



Covenant of Mayors in Sub-Saharan Africa

Finance Roadmaps for Climate Projects

*How can local governments in Sub-Saharan Africa
facilitate access to finance?*



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Acronyms and Abbreviations

Terms marked with asterisks (*) are included in the Glossary of Terms

3R	Reduce, Reuse and Recycle
ADRF	Africa Disaster Risk Financing Initiative
AFD	<i>Agence Française de Développement</i> (French development bank)
AfDB	African Development Bank
AFR100	African Restoration Initiative
AGF	African Guarantee Fund
ATI	African Trade and Insurance Agency
BOOT*	Build, Operate, Own, and Transfer (BOOT) contract
CAPEX*	Capital Expenditures
CBEA	CrossBoundary Energy Access
CFLs	Compact fluorescent lamps
CFO	Chief Financial Officer
CIL*	Community Infrastructure Levies
CoM SSA	Covenant of Mayors in Sub-Saharan Africa
CoCT	City of Cape Town
COD	Commercial Operation Date
COP21	2015 United Nations Climate Change Conference
DBSA	Development Bank of Southern Africa
DFI	Development Finance Institution
DRR	Disaster Risk Reduction
EC	European Commission
ECBC	Energy Conservation Building Code
EESL	Energy Efficiency Services Limited
EIB	European Investment Bank
ElectriFI	Electrification Financing Initiative (a multi-donor initiative)
EPC*	Engineering Procurement Construction
ERU*	Equivalent Residential Unit system
ESCOs*	Energy Services Companies
ESIA*	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Programme (World Bank program)
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FEI	Facility for Energy Inclusion

FRM	Flood Risk Management
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG*	Greenhouse Gas
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH</i> (German development agency)
GMGs	Green Mini-Grids
GSI	Green Stormwater Infrastructure
GVE	Green Village Electricity Project
HCMC	Ho Chi Minh City
HVAC	Heating, ventilation, and air-conditioning systems
I&CCS	Improved & Clean Cooking Stoves
IDA	International Development Association (part of the World Bank Group)
EEIE	Institute of Electrical Electronic Engineers
IFC	International Finance Corporation (part of the World Bank Group)
IPP	Independent Power Producer
IRR	Internal Rate of Return
IRCC	Integrated Resource Recovery Centre
IWM	Integrated Waste Management
JV	Joint Venture
KfW	<i>Kreditanstalt für Wiederaufbau</i> (German development bank)
LCOE	Levelised Cost of Electricity
LED	Light emitting diodes
LEP*	Local Enterprise Partnership
LGs*	Local Governments (cities, towns, districts, villages, counties, provinces, and states)
LGIP*	Local Government Investment Pool
LID	Low Impact Development
LVC*	Land Value Capture
M&E	Monitoring & Evaluation
MIGA	Multilateral Investment Guarantee Agency (part of the World Bank Group)
MSMEs	Micro, Small, and Medium-Sized Enterprises
MV	Mercury vapor
NAMA	Nationally Appropriate Mitigation Actions

NAPs	National Adaption Plans
NAPAs	National Adaptation Plans of Action
NDC*	Nationally Defined Contributions
NFFs	National Forest Funds
NGO	Non-Governmental Organisation
NGs	National Governments
NRECA	National Rural Electric Cooperative Association
ODA	Official Development Assistance
OGEF	Off-Grid Energy Access Fund
O&M*	Operations & Maintenance
OPEX*	Operating Expenses
PAYG*	Pay-As-You-Go
PPA*	Power Purchase Agreement
PPP*	Public Private Partnership
PSP	Private Sector Provider
PV*	Photovoltaic
REA	Renewable Energy Agency
REIPPP	Renewable Energy Independent Power Producer Procurement Programme (South Africa)
SE4ALL	Sustainable Energy for All
SFDRR	Sendai Framework for Disaster Risk Reduction
SEFA	Sustainable Energy Fund for Africa
SHS*	Solar Home Systems
SLAs*	Service Level Agreements
SMEs	Small and Medium-Sized Enterprises
SPV*	Special Purpose Vehicle
SSA	Sub-Saharan Africa
SREP	Scaling Up Renewable Energy Programme
SWHs*	Solar Water Heaters
TA	Technical Assistance
ToRs	Terms of Reference
TLUD*	Top-loading updraft
UHI	Urban Heat Island effect
UNAF	United Nations Adaption Fonds

UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN Habitat	United Nations Human Settlements Programme
UNIDO	United Nations Industrial Development Organisation
USADF	United States African Development Foundation
USAID	United States Agency for International Development
USMID	Uganda Support to Municipal Infrastructure Development Programme Project
USTDA	United States Trade and Development Agency
WBREDA	West Bengal Renewable Energy Development Agency
WRI	World Resource Institute
WtE	Waste-to-Energy
WWT	Wastewater Treatment
WWT&R	Wastewater Treatment and Reuse

Unit Measurements

km	Kilometer [1 km = 0,621371 mi (miles)]
kg	Kilogram [1 kg = 2.2046226218 lbs (pounds)]
MT	Million tons [1 million tons = 2,000,000,000 lbs]
KW	Kilowatt
Kwh	Kilowatt hour
kWp	Kilowatt peak power (maximum electronic power rating)
Gwh	Gigawatt hour
MW	Megawatts
MWh	Megawatt-hour
tCO₂e	Tons of carbon dioxide equivalent

Currency Abbreviations

EUR	Euro
US\$	United States Dollar
R or ZAR	South African Rand
Rs	Indian Rupee

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Overview

1 Study Objective

Local Governments (LGs) located in Sub-Saharan Africa (SSA) are faced with the daunting challenge of managing the highest urban growth rate in the world, while simultaneously confronting the highest levels of climate change with devastating impacts cutting across local communities, the economy, and political stability. This study is aimed at providing LGs located in SSA with practical roadmaps of specific action steps that they can proactively undertake to facilitate the urgent identification, development, finance, and implementation of Climate Projects for their constituencies.

This study has been produced by the *Covenant of Mayors in Sub-Saharan Africa (CoM SSA)* with the

objective of empowering LGs to accelerate Climate Projects at the local level. For the purposes of this document, a **Climate Project** is defined as a focussed intervention that targets climate change mitigation or an adaptation or has climate mitigation and adaptation as a co-benefit. Given the urgency of developing effective climate solutions, this study is intended to be a living dynamic support document, updated over time with lessons learned. Training modules are also available for the use of LGs and their partners.¹ The approaches outlined in this study are indicative and may not be feasible or appropriate for the wide range of different contexts and projects across the SSA region.

Study Organisation:

- This chapter provides an overview of the financing roadmap for LGs, with an introduction to key concepts and projects for LGs. The chapter summarises the overall benefits and challenges of Climate Projects, outlining the financing roadmap throughout the project lifecycle from project identification to project development, finance, and operation.
- The following ten chapters define financing roadmaps for specific types of Climate Projects, highlighting the possible proactive roles that LGs can undertake at each stage of the project lifecycle to advance Climate Projects for their constituencies.
- Financing Roadmaps are provided for ten specified types of Climate Projects: Waste-water Treatment & Reuse, Integrated Waste Management, Waste-to-Energy, Solar Projects (including Rooftop PV and Heaters), Solar Mini-Grids, Public Street Lighting Efficiencies and Expansion, Building Efficiency, Flood Risk Management, Planting Trees & Forestation, and Improved & Clean Cooking Stoves.

Each of the 10 types of Climate Projects are defined in Table 0.1 below.

¹ The study is complemented by an advisory support team and six training modules designed to be implemented in interactive workshops yielding leading-edge instructive insights and innovative solutions.

Table 0.1: Definitions of 10 Types of Climate Projects

Types of Climate Projects	Definitions
● Wastewater Treatment & Reuse (WWT&R)	The primary function of WWT&R facilities is to treat and purify wastewater for reuse by industrial, agricultural, and domestic users. Agricultural irrigation is the most common water reuse approach, followed by industrial applications such as water cooling.
● Integrated Waste Management (IWM)	Integrated waste management involves the effective combinations of several waste management approaches: Reduce, reuse, and recycle (3R) as the three essential components of environmentally-responsible consumer behavior, optimised collection, recycling, the development of formal landfill sites, anaerobic digestion, and the valorisation of organic/food waste.
● Waste-to-Energy (WtE)	WtE processes generally make use of either anaerobic digestion (AD) or incineration processes to convert waste to electricity, biogas, and other by-products.
● Solar Projects (rooftop PV and heaters)	Solar interventions that include rooftop photovoltaic (PV) panels and solar water heaters (SWHs). While both PV panels and SWHs work by absorbing sunlight, PV panels convert sunlight into electricity, and SWHs convert sunlight into heat that is used to produce hot water.
● Solar Mini-Grids	A solar mini-grid is an on or off-grid small-scale solution to power production. It is a localised production and distribution network that offers a hybrid solution to those cities and communities that are “beyond” planned extension of the national grid by national utilities.
● Public Street Lighting Efficiencies & Expansion	Public Street Lighting Efficiency Projects require LGs to replace or “retrofit” existing public lighting infrastructure with energy efficient lamps and fixtures, and automatic controls to optimise performance and energy use. Public Street Lighting Expansion Projects require LGs to make use of more efficient technologies when expanding public lighting services.
● Building Efficiencies	Building Efficiency Projects focus on the retrofitting of existing buildings and the energy-efficient design and construction of new buildings. Retrofit projects generally include interventions such as the installation of efficient heating, ventilation, and air-conditioning (HVAC) systems; the replacement of electric heaters with gas or solar water heaters; the installation of energy-efficient lighting; and the use of building materials with less embodied energy.

Table 0.1: Definitions of 10 Types of Climate Projects

continued

Types of Climate Projects	Definitions
• Tree Planting & Forestation	Tree planting refers to planting trees in urban areas and the term forestation to include both reforestation and afforestation initiatives in rural areas that are in the jurisdiction of LGs, excluding large commercial ventures.
• Flood Risk Management (FRM)	FRM is a component of Disaster Risk Reduction (DRR). The United Nations <i>International Strategy for Disaster Risk Reduction</i> defines disaster risk as “the potential disaster losses, in lives, health status, livelihoods, assets, and services, which could occur to a particular community or a society over some specified future time period.”² FRM has been established as a well-defined procedure for handling risks due to natural, environmental, or man-made hazards, of which floods are representative. Risk management takes place on three different levels of actions: the operational level (which is associated with operating an existing system), a project planning level (which is used when a new or revised existing project is planned), and a project design level (which is embedded into the second design stage aimed at reaching an optimal solution for the project).
• Improved & Clean Cooking Stoves (I&CCS)	A wide range of I&CCS exists that offer enhanced fuel efficiency and emissions performance. These projects seek to increase the adoption of both clean and improved cooking stoves at the local level.

Approach: For ease of use, each of the 10 Chapters on types of Climate Projects serves as a stand-alone document following a standard format. The first section of each chapter defines the type of Climate Project, and then presents benefits and challenges, possible LG actions to develop the project, alternative financing

models (citing advantages and disadvantages), a short-hand project typology tool to assess possible financing sources and models, and examples of specific projects from SSA and worldwide, concluding with enabling factors that LGs and National Governments (NGs) can adopt to unlock access to finance.

2 “2009 UNISAR Terminology on Disaster Risk Reduction,” United Nations International Strategy for Disaster Reduction (UNISDR), 2009. See: https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

1.1 Overview of Benefits and Challenges of Climate Projects

Climate Projects can result in transformative benefits for LGs and their citizens, ranging from improved social services and living conditions to budget savings, new sources of revenues and economic growth, job creation, and other development impacts. Moreover, Climate Projects can provide opportunities for developing new economic sectors at the local level and increase LG fiscal income.

However, specific challenges need to be identified and addressed through a wide range of proactive LG action steps engaging diverse stakeholders across the economic and political ecosystem of Climate Projects including local actors, the NG, the private sector, and development partners.

1.1.1 Benefits of Climate Projects

The overall benefits of LGs proactively undertaking Climate Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change impacts, such as decreasing Greenhouse Gas (GHG) emissions, reducing heat waves, avoiding the destruction of crops, reducing the impact of droughts and floods, and attaining overall environmental benefits from reductions in air, soil and water pollution;
- **Development Benefits:** Improve public health and living standards, increase food security, stimulate higher rates of economic growth and job creation, and increase the competitiveness of Micro, Small, and Medium-Sized Enterprises (MSMEs); and
- **Local Government Economic Benefits:** Create savings in existing LG budgets (e.g., more efficient services, less damage from climate impacts, etc.), additional indirect income (e.g., secondary income related to increased economic activity), and direct income from services (e.g., specific income from Climate Projects such as fees from water & sanitation, waste products, energy, agricultural products, etc.).³

The potential benefits for the 10 types of Climate Projects in this study are summarised in Table 0.2 below.

³ In some cases LGs can receive direct income from Climate Projects, for example from the revenues related to the project operation (e.g., waste products, user charges, dividend shareholder payments, etc.). Most Climate Projects can increase indirect income to LGs, as the economic impact from the project can increase LG fiscal income from greater tax payments from people with new jobs, higher land values, increased sales of Micro, Small, and Medium-Sized Enterprises (MSMEs), etc.

Table 0.2: Summary of Potential Benefits Resulting from Climate Action Projects

Types of Climate Projects	Climate and Environmental Benefits	Development Benefits	LG Economic Benefits
Wastewater Treatment & Reuse (WWR&R)	Reduce GHG emissions, produce biogas/bio-briquettes that replace dirtier fuels, reduce pollutants discharged into rivers/ground-water, reduce the need for chemical fertilizers	Waste reduction, improvement of public health and environment, increase availability of safe drinking water, reduce water bills, provide nutrient benefits for irrigation, produce electricity to improve energy security, produce heat for industrial purposes, create local jobs	Generate revenues from outputs (e.g., wastewater collection, fertilizer production, selling of treated water for irrigation, energy production), create budget savings (wastewater treatment, disposal), reduce pressure on LG main water supply, improve water scarcity, reduce health services costs, create job opportunities (e.g. through maintenance services), reduce costs from underperforming infrastructure
Integrated Waste Management (IWM)	Reduce GHG emissions, biogas produced can replace dirtier fuels, reduce pollutants discharged into soil and air, avoid the need for waste burning, mitigate emissions of short-lived climate pollutants (SLCPs) that have a warming influence on the climate, including methane from landfills and black carbon from open burning	Reduce waste, improve public health and environment, reduce and avoid contamination (air, soil, water), generate electricity to drive economic growth, delay capital expenditure, create local jobs	Generate revenues from outputs (e.g., recyclables, compost / fertilizer, electricity, biogas), achieve operational savings due to reduced land-filling and transport of waste, create job opportunities

Source: The 10 Climate Action Chapters in this Study

Table 0.2: Summary of Potential Benefits Resulting from Climate Action Projects

continued

Types of Climate Projects	Climate and Environmental Benefits	Development Benefits	LG Economic Benefits
Waste-to-Energy (WtE)	Reduce GHG emissions (methane reduction at landfill sites and CO ₂ from transportation), produce biogas to replace dirtier fuels, eliminate waste burning practices	Generate electricity to drive economic growth, improve access of social services to electricity, free up land for development, delay capital expenditures, create local jobs	Generate revenues from outputs (e.g., electricity, biogas), achieve operational savings due to reduced landfilling and transport of waste
Solar Projects (Rooftop PV and Heaters)	Reduce GHG emissions, conserving natural resources, improve air quality, reduce water consumption, reduce fossil fuel consumption	Improve security of supply, reduce burden on existing electricity distribution infrastructure, reduce transmission losses, stimulate economic growth, create local jobs	Lower energy consumption, lower fossil fuel consumption, reduce operation and maintenance costs; free up budgets for the delivery of public services, create job opportunities (e.g. maintenance/cleaning of panels)
Solar Mini-Grids	Reduce GHG emissions, replace fossil fuels, replace thermal and coal-fired power generation	Provide power to underserved communities, achieve a more reliable electricity supply, enhance quality of life by enabling access to electrical appliances, create jobs (local SME development and industrialisation), reduce dependency on fuel imports	Achieve significant secondary economic impacts through improved and more reliable public services, growth of local businesses, local job creation, increased tax revenues
Public Street Lighting Efficiencies & Expansion	Reduce GHG emissions, reduce fossil fuel consumption	Increase economic and social activity after sunset that may create jobs and additional taxes, improved visibility reduces traffic accidents & lowers crime rates, create local jobs	Reduce LG energy consumption, operation, and maintenance costs, freeing up budgets for expansion of public lighting networks

Source: The 10 Climate Action Chapters in this Study

Table 0.2: Summary of Potential Benefits Resulting from Climate Action Projects

continued

Types of Climate Projects	Climate and Environmental Benefits	Development Benefits	LG Economic Benefits
• Building Efficiencies	Reduce GHG emissions and fossil fuels consumption for HVAC systems	Improve indoor air quality resulting in health and productivity benefits, create local jobs	Reduce LG energy consumption, operation & maintenance costs; delay spend on infrastructure
• Tree Planting & Forestation	Improve microclimate, air quality, absorb carbon dioxide from the environment, release oxygen, improve water retention abilities (flood prevention), improve soil health and biodiversity, control soil erosion, mitigate CO ₂ emissions, provide sustainable products (timber, fibre, fuel)	Improve health of citizens, reduce pollution and heat waves, create recreational opportunities, reverse land degradation and rehabilitate degraded land, create local jobs	Achieve savings for LGs for healthcare services resulting from the potential reduction of respiratory diseases related to air pollution, create local jobs, attain benefits related to environmental protection
• Flood Risk Management (FRM)	Reduce flood risks and catastrophic damage to environment, promote beneficial effects of flooding	Protect lives, minimise losses of assets, avert financial losses, prevent water-borne diseases, prevent/reduce soil and water contamination, improve food security (including farmed and wild food land and water-based), improve water security (dams, etc.), improve energy security (hydro-power, large and small scale), secure development gains, create local jobs	Protect LG from asset losses affecting constituencies, income, budgets, create job opportunities, create water and energy security

Source: The 10 Climate Action Chapters in this Study

Table 0.2: Summary of Potential Benefits Resulting from Climate Action Projects

continued

Types of Climate Projects	Climate and Environmental Benefits	Development Benefits	LG Economic Benefits
Improved and Clean Cooking Stoves (I&CCS)	Reduce black carbon and GHG emissions	Decrease disease associated with household air pollution, provide efficient and sustainable energy for cooking, minimise forest degradation & deforestation, stimulate manufacturing sector, create local jobs, contribute to improving gender equality, help LGs to meet their developmental targets as women and children are likely to be the main beneficiaries of clean cooking stove interventions	Achieve a more productive workforce, reduce healthcare services costs, grow LG tax revenues

Source: The 10 Climate Action Chapters in this Study

As illustrated in the above table, benefits from Climate Projects include improved health, living and environmental conditions, increased land values, and greater local employment, as well as LG budget savings and additional LG income (e.g., project revenues, new fees, and taxes, payroll taxes, land taxes, etc.).

Direct and Indirect Income Benefits – Short Term & Long Term

Moreover, LGs may benefit over the long term from Climate Projects owned by the LG or its utilities that generate direct project income for providing services, such as waste management. In some cases, these revenue streams can eventually become profitable.

Examples of successful LG utilities that have generated very significant revenues over the longer term include Sabesp (water company 50.3% owned by the State of São Paulo, Brazil) and Empresas Públicas de Medellín (a 100% owned municipal enterprise Medellín, Colombia operating in the water, sewerage, electricity, and gas sectors).⁴

In addition to **direct** income, it is important to recognise that LGs can also potentially benefit from **indirect** income resulting from Climate Projects, such as land sales and rentals, fees, and taxes. Examples of potential LG direct and indirect income from Climate Projects are provided in Table 0.3 below.

⁴ Sabesp is a mixed capital company (50.3% owned by the state of São Paulo, Brazil) responsible for supplying water and collecting and treating sewage in the 372 municipalities of São Paulo state, providing 28 million people with water and sewage collection services to 24 million people. Empresas Públicas de Medellín E.S.P. (EPM) is a public company located in the city of Medellín, Colombia, 100% owned by the Municipality of Medellín. It was founded in 1955 as an independent public institution and transformed into an Industrial and Commercial State Company.

Table 0.3: Examples of Potential Direct and Indirect Income for Local Governments from Climate Projects

Types of Climate Projects	LG Direct Income & Operational Savings from Climate Projects	LG Indirect Income from Impact of Climate Projects
Wastewater Treatment & Reuse (WWT&R)	Income from the sale of outputs (e.g., fertilizer, treated water, biogas, bio-briquettes, etc.); operational savings from reduced costs of wastewater treatment and disposal	Taxes and fees from increased employment, household income, business income, property values
Integrated Waste Management (IWM)	Income from the sale of outputs (e.g., recyclables, fertilizer, electricity, biogas, etc.); operational savings due to reduced landfilling and transport of waste	Taxes and fees from increased employment, household income, business income, property values
Waste-to-Energy (WtE)	Income from the sale of outputs (e.g., biogas, electricity, etc.); operational savings due to reduced landfilling and transport of waste	Taxes and fees from increased employment, household income, business income, property values
Solar Projects (Rooftop PV)	Income from electricity and other operational savings; delayed expenditure on new distribution infrastructure	Taxes and fees from increased employment, household income, business income, property values
Solar Mini-Grids	Income from land sales and rental fees, user tariffs (if project sponsor or shareholder)	Taxes and fees from increased employment, household income, business income, property values
Public Street Lighting Efficiencies & Expansion	Savings from electricity and other operational efficiencies; delayed or avoided expenditure on new distribution infrastructure	Taxes and fees from extended trading hours; taxes and fees from increased employment, household income, business income, property values
Building Efficiencies	Savings from electricity and other operational efficiencies	Green buildings can achieve productivity gains for an LG as a result of less sick time taken by LG staff and greater worker productivity ⁵

Source: The 10 Climate Action Chapters in this Study

5 For examples, see: https://www.researchgate.net/publication/285165888_Green_buildings_and_productivity

Table 0.3: Examples of Potential Direct and Indirect Income for Local Governments from Climate Projects

continued

Climate Action	LG Direct Income from Project Operations	LG Indirect Income from Impact & Related Activities
● Tree Planting & Forestation	Taxes, fees and income from the sale of plants and other forest products; fees related to leases, concessions and felling permits	License fees for harvesting wood products and hunting; license fees from ecotourism operators; license fees for the transporting, processing and marketing of wood
● Flood Risk Management (FRM)	Drain maintenance fees, storm water utility fees, other related taxes directly related to FRM, income from land value capture	Mandatory payments from property developers (e.g., Community Infrastructure Levies)
● Improved & Clean Cooking Stoves (I&CCS)	Operational savings if sludge is sold to bio-briquette manufacturers, revenue from the sale of LG produced bio-briquettes	LG savings due to reduced health-care spending

Source: The 10 Climate Action Chapters in this Study

As illustrated from the above table, Climate Projects can generate direct and income for LGs, in addition to significant developmental and economic benefits critical for LG constituencies.

As evidenced by the extensive list of benefits, Climate Projects provide significant benefits to a Local Government and its constituencies encompassing climate resiliency, development impact, and economic improvements for citizens and their Local Governments.

Details on the benefits of each of the 10 specific types of Climate Projects are provided in the attached chapters.

1.1.2 Challenges for Local Governments

Given SSA's extremely high population growth, rapid urbanisation rates, and vulnerability to climate change, it is imperative to define roadmaps that enable LGs to take leadership roles in pragmatically facilitating the identification, development, and implementation of Climate Projects across the region.

The challenges associated with expanding urban populations in Africa cannot be overstated: SSA's urban population growth rate is 4% a year, double the world's annual growth rate of 2%. Currently, urban areas in SSA contain 472 million people. The global share of African urban residents is projected to almost double

from 11% in 2010 to 20% by 2050, as urban areas are expecting to double over the next 25 years. The result is that an estimated one billion people will live in SSA cities by 2050.⁶

Against this need to plan for ballooning urban populations, LGs in SSA face three broad categories of challenges in facilitating Climate Projects for their jurisdictions:

- 1 How can LGs navigate the inherent complexity of Climate Projects themselves, prioritising the projects best suited for the specific needs of their citizens and economy?
- 2 How can LGs build partnerships with key actors in delivering on Climate Projects?
- 3 How can LGs compensate for their contextual limitations related to finance and expertise?

The nature of these three categories of challenges is explained below.

The Inherent Challenges of Climate Projects

While the benefits of Climate Projects are compelling, the nature of Climate Projects themselves present inherent challenges:

- **The range of technology solutions employed for Climate Projects is vast and highly complex, requiring reliable and experienced assessments relative to the specific conditions and needs at the local level.** For example, energy solutions for a LG jurisdiction will depend on the needs of the local economy as well as the national framework and long-term plans for energy generation and transmission.
- **Securing finance for the development and construction of Climate Projects is often difficult, as many projects do not generate sufficient revenue to achieve “bankability.”** Funding for the great majority of Climate Projects is not available from public budgets but most projects are unable to meet the investment criteria of private investors. Therefore, most Climate Projects cannot secure the funds required for project development and construction. For example, waste solutions often require a significant level of grant funding for the development and construction of the actual projects.
- **Many Climate Projects do not generate enough income to maintain their operation, so additional funding is required for financial sustainability.** For example, the World Bank reports that waste management in developing countries is very costly, often comprising 20 – 50% of municipal budgets.⁷ In such cases, municipalities need to establish adequate solutions that enable them to tap into other funding (e.g., local taxes) to maintain the operation of waste services. Moreover if today local taxes are already covering the existing costs of waste management, long-term prospects are bleak given small LG tax bases, low rates of tax collection, and the inability of the majority of the residents to pay taxes.
- **The local community may not be supportive or aware of the importance of Climate Projects, and need to be convinced of their importance and of any required changes in their own behaviour.** For example, flooding may be a risk for citizens and businesses, but there may not be support for increasing local taxes to pay for the needed additional drains and flood prevention measures.

6 For details, see: “State of the World’s Cities: Trends in Sub-Saharan Africa,” UN Habitat Features; “African cities will double in population by 2050. Here are 4 ways to make sure they thrive,” World Economic Forum, 2018; Jamal Saghir, “Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders,” Center for Strategic and International Studies, 2018.

7 “Solid Waste Management,” World Bank article, September 23, 2019; Available at: <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>

- **The lack of capacity in LGs and the lack of knowledge of new technologies and financial instruments can seriously handicap the effective development and implementation of their Climate Projects.** The need for LG support is especially critical for Climate Projects, given the inherent difficulty of identifying and accessing the wide range of climate-smart emerging technologies and approaches.
- **The ability to develop viable successful financing proposals for Climate Projects is limited by LG lack of technical capacity and ability to secure credible project developers.** LGs need support for project development at all stages – from project identification to early project concept, technical studies, financial structuring, and operation.

Moreover, financing sources for Climate Projects are diverse, with the largest financing sources being **private sector developers** and **national governments**. A recent study of global finance for 2017 and 2018 stated:⁸

- The private sector provided 56% of global climate finance, US\$579 billion (annual average of flows in 2017 and 2018): Corporate actors (including project developers) provided the greatest share of total global finance (32%) followed by commercial financial institutions (13%) and households (9%).
- The public sector provided 44% of global climate finance: National financial institutions provided the greatest share of total global finance (23%), followed by multilateral and bilateral financial institutions (16%). International climate funds (e.g., Green Climate Fund, GEF, etc.)⁹ provided less than 1%.

As demonstrated by this analysis, if LGs want to proactively advance Climate Projects, they need to engage the actors who can be activated to identify, develop, finance, and operate Climate Projects and conduct public campaigns to ensure support and compliance from the local communities.

1.2 The Climate Ecosystem: How can LGs Build Partnerships with Key Actors Driving Climate Projects?

To advance Climate Projects for their constituencies, LGs need to understand climate ecosystems and engage the key actors and stakeholders shaping their identification, development, implementation, and operation.

1.2.1 Key Actors Driving Climate Projects

The climate ecosystem is extremely broad, involving designated NG entities, development partners (including international climate funds), the private sector (project developers, providers of finance and risk mitigation), local community organisations,

associations, and Non-Governmental Organisations (NGOs). In cases where fees are charged, finance can also be provided by users, including upfront payments from households and business.

⁸ Barbara Buchner et al., “Global Landscape of Climate Finance 2019,” Climate Policy Initiative, 2019.

⁹ Selected climate finance sources are presented in [Annex](#).

To illustrate, examples of key actors and their roles in Sub-Saharan Africa are provided for each of the 10 types of Climate Projects in Table 0.4 below.

Table 0.4: Examples of Key Actors in the Sub-Saharan Africa Climate Ecosystem and their Roles

Key Actors	Potential Roles				Examples of Projects & Roles of Key Actors
	Project Owner	Project Manager	Technical Assistance +/or Finance for Project	Project Operation	
Local Governments	X	X	X	X	Waste Water Treatment & Reuse: In Ghana, Ashaiman Municipal Assembly (ASHMA) entered into an 18-year PPP agreement with SAFI SANA Ghana Limited (SSGL). Solar Rooftop: As of 2017, the City of Cape Town has installed 247 kW of solar rooftop generation capacity at seven municipal buildings and facilities. Solar Mini-Grids: In Cameroon, the private sector PRIVADA Project is working with LGs transferring ownership to the local councils over a 25 to 30 year period; Kenya's national government set up an off-grid unit that works with LGs to diagnosis needs and contribute land for solar mini-grids.
Local Community Organisations	X	X	X	X	Tree Planting: Kenya's local organisation, Green Belt Movement, planted 51 million trees. Integrated Waste Management: The first recycling centre in the city of Ouagadougou, Burkina Faso was set up with support of the Italian NGO LVIA. The centre provides jobs to an association of women that runs the centre. Clean & Improved Cooking Stoves: EnDev Kenya helped develop the cookstove market in Kenya through activities that span the I&CCS supply chain (e.g., production, marketing, installation, etc.).
National Governments	X	X	X	X	Integrated Waste Management: South Africa's Municipal Waste Diversion Programme was developed by the Department of Environmental Affairs in partnership with GlZ to unlock funding for waste diversion interventions at 30 to 40 municipal landfill sites. Renewable Energy: South Africa's national renewable energy programme REIPPP has mobilised US\$15 billion for projects; JIRAMA, Madagascar's vertically integrated state-owned utility, and the National Electrification Agency own and operate 130 isolated mini-grids. Tree Planting: Burkina Faso's national government decentralised the forest management system with local organisations, collecting fees from merchants who pay into forest and village development funds.

Source: The 10 Chapters in this Study

Table 0.4: Examples of Key Actors in the Sub-Saharan Africa Climate Ecosystem and their Roles

continued

Key Actors	Potential Roles				Examples of Projects & Roles of Key Actors
	Project Owner	Project Manager	Technical Assistance +/or Finance for Project	Project Operation	
Local Businesses	X	X	X	X	Waste: A local businessman in Uganda developed the Aquila recycling plant, sorting plastic that is exported to India.
Project Developers	X	X	X	X	Wastewater Treatment and Reuse: The project developer Veolia provided equity equal to 20% of the project cost for South Africa's eThekweni municipality. Solar Mini Grids: Private sector developers provide the bulk of project development costs.
Providers of Services and Equipment	X	X	X	X	Waste Water Treatment and Reuse: Windhoek's Goreangab WWT&R plant is operated and maintained by a privately-owned company under a Service Level Agreement.
Technical Experts		X	X	X	All projects require technology, finance, and other experts to provide specialised services in project identification, development, and operation.
Households			X		Solar Rooftop: M-Kopa sells solar home systems on a mobile money payment plan in Kenya, Uganda, and Tanzania. Customers pay an initial US\$35 deposit, followed by 365 payments of 45 cents. To date M-Kopa has sold over 750,000 off-grid solar systems unlocking US\$233 million in financing for households.
Commercial Banks & Impact Investors			X		Waste Water Treatment & Reuse: The Development Bank of Southern Africa provided a loan to a South African project covering 47% of the project's costs, with a further 33% funded via a commercial loan. Waste-to-Energy: A private sector company Sistema Bio received US\$ 12 million of investment from impact investors to roll out biodigesters to smallholder farmers in Burkina Faso. NOTE: Commercial finance is limited to financially viable projects with limited risk and proven technologies
International Climate Funds & Development Partners			X		Public Street Lighting: The city of Jinja in Uganda accessed UGX 2 billion (US\$531,000) in loans from the USMID World Bank Programme and grants from national government to upgrade the city's road network and street lighting. Building Efficiency: The Nairobi City Council is working with the Green Africa Foundation, UNEP, and UN-Habitat to develop green building codes. NOTE: Climate Fund Finance is usually limited to high-impact climate projects approved by national governments.

Source: The 10 Chapters in this Study

As illustrated in the examples above, the ecosystem of Climate Project implementation in SSA is characterised by a diverse mix of implementation strategies, with various key actors each providing a range of contributions in multiple configurations across projects and countries.

Key partners range from local community organisations to designated national government (NG) programmes and international climate funds as well as the private sector providing specialised technical and financial expertise, project developers, providers of finance, and operational service support.

Scaling up Climate Projects in Sub-Saharan Africa requires LGs to serve as “Proactive Facilitators” and “Project Champions” identifying and engaging key actors across the ecosystem to deliver Climate Projects for their constituencies.

1.2.2 Local Government Actions to Activate the Climate Ecosystem

While the implementation of Climate Projects is critical to the well-being of their constituencies, LGs face many constraints in developing and implementing specific Climate Projects:

- 1 LGs usually lack the significant financial resources required to identify, develop, and finance Climate Projects.
- 2 A Climate Project usually requires the engagement of one or more specialised experts to undertake a preliminary diagnostic of the LG’s needs and possible solutions, covering technical options and financing sources.
- 3 LGs may not be mandated to implement the Climate Project under their national legal, regulatory, and policy frameworks, thereby facing restrictions affecting finance and their roles.

Given these constraints, LGs need to identify “Levers for Facilitation” to engage key actors that can help deliver Climate Projects: What are the specific actions that LGs can undertake to effectively address each constraint and advance Climate Projects?

Common constraints restricting LGs and potential facilitation actions are summarised in Table 0.5 below.

Table 0.5: Local Governments as Project Champions – Facilitation Actions to Address Constraints

Common LG Constraints	Potential LG Facilitation Actions
1. LGs often lack funds for project identification and development	Identify possible financing models and sources of funding from across the public and private sectors: • Identify initial amounts of funding from LG budget that could be utilised to assess options (e.g., future budget savings, potential direct and indirect LG income, developmental benefits, etc.) • Identify possible support (technical, funding) from existing national budgets & programmes, international climate funds • Assess the potential for project to generate income streams • Identify potential private sector actors that could potentially provide expertise, development & operational support, finance (equity, debt)
2. LG often lack funds for project operation and maintenance	Identify sources of finance to operate and maintain Climate Projects (e.g., costs of staff, operations, finance, etc.) • Identify possible direct income from user fees and indirect funds from related activities • Identify the level of potential support from the LG and NG • Identify potential private sector funding sources
3. LGs usually lack expertise related to the development of projects	Train finance and technical staff and engage external specialised experts: • Engage national and international technical assistance and funding programmes (provide capacity building support and experts, fund technical studies) • Engage private sector developers to provide experts and fund technical studies
4. LGs often lack the mandates to undertake projects and serve as “project owner”	Facilitate other actors (alone or in a coalition) to undertake the implementation of the Climate Project: • NG programmes and agencies • Private sector companies • Local community organisations & NGOs • International climate funds

Table 0.5: Local Governments as Project Champions – Facilitation Actions to Address Constraints

continued

Common LG Constraints	Potential LG Facilitation Actions
5. LGs need to ensure the success of projects, but in many cases have limited control (i.e., not able to serve as “project owner”)	Maximise the proactive leadership role of the LG as a “Project Champion” across the project development cycle and operation. Possible actions include: ● Assist in securing the specialised technical experts needed for project identification (e.g., credible demand & options analysis demonstrating project’s developmental impact and financial sustainability) ● Provide or arrange for land needed for site of Climate Project (if any) ● Secure support of local community; project developers; investors; providers of technical support, finance, equipment, services; etc. ● Secure needed approvals from NG agencies & programmes ● Endorse project to public and private providers of technical assistance, risk mitigation, and finance ● Implement local regulations and actions required for financial sustainability (such as collection of fees, achieve committed budget support from LG and NG, conduct effective community outreach meetings, etc.) ● Facilitate meetings and approvals between all stakeholders

The solutions to these challenges therefore require a new LG mindset and the LG’s adoption of new internal processes, partnerships, and financing models.

The overall potential role of LGs throughout the project development cycle is provided in Section 1.5. For details specific to each Climate Project, please see the attached chapters.

1.3 Required Shift in Local Government Mindsets & Processes for Delivering Climate Projects

As noted above, LGs can be essential to advancing Climate Projects as facilitators. Successful approaches across SSA, and developing countries provide invaluable insights, lessons learned, and best practices to guide optimal LG actions.

However, for LGs to be successful in spearheading and facilitating Climate Projects, they need to leverage lessons learned and best practices, adopting a new mindset and implementing new processes. Key success factors include the following changes in mindsets and processes:

- 1 Engage citizens and champion the political messages required to sell Climate Projects to LG staff and the community-at-large,** recognising that even if Climate Projects are outside of the LG's mandate, the LG can serve as a key facilitator and champion;
- 2 Designate a senior accountable LG official to lead a new proactive “Initiative on Climate Project,”** identifying benefits and potential ways for the LG to support projects (including possible budget allocations), engaging possible public and private sector actors for specific projects, and proposing specific ways to advance possible projects at regular senior management meetings;
- 3 Engage specialised experienced experts for each specific Climate Project,** tapping into new sources of support and expertise knowledgeable of the latest technologies and financing models; and
- 4 Leverage the project development and financial approaches that have proven successful** in other LGs in Africa and worldwide as set forth in this study.

Explanations of the financing models and approaches are provided in the next section, with details in the attached chapters on specific Climate Projects.

1.4 Overview of Financing Roadmap

LGs can undertake a proactive role in facilitating the identification, development, and finance of Climate Projects. This section provides a financing roadmap detailing early action steps LGs can undertake to advance Climate Projects.

1.4.1 Assess Revenue Requirements and Opportunities

A first step in assessing a Climate Project is understanding the potential to generate revenue and be self-financing through user charges (i.e. cost recovery through “cost-reflective tariffs and fees”). Some Climate Projects may directly generate revenues but usually in SSA, these revenues are not sufficient to recover all project-related costs in the project lifecycle from project identification to development, implementation, and operation.

LGs in SSA therefore need to understand the potential for revenues for each Climate Project to generate revenues relative to the costs of project development, implementation, and operation. The Table 0.6 below illustrates the approximate range of cost-recovery potential for the 10 Climate Projects compared with actual projects operating in SSA noted in this study.

Table 0.6: Illustration of Cost-Recovery Potential of Climate Projects Versus Sub-Saharan Africa Experience

Types of Climate Projects	Potential Level of Cost-Recovery Worldwide			Experience to date in Sub-Saharan Africa Projects
	Total	Partial*	None	
Wastewater Treatment & Reuse	X	X		Total/Partial
Integrated Waste Management	X	X		Partial only
Waste-to-Energy	X	X		Partial only
Solar Projects (Rooftop PV)	X	X		Total/Partial
Solar Mini-Grids	X	X		Partial only
Public Street Lighting Efficiencies & Expansion		X	X	Partial/None
Building Efficiencies	X	X		Total/Partial
Tree Planting & Forestation		X	X	Partial/None
Flood Risk Management		X	X	None
Improved & Clean Cooking Stoves	X	X		Total/Partial

Note: * The term “Partial” indicates that a project is unable to cover 100% of its capital expenditures (CAPEX) and operating expenses (OPEX). However, the project may be able to cover all its OPEX.

Sources: The ten chapters on the selected types of Climate Projects in this study using examples from Sub-Saharan Africa

The range of cost-recovery potential noted in the above table is a function of the conditions in the locality and the ability and willingness of households and businesses to contribute to the full cost of the Climate Project. The ability to spread the cost of the intervention through a financing mechanism such as a loan or a Public-Private Partnership (PPP) is key to enabling cost recovery over several years.

As common across developing countries for Climate Projects, the conditions in most SSA countries prohibit the collection of cost-reflective user fees due to the insufficient payment capacity of households and businesses. For example, integrated waste management

enterprises typically have multiple revenue streams as they offer a range of services: waste collection fees from households, commercial enterprises and institutions, and proceeds from the sale of recycled products, biogas, and compost. However, the efficiency of fee collection from households in Africa is reported as currently only around 50%, below the costs of primary waste collection and core operations.

Moreover, some Climate Projects such as Tree Planting and Flood Risk Management may require ongoing public support from inception to development and implementation through the operational period. Therefore, the experience of Climate Projects in SSA suggests the

requirement for substantial initial public sector support for project development and implementation, and in some cases, for the ongoing operation of the project.

The Project Development Funding Gap: Virtually all projects require upfront investments to cover the project development process (e.g., expert consultants, provision of expert technical studies like feasibility and legal support, etc.).

The need for public support is therefore critical to conduct the early stage and mid-late stages of project development, from inception to securing the partners willing to provide finance for implementation and operation.

LGs will need to factor the above realities into their financing approaches for Climate Projects, casting a broad net across potential sources from the public and private sectors at local, national, and international levels.

As evidenced across SSA, the most commonly required financing approach for Climate Projects is to secure a combination of finance, from 100% finance from several public sources to a mix of public and private sector financing sources (“blended finance”).

1.4.2 Identify Possible Funding Mechanisms and Contract Types

The LG will need to assess the implementation modality for the Climate Project based on a preliminary assessment of financing sources and capacity. A summary of funding options and contract types is provided below.

Public-Sector Funding Model

For an LG to employ a public sector funded model to finance a Climate Project, an assessment will need to be made of the LG’s own funding capacity to cover total costs:

- 1 Does the LG (or a related LG utility) have sufficient funding in its capital investment budget to cover the costs of the design and installation of the Project?
- 2 Does the LG (or a related LG utility) have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the NG, development partners, climate funds, or other sources?
- 3 Does the LG (or a related LG utility) have the ability based on national regulations, NG support, and/or its own credit standing to use its own balance sheet to borrow debt from commercial banks, Development Finance Institutions (DFIs), or other private sector institutions?
- 4 Does the LG have the capacity to manage the funds required for development and operation of the Project?

Private Sector Funding Model

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of an LG-owned utility) for raising debt or the ability to mobilise funds from the NG or development partners, it can also use private sector entities to contract debt (commercial and concessional debt).

However, the project will need to be structured to minimise risks for the private sector and its lenders. Key success factors that the LG will need to consider in assessing the ability to use a private sector funding model include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG or offtake agreements with third parties;
- Guaranteed minimum levels of inputs such as feedstocks for waste projects (if required for the project);
- A known and tested technological solution;
- Predictable development and operational costs not subject to unacceptable foreign exchange risk;
- A creditworthy LG that will pay the private sector in full and on time for services;
- Significant third-party revenues (such as electricity or biogas sales) under long term offtake agreements; and
- Capital expenditure costs that can be minimised by making use of LG land, other in-kind contributions, and/or grants to buy down the cost of equipment and services.

PPP Models

The World Bank defines a PPP as “a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.” As noted earlier, Climate Projects usually

require PPPs with a blended finance approach, mixing finance from public and private sector sources.

In these cases, a **Special Purpose Vehicle (SPV)** is normally set up to own a project that is delivered through a PPP. The project's debt is secured against the revenue and collateral of the project and the lender does not have recourse to the private sector sponsor. Both the private sector and public sector can potentially be shareholders in the SPV, depending on the public/private models selected. However, the private sector usually prefers a 100% privately owned model.

The most typical PPP model used by LGs is known as a **Build Operate and Transfer (BOT)** PPP. Under this model the asset is transferred back to the LG at the end of the contract period. The private sector typically takes responsibility under a BOT PPP for the design, finance, build and operation of the project. Depending on the ownership structure, the LG may also be required to raise its share of equity. Given that the asset ultimately reverts to the LG, it is often constructed on LG-owned land under a lease arrangement with the SPV.

Another approach is the **Design Build Operate (DBO)** PPP. In this case, the asset is not transferred back to LG as the private sector retains ownership of the asset at the end of the contract period. The private sector's responsibilities remain the same in terms of designing, financing, building and operating the asset. This model does not lend itself to using LG land given that the asset does not revert to LG.

In many cases a **concessionary PPP approach** is used. A concession gives a concessionaire the long-term right to use specified LG owned asset(s) and operate the asset(s) over the contract period. The concessionaire is also responsible for making specific investments over the contract period. Asset ownership remains with the LG and the LG is typically responsible for replacement of larger assets. Assets revert to the LG at the end of the concession period, including assets purchased by the concessionaire.

Pooled Approaches

The modular nature of Climate Projects (e.g., WWT&R, Building Efficiency, IWM, Public Street Lighting, etc.) can also provide the basis for pooled development funding as well as pooled financing facilities and pooled procurement.

- **Pooled Development Support:** Technical assistance can be pooled for a number of LGs in one project support facility. For example, Kenya's Water Sector Trust Fund has developed pooled technical resources that any LG can access to develop and procure wastewater treatment facilities. These include detailed designs for wastewater treatment plants with different capacities.
- **Pooled Finance Facilities:** Climate Projects can benefit from the economies of scale used in pooling finance. For example, South Africa's Department of Energy and GIZ developed a pooled LG programme in 2016 for Building Efficiencies to enable ESCOs to access affordable funding via a portfolio lender and develop capacity within municipalities. The programme makes use of a partial risk guarantee mechanism that reduces default and liquidity risk for the lender and the implementing ESCOs. The programme raised EUR40 million in funding commitments from the NAMA Facility and the South African Government in 2018 and is expected to be operational in early 2020.
- **Pooled Procurement:** By combining inputs to several Climate Projects, LGs can increase their bargaining power, reduce transaction costs, improve access to leading experts and technologies, and enhance delivery times. For example, South Africa's Department of Environment developed a programme that will pool funding from the Green Climate Fund (GCF) for waste diversion interventions at 30 municipalities in South Africa. The programme will also develop standardised procurement documents and designs for a number of alternative waste treatment technologies.

Contract Options

LGs must consider the full range of contracts needed to develop and operate Climate Projects, leveraging private sector expertise and capital:

- **Service Level Agreements (SLAs):** In some cases, the LG may contract a private sector company to deliver the service. This approach does not require the establishment of a separate legal entity. In some cases, the private company uses its own balance sheet to raise debt to fund the project.
- **Engineering Procurement Construction (EPC) contracts:** To construct complex infrastructure used by a Climate Project (such as Waste-to-Energy Projects), an EPC Contract between the LG and the contractor pays the contractor to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

The attached chapters provide examples of Climate Projects using these contractual modalities.

Other Public Sector Support

A blended finance model is often dependent on securing additional grant funding. In some cases, the LG and the private sector investors can mobilise grant funding from national and international programmes.

As noted earlier, national programmes provide the greatest level of public funding support to climate projects. Additional finance from national and international climate funds can sometimes be accessed by projects structured to maximise GHG emission savings.

For example, South Africa's Waste Diversion and Energy Efficiency in Public Building Programmes successfully accessed funding from two climate finance facilities (i.e., GCF¹⁰, NAMA Facility¹¹).

10 <https://www.greenclimate.fund/sites/default/files/document/ppf-application-waste-management-flagship-programme.pdf>

11 <https://www.nama-facility.org/projects/south-africa-energy-efficiency-in-public-buildings-and-infrastructure-programme-eeppip/>

1.4.3 Comparison of Different Financing Models

This section provides an overview of alternative generic financing models for Climate Projects:

- 1 Public Sector without Private Sector Service Provider
- 2 Public Sector with Private Sector Service Provider (Service Level Agreement – SLA)
- 3 Public Private Partnership (PPP)
- 4 Private Sector Company

The first option – Climate Projects operated totally by the public sector – is not employed broadly as the public sector often lacks the expertise and funding for project development and operation, especially in developing countries. However, if funding is available, the public sector can contract specialised and experienced private sector experts to develop and operate most Climate Projects, using SLAs (Service Level Agreements between a LG and a private sector provider for the delivery of services).

Alternatively, PPP and private sector models can be used provided there is a way to ensure acceptable

returns and risks to the providers of finance. As noted earlier, such approaches will require careful structuring of the project to ensure the securing of finance as well as the expected development impact.

The advantages and disadvantages of the four different funding models are summarised against key implementation criteria in Table 0.7 below, with advantages highlighted in green and disadvantages in red.

The attached chapters break out the advantages and disadvantages of different funding models for each of the 10 selected types of Climate Projects.

Table 0.7: Overview of Funding Models for Climate Projects

Criteria	Public Sector Company <i>without</i> Private Sector Service Provider	Public Sector Company <i>with</i> Private Sector Service Provider (SLA)	Public-Private Partnership (PPP)	100% Owned Private Company
Marketing skills	The public sector is unlikely to have the necessary skills to develop/grow a market for a Climate Project's outputs (e.g. organic fertilizer).	The private sector has the necessary skills and incentives to market the outputs (e.g. compost, biogas) and to develop the market if it does not exist already.		
Contract term for operation of facility	No contract required	Unless contract is long enough to recoup investment, the private sector will not make necessary investment.	Long term contract gives private sector incentives to grow the market.	Outright ownership of all rights to revenue and profit incentivises the private sector.

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services. Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

Table 0.7: Overview of Funding Models for Climate Projects

continued

Criteria	Public Sector Company without Private Sector Service Provider	Public Sector Company with Private Sector Service Provider (SLA)	Public-Private Partnership (PPP)	100% Owned Private Company
Access to finance	Reliant on grants from NG and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via programme as size of project may not justify direct application to international climate facility.			Will need to access climate finance via private sector facility.
Technology risk	Public sector is unlikely to have the necessary skills.	The private sector has the necessary skills and experience to manage and operate niche technologies such as anaerobic digestion, production of organic fertilizers, manufacturing of bio-briquettes, etc.		
Costs and time to implement	Lesser requirements in respect of financial and legal expertise normally make SLAs and public sector delivered solutions cheaper and faster to implement.		PPPs require technical, financial and legal expertise to develop. Unless large project or programme that pools project, development costs may not be justified.	Private sector is able to respond to opportunities quickly and to fund development costs.
Opportunities for pooling projects via programmes	EPCs, SLAs and PPPs could be procured and developed across a number of LGs or a number of sites within an LG.			Sometimes private companies can manage several projects in the same country and/or region.
Ability to mitigate construction risk	Engineering Procurement Construction (EPC) contracts can be used to reduce the risk of cost overruns and nonperforming technology.			

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages.

Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

1.5 Action Steps for Local Governments

The role of the LG will be determined by the specifics of the Climate Project, its location, size, technology, costs, and returns. This section outlines the full range of potential actions that LGs can undertake to advance the identification, development, and finance of Climate Projects.

To begin the process of analysis, the LG's financial and technical staff need to address key questions with the support of one or more qualified specialised experts if relevant (possibly using grant funding):

- What are the needs of the LG and what are the optimal technical solutions for the specific Climate Project?
- What is the priority of this project given projected costs and benefits, assessing the impact on the climate, citizen welfare, and business?
- What are the resulting technical options and costs?
- What funding is available for the project from LG budget own source revenues and from other sources (e.g., national government, development partners, private sector, etc.)?

To determine which contract type and funding model is most appropriate and affordable for a Climate Project, LGs will also need to identify any possible budget savings, the ability to access these budgets, and internal capacity to engage experts effectively. Specific early actions include:

- Understanding how much the LG spends annually on related activities that could be reallocated to the Climate Project;
- Investigating how these existing LG budgets could be reallocated to compensate the private sector for delivering an SLA or PPP; and
- Assessing LG project management capabilities to manage and monitor contracts effectively.

The resulting scoping of available resources and options assessment can provide a foundational basis for exploring possible funding mechanisms and contract types.

Once the basic approach has been identified, professional experts will potentially need to be contracted to

implement the required detailed technical approach and develop the project. If the LG lacks access to specialised experts, the LG may need to secure funding from external sources (e.g., NG, project preparation facilities, etc.) to provide experts and/or funding to engage experts.

Table 0.8 below summarises the main generic proactive action steps required to implement a Climate Project that could potentially be undertaken by LGs depending on the specific project, detailing tasks and outputs.

While not all Climate Projects will require LGs to undertake all the above steps, LGs need to understand the project development process and financing options to fulfil their role in the facilitation of Climate Projects. For details on the specific Climate Projects, please see the attached chapters.

As each LG needs to assess the potential sources of finance, the next section provides a tool to evaluate a project's suitability for public and private funds, including the project's potential for mobilising commercial finance.

Table 0.8: Roadmap of Potential LG Action Steps for Implementing Climate Projects

Potential Action Steps	Potential Tasks	Potential Outputs
1. Assess the benefits of Climate Projects & identify project options	• Engage an expert specialised in this Climate Project to assess the need for Climate Projects and benefits, identifying possible project approaches	• Statement of Benefits • Project Concept Note with rationale for suggested approach, detailing issues, additionality, and proposed next steps
2. Develop budget	• Analyse LG budgets to understand current spend on activities related to the Climate Project • Undertake a study/audit • If there are currently fees for a related service, assess whether existing fees are cost-reflective • Undertake a regulatory review to identify possible funding mechanisms and sources	• Budget available for Climate Project • Revised fees if required, or alternative funding source

Table 0.8: Roadmap of Potential LG Action Steps for Implementing Climate Projects

continued

Potential Action Steps	Potential Tasks	Potential Outputs
3. Assess options	- Engage technical and financial expert(s) to identify and cost technical solutions under different funding models - Assess affordability and benefits of each technical solution - Rank options based on affordability and other criteria	- Preferred option & indicative funding model - Funding gap
4. Engage funders	- Develop a concept note for LG CFO and other potential funders (national programmes, Project Preparation Facilities, DFIs, Climate Facilities, investors) - Present project to LG's CFO to access own sources of funds/grants - Assess relevance of national grant mechanisms	- Project preparation grant - Feedback from targeted fund providers - Commitments from LG CFO - Minimum technical and co-funding requirements
5. Demonstrate feasibility	- Conduct technical studies - Identify and secure site(s) - Undertake financial/economic/GHG modelling - Finalise funding model and sources - Identify criteria for Monitoring & Evaluation (M&E)	- Business plan - Funding requirements - Approval by LG Executive
6. Secure funding	Develop funding application(s)	Funding commitments
7. Procure	- Develop procurement documents - Evaluate and award tenders - Conclude construction, PPP, SLA contracts	Signed contracts
8. Monitor and Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

1.6 A Short-hand Project Typology Tool for LGs to Identify Likely Funding Sources and Models

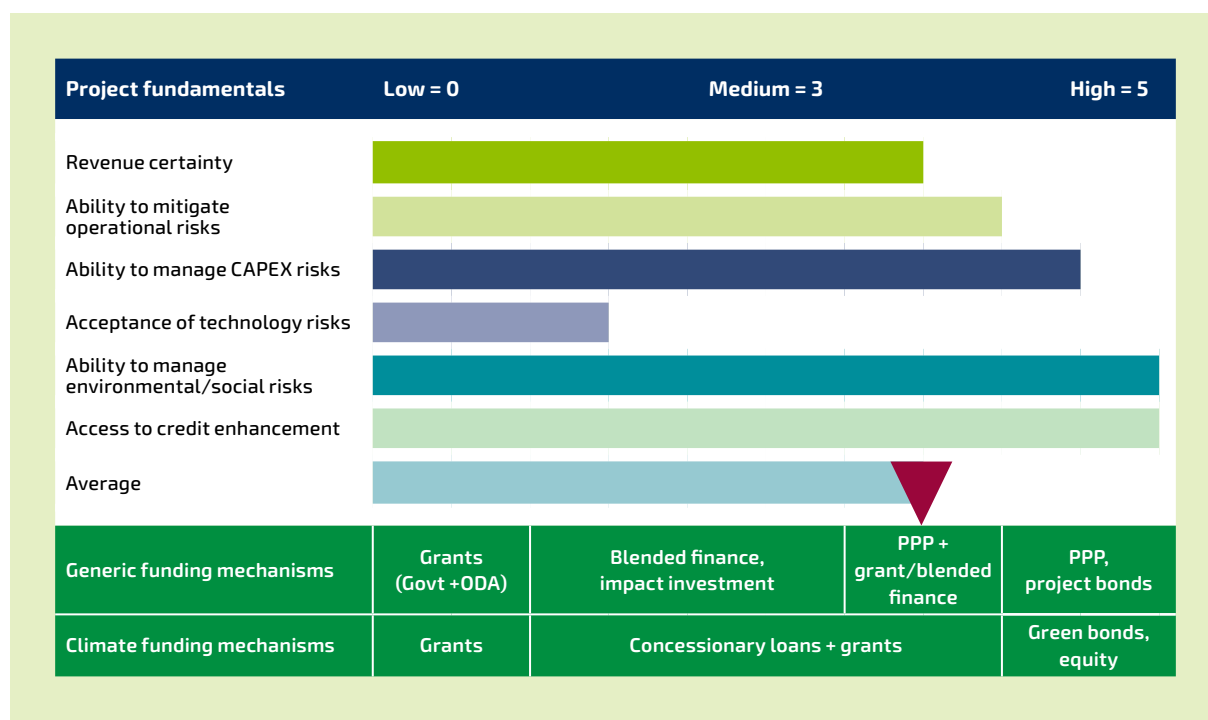
As explained earlier, a project's risk and revenue profile will largely determine what financing sources it will be able to access. Credit enhancement can be used to

mitigate some of the risks and increase the project's revenue certainty, allowing the project to access more commercial sources of funding.

The typology developed for this study is aimed at providing LGs with a short-hand tool to enable an initial assessment of potential funding sources and models that may be most appropriate for a specific Climate Project.

Figure 0.1 below provides a high-level overview of the six **project fundamentals** that are assessed and scored to arrive at an average score that indicates the funding source or model that may be suitable for the project.

Figure 0.1: Overview of Project Typology Tool



In the example above, an average score of 3.8 was calculated, indicating that the project may be implementable via a PPP provided the ability to access grants or blended finance. From a climate finance perspective, the project may be able to access concessional loans and grants.

Understanding the Approach

As noted above, this shorthand approach evaluates six main fundamentals of a project to reach a total score:

- Revenue certainty;
- Four key risk factors: Operational, capital expenditure, technology, environmental & social; and
- Ability to access guarantees and/or credit enhancements and extent of coverage.

The scores from each of these six factors are averaged to reach a final score that provides an indication of possible financing sources.

Revenue Certainty: The first dominant fundamental is the *revenue certainty* of a project, as return is usually the key determinant for securing finance from the private sector. In the case of debt investors such as commercial banks, they will need to ensure that the project generates sufficient revenues to cover debt repayments even under adverse conditions. Revenue certainty is assessed through evaluating the below six factors, each given a score of 1 to 5 as shown in Table 0.9 below.

Four Key Risk Factors: The project is then evaluated as to the extent to which the project's risks can be managed or mitigated, taking into account operational, capital expenditure, technology, and social/environmental factors as set forth in Table 0.10 below.

Table 0.9: Revenue Certainty: Key Factors & Scoring

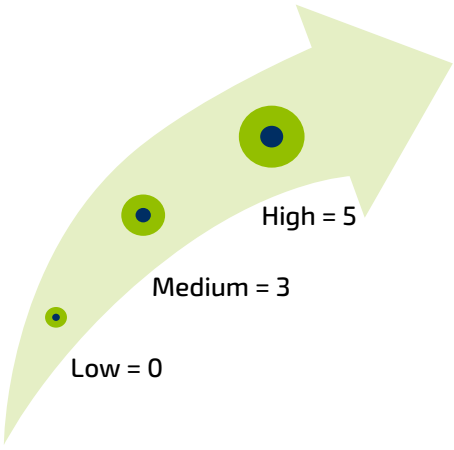
Factors for Scoring Revenue Certainty	Score	
Opportunity for cost recovery through user payments/savings	0–5	
Opportunities for generating 3rd party revenue	0–5	
Ability of LG to guarantee revenue	0–5	
Ability to manage tariff risk	0–5	
Creditworthiness of off-taker(s)	0–5	
Predictability of demand	0–5	
Predictability of supply	0–5	
Overall score	0 to 35	The higher the revenue certainty, the higher the score.

Table 0.10: Four Key Risk Factors of a Project & Scoring

Ability to Mitigate Operational Risks (OPEX)	Ability to Manage Capital Expenditure Risks (CAPEX)	Acceptance of Technology Risks	Ability to Manage Environmental & Social Risks
Ability of LG to guarantee inputs (for example, feedstock)	Ability to recover CAPEX investment via revenue	Acceptance of technology by lenders	Ability to minimise environmental impact/costs
Predictability of costs (including FX risks)	Ability to allocate construction risk to private sector	Suitability of technology as security for commercial lenders	Ability to minimise social impact/costs
Likelihood of recovering OPEX via revenues/savings	–	–	–
Min score: 0 Max score: 15	Min score: 0 Max score: 10	Min score: 0 Max score: 10	Min score: 0 Max score: 10

Given the ongoing basis of operational risks, the operational risk (OPEX) scoring is weighted higher than the other three key risk factors, with a maximum score of 15 points (representing 5 points more than the other three risk factors).

Table 0.11 below provides an example using Integrated Waste Management (IWM) and Wastewater Treatment and Reuse (WWT&R) Projects of how the four key risks identified above can be scored, noting the typical questions that need to be answered by the LG to assess each of the four key risk factors.

Table 0.11: Illustration of the Scoring Approach for Climate Projects: Key Risks of IWM and WWT&R Projects

Key Risks	Examples of Questions
Operational Risks (OPEX)	Ability to mitigate operational (OPEX) risks
	Ability of LG to guarantee feedstock: - Does the LG understand wastewater or solid waste volumes well enough to guarantee volumes to the private sector? - Is your LG allowed to issue guarantees? Predictability of costs (including foreign exchange, etc.): - Are operational costs likely to be predictable or will they be unpredictable because of costs that need to be paid in foreign currencies or other uncertainties? Likelihood of recovering OPEX via revenue/savings: - Will either revenues (from the sale of electricity, biogas, fertilizer, etc.) or savings (electricity, landfilling, transport, etc.) be enough to cover the project's operational costs?
Capital Expenditure (CAPEX)	Ability to manage capital expenditure (CAPEX) risks
	Recover CAPEX investment via revenue - Will revenue generated by the project be enough to first cover operational costs and then also repay the upfront investment? Ability to transfer construction risk to private sector - Can construction risk be transferred to the private sector via an EPC contract or another measure?
Technology Risks	Acceptance of technology risks
	Acceptance of technology by lenders - Is this a tried and tested technology that lenders will be comfortable with? Suitability as collateral for commercial lenders - Will lenders be able to find a buyer for the project (under a PPP) if the private sector partner goes bankrupt?

Table 0.11: Illustration of the Scoring Approach for Climate Projects: Key Risks of IWM and WWT&R Projects

continued

Key Risks	Examples of Questions
Environmental & Social Risks	Ability to manage environmental & social risks
	Ability to minimise environmental impact/costs ● Can environmental risks be addressed cost effectively? Ability to minimise social impact/costs ● Will there be little or no negative impact on the local community and informal labour market (e.g. waste pickers)? ● Will the local community accept a facility nearby?

Each of the above questions requires a score of between 0 and 5, with a score of 5 representing a confident positive response (“yes”). If the response to the question is uncertain (“maybe”), the score would be 3. If the answer is negative (“no”), the score would be zero. If the question is not applicable to the project, the user should assign “N/A” to it and exclude the question from the average score calculation.

Guarantees and Credit Enhancements: The last factor used to generate a total project score is the extent to which the project can access guarantees and/or credit enhancements. Such interventions can mitigate risks and increase the project’s revenue certainty. As with the other questions, a score between 0–5 can be assigned based on whether a guarantee and/or credit enhancement mechanism is available to mitigate project risks and the extent to which risks are mitigated.

The average of the six above scores will produce a total score between 0–5 that can be used to indicate an initial assessment of potential funding sources for a specific Climate Project. In the illustrative project provided above, the average score of 3.8 out of a range of 0–5 indicated that the project may be implementable via a PPP provided that it can access grants and/or concessional finance.

Therefore, the above project typology provides LGs with a short-hand tool to evaluate potential funding sources for a specific Climate Project based on basic project fundamentals.

Such evaluations are in the context of the LG’s local and national enabling environment: It is therefore important to recognise that the specific project fundamentals of a specific Climate Project are largely a function of the host country’s enabling environment, as explained in the following section.

1.7 Enabling Factors

For LGs to effectively scale the implementation of Climate Projects, both LGs and NGs need to have enabling factors that allow LGs to facilitate the required access to experts and funding. LGs can

systematically evaluate their enabling environments and advocate for changes that unlock opportunities for the development and finance of Climate Projects.

1.7.1 Local Government Enabling Factors

Several enabling factors can be put in place by LGs to unlock finance for Climate Projects, as listed in Table 0.12 below against four financing models.

Table 0.12: Illustrative Enabling Factors for Local Governments

Local Government Enabling Factors	Public Sector <i>without</i> Private Sector Service Provider	Public Sector <i>with</i> Private Sector Service Provider (SLA)	PPP Owned by Private Sector	PPP with LG Shareholding	100% Private Sector
1. LG has significant own sources of revenue	✓	✓	✓	✓	✓
2. LG can incur debt	✓	✓	N/A	✓	N/A
3. LG can access CAPEX grants	✓	✓	✓	✓	N/A
4. LG can be shareholder in a company	N/A	N/A	N/A	✓	N/A
5. LG can enter into long term contracts for services/products	✓	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay PPP/SLA contracts	N/A	✓	✓	✓	✓
7. LG can guarantee inputs (e.g., feedstock for waste projects)	✓	✓	✓	✓	✓
8. LG can implement cost reflective tariffs	✓	✓	✓	✓	✓
9. LG can charge cost reflective fees and tariffs	✓	✓	✓	✓	✓
10. LG has capacity to develop project (planning, budgeting, engage experts, etc.)	✓	✓	✓	✓	N/A
11. LG can make land available at no or minimal cost	✓	✓	✓	✓	✓
12. LG has capacity to procure EPC contractors	✓	✓	N/A	N/A	N/A
13. LG has capacity to procure and manage long term contracts	N/A	✓	✓	✓	N/A

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Climate Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

It is important to note that LGs can proactively take steps to identify and facilitate the development and finance of Climate Projects:

→ **Proactive development of Climate Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop Climate Projects working with private sector professionals, developers, and investors. As noted earlier, securing qualified experts will be critical to the analysis

of the needed project development process to design an investable project.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking projects can be proactive in taking steps to reduce impediments at local and national levels. Proactive LG actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

1.7.2 National Government Enabling Factors

Given the need to contract private sector professionals for most Climate Projects, national frameworks can enable LGs to contract professionals and provide support ranging from expertise to finance and guarantees.

Examples of the various enabling factors that can be put into place by NGs to promote Climate Projects are listed in Table 0.13 below.

Table 0.13: Illustrative Enabling Factors for National Governments

National Government Enabling Factors	Public Sector <i>without</i> Private Sector Service Provider	Public Sector <i>with</i> Private Sector Service Provider (SLA)	PPP Owned by Private Sector	PPP with LG Shareholding	100% Private Sector
1. NG can commit grant funding to LG or project and make transfers on time	✓	✓	✓	✓	N/A
2. NG has put in place supporting regulatory and legal frameworks	✓	✓	✓	✓	✓
3. NG can develop programme in line with climate commitments (include pooling of similar LG projects)	✓	✓	✓	✓	✓
4. NG can support and develop applications for climate finance	✓	✓	✓	✓	N/A
5. NG is able to provide expert support	✓	✓	✓	✓	N/A
6. NG provides tax incentives for investment in the sector	N/A	N/A	✓	✓	✓
7. NG develops standardised contracts & user-friendly sustainable procurement policies	✓	✓	✓	✓	N/A

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Climate Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 0.13: Illustrative Enabling Factors for National Governments

continued

National Government Enabling Factors	Public Sector <i>without</i> Private Sector Service Provider	Public Sector <i>with</i> Private Sector Service Provider (SLA)	PPP Owned by Private Sector	PPP with LG Shareholding	100% Private Sector
8. NG establishes private sector climate finance facility	N/A	N/A	✓	✓	✓
9. NG provides guarantees covering LG commitments	✓	✓	✓	✓	N/A
10. NG is able to mitigate exchange control risk for investors	N/A	N/A	✓	✓	✓
11. NG has puts into place legislation that promotes the specific Climate Project	✓	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Climate Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, NGs can provide enabling factors for the financing of Climate Projects increasing access to public and private financing sources.

Therefore, Climate Projects can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 0.1 below.

Box 0.1: Examples of Enabling Factors for Climate Projects in Sub-Saharan Africa

- **Off-take Agreements:** A waste water treatment and reuse PPP that was developed by eThekweni municipality in South Africa benefited from a long-term off-take agreement with a creditworthy off-taker (Mondi). The off-take agreement unlocked long term commercial and DFI debt for the project.
- **Grant Funding:** SAFI SANA Ghana Limited was able to raise grant funding to cover 100% of its waste water treatment and reuse plant’s capital expenditure from the international community. However, it had to demonstrate to grant funders that it would be able to cover the plant’s operational expenditure with the revenue earned to ensure sustainability.
- **Guarantees:** A guarantee provided by the Government of Egypt unlocked non-recourse debt and an equity investment by the private sector for its US\$200 million wastewater treatment and reuse plant.
- **Long-term PPP Agreements:** Both eThekweni municipality and the Government of Egypt entered into long term PPP agreements (i.e., 20 years) with the private sector for a wastewater treatment and reuse project. These long-term contracts allowed the private sector enough time to recover their investment and to repay their debt.

Sources: The 10 Climate Project Chapters in the Study

1.8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of Climate Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance Climate Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support this Climate Project can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including NG agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), NGOs, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the action steps set out in the prior section “*Table 0.8: Roadmap of Potential LG Action Steps for Implementation of Climate Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design Climate Projects. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the actions steps in Climate Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Climate Projects. LGs will need to have access to such advisors. NGs and development partners can provide critical support.

To build out a further database of technical experts, the professionals involved in existing Climate Projects could be identified and compiled into a list, with information on their services and contact information.

There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. For example, countries with successful Climate Projects can share their experiences with African LGs.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing actions steps of enabling information on experts and financing sources as noted above.

The CoM SSA training materials include modules for project development, finance, and modules on specific types of climate projects.



Solar kiosk in Talek, Kenya



Chapter 1:

Wastewater Treatment & Reuse Projects

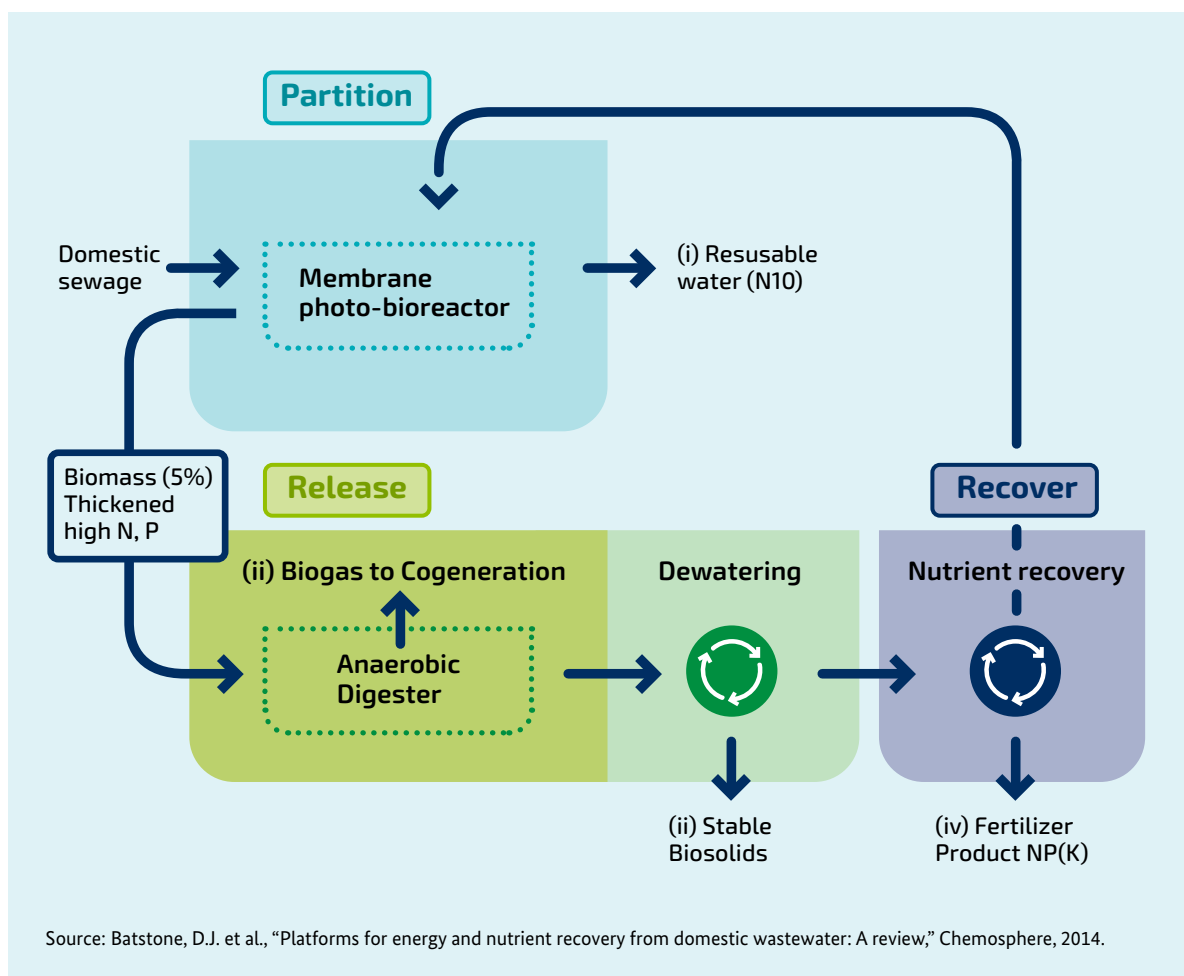
1 Definition: What is Wastewater Treatment & Reuse (WWT&R)?

The primary function of Wastewater Treatment & Reuse (WWT&R) Projects is to treat and purify wastewater for reuse by industrial, agricultural and domestic users. Agricultural irrigation is the most common water reuse approach, followed by industrial applications such as water cooling. However, in water scarce countries like Namibia, reused water is also used for domestic purposes.

WWT&R Projects can also achieve secondary benefits by reducing energy consumption and GHG

(Greenhouse Gas) emissions through energy and nutrient recovery processes. Energy plays an important role in resource recovery since electricity is used for the treatment of wastewater and can also be recovered from the treatment process. The two most important energy recovery paths from the water reclamation process are anaerobic digestion¹ (AD) and heat recovery from the sludge which can be burnt in a cogeneration unit. Sludge can also be used to recover nutrients when it is used as fertilizer or to extract the active ingredients of fertilizers.

Figure 1.1: Illustrative WWT&R Process



¹ Anaerobic digestion is the process by which organic matter such as food waste is broken down to produce biogas and biofertilizer. This process happens in the absence of oxygen in a sealed, oxygen-free tank called an anaerobic digester.

2 Benefits Associated with WWT&R Projects

WWT&R Projects can result in transformative benefits to Local Governments (LGs) and their citizens, ranging from improved living conditions, to budget savings, new sources of revenues and economic growth, job

creation, and other development impacts. The overall benefits of LGs proactively undertaking WWT&R Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change impact, namely decreasing GHG emissions, managing natural resources in a more sustainable way and attaining overall environmental benefits from decreased water pollution;
- **Development Benefits:** Increase availability of drinking water, improve public health and living standards, increase energy security that can stimulate higher rates of economic growth and job creation, create opportunities for Micro, Small, and Medium-Sized Enterprises (MSMEs); and
- **Local Government Economic Benefits:** Obtain savings in existing budgets (e.g., more efficient services), generate additional indirect income (e.g., fees, taxes, sales of land, etc.) and direct income from services (e.g., wastewater products, energy tariffs, etc.).

The summary of potential benefits from WWT&R Projects is detailed in Table 1.1.

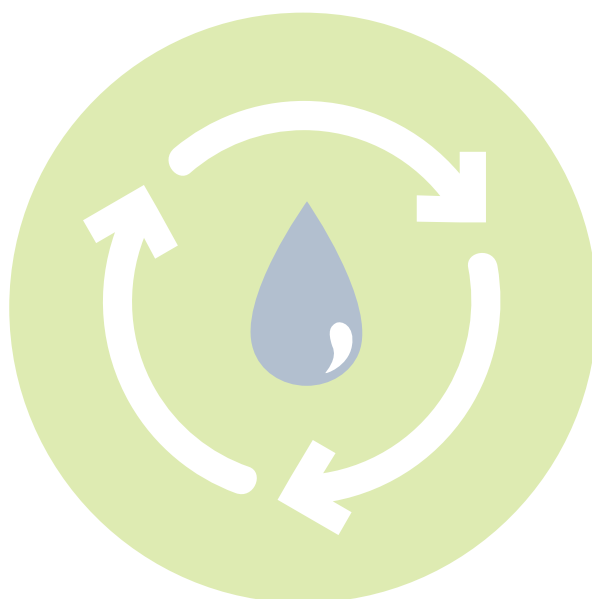


Table 1.1: Details of Potential Benefits Resulting from WWT&R Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
• Production of biogas that can replace dirtier cooking fuels • Production of bio briquettes that can be used in clean cooking stoves • Reduction of pollutants discharged into rivers and groundwater sources • Irrigation with recycled water can reduce the need for chemical fertilizers and improve soil quality • GHG emission reductions as a result of the generation or harvesting of energy or heat	• Reduced pressure on main water supply and delay investment in new water storage and treatment infrastructure • Increased availability of drinking water due to substitution of treated water for irrigation in place of freshwater • Regeneration of depleted aquifers with treated wastewater • Production of electricity that can be fed into the grid to improve energy security • Provision of nutrient benefits when used for irrigation purposes • Heat generated can be used for industrial purposes • Improved public health due to the reduction of water borne diseases	• Reuse of treated water and savings with respect to the treatment and disposal of sewerage • Organic fertilizer and treated water can be sold to local farmers who will benefit from increased yields and water security • Access to renewable electricity and electricity security for key social services such as clinics and schools resulting from electricity generated by WWT&R interventions • Economic growth in the LG area, partly due to stimulated local economy by employment opportunities maximisation for citizens • Opportunities for MSMEs through local content requirements • Overall increased local economic activity and job creation, tax revenues from payrolls, land values, etc.

Note: An important source of GHG is the electricity used to treat wastewater. However, there is a lack of a proper and generalised methodology to study the interlinkages between water and energy use and intensity and GHG emissions in the wastewater sector. GHG calculations appear to be complex as they depend on the source of electricity used by the wastewater treatment plant (thermal versus renewable), the reuse technology employed, and the extent to which energy or heat is generated or harvested.²

² Mounia Lahmouri et al., "Analysis of Greenhouse Gas Emissions in Centralized and Decentralized Water Reclamation with Resource Recovery Strategies in Leh Town, Ladakh, India, and Potential for their Reduction in Context of the Water–Energy–Food Nexus," *Water*, April 2019. See: <https://www.mdpi.com/2073-4441/11/5/906/pdf-vor>

3 Challenges Faced by Local Governments

LGs face increasing pressure treating wastewater due to urbanisation which is putting pressure on existing wastewater treatment (WWT) infrastructure and limited budgets for the treatment of sewerage. Because of budget constraints, the maintenance of WWT assets is often neglected, resulting in inadequate service delivery and potential environmental pollution. Funding for

new WWT infrastructure is often not prioritised, resulting in the need for existing infrastructure to operate well beyond its design capacity. Moreover, LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

4 Financing Roadmap for WWT&R Projects

LGs can undertake a proactive role in the development and finance of WWT&R Projects. This section provides a financing roadmap including early WWT&R action steps of relevance for LGs to develop a realistic proactive approach to developing and financing WWT&R

Projects. The approaches set forth are indicative and may not be feasible or appropriate for the wide range of different contexts and projects across the Sub-Saharan African (SSA) region.

4.1 Assess Revenue Requirements and Opportunities

WWT&R Projects offer a variety of revenue opportunities that will need to be maximised within the specific LG context. WWT&R Projects can generate revenue by selling treated water to industrial or agricultural off-takers. Further revenue opportunities may exist for the sale of by-products such as biogas, heat, electricity, fertilizer and sludge. A WWT&R Project could also charge the private sector for taking the wastewater if

the latter is responsible for emptying pit latrines and disposing of the waste. Lastly, the private sector operator of a WWT&R Project may also be able to earn income from the LG in cases where it delivers a service by treating wastewater. Section 6 provides examples of relevant WWT&R Projects and highlights potential revenue streams.

4.2. Identify Financing Models

Different financing models can be implemented to unlock investment in WWT&R Projects. Because of their revenue potential and technical complexity, WWT&R Projects lend themselves to private sector involvement. Public-Private Partnerships (PPPs) tend to be most suitable for WWT&R Projects that can secure predictable long-term revenue streams from

creditworthy off-takers and require significant levels of investment. However, such large investments also require certainty in respect of revenue in order for the private sector to make the investment. Towards this end, PPPs require long-term contracts (i.e., greater than 10 years) in order for the private sector to recoup its investment.

Another option for the public sector to unlock WWT&R investment from the private sector is to assume responsibility for the funding and construction of the infrastructure, and then transfer operational risk through Service Level Agreements (SLAs) to the private sector. Since SLAs require minimal investment from the private sector, they do not require long contract periods and can be as short as three years.

Table 1.2 below provides an overview of the different funding models and the allocation of roles between the public and private sectors for the financing, construction, operation, and maintenance of WWT&R Projects.

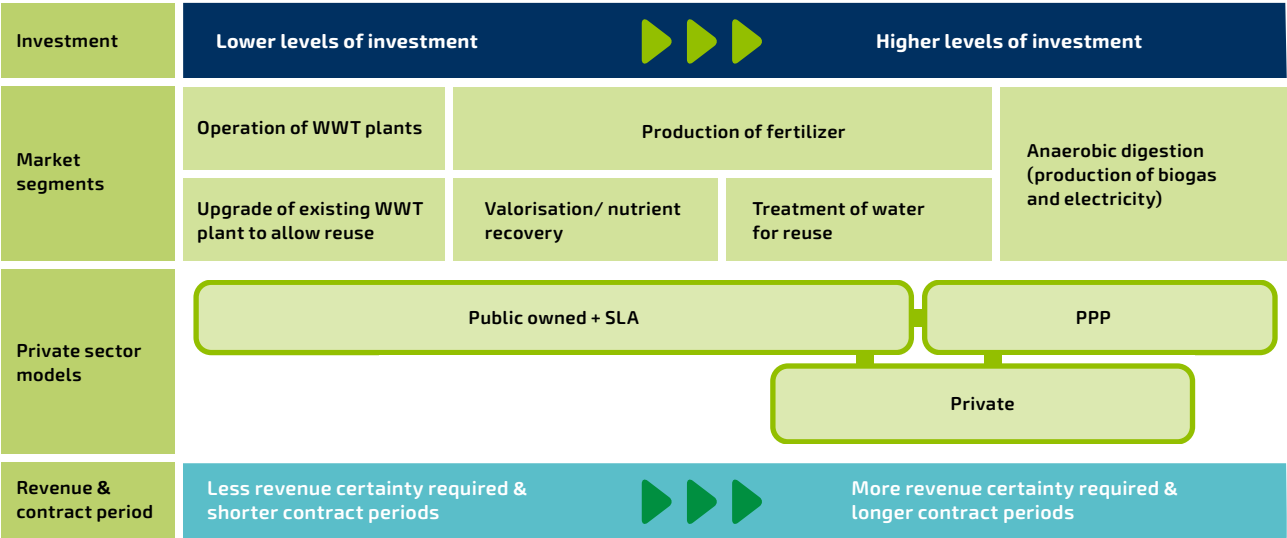
Table 1.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Operated	Public Owned & Private Sector Operated (SLA)	PPP (100% private- owned)	PPP (minority LG ownership)	Private Owned & Operated
Design	LG		Private sector assumes roles and risks		
Construction					
Funding of CAPEX	LG raises grants & debt		Private sector mobilises debt & equity. LG could provide land	LG funds its share of equity and/or provides land. Private sector raises rest of funds	Private sector mobilises equity & debt
Grants	LG can raise grants to make funding model more affordable				Private sector mobilises equity and debt
Operation	LG	Private sector			
Maintenance					
Sales & Marketing					

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Figure 1.2 below illustrates how the level of investment correlates with different types of private sector engagement and market segments.

Figure 1.2: WWT&R Financing Models



As noted above, the higher investment levels for WWT&R Projects usually require PPPs or 100% private sector investment approaches.

There have been some successes in financing viable WWT&R Projects in SSA through PPPs. For example, South Africa’s Ethekwini Municipality entered into a 20-year PPP agreement in 1999 for the upgrade of an existing wastewater treatment plant with reuse functionality. Ghana’s Ashaiman Municipal Assembly signed an 18-year Build, Operate, Own and Transfer (BOOT) contract with the private sector to construct a new WWT&R plant.

Service Level Agreements (SLAs) are also used in SSA countries to contract the private sector to deliver operating & maintenance (O&M) services over shorter time

periods. For example, Windhoek’s Goreangab WWT&R plant is operated and maintained by a privately-owned company under an SLA.

The modular nature of water treatment and reuse systems could provide the basis for pooled development tools as well as pooled financing facilities. Kenya’s Water Sector Trust Fund (WSTF) has developed pooled technical resources that any LG can access to develop and procure wastewater treatment facilities. These include detailed designs for wastewater treatment plants with different capacities.³

3 Based on the consultant’s experience. Details cannot be disclosed due to required confidentiality in Non-Disclosure Agreement.

To unlock financing, LGs will need to undertake the following preliminary assessments and early action steps:

- Analyse their available budgets that can be reallocated to compensate funders and the private sector to deliver WWT&R services;
- Identify which financing models are supported by local legislation and regulations;
- Identify water and sanitation master plans and strategies that could form the basis for future funding applications; and
- Identify Capital Expenditures (CAPEX) budgets from National Government (NG) or the LG's finance department which could be used to co-fund the project.

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of different finance models are summarised against key implementation criteria in Table 1.3 below, with advantages highlighted in light green and disadvantages in red.

No matter what model is used, it is critical that LGs engage proven experienced expert professionals early on to structure a cost-effective and climate smart project development process and design. Pooled project development resources, such as detailed designs and standardised EPC, SLA and PPP contracts, can allow

LGs to develop and procure WWT&R Projects cost effectively. However, standardised PPP agreements may require some inputs from technical advisors on a project by project basis to ensure that risks are shared appropriately between the public and private sectors based on the LG's capacity and creditworthiness.

The above analysis of the finance models demonstrates the importance of a blended finance approach with credit enhancements, as explained in the prior section.

Table 1.3: Advantages and Disadvantages of Different Finance Models

Criteria	Public Sector Owned and Managed	Public Sector Owned/ Private Sector Managed (SLAs)	Public-Private Partnerships	Private Owned & Operated
Marketing skills	Public sector does not have the necessary skills to develop/grow a market for WWT&R products.	Private sector has necessary skills and incentives to market WWT&R products such as compost and gas or to develop the market if it does not exist already.		
Contract term for operation of facility	No contract required	Unless contract is long enough to recoup investment, the Private sector will not make necessary investment.	Long term contract gives private sector incentives to grow the market.	Outright ownership of all rights to revenue and profit incentivises the private sector.

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services. Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

Table 1.3: Advantages and Disadvantages of Different Finance Models

continued

Criteria	Public Sector Owned and Managed	Public Sector Owned/ Private Sector Managed (SLAs)	Public-Private Partnerships	Private Owned & Operated
Access to finance	Reliant on grants from national government and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via programme as size of project may not justify direct application to international climate facility.			Will need to access climate finance via private sector facility.
Technology risk	Public sector does not have the necessary skills.	Private sector has the necessary skills and experience to manage and operate niche technologies such as anaerobic digestion, production of organic fertilizers and valorisation.		
Costs and time to implement	Lesser requirements in respect of financial and legal expertise may make SLAs and public sector delivered solutions cheaper and faster to implement.		PPPs require technical, financial and legal expertise to develop. Unless large project or programme that pools project, development costs may not be justified.	Private sector is able to respond to opportunities quickly and to fund development costs.
Opportunities for pooling projects via programmes	Engineering Procurement Construction contracts (EPCs), SLAs and PPPs could be procured and developed across a number of LGs or a number of sites within an LG.			Private companies can manage several WWT&R Projects in the same country and/or region.
Ability to mitigate construction risk	EPC contracts can be used to reduce the risk of cost overruns and nonperforming technology.			

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages.

Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model are most appropriate and affordable for a WWT&R Project, LGs and LG-owned utilities will need to identify possible funding mechanisms.

LGs will need to undertake the following six early action steps assessing their own financial positions and abilities to manage a WWT&R Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the WWT&R Project given the current and projected needs of the local community, engaging an external experienced WWT&R expert if needed;
- 2 Quantify how much the LG spends annually on the treatment and collection of wastewater and potable water (current and projected) that would be substituted by the proposed WWT&R Project, working with the LG's financial staff;
- 3 Determine how wastewater and water budgets can be reallocated to compensate for the costs of the design and installation of the WWT&R Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed WWT&R Project (after subtracting total budgeted amounts – current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the WWT&R Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, and monitor contracts, estimate the additional cost for the WWT&R Project.

For LGs to employ a public sector funded model to finance the WWT&R Project, an assessment will need to be made of its own funding capacity to cover total costs:

- 1 Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the WWT&R Project?
- 2 Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the NG, development partners, climate funds, or other sources?⁴
- 3 Does the LG have the ability based on national regulations, national government support, and/or its own credit standing to use its own balance sheet to borrow debt from commercial banks, Development Finance Institutions (DFIs) or other private sector institutions?

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of a LG-owned utility) for raising debt, it can also use private sector entities to contract debt (commercial and concessionary debt). However, the project will need to be structured to minimise risks for the private sector and its lenders.

Key success factors include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG or offtake agreements with third parties, including power purchase agreements for the sale of electricity;
- Guaranteed minimum levels of feedstock provided by the government (local or national government) or another entity (such as a company or industrial park);

4 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

- A known and tested technological solution;
- Predictable OPEX (Operating Expenses) and CAPEX (Capital Expenditures) that are not subject to foreign exchange risk;
- A creditworthy LG that will pay the private sector on time for WWT&R services;
- Significant third-party revenues (e.g. water, fertilizer, briquettes or biogas sales) under long term offtake agreements; and
- CAPEX that is minimised by making use of LG land, existing WWT plants, and other in-kind contributions.

WWT&R Projects can access **climate finance** if they are structured to maximise GHG emission savings and improve water security in water scarce areas. Green bonds, such as the City of Cape Town's 2017 issue, also offer an opportunity to finance WWT&R infrastructure. The City of Cape Town successfully issued a 10-year green bond in 2017 to finance eight adaptation and mitigation projects, including a WWT&R Project that will supply non-potable water for irrigation. The city raised R1 billion (US\$70 million) through the bond issue which was oversubscribed by a multiple of almost 5 times.

An opportunity exists to develop a pooled application for the Green Climate Fund (GCF) that will raise grants and concessionary debt for a programme of WWT&R Projects across one or more SSA countries. The application could unlock financing for between 10 and 30 WWT&R Projects while benefiting from standardised procurement documents, contracts, and designs.

Often Climate Projects requiring external finance are constructed and financed through separate entities.

These entities can be owned by the public sector, a Public-Private Partnership (PPP), or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages for accessing finance for larger projects and pooled finance vehicles using **project finance techniques** as such approaches are proven to minimise default risk and increase recovery rates.⁵ SPVs often obtain loans which are secured against the revenues of the project, with no or limited recourse to the SPV owner(s). According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks, and to minimise any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggest that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterise project finance techniques are effective.⁶ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$15 million in total investment costs).

Service Level Agreements (SLAs) are entered into between the private sector and the public sectors for the delivery of specific services. SLAs do not require the establishment of a separate legal entity such as a SPV.

5 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983–2017," Moody's Investor Service, March 2019, pages 8–9.

6 In fact, the 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983–2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

Engineering Procurement Construction (EPC) contracts are normally used to construct complex WWT&R infrastructure. Under an EPC Contract, a

contractor is required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

To determine which contract type and funding model is most appropriate and affordable for a WWT&R Project, LGs will need to implement the following early action steps:

- Understand how much the LG spends annually on treating wastewater and water;
- Investigate how existing sewerage and water treatment budgets can be reallocated to compensate the private sector for delivering Service Level Agreements (SLAs) or Public-Private Partnerships (PPPs);
- Develop project management capabilities to manage and monitor contracts effectively; and
- Enter into an SLA for limited services to build a track record of managing private sector contracts.

4.5 Identify and Implement Credit Risk Solutions

WWT&R Projects can greatly benefit from credit risk solutions, such as the use of guarantees and debt service escrow accounts, that can be structured to protect lenders and the private sector against key risks such as the following:

- Default by LGs;
- Late payments by LGs;
- Default or late payments by other off takers; and
- Lower than guaranteed levels of feedstock.

To determine what credit solutions are needed and available, LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory.

It is important to note that guarantees will need to meet the stringent credit requirements of risk mitigation providers, either by demonstrating the capacity to make timely and complete payments, a counter-guarantee from a creditworthy entity (such as the NG), or through adequate collateral and escrow accounts.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology for potential WWT&R Projects.

Box 1.1: Indicative Funding Sources and Mechanisms for WWT&R Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

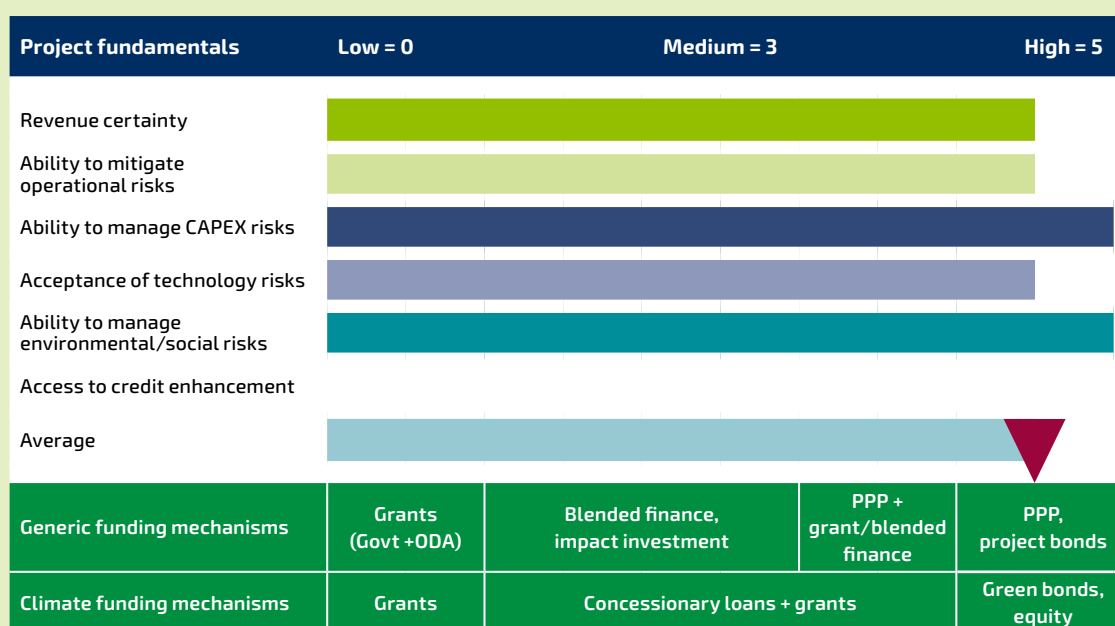
Figure 1.3 shows a typology for a well-structured WWT&R Project that benefits long term off-take agreements. It indicates that a PPP with commercial funding may be implementable and that a climate finance facility would consider making an equity investment in the project.

The following revenue and risk mitigation factors drive this typology:

- Long-term off-take agreements were negotiated with creditworthy off takers;
- Third party revenues from the sale of water were maximised;
- CAPEX and OPEX risk were transferred cost effectively to the private sector;
- The LG which has a good credit rating committed to make regular payments to the private sector;
- CAPEX was minimised by making use of an existing plant; and
- The private sector could forecast feedstock volumes as data was available from the existing WWT plant.

In those cases that off-take agreements cannot be negotiated with creditworthy off-takers and the LG is not considered creditworthy, a PPP may still be possible provided the project is properly structured with the required level of public sector support. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 1.3: Illustrative WWT&R Project Typology



4.6 Establish Contacts with Private Sector Actors

The water and wastewater treatment sectors are served by a number of large international firms. The 10 largest companies are all either European or American, but only some of them currently operate in SSA.

To unlock private sector investment in WWT&R Projects, LGs will need to implement the following steps:

- Connect generators of wastewater to potential users of their by-products to drive a circular economy;
- Secure revenue for the project by identifying which products the private sector could sell to the LG or other entities (e.g., water, fertilizer, electricity) to make the WWT&R Project more financially viable;

- Understand and monitor wastewater volumes to make minimum feedstock commitments to the private sector;
- Appoint reputable transaction advisors that will help LG structure projects and contracts that share risks and rewards appropriately between the LG and the private sector; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

The next section breaks out the main LG action steps by the specific stage of project development.

5 Action Steps for Local Governments

Table 1.4 below summarises the main proactive action steps for LGs, detailing the tasks and outputs required to implement WWT&R Projects.

Table 1.4: Roadmap of Proactive LG Steps for Implementing WWT&R Projects

Action Steps	Tasks	Outputs
1. Develop budget	• Analyse LG budgets to understand current spend on the treatment of wastewater and water • Assess whether existing sewerage tariffs are cost reflective • Undertake a regulatory review to identify possible funding mechanisms and sources	• Budget available for WWT&R • Revised sewerage tariffs
2. Engage experts to assess options	• Identify and cost technical solutions under different funding models • Assess affordability and benefits of each technical solution • Rank options based on affordability and net benefits	• Preferred option & indicative funding model • Funding gap

Table 1.4: Roadmap of Proactive LG Steps for Implementing WWT&R Projects

continued

Action Steps	Tasks	Outputs
3. Engage funders	- Develop a concept note for Project Preparation Facilities, DFIs, Climate Facilities or existing Programmes - Present project to LG's Chief Financial Officer (CFO) to access own sources of funds/grants - Assess relevance of national grant mechanisms	- Project preparation grant - Feedback from DFIs, Climate Facilities, etc. - Commitments from LG's CFO - Minimum technical and co-funding requirements
4. Demonstrate feasibility	- Conduct technical studies - Identify and secure site(s) - Undertake financial/economic/GHG modelling Finalise funding model and sources - Identify M&E criteria	- Business plan - Funding requirements - Approval by LG's Executive
5. Secure funding	Develop funding application(s)	Funding commitments
6. Procure	- Develop procurement documents - Evaluate and award tenders - Conclude construction, PPP, SLA contracts	Signed contracts
7. Monitor and Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants for the technical studies. Technical studies include Environmental and Social Impact Assessments (ESIA) that

identify the positive and negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of WWT&R Projects from Sub-Saharan Africa and Worldwide

There are many examples of WWT&R Projects in Africa and worldwide to provide LGs with insights. Below are examples of two SSA LGs and one North African NG that have implemented WWT&R PPP Projects.

6.1 South Africa's eThekweni Municipality PPP

South Africa's eThekweni municipality entered into a 20-year PPP agreement in 1999 for the upgrade of an existing WWT plant with reuse functionality. At the time, the municipality experienced sewage capacity constraints and faced significant capital expenditure for the construction of new marine outfall pipeline. In response, the municipality decided to procure a WWT plant with reuse capacity via a PPP. The project included the upgrade of an existing activated sludge process and construction of a new 47,500m³/day tertiary plant, aimed at treating and supplying treated effluent to a level which was acceptable to an industrial recipient

(i.e., Mondi Paper Mills). The funding of the capital for upgrade and new technologies, as well as the risks of meeting the water quality resided with the private sector partner (i.e., Veolia) under a 20-year production, operation and transfer concession. The Development Bank of Southern Africa (DBSA) provided a loan to the SPV that covered 47% of the project's costs. A further 33% was funded via a commercial loan while Veolia provided the remaining 20% via equity.⁷ For Mondi, the benefits were a 50% reduction of the normal industrial water tariffs.

6.2 Ghana's ASHMA PPP

In Ghana, Ashaiman Municipal Assembly (ASHMA) entered into an 18-year PPP agreement which became operational in 2017. Prior to the project's implementation, ASHMA owned disused faecal waste treatment ponds and did not treat any faecal waste. To remedy the situation, ASHMA signed a PPP contract with SAFI SANA Ghana Limited (SSGL) to make the necessary investment in new infrastructure and to operate the plant for a period of 18 years. The new WWT&R facility treats 25 tons/day and includes a new bio-fertilizer production facility with a capacity of 500 tons/year and an existing anaerobic digester that can supply 580,000 kWh of electricity to the grid. SSGL is a Dutch social enterprise that designs, constructs and operates

waste-to-energy factories in developing countries. It raised grants from the African Water Fund (AWF) and its partners to fund the project's capital expenditure (EUR1.5 million). SSGL's original business case forecast that all operating and maintenance costs would be covered by the sale of products under long-term offtake agreements. Whilst a Power Purchase Agreement (PPA) was successfully concluded with ECG, SSGL failed to conclude a fertilizer offtake agreement with Ghana's Ministry of Food and Agriculture. A recent AWF appraisal highlighted the need to achieve economies of scale and finalise long-term off-take agreements for the business model to be more commercially viable.⁸

6.3 Egypt Government PPP

A WWT&R plant with a daily treatment capacity of 250,000m³ was completed via a PPP by the Government of Egypt (GoE) in 2013. The large plant serves the satellite cities of New Cairo, Madinaty, and El Mostakbal and serves one million people. The treated water is used for irrigation, reducing the demand for freshwater by farmers and urban green areas. Sludge

derived fuel is sold to the cement industry, avoiding considerable sludge transport costs and GHG emissions. Since the sludge derived fuel replaces coal, it gives rise to further GHG emissions savings. A 20-year concession was issued to the private sector to design, build, finance, operate, and transfer the facility. Under the contract, the GoE pays a sewage treatment charge

7 "Wastewater? From Waste to Resource: Shifting Paradigms for Smarter Wastewater Interventions in Latin America and the Caribbean," World Bank, August 2018. See: <https://www.worldbank.org/en/topic/water/publication/wastewater-initiative>

8 "Ghana: A Business Approach for Improved Sanitation Organic Fertilisers and Energy Drivers," African Water Facility, AfDB, September 2018. See: <https://projectsportal.afdb.org/dataportal/VProject/show/P-GH-EBZ-001?cur=usd>

to the private sector which comprises both a fixed payment and variable payment. The GoE funded 71% of the project's total cost of US\$200 million. The private sector raised the remaining financing comprising of

non-recourse debt (21%) and equity (8%).⁹ New Urban Cities Agency,¹⁰ a national government agency, is the public sector contracting entity and its commitments are guaranteed by the Ministry of Finance.¹¹

6.4 Namibia's Windhoek SLA

SSA's largest WWT&R facility is operated by the private sector under an SLA. Windhoek's Goreangab Plant is operated and maintained by the Windhoek Goreangab Operating Company (WINGOC) which is owned by two international companies (i.e., Veolia, Wabag). Under the SLA agreement, the City of Windhoek can levy financial penalties if the quality guidelines and

standards contained in the SLA are breached. The facility currently supplies 20,800 m³ of potable water per day to 350,000 Windhoek residents. Industrial waste is treated separately at the Ujams wastewater treatment facility and its effluent is used for irrigation purposes.¹²

6.5 Mexico's Tenorio and Atotonilco PPPs

Mexico's Tenorio WWT&R Project required the construction of a new WWT&R facility with a total capacity of 90,720m³/day. The project treats sewerage generated by the City of San Luis Potosí but was contracted by Mexico's State Water Commission. Tertiary effluent produced by the plant is used in the cooling towers of a nearby power plant and for agricultural purposes. The project has been operational since 2008 and was the first of its kind in Mexico. It was developed under a 20-year BOOT contract and benefits from a long-term off-take agreement with Mexico's Federal Electricity Commission (CFE) that purchases

treated effluent. A significant amount (40%) of the project's costs were funded via a government grant while the remaining 60% was raised by the private sector in the form of debt and equity. The project also benefited from a federal government guarantee.¹³

The Atotonilco de Tula project was developed through a 25-year BOOT model. Treated wastewater is used for irrigation and the project generates electricity that covers 60% of its own needs. A government grant was used to fund 49% of the project's cost while the remaining 59% was raised by the private sector in the form of commercial debt (31%) and equity (20%).¹⁴

6.6 Other SSA WWT&R Projects

Below are two other examples of WWT&R Projects implemented or planned by the private sector in SSA:

→ Old Mutual, the large pension and investment company, implemented a privately-owned and financed wastewater treatment facility in 2018 at

9 "Wastewater," World Bank, Op.cit.

10 New Urban Communities Authority is an Egyptian government authority affiliated with the Ministry of Housing. It is the competent authority in charge of developing new urban cities as mandated in Law 59 of 1979.

11 "Public Private Partnerships," City Resilience Program, World Bank. See: <https://www.gfdrr.org/sites/default/files/publication/Public%20Private%20Partnerships.pdf>

12 "Global Potable Reuse Case Study 4: Windhoek, Namibia," Australian Water Recycling Centre of Excellence, November 2014. See: <http://vuir.vu.edu.au/32234/1/WQ%2BCase%2BStudy%2B4%2B-%2BWindhoek%2BNamibia%2B100815.pdf>

13 "Wastewater," World Bank, Op.cit.

14 "Wastewater," World Bank, Op.cit.

its office park in Cape Town in response to the city's 2018 water crisis. The WWT&R facility serves 9,000 employees and an office area of 166,000m². The waste-to-drinking water filtration plant produces between 650,000 and 800,000 litres of potable water a day. It operates at a 70% efficiency level, meaning that for every 100 litres treated, 70 litres of potable water are produced. The City of Cape Town was a key stakeholder during the development of the project.¹⁵

→ Kenya Breweries recently announced that it will build a WWT&R facility to serve its Kisumu plant which will allow more than 90% of the plant's wastewater to be reused. The project, which is estimated to cost US\$40 million, will allow the company to achieve its sustainability goals while limiting its dependence on the Kisumu Water and Sanitation Company Limited.¹⁶

7 Enabling Factors

For LGs to effectively scale the implementation of WWT&R Projects, LGs and the NG need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put into place to enable LGs to unlock finance for WWT&R Projects. For example, if an LG is able to provide land or existing infrastructure at no cost to the private sector developer, it will reduce the private sector's upfront investment. The powerful impact of reducing upfront capital costs is demonstrated by Ethekewini Municipality's ability to secure a PPP partner by reducing the required level of private sector's investment by refurbishing an existing WWT plant. Examples of LG enabling factors are provided in Table 1.5 below.

It is important to note that in any scenario LGs can proactively take steps to facilitate the identification, development, and finance of WWT&R Projects:

→ **Proactive development of WWT&R Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop WWT&R

Projects working with private sector professionals, developers, and investors. As noted earlier, securing qualified WWT&R experts will be critical to the analysis of the needed project development process to design an investable WWT&R Project.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking WWT&R Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

15 "Old Mutual Cape Town Will Go 'Off The Water Grid' With Launch of Water Filtration Plant," Old Mutual Life Insurance Company, South Africa, 2014.

16 Jean Marie Takoulu, "Kenya: Kenya Breweries will reuse its wastewater in Kisumu," Afrik, 2019. See: <https://www.afrik21.africa/en/kenya-kenya-breweries-will-reuse-its-wastewater-in-kisumu/>



Wastewater system in Kenya, maintenance at a tank
Nyeri, Kenya

Table 1.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Owned/Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private Sector Owned 100%
1. LG has significant own sources of revenue	✓	✓	✓	✓
2. LG can incur debt	✓	N/A	✓	N/A
3. LG can access CAPEX grants	✓		✓	N/A
4. LG can be shareholder in a company	N/A	N/A	✓	N/A
5. LG can enter into long term contracts for services/products	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay contracts for PPPs and SLAs	✓	✓	✓	✓
7. LG can guarantee feedstock	✓	✓	✓	✓
8. LG can implement cost reflective tariffs	✓	✓	✓	✓
9. LG can charge cost reflective tariffs	✓	✓	✓	✓
10. LG has capacity to develop projects (planning, budgeting, engage experts, etc.)	✓	✓	✓	N/A
11. LG can make land available at no or minimal cost	✓	✓	✓	✓
12. LG has capacity to procure EPC contractors	✓	N/A	N/A	N/A
13. LG has capacity to procure and manage long term contracts	✓	✓	✓	N/A

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for WWT&R Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

7.2 National Government Enabling Factors

LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support ranging from expertise to

finance and guarantees. The various enabling factors that can be put in place by NGs to promote WWT&R Projects are listed in Table 1.6 below.

Table 1.6: National Government Enabling Factors

National Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private 100% Owned
1. NG can commit grant funding to project and makes transfers on time	✓	✓	✓	N/A
2. NG has put into place supporting regulatory and legal frameworks	✓	✓	✓	✓
3. NG has programme in line with Nationally Defined Contributions (NDC) commitments (can include pooling of similar LG projects)	✓	✓	✓	✓
4. NG can support and develop climate finance applications	✓	✓	✓	N/A
5. NG is able to provide expert support	✓	✓	✓	N/A
6. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓
7. NG develops standardised contracts & user-friendly sustainable procurement policies	✓	✓	✓	N/A
8. NG establishes climate finance facility for the private sector	N/A	✓	✓	✓
9. NG can provide guarantees covering LG commitments	✓	✓	✓	✓
10. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓
11. NG has put into place legislation that promotes WWT&R (e.g., legislation that allows reuse)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for WWT&R Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, NGs can provide enabling factors for WWT&R Projects across all financing sources, public and private.

WWT&R Projects can achieve results with break-through enabling factors, as demonstrated by the successful examples listed in Box 1.2 below.

Box 1.2: Examples of Enabling Factors for WWT&R Projects

- **Off-take Agreements:** The WWT&R PPP that was developed by eThekweni municipality in South Africa benefited from a long-term off-take agreement with a creditworthy off-taker (Mondi). The off-take agreement unlocked long term commercial and DFI debt for the project.
- **Grant Funding:** SAFI SANA Ghana Limited was able to raise grant funding to cover 100% of its WWT&R plant's capital expenditure from the international community. However, it had to demonstrate to grant funders that it would be able to cover the plant's operational expenditure with the revenue earned to ensure sustainability.
- **Guarantees:** A guarantee provided by the Government of Egypt unlocked non-recourse debt and an equity investment by the private sector for its US\$200 million WWT&R plant.
- **Long-term PPP Agreements:** Both eThekweni municipality and the Government of Egypt entered into long-term PPP agreements (i.e., 20 years) with the private sector. These long-term contracts allowed the private sector enough time to recover their investment and repay their debt.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of WWT&R Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance WWT&R Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support WWT&R Projects can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including National Government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, Small and Medium Enterprises, etc.), Non-Governmental Organisations, urban residents, and farmers. Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the WWT&R action steps defined in the prior section “*Table 1.4: Roadmap of Proactive LG Action Steps for Implementation of WWT&R Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design an WWT&R Project. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the action steps in existing WWT&R Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of WWT&R Projects. LGs will need to have access to such advisors. NGs and development partners can provide critical support.

To build out a database of technical experts, the professionals involved in existing WWT&R Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration & Knowledge Exchange

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful WWT&R Projects can share their experiences with other SSA LGs. Early contributors could be participants in WWT&R Projects in Ghana, Namibia, and South Africa.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing actions steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.



Biogas production at Thika, Kenya



Chapter 2:

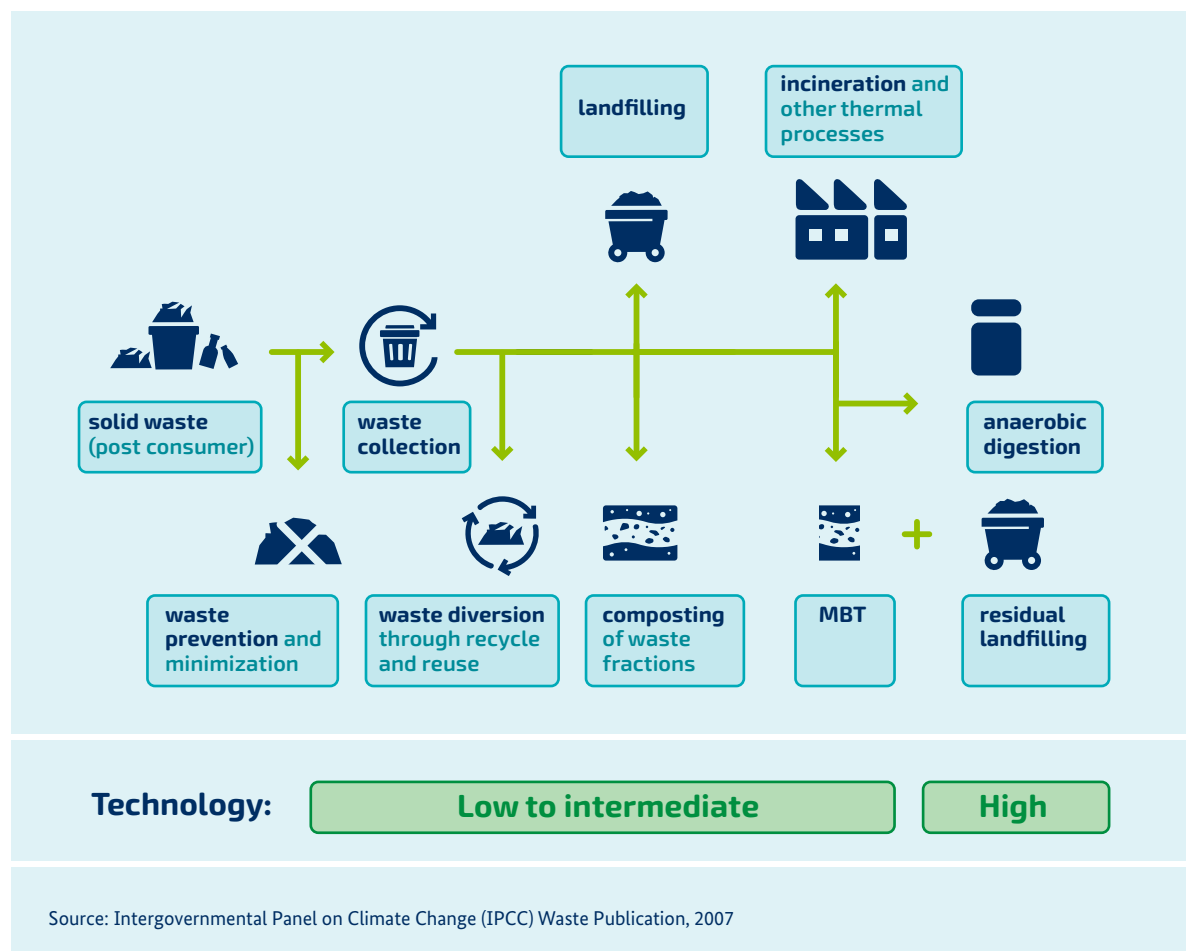
Integrated Waste Management Projects

1 Definition: What is Integrated Waste Management (IWM)?

Integrated Waste Management (IWM) involves the effective combination of several waste management approaches such as optimised collection, recycling, the development of formal landfill sites, anaerobic digestion (AD),¹ and the valorisation² of organic food waste.

Local Governments (LGs) tend to use a combination of several or all these options to manage their waste streams effectively. A typical IWM process is illustrated in Figure 2.1 below.

Figure 2.1: IWM Technologies



1 Anaerobic digestion is the process by which organic matter such as food waste is broken down to produce biogas and biofertilizer. This process happens in the absence of oxygen in a sealed, oxygen-free tank called an anaerobic digester.

2 Valorisation makes use of food waste as feedstock in biotechnological processes to recover parts of the energy and nutrients initially spent on food production.

2 Benefits Associated with IWM Projects

IWM Projects can result in transformative benefits to Local Governments (LGs) and their citizens, ranging from improved living conditions, to budget savings, new sources of revenues and economic growth, job

creation, and other development impacts. The overall benefits of LGs proactively undertaking IWM Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change, namely decreasing Greenhouse Gas (GHG) emissions and attaining overall environmental benefits from the reduction of air, soil and water pollution;
- **Development Benefits:** Improve public health and living standards, stimulate higher rates of economic growth and job creation, and increase the competitiveness of Micro, Small, and Medium-Sized Enterprises (MSMEs); and
- **Local Government Economic Benefits:** Obtain savings in existing budgets (e.g., more efficient services, less damage from climate impacts, etc.), additional indirect income (e.g., fees, taxes, sales of land, etc.) and direct income from services (e.g. waste products, energy tariffs, etc.).

The summary of potential benefits from IWM Projects is detailed in Table 2.1 below.



Table 2.1: Details of Potential Benefits Resulting from IWM Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● GHG emissions savings as a result of methane avoidance at landfill sites ● GHG emissions savings as a result of the production of biogas at markets, abattoirs and landfill sites that can be used to generate electricity or for cooking, replacing thermally generated electricity or charcoal stoves ● GHG emissions savings related to the avoided transportation of waste to landfill sites ● Replacement of waste burning practices that cause air pollution and respiratory issues	● Improved public health and sanitation conditions due to diminished disease vectors that breed in open waste ● Reduced contamination of ground water, surface water and other resources by controlling nutrient run-off and reducing harmful pathogens ● Electricity generated can drive economic growth and allow electricity security for key social services such as clinics and schools ● Delayed capital expenditure in respect of landfill sites by diverting waste ● Operational savings for LGs as a result of the reduced need for landfilling and transporting waste³ ● Job creation through labour intensive recycling processes ● Creation of downstream economic opportunities for entrepreneurs⁴	● Generated revenue from the sale of recyclables, renewable electricity or biogas ● Solid waste management savings as a result of lower waste volumes that need to be treated and landfilled ● Stimulated local economy by maximising employment opportunities for citizens and creating opportunities for Small and Medium-Sized Enterprises (SMEs) through local content requirements ● Overall increased local economic activity and job creation, tax revenues from payrolls, land values, etc.

Note: A UN report found that every ton of waste converted into compost can save half a ton of carbon dioxide emissions. The potential impact of a large IWM programme can be significant as demonstrated by Kenya's "Circular Economy Solid Waste Management Approach for Urban Areas Program" which targets significant GHG emission reductions of 832,032 tons of carbon dioxide equivalent (tCO₂e).

3 "Sustainable Development Benefits of Integrated Waste Management: Integrated Resource Recovery Centres," United Nations, 2017. See: <https://www.unescap.org/sites/default/files/Sustainable%20Development%20Benefits%20of%20Waste%20Management.pdf>

4 Oelofse et al., "Opportunities and Challenges in Waste Management," CSIR, 2018. See: <http://sustainabilityweek.co.za/assets/files/Day%203%20-%20CSIR%20-%20Waste.pdf>

3 Challenges Faced by Local Governments

Effective waste management is essential for public health and for maintaining a healthy, safe, and sustainable environment. If not properly managed, waste can pose serious health and environmental problems and pollute water sources, soil and air.

However, at the LG level solid waste services are often not prioritised, and user fees are not usually cost-reflective covering all costs. As a result, solid waste departments are generally heavily reliant on grants

from the National Government (NG) to fund new capital expenditures and subsidise operations. Moreover, LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

Understanding how to identify and finance alternative waste management solutions is therefore a key priority for LGs that have limited solid waste management budgets.

4 Financing Roadmap for IWM Projects

LGs can undertake a proactive role in the development and finance of IWM Projects. This section provides a financing roadmap including early action steps of relevance for LGs to develop a realistic proactive approach to developing and financing IWM Projects. The

approaches set forth are indicative and may not be feasible or appropriate across the wide range of different contexts and projects across the Sub-Saharan African (SSA) region.

4.1 Assess Revenue Requirements and Opportunities

IWM Projects typically generate multiple revenue streams as they offer a range of services. These potential revenue streams include waste collection fees from households, commercial enterprises and institutions, and proceeds from the sale of recycled products such as gift and utility items, biogas and compost. An IWM Project could also charge the private sector for taking the waste if the latter is responsible for collecting rubbish and disposing of the waste. Lastly, the private sector operator of an IWM Project may also be able to earn income from the LG in cases where it delivers a service by treating waste. These additional revenue streams can sometimes provide total cost recovery and enable the finance of the ongoing commercial operation of an IWM Project.

However, while IWM Projects may finance their operational costs, the user fees often do not cover the costs of capital expenditures in developing and constructing projects. Furthermore, total costs of a modern waste management system might be more expensive than waste collection and dumping. As a result of the lack of total cost recovery, LGs are often dependent on subsidisation of the development and construction costs.

Therefore, LGs may be dependent on NG funding to provide solid waste management services.⁵ As a result, the lack of sufficient intragovernmental fiscal transfers poses a significant challenge for LGs in delivering IWM services. Section 6 provides examples of relevant IWM Projects and highlights potential revenue streams.

5 Van Niekerk et al., "Municipal Solid Waste Management Services in Africa," Working Paper, Public Services International, 2019. See: http://www.world-psi.org/sites/default/files/documents/research/waste_management_in_africa_2018_final_dc_without_highlights_2019.pdf

4.2 Identify Financing Models

Different financing models can be implemented to unlock investment in IWM Projects. Because of their revenue potential and technical complexity, IWM Projects lend themselves to private sector involvement. Public-Private Partnerships (PPPs) tend to be most suitable for IWM Projects that can secure predictable long-term revenue streams from creditworthy off-takers and require significant levels of investment. Another option for the public sector to unlock IWM investment from the private sector is to assume responsibility for the funding and construction of the infrastructure, and

then transfer operational risk through Service Level Agreements (SLAs) to the private sector. Since SLAs require minimal investment from the private sector, they do not require long contract periods and can be as short as three years.

Table 2.2 below provides an overview of the different funding models and the allocation of different roles between the public and private sectors for the financing, the construction, operation and maintenance of the project.

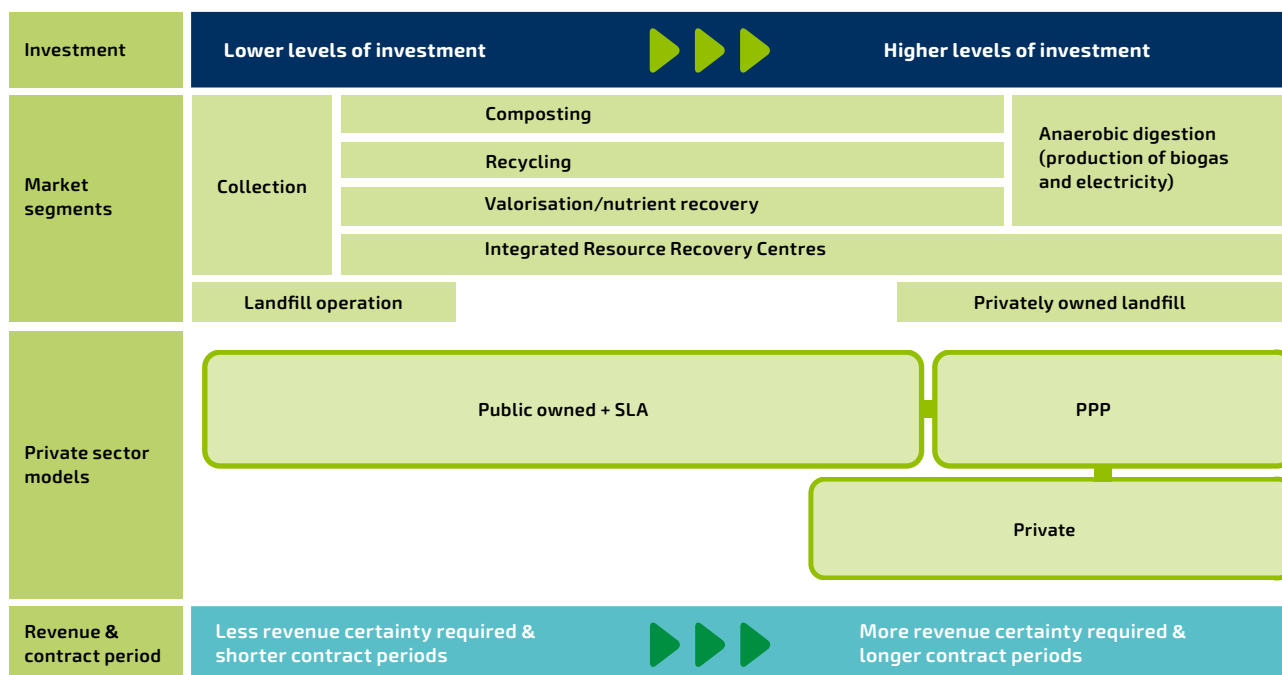
Table 2.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Operated	Public Owned & Private Sector Operated (SLA)	PPP (100% private- owned)	PPP (minority LG ownership)	Private Owned & Operated
Design risk	LG		Private sector		
Construction risk					
Funding of CAPEX	LG raises grants & debt		Private sector mobilises debt & equity	LG funds its share of equity. Private sector raises rest of funds	Private sector mobilises equity & debt
Grants	LG can raise grants to make funding model more affordable				Private sector may be able to secure grants
Operation	LG		Private sector		
Maintenance					
Sales & Marketing					

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

The different market segments are shown in Figure 2.2 below, showing how the level of investment correlates with different types of private sector engagement and finance models that can be implemented to unlock investment by the private sector.

Figure 2.2: IWM Financing Models



As noted above, the higher investment levels for IWM Projects usually require PPP or 100% private sector investment approaches.

There have been some successes in financing viable IWM Projects in SSA through PPPs. For example, Cameroon's municipal solid waste management policy is largely based on PPPs that provide regular collection and processing services for domestic waste in the country's major cities.

As waste treatment projects only become financially viable with a large base of users (e.g., over 150,000), LGs can benefit from pooled IWM Projects that enable economies of scale, enabling the allocation of fixed costs over a larger revenue base. For example, in 2018 five municipalities in South Africa pooled their respective IWM Projects into a single PPP and successfully procured a new landfill site with alternative waste

treatment capability in Mossel Bay. However, the PPP procurement process took more than two years largely due to affordability issues and bylaws that needed to be put into place in each municipality to ring fence unitary payments due to the private sector partner.⁶

Service Level Agreements (SLAs) are also used in SSA countries to contract the private sector to deliver IWM services. For example, in South Africa many LG-owned landfill sites are operated and maintained by the private sector under three year SLAs with some waste collection services also provided on this basis.

In addition, IWM Projects can be financed through pooled finance facilities and development. For

⁶ Based on the consultant's experience. Details cannot be disclosed due to required confidentiality in Non-Disclosure Agreement.

example, South Africa's Department of Environment developed a programme that will pool funding from the Green Climate Fund (GCF) for waste diversion interventions at 30 municipalities in South Africa. The

programme will also develop standardised procurement documents and designs for a number of alternative waste treatment technologies.

To unlock financing, LGs will need to take the following preliminary assessments and early action steps:

- Analyse their available budgets that can be reallocated to compensate funders and the private sector to deliver IWM services;
- Identify which financing models are supported by local legislation and regulations;
- Identify integrated waste management plans and strategies that could form the basis for future funding applications; and
- Identify CAPEX (Capital Expenditures) budgets from the NG and the LG's finance department which could be used to co-fund the project.

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of the different finance models are summarised against key implementation criteria in Table 2.3 below, with advantages highlighted in light green and disadvantages in red.

Whatever model is chosen, it is critical that LGs engage proven private sector professionals early on to structure a cost-effective project development process and design.

Costs could be minimised by packaging projects at several LGs and procuring them on a pooled basis.

An expert pool can be used to develop standardised contracts and procurement processes, reducing development costs at a LG level. Pooled finance applications to the GCF and other financial sources can also unlock more affordable funding.

The above analysis of the four finance models demonstrates the importance of a blended finance approach with credit enhancements, as explained in the prior section.



Biogas at an agricultural training centre, Kenya

Table 2.3: Advantages and Disadvantages of Different Finance Models

Criteria	Public Sector Owned and Managed	Public Sector Owned/Private Sector Managed (SLAs)	Public-Private Partnerships (PPP)	Private Sector 100% Owned
Marketing skills	Public sector does not have the necessary skills to develop/grow a market for IWM products.	Private sector has necessary skills and incentives to market IWM products such as compost and gas or to develop the market if it does not exist already.		
Contract term for operation of facility	No contract required	Unless contract is long enough to recoup investment, the private sector will not make the required level of investment.	Long term contract gives private sector incentives to grow the market.	Outright ownership of all rights to revenue and profit incentivises the private sector.
Access to finance	Reliant on grants from national government and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via national programme as size of project may not justify direct application to international climate facility.			Will need to access climate finance via private sector facility.
Technology risk	Public sector does not have the necessary skills.	Private sector has the necessary skills and experience to manage and operate niche technologies such as anaerobic digestion, production of organic fertilizers and valorisation.		
Costs and time to implement	Lesser requirements in respect of financial and legal expertise may make SLAs and public sector delivered solutions cheaper and faster to implement.		PPPs require technical, financial and legal expertise to develop. Unless large project or programme that pools project, development costs may not be justified.	Private sector is able to respond to opportunities quickly and to fund development costs.
Opportunities for pooling projects via national programmes	Limited opportunity for pooling.	SLAs or PPPs could be procured and developed across a number of LGs or a number of sites within an LG.		Private companies can manage several IWM Projects in the same country and/ or region.
Ability to mitigate construction risk	Engineering Procurement Construction (EPC) contracts can be used to reduce the risk of cost overruns and nonperforming technology.			

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages.

Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model are most appropriate and affordable for an IWM Project, LGs and LG-owned utilities will need to identify possible funding mechanisms.

LGs will need to undertake the following six early action steps assessing their own financial positions and abilities to manage an IWM Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the IWM Project given the current and projected needs of the local community, engaging an external experienced IWM expert if needed;
- 2 Quantify how much the LG spends annually on solid waste management disposal and collection (current and projected) that would be substituted by the proposed IWM Project, working with the LG's financial staff;
- 3 Determine how solid waste management budgets can be reallocated to compensate for the costs of the design and installation of the IWM Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed IWM Project (after subtracting total budgeted amounts – current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the IWM Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, and monitor contracts, estimate the additional cost for the IWM Project.

For LGs to employ a public sector funded model to finance an IWM Project, an assessment will need to be made of its own funding capacity to cover total costs:

- 1 Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the IWM Project?
- 2 Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the NG, development partners, climate funds, or other sources?⁷
- 3 Does the LG have the ability based on national regulations, national government support, and/or its own credit standing to use its own balance sheet to borrow debt from commercial banks, Development Finance Institutions (DFIs) or other private sector institutions?

7 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in the [Annex](#).

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of a LG-owned utility) for raising debt, it can also use private sector entities to contract debt (commercial and concessionary debt). However, the project will need to be structured to minimise risks for the private sector and its lenders.

Key success factors include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG or offtake agreements with third parties, including power purchase agreements for the sale of electricity;
- Guaranteed minimum levels of feedstock;
- A known and tested technological solution;
- Predictable OPEX (Operating Expenses) and CAPEX (Capital Expenditures) that are not subject to foreign exchange risk;
- A creditworthy LG that will pay the private sector on time for IWM services;
- Significant third-party revenues (e.g., compost sales) under long term off-take agreements; and
- CAPEX that is minimised by making use of LG land and other in-kind contributions.

IWM Projects can access climate finance provided that they are structured to maximise GHG emission savings. South Africa's Waste Diversion Programme is an example of an IWM programme that has successfully accessed funding from climate financing facilities.

Often Climate Projects requiring external finance are constructed and financed through separate entities. These entities can be owned by the public sector, a Public-Private Partnership (PPP), or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages for accessing finance for larger projects and pooled finance vehicles using **project finance techniques** as such approaches are proven to minimise default risk and increase recovery rates.⁸ SPVs often obtain loans which are secured against the revenues of the project, with no or limited recourse to the SPV owner(s).

According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks, and to minimise any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggest that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterise project finance techniques are effective.⁹ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$15 million in total investment costs).

8 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983-2017," Moody's Investor Service, March 2019, pages 8-9.

9 In fact, the 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983-2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

Service Level Agreement (SLAs) are entered into between the private sector and the public sectors for the delivery of specific services. SLAs do not require the establishment of a separate legal entity such as an SPV.

Engineering Procurement Construction (EPC) contracts are normally used to construct complex IWM infrastructure. Under an EPC Contract, a contractor is

required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

To determine which contract type and funding model is most appropriate and affordable for an IWM Project, LGs will need to implement the following early action steps:

- Understand how much the LG spends annually on waste management, in particular disposal;
- Investigate how existing waste management budgets can be reallocated to compensate the private sector for delivering Service Level Agreements (SLAs) or Public-Private Partnerships (PPPs);
- Develop project management capabilities to manage and monitor contracts effectively; and
- Enter into an SLA for limited services to build a track record of managing private sector contracts.

4.5 Identify and Implement Credit Risk Solutions

The IWM sector can greatly benefit from credit risk solutions, such as the use of guarantees and debt service escrow accounts, that could be structured to protect lenders and the private sector against key risk such as the following:

- Default by LGs;
- Late payments by LGs;

- Default or late payments by other off takers; and
- Lower than guaranteed levels of feedstock.

To determine what credit solutions are needed and available, LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory.

4.6 Establish Contacts with Private Sector Actors

Traditional waste management companies tend to focus on waste collection, landfill services, and recycling while niche companies tend to focus on alternate waste treatment solutions such as AD, valorisation and composting.

However, partnerships between traditional waste management companies and new technology providers will increase as LGs appoint private sector partners to operate IWM Projects.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology for potential IWM Projects.

Box 2.1: Indicative Funding Sources and Mechanisms for IWM Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

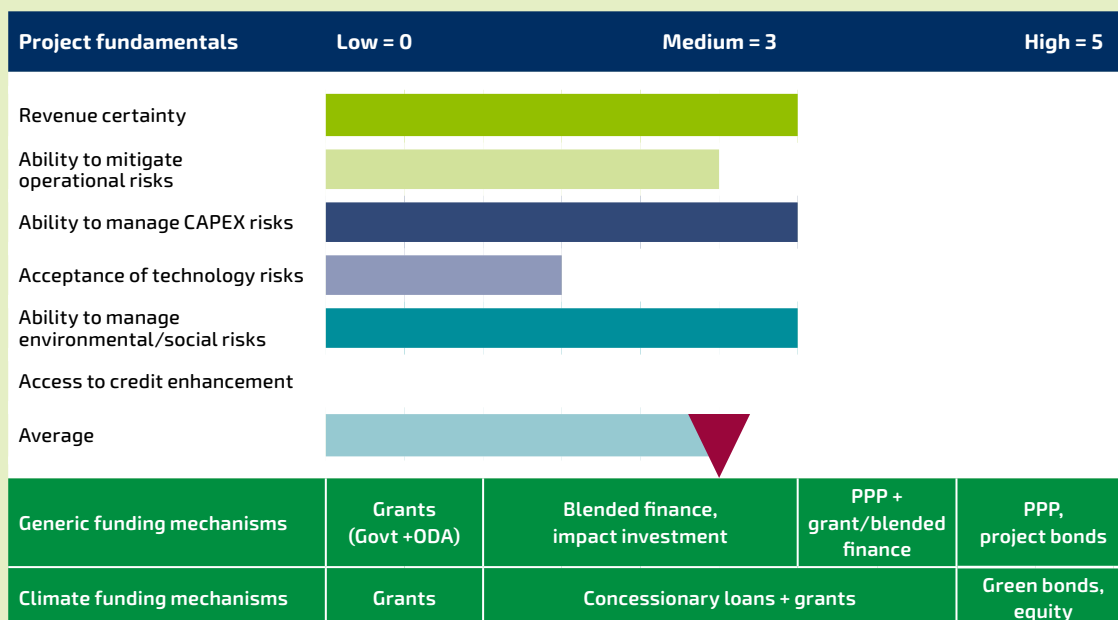
Figure 2.3 below shows a typology for a generic IWM Project and indicates that a blended finance approach may be the most suitable funding option. If climate finance were to be accessed, a combination of concessionary loans and grants may be most suitable.

The following risk and revenue factors drive this typology:

- IWM user fees and tariffs do not tend to be cost reflective;
- LGs often are not able to guarantee feedstock volumes;
- LGs may not be able to guarantee revenue to the private sector; and
- Commercial lenders are often not familiar with IWM technologies.

If risks can be mitigated or revenue certainty increased, an IWM Project could also be implemented via a PPP provided it can access grant funding to reduce upfront costs. A fully funded PPP is unlikely unless an LG has a good credit rating and is able and willing to guarantee revenue and feedstock, and/or secure third-party credit enhancements. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 2.3: Illustrative IWM Project Typology



To unlock private sector investment in IWM Projects, LGs will need to implement the following action steps:

- Connect waste generators to potential users of waste to drive a circular economy and divert waste from landfill;
- Secure revenue for the project by identifying which products the private sector could sell to the LG (e.g., compost, electricity) to make the IWM Project more financially viable;
- Understand and monitor LG waste streams to be able to make minimum feedstock commitments to the private sector;
- Appoint reputable transaction advisors that will help LG structure projects and contracts that share risks and rewards appropriately between the LG and the private sector; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

The next section breaks out the main LG action steps by the specific stage of project development.

5 Action Steps for Local Governments

Table 2.4 below summarises the main proactive action steps that LGs can potentially undertake to implement IWM Projects, detailing the related tasks and outputs.

Table 2.4: Roadmap of Proactive LG Action Steps for Implementing IWM Projects

Action Steps	Tasks	Outputs
1. Develop budget	● Analyse LG budgets to understand current spend on IWM ● Assess whether existing solid waste management tariffs are cost reflective ● Undertake a regulatory review to identify possible funding mechanisms and sources	● Budget available for IWM ● Revised solid waste management tariffs

Table 2.4: Roadmap of Proactive LG Action Steps for Implementing IWM Projects

continued

Action Steps	Tasks	Outputs
2. Engage experts to assess options	- Identify and cost technical solutions under different funding models - Assess affordability and benefits of each technical solution - Rank options based on affordability and net benefits	- Preferred option & indicative funding model - Funding gap
3. Engage funders	- Develop a concept note for Project Preparation Facilities, DFIs, Climate Facilities or existing Programmes - Present project to LG's CFO (Chief Financial Officer) to access own sources of funds/grants - Assess relevance of national grant mechanisms	- Project preparation grant - Feedback from DFIs, Climate Facilities etc. - Commitments from LG's CFO - Minimum technical and co-funding requirements
4. Demonstrate feasibility	- Conduct technical studies - Identify and secure site(s) - Undertake financial/economic/GHG modelling Finalise funding model and sources - Identify M&E criteria	- Business plan - Funding requirements - Approval by LG's Executive
5. Secure funding	Develop funding application(s)	Funding commitments
6. Procure	- Develop procurement documents - Evaluate and award tenders - Conclude construction, PPP, SLA contracts	Signed contracts
7. Monitor and Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above action steps will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants. Technical studies include Environmental and Social Impact Assessments (ESIA) that identify the positive

and negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of IWM Projects from Sub-Saharan Africa and Worldwide

There are many IWM Projects in SSA and worldwide as illustrated with the examples below.

6.1 Integrated Resource Recovery Centres (IRRCs)

Especially notable are Integrated Resource Recovery Centres (IRRCs), as they have been successfully implemented to improve solid waste management in secondary cities and towns in countries such as South Africa, Vietnam and Sri Lanka. Compared to large scale urban waste management solutions that use expensive technologies such as mechanical-biological treatment or waste incinerators, the technologies employed in IRRCs are simple to construct and operate locally, mostly non-mechanised, and durable. IRRCs are modular by design, which means they can be easily scaled up, replicated, and integrated with larger waste management facilities.

In SSA, IRRCs have been implemented in South Africa by the private sector on privately owned land which benefit LGs as they divert waste from LG owned land-fill sites and reduce GHG emissions. Two examples of IRRCs in South Africa include:

→ The New Horizons IRRC which was substantially completed in Cape Town in 2017. It was developed through a joint venture between Waste Mart (a South African waste collector) and Clean Energy Africa and raised debt from South Africa's

Industrial Development Corporation (IDC). Waste Mart had a guaranteed waste stream in place as it is contracted to collect municipal waste in the City of Cape Town. The facility was designed to produce the following products from 63 tons/day of organic waste and 480 tons/day of municipal solid waste: Bio-CNG (for Compressed Natural Gas) for sale as gaseous fuel; liquid carbon dioxide; recyclable plastic, paper, metal and glass; Refuse Derived Fuel (RDF); and organic fertilizer. Gate fees and revenue from Bio-CNG sales were expected to account for 90% of the project's revenue. Whilst the project was proven to be technically sound, higher than expected CAPEX and poorly negotiated offtake agreements led to the lender stepping in to take the project over. The IDC is currently seeking a buyer for the project.¹⁰

→ A waste-to-energy IRRC is operated by Oricol Environmental Services outside Durban in an area called Cato Ridge. It diverts hydrocarbons, oils, solvents and other high calorific sludge waste from a municipal-owned landfill.¹¹ The diverted waste is blended by Oricol to a specific standard and supplied to a nearby cement kiln under a long-term off-take agreement to replace coal as fuel source.

6.2 Private sector investment in IWM Projects

IWM solutions that make use of private sector investment and expertise as well as NGO support have also been implemented in the rest of SSA. Examples include the following:

→ The city of Ouagadougou in Burkina Faso opened its first recycling centre in 2007 which has not only made the city cleaner and safer, but it has also created jobs and income for the local community.

10 "New Horizons Waste to Energy: Athlone Municipal and Organic Waste to Energy Presentation," Department of Energy Biogas Conference, 2017. See: <http://www.energy.gov.za/files/biogas/2017-Biogas-Conference/day2/New-Horizons-Waste-to-Energy.pdf>

11 "Opening of Oricol's KZN Energy and Resource Recovery Facility," Oricoles, 2019. See: <https://www.oricoles.co.za/news/113-opening-of-oricol-s-kzn-energy-and-resource-recovery-facility>

Around 30 women manage the centre, with approximately 2,000 informal collectors bring waste to be recycled. The project creates an economic incentive to collect plastic waste as the recycled product is sold to local businesses at half the price of imported plastic. Collected waste is washed, sorted, and ground down into granules before it is sold. The project was supported by the Italian NGO, LVIA.¹²

→ In Ghana, the Ministry of Local Government and Rural Development signed a contract in 2015 with Armech Africa Limited. The agreement requires Armech to receive the waste collected in Accra in six modern transfer stations, extract recyclable material, and then convert the waste to electricity through incineration.¹³

6.3 Climate finance-funded IWM Projects

The following South African programme makes use of climate finance to fund IWM interventions at the LG level. South Africa's Municipal Waste Diversion Programme was developed by the Department of Environmental Affairs in partnership with GIZ to unlock funding for waste diversion interventions at 30 to 40

municipal landfill sites. It makes use of combination of grants (from the NG and GCF) and concessionary loans (from GCF) to fund the construction of alternative waste treatment facilities at municipalities. The private sector will operate the facilities and market their products under long-term SLAs.

6.4 Public Sector IWM Interventions

The Moshi Municipal Council in Tanzania prioritised service delivery, making use of the country's administrative demarcations to empower lower levels of government to undertake service delivery. It does so by providing an enabling policy environment through the establishment of by-laws, which are vertically embedded from central government to local government, involving community and private entities through the

use of award incentives and punitive fines. The success of this arrangement is evidenced by the city being named Tanzania's cleanest city for four consecutive years. The Moshi Council uses this approach to shape a sustainable waste system that can deliver a service, generate revenue, and create shared values among its citizens.

7 Enabling Factors

For LGs to effectively scale the implementation of IWM Projects, LGs and the NG need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

12 "Burkina Faso: Protecting the Environment by Profiting from Garbage," ILO, 2007. See: http://www.ilo.org/global/about-the-ilo/multi-media/video/video-news-releases/WCMS_083396/lang--en/index.htm

13 "Waste-To-Energy Power Plant to be Constructed in Tema," PowerMag, 2018. See: <https://www.powermag.com/press-releases/waste-to-energy-power-plant-to-be-constructed-in-tema/>

7.1 Local Government Enabling Factors

Several enabling factors can be put into place that enable LGs to unlock finance for IWM Projects. For example, an LG that has the authority to enter into long-term contracts for services has the ability to engage private sector partners in the development and operation of IWM Projects. To illustrate, the South African Municipal Waste Diversion Programme (see section 6 above) engages private sector companies through the use of multi-year SLAs. Examples of LG enabling factors are provided in Table 2.5 below.

It is important to note that in any scenario LGs can proactively take steps to facilitate the identification, development, and finance of IWM Projects:

- **Proactive development of IWM Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop IWM Projects working with private sector professionals, developers, and investors. As noted earlier, securing qualified IWM experts will be critical to the analysis of the needed project development process to design an investable IWM Project.
- **Address environmental impediments:** LGs that lack key enabling factors for unlocking IWM Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

Table 2.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Owned/Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private Owned 100%
1. LG has significant own sources of revenue	✓	✓	✓	✓
2. LG can incur debt	✓	N/A	✓	N/A
3. LG can access CAPEX grants	✓	✓	✓	N/A
4. LG can be shareholder in a company	N/A	N/A	✓	N/A
5. LG can enter into long term contracts for services/products	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay contracts for PPPs and SLAs	✓	✓	✓	✓
7. LG can guarantee feedstock	✓	✓	✓	✓
8. LG can implement cost reflective tariffs	✓	✓	✓	

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for IWM Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 2.5: Local Government Enabling Factors

continued

Local Government Enabling Factors	Public Sector Owned/Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private Owned 100%
9. LG can charge cost reflective tariffs	✓	✓	✓	✓
10. LG has capacity to develop projects (planning, budgeting, engage experts, etc.)	✓	✓	✓	N/A
11. LG can make land available at no or minimal cost	✓	✓	✓	✓
12. LG has capacity to procure EPC contractors	✓	N/A	N/A	N/A
13. LG has capacity to procure and manage long term contracts	✓	✓	✓	N/A

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for IWM Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

7.2 National Government Enabling Factors

LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support ranging from expertise to finance

and guarantees. The various enabling factors that can be put in place by NGs to promote IWM Projects are listed in Table 2.6 below.

Table 2.6: National Government Enabling Factors

National Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private 100% Owned
1. NG can commit grant funding to LG/ project and makes transfers on time	✓	✓	✓	N/A
2. NG has put in place supporting regulatory and legal frameworks	✓	✓	✓	✓
3. NG can develop programmes that in line with Nationally Defined Contributions (NDC) commitments (including the pooling of similar LG projects)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for IWM Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 2.6: National Government Enabling Factors

continued

National Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Private 100% Owned
4. NG can support/develop climate finance applications	✓	✓	✓	N/A
5. NG is able to provide Monitoring & Evaluation support	✓	✓	✓	N/A
6. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓
7. NG develops standardised contracts & user-friendly sustainable procurement policies	✓	✓	✓	N/A
8. NG establishes climate finance facility for the private sector	N/A	✓	✓	✓
9. NG provides guarantees over LG's commitments	✓	✓	✓	✓
10. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓
11. NG puts in place legislation that promotes IWM (e.g., producer pay laws)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for IWM Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, NGs can provide enabling factors for IWM Projects across all financing sources, public and private.

IWM Projects can achieve results with breakthrough enabling factors, as demonstrated by the successful examples listed in Box 2.2 below.

Box 2.2: Examples of Enabling Factors for IWM Projects

- **Off-take Agreements:** In Cato Ridge, South Africa, a waste to energy IRRC diverts hydrocarbons, oils, solvents and other high calorific sludge waste from a municipal owned landfill, with the diverted waste supplied to a nearby cement kiln under a long-term off-take agreement to replace coal as fuel source.
- **National Programmes:** The Ghana Ministry of Local Government and Rural Development signed a contract with a private sector company to enable waste management for Accra, requiring the company Armech to receive the waste collected in Accra, extract recyclable material, and then convert the waste to electricity through incineration.
- **Standardised Contracts and Procurement Processes:** South Africa's Municipal Waste Diversion Programme was developed by the Department of Environmental Affairs in partnership with GIZ to unlock funding for waste diversion interventions at 30 to 40 municipal landfill sites. The programme makes use of standardised contracts and procurement processes that are being developed with GCF support.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of IWM Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance IWM Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support IWM Projects can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, Small and Medium Enterprises, etc.), Non-Governmental Organisations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the Action Steps set out in the prior section “*Table 2.4: Roadmap of Proactive LG Action Steps for Implementation of IWM Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design an IWM Project. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the actions steps in existing IWM Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of IWM Projects. LGs will need to have access to such advisors. NGOs and development partners can provide critical support.

To build out a further database of technical experts, the professionals involved in existing IWM Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options. Initially, SSA countries with successful IWM Projects can share their experiences with other SSA LGs. Early contributors could be participants in IWM Projects in Kenya and South Africa.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing actions steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.



Recycling of electronic waste and bulky waste
Accra, Ghana



Chapter 3:

Waste-to-Energy Projects

1 Definition: What is Waste-to-Energy (WtE)?

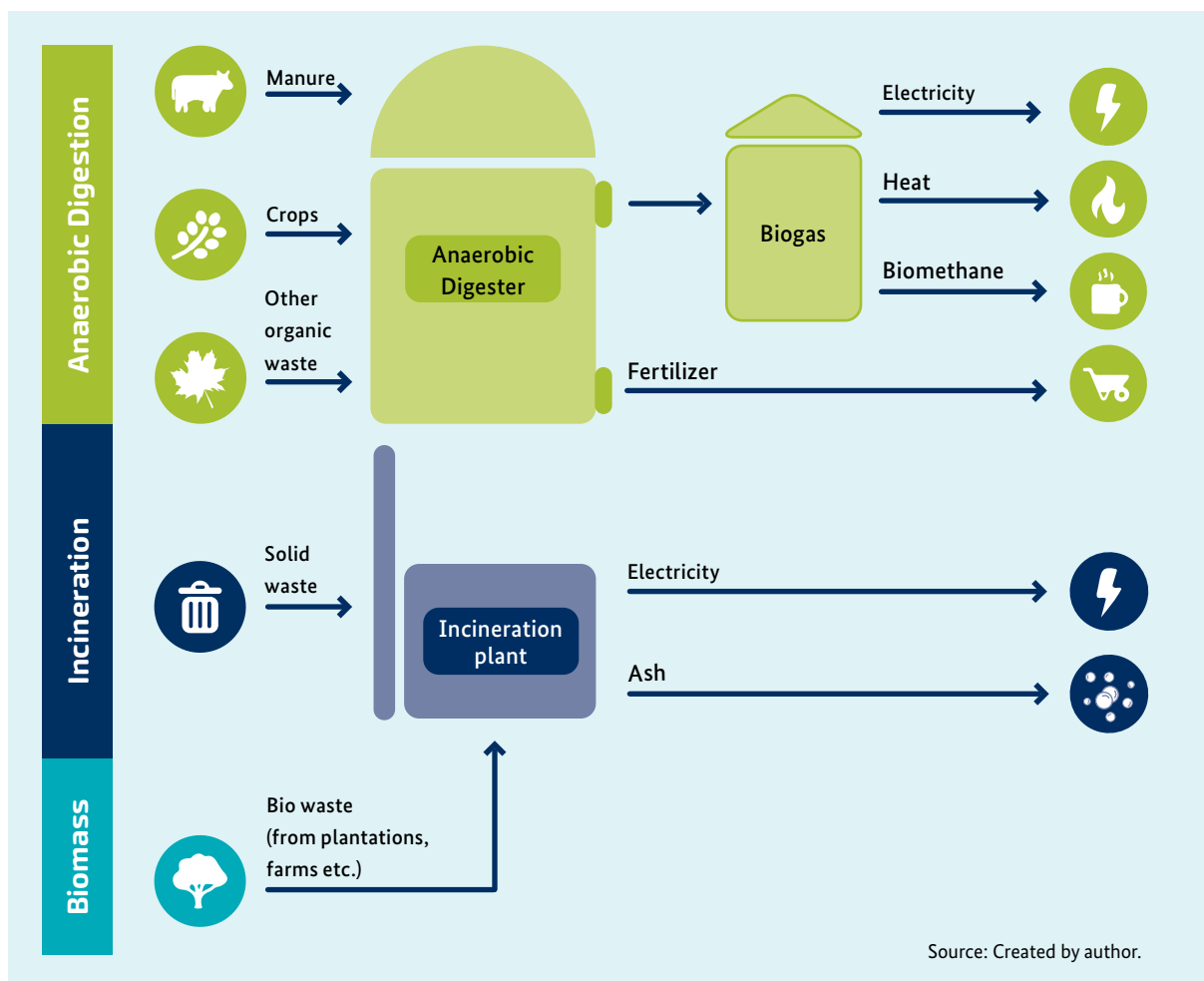
Waste-to-Energy (WtE) processes generally make use of either anaerobic digestion (AD) or incineration processes to convert waste to electricity, biogas, and other by-products. AD refers to a collection of processes by which microorganisms break down biodegradable material in the absence of oxygen. The process is used for industrial or domestic purposes to convert waste into fuels (i.e., electricity and biomethane) and organic fertilizer.

During an incineration process, waste is burnt, generating heat, and ultimately steam that is used to

produce electricity. Ash, flue gases, and particulates are also produced by the incineration process. Gasification and pyrolysis are incineration processes that make use of higher operating temperatures (greater than 700 degrees Celsius) and a controlled oxygen environment to produce a mixture of carbon monoxide, hydrogen, and carbon dioxide.

WtE facilities are considered one element of an integrated waste management (IWM) system that comprehensively collects, treats and disposes waste (see chapter on IWM). Collected waste fractions from manure,

Figure 3.1: Anaerobic Digestion and Incineration Waste-to-Energy Processes



crops, and other organic waste in the case of AD facilities and solid as well as bio waste in the case of incineration are considered the relevant input to convert waste to electricity, biogas, and other by-products.

Incineration projects are unlikely to meet the definition of a climate project as they lock Local Governments (LGs) into high-carbon pathways by producing waste to feed the incinerator and creating air pollution. Moreover, they do not result in affordable electricity tariffs.¹

Incineration, gasification, and pyrolysis interventions are capital intensive, typically requiring an initial investment in the range of US\$800 – 1,100 per ton of annual plant capacity (e.g., a 100,000 ton per year plant would cost in the range of US\$80 – 110 million).² Annual operation and maintenance costs are also high. AD plants tend to be more modular, allowing for smaller facilities that require less upfront investment and smaller waste quantities. In its most basic form, AD plants can be installed at a rural household level in the form of a biodigester that produces cooking gas and fertilizer for smallholder farmers.

2 Benefits Associated with WtE Projects

WtE Projects, can result in transformative benefits to LGs and their citizens, ranging from improved living conditions to budget savings, new sources of revenues and economic growth, job creation, and other development impacts. In fact, WtE initiatives can provide

opportunities for developing new economic sectors at the local level and LG fiscal income. The overall benefits of LGs proactively undertaking WtE Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change impact, through reduction of Greenhouse Gas (GHG) emissions – for example, methane reduction at landfill sites and carbon dioxide (CO₂) from transportation – production of biogas to replace dirtier fuels, and elimination of waste burning practices;
- **Development Benefits:** Improve public health and living standards, generating electricity to drive economic growth and enabling energy security for social services; and
- **Local Government Economic Benefits:** Generate revenues from outputs (e.g., recyclables, compost/fertilizer, electricity, biogas), achieve operational savings from reduced landfilling and transport of waste, and create job opportunities.

The summary of potential benefits from WtE Projects is detailed in Table 3.1 below.

1 https://www.c40knowledgehub.org/s/article/Why-solid-waste-incineration-is-not-the-answer-to-your-city-s-waste-problem?language=en_US.

2 <https://www.cowi.com/insights/massive-waste-in-african-megacities-calls-for-sustainable-waste-to-energy-facilities>

Table 3.1: Details of Potential Benefits Resulting from WtE Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● GHG emissions savings • biogas can be used to generate electricity (replacing thermally generated electricity and charcoal stoves) • avoided transportation of waste to landfill sites ● Replacement of waste burning practices that cause air pollution and respiratory issues ● Emission savings from recovering energy in substitution of 'dirty' energy³	● Improved public health and sanitation conditions due to diminished disease from open waste ● Avoided contamination of ground water, surface water, and other resources (controlling nutrient runoff and reducing harmful pathogens) ● Electricity can drive economic growth ● Energy security for key social services such as clinics and schools ● Free up land with fewer needs for landfilling	● Generate savings as a result of lower waste volumes to be treated and landfilled ● Drive economic growth in the LG's area and ensure electricity security for key social services ● Stimulate local employment opportunities and create opportunities for SMEs through local content requirements ● Operational savings give reduced need for land-filling and transporting of waste⁴ ● Overall increased local economic activity and job creation, tax revenues from payrolls, land values, etc.

3 Challenges Faced by Local Governments

Many LGs are faced with ever-increasing solid waste volumes that need to be disposed of due to urbanization. However, at an LG level, solid waste services are often not prioritized, and user fees do not tend to be cost-reflective.

As a result, solid waste departments are generally heavily reliant on grants from the national government

to fund new capital expenditures and subsidize operations. The affordability and finance of WtE solutions is, therefore, a key consideration for LGs that have limited solid waste management budgets. Moreover, LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

³ Emission savings are particularly large in areas where the energy is produced from brown coal potentially saving up to 1,000 kg of CO₂ equivalent per ton of waste treated.

⁴ "Sustainable Development Benefits of Integrated Waste Management: Integrated Resource Recovery Centres," United Nations, 2017. See: <https://www.unescap.org/sites/default/files/Sustainable%20Development%20Benefits%20of%20Waste%20Management.pdf>

4 Financing Roadmap for WtE Projects

LGs can undertake a proactive role in the development and finance of WtE Projects. This section provides a financing roadmap including early action steps of relevance for LGs to develop a realistic proactive approach to developing and financing WtE Projects.

4.1 Assess Revenue Requirements and Opportunities

Electricity generated by biogas and incineration plants tends to be expensive when compared to commercial-scale solar and wind technologies. This is best illustrated by South Africa's Renewable Energy Independent Power Producer Programme (REIPPP)'s recent bid window⁵ which resulted in a biogas price of R1.80/kW (or 12.4\$/kW) compared to only R0.84/kW (5.8\$/kW) for wind and R1.01/kW (7\$/kW) for solar photovoltaic (PV).

However, where electricity generated by biogas plants replaces expensive diesel generated electricity and plants can sell the heat and fertilizer produced to creditworthy off takers, a Public-Private Partnership (PPP) model becomes viable as illustrated by the Gorge Farm Project in Kenya.

To recoup the high capital expenditure associated with incineration projects (greater than US\$100 million), LGs need to have enough waste of the right type to feed the plant. Hence, the current waste collection system is an important element that LGs need to consider when evaluating WtE Projects. To structure a viable PPP for an incineration plant, the private sector will most likely need to have both subsidized tariffs and significant gate fees, as well as minimum feedstock guarantees.

WtE Projects offer a variety of revenue opportunities that will need to be maximised within the specific LG context. WtE Projects can generate revenue by selling electricity to off takers. Further revenue opportunities may exist for the sale of by-products such as compost or gas. A WtE Project could also charge the private sector for provision of energy or taking the waste if the latter is responsible for disposing and treating waste. Lastly, the private sector operator of a WtE Project may also be able to earn income from the LG in cases where it delivers a service by treating the waste, and through the direct sale of energy generated.

To date, five South African cities⁶ have undertaken feasibility studies for WtE incineration plants, but none of these studies have indicated that this approach is affordable for the respective LGs. Considering the affordability issues associated with WtE incineration plants, this financing roadmap focuses primarily on AD WtE solutions. However, to provide a wider context, additional references are also provided for incineration WtE Projects in SSA. Section 6 provides examples of relevant WtE Projects and highlights potential revenue streams.

4.2 Identify Financing Models

Different financing models can be implemented to unlock investment in WtE Projects. Because of their revenue potential and technical complexity, WtE Projects lend themselves to private sector involvement. PPPs

tend to be most suitable for WtE Projects that can secure predictable long-term revenue streams from creditworthy off-takers and require significant levels of investment.

⁵ Bid window 4.

⁶ Refers to Johannesburg, Cape Town, Rustenburg, Pietermaritzburg, Pretoria

PPPs tend to be most suitable for projects that require significant levels of investment that will provide adequate returns. However, such large investments also require certainty in respect of revenue in order for the private sector to make the investment. Towards this end, PPPs require long term contracts (i.e., greater than 10 years) in order for the private sector to recoup its investment.

Another option for the public sector to unlock WtE investment from the private sector is to assume responsibility for the funding and construction of the infrastructure and then transfer operational risk through Service Level Agreements (SLAs) to the private sector. Since SLAs require minimal investment from the private sector, they do not require long contract periods and can be as short as three years.

Different financing models can be implemented to unlock investment in WtE Projects. Because of their

revenue potential and technical complexity, WtE Projects lend themselves to private sector involvement. PPPs tend to be most suitable for WtE Projects that can secure predictable long-term revenue streams from creditworthy off-takers and require significant levels of investment. Another option for the public sector to unlock WtE investment from the private sector is to assume responsibility for the funding and construction of the infrastructure, and then transfer operational risk through SLAs to the private sector. Since SLAs require minimal investment from the private sector, they do not require long contract periods and can be as short as 3 years.

Table 3.2 below provides an overview of the different funding models and the allocation of roles between the public and private sectors for the financing, construction, operation, and maintenance of WtE Projects.

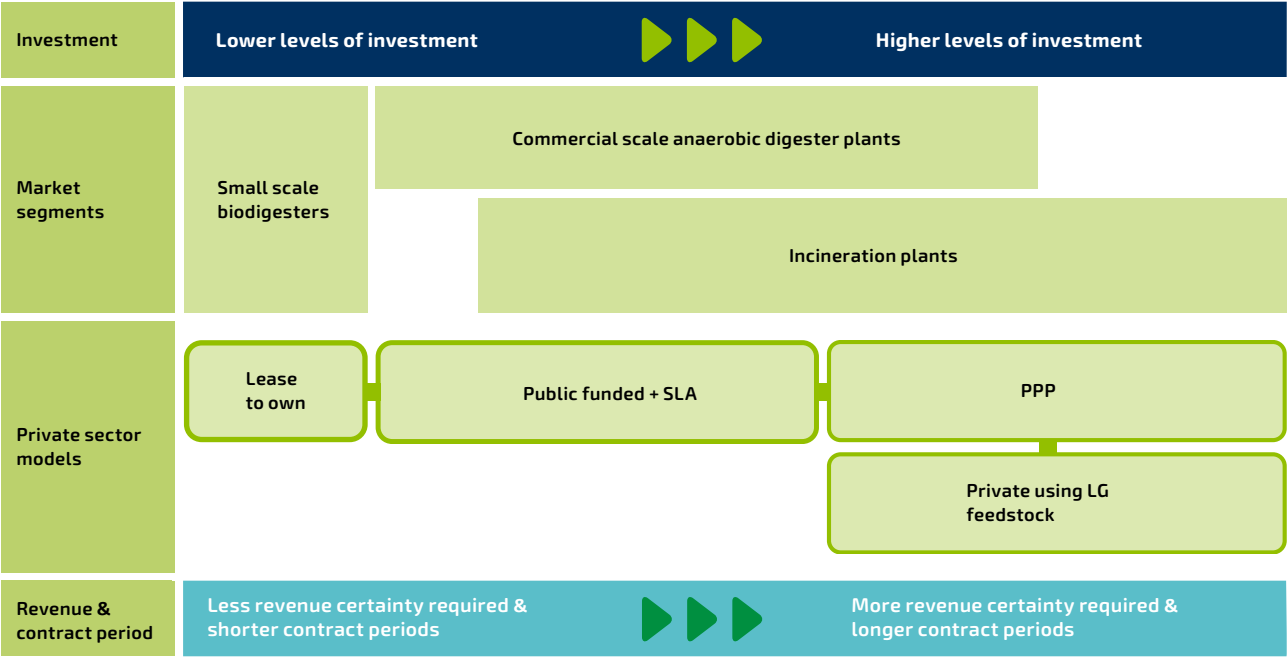
Table 3.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Operated	Public Owned & Private Sector Operated (SLA)	PPP (100% private- owned)	PPP (minority LG ownership)	Private Owned & Operated
Design risk	LG		Private sector assumes roles and risks		
Construction risk					
Grants	LG can raise grants to make funding model more affordable				Private sector may be able to secure grants
Operation	LG		Private sector		
Maintenance					
Sales & Marketing					

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Figure 3.2 below illustrates how the level of investment correlates with different types of private sector engagement and market segments.

Figure 3.2: WtE Financing Models



As noted above, the higher investment levels for WtE projects usually require PPP or 100% private sector investment approaches.

Approaches are illustrated through some successes in financing viable WtE Projects in Sub-Saharan Africa (SSA) through PPPs. For example, the 25-megawatt Ngodwana biogas project is currently under construction in South Africa. The project was awarded to a private consortium as part of the 4th bid window of South Africa’s REIPPP. Shorter term contracts or SLAs are also used in SSA countries to contract the private sector to deliver WtE operating & maintenance services over reduced time periods.

WtE Projects can also be financed through pooled finance facilities and development. For example, South Africa’s Department of Environment developed a

programme that will pool funding from the Green Climate Fund (GCF)⁷ for waste diversion interventions at 30 municipalities in South Africa, including anaerobic digestion. The programme will also develop standardized procurement documents and designs for several alternative waste treatment technologies.

Programmes that make use of grants to stimulate a market for small-scale biogas plants can unlock investment on a lease-to-own basis as demonstrated by Kenya’s National Bio-digester Programme. In the absence of a grant funded programme, LGs can also promote these interventions by educating households and connecting them with private sector providers.

7 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

To unlock financing, LGs will need to take the following preliminary assessments and early action steps:

- Analyse their available budgets that can be reallocated to compensate funders and the private sector to deliver WtE services;
- Identify which financing models are supported by local legislation and regulations;
- Identify IWM plans and strategies that could form the basis for future funding applications; and
- Identify CAPEX budgets from the national government and the LG's finance department which could be used to co-fund the project.

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of different finance models are summarized against key implementation criteria in Table 3.3 below, with advantages highlighted in light green and disadvantages in red.

No matter what model is used, it is critical that LGs engage proven private sector professionals early on to structure a cost-effective project development process and design.

Costs can be minimized by packaging projects at several LGs and procuring them on a pooled basis. An expert

pool can be used to develop standardized contracts and procurement processes, reducing development costs at an LG level. Pooled finance applications to the GCF and other funding sources can also unlock more affordable funding.

The above analysis of the four service delivery models demonstrates the importance of a blended model and finance approach with credit enhancements, as explained in the prior section.

Table 3.3: Advantages and Disadvantages of Different Financing Models

Criteria	Public Sector Owned and Managed	Public Sector Owned/ Managed by Private Sector (SLAs)	Public-Private Partnerships (PPP)	Private Sector Owned 100%
Marketing skills	Public sector does not have the necessary skills to develop/grow a market for WtE by-products (e.g., fertilizer and biogas).	Private sector has necessary skills and incentives to market WtE by-products such as compost and gas or to develop the market if it does not exist already.		

Note: SLA= Service Level Agreement between LG and private sector provider for delivery of services. Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

Table 3.3: Advantages and Disadvantages of Different Financing Models

continued

Continued

Criteria	Public Sector Owned and Managed	Public Sector Owned/Managed by Private Sector (SLAs)	Public-Private Partnerships (PPP)	Private Sector Owned 100%
Contract term for operation of facility	No contract required	Unless contract is long enough to recoup investment, the Private sector will not make necessary investments.	Long term contract gives private sector incentives to grow the market.	Outright ownership of all rights to revenue and profit incentivizes the private sector.
Access to finance	Reliant on grants from national government and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via national programme as size of project may not justify direct application to international climate facility.			Will need to access climate finance via private sector facility.
Technology risk	Public sector does not have the necessary skills.	Private sector has the necessary skills and experience to manage and operate niche technologies such as anaerobic digestion.		
Costs and time to implement	Lesser requirements in respect of financial and legal expertise may make SLAs and public sector delivered solutions cheaper and faster to implement.		PPPs require technical, financial and legal expertise to develop. Unless large project or program that pools projects, development costs may not be justified.	Private sector is able to respond to opportunities quickly and fund development costs.
Opportunities for pooling projects via national programmes	Limited opportunity for pooling.	SLAs or PPPs could be procured and developed across a number of LGs or a number of sites within an LG.		Private companies can manage several WtE Projects in the same country and/or region.
Ability to mitigate construction risk	Engineering Procurement Construction (EPC) contracts can be used to reduce the risk of cost overruns and nonperforming technology.			

Note: SLA= Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages.

Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model are most appropriate and affordable for an WtE Project, LGs and LG-owned utilities will need to identify possible funding mechanisms.

An LG will need to undertake the following six early action steps assessing its own financial position and abilities to manage the WtE Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the WtE Project given the current and projected needs of the local community, engaging an external experienced WtE expert if needed;
- 2 Quantify how much the LG spends annually on solid waste management disposal and collection (current and projected) that would be substituted by the proposed WtE Project, working with the LG's financial staff;
- 3 Determine how solid waste management budgets can be reallocated to compensate for the costs of the design and installation of the WtE Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed WtE Project (after subtracting total budgeted amounts – current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the WtE Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, and monitor contracts, estimate the additional cost for the WtE Project.

For an LG to employ a public sector funded model to finance the WtE Project, an assessment will need to be made of its own funding capacity to cover total costs:

- 1 Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the WtE Project?
- 2 Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the national government, development partners, climate funds, or other sources?
- 3 Does the LG have the ability based on national regulations, national government support, and/or its own credit standing to use its own balance sheet to borrow debt from commercial banks, DFIs, or other private sector institutions?



Biogas production with waste from the oil pressing of avocados near Thika, Kenya

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of a LG-owned utility) for raising debt, it can also use private sector entities to contract debt (commercial and concessionary debt). However, the project will need to be structured to minimize risks for the private sector and its lenders.

Key success factors include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG or offtake agreements with third parties, including power purchase agreements for the sale of electricity;
- Guaranteed minimum levels of feedstock;
- A known and tested technological solution recommended by experienced qualified independent advisors to support LGs in their development of WtE Projects;
- Predictable OPEX (Operating Expenses) and CAPEX (Capital expenditure) that are not subject to unacceptable foreign exchange risk;
- A creditworthy LG that will pay the private sector in full and on time for WtE services;
- Significant third-party revenues (e.g., fertilizer or biogas sales) under long term off-take agreements; and
- CAPEX that is minimized by making use of LG land, other in-kind contributions, and/or grants to buy down the cost of equipment and services.

WtE Projects can access **climate finance** provided that they are structured to maximize GHG emission savings. For example, South Africa's Waste Diversion Programme is a waste diversion program with small-scale AD

interventions that has successfully accessed funding from a climate finance facility.

Often Climate Projects requiring external finance are constructed and financed through separate entities. These entities can be owned by the public sector, a PPP, or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages for accessing finance for larger projects and pooled finance vehicles using **project finance techniques** as such approaches are proven to minimise default risk and increase recovery rates.⁸ SPVs often obtain loans that are secured against the revenues of the project, with no or limited recourse to the SPV owner(s). According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks and to minimize any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggest that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterize project finance techniques are effective.⁹ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$15 million in total investment costs).

8 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks, and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983–2017," Moody's Investor Service, March 2019, pages 8–9.

9 In fact, 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983–2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

SLAs are entered into between the private sector and the public sector for the delivery of specific services. The use of an SLA does not require the establishment of a separate legal entity such as a SPV.

Engineering Procurement Construction (EPC) contracts are normally used to construct complex WtE infrastructure. Under an EPC Contract, a contractor is required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

To determine which contract type and funding model is most appropriate and affordable for an WtE Project, LGs will need to implement the following early action steps:

- Understand how much the LG spends annually on landfilling and collection per ton;
- Investigate how existing solid waste management budgets can be reallocated to compensate the private sector for delivering SLAs or PPPs.
- Develop project management capabilities to manage and monitor contracts effectively; and
- Enter into an SLA with a private sector company for limited services to build its contract management capacity and a successful track record of managing private sector contracts.

4.5 Identify and Implement Credit Risk Solutions

The WtE sector can greatly benefit from credit risk solutions, such as the use of guarantees and debt service escrow accounts that could be structured to protect lenders and the private sector against risks. Examples of key risks that need to be mitigated include the following:

- Default by LGs;
- Late payments by LGs;
- Default or late payments by other off takers; and
- Lower than guaranteed levels of feedstock.

To determine what credit solutions are needed and available, LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory.

It is important to note that guarantees will need to meet the stringent credit requirements of risk mitigation providers, either by demonstrating the capacity to make timely and complete payments, a counter-guarantee from a creditworthy entity (such as the national government), or through adequate collateral and escrow accounts.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology for potential WtE Projects.

Box 3.1: Indicative Funding Sources and Mechanisms for WtE Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

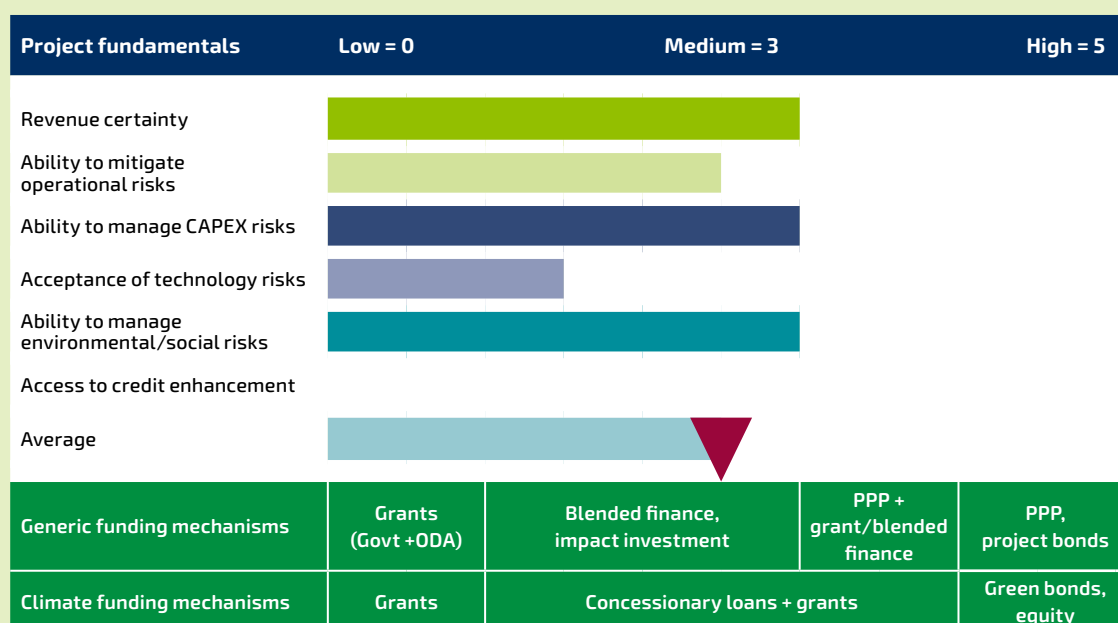
Figure 3.3 below shows a typology for a generic LG implemented WtE Project and indicates that a blended finance approach may be the most suitable funding option. If climate finance were to be accessed, a combination of concessionary loans and grants may be most suitable.

The following risk and revenue factors drive this typology:

- Solid waste fees and tariffs are not usually cost reflective;
- LGs often are not able to guarantee feedstock volumes;
- LGs may not be able to guarantee revenue to the private sector; and
- Commercial lenders are often not familiar with WtE technologies.

If risks can be mitigated or revenue certainty increased, an WtE Project could also be implemented via a PPP provided it can access grant funding to reduce upfront costs. A fully funded PPP is unlikely unless an LG has a good credit rating and is able and willing to guarantee revenue and feedstock, and/or secure third-party credit enhancements. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 3.3: Illustrative WtE Project Typology



4.6 Establish Contacts with Private Sector Actors

Traditional waste management companies tend to focus on waste collection, landfill services, and recycling whilst niche companies tend to focus on alternate waste treatment solutions such as AD, incineration, pyrolysis, etc. However, it is important to note that

partnerships between traditional waste management companies and new technology providers will increase as LGs appoint more private sector partners to operate WtE Projects.

To unlock private sector investment in WtE Projects, LGs will need to implement the following action steps:

- Connect waste generators to potential users of waste to drive a circular economy and divert waste from landfill;
- Secure revenue for the project by identifying which products the private sector could sell to the LG (e.g., water, fertilizer, electricity) to make the WtE Project more financially viable;
- Understand and monitor LG waste streams to be able to make minimum feedstock commitments to the private sector;
- Appoint reputable transaction advisors that will help LG structure projects and contracts that share risks and rewards appropriately between the LG and the private sector; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

The next section breaks out the main LG action steps by the specific stage of project development.

5 Action Steps for Local Governments

The table 3.4 below summarises the main proactive action steps of LGs and details the tasks and outputs required to implement an WtE Project.

Table 3.4: Roadmap of Proactive LG Action Steps for Implementing WtE Projects

Action Steps	Tasks	Outputs
1. Develop budget	- Analyse LG budgets to understand current spend on solid waste management services and electricity - Undertake a waste characterization study/audit - Assess whether existing solid waste management tariffs are cost reflective - Undertake a regulatory review to identify possible funding mechanisms and sources, including subsidized electricity tariffs, gate fees, etc.	- Budget available for WtE - Revised solid waste management tariffs
2. Engage experts to assess options	- Identify and cost technical solutions under different funding models - Assess affordability and benefits of each technical solution - Rank options based on affordability and net benefits	- Preferred option & indicative funding model - Funding gap
3. Engage funders	- Develop a concept note for Project Preparation Facilities, DFIs, Climate Facilities, or existing Programmes - Present project to LG's CFO to access own sources of funds/grants - Assess relevance of national grant mechanisms	- Project preparation grant - Feedback from DFIs, Climate Facilities, etc. - Commitments from LG's CFO - Minimum technical and co-funding requirements
4. Demonstrate feasibility	- Conduct technical studies - Identify and secure site(s) - Undertake financial/economic/GHG modelling Finalize funding model and sources - Identify M&E criteria	- Business plan - Funding requirements - Approval by LG's Executive
5. Secure funding	Develop funding application(s)	Funding commitments
6. Procure	- Develop procurement documents - Evaluate and award tenders - Conclude construction, PPP, SLA contracts	Signed contracts
7. Monitor and Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants. Technical studies include Environmental and Social Impact Assessments (ESIA) that identify the positive and

negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of WtE Projects from Sub-Saharan Africa and Worldwide

There are numerous examples of WtE Projects in SSA, ranging from public sector programmes to PPPs and private sector-led projects.

6.1 Public Sector Programmes

The below examples are related to the Africa Biogas Partnership Programme (ABBP) illustrating how public sector programmes can unlock investment in WtE Projects by smallholder farmers:

- The Africa Biogas Partnership Programme (ABBP) supported the establishment of Biodigester Construction Enterprises (BCEs) in Kenya, Senegal, Uganda, Ethiopia, Tanzania, and Burkina Faso.
- Subsidies to end-users for up to 50% of the biodigester's cost were provided by the ABBP in Phase 1 but were replaced by government subsidies in Phase 2. The second phase targeted the expansion of credit facilities available to end users and set a target of 40–60% of biodigesters being financed with end-user credit provided by micro-finance institutions (MFIs) and Savings & Credit Organizations (SACCOs).

- The National Bio-digester Programme in Burkina Faso unlocked investment in 12,000 bio-digesters between 2009 and 2018, giving over 75,000 people access to clean cooking, lighting and organic fertilizer.¹⁰ However, less than 5% of biodigesters sold in Burkina Faso were financed through credit-facilities as MFIs operating in the country were generally unwilling to recognize the fixed-dome biodigesters as collateral. The financing target of 40–60% was only achieved in Ethiopia and only around 30% of biodigesters sold in Kenya were financed via credit in most years.¹¹
- Post the ABBP, several new biodigester companies have entered the market in Kenya that offer lease to own financing.¹² One of these firms, Sistema Bio, received US\$12 million of investment from impact investors in 2019 to roll out more biodigesters to smallholder farmers.¹³

10 "SNV staff honoured for contribution to bio-digester sector," SNV, 2018. See: <https://snv.org/update/snv-staff-honoured-contribution-bio-digester-sector>

11 "Africa Biogas Partnership Programme (ABPP) Phase 2 – Effect Evaluation," Government of the Netherlands, 2019. See: <https://www.government.nl/documents/reports/2019/05/13/africa-biogas-partnership-programme-abpp-phase-2---effect-evaluation>

12 Ibid.

13 "Kenya Social Enterprise Sistema.bio to Impact 100,000 Kenyan Farmers Following Latest Investment," Weetracker, 2019. See: <https://weetracker.com/2019/05/20/sistema-bio-boost-kenyan-farmers-following-latest-investment/>

An example of an SSA public sector financed and operated WtE Project is a sizeable incinerator plant located in Addis Ababa at the Reppie landfill site. A US\$120 million EPC contract was concluded in 2013 between Ethiopian Electrical Power (EEP) and a consortium comprising Cambridge Industries and China National Electric Engineering Co.¹⁴ The facility is designed to process 1,400 tons of municipal waste per day and to produce 185 GWh of electricity annually (equal to 25% of Addis Ababa's power needs). The generated electricity feeds into the Ethiopian national grid.¹⁵ While the joint EPC consortium will provide training, first-year spare-parts, and full consumables as well as continued warranty, EEP will operate the plant.

The project was inaugurated in June 2018 after two years of delays. However, recent press statements suggest that the EEP and its EPC contractor/consortium are in dispute over several issues such as the design capacity of the plant, and that the EPC contract may not have clearly specified risks and responsibilities.¹⁶ A common issue in EPC contracts is the lack of adequate definition of performance risks and damages that are the responsibility of the EPC contractor, ensuring adequate compensation to the project owner for cost overruns and costs resulting from significant delays.

6.2 PPP and Private Sector Projects

An example of an PPP/IPP WtE Project is the 25 megawatt biomass WtE Project that reached financial close in April 2019 as part of the South African government's Renewable Energy Independent Power Producer Procurement (REIPPP) Programme.

Below are two examples of private sector-led WtE Projects that make use of LG feedstock:

→ A 275 kW biogas-to-power plant located in Ouagadougou, Burkina Faso was the first grid-connected biogas plant in West Africa. The plant was developed by Fasobiogaz SARL, a Dutch owned company that is supported by the Dutch government. It has the capacity to treat 40 tons of waste daily from the nearby municipal abattoir and a large brewery. The plant supplies electricity to the national utility (Sonabel) and generates heat that is used by neighbouring industries and produces organic fertilizer.

Financing for the plant was provided by a Dutch private sector fund.¹⁷

→ An innovative private sector-led WtE Project, the New Horizons Energy Project, was completed in Cape Town, South Africa in 2017. As a joint venture between Waste Mart (a South African waste collector) and Clean Energy Africa, the company raised debt from South Africa's Industrial Development Corporation (IDC). Waste Mart has a guaranteed waste stream in place as it is contracted to collect municipal waste in the City of Cape Town. The facility was designed to produce the following products from 63 tons/day of organic waste and 480 tons/day of municipal solid waste:

- Bio-CNG for sale as gaseous fuel;
- Food grade liquid carbon dioxide;
- Recyclable plastic, paper, metal and glass;

14 "Reppie in Addis Ababa, Ethiopia: The first waste-to-energy facility on the African continent," Ramboll, 2018. See: <https://ramboll.com/projects/re/reppie-in-addis-ababa-ethiopia-first-waste-to-energy-facility-african-continent>

15 "Ethiopia's waste-to-energy plant is a first in Africa," UNEP, 2017. See: <https://www.unenvironment.org/news-and-stories/story/ethiopia-waste-energy-plant-first-africa>

16 "Contentious Waste Power Plant to Resume Operations," Addis Fortune, 2019. See: <https://addisfortune.news/contentious-waste-power-plant-to-resume-operations/>

17 "Bioenergy for Sustainable Energy Access in Africa," DFID, 2017. See: https://assets.publishing.service.gov.uk/media/5ab4d869ed915d78b9a459bf/TVC_Prioritisation_Report_final_to_DFID.pdf

18 "New Horizons Waste to Energy: Athlone Municipal and Organic Waste to Energy Presentation," Department of Energy Biogas Conference, 2017. See: <http://www.energy.gov.za/files/biogas/2017-Biogas-Conference/day2/New-Horizons-Waste-to-Energy.pdf>

- Refuse Derived Fuel (RDF); and
- Organic fertiliser.¹⁸

Gate fees were forecast to account for almost half of the facility's income and gas sales for a further 40%. The other income streams accounted for only 10% of

projected revenues.¹⁹ While the project was proven to be technically sound, higher than expected capital expenditure and poorly negotiated offtake agreements led to the lender assuming control of the project in mid-2018.²⁰ The IDC is currently seeking a buyer for the project.

6.3 Projects that Connect to the National Grid

A Kenya AD power plant, the Gorge Farm Plant, is a good example of how the private sector can implement a WtE Project that supplies electricity to the grid. With a capacity of 2.8 MW, the project was developed by a private sector company on a large commercial farm. The Gorge Farm Plant is the largest of its size and type in East Africa²¹ and sells surplus power to the grid.²² The Gorge Farm is an 800 hectares vegetable farm owned and operated by Vegpro Group, the largest

fresh-produce exporter in East Africa. The AD plant was developed by Tropical Power and is operated by Biojoule Kenya, an independent power producer that sells electricity to Kenya Power & Lighting Company (KPLC) and Gorge Farm at US\$0.10 per kWh. The Vegpro Group supplies 150 tons of organic waste to the plant daily and is also the offtaker of the plant's organic fertiliser and uses some of the heat generated by the plant to heat its greenhouses.

6.4 Pooled Finance

The South Africa's Municipal Waste Diversion Programme makes use of pooled climate finance to fund AD WtE projects and other alternative waste treatment interventions at the LG level. The programme was developed by the Department of Environmental Affairs in partnership with GIZ to unlock funding for waste diversion interventions at 30 to 40 municipal landfill

sites. It makes use of combination of grants (National, GCF) and concessionary loans (GCF) to fund the construction of alternative waste treatment facilities at municipalities. The private sector company will operate the facilities, including small-scale AD plants, and market their products (organic fertilizer) under long term SLAs.

7 Enabling Factors

For LGs to effectively scale the implementation of WtE Projects, LGs and the National Governments (NGs) need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

19 Ibid.

20 Sourced from consulting engineer's experience. Details cannot be disclosed due to required confidentiality in Non-Disclosure Agreement.

21 "Gorge Farm Energy Park, at Naivasha, Kenya, is dedicated to showcasing leading-edge renewable technologies," Tropical Power, 2019. See: <http://www.tropicalpower.com/projects/gorge-farm-energy-park/>

22 "A Review of Commercial Biogas Systems and Lessons for Africa," Research Gate, 2018. See: https://www.researchgate.net/publication/328684041_A_Review_of_Commercial_Biogas_Systems_and_Lessons_for_Africa

7.1 Local Government Enabling Factors

Several enabling factors can be put into place that enable LGs to unlock finance for WtE Projects. For example, an LG that has the authority to enter into long term contracts has the ability to engage private sector partners in the development and operation of WtE Projects. To illustrate from the cited case studies (section 6), two SSA projects have long-term contracts that enable the processing of LG waste: The biogas-to-power plant located in Ouagadougou, Burkina Faso secures waste from the LG's abattoir and the Reppie facility in Addis Ababa, Ethiopia is expected to process 1,400 tons of municipal waste per day, producing 185 GWh of electricity annually (equal to 25% of Addis Ababa's power needs). Examples of LG enabling factors are provided in Table 3.5 below.

It is important to note that in any scenario LGs can proactively take steps to facilitate the identification, development, and finance of WtE Projects:

→ **Proactive development of WtE Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop WtE Projects working with private sector professionals, developers, and investors. As noted earlier, securing qualified WtE experts will be critical to the analysis of the needed project development process to design an investable WtE Project.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking WtE Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

Table 3.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Lease-to-Own with Grant	Private Company using LG Feedstock
1. LG has significant own sources of revenue	✓	✓	✓	✓	✓
2. LG can incur debt	✓	N/A	✓	N/A	N/A
3. LG can access CAPEX grants	✓	✓	✓	✓	N/A
4. LG can be shareholder in a company	N/A	N/A	✓	N/A	N/A
5. LG can enter into long term contracts for services/products	✓	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay PPP/SLA contracts	✓	✓	✓	N/A	N/A
7. LG can guarantee feedstock	✓	✓	✓	N/A	✓
8. LG can implement cost reflective tariffs	✓	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for WtE Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 3.5: Local Government Enabling Factors

continued

Local Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Lease-to-Own with Grant	Private Company using LG Feedstock
9. LG can charge cost reflective landfill gate fees	✓	✓	✓	✓	✓
10. LG has capacity to develop project (planning, budgeting, expert support, etc.)	✓	✓	✓	✓	N/A
11. LG can make land available at no or minimal cost	✓	✓	✓	N/A	✓
12. LG has capacity to procure EPC contractor	✓	N/A	N/A	N/A	N/A
13. LG has capacity to procure and manage long term contract	✓	✓	✓	N/A	N/A
14. LG has capacity to administrate a grants program	N/A	N/A	N/A	✓	N/A

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for WtE Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

7.2 National Government Enabling Factors

LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support ranging from expertise to finance and guarantees. The various enabling factors that can be put in place by National Governments to promote WtE Projects are broken out by financing model in Table 3.6 below.

Table 3.6: National Government Enabling Factors

National Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Lease-to-Own with Grant	Private Company using LG Feedstock
1. NG can commit grant funding to LG/project and makes transfers on time	✓	✓	✓	✓	N/A
2. NG has put in place supporting regulatory and legal frameworks	✓	✓	✓	✓	✓
3. NG has put into place feed-in tariffs for biogas	✓	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for WtE Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 3.6: National Government Enabling Factors

continued

National Government Enabling Factors	Public Sector Owned/ Private Sector Managed (SLAs)	PPP 100% Owned by Private Sector	PPP with LG Shareholding	Lease-to-Own with Grant	Private Company using LG Feedstock
4. NG can develop programme that is in line with NDC commitments (including pooling of similar LG projects)	✓	✓	✓	✓	✓
5. NG can support and develop climate finance applications	✓	✓	✓	✓	N/A
6. NG is able to provide expert support	✓	✓	✓	✓	N/A
7. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓	✓
8. NG develops standardised contracts & user-friendly sustainable procurement policies	✓	✓	✓	N/A	N/A
9. NG establishes climate finance facility for the private sector	✓	✓	✓	✓	✓
10. NG can provide guarantees covering LG commitments	✓	✓	✓	✓	✓
11. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓	✓
12. NG has in place legislation that promotes WtE (e.g., producer pay laws)	✓	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for WtE Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, National Governments can provide enabling factors for WtE Projects across public and private financing sources.

Therefore, this Climate Project can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 3.2 below.

Box 3.2: Examples of Enabling Factors for WtE Projects

- **Guaranteed Feedstock:** The Gorge Farm AD Plant in Kenya demonstrates how long-term feedstock agreements with a reliable supplier is key to unlocking significant private sector investment for a WtE Project.
- **Off-take Agreements:** The Gorge Farm Plant also benefited from a long-term off-take agreement with Kenya Power & Lighting Company which allowed the private sector to raise long term commercial debt.
- **Grant Funding:** The Africa Biogas Partnership Programme (ABBP) made use of grant funding to support the establishment of Biodigester Construction Enterprises in Kenya. Post the ABBP, several new biodigester companies entered the market in Kenya that offer lease to own financing which may not have been possible if the initial grant-funded programme had not stimulated the market for biodigesters.
- **Standardized Contracts and Procurement Processes:** South Africa's Municipal Waste Diversion Programme was developed by the Department of Environmental Affairs in partnership with GIZ to unlock funding for waste diversion interventions, including AD plants, at 30 to 40 municipal landfill sites. The programme makes use of standardized contracts and procurement processes that are being developed with GCF support.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of WtE Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance WtE Projects by working through national agencies and programs, and those of development partners.

Towards this end, a national ecosystem to support this Climate Action can be mapped to identify constraints and opportunities. Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), non-governmental organizations, urban residents, and farmers. Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the action steps set out in the prior section “*Table 3.4: Roadmap of Proactive LG Action Steps for Implementation of WtE Projects.*” In addition, enabling information will need to be provided on the professional services required to develop and design WtE Projects. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information. To begin this process, the actions steps in WtE Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of WtE Projects. LGs will need to have access to such advisors. National governments and development partners can provide critical support.

To build out a further database of technical experts, the professionals involved in existing WtE Projects could be identified and compiled into a list, with information on their services and contact information.

There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimize access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful WtE Projects can share their experiences with other SSA LGs. A key participant would be South Africa’s Waste Diversion Programme that makes use of waste-to-energy interventions. Early contributors could be participants in IWM Projects in Kenya and South Africa.

5 Provide Online “Local Government Climate Action Platform” Enabling Cost-Effective Access to Information and Communication Venues.

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

The CoM SSA training materials include modules for project development, finance, and modules on specific Climate Projects.



Chapter 4:

Solar Projects

Rooftop and Heaters

1 Definition: What are Solar Rooftop and Water Heater Projects?

This chapter provides a financing roadmap to unlock investment in solar interventions related to rooftop photovoltaic (PV) panels and solar water heaters (SWHs).¹ While both PV panels and SWHs work by absorbing sunlight, PV panels convert sunlight into electricity, and SWHs convert sunlight into heat that is used to produce hot water. Even though the two systems work differently and have distinct purposes, they both make use of renewable energy instead of traditional dirtier power sources.

Solar appliances can be small scale, stand-alone installations, such as rooftop solar PV panels to provide electricity for individual public buildings, or larger scale projects such as entire newly planned city areas to be electrified by solar PV, or even large-scale solar power plants.

A further distinction can be made between off-grid installations and grid-connected PV panels that are tied to an electrical grid that is owned either by the Local Government (LG) or the utility. When the grid-connected PV panels generate more electricity than is consumed by the building or household, the excess electricity can be fed into the grid instead of being lost. Net metering (or feed-in tariff schemes in some countries) allows the owners of grid-connected PV panels to earn income from the excess electricity generated.

Grid-connected PV panels could play an important role in improving the business case for LGs and households to invest in PV panels. Since excess electricity generated by off-grid PV panels cannot be sold to the grid, it is normally stored using expensive battery systems.

2 Benefits Associated with Solar Projects

Solar Projects can result in transformative benefits to LGs and their citizens, ranging from improved living conditions to budget savings, new sources of revenues and economic growth, job creation, and other development impacts. In fact, solar rooftop PV initiatives can also provide opportunities for developing new

economic sectors at the local level and increasing LG fiscal income.

The overall benefits for LGs proactively undertaking Solar Projects can be summarised from three perspectives:

● **Climate and Environmental Benefits:** Reduce Greenhouse Gas (GHG) emissions, conserve natural resources, improve air quality, reduce water consumption and fossil fuel consumption;

● **Development Benefits:** Development Benefits: Improve security of energy supply, reduce burden on the existing electricity distribution infrastructure and transmission losses, stimulate economic growth creating opportunities for Micro, Small, and Medium-Sized Enterprises (MSMEs), create local jobs; and

¹ Two other chapters in the study include solar interventions: (1) Solar Mini-grids (off-grid and on-grid) and (2) Public Lighting (including solar lighting).

- **Local Government Economic Benefits:** Lower energy and fossil fuel consumption, reduce operation and maintenance costs, free up budgets for the delivery of public services, and create job opportunities (e.g., maintenance, cleaning of panels, etc.).

The summary of potential benefits from Solar Projects is detailed in Table 4.1 below.

Table 4.1: Details of Potential Benefits Resulting from Solar Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● Reduced GHG emissions ● Conservation of natural resources ● Improved air quality ● Reduced water consumption as solar interventions do only require minimal water for cooling or processing ● Examples of emission reductions: • SWHs that displace electric geysers that make use of coal-based electricity could reduce CO₂ emissions by 2–3 tons per household per year² • A 10-kilowatt-peak rooftop PV system can reduce 12 tons of CO₂ emissions per year if it replaces coal-based electricity³	● Lower costs for LGs for energy consumption, operation, and maintenance, freeing up budgets for the delivery of services ● Improved security of supply ● Reduced burden on existing electricity distribution infrastructure ● Energy security for key social services such as clinics and schools ● Reduced transmission losses	● Energy cost savings by installing SWHs and PV panels as these interventions pay for themselves over relatively short periods ● Under a <i>public sector</i> funded model, after raising the funding to pay for the equipment and installation, the LG will achieve electricity savings from its commercial operation date (COD) ● Under a <i>private sector</i> funded model, the LG is required to make payments to the private sector entity (can be structured to be cost neutral), but once the contract comes to an end, the LG will benefit fully from the energy savings ● Stronger local economy as local SMEs and citizens can be engaged in the installation of SWHs and PV panels ● Overall increased local economic activity and job creation, tax revenues from payrolls, land values, etc.

2 “Sustainable Energy Solutions for South African Local Government: a Practical Guide,” Heinrich Böll Stiftung, 2017. See: https://za.boell.org/sites/default/files/sustainable_energy_solutions_for_south_africa_cities-a_practical_guide.pdf

3 “How to neutralise your greenhouse gas footprint,” The Conversation, 2019. See: <http://theconversation.com/how-to-neutralise-your-greenhouse-gas-footprint-103922>

3 Challenges Faced by Local Governments

LGs across Sub-Saharan Africa (SSA) are facing pressures from their constituencies to increase their delivery of services. As a result, LGs need to minimise spend on overhead expenses, such as electricity. Moreover, LGs that are interested in facilitating the development and financing of Solar Projects are compounded by a systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

However, Solar Projects offer LGs the opportunity to reduce their electricity costs, increase access to electricity, and reduce the number of blackouts by reducing their dependence on unreliable grid-supplied electricity and polluting expensive diesel generators.

4 Financing Roadmap for Solar Projects

LGs can undertake a proactive role in the development and finance of Solar Projects. This section provides a financing roadmap including early action steps of

relevance for LGs to develop a realistic and proactive approach to developing and financing Solar Projects related to solar panels and heaters.

4.1 Assess Revenue Requirements and Opportunities

To unlock debt funding for Solar Projects, LGs will need to understand the savings or revenues that will be generated by the proposed projects over a time period of five to seven years. To quantify savings, LGs will need to undertake baseline energy studies and model energy savings. To evaluate the proposed projects, an LG's executive and finance department will want to understand over what period the debt could be repaid by the associated electricity savings, as well as the underlying revenue or savings assumptions used to calculate the payback period. Since existing budgets will need to be reallocated from electricity costs to debt servicing, the projections of revenues and savings data will need to be integrated into the LG's annual budgeting process. As projected revenues and savings data are in separate budget categories, these two items will need to be assessed in a new integrated manner.

Investment could potentially be unlocked through private sector companies that provide technical and

operational support over the duration of the contract. In more developed markets, such as Europe and the USA, energy services companies (or ESCOs) are well established and offer funded solutions to LGs that tend to require contract terms of 3 to 10 years to allow the private sector to recover their investment. However, the ESCO market is nascent in SSA and the limited number of ESCOs that operate in SSA do not tend to offer funded solutions to LGs.

Given the current state of the ESCO market in SSA, LGs will most likely need to raise a combination of debt and grants to fund the installation of Solar Projects (i.e., capital expenditures). Alternatively, private sector companies, such as ESCOs or equipment suppliers may be able to provide short term funding enabling LGs to validate the performance of the equipment before payment is made to the private sector. Section 6 provides examples of relevant Solar Projects and highlights potential revenue streams.

4.2 Identify Financing Models

There are various approaches to financing Solar Projects, as summarised below. The financing will need to cover the installment of the Solar Projects and later on the operation and maintenance of the project over time.

Under a **turnkey model**, an LG provides the funding but does not bear technical and implementation risks as these risks are borne by a private sector company installing the Solar Project. The public sector raises funding to implement interventions via debt, grants, or own sources of revenue. The private sector company must ensure the commissioning of the project on time and in accordance with the specifications set by the LG. To protect itself against non-performance by the private sector company, the LG may require the private sector company to provide performance bonds or deposits that will only be cancelled or repaid once performance has been verified. For example, once installed, the private sector may be required to guarantee performance for the entire payback period which means that if the interventions do not achieve the anticipated savings, the private sector is obliged to reimburse the LG for the difference.

Under an **ESCO funded model**, an LG does not provide upfront funding but is required to repay an ESCO over a period of time. ESCO funded contracts can take different forms depending on the private sector's appetite to take commercial risk over a period of 5–10 years. While the ESCO industry in developed countries like the U.K. offers a range of funding models to clients, ESCOs operating in developing countries such as South Africa have had little appetite to date to adopt more complex models such as shared savings contracts, mainly due to LG capacity issues and the lack of baseline data.

Under a **Public-Private Partnership (PPP) model**, the design, installation, maintenance and finance of pooled solar rooftop projects can be outsourced to a private sector entity over a substantial time period (i.e., 20–25 years). The LG commits to make regular payments to the private sector entity, provided the private sector entity meets pre-agreed upon standards. If the private sector entity fails to comply with the standards, the LG applies penalty deductions to its regular payments. To achieve the scale required to justify the transaction costs of a PPP, a number of buildings need to be packaged together in one PPP and financed via a project finance facility.⁴

Service Level Agreements (SLA) can be entered into between an ESCO and an LG for the operation and maintenance of solar equipment. A well designed SLA specifies output performance parameters such as warranties that the equipment will be replaced if necessary and specifies how the parameters should be measured.

Pay-as-you-go (PAYG) models are used by households that wish to install PV panels but cannot afford to purchase the equipment outright. PAYG customers are required to pay an initial deposit, followed by daily or weekly payments over a specified period of time. Ownership of the equipment reverts to the customer at the end of the contract period. LGs could play a critical facilitation role in accrediting PAYG suppliers and helping them with marketing to promote use by households.

Table 4.2 below provides an overview of the different funding models and the allocation of roles between the public and private sectors for the financing, construction, operation, and maintenance of Solar Projects.

4 “LED street lighting Climate Group Document - Financial Section,” PwC, 2013. See: <https://www.theclimategroup.org/sites/default/files/archive/files/LONDON-Working-Document-finance.pdf>

Table 4.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Managed	Public Owned & Private Sector Managed (SLA)	ESCO Funded	PPP (100% Private)	PPP (minority LG ownership)	PAYG
Design	LG		Private sector			
Construction						
Funding of CAPEX	LG raises grants and debt		Private sector raises debt & equity		LG funds its share of equity, Private sector raises rest of funds	Private sector raises debt & equity (and possibly DFI grants)
Grants	LG can raise grants to make funding model more affordable					
Operation	LG	Private sector				
Maintenance						
Sales & Marketing						

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

The different financing models for Solar Projects are illustrated in the below figure, comparing the level of investment against different approaches.

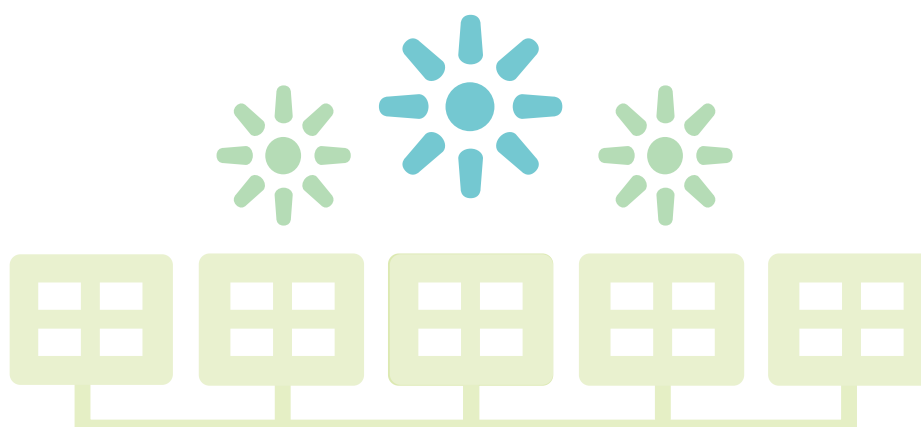
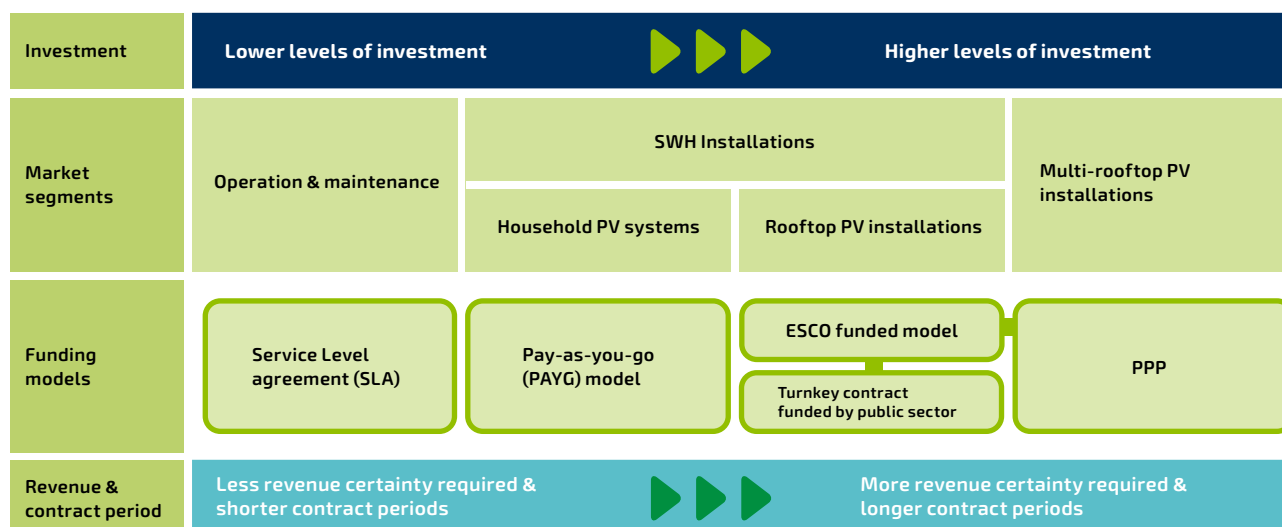


Figure 4.1: Solar Financing Models



PPPs that make use of project finance only tend to be used for multi-roof projects that justify a contract term of 15–25 years. ESCO funded models tend to require shorter contract periods of up to 10 years.

To unlock financing, LGs will need to undertake the following nine preliminary assessments as a baseline to estimate demand and the LG’s situation:

- 1 What are available budgets that can be reallocated to compensate the private sector to implement Solar Projects via their own funding, ESCO funded models, or PPPs?
- 2 What financing models fit the specific situation of the LG?
- 3 What is the baseline of current electricity usage?
- 4 What risks can the private sector assume cost-effectively?
- 5 What is the number of geysers that can be replaced at LG-owned buildings and social housing units?
- 6 What are suitable buildings where PV panels could be installed?
- 7 What financing models are supported by local and national legislation and regulations?
- 8 What energy plans and strategies could form the basis for future funding applications?
- 9 What CAPEX budgets from LG’s finance department, the national government, and development partners could be used to co-fund the project?

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of different finance models are summarized against key implementation criteria in Table 4.3 below, with advantages in green and disadvantages highlighted in red.

Table 4.3: Advantages and Disadvantages of Different Finance Models

Criteria	Public Sector Owned and Managed	Public Sector Owned/Private Sector Managed (SLA)	ESCO Funded	PPP/ Project Finance Funded
Contract term for operation of infrastructure	No contract required	Contract terms need to align with re- placement spend requirements (guarantees, scheduled maintenance, etc.).	Long-term contract allows private sector to recover its development, investment and operating costs as well as a profit margin.	
Access to finance	Reliant on grants from national government and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via national program as size of project may not justify direct application to international climate facility.		Will need to access climate finance via private sector facility.	
Costs and time to implement	Capacity required at an LG level to develop both ESCO funded and public sector funded projects due to the complexity of projects. A national pool of experts could assist LGs with the development of standardized tender documents and contracts.			PPPs require technical, financial and legal expertise to develop. Unless large project/program, development costs may not be justified.
Impact on LG budget of retrofit project	LG achieves operational savings once implemented but requires significant funding for CAPEX.		Projects can be structured to be cost neutral to the LG over contract period (i.e. existing budgets cover payments to the private sector). At the end of the contract period, savings can be used to fund expansion.	
Opportunities for pooling projects	Opportunities to package projects at several LGs and to procure on a pooled basis. An expert pool can be used to develop standardized contracts and procurement processes.			
Ability to mitigate construction risk	Turnkey contracts can be used to reduce the risk of cost overruns and nonperforming technology.		Construction risk is passed to the private sector via ESCO funded and PPP contracts	

Note: SLA= Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

LGs can benefit from accessing a national expert pool that has developed feasibility assessment tools, standardized contracts, and procurement processes. These tools and processes can be applied at LGs with support from the expert pool.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model is most appropriate and affordable for a Solar Project, LGs (and any LG-owned utility) will need to implement

the following six early action steps assessing its own position and abilities to manage the Solar Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the Solar Project given the current and projected needs of the local community, engaging an external experienced solar expert if needed;
- 2 Quantify how much the LG spends annually on electricity and heating water (current and projected) that would be substituted by the proposed Solar Project, working with the LG's financial staff;
- 3 Determine how electricity budgets can be reallocated to compensate for the costs of the design and installation of the Solar Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed Solar Project (after subtracting total budgeted amounts – current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the Solar Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, and monitor contracts, estimate the additional cost for the Solar Project.

For LGs to employ a public sector funded model to finance the Solar Project, an assessment will need to be made of its own funding capacity to cover total costs:

- 1 Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the Solar Project?
- 2 Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the national government, development partners, climate funds, or other sources?⁵
- 3 Does the LG have the ability based on national regulations, national government support, and/or its own credit standing, to use its own balance sheet to borrow debt from commercial banks, other private sector entities, Development Financial Institutions (DFIs), or other development partners?

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of an LG-owned utility) for raising debt, it can also use private sector entities to

contract debt (commercial and concessionary debt). However, the project will need to be structured to minimize risks for the private sector and its lenders. Key enabling factors include the following:

⁵ Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

- High level of revenue certainty as a result of payment guarantees by the LG;
- A known and tested technological solution;
- Well-structured tender documents and contracts that clearly allocate risks and rewards between the private sector and LG;
- Predictable OPEX (Operating Expenses) and CAPEX (Capital expenditure) that are not subject to unacceptable foreign exchange risk;
- A creditworthy LG that will pay the private sector on time; and
- Guarantee mechanisms that could reduce political, credit, and liquidity risks for the private sector and lenders.

ESCO funded projects are underpinned by either an energy savings contract or a Power Purchase Agreement (PPA) between an ESCO and a public sector entity. The ESCO raises finance off its own balance sheet or via a larger parent company to fund the project, but may also make use of capital grants provided by the public sector to minimize funding requirements. These contracts can be complex as they need to address key factors such as the level of guaranteed savings, the energy baseline that will be used to evaluate savings, the tariff price path that will be applied, penalty mechanisms, etc. Standardized energy savings contracts or PPAs should ideally, be developed at a national level to minimize project development costs for LGs.

Often Climate Projects requiring external finance are constructed and financed through separate entities. These entities can be owned by the public sector, a Public-Private Partnership (PPP), or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and

public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages to access finance for larger projects and pooled finance vehicles using **project finance techniques**, as such approaches are proven to minimise default risk and increase recovery rates.⁶ SPVs often obtain loans which are secured against the revenues of the project, with limited or no recourse to the SPV owner(s). According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks, and to minimize any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggests that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterize project finance techniques are effective.⁷ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$ 15 million in total investment costs).

SLAs are entered into between the private sector and the public sector for the delivery of specific services. SLAs do not require the establishment of a separate legal entity such as an SPV.

Turnkey contracts are used to implement publicly funded Solar Projects. Under a turnkey contract, an ESCO is required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology for potential Solar Projects.

6 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks, and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983–2017," Moody's Investor Service, March 2019, pages 8–9.

7 In fact, 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983–2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

Box 4.1: Indicative Funding Sources and Mechanisms for Solar Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

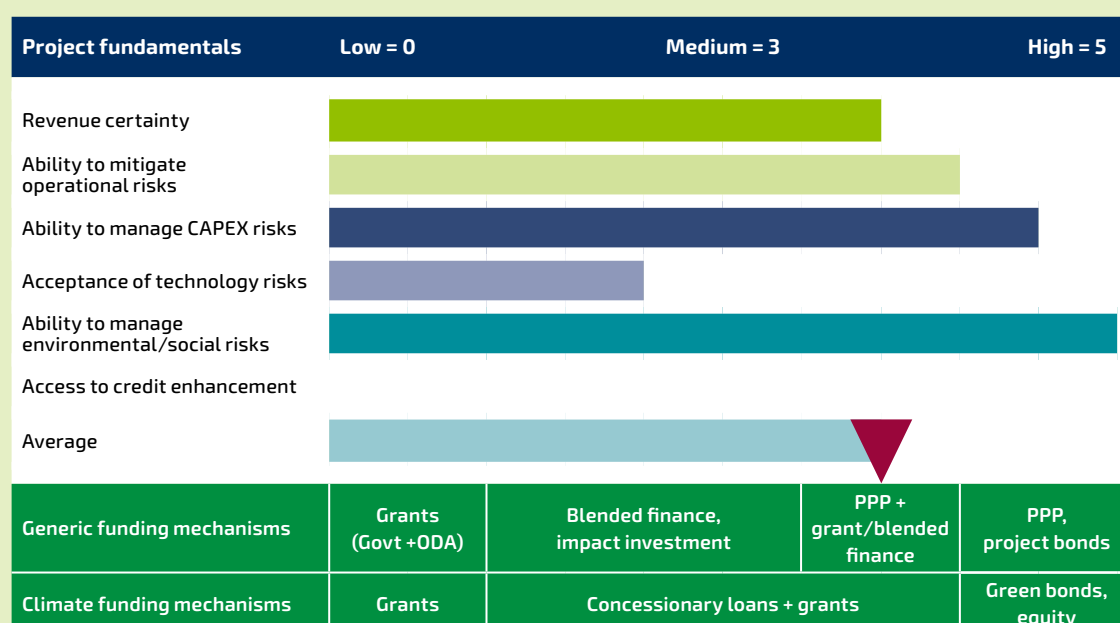
Figure 4.2 below shows a typology for a generic solar project and indicates that an ESCO funded model may be most appropriate provided that it can access blended finance to make it more affordable or to reduce payback periods.

The following risk and revenue factors drive this typology:

- Projects can be structured to be cost neutral to LGs by using longer contract periods or grants;
- Lenders are exposed to both ESCO and LG credit risk that may require credit enhancement;
- Demand is predictable;
- CAPEX and OPEX risk can be transferred cost effectively to the private sector; and
- The average project size is often too small for lenders to invest time in due diligence processes.

Unlocking ESCO funded projects or PPPs may require credit enhancement via guarantee funds/mechanisms unless LGs are considered creditworthy or a pooled finance approach enables the required economies of scale. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 4.2: Illustrative Solar Project Typology



4.5 Identify and Implement Credit Risk Solutions

LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory support to determine what credit solutions are needed and available.

If the LG is using a public-funded model, it may need to secure credit risk support from the national government and/or development institutions. For example, LGs can use their financial experts or hire a transaction advisory service to structure a project that provides collateral through escrow accounts or guarantees to commercial banks.

If the LG is using an ESCO approach, they will also need to be aware of the risk mitigation needs of most

ESCOs located in SSA. As small and medium-sized enterprises (SMEs) with limited capital and equity, they are usually reliant on debt finance to implement projects. Commercial banks often perceive ESCO contracts with LGs to be too risky to fund due to several factors: the perceived low credit quality of LGs; the lack of ability of ESCOs to service debt when an LG does not pay on time; and the relatively small size of an ESCO transaction which does not warrant expensive due diligence processes. As a result, ESCOs may struggle to raise finance to implement LG interventions unless credit enhancement support can reduce credit risks. Guarantee facilities can also be used to reduce default and liquidity risks for lenders, as well as liquidity risks for ESCOs.

4.6 Establish Contacts with Private Sector Actors

LGs will need to implement the following action steps to unlock private sector investment in Solar Projects:

- Understand and monitor current electricity usage and energy baselines;
- Develop inhouse capacity to understand energy savings contracts, PPAs, and procurement processes;
- Engage experts and use standardized contracts to develop, package, and procure projects; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

As noted earlier, ESCOs that operate in Africa are generally SMEs with limited balance sheets. Smaller ESCOs on the continent could be consolidated into larger companies and benefit from the balance sheets of larger parent companies to access more capital.

The next section breaks out the main LG action steps by the specific stage of project development.

5 Action Steps for Local Governments

The table 4.4 below summarises the main proactive action steps of LGs and details the tasks and outputs required to implement Solar Projects.

Table 4.4: Roadmap of Proactive LG Action Steps for Implementing Solar Projects

Action Steps	Tasks	Outputs
1. Develop budget	- Assess needs and benefits from implementing Solar Project(s), estimating scope and costs - Analyse LG budgets to understand current spend on electricity and heating water - Investigate how electricity and maintenance budgets can be reallocated to pay ESCO funded contracts	Budget available for Solar Projects
2. Develop baseline data	- Engage technical advisor to undertake baseline study - Implement data management system for baseline data	Baseline data and management system
3. Identify Funding Options	- Determine LG ability to finance the Solar Project using its own funding and/or other public source (national government, development partners, etc.) - Determine LG ability to use its own balance sheet (or that of LG-owned utility) to obtain debt finance - Explore other funding options, such as private companies and ESCOs that could provide funding and implement projects	Initial specification of alternative funding options

Table 4.4: Roadmap of Proactive LG Action Steps for Implementing Solar Projects

continued

Action Steps	Tasks	Outputs
4. Evaluate technical solutions and funding models	• Use experts and project development tools to cost out the range of technical solutions, including solar solutions and optimal funding models • Assess affordability of each funding model using a standardized financial model • Stress test each financial model to assess payback periods and affordability • Rank options based on affordability and net benefits	• Recommendation of funding model • Estimate of funding gap
5. Close funding gap (if any)	• Identify grants from national government and development partners that can be accessed to close the funding gap (if any) • Develop grant applications	• Grant funding commitments (if needed)
6. Demonstrate feasibility	• Develop Terms of Reference (ToRs) and engage experts to conduct technical studies • Update financial model to conclude on the affordability of preferred funding model • Present project to LG's CFO to obtain commitment	• Business plan • Commitment from LG CFO
7. Procure	• Amend standardized procurement documents • Evaluate and award tenders • Conclude contracts (e.g., turnkey, ESCO funded, PPP, SLA, etc.)	• Signed contracts
8. Monitor & Evaluate (M&E)	• Monitor performance of project against M&E criteria	• M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants for the technical studies. Technical studies include Environmental and Social Impact Assessments (ESIA) that identify the

positive and negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of Solar Projects from Sub-Saharan Africa and Worldwide

There are many examples of successful Solar Projects that can provide insights into the wide range of options for project development and finance.

The City of Cape Town (CoCT) in South Africa has developed below public funded model that makes use of grant funding and concessionary debt raised by the city:

- The CoCT developed a public-funded guaranteed savings model to fund a variety of energy efficiency measures. Under this model, an ESCO is responsible for installing, managing, and maintaining the equipment, but it does not fund the interventions beyond the installation period. The CoCT pays the ESCO for the capital expenditure once the equipment has been installed using the ESCO's own sources of funds. Once installed, the ESCO guarantees performance for the entire payback period: If the interventions do not achieve the anticipated savings, the ESCO is obliged to reimburse the CoCT for the difference.⁸
- In 2017, the CoCT installed 247 kW of solar rooftop generation capacity at seven municipal buildings and facilities. One of these facilities is the Wallacedene Taxi Rank that has a 130 kWh/day generation capacity and is supported by a storage system of 24 batteries to provide uninterrupted electricity supply. The Wallacedene Taxi Rank required a capital investment of ZAR 25 million (US\$2.3 million). Estimates indicate that this capital cost will be recovered within 6–10 years through energy cost savings.

Two rooftop solar PPPs have been implemented in India by the Government of Gujarat:

- Gandhinagar served as a pilot in 2010 when 5 MW of generation capacity was procured from two private firms (Azure Power and SunEdison), unlocking US\$ 12 million in private financing. The PPP agreement granted the firms a 25-year concession to install solar photovoltaic (PV) panels on the rooftops of public buildings and private residences and connect them to the grid, securing a feed-in-tariff of Rs 11.21 (US\$0.18) per KWh.
- Vadodara, a city of 2 million people, became the second municipality in Gujarat to adopt the multi-rooftop solar concept in 2014.

Two PAYG models are gaining traction in Africa at the household level:

- PAYG solar companies such as PEG, d.Light, BBOX, Mobisol and M-Kopa raised over US\$360 million in capital between 2012 and 2016. M-Kopa which has been operating since 2010, sells solar home systems on a mobile money payment plan in Kenya, Uganda, and Tanzania. Customers pay an initial US\$35 deposit, followed by 365 payments of US\$0.45. After completing the payment package, customers own their system outright. M-Kopa's PAYG model assumes that the average off-grid household in Kenya spends around US\$0.50 per day on kerosene, candles, and batteries making their payment plan affordable to the average household. To date, M-Kopa has sold over 750,000

8 "Opportunities in Energy: Efficiency for Municipalities in South Africa," SALGA, 2018. See: <https://www.salga.org.za/SALGA%20Energy%20Summit%202018/Energy%20Summit%20Web/Document/Booklet%20Opportunities%20in%20Energy%20Efficiency%20for%20Municipalities%20in%20South%20Africa%20January%202018.pdf>

9 "M-KOPA Solar: The 7 Innovations Leading Africa's Digital Future," M-Kopa, 2013, See: <http://www.m-kopa.com/m-kopa-solar-the-7-innovations-leading-africas-digital-future/>

off-grid solar systems and has unlocked US\$233 million in financing for households.⁹

- The Electrification Financing Initiative (ElectriFI) instrument is a worldwide initiative, launched in 2015 and funded by the European Union and other cooperating partners, which has helped the private sector reach financial closure, boosted investments in different off-grid solutions, and introduced a range of business models in several geographical areas. For instance, Azuri expanded off-grid PAYG solar home systems in rural Kenya; Mera Gao Power unlocked investments for the construction of 2,500 micro-grids and provided clean energy to 55,000 households in rural India. Financial support from ElectriFI enabled Sigora Haiti to reach final closure to provide electricity in remote northern Haiti through solar panels and PAYG models. The Zambia window of ElectriFI, with a budget of EUR 40 million, is an opportunity to rapidly scale up viable business models in an SSA country. Other SSA country windows are being opened by ElectriFI in Benin, Ghana, and the Ivory Coast.¹⁰

These PAYG models and initiatives are often focussed on increasing energy access in rural and remote areas, so LGs with such constituencies will potentially find these PAYG approaches appropriate and feasible.

A number of countries, including South Africa and Lebanon, implemented SWH programmes that incentivised households to invest in SWH by offering capital subsidies:

- South Africa's solar water rebate programs achieved scale relying on grant funding from the National Government. The market contracted significantly once the grants were phased out.

- The Lebanese solar programme benefited from a US\$ 1 million GEF grant and included an interest free loan mechanism established by the Government of Lebanon that allowed households to borrow up to US\$5,000 to fund their SWHs. The subsidised loans were issued by commercial banks to end-users and were seen as a key driver of the programme's success. Prior to the SWH Program, Lebanon subsidised diesel sales during winter. The diesel subsidies were abolished at the start of the SWH Programme and used to fund the SWH programme instead.¹¹

The introduction of regulations can serve to channel investment into Solar Projects, provided they are well thought through and the necessary enforcement measures and enabling financing mechanisms are put into place:

- Kenya's Energy SWH Regulations enacted in 2012 made it mandatory for all premises (within the jurisdiction of a local authority) with hot water requirements exceeding 100 litres per day to install and use SWH systems. However, five years after the legislation was passed, the uptake of SWHs has been low. A study was commissioned in 2017 by Kenya's Energy Regulatory Commission to investigate the reasons for the low uptake. The study identifies the following barriers: inadequate technical skills, high upfront cost, lack of innovative business models, limited financing options, limited awareness/interest and demand, unclear policy requirements, disjointed institutional mandates, inadequate technical standards, limited enforcement capacities among mandated institutions, lack of quality products and services, and owner-occupier mismatch.¹²

10 https://eeas.europa.eu/delegations/zambia/46493/node/46493_fa

11 "Solar Water Heater Market Evaluation: Case Study of Lebanon," UNEP, 2015. See: https://www.solarthermalworld.org/sites/gstec/files/story/2015-11-27/swh_case_study_report_uptd_25nov_web.pdf

12 "Study of the Solar Water Heater Industry in Kenya," EED Advisory, 2017. See: https://www.solarthermalworld.org/sites/default/files/news/file/2018-10-31/study_of_the_swh_industry_-_kenya_high_res_final.pdf

13 "Mitigating Climate Change through Renewable Energy Development: Cape Town," IRENA, 2018. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Dec/IRENA_Cities_2018b_Cape-Town.pdf?la=en&hash=DA85B0E4CCB76529FC4DBC6F0409822F38956477

LGs can advance investment by households through accreditation and marketing campaigns:

- The CoCT launched its Solar Water Heater (SWH) Accreditation and Marketing Campaign in 2014 to promote the installation of high-pressure residential solar water heaters and improve the reliability, quality and standards of products and installations. The SWH campaign supported the development of

the local solar water sector by increasing consumer confidence in the technology. The campaign involved accrediting service providers and monitoring their performance, encouraging the uptake of SWHs by households through targeted communication and education campaigns, providing training to service providers and undertaking quality control.¹³

7 Enabling Factors

For LGs to effectively scale up the implementation of solar projects, Local Governments and the National Governments (NGs) need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put into place that enable LGs to unlock finance for Solar Projects. For example, concessional finance and grants can be the basis for developing viable Solar Projects. To illustrate, the City of Cape Town, South Africa implemented a number of Solar Projects using a R2.4 billion (US\$ 162 million) long-term concessionary loan from the AFD combined with a national grant. Examples of LG enabling factors are provided in Table 5 below.

It is important to note that in any scenario LGs can proactively take steps to facilitate the identification, development, and finance of Solar Projects:

- **Proactive development of Solar Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop Solar Projects working with private sector professionals, a

national expert team, developers, and investors. As noted earlier, securing qualified solar experts will be critical to the analysis of the needed project development process to design an investable Solar Project.

- **Address environmental impediments:** LGs that lack key enabling factors for unlocking Solar Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

Table 4.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Owned/ Private Sector Managed	ESCO Funded Model	PPP 100% Owned by Private Sector	PPP with LG Shareholding
1. LG can implement accreditation and training for service providers	✓	✓	✓	✓
2. LG has significant own sources of revenue	✓	✓	✓	✓
3. LG can incur debt	✓	N/A	N/A	✓
4. LG can access CAPEX grants	✓	✓	✓	✓
5. LG can be shareholder in a company	N/A	N/A	N/A	✓
6. LG can enter into long term contracts for services/products	✓	✓	✓	✓
7. LG can reallocate existing budgets to pay private sector contracts	✓	✓	✓	✓
8. LG can implement cost reflective tariffs	✓	✓	✓	✓
9. LG has capacity to develop projects (planning, budgeting etc.)	✓	✓	✓	✓
10. LG can unlock additional revenue opportunities for the private sector	✓	✓	✓	✓
11. LG has capacity to procure turnkey contractors	✓	N/A	N/A	N/A
12. LG has capacity to procure and manage long term contracts	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Solar Projects. N/A is the abbreviation for “Not Applicable.”
SLA = Service Level Agreement between LG and private sector provider for delivery of services.



Solar panels on rooftop of building,
Cape Town, South Africa



7.2 National Government Enabling Factors

LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support ranging from expertise to finance

and guarantees. The various enabling factors that can be put in place by National Governments (NGs) to promote Solar Projects are listed in Table 4.6 below.

Table 4.6: National Government Enabling Factors

National Government Enabling Factors	Public Sector Owned/Private Sector Managed (SLA)	ESCO Funded Model	PPP 100% Owned by Private Sector	PPP with LG Shareholding
1. NG can commit grant funding to project enabling blended finance and makes transfers on time	✓	✓	✓	✓
2. NG has put into place supporting regulatory and legal frameworks	✓	✓	✓	✓
3. NG establishes a national expert pool that develops standardized project development tools and contracts that can be used by LGs	✓	✓	✓	✓
4. NG establishes a national expert pool that can support LGs during project development and procurement	✓	✓	✓	✓
5. NG can support and develop climate finance applications (including pooling of similar LG projects)	✓	✓	✓	✓
6. NG is able to provide expert support	✓	✓	✓	✓
7. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓
8. NG has climate finance facility for the private sector	N/A	✓	✓	✓
9. NG can provide guarantees covering LG commitments	✓	✓	✓	✓
10. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓
11. NG has in place legislation that promotes energy efficiency projects (e.g., green building codes)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Solar Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, National Governments can provide enabling factors for Solar Projects across all financing sources, the most important being the facilitation of national support programmes and PPPs.

Solar Projects can achieve results with breakthrough enabling factors, as demonstrated by the successful examples listed in Box 4.2 below.

Box 4.2: Examples of Enabling Factors for Solar Projects

- **Blended Finance/Grants:** The City of Cape Town, South Africa has implemented a number of debt-funded turnkey interventions to advance energy efficiency interventions using a public funded guaranteed savings model. The CoCT raised R2.4 billion (US\$ 162 million) by securing a long-term concessionary loan from the AFD to fund climate focused interventions, including public lighting and energy efficiency. This facility, together with a national grant, has funded the city's Solar Projects.
- **National Legislation:** Kenya's New Energy Act signed into law in 2019 mandates LGs to set up Energy Efficiency Funds to promote and fund energy efficiency interventions. The Act requires all related grants and loans to be channelled through these LG Funds. These Funds could act as catalysts for Solar Projects if properly capitalized provided a sufficient number of projects are developed that meet funding requirements.
- **LG Accreditation:** The City of Cape Town, South Africa launched an accreditation and marketing campaign in 2014 to promote the installation of high-pressure residential SWHs and improve the reliability, quality, and standards of products and installations. The campaign provided accreditation to service providers, provided training to service providers, and monitored their performance.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level requires the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of Solar Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance Solar Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support this Climate project can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), non-governmental organizations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the Action Steps set out in the prior section “*Table 4.4: Roadmap of Proactive Action Steps for Implementing Solar Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design a Solar Project and Programmes (including pooled finance approaches and guarantees). Information on funding and guarantee sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the Action Steps in existing SSA and other Solar Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Solar Projects. LGs will need to have access to such advisors. National governments and development partners can provide critical support.

To build out a database of technical experts, the professionals involved in existing SSA Solar Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimize access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful Solar Projects can share their experiences with other SSA LGs. Early contributors could be participants in solar projects operating in Cape Town and eThekweni.

5 Provide Online “Local Government Climate Action Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

The CoM SSA training materials include modules for project development, finance, and a specific module on Solar Rooftop and Water Heater Projects.



Chapter 5:

Solar Mini-Grid Projects

1 Definition: What are Solar Mini-Grid Projects?

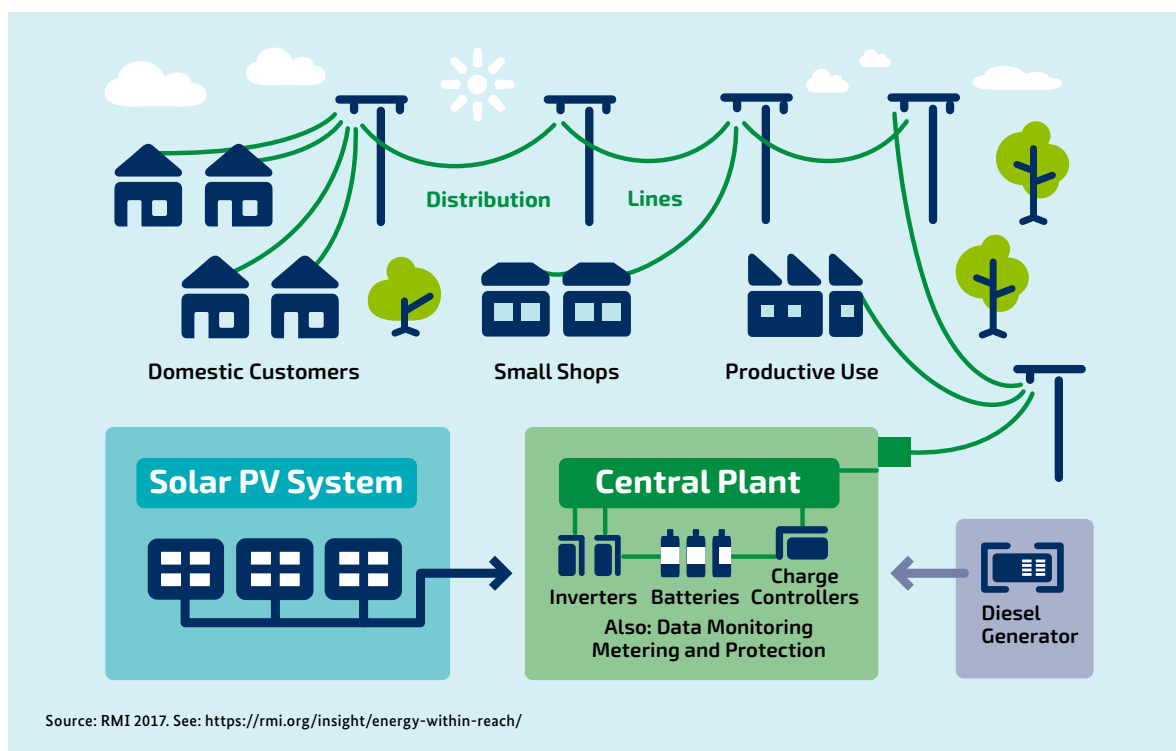
Power is predominantly provided through three means: connecting households and businesses to the national grid, the rollout of standalone systems, and mini-grids. Technological progress, including the falling cost of solar photovoltaic (PV), battery-storage solutions, and the rollout of innovative payment solutions in emerging markets, have seen a rise in the deployment of mini-grids.¹

A mini-grid is an on-grid or off-grid small-scale solution to power production. It is a localised production and distribution network, based primarily on solar PV

power, wind, or mini-hydro that offers a hybrid solution to those cities and communities that are ‘beyond’ planned extension of the national grid by national utilities.

Solar Mini-Grid Projects can be stand-alone systems or connected and integrated into the main grid. They typically range from 10 kW to 10 MW in size. Solar Mini-Grid Projects range from Solar Pico Systems, a type of small solar power system providing smaller loads,² to much larger solar PV systems as depicted in Figure 5.1 below.³

Figure 5.1: Illustrative Solar Mini-Grid



- 1 Kelly Carlin, “Minigrids in the Money: Six Ways to Reduce Minigrid Costs by 60%,” Rocky Mountain Institute (RMI), 2018. See: <https://rmi.org/minigrids-money-reduce-costs/>
- 2 “Pico Solar” refers to a type of small solar power system used in rural electrification in developing countries. «Pico-Solar» solar generators are used to provide indoor lighting in off-grid locations. Also called “Pico PV,” these systems usually consist of a photovoltaic module ranging from 1-10 watts, and a self-contained charge controller, small deep-cycle rechargeable battery pack with high efficiency LED lights. Some Pico Solar Systems integrate cell phone charging capability.
- 3 “Opportunities and Challenges in the Mini-grid Sector in Africa: Lessons Learned from the EEP portfolio,” Energy and Environment Partnership (EEP) Africa, 2018. See: https://eepafrica.org/wp-content/uploads/2019/11/EEP_MiniGrids_Study_DigitalVersion.pdf

Likewise, a range of financing models exist for Solar Mini-Grid Projects: the small Pico Solar Systems use Pay-as-You-Go (PAYG) models; the larger Solar Mini-Grid Projects use Power Purchase Agreements (PPAs), a contract between two parties in which one party generates electricity (the seller) and one party purchases the electricity (the buyer).

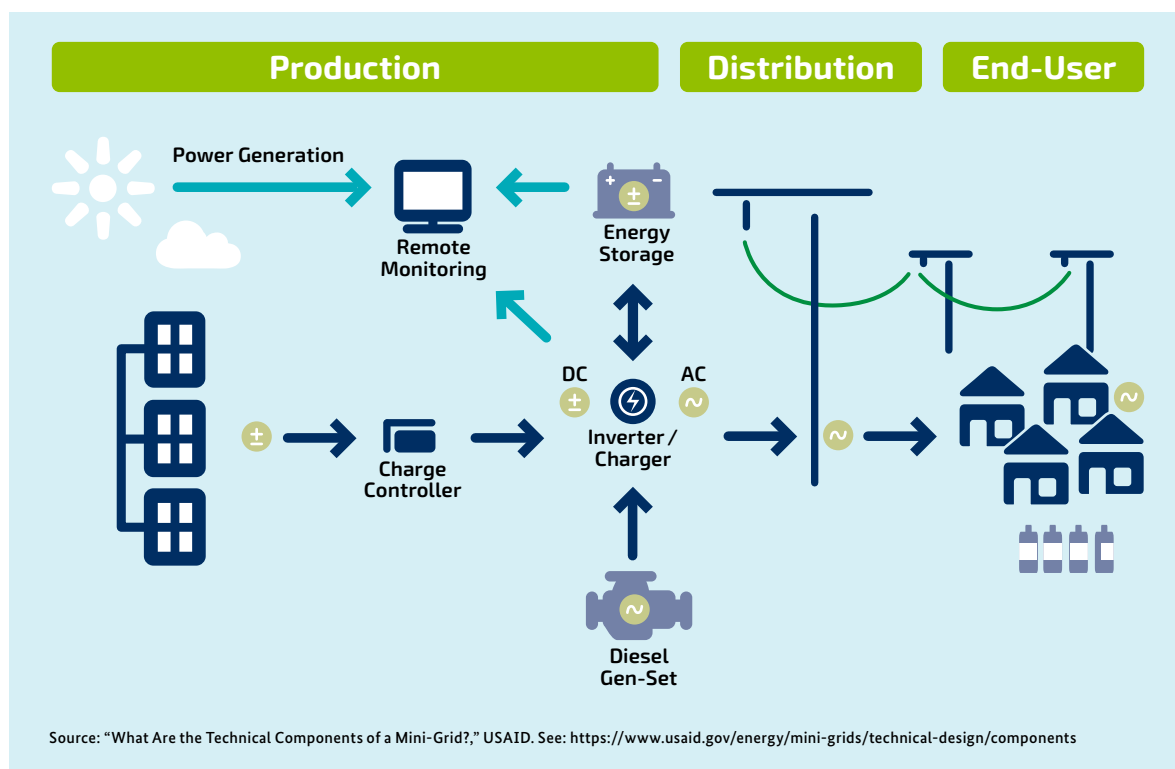
LGs need to consider the trade-offs between grid extension and off-grid mini-grids. Usually grid extension is optimal, as it provides users with the lowest cost option. However, grid connection may not be viable for some cities and rural areas in Sub-Saharan Africa (SSA) due to high costs of expanding the transmission network, low user ability and/or willingness to pay, and insufficient demand relative to the cost of connection. Moreover, the unreliability of grid-based power in some SSA countries may result in the preference for locally-generated energy sources that are more reliable, especially for ensuring the consistent production

of local goods and resources (such as mining and agro-processing), and the delivery of services (such as health clinics, schools, and tourism hotels).⁴

Therefore, if grid extension of reliable low-cost energy is a possibility, it will be critical for the LG to coordinate with the national accountable entities for energy provision to determine the optimal approach to access energy through the national grid.

However, if an LG's constituency has inadequate local energy access and there are dim prospects for timely adequate grid extension, it will be important to facilitate the implementation of optimal off-grid solutions setting up one or more mini-grids to meet community needs. As the LG constituency may have low purchasing power, a blended finance approach is critical to provide affordable tariffs, mixing grants, concessional, and commercial finance to lower the costs of energy provision.⁵

Figure 5.2: Technical Components of a Solar Mini-Grid Project



4 Kelly Carlin, "Minigrids in the Money: Six Ways to Reduce Minigrid Costs by 60%," Rocky Mountain Institute (RMI), 2018. See: <https://rmi.org/minigrids-money-reduce-costs/>

5 For an insightful depiction of the relative advantages and disadvantages of on-grid and off-grid energy projects, see "Beyond Construction: The Challenges of Deploying Mini-Grids in Kenya," Chatham House, 18 June 2019

From a technical perspective, an off-grid Solar Project packages the production, distribution, and end-user systems of power into one system. Off-grid Solar Projects are one of several solutions for providing electricity to populations that are too small or remote to justify grid extension. The technical specifications are highly dependent and calibrated according to end-user demand, time of use, availability of technology,

and a host of other factors. In all Solar Mini-grid Projects, solar PV technology is deployed for producing power. However, these grids are often combined into hybrid models (e.g., diesel generators used as backup to make up for intermittency, etc. or batteries for storage), thereby supporting more reliable access to electricity, as depicted in Figure 5.2.⁶

2 Benefits Associated with Solar Mini-Grid Projects

The well-being of citizens and the overall economy in Africa is often undermined by the lack of access to affordable energy. Solar Mini-Grid Projects can result in transformative benefits to Local Governments (LGs) and their citizens, ranging from improved living

conditions to budget savings, new sources of revenues and economic growth, job creation, and other development impacts. The overall benefits of LGs proactively undertaking Solar Mini-Grid Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change impact, decreasing Greenhouse Gas (GHG) by replacing thermal and coal-fired power generation with renewable energy;
- **Development Benefits:** Improve food security and living standards and increase energy security, thereby stimulating higher rates of economic growth and job creation; and
- **Local Government Development Benefits:** Increase access to energy for public services, and generate additional indirect income (e.g., fees, taxes, sales of land, etc.).

The summary of potential benefits from Solar Mini-Grid Projects is detailed in Table 5.1 below.

6 Kelly Carlin, Op.cit.

Table 5.1: Details of Potential Benefits Resulting from Solar Mini-Grid Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
• Less GHG emissions due to minimal pollutants in the production of solar-based electricity • Provision of renewable/ low carbon energy in rural and urban centres • In some cases, replacement of thermal and coal-fired power generation • Reduction of dependency on fuel imports that power many systems in Sub-Saharan Africa	• Provision of power to underserved communities and cities, ensuring “<i>no one is left behind</i>” • More reliable electricity supply than grid-supplied power, which is subject to disruptions, providing greater reliability of energy for the development of local Small and Medium Enterprises (SMEs) and industrialisation • Greater food security through higher yields in agriculture powered by solar irrigation systems • More inclusive growth with the potential to boost incomes through productive end-use of energy (e.g., irrigation providing opportunity to grow cash crops) • Enhanced quality of life by providing ability to use and power larger appliances	• Increased access to energy for public services, local businesses, and residents • Increased business activities, job creation, such as the development of local green handicraft for setting up and maintaining mini-grids, and overall well-being of the community resulting from generated economic growth • Increased tax revenues from payrolls, land values

3 Challenges Faced by Local Governments

LGs face increasing pressure to provide power to growing demand from urban and rural households and SMEs. As noted earlier, this challenge is particularly acute in SSA, as over 65% of the population – some 600 million people – do not have access to electricity, and populations across the continent are increasing at high rates.⁷

In order to achieve Sustainable Development Goal 7 – Affordable and Clean Energy – ensuring access to affordable, reliable, sustainable and modern energy for all, LGs will need to play a central role in promoting and facilitating the identification, development, and finance of Solar Mini-Grid Projects.

This is especially the case where national grid extension is technically and/or financially unviable. Solar Grid Projects are expected to be the primary means of accessing energy. Nevertheless, the financing of Solar Mini-Grid Projects in remote areas pose significant challenges to LGs and project developers due to their large up-front investment costs, potential regulatory and policy barriers (such as lack of adequate subsidies), and the lack of sufficient energy demand in rural areas, thereby undermining long-term commercial viability. Moreover, LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

4 Financing Roadmap for Solar Mini-Grid Projects

It is important to note that LGs generally do not develop, own, or operate Solar Mini-Grid Projects on their own, but rather serve to facilitate their development through National Government (NG) entities, private sector developers, and community organisations. The roadmap below therefore focuses on the facilitating role of LGs through the project development cycle from project identification and the definition of user needs through project development, construction, and operation. This section therefore provides information for LGs to better understand the potential roles of all stakeholders in the implementation of Solar Mini-Grid Projects, including NG entities, private sector developers, and/or community organisations as well as their proactive roles in facilitation.

In any financing or development scenario, it is important to recognise that Solar Mini-Grid Projects are usually not financially viable (i.e., bankable) without public sector support as their development, construction, and operational costs are usually higher than their expected returns. Therefore, currently there is no clear or proven roadmap for the financial viability of Solar Mini-Grid Projects,⁸ nor is there a proven business model for private sector-driven mini-grids that has achieved scale. While the 80% drop in price of solar PV modules from 2009 to 2015⁹ has made Solar Mini-Grid Projects competitive with diesel alternatives, financial sustainability and commercial viability remain key challenges accentuated by the contextual nature and lack of a “one size fits all” approach.

7 Kelly Carlin, “Minigrids in the Money: Six Ways to Reduce Minigrid Costs by 60%,” Rocky Mountain Institute (RMI), 2017. See: <https://rmi.org/minigrids-money-reduce-costs/>

8 Kelly Carlin, “Minigrids in the Money: Six Ways to Reduce Minigrid Costs by 60%,” Rocky Mountain Institute (RMI), 2018. See: <https://rmi.org/minigrids-money-reduce-costs/>

9 “Solar PV in Africa: Costs and Markets,” IRENA, 2016. See: <https://www.irena.org/publications/2016/Sep/Solar-PV-in-Africa-Costs-and-Markets>

However, the financing of Solar Mini-Grid Projects can be successful using a mixed public-private finance approach (i.e., blended finance) in which financing from both public and private sources is mobilised. The partnerships with Non-Governmental Organisations (NGOs) active in international cooperation may be useful in this context, due to their relevant missions and commitments, contacts with donors, and access to private and public grants.

The successful implementation of Solar Mini-Grid Projects can be supported by LGs can undertake a proactive role, either unilaterally or in collaboration with national governments. Key actions include:

- Understanding and evaluating their current situation and needs;
- Mapping energy needs;
- Understanding the LG's priority development plans and the role of energy in achieving them;
- Evaluating the distance of their constituencies from the national grid and the cost to connect to the national grid;
- Understanding the national energy frameworks, and related policies, regulations, processes, incentives, and related support programmes from development partners relevant to Solar Mini-Grid Projects, including any impediments potentially reducing the interest of private sector developers and investors; and
- Exploring the interest of reliable proven private sector developers and investors.

It is important that the economic benefits of a Solar Mini-Grid Project are well understood by the LG as the

required scope will determine its design and cost. For example, to what degree is increased energy access critical for the provision of public services? To what extent is increased energy access a precondition for creating more local economic opportunities, such as supporting SMEs, the development of supply chains, and competitiveness of local products and services?

This analysis also needs to define the kind and degree of policy support needed from the national government. As private sector expertise and capital is usually required for the successful implementation of Solar Mini-Grid Projects, this analysis will also need to address any policy barriers that might potentially inhibit the interest and ability of private sector players to develop and invest in these projects.

As national governments implement national energy programmes, LGs need to thoroughly understand national priorities, policies, regulations, and processes so they are able to optimise their facilitation in identification, development, and finance of solar mini-grid projects. National governments are usually also better placed and positioned to extend market incentives to industry, often in coordination with development partners that offer grants, concessionary finance, and risk mitigation.

Another aspect is the role of Rural and National Electrification Authorities, having in many cases monopolist roles in extending the grid and creating new isolated distribution lines. LGs need to assess the willingness of such national institutions to support Solar Mini-Grid Projects and to ensure they buy into projects located in their jurisdiction to avoid bureaucratic obstacles.

4.1 Assess Revenue Requirements and Opportunities

LGs have a role to play in supporting private developers to understand local priorities and the demand and ability of local households and businesses to pay for energy access. These critical factors determine the design and viability of a Solar Mini-Grid Project, as adequate revenue and project financing are both required to make the project sustainable.

Revenue opportunities from Solar Mini-Grid Projects are generally determined by the amount of connection fees obtained from end users, electricity sales (tariffs), grants, and subsidies.¹⁰ The determination of long-term revenue is critical. Revenue is largely dependent on demand, the ability and willingness of end users to pay, and the number of customers, ensuring an

appropriate match of demand, supply, and cost structuring. To close the project viability gap, the sector is highly subsidised by the public sector. The level of public support, if any, is usually conditional on the private sector being able to demonstrate its ability to secure project financing. Public support is usually required for project development as well as for mini-grid operation through grants, subsidies, and other incentives.

Some private operators, such as PowerGen, Power-Corner (Engie), RVE.SOL, and PowerHive in East Africa, have added additional revenue streams through the provision of electric appliances financing programmes, widening their services and income generation beyond the sale of electricity.¹¹

4.2 Identify Financing Models

Financing for LGs and municipalities is multi-faceted, and may involve a combination of budget financing, national and international funds and grant schemes, and public support guarantees to leverage private capital, and private commercial financing.¹²

When examining elements of financial viability, LGs will need to understand the estimated costing metrics used by private developers to assess viability of mini-grids. Understanding the Levelised Cost of Electricity (LCOE) and connection costs is critical, as are analyses and estimations of the willingness and ability of customers to pay. Collectively, these influence the economics of the project, as well as the range of revenue the developer can expect, and also clarifies which role each party will play – the LG, developer, operator, financier – over the course of the project’s lifespan. The definition of roles is critical in the formulation and deployment of business, finance, and operation models for mini-grid development.

Pooled finance and development support programmes characterise the mini-grid sector (see section 4.4.1 for examples of facilities). Given commercial viability, financial sustainability challenges, and blended finance models, a combination of private and public support is

crucial to create the preconditions for private financing.¹³ Financing will depend on the kind of business and operating models deployed, defining specific roles and contributions of all parties. For example, NGs can provide subsidies and LGs can provide land, while the private sector may be well-positioned to access grants from development partners.

The form of ownership of mini-grids varies from project to project. Three principal actors – governments/utilities, private entrepreneurs, and local communities – can own, install, manage, operate and/or maintain mini-grid systems. In some cases, two or more actors share ownership. The four most common mini-grid ownership models are the utility-based public model (usually at the national level), community-based (or in rare cases LG) model, the private sector developer model, and the PPP model, as summarised in Table 5.2 below.

10 “Mini-Grid Policy Toolkit: Policy and Business Frameworks for Successful Mini-grid Roll-outs,” European Union Energy Initiative Partnership Dialogue Facility (EUEI PDF). See: [http://minigridpolicytoolkit.euei-pdf.org/system/files_force/RECP_Minigrid_Policy_Toolkit_doublepage%20\(pdf%2c%2012.5MB%2c%20EN\)_web60ab.pdf?download=1](http://minigridpolicytoolkit.euei-pdf.org/system/files_force/RECP_Minigrid_Policy_Toolkit_doublepage%20(pdf%2c%2012.5MB%2c%20EN)_web60ab.pdf?download=1)

11 Gabriel Davis, “Private Mini-Grid Firms Deserve a Chance to Compete Against Slow Utilities in Africa. A faster path to rural electrification,” 2018. See: <https://www.greentechmedia.com/articles/read/a-faster-path-to-rural-electrification#gs.gBJoRNOA>

12 “Financing Municipal Energy Efficiency Projects: Mayoral Guidance Note 2,” Energy Sector Management Assistance Programme (ESAMP), 2014. See: https://www.esmap.org/sites/esmap.org/files/DocumentLibrary/FINAL_MGN1-Municipal%20Financing_KS18-14_web.pdf

13 Peter Weston et al., “Financial and Operational Bundling Strategies for Sustainable Micro-Grid Business Models,” National Renewable Energy Laboratory and Energy4Impact, 2018. See: <https://www.nrel.gov/docs/fy19osti/72088.pdf>

Table 5.2: Indicative Solar Mini-Grid Ownership Models

Model	Public Owned and Managed (national government, utility)	Community-Based/LG Owned and Managed	Private Sectors Developer Owned and Managed	Public-Private Partnerships (PPPs)
Overview	Owner of the system is the national government, usually through the renewable energy agency (REA) or national utility. In some cases, LGs are minority owners, exchanging land for a minority share. The government covers costs through revenue collection. While operations can be contracted out to private operators or communities, government holds end-accountability for operations. This model is highly dependent on donor support, government subsidies, and the creditworthiness of the utility where the utility is the off-taker.	Ownership may include a community electricity cooperative or another local organisation. Often the developer or another outside organisation provides technical capacity-building. The community assumes responsibility for tariff collection. Most likely to succeed alongside programmes that promote productive uses of energy. This model is dependent on grants and financial assistance.	The private sector developer maintains ownership, manages and operates the mini-grid. The project must provide returns commensurate with risks. This model is highly dependent on obtaining concessional finance, government/donor grants and/or guarantees and anchor load to ensure commercial viability.	PPPs are characterised by the government and private sector having clearly defined and mutually beneficial roles from inception. There are a variety of different models and configurations that can be deployed which configure investment, ownership and operation responsibilities between public, community and/or private developers. PPPs are highly contextual, and often involve the de-bundling of power production and distribution responsibilities of the system, though not always. For instance, a government could grant service licenses and concessional funding to private developers, who in exchange agree to provide a certain level of service at an agreed-upon rate.
Indicative Financing	• Government grants/subsidies • Donor financing • Debt financing • Cross-subsidies (larger consumers subsidising mini-grids)	• Government grants/subsidies • Donor financing	• Equity (first loss/junior, mature) • Commercial loans • Corporate or Project finance • Government grants/subsidies • Guarantees • Export finance • Donor financing • Results-Based Financing	

Note: Indicative using various sources. Mini-grid operating, and business models and sources of financing are highly contextual and inter-dependent.

Sources: USAID: "What Ownership Models are used for Mini-Grids." See: <https://www.usaid.gov/energy/mini-grids/ownership/models>; Smart Villages 2017. See: <https://e4sv.org/wp-content/uploads/2017/05/TR9.pdf>; IRENA 2018. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_mini-grid_policies_2018.pdf; IRENA 2016. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_mini-grid_policies_2018.pdf; National Renewable Energy Laboratory 2018. See: <https://www.nrel.gov/docs/fy19osti/72088.pdf>; ESMAP 2019. See: <https://openknowledge.worldbank.org/bitstream/handle/10986/31926/Mini-Grids-for-Half-a-Billion-People-Market-Outlook-and-Handbook-for-Decision-Makers-Executive-Summary.pdf?sequence=1&isAllowed=y>

Table 5.2: Indicative Solar Mini-Grid Ownership Models

continued

Model	Public Owned and Managed (national government, utility)	Community-Based/LG Owned and Managed	Private Sector Developer Owned and Managed	Public-Private Partnerships (PPPs)
Indicative Business/Operating Models	- Utility model - Renewable energy agency model - Rural Electrification Authority model	Community model (in-kind contributions)	- Cost-recovery models (post-paid, pre-paid) - Alternative models (appliance sales) - Energy service companies (ESCOs) model - Franchise model - Anchor, Business, Community (ABC) model - Clustering models - PPAs - Concession agreements - NGO local development projects	

Note: Indicative using various sources. Mini-grid operating, and business models and sources of financing are highly contextual and inter-dependent.

Sources: USAID: "What Ownership Models are used for Mini-Grids." See: <https://www.usaid.gov/energy/mini-grids/ownership/models>; Smart Villages 2017. See: <https://e4sv.org/wp-content/uploads/2017/05/TR9.pdf>; IRENA 2018. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_mini-grid_policies_2018.pdf; IRENA 2016. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_mini-grid_policies_2018.pdf; National Renewable Energy Laboratory 2018. See: <https://www.nrel.gov/docs/fy19osti/72088.pdf>; ESMAP 2019. See: <https://openknowledge.worldbank.org/bitstream/handle/10986/31926/Mini-Grids-for-Half-a-Billion-People-Market-Outlook-and-Handbook-for-Decision-Makers-Executive-Summary.pdf?sequence=1&isAllowed=y>

Under any scenario, LGs that want to secure access to energy through Solar Mini-Grid Projects will need to engage the relevant NG agencies and private sector developers given their usual dominant role in determining the financial viability of projects:

- 1 Energy utilities, rural electrification authorities, and renewable energy agencies** are important national governmental bodies that both define the framework of the energy sector and determine incentives for private developers; and
- 2 Private sector developers** can provide expertise and, in many cases, significant amounts of required capital.

As noted earlier, LGs play critical roles in determining energy needs, assessing the ability and willingness of end users to pay for electricity, the proximity to the grid, and access to land, enabling the development of a viable and sustainable project that is both realistic and supported by local stakeholders. The examples of ownership models cited below provide insights to how LGs need to engage national governmental entities, the private sector, and local communities.

Publicly Supported Mini-Grid Projects

Most publicly supported Solar Mini-Grid Projects are championed by NG agencies and utilities. The utility-owned model works best when a government supports mini-grid development as part of its national electrification strategy. For example, India's Rural Electrification Policy defines when utilities should use distributed generation such as mini-grids instead of grid extension to fulfil rural electrification objectives. In

countries without a mini-grid strategy, traditional national utilities and rural electrification authorities tend to prioritise grid extension.

Three examples of SSA nationally supported utility-based solar mini-grid programmes are in Tanzania, Kenya, and Madagascar:

- Tanzania's national utility, the Tanzania Electric Supply Company Limited (TANESCO), implemented a successful utility-owned mini-grid project that relies on cross-subsidisation and contracts with local energy service companies. In the Njombe region, TANESCO owns, operates, and manages an 820 kW micro-hydro plant connected to the national grid. TANESCO charges a uniform tariff throughout the country to subsidise mini-grid operations. In some cases, the utility develops and owns the mini-grid while an energy service company manages local billing and collections.¹⁴
- In Kenya, where the utility-based ownership model is common, the Rural Electrification Authority develops mini-grid sites throughout the country. Kenya Power, the national utility, then manages, operates, and maintains the mini-grids. Kenya Power's portfolio consists of 19 mini-grids totalling 21 MW generation capacity, with plans to convert these to solar-diesel hybrids and 43 greenfield solar mini-grids through the Scaling Up Renewable Energy Program (SREP).¹⁵
- JIRAMA, Madagascar's vertically integrated state-owned utility that operates most of the country's grid infrastructure, owns and operates (along with the Rural Electrification Agency) about 130 isolated mini-grids.¹⁶

Community Mini-Grid Projects

Community mini-grid projects are often used to help expand electricity to dispersed, low-income populations. Many successful community models are implemented at the national level through utilities or agencies, or in some cases, by regional state-level entities or PPPs. Examples include:

- The West Bengal Renewable Energy Development Agency (WBREDA), serving as the State Nodal Agency for implementation of Non-Conventional Energy Programmes in the State of West Bengal, India, developed a community-based partnership-ownership model. In each village, WBREDA helps form a local cooperative or beneficiary committee to help manage the mini-grid. At the beginning of each mini-grid project, WBREDA helps form a local cooperative to drive direct community involvement. In the planning stages, cooperatives build trust and local support for projects. As a result, communities readily provide land for mini-grids and participate in planning. Communities remain engaged throughout the project life cycle, from planning to implementation. The local cooperative or beneficiary committee is actively involved in determining and collecting tariffs, selecting customers, planning distribution lines and handling grievances. The local cooperative is instrumental in educating communities about the project and responsible use of electricity. WBREDA always pays qualified personnel to operate and maintain systems. This community-approach ensures that services meet consumer expectations and foster continued support for the mini-grid project.¹⁷

14 "Accelerating mini-grid deployment in sub-Saharan Africa: Lessons from Tanzania," World Bank, <http://documents.worldbank.org/curated/en/532751512396163620/pdf/WP-acceleratingminigriddesploymentsubaharanafrica-PUBLIC.pdf>

15 "Development of Kenya's Power Sector," Power Africa, 2016. See: https://www.usaid.gov/sites/default/files/documents/1860/Kenya_Power_Sector_report.pdf

16 "Madagascar – Least-Cost Electricity Access Development Project," World Bank, January 2019. See: <http://documents.worldbank.org/curated/en/281861547039951916/pdf/Project-Information-Documents-Integrated-Safeguards-Data-Sheet-Madagascar-Least-Cost-Electricity-Access-Development-Project-LEAD-P163870.pdf>

17 "Island Mini-Grids In West Bengal," USAID web site. See: <https://www.usaid.gov/energy/mini-grids/case-studies/india-island-mini-grids/>

- The U.S. Rural Electrification Administration provides low-interest loans to non-profit, farmer-owned cooperatives. In under two decades, 93% of U.S. farms have been electrified, with loan default rates less than 1%. Today 897 cooperatives serve 42 million people.¹⁸
- African Community-Based Rural Electrification Programmes are now being considered by the African Development Bank. This approach would adapt the U.S. community-based approach in

collaboration with the National Rural Electric Cooperative Association (NRECA) in Nigeria and Ethiopia, expanding NRECA's existing programmes with many African national government agencies.¹⁹

While pure private sector operator models in which all the investment comes from private sources are rare, they do exist (e.g., Mesh Power, Powerhive).²⁰ More examples of Solar Mini-Grid Projects are provided in Section 6.

4.3 Evaluate Advantages and Disadvantages of Private Sector Finance Models

In all models deployed, LGs will need to be aware that private developers often mobilise technical assistance and transaction support to structure a cost-effective and climate smart project. This assistance will often include local technical studies (e.g., demand, environmental, social impact) that provide the technical basis for structuring the project and its services.

There is an opportunity for LGs to ensure they are involved in upstream development, as these technical studies offer an opportunity to ensure that Solar Mini-Grid Projects are well designed given local needs and are well integrated into the local context.

The advantages and disadvantages of different finance models for Solar Mini-Grid Projects are summarised in Table 5.3 below.

18 "A Historical Approach to Solving a Modern Problem," USAID web site." See: <https://medium.com/power-africa/electrifying-africa-based-on-the-u-s-rural-electrification-model-47dfa671fa9d>

19 "Africa Development Bank explores electricity cooperative potential," Africa Oil & Power website. See: <https://africaoilandpower.com/2019/02/25/africa-development-bank-explores-electricity-cooperative-potential/>

20 "Mini-Grid Policy Toolkit: Policy and Business Frameworks for Successful Mini-grid Roll-outs," European Union Energy Initiative Partnership Dialogue Facility (EUEI PDF). See: [http://minigridpolicytoolkit.euei-pdf.org/system/files_force/RECP_Minigrid_Policy_Toolkit_doublepage%20\(pdf%2c%2012.5MB%2c%20EN\)_web60ab.pdf?download=1](http://minigridpolicytoolkit.euei-pdf.org/system/files_force/RECP_Minigrid_Policy_Toolkit_doublepage%20(pdf%2c%2012.5MB%2c%20EN)_web60ab.pdf?download=1)

Table 5.3: Indicative Challenges of Different Finance Models

Criteria	Public Owned and Managed (national government, utility)	Community-Based/ LG Owned and Managed	Private Sector Developer Owned and Managed	Public-Private Partnerships (PPPs)
Reliable End-user demand	Mini-grids are often deployed as part of rural electrification plans into areas where citizens may not be able to afford the power supplied, and typically do not have industrial centres or clusters of sizable SMEs in which to anchor mini-grid loads. LGs could deploy incentives to promote rural economic growth; however, there are issues of scale, feasibility, and coordination with NGs to consider.	Community-based models can secure local demand, but local users usually lack ability to pay cost-reflective tariffs.	There are several models (e.g., Anchor, Business, Community) in which developers identify 'anchor' customers (e.g. an irrigation pumping project) with high credit-worthiness to reduce overall payment risks (these approaches are highly context-dependent and have equal cases of success and failure and often require government support).	Generating reliable demand is critical for scalability. A broader partnership between government and private sector would enable development of larger mini-grid programmes that could achieve scale.
Access to finance (including climate or 'green' finance)	Reliant on grants from national government and donors unless LG can raise debt or issue bonds. There are many renewable energy funds supporting mini-grid development, including climate funds. ²¹ LGs would typically have to go through central governments.	Very limited ability to access private or public finance as projects are usually not profitable and very small below levels of grant finance.	There is no proven business model for private sector driven mini-grids that has achieved scale. Private operators need to access equity and debt facilities at concessional rates to be viable, in addition to government support if the expected profitability is low.	Projects with blended finance – climate funds, government grants/subsidies, and private investment – are typical models that have delivered successful programmes and projects and reduced the burden on governments.

NOTE: This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

21 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

Table 5.3: Indicative Challenges of Different Finance Models

continued

Criteria	Public Owned and Managed (national government, utility)	Community-Based/ LG Owned and Managed	Private Sector Developer Owned and Managed	Public-Private Partnerships (PPPs)
Pooling	Pooling requires a high level of effort in coordination, negotiations with various stakeholders. While LGs could pool resources (e.g., revenue sharing, responsibilities, etc.), there should be a third party in charge to lower high transaction costs.	Pooling approach at national level can help to access public finance and structure projects using blended finance models.	A larger procurement plan that develops a larger number of sites, which helps to address scale and improve IRR (Internal Rate of Return), in partnership with facilities and funds (for micro-grid scale up and/or end-user financing), would be more attractive for private developers, commercial lenders, and investors. Pooling can remove barriers to private investment, but the allocation of risks (e.g., payment, operation, etc.) can be challenging without effective government support.	Risk, operational, and financial pooling can remove barriers to private investment and enable a partnership approach.
Legal framework/ enabling environment	National governments can adapt frameworks as needed.	All projects are typically reliant on national legal frameworks and strategies for the development of the power sector. Project owners have minimal ability to shape/change/adapt according to local context and to incentivise private sector entry (e.g., cross-subsidies, tariff structuring, Independent Power Producer programmes, etc.).		
Capacity (to access funding)	National utilities normally have experience in accessing finance.	Community and private sector developers may lack the capacity to access adequate levels of private and public finance. Third party expertise may be required.		Private sector has challenges, but also must be willing to develop the required capacities as part of wider project partnership.
Costs and time to implement	National government and/or private sector support usually required as LGs often do not have funding and normally do not control the regulatory framework.	Community-based organisations, LGs, and private sector developers often individually lack the significant funding required to cover CAPEX (Capital Expenditures) and/or resources for third-party support. Given degree of subsidisation required, and inability to pass costs onto users, support often required of government (e.g., subsidies, etc.).		PPPs require significant technical, financial and legal expertise to develop. Even with partial coverage of project development costs, there may be inadequate time and resources to develop projects to financial close and implement.

NOTE: This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Identify Possible Funding Mechanisms

There are a number of different vehicles, instruments and blended finance arrangements to de-risk solar mini-grid investments, provide end-user financing, and support projects to reach viability.²²

The identification and mobilisation of funding mechanisms is usually the role of the private developer, but the LG can assume a pivotal role in providing input on how to design the project to develop the required levels of revenues, secure the support of important local stakeholders, secure governmental grants and subsidies, and the required approvals for PPAs,

permits, and land, also contributing to the various required technical studies.

Some development partners offer advice and assistance to governments on funding sources, such as AfDB's Green Mini-Grids (GMGs) Market Development Programme, a resource library for governments and private developers.²³

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology to assess potential Solar Mini-Grid Projects.

4.4.1 Indicative sources for project support facilities

Given the contextual nature of each project (from site selection to financing instruments), project bankability is a bottleneck that can be supported through project support facilities and grants. Examples of finance vehicles for Solar Mini-Grid Projects are provided below.

Sustainable Energy Fund for Africa (SEFA):

SEFA is a Special Fund within the AfDB providing technical assistance (TA) in the form of project preparation grants to prepare and structure procurement programmes led by public sector beneficiaries for mini-grids and support regulatory reform and market facilitation through the Market Development Program on a country-by-country basis. SEFA offers several country programmes on Green Mini-Grids (GMGs), which focus on policy and market preparation necessary for GMG implementation, including policy support to address barriers to scale, demand-side mapping, and innovative financing models.²⁴

Green Mini-Grids Support Facility:

This facility aims to help transform the GMGs sector in Africa by enabling a critical mass of experience and evidence of success in the two leading countries of Kenya and Tanzania, coupled with improved policy and market conditions for mini-grids regionally.

IFC Energy and Resource Efficiency Advisory:

This International Finance Corporation (IFC) advisory programme provides advisory services to companies in three main areas: power (typically new and clean technologies like solar, wind, hydro, biomass, and geothermal resources), resource efficiency, and increasing access to modern energy services. For power, greater emphasis is on off-grid and mini-grid.

Scaling Solar:

This “one-stop-shop” programme for African governments and utilities aims to make privately funded grid-connected solar projects operational within two years

22 Various sources listed in Power Africa Toolbox, USAID, 2020. See: <https://www.usaid.gov/powerafrica/toolbox/search/results/pdf>

23 The GMG Market Development Programme provides: i) market intelligence services for developers; ii) business development assistance for developers; iii) policy and regulatory assistance for governments; iv) quality assurance for regulators and industry associations; and v) access to finance, including a results-based financing (RBF) grant funding in collaboration with donors. See: <https://greenminigrd.afdb.org/>

24 See Green Mini-Grid Help Grid: <https://greenminigrd.afdb.org/green-mini-grid-market-development-program-gmg-mdp-supports-scale-investments>

Box 5.1: Indicative Funding Sources and Mechanisms for Solar Mini-Grid Projects

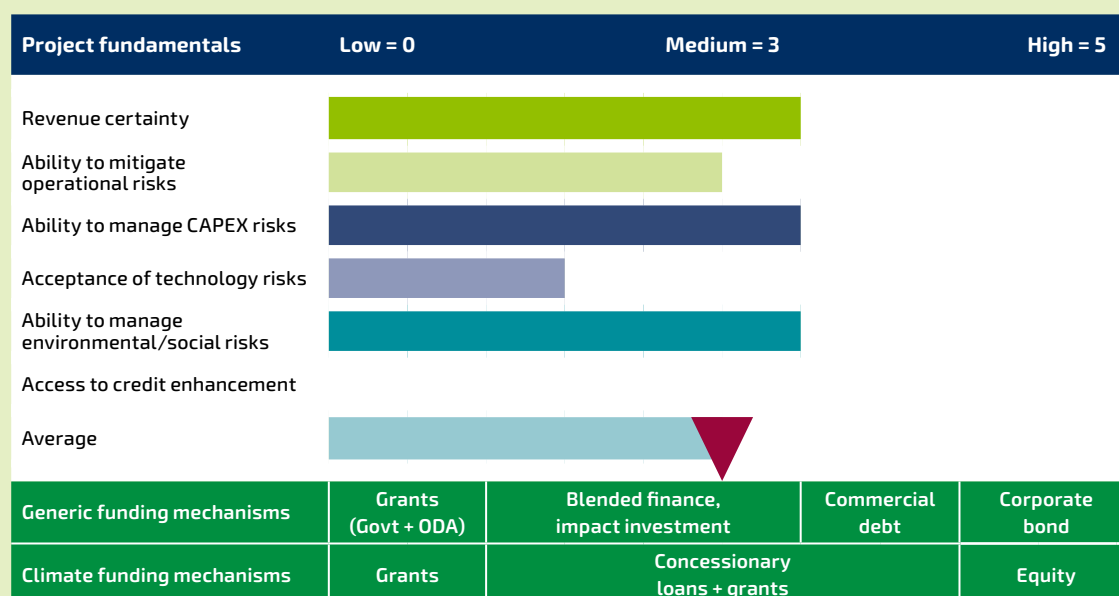
To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach. The figure 5.3 below shows a typology for a generic Solar Mini-Grid Project and indicates that a blended finance approach may be the most suitable funding option. If climate finance were to be accessed, a combination of concessionary loans and grants may be most suitable.

The following risk and revenue factors drive this typology:

- Electricity tariffs do not tend to be cost reflective;
- LGs are not likely to be able to guarantee revenue;
- Lack of creditworthy off-taker(s); and
- Lenders may not be incentivised to undertake the necessary due diligence processes to unlock funding given the size of a typical Solar Mini-Grid Project.

In those cases that off-take agreements cannot be negotiated with creditworthy off-takers, the investment attractiveness of the project may be enhanced through the use of credit enhancements, such as grants, guarantees, and/or first loss facilities. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 5.3: Illustrative Solar Mini-Grid Project Typology



If risks can be mitigated or revenue certainty increased, a Solar Mini-Grid Project could also be implemented via a PPP provided it can access grant funding to reduce upfront costs.



Mini-grid in rural area

and at competitive tariffs. By assisting governments, the Scaling Solar Programme executes competitive procurement for Solar Projects. Successful bidders can access finance and risk mitigation through the World Bank Group, including the International Finance Corporation (IFC) and the Multilateral Investment Guarantee Agency (MIGA).

Lighting Global:

This IFC programme focuses exclusively on off-grid solar. It supports market development by working with private companies to lower first-mover risk and mobilise private sector investment through market intelligence, quality assurance, business support services, and consumer education. While the IFC primarily supports manufacturers and distributors, it also works with companies throughout the value chain.

4.4.2 Indicative sources for grants, debt, and equity

Grants, debt, and equity can be accessed by both the private and public sectors to fund Solar Mini-Grid Projects. Given the need for grants and subsidies to achieve project viability, access to grants and concessional finance is especially critical as the financing costs are below market commercial interest rates. Examples of debt and equity finance sources are provided below.

Cross-Boundary Energy Access:

Africa's first project financing facility for Solar Mini-Grid Projects was launched in January 2019. It bridges the gap to commercial scale, allowing private capital to invest in mini-grid projects by blending private sector capital with patient equity from impact investors such as Ceniart and development-focused debt from institutions such as the Rockefeller Foundation.²⁵ The facility was launched by CrossBoundary Energy Access (CBEA) that will initially invest US\$16 million into mini-grids serving 170,000 people, providing first-time power to homes and businesses.²⁶

SEFA Concessional Investment Window:

SEFA is a special fund within AfDB providing concessional investment to address viability gaps identified in beneficiary financing structures for mini-grids. It provides results-based financing to eligible beneficiaries under national programmes and targeted concessional investment to catalyse commercial investment in green mini-grids.

Facility for Energy Inclusion:

The Facility for Energy Inclusion (FEI) is comprised of two funds: The Off-Grid Energy Access Fund (OGEF) and the On-Grid Fund, which provide debt to project developers and sponsors of smaller renewable energy projects under 25 MW with total project costs of US\$30 million or less.²⁷ FEI has created a capital structure with low cost on-lending. While the fund itself is blended, it provides senior and mezzanine debt to off-grid, mini-grid, and small-scale Independent Power Producers (IPP).²⁸ The fund provides foreign and local currency financing. The main donor is AfDB.

25 A class of private sector investors is willing to provide capital at terms below mainstream market requirements. For example, providers of "patient equity" provide long term capital with no expectation of turning a quick profit, forgoing an immediate return in anticipation of returns over the long-term. "Impact investors" refers to investors whose criteria includes a measurable, beneficial social or environmental impact in addition to financial return.

26 "Project finance model emerges for African mini-grids," Inspiratia Market Insights. See: <https://www.crossboundary.com/wp-content/uploads/2019/08/20190828-Inspiratia-Article-Project-finance-model-emerges-for-African-mini-grids.pdf>

27 African Development Bank (AfDB). See: <https://www.afdb.org/en/projects-and-operations/p-z1-f00-063>

28 Investment has different levels of risk and protection. Senior debt is prioritized for repayment in the case of bankruptcy and therefore has the lowest risk. Mezzanine debt is the middle layer of capital that falls between secured senior debt and equity, is usually not secured by assets, and is lent strictly based on a company's ability to repay the debt from free cash flow.

ResponsAbility

ResponsAbility provides equity and debt financing to private companies that are active in the field of renewable energy generation – whether the power they produce is fed into the grid or used for captive consumption. Financing is also available to companies that produce and distribute renewable energy products to domestic users, as well as to other companies with innovative business models related to the energy value

chain. Suppliers of energy-efficient appliances, as well as renewable energy mini-grids, may also qualify for investment. The programme addresses the sustainable use of energy by increasing the efficiency of energy consumption to mitigate growth related increases in energy demand. ResponsAbility works through dedicated financing for the financial sector used to fund energy efficiency projects. The programme may also finance such projects directly (e.g., ESCO financing).

4.5 Identify and Implement Credit Risk Solutions

As explained in the prior sections, LGs are not responsible for energy policy, cannot control the level of payments made for services, and cannot normally provide credit solutions for Solar Mini-Grid Projects. However, LGs should be aware of credit related issues and possible solutions, especially as the providers of finance and credit enhancement will consider the political support of the LG as critical.

Credit risk solutions vary from the use of public loans and public guarantees that can address multiple risk categories, including developer, end-user credit, and financing risk²⁹ to incentivise participation by the private sector. Examples of international and regional risk mitigation providers include the World Bank's Multilateral Investment Guarantee Agency (MIGA), GuarantCo, African Trade Insurance Agency (ATI), and the African Guarantee Fund (AGF).

4.6 Establish Contacts with Private Sector Actors

As noted in earlier sections, national governments and private developers generally tend to be in the driver's seat in developing mini-grid projects, though there are opportunities across the development cycle for LGs to influence and contribute. A key opportunity for LGs is establishing contacts with the private sector developers early in the process with the objective of building partnerships for specific projects.

There are a number of international private sector developers driving the development of Solar Mini-Grid Projects in SSA and worldwide. Some of the larger companies, such as PowerGen, OMC, and Husk Power have between 45–100 mini-grid projects in their portfolio, whereas other developers have an investment approach more tailored to certain markets. Examples of mini-grid developers are provided in Table 5.4 below.

29 "Derisking Renewable Energy Investment: Off-Grid Electrification," UNDP & ETH Zürich, 2018. See: [https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/DREI%20Off-Grid%20Electrification%20-%20Full%20Report%20\(20181210\).pdf](https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/DREI%20Off-Grid%20Electrification%20-%20Full%20Report%20(20181210).pdf)

Table 5.4: Examples of Mini-Grid Developers in SSA and Worldwide

Examples of Developers	Indicative footprint
PowerGen	 Niger  Benin  Mozambique  Zambia  Uganda  Rwanda  Somalia  Tanzania  Kenya  Nigeria
OMC	 India several African countries
Husk Power	 India  Tanzania West Africa
ABB	 India  Pakistan  Singapore  South Africa  Vietnam
RVE.Sol	 Portugal  Tanzania  Kenya  Mozambique
Virunga Power	 Kenya  Tanzania  Burundi  Zambia
Redavia Solar Power	Sub-Saharan Africa
PowerHive	 Kenya
EM-ONE	 Nigeria
GVE Projects Ltd	 Nigeria
ARC Power Ltd	 Rwanda
Jumeme Rural Power Supply	 Tanzania
Winch Energy	Sub-Saharan Africa
PowerCorner (Engie)	 Tanzania

Sources: Developer websites, Renewable Energy Performance Platform (REPP), IRENA

To attract more private sector investment into Solar Mini-Grid Projects, potential activities that can be undertaken by LGs relate to fiscal and policy assessment, stakeholder engagement, financial sources, and project facilitation, as listed below:

Fiscal and policy assessment:

- Map the overall degree of fiscal and policy autonomy for LGs provided in national legal, regulatory, and policy frameworks;
- Assess the national legislation and regulatory environment, including how mini-grids are addressed in the country's energy sector Master Plan, Rural Electrification Strategy, etc.; and
- Assess the fiscal space (national and municipal) and LG creditworthiness to map the ability to provide incentives and policy levers that de-risk private sector investment (e.g., connection subsidies, partial risk guarantees, etc.).

Stakeholder engagement:

- Work with local communities, developers and other stakeholders to map and assess demand, site selection, and other technical requirements which inform assessments of financial viability and commercial sustainability;
- Identify technical assistance support provided to public sector, such as the African Development Bank's GMG Help Desk; and

- Partner with developers in securing technical assistance and transaction advisory support during the project structuring phase with a focus on defining risks and rewards, and the proper allocation to public and private stakeholders.

Financial sources and project facilitation:

- Identify the most appropriate sources of concessional finance and grants for project finance, including those instruments available to the private sector to support developers in ensuring project bankability;
- Identify appropriate policy instruments and levers available to LGs in consultation with the Ministry of Finance and Ministry of Local Government and other line ministries as relevant;
- If relevant, develop project management capabilities to manage contracts with the private sector and solar mini-grid operators more efficiently; and
- Prioritise the project in the LG budget if needed and ensure the continued coordination of relevant government entities and agencies across the project life cycle, from project identification to project's planning, development, construction, and operation.

The next section breaks out the main LG action steps by the specific stage of project development.

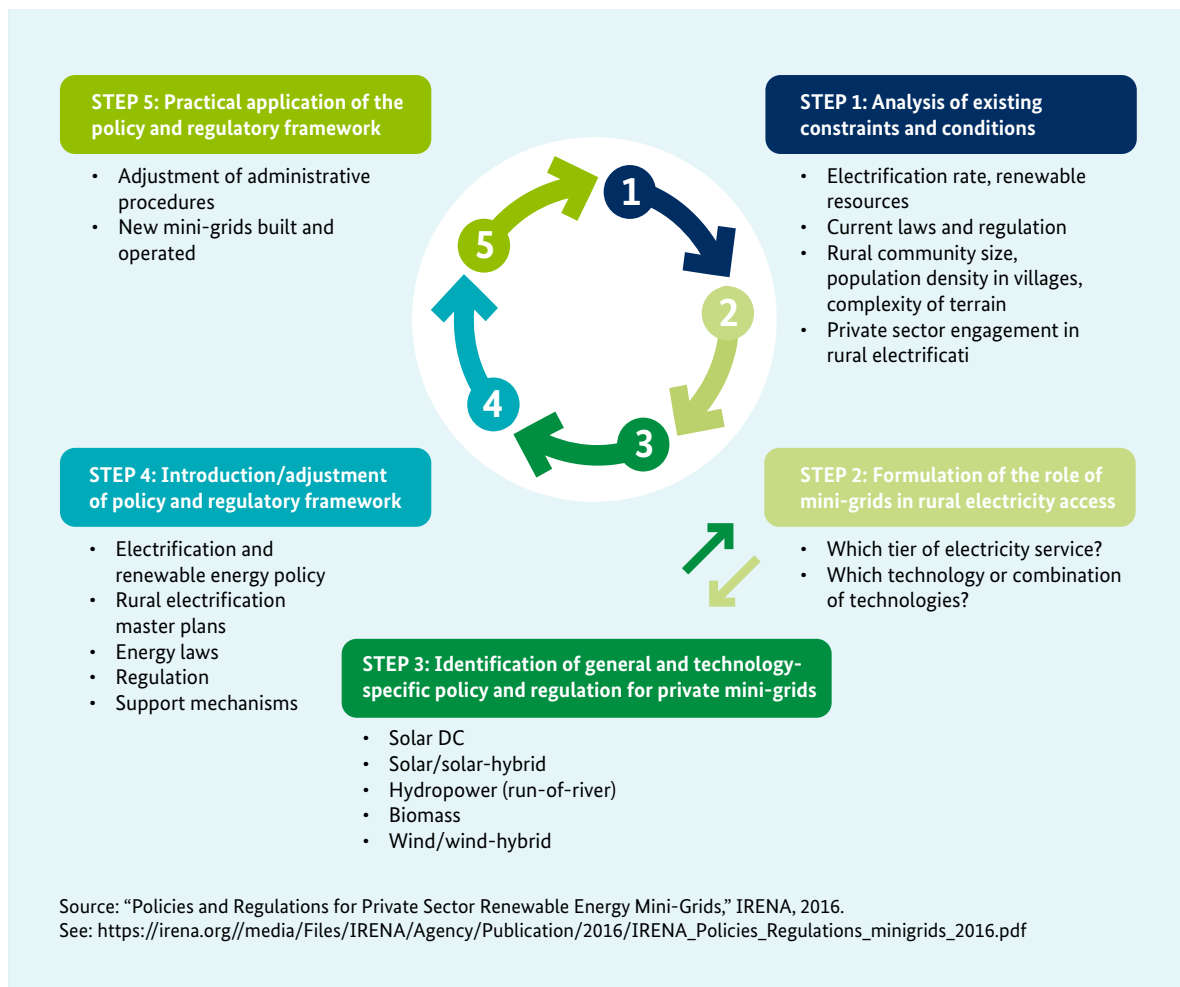
5 Action Steps for Local Governments

LGs will also need to understand the policy development cycle in the national environment as it relates to mini-grid development, as well as the steps that project developers will need to implement to develop a

viable Solar Mini-Grid Project.³⁰ These processes guide the developer's local adaptation and tailoring to suit contextual needs, as illustrated in the five steps outlined in Figure 5.4 below.

³⁰ There are several references that describe the framework for project development and the lifecycle. For example, reference the "Effective Project Preparation for Africa's Infrastructure Development," Infrastructure Consortium of Africa, 2014. See: https://www.icafrica.org/fileadmin/documents/Publications/Effective_project_preparation_in_Africa_ICA_Report_31_October_2014.pdf

Figure 5.4: Applying the Local Context of Policy Development Cycle to Mini-Grid Development



Similarly, the proactive steps that LGs can implement need to be tailored to the national and local context, as LGs are likely to have limited roles depending on the specific Solar Mini-Grid Project. The scope of potential

LG proactive actions is outlined in Table 5.5 below, breaking down actions according to the stage of the project's development life cycle.



Table 5.5: Roadmap of Proactive LG Action Steps for Implementation of Solar Mini-Grid Projects

Stage of Project Development	Potential Actions of Local Governments
Enabling environment and supporting policy	Prior to project preparation phase, the LG can collaborate with the national government in improving the enabling environment and addressing impediments to the implementation of Solar Mini-Grid Projects (e.g., lack of adequate tariffs and/or concessional finance and grants, secure land access, etc.). For key enabling factors, see Section 7.0.
Early stage preparation	• Understand relationship between regulatory functions and development functions to avoid and prevent conflicts of interest • Support the development of the criteria for site identification • Support the selection and securing of suitable site(s) • Support the evaluation of energy demand and willingness and ability to pay conducted by developers and their experts • Identify the extent of local participation in the project • Identify parties at risk and those able to support project • Identify potential sources of public sector technical assistance for ownership structuring, capacity-building, technical studies, etc. • Participate in and facilitate discussions around legal ownership and structuring, local community acceptance, and securing of land (e.g., structuring of the legal vehicle and ownership, enable community comfort with project ownership and operation, ensure access to required land, etc.) • Participate in trainings/capacitation on basic technical aspects of mini-grids and electrification planning • Support community-sensitisation and education efforts, especially ability to integrate new energy access into local economic development (e.g., use by local community, SME business expansion, development of supply chains and exports, etc.) • Facilitate agreement between project developer and off taker(s) to ensure project financial viability where relevant
Mid-stage preparation	• Support land leasing or purchase • Facilitate securing required permits/licenses (provided there is no conflict of interest with national regulatory functions) • Participate in dialogue with developers to ensure clear understanding of ownership rights, management responsibilities, risks of the project, etc.
Late-stage preparation	• Facilitate off-taker discussions • Where relevant, participate in the definition of the tariff between off-taker and project developer on Power Purchase Agreement(s) (PPAs)
Operations	• Ongoing monitoring of project against criteria for Monitoring and Evaluation (M&E)

As demonstrated above, LGs can be proactive with specific action steps in ensuring the successful identification, development, finance, and operation of Solar Mini-Grid Projects.

6 Examples of Solar Mini-Grid Projects in Sub-Saharan Africa

There are extensive examples of solar mini-grid development in SSA. The Energy Sector Management Programme database (ESMAP) has more than 26,000 mini-grid projects in 134 countries. Three African countries are listed in the top five countries worldwide for planned future development of third generation mini-grids: Senegal (1,217 projects); Nigeria (879 projects); and Tanzania (301 projects).³¹

Both national and local enabling environments have played a critical role in attracting more investments from the private sector into SSA Solar Mini-Grid Projects. It is important to note that promoting mini-grid development is easiest when it is incorporated and prioritised in the key energy policies and planning processes of the host national government.³² Examples of SSA countries that have prioritised Solar Mini-Grid Projects in their national climate plans and/or energy sector plans and strategies are provided below.

6.1 Nigeria

The Electric Power Sector Reform Act of 2005 is the overarching law ruling the power sector in Nigeria. Other relevant policies supporting off-grid electrification include the Electric Power Sector Reform Act (2005); the Nigerian Renewable Energy and Efficiency Policy (2015); and the Rural Electrification Strategy and Implementation Plan (2016).

Regulations for mini-grids issued in 2016 are applicable to systems smaller than 1 MW.³³ They are designed to address some of the barriers against investment in mini-grids for rural electrification. The regulations allow a developer to reserve a site through an exclusivity agreement while preparing the project,³⁴ and provide mechanisms for developers to more easily recover investments.³⁵

For example, the Green Village Electricity Project (GVE) plans to construct mini distribution grids in 72 villages across seven states in Nigeria. They have 12 operational sites to date and have conducted several projects with financial support from various actors.³⁶ Examples of GVE projects include:

→ In 2015, GVE installed a 40 kWp (kilowatt peak) solar mini-grid pilot project in the Bisanti Village located in the Katcha Local Government Area of Niger State, Nigeria. The project with a total cost of US\$ 250,000 was financed 90% by the Bank of Industry Nigeria through equity and debt financing and a 10% grant support from the Institute of Electrical Electronics Engineers (IEEE).³⁷

31 "Mini Grids for Half a Billion People: Outlook and Handbook for Decision Makers," ESMAP, 2019. See: <https://www.worldbank.org/en/topic/energy/publication/mini-grids-for-half-a-billion-people> Solar-hybrids incorporate the latest technologies such as smart meters and remote monitoring systems, and are typically designed to interconnect with the main grid.

32 Energy policy or rural electrification policies; rural electrification strategies; electricity act and energy laws; electrification master plans. For more information, "How Should Governments Integrate Mini-Grids into National Electrification Planning?" USAID website. See: <https://www.usaid.gov/energy/mini-grids/policy/national-planning/>

33 Mini grids in Nigeria: A case study of a promising market," ESMAP, 2017. See: <http://documents.worldbank.org/curated/en/697871512385971705/pdf/121827-ESM-dNigeriaMiniGridsCaseStudyConfEd-PUBLIC.pdf>

34 Nigerian Electricity Regulatory Commission. See: <https://nerc.gov.ng/index.php/home/operators/mini-grid>

35 "Minigrid investment report: Scaling the Nigerian Market," Nigerian Economic Summit Group, 2018. See: http://rmi.org/wp-content/uploads/2018/08/RMI_Nigeria_Minigrid_Investment_Report_2018.pdf

36 Camco Clean Energy. See: <https://www.camco.energy/gve-nigeria-nigeria/>

37 "Bisanti Village Mini Grid Project – Pilot IV Project 2015," Green Village Electricity (GVE). See: <https://gve-group.com/portfolio/bisanti-village-mini-grid-project/>

→ In 2017, GVE implemented a 46 kWp solar PV based mini-grid pilot project in Kolaku community, located in the Balanga Local Government Area of Gombe State, Nigeria. The project was

implemented in collaboration with the Bank of Industry Nigeria and the United Nations Development Programme (UNDP).³⁸

6.2 Tanzania

Tanzania has implemented several enabling policies for renewable energy development, including the revised energy policy of 2003, which encouraged private sector participation and investments in renewable energy

mini-grids. The Electricity Act of 2008 encourages private participation in small power production and distribution.³⁹

- 1 One example is Jumeme Rural Power Supply Ltd., that founded a joint venture in 2014 to develop, build, and operate mini-grids in rural Tanzania. By 2022, Jumeme aims to supply high quality and reliable electricity to one million people and provide a grid-connected installed power capacity of 200 MW.⁴⁰ Jumeme, like other mini-grid projects, is dependent on stable and predictable demand for electricity to ensure viability. The developer has conducted a thorough mapping exercise to both build and anticipate future demand. A holistic approach has been adopted to advance local development, including providing down payments on machinery and electric mills for agro-processing; funding irrigation projects; electrifying local clinics; driving job creation in the fisheries sector; and conducting activities to attract and develop local businesses by offering free consulting services.⁴¹

The project has funding of EUR 7.4 million. Co-funded by the European Union Energy Facility, the project also has funding from the Tanzania Rural Energy Agency (through its European Union result-based financing scheme). As project developer, JUMEME has contributed equity and engaged other equity partners.⁴² Shareholders include INENSUS, a German company specialised in development, technology and consultancy services for rural mini-grids; TerraProjects, an Austrian specialist company in renewable energy project development; and St. Augustine University of Tanzania, a higher learning institution based in Mwanza. The majority shareholder, RP Global, is an Austrian Independent Power Producer.⁴³

38 "Kolaku Community Electrification Pilot VIII Project – 2017," GVE. See: <https://gve-group.com/portfolio/kolaku-community-electrification-project/>

39 Odarno et al., Accelerating mini-grid deployment in Sub-Saharan Africa: Lessons from Tanzania, World Resources Institute (WRI), 2017. See: <http://documents.worldbank.org/curated/en/532751512396163620/pdf/WP-acceleratingminigriddeloymentsubsaharanafrica-PUBLIC.pdf>

40 "Jumeme Hybrid Solar Joint Venture," Renewable Power Global (an independent power producer). See: <https://www.rp-global.com/solar/tanzania/jumeme/>

41 Interviews conducted by KPMG Norway, 2019.

42 "European Union and JUMEME inaugurate new solar-powered mini-grid on Lake Victoria's Mulumo Island in Kagera Region," EU Energy Facility. See: https://eeas.europa.eu/headquarters/headquarters-homepage/64538/european-union-and-jumeme-inaugurate-new-solar-powered-mini-grid-lake-victoria%E2%80%99s-mulumo-island_en

43 Press release from the EU: "European Union and JUMEME inaugurate new solar-powered mini-grid on Lake Victoria's Mulumo Island in Kagera Region." See: https://eeas.europa.eu/sites/eeas/files/eu_jumeme_solar_mini_grid_project_inauguration_.pdf; "Jumeme Hybrid Solar Joint Venture," Op. cit.

- 2 Another example is Ruaha Energy, a Tanzanian private developer and operator of rural and small urban electrification projects, including village micro-grids (solar PV with biomass gasifiers). Ruaha is developing village micro-grids in the Kilosa District of Tanzania, which is about 300 km west of Dar es Salaam. So far the company has installed one 50 kWp micro-grid serving the village of Zombo and two nearby villages. It has 150 connections, with another 50 likely to be connected soon. Ruaha is planning to eventually double the generation capacity of Zombo from 50 kWp to 100 kWp. Presently, Ruaha is developing micro-grids in three other village clusters, including a 450 kWp plant which eventually will be connected to two grid-tied mini-hydro plants that the company is also developing. Funding for the village micro-grids (expansion of Zombo plus the three village clusters) will be mainly provided by grants.⁴⁴

6.3 Kenya

Kenya's National Climate Change Action Plan (NCCAP) lists the development of 30 MW of distributed solar and mini-grids as a key action. The Kenya Off-Grid Solar Access Project (KOSAP), a flagship project of the Ministry of Energy financed by the World Bank, is aimed at providing electricity to parts of the country in 14 counties that are not served by the national grid. The six-year project started in 2017 is being jointly implemented by the Ministry of Energy, the Kenya Power and Lighting Company (KPLC), and the Rural Electrification Agency (REA). The project targets approximately 277,000 households (close to 1.3 million people). As part of this programme, counties were tasked with providing possible sites for the construction of the mini-grid based on the following criteria: ability to serve 100–700 prospective users and ability to attract demand of 20–300 kW.⁴⁵

As part of Kenya's KOSAP, a mini-grid project is being procured for Baragoi in Samburu County as a PPP. Under this arrangement a Private Service Provider (PSP) will be responsible for construction and partial financing of the generation systems and distribution network for each mini-grid. The PSP will sign two long-term contracts with KPLC: (1) a seven to ten-year PPA; and (2) a contract for the Operation and Maintenance (O&M), including the payment of the PSP of the monies required for the total recovery of the privately financed part of the investment. After the recovery of the private investments, all assets (generation and operation) will be owned by the Government of Kenya. Customers supplied through these mini-grids will be KPLC customers and pay the same tariff to the national government utility.⁴⁶

6.4 Rwanda

Rwanda's Vision 2020 (supported by a series of five-year medium-term strategic plans) is targeting 100% electricity access by 2024 through on-grid sources and

off-grid sources, providing the country with 52% and 48% of total energy access respectively. This plan complements Rwanda's Nationally Determined

44 Content for this section sourced from "Financial and Operational Bundling Strategies for Sustainable Micro-Grid Business Models," USAID, Op.cit.

45 Mini-grid information from web site of Kenya Ministry of Energy. See: http://energy.go.ke/?page_id=8074

46 Mini-grid information from web site of Kenya Ministry of Energy. See: http://energy.go.ke/?page_id=8074

Contributions (NDCs) under the Paris Agreement, which lays out commitments of greening the power sector through mitigation actions on renewable energy and energy efficiency. Rwanda's NDC specifically prioritises: i) increasing the share of new grid connected renewable capacity compared to fossil fuels and (ii) installing solar mini-grids in rural communities.⁴⁷

At a sectoral level, Rwanda's Rural Electrification Strategy (RES) outlines four different programmes, one of which focuses on *"development of mini-grids by the private sector with Government playing a key role in identifying sites and establishing a framework through which these can become financially viable investments."*⁴⁸ Associated incentives include the following:

- The Rwanda Utility Regulatory Authority (RURA) has developed a simplified framework to expedite licensing of mini-grids and reduce transaction costs. This framework provides a single license covering the activities of generation, distribution, and trade of electricity.⁴⁹
- The assessment of 20 potential mini-grid locations is being carried out by the Rwanda Energy Group (REG), which is responsible for identifying the sites most appropriate for micro-grids.⁵⁰

Therefore, the ability to scale up Solar Mini-Grid Projects has been demonstrated, assuming national and local governments provide enabling environments.

7 Enabling Factors

For LGs to effectively scale the implementation of Solar Mini-Grid Projects, NGs and the LGs need to have enabling factors that enable LGs to facilitate the required access to experts and funding.

7.1 National Government Enabling Factors

In order to attract private sector investments into Solar Mini-Grid Projects, LGs need to be in countries with enabling national frameworks, regulations, and legislation that enable them to incentivise market entry for private sector developers of Solar Mini-Grid Projects.

The broader national enabling environment is critical in the design of the legal and regulatory frameworks, and in identifying where reforms may be necessary to promote further investment into renewable energy projects in the country. During the project preparation phase, the LG would benefit from collaborating with relevant national government entities such as the

Ministry of Energy, Ministry of Finance, relevant agencies such as the Renewable Energy Agency, and the public energy utility.

Key NG enabling factors for Solar Mini-Grid Projects include related national grant mechanisms, adequate fiscal space to deploy national grant and guarantee schemes, supportive legislation and regulations, sectoral master plans and strategies that secure appropriate sites and jurisdictions for off-grid electrification, and tariff structures that are cost-reflective. A longer list of key NGs enabling factors is provided in Table 5.6 below.

47 See: <http://documents.worldbank.org/curated/en/321321512356422171/pdf/RWANDA-PAD-11082017.pdf>

48 Rural Electrification Strategy, Ministry of Infrastructure, Republic of Rwanda, 2016. See: https://www.mininfra.gov.rw/fileadmin/user_upload/aircraft/Rural_Electrification_Strategy.pdf

49 Rules for registering a company and obtaining an energy license from Rwanda Development Board. See: <https://rdb.rw/investment-opportunities/energy/#tab-1-3>

50 "Review Assessment of current electrification programs prepared by REG / EDCL and confirmation on institutional, technical and financial aspects," Rwanda Energy Group, 2019. See: http://www.reg.rw/fileadmin/user_upload/Report_of_the_Design_of_the_National_Electrification_Plan_in_Rwanda.pdf

Table 5.6: Indicative National Government Enabling Factors

Measures	Relevance to the mini-grid sector
National policy on energy, renewable energy, and mini-grids	Sets country objectives, identifies priority areas, and outlines the vision for electricity sector development and the role of renewable energy, including off-grid solutions. Dedicated mini-grid policies bring further definition and refinement, including capacity definitions, descriptions of different actors and their roles, and specifications of implementation-level interventions, service requirements, and financial incentives.
Rural electrification strategy; master plan	Defines the timeline, mode, and implementation strategy for rural electrification, covering aspects such as: • The definition of electricity access • Districts/villages identified as being unconnected and areas where specific solutions (e.g., mini-grids) are particularly suited • Financing and grant support strategies
Energy legislation	Provides the legal basis for licenses, permits, and concession contracts and schemes for private generation, distribution, and sale of electricity. Establishes the legal and institutional framework for the design, implementation, and enforcement of regulations. Establishes dedicated institutions and defines roles and responsibilities within the sector.
Late-stage preparation	• Facilitate off-taker discussions • Where relevant, participate in tariff signing process between off-taker and project developer on Power Purchase Agreement(s) (PPAs)
Mini-grid regulations	Implements the strategies and sets the rules of the game for all mini-grid stakeholders: • Defines tariff guidelines for mini-grid operators. • Provides grid interconnection regulations and procedures. • Ensures safe and reliable operation. • Establishes quality-of-service regulations. • Defines regulations governing feed-in tariffs and power purchase agreements. • Sets conditions for safety, power quality and service level.
Financial support for mini-grids	Outlines the dedicated financial support available for mini-grid projects: • Defines the types of financial support and their combinations (e.g., grants, concessional loans, guarantees, etc.). • Outlines the purpose of financing (e.g., for project development, fixed assets, capacity building, operational subsidies, leveraging working capital, etc.). • Puts forth the conditions and processes for securing financing (e.g., track record, cofinancing requirements, repayment options, equipment or service standards, etc.). • Provides the source of financing (e.g., revolving debt funds, rural electrification funds, electricity levy or duty, etc.).
Environmental and health protection	Defines environmental and health-related obligations of mini-grid developers and operators (e.g., environmental impact assessments, assessments, evaluation of use of hydro and biomass resources, etc.)

Source: "Policies and Regulations for Private Sector Renewable Energy Mini-Grids," IRENA, 2016. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Policies_Regulations_minigrids_2016.pdf

Table 5.6: Indicative National Government Enabling Factors

continued

Measures	Relevance to the mini-grid sector
Taxation and other fiscal measures	Relates to taxation of rural electricity supply and imported equipment: • Defines taxation (e.g., value-added tax) on mini-grid tariffs. If VAT applies, the amount paid per kWh by a mini-grid customer could be capped at the absolute amount of VAT paid by main-grid customer • Establishes tax treaties between countries to avoid double taxation for foreign private sector developers and operators. • Outlines tax-breaks, tax holidays, and incentives based on tax credits. • Defines exemptions from VAT for locally procured equipment, exemptions from service tax, etc. • Determines reductions in import taxes and duties for imported equipment. • Defines incentive for accelerated depreciation of generation assets.
Land rights and use	Provides the basis for land acquisition or operators use of land for generation and distribution (e.g., land ownership and leasing rules for local and foreign companies).
Incorporation, company formation	Determines rules and procedures for establishing a company, including resources needed to establish special purpose vehicles and the right to transfer profits overseas.
Building and construction	Defines processes during construction and installation, including permits and approvals for movable structures (e.g., containers), small buildings (e.g., power houses), etc.
Banking	Affects the willingness and ability of: • Domestic financing institutions to lend to mini-grid projects (e.g., priority sector lending provisions). • International financing institutions to finance local projects/enterprises. • Insurance providers to cater to mini-grid project requirements. • Shapes the extent to which nontraditional financing can be used (e.g., mobile payment, international crowdfunding, etc.)
Technical assistance and capacity building	Establishes the knowledge base on mini-grid systems and business and increases capacity for the implementation and administration of projects at the individual, organizational, and enabling-environment levels.
Statistics and data collection	Gathers and makes available data to facilitate site selection, specifically on inhabitants per town/village, average income and existing semi-industrial loads, GPS locations and renewable resources. Identifies institutions responsible for storing and processing data useful for planning.
Synergies with other sectors	Expands the scope of electricity access discussions to other sectors—including health, education, micro-industries, telecommunications, agriculture, and water – to identify synergies (e.g., as anchor loads) and maximise development impact.

Source: “Policies and Regulations for Private Sector Renewable Energy Mini-Grids,” IRENA, 2016. See: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Policies_Regulations_minigrids_2016.pdf

Given the importance of the national environment to the successful implementation of Solar Mini-Grid Projects, it is critical that LGs conduct effective advocacy

campaigns targeted on the impediments relevant to supplying adequate energy access to their constituencies.

7.2 Local Government Enabling Factors

Notable governance and regulatory-side challenges facing LGs were set forth at the 2018 South African Local Government Association Summit “*Defining the Energy Future for Local Government in South Africa*.”⁵¹

These challenges, while tailored to the South African context, offer broader insights to the challenges faced by LGs in other African countries:

- **Centralisation of policy development:** Energy Master Plans are often completed at a national scale with minimal input from LGs, so they need to ensure they are adequately consulted in the update of sector master plans and are also given opportunities to feed into sub-sector plans and strategies (e.g., Rural Electrification Plans, Energy Efficiency Strategies, Renewable Energy Strategies, De-carbonisation Strategies, National Climate Plans, etc.).
- **Lack of horizontal policy alignment:** Current policies and regulations are not always aligned, and often driven by multiple competing and uncoordinated entities. LGs face an uphill task coordinating activities with relevant ministries and government agencies to align on policy and implementation. LGs advocating for a cross-ministry coordination fora with relevant ministries at a local-level may be advisable in order to improve alignment.
- **Lack of vertical policy alignment:** National level policies do not always integrate with local policies, regulations, and objectives. The decentralisation of fiscal, political and administrative control will have a direct impact on the extent of LGs to pull the appropriate policy levers to incentivise mini-grid developments in their jurisdiction. LGs advocating for a coordination forum with national government may be advisable in order to improve alignment.
- **Lack of legal and regulatory procedures and capacity for implementation:** Procedures for the enactment of new policies and regulations may not exist. Similarly, the requisite capacities to implement and/ or enforce may be more limited at a local level. LGs may wish to advocate for clearer guidelines from national government in order to plan, prioritise and implement using precious capacities and resources.
- **Lack of innovation in policy development:** Centralised policy-making minimises the degree of local adaptation. LGs may wish to advocate for a mechanism that allows for more autonomy to tailor solutions to the local context of mini-grid development, critical to financial viability and commercial sustainability as well as development impact.

51 Adapted from “Defining the Energy Future of Local Government: Discussion Document,” South African Local Government Association (SALGA), 2018. See: <https://www.salga.org.za/SALGA%20Energy%20Summit%202018/Energy%20Summit%20Web/Document/Energy%20Summit%20Discussion%20Documents>

In addition, other challenges specifically affecting Mini-Grid Projects in Africa include lack of ownership by public entities, difficulties in calculating proper tariffs for households and small businesses, and insufficient consumer engagement in key policy areas, such as tariff structures.⁵²

The above points underline the potential for LGs to undertake proactive steps to promote the development and finance of Solar Mini-Grid Projects. For example, LGs can collaborate with national government agencies to access grant or concessional finance for project developers, thereby improving the potential financial viability of a Solar Mini-Grid Project.

The importance of national government agencies and private sector developers in developing successful Solar Mini-Grid Projects is well-documented in the cited programmes of Nigeria, Rwanda, and Tanzania. Moreover, the PRIVADA Project now being developed in Cameroon illustrates the potential for a very involved LG approach, in which the LG provides land and helps secure contracts with energy users, with the eventual transfer of ownership of the company to the LG over a 25–30 year period.

Examples of LG enabling factors for greater participation in the development and finance of Solar Mini-Grid Projects are provided in Table 5.7 below.

Table 5.7: Indicative Local Government Enabling Factors

Local Government Enabling Factors	Public	PPP	Private
1. LG has significant own sources of revenue	✓	✓	✓
2. LG can incur debt	✓	✓	N/A
3. LG can access CAPEX grants	✓	✓	✓
4. LG can be shareholder in companies	N/A	✓	N/A
5. LG can enter into long term contracts for services and products	✓	✓	✓
6. LG can reallocate existing budgets	✓	✓	✓
7. LG can assist in the <i>implementation</i> of cost reflective tariffs	✓	✓	✓
8. LG can charge cost reflective tariffs	✓	✓	✓
9. LG has capacity to develop projects (e.g., planning, budgeting, access experts, etc.)	✓	✓	✓
10. LG can make land available at no or minimal cost	✓	✓	✓
11. LG has capacity to procure Engineering Procurement Construction (EPC) contractors	✓	✓	N/A
12. LG has capacity to procure and manage long term contracts	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for Local Governments to unlock finance for Solar Mini-Grid Projects. Dark blue denotes greater enablement than light blue. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Therefore, Solar Mini Grids Projects can achieve results with breakthrough enabling factors at the LG and NG levels. Some of these key factors are illustrated by the successful examples listed in Box 5.2 below.

Box 5.2: Examples of Enabling Factors for Solar Mini-Grid Projects

- **Coordination with Private Sector Developer, Development Partners, and Private Companies:** Several local communities in Nigeria have successfully worked with Green Village Electricity (GVE) Projects Limited, a leading renewable energy solutions provider in West Africa. Partners include the US Agency for International Development (USAID), US Trade and Development Agency (USTDA), US African Development Foundation (USADF), US Power Africa Initiative, EU-Energy Initiative, General Electric, and Schneider Electric.
- **Coordination with National Solar Programmes:** The Kenya Off-Grid Solar Access Project (KOSAP), a flagship project of the Kenya Ministry of Energy, financed by the World Bank, aimed at providing electricity to parts of the country in 14 Counties that are not served by the national grid. The six-year project which started in 2017 is being jointly implemented by the Ministry of Energy, the Kenya Power and Lighting Company (KPLC), and the Rural Electrification Agency (REA). The project targets approximately 277,000 households or close to 1.3 million people. As part of this programme, counties were tasked with providing possible sites for the construction of the mini grid based on the following criteria: ability to serve 100–700 prospective users and ability to attract demand of 20–300 kW.⁵³
- **Using a PPP Structure with Investor Reimbursement Before Asset Transfer to Government:** In Samburu County, Kenya, a PPP structure requires the Private Service Provider (PSP) to be responsible for the construction and partial financing of the generation systems and distribution network of several mini-grids. The PSP has two long-term contracts with KPLC: (1) 7–10-year PPA; and (2) contract for O&M. This arrangement includes payments from the government to the PSP of the monies required for the total recovery of its investment. After the recovery of the investment, the project's assets (generation and operation) will be owned by the Government of Kenya.
- **Simplified National Government Processes:** Rwanda's Utility Regulatory Authority (RURA) has developed a simplified framework to expedite licensing of mini-grids and reduce transaction costs. This framework provides a single license covering the activities of generation, distribution, and trade of electricity.

Sources: The above examples are taken from section 6 of this chapter.

52 "Renewable Energy-Based Mini-Grids: The UNIDO Experience," UNIDO, 2017. See: https://www.unido.org/sites/default/files/2017-03/Minigrid_report_Jan2017.v19_FINAL29906_0.pdf

53 Mini-grid information from the website of the Kenyan Ministry of Energy. See: http://energy.go.ke/?page_id=8074

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level requires the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate Solar Mini-Grid Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance solar mini-grid projects by working through national agencies and programmes and those of development partners. Towards this end, a national ecosystem to support SMG Projects can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), NGOs, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the action steps set out in the prior section in “*Table 5.5: Roadmap of Proactive LG Action Steps for Implementation of Solar Mini-Grid Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design a Solar Mini-Grid Project. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the action steps in existing SSA and other Solar Mini-Grid Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

Key sources include Power Africa’s Toolbox,⁵⁴ which mobilises 160 different tools to unlock obstacles facing private sector power deals in Sub-Saharan Africa and AfDB’s GMG Market Development Programme, a resource library and technical assistance database used to scale-up investments in commercially viable GMG projects.⁵⁵

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Solar Mini-Grid Projects. LGs will need to have access to such advisors. NGs and development partners can provide critical support.

To build out a database of technical experts, the professionals involved in existing Solar Mini-Grid Projects could be identified and compiled into a list, with information on their services and contact information.

54 Various sources listed in Power Africa Toolbox, USAID, 2020. See: <https://www.usaid.gov/powerafrica/toolbox/search/results/pdf>

55 The GMG Market Development Programme provides: i) market intelligence services for developers; ii) business development assistance for developers; iii) policy and regulatory assistance for governments; iv) quality assurance for regulators and industry associations; and v) access to finance, including a results-based financing (RBF) grant funding in collaboration with donors. See: <https://greenminigrid.afdb.org/>

There are also a number of project preparation facilities that could provide technical advisory support to LGs. Sample facilities are provided in Section 4.5. Existing resources include SIDA's analysis of renewable energy project preparation facilities in Sub-Saharan Africa⁵⁶ and Power Africa's Partners Toolbox.⁵⁷

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

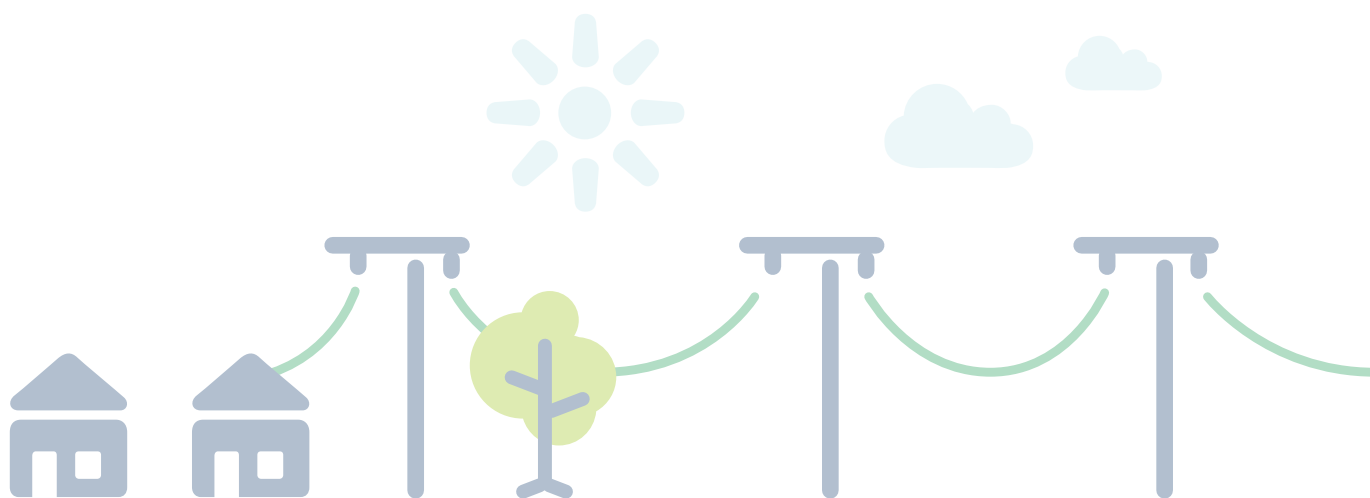
LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful Solar Mini-Grid Projects can share their experiences with other SSA

LGs. Early contributors could be participants in Solar Mini-Grid Projects in Cameroon, Kenya, Nigeria, and Tanzania.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.



56 “Analysis of Renewable Energy Project Preparation Facilities in Sub-Saharan Africa,” SIDA, 2015. See: <https://www.sida.se/globalassets/sida/sve/sa-arbetar-vi/utvecklingsfinansiering/analysis-of-project-preparation-facilities-in-sub-saharan-africa.pdf>

57 Power Africa Partners Toolbox, USAID, 2017. See: https://www.gov.il/BlobFolder/generalpage/power_africa/he/pw.pdf



Chapter 6:

Public Street Lighting Projects

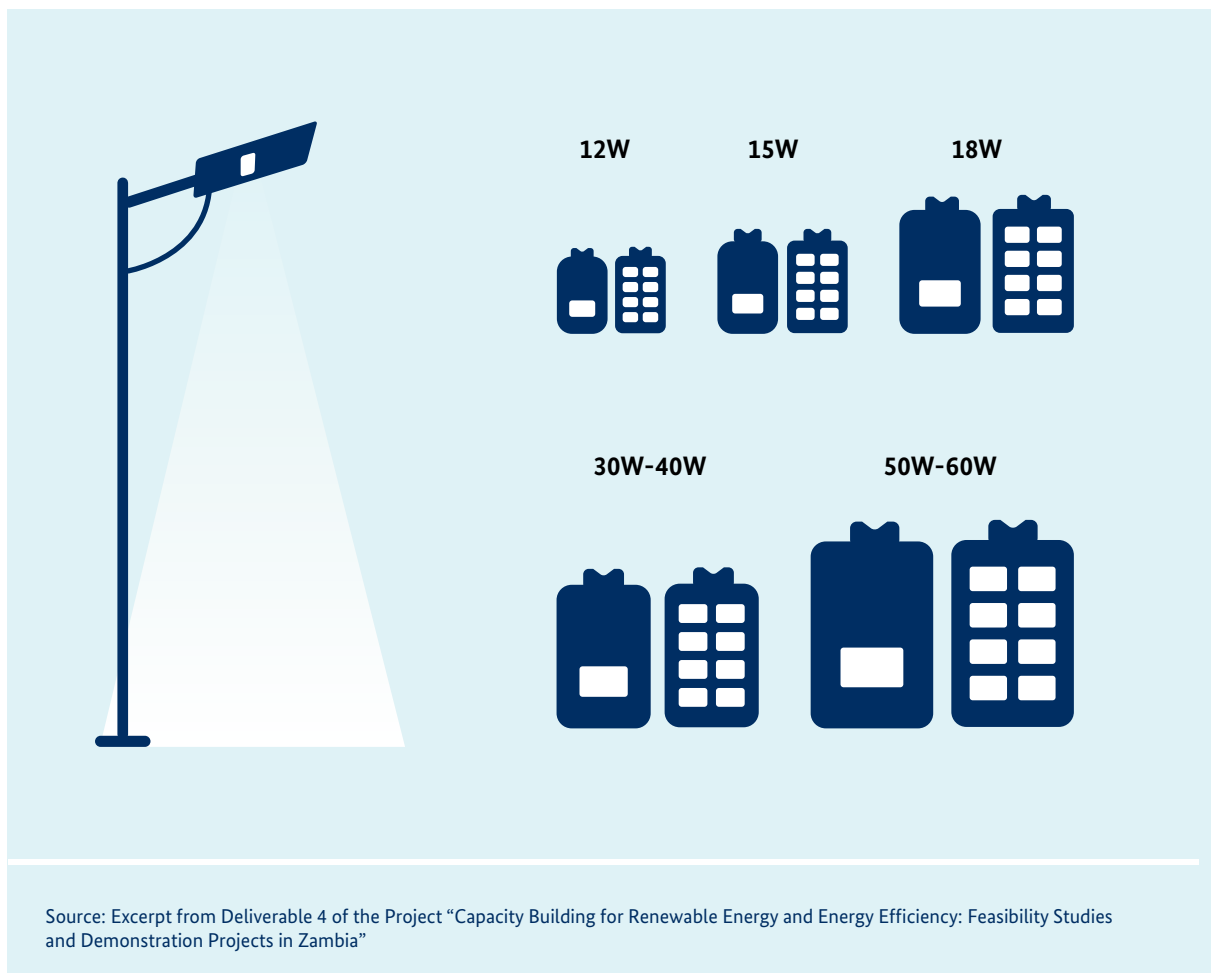
Efficiency and Expansion

1 Definition: What are Public Street Lighting Projects for Efficiencies & Expansion?

Various technologies are used in the provision of public street lighting services, including discharge technologies such as mercury vapor (MV) and high-pressure sodium (HPS) and relatively new technologies such as

light emitting diodes (LED) and compact fluorescent lamps (CFLs).¹ As an example, smart solar LED technology is presented in Figure 6.1 below.

Figure 6.1: Smart Solar LED lamps



1 “Modelling Energy Efficiency in Municipal Operations,” South African Cities Network, 2014. See: <https://www.sustainable.org.za/uploads/files/file39.pdf>

LED interventions offer significant efficiencies relative to older technologies such as HPS and MV due to an extended lifetime (i.e., 3 times that of HPS and MV) and higher lumens² produced per watt of electricity used.³

- **Public Street Lighting Efficiency Projects** require Local Governments (LGs) to replace or “retrofit” existing public lighting infrastructure with energy efficient lamps and fixtures, and automatic controls to optimise performance and energy use. Existing street lighting budgets can often be repurposed to pay for energy efficient retrofit projects by taking a longer-term view as the savings achieved over several years tend to pay for the higher upfront investment costs.
- **Public Street Lighting Expansion Projects** require LGs to make use of more efficient technologies when expanding services. Expansion projects will require additional budgets to install and operate, but more efficient technologies can minimise operational costs and offer long term value for money.

LGs can either make use of grid tied LED lights or opt for solar equivalents that do not need a connection to the electrical grid. Solar street lights are standalone units that consist of a solar panel, a battery, an LED light, and light sensor. They tend to be most suitable and cost-effective in areas not connected to the grid as they avoid additional investment in grid expansion.

However, the relatively short lifespan of their batteries has been an issue historically as LGs have had to replace them every five years. New generation batteries are proving to be more cost-effective as they have longer lifespans of up to 15 years.

In addition, the risk of theft of solar panels and batteries has been a deterrent for some LGs. A net present value calculation would need to be performed by an LG to quantify the most affordable technical solution (i.e., grid tied versus solar) as it will depend on several factors such as proximity to the grid and irradiation levels.

2 Benefits Associated with Public Street Lighting Projects

Public Street Lighting Projects can result in transformative benefits to LGs and their citizens, ranging from improved living conditions to budget savings, new sources of revenues and economic growth, job

creation, and other development impacts. The overall benefits of LGs proactively undertaking Public Street Lighting Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Reduce climate change impact, namely decreasing Greenhouse Gas (GHG) emissions through the reduction of fossil fuels consumption and attaining overall environmental benefits from energy consumption.
- **Development Benefits:** Improve public health, living standards and security, stimulate higher rates of economic growth and job creation, and increase the competitiveness of Micro, Small, and Medium Enterprises (MSMEs).

² Lumens denote the measure of brightness from a light source.

³ “Modelling,” Op. cit.

- **Local Government Economic Benefits:** Savings in existing budgets (e.g., more efficient services, less damage from climate impacts, etc.), additional indirect income (e.g., fees, taxes, etc.); and direct income from services (e.g. energy tariffs, etc.).

The summary of potential benefits from Public Street Lighting Projects is detailed in Table 6.1 below.

Table 6.1: Details of Potential Benefits Resulting from Public Street Lighting Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● Electricity and operational savings in respect of existing lighting infrastructure ● Reduced fossil fuels consumption ● According to Sustainable Energy Africa, approximately 800 kg of CO₂ will be saved over the operational lifetime of one LED bulb compared to the equivalent incandescent if the electricity used is largely coal-based. For example, in India a World Bank funded programme that replaced 275 million conventional light-bulbs with energy-saving LED bulbs reduced emissions by 29 million tons of CO₂ per year.⁴	● Increased economic and social activity after sunset that may result in job creation ● Lower energy consumption, operation and maintenance costs ● Reduction in traffic accidents due to better visibility ● Lower crime rates in areas that are illuminated ● Improved security for women who either commute or operate businesses in public areas ● In terms of security and well-being, studies have shown that public street lighting can reduce crime by up to 20% and traffic accidents by up to 35%.⁵	● Proportional lower energy consumption as well as lower operation and maintenance costs, freeing up lighting budgets for expansion once a retrofit has been paid back ● Stimulation of local economy by maximising employment opportunities for citizens and creating opportunities for Small and Medium Enterprises (SMEs) through local content requirements ● Increased tax revenues from payrolls, increased land values, etc. ● For example, the World Bank found out that the city of Nairobi could reduce its current annual expenditure on electricity and ongoing maintenance of street lighting by approximately half by retrofitting with energy-efficient technologies, with a payback period of 7 to 8 years.⁶

4 "Energy Efficiency," World Bank, 2017. See: <https://www.worldbank.org/en/results/2017/12/01/energy-efficiency>

5 A study on streetlights and crime states that: "A meta-analysis of the eligible studies found that improved street lighting led to significant reductions in crime and with an overall reduction in recorded crime of 20 per cent ..." See David P. Farrington et al., "Effects of improved street lighting on crime: a systematic review," UK Research Development and Statistics Directorate, 2002. See: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.7395&rep=rep1&type=pdf>

6 "LED street lighting: Unburdening our cities," World Bank. See: <https://blogs.worldbank.org/energy/led-street-lighting-unburdening-our-cities>

3 Challenges Faced by Local Governments

Public street lighting is often not prioritised in Sub-Saharan African (SSA) cities as LGs may not be able to fully recover their operating and investment costs via tariffs and charges received from users. In many instances, public lighting must compete with various other services and priorities for limited funding. In cities, such as Kampala and Jinja, where specific taxes are levied for the provision of public lighting, collection efficiencies are often poor, and the actual revenue collected does not cover costs.⁷

High up-front investment costs are a major barrier for LGs that want to upgrade existing street lighting to more energy efficient technologies such as light emitting diode (LED) solutions. While LED luminaires offer significant long-term savings and climate benefits, their installation costs can be two to four times greater than high-pressure sodium-vapor (HPS) luminaires.⁸

Moreover, LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

4 Financing Roadmap for Public Street Lighting Projects

LGs can undertake a proactive role in development and finance of Public Street Lighting Projects. This section provides a financing roadmap including early action

steps of relevance for LGs to develop a realistic proactive approach to encourage these projects.

4.1 Assess Revenue Requirements and Opportunities

Investment could potentially be unlocked via private sector companies that provide technical and operational support over the duration of the contract. In more developed markets, such as Europe and the USA, Energy Services Companies (ESCOs) are well established and offer funded solutions to LGs that tend to require contract terms of 3 to 10 years to allow the private sector to recover their investment.

However, the ESCO market is nascent in SSA and the limited number of ESCOs that operate in SSA do not tend to offer funded solutions to LGs. Given the current state of the ESCO market in SSA, LGs will most likely need to raise a combination of debt and grants to fund Public Street Lighting Projects' capital expenditures. Private sector companies, such as ESCOs or equipment suppliers, may however be able to provide

7 Ross Gillard et al., "Sustainable urban infrastructure for all: Lessons on solar-powered streetlights from Kampala and Jinja, Uganda," Coalition for Urban Transitions, University of Leeds. See: http://newclimateeconomy.net/sites/default/files/cut19_frontrunners_streetlighting_final.pdf

8 "LED street lighting: Unburdening our cities," World Bank. See: <https://blogs.worldbank.org/energy/led-street-lighting-unburdening-our-cities>

short term funding that will allow LGs to validate the performance of the equipment before payment is made to the private sector.

To justify raising debt for Public Lighting Efficiency Projects, a LG will need to structure a basket of for the LG affordable interventions by reallocating existing budgets to repaying debt over a 3 to 7-year time. To achieve affordable solutions, grants can be used to reduce the loan amount, or the loan terms can be extended.

4.2 Identify Financing Models

Different financing models can be implemented to unlock investment in Public Street Lighting Projects.

Under a **Turnkey Model**, a private sector company bears technical and implementation risks but does not provide funding. Instead, the public sector raises funding to implement interventions via debt, grants or own sources of revenue. The private sector company must ensure commissioning of the project on time and in accordance with the specifications set by the LG. To protect itself against non-performance by the private sector, the LG may require the private sector company to provide performance bonds or deposits that will only be cancelled or repaid once performance has been verified.

Under an **ESCO Funded Model**, an ESCO funds the Public Street Lighting Project's capital expenditure and is repaid over a period of time by the LG. ESCO funded contracts can take different forms depending on the private sector's willingness to take commercial risk over a period of 3 to 10 years. Whilst the ESCO industry in developed countries like the U.K. offer a range of funding models to clients, ESCOs operating in countries such as South Africa show little interest to date in adopting more complex models such as guaranteed and shared savings contracts, mainly due to LG capacity issues and a lack of baseline data.

SSA cities, such as Kampala, have also investigated raising additional revenue from advertising by charging for advertisements mounted on public lighting infrastructure. This additional revenue source could make Public Street Lighting Projects more affordable to LGs. Section 6 provides examples of relevant Public Street Lighting Projects and highlights potential financing approaches.

Under a **Public-Private Partnership (PPP) Model**, the design, installation, operation, maintenance and finance of a public lighting system can be outsourced to the private sector over a substantial period (i.e., 20–25 years). The LG commits to make regular payments to the private sector provided the private sector meets pre-agreed standards. Failing to do so results in the LG applying penalty deductions. To achieve the scale required to justify the transaction costs of a PPP, a number of road related services (e.g., road maintenance, public lighting) are often packaged together in one PPP and financed via a project finance facility.⁹

Service Level Agreements (SLA) can be entered into between a private sector company and an LG for the operation and maintenance of public street lighting infrastructure. A well-designed SLA specifies output performance parameters such as warranties for replacement and uptime of lights and specifies how the parameters should be measured.

Table 6.2 below provides an overview of the different funding models and the allocation of different roles between the public and private sectors for the financing, construction, operation, and maintenance of Public Street Lighting Projects.

9 "LED Street Lighting Climate Group Document – Financial Section," PwC, 2013. See: <https://www.theclimategroup.org/sites/default/files/archive/files/LONDON-Working-Documents-finance.pdf>

Table 6.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Managed	Public Owned & Private Sector Managed (SLA, turnkey model)	ESCO Funded	PPP (100% private)	PPP (minority LG ownership)
Design risk	LG		Private sector		
Construction risk					
Funding of CAPEX	LG raises grants & debt		Private sector raises debt & equity		LG funds its share of equity. Private sector raises rest of funds
Grants	LG can raise grants to make funding model more affordable				
Operation	LG		Private sector		
Maintenance					
Sales & Marketing					

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

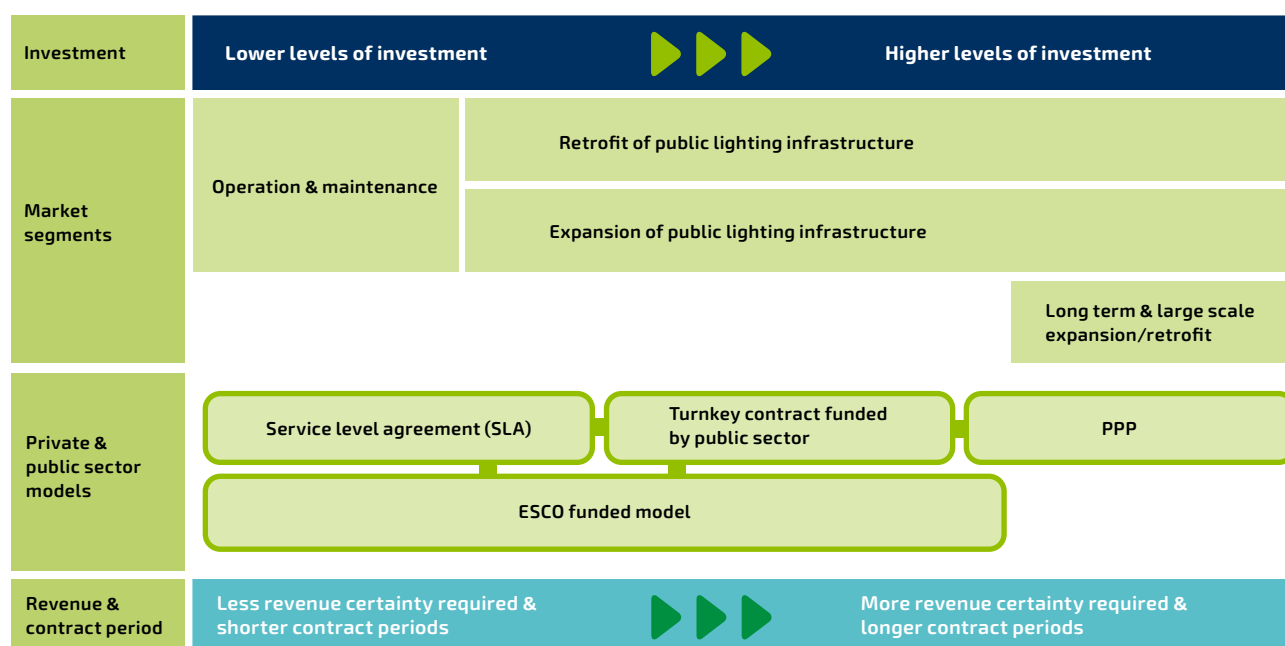
Energy efficiency interventions lend themselves to pooling as they have relatively small capital expenditure requirements¹⁰ while interventions are fairly standard. As such, a pooled finance facility, ideally supported by a guarantee mechanism, could be instrumental in unlocking significant investment and interest from private sector companies. A shared services centre or Super ESCO may be required to support LGs with the development and procurement of pooled projects.

The different financing models for Public Street Lighting Projects are illustrated in Figure 6.2 below, comparing the level of investment against different approaches.

PPPs that make use of project finance only tend to be used for large value long term Public Street Lighting Programmes that require a contract term of 20–25 years while ESCO funded models require shorter contract periods of between 3–10 years. To date, Public Street Lighting Projects in SSA have been funded by the public sector and implemented via turnkey contracts. As such, no examples were found in SSA of ESCO-funded Public Street Lighting Projects.

¹⁰ Demonstrated by Lusaka's Street Lighting Project that has a total budget of only US\$600,000.

Figure 6.2: Public Street Lighting Financing Models



To unlock financing, LGs will need to conduct the following preliminary assessments and early action steps:

-  Evaluate the stock of existing luminaries and document the stock in a database;
-  Analyse available budgets that can be reallocated to compensate the private sector to deliver Public Street Lighting services;
-  Understand which financing models the private sector can offer to the LG;
-  Undertake baseline assessments to understand what current electricity consumption is;
-  Understand which risks the private sector can take on resulting in greater cost-effectiveness;
-  Identify which financing models are supported by local legislation and regulations;
-  Identify lighting plans and strategies that could form the basis for future funding applications; and
-  Identify CAPEX (Capital Expenditures) budgets from national government and the LG's finance department which could be used to co-fund the project.

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of different finance models for the LG are summarised against key implementation criteria in Table 6.3, with advantages highlighted in green and disadvantages in red.

LGs can benefit from accessing a national expert pool that has developed feasibility assessment tools, standardised contracts and procurement processes. These tools and processes can be applied by LGs with the support of the expert pool.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model are most appropriate and affordable for a Public Street Lighting Project, LGs and LG-owned utilities will need to identify possible funding mechanisms.

An LG will need to undertake the following six early action steps assessing its own financial position and abilities to manage a Public Street Lighting Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the project given the current and projected needs of the local community, engaging an external experienced lighting expert if needed;
- 2 Quantify how much the LG spends annually on electricity and the maintenance of public street lighting (current and projected) that would be substituted by the proposed Public Street Lighting Project, working with the LG's financial staff;
- 3 Determine how electricity and maintenance budgets can be reallocated to compensate for the costs of the design and installation of the Public Street Lighting Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed Public Street Lighting Project (after subtracting total budgeted amounts - current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the Public Street Lighting Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, monitor contracts, and estimate the additional cost for the Public Street Lighting Project.

For LGs to employ a public sector funded model to finance the Public Street Lighting Project, an assessment will need to be made of its own funding capacity to cover total costs:

- 1 Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the Public Street Lighting Project?
- 2 Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the national government, development partners, climate funds, or other sources?¹¹
- 3 Does the LG have the ability based on national regulations, national government support, and/or its own credit standing to use its own balance sheet to borrow debt from commercial banks, Development Finance Institutions (DFIs), or other private sector institutions?

Table 6.3: Advantages and Disadvantages of Different Finance Models

Criteria	Public Sector Funded and Managed	Public Sector Funded/Managed by Private Sector (SLA)	ESCO Funded	PPP/ Project Finance
Contract term for operation of infrastructure	No contract required	Contract term needs to align with replacement spend requirements.	Long term contract allows private sector to recover its development, investment and operating costs as well as a margin.	
Access to finance	Reliant on grants from national government and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	
Access to climate finance	May need to access climate finance via national programme as size of project may not justify direct application to international climate facility.		Can potentially access climate finance via private sector facility.	
Costs and time to implement	Capacity required at a LG level to develop both ESCO funded and public sector funded projects due to the complexity of energy efficiency projects. National pool of experts could assist LGs with the development of standardised tender documents and contracts.			PPPs require technical, financial, and legal expertise to develop. Unless large project/ programme, development costs may not be justified.
Impact on LG budget of retrofit project	LG achieves operational savings once implemented but requires significant funding for CAPEX. Debt and grants can be used to spread the upfront costs over several years and to be cost neutral to the LG.		Projects can be structured to be cost neutral to the LG over contract period (i.e. existing budgets cover payments to the private sector). At the end of the contract period, savings can be used to fund expansion.	
Impact on LG budget of expansion project	If LG can pass costs of expansion onto users via higher tariffs, project could be cost neutral to LG once implemented. If LG is unable to pass costs onto users, additional budget or subsidies will be required to cover the project's OPEX (Operating Expenses). Significant funding will be required for CAPEX.		If LG can pass costs of expansion onto users via higher tariffs, project could be structured to be cost neutral to LG (using grants and longer payback periods). If LG is unable to pass costs onto users, additional budget or subsidies will be required to cover the project's costs.	
Opportunities for pooling projects	Opportunities to package projects at several LGs and to procure on a pooled basis. An expert pool can be used to develop standardised contracts and procurement processes.			
Ability to mitigate construction risk	Turnkey contracts can be used to reduce the risk of cost overruns and nonperforming technology.		Construction risk is passed to the private sector via ESCO funded and PPP contracts.	

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

11 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of a LG-owned utility) for raising debt, it can also use private sector entities to contract debt (commercial and concessionary debt). However, as required for all investments, the project will need to be structured to minimise risks for the private sector and its lenders.

Key success actors include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG;
- Known and tested technological solution;
- Well-structured tender documents and contracts that clearly allocate risks and rewards between the private sector and the LG;
- Predictable CAPEX (Capital Expenses) and OPEX (Operating Expenses) that is not subject to foreign exchange risk;
- Creditworthy LG that will pay the private sector on time for Public Street Lighting services;
- Guarantee mechanisms that could reduce credit and liquidity risk for the private sector and lenders; and
- Minimised CAPEX by making use of LG land, existing infrastructure, and other in-kind contributions.

Public Street Lighting Projects can access **climate finance** provided that they are structured to maximise GHG emission savings.

Often Climate Projects requiring external finance are constructed and financed through separate entities. These entities can be owned by the public sector, a Public-Private Partnership (PPP), or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages for accessing finance for larger projects and pooled finance vehicles using **project finance techniques** as such approaches are proven to minimise default risk and increase recovery rates.¹² SPVs often obtain loans which are secured against the revenues of the project, with no or limited recourse to the SPV owner(s). According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks, and to minimise any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggest that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterise project finance techniques are effective.¹³ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$15 million in total investment costs).

12 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983–2017," Moody's Investor Service, March 2019, pages 8–9.

13 In fact, the 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983–2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

Service Level Agreements (SLAs) are entered into between the private sector and the public sector for the delivery of specific services. They do not require the establishment of a separate legal entity such as an SPV.

Turnkey contracts are used to implement publicly funded Public Street Lighting Projects. Under a turnkey contract, an ESCO is required to deliver a complete

contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology. In this case, the ESCO does not provide finance beyond the date of commissioning.

To determine which contract type and funding model is most appropriate and affordable for a Public Street Lighting Project, LGs will need to implement the following early action steps:

- Understand how much the LG spends annually on public street lighting;
- Investigate how public street lighting budgets can be reallocated to service debt or pay the private sector for delivering the services;
- Develop project management capabilities to manage and monitor contracts effectively; and
- Enter into a SLA for limited services to build a track record of managing private sector contracts.

4.5 Identify and Implement Credit Risk Solutions

The use of credit enhancements is important to the successful financing of Public Street Lighting Projects. ESCOs that operate in SSA are generally small to medium sized businesses with limited capital and are reliant on debt to implement projects. Commercial banks often perceive ESCO contracts with LGs to be too risky to fund due to several factors such as the perceived low credit quality of LGs; the lack of ability of ESCOs to service debt when a LG does not pay on time; and the relatively small size of an ESCO transaction which does not warrant expensive due diligence processes.

As a result, ESCOs may struggle to raise finance to implement LG interventions unless credit enhancement support can reduce the risk. Guarantee facilities can be

used to reduce default and liquidity risk for lenders and liquidity risk for ESCOs. Another solution contributing to risk mitigation is the adoption of a “ring fencing mechanism” to the LG’s budget line dedicated to the payments to the ESCO. This ring-fencing of budgeted payments means that this line of the budget cannot be diverted to pay for other expenses. LGs would need to investigate whether this approach is supported by the LG’s legislative framework.

To determine what credit solutions are needed and available, LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory support.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology for potential Public Street Lighting Projects.

Box 6.1: Indicative Funding Sources and Mechanisms for Public Street Lighting Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

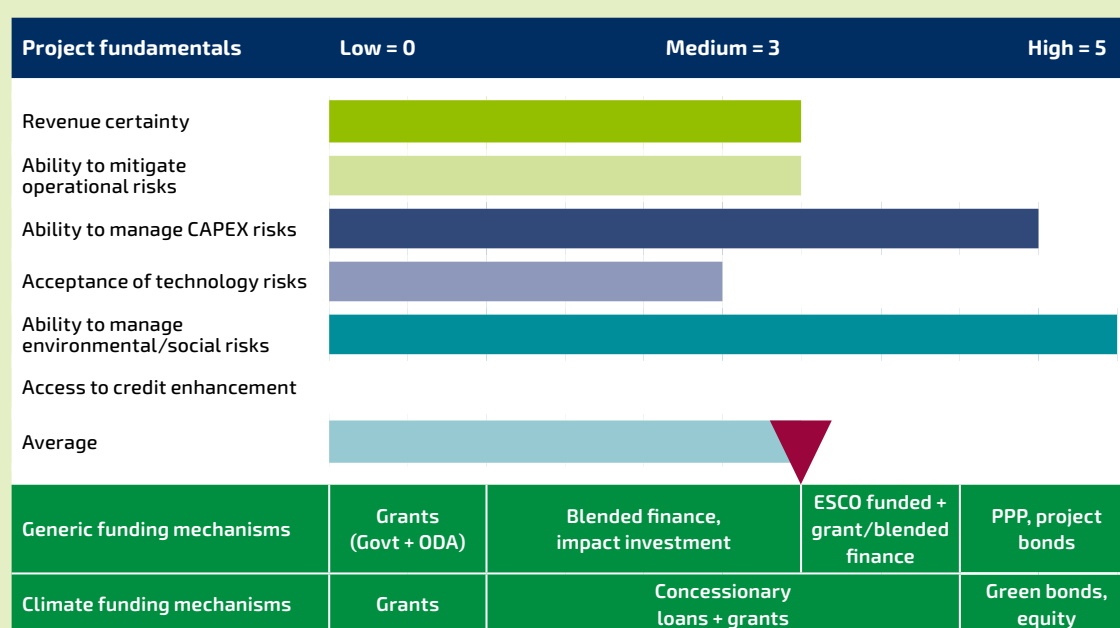
Figure 6.3 below shows a typology for a generic Public Street Lighting Efficiency Project assuming that and indicates that a turnkey contract that makes use of blended finance is likely to be the most appropriate financing model given the nascent status of ESCOs in SSA.

The following risk and revenue factors drive this typology:

- Public lighting may need to compete for limited revenue sources unless specific tariffs are in place to recover costs from users;
- Both demand and supply are predictable;
- CAPEX and OPEX risk can be transferred cost-effectively to the private sector;
- Projects can be structured to be cost neutral to LGs by using longer loan periods and grants; and
- Technologies are known and tested, but the average project size is often too small for lenders to invest time in due diligence processes.

A PPP approach, if justified given the need to package a large number of interventions, will require credit enhancement (e.g., guarantees, first loss, etc.) unless the LG is considered credit-worthy. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 6.3: Illustrative Public Street Lighting Project Typology



4.6 Establish Contacts with Private Sector Actors

While ESCOs that operate in Africa are generally Small to Medium-Sized Enterprises (SMEs), a large financial institution in South Africa recently acquired a majority stake in one of the country's largest ESCOs, becoming a "Super ESCO." This investment indicates the potential for smaller ESCOs on the continent to consolidate into

larger companies or benefit from the balance sheets of larger parent companies to access more capital.

To unlock private sector investment in Public Street Lighting Projects, LGs will need to implement the following action steps:

- Secure revenue for the project by identifying additional revenue sources that could be generated, such as advertising revenue, to make Public Street Lighting Projects more financially viable;
- Understand and monitor current electricity usage and energy baselines;
- Develop inhouse capacity to understand energy savings contracts and procurement processes;
- Appoint reputable transaction advisors that will help LG structure projects and standardised contracts that share risks and rewards appropriately between the LG and the private sector; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

The next section breaks out the main LG action steps by the specific stage of project development.

5 Action Steps for Local Governments

Table 6.4 below summarises the main proactive action steps that LGs can take to advance Public Street Lighting Projects, detailing tasks and outputs.

Table 6.4: Roadmap of Proactive LG Action Steps for Implementing Public Street Lighting Projects

Action Steps	Tasks	Outputs
1. Develop budget	● Analyse LG budgets to understand current spending on Public Street Lighting	● Budget available for public street lighting ● Revised public street lighting tariffs

Table 6.4: Roadmap of Proactive LG Action Steps for Implementing Public Street Lighting Projects

continued

Action Steps	Tasks	Outputs
	- Assess whether existing public street lighting tariffs (if any) are cost-reflective - Assess if the electricity unit cost rate is exposed to significant changes, for example removal of subsidies to the power companies - Investigate how electricity and maintenance budgets can be reallocated to service debt or to pay the private sector - Quantify the impact of expansion and retrofit projects on existing public street lighting tariffs	
2. Develop baseline data	- Appoint technical advisor to undertake baseline study - Implement data management system for baseline data	Baseline data and management system
3. Engage private sector	Understand private sectors' appetite for implementing different funding models	Likely funding models
4. Evaluate technical solutions and funding models	- Access national expert pool and their project development tools to cost technical solutions, including solar solutions, and funding models - Assess affordability of each funding model using a standardised cash flow model - Stress test the financial model for different payback periods to assess affordability - Rank options based on affordability and net benefits	- Preferred option & funding model - Funding gap
5. Close funding gap	- Identify grants from national government and DFIs that can be accessed to close the funding gap - Develop grant applications	Grant funding commitments
6. Demonstrate feasibility	- Conduct technical studies - Update financial model to conclude on the affordability of preferred funding model - Present project to LG's Chief Financial Officer (CFO) to obtain commitment	- Business plan - Commitment from CFO

Table 6.4: Roadmap of Proactive LG Action Steps for Implementing Public Street Lighting Projects

continued

Action Steps	Tasks	Outputs
7. Procure	- Amend standardised procurement documents - Evaluate and award tenders - Conclude contracts (Turnkey, ESCO funded, PPP, SLA, etc.)	Signed contracts
8. Monitor & Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants for the technical studies. Technical studies include Environmental and Social Impact Assessments (ESIA) that identify the

positive and negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of Public Street Lighting Projects from Sub-Saharan Africa and Worldwide

Debt funded Turnkey Models have been used by LGs in SSA, such as Jinja, Uganda, and Cape Town, South Africa:

→ The City of Jinja in Uganda accessed UGX2 billion (US\$531,000) in loans from the USMID World Bank Programme and grants from National Government to upgrade the city's road network and street lighting. UGX170 million (US\$45,500) of the funding was used to procure 92 solar streetlights via a turnkey contract.¹⁴

→ The City of Cape Town in South Africa raised a R2.4 billion (US\$162 million) long-term concessionary loan from the Agence Française de Développement (AFD) to fund climate focused interventions, including public lighting and energy efficiency.¹⁵ This facility, together with a national grant, has allowed the City of Cape Town to implement LED traffic lights throughout the city and retrofit more than 15% of streets lights as of December 2017. Cape Town continues to spend around R20 million or US\$1.4 million per year on street lighting retrofits.¹⁶

14 "World Bank Support to Ugandan Municipalities Helps Modernize Infrastructure," World Bank Group, 2019. See: <https://www.world-bank.org/en/news/feature/2019/01/30/world-bank-support-to-ugandan-municipalities-helps-modernize-infrastructure>

15 "Integrated Annual Report 2017/18," City of Cape Town, 2018. See: http://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/CCT%20Integrated%20Annual%20Report%202017_18.pdf

16 "Street lighting programme driving energy efficiency, reducing long-term costs," City of Cape Town, 2018. See: <http://www.capetown.gov.za/Media-and-news/Street%20lighting%20programme%20driving%20energy%20efficiency,%20reducing%20long-term%20costs>



Solar street lights

Examples of ESCO-financed public lighting projects scaling Public Street Lighting Projects across several LGs include both private and public sector companies in India:

- ➔ Asian Electronics Limited (AEL) was selected by the World Bank to implement an ESCO funded model for public lighting at nine LGs in India between 2005 and 2009. Under this model the ESCO and the LG shared performance risk, each party receiving a fraction of the savings from the investment. The programme made use of carbon finance and domestic Indian bank loans accessed by AEL and replaced 121,365 lighting points in nine Indian municipalities.¹⁷
- ➔ India's Ministry of Power established a public sector company, Energy Efficiency Services Limited (EESL), as its implementation arm for energy efficiency interventions. EESL acts as a Super ESCO in India and has been successful in implementing Public Street Lighting Projects. The Super ESCO is mandated to provide a wide range of energy efficiency functions, including development, procurement and financing of municipal public lighting.¹⁸ The Government of India capitalised the structure with US\$50 million when it was first established in 2014. EESL has since benefited from two concessionary loans issued by KfW (*Kreditanstalt für Wiederaufbau* for Credit Institute for Reconstruction) with a total value of EUR250 million and a further US\$220 million of debt from the World Bank as well as a US\$80 million World Bank guarantee.¹⁹
- ➔ EESL makes use of Service Level Agreements once the equipment has been installed.²⁰

Public street lighting PPPs have been implemented worldwide, as illustrated by the two examples below, one in Latin America and the other in Europe:

- ➔ The Municipality of Belo Horizonte in Brazil entered into a 20-year PPP agreement in 2016 for the development, modernisation, expansion, operation, and maintenance of its street lighting system. The private sector upgraded 178,000 public streetlights with more efficient LED lights which required US\$100 million of capital expenditure. PPP bidders were asked to offer a monthly payment for above services and the contract was awarded to the bidder that offered the lowest price. The municipality was able to reallocate existing budgets to pay the PPP partner.²¹
- ➔ A PPP agreement was entered into in the UK between Birmingham City Council and Amey in 2010 for the rehabilitation, maintenance, management and operation of the city's roads and street lighting. The streetlight component is only one part of the 25-year contract and covers the modernisation and maintenance of 97,000 streetlights and the upgrade of associated street infrastructure.²²

In Lusaka, Zambia, The Road Development Authority (RDA) installed solar LED lamps as part of the rehabilitation works of main Lusaka roads (funded by AVIC International). HPS lamps represented 71% of the installed lamps, and the remaining part 29% are 80W LED solar, under request of the Municipality, who wanted a more up-to-date technology. LUSAKA City Council (LCC) has embarked on a US\$600,000 street lighting project on selected roads. The local authority has partnered with Road Development Agency (RDA) to put speed humps and markings on busy roads in the city.²³

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- 17 Makumbe et al., "Proven Delivery Models for LED Public Lighting: ESCO Delivery Model Case Study," ESMAP, [2015]. See: https://www.esmap.org/sites/esmap.org/files/DocumentLibrary/AEL%20-%20Proven%20LED%20Delivery%20Models8_Final_optimized.pdf
- 18 "Scaling-Up Energy Efficiency: The Case for a Super-ESCO Presentation," ASIAESCO, 2010, See: <http://www.asiaesco.org/pdf/presentation/2-2.pdf>
- 19 "International Bank for Reconstruction and Development Program Appraisal Document: India Energy Efficiency Scale-Up Program," The World Bank Group, 2018. See: <http://documents.worldbank.org/curated/en/532521527391818294/pdf/India-Energy-Efficiency-PAD-125034-IN-04272018.pdf>
- 20 "International Bank for Reconstruction and Development Program Appraisal Document: India Energy Efficiency Scale-Up Program," The World Bank Group, 2018. See: <http://documents.worldbank.org/curated/en/532521527391818294/pdf/India-Energy-Efficiency-PAD-125034-IN-04272018.pdf>
- 21 "Lighting Brazilian Cities: Business Models for Energy Efficient Public Street Lighting", The World Bank Group, 2017. See: <http://documents.worldbank.org/curated/en/679281521548635917/pdf/ESM-P150942-PUBLIC-LightingBrazilianCitiesReportENGLISHFINAL.pdf>
- 22 "Birmingham Highways Maintenance and Management Service PFI - Project Agreement & Schedules," The World Bank Group, 2016. See: <https://ppp.worldbank.org/public-private-partnership/library/birmingham-highways-maintenance-and-management-service-pfi-project-agreement-schedules>
- 23 Key technical subjects need to be covered as part of the enabling information, such as energy management, scheduled maintenance, and monitoring and control systems

7 Enabling Factors

For LGs to effectively scale the implementation of Public Street Lighting Projects, NGOs and LGs need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put in place to enable LGs to unlock private finance for Public Street Lighting Projects. For example, an LG that can access loans and grants for Public Street Lighting

Projects are able to complete projects, as in the cases of Jinja (Uganda) and Cape Town (South Africa). Examples of LG enabling factors are provided in Table 6.5 below.

Table 6.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Owned/ Private Sector Managed (SLAs)	ESCO Funded Model	PPP Owned by Private Sector	PPP with LG Shareholding
1. LG has significant own sources of revenue	✓	✓	✓	✓
2. LG can incur debt	✓	N/A	N/A	✓
3. LG can access CAPEX grants	✓	✓	✓	✓
4. LG can be shareholder in a company	N/A	N/A	N/A	
5. LG can enter into long term contracts for services and products	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay private sector contracts	✓	✓	✓	✓
7. LG can implement cost-reflective tariffs	✓	✓	✓	✓
8. LG has capacity to develop project (planning, budgeting, engage experts, etc.)	✓	✓	✓	✓
9. LG can unlock additional revenue opportunities (e.g. advertising revenue) for the private sector	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for “Not Applicable.”
SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 6.5: Local Government Enabling Factors

continued

Local Government Enabling Factors	Public Owned/ Private Sector Managed (SLAs)	ESCO Funded Model	PPP Owned by Private Sector	PPP with LG Shareholding
10. LG has capacity to procure turnkey contractors	✓	N/A	N/A	N/A
11. LG has capacity to procure and manage long-term contracts	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Under any scenario, it is important to recognise that LGs can proactively take steps to facilitate the development and finance of Public Street Lighting Projects:

→ **Proactive development of Public Street Lighting Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop Public Street Lighting Projects working with private sector professionals, a national expert team, developers, and investors. As noted earlier, securing qualified public lighting experts will be critical to the analysis of the needed project

development process to design a financially viable project.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking finance for Public Street Lighting Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

7.2 National Government Enabling Factors

LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support ranging from expertise to finance

and guarantees. The various enabling factors that can be put in place by NGs to promote Public Street Lighting Projects are listed in Table 6.6 below.

Table 6.6: National Government Enabling Factors

Private Sector Models	Public Owned/ Private Sector Managed (SLAs)	ESCO Funded Model	PPP Owned by Private Sector	PPP with LG Shareholding
1. NG commits grant funding to project and makes transfers on time	✓	✓	✓	✓
2. NG puts into place supporting regulatory and legal frameworks	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 6.6: National Government Enabling Factors

continued

Private Sector Models	Public Owned/ Private Sector Managed (SLAs)	ESCO Funded Model	PPP Owned by Private Sector	PPP with LG Shareholding
3. NG establishes a national expert pool that develops standardised project development tools and contracts that can be used by LGs	✓	✓	✓	✓
4. NG establishes a national expert pool that can support LGs during project development and procurement	✓	✓	✓	✓
5. NG can support and develop climate finance applications (including pooling similar LG projects)	✓	✓	✓	✓
6. NG is able to provide expert support	✓	✓	✓	✓
7. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓
8. NG establishes climate finance facility for the private sector	N/A	✓	✓	✓
9. NG provides guarantees covering LG commitments	✓	✓	✓	✓
10. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓
11. NG puts into place legislation that promotes energy efficiency projects (e.g., banning incandescent light bulbs)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, NGs can provide enabling factors for Public Street Lighting Projects across all financing sources, public and private.

These Public Street Lighting Projects can achieve results with breakthrough enabling factors, as demonstrated by the successful examples listed in Box 6.2.

Box 6.2: Examples of Enabling Factors for Public Street Lighting Projects

- **Legislation:** Kenya's New Energy Act that was signed into law in 2019 mandates LGs to set up Energy Efficiency Funds to promote and fund energy efficiency interventions. The Act requires all related grants and loans to be channelled via LG funds. These funds could act as catalysts for energy efficiency measures if properly capitalised and provided that a sufficient number of projects are developed that meet the fund's criteria.
- **Blended Finance:** The City of Cape Town, South Africa (CoCT) has implemented a number of debts funded turnkey interventions to advance Building Efficiency using a public funded guaranteed savings model. The CoCT secured a R2.4 billion (US\$162 million) long term concessionary loan from the AFD to fund climate focused interventions, including public lighting and energy efficiency. This facility, together with a national grant, has funded the retrofits of several buildings.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level requires the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of Public Street Lighting Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale their capacity to develop and finance Public Street Lighting Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support this Climate Project can be mapped to identify constraints and opportunities.

In addition, specific action steps could be identified with suggested interventions to address the full range

of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), Non-Governmental Organisations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the Action Steps set out in the prior section "Table 6.4: Roadmap of Action Steps for Implementation of Public Street Lighting Projects."

In addition, enabling information will need to be provided on the professional services required to develop and design a Public Street Lighting Project. Information on funding sources also need to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the action steps in existing SSA and other Public Street Lighting Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Public Street Lighting Projects. LGs will need to have access to such advisors. NGs and development partners can provide critical support.

To build up a further database of technical experts, the professionals involved in existing SSA Public Street Lighting Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as online platforms, with the sharing of case studies, lesson learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful Public Street Lighting Projects can share their experiences with other SSA LGs. Early contributors could be participants in Public Street Lighting Projects in Uganda, Kenya, and South Africa.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an online platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.



Street lighting system,
Sharm el Sheikh, Egypt



Chapter 7:

Building Efficiency Projects

1 Definition: What are Building Efficiency Projects?

This action seeks to unlock investment in energy efficiency measures related to public sector buildings and social housing stock. These actions are linked to the retrofitting of existing buildings and the energy-efficient design and construction of new buildings.

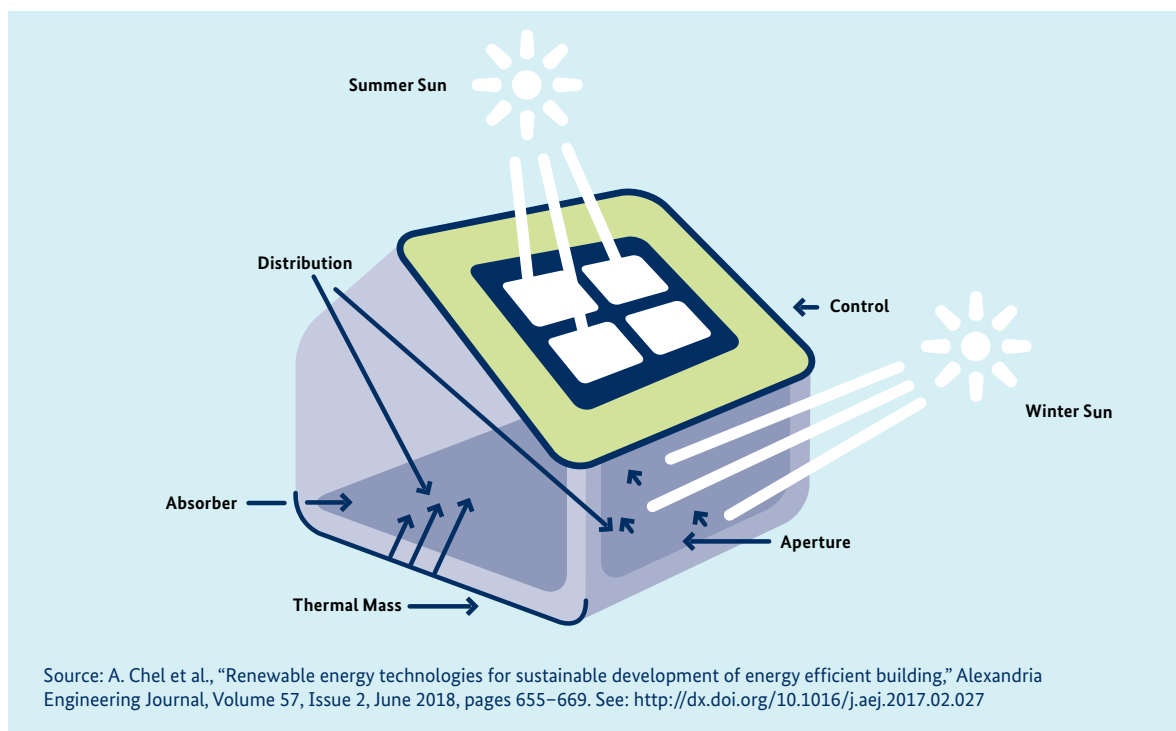
Retrofit projects generally include the following interventions:

- Installing efficient heating, ventilation and air-conditioning (HVAC) systems;
- Installing ceiling fans to increase air flow, reducing the need for air conditioners that consume more electricity;
- Replacing electric heaters with gas heaters;

- Replacing electric geysers with solar water heaters; and
- Installing energy efficient lighting that will use less electricity and produce less heat.

Other measures reflecting the full scope of energy efficiency interventions may be incorporated during the design phase of new buildings and quarters, and in response to challenges in retrofitting existing buildings. The application of passive design principles¹ is determined by the local climate with the objective of maintaining a comfortable temperature range in the building that eliminates the need for heating, cooling, and to some extent lighting, as shown in Figure 7.1 below.

Figure 7.1: Passive Solar Designed House Scheme



¹ The key elements of passive design are: building location and orientation on the site; building layout; window design; insulation (including window insulation); thermal mass; shading; and ventilation. Each of these elements works with the others to achieve comfortable temperatures and good indoor air quality.

By optimising a building's orientation and geometry, roof overhangs, window orientation and shading, construction materials and techniques (including

insulation), and surrounding landscaping, solar radiation can be harnessed during cooler months and minimised during warmer months.

2 Benefits Associated with Building Efficiency Projects

Building Efficiency Projects can result in transformative benefits to Local Governments (LGs) and their citizens, ranging from improved living conditions to budget savings, new sources of revenues and economic

growth, job creation, and other development impacts. The overall benefits of LGs proactively undertaking Building Efficiency Projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Mitigate and reduce climate change impact, namely decreasing Greenhouse Gas (GHG) emissions and attaining overall environmental benefits from conserved natural resources, and improving water and air quality;
- **Development Benefits:** Improve public health and living standards, increase energy self-sufficiency that can stimulate higher rates of economic growth and job creation; and
- **Local Government Economic Benefits:** Create savings in existing budgets (e.g., more efficient services) and additional indirect income (e.g., fees, taxes, etc.).

The summary of potential benefits for Building Efficiency Projects is detailed in Table 7.1 below.

The compelling benefits of Building Efficiency Projects is evidenced by the buildings awarded the Green Star certification by South Africa's Green Building Council

for GHG emission savings of 30–40% and potable water use reduction of 20–30% when compared to the industry norm.² Another example is provided by a recent World Bank study citing energy and cost savings of between 10–50% across Accra's building stock as a result of energy efficiency interventions.³

2 "About Green Building: Benefits of Green Buildings," World Green Building Council, 2020. See: <https://www.worldgbc.org/benefits-green-buildings>

3 "Development of Energy Efficiency in Sub-Saharan African Cities: A Municipal Perspective from Accra, Addis Abba and Nairobi," World Bank Group, 2019. See: <https://comssa.org/wp-content/uploads/2019/10/Development-of-Energy-Efficiency-in-Sub-Saharan-African-Cities.pdf>

Table 7.1: Details of Potential Benefits Resulting from Building Efficiency Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
• Reduced GHG emissions • Conserved natural resources • Reduced potable water use • Improved water and air quality	• Lower energy consumption resulting in monetary savings for the end consumer • Improved indoor air quality and temperature which has both health and productivity benefits • Reduced burden on existing electricity distribution infrastructure	• Lower energy consumption, operation, and maintenance costs for LGs, freeing up budgets for the delivery of services • Local economy stimulated by maximising employment opportunities for citizens and creating opportunities for Small and Medium-Sized Enterprises (SMEs) through local content requirements • Increased revenues from income taxes, land values, and other economic activities

3 Challenges Faced by Local Governments

LGs across Sub-Saharan Africa (SSA) are facing increasing service delivery pressures and will need to minimise their spending on overhead, such as electricity, to steer available budgets on service delivery instead. While energy efficiency interventions pay for themselves over relatively short periods (i.e., 1–7 years) and offer significant climate and cost-saving benefits over the long run, high up-front investment costs are a major barrier for LGs that want to retrofit existing public buildings and build new energy-efficient buildings.

Buildings and their construction account for 39% of energy-related carbon dioxide emissions worldwide.⁴ As SSA cities expand in concert with urbanisation and economic growth, SSA buildings' contributions to GHG emissions will grow exponentially unless new buildings are designed and planned to minimise GHG emissions.

LG financing challenges are compounded by the systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

⁴ "UN Environment and International Energy Agency (2017): Towards a zero-emission, efficient, and resilient buildings and construction sector. Global Status Report 2017, see https://www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf

4 Financing Roadmap for Building Efficiency Projects

LGs can undertake a proactive role in the development and finance of Building Efficiency Projects. This section provides a financing roadmap including early action

steps of relevance for LGs to develop a realistic proactive approach to developing and financing Building Efficiency Projects.

4.1 Assess Revenue Requirements and Opportunities

As an initial step, LGs should evaluate their building stock to define the scope of potential energy efficiency interventions. LGs will need to analyse the ownership of these buildings as some buildings may be leased rather than LG owned. For the latter, LGs will first need to investigate the willingness of the owners to participate before including them in the scope of considered buildings.

LGs will then need to understand the savings or revenues that will be generated by the proposed projects over a time period of 5 - 7 years to unlock debt funding for Building Efficiency Projects. To quantify savings and costs, LGs will need to undertake baseline energy studies and model energy savings. At the same time, LGs will need to identify potential interventions which may range from simply replacing less efficient luminaires with LEDs to making structural changes to the building.

For an evaluation of the proposed projects, the LG's executive and finance department will want to determine the payback period for the investment (i.e., over what period the debt could be repaid by the associated electricity savings), including the underlying revenue or savings assumptions used to calculate the payback period. Since existing budgets will need to be

reallocated from electricity costs to debt servicing, the projections of revenues and savings data will need to be integrated into the LG's annual budgeting process.

Investment could potentially be unlocked through private sector companies that provide technical and operational support over the duration of the contract. In more developed markets, such as Europe and the USA, Energy Services Companies (ESCOs) are well established and offer funded solutions to LGs that tend to require contract terms of 3 - 10 years to allow the private sector to recover their investment. However, the ESCO market is nascent in SSA and the limited number of ESCOs that operate in SSA do not tend to offer funded solutions to LGs.

Given the current state of the ESCO market in SSA, LGs will most likely need to raise a combination of debt and grants to fund the installation of Building Efficiency Projects (i.e., capital expenditures). Alternatively, private sector companies, such as ESCOs or equipment suppliers, may be able to provide short term funding enabling LGs to validate the performance of the equipment before payment is made to the private sector. Section 6 provides examples of relevant Building Efficiency Projects and highlights potential financing approaches.

4.2 Identify Financing Models

There are several financing models allowing LGs to unlock financing for Building Efficiency Projects. The models can be applied to existing buildings to be renovated for energy efficiency improvements or to the construction of new energy efficient buildings.

Under a turnkey model, a private sector company bears technical and implementation risks, but does not provide funding. Instead, the public sector raises funding to implement interventions via debt, grants, or own sources of revenue. The private sector company must ensure commissioning of the project on time and in accordance with the specifications set by the LG. To protect itself against non-performance by the private sector, the LG may require the private sector to provide performance bonds or deposits that will only be cancelled or repaid once performance has been verified.

Under an **ESCO funded model**, an ESCO funds the Building Efficiency Project's capital expenditure (CAPEX) and is repaid over a period of time by the LG. ESCO funded contracts can take different forms depending on the private sector's appetite to take commercial risk over a period of 3–10 years. While the ESCO industry in developed countries like the U.K. offer a range of funding models to clients, ESCOs operating in countries such as South Africa have had little appetite to date to adopt more complex models such as guaranteed or shared savings contracts, mainly due to LG capacity issues and the lack of baseline data.

Under a **Public-Private Partnership model (PPP)**, the design, installation, maintenance and finance of energy efficiency interventions can be outsourced to the private sector over a substantial period (i.e., 20–25 years). The LG commits to make regular payments to the private sector company provided the company meets pre-agreed standards. Failing to do so results in

the LG applying penalty deductions. To achieve the scale required to justify the transaction costs of a PPP, a number of related services may need to be packaged together in one PPP and financed via a project finance facility.⁵

Service Level Agreements (SLAs) can be entered into between a private sector company and a LG for the Operation and Maintenance (O&M) of building efficiency equipment. A well-designed SLA specifies output performance parameters such as warranties for replacement and uptime of lights and specifies how the parameters should be measured.

Energy efficiency interventions can lend themselves to pooling arrangements as they have relatively small capital expenditure requirements while interventions are fairly standard. For example, a pooled finance facility, ideally supported by a guarantee mechanism, could be instrumental in unlocking significant investment and interest from private sector companies.

However, the transaction costs for setting up and managing pooled finance facilities can be high given the extensive coordination needs, resulting in prohibitive legal and administrative costs and staff travel. In such cases, there may be a need for public sector support of the development and operation of pooled finance facilities to meet LG needs and investor requirements. For example, a shared services centre or Super ESCO may be required to support LGs with the development and procurement of pooled projects.

Table 7.2 below provides an overview of the different funding models and the allocation of different roles between the public and private sectors for the financing, the construction, operation, and maintenance of the project.

5 "LED Street Lighting Climate Group Document – Financial Section," PwC, 2013. See: <https://www.theclimategroup.org/sites/default/files/archive/files/LONDON-Working-Document-finance.pdf>

Table 7.2: Different Funding Models and Allocation of Roles

Funding Models Role/ Responsibility	Public Owned & Private Sector Operated (SLA)	ESCO funded	PPP (minority LG ownership)	PPP (100% private)
Design risk	LG*	Private sector		
Construction risk				
Funding of CAPEX	LG raises grants & debt	Private sector mobilises debt & equity	LG funds its share of equity and/or provides land. Private sector raises rest of funding	Private sector mobilises equity & debt
Grants	LG can raise grants to make funding model more affordable			Private sector would need to secure grants from Development Finance Institutions (DFIs)
Operation	Private sector			
Maintenance				

Note: * Risks can be passed onto private sector via a turnkey contract.

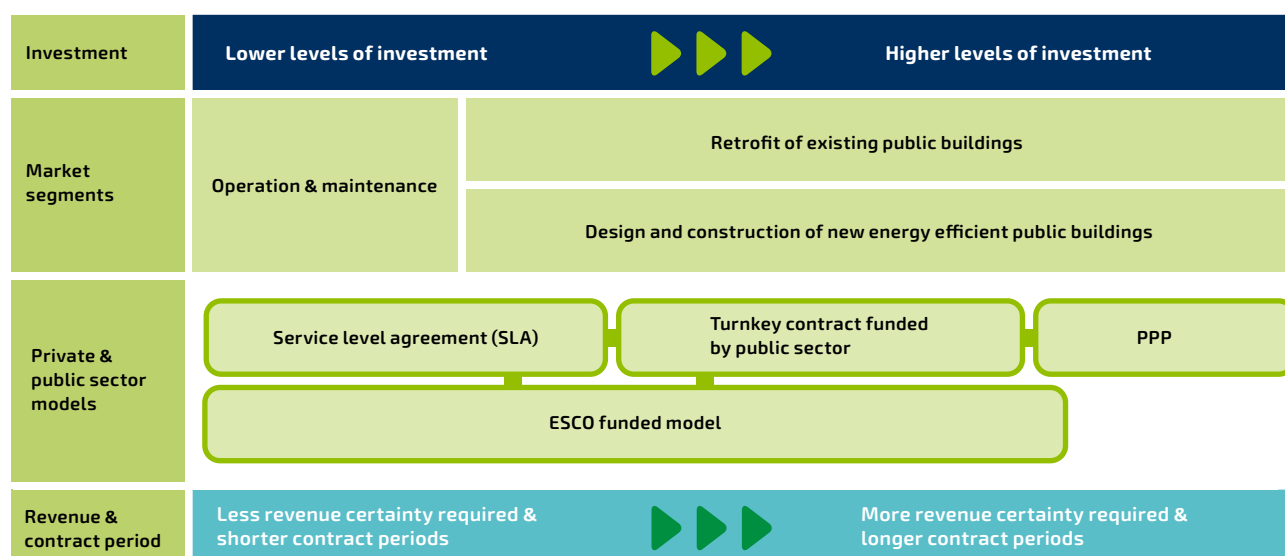
SLA = Service Level Agreement between LG and private sector provider for delivery of services.

The different financing models for Building Efficiency Projects are illustrated in Figure 7.2 below, comparing the level of investment against different approaches.

To unlock financing, LGs will need to undertake the following preliminary assessments and early action steps:

- Estimate expenditures and potential energy savings;
- Analyse their available budgets that can be reallocated to compensate the private sector to deliver Building Efficiency services;
- Understand which financing models private sector companies can offer to the LG;
- Influence policies and building codes to mainstream low-energy and green-building measures;
- Undertake baseline assessments to understand what current electricity usage is;
- Understand which risks the private sector can take on cost effectively;
- Identify which financing models are supported by local legislation and regulations;
- Identify energy plans and strategies that could form the basis for future funding applications; and
- Identify CAPEX budgets from the LG's finance department, the National Government (NG), and/or development partners which could be used to co-fund the project.

Figure 7.2: Building Efficiency Financing Models



As noted above, higher investment levels may justify PPPs or 100% private sector investment approaches.

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of the different finance models are summarised against key implementation criteria in Table 7.3 below, with advantages highlighted in green and disadvantages in red.

LGs can benefit from accessing a national expert pool that has developed feasibility assessment tools, standardised contracts, and procurement processes. These tools and processes can be applied at LGs with support from the expert pool.

Table 7.3: Advantages and Disadvantages of Different Finance Models

Criteria	Public Sector Funded and Managed	Public Sector Funded/ Private Sector Managed (SLAs)	ESCO Funded	Public-Private Partnership (PPP)
Contract term for operation of infrastructure	No contract required	Contract term needs to align with replacement spend requirements.	Long term contract allows private sector to recover its development, investment and operating costs as well as a margin.	
Access to finance	Reliant on grants from NG and donors unless LG can raise debt or issue bonds.		Private sector can raise commercial debt to fund project and provide equity, reducing reliance on government funding.	

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services. Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

Table 7.3: Advantages and Disadvantages of Different Finance Models

continued

Continued

Criteria	Public Sector Funded and Managed	Public Sector Funded/ Private Sector Managed (SLAs)	ESCO Funded	Public-Private Partnership (PPP)
Access to climate finance	May need to access climate finance via national programme as size of project may not justify direct application to international climate facility.		Will need to access climate finance via private sector facility.	
Costs and time to implement	Capacity required at a LG level to develop both ESCO funded and public sector funded projects due to the complexity of ESCO projects. National pool of experts could assist LGs with the development of standardised tender documents and contracts.			PPPs require technical, financial and legal expertise to develop. Unless large project/program, development costs may not be justified.
Impact on LG budget of retrofit project	LG achieves operational savings once implemented but requires significant funding for CAPEX. Debt and grants can be used to spread the upfront costs over several years and to be cost neutral to the LG.		Projects can be structured to be cost neutral to the LG over contract period (i.e. existing budgets cover payments to the private sector). At the end of the contract period, savings can be used to fund expansion.	
Impact on LG budget of expansion project	If LG can pass costs of expansion onto users via higher tariffs, project could be cost neutral to LG once implemented. If LG is unable to pass costs onto users, additional budget or subsidies will be required to cover the project's OPEX (Operating Expenses). Significant funding will be required for CAPEX.		If LG can pass costs of expansion onto users via higher tariffs, project could be structured to be cost neutral to LG (using grants and longer payback periods). If LG is unable to pass costs onto users, additional budget or subsidies will be required to cover the project's costs.	
Opportunities for pooling projects	Opportunities to package projects at several LGs and to procure on a pooled basis. An expert pool can be used to develop standardised contracts and procurement processes.			
Ability to mitigate construction risk	Turnkey contracts can be used to reduce the risk of cost overruns and nonperforming technology.		Construction risk is passed to the private sector via ESCO funded and PPP contracts.	

Note: SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Identify Possible Funding Mechanisms and Contract Types

To determine which contract type and funding model are most appropriate and affordable for a Building Efficiency Project, LGs and LG-owned utilities will need to identify possible funding mechanisms.

LGs will need to undertake the following six early action steps assessing their own financial position and abilities to manage a Building Efficiency Project:

- 1 Evaluate the approximate scope and cost of the design and installation of the Building Efficiency Project given the current and projected needs of the local community, engaging an external experienced energy efficiency expert if needed;
- 2 Quantify how much the LG spends annually on electricity and heating water (current and projected) that would be substituted by the proposed Building Efficiency Project, working with the LG's financial staff;
- 3 Determine how electricity budgets can be reallocated to compensate for the costs of the design and installation of the Building Efficiency Project, confirming with LG's financial staff;
- 4 Calculate the net cost of the proposed Building Efficiency Project (after subtracting total budgeted amounts - current and projected);
- 5 Assess the LG's capacity to manage and monitor contracts effectively for the design, installation, and operations of the Building Efficiency Project, including technical and legal support for contract negotiations; and
- 6 If there is the need to engage one or more external experts to negotiate, manage, and monitor contracts, estimate the additional cost for the Building Efficiency Project.

For LGs to employ a public sector funded model to finance the Building Efficiency Project, an assessment will need to be made of its own funding capacity to cover total costs:

- Does the LG have sufficient funding in its capital investment budget to cover the costs of the design and installation of the Building Efficiency Project?
- Does the LG have the ability to source grant and/or concessionary funding to cover costs from other public sources, such as the NG, development partners, climate funds, or other sources?⁶
- Does the LG have the ability, based on national regulations, NG support, and/or its own credit standing, to use its own balance sheet to borrow debt from commercial banks, DFIs, or other private sector institutions?

If the LG's senior management determines that it does not have the ability and/or willingness to use its own balance sheet (or that of a LG-owned utility) for raising debt, it can also use private sector entities to contract debt, both commercial and concessionary. However,

the project will need to be structured to minimise risks for the private sector and its lenders.

Key success factors include the following:

- High levels of revenue certainty as a result of payment guarantees by the LG;
- A known and tested technological solution;
- Well-structured tender documents and contracts that clearly allocate risks and rewards between the private sector and LG;
- Predictable operating OPEX (Operating Expenses) and CAPEX (Capital Expenditures) that are not subject to unacceptable foreign exchange risk;
- A creditworthy LG that will pay the private sector on time for Building Efficiency Services; and
- Guarantee mechanisms that could reduce political, credit, and liquidity risks for the private sector and lenders.

Building Efficiency Projects can also potentially access **climate finance** if they are structured to maximise GHG emission savings.

6 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in the [Annex](#).



With 13 Green Star rated green buildings, the Waterfront of Cape Town undertook several efficiency measures saving energy use and CO₂ emissions

Often Climate Projects requiring external finance are constructed and financed through separate entities. These entities can be owned by the public sector, a Public-Private Partnership (PPP), or a 100% owned private sector sponsor.

The entity often embodies the same approach as infrastructure projects, using a legal entity referred to as a **Special Purpose Vehicle (SPV)**. Both private sector and public sector entities can potentially be shareholders in the SPV, depending on the public/private models selected. However, private sector entities normally prefer a 100% privately owned SPV.

It is important to note that SPVs have advantages for accessing finance for larger projects and pooled finance vehicles using **project finance techniques** as such approaches are proven to minimise default risk and increase recovery rates.⁷ SPVs often obtain loans which are secured against the revenues of the project, with no or limited recourse to the SPV owner(s). According to Moody's Investor Service analysis, project finance loans tend to be structured to be both highly robust to a wide range of potentially severe risks, and to

minimise any post-default economic loss, including in African countries. The findings of the annual Moody's default study suggest that the risk allocation, structural features, underwriting disciplines, and incentive structures which characterise project finance techniques are effective.⁸ It is important to note that the transaction costs for project finance techniques are high, so this approach is only appropriate for larger projects or pooled finance investment vehicles that combine several projects (e.g., over US\$15 million in total investment costs).

Service Level Agreements (SLAs) are entered into between the private sector and the public sector for the delivery of specific services. SLAs do not require the establishment of separate legal entities such as a SPV.

Turnkey contracts are used to implement publicly funded Building Efficiency Projects. Under a turnkey contract, an ESCO is required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

To determine which contract type and funding model is most appropriate and affordable for a Building Efficiency Project, LGs will need to implement the following early action steps:

- Understand how much the LG spends annually on lighting, cooling and heating buildings;
- Investigate how electricity budgets can be reallocated to service debt or to pay the private sector for delivering the services;
- Develop project management capabilities to manage and monitor contracts effectively; and
- Enter into an SLA for limited services to build capacity and a track record of managing private sector contracts.

7 Moody's Investors Service definition: "Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited-recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Project financings are based on the notion that risks in the transaction are identified upfront, allocated to transaction parties best able to manage those risks and mitigated such that residual risks are acceptable to funders. A typical project finance structure has many elements, including the use of a special or single-purpose entity or project company to raise non-recourse debt which is serviced and repaid from the net cash flows generated by the project." "Default and recovery rates for project finance bank loans, 1983–2017," Moody's Investor Service, March 2019, pages 8–9.

8 In fact, the 2019 Moody's annual assessment of project finance loans documents the superior performance of African project finance loans, with defaults of African infrastructure projects from 1983–2017 averaging 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%).

4.5 Identify and Implement Credit Risk Solutions

The use of credit risk solutions is important to the successful financing of Building Efficiency Projects. In order to guarantee the actual payment of the debt or to have a back-up option in case of non-payment due to the failure of a project, LGs can utilise credit risk solutions in the financial structuring of their Building Efficiency Projects. To determine what credit solutions are needed and available, LGs will need to identify credit solutions that have been used in their country, engage in discussions with credit risk providers, and possibly engage finance experts to provide transaction advisory support.

ESCOs that operate in SSA are generally small to medium-sized businesses (SMEs) with limited capital and

are reliant on debt (rather than equity) to implement projects. Commercial banks often perceive ESCO contracts with LGs to be too risky to fund due to several factors: the perceived low credit quality of LGs; the lack of ability of ESCOs to service debt when a LG does not pay on time; and the relatively small size of an ESCO transaction which does not warrant expensive due diligence processes.

As a result, ESCOs may struggle to raise finance to implement LG interventions unless credit enhancement support can reduce the credit risks. Guarantee facilities can be used to reduce default and liquidity risks for lenders as well as liquidity risks for ESCOs.

4.6 Establish Contacts with Private Sector Actors

While ESCOs that operate in Africa are generally small to medium-sized enterprises, a large financial institution in South Africa recently acquired a majority stake in one of the country's largest ESCOs. This investment

signals a potential for smaller ESCOs on the continent to consolidate into larger companies or to benefit from the balance sheets of larger parent companies to access more capital.

To unlock private sector investment in Building Efficiency Projects, LGs will need to implement the following action steps:

- Understand and monitor current electricity usage and energy baselines through the use of meters;
- Develop in-house capacity to understand energy savings contracts and procurement processes;
- Engage experts and use standardised contracts to develop, package and procure projects; and
- Develop project management capabilities to manage contracts with the private sector efficiently.

To develop an understanding of potential funding sources and mechanisms, LGs can employ the use of the below typology to assess the potential of Building Efficiency Projects.

Box 7.1: Indicative Funding Sources and Mechanisms for Building Efficiency Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report. As the project advances and the risks and revenue opportunities are better understood, this rating exercise can be repeated to calibrate the appropriate project financing approach.

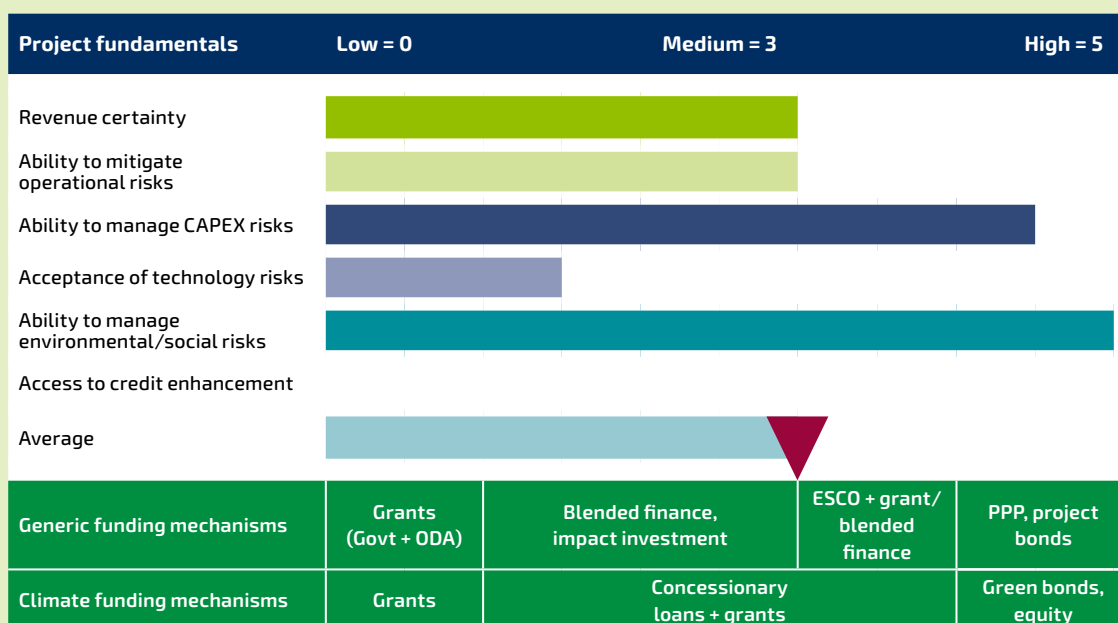
Figure 7.3 below shows a typology for a generic Building Efficiency Project and indicates that a turnkey contract that makes use of blended finance is likely to be the most appropriate financing model given the nascent status of ESCOs in SSA.

The following risk and revenue factors drive this typology:

- Projects can be structured to be cost neutral to LGs by using longer loan periods and grants;
- Lenders are exposed to both ESCO and LG credit risk that may require credit enhancement;
- Both demand and supply are predictable;
- Capital expenditure (CAPEX) and operating expense (OPEX) risks can be transferred cost effectively to the private sector; and
- The average project size is often too small for lenders to invest time in due diligence processes.

A PPP model, if justified given the need to package a large number of interventions, will require credit enhancement (e.g., guarantee, first loss, subsidies) unless the LG is considered creditworthy. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 7.3: Illustrative Building Efficiency Project Typology



5 Action Steps for Local Governments

Table 7.4 below summarises the main proactive action steps that LGs may potentially undertake to implement Building Efficiency Projects, detailing tasks and outputs.

Table 7.4: Roadmap of Proactive Local Government Action Steps for Implementing Building Efficiency Projects

Action Steps	Tasks	Outputs
1. Evaluate the LG's building stock	- Determine the number of buildings owned by the LG - Identify buildings leased by LG from other entities. Investigate owners' willingness to cooperate on energy efficiency interventions	Defined intervention (scope, locations, building usage)
2. Develop budget	- Analyse LG budgets to understand current spend on the cooling, lighting, and heating of buildings - Investigate how electricity and maintenance budgets can be reallocated to service debt or to pay the private sector⁹	Budget available for Building Efficiency
3. Develop baseline data	- Engage technical advisor to undertake baseline study - Implement data management system for baseline data	Baseline data and management system
4. Engage private sector	Understand the private sector's appetite for implementing different funding models at LG level	Menu of funding models
5. Evaluate technical solutions and funding models	- Use experts and project development tools to cost out the range of technical solutions and funding models - Assess affordability of each funding model using a standardised financial model - Stress test each financial model to access payback periods and affordability - Rank options based on affordability and net benefits	- Preferred option & funding model - Funding gap

⁹ If there is not adequate funding in the LG's budget to support the project, the LG will need to find other financial resources. The usage of the LG's budget is not a necessary condition to implement the project.

Table 7.4: Roadmap of Proactive Local Government Action Steps for Implementing Building Efficiency Projects

continued

Action Steps	Tasks	Outputs
6. Close funding gap	- Identify grants from NG and development partners that can be accessed to close the funding gap - Develop grant applications	Grant funding commitments
7. Demonstrate feasibility	- Develop ToRs and engage experts to conduct technical studies - Update financial model to conclude on the affordability of preferred funding model - Present project to LG's key decision-maker (e.g. CFO) to obtain commitment	- Business plan - Commitment from LG CFO
8. Procure	- Amend standardised procurement documents - Evaluate and award tenders - Conclude turnkey/ESCO funded/PPP/SLA contracts	Signed contracts
9. Monitor & Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants for the technical studies. Technical studies include Environmental and Social Impact Assessments (ESIA) that identify the

positive and negative impacts caused by project implementation on the local environment and community. The completion of a satisfactory ESIA that meets local and financial standards is required by financiers before they can commit funds.

6 Examples of Building Efficiency Projects from Sub-Saharan Africa and Worldwide

There are several examples of building efficiency interventions in SSA and around the world:

→ The City of Cape Town, South Africa (CoCT) has implemented a number of debt-funded turnkey interventions to advance Building Efficiency Projects using a public funded guaranteed savings model.

While the ESCO is responsible for installing the interventions and for managing and maintaining the equipment, it does not fund the interventions beyond the installation period. The CoCT pays the ESCO for the capital expenditure once the equipment has been installed using funds provided by the ESCO. Once installed, the ESCO guarantees performance for the entire payback period which means that if the interventions do not achieve the anticipated savings, the ESCO is obliged to reimburse the CoCT for the difference.¹⁰ The CoCT raised a R2.4 billion (US\$162 million) long term concessionary loan from the AFD to fund climate-focused interventions, including public lighting and energy efficiency.¹¹ This facility, together with a national grant, has funded the retrofits of several buildings.

- Another approach is illustrated by the Super ESCO model implemented in India. The India's Ministry of Power established a public sector company, Energy Efficiency Services Limited (EESL), as its implementation arm for energy efficiency interventions. EESL acts as a Super ESCO in India and has been successful in implementing building retrofits. This ESCO model does not require minimum savings to be guaranteed. The Super ESCO is mandated to provide a wide range of energy efficiency functions, including the development, procurement, and financing of building retrofits.¹² The Government of India capitalised the structure with US\$50 million when it was first established in 2014. EESL has since benefited from two concessionary loans issued by KfW (*Kreditanstalt für Wiederaufbau* for Credit Institute for Reconstruction) with a total value of EUR250 million and a further US\$220 million of debt from the World Bank as well as an US\$80 million World Bank guarantee.¹³ EESL makes use of service level agreements once the

equipment has been installed. A public ESCO may be more successful at accessing concessionary finance than a private ESCO and could also provide capacity building support to the LG.

- Pooled financing mechanisms can also use credit enhancement. For example, South Africa's Department of Energy and GIZ developed a pooled LG programme in 2016 to enable ESCOs to access affordable funding via a portfolio lender and develop capacity within municipalities. The programme makes use of a partial risk guarantee mechanism that reduces default and liquidity risk for the lender and the implementing ESCOs. The programme raised EUR40 million of funding commitments from the NAMA Facility (Nationally Appropriate Mitigation Action) and the South African Government in 2018 and is expected to be operational in early 2020.
- A Slovenia example of a building efficiency PPP provides insights into how PPPs might be used by LGs in SSA and possible sources of international funding. In 2017, the City of Ljubljana, Slovenia signed a PPP contract with a private sector consortium for the retrofitting of 49 municipal buildings. The private sector is also responsible for managing and maintaining the equipment over the contract period. The city will use the electricity savings to repay its private partners over the 15-year contract period. Once the contract expires, the Ljubljana LG will retain the full savings benefits from the retrofitting of the buildings. The private sector consortium raised 50% of the project's capital expenditure and the Ljubljana LG and the EU Cohesion Fund provided the balance. The EUR14.9 million project will deliver energy savings of 8,245 MWh annually and a reduction of 2,956 tons of CO₂ emissions each year.¹⁴

10 "Opportunities in Energy Efficiency: for Municipalities in South Africa," SALGA, 2018. See: <https://www.salga.org.za/SALGA%20Energy%20Summit%202018/Energy%20Summit%20Web/Document/Booklet%20Opportunities%20in%20Energy%20Efficiency%20for%20Municipalities%20in%20South%20Africa%20January%202018.pdf>

11 "Integrated Annual Report 2017/18," City of Cape Town, 2018. See: http://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/CCT%20Integrated%20Annual%20Report%202017_18.pdf

12 "Scaling-Up Energy Efficiency: The Case for a Super-ESCO Presentation," ASIAESCO, 2010. See: <http://www.asiaesco.org/pdf/presentation/2-2.pdf>

13 "International Bank For Reconstruction and Development Program Appraisal Document: India Energy Efficiency Scale-Up Program," The World Bank Group, 2018. See: <http://documents.worldbank.org/curated/en/532521527391818294/pdf/India-Energy-Efficiency-PAD-125034-IN-04272018.pdf>

14 "Resalta signs PPP with the City of Ljubljana for the energy retrofit of 49 buildings," Resalta, 2017. See: <https://www.resalta.com/news/resalta-signs-ppp-city-ljubljana-energy-retrofit-49-buildings>

It is important to note that the introduction of regulations can serve to channel investment into energy efficient buildings, as shown by the below examples from Kenya and India:

- Kenya's New Energy Act, promulgated in 2019, sets out a comprehensive mandate for LGs in respect of ensuring and promoting energy efficiency interventions. LGs' mandate includes: the right to amend the country's energy conservation building codes to suit local climatic conditions;¹⁵ and the requirement to establish an energy efficiency fund that will promote and fund interventions in their county.
- The Nairobi City Council is working with the Green Africa Foundation, UNEP (United Nations Environment Programme), and UN Habitat to develop green building codes. The green building codes promote passive design as well as the integration of energy-efficient and renewable energy technologies. According to Kenya's Association of

Manufacturers, energy savings of 15–20% can be achieved by retrofitting lights, pumps, and fans to more energy-efficient models.¹⁶

- India's Telangana State and the Greater Hyderabad Municipal Corporation developed and implemented its Energy Conservation Building Code (ECBC) in 2017. All new commercial and public buildings, and major retrofits need to comply with the state's ECBC before construction can begin. The code sets minimum energy efficiency standards that real estate developers must meet in their building projects through various technologies, such as energy-efficient windows, lighting, building materials, ventilation, landscape orientation, heating and cooling systems, and overall design. Real estate developers have to use an online system to apply for construction permits which requires developers to disclose how energy efficiency targets will be achieved. Developer's compliance with the codes and targets is verified by third-party assessors during the building design approval stage and after construction.¹⁷

7 Enabling Factors

For LGs to effectively scale the implementation of Building Efficiency Projects, LGs and NGs need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put in place for and/or by LGs to unlock private finance for Building Efficiency Projects. For example, LGs are empowered if they can adapt energy efficient building codes and establish energy efficiency funds. To illustrate, Kenya's New

Energy Act, promulgated in 2019, states that LGs have the right to amend the country's energy conservation building codes to suit local climatic conditions¹⁸ and to establish energy efficiency funds that will promote and fund interventions in their counties.

15 With permission of Kenya's Energy and Petroleum Regulatory Authority

16 "Development of Energy Efficiency," World Bank, Op.cit.

17 "Getting Cities Climate-Ready: The Story of India's First Mandatory Energy Efficient Building Compliance System & How to Guide in Five Steps," NRDC, 2018. See: <https://www.nrdc.org/sites/default/files/getting-cities-climate-ready-india-mandatory-energy-efficient-building-compliance-system-cs.pdf>

18 With permission of Kenya's Energy and Petroleum Regulatory Authority

Under any circumstances, it is important to recognise that LGs can proactively take steps to facilitate the identification, development, and finance of Building Efficiency Projects:

→ **Proactive development of Building Efficiency Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop Building Efficiency Projects working with private sector professionals, a national expert team, developers, and investors. As noted earlier, securing qualified Building Efficiency experts will

be critical to the analysis of the needed project development process to design an investable Building Efficiency Project.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking Building Efficiency Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

Table 7.5: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Owned/ Managed by Private Sector (SLA)	ESCO Funded Model	PPP 100% Owned by Private Sector	PPP with LG Shareholding
1. LG has significant own sources of revenue	✓	✓	✓	✓
2. LG can incur debt	✓	N/A	N/A	✓
3. LG can access CAPEX grants	✓	✓	✓	✓
4. LG can be shareholder in a company	N/A	N/A	N/A	✓
5. LG can enter into long term contracts for services/products	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay private sector contracts	✓	✓	✓	✓
7. LG can implement cost-reflective tariffs	✓	✓	✓	✓
8. LG has capacity to develop project (planning, budgeting, etc.)	✓	✓	✓	✓
9. LG can unlock additional revenue opportunities for the private sector	✓	✓	✓	✓
10. LG has capacity to procure turnkey contractors	✓	N/A	N/A	N/A
11. LG has capacity to procure and manage long-term contracts	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

7.2 National Government Enabling Factors

Given the need to contract private sector professionals for Building Efficiency Projects, LGs need to be in countries with enabling national frameworks that enable them to contract professionals and provide support

ranging from expertise to finance and guarantees. The various enabling factors that can be put in place by NGs to promote Building Efficiency Projects are listed in Table 7.6 below.

Table 7.6: National Government Enabling Factors

National Government Enabling Factors	Public Sector Owned/ Managed by Private Sector (SLA)	ESCO Funded Model	PPP 100% Owned by Private Sector	PPP with LG Shareholding
1. NG can commit grant funding to project and makes transfers on time	✓	✓	✓	✓
2. NG has put into place supporting regulatory and legal frameworks	✓	✓	✓	✓
3. NG establishes a national expert pool that develops standardised project development tools and contracts that can be used by LGs	✓	✓	✓	✓
4. NG establishes a national expert pool that can support LGs during project development and procurement	✓	✓	✓	✓
5. NG can support and develop climate finance applications (including pooling similar LG projects)	✓	✓	✓	✓
6. NG is able to provide expert support	✓	✓	✓	✓
7. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓
8. NG establishes climate finance facility for the private sector	N/A	✓	✓	✓
9. NG can provide guarantees covering LG commitments	✓	✓	✓	✓
10. NG is able to mitigate exchange control risk for investors	✓	✓	✓	✓
11. NG has put into place legislation that promotes energy efficiency projects (e.g., green building codes)	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Public Street Lighting Projects. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, NGs can provide enabling factors for Building Efficiency Projects across all financing sources, public and private.

Therefore, Building Efficiency Projects can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 7.2 below.

Box 7.2: Examples of Enabling Factors for Building Efficiency Projects

- **Legislation:** Kenya's New Energy Act that was signed into law in 2019 mandates LGs to set up Energy Efficiency Funds to promote and fund energy efficiency interventions. The Act requires all related grants and loans to be channelled via the LG funds. These funds could act as catalysts for energy efficiency measures if properly capitalised and provided that a sufficient number of projects are developed that can apply for funding.
- **National Programme that includes Standardised Contracts and Procurement Processes:** South Africa's Energy Efficiency in Public Buildings Programme was structured to provide affordable funding via a portfolio lender to ESCOs implementing interventions at LGs. The Programme makes use of a partial risk guarantee mechanism that reduces default and liquidity risk for the lender and the implementing ESCOs. The programme also seeks to simplify the procurement process for LGs via standardised contracts and procurement processes.
- **Blended Finance:** The City of Cape Town, South Africa (CoCT) has implemented a number of debt funded turnkey interventions to advance Building Efficiency using a public funded guaranteed savings model. The CoCT raised R2.4 billion (US\$162 million) long term concessionary loan from the AFD to fund climate focused interventions, including public lighting and energy efficiency. This facility, together with a national grant, has funded the retrofits of several buildings.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of Building Efficiency Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance Building Efficiency Projects by working through national agencies and programmes, and those of development partners. Towards this end, a national

ecosystem to support this Climate Project can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), Non-Governmental Organisations (NGOs), urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the action steps set out in the prior section “*Table 7.4: Roadmap of Proactive LG Action Steps for Implementing Building Efficiency Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design a Building Efficiency Project and Programmes (including pooled finance approaches and guarantees). Information on funding and guarantee sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information.

To begin this process, the action steps in existing SSA and other Building Efficiency Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Building Efficiency Projects. LGs will need to have access to

such advisors. NGs and development partners can provide critical support.

To build out a further database of technical experts, the professionals involved in existing Building Efficiency Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimise access to finance. Workshops and webinars can be used for peer-sharing, as well as in on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technologies options, etc. Initially, SSA countries with successful Building Efficiency Projects can share their experiences with other SSA LGs. Early contributors could be participants in Building Efficiency Projects in Kenya and South Africa.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.



Chapter 8:

Tree Planting and Forestation Projects

1 Definition: What is Tree Planting and Forestation?

This chapter uses the term Tree Planting Projects to refer to tree planting in urban areas and the term Forestation Projects to refer to both afforestation and reforestation in rural areas that are in the jurisdiction of Local Governments (LGs). The *World Overview of Conservation Approaches and Technologies* glossary, adopted by the *United Nations Convention to Combat*

Desertification, distinguishes between two forms of forestation: Afforestation is the planting of trees or forest cover on land which historically did not contain forests, and reforestation is the planting of trees or forest cover on land which previously contained forest that was converted to another land use.¹

2 Benefits Associated with Tree Planting and Forestation

Tree Planting and Forestation Projects can result in transformative benefits to LGs and their citizens, ranging from improved living conditions to budget savings, job creation, and other development impacts. In fact, Tree Planting and Forestation Projects can provide

opportunities for developing new economic sectors at the local level and have a tangible environmental and climatic impact. The overall benefits of LGs proactively undertaking such projects can be summarised from three perspectives:

- **Climate and Environmental Benefits:** Improve microclimate and air quality, absorb carbon dioxide from the environment and release oxygen, improve water retention abilities (flood prevention), improve soil health and biodiversity, control soil erosion, mitigate carbon dioxide (CO₂) emissions, provide sustainable timber, fibre and fuel;
- **Development Benefits:** Improve health of citizens, reduce pollution and heat waves, create recreational opportunities, reverse land degradation and rehabilitate degraded land, create local jobs; and
- **Local Government Benefits:** Achieve savings for LGs for healthcare services resulting from the potential reduction of respiratory diseases related to air pollution, job creation, and benefits related to environmental protection.

The summary of potential benefits from Tree Planting and Forestation Projects is detailed in Table 8.1 below.

1 "Sustainable land management technologies: afforestation/reforestation," United Nations Knowledge Hub, Convention to Combat Desertification. See: <https://knowledge.unccd.int/knowledge-products-and-pillars/best-practices-sustainable-land-management/identifying-slm>

Table 8.1: Details of Potential Benefits Resulting from Tree Planting and Forestation Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● Reduce CO₂ emissions • Natural climate solutions including planting new forests could account for almost 40% of the carbon savings needed to keep the global emissions under the 2-degree Celsius path² ● Improve air quality ● Reduce extreme heat especially in urban contexts ● Provide sustainable timber, fibre, and fuel ● Improve soil health ● Improve biodiversity ● Reverse land degradation and rehabilitate degraded land ● Improve ecosystem functions and environmental services (soil and water conservation)³	● Improve citizens' health by reducing exposure to pollution and heat waves ● Provide sustainable organic products from forests ● Provide aesthetic and recreational value, thereby increasing revenues and job creation from commerce and tourism ● Increase protection from particulate matter (most damaging air pollutant) which is emitted from a variety of sources, especially the burning of agricultural residues, fuelwood, and fossil fuels. ● Protect from fine particulate matter that can be deeply inhaled into the lungs and can cause cerebrovascular disease (e.g., stroke) and ischemic heart disease (e.g., heart attack)⁴ ● Safeguard from PM2.5 exposure which contributes to chronic and acute respiratory diseases, including asthma	● Save megacities more than US\$500 million a year in public health costs, energy expenses, and environmental protection⁵ ● Save costs of reducing air pollution (estimated up to US\$482 million a year) ● Improve the health of citizens • According to studies, investing US\$4 per resident in tree-planting efforts could improve the health of millions of people⁶ ● Provide a cost-effective means for reducing fine particulate matter and urban heat • “Green” solutions (e.g. planting trees) are as cost-effective for reducing particulate matter and reducing urban heat as many other “grey” solutions (e.g. waste treatment plants)

The compelling benefits of Tree Planting and Forestation Projects are illustrated in Figure 8.1 below.

² Ibid.

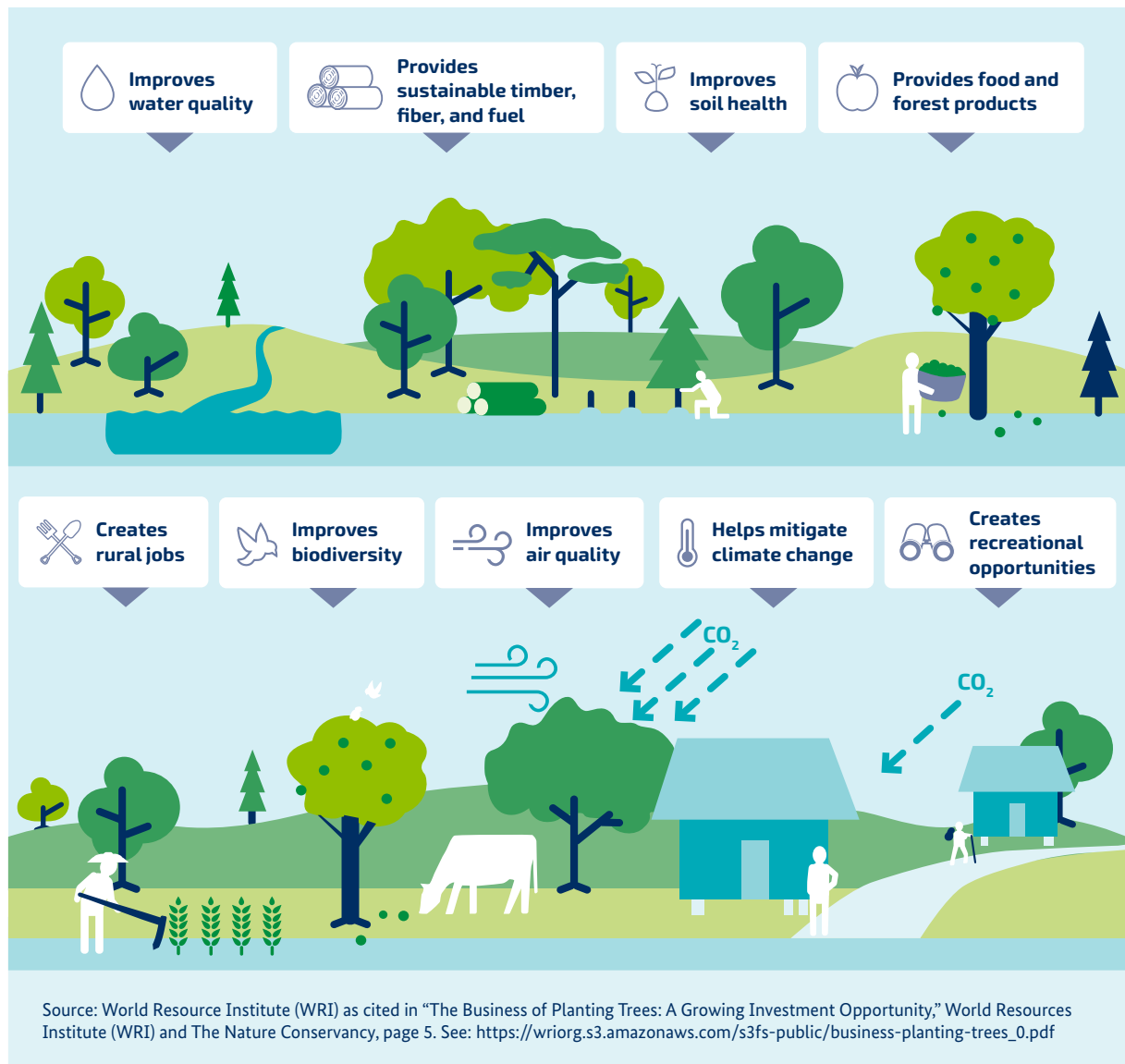
³ Sofia Faruqi et al., “The Business of Planting Trees, A Growing Investment Opportunity,” The World Resources Institute (WRI) and the Nature Conservancy. See: https://www.nature.org/content/dam/tnc/nature/en/documents/Business_of_Planting_Trees_Report.pdf

⁴ Fine particulate (less than 2.5 micrograms, µg, in diameter, also known as PM2.5) is estimated to cause 3.2 million deaths per year worldwide.

⁵ “Implementing and managing urban forests: A much needed conservation strategy to increase ecosystem services and urban wellbeing,” Ecological Modelling, volume 360, September 2017, pages 328–335.

⁶ McDonald et al., “Planting Healthy Air,” The Nature Conservancy, 2016. See: https://www.nature.org/content/dam/tnc/nature/en/documents/20160825_PHA_Report_Final.pdf

Figure 8.1: Benefits of Tree Planting and Forestation Projects



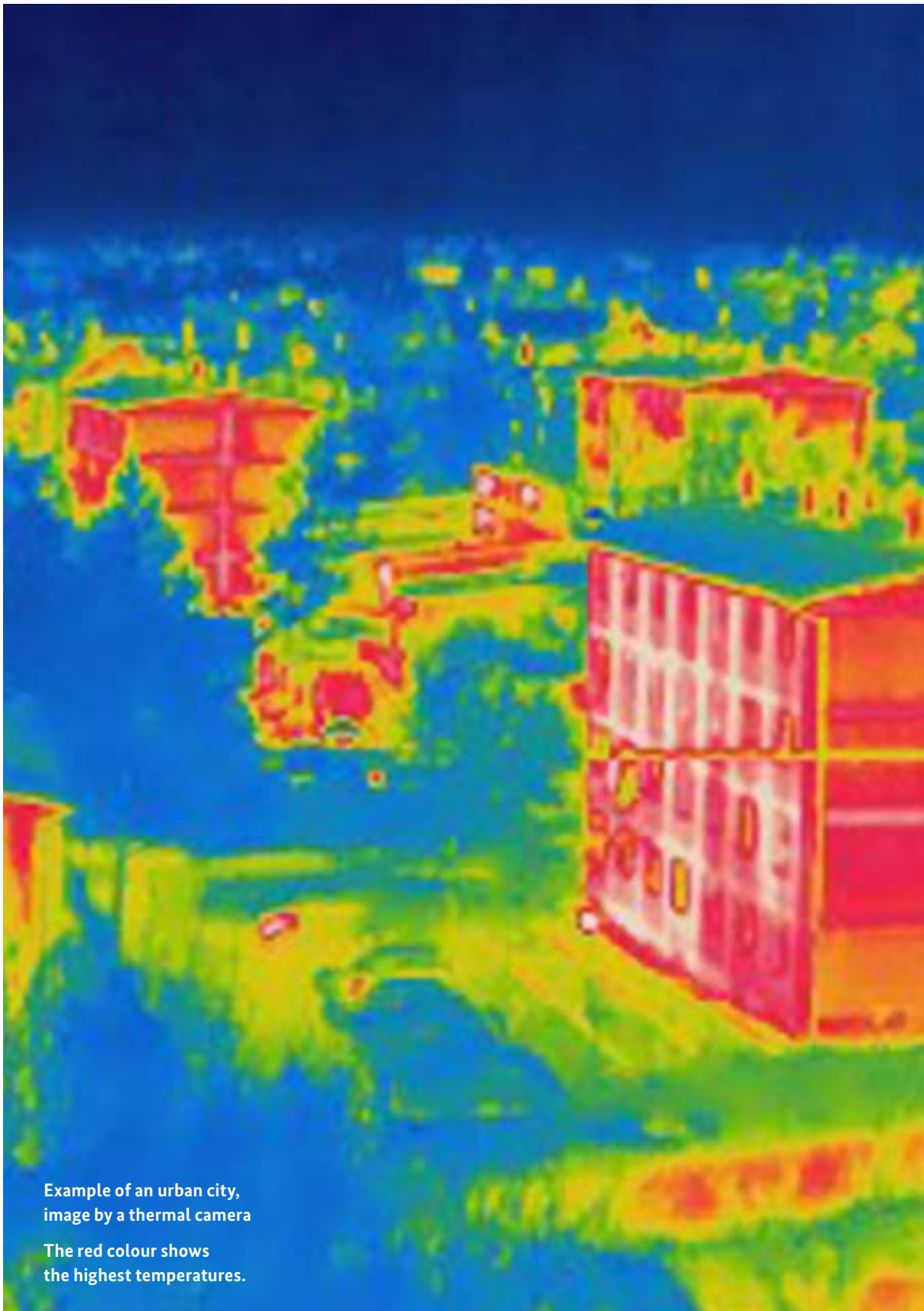
3 Challenges Faced by Local Governments

Cities experience an "Urban Heat Island Effect (UHI)," as certain areas have temperatures higher than surrounding areas due to the concentration of asphalt and other grey infrastructure. Intense summer heat could increasingly lead to uncomfortable and harmful conditions for residents, as well as reduced tourist attraction during warmer periods. Trees, green roofs, and

vegetation can help reduce urban heat island effects by shading building surfaces. The absence of vegetation impacts the UHI in several ways, since vegetation, and in particular trees, intercept solar energy and their shade reduces the temperature of surfaces below while releasing moisture into the atmosphere.⁷

⁷ Yupeng Wang et al., "The effects of street tree planting on Urban Heat Island mitigation in Montreal," *Sustainable Cities and Society*, Volume 27, November 2016, pages 122–128. See: <https://www.sciencedirect.com/science/article/abs/pii/S221067071630066X>

Figure 8.2: Urban Heat Island Effect



In rural areas, deforestation affects the quality and quantity of available water, which has serious impacts on rural communities' health, livelihood and food security. Deforestation also paves the way to land degradation, with consequences for biodiversity and the ability of the ecosystem to regenerate itself, leading to desertification. The continent of Africa is especially at risk, with over 60% of its land affected by land degradation and desertification already, while annually losing 3% of its agricultural GDP due to soil and nutrient loss on farmland.⁸

For this reason, in 2015 at COP21 African governments announced the African Restoration Initiative (AFR100) with the goal of restoring 100 million hectares of degraded and deforested land in Africa by 2030, with development partners pledging more than US\$1 billion in development finance and US\$540 million in private sector impact investment.⁹ These LG financing challenges are compounded by the systematic lack of technical capacity and inadequate access to financial and relevant climate action expertise.

The importance of planning

It is important to note that both tree planting and forestation may have unintended impacts on the existing ecosystem and therefore their implementation must be carefully planned, and the right tree species selected for the area in question in order to ensure maximum benefits and avoid harmful effects to the local biodiversity, whether rural or urban. For example, eucalyptus is widely chosen for forestation in rural areas because it is fast-growing and economically valuable. However, it is a species that requires large amounts of water, which drains the water table and may lead to competition for water for human consumption and agriculture.¹⁰

According to research from Lancaster University, replacing broad-leafed native oak trees with faster-growing conifers in Europe has meant that forest cover on the continent is 10% greater than it was before the industrial revolution. However, these new conifer trees trap heat more efficiently than carbon, thereby increasing global warming instead of reducing it. These kinds of failed tree planting interventions highlight the imperative of careful planning to avoid doing more harm than good.¹¹

4 Financing Roadmap for Tree Planting and Forestation Projects

LGs can undertake a proactive role in the development and financing of Tree Planting and Forestation Projects. This section provides a roadmap, including early

action steps of intervention for LGs to develop a realistic and proactive approach to developing and financing Tree Planting and Forestation Projects.

8 Of Africa's total land area (2,966 million hectares), 494 million hectares (17%) is degraded. In addition, desertification affects around 45% of Africa's land area, with 55% of this area at high or very high risk of further degradation. For details see "The Economics of Land Degradation in Africa," UNEP, 2015.

9 "African Countries Aim to Restore 100 Million Hectares of Degraded Land," WRI, 2015. See: <https://www.wri.org/blog/2015/12/african-countries-aim-restore-100-million-hectares-degraded-land>

10 "Greenwashing: corporate tree planting generates goodwill but may sometimes harm the planet," The Conversation, September 2018. See: <https://theconversation.com/greenwashing-corporate-tree-planting-generates-goodwill-but-may-sometimes-harm-the-planet-103457>

11 Ibid.

4.1 Assess Funding Requirements and Opportunities

The necessary budget for a tree planting or forestation project will depend on many factors such as the specific characteristics of the area, the size of the project, equipment, and labour requirements (for example, volunteers or employees paid by LGs), the tree species to be planted, and maintenance requirements.

Currently most Tree Planting and Forestation Projects in Sub-Saharan Africa (SSA) are funded by public budgets, but there are examples of co-funding with non-governmental organizations and the private sector, as well as innovative co-financing schemes for projects in urban and rural areas.

Private sector investment in forestation occurs mostly in cases where companies carry out commercial exploitation of forests for their products, including resins, furniture, and charcoal. These large private sector investments in forestation fall outside the scope of this chapter and will not be addressed here. However, there are mechanisms to attract private sector finance for Tree Planting and Forestation Projects, such as sponsorships, donations, advertising, sustainable business practices, and corporate social responsibility activities. Section 6 provides examples of Tree Planting and Forestation Projects and financing approaches.

4.2 Identify Financing Models

There are several financing models for Tree Planting and Forestation Projects, including forest funds, revenue collection instruments, Public-Private Partnerships (PPPs) and innovative programmes, and international climate funds,¹² as summarised below.

Revenue Collection Instruments (local and national):

The most prevalent sources of funding for tree planting and forestation today in SSA are national and local government budgets. A review of fiscal policies in the forest and related sectors showed that most African

countries have fiscal policies and forest revenue collection guidelines that can be used to generate resources from the forest sector for forestation or tree planting purposes.¹³ For example, in many countries, forestry and tree planting activities are funded through government budgetary allocations to various official forestry bodies, which manage revenues from state-owned forests.

A range of finance sources such as licenses, fees, taxes, fines, and direct sales can fund Tree Planting and Forestation Projects, as documented in Table 8.2 below.

12 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in [Annex](#).

13 "State of the World's Forests," Food and Agriculture Organisation (FAO), United Nations, 2011.

Table 8.2: Possible Revenue Collection Instruments to Fund Tree Planting and Forestation Projects

Licenses	Fees	Taxes and Fines	Sales
• Licenses for harvesting wood products • Hunting licenses • Licenses and stamp duty for the transporting, processing and marketing of wood and other products • Tour operators licenses for eco-tourism in protected forest areas and similar permits	• Lease fees for the allocation of land, forests and contracts to harvest timber • Fees for forest concessions, payments for felling permits (which can be used for forestation and tree planting)	• Taxes • Fines, confiscation, and damages for infringements of legislation	• Direct sales of plants, plant material, and other forest products

The ability of LGs to directly collect revenues from government budgets will depend on the degree of fiscal decentralization and legislation of the country in question.

However, even in the case of no direct authority to generate the above revenues, LGs can advocate at the national level of the need to generate and access revenues from licenses, fees, taxes, fines, and sales for planting trees and forestation.¹⁴

National Forest Funds:

According to a study done for the United Nations,¹⁵ a number of African countries have set up national forest funds (NFFs), largely financed by national government contributions and revenues from the sales of forest products such as gum Arabic (Sudan), flavours and essences (Ethiopia, Eritrea, Sudan, Kenya), and labdanum resins (Sudan, Ethiopia). Some countries, such as Mali, are already using financial resources from national forest funds for tree nurseries in forestation projects. Table 8.3 below provides a listing of forest funds in ten SSA countries.

¹⁴ Peter C. Gondo, "A Review of Forest Financing in Africa," study prepared for the United Nations Forum on Forests (UNFF), Southern Alliance for Indigenous Resources, Harare, 2012. See: https://www.un.org/esa/forests/wp-content/uploads/2014/12/Forest_Financing_Africa_Gondo.pdf

¹⁵ Ibid.

Table 8.3: Examples of Forest Funds in SSA Countries

SSA Country	Type of Forest Fund
 Burkina Faso	National and local forest management funds that receive revenues from taxes and sales of forest products
 Cameroon	Forest development fund receives money from government budget allocation and own revenue from sale of forest products
 Congo	Natural resources management fund receives income from multiple sources and supports forestry development, wildlife and fisheries
 Lesotho	National forest fund receives all forest fees and taxes and is used to support research, private and community forestry
 Malawi	Forest development and management fund receives income from government and other sources and is used for supporting forest development with emphasis on community forestry
 Mali	Fund for the development of forests and fauna established in 2009 to finance forest development and investments in nurseries and reforestation
 Mozambique	Forest and wildlife development fund receives money from royalties, taxes, and concession fees and has community funds
 Senegal	National forest fund receives income from sales of forest products and other sources; used to fund government, private and community forestry
 Tanzania	National forest fund receives income from various sources and uses it to support forest development, including education, research, and community forestry
 Zambia	National forest fund receives incomes from royalties and concession fees; uses it to support forestry development, research, and community forestry

Source: Gondo, Peter C., "A Review of Forest Financing in Africa," Southern Alliance for Indigenous Resources, Harare, 2012.

Budget allocations to forestry, and the proportion allocated to the sector in relation to the national budget, vary from country to country depending on national and political priorities.¹⁶ For example, in many countries such as Zambia, the funds raised for the forest sector become part of the national income and are later allocated to local forestry authorities as part of annual budgetary allocations.¹⁷ LGs and other organizations can receive earmarked budget contributions from national forest funds, for the tree planting and forestation activities, conservation, protection, and sustainable utilisation of forests.

Therefore, even though the national government controls many processes, LGs can lobby for and secure budget allocations for Tree Planting and Forestation Projects. An example of successful lobbying for financial support from national governments and their development partners is provided by Uganda's local forestry associations that have received support from the national agricultural programme and development partners.¹⁸ It is important to note that the bargaining power of LGs has increased given the concrete targets set forth in each country's Nationally Determined Contribution (NDC) and the significant potential value of tree planting and forestation in contributing to national climate change mitigation and adaptation targets.

Local Forest Funds

While most SSA countries have national forest funds, Burkina Faso has a localized forest management system that generates local funds allocated locally. The outlines of the programme are summarised in Box 8.1 below.¹⁹

The local forest funds in Burkina Faso illustrates how local organizations (including LGs) can potentially develop, fund, and manage local funds in countries with enabling national legal and regulatory frameworks.

Scalable National Programmes

A notable example of a high-impact scalable country wide tree planting and forestation programme is provided by Kenya's commitment in 2016 to restore 5.1 million hectares of land, nearly 9% of its total land-mass (an area roughly the size of Costa Rica). Kenya's commitment was determined by the analysis of national restoration opportunity maps created by the Kenyan Ministry of Environment and Natural Resources and the Kenya Forest Service, with technical support from World Resources Institute, Clinton Climate Initiative, International Union for Conservation of Nature, and the Greenbelt Movement (GBM).

Kenya's resulting programme, the *National Forest and Landscape Restoration Opportunity Assessment*, provides a roadmap to implement Kenya's commitment to restore 5.1 million hectares, as well as assist with national restoration targets laid out in the Kenyan constitution.²⁰ If Kenya achieves these national restoration targets, the country will have:

- Increased its total tree cover by 9%, surpassing the constitutional mandate and NDC target of 10%;
- Met its National Adaptation Plan and National Climate Change Action Plan restoration targets;
- Reduced CO₂ emissions by 3.7%;
- Sequestered 130 mtCO₂ by 2063; and

16 Peter C. Gondo, "A Review of Forest Financing in Africa," Op. cit.

17 Ibid.

18 National government support was received from National Agriculture Advisory Services (NAADS), a statutory semi- autonomous body under the Uganda Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF). The European Union also provided grant support through the Forest Resource Management and Conservation Programme (FRMCP) for the local rural development association in Bushenyi District, reportedly demonstrating that the "marginalized can gain access to financing and achieve high standards of forestry practice." See Cornelius Kazoora et al., "Forest-based associations as drivers for sustainable development in Uganda," Sustainable Development Centre, Uganda, 2006.

19 Peter C. Gondo, "A Review of Forest Financing in Africa," Op. cit.

20 "Kenya Commits to Restore 5.1 Million Hectares of Land Based on New National Opportunity Maps," World Resource Institute (WRI), 2016. See: <https://www.wri.org/news/2016/09/release-kenya-commits-restore-51-million-hectares-land-based-new-national-opportunity>

Box 8.1: Local Forest Management in Burkina Faso

In 2004, Burkina Faso's Ministry of Environment, with assistance from the FAO, initiated a plan to decentralize the country's forest management with the objective of reducing pressure on the forests and improving productivity through controlled harvesting, especially of firewood.

Under this decentralized system, community members are organised into several forest management groups (FMGs). These groups are then joined together within a Union. Unions are granted the authority to manage forest management units for the benefit of their members. Several Unions are grouped together to form the Forest Management Pre-co-operative Union to manage a forest management site headed by a Technical Directorate.

In terms of management and revenue generation, forest management units are divided into forest management plots from which wood fuel is harvested on a rotational basis. Woodcutters from the Union's members are paid under the supervision of the Union. The wood fuel merchants pay taxes and fees to two community funds, the forest management fund and the village development fund.

In 2012, for every m³ of wood sold, the amount of CFA600 was paid to the local forest management fund. This money is used for investment in forest management and other purposes such as reforestation, road construction, and maintenance. In addition, CFA200 is paid by merchants into the village development fund for each m³ of wood sold. These resources are used for community development projects selected by the local communities. Some of the projects include construction of schools, health centres, and water projects. While limited, the village development funds are also used to provide loans to members of the community. The two funds have helped raise financial resources for supporting community forestry management as well as meeting some of the livelihood needs of the communities. Although implementation of this approach may face some challenges related to corruption, the system itself is reported as functioning well.

Sources: Gondo, Peter C., "A Review of Forest Financing in Africa," Southern Alliance for Indigenous Resources, Harare, 2012; "Case Study 1: The Nazinon Reserved Forest (Burkina Faso)," FAO.

→ Improved drought management throughout the country, reducing economic losses of farmers and city dwellers.

with national governments for the adoption of effective and high-impact national tree planting and forestation programmes.

The Kenyan national programme provides LGs with a concrete example to use in their advocacy campaigns

Public Private Partnerships and Other Innovative Approaches

In SSA today, financing forestation and tree planting through PPPs and innovative approaches are less common than the use of revenue collection sources, forest funds, and national programmes. However, PPPs and innovative approaches can be promoted by LGs to finance tree planting and forestation climate actions. In fact, many communities, particularly those not experiencing rapid growth and urban development, are leveraging public-private partnerships and innovative approaches to realize tree planting and urban forestry goals.²¹

Tree-planting programmes can benefit from robust partnerships between governments (national and local), with the private sector, NGOs, research institutes, and academia at local, national, and international levels. Experts from national forestry services, universities, NGOs, and the private sector may provide technical guidance to help identify appropriate tree species and set up ongoing maintenance recommendations. For example, the United States Forest Service recommends that LGs undertake urban tree canopy assessments as a starting point for developing policies about city natural resources. It has published a comprehensive guide for conducting urban tree canopy assessments that is available online. Such services can be performed at a discounted or *pro bono* basis by experts.²²

Tree Planting and Forestation Projects can be implemented through broad partnerships with NGOs, community organizations, local SMEs, larger companies (national and international), and foundations from the country and worldwide. Individuals and organizations

can contribute time, money, and labour.²³ A number of international NGOs and private sector foundations offer grants to support tree-planting and urban gardening efforts in Africa. Even if LGs are not considered eligible recipients, they can receive grant support from many sources, public and private, including local community organizations and NGOs.²⁴ Private sector contributions can also complement LG efforts by purchasing tree stocks as well as by designing and printing public outreach materials.

For example, the Vodacon Tanzania Foundation provided over US\$100,000 for the “*Greening Dodoma Project*” for planting 100,000 trees in the first year and creating three gardens in the country’s capital city. The project also aimed at increasing awareness and social mobilization for eco-friendly initiatives and economic empowerment activities, such as waste management and training women and youth groups on the production and use of alternatives to plastic bags.²⁵ Such tree-planting activities are often carried out by volunteers of all ages.

Researchers point out that the environmental and material benefits of urban trees is not inherently recognized by city dwellers, so cultural and economic factors need to be taken into account in planning and mobilising local support for tree-planting programmes.²⁶ Successful actions will need to include social components. For example, targeted public consultations can help to ensure shared ownership of green projects and help officials design “*fair*” means of allocating garden plots to families or organizations.

21 McDonald et. al, “Funding Trees for Health,” Op. cit., pages 20–21.

22 “Urban Tree Canopy Assessment: A Community’s Path to Understanding and Managing the Urban Forest,” U.S. Forest Service, April 2019. See: https://www.fs.fed.us/sites/default/files/fs_media/fs_document/Urban%20Tree%20Canopy%20paper.pdf

23 For an example, see Million Trees NYC, a public-private partnership created in 2007 to plant and care for a million trees: 70% of the trees will be planted in parks and other public spaces and 30% will be planted by private businesses and organizations, homeowners, and community organizations. See: <https://www.milliontreesnyc.org/html/about/about.shtml>

24 Additional research would be needed to help identify eligibility and other requirements.

25 “Vodacom Tanzania Foundation Injects USD 131,000 to conservation initiatives through WWF Tanzania,” World Wide Fund for Nature, 20 August 2019. See: http://wwf.panda.org/our_work/forests/deforestation_fronts2/deforestation_in_the_congo_basin/?351814/Vodacom-Tanzania-Foundation-Injects-USD-131000-to-conservation-initiatives-through-WWF-Tanzania

26 Jonathan Onyekmelu, “Urban Forest Development in West Africa: Benefits and Challenges,” *Journal of Biodiversity and Ecological Sciences*, volume 1, 2011, pages 77–94. See: <https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=202632>

Examples of innovative tree planting actions include:

- LGs can proactively promote a model similar to that employed by F3 Life partnering with Financial Access, the Global Innovation Lab for Climate Finance, and the International Union for Conservation of Nature (IUCN), whereby local banks provide credit access for smallholder farmers contingent on their adoption of agricultural practices that make the farms less vulnerable to climate change – for example, planting grass strips and trees. (For details, see Box 8.2 below.)
- LGs could encourage tree planting and forestation partnerships by offering access to land and/or fiscal benefits for companies, individuals (farmers and city dwellers), and banks who participate in tree planting and forestation activities.
- Sponsoring of trees and green spaces helps advertise the sponsors' social engagement, while generating funds for LGs and encouraging tree planting in urban settings. For example, private sector companies, city residents and/or business owners can 'own' a tree and pay the costs for seeds and maintenance through LG green area maintenance budgets. Trees can be planted along avenues, in public buildings and parks, and/or other areas with high movement of people. In addition, corporate co-branding of uniforms and/or other material used by city park maintenance staff can provide visibility for the private sector's logos, thereby generating funding for the city's tree planting endeavours.
- The tourism industry can support LGs efforts by providing their climate-conscious customers the

opportunity to offset their travel emissions by investing in city tree-planting, urban gardening, and other related climate actions.

- Urban allotments consist of areas where LGs make available land for rental at low costs, which can be used for farming, recreation, and gardening. This scheme offers citizens an opportunity to obtain affordable spaces where they can contribute to the greening of cities and enjoy their own private garden. Allotments can also be offered to residents of a specific street or area at discounted rental rates, which allows resource pooling for community green areas. LGs can collect revenues from these rental arrangements, using the proceeds for additional tree planting and other climate actions.
- LGs can advance and scale up tree planting partnership schemes for tree planting and forestation by working with their national governments to put in place enabling regulatory environments with incentives for banks, companies, farmers, and urban residents.

An example of using a climate-smart credit scheme to incentivise tree planting activities is provided in Box 8.2 below.

LGs that have established successful tree-planting partnership and innovative programmes can share their experiences and lessons learned across environmental zones and national boundaries, detailing ways to successfully secure partners and coordinate with the broad range of alternative counterparties.

International Sources of Funding

Forestation programmes are eligible for support from a number of currently existing international climate finance sources. These programmes are outlined in Table 8.4 below, comparing different financing mechanisms and focus areas.

Box 8.2: Example of Climate-Smart Credit for African Farmers (F3 Life)

F3 Life has developed a climate-smart credit approach that addresses climate risks by increasing the climate resilience of farmers and de-risking agricultural loan portfolios. F3 is partnering with Financial Access, the Global Innovation Lab for Climate Finance, and the International Union for Conservation of Nature (IUCN), that are pooling their networks and expertise to de-risk finance to farmers by using climate-smart techniques.

The model is designed by making farmers' credit access dependent on specified agricultural practices: (1) Credit access for smallholder farmers is contingent on them agreeing to agricultural practices that make the farms less vulnerable to climate change – for example, planting grass strips and trees. (2) F3 Life systems are used to verify that required agricultural practices have been adopted, scoring farmers according to their resilience to extreme weather events. (3) This score can then be included in lenders' credit-scoring algorithm. Loan amounts and interest rates are variable, dependent on the lenders' needs.

In 2013, F3 Life started with a pilot of 75 farmers in the Aberdare mountains of Kenya to test how the system would work. The company saw high rates – above 90% – of environmental compliance and farm restoration because credit access was a strong incentive for farmers to improve land management. Moreover, farmers continued to plant trees even after the pilot ended because they witnessed a fall in soil erosion and an improvement in soil health. The program incentivized a long-term change in farmers' behaviour. The pilot helped F3 Life develop its technology to monitor farmers' implementation of climate-smart practices. The company's target clients consist of local and regional banks that lend to smallholder farmers and would like to reduce portfolio default risk caused by unsustainable land management and climate change-related weather events. Lenders can use F3 Life's tools to ensure that farmers comply with the sustainable and climate-smart land management requirements of their loan agreements. Farmers, extension officers, or loan officers can use smartphones to take geotagged photos of the grass strips and trees they have planted, which F3 Life translates into a score for use by the lender.

This approach is cheaper and more effective for banks than having a team of officers monitor whether restoration has taken place. F3 Life will charge an upfront fee of US\$50,000 for each lender (to design its climate-smart credit products), as well as a recurring per-user fee of \$1 per farmer per year. F3 Life is currently developing lending projects with major lenders – including Deutsche Bank – in Ghana, Rwanda, and Kenya. This Phase 1 project targets 45,000 farmers by 2020 who are already receiving credit, albeit not on climate-smart terms. F3 Life has also recently launched a product targeted toward large non-profits that grant funds to smallholder farmers, and IUCN and Pact are initial clients. Its technology has important implications for the risk management of agricultural loan portfolios, credit access for smallholder farmers, and the way farmers treat their land.

Source: World Resource Institute; for more information, see <https://f3-life.com>



Table 8.4: Examples of International Sources of Climate Finance and Support

	Pilot Program for Climate Resilience/ World Bank Climate Investment Funds	United Nations Adaptation Fund (UNAF)	Global Environment Facility (GEF)	Green Climate Fund (GCF)	European Investment Bank (EIB)
Financing mechanisms and technical support	- Grants - Equity - Loans - Guarantees - Technical Advisory Services - Blended finance with multilateral development banks and regional development banks	- Grants - Readiness Support - Technical Assistance grants for Environmental and Social Policy, Gender Policy, and for South-South Cooperation	- Blended Finance (guarantees, debt, equity) - Grants - Capacity development - Small grants - Knowledge and learning services - Partnership building - Technical Advisory Services	- Grants - Loans - Equity - Guarantees - Project preparation support - Knowledge Sharing	- Loans - Blended Finance - Advisory Services
Focus areas	- Capacity Building - Institutional strengthening and governance reform - Clean technologies - Climate resilience - Enabling environment - Energy access - Energy Efficiency - Evaluation & learning - Financing - Gender - Infrastructure - Monitoring & reporting - Private Sector Engagement - Sustainable Forests	- Agriculture - Coastal Zone Management - Disaster Risk Reduction - Food Security - Forests - Multisector Projects - Rural Development - Urban Development - Water Management	- Biodiversity - Chemicals and Waste - Climate Change: adaptation, mitigation - Forests - International Waters - Land Degradation - Gender - Indigenous Peoples	- Resilience and advanced livelihoods of vulnerable people, communities, and regions - Resilience of health and well-being, water and food security - Resilience of infrastructure and environment - Resilience of ecosystems	- Agriculture, food, and rural development - Energy - Forestry - Transport - Water and wastewater management - Greening of urban areas - Regional development

A critical counterparty for African governments is the African Development Bank (AfDB) as it serves as an implementing entity for the above five programmes offering all the products listed above.

In addition, in 2019 the AfDB started to offer limited support directly to municipalities through technical assistance grants for capacity development activities, governance, and regulatory reviews. The AfDB also invests in forestry through a new fund, the Africa Forestry Fund II, approved in September 2019. The Fund is a US\$ 150 million second generation private equity fund focused on investing in sustainable forestry value chains in SSA.²⁷

As every organization has its own application requirements, specific guidance on how to apply can be obtained by contacting the organization's country office. It is important to note that applications for international climate finance may require technical expertise and support, particularly for infrastructure projects, which may involve social and environmental impact assessments and prefeasibility studies. Most international finance sources will also require the explicit approval of national governments and oftentimes that the proposal is submitted through the designated national counterpart. In many cases, a single local project may not be large enough to meet the criteria of the climate finance provider, so the national government may opt to pool several projects into a single application.

Additional Means to Finance Tree Planting

Recently LGs worldwide have established new revenue streams to support ongoing environmental programmes, such as tree planting. For example, three finance mechanisms can be used by LGs in the United States to fund their tree planting and forestry goals: 1) public revenue; 2) municipal codes and policies; and 3) partnerships. LGs and national governments throughout SSA are developing new policies and partnerships around tree planting and forestation that can benefit by learning from other governments worldwide how to optimize revenue generation.

For example, the establishment of new LG revenue streams often require the rights of LGs to raise finance through taxes, bonds, or other sources as well as create incentives. For example, LGs in the United States have the right to use voter-approved ballot measures to approve the establishment of a new revenue source by authorizing a new tax, bond measure, and other means of raising revenue. Municipal codes and policies include both regulatory and incentive-based tools such as zoning ordinances, storm water utility fees, and density bonuses or other incentives for private developers. Some cities in the United States have also incentivized the maintenance of tree cover and green space by private entities by incorporating tree planting into tax rates or zoning regulations (e.g., Washington, D.C.).

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of different finance models are summarised against key implementation factors in Table 8.5 below, with advantages highlighted in green and disadvantages in red.

12 "Multinational – Africa Forestry Fund II – Project Summary Note," AfDB website. See: Sourced from <https://www.afdb.org/en/documents/multinational-africa-forestry-fund-ii-project-summary-note>

Table 8.5: Advantages and Disadvantages of Different Finance Models

Criteria	International Sources of Finance	Forest Funds	Revenue Collection Sources	Public Private Partnerships	Urban Allotments
Direct access to finance sources	LGs need to go through national governments in most cases.	Depending on national legislation, LGs may not be able to access funds or collect revenues directly, but LGs can advocate for larger shares citing national commitments, such as NDCs, or create local funds where legislation permits.		Forestation PPPs require a lot of coordination and will not offer direct access to resources but may help secure intended outcomes.	LGs can initiate urban allotment schemes on their own and collect revenues from leases.
				Sponsorships and advertisements are under full LG control.	
Income level	Low Income Countries have priority for grants for both mitigation and adaptation. Blended finance and loans are also available.	Forest funds exist even in very low-income countries.	In very low-income areas, it may be difficult to enforce collection of licenses and fees. Corruption is also a possible risk.	Poor areas can benefit from PPPs for both forestation and tree planting as long as there are private sector investors willing to take risks.	In very low-income areas, citizens may not be able to afford the lease unless it is heavily subsidized.
Pooling	A cluster of urban and rural LGs can put together a joint proposal to the national government. Kenya's National Forest and Landscape Restoration Opportunity Assessment shows the benefit of having multiple partners in a national programme.	The sharing of revenues from forest funds and sales, licenses, fines, taxes, and other levies among LGs may be difficult unless the same area (for example a national park) borders several municipalities and there is an agreement to that effect.		Forestation PPPs offer good opportunity for pooling resources as various partners can contribute funding to ensure the new schemes work.	Urban allotments do not lend themselves to pooling from a LG perspective, but a group of users could pool resources to use the grounds.
				Sponsorships and advertisement involve one-to-one agreements between sponsors.	

Note: Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

Table 8.5: Advantages and Disadvantages of Different Finance Models

continued

Criteria	International Sources of Finance	Forest Funds	Revenue Collection Sources	Public Private Partnerships	Urban Allotments
Capacity	Public sector may not have the necessary skills to access finance and may require third party support to develop proposals and implement funding applications.	Managing funds may not require significant capacity but sufficient human resources are necessary to enforce legislation and accountability procedures that need to be in place to minimize corruption.		PPPs for forestation involving technology solutions such as F3 Life's require significant capacity depending on the scheme. Private sector must be willing to develop the required capacities.	Urban allotments do not require significant capacity to manage.
				Sponsorships and advertisements do not require high capacity levels.	
Costs and time to implement	Application processes are lengthy and require many iterations with the respective institutions.	In countries where funds and revenues collected go directly to central government, LGs may only have access to their allotted amounts once a year through national budget disbursements.		PPPs for forestation may take time to implement as they entail coordination among all parties to put in place the necessary conditions.	LGs that have available land may make it available immediately. There may be some costs related to fencing off areas and preparing for leases.
				PPPs for sponsorships and advertisement do not require large investments or time.	

Note: Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

4.4 Establish Contacts with Private Sector Actors

In many cases, private sector companies can be attracted to contributing to tree planting and forest funds for marketing purposes. Companies can also implement their corporate social responsibility campaigns by supporting such projects. These contributions can include financial support as well as contributing with human resources for tree-planting activities engaging their staff to help during campaigns and events.

PPPs involving sponsorships and advertisements are relatively easy to implement. However, putting in place an enabling environment for PPPs involving technical solutions and credit schemes may require lengthy negotiations to ensure win-win solutions for all parties. In cases where companies are involved in forestry projects, it will be important for LGs to ensure best practices are used in managing the environmental, social, and governance related dimensions of sustainable harvesting of forest resources.

To define possible partnerships and innovative programmes, LGs will need to implement the following analysis:

- Assess current needs for tree planting and forestation based on a competent environmental assessment, including priority areas for implementation and costs;
- Assess current sources of finance from government (national and LG);
- Assess the potential demand from the private sector and residents for related programmes (e.g., advertising, carbon-smart credits, forestation, urban allotments, etc.);
- Assess how to obtain the required project management capabilities to develop programmes and manage contracts with the private sector efficiently; and
- Explore how to scale efforts and effectiveness through the possible support of national government.

These assessments will need to be incorporated into the detailed LG action steps listed in the next section.

5 Action Steps for Local Governments

Action steps to implement the resource mobilization strategies and implement projects will vary depending on whether the LG is engaging with the national

government, climate funds, or the private sector. Implementation can potentially include the action steps listed in Table 8.6 below.

Table 8.6: Roadmap of Proactive LG Action Steps for Implementing Tree Planting and Forestation Projects

Action Steps	Tasks	Outputs
1. Map stakeholders and budget available	- Estimate the costs of land degradation and pollution, and impact on community - Map all central and local entities with a role in tree planting and forest management - Estimate the income that may be collected through forest funds, revenue collection sources, PPPs, urban allotments, etc. - Explore new possible sources of funding - Undertake a regulatory review to identify possible impediments to revenue collection and PPPs/innovative programmes - Test approach with national government, private sector, other targeted finance providers	- Historical costs (breaking out impact) - Total existing funds available for actions - Mapping of funding sources (local, national, international)
2. Engage experts to assess risks, costs, pre-emptive actions, and resulting savings	- Identify sources of risk and solutions based on current and future risks - Assess costs and benefits of each technical solution - Rank options based on affordability and net benefits - Estimate scenarios of possible future damage (breaking out lives, health, economic, taxes, development, etc.) - Estimate savings from tree planting actions (rationales for pre-emptive actions) - Identify appropriate species for each ecosystem in order to avoid doing harm	- Tree planting options and possible funding sources - Calculation of funding gaps - Damage forecast estimate of not investing in tree planting based on historical data - Savings estimate from tree planting actions - Mapping of ecosystems and suitable species for reforestation and tree planting projects

Table 8.6: Roadmap of Proactive LG Action Steps for Implementing Tree Planting and Forestation Projects

continued

Action Steps	Tasks	Outputs
3. Engage funders and stakeholders, and assess relevant regulations	- Assess any regulatory constraints and explore strategies to address them, adapting project design as needed, and advocating for changes in regulatory environment as required - If using PPP models, organize bilateral as well as joint meetings with relevant stakeholders in order to facilitate the required conditions for partnerships - If applying for international climate finance, check criteria, role of national government, and develop a concept note with support of experts as needed	- Assessment of regulatory and compliance related issues governing public-private partnerships - Project concept note - Memorandum of understanding or contracts drawn up with relevant stakeholders
4. Mapping of physical areas for tree planting, forestation, and/or urban allotments based on applicable regulations and demand assessments	- Carry out a mapping of areas that can be used for tree planting, forestation, and/or urban allotments - Assess any regulatory constraints and explore strategies to address them, adapting project design as needed	- Assessment of regulatory and compliance related issues, and governing municipal land use/zoning regulations - Map detailing indicated areas for forestation, tree planting, and/or urban allotments
5. Secure financial and human resources	- Develop project proposals - Evaluate and award tenders as needed - Hire required personnel and/or mobilize volunteers	- Project proposal - Project contractors selected - Signed contracts with project staff/volunteers
6. Monitor & Evaluate (M&E)	Monitor performance of project against M&E criteria set in project document and provide reports as needed	M&E Reports

The above actions may require the engagement of professional experienced experts, such as project managers, tree specialists, and consultants for the necessary technical studies.

6 Examples of Tree Planting and Forestation Projects from Sub-Saharan Africa and Worldwide

As noted in the introduction, at COP21 African governments announced the *African Restoration Initiative* (AFR100) with the goal of restoring 100 million hectares of degraded and deforested land in Africa by 2030, with development partners pledging more than US\$1 billion in development finance and US\$540 million in private sector impact investment.

Against this backdrop, many African national and local governments have undertaken tree planting actions. Four examples are provided below.

Ghana

The Sagnarigu Municipality, one of Ghana's youngest provinces established in 2012, is working with the “*Green Republic*,” an organization that plants trees in public spaces. Through this collaboration, 50,000 trees will be planted in six selected public schools. The municipality is also running a government flagship program, dubbed “*Greening Northern Ghana Project*,” through the Forestry Commission of Ghana, with funding from the World Bank. This project has engaged over 500 young people, within the municipality, to plant trees in public institutions, creating forest reserves in available communities.²⁸

Kenya

The Green Belt Movement (GBM) is an environmental organization that empowers communities, particularly women, to conserve the environment and improve livelihoods. GBM was founded by Professor Wangari Maathai in 1977 under the auspices of the National

Council of Women of Kenya (NCWK) to respond to the needs of rural Kenyan women who reported that their streams were drying up, their food supply was less secure, and they had to walk further and further to get firewood for fuel and fencing. GBM encouraged the women to work together to grow seedlings and plant trees to bind the soil, store rainwater, provide food and firewood, and receive a small monetary token for their work.

GBM uses a watershed-based approach to restore degraded watersheds of key water catchments so as to improve their functions and improve the livelihood of the local communities. GBM supports and diversifies the sources of income for the communities neighbouring the forest by generating income from tree planting activities and promoting alternative and profitable use of the forest. The organization receives grant funding from organizations worldwide, reporting grants larger than US\$100,000 from each of the following organisations: UNDP-GEF, The Nature Conservancy, and the International Climate Initiative, among many other donors.²⁹

Since 1977, GBM communities have planted over 51 million trees in Kenya, in watersheds in the highlands of Mt. Kenya, the Aberdares, and the Mau Complex (three of the five major mountain ecosystems in Kenya), as well as on private lands. GBM also plants trees on public lands with institutions such as faith-based groups, schools, and has a partnership with the Kenya Army to help access remote areas for planting and tree planting on army lands.³⁰

28 “Sagnarigu Municipality – Climate Action starts with community-driven Awareness,” Global Covenant of Mayors. See: <https://www.globalcovenantofmayors.org/city-story/climate-action-starts-with-community-driven-awareness/>

29 Green Belt Movement, “2017 Annual Report.” See: <http://www.greenbeltmovement.org/sites/greenbeltmovement.org/files/GBM%202017%20Annual%20Report.pdf#overlay-context=node/890>

30 “Tree Planting and Water Harvesting,” The Green Belt Movement. See: <http://www.greenbeltmovement.org/what-we-do/tree-planting-for-watersheds>

Niger

The forestry sector accounts for about 4% of Niger's Gross Domestic Product and plays a key role in energy supply and the control of desertification. Niger collects revenues from wood production and commercialization, based on the size and tree species of trees. The fees that are collected are distributed between the state treasury, local forest management organizations at LG level, communities and the Water and Forest Service. Funds are allocated to: (a) local management organizations and communities for forestry activities, (b) general development purposes, and (c) the state treasury forest monitoring fund. There are no charges on the production of non-wood forest products, but fees are collected for the issuing of hunting permits, guide licenses, and for the capture or harvesting of animals. In addition, visitor recreation permits are issued on a fee basis. Import and export levies are collected from international trade in forest products, but these levies are not administered by the forestry administration.³¹

Lesotho

Lesotho has 12,000 hectares of forest which are directly managed by the central government. Forest charges are only levied on the production of roundwood from these forests and there are no other forest charges on any other production or trade in forest products. The relatively small area of natural forest in Lesotho is under the control of traditional authorities and falls outside the revenue system. Lesotho imports forest products from South Africa and value added tax (VAT) is charged on the value of these imports as they enter the country. National Forestry Policy in Lesotho clearly indicates that the primary responsibility for the sustainable and beneficial management of natural resources and the environment lies with individuals and communities. Therefore, the government allocates very little funds to sustainable forest management activities. Forest revenue collection only funds 20% of

the recurrent budget for the Forestry Division. The budget for capital investment is funded mainly by international sources.³²

Examples from outside Africa also provide insights on the potential reinforcing roles of LGs with relation to national governments, civil society, and business as well as possible LG tree planting and forestation actions.

Brazil

Under the Paris Agreement, Brazil committed to restoring 12 million hectares of native forests. Notably Brazil has adopted national legislation related to tree planting and forestation that is a shared responsibility between the national and state governments, such as Forest Code Law no. 12.651. A key component of this national law is the Rural Environmental Registry (CAR, the acronym in Portuguese), a mandatory national public environmental registry for the integration of environmental information of all rural properties. Registration in the CAR is done through the Rural Environmental Registry System (SICAR) which is part of the National Environmental Information System (SINIMA), managed by the Ministry of Environment. Registration in the CAR must then be validated by the environmental agency of the state where the property is located. Registration is entered in the state's CAR registration module and then uploaded electronically to the SICAR system by using each state's CAR website.³³

The role of Brazilian LGs has been most pronounced with respect to Brazil's Atlantic Forest, one of six Brazilian biomes that contributes to sustaining the life of almost 75% of the country's population, providing invaluable ecosystem services that help balance the climate, regulate the water cycle, and provide food. It is also one of the areas with the highest socio-biodiversity of the world, recognized by UNESCO as a Biosphere Reserve and by the Brazilian Federal

31 Peter Gondo, "A Review of Forest Financing in Africa," Op cit.

32 Ibid.

33 For details, see "Brazil's new Forest Code: A guide for decision-makers in supply chains and governments," World Resources Institute Brazil, 2016.

Constitution as National Heritage site. Once occupying around 15% of the country's area, stretching from north to south, the Atlantic Forest has lost more than 90% of its original area in recent years. Given its importance and high level of endangerment, the Atlantic Forest biome is the only Brazilian forest protected under federal law (Atlantic Forest Act, 2006), which guarantees the protection of 100% of the remaining forests by prohibiting landowners from suppressing native vegetation.

In Article 38, the law established the *Municipal Plan for the Conservation and Recovery of the Atlantic Forest* (Brazilian acronym, *PMMA*), which allows municipalities to work proactively to protect, conserve, and restore native vegetation by defining priority actions and areas. However, not all municipalities understand how the plan works or have the human resources capable of complying with the legislation and taking advantage of its benefits.

In order to strengthen environmental management in municipalities and promote conservation of the Atlantic Forest, UN Environment and the National Association of Municipal Environment Agencies (ANAMMA) joined efforts in late 2017 to develop the project “*Strengthening Municipal Environment Councils through Municipal Plans for the Conservation and Recovery of the Atlantic Forest*.” Another consequence of the initiative was the creation of the Federation of Municipal Environment Council Members, a facility for the exchange of experiences and good practices among municipal council members. Fifteen municipalities are being selected to receive support for drafting their conservation and recovery plans, with conservation actions for at least 20% of the Atlantic Forest and restoration actions for at least 5% of the municipality.³⁴

For example, Salvador's Municipal Secretary of Sustainability, Innovation and Resilience has planted a tree

species that is native to the Atlantic Forest in urban areas. One of its initiatives is the “Dial Atlantic Programme” which has provided 4,500 trees for residents to plant at home since it was launched in 2017.³⁵

Another important example is the city of São Paulo: In 2016 the city implemented an in-depth analysis of the Atlantic Forest area. To better connect green spaces, São Paulo expanded its parks and protected areas to cover more than 20% of its total land area. Moreover, the city is working with local stakeholders to restore 4,000 hectares in the nearby forest watershed to improve water quality, cut sediment pollution by a third, and increase water supply during the dry season, which is expected to generate a 28% return on investment for the local water company.³⁶

Civil society, sustainable businesses, universities, and other stakeholders are noted as critical in attaining results. The Atlantic Forest Restoration Pact, a multi-stakeholder movement comprised of NGOs, universities, businesses, and government agencies, is reported as restoring approximately 700,000 hectares of native forests between 2011 to 2015. The role of sustainable business is noted in the multiple country-led effort to restore degraded land across Latin America and the Caribbean. Cited examples include Symbiosis and limiting soil erosion in Bahia State (where Salvador is located) through its biodiverse timber operation, planting a variety of native trees and restoring additional land outside the areas it harvests. Near São Paulo, the company Floresta Viva is replacing the existing chemical-intensive palm plantations with soil-restoring diversity that more closely mimics the forest ecosystem.³⁷

Portugal

The Portuguese capital, Lisbon, developed 107.23 hectares of new green areas between 2009 and 2014 as urban allotments. Most of these allotments have been

34 This section is taken from “Municipalities in Brazil take the lead in conserving fragile Atlantic Forest biome,” UN Environment Programme, 16 November 2018.

35 Sabin Ray et al., “A Tale of Two Cities in Brazil (and the Forest that Connects Them),” The City Fix, August 26, 2019.

36 Ibid.

37 Op.cit. For information on 20x20, see initiative20x20.org. Currently 17 Latin American and Caribbean countries and three regional programmes support the initiative, with commitments to begin restoring more than 50 million hectares (an area roughly the size of France) of degraded land. The initiative is also supported by more than 70 technical organizations and institutions and a coalition of impact investors and private funds deploying US\$ 2.4 billion in private investment.

built on new green areas developed by the municipality, for example on brownfield land. There are two types of allotments: larger allotments of over 100 m² for social uses, providing subsistence to those who cultivate them; and smaller allotments of between 50 m² and 100 m² for recreational and educational purposes. The latter is reserved for organic production. The annual rental of these allotments is usually EUR0.9/m². However, the municipality subsidizes the costs for some renters, such as associations and people using allotments for community purposes.³⁸

Moldova

In Festelita, a village in the Republic of Moldova, more than 70,000 willow and poplar trees have been planted in Festelita, as part of the “*Adopt a tree!*” campaign organised as part of the EU-funded initiative “*Covenant of Mayors – Demonstration Projects*”.³⁹ Over the course of two weeks, more than 100 residents of Festelita were given the opportunity to plant trees. Every participant could mark his or her tree and receive an official “*tree adoption certificate*.”

7 Enabling Factors

For LGs to effectively scale the implementation of Tree Planting and Forestation Projects, LGs and National Governments (NGs) need to have enabling factors in place that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put in place to unlock finance for tree planting and forestation projects, as broken down across four finance models in Table 8.7 below.

Table 8.7: Local Government Enabling Factors

Local Government Enabling Factors	Forest Funds	Revenue Collection Instruments	Public Private Partnerships	Urban Allotments
1. LG has authority and capacity to adopt tax rates and zoning regulations, manage funds, and enforce legislation that increases tree planting and forestation activities	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Tree Planting and Forestation Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

38 “Sustainable, Climate-Resilient and Vibrant Cities: Good practices from Covenant of Mayors signatories,” Covenant of Mayors for Climate & Energy. See: https://www.eumayors.eu/IMG/pdf/CovenantOfMayors_BestPracticePublication_web.pdf

39 “Adopt a tree!, action organised as part of Moldova’s effort to boost renewable energy,” EU Community. See: <https://www.euneighbours.eu/en/east/stay-informed/news/adopt-tree-action-organised-part-moldovas-effort-boost-renewable-energy>; and “Procedures and Requirements for Paying Reforestation Levy and FRIAA Dues.” See: https://friaa.ab.ca/wp-content/uploads/2017/05/Reforestation-Levy-Instructions_March-2016.pdf

Table 8.7: Local Government Enabling Factors

continued

Local Government Enabling Factors	Forest Funds	Revenue Collection Instruments	Public Private Partnerships	Urban Allotments
2. LG can generate revenues from licences, fees, taxes, fines, and sales to pay for tree planting and forestation activities	✓	✓	✓	✓
3. LG can access international grants with approval of national government	✓	N/A	✓	✓
4. LG can be a shareholder in a company and member of a local association	✓	✓	✓	N/A
5. LG can enter into long term contracts for tree planting and forestation activities	✓	✓	✓	✓
6. LG can reallocate existing budgets to pay for tree planting and forestation activities	✓	✓	✓	N/A
7. LG can incur debt	✓	N/A	✓	N/A

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Tree Planting and Forestation Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

It is important to note that in any scenario LGs can proactively take steps to facilitate the identification, development, and finance of Tree Planting and Forestation Projects:

→ **Proactive stakeholder engagement:** LGs can proactively develop forestation and tree planting projects working with the national government, communities, urban residents, NGOs, and the private sector. As noted above, NGOs and community organisations can be engaged and potentially take the lead in implementing projects. Also, international finance options may be available, usually requiring

the support of the national government. All project development efforts may require external experts to assist with developing projects and applying for grant funding on a paid or volunteer basis.

→ **Sponsorships for tree planting and urban allotments:** LGs can implement volunteer and sponsorship programmes for tree planting and urban allotments without the approval of the national governments. To kickstart and support the scaling of such projects, LGs could implement campaigns reinforced by community events and announcements in local media (e.g., newspapers, radio stations, social media, etc.).

7.2 National Government Enabling Factors

The various enabling factors that can be put in place by NGs to promote Tree Planting and Forestation Projects are listed in Table 8.8 below.

Table 8.8: National Government Enabling Factors

National Government Enabling Factors	Forest Funds	Revenue Collection Instruments	Public Private Partnerships	Urban Allotments
1. NG provides grant funding to LG tree planting and forestation projects through earmarked budgets with timely payments (including pooling for similar LG projects)	✓	✓	✓	✓
2. NG puts into place supporting regulatory and legal frameworks, enabling LGs to generate revenues from licences, fees, taxes, fines, and sales to pay for tree planting and forestation activities	✓	✓	✓	✓
3. NG implements national tax incentives, zoning regulations, and other measures that increase investment in tree planting and forestation projects	N/A	✓	✓	N/A
4. NG develops programmes working with LGs and local communities in line with NDC commitments, with earmarks in NDC budgets	✓	✓	✓	✓
5. NG puts into place legislation that promotes forestation and tree planting (e.g., targets for tree cover with specified completion dates, etc.)	✓	✓	✓	N/A
6. NG supports climate finance applications	✓	✓	✓	N/A
7. NG provides access to experts	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Tree Planting and Forestation Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, National Governments can provide enabling factors for tree planting across all financing sources, the most important being the facilitation of revenue collection sources, national support programmes, and public private partnerships.

Therefore, Tree Planting and Forestation Projects can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 8.3 below.

Box 8.3: Examples of Enabling Factors for Tree Planting and Forestation Projects

Ability to collect fees at local level: In Burkina Faso, under a decentralized forestation management system, wood fuel merchants pay taxes and fees into two community funds, the forest management fund and the village development fund. Village development resources are used for community development projects selected by the local communities.

National forest funds provide funding for local tree planting and forestation: The Niger government collects revenues from wood production and commercialization, the issuing of hunting permits, guides' licenses, and for the capture or herding of animals. Funds are allocated to: (a) local management organizations and communities for forestry activities, (b) general development purposes, and (c) the state treasury forest monitoring fund.

Ability to engage in PPP agreements: The Vodafone Tanzania Foundation provided over US\$ 100,000 for the "Greening Dodoma Project" that expects to plant 100,000 trees in the first year and create three gardens in the country's capital city, as well as increase awareness and social mobilization for eco-friendly programs through training women and youth groups.

Mobilization of grant funding: In Kenya, the community-based organization Green Belt Movement (GBM) has raised large amounts of funding from international organisations. In 2017, GBM raised over US\$ 100,000 from UNDP-GEF, The Nature Conservancy, and the International Climate Initiative, among other donors. Since 1977, GBM communities have planted over 51 million trees in Kenya.

Ability to collect taxes and borrow: LGs in some countries such as the United States collect taxes and issue bonds allocating funds for tree planting and forestation.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to

increase the capacity of LGs to facilitate the identification, development, and finance of Tree Planting and Forestation Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance Tree Planting and Forestation Projects by working with national forest sector agencies and programmes, and those of development partners. Towards this end, a national ecosystem to support this Climate Action can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, travel sector, etc.), non-governmental organizations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling Information

LGs will need to have a training module that details the action steps set out in the prior section in “*Table 8.6: Roadmap of Proactive LG Action Steps for Implementation of Tree Planting and Forestation Projects.*”

In addition, enabling information will need to be provided on the professional services required to develop and design Tree Planting and Forestation Projects. Information on funding sources also needs to be provided, including eligibility requirements and application processes.

This wide array of information can be consolidated in an online knowledge portal with directories of information. To begin this process, the action steps for Tree Planting and Forestation Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of Tree Planting and Forestation Projects. LGs will need to

have access to such advisors. National governments and development partners can provide critical support.

To build out a further database of technical experts, the professionals involved in existing Tree Planting and Forestation Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimize access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful Tree Planting and Forestation Projects can share their experiences with other SSA LGs.

Early contributors could be participants in IWM Projects in Kenya and South Africa.

5 Provide Online “Local Government Climate Action Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an online platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

The CoM SSA training materials provide support in project development and finance.



Chapter 9:

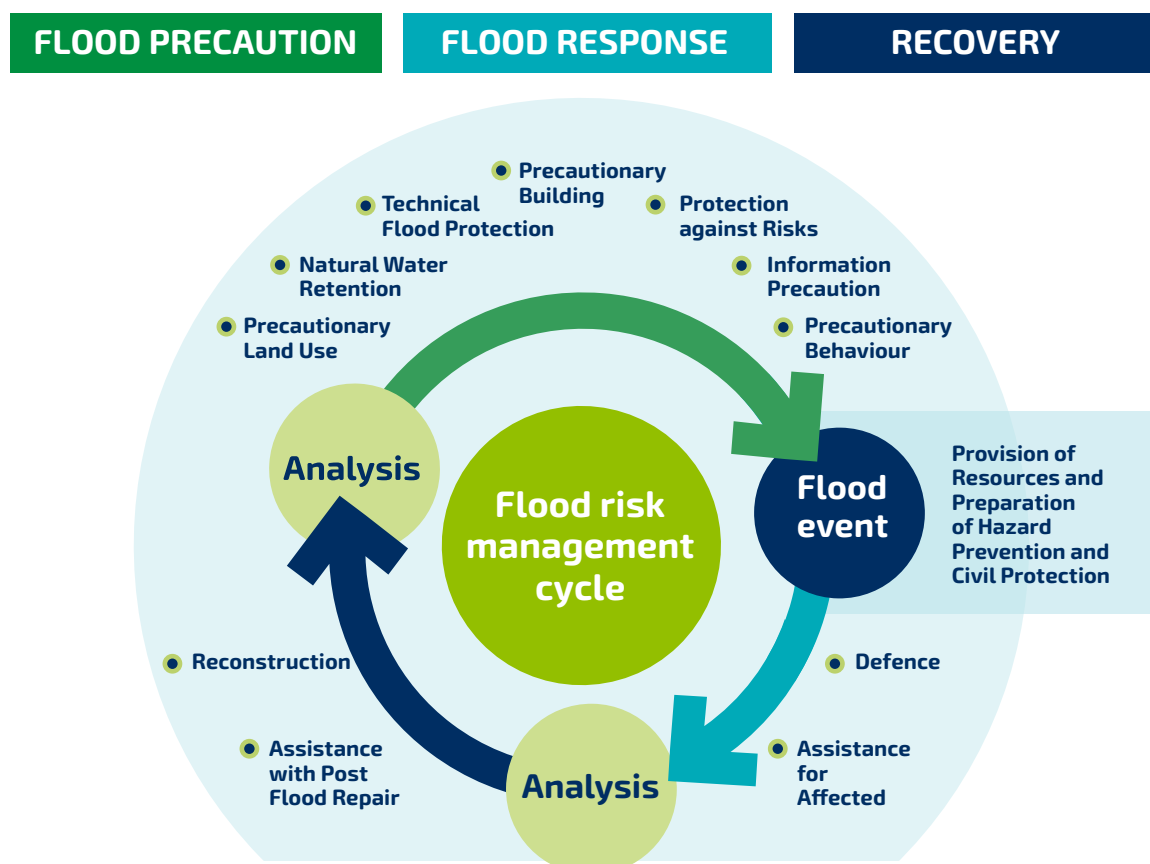
Flood Risk Management Projects

1 Definition: What is Flood Risk Management (FRM)?

Flood Risk Management (FRM) is a critical component of Disaster Risk Reduction (DRR). FRM aims to reduce the likelihood and the impact of floods. Floods are natural phenomena which cannot be prevented. However, human activity is contributing to an increase in the likelihood and adverse impacts of extreme flood events. Firstly, the scale and frequency of floods are likely to increase due to climate change which will bring higher intensity of rainfall and rising sea levels. In addition, inappropriate stormwater drainage reduces the capacity to absorb flood waters. Moreover, the number of people and economic assets located in flood risk zones continues to grow.

According to the 2010 European Environment Agency (EEA) *State of the Environment Report*, a further major potential impact of climate change, in combination with land-use changes and water management practices, is the intensification of the hydrological cycle resulting from changes in temperature, precipitation, glaciers and snow cover.¹ FRM comprises a wide variety of aspects, ranging from the reduction of the probability of occurrence of a flood to the reduction of the potential damage. These aspects rest in the common responsibility of the official agencies at the state and community level, as well as with the affected population. The wide ecosystem and the various actions steps of the FRM cycle are depicted in Figure 9.1 below.

Figure 9.1: Flood Risk Management Cycle



Source: Michael Cassel et al., "Flood partnerships: a participatory approach to develop and implement the Flood Risk Management Plans," Journal of Flood Risk Management, 2017, Volume 10, pages 164–172.

1 The factors cited in this section are taken from the EU Flood Directive.
See: https://ec.europa.eu/environment/water/flood_risk/impacts.htm

FRM is considered a key imperative of public sector agencies, forming a foundational basis of their disaster risk capacities. The United Nations *International Strategy for Disaster Risk Reduction* defines disaster risk as “the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.”² In the same vein, disaster risk reduction is “the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.”³

The importance of FRM is recognized by the *Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR)*, adopted by the UN General Assembly in 2015. SFDRR recognizes that national governments have the primary role in DRR and other stakeholders, also noting the essential critical roles of LGs and the private sector. The essential role of LGs is also explicitly recognized by other development frameworks such as the *Paris Agreement on Climate Change* and the *2020–30 Agenda for Sustainable Development*.

The SFDRR identifies the following four priorities for projects, encompassing the disaster component of flooding:⁴

- 1 Understanding disaster risk** requires resources to promote the mainstreaming of disaster risk assessments into land-use policy development and implementation. This includes urban planning, land degradation and informal settlements assessments. Having information on anticipated demographic and environmental changes is important, as floods impact the poor and vulnerable disproportionately both in urban and rural areas.
- 2 Strengthening disaster risk governance to manage disaster risk** and the allocation of resources for equipment, logistics and personnel to develop and implement risk reduction strategies for floods and their consequences. This includes policies, plans, laws and regulations in all relevant sectors (e.g. disaster preparedness, health, education, agriculture, water and sanitation, energy, etc.).
- 3 Investing in disaster risk reduction for resilience**, including mainstreaming of disaster risk assessments, mapping and management into development planning for both urban and rural areas. Investments are required to increase business resilience and protection of livelihoods and productive assets, including livestock, working animals, tools, and seeds.
- 4 Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.** This includes the revision of existing or the development of new building codes and standards and rehabilitation and reconstruction practices with the aim of making them more applicable within the local context, particularly in informal and marginal human settlements. Developing capacities to implement, survey and enforce such codes through an appropriate approach is particularly important in settings with informal settlements near riverbanks and in areas prone to landslides. In addition, LGs must liaise as appropriate with national level agencies to ensure that they have access to: (a) information provided by early warning systems and (b) disaster relief for flood-affected populations.

2 “2009 UNISAR Terminology on Disaster Risk Reduction,” United Nations International Strategy for Disaster Reduction (UNISDR), 2009. See: https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

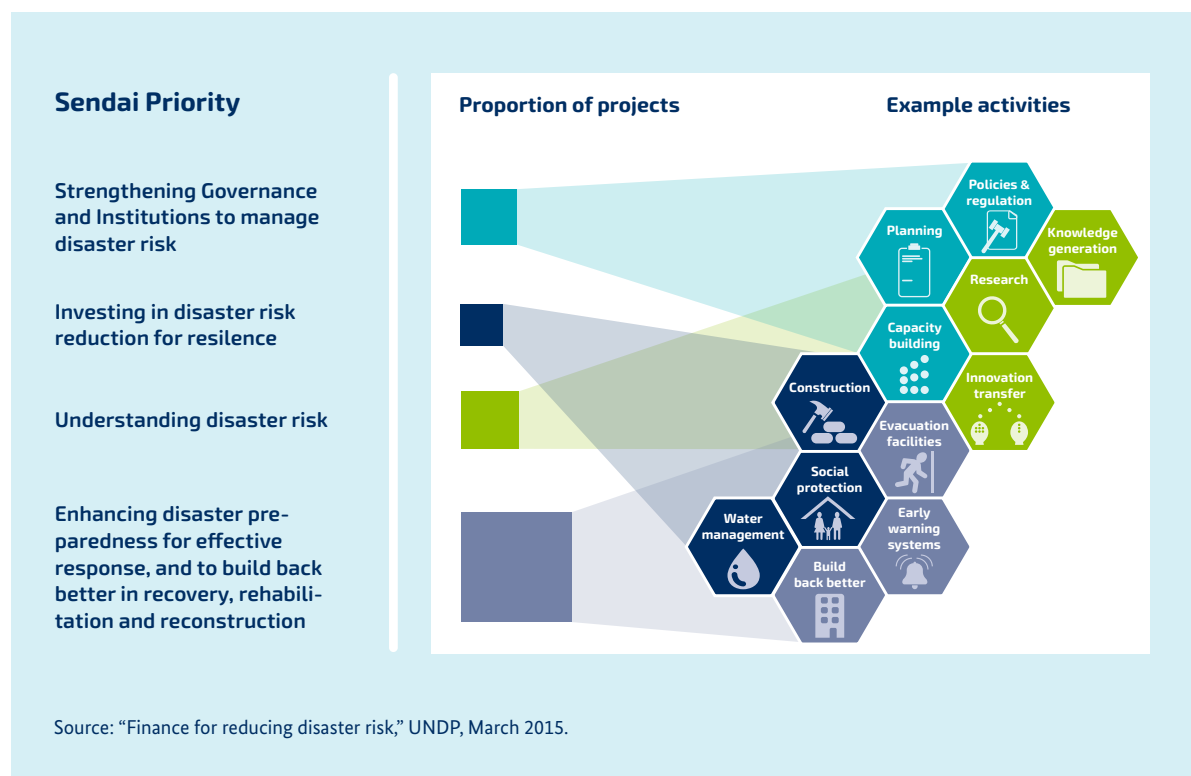
3 Ibid.

4 Sourced from the website of the United Nations Office for Disaster Risk Reduction. See: <https://www.unisdr.org/we/coordinate/sendai-framework>

Of these four priority actions, most projects supported by international assistance fall in the category “Enhancing Preparedness for Effective Response and Build Back Better.” The category “Understanding

Disaster Risk” receives the second largest envelope of funding, followed by “Investing in Disaster Risk Reduction and Strengthening Governance.”⁵ The relative distribution of funding is presented in Figure 9.2 below.

Figure 9.2: Projects Funded by International Development Assistance Sources



Therefore, there is a strong international framework for implementing FRM that recognizes the critical role of LGs.

The public sector programmes to date in Sub-Saharan Africa (SSA) have been directed towards DRR. Between 2005 and 2015, the region experienced an average of 157 disasters per year, claiming the lives of roughly 10,000 people annually. The “Programme,” funded by the European Commission (EC), is the first comprehensive DRR programme of magnitude in SSA, bringing

together four organisations that implement different result areas, in line with their mandates and areas of expertise (African Union, UN Office for Disaster Risk Reduction, World Bank Global Facility for Disaster Relief and Recovery, and the African Development Bank). Cited results include a coordination DRR office at the African Union (AU) Commission, strengthening of institutional capacity for DRR at the Regional Economic Communities, and improved understanding of risk among member states.⁶

5 “Finance for reducing disaster risk: 10 things to know,” UNDP, 2015. See: <https://www.undp.org/content/dam/undp/library/crisis%20prevention/disaster/Finance%20for%20reducing%20disaster%20risk-10-Things-to-know-report.pdf>

6 “Building Disaster Resilience to Natural Hazards in Sub-Saharan African Regions, Countries and Communities 2014–2017”

A related programme, the Africa Disaster Risk Financing (ADRF) Initiative, is now working with 19 African countries to develop and implement tailored financial protection policies and instruments which can help them respond quickly and resiliently to disasters. Financed by the European Union (EU), it is implemented by the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR). DRF aims to strengthen countries' ability to manage economic and fiscal stresses when disasters strike.

Examples of ADRF supported projects in SSA include the following:

- The World Bank approved a catastrophe credit for Kenya in June 2018, providing a US\$200 million contingent line of credit to the country. While preparing to develop this credit, the government of Kenya approved a National Disaster Risk Financing Strategy – the first to be implemented in Africa. Kenya also improved its policy framework for managing natural hazard risks in urban, land, and water management.

- SSA countries have established the critical importance of rapidly delivering emergency assistance to vulnerable households in the event of a disaster (e.g., Malawi, Niger, Sierra Leone), as well as unlocking critical access to credit for low-income farmers (e.g., Uganda, Rwanda).
- Nearly 60 knowledge exchanges and trainings have been organized to gather and disseminate lessons learned and build the capacity of governments. In May 2018, an event was organized on the margins of the Understanding Risk Forum in Mexico City, including 40 SSA government delegates as the largest assembly of African DRR practitioners to date.⁷

While the above projects do not focus exclusively on FRM, the African Risk Capacity (ARC), a specialized AU agency, was established to help African governments improve their capacities to better plan, prepare, and respond to extreme weather events and natural disasters. ARC has been developing a pan-African flood model which will be used to underpin parametric flood insurance offered to African Union Member States. The ARC parametric insurance product for floods will be the first of its kind globally.⁸

2 Benefits Associated with Flood Risk Management

FRM Projects can result in transformative protective benefits to LGs and their citizens, pre-empting catastrophic damages to human life, infrastructure, environment, and the economy as a whole, as well as in developing new programmes that can support micro, small and medium-sized enterprises (MSMEs) and job

creation. In fact, FRM Projects can provide opportunities for developing new economic sectors at the local level and LG fiscal income. The overall benefits of LGs proactively undertaking FRM can be summarized from three perspectives.

7 Hugo Wesley et al., "Across Africa, disaster risk finance is putting a resilient future within reach," World Bank Blog (published on Nasikiliza), 3 January 2019.

8 ARC has partnered with leading US-based atmospheric and environmental research firm AER to develop the underlying flood model, while ARC will create the overlying insurance product as part of Africa RiskView. At the end of 2016, AER completed the pan-African Flood Extent Depiction (AFED) product for ARC using historical daily data starting in 1992. In 2017, the Africa Flood Extent Depiction model was piloted in Ghana, the Gambia, and Cote d'Ivoire. Dedicated technical experts are currently fine-tuning the model to enable the provision of a robust flood parametric insurance product across Africa. For more information, see <https://www.africanriskcapacity.org>

9 Stephane Hallegatte et al., "Assessing Socioeconomic Resilience to Floods in 90 Countries," World Bank Policy Research Working Paper 7663. (Climate Change Cross-Cutting Solutions Area). See: <https://openknowledge.worldbank.org/bitstream/handle/10986/24503/Assessing0soci0oods0in0900countries.pdf>

- **Climate and Environmental Benefits:** Reduce flood risks, reduce catastrophic damage to environment, promote beneficial effects of flooding;
- **Development Benefits:** Protect lives, minimize losses of assets, avert financial losses, prevent water-borne diseases, prevent and reduce soil and water contamination, enable food security (including farmed and wild food both land and water-based), enable water security (e.g., dams, etc.), enable energy security (i.e., hydro-power, large and small scale), secure development gains, create opportunities for MSMEs and local jobs; and
- **Local Government Benefits:** Protect LGs from asset losses affecting constituencies, protect income sources and LG budgets from unexpected expenses, enable water and energy security, create local opportunities for MSMEs and job creation, increase fiscal revenue.

The summary of potential benefits from FRM Projects is detailed in Table 9.1 below.

Table 9.1: Details of Potential Benefits Resulting from FRM Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
● Protect environment (e.g., infrastructure, land, trees, animals, etc.) against floods arising from current and potential future climate variability ● Reduce systemic vulnerability and increase resilience to wide range of potential climate-related shocks ● Restore wetlands that can provide flood storage and serve as habitats for endangered species	● Protect lives and prevent water-borne diseases ● Avoid devastating loss of income to communities, residents, and business ● Safeguard development gains that could be lost as a result flooding incident (e.g., living standards, transport, energy, housing, schools, medical clinics, etc.) ● Protect urban poor who are particularly vulnerable as they live in areas most affected by flooding	● Reduce risk to local economy and tax base • US\$1 in flood asset loss is equivalent to US\$1.6 reduction in country's national income⁹ ● Reduce risk of LG budget expenses for health support and disaster recovery ● Reduce risk of damaged infrastructure (e.g., roads, bridges, buildings, etc.) ● Create opportunities for MSMEs and job creation through FRM Projects ● Increase LG income through FRM taxes and fees ● Overall increase in local economic activity and job creation, tax revenues from payrolls, land values, etc.

According to the United Nations Development Programme (UNDP), the average annual direct losses resulting from disasters between 1991 and 2010 were approximately US\$117 billion, with indirect losses as much as 50% higher. Low and middle-income countries are reported as experiencing the greatest unreported losses, accounting for 93% of total deaths from natural hazard related disasters in this time period.¹⁰ Flooding is the most common of all environmental hazards worldwide, claiming on average each year 20,000 lives, adversely affecting approximately 75 million people, with extensive damage to economic and social infrastructure as well as the environment.¹¹ According to one study, floods cause approximately one third of all deaths, one third of all injuries, and one third of all damage from natural disasters.¹² Effective flood risk management actions aimed at reducing such

catastrophic damage, thereby safeguarding the environment, local communities, and the economies and stimulating speedy reconstruction, have an important impact for cities across the world.

For example, in Tanzania the financial losses as a result of floods are estimated as costing the country twice the 2017/2018 combined state budget for health and education, approximately US\$2 billion annually.¹³ Nation-wide floods in Nigeria in 2012 are estimated to have caused asset losses of over US\$10 billion.¹⁴ Heavy rains resulting in floods killed 363 people, injured nearly 6,000 people, and displaced 3.9 million people.¹⁵ The recent Tropical Cyclone Idai in southern Africa in March 2019 caused significant loss of life and the displacement of hundreds of thousands of people because of related river flooding.¹⁶

3 Challenges Faced by Local Governments

In many African cities, drainage systems are inadequate and there is a lack of resources to handle severe weather events that are increasing in magnitude and frequency as a result of climate change.¹⁷ A key issue is “combined sewer overflow,” when too much rain comes at once and the existing water system pushes raw sewage into nearby rivers, contaminating drinking water resources and potentially causing epidemics.

For these reasons, recurring floods and other related disasters have been identified as a serious threat to sustainable development. LGs typically depend on financial transfers from national governments to fund disaster risk management, and often lack the infrastructure necessary to prevent or mitigate the effects of floods.

10 “Finance for reducing disaster risk: 10 things to know,” op.cit., page 1.

11 Keith Smith., *Environmental Hazards: Assessing Risk and Reducing Disaster*, London: Routledge, 1996.

12 A. J. Askew, “Water in the International Decade for Natural Disaster Reduction,” in Leavesley et al. (eds.), *Destructive Water: Water-Caused Natural Disaster, their Abatement and Control*, IAHS Publication No. 239, 1999.

13 Sylvester Domassa, “Tanzania: Floods Cost Tanzania U.S.\$ 2 billion Annually,” allAfrica. See: <https://allafrica.com/stories/201802280677.html>

14 Olaekan Adekola, “Many African Countries Are Flooding, Risking Decades of Development if They Do Not Adapt,” *The Conversation*, November 30, 2018. See: <https://theconversation.com/many-african-countries-are-flooding-risking-decades-of-development-if-they-do-not-adapt-106581>

15 Federal Government of Nigeria: “Post-Disaster Needs Assessment 2012 Floods,” June 2013. See: https://www.gfdrr.org/sites/gfdrr/files/NIGERIA_PDNA_PRINT_05_29_2013_WEB.pdf

16 <https://reliefweb.int/disaster/tc-2019-000021-moz>

17 O.M. Chukuma et al., “A Comparative Analysis of Flooding in Warri and Port Harcourt Urban Areas in the Niger Delta Region in Southern Nigeria,” *Arabian Journal of Geosciences*, April 2018, 11: 116. See: <https://doi.org/10.1007/s12517-018-3525-3>

In fact, the development of early warning systems in West African countries has been funded mainly by development agencies, but reported as failing due to the lack of proper maintenance.¹⁸ Another reported issue in West African countries is the lack of timely access to national contingency funds as a result of complex and bureaucratic procedures.

Therefore, LGs are challenged by the lack of finance for both flood management as well as during the occurrence of floods. Moreover, these LG financing challenges are compounded by systematic lack of technical capacity and inadequate access to financial and relevant climate project expertise.

4 Financing Roadmap for FRM Projects

LGs can undertake a proactive role in the development and finance of FRM Projects. This section provides a financing roadmap including early action steps of relevance for LGs to develop a realistic proactive approach to developing and financing FRM Projects.

4.1 Assess Funding Requirements and Opportunities

In line with the Sendai Framework, the first step to assessing funding requirements and opportunities is to understand disaster risk through a sound climate risk and vulnerability assessment, which will inform the formulation of disaster risk reduction and climate change adaptation measures. Each measure should then be subject to a cost-benefit analysis, bearing in mind that the same solution may have different costs and benefits depending on the physical characteristics of the location in question, including its soil structure, exposure to hazards, communities inhabiting the area, and their specific vulnerabilities.

General FRM Projects for all LGs

As noted above, all LGs need to undertake a cost-benefit analysis of the costs of flood prevention and reconstruction, and explicitly frontload FRM Projects into their budgets. LG budgets can be used for FRM Projects, such as the following:

- Installation of early warning systems;
- Creation or rehabilitation of natural flood storage systems;
- Updating and/or installation of pumping stations;
- Greening urban spaces in view of water retention, rehabilitation of rural ecosystems in view of water retention (e.g., regeneration of mangrove areas, wetlands, etc.);
- Creation of sponge cities and/or communities (i.e., construction and/or rehabilitation of water and flood retention basins);
- Construction and/or rehabilitation of small and medium-sized dams;
- Maintaining drains and implementing effective urban solid waste management (including banning single-use plastics) to avoid drain clogging;

18 This issue is reported in a paper on of West African countries: R. Ouikotan et al., "Gaps and challenges of flood risk management in West African coastal cities," XVI World Water Congress, Mexico, 29 May – 3 June 2017. See: https://iwra.org/member/congress/resource/ABSID329_ABSID329_full_paper.pdf

- Scaling up rainwater harvesting to reduce pressure on LG drainage systems (small scale for households; large scale for public institutions such as hospitals, schools, etc.);¹⁹
- Rural and urban development planning to avoid construction in flooding zones;
- Investing in tree-planting and green/blue infrastructure projects to support flood mitigation;
- LG enforcement to ensure that there is no illegal or informal encroachment on high flood risk zones or green spaces dedicated to absorbing floodwaters;
- Providing tax incentives to companies and individuals willing to invest in flood-proofed buildings;
- Public relations campaigns and accompanying measures to create awareness; and
- Integrating flood prevention infrastructure and plans into public investments.

Examples of specific flood prevention planning that can be implemented by LGs include the following:

- **Land use planning:** Direct settlements away from flood plains;
- **Rural and urban development planning:** To elaborate drainage structures (green and/or grey infrastructure) for future developments and to avoid construction measures in flooding zones;
- **River basin management planning/catchment planning:** Tool for integrated water resources

management and water allocation plans as part of the flood risk management plan specifically designed for preventing catastrophic flooding in urban areas and designate floodplains or flood corridors;

- **Invest in natural or “green/blue” infrastructure:** Establish large areas with sufficient tree cover and permeable surfaces that can absorb some rainwater (flood plains, mangrove areas, wetlands, etc.);
- **Build appropriate and flood-proof “grey” infrastructure:** Create robust drainage systems, levees and floodwalls, catchment reservoir systems,²⁰ dams, etc.;
- **Build “green stormwater infrastructure (GSI)”:** Ensure infrastructure is designed to absorb water where it falls (Sponge Cities) or direct water in a controlled manner to treatment plants; and
- **Implement “low impact development (LID)” solutions:** Use site planning and small engineered stormwater controls spatially distributed throughout a development site to capture runoff as close as possible to where it is generated.

Specific Infrastructure-Related FRM Projects for LGs Exposed to Coastal or River Flooding

Cities to coastal or river flooding may require specific infrastructure to prevent such incidents. Examples of specific flood prevention projects for urban areas exposed to these flood hazards include the following:²¹

- **Flooding, pumping, piping, and storage infrastructure:** For cities exposed to river flooding, pumping, piping and storage infrastructure, along with improved drainage systems are key adaptation technologies, protecting buildings from flooding during heavy rain events and local floods. These systems are especially important for cities located near river deltas that might need to manage water even outside of storm surge or flood events.

19 For a discussion of catchment-scale rainwater harvesting in Kampala, see S. N. Mugume et al., “Multifunctional Urban Flood Resilience Enhancement Strategies.” Proceedings of the Institution of Civil Engineers Water Management, 2017, pages 115–127. See: <https://doi.org/10.1680/jwama.15.00078>

20 R. B. Ouikatan et al., “Gaps and Challenges in Flood Risk Management in West African Coastal Cities,” Paper presented at XVI World Water Congress, Cancun, Quintana Roo, Mexico, 19 May – 3 June 2017.

21 “Climate Change Adaptation in Delta Cities,” C40 Cities. See: http://c40-production-images.s3.amazonaws.com/good_practice_briefings/images/5_C40_GPG_CDC.original.pdf?1456788885

● **Sea walls and water barriers:** For cities exposed to coastal flooding, natural water barriers (e.g., coastal dunes, natural dykes, etc.) can be complemented by artificial permanent flood walls (e.g., dykes, levees, super levees, etc.) and temporary storm surge barriers to prevent coastal or river flooding. The construction of permanent flood walls needs to take into consideration not only historical and current flood trends, but also future sea-level rise and higher frequency of extreme weather events related to climate change. Additionally, socioeconomic consequences (e.g., impact on fishing communities, direct access to water, etc.) should also be taken into account when considering the construction of barriers.

● **Other climate stressors such as droughts, can also weaken dyke structures:** Additionally, flexible storm surge barriers require comprehensive cost-benefit analysis as well as desired protection level and efficacy studies. It should also include the assessments of socio-economic impacts (e.g. on fishing communities, port closures on the economy, etc.).

● **Green-blue infrastructure:** Green-blue infrastructure uses natural features such as vegetation, soils, and natural ecosystem processes to manage floods and provide other environmental and community benefits. Such infrastructure helps reduce coastal and riverbank risk by strengthening protective barriers (e.g., sand dunes, beaches, bank protection, etc.), storing water in lakes and water basins, and providing a buffer between the sea and urban settlements using mangroves and wetlands. It can also help slow or store storm water runoff, replenish groundwater tables (i.e., permeable green areas) and reduce the heat-island effect using parks and other green public areas. Green infrastructure, using plants and vegetation, not only has direct adaptation and greenhouse gas absorption benefits but also provides numerous co-benefits (e.g., recreational) for the LG's Sustainable Development Goals.

● **Flood proofing:** The primary objective of flood-proofing is to reduce or avoid the impacts of flooding upon structures and people. There are two main types of flood-proofing measures: (1) wet or flood resilient measures (allow floodwater to pass quickly through the structure to minimize structural damage, use flood-damage resistant materials and elevate important buildings); and (2) dry or flood-resistant measures (make the building watertight to floodwater up to the expected height). In addition to property-level flood proofing, city-scale measures may include installation of improved drainage, bioswales along the roads, green roofs, and insulation of key service systems, such as underground and other transport infrastructure. These measures are particularly important for areas of delta cities that are situated outside of dykes or other water barriers and might be flooded during storm-water surge or due to rising sea levels. In the latter case, more structural adaptation measures are needed, including building elevation efforts. Although flood proofing concerns mainly individual properties and is an area where LGs might have less direct control, it has high potential to reduce damages and costs, and can be addressed through strengthened building standards, raising awareness among homeowners, and other educational activities.

4.2 Identify Financing Models

FRM Projects can be financed by local, national, and international sources, both public and private. Emergency funding may also be available from international sources through humanitarian and development organizations.

Given the imperative of reducing risk to people and assets, FRM Projects can also be financed through the development of FRM-related tax and fees paid by residents and private sector companies.

According to a study financed by the Lloyd's Tercentenary Research Foundation, identifying the best financial model to reduce disaster and flood risk depends on four key factors:

- 1 Local natural conditions (e.g., geography, ecosystems, etc.);
- 2 Local governance, including the socioeconomic status of the affected communities;
- 3 The condition of national financial systems, including the robustness of public and private property insurance markets; and
- 4 The public policies of the affected local and national governments.²²

Accordingly the financing sources for FRM cut across the public and private sectors and geographies, drawing on funds from:

- Budget sources from governments (local and national);
- Grants from international organizations; and
- Revenue generation using a combination of new sources, budgeted funds, and/or grants.

Domestic Budget Sources

The allocation of domestic public funding for FRM at national and local levels is usually done as part of DRR budgets, through specific allocations and special funds in LGs and national line ministries. As an integral part

of development planning and management, functions are spread across DRR budgets, as illustrated in Figure 9.3 on the next page.

International Grant Funding

Other sources of funding for DRR and FRM are available through international development institutions, climate finance organizations, and humanitarian initiatives. Most international climate finance is channeled through national governments but depends on LGs for implementation at the local level.

FRM finance can be leveraged through National Adaptation Plans (NAPs) and National Adaptation Plans of Action (NAPAs).

22 C. S. Colgan, et al., "Financing Natural Infrastructure for Coastal Flood Damage," Lloyd's Tercentenary Research Foundation, London, 2017. See: https://www.researchgate.net/publication/318910538_FINANCING_NATURAL_INFRASTRUCTURE_FOR_COASTAL_FLOOD_DAMAGE_REDUCTION

Figure 9.3: DRR actions part of public finance budgets

DRR as part of a disaster risk management budget	DRR as budget line or special fund	DRR integrated into development planning and management
Early warning systems	National disaster management agency	Land use planning and management
Climate and risk monitoring	Early warning systems	Transport infrastructure
Evacuation facilities	Climate and risk monitoring	Water resource planning and infrastructure
National disaster management agency	National risk reduction frameworks and plans	Retrofitting schools and hospitals
National risk reduction frameworks and plans	Probabilistic risk assessments	Risk-targeted social protection
Risk and vulnerability assessments	Targeted risk reduction infrastructure, e.g. dykes, tsunami defenses	Targeted risk reduction infrastructure, e.g. dykes, tsunami defenses
Disaster response		Environmental protection
Stockpiling		Biodiversity
Catastrophic risk insurance		
Micro-insurance		

■ Risk reduction activities
 ■ Risk-related activities, but not specifically targeted to reduction

Source: Jan Kellet et al., "Financing disaster risk reduction: Towards a coherent and comprehensive approach," Overseas Development Institute and UNDP, 2014.

Five examples of international sources of finance for FRM are listed in Table 9.2 on the next page.

Table 9.2: Examples of International Sources of Climate Finance and Support

	Pilot Program for Climate Resilience/ World Bank Climate Investment Funds	United Nations Adaptation Fund (UNAF)	Global Environment Facility (GEF)	Green Climate Fund (GCF) ²³	European Investment Bank (EIB)
Financing mechanisms and technical support	- Grants - Equity - Loans - Guarantees - Technical Advisory Services - Blended finance with multilateral development banks and regional development banks	- Grants - Readiness Support - Technical Assistance grants for Environmental and Social Policy, Gender Policy, and for South-South Cooperation	- Blended Finance (guarantees, debt, equity) - Grants - Capacity development - Small grants - Knowledge and learning services - Partnership building - Technical Advisory Services	- Grants - Loans - Equity - Guarantees - Project preparation support - Knowledge Sharing	- Loans - Blended Finance - Advisory Services
Focus areas	- Capacity Building - Institutional strengthening and governance reform - Clean technologies - Climate resilience - Enabling environment - Energy access - Energy Efficiency - Evaluation & learning - Financing - Gender - Infrastructure - Monitoring & reporting - Private Sector Engagement - Sustainable Forests	- Agriculture - Coastal Zone Management - Disaster Risk Reduction - Food Security - Forests - Multisector Projects - Rural Development - Urban Development - Water Management	- Biodiversity - Chemicals and Waste - Climate Change: adaptation, mitigation - Forests - International Waters - Land Degradation - Gender - Indigenous Peoples	- Resilience and advanced livelihoods of vulnerable people, communities, and regions - Resilience, health and well-being, water and food security - Resilience of infrastructure and environment - Resilience of ecosystems	- Agriculture, food, and rural development - Energy - Forestry - Transport - Water and wastewater management - Greening of urban areas - Regional development

The above sources of finance can be complemented with other sources of finance from international organizations and new revenue sources from LG own source revenues and alternative business models, as summarized below.

23 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in the [Annex](#).

The African Development Bank (AfDB) is an implementing entity for all the above programmes, therefore serving as a critical counterparty for African governments in accessing funding for FRM. In addition, in 2019 the AfDB started to offer limited support directly to municipalities through technical assistance grants for capacity development activities, governance, and regulatory reviews.²⁴

As every international **climate finance** organization has its own application requirements, specific guidance on how to apply can be obtained by contacting the organization's country office or national designated intermediary. Most international climate finance organizations will require approval of each funding

application by the designated intermediary in the host national government.

Own Source Revenues

LGs can also fund FRM Projects through their own revenues. Given the limited budgets of most LGs, one option is for LGs to create new sources of FRM funding through increasing own source revenues.

For example, LGs worldwide are developing new revenue streams to finance FRM and other development priorities through the implementation of new fees and land sales using the following two instruments:

- **Stormwater Utility Fees:** A stormwater utility fee is similar to a water or sewer utility fee. In essence, customers pay a fee to convey stormwater from their properties. Stormwater system user fees or tariffs are typically collected based on the amount of impervious surface for individual residential parcels or an Equivalent Residential Unit (ERU) system.²⁵ Users within the district pay a stormwater fee and the revenue generated directly supports maintenance and upgrade of existing storm drain systems, development of drainage plans, flood control measures, water-quality programs, administrative costs and sometimes construction of major capital improvements. Unlike water and wastewater fees, a stormwater fee can be reduced by stormwater credits. Property owners who install best management practices, such as rain gardens, rain barrels, detention ponds, bioswales, green roofs, constructed wetlands, and other options, may qualify for long-term or permanent reductions in their stormwater fees. Calculation of the stormwater rates vary widely according to infrastructure needs and maintenance requirements. Countries that have established stormwater fees are Australia, Brazil, Canada, Ecuador, France, Germany, Poland, South Africa, and the United States.²⁶ Developing a system for collecting stormwater fees may be a viable option for many LGs in SSA if certain conditions are met.

24 "Multinational – Africa Forestry Fund II – Project Summary Note," African Development Bank, 19 September 2019. See: <https://www.afdb.org/en/documents/multinational-africa-forestry-fund-ii-project-summary-note>

25 F. A. Tasca et al, "International experiences in stormwater fees," Water Science and Technology, 2018, pages 287–299. See: <https://doi.org/10.2166/wst.2018.112>
For an explanation of how stormwater utility fees might be implemented, see a description from a city in the United States: <http://www.cityofgoodlettsville.org/DocumentCenter/View/837/Stormwater-Utility-Fee-FAQs?bidId=>

26 Ibid.

● **Land Value Capture:** Because flood prevention benefits private landowners, several cities have successfully utilized land value capture (LVC) as a means of self-financing flood control projects. LVC offers a range of tools that LGs can use to capture a share of the property value gains that are attributable to municipal improvements. These include assigning development charges, sale of development rights, land pooling, betterment of levies, and tax increment financing. Therefore the use of LVC to self-fund drainage and flood prevention infrastructure projects may be useful for LGs that can access this type of upfront investment, and can levy charges to recoup the investment from parties benefitting from the infrastructure upgrade.²⁷

While these two mechanisms are not currently widely applied across SSA and would require significant capacity investments, these financing sources could be used to generate new revenue sources over time. Other potential fees include additional charges for drainage system maintenance.²⁸

Other Business Models

Business models exist worldwide that may be leveraged to mobilize private capital to finance specific FRM Projects, partially reducing the costs of preventing and managing floods. The models below have been used in the UK and are cited here as possible models to be adapted and replicated by LGs in SSA and scaled up as appropriate.

Model 1:

Blended finance with mandatory payments

In this model, mandatory payments, such as community infrastructure levies (CILs) from property developers can help finance FRM Projects, supplementing budget transfers from the national governments and/or donor grants (see Figure 9.4).

Other payments may also be required from water utility companies, property owners, and other third-party actors, such as environmental bodies.

LGs are responsible for preparing local FRM strategies, maintaining an up-to-date flood risk asset registry, managing flood risks from surface water and drains, and ensuring that new developments are safe, flood resilient, and do not increase flood risk, through appropriate water and solid waste management. LGs coordinate with all parties and use their regulatory authority to charge fees. The end result is an “asset” that benefits the local community (i.e., a flood-proofed commercial, residential, and/or industrial area). In this model, CILs and other charges are collected for the project, which can be a residential building, a commercial area like a shopping centre, a private hospital, or any other privately-owned development where the delivery agent is a private company.

27 World Bank's City Resilience Program power point “Land Value Capture.” See: <https://www.gfdrr.org/sites/default/files/publication/Land%20Value%20Capture.pdf>

28 For example, the city of Dallas has a residential flat monthly rate of US\$3.75 per household. For commercial properties, a monthly rate of US\$0.105 per 100 square feet of impervious area is used to calculate charges, with a minimum charge of US\$3.75. The commercial rate is based on the amount of storm water a commercial property would contribute to the system relative to the average residential property. See: <https://www.cor.net/departments/water-customer-service/fees-and-rates/drainage-fee>

Figure 9.4: Blended Finance Model for Flood Risk Management



Model 2:

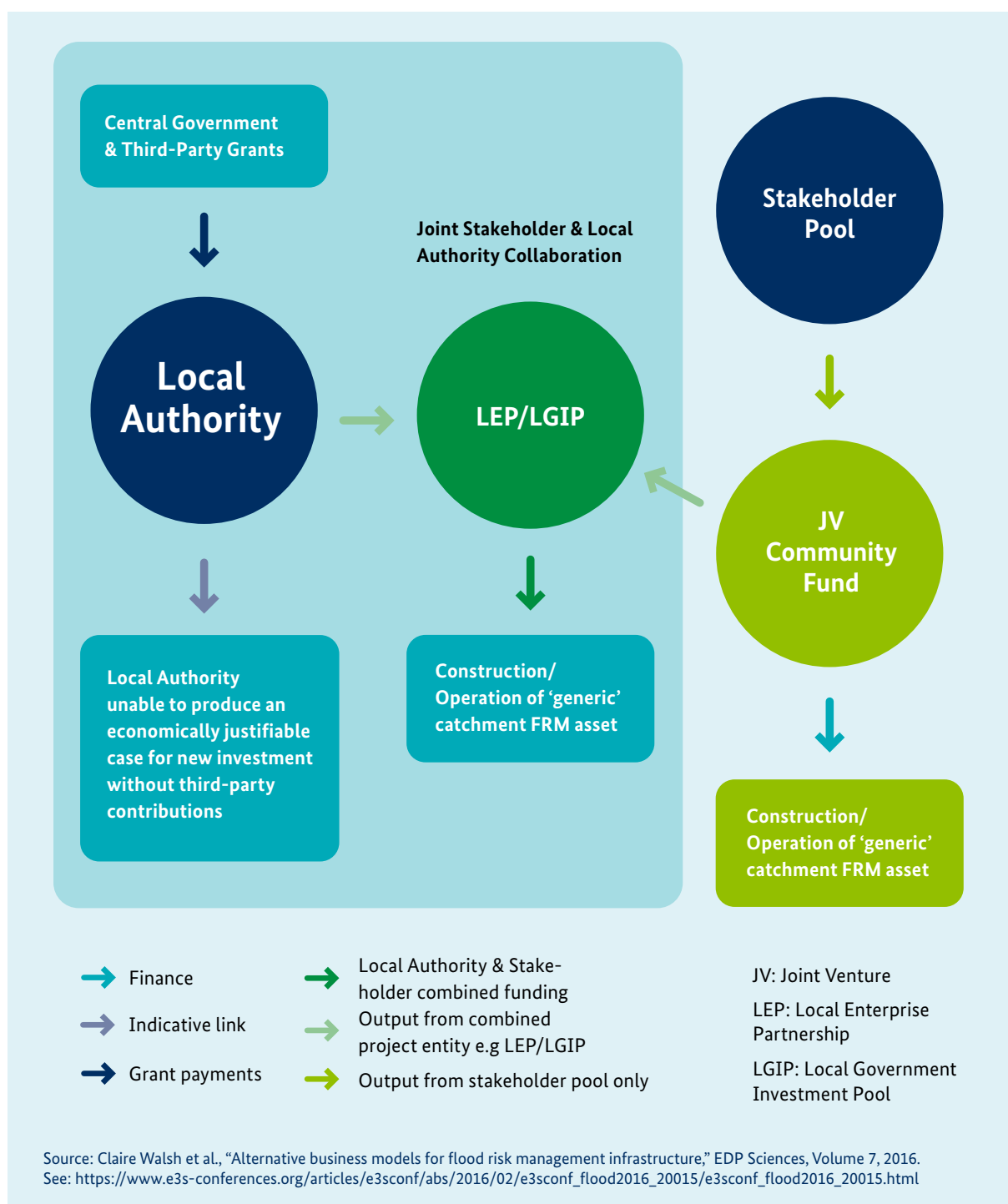
Blended finance with stakeholder delivery

In a blended finance with a stakeholder delivery model, an LG facilitates a partnership among stakeholders in a specific area to allow them greater control of flood risk management in their community. There are no mandatory fees or taxes, as flood management is considered a voluntary shared responsibility and investment.

In this model, the LG may form a Local Enterprise Partnership (LEP) with stakeholders, such as local

businesses, property owners, developers, sewerage undertakers, and other catchment users. The LEP would then have the authority to enter into business relationships to enable FRM Projects. For example, a catchment for common use could become an asset for the whole community, and then drain maintenance can be subcontracted by the LEP for the area in question. The model is presented in Figure 9.5 below.

Figure 9.5: Local Enterprise Partnership Model – Blended Insurance with Stakeholder Delivery



Model 2 differs from Model 1 in that stakeholders can play a role in decision making, rather than being subjected to taxes or payments without consultation. Furthermore, by pooling local resources, FRM Projects that may not be able to rely on significant national

government funding may become viable if stakeholders join forces and invest jointly. The end result is FRM Projects that have robust buy-in and financial support from all stakeholders.

Model 3:

Full cost recovery

This model requires the support of well-endowed LGs with sufficient levels of income and citizens that have the ability and willingness to provide funding. FRM Projects are financed through increased user fees, taxes, and insurance premiums.

In this model, the LG sets up a finance aggregator that is responsible for FRM. The finance aggregator collects funds from insurance companies, utilities, and property owners, as well as local disaster management bodies and possibly the national government. Insurance companies can be incentivized to participate in order to avoid paying high amounts of compensation after floods.

The African insurance market could now be approached to pilot this approach. While the current insurance industry in Africa represents less than 1% of insured catastrophe losses worldwide, the total value of African insurance premiums in 2017 was almost US\$ 45 billion. Moreover, some countries such as South Africa have significant amounts of property and casualty insurance, with gross premiums written in 2018 amounting to EUR 9 billion.²⁹ Property and casualty insurances are expected to grow by a compound annual growth rate (CAGR) of 4.3% between 2017 and 2025, much higher than projections in more mature markets.³⁰

Property owners would not contribute to the costs directly through local taxes or voluntary contributions, but instead through increased water bills, local taxes, and insurance premiums. This business model would allow the LGs, water companies, and insurance companies to raise 100% of the necessary funds to invest in the necessary infrastructure, enabling full cost recovery as depicted in Figure 9.6 on the next page.

This approach differs from the first two models in that water companies are not subject to levies or taxes, do not have to consult users about intended improvements, and may be able to increase user fees to finance FRM.

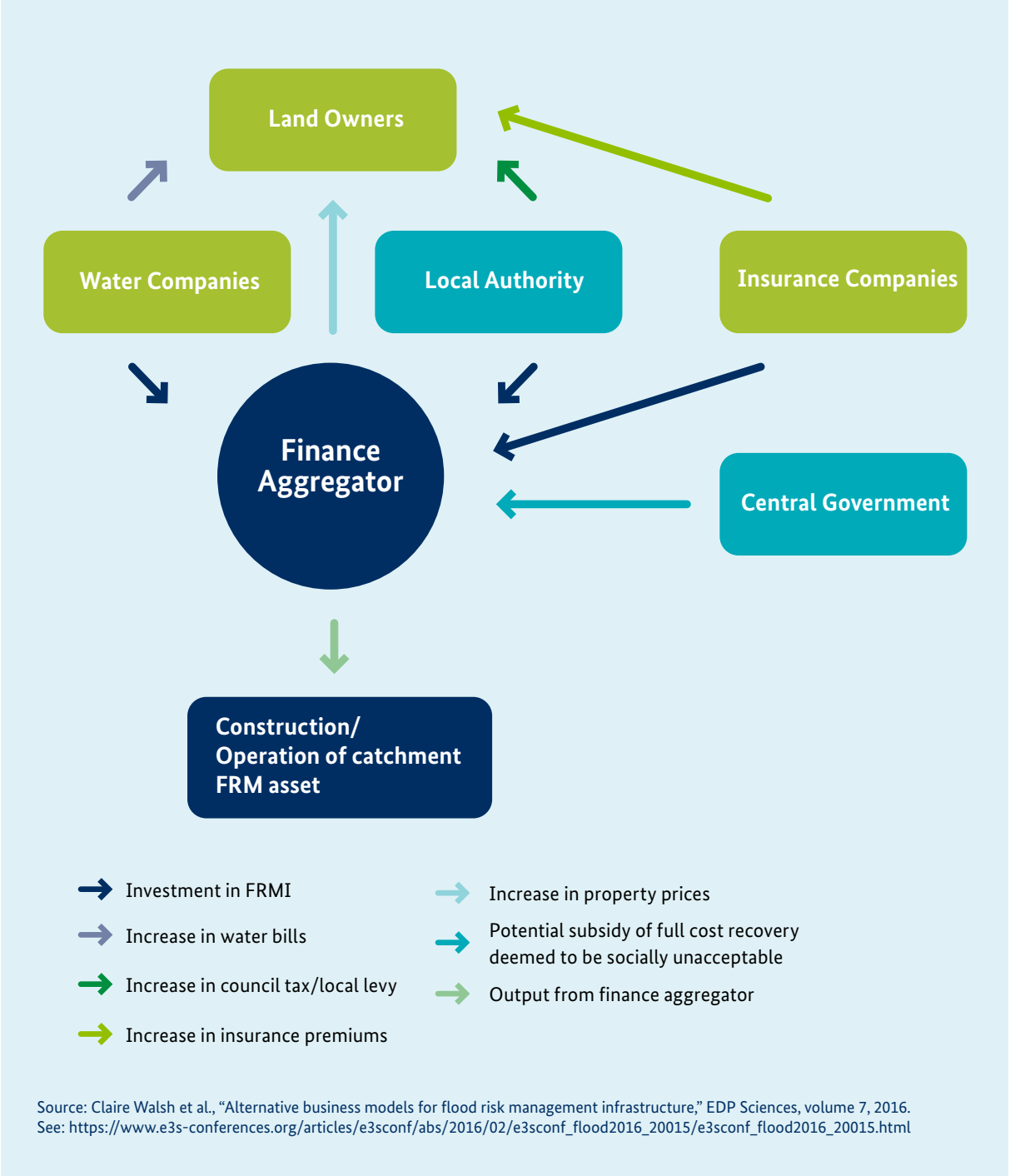
The premise in this model is that over the long term, all parties – LGs, insurance companies, water utilities, and citizens – will benefit from the improved infrastructure as there will be less disruptions to services and reduced economic losses. Therefore, each stakeholder will be incentivized to provide financing.

However, if full cost recovery is not possible, a scheme to provide subsidies from the national government can also be set in place for those unable to pay increased water bills, taxes, or insurance premiums, enabling the scaling of this model to cities with fewer resources and lower capacity to pass on costs to local citizens.

29 Jennifer Rudden, "Insurance industry in Africa: Statistics & Facts," Statista, August 23, 2019. See: www.statista.org

30 "Ready and Willing: African insurance industry poised for growth," PWC, 2018.

Figure 9.6: Flood Risk Management Model – Full Cost Recovery



4.3 Evaluate Advantages and Disadvantages of Different Finance Models

The advantages and disadvantages of different finance models are summarized against key implementation criteria in Table 9.3 below, with advantages in green and disadvantages highlighted in red.

Table 9.3: Advantages and Disadvantages of Different Finance Models

Criteria	Own Source Revenue	International Sources of Finance	Blended Finance through Mandatory Payments	Blended Finance with Stakeholder Delivery	Full Cost Recovery
Direct access to finance sources	LGs can often implement new initiatives related to land, local property taxes, fees, etc.	LGs usually need to have support of national governments.	It may be done locally but requires a high level of effort in coordination and negotiations with various stakeholders.		
Income level	Local residents and businesses may have low ability/willingness to pay new charges, and these costs may reduce incentives for building.	Low Income Countries have priority for grants for both mitigation and adaptation. Blended finance and loans are also available.	Requires availability of investment capital from property owners, developers, and utilities.	Requires availability of capital by investors including insurance companies and subsidies for those who cannot afford charges.	
Pooling	While property taxes and fees are applied on an individual basis, there are economies of scale through standardised processes.	All models enable and benefit from pooling. In the case of international finance, pooling can be an advantage as a cluster of urban and rural local governments can put together a joint proposal to central government as investment amounts and grants may be too high for a single city to be able to disburse. The main disadvantage is high transaction costs. Contract models vary from case to case depending on donor and utility requirements.			Requires the involvement of a neutral 'finance aggregator' who has the confidence of all parties such as a bank or an international organization.
Capacity	LGs need to engage the national government and experts to assess LG roles under national regulations, establish new systems, and implement.	Public sector may not have the necessary skill to access finance and may require third party to develop proposals and manage applications.	Private sector has the necessary skills and experience to manage and operate green and grey infrastructure, water and sanitation and risk but if part of the funds comes from international climate finance, third party expertise may be required to meet implementation and reporting requirements		
Costs and time to implement	New initiatives require considerable political support, funding, and expertise to implement.	Application processes are lengthy and require many iterations with the respective institutions.	Public Private Partnerships require technical, financial, and legal expertise to develop. Unless there is a large project or programme that pools several projects, development costs may be prohibitive.		

Note: Red coloured boxes signify disadvantages; green coloured boxes signify advantages. Grey is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.



A catastrophic debris flow destroyed a road in Tanzania

Despite the selected finance model, it is critical that LGs engage proven private sector professionals early on to structure a cost-effective project development process and design.

Costs could be minimized by packaging projects of several LGs and procuring them on a pooled basis. An

expert pool can be used to develop standardized contracts and procurement processes, reducing development costs at the LG level. Pooled finance applications to the GCF can also unlock more affordable funding, again using the required expert support to coordinate and meet GCF requirements.

4.4 Establish Contacts with the Private Sector

The existing amounts of finance for FRM Projects from public budgets are often insufficient to cover LG needs, especially due to increasing occurrences and intensity of extreme weather events. However, as illustrated in

the prior financing section, innovative finance models engaging developers, insurance companies, and other entities can unlock new opportunities to reduce flood risk.

To define possible sources of finance, LGs will need to implement the following four preliminary assessments:

- 1 What are the current and potential opportunities for FRM options and priority areas based on consultations with developers, property owners, utilities, and resident associations?
- 2 What are current and potential sources of finance from government entities (national and LG), international organizations, residents, and the private sector, based on new business models and local taxes/fees and the ability/willingness to pay?
- 3 How best to obtain the required project management capabilities to develop programmes and manage contracts efficiently (including any with the private sector)?
- 4 What are ways to scale efforts and effectiveness through possible support of the national government and international climate programmes (for example, grants, subsidies)?

These assessments will need to be incorporated into the LG action steps listed in the next section.

5 Action Steps for Local Governments

There are a number of step-by-step resources and international best practice methodologies for FRM in line with the Sendai Framework. As noted earlier, the choice of risk mitigation or climate change adaptation strategy will depend on the physical and demographic characteristics of the location, its exposure to risk, the

vulnerability of the population, the local government adaptive capacity, and cost-benefit considerations. Likewise, the action steps undertaken by LGs will also depend on the adaptation strategy and possible source(s) of finance but will generally consist of the action steps outlined in Table 9.4 below.

Table 9.4: Roadmap of Proactive LG Action Steps for Implementing Flood Risk Management Projects

Action Steps	Tasks	Outputs
1. Engage experts to assess FRM risks, costs, pre-emptive actions, and resulting savings	- Identify sources of risk and solutions based on current and future flooding risks - Assess costs and benefits of each technical solution - Rank options based on affordability and net benefits - Estimate scenarios of possible future damage resulting from flooding (breaking out lives, health, economic, taxes, development, etc.) - Estimate savings from FRM Projects documenting rationales for pre-emptive FRM actions	- FRM options and possible funding sources - Calculation of funding gaps - Damage forecast estimate of not investing in flood risk reduction based on historical data - Savings estimate from FRM Projects
2. Map stakeholders and budget available	- Estimate the costs of past flooding and impact on community - Map all national and local entities with a role in disaster risk reduction/ flood risk management and their budgets - Assess how much funding is currently available and possible new sources (domestic and international, public, private, including new sources of own source revenues) - Assess whether existing FRM fees are cost reflective and if not, potential to raise them	- Historical costs from flooding (breaking out impact in terms of human lives, health, economic growth, taxes, development, etc.) - Total existing funds available for FRM Projects - Mapping of funding sources (e.g., local, national, international, FRM fees, other own source revenues, etc.)
3. Engage funders and assess relevant regulations	- Develop a concept note with support of experts as needed - If using a blended finance model, organize meetings with relevant stakeholders to discuss roles, financing sources, and applicable contracts Explore international sources of finance and national government support if needed	- Project concept note - Memorandum of understanding or contracts drawn up with relevant stakeholders - Funding applications
4. Assess applicable regulations	Assess any regulatory constraints and explore strategies to address them, adapting project design as needed	Assessment of regulatory and compliance related issues governing public-private partnerships

Table 9.4: Roadmap of Proactive LG Action Steps for Implementing Flood Risk Management Projects

continued

Action Steps	Tasks	Outputs
5. Secure financial and human resources	• Develop project proposals • Evaluate and award tenders as needed • Hire required personnel	• Project proposal • Project contractors selected • Signed contracts with project staff
6. Monitor & Evaluate (M&E)	• Monitor performance of projects against M&E criteria set in project documents and provide reports as needed	• M&E Reports

The above actions will require the engagement of professional experienced experts, such as project developers, transaction advisors, and consultants for the technical studies.

6 Examples of Flood Risk Management Projects from Sub-Saharan Africa and Worldwide

As noted earlier, LG actions that address flood risk management are wide-ranging: a) land-use planning, to reduce or eliminate building in flood-prone areas; b) green/blue infrastructure such as expanded green space zones that provide important permeable surfaces that can absorb rainwater; and c) built infrastructure that can include drainage system and stormwater management projects. All these FRM Projects are important; no single action set is sufficient.

One example of actions that have already been taken across Africa to reduce the clogging of drains is the banning of single-use plastics, as implemented by governments in Botswana, Burundi, Eritrea, Kenya, Mauritania, Morocco, Rwanda, Tanzania, South Sudan, and Uganda. Plastic-clogged drains can form stagnant pools that provide a breeding ground for disease-carrying mosquitoes and cause loss of life in cases of severe rain. For example, in 2015 blocked drains in Ghana triggered flash floods that killed over 200 people.³¹

³¹ Experience applying plastic bans has been mixed. They have proven difficult to enforce in practice and a black market for plastics has developed in several countries. See: <https://www.safaribookings.com/blog/ban-on-plastics-africa-story-smuggling-success>

Examples of FRM Projects led by SSA national governments that have received international financing in the form of grants, debt, or equity include the following:

- 1 The Senegal Integrated Flood Management Project** includes a blend of public sector equity, loan, and grant resources. The governance component is supported by a US\$17 million grant from the Green Climate Fund; the balance consists of a US\$56 million loan from the Agence Française de Développement (AFD), and a US\$6.8 million equity contribution from the national government. No information is yet available on project implementation, as the project is now in progress with an estimated completion date of October 2023.³²
- 2 The World Bank's Cameroon Inclusive and Resilient Cities Development Project** is funded through a US\$160 million loan to help improve urban management and access to infrastructure and basic services for poor neighbourhoods and increase resilience to natural hazards and other eligible crises in seven cities. Expanding the urban area protected from floods is one of the key elements of this project.³³
- 3 The World Bank's Western Africa Coastal Areas Management Programme (WACA)** involves partnering between six countries and four regional institutions to strengthen the resilience of targeted areas and communities in coastal western Africa. The financial package includes a credit of US\$120 million and a grant of US\$70 million from the International Development Association (IDA) and a grant of US\$20.3 million from the Global Environment Facility (GEF). The Nordic Development Fund has committed an additional EUR13.1 million to improve climate resilience in the coastal regions, and the French Facility for the Global Environment will fund light infrastructure, land-use planning, and nature-based solutions against coastal erosion with a grant of EUR1.3 million.³⁴

An example of an undertaking by an African country with its own resources is *Zambia's National Disaster Management and Mitigation Unit*. Zambia's project is primarily concerned with reducing the damage resulting from flooding by disseminating accurate and timely information and instructions to citizens. A national early warning system, supported by an integrated information system, was set up including elements of monitoring, prediction, interpretation, message construction, communication, and protective behaviour. Zambia's LGs use this information as part of their FRM Projects, receiving advance information on areas and services at risk of flooding so that they can more appropriately plan effective land use. Lessons learned include the need to have a balance between structural

and non-structural measures aimed at "*living with floods*." The provision of information varies from situation to situation, using various communication venues such as facsimiles, phone calls, SMSs, e-mails, radio, television, radio, internet, and word of mouth. The delivery mechanism depends on the characteristics and location of the community at risk, the amount of lead warning time, and the capabilities and limitations of the early warning system. Consultation and communication are therefore the key elements in determining the optimum delivery mechanism in each case. This process involves discussions and input from all of the designated authorities and stakeholders, especially the community at risk.³⁵

32 See website of the Green Climate Fund: <https://www.greenclimate.fund/projects/fp021>

33 "Cameroon: Inclusive and Resilient Cities Development Project," World Bank. See: <http://projects.worldbank.org/P156210/?lang=en&tab=overview>

34 "West Africa Coastal Areas Management Program," World Bank. See: <https://www.wacaprogram.org/about-us> and <https://www.worldbank.org/en/news/press-release/2018/04/09/world-bank-board-approves-west-africa-coastal-areas-waca-resilience-investment-project>

35 Sourced from https://sustainabledevelopment.un.org/content/documents/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/zambia/Drought.pdf

Other FRM Projects are illustrated by LGs outside Africa. For example, *Ho Chi Minh City* in Vietnam has adopted a range of different actions. Located in the delta area of the Saigon and Dong Nai Rivers, the city's main challenge is urban flooding due to heavy rainfall and insufficient drainage capacity. This inherent problem has been exacerbated by fast urban development on low-lying marshland, the higher frequency of heavy rainfall events (attributed to the urban heat island effect), and sea-level rise. HCMC also suffers from salinization of the ground and groundwater. To address these multiple climate change-related impacts, Ho Chi Minh City adopted its comprehensive Climate Adaptation Strategy in April 2013, the "*Moving Towards the Sea with Climate Change Adaptation*" project with assistance from Rotterdam. Based on the Triple-A Strategic Planning method (Assessment Atlas – Adaptation Strategy – Action Plan), the integrated strategy consists of six types of actions: create smart urban density with connected living and working areas; develop step-by-step multi-scale flood protection measures; avoid local rainwater flooding by improving drainage and storage systems; reduce salinization problems by relocating drinking water intakes upstream; reduce land subsidence by restricting groundwater abstraction and improving surface water quality; and reduce urban heat stress through developing the urban green-blue network.³⁶

In some areas, urban residents practice rain water harvesting; it may be possible to scale up this practice to reduce pressure on LG drainage systems and also tackle water shortage in the dry months and season.³⁷ It is equally important to recognize the importance of LG enforcement to ensure that there is no illegal or informal encroachment on high flood risk zones or green spaces associated with flood loss avoidance. The case

of Accra cited earlier underscores the importance of maintaining urban drainage infrastructure to protect cities from damage caused by construction and illegal waste dumping that can create obstructions.³⁸

At the international level, there are examples of cities that have financed drainage and other flood loss avoidance projects leveraging their own source revenues. As noted earlier, these own source revenues include stormwater utility fees and land value capture, as explained with examples below.

➔ **Stormwater Utility Fees:** For many years cities in the United States experienced occasional severe storms and intense rains that overran their sanitary sewer systems and damaged those facilities. Recognizing the importance of avoiding this cost through improved storm drainage infrastructures, roughly 30 years ago some LGs began establishing stormwater utilities as a means of generating own-source revenue streams for financing the construction of appropriate drainage and reservoir systems to manage excessive rain. Previously stormwater management was tacitly provided by wastewater utilities which charged rates based on household water consumption. In contrast, stormwater system user fees or tariffs are typically collected based the amount of impervious surface for individual residential parcels or an Equivalent Residential Unit (ERU) system. Calculation of the stormwater rates vary widely according to infrastructure needs and maintenance requirements. Many of the cities with stormwater utilities have been able to issue stormwater system revenue bonds.³⁹ The United States has over 1,500 stormwater utilities and is the most advanced in designing and maintaining this user fee structure.⁴⁰ Other countries that have established

36 "Climate Change Adaptation in Delta Cities," Op. cit.

37 For a discussion of catchment-scale water harvest in Kampala reference S. N. Mugume et al., "Multifunctional Urban Flood Resilience Enhancement Strategies," Proceedings of the Institution of Civil Engineers Water Management, 2017, pages 115–127. See: <https://doi.org/10.1680/jwama.15.00078>

38 Félicien D. Badou et al., "Increasing Devastating Flood Events in West Africa: Who is to Blame?," National Water Institute, 2017. See: https://www.researchgate.net/publication/333081615_chapter_9_2017_op.cit.

39 The City of Columbia, South Carolina issued US\$37.9 million in stormwater revenue bonds in December 2018. The bonds were certified as green bonds by the Climate Bond Initiative and were rated Aa2 by Moody's Investors Service. See <https://www.bondbuyer.com/news/columbia-south-carolina-issues-first-green-bond>. Other cities issuing stormwater revenue bonds include Baltimore, Maryland and Miami, Florida.

40 Joseph W. Kane et al., "As flood risks intensify, stormwater utilities offer a more resilient solution," Brookings Institution, 2017. See: <https://www.brookings.edu/blog/the-avenue/2017/09/21/as-flood-risks-intensify-stormwater-utilities-offer-a-more-resilient-solution/>

stormwater fees are Australia, Brazil, Canada, Ecuador, France, Germany, Poland, and South Africa.⁴¹ While stormwater rates have helped some cities address infrastructure needs, stormwater management remains seriously underfunded in most cities throughout the world. Creating stormwater utility fees may be a viable option for many LGs in SSA over the longer term.

→ **Land Value Capture:** Because flood prevention benefits private landowners, several cities have successfully utilized land value capture (LVC) as a means of self-financing flood control projects. LVC offers a range of tools that LGs can use to capture a share of the property value gains that are attributable to municipal improvements. These include assigning development charges, sale of development rights, land pooling, betterment levies, and tax

increment financing. One example is the Indian city of Ahmedabad's Sabarmati Riverfront Upgrade. Ahmedabad invested US\$17 million in this project that environmental rehabilitation, slum resettlement, sewage upgrade, and 22 km. of enforced promenade. The project reduced the city's flood risk exposure and opened over 200 hectares of government-owned property for new private development. The city recovered 100% of its investment from the sale of only 15% of the improved land, with the remainder of sales being applied to its general fund.⁴² Therefore the use of LVC to self-fund drainage and flood prevention infrastructure projects may be useful for LGs that can access this type of upfront investment, and can levy charges to recoup the investment from parties benefitting from the infrastructure upgrade.⁴³

7 Enabling Factors

For LGs to effectively scale the implementation of flood risk management projects, Local Governments and their National Governments (NGs) need to have enabling factors that allow LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put in place by LGs to unlock finance for FRM Projects, as broken out in four finance models in Table 5 below. For example, LGs that can control local fees and taxes can raise funding for

FRM Projects. To illustrate, South Africa charges stormwater fees, as do other countries worldwide. Examples of LG enabling factors are provided in Table 9.5 below.

41 F. A. Tasca et al., "International experiences in stormwater fees," Op cit.

42 World Bank's City Resilience Program power point "Land Value Capture," Op.cit.

43 Ibid.

Table 9.5: Local Government Enabling Factors

Local Government Enabling Factors	Own Source Revenue	Blended Finance with Mandatory Payments	Blended Finance with Stakeholder Delivery	Full Cost Recovery
1. LG can reallocate existing budgets to pay for FRM	✓	✓	✓	N/A
2. LG has significant own sources of revenue	✓	✓	✓	N/A
3. LG can control local taxes and fees to increase own source revenues (e.g. drain maintenance fees, stormwater utility fees, land value capture, taxes incentivising flood risk management, etc.)	✓	✓	✓	N/A
4. LG can incur debt	✓	✓	✓	N/A
5. LG can access international grants	✓	✓	✓	N/A
6. LG can enter into long term contracts for FRM measures, including for land value capture	✓	✓	✓	✓
7. LG can charge cost reflective FRM fees	✓	✓	✓	✓
8. LG has capacity to develop projects (e.g., planning, budgeting, funding, contracting experts, etc.)	✓	✓	✓	✓
9. LG has capacity to carry out procurement	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for LGs to unlock finance for Flood Risk Management Projects. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

It is important to note that LGs can proactively take steps to define and facilitate the development and finance of FRM Projects:

➔ **Proactive development of FRM Projects:** LGs can proactively start to develop FRM Projects working with property developers, business associations,

utility companies, insurance companies, and other stakeholders. As mentioned above, accessing international climate finance options will require contacting a representative of the funding organization in question and may also require external experts to assist with applying for grants as well as the approval of the national government.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking FRM Projects can be proactive in taking steps to reduce impediments at local and national levels. Key actions include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programs and initiatives.

LGs can also be proactive in taking steps to reduce flood risks by launching public relations and awareness campaigns with local stakeholders to sensitize and educate the population on the harmful effects of littering and plastics clogging drains and their contribution to floods.

7.2 National Government Enabling Factors

The enabling factors that can be put into place by national governments (NGs) to promote FRM Projects are listed for four finance models in Table 9.6 below.

Table 9.6: National Government Enabling Factors

National Government Enabling Factors	Own Source Revenues	Blended Finance with Mandatory Payments	Blended Finance with Stakeholder Delivery	Full Cost Recovery
1. NG provides FRM grant funding through earmarked budgets with timely payments	✓	✓	✓	✓
2. NG has put into place supporting regulatory and legal frameworks, including ability of LGs to control local taxes and fees, sell land, etc.	✓	✓	✓	✓
3. NG develops FRM programme in line with NDC commitments (pooling similar LG projects)	✓	✓	✓	✓
4. NG establishes climate finance facility for FRM	✓	✓	✓	✓
5. NG supports climate finance applications	✓	✓	✓	✓
6. NG provides access to experts and monitoring and evaluation support	✓	✓	✓	✓
7. NG provides tax incentives for FRM	✓	✓	✓	✓
8. NG develops standardised contracts & user-friendly sustainable procurement policies related to FRM Projects	✓	✓	✓	✓

Note: All areas shaded in blue represent enabling factors for National Governments to unlock finance for Flood Risk Management. SLA = Service Level Agreement between LG and private sector provider for delivery of services.

All the above national enabling factors can facilitate the LG's ability to implement FRM Projects through own source revenues, blended finance, stakeholder delivery, and full cost recovery.

Therefore, FRM Projects can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 9.1 below.

Box 9.1: Examples of Enabling Factors for Flood Risk Management Projects

- **National government FRM programme for citizen protection and more effective land use:** Zambia's National Disaster Management and Mitigation Unit disseminates accurate and timely information and instructions to citizens. A national early warning system, supported by an integrated information system, was set up including elements of monitoring, prediction, interpretation, message construction, communication, and protective behaviour. Zambia's LGs use this information as part of their FRM programmes, receiving advance information on areas and services at risk of flooding so that they can more appropriately plan effective land use.
- **Ability to incur debt and equity for FRM:** The Senegal Integrated Flood Management Project includes a blend of public sector equity, loan, and grant resources. The governance component is supported by a US\$17 million grant from the Green Climate Fund; the balance comprises a US\$56 million loan from the Agence Française de Développement (AFD) and a US\$6.8 million equity contribution from the national government.
- **Ability to generate own source revenue through taxes, fees, and land improvement:** LGs worldwide have successfully utilized land value capture (LVC) as a means of self-financing flood control projects. LVC offers a range of tools that LGs can use to capture a share of the property value gains that are attributable to municipal improvements. These tools include assigning development charges, sale of development rights, land pooling, betterment levies, and tax increment financing. One example from India is Ahmedabad's Sabarmati Riverfront Upgrade: Ahmedabad invested US\$17 million in this project opening over 200 hectares of government-owned property for new private development. The city recovered 100% of its investment from the sale of only 15% of the improved land, with the remainder of sales being applied to its general fund.

Sources: The above examples are taken from section 6.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level requires the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to design and finance FRM Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance FRM Projects by working with national disaster risk reduction agencies and programs and those of development partners. Towards this end, a national ecosystem to support this Climate project can be mapped to identify constraints and opportunities.

Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), non-governmental organizations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the action steps set out in the prior section “*Table 9.4: Roadmap of Proactive LG Action Steps for Implementation of Flood Risk Management Projects.*” In addition, enabling information will need to be provided on the professional services required to develop and design an FRM Project using international climate finance. Information on international funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information. To begin this process, the Actions Steps in existing SSA and other FRM Projects could be identified and compiled into a list, with

information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of FRM Projects. LGs will need to have access to such advisors. National governments and development partners can provide critical support. To build out a further database of technical experts, the professionals involved in existing SSA FRM Projects could be identified and compiled into a list, with information on their services and contact information.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimize access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful FRM Projects can share their experiences with other SSA LGs.

5 Provide Online “Local Government Climate Project Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules of specific financing action steps and directories of enabling information on experts and financing sources as noted above.

The CoM SSA training materials provide support in project development and finance.



**Dune stabilization against flooding
Nouakchott, Mauritania**



Chapter 10:

Improved and Clean Cooking Stove Projects

1 Definition: What are Improved & Clean Cooking Stove Projects?

More than 70%¹ of people in Sub-Saharan Africa (SSA) cook using solid fuels – such as wood and charcoal – and kerosene in open fires and inefficient stoves. These cooking practices produce high levels of household air pollution and a range of health-damaging pollutants.

A wide range of Improved & Clean Cooking Stoves (I&CCS) have been developed internationally and

within SSA that offers enhanced fuel efficiency and emissions performance. Figure 10.1 below identifies various cooking stove technologies that are classified as either “clean” or “improved” and provides the technical definitions used to distinguish between clean and improved cooking stoves.

Figure 10.1: Overview of Improved and Clean Cooking Solutions

	“Improved” Stoves		“Clean” Stoves		
Definition	Includes all cookstoves that improved fuel efficiency without reducing particulate matter emissions to the low levels necessary for optimal health outcomes as defined by World Health Organisation (WHO) household air pollution guidelines ²		Includes low-particulate-emission technologies (ISO Tier 3–4 for emissions) ³		
Type	Legacy and Basic I&CCS	Intermediate I&CCS	Advanced I&CCS	Modern Fuel	Renewable Fuel
Key Features	Functional improvements in fuel efficiency over baseline technologies	Rocket-style designs with a focus on highly improved fuel efficiency	Fan or natural-draft gasifiers with high fuel and combustion efficiency; often designed for pellet/briquette fuels	Stoves that rely on fossil fuels or electricity; have high fuel efficiency and low emissions	Derive energy from renewable non-wood fuel energy; often used as supplementary stoves

Source: “Clean and Improved Cooking in Sub-Saharan Africa: A Landscape Report,” World Bank Group, 2014. See: <http://documents.worldbank.org/curated/en/164241468178757464/pdf/98664-REVISED-WP-P146621-PUBLIC-Box393185B.pdf>

1 “Rwanda – Improved Cook Stoves Project,” World Bank Group, 2017. See <http://documents.worldbank.org/curated/en/900301488876709987/Rwanda-Improved-Cook-Stoves-Project>

2 “Clean and Improved Cooking in Sub-Saharan Africa: A Landscape Report,” World Bank Group, 2014. See: <http://documents.worldbank.org/curated/en/164241468178757464/pdf/98664-REVISED-WP-P146621-PUBLIC-Box393185B.pdf>

3 Ibid. ISO Tier 3–4 refers to the International Organisation for Standards Performance levels 3–4. The ISO lab testing standard and voluntary performance targets were developed by an ISO technical committee comprised of experts nominated by 45 countries and 8 liaison organizations. They were approved and published in 2018. There are 5 indicators covered by the targets: thermal efficiency, fine particulate matter emissions, carbon monoxide emissions, safety, and durability. For each indicator, lab test results are rated along 6 tiers (0: lowest-performing to 5: highest-performing). Tier 0 represents performance typical of open fires and the simplest cookstoves. For more information, see the Clean Cooking Alliance: <https://www.cleancookingalliance.org/technology-and-fuels/standards/iwa-tiers-of-performance.html>

Figure 10.1: Overview of Improved and Clean Cooking Solutions

continued

Type	Legacy and Basic I&CCS	Intermediate I&CCS	Advanced I&CCS	Modern Fuel	Renewable Fuel
Technologies	- Legacy bio-mass and coal chimney stoves - Basic efficient charcoal - Basic efficient wood	- Portable rocket stoves - Fixed rocket chimney - Highly improved charcoal stoves	- Natural-draft gasifier: top-loading updraft (TLUD) or side-loading - Fan gasifier/fan jet - Combination TLUD and charcoal stoves	- LPG - Electric (including induction) - Natural gas stoves - Kerosene stoves	- Biogas - Ethanol - Solar - Retained heat cookers⁴
Level of Overall Benefits	Moderate		High		

Source: “Clean and Improved Cooking in Sub-Saharan Africa: A Landscape Report,” World Bank Group, 2014. See: <http://documents.worldbank.org/curated/en/164241468178757464/pdf/98664-REVISED-WP-P146621-PUBLIC-Box393185B.pdf>

It is worth noting that other factors not in the above table – such as fuel quality, user behaviour, kitchen design, and ventilation – are also key determinants of the level of fuel efficiency and emissions performance.

2 Benefits Associated with I&CCS Projects

I&CCS Projects can result in transformative benefits to Local Governments (LGs) and their citizens, ranging from improved living conditions to budget savings, new sources of revenues and economic growth, job creation, and other development impacts. In fact,

I&CCS Projects can provide opportunities for developing new economic sectors at the local level and LG fiscal income. The overall benefits of LGs proactively developing I&CCS Projects can be summarized from three perspectives:

- **Climate and Environmental Benefits:** Reduce black carbon and Greenhouse Gas (GHG) emissions;
- **Development Benefits:** Decrease disease associated with household air pollution, provide efficient and sustainable energy for cooking, unlock disposable income for households, minimise forest degradation and deforestation, stimulate manufacturing sector, and create local jobs;
- **Local Government Benefits:** Achieve a more productive workforce, reduce health-care costs, create opportunities for micro, small, and medium-sized enterprises (MSMEs), job creation, and increased LG tax revenues.

The summary of potential benefits for I&CCS Projects is detailed in Table 10.1 below.

Table 10.1: Details of Potential Benefits Resulting from I&CCS Projects

Climate and Environmental Benefits	Development Benefits	Economic Benefits for LGs
• Lower emissions • Solid-fuel cooking in SSA accounts for 6% of global black carbon emissions and 1.2% of carbon dioxide emissions⁵ • Biomass gasifier cook-stoves can reduce black carbon emissions by up to 95%⁶ • Clean cooking solutions reduce emissions of major climate forcing agents, including both GHG and short-lived climate pollutants • I&CCS products protect the inventory of existing trees, contributing directly to the well-being of the local community	• Improves the well-being of people in cooking area, especially women and children given greatly reduced exposure to smoke-related health hazards such as carbon monoxide and particulate matter (e.g., reduces the number of deaths, stunted growth, asthma, etc.) • Decreases healthcare costs of disease associated with household air pollution • Reduces the amount of fuel needed to cook, thus reducing the burden on families who would otherwise have to collect it, buy it, or trade their food for it • Reduces forest degradation and deforestation • Improves gender equality by reducing the time spent by women and girls who are principally responsible for collecting fuelwood and who are often most exposed to air pollution in the home • Creates economic growth, development of SMEs, and job opportunities by stimulating clean cooking sector • Contributes to gender equality, helping LGs to meet their developmental targets like women and children are likely to be the main beneficiaries of clean cooking stove interventions	• Savings in LG budget from reduced healthcare costs and improved environment (less forest degradation) • Improved local economy from the use of clean cooking stoves • Increased economic activity results in increased LG revenues from local taxes, land values, and job creation • Potential revenue from the sale of LG-owned faecal sludge

4 Retained cook heaters refer to products like wonder bags that constrain insulating materials and allows pots to keep on cooking once they achieve high temperature.

5 "Assessing the Climate and Health Co-Benefits of Clean Cooking Workshop Report," Global Alliance for Clean Cookstoves, 2015. See: <https://www.cleancookingalliance.org/binary-data/RESOURCE/file/000/000/481-1.pdf>

6 "Clean and Improved," World Bank, Op.cit.

As noted above, LGs could generate revenue from I&CCS Projects by selling LG-owned faecal sludge to producers of I&CCS fuel or by producing the I&CCS fuels itself. However, producing I&CCS fuels will require investment in equipment and production facilities.

Accordingly, the potential proactive roles for LGs could be on four fronts: (1) As an accreditor of local I&CCS

businesses to ensure that quality stoves are available for purchase and that the public is aware of their benefits; (2) By supporting programmes that seek to professionalize the I&CCS Sector; (3) By supplying feedstock to producers of I&CCS fuels under long term agreements; and (4) As producer of I&CCS fuels by converting LG-owned faecal sludge into briquettes.

3 Challenges Faced by Local Governments

The serious damage to the health of constituencies resulting from the use of inefficient cooking practices creates a political imperative for LGs to facilitate the adoption of I&CCS products in an urgent and comprehensive manner. Traditional cooking practices produce high levels of household air pollution and a range of health-damaging pollutants severe enough to result in the deaths of four million people annually worldwide.⁷

To grow a local market for I&CCS products, local manufacturers need to be supported financially and

technically to ensure that quality I&CCS products are available for purchase and consumers need to be made aware of the benefits of I&CCS products. Access to credit is a key constrain for local manufactures that wish to expand their operations; however, LGs lack the funds and mandate to provide financing or subsidies to I&CCS producers. Moreover, LG financing challenges are compounded by the systematic lack of technical capacity and inadequate access to financial and relevant climate action expertise.

4 Financing Roadmap for I&CCS Projects

LGs can undertake a proactive role in the development and facilitation of I&CCS Projects, or, ultimately, the development of a local market for I&CCS products. This section provides a financing roadmap including

early action steps of relevance for LGs to develop a realistic proactive approach to developing I&CCS Projects.

4.1 Assess Revenue Requirements and Opportunities

Rising fuel prices and the increased time spent collecting firewood due to deforestation are major demand drivers for investment in I&CCS products by households. However, willingness to adopt and pay for improved and clean stoves is a function of consumer exposure to these technologies and the ability of consumers to make upfront investments in new stoves. The upfront investment requirements of clean cooking stoves can be onerous as they require much longer payback periods than *improved* cooking stoves.

There is significant evidence that adoption is greatly increased if consumers can access credit for the full upfront cost and pay in small amounts over extended timeframes, enabling upfront costs to be spread over months. Studies undertaken in Uganda and Mozambique found that the adoption of I&CCS products increased by 40–50% when consumers were given access to credit and payment plans.⁸

On the supply side, I&CCS companies face significant impediments in growing their business due to logistical and transport challenges, coupled with the need to

extend credit to both consumers and retailers and conduct intensive consumer marketing campaigns to promote the adoption of new cooking stoves at higher costs.

The lack of access to working capital, generally a significant challenge for African Small and Medium-Sized Enterprises (SMEs), is compounded for I&CCS enterprises because they are often promoting new technologies in markets with uncertain or still-limited consumer demand. Moreover, financial institutions have limited understandings of their products and the underlying economics. Therefore, unlocking working capital for I&CCS producers of stoves and fuels is required for sector development and the provision of cooking stoves to the population at large.

Equally important is the need to professionalize the sector across the value chain (e.g., production, distribution, marketing, after-sales services, administration, etc.), enabling local producers to meet both consumer demands and lender requirements. In this scenario, LGs could play critical “enabling roles.”

4.2 Identify Financing Models

Different financing models can be implemented to unlock investment in I&CCS Projects. Because of their nature, I&CCS Projects require the wholesale involvement of the private sector in the manufacturing, marketing, distribution, and selling of I&CCS products. The private sector can also play an important role in driving the uptake of I&CCS products by making credit available to consumers through pay-as-you-go (PAYG)⁹ and leasing schemes.

The different market segments are portrayed in Figure 10.2 below, showing how the level of investment correlates with different types of private sector engagement and finance models that can be implemented to unlock investment by the private sector. Private models can make use of LG-owned feedstock,¹⁰ such as faecal sludge, that can be processed into fuels such as briquettes used in clean cooking stoves.

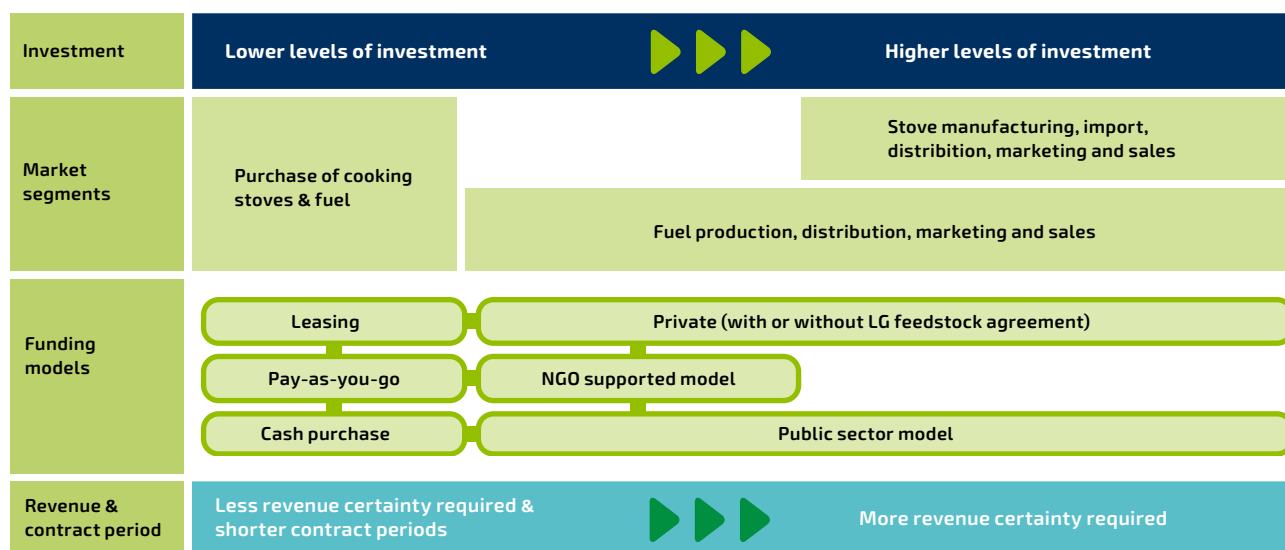
7 “Household air pollution and health,” WHO Newsroom Fact Sheet, 2019. See: <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>.

8 “Clean and Improved,” World Bank, Op.cit

9 See below for further explanation

10 Feedstock is the raw material to supply or fuel an industrial process.

Figure 10.2: I&CCS Financing Models



To unlock financing, LGs will need to take the following preliminary assessments and early action steps:

- Identify budgets that can be used to support I&CCS Projects;
- Design public awareness and product promotion campaigns to improve adoption of I&CCS technologies;
- Develop an accreditation system that will assess local I&CCS suppliers and their products to ensure that quality products are available for purchase and that standards are maintained once producers are accredited;
- Publish a list of accredited I&CCS suppliers;
- Provide space at LG-owned markets where accredited suppliers can demonstrate their products;

- Lobby national governments for the introduction of I&CCS standards and certification systems;
- Provide support to I&CCS producers and retailers who are targeting the area to help them understand the size of the market, consumer preferences, and affordability constraints;
- Support capacity building programs that seek to professionalize the I&CCS sector;
- Develop a gender-focused approach that will be attractive to funders who will want to understand how involvement by women can be maximized throughout the project lifecycle; and
- Lobby national governments to provide tax incentives enabling the growth of the industry (e.g., lower import duties on imported stoves, lower taxes for local stove or fuel producers, etc.).

4.3 Evaluate Advantages and Disadvantages of Finance Models

The advantages and disadvantages of the four finance models are summarised against key implementation criteria in Table 10.2 below, with advantages highlighted in green and disadvantages in red.

Table 10.2: Advantages and Disadvantages of Different Private Sector Finance Models

Criteria	Public Sector Models	NGO Models	Leasing/PAYG Models	Private Sector Models (with or without a LG feedstock agreement)
Marketing skills	Public sector is unlikely to have the necessary skills and incentives to develop/grow a long-term market for I&CCS products.	While NGOs have been instrumental in growing the market for I&CCS products in SSA, they may not have the necessary incentives to grow a long-term market for I&CCS products.	Private sector has necessary skills and incentives to market stoves and fuel.	
Ability to unlock finance for stoves	Likely to be reliant on grants to reduce the upfront cost of stoves to consumers.	Likely to be reliant on grants to reduce the upfront cost of stoves to consumers unless the program benefits from a micro-lending facility.	Supplier of stove/fuel provides credit to consumers that spreads the cost of the stove over several months/years, ensuring affordability.	Private sector manufacturer/supplier needs to raise affordable working capital and equity to fund its operations, expansion, and credit to consumers.
Access to climate finance	May need to access climate finance via national programme as size of a local project may not justify direct application to international climate facility.		Will need to access climate finance via private sector facility. However, the SME status of most producers is likely to be a constraint in accessing climate finance.	
Innovation	Public sector is less likely to drive innovation.	NGOs have demonstrated ability to drive innovation in the sector.	Private sector is best placed to innovate and drive new technologies.	
Costs and time to implement	Public sector will be less responsive to opportunities due to bureaucratic systems.	NGOs will be reliant on funding windows which may delay implementation.	Private sector can respond to opportunities quickly provided it can access working capital.	
Opportunities for pooling projects via national programs	Pooling programmes can be implemented by public sector/NGO sector across different LGs or African countries.		Private sector can access training and working capital via national programmes.	

Note: Red coloured boxes signify disadvantages; green coloured boxes signify advantages. The darker green colours indicate relatively greater advantages. Grey colour is used if the stated factor is neutral, representing neither advantage nor disadvantage. This table is intended to provide indicative information. It therefore might not fit in all the different contexts present in the SSA region for the full range of related projects.

The above analysis of the different finance models demonstrates the importance of unlocking working capital facilities for producers as well as credit mechanisms for consumers.

4.4 Identify Possible Funding Mechanisms and Contract Types

I&CCS Projects can access capital through the public and private sectors provided they can meet key criteria.

Public sector climate finance can be accessed if the projects are structured to maximize GHG and black carbon emission savings, are considered to be effective and well-governed, and meet the overall eligibility requirements of funders (e.g., size, technology, ownership, legal structure, country, etc.).

Commercial debt and impact investment capital¹¹ can also be mobilized to fund I&CCS producers and suppliers' working capital requirements if they can achieve most of the following key success factors:

- Demonstrate high levels of revenue certainty as a result of a diversified customer base and product offering;
- Demonstrate a track record of producing or sourcing stoves and/or fuel;
- Produce or source known and tested technological solutions;
- Demonstrate that profitability is not subject to unacceptable levels of foreign exchange risk;
- Access guarantees and/or first loss mechanisms to protect equity investors and commercial lenders;
- Present business plans and corporate structures that meet the requirements of private sector investors;

- Demonstrate their ability to effectively vet consumers that apply for credit if they provide PAYG/leasing solutions to consumers; and
- Access guaranteed quantities of quality feedstock for the production of fuel.

PAYG or leasing models can extend credit to consumers who pay for a stove over a period of time. These models can be structured to be affordable by ensuring that the repayments are less than or equal to the consumers' original extra-fuel spend. Consumers entering into a leasing contract with either the I&CCS supplier or a financial institution can make regular payments via a mobile banking service. Consumers may also be required to pay a deposit upon receipt of the stove.

I&CCS producers can either sell products directly to consumers via their own supply chains or via retailers. Distribution via retailers requires a supply agreement between the producer and the retailer that sets out the trade terms. The indicative funding sources and mechanisms for I&CCS Projects are summarized in Box 10.1 below.

11 Impact investors seek to generate returns while meeting environmental, social, and governance goals. A key actor in impact investing for the I&CCS sector is the Clean Cooking Alliance. In order to reach their goal of 100 million homes adopting clean cooking solutions, the Alliance is seeking to attract a billion dollars in investment into the sector. The Alliance has developed a number of funding and financing tools – Spark Fund, Pilot Innovation Fund, Women's Empowerment Fund, and Catalytic Small Grants – designed to target clean cookstoves and fuels enterprises at different stages of development and provide funding to help them scale and thrive.

Box 10.1: Indicative Funding Sources or Mechanisms for I&CCS Projects

To identify potential funding sources or mechanisms, LGs can apply the typology described in the [Overview Chapter](#) of this report.

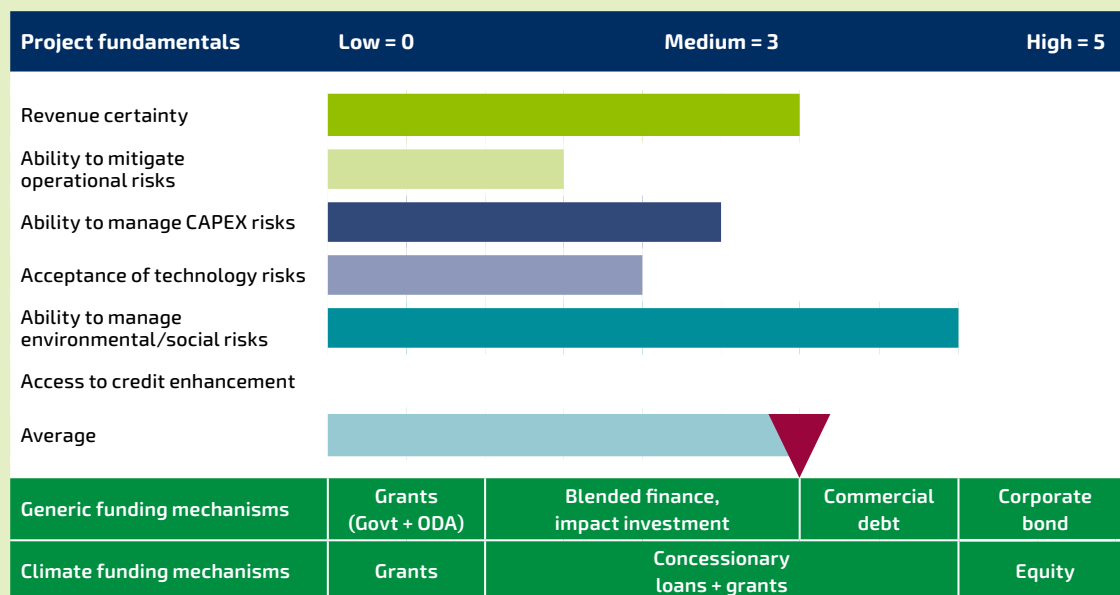
Figure 10.3 below shows a typology for a generic private sector implemented I&CCS business model and indicates that a blended finance/impact investment approach may be the most suitable funding option. If climate finance is to be accessed, a combination of concessionary loans and grants may be most suitable.

The following risk and revenue factors drive this typology:

- Uncertain consumer demand constrains revenue certainty;
- Limited understanding by financial institutions of I&CCS products/technologies and economics;
- Operational risks borne by producers that cannot be mitigated; and
- Lack of long-term off-take agreements with creditworthy entities.

Access to credit enhancement mechanisms, such as first loss facilities or partial credit guarantees, could unlock commercial debt for producers for I&CCS stoves and fuels. The below illustration does not benefit from a credit enhancement mechanism resulting in a zero score.

Figure 10.3: Illustrative Clean Cooking Project Typology



4.5 Identify and Implement Credit Risk Solutions

I&CCS Projects can greatly benefit from credit risk solutions, such as first loss facilities or partial credit guarantees, that could be structured to protect equity investors and commercial lenders against key credit risks such as the following:

- Default by consumers and retailers;
- Late payments by consumers and retailers;
- LG feedstock obligations; and
- Operational risks such as product recalls, strikes, fraud, etc.

5 Action Steps for Local Governments

As detailed in Section 4.0, LGs can take on a number of roles to implement I&CCS Projects, including:

- As accreditor of local I&CCS businesses to ensure that quality stoves are available for purchase and that the public is made aware of their benefits;
- By supporting programmes that seek to professionalize the I&CCS Sector;
- By supplying feedstock to producers of I&CCS fuels under a long-term agreement; and
- As producer of I&CCS fuels by converting LG-owned faecal sludge.

The first two roles focus on building capacity across the I&CCS supply chain and to professionalize the industry, while the last two roles promote a circular economy by converting LG-owned waste into I&CCS fuel. The last two roles require the LG to either enter into a long-term feedstock agreement with a private sector entity that will produce the fuel or for the LG to invest in a manufacturing facility and to produce the fuel itself.

Table 10.3 below summarises the main proactive action steps of LGs and details the tasks and outputs required to implement an I&CCS Project that requires significant investment in infrastructure and makes use of LG feedstock.

Table 10.3: Roadmap of Proactive LG Action Steps for Implementing I&CCS Projects

Action Steps	Tasks	Outputs
1. Develop budget	● Analyse LG budgets to understand current spend on treatment of faecal sludge ● Identify budgets or in-kind contributions that could be allocated to I&CCS programs ● Undertake a regulatory review to identify possible I&CCS business or feedstock models	● Budget costs and in-kind contributions to support I&CCS programs

Table 10.3: Roadmap of Proactive LG Action Steps for Implementing I&CCS Projects

continued

Action Steps	Tasks	Outputs
2. Engage experts to develop business models	- Identify and evaluate business models that could be implemented by the LG to produce I&CCS fuel - Identify a preferred business model	- Preferred option & indicative funding model - Funding gap
3. Engage funders	- Develop a concept note for Project Preparation Facilities, Development Finance Institutions (DFIs), other development partners, Climate Facilities, and existing Programmes - Present project to LG's Chief Financial Officer (CFO) to access own sources of funds/grants - Assess relevance of national grant mechanisms	- Project preparation grant - Feedback from DFIs, Climate Facilities, etc. - Commitments from LG's CFO - Minimum technical and co-funding requirements
4. Demonstrate feasibility	- Conduct technical studies - Identify and secure site(s) - Undertake financial/economic/GHG modelling - Finalize funding model and sources - Undertake pilot - Identify M&E criteria	- Business plan - Funding requirements - Approval by LG's Executive
5. Secure funding	Develop funding application(s)	Funding commitments
6. Procure	- Develop procurement documents - Evaluate and award tenders - Conclude contracts for construction, feedstock, operation, etc.	Signed contracts
7. Monitor & Evaluate (M&E)	Monitor performance of project against M&E criteria	M&E Reports

The above LG action steps will require the engagement of professional experienced experts, such as transaction advisors and consultants for the technical studies.



6 Examples of I&CCS Projects from Sub Saharan Africa and Worldwide

There are many examples of I&CCS Projects in SSA, encompassing PAYG models, fuel production models, international climate finance sources, and cooking stove funds. The below examples were selected based on available case studies to provide an overview of possible funding models that can be supported by LGs to unlock investment for I&CCS Projects.

The below examples show how local manufacturers of clean cooking stoves can enter into strategic partnerships with different financial institutions to provide credit solutions to customers and expand sales:

- **BURN Manufacturing Kenya (BURN)** is a for-profit company that was established in 2011 and grew out of a not-for-profit organisation. Its main product, the Jikokoa Stove, sells for around US\$40 through various partners, including banks and micro-finance organisations, social distributors, and retail outlets. Credit facilities unlock one third of BURN's sales and are provided by innovative financiers such as M-Kopa and Equity Bank.
- **Equity Bank**, one of the largest banks in East Africa, and the **Equity Group Foundation** formed a partnership with **Micro Energy Credits (MEC)** in 2013 to provide clean energy financing for buyers of clean cooking stoves. Customers are issued with a 12-month flexible loan to purchase a clean cooking stove from 3 different suppliers, including BURN. On average customers take only three to six months to repay their loans by reallocating fuel savings to repaying their loans. The **EcoMoto Loan** was initially marketed via Equity Bank's branches but is now marketed via an expanded network of 30,000 Equity Agents (i.e., small retail shops authorized to sell Equity Bank's products and services). Under this expanded model, MEC energy officers train and offer sales support to onboard new Equity Agents who are then responsible for direct sales to customers. The Equity Agents promote the stoves in their retail shops and facilitate loan applications using Equity Bank's digital platform.¹²
- **M-Kopa** allows customers to pay only a small deposit for cooking stoves, with the balance being paid through affordable daily or weekly instalments using a mobile phone.¹³ This model has led to low levels of default, as customers reallocate existing budgets to paying off a loan to finance their cooking stoves.¹⁴

12 "Equity Bank's Ecomoto Loan Program," Winrock International, 2017. See: <https://www.winrock.org/wp-content/uploads/2017/09/EquityBankProfile.pdf>

13 "Impact Report," Kenya M-Kopa, 2019. See: <http://www.m-kopa.com/wp-content/uploads/2019/09/M-KOPA-IMPACT-REPORT-2019.pdf>

14 "Beyond Charcoal: How One Company Helps Rwandan Families Save their Health and the Environment, One Cookstove at a Time," World Bank Group, 2018. See: <https://www.worldbank.org/en/news/feature/2018/12/19/beyond-charcoal-how-one-company-helps-rwandan-families-save-their-health-and-the-environment-one-cookstove-at-a-time>

Examples of I&CCS fuel production models that make use of LG feedstock include two business models for the manufacturing of cooking stove fuel from LG-supplied faecal sludge in Kenya's Nakuru County.

- The first model is a privately-owned business that makes use of LG-supplied feed-stock to produce and market briquettes. The private company funded its own capital expenditure but receives treated faecal sludge from the LG at no cost. The private company has developed a market for its briquettes amongst industrial users.
- Under the second business model, the county's water and sanitation company created a 100% owned subsidiary company NAWASSCOA that produces briquettes using the LG's faecal sludge and markets it to households. NAWASSCOA raised over EUR10 million in grants from the European Union to fund its capital expenditures on equipment procured internationally.

An example of a grant-funded I&CCS programme that built capacity at I&CCS producers and sought to professionalize the industry is in Kenya, the Energizing Development Kenya Programme (EnDev Kenya). An initiative implemented by GIZ, EnDev Kenya has been promoting improved cookstoves since 2006 in collaboration with the government of Kenya, NGOs, and private firms. It aims at developing the cookstove market in Kenya through activities that span the I&CCS supply chain (e.g., production, marketing, installation, etc.).

The grant-funded programme focused on **capacity building** of last mile distribution channels as well as

supporting the private sector to mitigate market development barriers. Activities include training stove producers, running consumer awareness campaigns, improving transport logistics, and implementing or introducing quality control measures. As of December 2018, more than 6.7 million people had gained access to improved cooking facilities through the programme and employment opportunities had been created for about 4,000 trained stove artisans and dealers.¹⁵

An example of a climate financed I&CCS programme in Kenya and Senegal involves the Green Climate Fund (GCF)¹⁶ in partnership with GIZ:

- The GCF programme seeks to unlock investment in clean cooking stoves in Kenya and Senegal. The program targets the production and sale of 1.6 million new stoves during the programme period and 12.8 million new stoves by 2030.
- The programme focuses on enabling I&CCS producers to expand their operations and formalise their businesses. For example, in Kenya, the programme aims to graduate 52 artisans to the professional level and 18 professionals to the business class level. Through this graduation process, producers will be capacitated to develop business plans and apply for credit.
- The programme will also work with both countries' financial sectors to educate financiers about the I&CCS sector and supporting the design of new financial products targeted at the sector. Financial products that will unlock funding for I&CCS producers will be prioritised as part of this process.

An example of an unsuccessful fund that provided working capital loans to producers of clean cooking stoves is the Clean Cooking Working Capital Fund:

- The Clean Cooking Working Capital Fund was launched in September 2015 to accelerate the development of the clean cooking supply chain by providing working capital loans to creditworthy producers of I&CCS. The Fund targeted producers that generated sales in excess of US\$350,000/annum and that had both a viable business plan and formal legal structures. The fund offered working capital loans at commercial interest rates that would allow the Fund to generate a return for its investors.
- Once operational, it became clear that there was a mismatch between the perceived need for the Fund which was structured to issue loans to relatively large, well-established manufacturers and the actual status of the I&CCS market which is comprised mainly of SMEs. Very few producers met the Fund's stringent criteria and were able to absorb the commercial debt.¹⁷ Moreover, while the Fund made use of a first loss facility and concessionary mezzanine and senior debt, the structure did not translate into concessionary interest rates for borrowers. As a result, only two producers received funding from the facility before it was closed in January 2017.

The above overview of the wide range of finance approaches needs to be further expanded and assessed to better achieve replicability and impact, fully integrating lessons learned from new pilots and approaches. Towards this end, LGs can contribute greatly to the success of I&CCS Projects by providing useful information about local conditions to experts, companies in

the I&CCS sector, and financiers who are interested in investing or developing the local I&CCS market. In addition, the provision of market information on adoption factors (e.g., cooking habits, barriers to the uptake of I&CCS products, etc.) can help investors and policy-makers design optimal financing and support mechanisms.

7 Enabling Factors

For LGs to effectively scale the implementation of I&CCS Projects, LGs and the National Governments (NGs) need to have enabling factors that enable LGs to facilitate the required access to experts and funding.

7.1 Local Government Enabling Factors

Several enabling factors can be put in place by LGs to unlock private finance for I&CCS Projects. As illustrated by the Kenya I&CCS Projects, LG that can enter into long term contracts for services and products have

more flexibility to cooperate with the private sector in the development of infrastructure and value chains for I&CCS Projects. Examples of LG enabling factors are provided in Table 10.4 on next page.

15 "Energising Development (EnDev) Kenya," GIZ. See: <https://www.giz.de/en/worldwide/21975.html>

16 Climate finance sources such as the Green Climate Fund (CFReady Programme and others) are presented in Annex.

17 "Financing Growth in the Clean Cookstoves and Fuels Market: An Analysis and Recommendations," Global Alliance for Clean Cookstoves, 2018. See: <https://www.accenture.com/il-en/insight-financing-growth-clean-cookstoves-fuels-market>

Table 10.4: Local Government Enabling Factors

Local Government Enabling Factors	Public Sector Support (to programmes and/or as producers of fuel)	Private Producers of Fuel (using LG feedstock)	Private Producers of Stoves	PAYG/Lease Models
1. LG has significant own sources of revenue	✓	N/A	N/A	N/A
2. LG can incur debt	✓	N/A	N/A	N/A
3. LG can access CAPEX grants	✓	N/A	N/A	N/A
4. LG can be shareholder in a company	✓	N/A	N/A	N/A
5. LG can enter into long term contracts	✓	✓	N/A	N/A
6. LG can reallocate existing budgets to support programmes	✓	✓	✓	✓
7. LG can guarantee feedstock	✓	✓	N/A	N/A
8. LG has capacity to develop projects (planning, budgeting, access experts, etc.)	✓	✓	N/A	N/A
9. LG can make land available at no or minimal cost	✓	✓	N/A	N/A
10. LG has capacity to procure construction contractors	✓	N/A	N/A	N/A
11. LG has capacity to procure and manage long-term contracts	✓	N/A	N/A	N/A

Note: All areas represent enabling factors for LGs to unlock finance for I&CCS Projects. Blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

It is important to note that LGs can proactively take steps to facilitate the identification, development, and finance of I&CCS Projects:

→ **Proactive development of I&CCS Projects:** LGs that currently have some of the above enabling factors can today proactively start to develop I&CCS Projects working with private sector professionals, developers, and investors. As noted earlier, securing qualified I&CCS experts will be critical to the

analysis of the needed project development process to design investable I&CCS Projects.

→ **Address environmental impediments:** LGs that lack key enabling factors for unlocking I&CCS Projects can be proactive in taking steps to reduce impediments at local and national levels. Key I&CCS action steps include collective advocacy through political processes and the engagement of African and international champions, such as related climate change programmes and initiatives.

7.2 National Government Enabling Factors

The various enabling factors that can be put in place by National Governments to promote I&CCS Projects are listed in Table 10.5 below, broken out by four business models.

Table 10.5: National Government Enabling Factors

National Government Enabling Factors	Public Sector Support (to programmes and/or as producers of fuel)	Private Producers of Fuel (using LG feedstock)	Private Producers of Stoves	PAYG/Lease Models
1. NG can commit grant funding to LG or project and makes transfers on time	✓	N/A	N/A	N/A
2. NG has put into place supporting regulatory and legal frameworks	✓	✓	✓	✓
3. NG can develop programme in line with Nationally Determined Commitments (NDC), including pooling of similar LG projects	✓	✓	✓	✓
4. NG can support and develop climate finance applications	✓	✓	✓	✓
5. NG is able to provide expert support	✓	✓	✓	✓
6. NG provides tax incentives for investment in the sector	N/A	✓	✓	✓

Note: All areas represent enabling factors for LGs to unlock finance for I&CCS Projects. Blue denotes greater enablement than light blue. N/A is the abbreviation for “Not Applicable.” SLA = Service Level Agreement between LG and private sector provider for delivery of services.

Table 10.5: National Government Enabling Factors

continued

National Government Enabling Factors	Public Sector Support (to programmes and/or as producers of fuel)	Private Producers of Fuel (using LG feedstock)	Private Producers of Stoves	PAYG/Lease Models
7. NG develops standardised contracts & user-friendly sustainable procurement policies	✓	✓	N/A	N/A
8. NG has climate finance facility for the private sector	N/A	✓	✓	✓
9. NG can provide guarantees covering LG commitments	✓	✓	N/A	N/A
10. NG has put into place legislation that promotes I&CCS (e.g., minimum standards)	✓	✓	✓	✓

Note: All areas represent enabling factors for LGs to unlock finance for I&CCS Projects. Blue denotes greater enablement than light blue. N/A is the abbreviation for "Not Applicable." SLA = Service Level Agreement between LG and private sector provider for delivery of services.

As illustrated above, National Governments can provide enabling factors for I&CCS Projects across public and private financing sources.

Therefore, this Climate Project can achieve results with breakthrough enabling factors at the local and national government levels, as demonstrated by the successful examples listed in Box 10.2 below.

Box 10.2: Examples of Enabling Factors for I&CCS Projects

- Feedstock Agreements:** Two I&CCS fuel production models that make use of LG feedstock are operational in Kenya's Nakuru County. Both the private sector and public sector models make use of LG supplied faecal sludge backed by feedstock agreements or commitments.
- Grant Funding:** The Energizing Development Kenya Program (EnDev Kenya) is grant-funded program that focuses on capacity building of last mile distribution channels as well as supporting the private sector to mitigate market development barriers. As of December 2018, more than 6.7 million people had gained access to improved cooking facilities through the programme and employment opportunities had been created for about 4,000 trained stove artisans/dealers.

Sources: The above examples are taken from section 6 of this chapter.

8 Building Scaled Local Government Capacity

The urgency of addressing climate challenges at the LG level require the immediate scaling up of effective actions. The five actions below can be implemented to increase the capacity of LGs to facilitate the identification, development, and finance of I&CCS Projects at scale across Africa:

1 Link to National, African, and International Initiatives

LGs can scale up their capacity to develop and finance I&CCS Projects by working through national agencies and programmes, as well as those of development partners. Towards this end, a national ecosystem to support this Climate Action can be mapped to identify constraints and opportunities. Specific action steps could be identified with suggested interventions for the full range of stakeholders, including national government agencies, LGs, development partners, the private sector (providers of finance, expertise, corporates, SMEs, etc.), non-governmental organizations, urban residents, and farmers.

Advocating for an improved enabling regulatory environment and national legislation can help LGs to achieve scaled actions.

2 Provide Training and Enabling-Information

LGs will need to have a training module that details the I&CCS action steps set out in the prior section “*Table 10.3: Roadmap of Proactive LG Action Steps for Implementation of I&CCS Projects.*” In addition, enabling information will need to be provided on the professional services required to develop and design I&CCS Projects. Information on funding sources also needs to be provided, including eligibility requirements and application processes. This wide array of information can be consolidated in a knowledge portal with directories of information. To begin this process, the action steps for I&CCS Projects could be identified and compiled into a list, with information on each step, lessons learned, and implications for project development processes.

3 Provide Technical Advisory

Experienced qualified independent advisors will be needed to support LGs in their development of I&CCS Projects. LGs will need to have access to such advisors. National governments and development partners can provide critical support. To build out a further database of technical experts, the professionals involved in existing SSA I&CCS Projects could be identified and compiled into a list, with information on their services and contact information. There are also a number of project preparation facilities that could provide technical advisory support to LGs.

4 Scale Up Peer-to-Peer Collaboration and Knowledge Sharing

LGs can share information with each other, providing their feedback on the performance of contracted professionals as well as lessons learned on project development and ways to optimize access to finance. Workshops and webinars can be used for peer-sharing, as well as on-line platforms, with the sharing of case studies, lessons learned, sources of project development and finance support, technology options, etc. Initially, SSA countries with successful I&CCS Projects can share their experiences with other SSA LGs. Early contributors could be participants in I&CCS programmes in Kenya and Senegal.

5 Provide On-line “Local Government Climate Action Platform” Enabling Cost-Effective Access to Information and Communication Venues

The above functions could be cost-effectively scaled up through the use of an on-line platform for LGs to access enabling-information and have dynamic exchanges with other LGs, experts, and stakeholders. The Platform could include e-learning modules on specific financing action steps of enabling information on experts and financing sources as noted above.

CoM SSA training materials provide guidance on project development and finance.

Annex

Overview of Climate Finance Sources for Project Preparation and Finance in Sub-Saharan Africa

This annex provides a list of selected finance sources that could potentially be available for Local Governments' climate projects, subject in some cases to national approval. The first section of this list provides selected sources for project preparation, followed by

a section of selected finance sources for a project's capital expenditures and operation & maintenance (O&M). Duplications are possible in cases where sources deliver on both. Links are provided for additional information.

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
Project Preparation Facilities and Funds		
Green Climate Fund (GCF) Project Preparation Facility	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency - Tree Planting and Forestation - Flood Risk Management	https://www.greenclimate.fund/projects/ppf
The C40 Cities Finance Facility (CFF)	- Wastewater Treatment and Reuse - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency - Flood Risk Management	https://www.c40cff.org/about#contact

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

continued

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
Project Preparation Facilities Network (PPFN) and PPFN Fund Finder tool	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency	https://www.icafrica.org/en/project-preparation/project-preparation-facilities-network-ppfn/ https://www.icafrica.org/en/project-preparation/the-fund-finder/
The International Municipal Investment Fund (IMIF)	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency - Tree Planting and Forestation - Flood Risk Management - Improved and Clean Cooking Stove	https://www.unescap.org/sites/default/files/Day%201%20Session%206_Paul%20Martin_Municipal%20Capital%20Investments.pdf
The Sustainable Energy Fund for Africa (SEFA), AfDB	- Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency	https://www.afdb.org/en/documents/climate-finance-matters-2019
Cities and Climate Change in Sub-Saharan Africa Initiative (CICLIA), AFD	- Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency	https://www.afd.fr/en/project-preparation-funds

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

continued

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
ARE Scale-up facility for renewable energy deployment in Africa, <i>AFD</i>	• Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting	https://www.afd.fr/en/project-preparation-funds
The Fund for Technical Expertise and Experience Transfers (FEXTE), <i>AFD</i>	• Waste-to-Energy • Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting • Building Efficiency • Flood Risk Management	https://www.afd.fr/en/fexte-cooperation-and-project-preparation-instrument
The Urban and Municipal Development Fund (UMDF), <i>AfDB</i>	• Waste-to-Energy • Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting • Building Efficiency • Tree Planting and Forestation • Flood Risk Management	https://www.afdb.org/en/documents/climate-finance-matters-2019
Financial Sources for Project Capital Expenditures and O&M		
The Urban and Municipal Development Fund (UMDF), <i>AfDB</i>	• Waste-to-Energy • Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting • Building Efficiency • Tree Planting and Forestation • Flood Risk Management	https://www.afdb.org/en/documents/climate-finance-matters-2019
The Africa Climate Change Fund (ACCF), <i>AfDB</i>	• Waste-to-Energy • Solar Mini-Grids • Tree Planting and Forestation • Improved and Clean Cooking Stoves	https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-climate-change-fund

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

continued

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
The Climate Finance Facility (CFF), DBSA	• Wastewater Treatment and Reuse • Waste-to-Energy • Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting • Building Efficiency • Flood Risk Management	https://www.dbsa.org/EN/About-Us/Products-Services/Pages/Fund-Management-Services.aspx
The Adaptation Fund	• Integrated Waste Management • Tree Planting and Forestation • Flood Risk Management	https://www.adaptation-fund.org/apply-funding/implementing-entities/national-implementing-entity/
The Municipal Investment Finance (MIF) Programme	• Wastewater Treatment and Reuse • Integrated Waste Management • Solar Rooftops and Water Heaters • Solar Mini-Grids • Public Street Lighting • Building Efficiency • Flood Risk Management	https://www.uncdf.org/mif
Local Climate Adaptive Living Facility (LoCAL)	• Wastewater Treatment and Reuse • Building Efficiency • Tree Planting and Forestation • Flood Risk Management	https://www.uncdf.org/local/contact-us

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

continued

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
Global Environment Facility (GEF)	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Building Efficiency - Public Street Lighting - Tree Planting and Forestation	https://www.thegef.org/documents/gef-7-programming-directions
Green Climate Fund (GCF)	- Solar Rooftops and Water Heaters - Solar Mini-Grids - Flood Risk Management - Tree Planting and Forestation	https://www.greenclimate.fund/how-we-work/tools/entity-directory
The Africa Investment Platform (AIP), <i>EU External Investment Plan (EIP)</i>	- Wastewater Treatment and Reuse - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency - Tree Planting and Forestation	https://ec.europa.eu/international-partnerships/system/files/efds-report_en.pdf
The European Fund for Sustainable Development (EFSF), <i>EU External Investment Plan (EIP)</i>	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency	https://ec.europa.eu/commission/eu-external-investment-plan/how-you-can-engage-external-investment-plan-one-stop-shop_en

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

continued

Climate Finance Sources	Eligible Types of Climate Projects	Additional Information
The Clean Ocean Initiative	- Wastewater Treatment and Reuse - Integrated Waste Management - Flood Risk Management	https://www.eib.org/attachments/press/fac-sheet_coi_final.pdf
The French Facility for Global Environment (FFEM)	- Wastewater Treatment and Reuse - Integrated Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Building Efficiency - Tree Planting and Forestation - Flood Risk Management	https://www.ffem.fr/en/working-ffem
The Global Energy Efficiency and Renewable Energy Fund (GEEREF)	- Integration Waste Management - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Public Street Lighting - Building Efficiency	https://geeref.com/about/investment-strategy.html
AFD loans and grants	- Wastewater Treatment and Reuse - Waste-to-Energy - Solar Rooftops and Water Heaters - Solar Mini-Grids - Building Efficiency - Flood Risk Management	https://www.afd.fr/en/loans-afds-main-financing-tool

Source: "Climate Finance Landscape for Sub-Saharan African Cities: Funding opportunities and financing instruments for Sub-Saharan African cities and local governments to develop and implement Sustainable Energy Access and Climate Action Plans (SEACAPs)," Global Fund for Cities Development (FMDV), ICLEI Africa, CoM SSA, 2019.

Glossary of Terms

ABC – Anchor-Business-Community Model: ABC is the method of rural energy development in which energy companies leverage anchor customers to reduce the risk of business in areas of uncertain demand, thereby incentivising electrification of all customer types in a community.

AD – Anaerobic Digestion: AD is the process by which organic matter such as human and food waste is broken down to produce biogas and biofertilizer. This process happens in the absence of oxygen in a sealed, oxygen-free tank called an anaerobic digester.

Bankability: A project is considered bankable or investable if it meets the investment criteria of commercial investors (debt and equity).

Blended Finance: The blended finance approach can enable a project to reach financial close and become operational by combining public and private funding in addition to credit enhancements (such as guarantees and first loss capital). Blended finance may include commercial debt and equity, grants, concessional loans, and other public support.

CAPEX – Capital Expenditures: CAPEX are the funds used by a company to acquire, upgrade, and maintain physical assets such as property, buildings, industrial plants, technologies, and equipment.

CIL – Community Infrastructure Levy: CILs are the fees that Local Governments can set on new infrastructure development in its jurisdiction. These fees are used to help fund the facilities and services needed to support the new homes and businesses that benefit from the infrastructure development.

CO₂ – Carbon Dioxide (chemical formula CO₂): Carbon dioxide is a colorless, odorless gas found in our atmosphere. It is a waste product in our bodies and is also produced by burning fossil fuels. CO₂ is the most significant long-lived greenhouse gas in the Earth's atmosphere and intensifies the pace of climate change.

Concessional Debt: Concessional debt refers to debt that is extended on terms substantially more generous than market loans. The concessionality is achieved either through interest rates below those available on the market or by grace periods, or through a combination of these concessionary terms. Providers of concessional debt include Development Finance Institutions, development partners, and foundations.

Commercial Debt: Commercial debt refers to debt that has current market terms for interest and repayment. Providers of commercial debt are mainly banks (private and public). Commercial loans are typically used to fund major capital expenditures and cover operational costs that the company may otherwise be unable to afford. Many commercial loans require collateral, such as property or equipment.

EPC – Engineering Procurement Construction contracts: EPC contracts are usually used for construction contracts as they mitigate key performance risks. Under an EPC contract, a contractor is required to deliver a complete contract for a fixed price by a fixed date, reducing the risk of cost overruns and nonperforming technology.

ERU – Equivalent Residential Unit: An ERU is a dwelling, unit, or development that is equal to a single-family residence in terms of the nature of its use or impact on an improvement to be provided in the assessment area. For example, stormwater system user fees or tariffs are typically collected based on the amount of impervious surface for individual residential parcels or based on an ERU system.

ESCOs – Energy Services Companies: ESCOs are companies that offer energy services (including implementing energy efficiency and renewable energy projects), often on a turnkey basis. An ESCO guarantees energy savings and/or cost reduction and can arrange financing for the operation of an energy system by providing a savings guarantee.

ESIA – Environmental and Social Impact Assessment:

ESIAs are an essential technical study that assesses and predicts the potential environmental and social impacts of a project, evaluating alternatives and designing appropriate mitigation, management, and monitoring measures. ESIAs are generally required for investments involving a new development or a significant expansion or modification of an existing facility before the proposed development may be authorised. An ESIA is required by financiers of projects, and needs to be prepared according to local legislation and also the requirements of finance providers.

Feedstock: Feedstock is usually a single, uniform, raw material that is given as an input into a machine or process, usually in large quantities. For waste-related projects, feedstock refers to renewable biological material that can be converted into energy or fuel. This approach recycles waste into fuel at the local level, thereby reducing costly transport fees and providing a new source of clean, high-performing fuel.

First Loss Capital: First loss capital refers to socially and environmentally-driven credit enhancement provided by an investor or grant-maker who agrees to bear first losses in an investment in order to catalyse the participation of co-investors who otherwise would not have participated in the transaction. First-loss capital has gained recent prominence in impact investing as more investors incorporate social and environmental goals into their investment criterion.

GHG – Greenhouse Gas: GHG refers to gases such as water vapor, ozone, carbon dioxide, methane, and nitrous oxide, that are naturally present in the atmosphere as well as other GHGs that are synthetic chemicals emitted only as a result of human activity. GHGs cause the “greenhouse effect,” retaining heat in the atmosphere by trapping the Earth’s outgoing energy, thereby altering climate and weather patterns.

Investable: A project is considered investable or bankable if it meets the investment criteria of commercial investors (debt and equity).

Impact Investors: Some investors are willing to provide capital at terms below mainstream market requirements. Impact investors refers to investors whose

criteria includes a measurable, beneficial social, or environmental impact in addition to financial return.

ISO Tier (International Organisation for Standardisation):

The ISO has developed standard voluntary performance targets for carbon emission reduction encompassing five indicators: thermal efficiency, fine particulate matter emissions, carbon monoxide emissions, safety, and durability. Each indicator is rated based on six tiers from the lowest performance (rated 0) to the highest performance (rated 5). The Tier 0 rating represents performance typical of open fires and the simplest cookstoves.

LEP – Local Enterprise Partnership: A LEP is a locally-owned partnership between Local Governments and businesses. A LEP plays a central role in deciding local economic priorities and undertaking activities to drive economic growth and create local jobs. In the case of Flood Risk Management, LEP refers to a partnership between Local Governments and a wide range of stakeholders, including businesses, property owners, developers, sewerage undertakers, and other catchment users. For example, a catchment for common use could become an asset for the whole community, and then drain maintenance can be subcontracted by the LEP for the area in question.

LG – Local Governments: The World Bank defines LGs as specific institutions or entities created by national constitutions, state constitutions, ordinary legislation of a higher level of central government, provincial or state legislation, or by executive order to deliver a range of specified services to a relatively small geographically delineated area.

LVC – Land Value Capture: LVC refers to public investment in infrastructure to reduce physical vulnerabilities due to floods, environmental degradation, and other risks, thereby increasing land values that benefit the public sector. In the case of Flood Risk Management, LGs can increase the value of property through drainage and flood prevention infrastructure projects as well as levy charges from parties benefitting from the infrastructure upgrade.

LGIP – Local Government Investment Pool: An LGIP is a pooled investment fund set up by a public entity

for the investment of public funds for the exclusive benefit of governments within the entity's jurisdiction. By pooling funds, participating governments benefit from economies of scale, full-time portfolio management, diversification, and liquidity.

NDC – Nationally Defined Contributions: In 2015, governments worldwide committed to NDCs, specifying their respective commitments to reductions in greenhouse gas emissions at the U.N. Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21). The climate actions communicated in these intended NDCs largely determine whether the world achieves the long-term goals of the Paris Agreement to hold the increase in global average temperature to well below 2 °C, to pursue efforts to limit the increase to 1.5 °C, and to achieve net zero emissions in the second half of this century.

Mezzanine Debt: Investment has different levels of risk and protection. Senior debt is prioritised for repayment in the case of bankruptcy and therefore has the lowest risk. Mezzanine debt is the middle layer of capital that falls between secured senior debt and equity, is usually not secured by assets, and is lent strictly based on a company's ability to repay the debt from free cash flow.

O&M – Operations & Maintenance: The O&M phase of a project refers to the period in which the project has been fully developed and is fully operating and providing services, therefore requiring the maintenance and repair of all aspects of the project, including equipment and property.

Off-Take Agreement: An off-take agreement is entered between a producer and a buyer to specify the terms of purchase of future production over a defined time period. The agreement is generally negotiated well in advance to guarantee a market for the facility's future production and enable the mobilisation of financing for development and construction of the project.

OPEX – Operating Expenses: OPEX expense refers to the expenses incurred by a project in its ongoing business operations. These operating expenses include rent, equipment, supply and inventory costs, marketing, distribution costs, payroll, insurance, funds

allocated for research and development, and any other expense related to operation.

Patient Equity: Some investors are willing to provide capital at terms below mainstream market requirements. For example, providers of patient equity provide long term capital with no expectation of turning a quick profit, forgoing an immediate return in anticipation of returns over the long-term.

PAYG – Pay-As-You-Go: The PAYG model extends credit to purchasers who pay for the goods or service over a period of time. In the case of purchasing clean cooking stoves, payments can be structured to be affordable by ensuring they are less than or equal to the purchaser's original fuel spend. Purchasers entering into a PAYG contract with either the supplier or a financial institution can make regular payments via a mobile banking service. Purchasers may be required to pay a deposit upon receipt of the good.

PPA – Power Purchase Agreement: PPAs are off-take agreements for energy-related projects that secure the payment stream for Independent Power Plants. PPAs are usually concluded between the purchaser "off-taker" (often a state-owned electricity utility) and a privately-owned power producer. In some cases, a PPA is between a corporate entity (such as a mine or industrial park) and a power producer.

PPP – Public Private Partnership: According to the World Bank, a PPP is defined as a long-term contract between a private party and a government entity for providing a public asset or service in which the private party bears significant risk and management responsibility and remuneration is linked to performance.

- The most typical PPP model used by Local Governments is known as a **Build Operate and Transfer (BOT) PPP**. Under this model, the asset is transferred back to the public sector at the end of the contract period. The private sector typically takes responsibility under a BOT PPP for the design, finance, build, and operation of the project. Depending on the ownership structure, the public sector may also be required to raise its share of equity. Given that the asset ultimately reverts to the public sector it is often constructed on public-owned land under a lease arrangement with the SPV.

- Another approach is a **Design Build Operate (DBO) PPP**. In this case, the asset is not transferred back to the public sector as the private sector retains ownership of the asset at the end of the contract period. The private sector's responsibilities remain the same in terms of designing, financing, building and operating the asset. This model does not lend itself to using public land given that the asset does not revert to the public sector.
- In many cases a **concessionary PPP** approach is used. A concession gives a concessionaire the long-term right to use specified public owned asset(s) and operate the asset(s) over the contract period. The concessionaire is also responsible for making specific investments over the contract period. Asset ownership remains with the public sector and the public sector is typically responsible for replacement of larger assets. Assets revert to the public sector at the end of the concession period, including assets purchased by the concessionaire.

Project Finance: The most common financing approach used for large infrastructure projects is project finance using a non-recourse or limited recourse financial structure. The debt used to finance the project are paid back from the cash flow generated by the project, with limited or no recourse to the project owner(s).

Pooling: Local Governments can benefit from pooling their activities, from procurement to project development and finance. First, Local Governments can pool procurement requests, thereby securing lower costs given larger purchase orders and increased bargaining power. Second, the costs of project development can also be pooled, with a single application to a project preparation facility covering the costs of developing multiple projects. Third, pooled finance can also be used to finance a large number of similar projects, reducing transaction costs and meeting the transaction size requirements of finance providers. Pooled finance can be secured through various instruments, such as pooled finance facilities, bonds, loans, funds, and grants.

Rooftop PV (power station/system): Rooftop PV refers to a photovoltaic system that has electricity-generating solar panels mounted on the rooftops of residential homes, business structures, and public sector buildings.

SHSs – Solar Home Systems: SHSs are stand-alone systems, suitable for residential applications, such as home appliances, lighting, computers, and water pumps. SHS are the most common way to provide access to modern energy systems in rural areas.

SLAs – Service Level Agreements: The Local Government may contract a private sector company with the required experience and expertise to deliver a service using a Service Level Agreement. This approach does not require the establishment of a separate legal entity.

SPV – Special Purpose Vehicle: Often projects requiring external finance are financed through separate companies set up as SPVs. The legal entity can be owned by the public sector, a Public-Private Partnership, or a 100% owned private sector company. The SPV's debt is secured against the revenue and collateral of the project so lenders do not have recourse to the SPV owner(s).

SWHs – Solar Water Heaters or Heating: SWHS systems enable the conversion of sunlight into heat for water heating using a solar thermal collector. A variety of configurations is available at varying cost to provide solutions in different climates and latitudes. SWHs are widely used for residential and some industrial applications.

TULD – Top-loading Updraft: A TULD is a micro-kiln gasifier used to produce charcoal, especially biochar, and heat for cooking. A TULD gasifier is smoke-free, providing a highly efficient combustion of fuel.

Vulnerability to climate change: According to the Intergovernmental Panel on Climate Change, vulnerability to climate change is the degree to which a system is susceptible to and unable to cope with adverse effects of climate change, including climate variability and extremes. The degree of vulnerability is a function of the character, magnitude, rate and variation of climate change, and the system's sensitivity, factoring in its adaptive capacity.

Disclaimers

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About CoM SSA

The Covenant of Mayors in Sub-Saharan Africa (CoM SSA) is an initiative that supports local authorities in Sub-Saharan Africa in their fight against climate change and in their efforts in ensuring access to clean energy. Under the CoM SSA, local authorities are invited to make a voluntarily political commitment to implement climate and energy actions in their communities.

The programme supports cities in the planning and implementation of climate and energy projects, and in mobilising climate finance at the local level. The CoM SSA programme is co-funded by the European Union, German Federal Ministry of Economic Cooperation and Development (BMZ), and the Spanish Agency for International Development Cooperation. It is implemented by the Spanish Agency for International Development Cooperation (AECID); the Agence Française de Développement (AFD); the Agence Française de Coopération Technique Internationale (Expertise France); the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); in cooperation with CoM SSA partners, the Secretariat, and Helpdesk.

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