The Covenant of Mayors in Sub-Saharan Africa

Training Module:

The Proactive Roles of Local Governments in Delivering Climate Actions:

Public Lighting Projects

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in Sub-Saharan Africa

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OBJECTIVES

TRAINING MODULE ON PUBLIC LIGHTING PROJECTS

ASSESS RELEVANCE

Help Local Governments (LGs) to understand their specific situations and how to identify benefits and challenges of Public Lighting Projects

EXPLORE TECHNICAL SOLUTIONS

Gain an understanding of how to apply technical solutions, given LG context

CASE STUDIES

Provide insights from relevant case studies from SSA and rest of the world

IDENTIFY FINANCE MODELS & KEY ACTORS

Gain an understanding of investment requirements and roles of the private sector (developers, experts, investors) and the public sector (national government, development partners)

IMPROVE ENABLING ENVIRONMENT

Understanding how LGs can facilitate improvements to the enabling environment to enable project identification, development, risk mitigation, finance, implementation, and operation

AGENDA

1.0	**WHAT IS PUBLIC LIGHTING?** Understanding benefits of Public Lighting and assessing relevance to your LG	8:00 – 8:30
1.1	**BREAKOUT & FEEDBACK SESSION 1**	8:30 – 9:15
2.0	**HOW TO IDENTIFY SOLUTIONS?** Examples of typical processes and how to assess relevance to your LG	9:15 – 9:45
2.1	**BREAKOUT & FEEDBACK SESSION 2**	9:45 – 10:30
3.0	**HOW TO IDENTIFY FINANCE OPTIONS?** Unpacking potential finance mechanisms & their benefits and disadvantages for your LG	11:00 – 11:40
3.1	**BREAKOUT & FEEDBACK SESSION 3**	11:40 – 1:00
4.0	**WHAT LG ACTIONS ARE REQUIRED?** Unpacking action steps required for LGs to implement a Public Lighting Project	14:00 – 14:40
4.1	**BREAKOUT & FEEDBACK SESSION 4**	14:40 – 16:00
5.0	**HOW TO IMPROVE THE ENABLING ENVIRONMENT?** Identifying key enabling factors for both national and local governments	16:15 – 16:40
5.1	**BREAKOUT & FEEDBACK SESSION 5**	16:40 – 17:30
6.0	**WRAP UP** Open discussion on how to move forward	17:30 – 18:00

1.0 WHAT IS PUBLIC LIGHTING?

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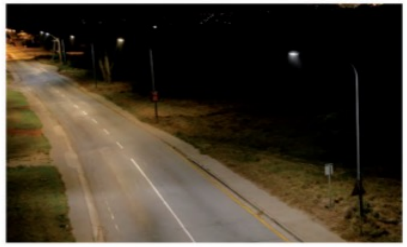
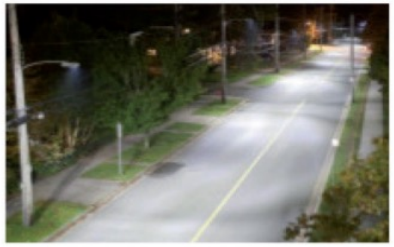
DEFINITION OF PUBLIC LIGHTING PROJECTS

Public Lighting Projects either “retrofit” existing public lighting infrastructure with energy efficient lamps and fixtures or expand public lighting services using energy efficient technologies. The objective is to minimize operational cost by minimizing electricity usage and maintenance costs and offering long term value for money.

Examples of public lighting technologies used by LGs in SSA

Traditional technologies → More efficient technologies





High Pressure Sodium (HPS)

Compact Fluorescent Light (CFL)

Light Emitting Diode (LED)

Solar LED Lights

Integrated Solar LED Lights

Source: Sustainable Energy Africa

DIRECT BENEFITS OF PUBLIC LIGHTING PROJECTS

SAVINGS

Retrofit projects can achieve significant electricity savings for LGs that can be used to fund expansion projects

SECURITY

Improved security for residents and traders

REVENUES

LGs can generate revenues directly via advertising and indirectly via additional taxes/fees arising from extended trading hours

CLIMATE BENEFITS

800 kg of CO2 can be saved over the lifetime of one LED bulb compared to the equivalent incandescent if the electricity used is largely coal*

SAFER ROADS

A reduction in traffic accidents due to better visibility

What benefits were delivered by Cape Town's Retrofit Program

*Source: *Sustainable Energy Africa*

CLIMATE, DEVELOPMENT & LG/ECONOMIC BENEFITS

CLIMATE

- Reduced electricity usage
- Reduced light pollution
- Minimal heat loss to the environment
- Longer lifespans of bulbs reduce the need for landfilling
- Up to 80% less GHG emissions than incandescent lights

DEVELOPMENT

- Longer trading hours may create new jobs
- A reduction in traffic accidents due to better visibility
- Lower crime rates
- Improved security for women
- Trading opportunities for women

LG/ECONOMIC

- Savings due to lower energy consumption & maintenance costs (retrofits)
- Savings can fund expansion
- Additional tax revenues/market rentals due to longer trading hours
- Possibility of providing Public Lighting services to remote areas (solar)

Opportunity: A Public Lighting Project could access climate finance (grants and concessional debt) from either a climate facility or a DFI provided the project demonstrates significant GHG emission reductions. Climate funders will want to understand how many tons of CO_2 will be avoided for every US$ of funding provided.

UNPACKING CHALLENGES TO IMPLEMENTING PUBLIC LIGHTING PROJECTS

BUDGETS

- Competes with various other services and priorities for limited funding raised via rates and fiscal allocations
- LGs often reliant on grants from National Governments to fund new infrastructure
- LGs need to be able to reallocate existing electricity budgets to pay for higher upfront costs

REVENUES

- Public lighting is often not prioritized in SSA cities as LGs may not be able to recover their costs via tariffs or charges
- In cases LGs levy specific taxes for the provision of public lighting, collection efficiencies are often poor

UPFRONT INVESTMENT

- While LED luminaires offer significant long-term savings, they can cost two to four times more than HPS luminaires
- High up-front investment costs are a major barrier for LGs with limited CAPEX budgets

DEBT FUNDING

- Banks often not familiar with Public Lighting technologies and therefore hesitant to lend
- Cost of due diligence required to lend to a project may not be justified given the small size of a typical project

ESCOs

- The ESCO market is nascent in SSA and local ESCOs do not usually offer funded solutions

TECHNICAL SOLUTIONS

- Technical solution needs to be "*fit for purpose*"
- Suitability of solar public lights need to be assessed given risk of theft and battery lives

ASSESSING RELEVANCE TO YOUR LG

ASSESS TECHNICAL NEEDS, SERVICE DELIVERY MODELS

BUDGETS & TARIFFS	• What LG capital and operational expenditure budgets are available? • Does your LG collect Public Lighting tariffs? • Are these tariffs cost reflective?
RETROFIT vs. EXPANSION	• Which Public Lighting technologies have been implemented in your LG? • Have existing Public Lights been retrofitted with more efficient technologies? • How many Public Lights need to be retrofitted? • What are your expansion needs?
NATIONAL PROGRAMMES	• Are any national or regional government programmes available that your LG can leverage? • Are any standardized designs/contracts available that your LG can access?
CAPACITY TO DEVELOP PROJECT	• What technical and project development capacity is available within your LG? • What budgets are available to contract experts? • Is baseline data available?

1.1 BREAKOUT & FEEDBACK SESSION 1

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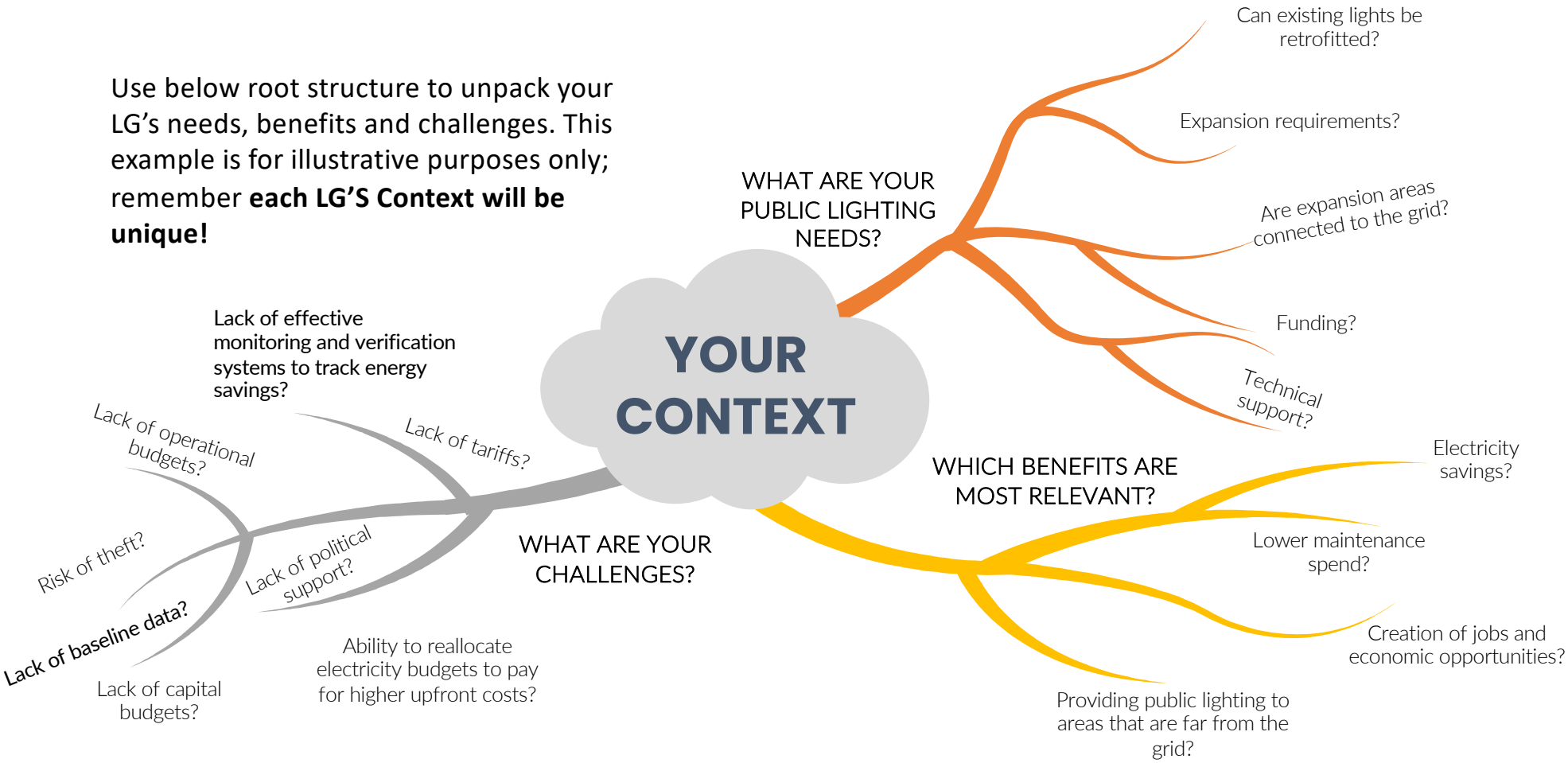
EXERCISE 1: IDENTIFY NEEDS, BENEFITS & CHALLENGES

Use below root structure to unpack your LG's needs, benefits and challenges. This example is for illustrative purposes only; remember **each LG'S Context will be unique!**



EXERCISE 1: FEEDBACK FORM

Context – Questions from prior slide	Answers (with numbers of how many people shared that issues)	Examples
Needs		
Challenges		
Benefits		

2.0 HOW TO IDENTIFY TECHNICAL SOLUTIONS?

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TECHNICAL ACTORS IN A TYPICAL PUBLIC LIGHTING PROJECT

PROJECT MANAGER

Role:
LG official that champions the project and forms the main point of contact between the LG, NG, consultants and private sector parties during the development phase

Skills required:
Project management, contract management, understanding of budgeting processes, understanding of lighting technologies and M&V

CONSULTANT TEAM

Role:
Develops technical options for the LG that will be assessed to conclude on affordability and technical suitability

Skills required:
A track record of designing and delivering energy efficiency projects in SSA. The consultant team should comprise different skillsets, including engineers, environmental scientists, a financial expert, etc.

EQUIPMENT SUPPLIER or ESCO

Role:
Supplies equipment that will represent a large portion of project costs

Requirements:
A track record of supplying equipment, backed by a strong balance sheet (i.e., a company that has significant assets net of liabilities)

CONSTRUCTION COMPANY

Role:
Constructs and installs infrastructure required for the project such as foundations and lampposts

Requirements:
A track record of constructing similar infrastructure, backed by a strong balance sheet (i.e., a company that has significant assets net of liabilities)

OPERATOR or ESCO

Role:
Operates and maintains the equipment. Commits to meeting performance targets and is penalized for not doing so

Requirements:
Track record of maintaining energy efficiency projects of a similar size and complexity. Required technical skillsets may justify the appointment of a private sector operator rather than an individual/ inhouse team

NATIONAL GOVERMENT

Role:
Ensures adherence to national standards and regulations

KEY CONCEPTS

EFFICACY (OR ENERGY EFFICIENCY)

Measure of light output (lumens) per watt of electrical power needed by the lamp

Lumens measure how much light is emitted; watts indicate how much electrical power is consumed

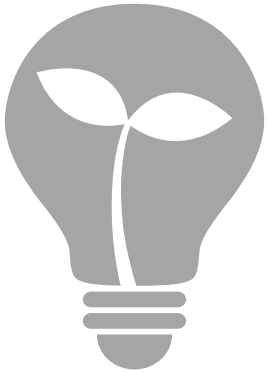
BALLAST

Device that controls the flow of power to a fluorescent lamp

Ballasts use power (increasing overall consumption)

Electronic ballasts are replacing magnetic ballasts (improving the efficiencies of HPS and CFLs)

LEDs do not make use of ballasts



COLOUR RENDERING INDEX (CRI)

Comparison of a light source's ability to accurately render the colour of an object

The CRI scale is from 0 to 100, with a value of 100 indicating excellent colour rendering

LUMINAIRE

Unit consisting of a lamp, together with the parts designed to distribute the light, position and protect the lamp, and connect the lamp to the power supply

Components include: reflector, refractor, and housing

Source: Adapted from Sustainable Energy Africa's *Efficient Public Lighting Guide*

KEY FEATURES & BENEFITS

Features	Benefits
Proper pole height and spacing	Provides uniform light distribution, which improves appearance for safety and security Meets recommended light levels Minimizes the number of poles, reducing energy and maintenance costs
Proper luminaire aesthetics	Blends in with the surroundings
High lamp efficacy and luminaire efficiency	Minimizes energy cost
Life of the luminaire and other components	Reduces lamp replacement costs
Cost effectiveness	Lowers operating cost
High lumen maintenance	Reduces lamp replacement costs
Good color rendering	Helps objects appear more natural and pleasing to the public Allows better recognition of the environment, improves security
Short lamp restrike	Allows the lamp to quickly come back after a power interruption
Proper light distribution	Provides required light on the roads and walkways
Proper cut-off	Provides adequate optical control to minimize light pollution
Minimizing light pollution and glare	Reduces energy use
Automatic shutoff	Saves energy and maintenance costs by turning lamps off when not needed

Source: World Bank publication *India Energy-Efficient Street Lighting—Implementation and Financing Solutions*

OVERVIEW OF LAMP TECHONOLOGIES

			LIFETIME (hours)	LUMENS /WATT	CRI
	**INCANDESCENT**	• Introduced more than 125 years ago • Produces light by heating up a metal filament enclosed within the lamp's glass • >90% of the energy used escapes as heat (<10% produces light)	1,000-5,000	11-20	40
	**METAL HALIDE (MH)**	• Much brighter than incandescent and lasts much longer • Operate at high temperatures and pressures, emit UV light • Need special fixtures to minimize risk of injury or accidental fire	10,000-20,000	60-100	70-105
	**HIGH PRESSURE SODIUM (HPS)**	• Introduced around 1970 • Internal arc tube of translucent ceramic enclosed in an outer glass envelope • Arc tube contains mercury, metallic sodium and Xenon gas	12,000-24,000	45-130	25
	**COMPACT FLUORESCENT LIGHT (CFL)**	• Phosphor coated glass tube with mercury and inert gas • Ionising by electric current • UV light converted to visible by phosphor coating	12,000-20,000	50-80	85
	**LIGHT EMITTING DIODE (LED)**	• Rapidly evolving and latest LED technologies are exceeding other technologies in all technical parameters	60,000-70,000	70-90	80

Source: Adapted from Sustainable Energy Africa's *Efficient Public Lighting Guide*

COMPARISON OF GRID CONNECTED LED, SOLAR LED & HPS

KEY ADVANTAGES VS. DISADVANTAGES

DESCRIPTIONS	KEY ADVANTAGES	KEY DISADVANTAGES
LED luminaires	• 40 - 60% more energy efficient than traditional bulbs • Last four times longer than traditional bulbs	• LED luminaires can cost two to four times more than HPS luminaires
LED solar	• Lowest operational and maintenance costs • Greatest GHG emission savings (if electricity source is thermal) • No electrical grid required	• Highest upfront investment costs • Batteries are expensive and will need to be replaced • Dust/moisture can reduce PV panel output • Risk of theft
LED grid connected	• Significant operational and maintenance savings • Significant GHG emission savings potential	• High upfront investment costs • Lower GHG emission savings potential than solar • Requires electrical grid or grid extension
HPS	• More energy efficient than Mercury Vapour and Metal Halide • Significantly lower upfront investment cost than LED (25 - 50%)	• Less energy efficient than LED • Contains mercury and lead • Needs to be replaced more frequently than LED

PUBLIC LIGHTING PLANNING

The components of a lighting system are classified based on the following three functions:

- **Structural Systems**: Consisting of poles and pole bases (foundations)
- **Optical Systems**: Consisting of the luminaires
- **Electrical Systems**: Consisting of lamps, ballasts, and service cabinets (fuse boxes)

To achieve an effective energy-efficient design, it is essential to select the proper lamp/ballast combination that produces high lumens per watt together with the right fixtures

Publicly available tools can be used to plan Public Lighting Interventions. The tool below is provided by the *Super-efficient Equipment and Appliance Deployment (SEAD) Initiative* (collaboration between 18 governments):

Insight: The *SEAD Street Lighting Tool* is an Excel-based tool for calculating the expected energy use, light performance, and lifecycle cost of street lighting upgrades for the most common road configurations. See: https://superefficient.org/tools/street-lighting-tool

KEY CONSIDERATIONS WHEN SELECTING A TECHNOLOGY

POSSIBLE PUBLIC LIGHTING TECHNOLOGIES

ACCESS TO GRID

Ability to access the electrical grid and cost of doing so will determine the viability of solar and grid tied interventions

CLIMATE

Local climate (dust levels, irradiation levels, etc.) will determine whether solar interventions are viable

INSTITUTIONAL CAPACITY

Availability of local skills for design, construction and O&M

ADAPTABILITY & FUTURE PROOFING

Ability to expand the network to unserved areas in the future. Ensuring selected technology will still be appropriate in 10 years time

ROAD CONDITIONS

Number of lanes, width of lanes, surface type, etc. need to be considered

ENERGY COST

The payback period of interventions will depend on local electricity prices. The higher the cost of electricity, the shorter the payback periods

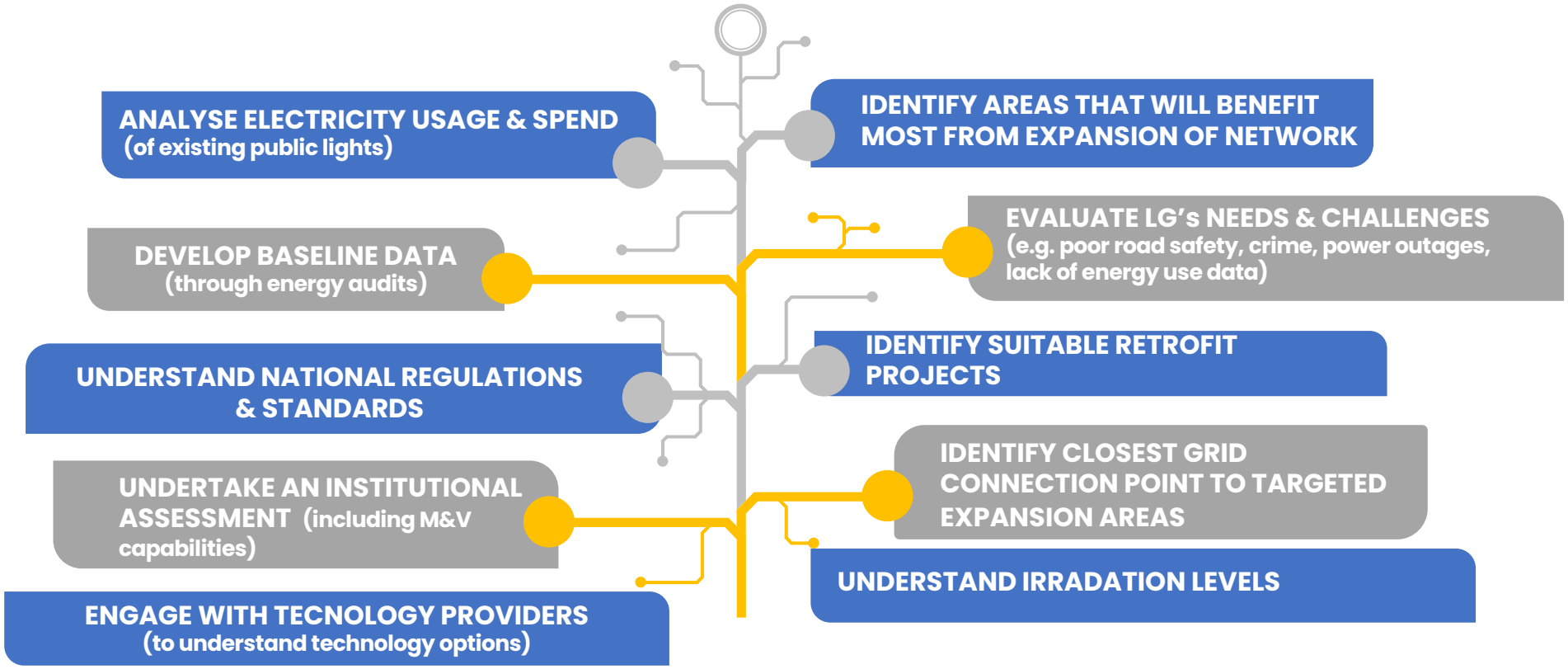
SECURITY

The risk of theft and mitigation options will inform whether solar interventions are viable

REGULATIONS

Technology options will be informed by national guidelines and standards for street lighting

SPECIFIC LG ACTIONS TO INFORM TECHNOLOGY SELECTION



APPOINT A REPUTABLE EXPERIENCED CONSULTANT TO ASSESS TECHNICAL OPTIONS

2.1 BREAKOUT & FEEDBACK SESSION 2

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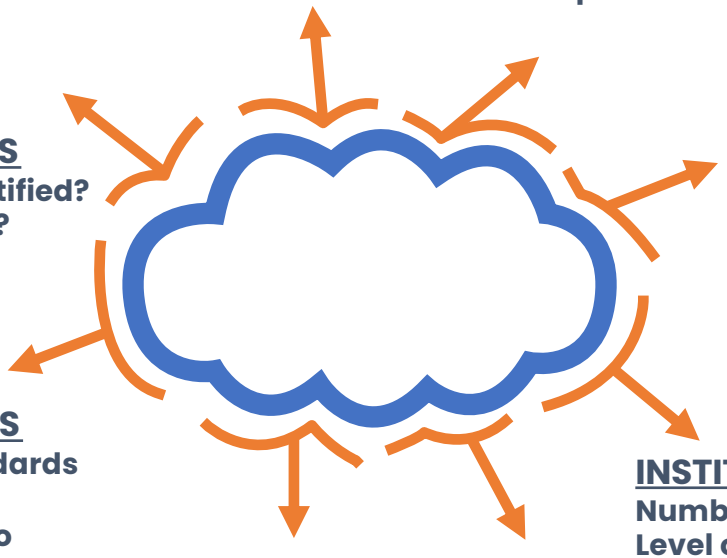
EXERCISE 2 – ASSESS YOUR TECHNICAL STATUS QUO & POSSIBLE SOLUTIONS

RETROFIT OPPORTUNITIES
What infrastructure (e.g. poles) can be reused?
Will new cabling in the ground be required?

ENERGY USAGE
What energy usage data is available?
Current spend on public lighting?
Current tariff (per KWh)?
Expected future tariff increases?



EXPANSION OPPORTUNITIES
Have priority areas been identified?
How close are they to the grid?

SOLAR
Have solar streetlights been trialed?
What was the outcome of the trial?
Are irradiation levels known?

STANDARDS & REGULATIONS
Do national guidelines or standards for street lighting exist?
What standards do you have to meet?
Are you meeting the standards?
What changes are required to meet standards?

INSTITUTIONAL CAPACITY
Number of staff in department/team?
Level of skills (unskilled, semi-skilled, skilled)?
Knowledge of EE technologies?
What M&V capabilities are available?

POSSIBLE SOLUTIONS
Which technologies are likely to be most appropriate?
What technical assessments have been done to date?

EXERCISE 2: FEEDBACK FORM

Context – Questions from prior slide	Answers (with numbers of how many people shared that issues)	Examples

3.0 HOW TO IDENTIFY FINANCE SOLUTIONS?

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KEY FINANCE & RISK TERMS EXPLAINED

SERVICE LEVEL AGREEMENT (SLA)

Contract between a LG and private sector service provider to operate & maintain Public Lighting infrastructure

PUBLIC PRIVATE PARTNERSHIP (PPP)

Long term contract (~ 20 years) between a LG and private sector partner that requires the private sector to design, build, finance, and operate Public Lighting infrastructure

ENERGY SERVICE COMPANY (ESCO)

A private sector company that provides technical and operational support over the duration of an EE contract; may also provide funding for projects

PAY-BACK PERIOD

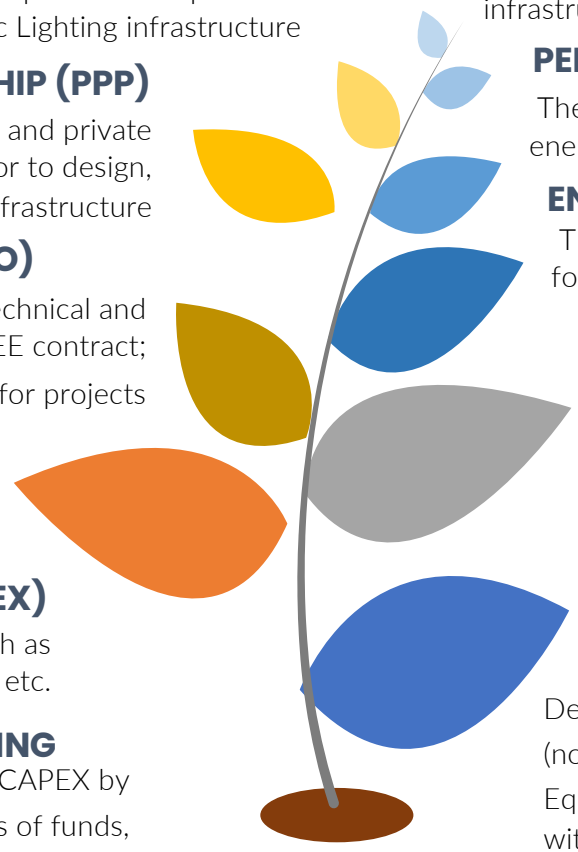
The amount of time it takes to recover the cost of an investment

CAPITAL EXPENDITURE (CAPEX)

Money spent acquiring fixed assets, such as land, poles, luminaires, fuse boxes, etc.

CAPEX FUNDING

Money that needs to be raised for CAPEX by either the LG via a loan, grants, own sources of funds, or the private sector (if a PPP)



CAPEX COST OVERRUNS

Risk that the costs budgeted for buying equipment and constructing infrastructure ends up being much higher than budgeted

PERFORMANCE RISK

The risk that the project does not produce as many units of energy saved as forecast

ENERGY PRICE RISK

The risk that actual electricity prices will be lower than forecast, reducing the savings that can be achieved

DESIGN RISK

Risk that public lighting's design does not meet national standards or legal and environmental requirements; risk that faulty design results in operational issues

CONSTRUCTION RISK

Risk that construction time exceeds time projected resulting in additional costs or loss of income

DEBT & EQUITY

Debt is an obligation that needs to be repaid to the lender (normally a bank) with interest over several years

Equity is the private sector's own money that it uses together with debt to fund the project

DIFFERENT FUNDING MODELS & ALLOCATION OF ROLES

RESPONSIBILITIES OF LG & PRIVATE SECTOR UNDER EACH FUNDING MODEL

<table>
<tr><th>FUNDING MODELS
Role/responsibility</th><th>PUBLIC OWNED & OPERATED</th><th>PUBLIC OWNED & PRIVATE SECTOR OPERATED (SLA)</th><th>ESCO FUNDED</th><th>PPP (100% private)</th><th>PPP (minority LG ownership)</th></tr>
<tr><td>Design risk</td><td colspan="2" rowspan="3">LG</td><td colspan="3" rowspan="3">Private sector</td></tr>
<tr><td>Construction risk & CAPEX cost overruns</td></tr>
<tr><td>Performance risk</td></tr>
<tr><td>Funding of CAPEX</td><td colspan="2">LG raises grants and debt</td><td colspan="2">Private sector raises debt & equity</td><td>LG funds its share of equity. Private sector raises rest of funds</td></tr>
<tr><td>Grants</td><td colspan="5">LG can raise grants to make funding model more affordable</td></tr>
<tr><td>Operation</td><td rowspan="3">LG</td><td colspan="4" rowspan="3">Private sector</td></tr>
<tr><td>Maintenance</td></tr>
<tr><td>Sales & marketing</td></tr>
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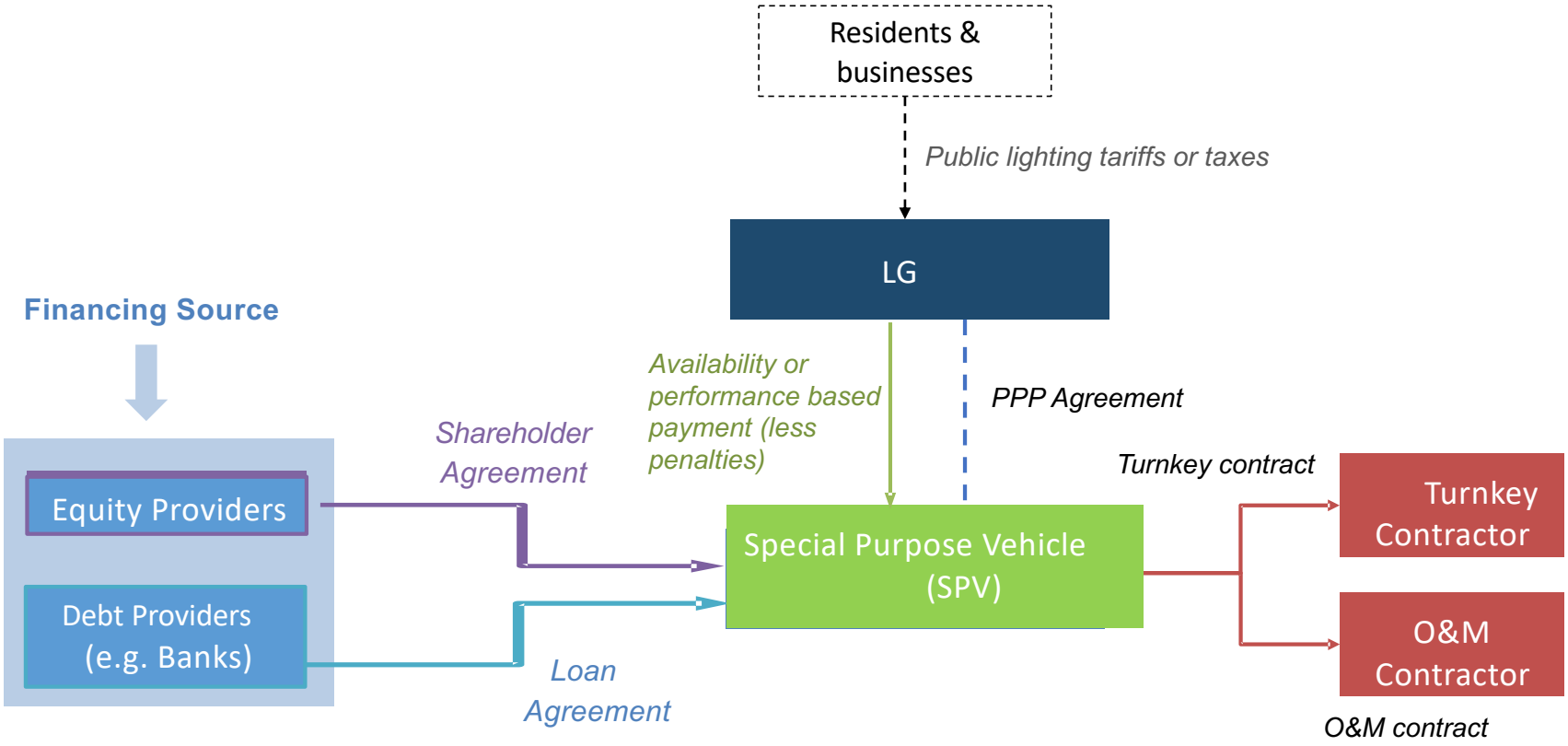
COMPARISON OF FUNDING MODELS

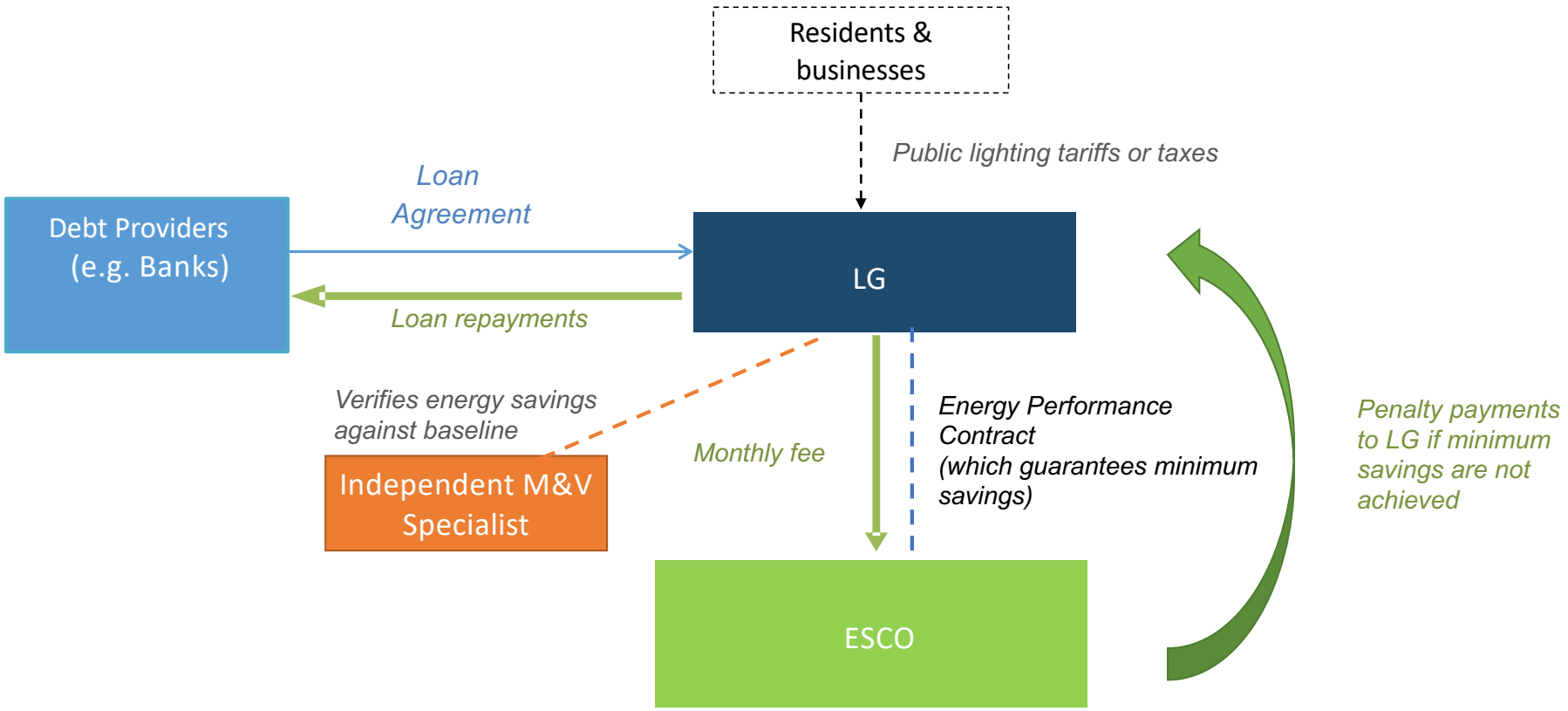
KEY ADVANTAGES VS. DISADVANTAGES

DESCRIPTIONS	KEY ADVANTAGES	KEY DISADVANTAGES
PUBLIC OWNED & OPERATED	• Procurement process is well known • LG controls asset	• LG retains all risks and has to raise 100% of funding • LG may not have required skills (O&M, M&V)
PUBLIC OWNED & PRIVATE SECTOR OPERATED (SLA)	• Project benefits from private sector skills (O&M, M&V) • Procurement process is well known	• LG retains construction risks (CAPEX overruns, design risk) • LG has to raise 100% of funding
ESCO FUNDED	• No funding required from LG • Project benefits from private sector skills (O&M, M&V) and performance risk is transferred to private sector	• Needs well developed ESCO market and banks that are willing to lend to ESCOs
PPP (100% private)	• No funding required from LG • Project benefits from private sector skills (O&M, M&V) and performance risk is transferred to private sector	• Prescribed PPP processes can be onerous and time consuming • Private sector capital can be expensive
PPP (minority LG ownership)	• Private sector can raise majority of funding • Project benefits from private sector skills (O&M, M&V) and performance risk is transferred to private sector	• LG must raise own share of funding • PPP processes can be onerous and time consuming • Private sector capital can be expensive

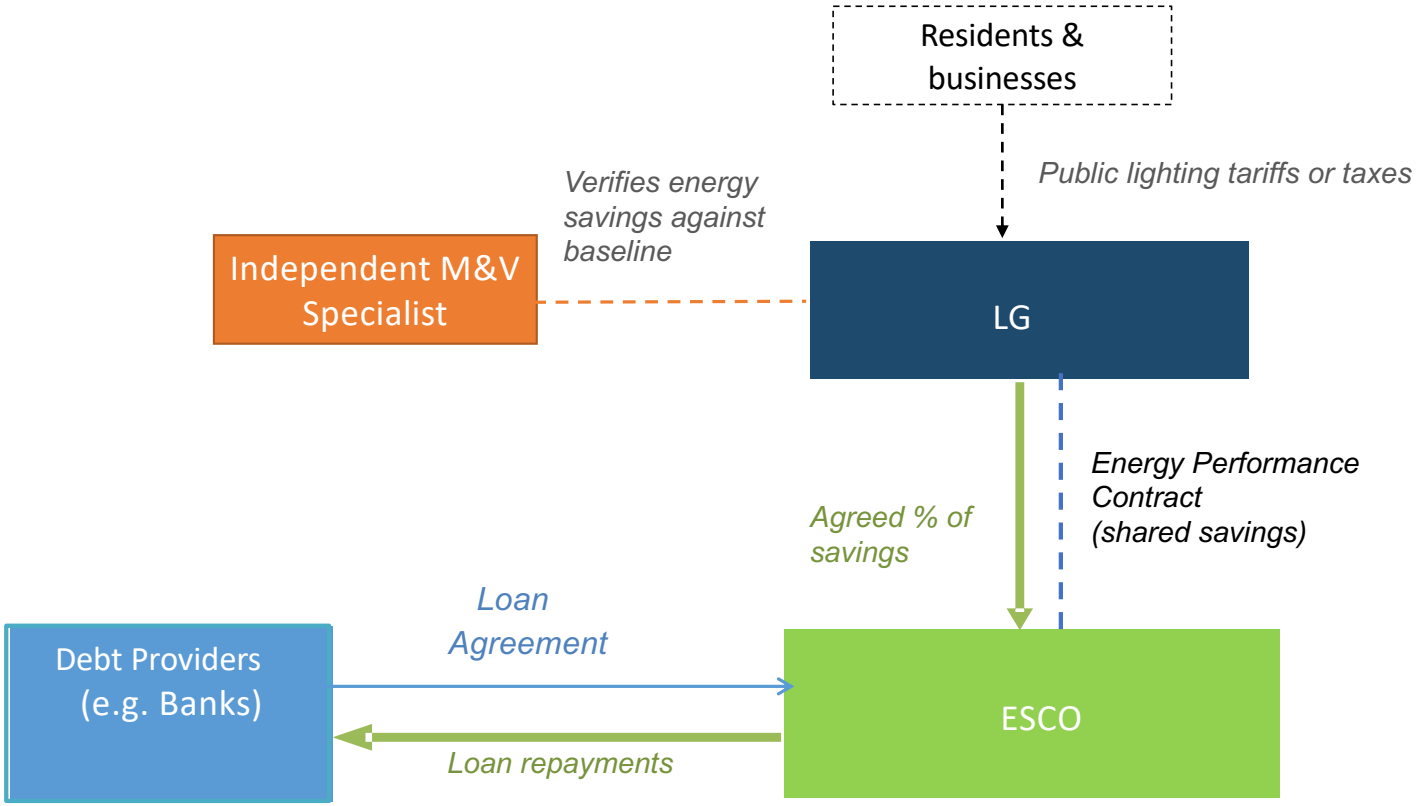
TYPICAL PPP STRUCTURE FOR A PUBLIC LIGHTING PROJECT



TYPICAL ESCO FUNDED STRUCTURE (GUARANTEED SAVINGS)

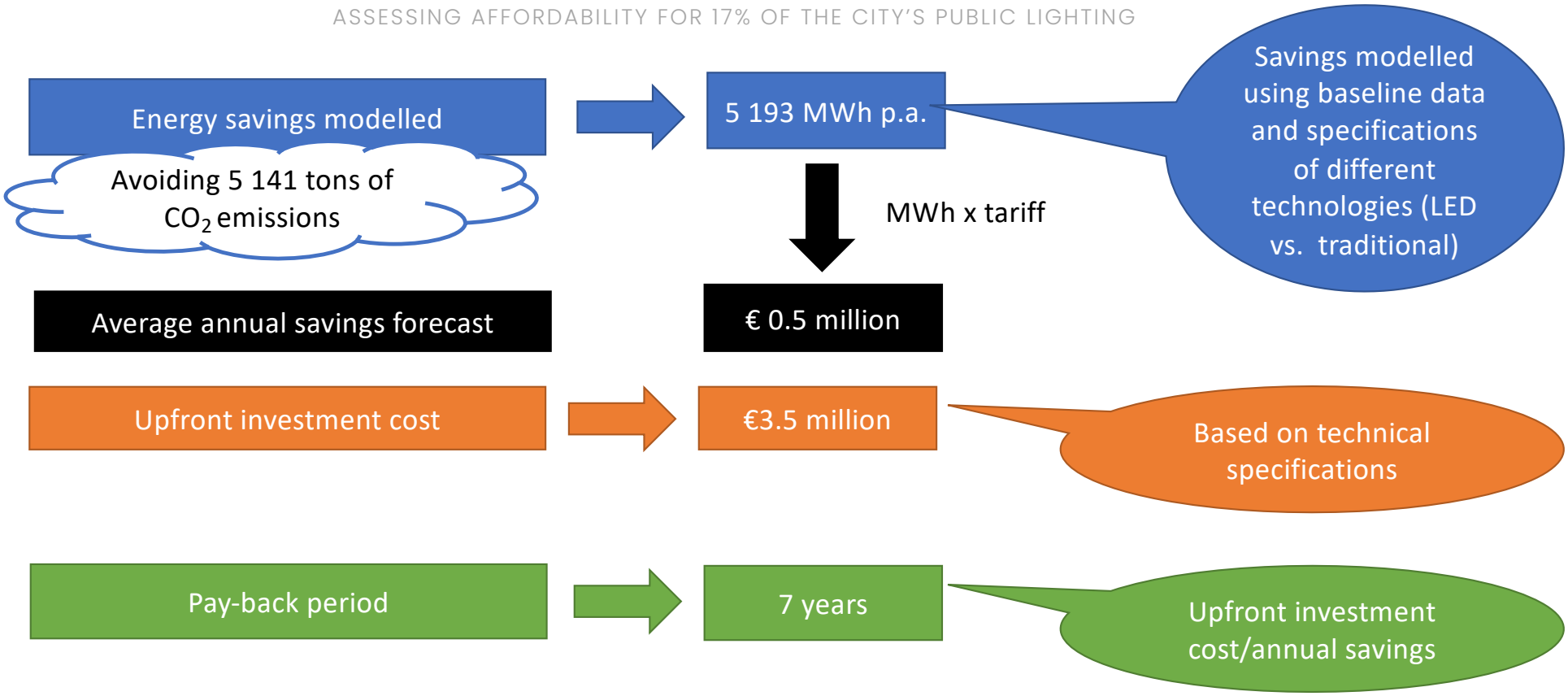


TYPICAL ESCO FUNDED STRUCTURE (SHARED SAVINGS)



CAPE TOWN'S PUBLIC OWNED & OPERATED RETROFIT PROGRAM

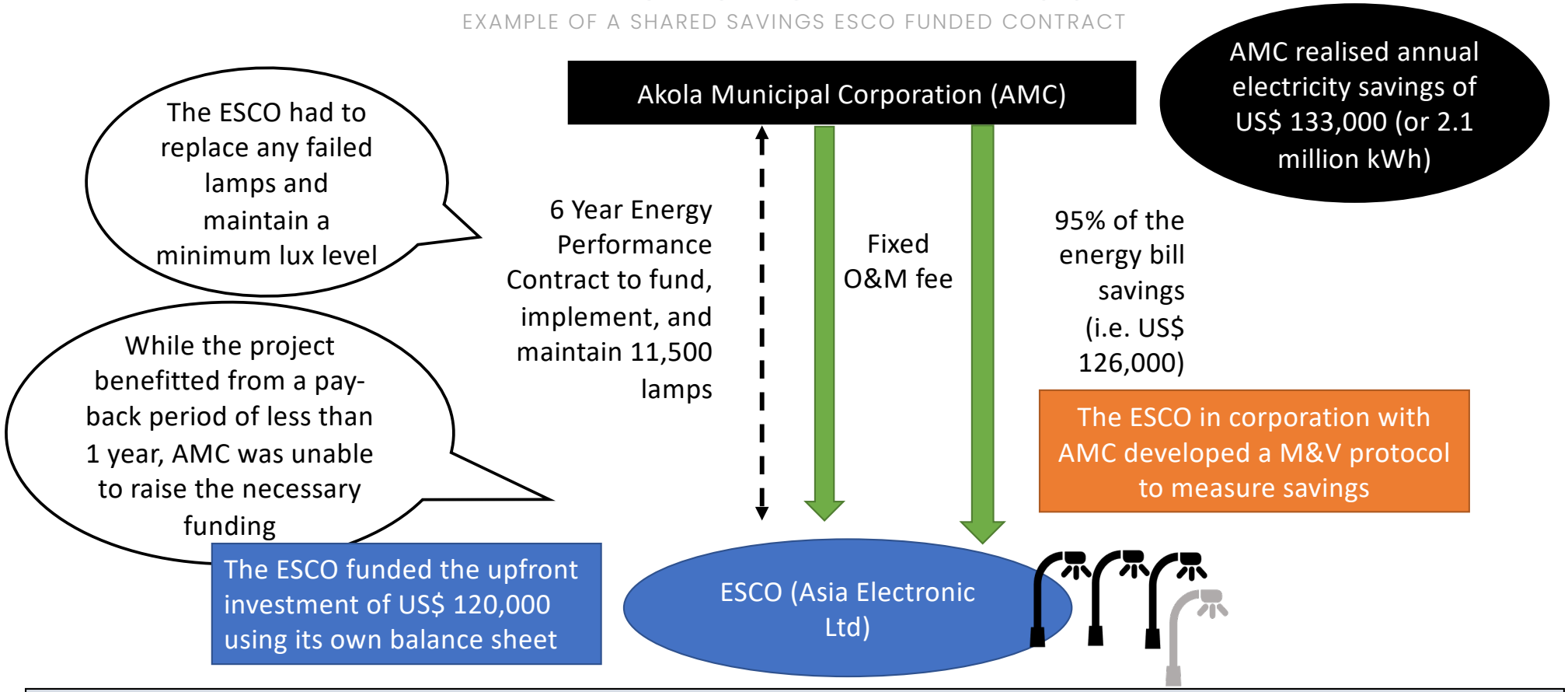
ASSESSING AFFORDABILITY FOR 17% OF THE CITY'S PUBLIC LIGHTING



Insight: Cape Town retrofitted all its traffic lights with LED lights at a cost of €1.8 million and benefits from €0.8 million of savings per year (i.e., a pay-back period of less than 3 years).

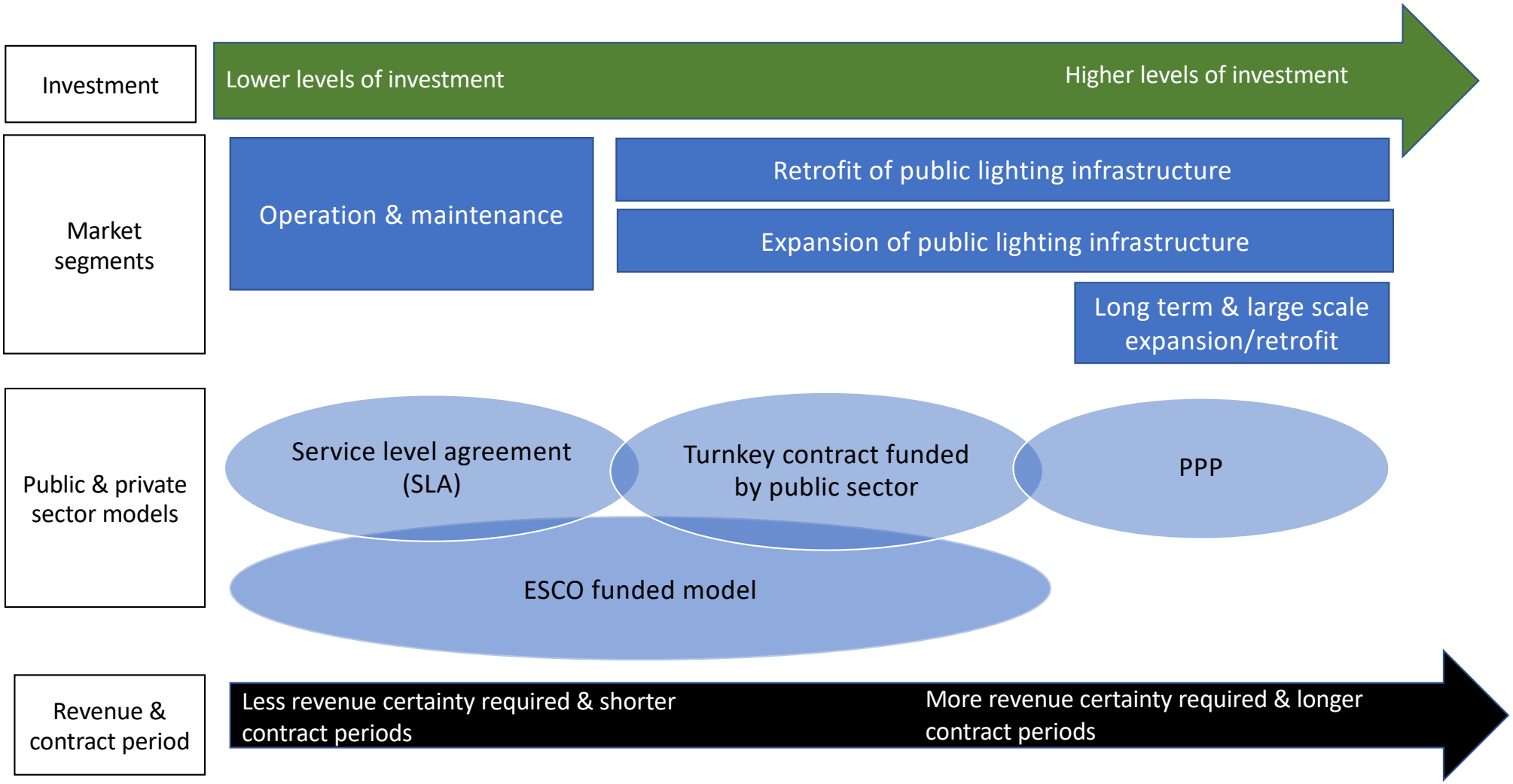
INDIAN ESCO FUNDED PROJECT

EXAMPLE OF A SHARED SAVINGS ESCO FUNDED CONTRACT



Insight: In 2007 Asia Electronic Ltd was a light manufacturer rather than an ESCO that was willing to offer AMC a funded solution backed by a 6-year Energy Performance Contract. The ESCO took on various risks (performance, late payment, credit risk, etc.) but was handsomely rewarded with an IRR of over 100%

TYPICAL PUBLIC LIGHTING FUNDING MODELS



FUNDING TYPOLOGY: RISK AND REVENUE FACTORS TO CONSIDER

ACCEPTANCE OF TECHNOLOGY RISKS

Considers how familiar lenders are with the technology and therefore willing to potentially finance the project

REVENUE CERTAINTY

Key to understanding whether a project can support debt and private sector equity

ABILITY TO MANAGE ENVIRONMENTAL/SOCIAL RISKS

Funders, especially DFIs, will want to ensure that environmental and social risks have been minimized

ABILITY TO MITIGATE OPERATIONAL RISKS

Considers the project's operational risks and how they can be mitigated to reduce risk for the LG, private sector, and lenders

ACCESS TO CREDIT ENHANCEMENTS

Credit enhancement can increase a project's revenue certainty, allowing the project to access more commercial sources of funding

ABILITY TO MANAGE CAPEX RISKS

Considers whether construction risk (and therefore cost overruns) have been mitigated and whether revenues will be enough to repay the upfront investment

REVENUE & RISK FACTORS – PUBLIC LIGHTING PROJECT (slide 1 of 2)

AKOLA MUNICIPAL CORPORATION ESCO FUNDED PROJECT

REVENUE CERTAINTY

Project fundamentals	Low = 0	Medium =3	High =5
Revenue certainty			
Cost recovery through user payments/savings			
Opportunities for generating 3rd party revenue	N/A		
Ability of LG to guarantee revenue			
Ability to manage tariff risk			
Creditworthiness of offtaker(s)			
Predictability of demand			
Predictability of supply	N/A		

High score (3.8 out of 5) due to:

- Revenues that are >5 times higher than upfront investment cost and additional O&M fees
- Demand is known

OPEX RISKS

Project fundamentals	Low = 0	Medium =3	High =5
Ability to mitigate operational risks			
Ability of supplier to ensure required inputs			
Predictability of costs (due to FX etc.)			
Likelihood of recovering OPEX via revenue/savings			

Very high score (4.3 out of 5) score due to:

- Costs that are predictable
- Operational costs are covered by additional fee

CAPEX RISKS

Project fundamentals	Low = 0	Medium =3	High =5
Ability to manage CAPEX risks			
Ability to recover CAPEX investment via revenue			
Ability to transfer construction risk to private sector			

Very high score (5 out of 5) due to:

- Revenues that are >5 times higher than upfront investment cost

OTHER FACTORS & SUMMARY – PUBLIC LIGHTING PROJECT (slide 2 of 2)

AKOLA MUNICIPAL CORPORATION ESCO FUNDED PROJECT

TECHNOLOGY RISKS

Project fundamentals	Low = 0	Medium =3	High =5
Acceptance of technology risks			
Acceptance of technology by lenders			
Suitability as collateral for commercial lenders	N/A		

High (4.0 out of 5) score as:

- Technology was simple and manufacturer of the equipment supplied funding

E&S RISKS

Project fundamentals	Low = 0	Medium =3	High =5
Ability to manage environmental/social risks			
Ability to minimise environmental impact/costs			
Ability to minimise social impact/costs			

Very high (5 out of 5) score as:

- Retrofit of existing infrastructure that had little or no environmental impact during installation and achieved significant E&S benefits once operational

SUMMARY

Project fundamentals	Low = 0	Medium =3	High =5
Revenue certainty			
Ability to mitigate operational risks			
Ability to manage CAPEX risks			
Acceptance of technology risks			
Ability to manage environmental/social risks			
Access to credit enhancement	N/A		
Average			

Overall score of 4.3 indicates that project can attract funding from an ESCO or a supplier of equipment that is able to fund the upfront investment costs

WHAT IS BLENDED FINANCE?

Blended finance - Addresses market failures by mitigating risks for private investors and/or improving returns; examples:

- **Interest rate subsidies -** Makes use of public grants to reduce a project's debt service payments
- **Concessional loans and/or grants -** Can reduce interest costs and offer longer maturities than those offered by private banks, allowing annual repayments to be reduced and spread over a longer period
- **Subordinated debt** - Form of debt that ranks behind 'senior debt' (e.g. bank loans) but before equity providers. It can help to insulate senior debt investors from unacceptable risks and reduces the cost of capital in cases where equity is too expensive
- **First loss - S**hields investors from a pre-defined amount of financial losses, making it more attractive for the private sector to fund the project's debt and/or equity
- **Guarantees** can mitigate various types of investment risks, including political, policy, regulatory, credit and technology risk

Types of guarantees and the risks they mitigate

Guarantee	Political Risk	Policy & Regulatory Risk	Counterparty Risk	Technology Risk	Currency Risk
Political risk insurance	×	×			Convertibility risk only
Partial risk/credit guarantee	×	×	×		
Export credit guarantee	×	×	×	×	
Currency risk mitigation (e.g., swaps, TCX)					×

LESSONS LEARNT FROM EXISTING PUBLIC LIGHTING PROJECTS

1 RETROFIT PROJECTS PAY FOR THEMSELVES

City of Cape Town Retrofits – The City achieved payback periods of 3 years on its traffic light retrofits and 7 years across a large portfolio of streetlights

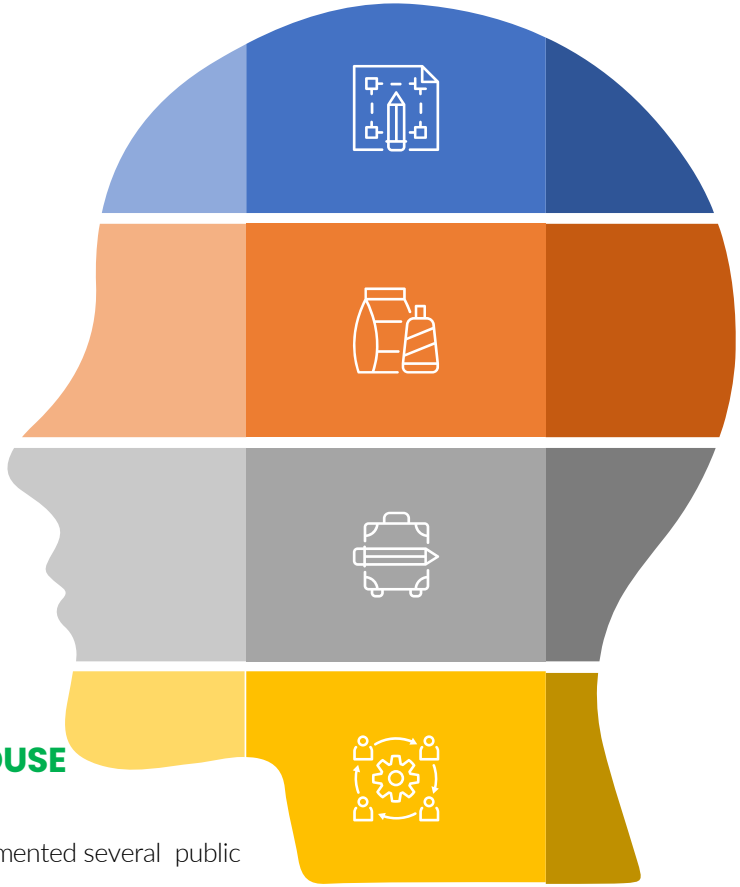
Indian ESCO Funded Project – The private sector recovered its upfront investment within 1 year due to minimal upfront investment requirements

2 BLENDED FINANCE CAN BE ACCESSED TO MAKE PUBLIC LIGTHING MORE AFFORDABLE

Ugandan turnkey contract funded by public sector - Jinja in Uganda accessed UGX2 billion (US$ 531,000) in loans from the USMID World Bank Program and grants from National Government to upgrade the city's road network and street lighting

3 PROJECTS CAN MADE MORE ATTRACTIVE TO THE PRIVATE SECTOR IF UPFRONT INVESTMENT IS MINIMISED & CONTRACT PERIODS ARE MAXIMISED

Indian ESCO Funded Project – The private sector's upfront investment was minimized as it was only required to replace lighting systems and did not have to fund structural or electrical systems. The private sector also benefited from a generous contract term of 6 years



4 THE PUBLIC SECTOR NEEDS TO ASSESS WHAT SKILLS IT HAS IN-HOUSE AND WHAT SKILLS NEED TO BE CONTRACTED

Indian Super ESCO – EESL, a public entity, acts as a Super ESCO in India and has successfully implemented several public lighting projects. It appoints the private sector to maintain lights under service level agreements after the equipment has been installed

3.1 BREAKOUT & FEEDBACK SESSION 3

Covenant of Mayors
in Sub-Saharan Africa

EXERCISE 3: APPLY TYPOLOGY TO YOUR LIGHTING PROJECT

EXERCISE 3: TYPOLOGY TOOL TEMPLATE

Project fundamentals	Score (0 to 5)	Clarification	Score guide
Revenue certainty			
Cost recovery through user payments/savings		Will the LG be able to reallocate electricity and maintenance savings to pay the private sector for retrofits? Can public lighting tariffs be implemented or expanded to pay for new public lighting projects?	Yes=5,Maybe=3,No=0 If not applicable, "n/a"
Opportunities for generating 3rd party revenue		Are there significant opportunities to earn advertising revenue by renting out spaces on lighting poles?	
Ability of LG to guarantee revenue		Can the LG make availability payments to the private sector or guarantee minimum payments?	
Ability to manage tariff risk		Can future savings be estimated reliably as future tariffs are likely to be fairly predictable?	
Creditworthiness of key off-takers		Does the LG have a good track record of paying suppliers on time and in full? Is the LG's balance sheet strong enough to attract investment from the private sector?	
Predictability of demand		Are the total hours of illumination known over the contract period?	
Predictability of supply		In respect of solar projects, are irradiation levels favourable and known?	
Ability to mitigate operational risks			
Ability of supplier to ensure required inputs (quantities, quality)		Are the suppliers of inputs such as lamps or PV panels able to guarantee quantity and quality under contract?	Yes=5,Maybe=3,No=0 If not applicable, "N/A"
Predictability of costs		Are operational costs likely to be predictable?	
Likelihood of recovering opex via revenue/savings		Will revenues or savings achieved (by new project) be enough to cover operational costs?	
Ability to manage CAPEX risks			
Ability to 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?	Yes=5,Maybe=3,No=0 If not applicable, "N/A"
Ability to transfer construction risk to private sector		Can construction risk be transferred to the private sector via a turnkey contract or another measure?	
Acceptance of technology risks			
Acceptance of technology by lenders		Is this a tried and tested technology that lenders will be comfortable with?	Yes=5,Maybe=3,No=0 If not applicable, "N/A"
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?	
Ability to manage environmental/social risks			
Ability to minimise environmental impact/costs		Are environmental approvals already in place, reducing the risk of delays?	Yes=5,Maybe=3,No=0 If not applicable, "N/A"
Ability to minimise social impact/costs		Are communities supportive of the project and are they willing to pay taxes (if relevant)?	
Access to credit enhancement			
Availability of guarantees		Can the project access any guarantees from national/LG/DFIs to improve revenue certainty?	Yes=5,Maybe=3,No=0 If not applicable, "N/A"
Average		**CALCULATE AVERAGE OF SCORES**	

EXERCISE 3: INTERPRETING AVERAGE SCORES

Generic funding mechanisms	Grants (Govt + ODA)	Blended finance, impact investment	ESCO funded + grant /blended	PPP, project bonds
Climate funding mechanisms	Grants	Concessionary loans + grants		Green bonds, equity

4.0 LG ACTION STEPS REQUIRED

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in Sub-Saharan Africa

OVERVIEW OF PROJECT DEVELOPMENT LIFECYCLE

EIGHT STAGES OF DEVELOPMENT

1. IDENTIFICATION

Identify projects based on LG's needs

2. EXPERT ENGAGEMENT

Engage the right experts to assess options

3. ASSESS OPTIONS

Quantify the benefits of each option and assess which options are affordable. Identity a preferred option.

4. EARLY PROJECT FINANCE

Secure financial support from LG and National Government. Engage with other development partners.

5. DEMONSTRATE FEASIBILITY

Conduct detailed technical and financial studies to conclude on affordability

6. SECURE FUNDING

Formalize funding commitments with legal contracts or via LG/NG budgets

7. PROCUREMENT

Appoint private sector partner (if PPP) via tender process. Procure Turnkey contractor if public owned, and SLA partner if operated by the private sector.

8. MONITORING

Monitor performance of private sector against contractual obligations. Report on KPIs.

KEY ROLES DURING PROJECT DEVELOPMENT LIFECYCLE (slide 1 of 2)

PROJECT MANAGER

CONSULTANT TEAM (technical and financial experts)

LG's CHIEF FINANCIAL OFFICER

NG

DFIs

KEY ROLES DURING PROJECT DEVELOPMENT LIFECYCLE (slide 2 of 2)

5. DEMONSTRATE FEASIBILITY

Develop a **business case/feasibility study** that quantifies payback periods for different interventions and concludes on affordability

6. SECURE FUNDING

Formalize funding commitments with legal contracts or via LG/NG budgets

7. PROCUREMENT

Procure Turnkey contractor if public funded, and SLA partner if operated by the private sector. Procure ESCO for an ESCO Funded Model and private sector consortium for a PPP

8. MONITORING

Monitor performance of private sector against contractual obligations. Report on KPIs

PROJECT MANAGER

CONSULTANT TEAM (various experts)

LG's CHIEF FINANCIAL OFFICER + EXECUTIVE

NG

DFIs

LG's LEGAL/COMPLIANCE TEAM

EQUIPMENT SUPPLIER or ESCO

CONSTRUCTION COMPANY

OPERATOR or ESCO

DETAILS ON STEP 1. PLANNING

The Project Owner needs to unpack the LG's Public Lighting needs and status quo by answering the following questions:

COST STRUCTURES

What costs are incurred to provide Public Lighting

ASSET REGISTER

Document existing Public Lighting assets, their ages, and technologies

ENERGY USE DATA

Assess what energy use data is available that can be used to establish a baseline

ENERGY MANAGEMENT PLAN

Document LG's aims, objectives and targets for Public Lighting projects

REVENUE MECHANISMS

What taxes or levies are paid by households/businesses

EXISTING PROGRAMS

Which programmes or standardised designs/contracts/energy modelling tools can the LG access

BUDGETS

What budgets are available to implement a Public Lighting project and appoint consultants

POSSIBLE FUNDING MODELS

Which funding models are possible given the status of ESCOs in the country and regulations

Insight/example: In reality, many of the responsibilities listed above are often passed onto experts. Undertaking these steps upfront will allow LGs to better scope work to be undertaken by experts and reduce expert costs.

DETAILS ON STEP 2. EXPERT ENGAGEMENT

HOW TO ENGAGE THE RIGHT EXPERTS

FACTORS TO CONSIDER

- Budgets available to hire experts
- LG's internal capacity
- Complexity of project
- Capacity to develop terms of reference
- Availability of local experts

TERMS OF REFERENCE (ToR)

- Seek support from development partners with ToR development
- Specify minimum skills and track record requirements
- Consider how requirements will be scored/evaluated
- Clearly define deliverables, timelines and payment milestones

EVALUATION & APPOINTMENT

- Development partner could form part of evaluation committee
- Develop scoring matrix to evaluate bids
- Communicate outcome of evaluation to bidders
- Finalize contract

Insight: If limited budgets are available to appoint consultants, the LG may want to adopt a phased appointment approach. A LG can include a break clause in the contract and require consultants to price the different phases/deliverables separately.

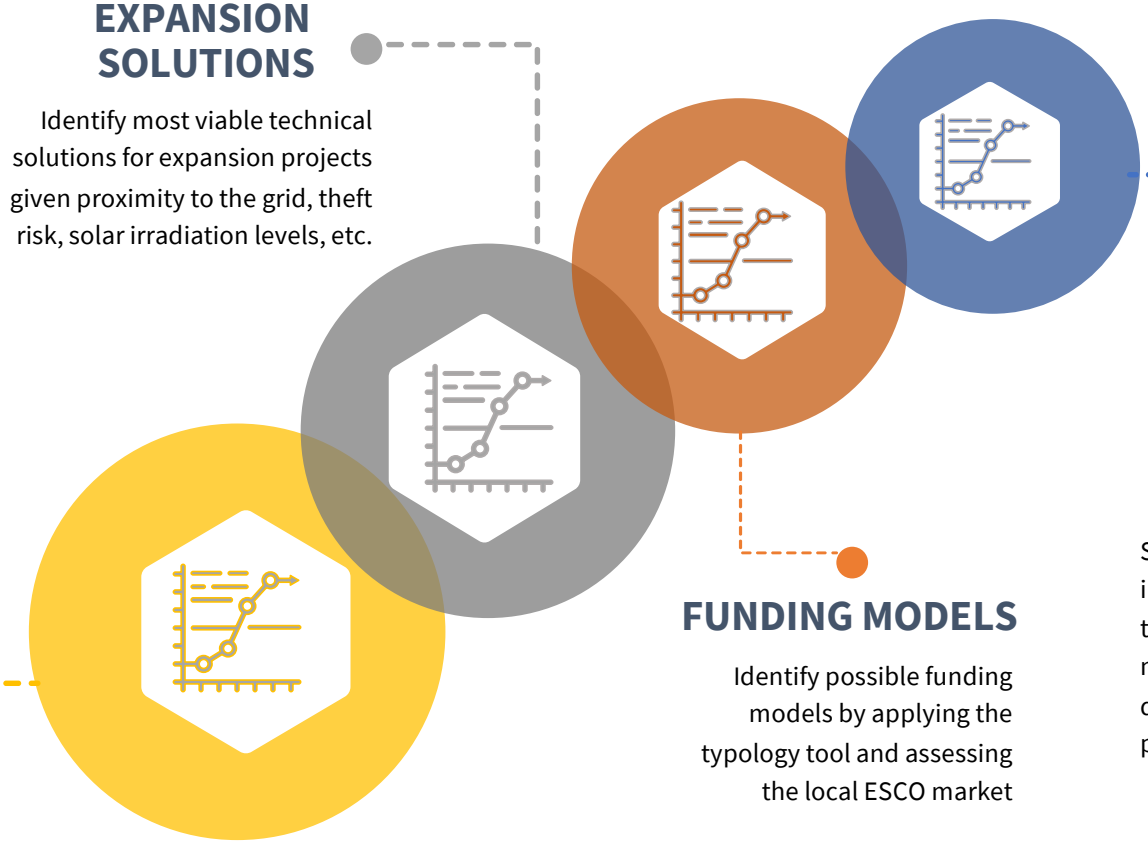
DETAILS ON STEP 3. IDENTIFY PROJECTS

RETROFIT SOLUTIONS

Identify most viable technical solutions for retrofit projects based on existing infrastructure and payback targets

EXPANSION SOLUTIONS

Identify most viable technical solutions for expansion projects given proximity to the grid, theft risk, solar irradiation levels, etc.



FUNDING MODELS

Identify possible funding models by applying the typology tool and assessing the local ESCO market

SHORTLIST

Shortlist existing Public Lighting infrastructure based on their potential to achieve savings (retrofits) and minimize costs while achieving development impact (expansion projects)

PROJECT MANAGER

CONSULTANT TEAM (technical and financial

3a. IDENTIFYING FUNDING MODELS

APPLY THE TYPOLOGY TOOL

Project fundamentals	Low = 0	Medium =3		High =5
Revenue certainty				
Ability to mitigate operational risks				
Ability to manage Capex risks				
Acceptance of technology risks				
Ability to manage environmental/social risks				
Access to credit enhancement	N/A			
Average				
Generic funding mechanisms	Grants (Govt + ODA)	Blended finance, impact investment	ESCO funded + grant /blended	PPP, project bonds
Climate funding mechanisms	Grants	Concessionary loans + grants		Green bonds, equity

UNDERSTAND REGULATORY ENVIRONMENT & ESCO MARKET

Identify funding models based on the project's revenue and risk profiles

Eliminate funding models that are not supported

CONFIRM MOST SUITABLE FUNDING MODELS

DETAILS ON STEP 4. EARLY PROJECT FINANCE

SECURING FINANCIAL COMMITMENTS

PROJECT MANAGER

CONSULTANT TEAM

LG ENGAGEMENT

- Present shortlist to LG's CFO and discuss target payback periods
- Seek early commitment for funding from CFO (own sources of revenue, debt, grants, etc.)
- Identify funding gap

NG ENGAGEMENT

- Assess relevance of national grant mechanisms
- Understand grant requirements and processes to access

DFI ENGAGEMENT

- Discuss project with development partners who may be able to support project development or fund the project
- Verify funding assumptions
- Discuss need for credit enhancement mechanism(s) that could unlock funding from equipment suppliers or ESCOs
- Develop a concept note to apply for project preparation funding and/or credit enhancement

Insight: Early engagement with developers and equipment suppliers is key to ensuring that a project will be attractive and viable for the private sector. Funding models may need to be reassessed or adapted if the private sector perceives the project as too risky.

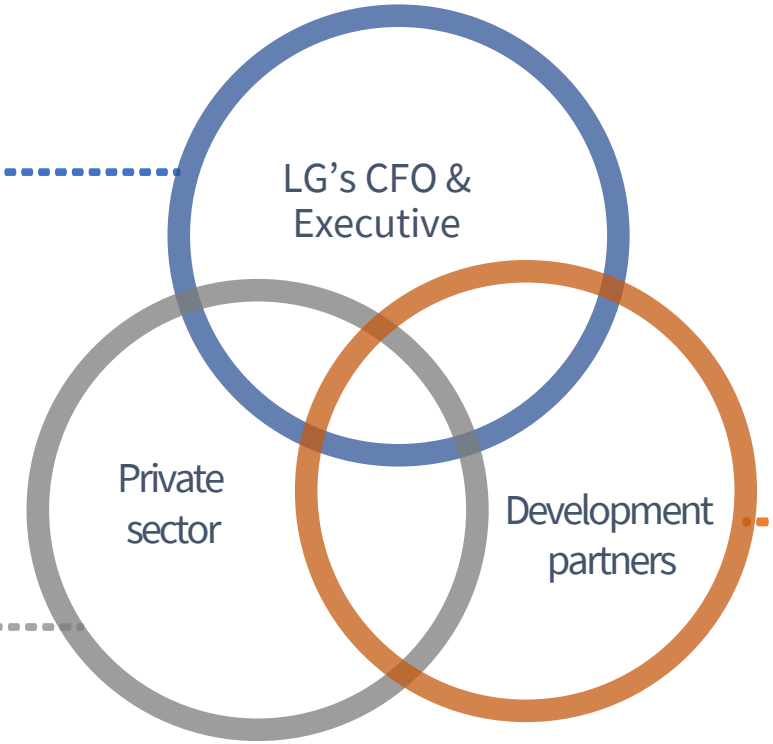
15 MIN BREAK

Covenant of Mayors
in Sub-Saharan Africa

DETAILS ON STEP 5. DEMONSTRATING FEASIBILITY

UNDERSTAND PROJECT VIABILITY REQUIREMENTS AND THE QUESTIONS THAT WILL NEED TO BE ANSWERED

- What the project's payback period is
- What the project's impact will be on user fees/tariffs
- How the project aligns with development plans, job creation targets, etc.



- Political support (local & national) for project
- Development benefits (jobs, climate, etc.)
- Whether the project's benefits will be greater than its costs
- How social and environmental risks will be mitigated
- Whether the business model is sustainable

- Whether risks have been allocated appropriately between the private and public sectors
- LG's ability to pay the private sector for services

Insight: Historically, many SSA feasibility studies were led by technical experts with limited inputs from financial experts. This approach often resulted in technically sound, but unaffordable or unfunded solutions.

5.a. DEMONSTRATING FEASIBILITY

STEPS 1 to 3

PROJECT MANAGER

CONSULTANT TEAM (all experts)

ENERGY AUDITS

- Conduct preliminary energy audits on shortlisted projects to assess energy efficiency potential
- Install a metering system to capture baseline data

TECHNICAL STUDIES

- Identify most suitable technical solutions
- Quantify each project's capital and operational expenditure under different technical scenarios
- Develop a tariff price path that can be used to quantify future savings
- If funded by the public sector, conduct an investment grade energy audit on preferred project or projects
- Calculate potential energy savings

MODELLING

- Model forecasts upfront investment and O&M costs and energy savings to calculate payback periods
- Payback periods are calculated for different funding models (if relevant)
- Economic modelling (if required) will quantify the project's economic benefits relative to its costs
- GHG modelling will quantify the project's emission savings

5.b. DEMONSTRATING FEASIBILITY

STEPS 4 to 6

PROJECT MANAGER

CONSULTANT TEAM (all experts)

CONFIRM FUNDING MODEL

- The model's outputs will confirm whether a funding model will be affordable to an LG
- Sensitivities test whether funding model remains feasible
- If funding model is not feasible, alternative funding models could be modelled.

M&E CRITERIA

- M&E criteria need to be identified
- GHG emission savings may need to be quantified and reported
- Baseline data will be required

REPORTING

- Business case needs to answer funders' questions
- Report should be concise and contain key findings
- Underlying technical reports or models should form annexures

Insight : Consultants often produce dense reports that have "thud value" while shorter punchier reports with annexures are far more likely to be read by funders and stakeholders. The project manager should work with the consultants to develop a report template that will be fit for purpose

6. SECURE FUNDING

PROJECT MANAGER

CONSULTANT TEAM (finance expert)

LG's CHIEF FINANCIAL OFFICER + EXECUTIVE | **DFIs** | **NG**

PUBLIC OWNED & OPERATED

PUBLIC OWNED & PRIVATE OPERATED (SLA)

- Submit business case to LG's CFO, Executive, and other involved parties (e.g., investors, National Government, DFIs, etc.)
- Present findings to Executive and obtain written approval for investment
- Present findings from business case to external funders (DFIs, NG, etc.)
- Obtain written commitments from external funders
- Ensure that project's funding requirements are included in LG's budgets
- LG's CFO finalizes capital funding with LG's treasury and completes grant funding processes

ESCO FUNDED

- Submit business case to LG's CFO, Executive, and other involved parties
- Present findings to Executive and obtain written approval to procure an Energy Performance Contract
- Ensure that LG's future estimated payments to the private sector are included in the LG's budgets
- If relevant, present findings from feasibility study to external funders (DFIs, NG, etc.) to secure grants and/or concessional finance

Insight: Grants from development partners and/or NG can be used to make any of the models more affordable to the LG

7. PROCUREMENT (PUBLIC FUNDED)

PROJECT MANAGER

CONSULTANT TEAM (various experts)

LG's CHIEF FINANCIAL OFFICER + EXECUTIVE

LG's LEGAL/COMPLIANCE TEAM

EQUIPMENT SUPPLIER or ESCO

CONSTRUCTION COMPANY

OPERATOR or ESCO

PUBLIC OWNED & OPERATED

- Technical consultant develops technical specifications
- Expression of Interest (EoI) is issued to shortlist Turnkey Contractors
- Contractors are shortlisted by evaluation committee using evaluation matrix
- Request for Proposal (RFP) issued to appoint a Turnkey Contractor that contains clear evaluation criteria
- Contractors submit tenders that specify price and performance guarantees
- Tenders are evaluated by the evaluation committee
- Preferred bidder is selected
- Turnkey contract is concluded

PUBLIC OWNED + SLA

- Technical consultant develops service specifications
- EoI is issued to shortlist operator
- Contractors are shortlisted by evaluation committee using evaluation matrix
- RFP is issued to appoint operator, clear evaluation criteria
- Operators submit tenders
- Tenders are evaluated and preferred bidder selected
- SLA is concluded

7. PROCUREMENT (ESCO FUNDED)

PROJECT MANAGER

CONSULTANT TEAM (various experts)

LG's CHIEF FINANCIAL OFFICER + EXECUTIVE	EQUIPMENT SUPPLIER or ESCO
LG's LEGAL/COMPLIANCE TEAM	CONSTRUCTION COMPANY
	OPERATOR or ESCO

ESCO FUNDED

- Technical consultant develops output specifications
- Expression of Interest (EoI) is issued to shortlist consortia (equipment supplier, construction company & operator)
- Consortia are shortlisted by evaluation committee using evaluation matrix
- Request for Proposal (RFP) issued to shortlisted consortia with clear evaluation criteria
- Shortlisted bidders are invited to conduct own preliminary energy audit
- Bids are evaluated by evaluation committee
- Preferred bidder is selected
- Preferred bidder undertakes investment grade energy audit
- Energy Performance Contract is concluded

Insight: The Energy Performance Contract must address performance guarantees, the payment structure and model, M&V, and agreement on the baseline for measuring energy savings during the project

8. MONITORING

PROJECT MANAGER
LG's CHIEF FINANCIAL OFFICER + EXECUTIVE
LG's LEGAL/COMPLIANCE TEAM

PUBLIC OWNED & OPERATED

- LG appoints an independent expert to monitor the turnkey contractor
- The independent expert must verify performance after installation/construction is completed
- Final payments are only made to the turnkey contractor once performance is verified
- Performance guarantees/bonds are cancelled following final sign off from independent expert

PUBLIC OWNED & PRIVATE OPERATED (SLA)

- LG establishes SLA monitoring process or appoints consultant to undertake process
- LG processes payments to private sector based on performance

ESCO

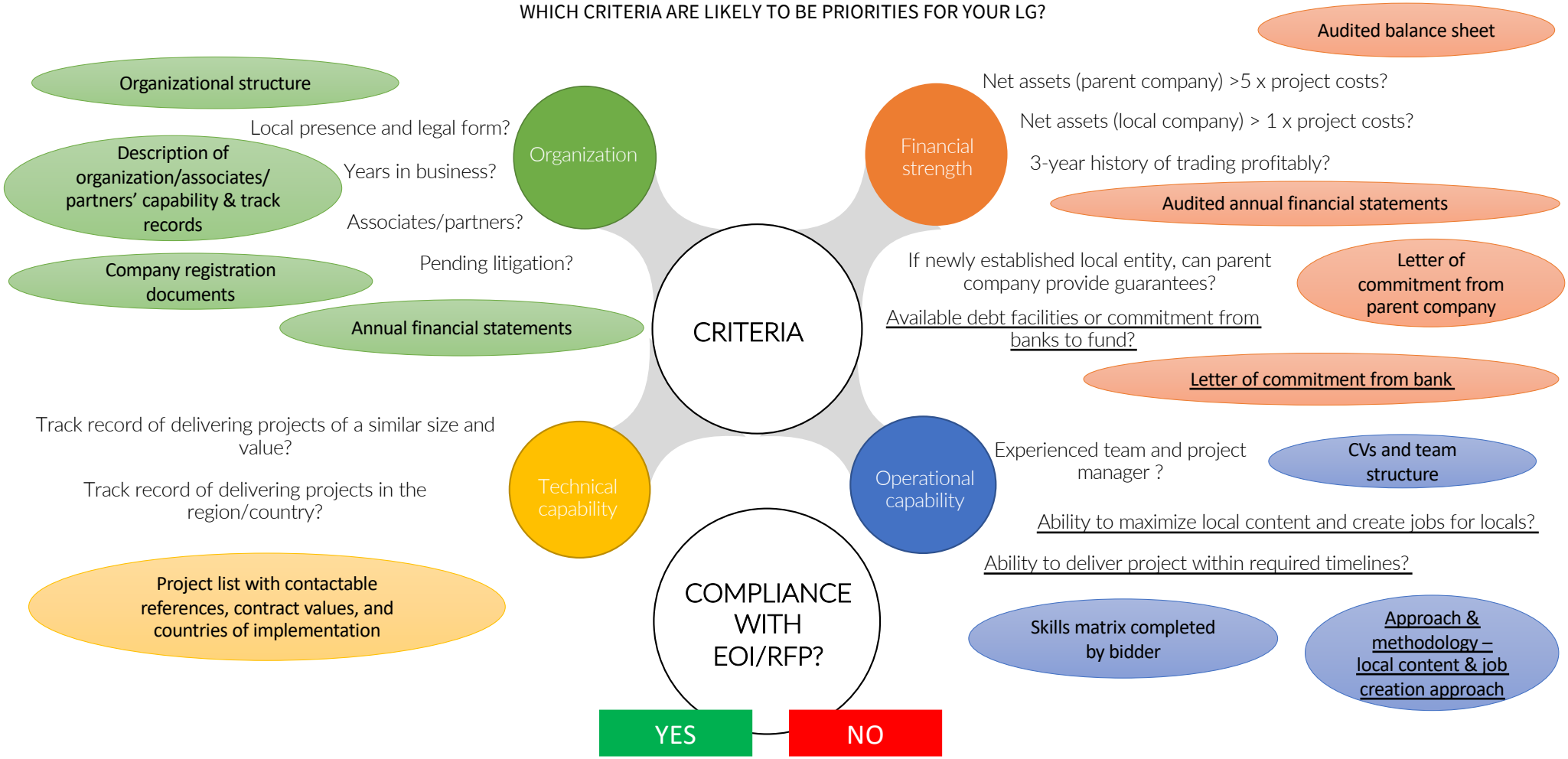
- LG establishes ESCO monitoring process or appoints consultant to undertake process
- LG processes payments to ESCO based on performance

4.1 BREAKOUT & FEEDBACK SESSION 4

Covenant of Mayors
in Sub-Saharan Africa

EXERCISE 4: DESIGN A VENDOR QUALIFICATION MATRIX

WHICH CRITERIA ARE LIKELY TO BE PRIORITIES FOR YOUR LG?



EXERCISE 4: VENDOR QUALIFICATION MATRIX EXAMPLE

CRITERIA	SUPPORTING EVIDENCE TO BE PROVIDED	SCORING APPROACH
Organization		
Identification of bidder	• Company registration documents • Audited annual financial statements	Bid is either compliant or noncompliant
Identification of partners, subcontractors, etc. (if relevant)	• Organizational structure	Bid is either compliant or noncompliant
Tax compliant	• Valid tax compliance certificate	Bid is either compliant or noncompliant
Financial strength		
Net assets (local company) > 1 x project costs or net assets (parent company) >5 x project costs	• Audited balance sheet • Letter of commitment from parent to support local company	Scores commensurate with level of net assets
3-year history of trading profitably (i.e., 3 cumulative years of net profit)	• Audited annual financial statements	Bid is either compliant or noncompliant
Other criteria		
Item 1		
Item 2		

EXERCISE 4: FEEDBACK FORM

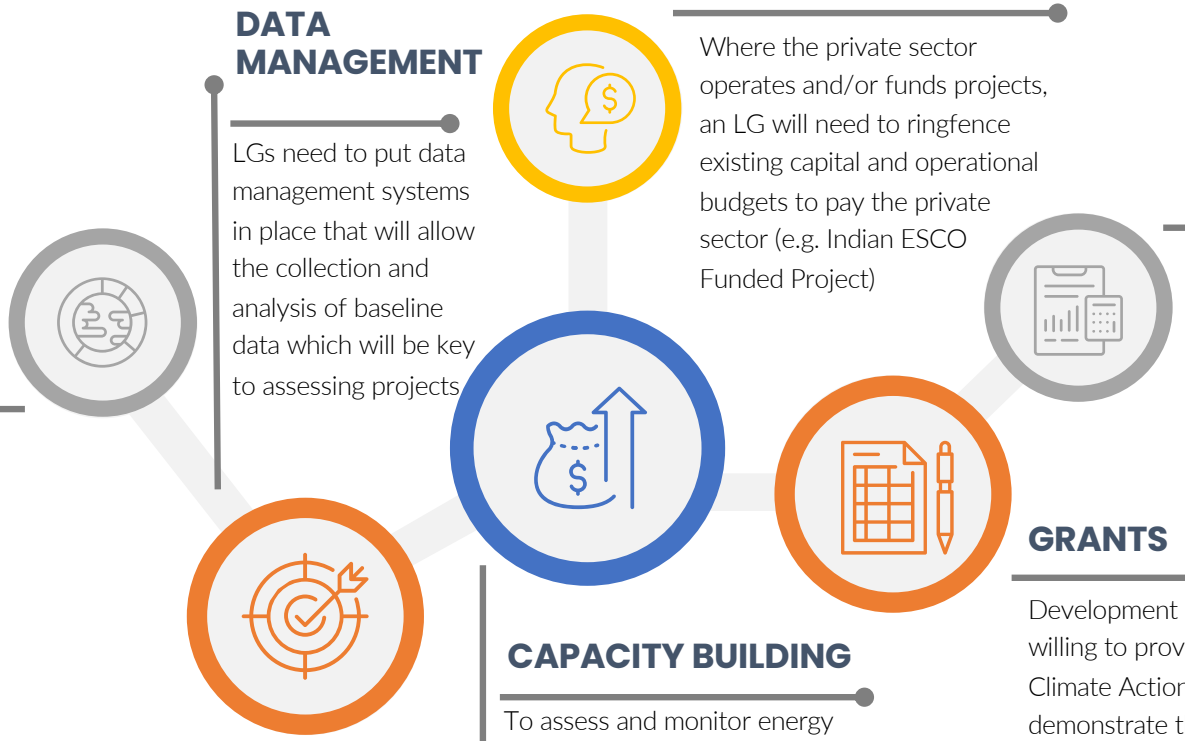
Criteria	Number of people that selected this criteria	Supporting evidence identified

5.0 HOW TO IMPROVE THE ENABLING ENVIRONMENT

Covenant of Mayors
in Sub-Saharan Africa

HOW LGs CAN UNLOCK PUBLIC LIGHTING PROJECTS

GIVEN THE IDENTIFIED ISSUES AND CONSTRAINTS



CONCESSIONAL DEBT

LGs may be able to raise concessional debt from DFIs using their own balance sheet to fund Climate Actions (e.g. City of Cape Town)

DATA MANAGEMENT

LGs need to put data management systems in place that will allow the collection and analysis of baseline data which will be key to assessing projects

BUDGETS

Where the private sector operates and/or funds projects, an LG will need to ringfence existing capital and operational budgets to pay the private sector (e.g. Indian ESCO Funded Project)

COST REFLECTIVE TARIFFS

Are key to ensuring financially sustainable projects. Development partners will want to understand how an LG intends to implement cost reflective tariffs

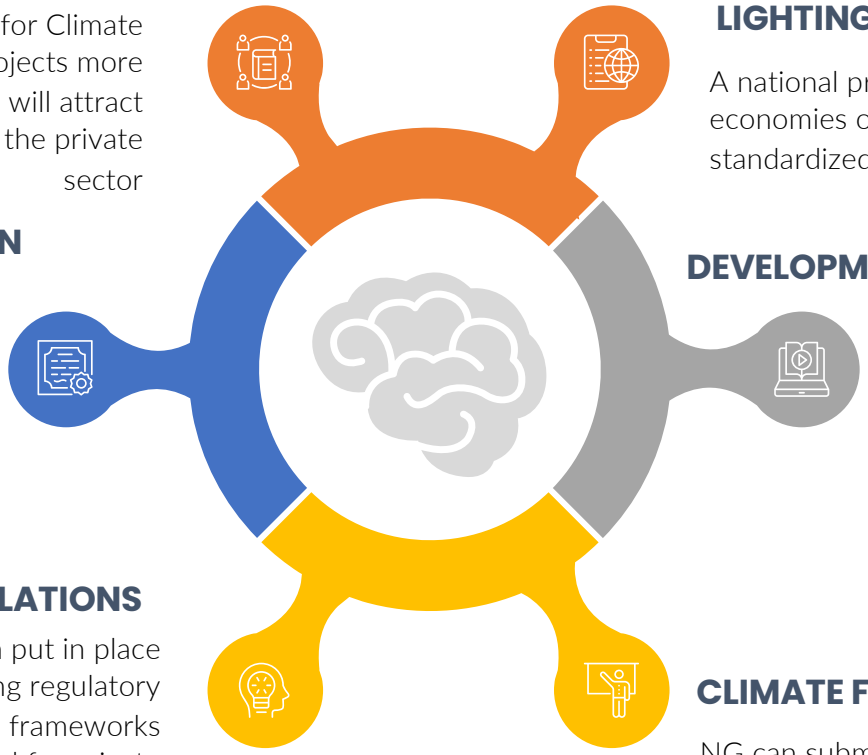
GRANTS

Development partners and NG may be willing to provide capital grants to a Climate Action Project if the LG can demonstrate that it will result in an affordable and sustainable project (e.g. Jinja Public Lighting Project)

CAPACITY BUILDING

To assess and monitor energy efficiency projects LGs will need people with specific skills sets and qualifications

LGs CAN LOBBY NG TO IMPLEMENT ENABLING CONDITIONS



TAX INCENTIVES

Tax incentives for Climate Actions will make projects more affordable to LGs and will attract investment from the private sector

NATIONAL PUBLIC LIGHTING PROGRAMMES

A national programme can achieve economies of scale as LGs can access standardized designs, contracts, etc

LEGISLATION

NG can put into place legislation that promotes private sector investment

- Energy Act that promotes energy efficiency
- Legislation that protects foreign investors' rights and minimises expropriation and exchange control risks
- PPP legislation

DEVELOPMENT OF ESCO MARKET

NG can develop the ESCO market by offering capacity building support to the private sector and by structuring a credit enhancement mechanism that will reduce the risk for ESCOs and their lenders

REGULATIONS

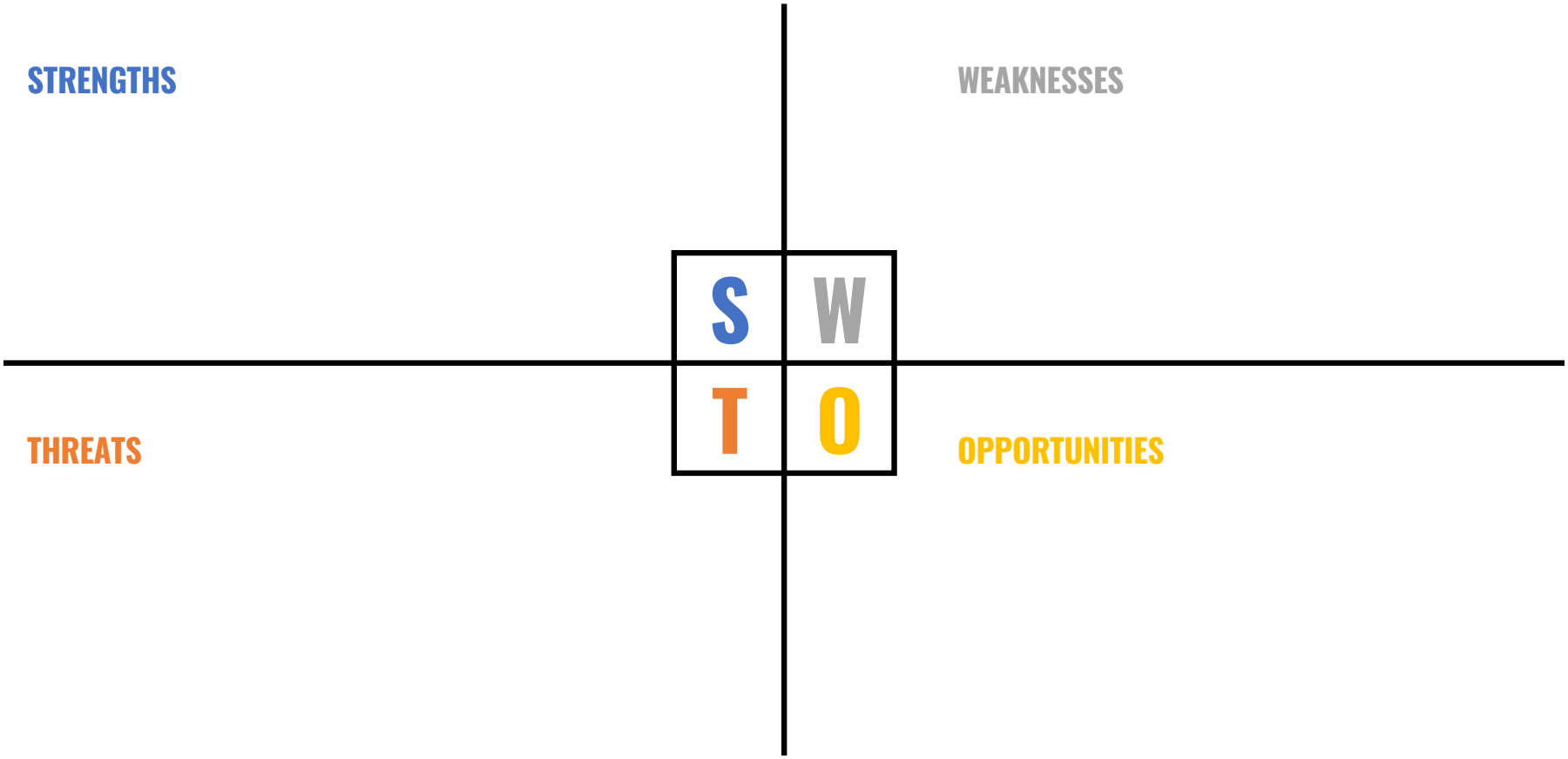
NG can put in place supporting regulatory and legal frameworks required for private sector participation

- National guidelines and standards for street lighting
- Investment policies
- Unsolicited bid policies

CLIMATE FACILITY APPLICATION

NG can submit application to the GCF and/or NAMA Facility that would unlock concessionary finance across several LGs

COUNTRY SPECIFIC ENABLING FACTORS



5.1 BREAKOUT & FEEDBACK SESSION 5

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in Sub-Saharan Africa

EXERCISE 5: ENABLING FACTORS EXAMPLE

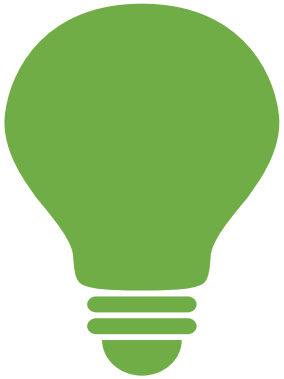
ENABLING FACTORS BASED ON THE CITY OF CAPE TOWN'S PUBLIC OWNED & OPERATED RETROFIT PROGRAM

City officials had the capacity to develop and evaluate turnkey tenders and contracts

The City's public lighting budgets were well understood

The cost of traditional public lighting technologies were known and affordability could be demonstrated

Measurement & verification processes had been put in place to monitor performance



The City could raise funding off its own balance sheet

The City undertook most viable retrofits first to prove concept

The City accessed grant funding from a national programme

Baseline data was captured and adequate data management processes had been put in place

EXERCISE 5: FEEDBACK FORM

Enabling factors – which are most feasible? How to obtain?	Answers (with numbers of how many people shared that issues)	Examples

6.0 WRAP UP

Covenant of Mayors
in Sub-Saharan Africa

ADDITIONAL TOOLS & INFORMATION

How to Finance Roadmaps
for 10 Climate Actions

6 Training Modules for LG
(including this one)

See COM SSA GlobalDF Climate Finance
(authored by GlobalDF; sponsored by GIZ, EU)
on GlobalDF website www.globaldf.org

See other training modules
(authored by GlobalDF; sponsored by GIZ, EU)
on GlobalDF website www.globaldf.org

For more information, please contact GlobalDF through the website contact form on www.globaldf.org

If interested in supporting the use of the training modules and their improvement, please contact Dr. Barbara Samuels, Executive Director of GlobalDF at barbara@globaldf.org