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LOW CARBON • CLIMATE RESILIENT • CITY DEVELOPMENT

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Local Governments for Sustainability

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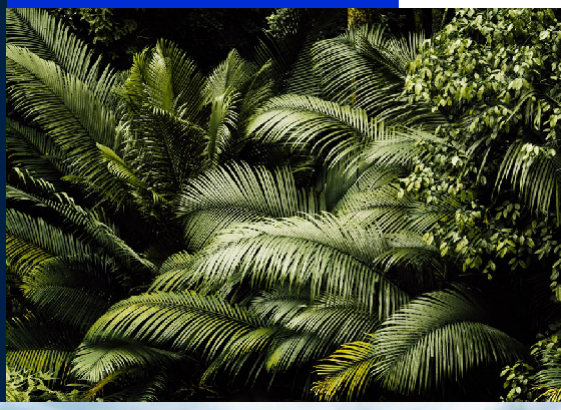
Module II:

Designing 'bankable' climate resilient infrastructure projects

Capacity Building Module
New Delhi, 02 February 2022



Details

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Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
CDM	Clean Development Mechanism
CLAF	City Level Advisory Forum
CNA	Capacity Need Assessment
CPI	Climate Policy Initiative
CRAP	Climate Resilient City Action Plan
CSCAF	Climate Smart City Assessment Framework
FCCL	Fiscal Cost and Contingent Liabilities
GOP	Gross Domestic Product
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LCCR	Low Carbon and Climate Resilient
MNRE	Ministry of New and Renewable Energy
NIUA	National Institute of Urban Affairs
NPK	Nitrogen, phosphorus and potassium or potash
NPSV	Net Present Social Value
PIN	Project Idea Note
PLN	Perusahaan Listrik Negara
PPP	Public Private Partnership
PULL	Project Urban Living Lab
SATAT	Sustainable Alternative Towards Alternative Transport
SDG	Sustainable Development Goals
ULB	Urban Local Body
ULL	Urban Living Lab
UNFCCC	United Nations Framework Convention on Climate Change

Designing “bankable” climate resilient infrastructure

Number of pages: 35

Learning goal:

Upon completion of this module, you will be able to:

- learn the basics and fundamentals of climate resilient infrastructure
- understand the key stages of project preparation
- tools and frameworks which can be used at different stages of project preparation to integrate “bankability”
- apply these tools and frameworks on live projects and entail learnings from live cases

Training Structure

- Offline/ Online trainings sessions through presentations, set of exercises, user manual for tools and Training of Trainer (ToT) manuals
- Training and reference material with respect to mapping on the above topic (this module)

Target Audience

The training is targeted towards the Smart Cities, Municipal Administration & Urban Development (state department officials), ULBs and development authority officials (Engineer, Dy. Commissioners, FAs among others) involved in taking decisions for financing low carbon and climate resilient infrastructure projects as well as trainers from regional training institutes that provide capacity building around these themes.

1. Introduction

The world is urbanizing at a rapid pace, and it is projected that 68% of world's population will reside in urban areas by 2050 (UNDESA, 2018). While urbanisation opens gateway to wider economic development, but is also have reparation in form of carbon emission from increase in energy demand at one hand and impact of extreme climate change events on other side. Cities are amongst biggest contributor as well as most vulnerable to climate change contributing to 75% of global carbon emissions. (UNEP, n.d). Hence, the cities have a key role to play in achieving global climate ambition to restrict world temperature rise by 1.5 degrees which would require significant investments in low carbon and climate resilient infrastructure.

World bank estimates that emerging economies will need to invest around 4.5 per cent of GDP (~over USD 2 tn) annually in development of sustainable infrastructure to achieve the SDG 2030 agenda. Another estimate from IEA suggest investments to the tune of 4% of global GDP is required to achieve net zero ambitions. Most of this investment would be focused on low carbon technologies and climate resilient infrastructure development in cities led by emerging economies. Moreover, once the acute phase of the COVID-19 crisis is over, governments will need investments in infrastructure more than ever to accelerate economic recovery, create jobs, reduce poverty, and stimulate productive investment. But most cities in these emerging economies face challenges in mobilising resources to finance the investments, given limited public resources and capacities, to narrow the investment gap these cities need to collaborate with regional and international sources of climate finance to unlock private sector infrastructure financing at scale.

India is amongst the fastest growing emerging economies in the world home to around 17% of world's populations, the rate of urbanisation in India is faster than most South Asian countries. UN estimates by 2050 the urban population size in India is set to double from 461 million to 877 million which would be in absolute numbers largest amongst the bigger Asian nations. High rates of urbanisation, industrialisation and economic development is exerting significant additional pressure on civic services and infrastructure across cities in India. This demographic pressure on urban infrastructure and services has mounted and is expected to increase in the future. The current quality of services and provision of infrastructure has, in turn, made cities both responsible for, and vulnerable to, climate change. It is estimated urban India generates 87% of national GHG emissions and multiplier effect of the impact of climate change disasters will expose USD 2 trillion of urban infrastructure assets and far reaching impact on the economy. Hence, to align with recently announce national ambition to achieve net zero by 2070, It is critical cities in India invest in development of low carbon and climate resilient infrastructure.

Development of such infrastructure would require significant investments, an investment requirement of INR 91 trillion (at current prices) was estimated by a high -powered government expert committee. A similar assessment was conducted by McKinsey Global Institute, which projected an investment need of INR 85 trillion (current prices) over the same period for the development of sustainable and inclusive urban infrastructure. National Infrastructure Pipeline recently estimated that an investment outlay of INR 19 trillion would be needed for urban infrastructure between 2021 and 2025. This translates into an average annual investment between INR 2.3-2.5 trillion over the next decade.

Given the limited public resources with the cities, they need to work towards blending the available climate finance resources from national & state budget, international development finance and climate funds towards mobilising investments from private sector at scale. This in turn requires cities to structure and develop a pipeline projects which are 'bankable' and wherever possible blend financing with available sources of local, regional and national climate finance. But at present cities face multiple internal as well as external constraints as below

- **Capacity constraints:** limited technical capacity to design "bankable" projects; limited knowledge of local, regional and national sources of climate finance and innovative structures, lack of capacity to execute complex financial transactions along with governance factors.

- **Institutional constraints:** low credit worthiness of Urban Local Bodies (ULB); willingness to charge for services to citizen to recover project costs

- **Market constraints:** underdeveloped debt capital markets for municipal borrowing, high transaction cost from investor's side

To circumvent the above capacity constraints and build capacities of city and state officials to enable access to climate finance, CapaCITIES a multiyear project supported by Swiss Agency for Development and Cooperation is working with 8 Indian cities and 2 States since last 6 years. The project team through working very closely with city and state officials have identified the key capacity gaps and has designed a comprehensive training program with two modules incorporating the best practices, approaches from the CapaCITIES project as well as national and global cases. These modules include:

1. Module I: Climate finance for cities: focusing on building knowledge of city and state officials on sources and application of climate finance

2. Module II: Designing 'bankable' climate resilient infrastructure projects: focusing on building capacity of city officials to incorporate bankability at each stage of project preparation

While the Module I aims at building ability of city officials identify suitable sources of climate finance, this Module focused on development of capacities of city officials to develop strong and fundable proposal by building understanding of bankability.

Hence, this module II focuses on providing actionable guidance to the target stakeholders to design bankable innovative low carbon and climate resilient urban solutions using lessons and experiences drawn from CapaCITIES project in Indian cities and expertise of national and international experts. Accordingly, the document is divided into the following subsections:

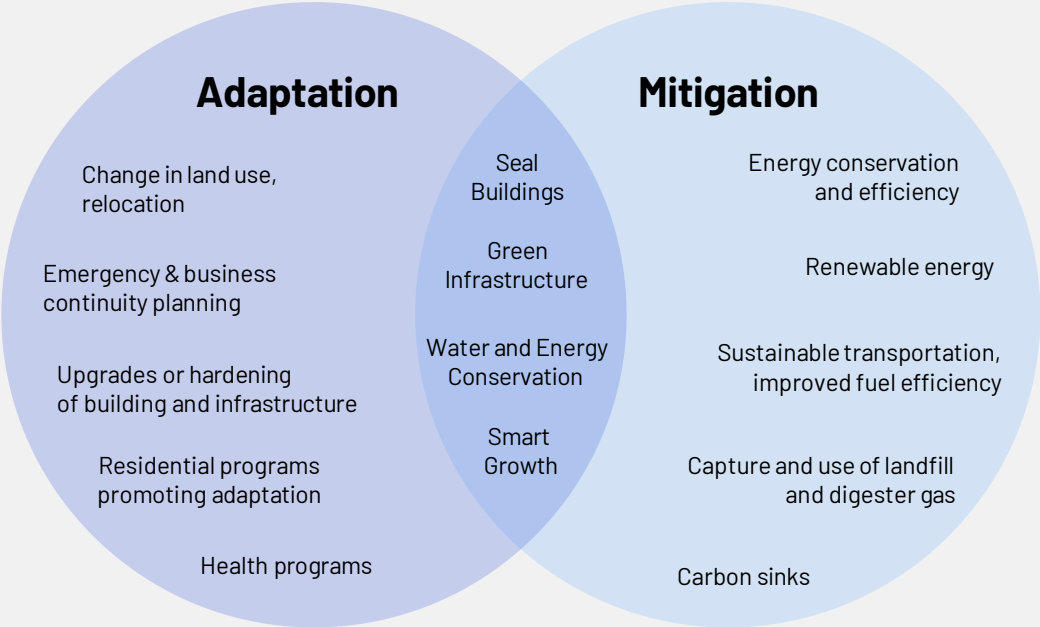
- Section 1: Introduction to low carbon climate resilient infra including different project preparation stages

- Section 2: Design and implement "bankable" low carbon and climate resilient infrastructure- guidance for each project preparation phase with case studies

2.Low carbon and climate resilient infrastructure

As stated in the introduction section, cities need to make substantial investments in low carbon and climate resilient infrastructure to tackle the climate change challenges and contribute towards the global ambition to restrict temperature rise to 1.5 degree at the same time spur their economic development. There is no standard definition of low- carbon and resilient infrastructure but it broadly focuses on three themes:

- Adaptation: focused on development/restoration of infrastructure that build resilience of economic sectors, communities, and ecosystems to climate change impacts
- Mitigation: focused on clean technologies which reduce carbon emissions at the same time resource efficient
- Sustainable Development: focused on achieving



Hence, low carbon and climate resilient infrastructure involves aligning three policy areas of climate change mitigation and adaptation and sustainable development to find synergies and 'winwin' which align to the city/ national development agenda. In order to design such projects the cities need to integrate these there policy areas in strategic urban planning, action plans and long term strategies of the city/ ULB. It is also important to integrate these policy at every stage of project preparation from concept to implementation at the same time design proposals/ projects which are 'bankable' and 'fundable' through various sources of climate finance. The projects should be designed in a manner that with limited public resources maximum private sector finance is leverage and impact is generated. The fundamentals of designing "bankable" low carbon and climate resilient projects include:

- **Definition:** while traditional bankability focuses on returns to investor, bankability for low carbon and climate resilient projects considers wider social and economic benefits and a mode of cost recovery whether through project or other sources.
- **Source of Funding:** whether the source of funding is public or private- the private sector funding also defines the bankability. Private sector evaluates the project based on profitability, financial returns and risk-return allocation along with green financing principles while the definition for a public sector can be broader focusing on national ambitions and sub-standard/ no direct return in some cases.

- **Structure, financial model and type of financial instrument:** the structure of the project directly impacts the bankability for instance some of the phases of the project like operations can be financially bankable while other would need a grant financing. Additionally, the bankability further depends on the financial instrument used for instance in case of an adaptation project a project proposal for grant funding need not be bankable but rather fundable meeting the eligibility.
- **Type of project:** whether the project is climate mitigation or adaptation projects. These project have distinct characteristics which determine the bankability, while mitigation projects are focused on emissions reduction and resource efficiency. In case of adaptation project risk and vulnerability reduction is a key factor. The mitigation projects in general are more direct revenue generating- hence can be linked to financial indicators. The adaptation projects are linked to non-financial indicators social impact, future loss aversion. Hence, the mitigation projects align to financial bankability indicators used by most financing agencies and adaptation project should be looked in lens of alignment or fitment in a national/ regional development plan or climate fund framework.

Based on these basic fundamentals the definition of "bankable" projects may be broadly divided into three categories:

a. Totally Bankable projects: could fully finance their investments through project revenues and hence can be financed through commercial or external financing agencies (Financial Institutions/Development Agencies/ Innovative financial instruments/ Green Financing) etc.

b. Partially Bankable projects: There are other projects in which project revenues are insufficient to recover the investments, in such cases, the partially Bankable projects are structured as Bankable projects through leveraging existing government funding schemes or project specific viability support from Government.

c. "Fundable projects": These are the projects which may not have a direct financial indicators through which investment may be recovered but adhere to non-financial parameters in terms of impact either aligned to national priorities or framework of a climate funds. Mostly adaptation project funded through grants or blended financing.

Hence, it is important that city/ state officials understand the fundamentals of designing "bankable" low carbon and climate resilient projects and integrate the consideration across the project preparation cycle. The next section discusses the key stage of project preparation across the project cycle and how bankability can be integrated at each stage.

2.1 Designing "bankable" low carbon and climate resilient infrastructure - Project Cycle

The designing of an infrastructure project would broadly be organised into 2 stages - project concept and pre-feasibility, feasibility and structuring leading to implementation stage. At each stage, the city would need specific capacity to make decisions and embed low carbon, climate resilience and bankability considerations into the project development process.. Figure 4 shows the tools presented at various stages of project preparation:

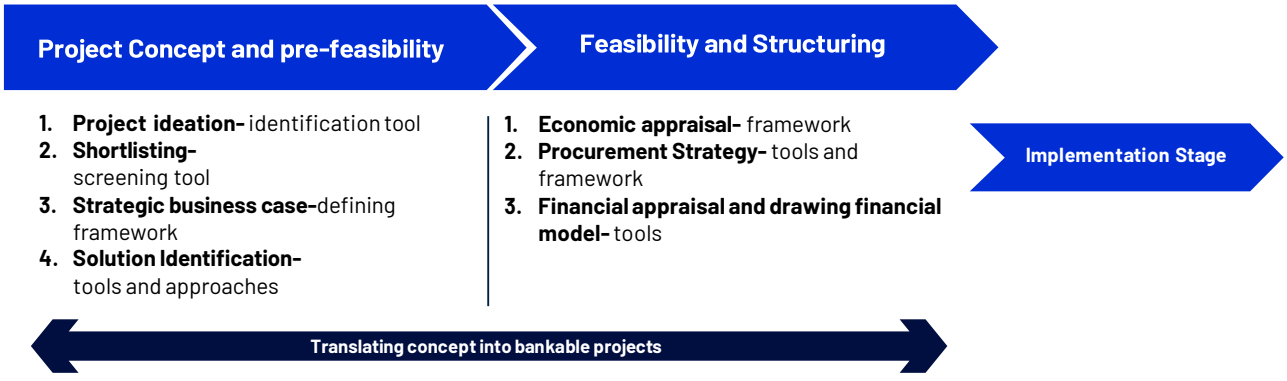


Figure 1: Tools at various stages of project preparation. Source: South Pole

The bankability considerations the city/state officials should incorporate at each step of project preparation and the key challenges faced by them are outlined below:

A. **Project concept and pre-feasibility:** The process of project identification and appraisal should clearly indicate and incorporate considerations to the bankability- revenues, and cost recovery parameters, as well as focus on low carbon solution which are climate resilient. The strategic business case- concept development stage should clearly outline the type of project, potential risks and benefits associated which are quantifiable and nonquantifiable. At the solution identification stage, in shortlisting the preferred way forward the funding and high-level cost-benefit assessment should be key consideration. So that the identified solution fits the eligibility requirements of the funder making the project proposal fundable. The key challenge at this stage face by city official is limited capacities to undertake the sub-steps and non-formal approach to solution identification.

B. **Feasibility and Structuring:** A comprehensive financial and economic analysis is a prerequisite for different sources of climate finance. It is crucial the city officials undertake a detailed economic and financial analysis articulating the risks and returns of project through economic analyses and financial analyses. The articulation of risk and return would also help the city design a most suitable procurement strategy leveraging the private sector financing wherever possible. The key challenge at this stage faced by city officials is the capacities to undertake these analysis and availability of climate risk data which directly impact the financial costing and cost-benefit analysis, hence, impacting the project bankability.

The next section of this module suggest potential frameworks a city can apply at the above stage of project preparation to incorporate "bankability" considerations and design proposal which are fundable by varied sources of climate finance.

3.Frameworks to design "bankable" low carbon and resilient infrastructure

3.1 Project Concept and Pre-feasibility

Cities often lack capacities to translate the infrastructure gaps/ needs into well-defined project concepts that are strategically linked to national development agenda and climate change ambitions. In India, in most cases city officials have limited knowledge of low carbon innovative solutions and visibility of climate risks while identifying the solutions. Frameworks, tools, and mechanisms to support cities at this stage are crucial towards development of a healthy pipeline of "bankable" projects.

Project ideas are usually identified from strategic plans like city development plan, comprehensive mobility plan, plans developed under National missions like Smart Cities Mission and Atal Mission for Rejuvenation and Urban Transformation (AMRUT), City Climate Action Plan (if applicable) or political commitments. Screening these projects and pre-feasibility assessment enable defining the project concept, technology, boundary, and scope. The key dimensions that should be covered during this stage generally include technical alternatives, market and demand assessment, high level estimates of capital cost and operating, potential revenue stream and financing options for the project.

The following section covers frameworks, tools and approaches that could help cities transition long term strategies into well-defined project concepts to enable decision making and facilitate evidence-based screening.

3.1 Project Ideation

The first step towards project ideation is defining the problem/ gap in the infrastructure service vis-a-vis a desired service level/ target, as identified in various strategic plans. Additionally, certain project ideas can be initiated by citizens or local politicians based on the on-ground requirements, and the city must make sure these ideas are also aligned with the long-term strategic objectives. A list of project ideas can be generated by the city which then can further be screened, the most promising ideas based on departmental assessments can be shortlisted. It is important at this stage when project idea is framed the considerations of bankability and climate change are duly incorporated- this would give a common ground for screening in the next stage. A standard framework for defining a project idea could help city/ state officials frame an idea covering all key aspects and parameters. Below in the Table 1 framework of project idea note developed under CapaCITIES project which can be integrated in the city/ state process of project ideation:

Table 1: Framework for Project Idea Note

1	Title of proposed project	
2	Sector	
3	Type of project	Part of strategic plan/ sourced otherwise
4	Rationale	Baseline Situation (current situation) Envisaged Situation post project implementation
5	SDG Benefits	
6	Alignment to Nationally Determined Contribution	
7	Climate Smart City Assessment Framework (CSCAF)	
8	Alignment to city strategic plans	
9	Nature and extent of technical expertise required for project preparation	
10	Climate change mitigation potential (how project can reduce GHG emissions)	
11	Climate change adaptation potential (does project has direct adaptation benefits and how project impact long term resilience of the infrastructure)	
12	Time Period of implementation	
13	Sustainability/ scale up potential	
14	Mode of implementation (including external stakeholder engagement)	
15	Leveraging Government Schemes/ financial model/ availability of budget for implementation with city	

3.1.2 Screening Tool

The second step involves screening the project ideas against broad parameters to prioritize the most relevant projects. The city can form an internal project screening committee to evaluate the project and shortlist the most favourable project idea post screening. It is important at this stage the strategic parameters of three policy area- climate change mitigation, adaptation and sustainable development are included in the screening framework, at the same time broad parameter of financial bankability can also be examines. A city should design its own screening framework to evaluate project proposal, an indicative framework which can be adapted for screening is outlined in the figure below and elaborated further:

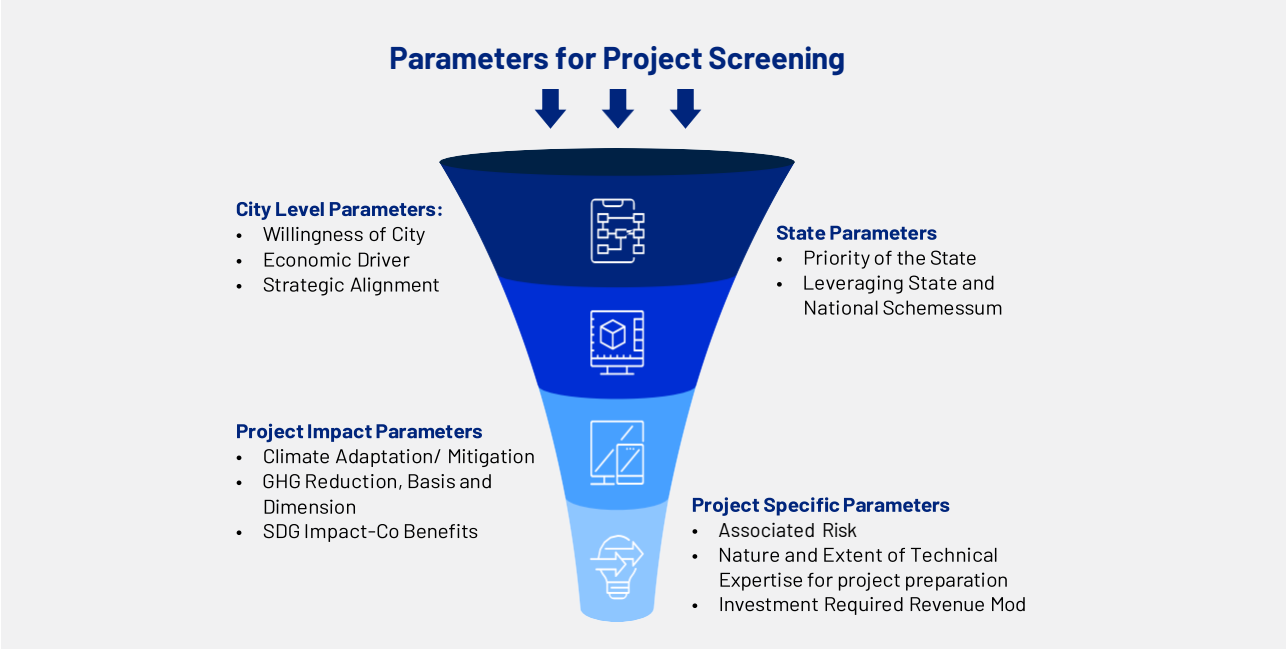


Figure 2: Broad parameters for project screening.

City level Parameters

i. Willingness of city leadership: Whether the city political and administrative leadership would support the project and the city would be able to meet minimum obligations required by the project.

ii. Economic driver of the city: Whether the project can enhance the economic potential of the city.

iii. Strategic Alignment: Whether the project is aligned to long term vision and plans of the city.

State Parameters:

i. Priority of State: Whether the project idea aligns with the priorities of the state administration and in line with the state broader policies.

ii. Leveraging State Schemes: Whether the project is aligned with a state policy or leverages state/national schemes

Project Impact Parameters:

i. Climate Change Mitigation: Whether the project idea would have direct/indirect result in reduction in GHG emissions

ii. Climate Change Adaptation: Whether the project idea would directly address adaptation activity or build resilience of the system for future climate change events- climate risks are accounted for in the project idea.

iii. SDG Impact: Out of 17 SDGs, which of SDGs does the project idea addresses directly and indirectly

Project Specific Parameters

i. Associated Risk: Technology Risk: Whether the technology/ approach for the project is identified- if yes: is there a past precedence or a new innovative technology is envisaged; if no: whether a call for proposals and pilot is planned Institutional Risk: Whether city has in past implemented similar projects- city's capability to host and honour contractual commitments under the project Climate risks: does the project build city resilience to future climate risks/ how the project aim to address the climate risk

ii. Project preparation: Whether external technical support is required for project preparation-if yes: estimated cost of external support

iii. Investment Required: High level estimation of the project cost and potential sources of funding

iv. Revenue Model: How the project intends to recover its investments: (a) own revenues (b) city fees and taxes (c) cost savings (d) blended structure

Case Study 1: Project Idea Note and screening of a renewable energy project in Rajkot

Background: City of Rajkot based on their Climate Resilient City Action Plan (CRCAP) has identified its own energy consumption as a major contributor to GHG emission and is evaluating various project ideas. One of the proposed ideas is to develop a captive solar plant to replace institutional energy consumption. Below is the Project Idea Note and screening assessment for the project

Project Idea Note:

1	Title of proposed project	Setting up captive solar plan to replace existing institution grid energy consumption
2	Sector	Renewable Energy
3	Type of project	Project identified under city climate action plan
4	Rationale	**Baseline Situation:** The annual institutional electricity consumption of Rajkot Municipal Corporation is around ~60 mil units supplied by the DISCOM through a grid which is mostly powered by thermal energy significantly contributing to GHG emissions. Additionally, the city incurs significant expenditure towards electricity consumption. **Envisaged Situation:** Transitioning the consumption of the city by setting up captive solar plants financed through future energy savings.
5	SDG Benefits	Linkages with various Global and National Goals/ Targets/ Framework
6	Alignment to Nationally Determined Contribution	NDC • 40% cumulative electric power from non-fossil fuel by 2030 • Reduce emissions intensity by 33 to 35 percent by 2030
7	Climate Smart City Assessment Framework (CSCAF)	CSCAF • Sector 1 (Indicator 2): Electricity derived from RE • Sector 3 (Indicator 1): Clean tech. shared vehicles • Sector 4 Indicator 5&6): EE Water and WW system
8	Nature and extent of technical expertise required for project preparation	External consultant may be required for preparation of project DPR and procurement process
9	Climate change mitigation potential (how project can reduce GHG emissions)	Total annual electricity consumption of Rajkot is 50 million units translating to ~ 55,080 tCO2e GHG emissions per year i.e. 2.7% of city emissions. By replacing a portion of electricity consumption by solar the project would reduce GHG emissions.
10	Climate change adaptation potential (does project has direct adaptation benefits and how project impact long term resilience of the infrastructure)	The project would help in building long term resilience of the city municipal services by reducing dependency on conventional fuel-based electricity.
11	Climate change adaptation potential (does project has direct adaptation benefits and how project impact long term resilience of the infrastructure)	The project would help in building long term resilience of the city municipal services by reducing dependency on conventional fuel-based electricity.
12	Time Period of implementation	6-8 months
13	Sustainability/ scale up potential	The project can be implemented in phases and can be scaled up to replace marginal electricity consumption of RMC in future.
15	Leveraging Government Schemes/ financial model/ availability of budget for implementation with city	The project would support the target of Government of India towards development of 500 GW of RE capacity by 2030 and State RE Policy.

Screening assessment:

Sector		Renewable Energy- Climate change mitigation
Project		Development of captive solar plant for RMC
1	Willingness of the City	Yes- the project idea was preliminary discussed in the city's budget committee meeting
2	Economic Driver of the City	NA
3	Alignment to strategic objectives	Towards achievement of target set under City's Climate Resilient City Action Plan
4	Priority of the State	State: RE Targets
5	Leveraging Government Schemes	Yes- State RE Policy has conducive incentives
6	Climate Mitigation potential	Yes, Climate Mitigation project, Reduced thermal energy emissions (+++); Operations of the Rajkot Municipal Corporation emitted 55,080 tCO2e, contributing to 2.7% of the city's total GHG emission. This project would reduce 0.97 million tCO2e (to be confirmed at later stage) to be mitigated on average annually, through shifting to Solar for captive consumption
7	Climate Adaptation potential	NA
8	SDG Impact	Goal 7- Affordable & Clean Energy Goal 11- Sustainable Cities & Communities
9	Maturity of Technology & Similar Projects- associated risk	Low /Mature- Similar projects being implemented across India
10	Nature and Extent of Technical Expertise Required	Technical assessment by external consultant Project structuring and financing support to be provided by an external project team.
11	Potential amount leveraged by City*	INR 50 Cr. (Project Cost to be financed by envisaged Savings)
12	Revenue Model	Savings in electricity expenditure of RMC
Priority (1-3)(1 being highest)- based on screening workshop qualitative assessment on above parameters		

3.1.3 Defining project strategic business case

The next stage after the project idea is shortlisted is to define the project's strategic business case. The main objective of this stage is to identify and agree on the project objectives, mapping existing arrangement/ situation, identification of business needs and potential scope of the project. Furthermore, at this stage the key service requirement along with benefits, risk and dependencies of the project are defined. This stage can also be referred as the "project concept" stage and should is very important to identify the variables of the projects which make it suitable for right kind of funding or funding instrument.

The key personnel requirement and outputs of this stage are shown in Table 2.

Table 2: Key personnel requirement and outputs of project's strategic business case.

Key Personal	• City Engineer • Executive Engineer for the nodal department • City Commissioner • Committee (appraisal) • Technical advisors
Instrument Type	• Project Objectives • Business needs and potential scope • Key benefits, risk, and dependencies • Project detailed concept note- summarising the above

Table 3 shows an indicative framework with description of activities which city may follow to define the strategic business case for the project and develop project concept note:

Table 3: Indicative framework with description of activities which city may follow to define the strategic business case for the project.

<table>
<tr><td>Objectives (Outcome the project seeks to achieve)</td><td>Why is the city undertaking the project?
Specifying the project objectives considering rationale, key outcomes and benefits, alignment to strategic objectives. The objectives should be:
• Strategically aligned with the cities and national visions
• SMART: Specific, measurable, attainable, result oriented and time bound
• Outcome or citizen focused rather than solution focuses
• Should address one of the following: effectiveness (improve service quality), efficiency and economy (optimise cost of service delivery), compliance (statutory requirement) and replacement (end of service contract- asset useful life)</td></tr>
<tr><td>Existing arrangements (Current Situation)</td><td>How is service currently delivered to citizens?
• Throughput, turnover, and existing costs
• Current asset availability, condition, and utilisation</td></tr>
<tr><td>Business Needs (Opportunities and problems in current situation)</td><td>Problems associated and opportunities with the current arrangements
• Confirmation and continued need for existing city operations
• Projections of climate change, level of demand for future operations</td></tr>
<tr><td>Project Scope (what is needed to address needs)</td><td>The next step is to identify the potential scope of the project which is operationally feasible to satisfy the identified business needs. The city may use the following framework to define project scope:
<table>
<tr><th>Range</th><th>Core</th><th>Desirable</th><th>Optional</th></tr>
<tr><td>Scope</td><td>Essential changes</td><td>Additional changes</td><td>Optional changes</td></tr>
<tr><td>Service Requirements</td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

Project Benefits (anticipated benefit as a result)

The city should define the project benefits aligned to the defined project objectives, benefits can accrue to the city corporation as an institution or wider benefits to household, individual and businesses. They can be broadly classified as:

Benefit Classification:	Example:
Direct economic benefits	• Optimising operating cost • Increase in revenues
Indirect economic benefits	• Reduction in future expenditure (building resilience) • Better resource management
Quantifiable other benefits	• Carbon Sequestration- reduction in GHG emissions- Climate Smart Assessment Framework • Citizen Satisfaction • Improved health and social outcomes- Ease of living index • Impact on SDGs- number of SDGs impacted
Qualitative	• Reputation of city

Project Risks (Risks that might arise)

The city should also identify the risks which are directly and indirectly associated in achievement of project outcomes and the plan for mitigating the identified risks. The key categories of the risk associated to projectdevelopment include:

Category of Risk	Description
Business Risk	Risks which remain with the city and cannot be transferred such as political and reputational risks
Service Risk	Risks associated with design, build, finance, operate, finance phases of project- may be shared with others
External Risk	Non-systematic risks which affect the entire society include technology, catastrophe, legislation, general inflation risks, climate risks

Project Constraints (Limitation we face)

The city should specify any constraints specific to the project like policy decisions, rules, and regulations among others. It is important that the constraints are managed at the initial stages.

Project Dependencies (things must be in place or managed elsewhere)

The city should identify any dependencies outside the project scope on which success of the project is dependent. These could include interdependencies on other programs and projects (outside project scope but within city's scope) and external dependencies (outside project and city' s scope) such as legislation, strategic decisions and approvals.

Case Study 2: Development of organics waste to bio CNG plant

Background: Coimbatore Municipal Corporation (CMC) based on Climate Resilient City Action Plan (CRCAP) has identified solid waste management as one of the largest contributors to GHG emissions. CMC is looking for proposals to reduce its GHG emissions from solid waste management operations and at the same time reduce the cost associated with solid waste management. Below is the framework to define the strategic business case for the project:

Objectives	**Why is the city undertaking the project?** • Reduce the GHG emission on account of mixed waste dumping in the landfill to achieve the target identified in the strategic climate resilient city action plan • Effectiveness: Provide an effective solution for bulk waste generators to manage their organic waste • Efficiency and Economy: Optimise the per ton cost associated with solid waste management and provide a self-sustainable waste management solution
Existing arrangements	**How is service currently delivered to citizens?** • Mixed waste ~500 TPD is collected and dumped at waste landfill in Vellalore • While bulk waste management is responsibility of generators- the waste is dumped often openly or disposed off in non-scientific manner
City future Needs	**Problems associated and opportunities with the current arrangements** • GHG emissions, air, heath, and environment hazard due to improper disposal of waste • It is estimated the per day waste generation increased annually by 8-10% as the city grows • Need of an effective and self-sustainable waste management solution for organic waste
Project Scope	A self-sustainable solution for collection and management of organic solid waste by setting up waste to bio CNG plant.

Range	Core	Desirable	Optional
Scope	Management of organic solid waste for bulk waste generators ~100 TPD	Management of all cities organic solid waste ~ 200 TPD	Complete management of city solid waste
Service Requirements	Solution to collect and recycle bulk organic waste	Solution to collect and recycle complete city organic waste	Multiple solutions management city solid waste

<table>
<tr><td>Project Risks</td><td>The city should also identify the risks which are directly and indirectly associated in achievement of project outcomes and the plan for mitigating the identified risks. The key categories of the risk associated to project development include:
<table>
<tr><th>Category of Risk</th><th>Description</th><th>Mitigation Strategy</th></tr>
<tr><td>Business Risk</td><td>Willingness of city leadership for charging bulk waste generators</td><td>Taking the city leadership on board since project inception</td></tr>
<tr><td>Service Risk</td><td>Risks associated with setting up waste management solution</td><td>To be transferred to private sector with defined service level arrangements</td></tr>
<tr><td>External Risk</td><td>Risk associated to non-supply of bulk waste in events like COVID-19 induced lockdown

Risk associated to climate change events floods</td><td>Alternate sourcing plan for waste at least for minimum plant operations

Design of the plant should consider resilience to such events</td></tr>
</table></td></tr>
<tr><td>Project Constraints</td><td>Non-availability of segregated organic waste can be a key constraint towards the project, the city notifies the bulk waste generators about their responsibility to provide segregated organic waste.

Identification of a suitable land parcel can emerge as a key constraint.</td></tr>
<tr><td>Project Dependencies</td><td>Setting up a waste to bio CNG plant would be dependent on Government of India SATAT initiative for purchase of CNG and viability support from MNRE. It is prudent the project concept is pre-approved before initiation under the schemes.</td></tr>
</table>

3.1.4 Identification of preferred implementation solutions

The purpose of this stage is to identify the best option/ solution for the delivery of the project which offers best value for money to the city including wider social and environmental impact as well as economic value. Many times, city officials lack the knowledge/understanding of the expected benefits out of projects. Identifying potential implementation solutions can be achieved by identifying potential service solutions, which align with the project objectives and business needs; by identification of critical success factors for the project, identification and appraisal of various alternatives and assessment of cost benefits and risk associated with the short-listed options.

Table 4: Key personnel requirement and outputs of preferred implementation solutions stage

Key Personal	• City Engineer • Executive Engineer for the nodal department • City Commissioner • Committee (appraisal) • External stakeholders- solution providers • Technical advisors • Financial advisors
Instrument Type	• Short list of options • Economic appraisal of short list options

Below is an indicative framework with description of activities which the city may follow to identify the preferred solution:

Sandbox Approach

The potential service solutions can be identified by the city internally by referring through best practices, research, and peer learnings or through innovative practices like the sandbox approach. The sandbox helps cities to prioritise urban solutions in the local context, by testing and fine-tuning solutions before their deployment at scale. This approach thus prevents a lock-in while also enhancing regulatory and institutional support from the local authorities and facilitating partnerships for new solutions (Figure 8). Under the sandbox, the city can set up an innovation secretariat including city officials and external experts. The role of innovation secretariat would be:

- **Demand Side:** Helping cities frame problems that external players can solve, design procurement to enable global solutions and enabling institutional collaboration
- **Supply Side:** Guide external and local players to create solutions and approaches to fit in the local context

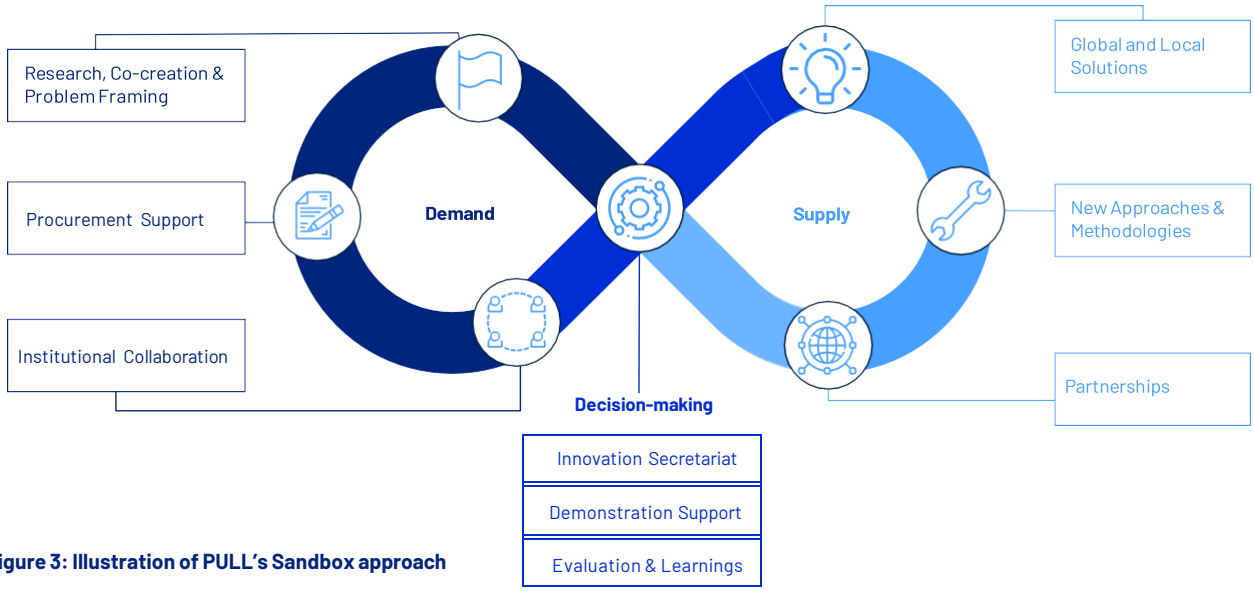


Figure 3: Illustration of PULL's Sandbox approach

Evaluate the identified options

To map the shortlisted options, the city can further use an options framework, clearly defining the scope, service solution, solution delivery, service implementation and potential funding alternatives for different options, as shown in Table 5.Supply Side: Guide external and local players to create solutions and approaches to fit in the local context

Table 5: Evaluation framework

Key Dimensions	Description
Scope	"what" in terms of potential coverage of project e.g., geography, number To be assessed in alignment with business needs and service requirement
Service Solution	'how' in terms of potential solution to deliver the identified scope To be defined by available technologies and best practices
Service Delivery	"who" in terms of entity to deliver the identified scope and solution e.g., Inhouse, strategic partner To be defined by resources, competencies, and capabilities- internal or external to city
Service Implementation	"when" in terms of phasing to deliver To be driven by deadlines, risks, economies of scale
Funding	"funding" required for preferred scope, solution, service delivery and implementation To be driven by cost of public funding and value for money for alternate funding options

The next step is required to define the critical success factors which are crucial to meet the project objectives. Each identified/ proposed option must be evaluated against the critical success factor matrix below for the project (Table 6):

Table 6: Evaluation matrix for critical success factors

Factor	Description
Strategic fit and business needs	How well does the option meets the project objectives and business needs?
Value for money	How well does the option optimises the value in terms of cost benefits and risks? - A high level assessment should be undertaken
Supplier capacity and capability	How well does the option matches with the capacity and willingness of the supplier to cater to the service? Is a pilot required? - in case of a new innovative solution
Affordability	How well does the option can be funded from available sources of financing? - consider the innovative sources of funding various stagesdesign, build and operational phases
Achievability	How well does the option fits with the city's capability to successfully deliver the project?

The most preferred option should then be identified, at this stage based on the above assessment the city must also consider undertaking a pilot exercise to test assumptions in case the option selected in new and significant past precedence/ information is unavailable to take the decision.

Case Study 3: Options framework to identify sustainable organic waste management solution for Coimbatore

Background: Coimbatore Municipal Corporation based on Climate Resilient City Action Plan (CRCAP) has identified solid waste management as one of the largest contributors to GHG emissions. CMC is looking for proposals to reduce its GHG emissions from solid waste management operations and at the same time reduce the cost associated with solid waste management. Through consultative workshops and in line with the project objectives and business needs CMC has identified various alternatives and mapped them using options framework. Based on the critical success factor the most preferred solution i.e. setting up a waste to Bio CNG plant on public private partnership has been identified. The results of the options framework are showcased below:

Project	Business as usual	Do minimum	Preferred way forward	Do Maximum
Service Scope	1.0 Support current practices	1.1 Cover organic bulk waste	1.2 Covering city level organic waste	1.3 Covering entire solid waste for city
Service Solution	2.0 Scientific Landfill- mixed waste	2.1 Bio Composting- Micro Composting Centres	2.2 Waste to bio CNG plant	2.3 Waste to energy plant
Service Delivery	3.0 Current Arrangement	3.1 Operation by Private Contractor	3.2 Design, build, finance and operations by national contractor	3.3 Design, build, finance and operations by international contractor
Implementation		4.1 Immediate	4.2 In two phases	4.3 In three phase
Funding		5.1 Public funding	5.2 Mixed public and private funding	5.3 Private Funding

Source: Options Framework adapted from UK Guide to project business case, UK Government, 2021, CapaCITIES project, 2021

3.2 Project Feasibility and Structuring

The next phase is the most critical phase towards bankability of a project it involves assessment of the project feasibility and identification of project investment and financing alternatives. During this phase, the identified solution is further detailed: evaluating the technical design and configuration, financial and economic feasibility assessment, and the socio-economic impact of the project as well as the preferred procurement alternative. Further, this stage typically covers following other aspects:

- Value for Money analysis and affordability considerations
- Government support requirements and implications for fiscal costs and contingent liabilities (FCCL)
- Project structuring and risk allocation
- Consideration of the use of a PPP form of procurement and the associated project implementation arrangements
- Broad terms of the bid process, documentation and contracting
- Market attractiveness and bidder interest
- Roadmap for implementation

The is achieved through following broad steps:

3.2.1 Economic Appraisal of preferred option

The first step of the project feasibility and structuring phase is to undertake an economic appraisal of the preferred option, determining the potential value for money. The focus of economic appraisal is on the public value of the project and all social, economic, and environmental costs along with the impact on citizen welfare are taken into consideration.

The project team needs to estimate the cost and benefits for the preferred option to undertake the economic appraisal. At this stage it is important that the project team takes into consideration the life cycle cost of assets (including replacement and disposal cost), due consideration and valuation to monetizable and non-monetizable benefits and right valuation of all associated risks including current and anticipated climate risk. This would give a fair cost benefit assessment of the preferred alternative. Additionally, at this stage the team should also incorporate alternate funding scenarios i.e., public sector comparator vis a vis private sector funding. This would give a fair idea in framing the procurement strategy.

To estimate the cost and benefits the city may use the following framework presented in Table 7.

Table 7: Framework to estimate the cost and benefits of the project.

<table>
<tr><th>Key Dimensions</th><th>Description</th></tr>
<tr><td>Estimating Costs</td><td>An overview of costs to be considered for economic appraisal:
• Life cycle costs: Capital cost of the project assets including the maintenance, replacement, and disposal costs.
• Revenue costs: Operational, running, management and overhead costs
• Fixed, variable, semi-variable costs related to project operations
• Opportunity costs: In relation to land, buildings, and manpower, they should be assessed against the most valuable alternative use
• Attributable costs: Cost of staff for project implementation from the public side
• Inflation: General inflation
• Climate Resilience Consideration: Inclusion of climate resilience considerations into project costs at various stages i.e., Construction stage: Inclusion of appropriate climate risk mitigation measures in capital cost estimates. Operations stage: Higher maintenance cost (due to more repairs- extreme climate events); Additional disaster response cost
• Contingent Liabilities: Commitments to future expenditure if certain events occur should be included in the economic appraisals. For example, the cancellation costs for which a public sector body may be liable if it prematurely cancels a contract</td></tr>
<tr><td>Estimating Benefits</td><td>An overview of benefits to be considered for economic appraisal:
• Direct benefits to the city, benefits to other public organisation and wider societal benefits:
  • Monetizable benefits in terms of additional revenues or cost savings for which cash can be realised- for low carbon solution value of carbon credits should be included
  • Quantifiable but non monetizable benefits: For example a solid waste management: a) improved health of sanitisation workers and overall citizens leading to less spending of state on health and better insurance premiums b) reduced GHG emissions c) enhancing aesthetic value because of better waste management leading to higher real estate pricing d) because of waste management, underground water does not get contaminated so water quality improves
  • qualitative but not readily quantifiable benefits

The purpose of valuing benefits is to ascertain whether an option's benefits are worth its costs, and to allow alternative options to be compared in terms of their net social value.</td></tr>
<tr><td>Risk Appraisal</td><td>A risk assessment of the preferred option is critical towards economic appraisal as it has a direct impact on cost and benefits. Hence, the critical risks associated to the project should be identified and valued, broadly these risks may include:
<table>
<tr><td>Business Risk</td><td>Risk that the city cannot anchor the project needs for instance reputational risks</td></tr>
<tr><td rowspan="6">Service Risk</td><td>Design risk: project design is unable to meet objectives</td></tr>
<tr><td>Planning risk: project in unable to secure planning or policy permissions</td></tr>
<tr><td>Build risk: construction is not completed in stipulated time</td></tr>
<tr><td>Project intelligence risk: project preliminary investigation is not robust</td></tr>
<tr><td>Environmental risk: project might have an adverse impact on local environment and raise objections</td></tr>
<tr><td>Procurement risk: related to the contract obligation or counterparty is unable to meet their obligations</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Risk Appraisal</td><td>A risk assessment of the preferred option is critical towards economic appraisal as it has a direct impact on cost and benefits. Hence, the critical risks associated to the project should be identified and valued, broadly these risks may include:
<table>
<tr><td rowspan="5">Generic Risk</td><td>Operations risk: invariable increase in estimated operational cost</td></tr>
<tr><td>Demand risk: invariable difference in actual vis avis anticipated demand</td></tr>
<tr><td>Technology risk; risk that changes in technology would impact service being offered using sub optimal technology</td></tr>
<tr><td>Funding risk: unavailability of funding delaying the project, foreign exchange</td></tr>
<tr><td>Residual value risk: relating to the end of life value of asset- For example in case of solar disposal of used asset</td></tr>
<tr><td>Climate Risk</td><td>Impact on Costs: how climate risk scenarios impact maintenance, operational and replacement costs
Impact on Benefits: how climate risk scenarios impact benefits of the projects</td></tr>
<tr><td>External Systematic Risk</td><td>Policy Risk: Significant change in the policy, regulations (change in law)
Political Risk: Change in political leadership resulting in change in priorities
Force majeure: natural and unavoidable catastrophes
Technology disruption risk: new technology that completely disrupts the project tech</td></tr>
</table>
The above risk should be appropriately identified and included in the risk register. It is also important to value the above risk and incorporate it into the cost- benefit assessment. For valuation of the risk a single point probability (a fixed percentage of contingency added to project) or advance methodology may be used by the city.</td></tr>
<tr><td>Recording Net Present Social Value</td><td>Following estimation of cost, benefits and risk related to preferred project the Net present social value should be computed using the Social discount rate: as proxy for an alternate public welfare return closer to the Government bond rate (minimum return).</td></tr>
</table>

At the end of economic appraisal, the most preferred option with positive Net Present Social Value (NPSV) should be taken to the next step, in case NPSV is negative or significantly closer to zero the preferred option should be reconsidered by the city.

Case Study 4: Cost benefits assessment for setting up a captive solar plan in Rajkot City

Background: City of Rajkot based on their Climate Resilient City Action Plan (CRCAP) has identified its own energy consumption as a major contributor to GHG emission and is evaluating various project ideas. Rajkot Municipal Corporation has identified development of a 4Mw captive solar plant to power corporations municipal water services as a preferred option identified through a stakeholder workshop. Below is the economic appraisal of this alternative:

Preferred Option	**Public Sector Funding**		**Private Sector Funding**	
	Undiscounted (In Cr.)	**Discounted (In Cr.)**	**Undiscounted (In Cr.)**	**Discounted (In Cr.)**
Cost in appraisal of public value				
1. Direct cost to city				
1.1 Capital (Lifecycle Cost of equipmentincluding dumping costs and robust civil infra cosidering extreme climate event-INR 4.7 Cr per mw +10% dumping cost)	₹20.68	₹20.68	₹22.18	22.18
1.2 Revenues (O&M costpreventive maintenance, staff salaries & repairs, transmission and distribution and insurance costs)	₹51.95	₹18.22	81.13	30.97
2. Indirect public cost				
2.1 Capital				
2.2 Revenues				
3. Wider Social Costs				
2.1 Capital				
2.2 Revenues				
4. Total Risk Costs				
4.1 Estimate risk costs (Considering service risk and climate risk and other contingencies- based on single probability analysis 8% of risk premium over project cost)	₹1.65	₹1.65	₹1.77	₹1.77
5 Total costs (1+2+3+4)	**₹74.28**	₹40.55	₹105.09	₹54.92

Benefits in appraisal of public value				
6 Direct Benefits to City				
6.1 Monetizable Benefits (savings in electricity expenditure)	₹94.75	₹40.39	₹77.70	₹33.12
6.2 Non monetizable Benefits	₹51.95	₹18.22	81.13	30.97
7 Indirect public benefits				
7.1 Monetizable Benefits (Carbon credits- emission reduction based on current grid factor- 6200 tCO2e/year for 10 years @ EUR 2.5- 4)	₹1.65	₹1.07	₹1.65	₹1.07
7.2 Non monetizable Benefits				
8 Total Wider social benefits				
8.1 Monetizable Benefits (Externality cost of coal powered power on environment and public health)- INR 1.40/ unit-Base year and 2% thereon Source: World development perspectives, 2021	₹35.40	₹12.80	₹35.40	₹12.80
8.2 Non monetizable Benefits	3-SDG Impact			
9. Total Value of benefits (6+7+8)	**₹131.80**	**₹54.26**	**₹114.75**	**₹46.99**
Net Public Value/ Net Present Social Value (9-5)	**₹57.52**	**₹13.71**	**₹9.66**	**-₹7.93**
Benefit cost ratio (9/5)	**1.77**	**1.34**	**1.09**	**0.86**

Source: Adapted from UK Guide to project business case, UK Government, 2021, CapaCITIES Project, 2021

3.2.2 Procurement Strategy

It is prudent that procurement arrangements are identified during the preparation stage to secure long term public value for the project. The decision to involve the private sector in funding or service delivery is based on the alternate options assessment completed by the city. The city should consider following considerations in Table 8 when evaluating a project or a project activity for private sector funding or service delivery:

Table 8: Considerations by the city when evaluating projects for private sector funding.

Considerations	Description
Substantial operating content within the project	If the project has high operating content- which the private sector specialises in delivery.
Scope for additional/alternate use of asset	If the project assets can be used alternatively by the private sectorimproving asset efficiency
Scope for innovation in design	If the expected outputs of the project can be achieved in a better manner through innovative design which is also cost effective
Long term financing availability	If the private sector can mobilise long term financing for the project at competitive rates
Risk primarily commercial in nature	If the risks associated with the project are primarily commercial, then private sector is better suited to manage
Past Experiences	If private sector in past has showcased efficient delivery of similar projects

To define the procurement strategy and identify the best procurement routes a city may follow the following framework (Table 9):

Table 9: Framework to identify the procurement strategy

<table>
<tr><th>Considerations</th><th>Description</th></tr>
<tr><td>Determine procurement strategy</td><td>The procurement strategy for different project activities and outputs should be developed taking into consideration:
• Local legislation for procurement- in line with state procurement guidelines
• Choice of procurement method and stage at which supplier should be involved
• Collaborative procurement- whether collaborative procurement practices make sense for the project- economies through aggregation</td></tr>
<tr><td>Define the project activities, service streams and outputs</td><td>Summarise the project service streams, outputs and anticipated timelines. The city can use the following format define the project service streams:
<table>
<tr><th>Activity</th><th>Output</th><th>Service level arrangement</th><th>Timeline</th></tr>
<tr><td>Define the project service activity</td><td>Define the expected output from the activity</td><td>How is the success of output measured?</td><td></td></tr>
</table>
</td></tr>
</table>

Potential risk apportionment

An important step in the procurement is to identify the risks in different phases of the project i.e., Design, Build, Funding and Operational (DBFO). The main objective here is to allocate the risk to the party which best manages the risk amongst the public and private sectors. The city should take in consideration the following factor while apportioning the risk:

- private service provider is better able to influence the outcome
- understanding of each risk element is important for the city to assess the impact of risk element on service provider incentives and financing costs
- private sector to be considered for the risk which they can manage better than the city particularly in activities in which there is clear responsibility, measure, and control
- transfer of risks can also act as an incentive to the private sector to deliver activities efficiently and through innovative approaches

Below is an indicative framework of risk allocation that can be used by the city:

Risk Type	Public	Private	Shared
Design Risk			
Construction Risk			
Implementation Risk			
Revenue Risk			
Termination Risk			
Technology obsolescence risk			
Financing Risk			
Policy Risk			
Residual value risk			

Potential payment mechanism

Defining the milestones for payment to service providers is equally important, the city should define the payment milestones so as to incentivise the service provider to provide value for money across the project life span and operations.

Some of the generally used mechanism at different phases of project have been outlined below:

Phase	Payment mechanism
Predelivery	Fixed Cost: fixed price of the items based on agreed BOQs • On agreed outputs, payments made only whennoutput benefit is realised by city
Operations Phase	Availability payment: Payment is linked with availability based on SLAs. For instance, 95% of the availability of buses. • Performance payment: Payment linked to achievement of a stipulated performance • Volume payment: Payment linked to achievement of transaction/ business volume • Incentive payment: Payment linked to implementation of a reform or improvement of business process- used in govt. scheme • Alternate revenues: Element of payment gives the private sector incentive to explore alternate revenue streams

Contractual arrangement for the project

It is important to identify the contractual frameworks which the city intends to use. The city can refer the model contracts available in different context:

- Model agreements NITI Aayog
- Model agreements available at Smartnet NIUA
- Model agreement available at PPP India portal, Ministry of Finance

Source: IADB Climate Resilient Infrastructure Framework, 2020 At the end of this stage, the city would be able to finalise the procurement and commercial strategy for the project, risk allocation matrix for the project and the structure of the project delivery mode.

Case Study 5: Procurement strategy for setting up a Captive Solar Plant in Rajkot

Background: City of Rajkot based on their Climate Resilient City Action Plan (CRCAP) has identified its own energy consumption as a major contributor to GHG emission and is evaluating various project ideas. Rajkot Municipal Corporation has identified development of a 4Mw captive solar plant to power corporations municipal water services replacing the current grid power consumption. The cost benefit assessment highlights the project has an economic value and the city is working on the procurement strategy for the project. Below is a snapshot of the procurement framework for the project:

Procurement Strategy

Identified procurement option as per VFM assessment: Technical Design by external consultant Engineering Procurement Construction (EPC) and O&M by contractor Single Procurement: National Contractor

Project activities, service stream plan and payment mechanism

Activity	Output	Service level arrangement	Timeline	Payment Mechanism
Technical design	BOQ and technical design	On submission of technical design	3 months	Fixed on output
EPC	Setting up plant as per design	Design and drawing and inspection by independent engineer	6 months	Fixed cost for equipment Final payment based on quality of civil work as per design
O&M	Energy output of the plant	Minimum assured energy output monitored through dashboard	Quarterly monitored	**Performance Payment** as per guaranteed output

Risk allocation matrix

Risk Type	Public	Private	Shared
Design Risk			
Construction Risk			
Implementation Risk			
Performance or availability Risk			
Revenue Risk			
Termination Risk			
Technology obsolescence risk			
Financing Risk			
Policy Risk			
Residual value risk			

Contractual Framework

Standard contract adapted with the inputs from technical consultants including climate resilient considerations

Source: CapaCITIES Project, 2021

3.2.3 Financial appraisal and model

The next stage once the project delivery mode is identified is to undertake the financial appraisal of the project to ascertain the funding and affordability of the project. To undertake the financial appraisal of the project, a financial model needs to be developed. The model provides an informed 'best guess' on likely impact and outcome of the project. While drawing a financial the city may consider the following framework in Table 10.

Table 10: Considerations by the city when evaluating projects for private sector funding.

Underlying Assumptions	Sheets and Schedules
General	• Interest Rate • Inflation • Taxation • Capital Charges- Depreciation and Amortisation • Discount rates
Cost	• Preparation and transaction cost • Construction phase cost: related to machinery, equipment and civil costs- life cycle cost including maintenance and disposal • Operations phase cost: related O&M and staff • Financial cost • Risk contingency costs Also include scenarios on how climate events scenarios might impact these costs.
Revenues	• User fees assumption • Potential savings assumption • Emission reduction calculation in case of low carbon technologies- and carbon revenues assumptions Also include scenarios on how climate events can impact project revenues.
Funding Options	• Funding structure • Funding schedule • Calculating project returns for the different elements of financing and payback

Based on the financial model a final assessment of the project is undertaken, appropriate adjustments making the project financially viable should be undertaken at this stage. A city can use different funding options for different stages of the project. The sources of urban climate finance which can be accessed by the city are outlined in the next chapter of the guidance document.

Case Study 6 : Financial appraisal of setting up a captive solar plant in Rajkot

Background: City of Rajkot based on their Climate Resilient City Action Plan (CRCAP) has identified its own energy consumption as a major contributor to GHG emission and is evaluating various project ideas. Rajkot Municipal Corporation (RMC) has identified development of a 4Mw captive solar plant to power corporations municipal water services as a preferred option identified through a stakeholder workshop. Below is the economic appraisal of this alternative:

Financial Appraisal Output: The pro forma cash flows for the project were calculated for the project period of 25 years. In order to compute the cash flow, the baseline expenditure of the RMC for consumption of the power from DISCOM was estimated. The table below shows the key assumptions to estimate the electricity expenditure of Rajkot in no project scenario:

Sl. No	Particulars	Unit	Value	Source
a	Average electricity price (adjusted to demand charge)	INR/ Unit	6.30	Electricity bills of RMC
b	Annual increase in electricity charges	%.	0.67	GERC-PGVCL Tariff Order 2021-22- tariff order enclosed as annexure 4.2)
c	Electricity expenditure of RMC (1st year)(under no project scenario)	INR Cr.	4.67	annual output (6.9 mil units) * average electricity price (a) or (a)*(1+B)(second year onwards)

The cash flows from the project were computed for two scenarios (a) 100% funding from RMC and (b) 30% funding from RMC & 70% debt @11.5% (alternate).

Cash flows from the project = (electricity expenditure of RMC in no project scenario) - (total operating expenditure of the project/ + interest cost of debt (alternate scenario)

Below table shows the proforma cash flow for both scenarios and payback period assessment:

Sl. No	Electricity Expenditure in NO Project Scenario	Operating Expenditure	Scenario 1-70% Debt			Scenario 2-100% RMC Budget	
			Interest Cost	Cash Flows to Project	Cumulative Cash flows	Cash Flows to project- 100% RMC Equity	Cumulative Cash flows
0				-20.09	-20.09	-19.95*	-19.95*
1	4.48	1.27	1.32	1.88	-18.21	3.20	-16.75
2	4.52	1.25	1.18	2.09	-16.12	3.27	-13.47
3	4.63	1.31	1.03	2.28	-13.84	3.31	-10.16
4	4.74	1.39	0.89	2.47	-11.37	3.35	-6.81
5	4.85	1.46	0.72	2.67	-8.70	3.39	-3.42
6	4.97	1.56	0.54	2.87	-5.83	3.41	-0.01
7	5.09	1.65	0.36	3.08	-2.75	3.44	3.43
8	5.21	1.74	0.20	3.27	0.52	3.47	6.90
9	5.33	1.84	0.05	3.44	3.96	3.49	10.39
10	5.46	1.95	0.00	3.52	7.47	3.52	13.91
11	5.59	2.05	0.00	3.54	11.02	3.54	17.45
12	5.60	2.17	0.00	3.43	14.45	3.43	20.88
13	5.74	2.30	0.00	3.44	17.89	3.44	24.32
14	5.88	2.43	0.00	3.44	21.33	3.44	27.76
15	6.02	2.58	0.00	3.44	24.77	3.44	31.20
16	6.17	2.73	0.00	3.43	28.21	3.43	34.64
17	6.32	2.90	0.00	3.42	31.62	3.42	38.05
18	6.47	3.08	0.00	3.40	35.02	3.40	41.45
19	6.63	3.26	0.00	3.37	38.39	3.37	44.82
20	6.79	3.31	0.00	3.48	41.87	3.48	48.30

21	6.95	3.35	0.00	3.60	45.47	3.60	51.91
22	7.12	3.40	0.00	3.73	49.20	3.73	55.63
23	7.29	3.45	0.00	3.85	53.05	3.85	59.48
24	7.47	3.50	0.00	3.97	57.02	3.977	63.45
25	7.65	3.55	0.00	4.10	61.12	4.10	67.55
A	**Payback period In years**			**7.15**		**6.00**	
B	**IRR**			**13%**		**17%**	

*included additional cost of raising finance

Source: CapaCITIES Project, 2021

4. Checklist for a good "bankable" climate finance project proposal

The frameworks in the last section provide actionable frameworks which a city can incorporate in the project preparation process to design a low carbon and climate resilient infrastructure project proposals which are "bankable" and can be funded through various sources of climate finance and instruments. These frameworks will help the city officials prepare a detailed funding proposal which can be used to discuss funding with various agencies or funds and taken forward based on the eligibility criteria.

Lastly, while the above steps give a summary of important frameworks to prepare "bankable" climate finance proposal. The Table 6 below gives an overview of the general criteria of international donor agencies use while appraising the project proposals:

Table 11: Funding criteria of donors for a climate finance project

Key funding criteria of donors	
High climate mitigation/adaptation potential	✓
Transformational / paradigm shift potential	✓
Governmental support and alignment with national policy priorities and NDC	✓
Co-funding from domestic sources; Potential to catalyse private finance	✓
Economic efficiency / bankability	✓
Sustainable development co-benefits	✓
Feasibility, cost benefit analysis	✓
Detailed design of all key elements including implementation roadmap with clear timelines, stakeholders' roles, etc.	✓

4.1 Module recap

"Bankability" has different perspective in terms of low carbon and climate resilient infrastructure as well as in terms of project type and funding instruments. It is important the city/ state officials understand the requirement of different sources of funding and design project proposals which are "bankable" and in some cases "fundable". This module provides comprehensive project preparation frameworks designed considering common requirements of different funders to give city officials a ready usable guidance towards development of "bankable" project proposals which can be funded through national and international public as well as private climate finance sources.

To successfully prepare a "bankable" climate action project, it is important to check the important parameters incorporated in the above frameworks such as the potential, scope, impact etc. Finally, to walk the low carbon development path, it is important that funding from private sources is enhanced and mitigation actions are developed at organizational levels.

4.1 Further Reading

- Guide to developing the project business case, UK Government
- Unlocking climate finance, CDKN

- Project Preparation translate concept into bankable project, GI hub

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