

CapaCITIES

Structuring “Bankable” Climate Resilient Infrastructure
Projects



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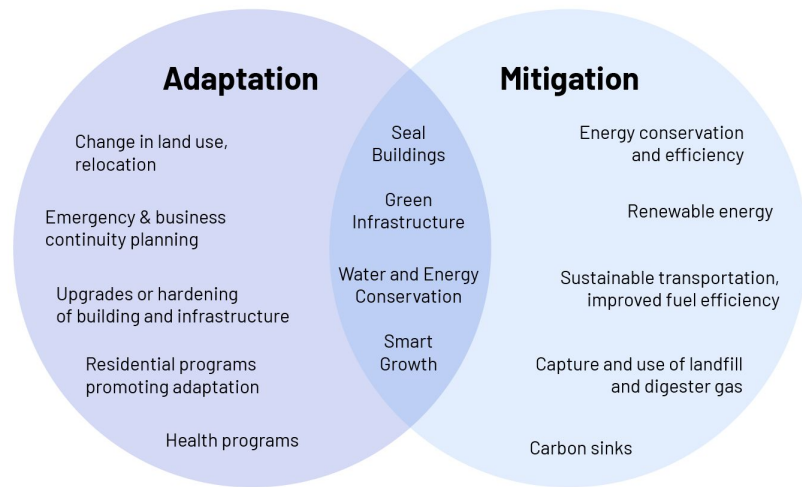


econcept
Research / Consulting / Evaluation



Defining climate resilient infrastructure

There is no standard definition of **low-carbon and resilient infrastructure** but it broadly focuses on **three themes**:



What does “bankability” mean

Project or proposal that has sufficient **collateral, future cashflow, and high probability of success**, to be acceptable to **institutional lenders for financing**.

Factors considered for Project Bankable and Investments				
Credibility of Sponsor 	Technology 	Construction/ Operations 	Demand/Offtake 	Environment 
Location/Country/ Political 	Legal 	Finance 	Force Majeure 	
Above risks needs to be addressed to the satisfaction of Lenders				



Factors impacting “Bankability”

Bankability focuses on **returns to investor a mode of cost recovery** whether through project or other sources, bankability for **low carbon and climate resilient projects** considers wider **climate change mitigation, adaptation and socio economic benefits**.



Source of funding

whether the source of funding is public or private



Structure, financial model and type of financial instrument

the structure and type of funding instrument of the project directly impacts the bankability

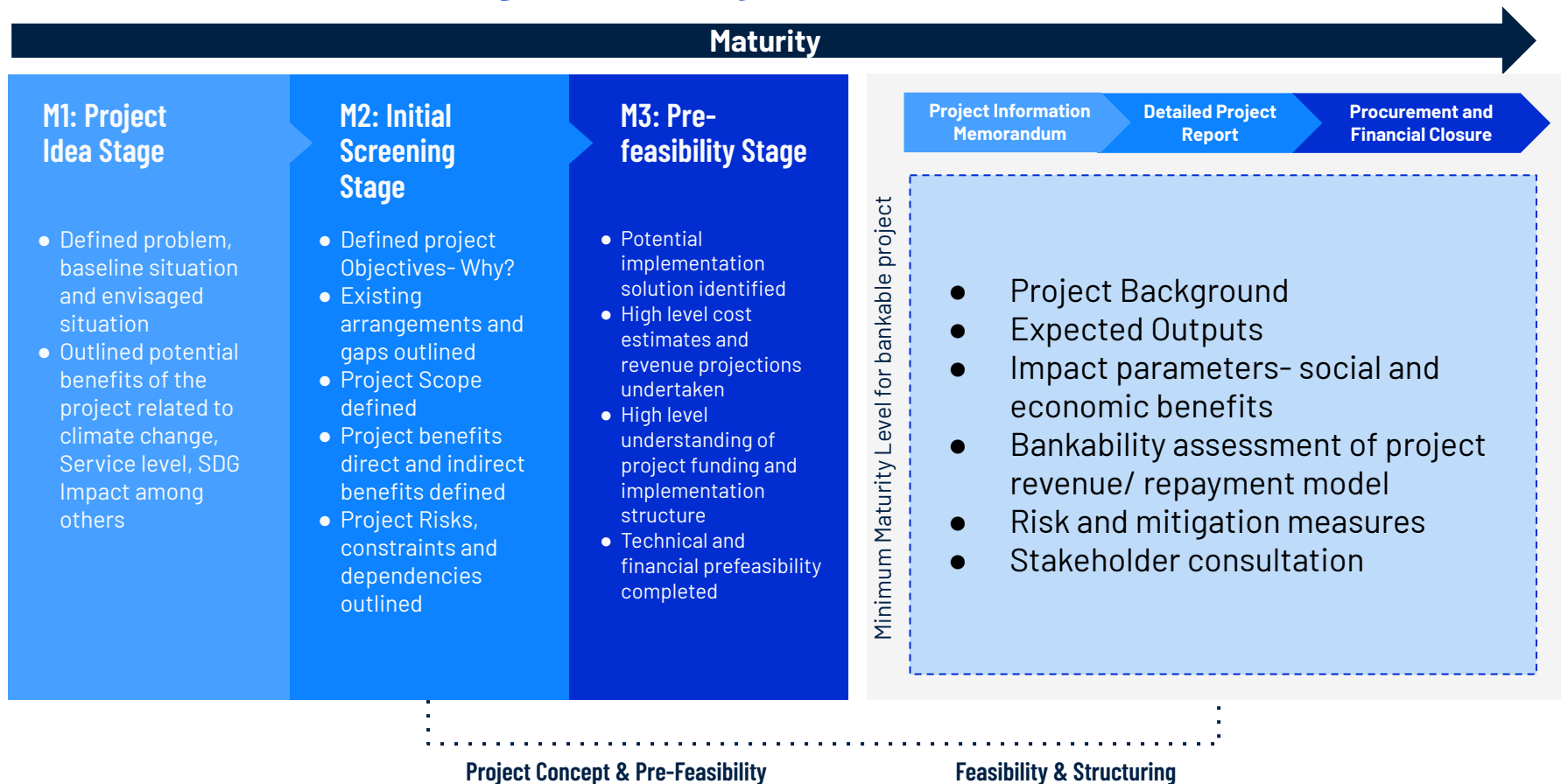


Type of Project

whether the project is climate mitigation or adaptation projects.



Tools at various stages of Project Preparation



Project Concept & 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**

Project Ideation (Identification tool)

- 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.

Shortlisting (Screening tool)

- The second step is the screening tool that basically evaluate the project proposal and prioritize the most relevant subjects.
- It basically examines three policy areas: climate change mitigation, adaptation and sustainable development

Strategic Business case defining framework

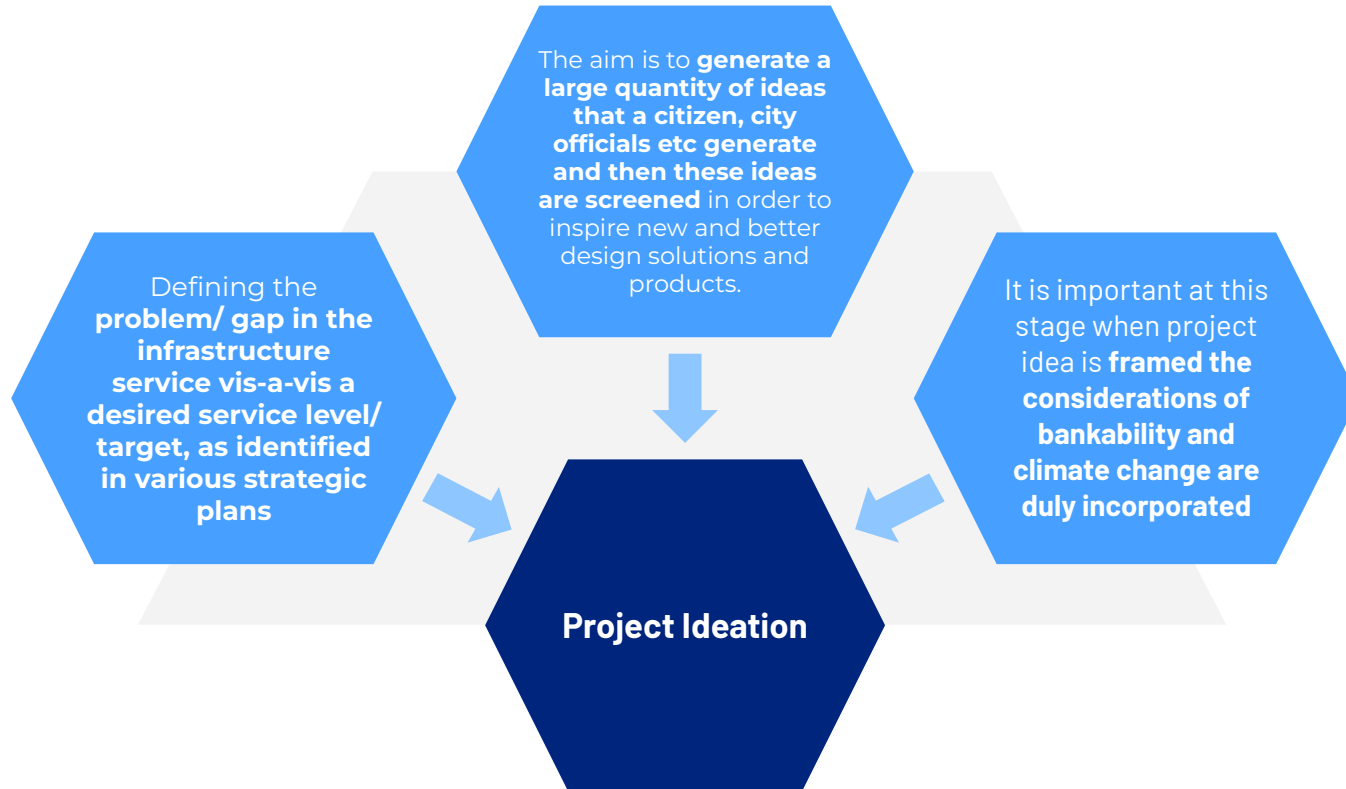
- The next stage after the project idea is shortlisted is to define the project's strategic business case.
- The main objective of this stage is to identify and agree on the project objectives, mapping existing arrangement/ situation, identification of business needs and potential scope of the project.

Solution Identification Tools and Approaches

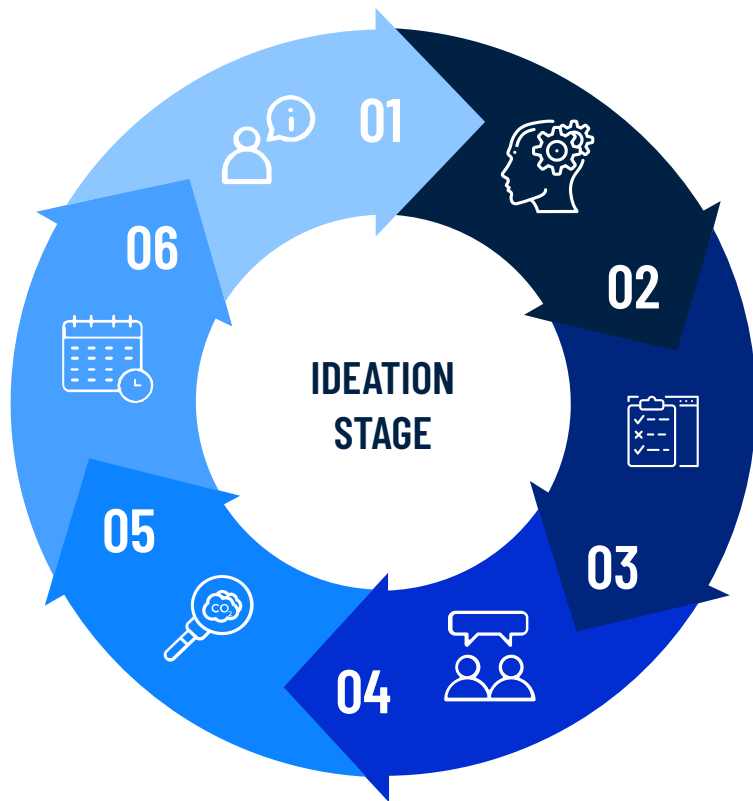
- The purpose of this stage is to identify the best option/ solution for the delivery of the project which offers best value for money to the city including wider social and environmental impact as well as economic value.



Project Ideation Stage: Objectives



Ideation Stage: Template Guidelines



01- Introduction of Proposed Project

Name, Sector and Type of Project

02- Project Rationale

Baseline situation of area and detailed explanation of project requirement in the area and how it is being implemented.

03- Alignment with Climate & Sustainable Development Agendas

SDG Benefits, NDC, CSCAF & City Climatic Strategies

04- Requirements of Technical Expertise

Nature and extent of technical expertise required for project preparation

05- Climate Change Mitigation & Adaptation Potential

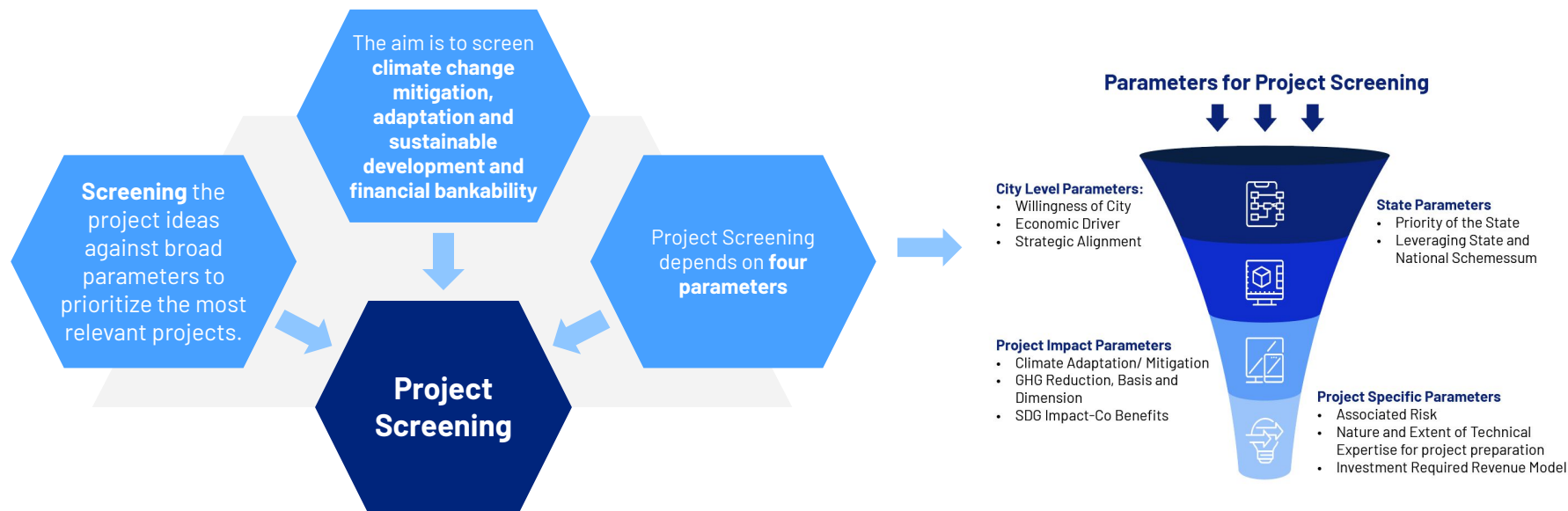
How project can reduce GHG emissions and does project has direct adaptation benefits and how project impact long term resilience of the infrastructure, Sustainability Potential

06- Project Implementation

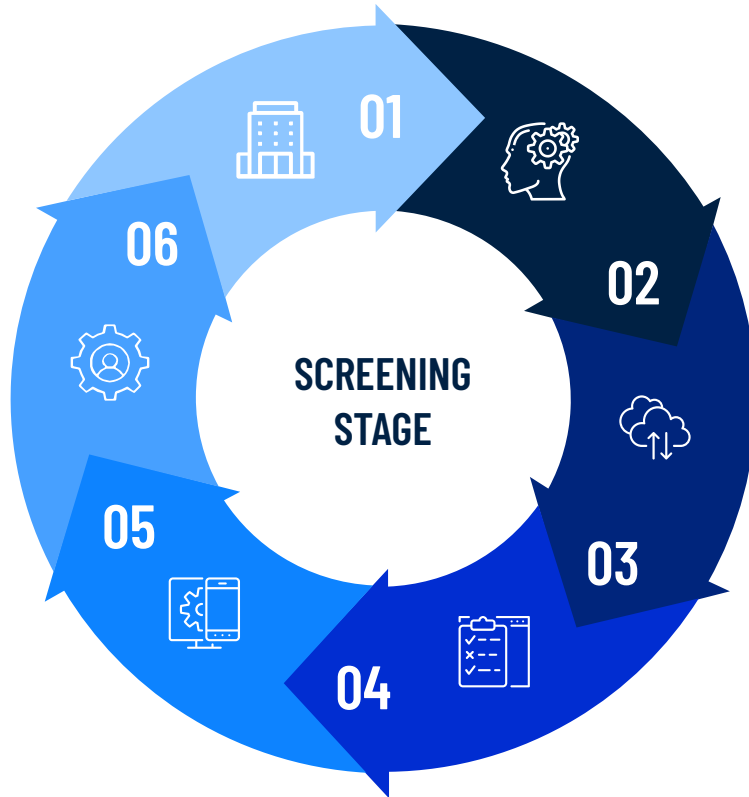
Time Period, Mode of implementation (including external stakeholder engagement), availability of budget/finance for implementation with city



Project Screening Stage: Objectives



Screening Stage: Template Guidelines



01- Screening at City Stage

Willingness, Economic Driver, Alignment to Strategic objectives of city

02- Project Rationale

Priority and Government Schemes of State

03- Climate Change Mitigation & Adaptation Potential

How project can reduce GHG emissions and does project has direct adaptation benefits and how project impact long term resilience of the infrastructure, Sustainability Potential

04- Alignment with Climate & Sustainable Development Agendas

SDG Benefits, NDC, CSCAF & City Climatic Strategies

05- Screening of Technology & Technical Expertise

Risk associated with technology used, Nature and extent of technical expertise required for project preparation

06- Project Potential

Priority (1-3)(1 being highest)- based on screening workshop qualitative assessment on above parameters



Ideation Stage & Screening Stage

Case 1: Setting up a Captive Solar Plan in Rajkot City

Challenge & Solution

Challenge

- Municipal own energy consumption from grid -amongst biggest contributor to GHG emissions (as per GHG inventory' 2019)
- Electricity is amongst biggest expenditure heads for city-burden on municipal finance

Solution

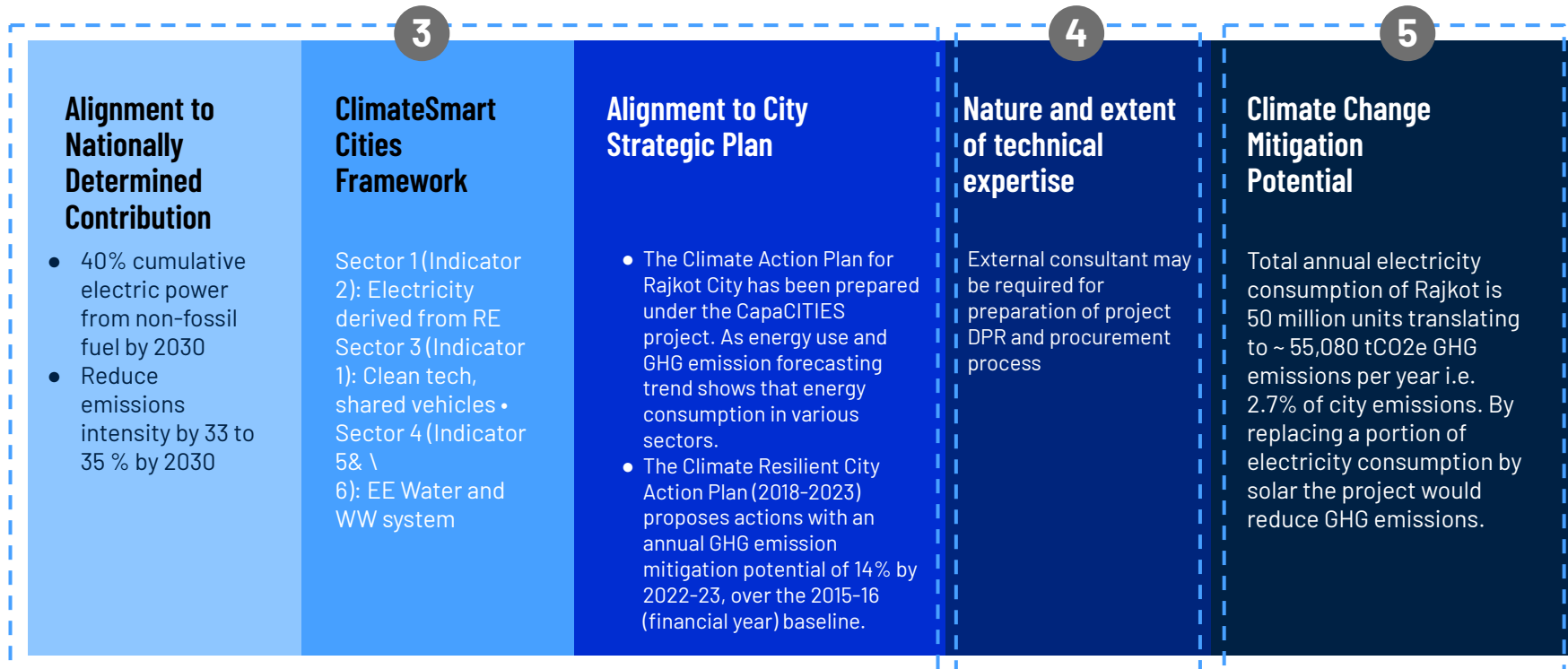
- Development of a solar plant to power own energy consumption of Rajkot (Water and Wastewater treatment plant)- contributing towards city target to reduce GHG emission by 18% by 2023 (CRCAP)
- Leveraging technical studies and scaling up pilot completed in Phase 1- Designed a bankable project to set up 10 mw captive solar power plant at multiple sites on EPC model (in line with power consumption profile and regulation of Gujarat Solar policy' 2020)

Application of Toolkit for Project Preparation-Ideation Stage

1	2	3	4	5
Name of Proposed Project	Sector	Type of Project	Rationale	SDG benefits
Setting up captive solar plan to replace existing institution grid energy consumption	Renewable Energy	Project identified under city climate action plan	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. SDG Benefits Application of Toolkit for Project Preparation-Ideation Stage 1 2 3	7 AFFORDABLE AND CLEAN ENERGY 11 SUSTAINABLE CITIES AND COMMUNITIES 12 RESPONSIBLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION



Application of Toolkit for Project Preparation-Ideation Stage



Application of Toolkit for Project Preparation-Ideation Stage

5

Climate Change Adaptation Potential

The project would help in building long term resilience of the city municipal services by reducing dependency on conventional fuel-based electricity.

Time Period of Implementation

6-8 months

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.

6

Mode of Implementation

- Capital Expenditure Model/ Solar EPC (Capex model): Under this model the end consumer either through its own sources or through external debt financing incurs the capital investment for the solar plant generating output for its own
- RESCO model: Unlike a solar EPC or capex proposition, wherein the consumer owns the system and invests upfront, the RESCO model is a zero-investment model in which the consumer pays only for the electricity generated, while the solar plant is owned by the RESCO developer.

Leverage Government schemes/implemented in 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.



Application of Toolkit for Project Preparation-Screening Stage

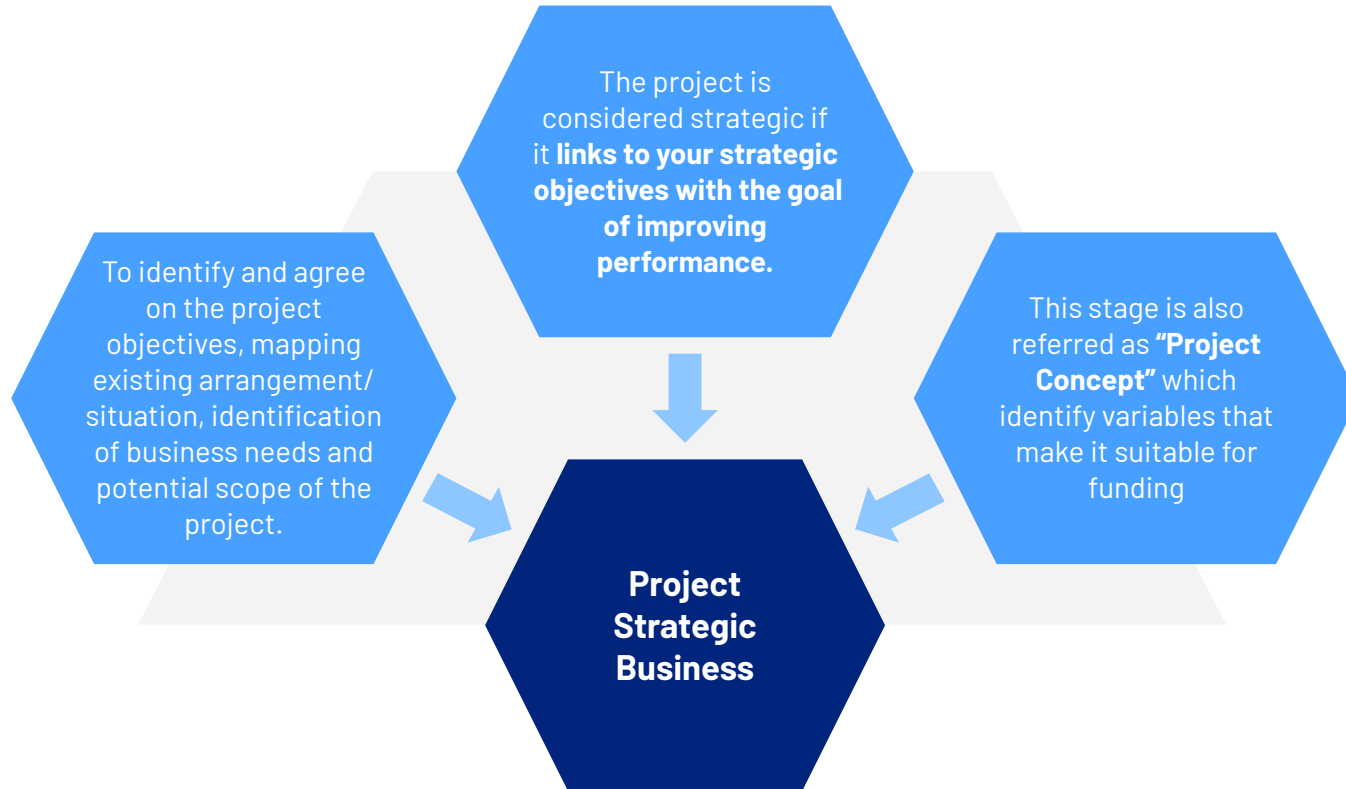
1			2	3
Willingness of City	Economic Driver of City	Alignment to Strategic Objective	Priority and Government Scheme	Climate Mitigation Potential
Yes- the project idea was preliminary discussed in the city's budget committee meeting	NA	Towards achievement of target set under City's Climate Resilient City Action Plan	State: RE Targets Yes- State RE Policy has conducive incentives	Yes, Climate Mitigation project, Reduced thermal energy emissions (+++); Operations of the Rajkot Municipal Corporation emitted 55,080 tCO ₂ e, contributing to 2.7% of the city's total GHG emission. This project would reduce 0.97 million tCO ₂ e (to be confirmed at later stage) to be mitigated on average annually, through shifting to Solar for captive consumption



Application of Toolkit for Project Preparation-Screening Stage

3 Climate Adaptation Potential N/A	4 SDG Impact • Goal 7- Affordable & Clean Energy • Goal 11- Sustainable Cities & Communities	5 Maturity of Technology • Low /Mature- Similar projects being implemented across India	5 Nature and extent of technical expertise • Technical assessment by external consultant • Project structuring and financing support to be provided by an external project team.	6 Project Potential • INR 50 Cr. (Project Cost to be financed by envisaged Savings) • Savings in electricity expenditure of RMC • Priority- 1
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Project Strategic Business Stage: Objectives



Project Strategic Business Stage : Template Guidelines



01- Objectives of the Project

(Outcome the project seeks to achieve)

02- Existing and Future needs of city

Opportunities and problems in current situation and its future needs.

03- Project scope

Opportunities and problems in current situation and its future needs.

04- Requirements of Technical Expertise

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

Project Constraints

The city should specify any constraints specific to the project like policy decisions, rules, and regulations, among others.

06- Project Implementation

The city should identify any dependencies outside the project scope on which success of the project is dependent



Project Strategic Business Stage

Case 2: Development of organics waste to bio CNG plant

Challenge & Solution

Challenge

- Bulk waste generators are responsible for managing their own waste, mostly this waste is improperly managed - ends up in mixed landfill or open burning- leading to GHG emissions and local air pollution
- Waste management sector as per the GHG Inventory is responsible for ~ 363,000 tCO₂e/ year of carbon emissions: 80% of this can be mitigated by improving waste management systems • CCMC is looking for a long term self sustainable solution for management of organic waste embracing the concept of circular economy.

Solution

- To reduce GHG emissions, properly manage the organic waste it is important the economic value of waste is embraced.
- Setting up of a 200 TPD organic waste to bio CNG plant on PPP can be a potential solution for all stakeholders: ○ City: Reduced cost of waste management and reduce quantum of waste in mixed land fill, additionally CNG can be used for city buses
- Bulk waste generators: Established waste management solution (meeting their responsibility) as well bio CNG can be repurchased for cooking
- Private Sector: A lucrative business opportunity with a captive consumer base
- Additional revenue from carbon credits* from voluntary markets for emission reduction in

Preparation- Project Business Strategic

1

Objective of 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

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

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



Preparation- Project Business Strategic

4

Project Risk

Identified Risks	Description	Mitigation Strategy
Business Risk	Willingness of city leadership for charging bulk waste generators	Taking the city leadership on board since project inception
Service Risk	Risks associated with setting up waste management solution	To be transferred to private sector with defined service level arrangements
External Risk	Risk associated to non-supply of bulk waste in events like COVID- 19 induced lockdown Risk associated to climate change events floods	Alternate sourcing plan for waste at least for minimum plant operations Design of the plant should consider resilience to such events

5

Project Constraints

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.

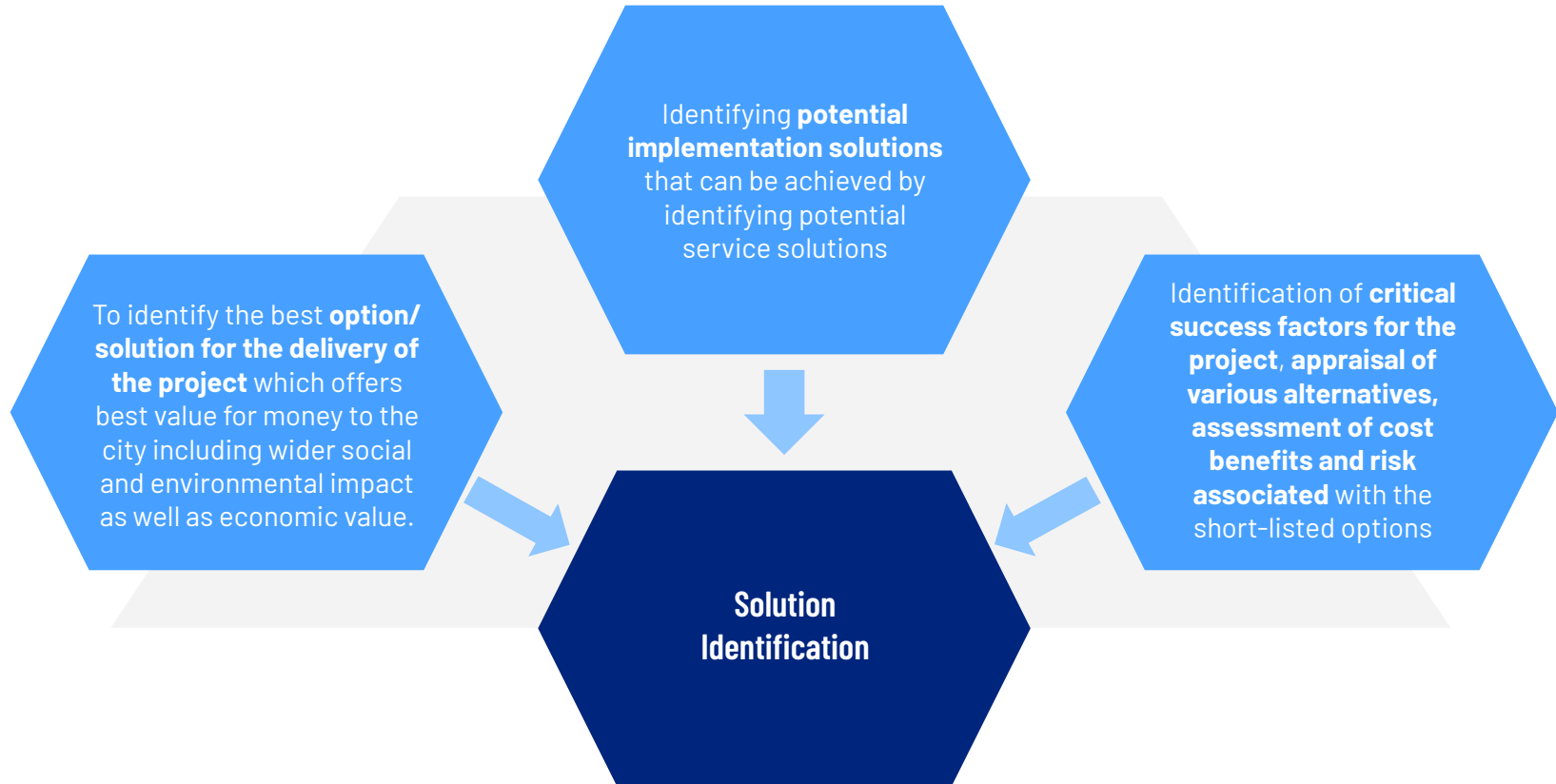
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Project Dependencies

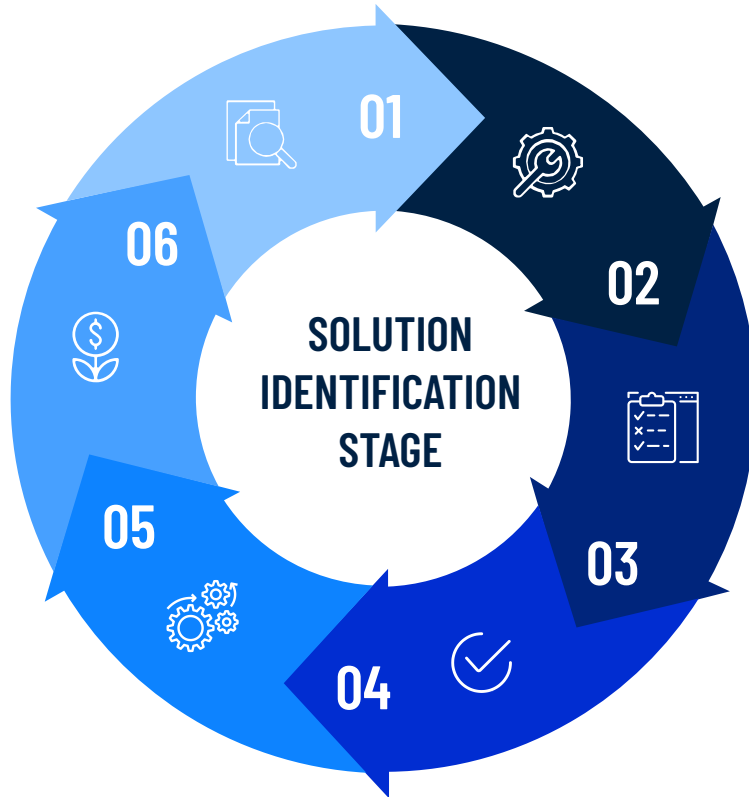
Setting up a waste to bio CNG plant would be dependent on Government of India SATAT initiative for purchase of CNG and viability support from MNRE



Solution Identification: Objectives



Solution Identification : Template Guidelines



01- Background

About the project

02- Service Scope

To be assessed in alignment with business needs and service requirement

03- Service Solution

To be defined by available technologies and best practices

04- Service Delivery

To be defined resources, by competencies, and capabilities-internal or external to city

05- Project Implementation

To be driven by deadlines, risks, economies of scale

06- Project Funding

To be driven by cost of public funding and value for money for alternate funding options

Solution Identification- Tools and Approaches

Case 3: Options framework to identify Electric Vehicle - Green Mobility Zone Udaipur

Challenge & Solution

Challenge

- Udaipur Municipal Corporation has committed to reduce its **GHG emissions by 18% by 2023, transportation sector accounts for 28% of total GHG emissions and is a major contributor to local air pollution**
- The old walled city is epicenter for economic development and tourism activities but faces **challenges such as congestion, local air pollution impacting the life of local population as well as tourism value of city.**

Solution

- Catalysing transition to electric for 2w and 3w in walled city & promotion of NMT
- Powering EVs in the walled city through Renewable Energy
- Design of a public private partnership (PPP) program **"Green Mobility Zone"** program to convert walled city into EV only zone in a phased manner- contributing towards city pledge to reduce GHG emission by 18% by 2023 (CRCAP)



Application of Toolkit for Project Preparation- Solution Identification

1

Background

Walled City the major tourist hub and densely populated -> challenges in terms of ambient pollution and congestion with ICE based autos constituting as the main source of public transport.

2

Service Scope

GMZ is envisaged to be implemented in the area of 3.5 sq.km

3

Service Solution

- Catalysing transition to electric for 2w and 3w in walled city & promotion of NMT
- Powering EVs in the walled city through Renewable Energy
- Design of a public private partnership (PPP) program "Green Mobility Zone" program to convert walled city into EV



Application of Toolkit for Project Preparation- Solution Identification

4

Service delivery

30% reduction in local transport based emissions
1500+ drivers livelihood enhancement through lifecycle savings from EV adoption
Reduced ambient & noise pollution and improved traffic flow

5

Project implementation

- Immediate
- Minimum in two phases
- Maximum to three phase

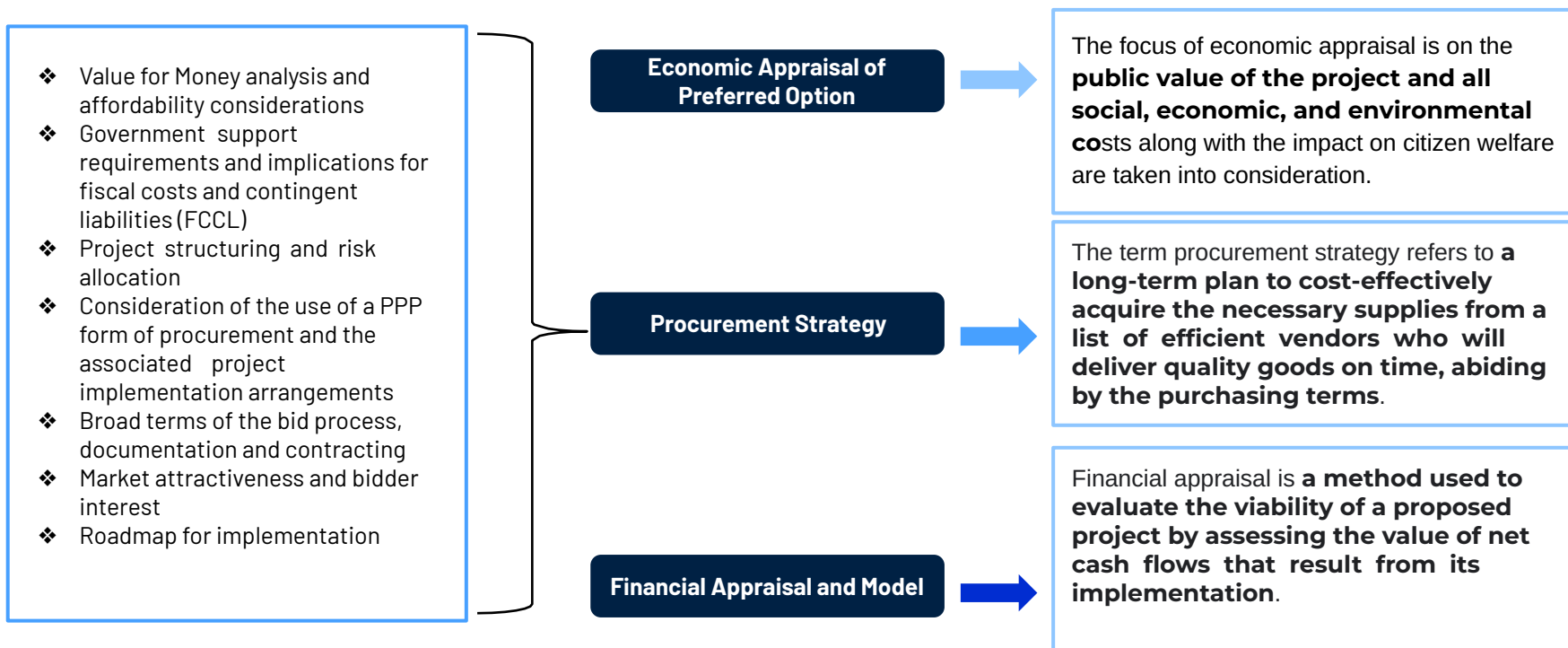
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Project funding

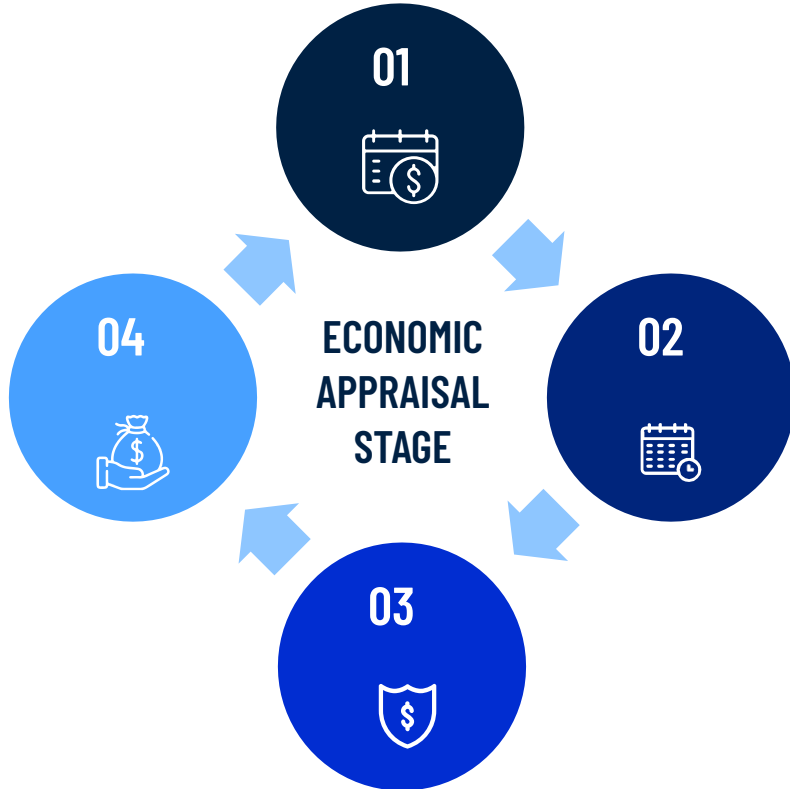
Public, Mixed, & Private Finding

Project Feasibility and Structuring

Aspects of Project Feasibility and Structuring



Economic Appraisal: Template Guidelines



01- Estimating Costs

Includes:

- Life Cycle costs
- Revenue Costs
- Fixed, Variable, Semi-variable costs
- Opportunity and Attributable costs
- Climate Resilience Consideration
- Inflation
- Contingent Liabilities

02- Estimate 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.

03- Risk Appraisal

A risk assessment of the preferred option is critical towards economic appraisal as it has a direct impact on cost and benefits.

04- Recording net present Social Value

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).

Economic Appraisal of Preferred Option

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

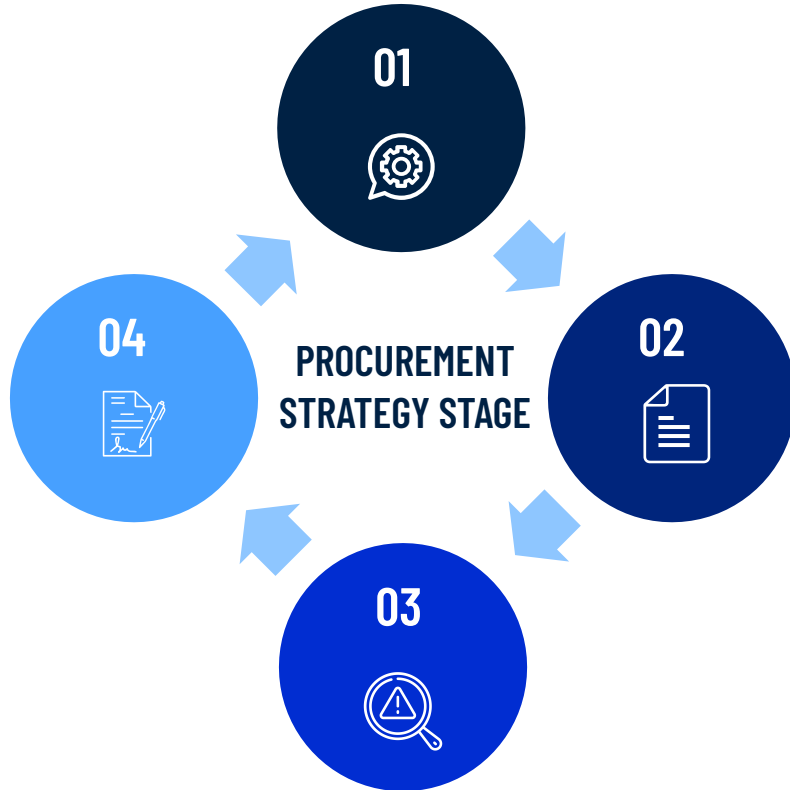
Application of Toolkit for Project Preparation- Economic Appraisal

Cost benefits assessment

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 equipment- including dumping costs and robust civil infra considering 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 cost- preventive 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



Procurement Strategy: Template Guidelines



01- Determine Procurement Strategy

- Local legislation for procurement- in line with state procurement guidelines
- Choice of procurement method and stage at which supplier should be involved

03- Risk Allocation Matrix

To identify the risks in different phases of the project i.e., Design, Build, Funding and Operational (DBFO). .

02- Defining Project Activities, service streams and outputs

Summarise the project service streams, outputs and anticipated timelines

04- Contractual Arrangement

To identify the contractual frameworks which the city intends to use.

Procurement Strategy

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

Application of Toolkit for Project Preparation- Procurement Strategy

1

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

2

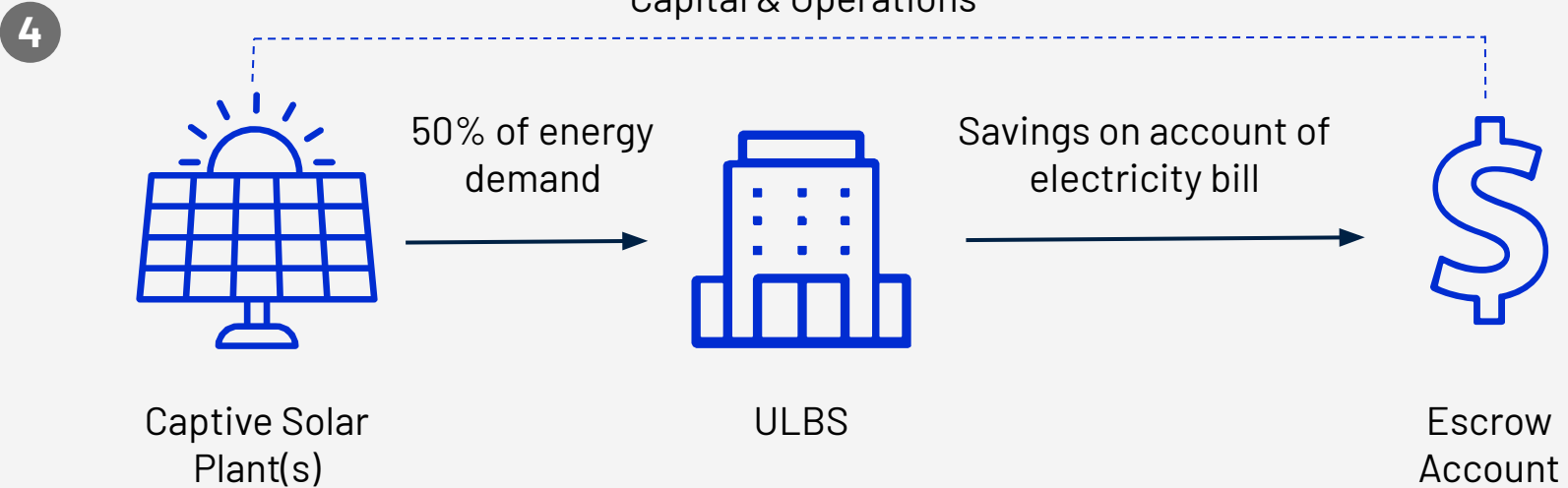
Project scope

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



Application of Toolkit for Project Preparation- Procurement Strategy

Project Structure



Application of Toolkit for Project

Preparation- Procurement Strategy



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	✓		

3



Contractual Arrangement

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

4

Implementation Option Risk allocation (Captive Solar Example)

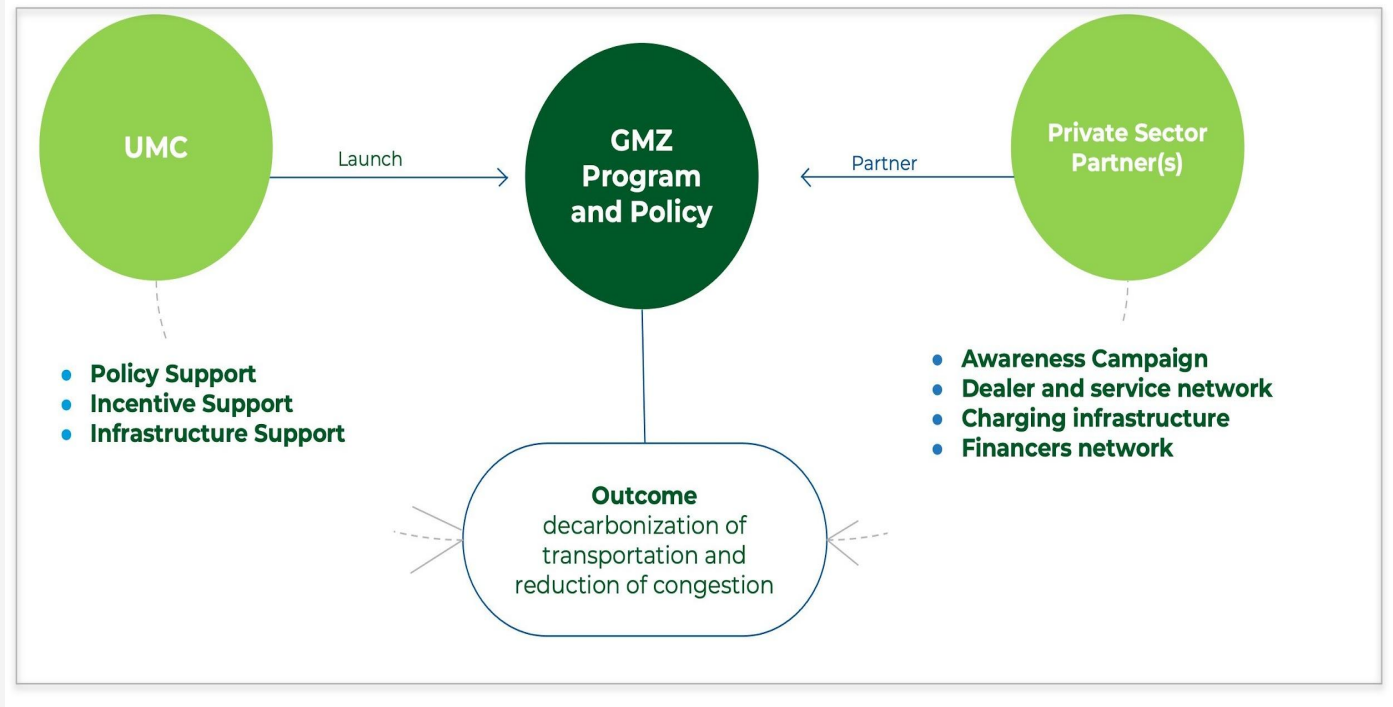
Risk Type	Public	Private	Shared
Design Risk		✓	
Construction Risk		✓	
Implementation Risk		✓	
Performance or availability Risk		✓	
Revenue Risk			✓
Termination Risk			✓
Technology obsolescence risk	✓		
Financing Risk	✓		
Policy Risk	✓		
Residual value risk	✓		

Procurement Strategy

Case 6: Project strategy for setting up a Green Mobility Zone, Udaipur

Application of Toolkit for Project Preparation- Procurement Strategy

Project Structure

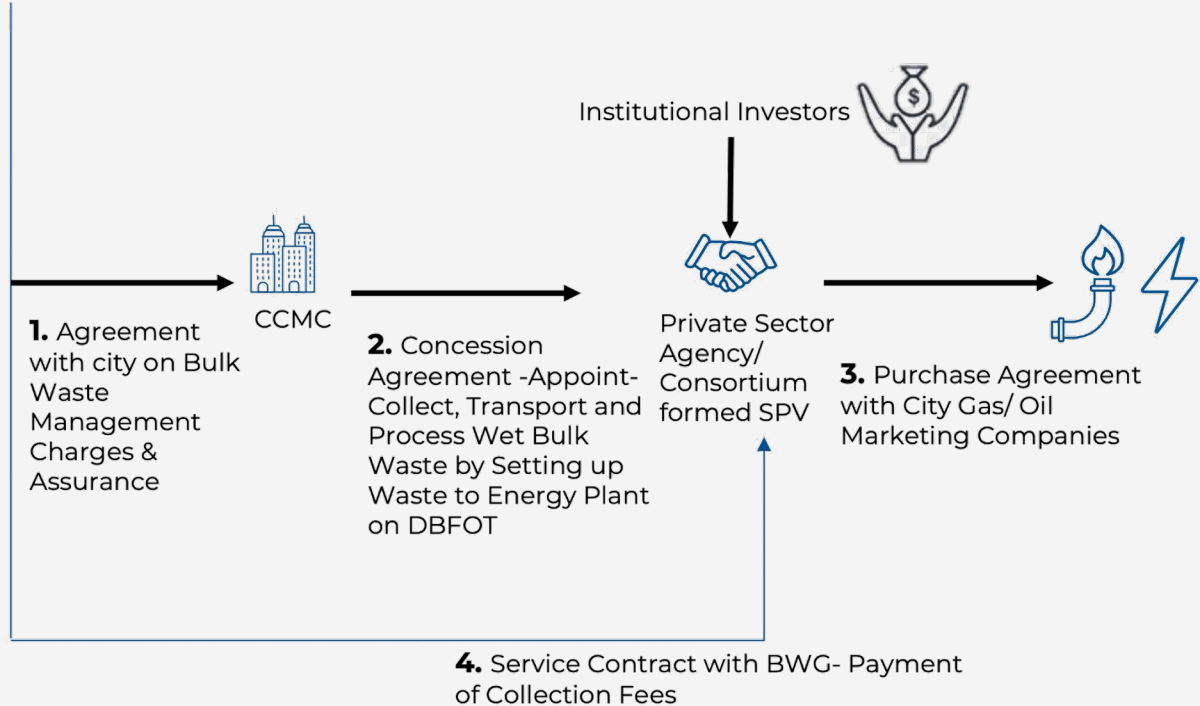
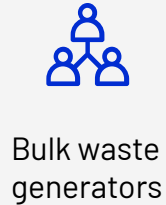


Procurement Strategy

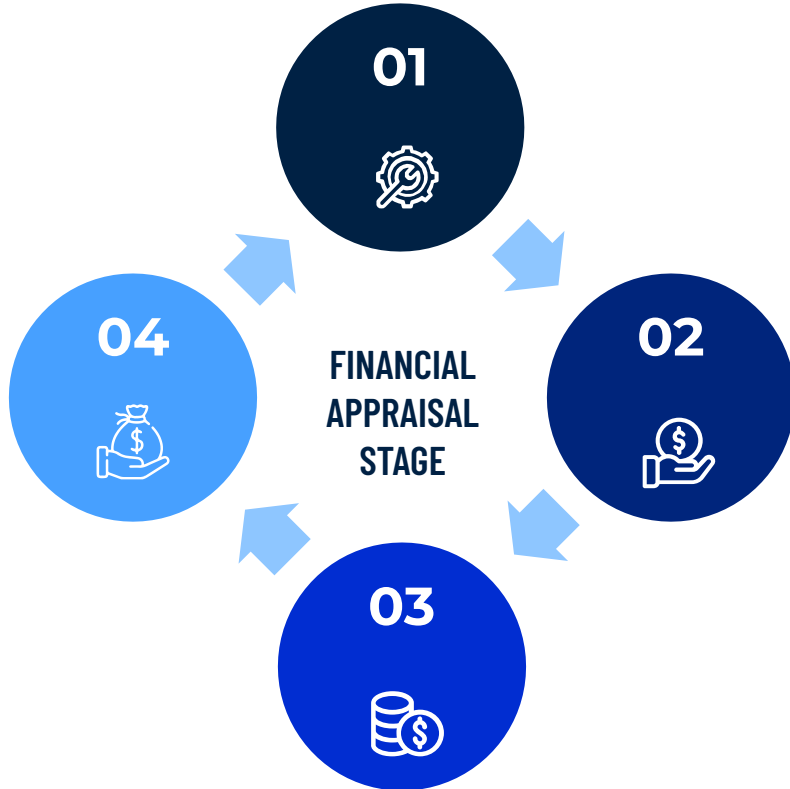
**Case 7: Project strategy for setting up a
Waste to Bio CNG Solution for
Organic Waste- Coimbatore**

Application of Toolkit for Project Preparation- Procurement Strategy

Project Structure



Financial Appraisal & Model: Template Guidelines



01- General

Interest Rate, Inflation, Taxation, Capital Charges-Depreciation and Amortisation Discount rates

03- Revenues

- User fees assumption
- Potential savings assumption
- Emission reduction calculation in case of low carbon technologies- and carbon revenues assumptions

02- 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

04- Funding Options

- Funding structure
- Funding schedule
- calculating project returns for the different elements of financing and payback

Financial Appraisal and Model

Case 8: Financial appraisal of setting up a captive solar plant in Rajkot

Application of Toolkit for Project Preparation- Financial Appraisal

Financial Appraisal Output:

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)

Application of Toolkit for Project Preparation- Financial Appraisal

Financial Appraisal Output:

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	3.97	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%

