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# CapaCITIES

## Bankability Report: Ground and Roof Top Based Solar Power Project, Rajkot



# CapaCITIES

LOW CARBON • CLIMATE RESILIENT • CITY DEVELOPMENT

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## CHAPTER-I

### **EXECUTIVE SUMMARY OF BANKABILITY REPORT**

Rajkot is one of 4 model cities which will be participating in the CapaCITIES project, supported by the Swiss Agency for Development & Coordination (SDC), which seeks to technically support fast track implementation of mitigation actions and also develop climate resilience strategies for Rajkot, with a specific focus on water resilience. This project is expected to build upon the progress achieved by Rajkot under its previous programmes.

**South Pole Carbon Asset Management Limited** which is working with Rajkot Municipal Corporation (RMC) on city infrastructure development decided to take up solar power generation proposal under CapaCITIES. Pursuant to same, SouthPole engaged technical consultant viz Ecofav Services Private Limited "ECOFAV" to prepare a Feasibility Report of the projects suggested by RMC. ECOFAV submitted Feasibility Reports to set up a new ground and roof-top based solar power project of ~23 MWp capacity at existing facilities viz:

- i) Anandpar Sewage Treatment Plant – to set up ground/rooftop solar system of 21 MWp
- ii) Madhapar Sewage Treatment Plant - to set up ground/ rooftop solar system of 0.035 MWp
- iii) Ribeda Water Treatment Plant - to set up ground/ rooftop solar system of 1.4 MWp
- iv) Raiyadhar Water Treatment Plant - to set up ground/ rooftop solar system of 0.68 MWp

It may be mentioned that IIFCL Projects Ltd (IPL) was earlier mandated to assess bankability of proposed projects under CapaCITIES. Following which IPL team had also made a visit to meet officials of Rajkot Municipal Corporation on 14 & 15 February 2019.

ECOFAV Feasibility Reports derived upon the existing shadow free available area of above mentioned sites, after assuming project life of 25 years with project specific payback periods ranging from 1-14 years, considered the project as doable.

Subsequently, IPL based on the Feasibility Report, the follow-up confirmations from ECOFAV, RMC and industry experiences, prepared an illustrative revenue model.

The Illustrative Revenue Model based on Feasibility Report provided following conclusion:

- Based on the data provided & constraints inbuilt in the Feasibility report the project is prima-facie bankable to be tendered on Independent Power Producers basis (Project IRR, Equity IRR, Average DSCR were 14%, 16% & 1.57 respectively).

However, a fresh Feasibility Report/ Detailed Project report with emphasis on parameters discussed under Chapter IV may be undertaken before finalization of tender documents.

## CHAPTER-II

### BACKGROUND OF PROJECT

The Rajkot Municipal Corporation (RMC) has undertaken a number of initiatives towards Implementing renewable energy, energy efficiency, sustainable transport and solid waste management initiatives, aiming to achieve low emissions development and city climate resilience over the past few years. Rajkot city council has approved Low Emission Development Strategies Action Plan and committed to reduce 25% GHG emission in year 2019-20 as compare to baseline year 2012-13.

Under CapaCITIES project, supported by the Swiss Agency for Development & Coordination **ClimateResilientCities** methodology was followed to develop to the Climate Resilient City Action Plan for Rajkot. The **ClimateResilientCities** Action Plan Process is a 9-step process in 3 phases:

**Analyse Act and Accelerate** - each unfolding into three steps - outlining how climate fragility can be assessed and climate resilient options (to achieve low emissions development and climate adaptive development) can be identified and integrated into urban development policies, plans and processes. It consists of a wide range of tools and guidance notes to support Local Governments to deliver effective Local Climate Action

In same line of action, once the space availability was identified with Rajkot Municipal Corporation for setting up solar power projects, South Pole Carbon Asset Management Ltd. commissioned Ecofav Services Private Limited (Ecofav) as an independent consultant to undertake the study titled “Solar Power Project Feasibility at Sewage (Anandpar, Madhapar) and Water Treatment Plants (Ribeda, Raiyadhar), Rajkot, Gujarat, India.”

The purpose was to investigate solar power generation technologies, identify an appropriate size/capacity of solar technology for the Rajkot Municipal Corporation, and establish the economic viability of a solar power facility. Thereupon, Feasibility Reports (April 11, 2019 and later revised version May 17, 2019) by ECOFAV were submitted which focused on:

- i) Energy calculations of site
- ii) Electrical calculations and other calculations of PV plant.
- iii) Cost calculations and analysis.
- iv) Per unit capital cost calculation.
- v) Payback period calculations.
- vi) Checking the feasibility of the plant.

Pursuant to the same, IPL as under the mandate was tasked to assess bankability of the project along with the preparation of an Illustrative Revenue Model based on the above mentioned Feasibility Report and the clarifications issued towards it thereafter.



## CHAPTER-III

### PROJECT DESCRIPTION

Fast-growing energy demand, increase in infrastructure demand due to rapid urbanization, scarce resources and dependence on imported energy are just some of the challenges and opportunities that call for decisive action and innovation in Rajkot. Rajkot is at the forefront among Indian cities preparing for a sustainable, low carbon and climate resilient future

The Climate Resilient City Action Plan report dated June 30, 2018 documents that the major contributors to Green House Gas (GHG) emission in Rajkot are Residential buildings and On-road Transportation sector, followed by Manufacturing Industry and Construction. Residential building energy use contributes to 35% of the total GHG emission while On-road Transportation accounts for 28% of the emission. Percentage share of Manufacturing Industry and Construction sector, waste sector, and commercial/Institutional sector is 19%, 11%, and 7% respectively. It has been noted that GHG emission from Residential sector is higher as use of thermal electricity is higher in sector.

Pursuant to same, the Rajkot Municipal Corporation envisaged to utilize the ground & roof-top spaces available with it to utilize for set up of solar power projects under CapaCITIES. Subsequently, Feasibility Study was carried out by ECOFAV at 5 locations identified by Rajkot Municipal Corporation viz:

- i) Anandpar Sewage Treatment Plant – to set up ground/ rooftop solar system*
- ii) Madhapar Sewage Treatment Plant - to set up ground/ rooftop solar system*
- iii) Ribeda Water Treatment Plant - to set up ground/ rooftop solar system*
- iv) Raiyadhar Water Treatment Plant - to set up ground/ rooftop solar system*
- v) Municipal solid waste facility at Nakarawadi- to set up ground based solar system*

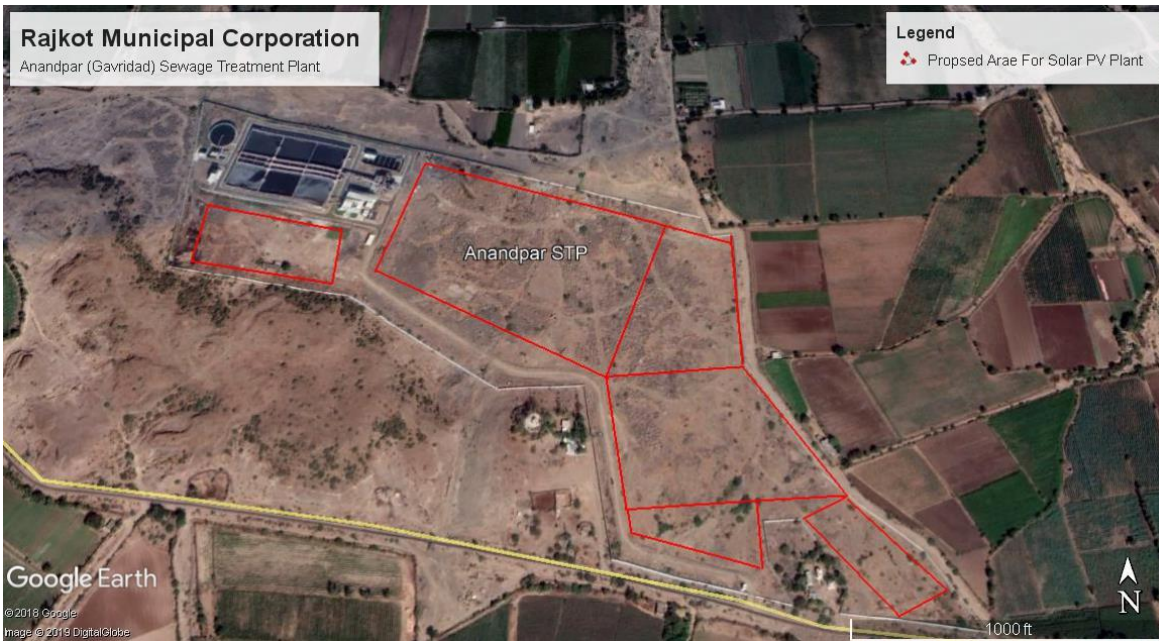
ECOFAV in its feasibility report advised setting up of ~23 MWp combined capacity ground and roof-top based solar Photo Voltaic system at Sewage (Anandpar, Madhapar) and Water Treatment Plants (Ribeda, Raiyadhar) and another ground based solar PV plant of 4 MWp capacity at Solid Waste Management facility of Nakarawadi, Rajkot.

#### **Individual Project Details:**

(i)

<b>Particulars</b>	<b>Feasibility Report Data</b>
Project Name	Anandpar Sewage Treatment plant
Proposed Capacity	21.78 MWp
Suitable Technology	Crystalline
Set up	Ground Based PV plant





*Location of proposed Anandpar Sewage Treatment plant- Ground based Solar Project*

(ii)

Particulars	Feasibility Report Data
Project Name	Madhapur Sewage Treatment Plant
Proposed Capacity	0.035 MWp
Suitable Technology	Crystalline
Set up	Roof Top Based PV plant



*Location of proposed Madhapur Sewage Treatment plant- Ground based Solar Project*

(iii)

Particulars	Feasibility Report Data
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Project Name	Ribda Water Treatment Plant
Proposed Capacity	1.4 MWp
Suitable Technology	Crystalline
Set up	Ground & Roof top Based PV plant



**Location of proposed Ribda Water Sewage Treatment plant- Ground & Roof top based Solar Project**

(iv)

Particulars	Feasibility Report Data
Project Name	Raiyadhar Water Treatment Plant
Proposed Capacity	0.068 MWp
Suitable Technology	Crystalline
Set up	Ground Based PV plant



### *Location of proposed Raiyadhar Water Sewage Treatment plant- Roof top based Solar Project*

The proposed solar plants were to have a project life of 25 years and were to be based either on Polycrystalline or Monocrystalline solar modules plant which ECOFAV recommended to be selected by Developer at implementation stage.

### **Key stakeholders**

- Project Owner: Depending upon the Feasibility Report it can either be the Municipal Corporation or an Independent Power Producer (s).
- Central & State Government: For Central/ State sponsored schemes under Smart Cities Mission/ Urban Low Emission Development Strategies (Urban-LEDS)/ UJALA.
- Citizens, NGOs: For creating awareness to have integrated approach towards City development and its infrastructure.

## **CHAPTER - IV**

### **PROJECT COST & FINANCIAL INDICATORS**

During preparation of the illustrative Revenue Model, a relook was taken at the Feasibility Report assumptions and in terms of industry experience, RMC feedback and ECOFAV, discussions following steps were undertaken:

- Project Concession initiation and Project Commercial operation achievement dates were augmented among others.
- Project was considered to be developed in PPP mode on Independent Power Producer (IPP) basis among others.
- Towards generation output the technology selection, module degradation, auxiliary consumption, transmission losses, plant down time and O&M costs inclusive of inflation post free period were also assumed among others.
- Assumptions regarding performance probability, project cost, fixed tariff without escalation over project life, Central/ State subsidy applicability and generation outputs were considered among others.
- To arrive at bankability of project additional components of project cost like Interest during Construction (IDC), Margin Money for Working Capital (MMWC) and Debt service Reserve Account (DSRA) were also considered to arrive at final project cost among others.

<b>Key Financial Indicators</b>	<b>Amount in Rs. Million</b>
<b>Total Project Cost</b>	1886.6
<b>Debt (70%)</b>	1320.6
<b>Equity (30%)</b>	566.0
<b>Project IRR</b>	14%
<b>Equity IRR</b>	16%
<b>Average DSCR</b>	1.57

## CHAPTER - V

### PROJECT RISKS AND RISK MITIGATION

Description of risk	Likelihood of occurrence	Potential Impact	Severity of Risk (likelihood * potent. impact)	Risk mitigation measures
<b>Promoter / Equity Infusion Risk</b>	Medium	High	High	Promoter/Sponsor shall infuse 100% of the total Promoters' contribution upfront.
<b>Financing Risk (i.e. Financial closure with lenders)</b>	Low	High	High	Timelines to be stipulated in Tender document for financial closure and penalty clauses be enforced.
<b>Project Technology Risk</b>	Low	High	Low	The proposed Projects are using the solar PV technology. The technology selected for this project has a proven track record.
<b>Land Acquisition</b>	Low	Medium	Low	Projects to be set up at space already available with RMC.
<b>Payment Risk -</b>	Low	High	Low	Independent Power producer decided to ensure ESCROW mechanism and selection of off takers.
<b>Approval &amp; Clearances</b>	Low	Medium	Low	The Municipal Corporation while devising the tender documents should envisage compliances with all applicable guidelines & laws. The Independent Power Producer to obtain all

Description of risk	Likelihood of occurrence	Potential Impact	Severity of Risk (likelihood * potent. impact)	Risk mitigation measures
				statutory and other clearances and ensure its compliance over project life.
<b>Construction &amp; O&amp;M Risk</b>	Low	Low	Low	The Independent Power Producer to select EPC and O&M contractor of proven record to implement the project within timelines. The EPC contractor to be liable in line with Rajkot Municipal Corporation applied penal charges, in case of non-adherence to timelines
<b>Cost Over run</b>	Low	Medium	Medium	The Independent Power Producer to bring in additional funds without recourse to lenders or Rajkot Municipal Corporation.
<b>Force Majeure</b>	Low	High	Mid	The Independent Power Producer to obtain adequate insurance cover and solar project to follow all applicable safety measures as applicable in the market and the lenders may advise.

## **CHAPTER – VI**

### **CONCLUSION – THE WAY FORWARD**

Based on and subject to the limitations, qualifications, restrictions & recommendations of the Feasibility Report provided to IIFCL Projects Limited, to consider Bankability of the proposed ~23 MWp combined capacity ground and roof-top based solar Photo Voltaic system at Sewage (Anandpar, Madhapar) and Water Treatment Plants (Ribeda, Raiyadhar) at Rajkot City, following may be concluded:

**The proposed solar projects at 4 sites as a part of CapaCITIES project may be taken up by Rajkot Municipal Corporation on tender route subject to, but not limited to, the assessment & variations of the parameters before/ at the time of formulation of tender documents as listed below:**

- Project Concession initiation and Project Commercial operation achievement dates.
- Project to be developed as Captive or on PPP mode.
- Data on the technology selection, module degradation, auxiliary consumption, transmission losses, plant down time and O&M costs inclusive of inflation post free period.
- Data on performance probability, project cost, fixed tariff without escalation over project life, Central/ State subsidy applicability and generation outputs.
- To arrive at bankability of project data on Interest during Construction (IDC), Margin Money for Working Capital (MMWC) and Debt service Reserve Account (DSRA).

## **ANNEXURES & ATTACHMENTS**

- 1) SDC report on Climate Resilient City Action Plan dated June 30, 2018
- 2) Illustrative Revenue Model – IIFCL Projects Ltd
- 3) Feasibility Report - ECOFAV

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