Ministry of Renewable Energy & Public Utilities, Republic of Mauritius

Development of 29.4 MW Wind Farm at Curepipe Point (Plaine Sophie) on PPP basis

CASE STUDY REPORT

September 2012

CRISIL Risk and Infrastructure Solutions Limited

Contents

1. Project Summary

1.1 Project Name

- ✓ Curepipe Point wind farm, Republic of Mauritius.

1.2 Project Description

- ✓ Development of 29.4 MW wind farm at Curepipe Point (Plaine Sophie) on Public Private Partnership (PPP) basis, in the Republic of Mauritius.

2. Project Deliverables

2.1 Wind Farm

The seller intends to develop, finance, design, construct, commission, test, own, operate, and maintain a wind farm, having a nameplate or rated capacity of 29.4 MW, to the resolution of 14 nos. (fourteen) wind turbines, to be located at Curepipe Point (Plaine Sophie), Republic of Mauritius, for generating electrical energy from wind. The generated electricity will be procured by Central Electricity Board (CEB) for the period of 20 years as per the Energy Supply & Purchase Agreement (ESPA).

2.2 Power Transmission

The project also includes setting up of all 33 KV lines within the wind park (wind park transmission lines), to be connected with the help of suitable conductors to the pooling substation, wherein the power shall be further step up to 66 KV level. The length of the 66 KV transmission line shall be of approximately 4.5 Kms from the pooling substation to the Central Electricity Board (CEB) interconnection facility at Henrietta substation.

2.3 Communication System

All the internal communication of the wind turbine generator (WTG) is to be achieved through CAN-bus whereas all external communication within the facility shall be performed by ethernet or MODBUS.

2.4 Reference Mast

The reference mast shall be located inside the facility and designed as per IEC norms. It shall be equipped with anemometers and wind vanes that are to be installed at the hub height, equivalent to as of the WTGs.

3. Project Details

3.1 Project Location

The project is located at Curepipe Point (Plaine Sophie), which is situated near the Lake Mare Aux Vacoas in Mauritius, as shown in the map below.

3.2 Sector

The project belongs to the renewable energy sector under the Ministry of Renewable Energy and Public Utilities (MREPU), Government of Republic of Mauritius.

3.3 Municipality

The project lies under the municipality of Curepipe, Republic of Mauritius.

3.4 Accounting & Project Officer

The accounting and project officer for the particular project is Mr. M.S. Mukoon who belongs to the Central Electricity Board, Government of Republic of Mauritius, with co-ordinates as follows:

Central Electricity Board,
Royal Road, Curepipe,
Republic of Mauritius.
Tel: +230-601-1103
Mob: +230-250-2226
Fax: +230-675-7958
E-mail: shams.mukoon@ceb.intnet.mu

3.5 Transaction Advisors

The transaction advisor for the particular project is CRISIL Risk & Infrastructure Solutions Ltd. with co-ordinates as follows:

CRISIL Risk & Infrastructure Solutions Ltd.

Crisil House, Central Avenue, Hiranandani Business Park, Powai, Mumbai – 400 076, INDIA Tel: +91-22-3342-3000	Building No. 46, Near EPF Office Sector 44, Gurgaon, Haryana – 122-003, INDIA +91-124-672-2000

3.6 Relevant Treasury's PPP Unit

Lead, PPP Unit, Ministry of Finance, Republic of Mauritius.

3.7 Signatories to the PPP Agreement

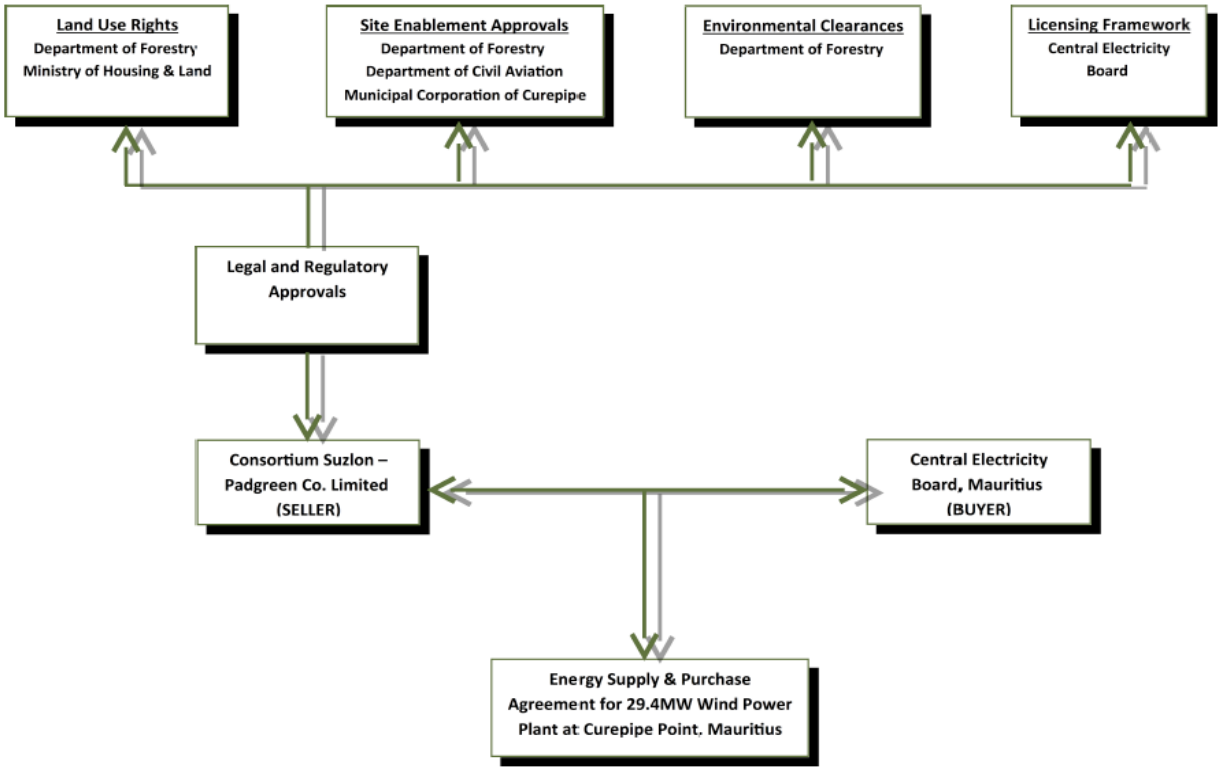
- ✓ Central Electricity Board, Republic of Mauritius (Buyer)
- ✓ Consortium between Suzlon Energy & Padgreen Co. Ltd. (Seller)

3.8 Agreement Signature Date

The Energy Supply & Purchase Agreement (ESPA) was signed on 3rd day of August, 2012.

3.9 Structure of the PPP

The following figure highlights the overall structure of the transaction under the PPP model.



3.10 Agreement Term

The term of the Energy Supply & Purchase Agreement (ESPA) is 20 years, post commissioning and commercial operation declaration of the particular wind plant.

3.11 Private Party Special Purpose Vehicle (SPV)

The private party forming the SPV is a consortium between Suzlon Energy & Padgreen Co. Ltd.

3.12 Shareholders in the SPV

The following table provides the percentage of shareholders in the consortium:

Consortium Partners	Share Holding
Consortium of Padgreen Co. & Valum Holding BV	74%
Suzlon Energy Limited	26%

3.13 Value for Money Achieved over the PSC

The value for money (VFM) as computed in the VFM report submitted to CEB in June, 2012 for a capacity of 20 MW is 1,341 Million MUR.

3.14 Risk Allocation

The risk sharing principles during the pre-construction phase are provided in the table below:

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
1	Finalization of project structure	The seller needs to get into partnerships with many entities with respect to project development. This includes EPC contract, O&M agreement etc. Finalization of such multi-entity project structure may take more than budgeted time.	Developer
2	Finalization of contractual framework of the bid process	The seller would have to enter into an ESPA with the CEB. Any delay in the execution of the contract is a risk for each party.	Both CEB and Seller
3	Availability of the requisite development approvals and clearances	The seller needs to obtain all approvals and clearances pertaining to the project which may take more than budgeted time.	Seller with facilitation from CEB

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
4	Achievement of financial closure	It is one of the most important milestone in the project development lifecycle, hence any delay in it, possess significant risk of project cost overrun.	Seller
5	Site Risk	Site risks pertain to unavailability or inability of the project land to be used at the required time or manner adversely affects the service delivery.	Seller

The risk sharing principles during the design, construction & commissioning phase are provided in the table below:

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
1	Project completion	The seller would have to construct the wind farm within a period of 730 days from the date of signing of the ESPA .	Seller
2	Project cost overruns	The project cost overrun including cost escalations due to delays in project commissioning.	Seller
3	Design deficiency or technology risk	The risk pertaining to inability of the project to handle the required demands or expected output specifications.	Seller

The risk sharing principles during the operation phase are provided in the table below:

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
1	Operations & maintenance costs	O&M costs exceeding the estimates used for establishment of financial viability by the bidders.	Seller
2	Latent defect	Seller incurring major corrective	Seller

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
		maintenance costs due to force majeure events or due to equipment defects etc.	
3	Wind speed risk (Post commissioning)	Any decrease in the wind speed would result in decrease in the generation of electrical energy	Seller
4	Performance loss & supply shortfall	Difference in actual performance of the project vis-à-vis the envisaged or planned performance at the time of bidding.	Seller

The risk sharing principles through the project life cycle are provided in the table below:

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
1	Exchange rate	The bidder would be quoting 80% of the tariff in USD and the balance in MUR. On the other hand, the CEB would be making the payments converted in MUR. Hence exchange risk arises in such arrangement.	CEB
2	Interest rate	It refers to the uncertainty over the macro-economic determinants of benchmark interest rates.	Seller
3	Inflation	It will affect the project at both the construction stage as well as the operational stage.	Seller
4	Force majeure	It deals with non-political events such as epidemics, earthquakes, flooding and cyclones impacting construction and/or operations	Both CEB and Seller
5	CDM market	Pertains to risk in variation of additional	Seller

Sr. No.	Risk	Nature of Risk	Party Bearing the Risk
		revenue achieved by selling Carbon Emission Reduction Certificates (CER) under the CDM framework	

3.15 Key Milestones of the Project

The key milestones achieved under the project are provided in the table below:

Sr. No.	Milestone	Completion Date
1	Commencement of the transaction	May 2009
2	Submission of Interim Report on Bigara Site	July 2009
3	Approval of Interim Report and Change of site from Bigara to Curepipe Point	September 2009
4	Submission of the feasibility report	October 2009
5	Approval of the feasibility report	March 2010
6	Installation of the reference wind mast	June 2010
7	Issue of tender documents – RFQ & RFP	August 2010
8	Submission of 11 RFQ proposals	November 2010
9	Pre-qualification of 9 proposals and issuance of RFP	December 2010
10	Submission and opening of Proposals by Suzlon-Padgreen & Aerowatt	April 2011
11	Submission of Evaluation Report	June 2011
12	Selection of the preferred bidder for negotiation stage	Feb 2012
13	Signing of the ESPA	3rd August 2012

4. Key Milestones & Other Details

4.1 Inception Report

The inception report submitted by the transaction advisor touched-upon the approach and methodology that would be followed for executing the assignment. In addition, key information required for the project, communication process with the contracting authority, and other related issues were elaborated in the report.

4.2 Interim Report

As a precursor to undertaking a feasibility study, the transaction advisors were required to prepare an interim report based on the technical reassessment of the proposed site. Accordingly, the wind potential at the proposed site was reviewed and various other technical feasibility challenges were addressed at the particular stage. The details are present in relevant sections.

4.3 Availability of Land

As a major impediment to the progress of the project, it was found on validation that the existing land at Bigara site would be inadequate for the proposed capacity of 25-40 MW and additional land needs to be acquired towards the forest area near the site (south and south east – Curepipe point). It was estimated that additional land requirement at the Curepipe point would be ranging from 225 to 470 hectares depending upon the capacity of 25-40 MW.

4.4 Feasibility Report

The project feasibility report was required to be submitted to the MREPU for the approval, before the commencement of the tendering process. The Report was submitted highlighting the feasibility of the site and the same was duly approved by the MREPU.

4.5 Request for Qualification (RFQ) and Request for Proposal (RFP)

RFQ document were issued for the qualification of the interested parties. Based on the qualification criteria 9 parties were shortlisted from 11 parties who submitted documents. Further, the RFP document was shared with these selected parties. Based on the evaluation criteria the party with lowest quoted tariff was selected among the two submitted documents.

4.6 Energy Supply and Purchase Agreement (ESPA)

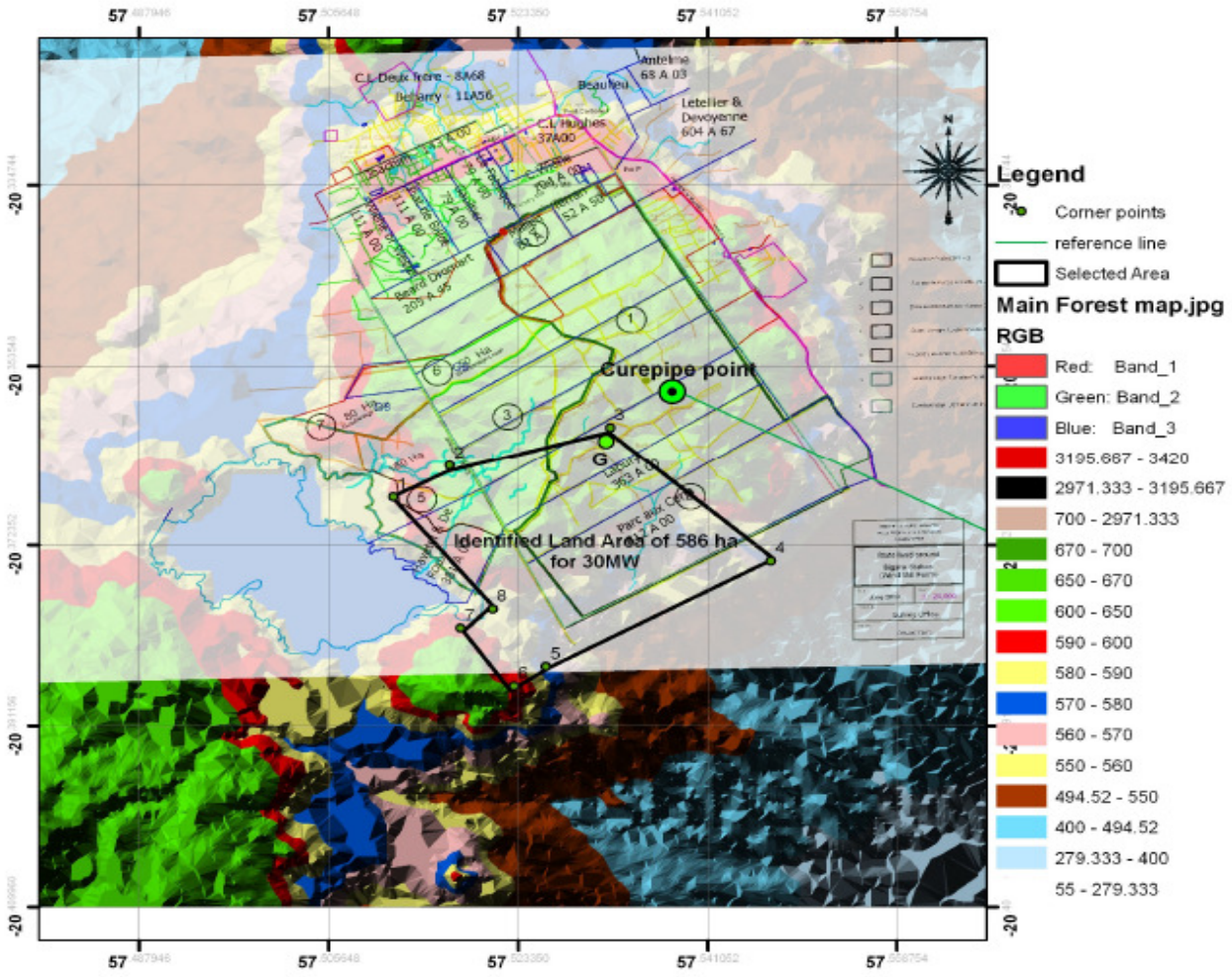
Draft ESPA was prepared and circulated to selected party. The same was negotiated and mutually agreed. ESPA was signed on August 3rd 2012.

5. Key Challenges Faced

5.1 Change of Project Site

The site for the particular project was initially identified at Bigara for the installation of the 25-40 MW wind farm, however on further due-diligence by the transaction advisors, it was found that the site was not viable for the development of the wind farm. The impediments could have been various encroachments due to the public utility installations at that particular site. Also, the size of the site was not found to be adequate for the installation of even 7-8 MW wind farm.

Owing to such reasons, the transaction advisors suggested the MREPU to consider a change of site for the project. After analysing various options available in Mauritius, the transaction advisors suggested an alternative site south of Curepipe Point, which is the also highest point in Mauritius, as shown in figure below.



The new site as suggested at Curepipe Point also had a few challenges discussed below:

- ✓ The site was in line with the flight landing path, hence there were apprehensions from the Department of Civil Aviation (DCA) that the wind-turbines may impede the flight landing. After carrying various round of consultations with the DCA, the project was given a 'go-ahead', subject to the final micro-sitting plan, to be approved by the DCA.

- ✓ The identified site is close to the Lake Mare Aux Vacoas, which is the biggest lake in Mauritius and serves as a source of drinking water for the entire island. The Department of Forestry had raised concern that the wind farm may obstruct the lake catchment areas and may decrease the capacity of the lake. Finally it was decided not to put any wind-turbines in the catchment area of the lake.

  Nevertheless, the new identified site was found feasible to set up 25-40 MW wind project.

5.2 Threat of Cyclones to the Wind Farm

As Mauritius is a cyclone-prone country, it occasionally does suffer extreme cyclonic conditions with wind speeds sometimes exceeding 70m/s, whereas most of the wind turbines in the world are designed to survive wind speeds under 60m/s.

To eliminate the risk of cyclones, very few technologically proven options are available throughout the world, however such wind turbines are also quite expensive. Therefore, in order to achieve reasonable value-for-money (VFM) for the project, it was important for the developers to assess the cyclone risk in correct perspective and counter the threat by over designing the wind turbines. Most importantly, it was decided that risk of cyclone borne by the developer and no compensation shall be provided in case of any damage either to the site or the WTGs, because of cyclone.

5.3 Change of Contracting Authority

Considering the importance of renewable energy in the context of Mauritius, the project was conceptualized and initiated by the Ministry of Renewable Energy and Public Utilities (MREPU). As the Central Electricity Board (CEB) is the sole distributor of power in Mauritius, it was found, as per the PPP guidelines that MREPU cannot be the contracting authority for the project and since CEB is entity which would eventually buy the power from the project, CEB has to run the tender process.

The project was then handed over from the MREPU to the CEB after the approval of the feasibility report by the parliament, which resulted in delays in the tendering process.

5.4 Bidding criteria and risk of wind speed

One of the key challenges pertaining to the tendering process was to establish the bid parameter and a transparent criterion for evaluation because of lack of wind data availability. Various options were evaluated by the Transaction Advisors including capital cost as bidding criteria. However, it was observed that capital cost based bidding will not include the technological advancement and performance levels of the turbines. Other pertinent issue was that, the wind data for the site was not available for a substantial period (2 to 3 years) which is generally recommended for estimating a reasonable level of generation from the wind park. Hence, it was recommended by the Transaction Advisors to implement tariff based bidding based on a normative wind speed with adjustment formula vis-à-vis change in the wind speed. In additional to this, it was decided that post the completion of 2 years, the tariff shall be adjusted based on the average recorded wind-speed of 2 years. The solution provided was innovative and helped in balancing the risk of wind speed perceived by the potential investors and deployment of best wind technology that can yield maximum generation in the site for the procurer.

5.5 Clearances/approvals

It has been observed that numerous clearances and approvals are required for this project. One of the key challenges foreseen was to get the existing leases for the identified site, transferred in the name of the developer. Also, since the project site lies in the proximity of the flight landing path, the approval from the Department of Civil Aviation (DCA), would be critical. Transaction Advisors worked closely with all the stakeholders to ensure due consultation is done and later no impending issues arise on account of land, forest, housing & residential society and DCA approval/clearances. However, this process did cause considerable delays in tendering the project. As a best practice, it is suggested that going forward a separate Special Purpose Vehicle (SPV) should be created that takes up responsibility of various clearances before transferring the project to the private player.

6. Recommendations & Conclusion

- ✓ It is recommended that in PPP projects, that the contracting authority for the project should remain same from the stage of award to the inception. Any mid-way change in the contracting authority causes delays in awarding the project. It is of worth mentioning here that the ownership to guide any project towards a successful completion is critical for PPP projects.

- ✓ Ideally, a first level due-diligence of the identified project-site needs to be conducted before appointing the transaction advisors which safeguards from various issues and delays, caused due to change of site, as witnessed in this particular project, where the transaction advisors voluntarily identified better site for this PPP project. Further, a wind mast should be installed prior to the appointment of Transaction Advisors. It is recommended that data for the site should be collected for at least one year before preparing the feasibility report for the site.

- ✓ Formation a Special Purpose Vehicle (SPV) by the contracting authority for activities such as land acquisition, legal & regulatory clearances, and later transferring the particular SPV to the selected bidder, helps to reduce significant risks in a project and thus increases the value for money (VFM) of the project. Such a structure and arrangement is highly suggested for the projects having no precedent in the country.

- ✓ For an efficient tender process, a joint steering committee comprising members from all the project stakeholder entities should be constituted. The particular committee should also include representations from the government bodies which will accord the necessary approvals and clearances for the particular project. It will lead to considerable saving in project development time.

- ✓ The ESPA should be available in its final form and duly approved by all the relevant authorities, before inviting the bids from the PPP partners. It helps the bidders to understand the key commercial terms of the agreement, thus facilitating them to make an informed bid.

- ✓ The rated capacity of the project should be pre decided before inviting the bids for the project or the range for the variation in capacity should not be more than 10% during the bidding stage. For the particular Curepipe Point wind project, the initial capacity was planned

to be between 25 MW to 40 MW but during the bidding stage, due to lack of enough clarity regarding eventual size of the project, bids were invited for 10 MW and 20-30 MW. Such instances add to confusions and unnecessary delays for the selection of bidder.

7. Disclaimer

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