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Electricity Supply to Africa and Developing Economies – Challenges and Opportunities

Renewable energy integration

Costs Containment Considerations by Utilities during Implementation of IPP Projects

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Abstract - The advent of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in South Africa, as per the country's IRP (Integrated Resource Plan for Electricity 2010-2030) of 2010, has resulted in the establishment of PPAs between the Seller (each IPP) and the utility's Single Buyer Office (Off-taker/Buyer). This paper details the salient points from the PPA that would qualify the REIPPs to seek relief for a System Event claim in the form of a deemed energy payment from the utility whilst detailing possible preventive measures that should be observed by the utility to ensure the financial sustainability of its operations into the future.

Keywords - renewable energy, compensation event, deemed energy, Power Purchase Agreement, system event, corporate objectives, environmental permits, project management, execution strategy, asset designs.

1. Introduction

The PPA (power purchase agreement) between the IPP (independent power producer) and the utility could result in deemed energy payment (DEP) claims if the terms and obligations thereof are not fully met. This paper is based on the South African case study and it aims to highlight the preventive measures that could be taken by utilities, following an investigation done to assess any process alignment shortfalls that could have been experienced during the asset creation process to connect the committed IPP (Independent Power Producer) generation projects onto the national grid.

The research methodology assumed an empirical approach to conduct the investigation whereby the authors relied on documented post event reports, prescribed process practices together with clarification interviews with relevant stakeholders, where necessary. The investigation findings are herein presented as “Key Principles”.

The content of this paper also includes the main features of the IPP bidding process, as applicable for this paper, and the Eskom (South African utility) asset creation value chain as background information. The contributing factors in the calculation of the DEP costs are also presented.

2. Definitions

2.1 Compensation Event

A “Compensation Event” [20] means any material breach by the Buyer of any of its obligations under this Agreement (save for any breach that constitutes a Government Default), including any failure to make any payments due and payable on the due date for payment, to the extent in each case that the breach is not caused or contributed to by the Seller or any Contractor or by Force Majeure, a System Event or Unforeseeable Conduct.

2.2 Deemed Energy

“Deemed Energy” [20] means the energy output that would otherwise be available to the Buyer, but was restricted by either a System Event or a Compensation Event.

2.3 System Event

[20] Means:

(a) any delay in the connection of the Facility to the System, beyond the contracted date once the Budget Quote Conditions had been met; or

(b) any constraint, unavailability, interruption, Curtailment, breakdown, inoperability or failure of or disconnection from, the whole or any part of the System,

that is not caused by any natural force or event or an act or omission of the Seller or a Contractor or, for the avoidance of doubt, termination of the Distribution Agreement or Transmission Agreement by the Distributor or the NTC (National Transmission Company) (as the case may be) due to breach of either such agreement by the Seller;

3. Qualification Criteria For Deemed Energy Claims

As per the PPA terms and obligations, IPPs qualify in two ways to claim for deemed energy payments from Eskom, i.e. due to a:

“Compensation Event”

“System Event” [20] – as a result of, inter alia, a delay in connection of the Facility to the System as well as the unavailability of the System which unavailability exceeds the threshold of the allowed grid unavailability period in a 12 month cycle (18.25 days for Distribution and 7.3 days for Transmission systems respectively) and curtailment requests by the system operator.

4. Deemed Energy Payment Costs

With regards to the DEP costs, Deemed Energy attracts the same value as the prevailing tariff of a specific Facility. Any DEP value is dependent on three factors, namely (i) the prevailing tariff structure, (ii) the duration of the event and (iii) the size of the Facility impacted. Depending on the above-mentioned three factors the exposure in the case of a System Event may amount to millions of ZAR (rands).

5. Salient Features of the IPP Bidding Process

The South African REIPPPP (Renewable Energy Independent Power Producer Procurement Programme) is a multi-stakeholder process comprising the IPP as the energy Seller, the DoE (Department of Energy) as the energy Procurer and Eskom (the local utility) as the Off-taker/ Buyer. The DoE's role, as mandated by the state

(government), is to control and manage the bidding process to determine the preferred bidders in accordance to the Ministerial Determinations as stipulated in the country's IRP (Integrated Resource Plan). The tariff is also determined as an outcome of the DoE process.

Eskom is responsible for network capacity analysis studies for each applicant, provision of the associated connection solution (quote), conclusion of a PPA with each of the successful bidders as well as entering into the Use of System Agreement with the IPP, either a Transmission or Distribution agreement, as applicable.

Eskom's model is non-discriminatory for each of the applicants and assumes that a certain IPP will be the only one to connect onto a specific node, either a substation or a powerline.

Since Eskom plays an indirect role in the adjudication process to establish the preferred bidders, this can have a negative impact on Eskom's project delivery to connect a successful IPP. Project delays could be experienced due to upstream infrastructure required to connect an IPP at a specific node or as a result of network congestion caused by generation allocations, as decided by DoE, in excess of the available capacity at a specific node.

6. Asset Creation Value Chain

The South African utility case study follows the PLCM (Project Life Cycle Model) [6] process for the planning, development and execution of projects. The PLCM is made up of six phases; namely Pre-Project Planning, the Concept Phase, the Definition Phase, the Execution Phase, the Finalisation Phase and the Post Project Phase. The key activities and milestones within each phase are herein briefly explained.

6.1 Pre-Project Planning Phase

The Pre-Project Planning Phase involves pre-concept project activities such as desktop network planning studies and project costing using standard costs. No site work is carried out. The output is a non-binding Eskom quote, namely the CEL (Cost Estimate Letter) issued to the IPP. At end of this phase, a CRA (Concept Release Approval) submission is prepared which is a milestone that signifies

project readiness to enter the next phase, the Concept Phase.

6.2 Concept Phase

On acceptance of the CEL, the applicable quotation fee is invoiced, and site activities are initiated to develop design alternatives, produce a high level schedule, preliminary cost estimate and risks for each alternative. Environmental assessment is also initiated for each alternative. Comparison of design alternatives is then performed to select the preferred design alternative. Thereafter the concept design is produced, the scope of work is confirmed, the environmental assessment report is concluded and the site or servitude, as applicable, is selected. The Project Management Plan is then developed, which contains the itemised equipment, the WBS (work breakdown structure) and the schedule thereof ("project schedule"), cost estimates and project resourcing, amongst others.

Conditional ordering of long-lead items is performed at the end of this phase, for example in cases where there is upstream network strengthening required in order to connect a customer project. This is however not done for IPP customer projects since at this stage it is unknown whether that specific IPP will be a preferred bidder or not, and is done during the Definition Phase.

The milestones for the Concept Phase are the issuing of the BQ (Budget Quote) to the IPP, which has an 85% confidence level, and the compilation of the DRA (Design Release Approval) documentation, after obtaining internal design governance approval. The PPA is also released to the IPP at the end of the Concept Phase.

6.3 Definition Phase

Acceptance of the BQ (an element of fulfilling BQ effective date conditions for IPP projects) triggers the Definition Phase to develop the solution. Detailed designs are produced, the required legal and regulatory approvals are obtained as well as purchasing or leasing of the selected site or servitude. Various project related plans are also concluded such as the Detailed Contracting and Procurement Strategy and Plan, Health and Safety Plan, Quality Plan, the Environmental Management Programme and the Risk Management Plan.

Long-lead items are also ordered early on during the Definition Phase while the balance

of the items of plant is ordered after obtaining internal approval of the Detailed Contracting and Procurement Strategy and Plan, as per the project schedule. The latter activity (ordering of the balance items) and the production of construction designs finalize the solution.

The compilation of the ERA (Execution Release Approval) signifies the completion of the Definition Phase.

6.4 Execution Phase

On-site project execution commences during the Execution Phase. This follows the site preparation for implementation and the delivery of equipment orders on site. The “as built” assets are constructed as per the applicable execution strategy, either purely Eskom build or Customer Self-build or a combination of the two. The project manager plays a key role of managing project delivery, the resources involved and the co-ordination thereof, conducting quality inspections, and the management of contracts. Asset testing for operational readiness is conducted followed by commissioning (also known as energisation). The FRA (Finalisation Release Approval) documentation is compiled as a milestone to complete the Execution Phase.

6.5 Finalisation Phase

The built assets are handed over to the asset owner, the applicable regional Transmission or Distribution O&M (Operations and Maintenance) personnel. The “as built” network diagrams and operating drawings are also submitted to the O&M personnel. Any defects identified at asset handover are corrected, activities to rehabilitate the site or servitude are carried out and costs are reconciled. The “Lessons Learnt” exercise is also done to evaluate project performance. Finally, the project team is disbanded at project close-out.

6.6 Post Project Phase

There are three main activities within the Post Project Review Phase. Firstly, the asset owner operates and maintains the new assets, measures the required benefits and records the findings in the Maintenance and Operational Plan. Secondly, the network planning manager conducts the business solution review to confirm that the correct solution, based on Need Statement and Benefits Identified, was selected and implemented. Lastly, the benefits realisation

manager measures and reports on the product or solution performance.

7. Key Principles

7.1 Supportive Corporate Objectives

The utility’s senior management shall ensure that strategic corporate objectives such as the Design-To-Cost paradigm do not hamper the development of contracted for IPP related connection projects. This would avoid a negative “ripple effect” onto the asset design, procurement and environmental processes, which when not fully followed (in the interest of the utility’s business) could raise a legal event for the utility.

7.2 Timely Environmental Permits for the Utility’s Portion of the Scope of Work

The full suite of the environmental assessment studies, namely the Geotechnical study, EIA (Environmental Impact Assessment) and EMPr (Environmental Management Programme), WULA (Water Use Licence Application), heritage approvals and the vegetation removal permit, as well as Servitude Acquisition for the Line and Substation Site, is critical to the success of a project.

Permits are regulated by various government departments. For example, the EIA is regulated by the Department of Environmental Affairs, WULA by the Department of Water and Sanitation; Heritage is regulated by the South African Heritage Resource Agency and the Department of Environmental Affairs, while Vegetation Removal is regulated by the Department of Agriculture, Forestry and Fisheries. A senior environmental adviser co-ordinates the permits activities while the senior adviser land acquisition co-ordinates activities for site and servitude acquisition as well as statutory approvals for road, rail, telecommunications and pipeline crossings over wayleaves of other service providers.

The lodging of the application with the applicable government’s authorities for the entire project scope of work, namely utility’s portion as well as the customer’s dedicated portion, shall be the accountability of the IPP. Accordingly, the utility does not have to initiate the application after BQ acceptance, which may not allow sufficient time for the construction of the grid connection solution to meet the customer’s need date.

Furthermore, the utility could strategically support the earlier initiation of the environmental application to enable adequate time for construction by collaborating with the DoE's IPP Office to establish a guarantee mechanism for the funding of pre-BQ activities such as strategic EIAs. This is the responsibility of the Eskom task team working together with the DoE IPP Office. This is for consideration by the utility's task team working with the DoE's IPP Office personnel.

7.3 Astute Project Scheduling

The utility's project manager shall ensure adequate resourcing from each of the affected disciplines and that each discipline's input into the project schedule, a subset of the Project Management Plan drawn up during the Concept Phase, accounts for seasonal conditions. Accordingly, adequate time allowance shall be made to limit execution during the rainy seasons of the year to a minimum.

Furthermore, the utility's project schedule shall be signed off by the utility's representatives, namely the customer services representative and the project manager. The project manager is accountable for this.

Prior to the Execution Phase, there shall be an exchange of the project schedules between the utility's project manager and the IPP's representative, with clear indication of at least the completion timelines of the interface milestones between the two parties.

The utility's project manager shall furthermore liaise with the designated IPP representative to ensure that the IPP's contractors do not hamper the activities of the utility's contractors, vice versa.

7.4 Co-ordination of Multiple On-Site Contractors Working Simultaneously

Having multiple contractors on site at the same time could negatively impact a project. As such, the utility's project manager shall be responsible for co-ordinating the activities of the various contractors to ensure seamless execution of the project scope of work.

The utility's project manager shall furthermore liaise with the designated IPP representative to ensure that the IPP's contractors do not hamper the activities of the utility's contractors, vice versa.

Compliance to Health and Safety regulations should be observed at all times to minimise safety related risks to personnel working close to a live chamber. Each contractor's management, namely the utility's project manager and the IPP's representative respectively, shall ensure that its personnel have undergone the applicable safety induction training such as ORHVS (Operating Regulations for High Voltage Systems) prior to working in a high or low voltage environment.

7.5 Conformity to the Contracted Execution Strategy

The utility shall not deviate from the contracted execution strategy; either purely utility build, customer self-build or a combination of the two. Informal verbal agreements should be avoided into the future. The accountability for this lies with the utility's project manager, on behalf of all applicable disciplines involved in the project development and execution team.

7.6 Procurement Process Alignment

The utility's procurement office should adhere to the prescribed procurement process, including the appointment of suitably qualified contractors based on their capacity to carry out the contracted works and are of acceptable financial standing. This would avoid the construction of "stranded assets", which are both cost ineffective and time consuming, and the need to fast-track projects at ERA stage, thereby increasing the risk of inadequate (poor quality) and costly workmanship.

The procurement office shall ensure that before a contract is concluded with a service provider, that the contract (NEC3 Engineering & Construction Contract or other kind) contains conditions to deal with pass through costs, deviations and non-conformances. Note that NEC means National Engineering Contract.

7.7 Designs Scope Sign-Off by the Utility where More Than One Utility Divisions are Impacted

All asset designs allocated to an IPP shall be signed off for acceptance by the utility's project manager and the responsible utility's design engineer, for each of the impacted utility's divisions. This is so because the third party enters into a contract with one of the divisions and could lose sight of the full

interests of the other division(s), thereby adding to project costs and time overruns.

8. Discussion

The South African investigative exercise on deemed energy payments claims provided an opportunity for assessment of the effectiveness of the current asset creation process. The findings indicate that challenges could be experienced during any of the project phases. Therefore, strict monitoring of compliance to the existing process as well as the adoption of the additional process improvement initiatives is recommended. Subsequent to this investigation, a practice note document has been developed and accepted for implementation across the utility's operations as a process improvement mechanism to ensure the utility's financial sustainability into the future.

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- [16] National Heritage Resources Act, Act 25 of 1999
- [17] National Veld and Forest Fire Act, Act 101 of 1998
- [18] National Water Act, Act 36 of 1998 (as amended)
- [19] Occupational Health and Safety Act, Act 85 of 1993
- [20] REIPP Power Purchase Agreement between the IPP as the Seller and Eskom as the Buyer
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- [23] The South African Grid Code Preamble Version 9.0 (as amended from time to time)

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- [5] Eskom Procedure for Customer Self-Build Projects in Transmission (unique identifier 240-61713594)
- [6] Eskom Wires Project Life Cycle Model and Work Package Framework (unique identifier 240-76628703)
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