

JPS Guidelines for Interconnection Studies of New Generation

January 2023

JPS Engineering Services Division

Background

This document seeks to provide a broad framework for addressing information and data requests to support potential investors/bidders which typically include the following areas:

- The size and nature of generation that can be interconnected at various nodes on the Transmission & Distribution network
- Interconnection facilities required to deliver generation to the grid
- Cost estimates on the interconnection facilities (transmission/distribution lines, substation modification, protection)
- Feasibility and Grid Impact Studies for individual projects (inclusive of system data for grid impact on the candidate plant)

The Ministry of Science, Energy & Technology (MSET) RFP process provides further guidelines with regards to the Grid Impact Assessment of the aggregate projects that are short listed including the following areas:

- Cost allocation and assignment relative to any required system upgrades from the shortlisted projects
- Modifications to interconnections arising from aggregate impact of generation (e.g. if concentrated in one location) and how interconnection modification costs will be treated at this stage.
- Incorporation and consideration of Grid Impacts in the Bid Evaluation stage

JPS has developed and here proposes a two-tier process that includes the provision of basic system data and configuration details free of cost and a schedule of other services and analysis that will attract fees.

Interconnection Designs and Costs to be included in Bid Documents

Due to the unavailability of some system studies and analysis to inform this first stage of the RFP the MSET has recommended that to facilitate the inclusion of interconnection costs for the purpose of a bid submission JPS should provide ONLY an outline of the physical facilities (breakers, bus work, transmission/feeder line construction etc.) required to physically interconnect the facility into the proposed node. The bidder would be required to prepare a cost estimate to physically interconnect the facility.

If the bidder requires JPS to perform a system assessment or prepare an engineering estimate in relation to this interconnection, a quotation can be provided to the requesting party as outlined on page 9. The section on “JPS Process to Respond to Queries from Bidders” will provide further information with regard to the type of information which can be provided.

Please note that the engagement of JPS to provide the below engineering services is optional. JPS has no obligation to deliver these services and thus will provide them only on a commercial basis. MSET will provide guidance to potential bidders, on how changes to interconnection arrangements arising from the feasibility studies during the evaluation phase, will be treated.

JPS Guideline to Developers

The following section outlines typical queries, system studies and engineering services requested by investors and the framework for addressing these, including the applicable charges and internal responsibility. JPS will request that all queries with regard to the RFP be directed to a single designated contact within JPS. This is critical so that a record of the information requested is maintained to ensure transparency in the process. There has to exist an executed Non-Disclosure Agreement between JPS and the developer before any information can be shared.

JPS Contact

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Feasibility Study

A Feasibility Study is required as the first step to access the interconnection of the new generation facility to the nearest feasible location on the national grid. This study includes load flow, short circuit and contingency analysis to determine the feasibility of interconnecting the plant to the closest node(s) on the T&D and the need for any upgrades to the network and infrastructure.

Input from Developer

- GPS coordinates of the proposed site
- Capacity of the facility
- Size of the individual generator/power converter
- Generation technology
- Design configuration of facility
- Expected Commercial Operation Date
- DigSILENT Powerfactory data file format (pfd) of the proposed generator/power system (if available)

Deliverable

- Pdf report detailing options for interconnection of proposed plant to the T&D network, load flow studies, short circuit analyses, contingency analyses and any upgrades of the network (including costs) which may be required.

Grid Impact Study

A Grid Impact Study is required after the candidate plant has received all approvals from MSET and a license has been awarded to interconnect to the national grid. This study includes stability analysis, critical fault clearing time analysis, low voltage and high voltage ride through capabilities consistent with Jamaica's Grid Codes.

Input from Developer

- Dynamic plant model and parameters. These models should be generic IEC, IEEE or WECC models tuned to the specific plant.

Deliverable

- Pdf report detailing stability analysis, critical fault clearing times for the station, low voltage and high voltage ride through criteria acceptability.

Basic Grid Data to Be Provided to Developers

Any data/information to be exchanged must firstly have an executed Non-Disclosure Agreement between JPS and the developer.

- Geographical Map of the JPS Grid with Transmission and Distribution Network
- Transmission System One-Line Diagram
- Substation Peak Loading Data

Table #1: Typical Queries for Grid Integration and JPS Departments Required to Respond

No.	Item	Typical Question	Proposed JPS Response	Responsible Team	Applicable Charges
1	Feasibility Study	<p>Can the JPS grid accommodate the proposed maximum generation at the proposed point of grid interconnection?</p> <p>Will JPS recommend the node for the interconnection of the new generation facility?</p> <p>Outline of Facilities for Physical Interconnection of Generation Facility.</p> <p>Final configuration subject to number of entrants at the proposed node.</p> <p>What studies will JPS provide?</p> <p>Can a third party be used to perform the Feasibility Study?</p>	<p>Basic high level statistical data provided for determination (substation/feeder rating and peak loading etc.)</p> <p>The bidder will propose a point of interconnection to the Grid. JPS will review and can provide a tentative indication of the point(s) which could be feasible.</p> <p>JPS will provide a high level outline of the requirements for interconnection to include:</p> <ul style="list-style-type: none"> • Distance (km) for new line construction • Substation configuration/Line-In-Line-Out Design for interconnection configuration, etc.) <p>JPS Feasibility Study will include:</p> <ul style="list-style-type: none"> • Power Flow • Fault Studies • Contingency Analysis • Feasible points of interconnection <p>Yes, third parties may be used.</p>	<p>T&D Grid Planning</p> <p>T&D Grid Planning</p> <p>T&D Grid Planning</p> <p>T&D Grid Planning</p> <p>Third Party</p>	<p>No Charge</p> <p>No Charge</p> <p>No Charge</p> <p>Fee applicable based on nature and scope of the request</p> <p>Fee may be applicable based on the work involved</p>

No.	Item	Typical Question	Proposed JPS Response	Responsible Team	Applicable Charges
2	Grid Impact Study	<p>Will JPS perform the Grid Impact Study of the proposed plant?</p> <p>Can a third party be used to perform the Grid Impact Study?</p>	<p>JPS Grid Impact Study will include:</p> <ul style="list-style-type: none"> • System dynamic response to proposed plant events • Transient Voltage and Frequency Stability • Low & High Voltage Ride Through • Critical Fault Clearing Time <p>Yes, third parties may be used.</p>	<p>T&D Grid Planning</p> <p>Third Party</p>	<p>Fee applicable based on nature and scope of the request</p> <p>Fee applicable based on nature and scope of the request</p>
3	Substation Modification or Extension Design and Estimate (Facility Study)	<p>Is JPS willing to do the engineering designs and cost estimates for substation modifications to facilitate grid interconnection?</p> <p>Is JPS willing to provide data to 3rd-Party engineering firm to develop engineering designs for grid interconnection?</p>	<p>JPS can do engineering designs and cost estimates.</p> <p>JPS is willing to provide data to 3rd-Party (layout drawings, etc.) but this is considered proprietary data and therefore requires a confidentiality agreement</p>	<p>Engineering & Standards/ System Protection & Control</p> <p>Engineering & Standards/ System Protection & Control</p>	<p>Fee applicable based on nature and scope of the request</p> <p>Fee applicable based on nature and scope of the request</p>

4	Transmission/ Distribution Line Extension Design and Estimate (Facility Study)	Is JPS willing to do the engineering designs and cost estimates for transmission line infrastructure for the interconnection of the generation facility? If 3 rd . Party recommendations are made for transmission line expansion, will JPS review and provide comments?	JPS can do engineering designs and cost estimates. JPS can review designs of 3 rd . Party engineering firms.	Engineering & Standards Engineering & Standards	Fee applicable based on nature and scope of the request Fee applicable based on nature and scope of the request
5	Interconnection Criteria	What are the grid performance requirements for generation interconnected to the grid?	JPS has an “Interconnection Criteria” for generators connected to the grid. This is also available from MSET.	T&D Grid Planning	No Charge
6	Fault Levels	Will JPS provide fault level data at the major bus bars on the grid?	JPS will provide fault level data.	T&D Grid Planning/ System Protection & Control	No Charge
7	Historical Data - Grid Availability	Will JPS provide reliability data for grid elements (feeders, transmission lines, etc.) that will affect export of generation to the grid?	JPS can provide reliability data subject to the nature of the request	System Control	No Charge

To request a quotation, fill out Tables 2 and 3 below and submit to the JPS contact outlined on page 4.

Table #2: Requirements to perform Interconnection Feasibility Study

Item No.	Description	Response
1	GPS coordinates of the proposed site (Eg. 18° 2'18.07" N 77°15'36.67" W) The boundaries of the parcel can be provided or a single point	
2	Volume/Folio of land parcels associated with proposed site (Eg. 1300/250)	
3	Address of the proposed site (Eg. Hayes, Clarendon, Jamaica)	
4	Type of technology to be utilized (Eg. Solar PV)	
5	Maximum AC Capacity of the facility (Eg. 50 MW AC)	
6	Expected commercial operation date (Eg. Q3 2023)	
7	Timeline to have Feasibility Study completed (Eg. 4 weeks) *Typical timeline is 4 weeks to complete study, reduced timeline may incur additional charge	

Table #3: Information for Invoicing

Item No.	Description	Response
1	Name of Person for invoicing	
2	Position	
3	Company Name	
4	Address	
5	Currency of Payment (US\$ preferred)	