Generator Interconnection Facility Study Report

for the

[redacted] **Project #530**

for

[redacted]

in

Elmore County, Idaho

7/7/2021

FACILITY STUDY REPORT (FSR)

[redacted]

Project #530

7/7/2021

1. General Facility Description

[redacted] (Interconnection Customer) has stated that the proposed project will consist of 720 MW of pumped storage hydro (12 x 60 MW), 110 MW of wind (40 x 2.5 MW), and 40 MW of photovoltaic located ([redacted]) in [redacted], Idaho. The Interconnection Customer will install two approximately [redacted] mile 230kV transmission lines connecting to a new Idaho Power Company (IPC) 500/230kV substation called [redacted] Substation. The new IPC [redacted] Substation will have connection to the jointly owned IPC's and PacificCorp's [redacted] 500kV Transmission Line with a 230kV transmission line/tie to IPC's [redacted] Substation. The total project output as studied is 870 MW.

Contact Information for Interconnection Customer is as follows:

[redacted]

A Standard Large Generator Interconnection Agreement (the "GIA") under IPC's Open Access Transmission Tariff (OATT) between Interconnection Customer and IPC – Delivery (Transmission Provider) for the [redacted] Project, specifically Generator Interconnection Project #530 ("Project"), will be prepared for this project. The GIA will be a definitive agreement that contains terms and conditions that supersedes this FSR.

1.1 Interconnection Point

The two Points of Interconnection ("POI") for the Project will be (1) on the Interconnection Customer's side of the air break switch 201T and (2) on the Interconnection Customer's side of air break switch 202T at IPC's new [redacted] Substation. The new substation will be located in IPC's Capital Region with the approximate coordinates ([redacted]). A drawing identifying the Points of Interconnection is attached as Exhibit 1.

1.2 Point of Change of Ownership

The Point of Change of Ownership for the Project will be the same as the Interconnection Points.

1.3 Interconnection Customer's Interconnection Facilities

The Interconnection Customer will install pump storage hydro generation, wind turbines, solar arrays, inverters, disconnect switches, distribution collector system, transformers (including main step-up transformers), controllers, appropriate grounding measures, transmission systems and associated auxiliary equipment. Interconnection Customer will install a 100 MVAr 230kV Shunt

Capacitor Bank at the Interconnection Customer's [redacted] Substation. Interconnection Customer will build two 230kV transmission lines between the Project and the Point of Change of Ownership including the transmission line termination apparatus, such as transmission line hardware on the deadend, insulators, jumpers, connectors, and other equipment to connect to the Customer's side of the air break switches. Interconnection Customer will build facilities to the Point of Change of Ownership.

1.3.1 Telecommunications

In addition to communication circuits that may be needed by the Interconnection Customer, the Interconnection Customer shall provide an all-dielectric fiber optic cable between the Interconnection Customer's control building at the [redacted] Substation and IPC's control building at the IPC [redacted] Substation. The fiber optic cable shall have 12 each 50 or 62.5 micrometer core multimode fibers and 12 each 9 micrometer core singlemode fibers. This cable will be used for the high speed transfer trip protection scheme for the two Interconnection Customer's 230kV transmission lines and other uses described in the rest of this document. IPC will not provide any other connectivity or services using this cable other than connectivity and services specified as needed by IPC.

1.3.2 Ground Fault Equipment

The Interconnection Customer will install transformer configurations that will provide a ground source to the transmission system.

1.3.3 Generator Output Limit Control

The Interconnection Customer will install equipment to receive signals from IPC Grid Operations for Generation Output Limit Control ("GOLC") - see Section 3 Operating Requirements and Appendix A. IPC's recommended method of communication for GOLC is via the multi-fiber cable described in 1.4.1 above.

1.3.4 Local Service

The Interconnection Customer is responsible to arrange for local service to their site, as necessary.

1.3.5 Monitoring Information

If the Interconnection Customer requires the ability to monitor information related to the IPC breaker/relay (i.e. Mirrored Bits) in the IPC [redacted] Substation, they are required to supply their own communications circuit to the interface area of the IPC [redacted] Substation. The multi-fiber communication cable described in section 1.3.1 above is acceptable.

1.3.6 Meteorological Data- Wind

In order to integrate the wind energy into the IPC system, the Interconnection Customer will provide weather data to IPC from the proposed Project site or from a location within two miles of the Project site consisting of the following near real-time weather parameters that will be collected via each meteorological observation tower at 10 m & 80 m above ground: Wind Speed (miles/second), Wind Direction, Air Temperature (degrees Centigrade), along with Relative Humidity, and Barometric Pressure. This data shall be provided to IPC hourly via commonly accepted electronic web service standards or similar communication method. Specific meteorological data must also be sent over the GOLC communication circuit as identified in Appendix A. The

Interconnection Customer will provide relevant historical meteorological data to IPC. Additionally, the Interconnection Customer shall submit to IPC the physical and technical specifications for all meteorological measurement devices, geographic locations and technical specifications of all turbines. The associated cost for obtaining this data is the Interconnection Customers responsibility and therefore not included in the Facility Study estimate.

1.3.7 Meteorological Data- Solar

In order to integrate the solar energy into the IPC system and operate IPC's solar forecasting tool, the Interconnection Customer must provide solar irradiation and weather data from the Project's physical location to IPC via real time telemetry in a form acceptable to IPC. The associated cost for obtaining this data is the Interconnection Customer's responsibility.

The data must be provided at 10 second intervals and consist of:

1. Global Horizontal Irradiance
2. Plane of Array Irradiance
3. Ambient Temperature
4. Wind Speed and Wind Direction
5. Relative Humidity

The installed instruments must equal or exceed the specifications of the following instruments:
Temperature and Relative Humidity: R.M Young Relative Humidity and Temperature Probe Sensors Model 41382
Wind: R.M Young Wind Monitor Model 05103
Pyranometer: Apogee Instruments Model SP-230

1.3.8 Generator Technical Information & Drawings

Interconnection Customer shall provide draft design prints during GIA negotiations containing technical information, like impedances, and equipment brand and models. After construction, the Interconnection Customer shall submit to IPC all the as-built information, including prints with the latest approved technical information and commissioning test results.

1.4 Transmission Provider's Interconnection Facilities

IPC will install two meters, two dead-end structures, two 230kV air break switches, and the required foundations (Interconnection Facilities) in the IPC [redacted] Substation yard to allow the Interconnection Customer to interconnect the Project. IPC will install facilities up to the Point of Change of Ownership. Revenue metering will be accomplished at the two Points of Interconnection on the 230kV bus.

The remaining IPC [redacted] Substation facilities are described in Section 5.1 Network Upgrades.

2. Estimated Milestones

These milestones will begin, and the construction schedule referenced below will only be valid, upon receipt of funding from Interconnection Customer or its authorized third party no later than the date set forth below for such payment. IPC will not commit any resources toward Project construction that have not been funded by Interconnection Customer. Additionally, failure by Interconnection Customer to make the required payments as set forth in this Study by the date(s) specified below may result in the loss of milestone dates and construction schedules set forth below. In the event that the Interconnection Customer is unable to meet dates as outlined below, Interconnection Customer may request an extension of the Operation Date of up to three (3) years. Interconnection Customer's request will be evaluated by IPC to ensure Interconnection Customer's request does not negatively impact other projects in IPC's Generator Interconnection Queue. Such extension will be allowed only if IPC determines, in its sole discretion, that the extension will not negatively impact other projects in IPC's Generator Interconnection Queue. Estimated milestones, which will be updated and revised for inclusion in the GIA in light of subsequent developments and conditions, are as follows:

Estimated Date	Responsible Party	Estimated Milestones
[DATE]	*Interconnection Customer*	*IPC receives Notice to Proceed and construction funding or arrangements acceptable to IPC are made with IPC's Credit Department*
24 months after construction funds received	*IPC*	*IPC Engineering and Design Complete*
30 months after construction funds received	*IPC*	*IPC Long Lead Material Procured/Received*
36 months after construction funds received	*IPC*	*Fee Ownership Parcel, Easements and permits procured for IPC* [redacted] *Substation, construction will not begin until easements and permits are in place.* *Permitting is required for all substation sites, transmission lines, and microwave sites.*
9 months prior to IPC Commissioning	*IPC*	*New generation must be modeled and submitted to the Western Energy Imbalance Market a minimum of 6 months prior to coming online, failure to submit by given lead time will results in Project delay.*
48 months after construction funds received	*IPC*	*IPC Construction Complete*
50 months after construction funds received	*IPC*	*IPC Commissioning Complete*
5 days after switching request made to IPC Dispatch	*Interconnection Customer*	*Switch at the Point of Interconnection can be closed*

TBD	*IPC*	*Notification from IPC's Energy Contracting Coordinator confirming First Energy of Non-Firm Output*
TBD	*Interconnection Customer*	*Interconnection Customer testing begins*
TBD	*IPC*	*Notification from IPC's Energy Contracting Coordinator confirming Operation Date (pending all requirements are met) of Firm Network Resource Output*

IPC does not warrant or guarantee the foregoing estimated milestone dates, which are estimates only. These milestone dates assume, among other things, that materials can be timely procured, labor resources are available, and that outages to the existing transmission system are available to be scheduled. Additionally, there are several matters, such as permitting issues and the performance of subcontractors that are outside the control of IPC that could delay the estimated Operation Date. For purposes of example only, federal, state, or local permitting, land division approval, identification of the IPC [redacted] Substation location, access to proposed IPC [redacted] Substation location for survey and geotechnical investigation, coordination of design and construction with the Interconnection Customer, failure of IPC's vendors to timely perform services or deliver goods, and delays in payment from Interconnection Customer, may result in delays of any estimated milestone and the Operation Date of the Project. To the extent any of the foregoing are outside of the reasonable control of IPC, they shall be deemed Force Majeure events.

3. Operating Requirements

The Project is required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 519-1992 *IEEE Recommended Practices and requirements for harmonic Control in Electrical Power Systems* or any subsequent standards as they may be updated from time to time.

The Project will be subject to reductions directed by IPC Grid Operations during transmission system contingencies and other reliability events. When these conditions occur, the Project will be subject to Generator Output Limit Control ("GOLC") and will have equipment capable of receiving an analog setpoint via Distributed Network Protocol 3 ("DNP") 3.0 from IPC for GOLC. Generator Output Limit Control will be accomplished with a setpoint and discrete output control from IPC to the Project indicating maximum output allowed. For more detail see Appendix A.

Low Voltage Ride Through: The Project must be capable of riding through faults on adjacent sections of the power system without tripping due to low voltage. The interconnection projects must meet or exceed the Low Voltage Ride-Through requirements as set forth in NERC Standard PRC-024.

Frequency Response Requirements: Generator must be capable of providing Fast Frequency Response for both positive and negative frequency deviations from 60Hz (+/- 0.036 Hz) for Bulk Electric System disturbances. The required frequency response will be linear for a deviation of 0 to +/- 0.1 Hz, a response of 0% to 3% of generator capacity, with a maximum required response of 3% of generator's full capacity for as long as the generator is able to provide support, or the frequency deviation is reduced to within stated limits, whichever occurs first. Provided that Generator meets the above Fast Frequency Response requirements, Company shall not curtail

Interconnection Customer when such curtailments are caused by a need to comply with applicable Frequency Responsive reliability standards.

Interconnection Customer will be able to modify power plant facilities on the Interconnection Customer side of the Interconnection Point with no impact upon the operation of the transmission or distribution system whenever the generation facilities are electrically isolated from the system via the [redacted] 201T and 202T switches and terminal clearances are issued by IPC's Grid Operator for both of the [redacted] transmission line terminals.

4. Reactive Power

Transmission Connection (138kV and above): The Project must be capable of +/- 0.95 power factor operation, as measured at the Interconnection Point, for all MW production levels. The Project must have equipment capable of receiving an analog setpoint, via DNP 3.0 from IPC for voltage control. The setpoint will be the desired voltage level as measured at the interconnect bus. The range of setpoint will be 219kV to 242kV. For more detail see Appendix A.

5. Network Upgrades

5.1 Network Upgrades – IPC New RattleCat Substation

IPC will purchase real property and install a new 1,350' x 1,350' fenced 500/230kV interconnection substation with control building near IPC's existing [redacted] 230kV Substation with the approximate coordinates ([redacted]). The new interconnection substation will be called [redacted] Substation. The interconnection facilities will be located within [redacted] Substation.

The new [redacted] Substation 500kV yard will be a double-breaker double-bus configuration and the 230kV yard will be a ring bus configuration. The transformer will be 1,000 MVA 500/230kV (4 single-phase transformers including spare). A second transformer is required for Network Resource Interconnection and will be a match to the first at 1,000 MVA 500/230kV (3 single-phase transformers). The installation of this second transformer at the [redacted] Substation eliminates the need for rebuilding the [redacted] mile [redacted] 230kV Transmission Line that was included in the April 29, 2019 Generator Interconnection System Impact Study for the integration of the proposed 870 MW [redacted] Project. The substation will include two 500kV dead-end structures and three 230kV dead-end structures, eight 500kV circuit breakers, five 230kV breakers, sixteen 500kV air break switches, fourteen 230kV air break switches, CTs, PTs, and associated relaying, PLC communications, communication equipment, control and metering equipment.

To meet North American Electric Reliability Corporation's ("NERC's") MOD-11 and 13-WECC-CRT-1, R1.2 requirements, IPC will install equipment to collect and transmit Phasor Measurement Unit ("PMU") data to IPC. The data can be made available to the Interconnection Customer on request.

The minimum acceptable PMU message rate is 30 samples per second. The minimum set of PMU measurement channels recorded at the POI is shown below. Additional or substitute

channels may be required[1] on a per case basis depending on the interconnection configuration and facility design details.

- Frequency
- Frequency Delta (dF/dt)
- A-B-C Phase Voltage Magnitude
- A-B-C Phase Voltage Angle
- Positive Sequence Voltage Magnitude
- Positive Sequence Voltage Angle
- A-B-C Phase Current Magnitude
- A-B-C Phase Current Angle
- Positive Sequence Current Magnitude
- Positive Sequence Current Angle

5.2 Upgrades to the Distribution System

No distribution upgrades are required.

5.3 Network Upgrades to Other Substations

IPC will install a 230kV transmission line terminal at [redacted] for the new [redacted] 230kV Transmission Line. IPC will install a dead-end structure, one 230kV Breaker, two 230kV air break switches, CTs, PTs, and associated relaying and control equipment in the [redacted] Substation yard and building.

IPC will replace the existing 500kV Series Capacitor at the [redacted] Substation ([redacted] 500kV Transmission Line) to a new size and remove an existing 500kV reactor.

IPC will also install two new series capacitors at [redacted] Substation on the [redacted] 500kV Transmission Line and on the [redacted] 500kV Transmission Line. IPC will re-install a 500kV reactor at [redacted] Substation (relocated from [redacted] Substation).

IPC will install 230kV transmission line terminals at the [redacted] Substation. IPC will install two dead-end structures, two 230kV Breakers, CTs, PTs, and associated relaying and control equipment will be installed in the substation yard and building.

IPC will install new 230kV transmission line protection at [redacted] Substation for the new [redacted] 230kV Transmission Line.

IPC will install new 230kV transmission line protection at [redacted] Substation for the new [redacted] 230kV Transmission Line.

IPC will install a new [redacted] 500kV Remedial Action Scheme (MHS RAS) with redundant communication to [redacted] and [redacted] Substations. The MHS RAS is required to eliminate cross-tripping the [redacted]

[1] Consult with System Planning to determine acceptability.

and [redacted] 500kV Transmission Lines for loss of the [redacted] 500kV Transmission Line.

5.4 Network Upgrades to the Transmission System

IPC will install two [redacted]-mile 500kV transmission lines between the existing [redacted] 500kV Transmission Line and [redacted] Substation. The two transmission lines will connect in and out of the substation to create a [redacted] 500kV Transmission Line and a [redacted] 500kV Transmission Line. Also, IPC will install a new [redacted] mile 230kV transmission line to IPC's [redacted] Substation to create a [redacted] 230kV Transmission Line.

IPC will relocate approximately [redacted] miles of the [redacted] 230kV Transmission Line to create access into [redacted] Substation for the new [redacted] 230kV Transmission Line.

IPC will rebuild the [redacted] mile [redacted] 230kV Transmission Line with 1590 MCM ACSR "Lapwing" Conductor and will include an optical ground wire (OPGW).

IPC will rebuild the [redacted] mile [redacted] 230kV Transmission Line with 1590 MCM ACSR "Lapwing" Conductor and OPGW.

IPC will install [redacted] miles of 230kV double circuit transmission lines between the existing [redacted] 230kV Transmission Line and [redacted] Substation. The two transmission lines will connect in and out of the [redacted] Substation to create a [redacted] Transmission Line and a [redacted] 230kV Transmission Line.

5.5 Network Upgrades to the Communication System

IPC will create redundant communication paths between [redacted], [redacted], and [redacted] Substations.

IPC will build a new microwave site near [redacted] and [redacted] which will connect to existing fiber optic cables on an adjacent transmission line. IPC will build a new microwave reflector near [redacted], south of [redacted]. IPC will build a new microwave tower and radio at [redacted] Substation. This new microwave and fiber path will become the second communication path between [redacted] and [redacted] Substations.

IPC will install a new microwave tower and radio at [redacted] which will connect to fiber optic cable on an adjacent transmission line. IPC will install a new microwave site near [redacted] in Owyhee County. IPC will install a new microwave site [redacted] miles west of [redacted] Substation which will connect to fiber optic cable on an adjacent transmission line. IPC will adjust an existing microwave dish at [redacted] to aim at [redacted] Substation. IPC will move the microwave radio at [redacted] that connects to the [redacted] microwave radio to [redacted] Substation. This relocated microwave and fiber path will become the second communication path between [redacted] and [redacted] Substations.

6. Estimated Costs of Transmission Provider's Interconnection Facilities and Network Upgrades

The following good faith estimates are provided in 2019 dollars and are based on a number of assumptions and conditions. IPC does not warrant or guarantee the estimated costs in the table below, which are estimates only and are subject to change. Interconnection Customer will be responsible for all actual costs incurred in connection with the work to be performed by IPC and its agents, under the terms and subject to the conditions included in any GIA executed by IPC and Interconnection Customer.

The estimated cost below is required to be paid in full prior to IPC commencing construction on the Project or other arrangements acceptable to IPC are made with IPC's Credit Department.

Estimated Cost:

Description	Ownership	Funding Responsibility[2]	Cost Estimate
Transmission Provider's Interconnection Facilities:			
I.			
Interconnection equipment, including meters, deadends, air-break switches, and foundations as described in 1.4 above	IPC	Interconnection Customer	$477,700
TOTAL			**$477,700**
II.			
III.			
INTERCONNECTION UPGRADE TOTAL		**$477,700**	
Network Upgrades:			
I. Upgrades to Substation:			
New [redacted] Substation including transformers, breakers, switches, protection system, and control building	IPC	Interconnection Customer	$57,363,000
Install a 230kV transmission line terminal at [redacted] Substation for the new [redacted] 230kV line	IPC	Interconnection Customer	$2,129,600
Replace the existing Series Capacitor at [redacted] Substation to a new size and remove an existing 500kV reactor at [redacted] Substation	IPC	Interconnection Customer	$8,591,000
Install two new series capacitors at [redacted] Substation on the [redacted] – [redacted] 500kV Transmission Line and on the [redacted] 500kV Transmission Line, install a 500kV reactor (relocated from [redacted] Substation) at [redacted] Substation	IPC	Interconnection Customer	$16,843,200

[2] Funding responsibility is described in the standard Large GIA in Idaho Power's OATT (OATT Attachment M).

Install two 230kV transmission line terminals at [redacted] Substation	IPC		$2,510,750
Replace 230kV transmission line protection at [redacted] Substation for [redacted] - [redacted] Transmission Line	IPC	Interconnection Customer	$121,000
Replace 230kV transmission line protection at [redacted] Substation for [redacted] 230kV Transmission Line	IPC	Interconnection Customer	$121,000
Install [redacted] 500kV Remedial Action Scheme with redundant communication to [redacted] and [redacted] 500kV Substations	IPC	Interconnection Customer	$1,210,000
TOTAL			**$88,862,650**
II. ***Upgrades to Transmission:***			
Install two [redacted]-mile 500kV transmission lines to interconnect the [redacted] – [redacted] 500kV Transmission Line	IPC	Interconnection Customer	$4,803,700
Install a [redacted] mile 230kV transmission line to [redacted] Substation	IPC	Interconnection Customer	$804,650
Relocate [redacted] miles of 230kV transmission line from [redacted] adjacent to [redacted] Substation	IPC	Interconnection Customer	$816,750
Rebuild the [redacted]-mile [redacted] – [redacted] 230kV Transmission Line with 1590 MCM ACSR "Lapwing" Conductor	IPC	Interconnection Customer	$36,868,700
Rebuild the [redacted] mile [redacted] – [redacted] 230kV Transmission Line with 1590 MCM ACSR "Lapwing" Conductor	IPC	Interconnection Customer	$3,212,550
Install [redacted] miles of 230kV double circuit transmission line between the existing [redacted] – [redacted] 230kV Transmission Line and [redacted] Substation	IPC	Interconnection Customer	$1,258,400
TOTAL			**$47,764,750**
III. ***Upgrades to Communication:***			
Install a new microwave site near [redacted] and [redacted], with a control building, tower, microwave radio, and backup generator	IPC	Interconnection Customer	$1,815,000
Install a new microwave reflector on [redacted]	IPC	Interconnection Customer	$980,100
Install a tower and microwave radio at [redacted] Substation	IPC	Interconnection Customer	$393,250
Install a tower and microwave radio at [redacted]	IPC	Interconnection Customer	$393,250
Install a new microwave site on [redacted], with a control building, tower, microwave radio, and backup generator	IPC	Interconnection Customer	$1,815,000
Install a new microwave site near [redacted] Substation, with a control building, tower, microwave radio, and backup generator	IPC	Interconnection Customer	$1,815,000

Remove an existing microwave radio at [redacted] and relocate to [redacted] Substation. Add microwave antenna at [redacted] Substation. Adjust microwave dish at [redacted]	IPC	Interconnection Customer	$786,500
TOTAL			**$7,998,100**
NETWORK UPGRADE TOTAL		**$144,625,500**	
GRAND TOTAL		**$145,103,200**	

Note Regarding Transmission Service:

This FSR is a study of a request for Network Resource Interconnection Service. This FSR identifies the facilities necessary to provide such service. Network Resource Interconnection Service in and of itself does not convey any right to transmission service or to deliver electricity to any specific customer or Point of Delivery. In addition, the provision of Network Integration Transmission Service or firm Point-to-Point Transmission Service may require additional studies (which may be performed in response to a request for such transmission service) and the construction of additional upgrades.

Note Regarding GIA:

This Facility Study Report (FSR) is a study and preliminary evaluation only and does not constitute, or form the basis of, a definitive agreement related to the matters described in this FSR. Unless and until a GIA is executed by IPC and Interconnection Customer, no party will have any legal rights or obligations, express or implied, related to the subject matter of this FSR.

Appendix A

Generation Interconnection Control Requirements

A.1 Generator Output Limit Control (GOLC)

A.1.1 IPC requires Interconnected Power Producers to accept GOLC signals from IPC's energy management system ("EMS").

A.1.2 The GOLC signals will consist of four points shared between the IPC EMS (via the IPC RTU) and the Interconnection Customer's Generator Controller ("SGC"). The IPC RTU will be the master and the SGC will be the slave.

A.1.2.1 GOLC Setpoint: An analog output that contains the MW value the Interconnection Customer should curtail to, should a GOLC request be made via the GOLC On/Off discrete output Control point.

A.1.2.1.1 An Analog Input feedback point must be updated (to reflect the GOLC setpoint value) by the SGC upon the Controller's receipt of the GOLC setpoint change, with no intentional delay.

A.1.2.2 GOLC On/Off: A discrete output (DO) control point with pulsing Trip/Close controls. Following a "GOLC On" control (DNP Control Code "Close/Pulse On"), the SGC will run power output back to the MW value specified in the GOLC Setpoint. Following a "GOLC Off" control (DNP Control Code "Trip/Pulse On"), the Interconnection Customer is free to run to maximum possible output.

A.1.2.2.1 A Discrete Input (DI) feedback point must be updated (to reflect the last GOLC DO Control Code received) by the SGC upon the SGC's receipt of the GOLC DO control, with no intentional delay. The feedback DI should latch to an OFF state following the receipt of a "GOLC OFF" control and it should latch to an ON state following the receipt of an "GOLC ON" control.

A.1.3 If a GOLC control is issued, it is expected to see MW reductions start within 1 minute and plant output to be below the GOLC Setpoint value within 10 minutes.

A.2 Voltage Control

A.2.1 IPC requires Transmission-Interconnected Power Producers to accept voltage control signals from IPC's EMS when they are connected to IPC's transmission system.

A.2.2 The voltage control will consist of one setpoint and one feedback point shared between the IPC EMS and the SGC.

A.2.3 The setpoint will contain the desired target voltage for plant operation. This setpoint will have a valid control range between 0.95 and 1.05 per unit ("p.u.") of nominal system voltage.

A.2.4 The control will always be active, there is no digital supervisory point like the Curtail On/Off control above.

A.2.4.1 When a setpoint change is issued an Analog Input feedback point must be updated (to reflect the voltage control setpoint value) by the SGC upon the Controller's receipt of the voltage control setpoint change, with no intentional delay.

A.2.4.2 When a setpoint change is received by the SGC, the voltage control system should react with no intentional delay.

A.2.4.3 The voltage control system should operate at the voltage indicated by the setpoint with an accuracy of +/- 0.5% of the nominal system voltage.

A.2.5 The Interconnection Customer should supervise this control by setting up "reasonability limits", i.e. configure a reasonable range of values for this control to be valid. As an example, they will accept anything in the valid control range (between 0.95 and 1.05 p.u.) but reject values outside this range. If they were fed an erroneous value outside the valid range, their control system would default to the last known, good value.

A.3 Generation Interconnection Data Points Requirements

Digital Inputs to IPC (DNP Obj. 01, Var. 2)			
Index	Description	State (0/1)	Comments:
0	GOLC Off/On (Control Feedback)	Off/On	Feedback provided by Interconnection Customer
1	FREQUENCY RESPONSE OFF/ON (Control Feedback)	Off/On	Feedback provided by Interconnection Customer
2	52A Interconnection Customer Main Breaker (if present)	Open/Closed	Sourced at substation
3	52A Interconnection Customer Capacitor Breaker (if present)	Open/Closed	Sourced at substation

Digital Outputs to Interconnection Customer (DNP Obj. 12, Var. 1)		
Index	Description	Comments:
0	GOLC Off/On	Control issued by IPC
1	Frequency Response Off/On	Control issued by IPC

Analog Inputs to IPC (DNP Obj. 30, Var. 2)							
Index	Description	Raw High	Raw Low	EU High	EU Low	EU Units	Comments:
0	GOLC Setpoint Value Received (Feedback)	32767	-32768	TBD	TBD	MW	Provided by Interconnection Customer
1	Voltage Control Setpoint Value Rec'd (Feedback)	32767	-32768	TBD	TBD	kV	Provided by Interconnection Customer
2	Maximum Park Generating Capacity	32767	-32768	TBD	TBD	MW	Provided by Interconnection Customer
3	Ambient Temperature	32767	-32768	327.67	-327.68	DEG C	Provided by Interconnection Customer
4	Wind Direction	32767	-32768	327.67	-327.68	Deg from North	Provided by Interconnection Customer
5	Wind Speed	32767	-32768	327.67	-327.68	M/S	Provided by Interconnection Customer
6	Relative Humidity	32767	-32768	TBD	TBD	%	Provided by Interconnection Customer

7	Global Horizontal Irradiance	32767	-32768	TBD	TBD	W/M^2	Provided by Interconnection Customer
8	Plane of Array Irradiance	32767	-32768	TBD	TBD	W/M^2	Provided by Interconnection Customer
9	Number of Turbines In High Speed Cutout	32767	-32768	32767	-32768	Units	Provided by Interconnection Customer
10	Maximum Hydro Generating Capacity	32767	-32768	TBD	TBD	MW	Provided by Interconnection Customer
11	Maximum Wind Generating Capacity	32767	-32768	TBD	TBD	MW	Provided by Interconnection Customer
12	Maximum Solar Generating Capacity	32767	-32768	TBD	TBD	MW	Provided by Interconnection Customer
13	SPARE						
14	SPARE						
15	SPARE						
16	SPARE						
17	SPARE						

Analog Outputs to Seller (DNP Obj. 41, Var. 2)							
Index	Description	Raw High	Raw Low	EU High	EU Low	EU Units	Comments:
0	GOLC Setpoint	32767	-32768	TBD	TBD	MW	Control issued by IPC
1	Voltage Control Setpoint	32767	-32768	TBD	TBD	kV	Control issued by IPC
2	SPARE						
3	SPARE						
4	SPARE						
5	SPARE						
6	SPARE						
7	SPARE						
8	SPARE						
9	SPARE						