Joint Operating Committee Meeting – Data Requirements

March 3rd, 2011

Agenda

8:00 – 8:45 Welcome and Introductions (Topics to be Covered and Member Check in) (Read Rules for Rates Hearing Room) - Eric Taylor

8:45 – 10:00 Forecasting WIT Initiative - Scott Winner

- Review new wind generator data requirements and discuss.
- Discuss the concept of a Turbine Cluster and Business Intelligence web service interface.

10:00 – 10:15 Break

10:15 – 11:00 Review Updated Operational Data Requirements – Steve Enyeart

- Dispatch support and event analysis
- Review DSO216 Data and control requirements
- Discuss Synchro-Phaser/PMU project impact on wind generation

11:00 – 11:30 Review new future control requirements – Bart McManus

- Frequency Provision (governor response) control,
- Ramp Control Provision, and
- Automated dispatch to enable these systems

11:30 – 12:00 Questions and Closing Remarks

BPA Wind Power Forecasting - Background

- In 2009, BPA Wind Power Forecasting was identified as a critical BPA WIT Initiative essential for the safe and reliable integration of 6,000 MW of installed wind power by 2013.
- BPA Wind Power Forecasting efforts support
  - Grid line loading situational awareness
  - Hydro management situational awareness
  - Load / resource balancing

New Data Requirements

- To support wind power forecasting efforts and in accordance with sections 2(a) and 8(a) of the WI-09 Wind Integration Rate Case Settlement Agreement, BPA has added the new operational and meteorological data requirements to the “BPA Technical Requirements for Interconnection to the BPA Transmission Grid.”

New Data Requirements

- Outreach and communication
  - Initial March 2010 JOC meeting
  - Individual meeting with Wind Operators, other utilities, and forecast vendors
  - WIT Customer Forum Updates
  - February 2011 new “Data requirement for wind generators” announcement letter

New Data Requirements

- Static data – via email to Account Executive
  - Number of turbines
  - Information for each turbine:
    - Model/type, nameplate capacity
    - Turbine identification number
    - Turbine coordinates
- Plant planning data – via email to Gen Dispatcher
  - Planned outages – capacity limitation and duration

New Data Requirements

- Plant telemetry data – via BPA SCADA/ICCP
  - Plant output (MW)
  - Available Capacity (MW, updated within 10 min of a change)
  - High wind cutout (MW total)
  - Plant control limit (MW, when output of plant is limited)
- Plant telemetry data needs to be updated every 2 seconds

New Data Requirements

- Plant Met data – via web service
  - Anemometer Coordinates
  - Wind speed (mph)
  - Wind direction (degrees of north)
  - Temperature (degrees F)
  - Humidity (relative %)
  - Pressure (inHg)
- Plant met data needs to be updated every minute

New Data Requirements

- Nacelle cluster met data – via web service
  - A cluster will typically be represented by a five blade diameter square with a center turbine designated to provide met data.
  - Same data as Plant Met Data
- Nacelle cluster met data needs to be updated every ten minutes

New Data Requirements

- Two years historical data – via email to AE
  - Available Capacity (hourly average)
  - Plant met data (10 minute average)
    - Anemometer Coordinates
    - Wind speed (mph)
    - Wind direction (degrees of north)
    - Temperature (degrees F)
    - Humidity (relative %)
    - Pressure (inHg)

Web Service Requirements

- All systems must meet BPA standards for:
  - Security
  - Reliability
  - Supportability
- Specific security requirements:
  - Must have a digital SSL certificate signed by an external 3rd party per industry best practices (i.e., Verisign, GeoTrust, etc)
  - Must have a password-based or similar means of credential authentication
  - Must use only known IP addresses/ranges
  - BPA will **pull** data from the vendor's posting location
  - System cannot be FTP-based

Web Services Requirements

- The underlying web service tool must be a Business Intelligence tool:
  - Designed for Enterprise-level data transfer
  - Examples include Microsoft Web Services, Windows Communication Foundation, or BizTalk
- The following information must be provided to BPA prior to implementation:
  - XML schema used to post the data
  - Methods to be used
  - Variables/arguments provided in these methods
  - Identification details (username/password, IP addresses/ranges)

New Data Requirement

- Next steps
  - Over the next few months, BPA will set up individual meetings with wind plants through their Account Executive.
  - Through these meeting, BPA will answer questions and through a collaborative process develop a detailed implementation plan.
  - BPA hopes to have all new data feeds established for all wind plants by September 2011.

Plant Data via SCADA / ICCP

(**Bold Type** below indicates new or revised requirement)

- **Wind Project Data - Analog quantities via SCADA or ICCP:**
  - Plant Generation (MW via BPA Meters at Point of Metering)
  - Plant Reactive Power (MVAr via BPA Meters at POM)
  - **Plant Reactive Power** (MVAr) – *each switched reactive element* and
  - **Each Generation Breaker** (MVAR - 34.5 kV typically)
    - *Needed to analyze MVAr consumption of collector system*
  - **Each Dynamic VAr device** (MVAr) – (STATCOM typically)

Plant Data via SCADA / ICCP (cont)

(**Bold type** below indicates new or revised requirement)

- **Wind Project Data - Analog quantities via SCADA or ICCP:**
  - **Bus voltages** (High and Low side bus)
  - **Plant Reactive Power Reserves** (still to be implemented)
    - *maximum boost continuous capacity (MVAr) (plant reactive capability less elements not available)*
  - **Plant Available Capacity** (MW) for BPA Wind Forecasting - *total available to generate*
  - **Plant MW Limit** (MW) *Control MW limit, if any, placed on the plant output, will be used to adjust BPA forecasting analysis*
  - **High speed Cutout** (MW) *Total of all units while tripped for high wind, will be used to adjust BPA forecasting analysis*

Dispatch Control and Indication

- Plant Breaker Control, Status and Indication
  - **BPA Dispatch trip of generation and status – (DSO 216 requirement)**
  - **PCB status all high side breakers** between BPA POI and Generation
  - **PCB status all reactive element breakers and switches**
  - Plant voltage control status - enable/disable (each controller)
  - Each Dynamic VAR device (e.g. STATCOM) - enable/disable
- The additional data, control, and status/indication are being added:
  - Existing projects as part of DSO 216 RTU replacement
  - Projects under design and construction (and all new projects)
  - New work for ICCP/Gen ICCP plants as part of DSO 216 modifications
- BPA will be contacting each project owner about the schedule

DSO216 Data - Signals

- For review - DSO216 Requirements:
  - Limit Warning @ 85% Reserves consumed Dec or Inc
  - Limit Level 1 @ 90% Reserves Dec
  - Limit Level 2 @ 100% Reserves Dec
  - MW Value Set-point
  - Curtail Tag Level 1 @ 90% Reserves Inc
  - Curtail Tag Level 2 @ 100% Reserves Inc
- D20 SCADA RTU replacement projects are scheduled for completion this fiscal year
- ICCP Projects will be contacted regarding addition of trip requirements this calendar year.

Plant Study Data

- Plant Data is required for all interconnections studies, resubmitted as built.
- Annual Data reporting updates required by WECC / NERC.
- Generation and Interconnection Facility Data is to be provided via the generation data sheet provided by BPA, including:
  - Number of turbines
  - Model/Type, Nameplate capacity of each turbine type
  - Collector system configuration and equipment specifications (provide one-line including line parameters to the BPA POI)
  - Number of each type of turbine (list per collector on one-line)*
  - Size and specifications of each reactive device (include configuration on oneline update)

*Needed for Wind Forecasting effort as well.

Synchro-Phaser / PMU Program

- BPA has undertaken an effort to install Phase Measurement Units (PMU's) at most large generation projects
- This is part of a WECC Synchro-Phaser program (Smart Grid)
- Synchro-Phasers are being added to several BPA Substations:
  - Provide real-time data
  - Validate System modeling and system performance
  - Provide Operational Awareness and near real-time system evaluation
  - Provide post event analysis, system limitations
  - Eventual Smart Grid controls
- PMU program will be added at Wind project sites to:
  - Validate generator modeling and system performance
  - Provide Operational Awareness and near real-time system evaluation
- BPA will be installing the PMU's at each large wind project.
  - Project will need to provide room to locate, CT's and PT's inputs
  - BPA will connect equipment to BPA communications

Future Control Requirements – Wind Generation Controls with Automated Dispatch

- **Wind projects greater than 50 MW shall be required:**
  - To provide over-frequency and under-frequency (governor type) control in the wind farm control systems.
  - To provide ramp rate control in the wind farm control systems
  - To provide for BPA Dispatch to initiate an arming signal when system conditions warrant enabling these and other systems such as DSO216.

Future Control Requirements – Wind Generation Controls with Automated Dispatch

- **Wind projects greater than 50 MW:**
  - May be required to feather for over-frequency, or when enabled to feather wind generation in advance to provide an ability to increase generation for an under-frequency event. As more wind non-dispatchable generation connects to the BPA system, the amount of dispatchable generation providing frequency response for system events will be reduced. BPA may need to enabled (via BPA automated Dispatch) wind generation for frequency response during system situations where wind is a majority of the generation (most likely to occur at high wind-low load times at night).
  - Likewise, wind ramps rate control may be necessary as the wind fleet continues to expand to address severe ramps impacting balancing service capability or the AGC generating units. System would be enabled via BPA automated Dispatch.
  - Current requirement is to provide the capability to implement these systems in the control schemes for new projects coming on line.

Any Questions?