Wind Integration Initiatives Update

September 18, 2009

Wind Initiatives

- Operational Controls for Variable Generators – Kevin Johnson
- Sub-Hourly Scheduling Pilot – Troy Simpson
- Customer Supplied Generation Imbalance – Salah Kitali
- Dynamic Transfer Limits Study – Brian Tuck/Abbey Nulph
- Forecasting – Matt Neel/Scott Winner

Background for Wind Initiatives

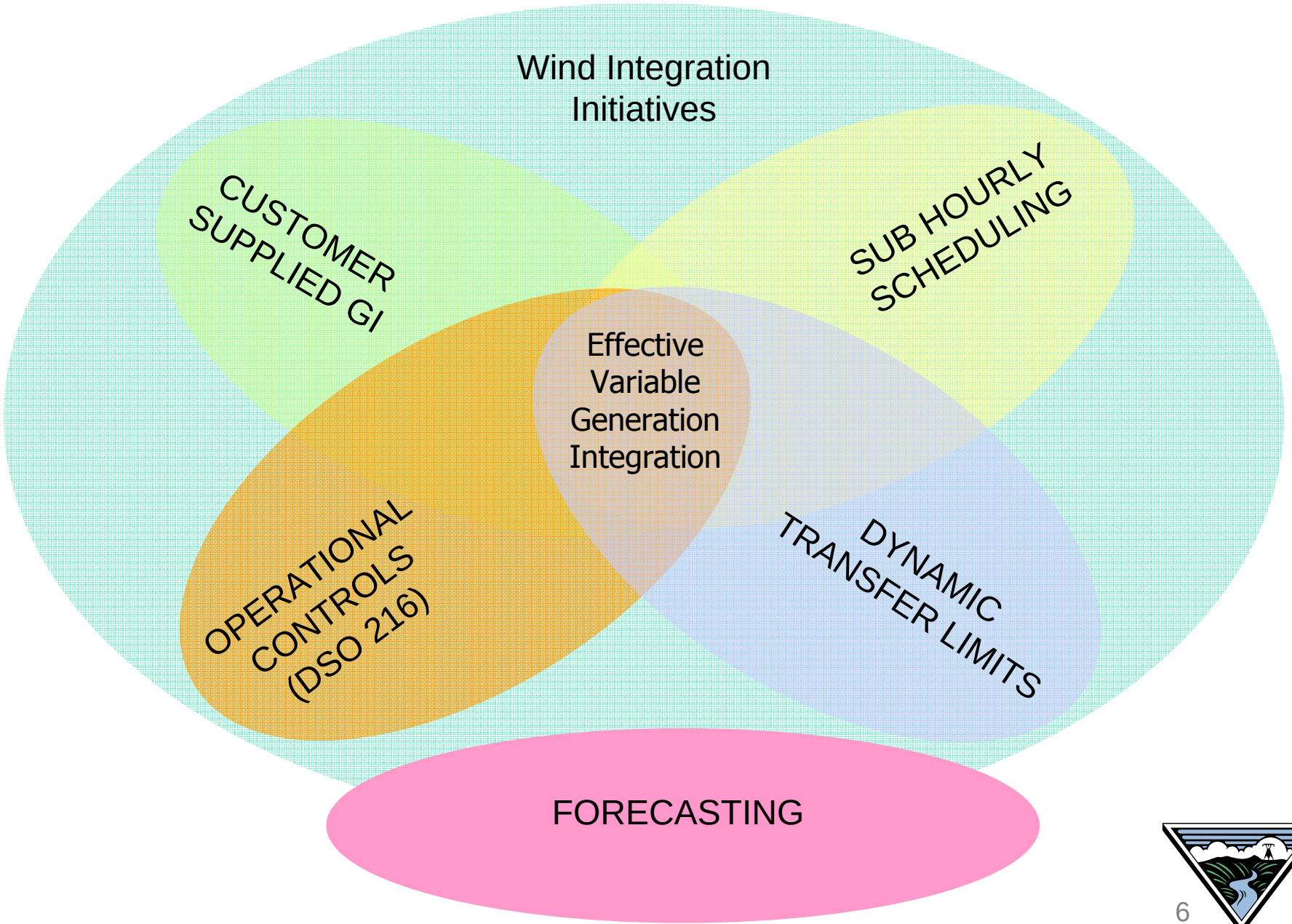
When BPA released its Wind Integration Team Work Plan in June 2009, we promised to provide quarterly updates to interested parties on Work Plan progress. This is the first such update, and we're happy to report that all the WIT projects are on schedule or ahead of schedule. This letter offers a summary of progress on each project.

Background for Wind Initiatives

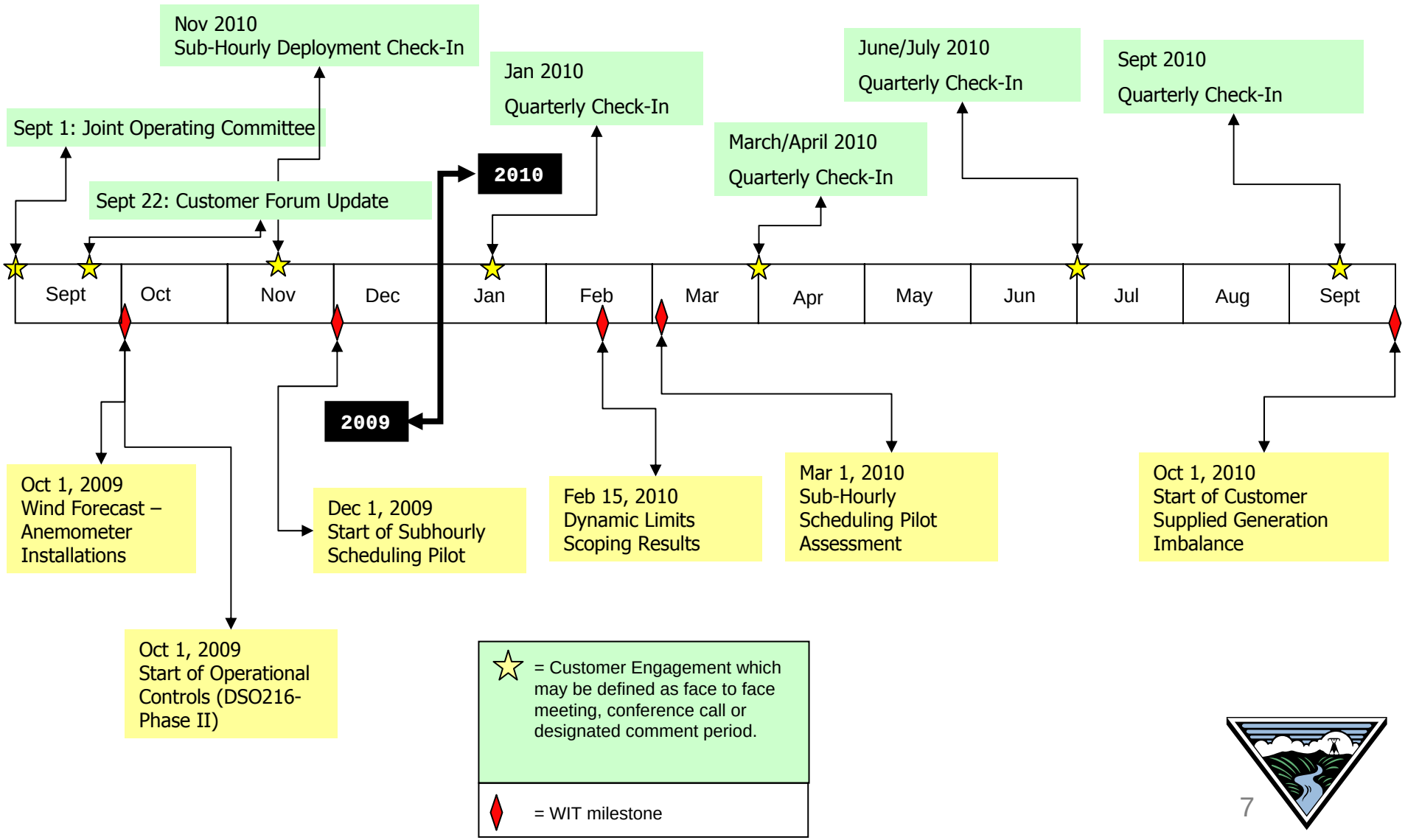
- On May 29th, the BPA Wind Integration Team held a public meeting to discuss and develop a wind initiative work plan for the next two years.
- Prior to this meeting, BPA sent a letter identifying seven potential areas of work or wind initiatives and asked customers to assist in identifying the "right" wind initiatives to focus and list their priority.
- The meeting drew representatives from all of BPA's major constituencies and customers who presented their proposed list of wind initiatives to focus and their priority.
- Input received at the meeting assumed that BPA would continue progress on (1) Operational Controls for Variable Generators (DSO216), (2) developing better wind forecasting, and (3) state awareness efforts.

Background for Wind Initiatives

- At the May 29th meeting, Customer's also identified and recommended our next major push, which included:
  - Sub-Hourly Transmission Scheduling;
  - Customer Supplied Generation Imbalance; and
  - Dynamic Transfer Limit Studies.
- Customers suggested that the 3rd Party Supply initiative to be considered in the future as a potential effort, but recommended not focusing on it at this time.
- Since the May 29th meeting, BPA has continued to work with Generators and Customers to identify various approaches to provide sufficient balancing reserves to ensure reliability of the transmission system.
- BPA completed the 2010/2011 Rate Case which included the amount of balancing reserves that would be available from the FCRPS to balance the large amount of wind interconnecting into BPA's system.
- Through these continuing efforts, BPAT was able to continue to offer Large Generation Interconnection Agreements (LGIA) for wind development in the Pacific NW.


Wind Integration Initiatives
CUSTOMER SUPPLIED GI
SUB HOURLY SCHEDULING
Effective Variable Generation Integration
OPERATIONAL CONTROLS (DSO 216)
DYNAMIC TRANSFER LIMITS
FORECASTING

Wind Integration Initiatives Roadmap and Timeline



Operational Controls for Variable Generators

Summary of Operational Controls for Variable Generators - Background

- Phase I – Limit Wind to Schedule protocols went into effect on April 3, 2009.
- The AGC system was modified to send a message to all wind plant directing each to limit actual generation to schedule if DEC balancing reserves were exhausted.
- Wind plant operators are required to acknowledge the message within one minute and have their generation reduced within 10 minutes.
- In Phase I – the warning and limit messages could only be manually initiated by Dispatch, making this effort more difficult as more wind generators came onto BPA's system.
- Phase II builds on Phase I by continuously calculating the available balancing reserves and allowing Dispatch to automatically send out warning and limit messages to wind plants.
- Since this is all automated, no phone calls will be required from BPA Dispatchers.

Summary of Operational Controls for Variable Generators – Phase II

- Final Dispatchers Standing Order (DSO) 216 for Phase II will be implemented on October 1st, 2009.
- Phase II changes include:
  - BPA will add command point that triggers when 90% of the DEC balancing reserves are deployed, to limit to schedule + DEC reserve allocation.
  - BPA will provide the target MW value to each wind plant that is required when a limit signal is initiated (either for 90% or 100%).
  - A new warning signal will be sent to wind plants at 85%.
  - Procedures will be in place to curtail schedules when 90% or 100% INC balancing reserve are deployed for under-generation.
- Phase III scoping will be conducted to support netting and customer supplied generation imbalance.

Summary of Operational Controls for Variable Generators – DSO216 Schedule Curtailments

- When Reserves Deployed % exceeds INC reserve thresholds, the following will occur for plants whose schedules exceed actual generation:
  - e-Tags will be curtailed down to the level of actual generation plus their allocated portion of INC wind balancing reserves (90%); or
  - Curtailed down to the level of actual generation (100%).
  - This will remain in effect for the remainder of the hour, unless an additional curtailment occurs in the same hour.
- Curtailments for DSO216 will be made through the e-Tag process.
- The comment field on the tag will include an ID of "WIND" and a number and text indicating "DSO216 – Exceeding Reserve Threshold."
- All automatic/electronic requests coming from Dispatch are considered Dispatcher Directives.
- No phone calls will be made to wind generators.
- According to the Failure to Comply (FTC) BP, generation in excess of the WIND/DSO216 curtailment would not be subject to that penalty. FTC applies for all other curtailments, including those in the same hour as a DSO216 cut.

Clarification – Network Flowgate Curtailments

- When an OTC or SOL is exceeded (or nearing exceeding) on any of BPA's network flowgates, all schedules impacting the path will be curtailed pro-rata according to transmission priority.
  - e-Tags will be curtailed down to the new level.
  - Generators are required to adjust actual generation to this new level within 10 minutes of curtailment.
  - This will remain in effect for the remainder of the hour, unless additional curtailments occur in the same hour.
- Curtailments for network congestion will be made through the e-Tag process.
- The comment field on the tag will include an ID of "iCRS" and a number and text indicating "Congestion on network flowgate."
- All automatic/electronic requests coming from Dispatch are considered Dispatcher Directives, even if BPA does not initiate the curtailment.
- No phone calls will be made to wind generators.
- According to the Failure to Comply (FTC) rates, generation in excess of the network curtailment would be subject to that penalty. FTC applies for all other curtailments, including those in the same hour as a network cut.
  - Currently, the FTC penalty is $100/MWh of excess generation
  - Beginning October 1, 2009, the penalty will be $1,000/MWh of excess generation.

Operational Controls for Variable Generators – Additional Wind Data

Wind data available to Dispatchers and Wind Owners/Operators:

- Wind plants with telemetered communication links via GenICCP, SCADA ICCP or SCADA RTU's will receive and display data from BPA on the status of balancing reserves and actions required.
- An external BPA iCRS Web Application will be available to wind operators by October 1st as a supplement to other type of communication links. This application will allow monitoring of the current balancing reserve limits, balancing reserve deployment, and alarms. There are two request forms that will need to be completed to gain access to the iCRS Web Application Portal, direct links:

  http://www.transmission.bpa.gov/operations/wind_operations/docs/applicant_Access_Request.doc

  http://www.transmission.bpa.gov/operations/wind_operations/docs/Security_Officer_Access_Request.doc

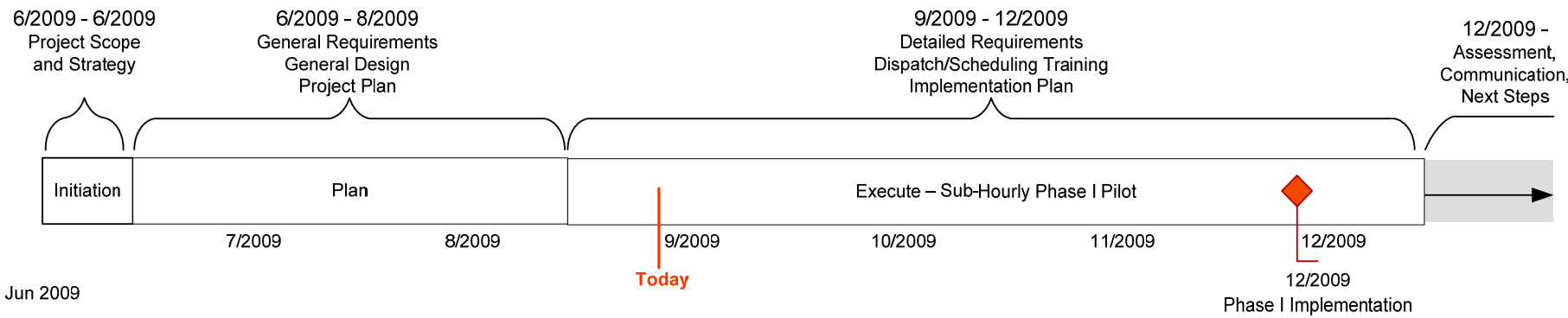
Wind data available to interested parties curious about the status of wind on the BPA system:

- A summary of Phase II DSO 216 is available to the public on BPA's external website at : http://www.transmission.bpa.gov/operations/wind_operations/docs/DSO216_Phase_II_Summary.pdf
- The status of BPA's Balancing Authority Load, Total Wind Generation and Wind Basepoints are available on an external Operational Information website at: http://www.transmission.bpa.gov/Business/Operations/Wind/

Sub-Hourly Scheduling Pilot Program

Summary of Sub-Hourly Scheduling Pilot Program - Phase I

- The purpose of this pilot is to provide the ability for wind customers to submit schedules on a sub-hourly basis.
- BPA will implement systems and processes that will enable purchasing/selling entities to schedule excess wind generation from BPA Balancing Authority Area (on the half hour).
- Phase I Pilot will be implemented December 1st, 2009.
- BPA will evaluate other options for increasing flexibility in scheduling wind generation post-implementation.



Sub-Hourly Scheduling Pilot Program – Phase I Business Practice

- The Criteria for Phase I Pilot includes:
  - Purchasing "Non-Firm Sub-Hourly PTP" Transmission Service (NERC Priority Code 1-NS) prior to submitting an e-Tag
  - Reservation window is from 20 minutes prior to the top of the hour to 15 minutes after the hour
  - Submitting a new within-hour non-firm e-tag request
  - Must be a wind resource
  - Must be an export
  - When generation for wind resources exceeds the existing schedules
  - For service beginning on the half hour
  - Must have a 10 minute ramp
  - Billing the entire hour as Hourly Non-firm PTP Transmission Service
- The Business Practice was posted on September 8, 2009 for review.
- Customer comments regarding the business practice should be submitted no later than September 25, 2009.

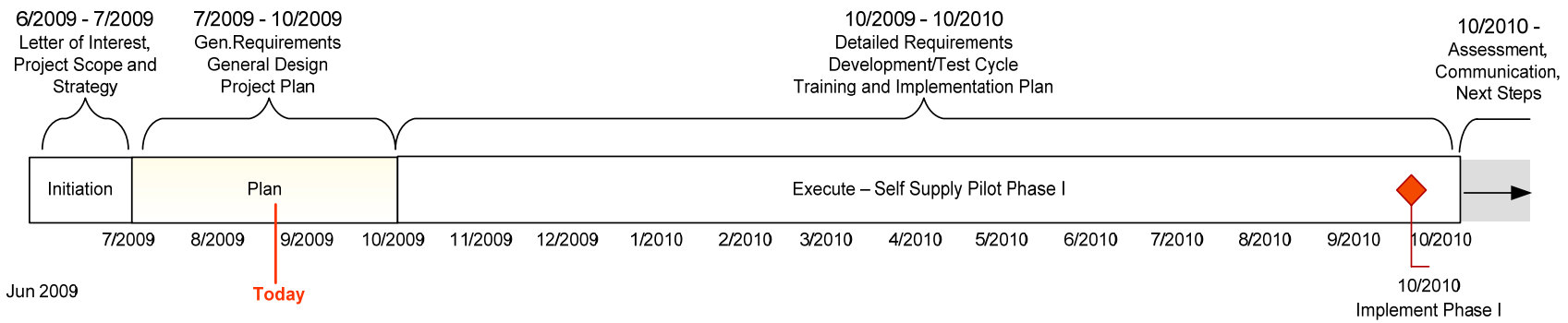
Customer Supplied Generation Imbalance

Summary of Customer Supplied Generation Imbalance – Survey Results

- This initiative will develop systems and processes to enable customers to self-supply their within hour balancing requirements from their own and/or contracted dispatchable resources for one or more wind plants.
- BPA kicked-off the Customer Supplied Generation Imbalance Pilot process at the June 17th Customer Forum.
- Surveys were sent to qualified participants on June 26th with comments due by July 10th.
- The Criteria for participation was: wind only, in BPA's BA, and generators already connected to the BPA grid.
- Four responses were received; BPA has begun working with 1 participant, another participant is discussing the pilot in more detail, and 2 other participants are on hold and may participate at a later date.

Customer Supplied Generation Imbalance – Pilot Program Participation

- The Customer Supplied Generation Imbalance pilot will start no later than October 1, 2010.
- Participants will be required to remain in the pilot until the end of the 2010/2011 rate case period due to Power Services need to provide obligated capacity through September 2011.
- Persistent supply of Generation Imbalance.
- BPA will continue to supply load following and regulation.



Customer Supplied Generation Imbalance – List of Issues

- Identify requirements for Wind Generators to keep their Station Control Error (SCE) inside specific limits and identifying the consequences for deviating outside this limit.
- Determine data set needs from customers and their facilities for balancing purposes.
- Determine transmission requirements for netted facilities and resources used to balance.
- Examine the billing process for netted resources.
- Tracking resources that use part of their output for balancing resources.
- Calculating constrained path issues and communicating with the wind generators.
- Determine how limitations and curtailments for self-suppliers will handled when DSO216 is initiated.

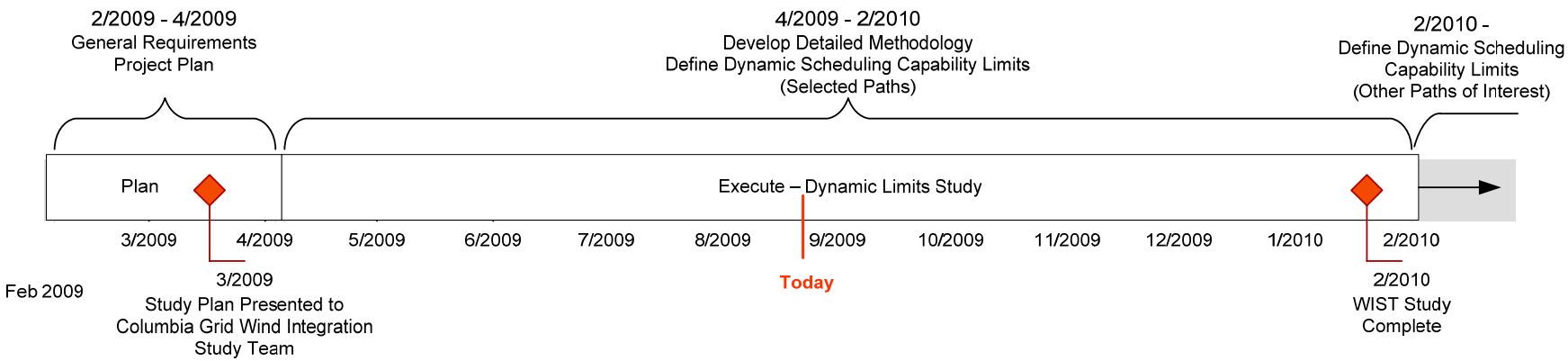
Dynamic Transfer Limits Study

Summary of Dynamic Transfer Limits Study

- The purpose of this project is to identify the dynamic transfer limit associated with various paths. Scope includes:
  - Define how the path limit is established
  - Identify the reliability concerns restricting dynamic signals across PNW transmission paths
  - Establish a credible, repeatable, and timely methodology to allow dynamic scheduling in BPA's transmission network and interties.
- This project does not identify dynamic limits of any particular generator, load, or implement dynamic scheduling.
- Paths/Flowgates under study:
  - California-Oregon Intertie (COI)
  - Northern Intertie
  - West of Garrison
  - NW-to-Idaho (LaGrande)
  - West of Cascades – North
  - West of Cascades - South
  - North of Hanford
  - North of John Day
  - South of Allston
  - West of McNary
  - West of Slatt

Summary of Dynamic Transfer Limits Study

- Repeatable study methodology will be published no later than February 15, 2010.
- Commercial Systems Considerations:
  - Market development (awards of capacity)
  - Joint Initiative Dynamic Scheduling System (DSS)

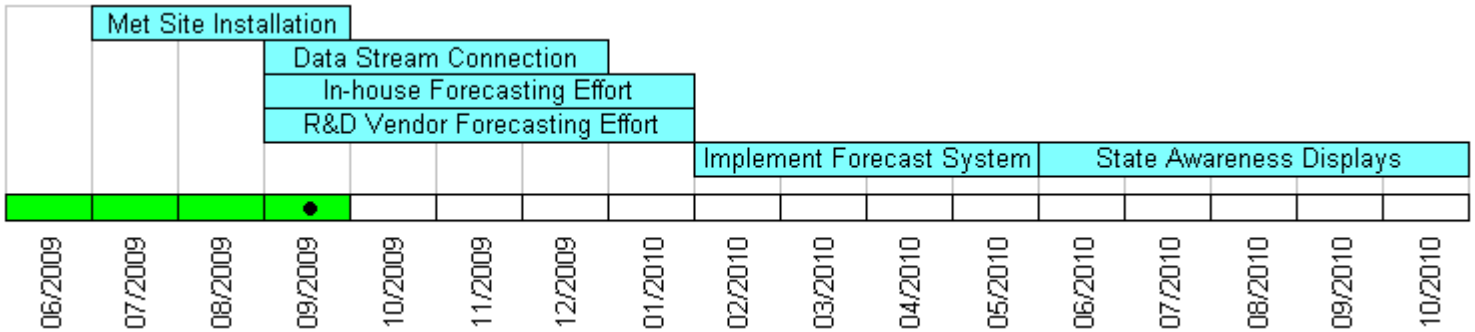


Forecasting

Forecasting

- This project will improve BPA's ability to forecast wind power generation and to develop, test and deploy tools for dispatchers and hydro duty schedulers to achieve greater understanding and awareness of wind generation patterns and operational risks and to improve reserve management and use.
- The project overall is on-track and moving forward.
- Timeline:
  - BPA will install meteorological equipment on 14 BPA facilities by October 1st, 2009. As of September 9th, 8 met sites were complete.
  - Data Feeds from Met Sites will be in place by December 1st 2009 for forecast displays.
  - BPA is developing in-house capability and has also contracted for wind forecasting research and development. A buy vs. build decision is scheduled for January 2010.
  - Dispatchers and duty schedulers will be working with wind generation and forecast displays by October 1st, 2010. The displays will continue to develop as needs change.

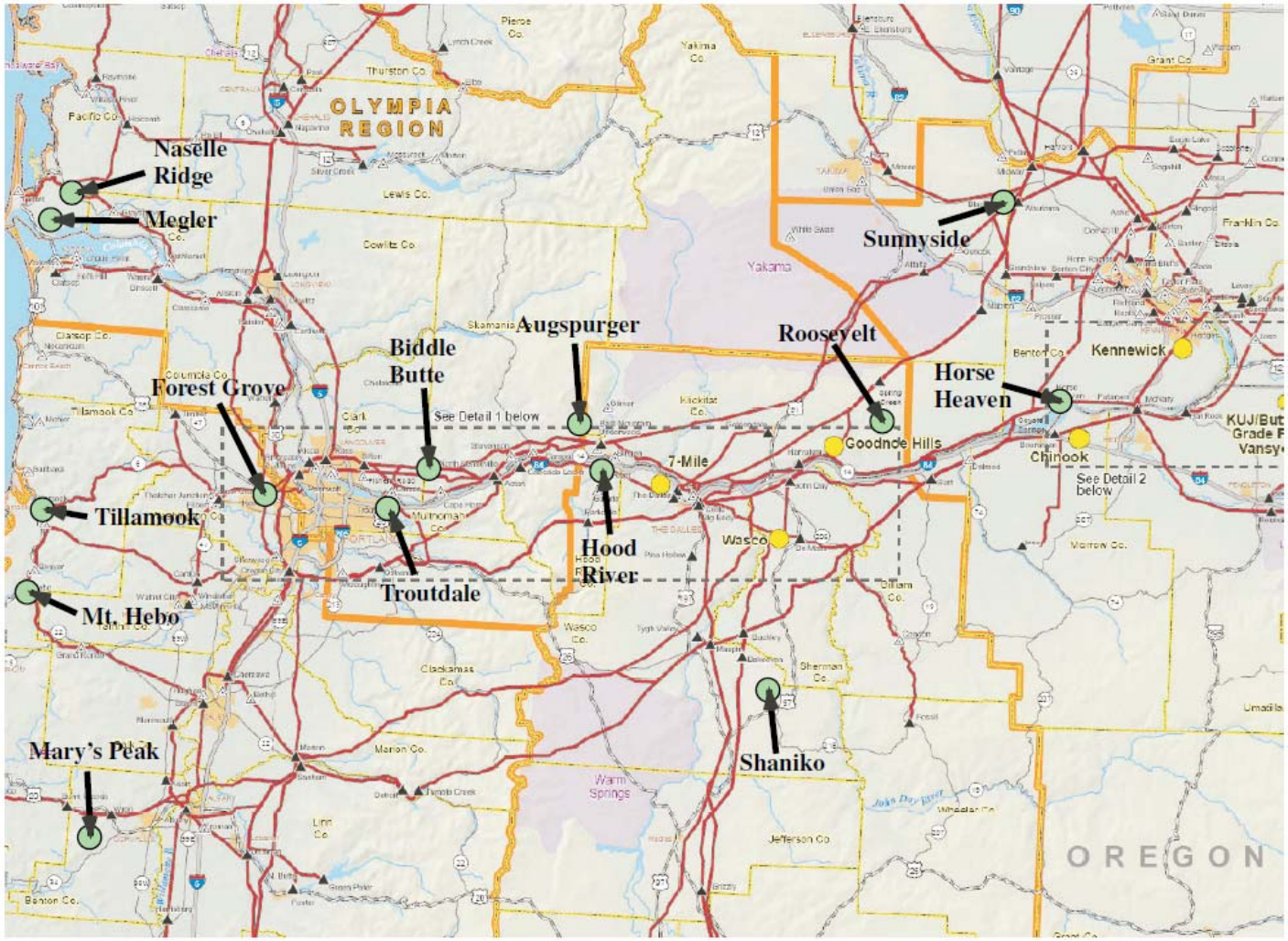
Forecasting



Project Benefits

- Raw met site data publicly available
- Improve near-term wind energy content and ramping forecast accuracy for use in operational planning
- Forecast wind serving BPA load
- Improve planning for wind energy storage and balancing energy consumption
- Predict positive or negative reserve deployment

Forecasting



14 New Met Sites (shown in green)

For More Information

BPA Wind Integration Team Web Page

www.bpa.gov/corporate/WindPower/WIT.cfm

Eric King,

BPA Wind Integration Project Manager

(503) 230 5236

evking@bpa.gov