Development of Balancing Markets in the West – Status Report

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Northwest Power and Conservation Council

Overview

- Why balancing markets?
- Related 6th Power Plan action items
- Joint Initiative efforts – balancing market-related and other items
- FERC Notice of Proposed Rulemaking (NOPR) on Integration of Variable Energy Resources – new context for balancing market initiatives
- Proposed west-wide balancing market
  - Efficient Dispatch Toolkit – major effort at WECC
- What next?

Why Balancing Markets? – A Simplified Example

- All load and generation changes within a clock hour have to be balanced by the utility (Balancing Authority, BA) operator
  - Load changes have to be followed up or down
  - Generation changes have to be offset
- Load changes within an hour are relatively predicable
- Reserves need to be carried to cover changes as they occur
- Reserve size is generally a function of the total potential change from the average expected level (schedule) within the hour
- Historically BAs carries all their own reserves

A Simplified Example – 2

- Why is this a problem?
  - Reserves hold resources out from other uses, costing money
  - Operating constraints may limit reserve usage
    - BPA is particularly limited in its ability to reduce generation when wind increases in the off-peak nighttime hours by flow requirements
    - Thermal utilities may be more limited by ability to increase generation to account for wind drops
    - Thermal utilities may not be able to change generation fast enough with some plants

A Simplified Example – 3

- Balancing is particularly a problem now for BAs with large amounts of wind, e.g., BPA
- What can be done to reduce the impact on the BA?
  - Curtail wind output/deliveries
  - Shorter scheduling intervals (reduce the uncertainty)
  - Better wind forecasting to reduce errors
  - Dynamic transfers (moves the balancing obligation)
  - Find other sources of balancing resources
- Balancing market goal: Expand the pool of resources available to BAs: more flexibility, cheaper resources

Related 6th Power Plan Action Items

- GEN-3 Reduce Demand for System Flexibility – using, among others, “liquid intra-hour wholesale power markets” to reduce demand for balancing reserves on individual BAs
- GEN-4 Expand Access to Existing Flexibility – improve business practices, operating protocols, communication systems to increase availability of existing balancing capability
- BPA-3a Institutional Changes to Meet Flexibility Needs – Bonneville should pursue institutional and business practice changes described above

Joint Initiative Efforts

- Parties: ColumbiaGrid, Northern Tier Transmission Group (NTTG), WestConnect
- Three initiatives to facilitate bilateral markets and transactions
  - Intra-hour transmission scheduling
  - Intra-hour Transaction Accelerator Program (I-TAP)
  - Dynamic Scheduling System

Joint Initiative Efforts – 2

- Intra-hour transmission scheduling
  - Targeting standardized half-hour scheduling business practices among participating BAs by July 1, 2011
    - Current standard scheduling practice: hourly schedules
  - Will reduce lag between forecasts and operating period and allow more frequent adjustments of export schedules
  - Will use current transmission reservations (no new transmission product) with new/updated schedule e-tags
    - E-tag – data template transferring schedule information
  - Fifteen participating BAs
  - BPA continuing its intra-hour scheduling pilot and working with California to develop pilot with CAISO

Joint Initiative Efforts – 3

- Intra-Hour Transaction Accelerator Program
  - Web-based bulletin board platform for energy bids and offers, including enabling transaction execution, transmission rights purchase if needed, and the creation of e-tags
  - Facilitates easier bilateral deals – not a centralized market
  - Target implementation mid-2011
  - Sixteen parties signed subscription agreements
  - Expect most benefit from intra-hour purchase capability
  - Complements intra-hour transmission scheduling business practice development

Joint Initiative Efforts – 4

- Dynamic Scheduling System
  - Communications infrastructure platform to easily set up dynamic transfers among multiple BAs, replacing case-by-case procedures
    - Can transfer real-time balancing requirement for exports out from wind host BA to receiving BA or real-time balancing generation into wind host BA
      - Sometimes used within BA footprint for matching balancing generation to variable generation
    - Causes varying real-time transmission flows, so full implementation subject to more study to determine physical reliability-related limits, by path

Joint Initiative Efforts – 5

- Dynamic Scheduling System (continued)
  - BPA currently conducting a pilot project of dynamic transfers based on scheduling limits from initial study prior to full implementation of dynamic scheduling system
    - BPA using some available capacity for self-supply and third-party supply of balancing resources within its BA
    - BPA has self-supply and third-party supply pilots underway

FERC NOPR – Integration of Variable Energy Resources

- Not directly balancing-market related – helps to take pressure off balancing market by reducing demand for reserves
- Three interrelated proposals in NOPR
  - Fifteen minute scheduling
  - Forecasting by transmission providers and provision of forecasting data by variable energy resources
  - Ability for transmission providers to recover costs from variable generators on different basis than from others
  - Third is contingent on implementation of first two
- Applicable to IOUs and to non-jurisdictionals through reciprocity provisions

FERC NOPR – 2

- Fifteen minute scheduling – amendment to Open Access Transmission Tariff (OATT)
  - Allows customers to use fifteen minute scheduling
  - NOPR asks for comments on implementation difficulties
- Variable generators must provide operational and meteorological data to transmission providers that choose to do their own forecasting – amendment to Large Generator Interconnection Agreement

FERC NOPR – 3

- Creates new Schedule 10 “Generator Regulation and Frequency Response Service” for OATT – previously addressed on case-by-case basis by FERC
  - Allows transmission provider to charge different generators for different amounts of regulation service (i.e., charge more for variable energy resources)
    - But only if provider implements 15 minute scheduling and the required forecasting and if difference is cost-justified
  - Rejected making Schedule 10 charges contingent on other reforms by provider that were proposed

Proposed West-Wide Market

- Efficient Dispatch Toolkit (EDT)
  - Enhanced Congestion Calculator – mandatory, run by Reliability Centers – won't discuss further
  - Energy Imbalance Market – voluntary
- WECC conducting cost/benefit study
  - Supported by states/provinces through Western Interstate Energy Board
- Key differences from Joint Initiative efforts
  - Centralized market and dispatch signals – not bilateral
  - Expected to operate on 5 minute basis
  - Incorporates real-time transmission congestion information

Energy Imbalance Market

- Real-time energy imbalance and congestion redispatch
- Centralized, automated interconnection-wide generation redispatch subject to transmission constraints
- Limited to real-time energy market, as add-on to current pre-operating hour bilateral energy and capacity markets
- Generation dispatch done on five minute basis
- Participation would be voluntary
- Modeled on market currently in place in Southwest Power Pool (part of Texas, Oklahoma, Kansas, Nebraska, parts of five others)

Energy Imbalance Market – 2

- Initial participation choice would be by BA and/or transmission provider – undecided
  - Expected to exclude organized markets (California – CAISO, Alberta – AESO)
  - May not include PMAs (BPA, WAPA) – potential legal issues
- Within that choice, generators could choose to offer into balancing market or not
- In participating footprint, settlement of load and generation imbalances would be at nodal market prices
- Requires independent market operator but would not have regional tariff – modifications to current OATTs

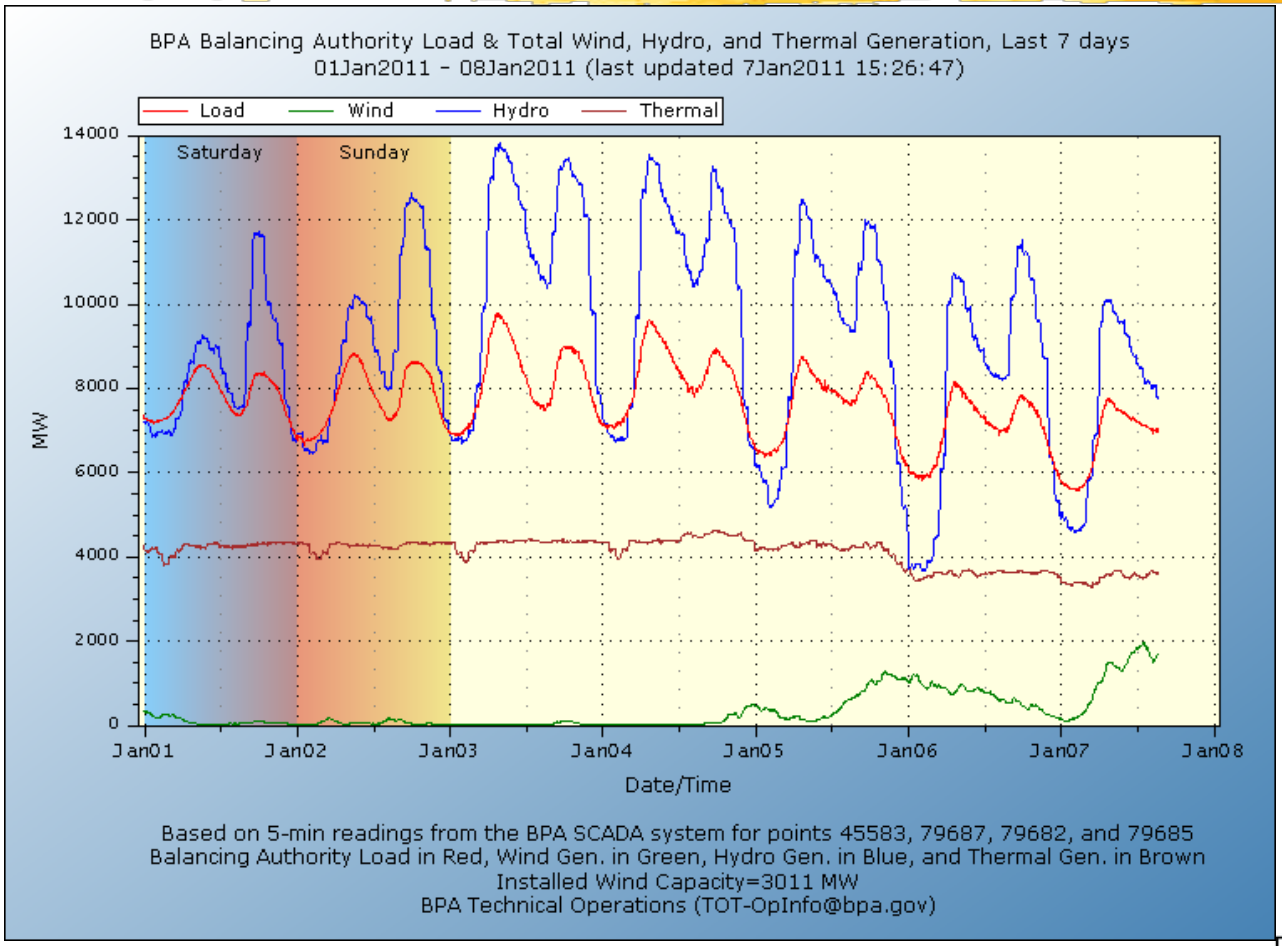
What Next?

- Interest in Joint Initiative taking on potential near-term solutions, e.g.:
  - Small-scale voluntary capacity pool (I-TAP enhancement?)
  - Near-term actions to support EDT development
- Outcome of FERC NOPR, particularly implementation details
- WECC EDT cost/benefit study – target completion June 2011
  - States/provinces interested in incremental cost and benefit
  - Conclusion of net benefits would only be first step
    - Implementation would need to be worked out
    - Market operator, settlements, interaction with CAISO
  - Already some pushback on EDT proposal

Extra Slides

- Example BPA weekly operation
- Scheduling process – examples from 6th Power Plan

Example Weekly BPA Operation



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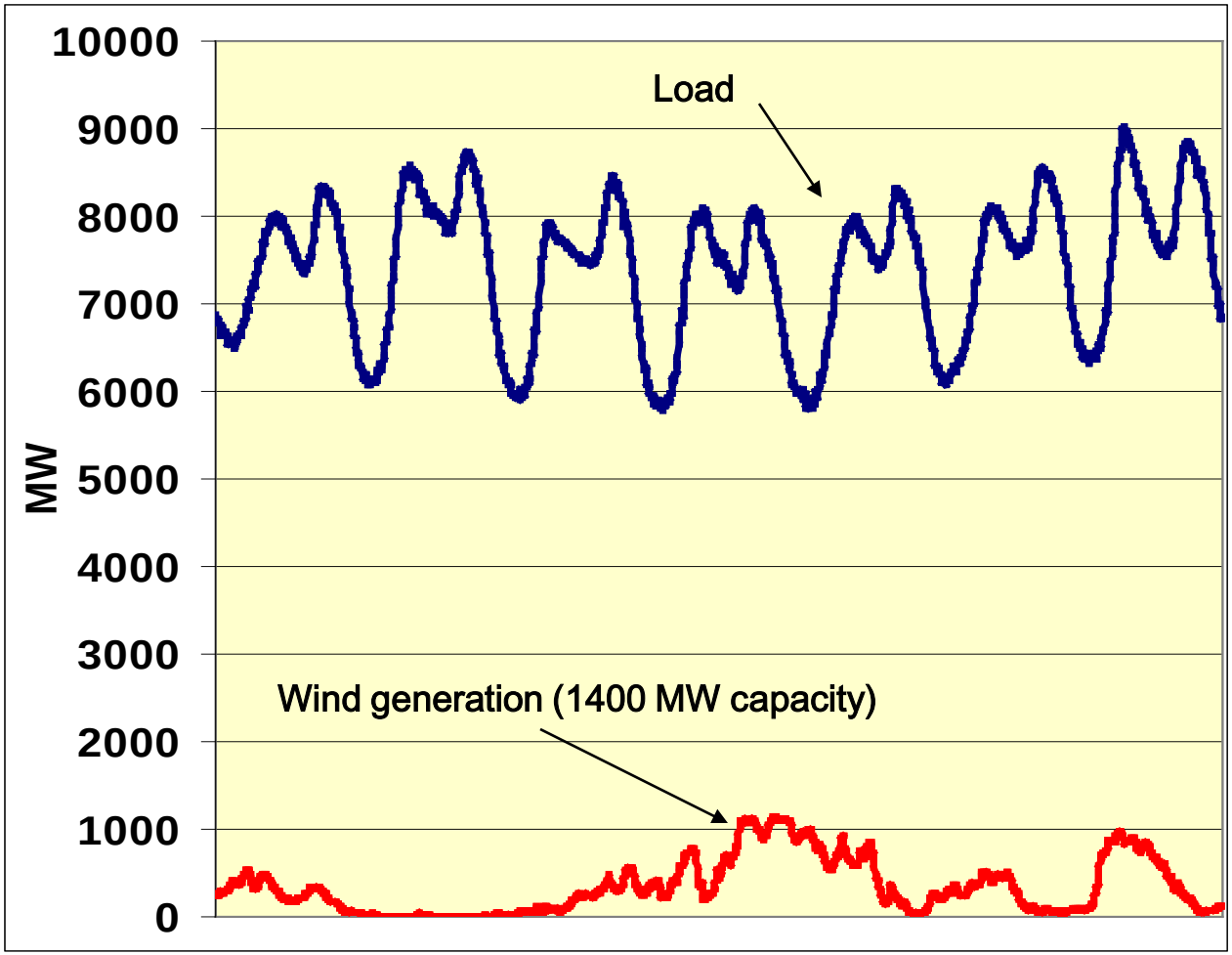
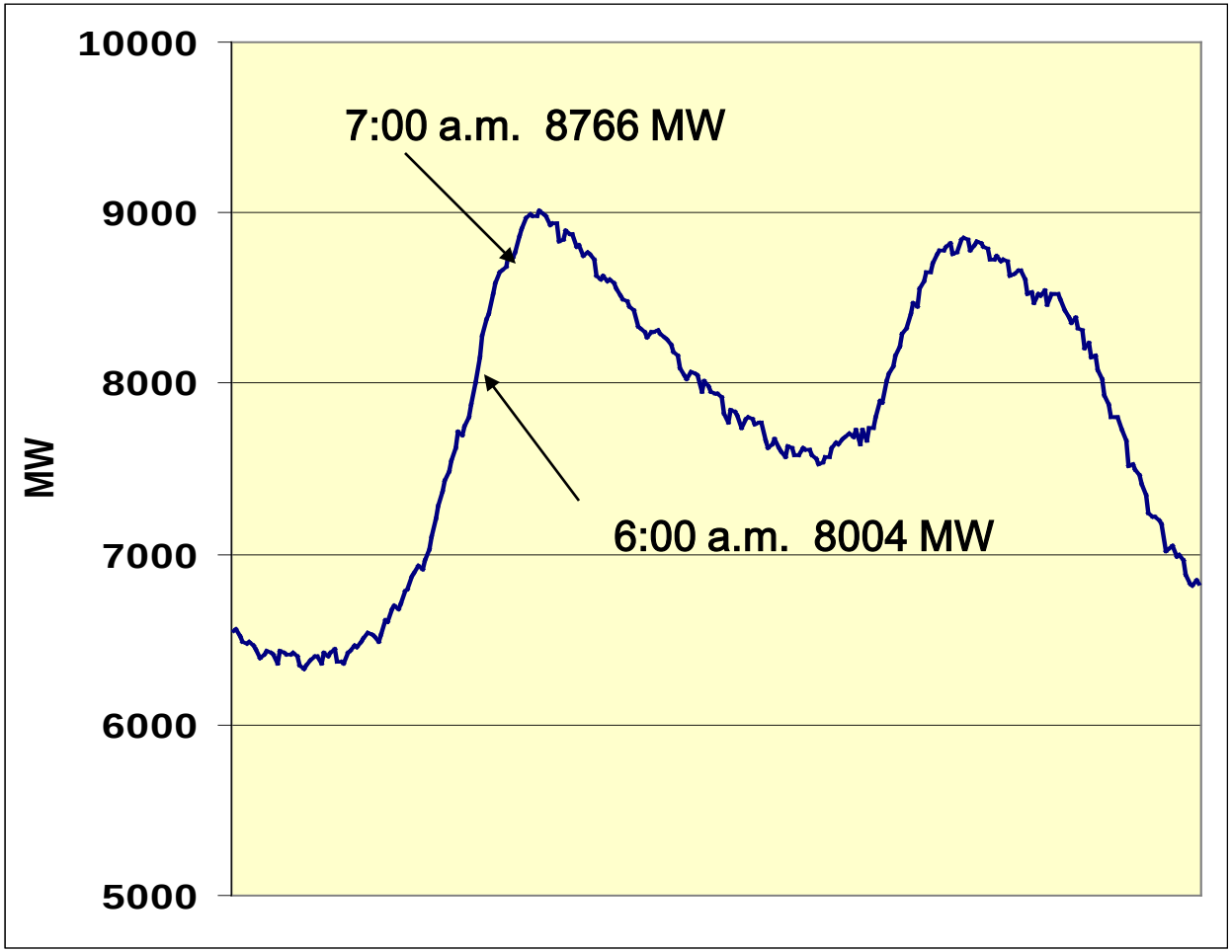
Example Load and Wind Patterns
BPA 1 Jan 08 – 7 Jan 08



Daily Load Curve – BPA 7 Jan 08



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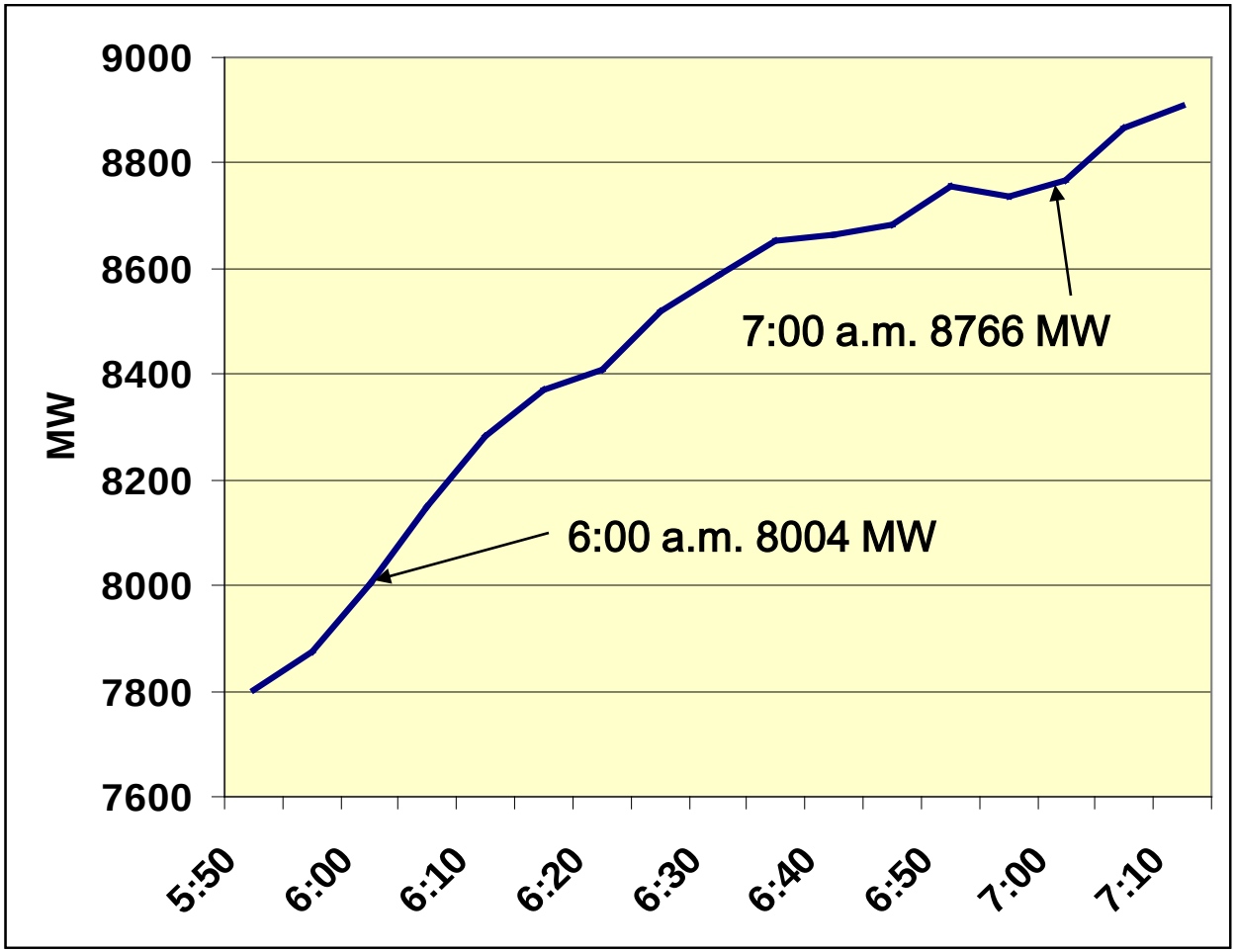
Hourly Load Curve – BPA 7 Jan 08 6:00-7:00 a.m.



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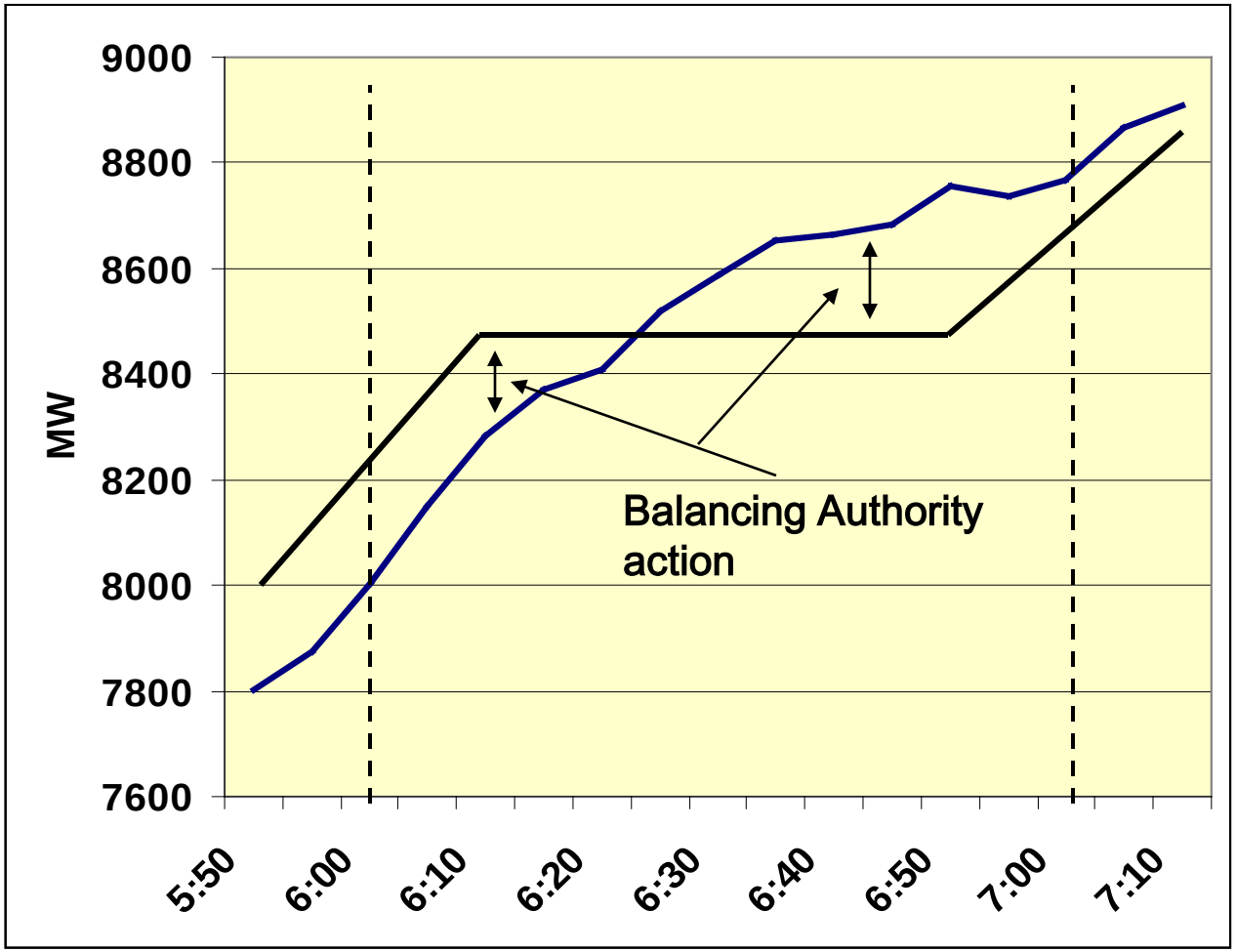
Hourly Load Curve – BPA 7 Jan 08
6:00-7:00 a.m. – Example Hourly Scheduling



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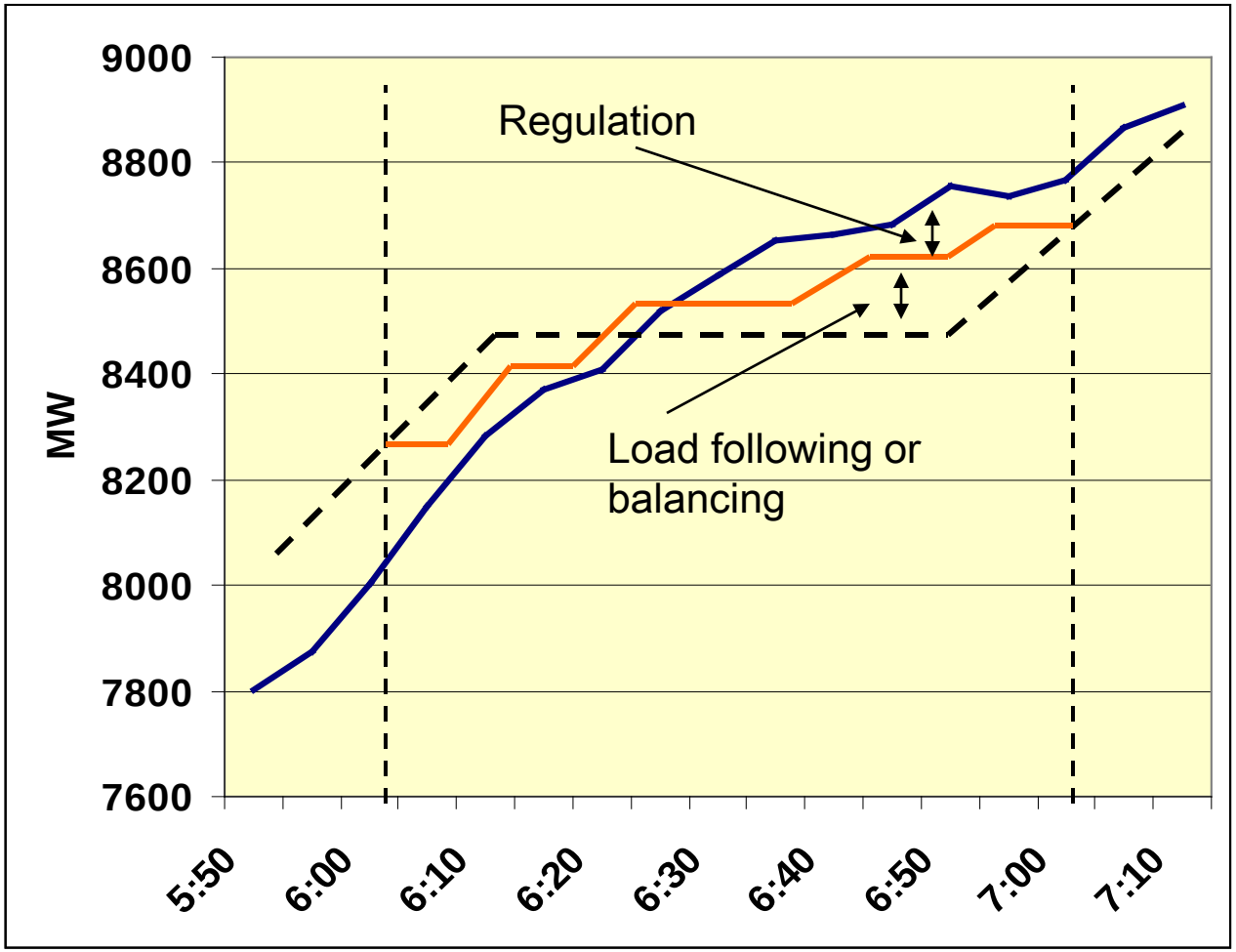
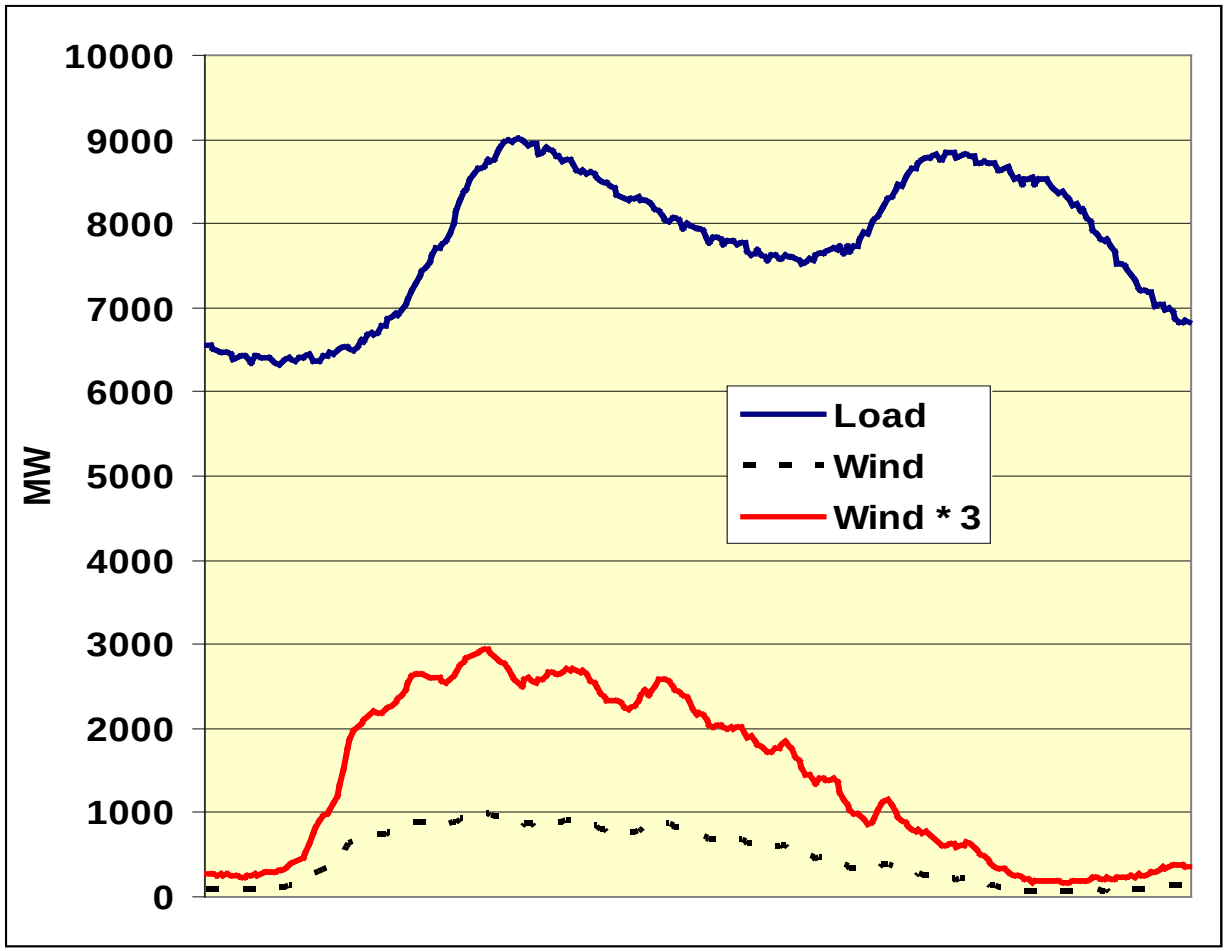
Hourly Load Curve – With Hourly Scheduling and Illustrative Load Following



Wind Can Add to the Ramp Problem – Example BPA 7 Jan 08 – Load and Wind



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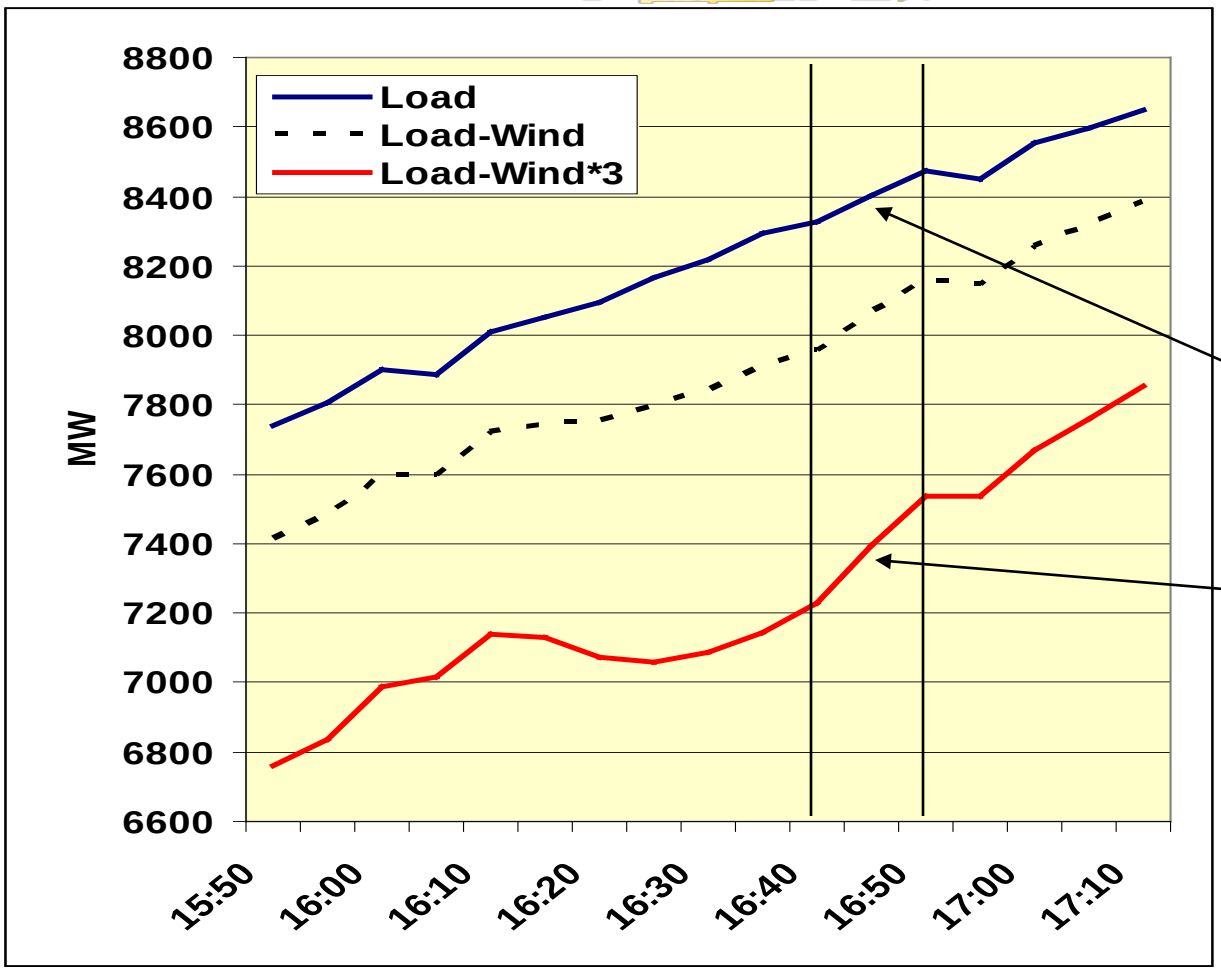
Wind Can Add to the Ramp Problem - Example BPA 7 Jan 08 15:50 – 17:10



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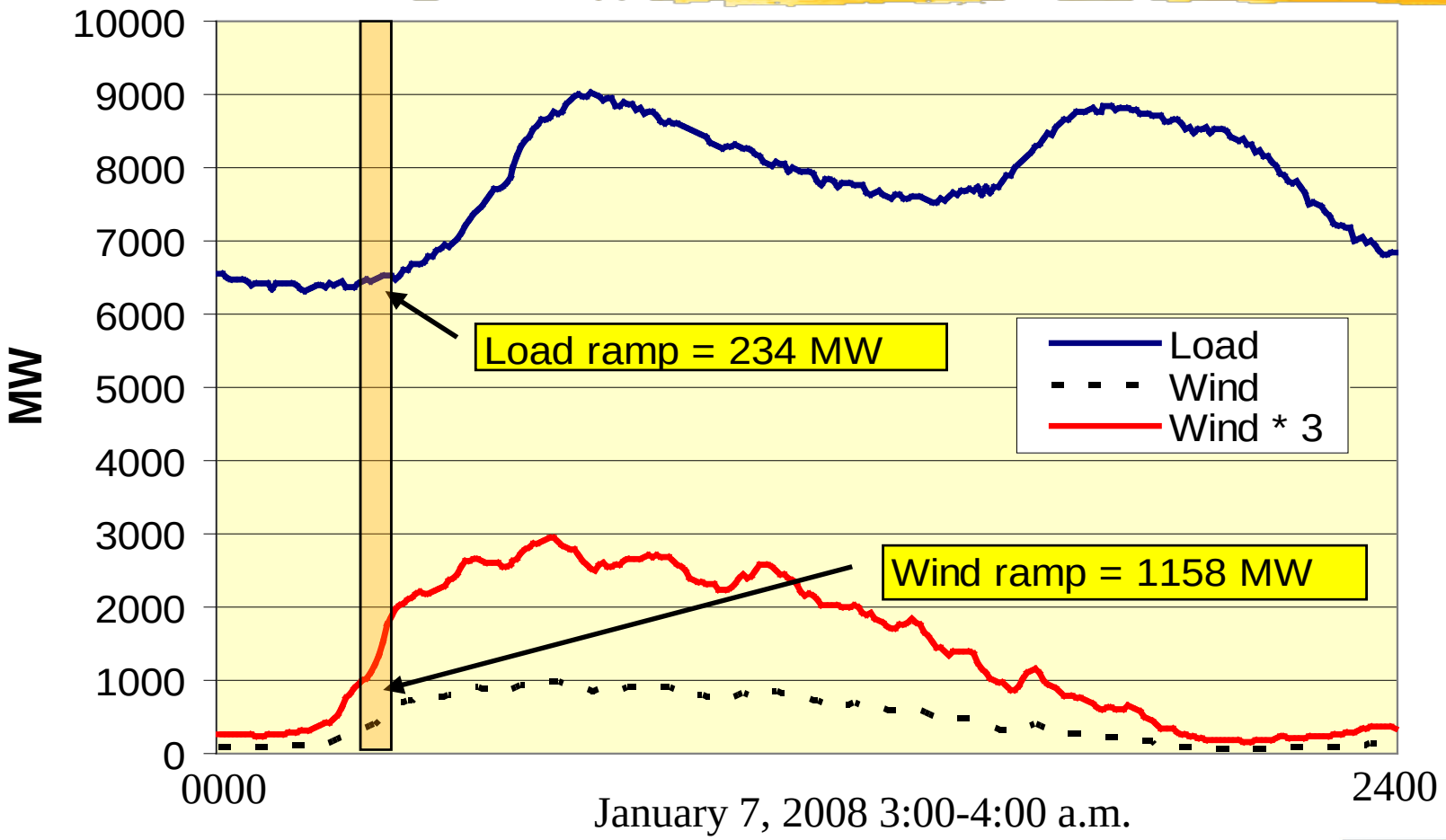
Ramping Example: 3:00 to 4:00 a.m.



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