

Wind Integration in Ontario

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CanWEA Municipal Issues and Wind Conference 2007

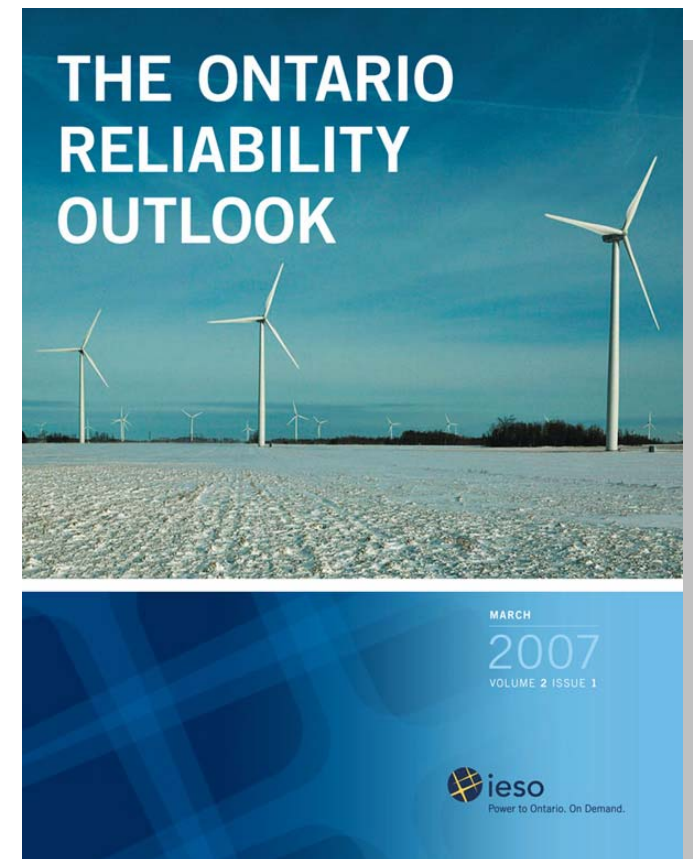


- The IESO is responsible for maintaining reliability
- We manage Ontario's integrated electricity system
- We administer the wholesale electricity market

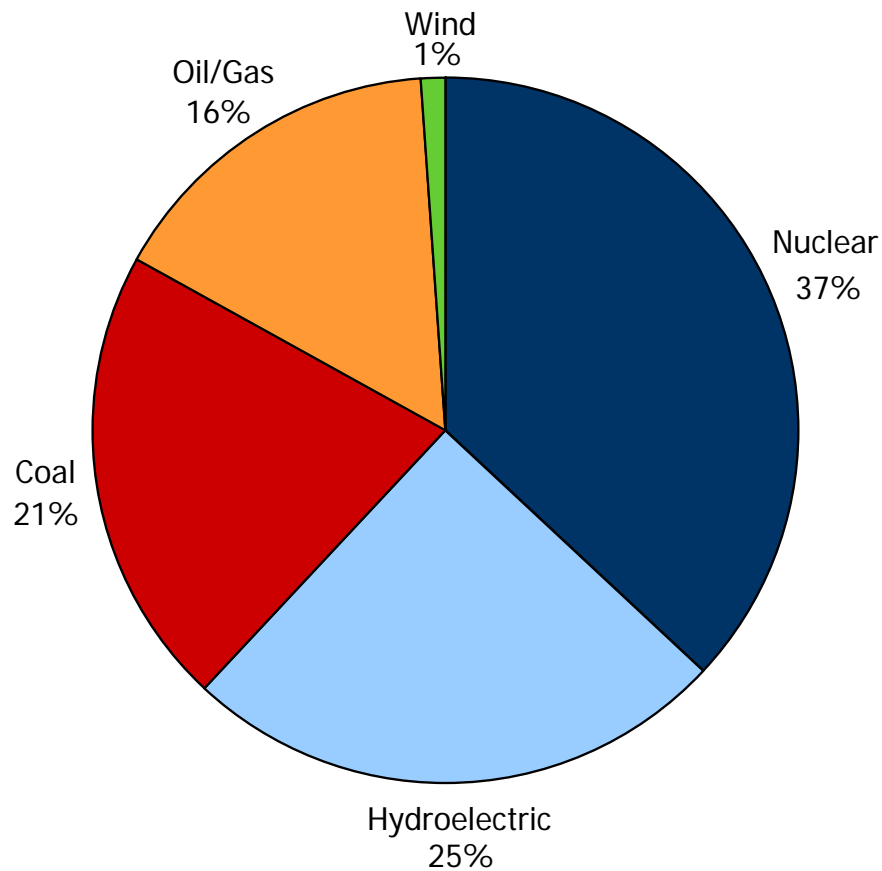


Commitment to Reliability Summer 2007 and Going Forward

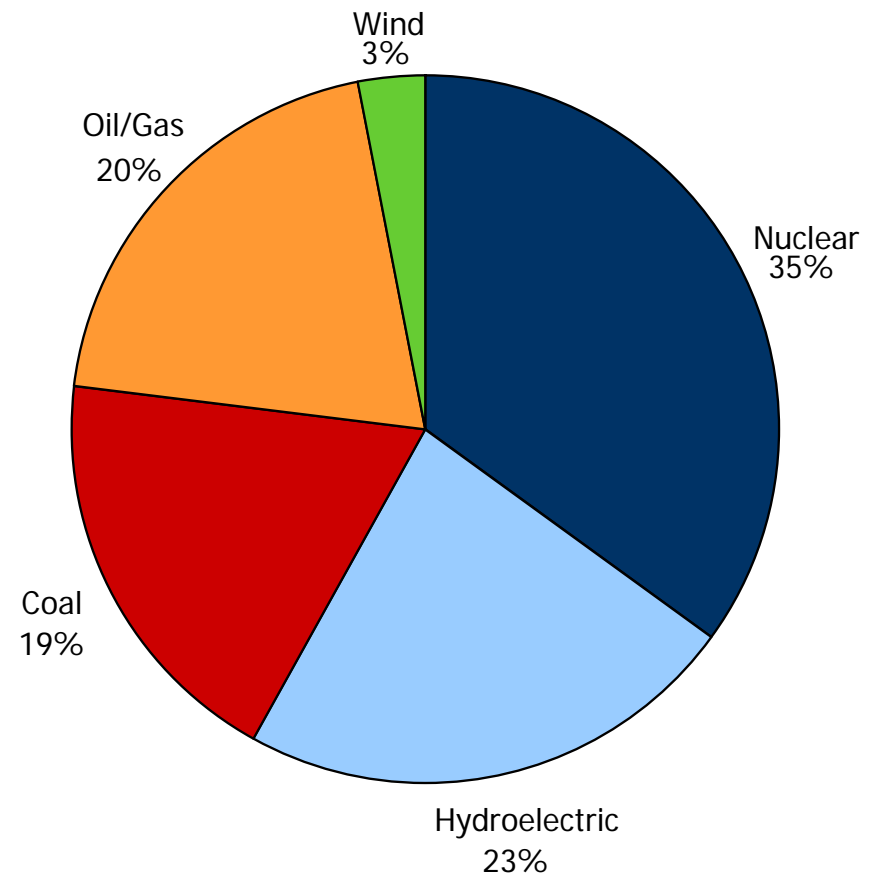
- Overall, the supply – demand picture is positive
- Over 2,300 MW of new capacity is expected to come into service over the next 18 months
- Under extreme weather or unexpected equipment failures, the Ontario system may be strained
 - These conditions could be mitigated by ELRP activations and emergency purchases



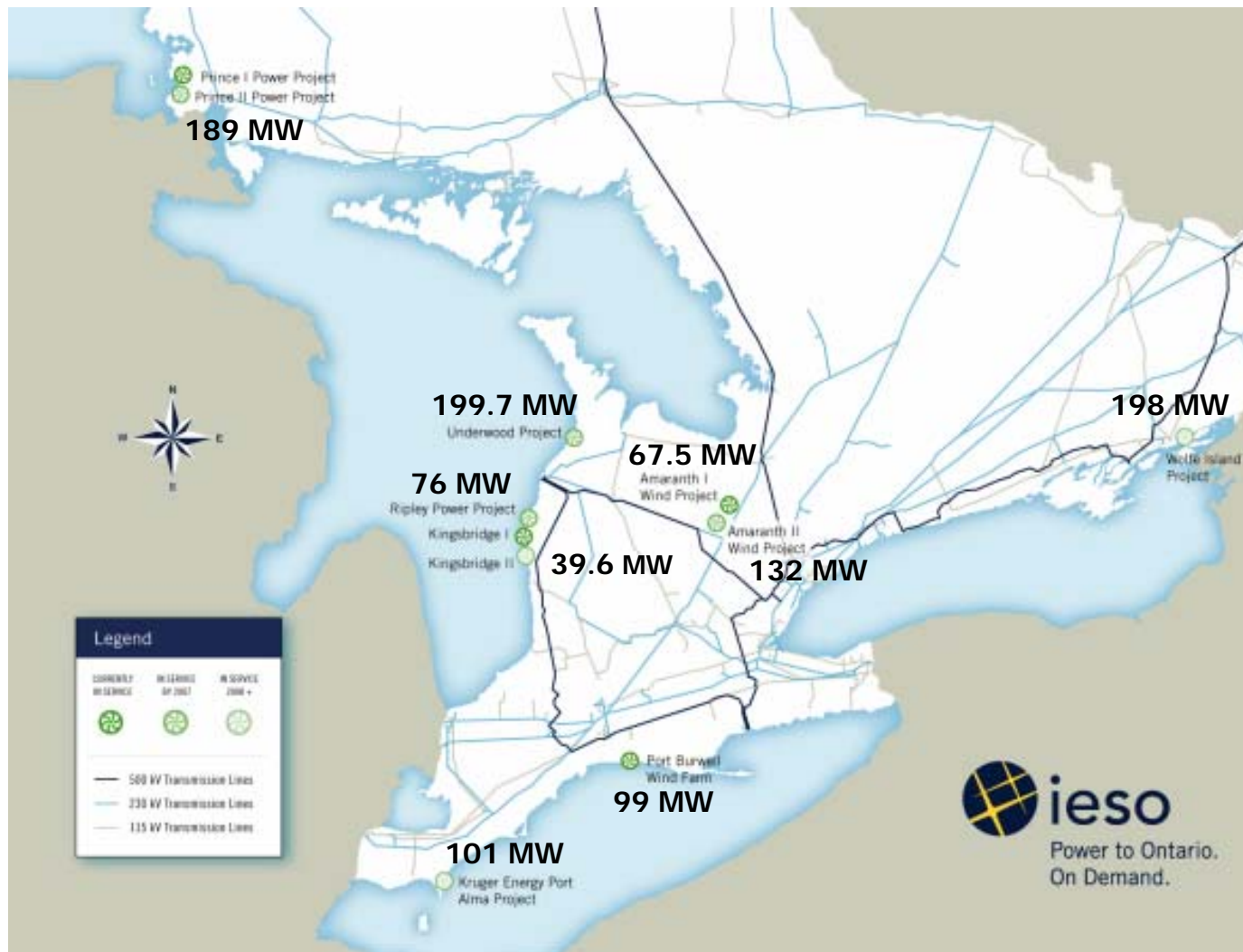
Today



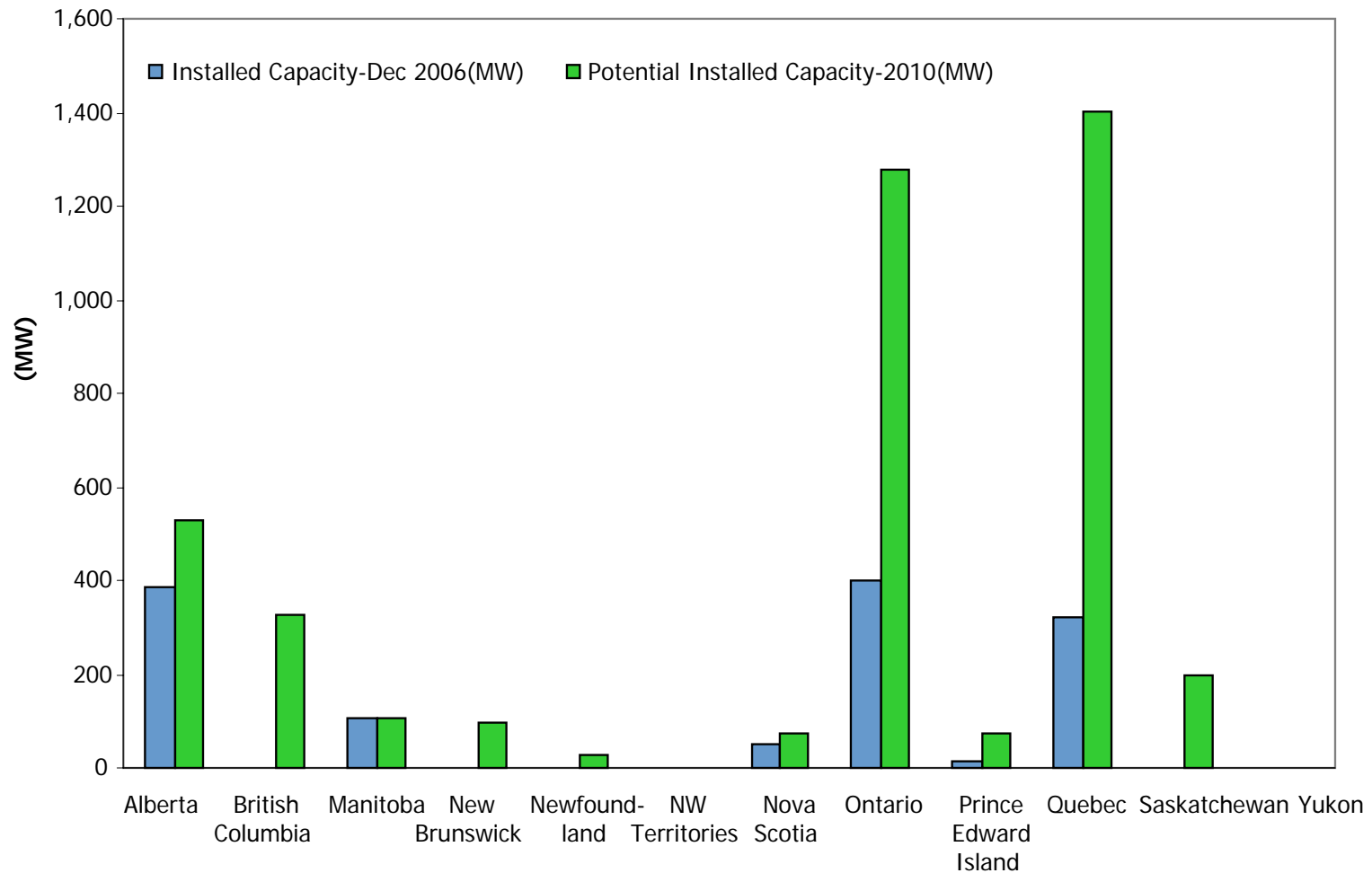
End of 2008



Wind Projects in Ontario

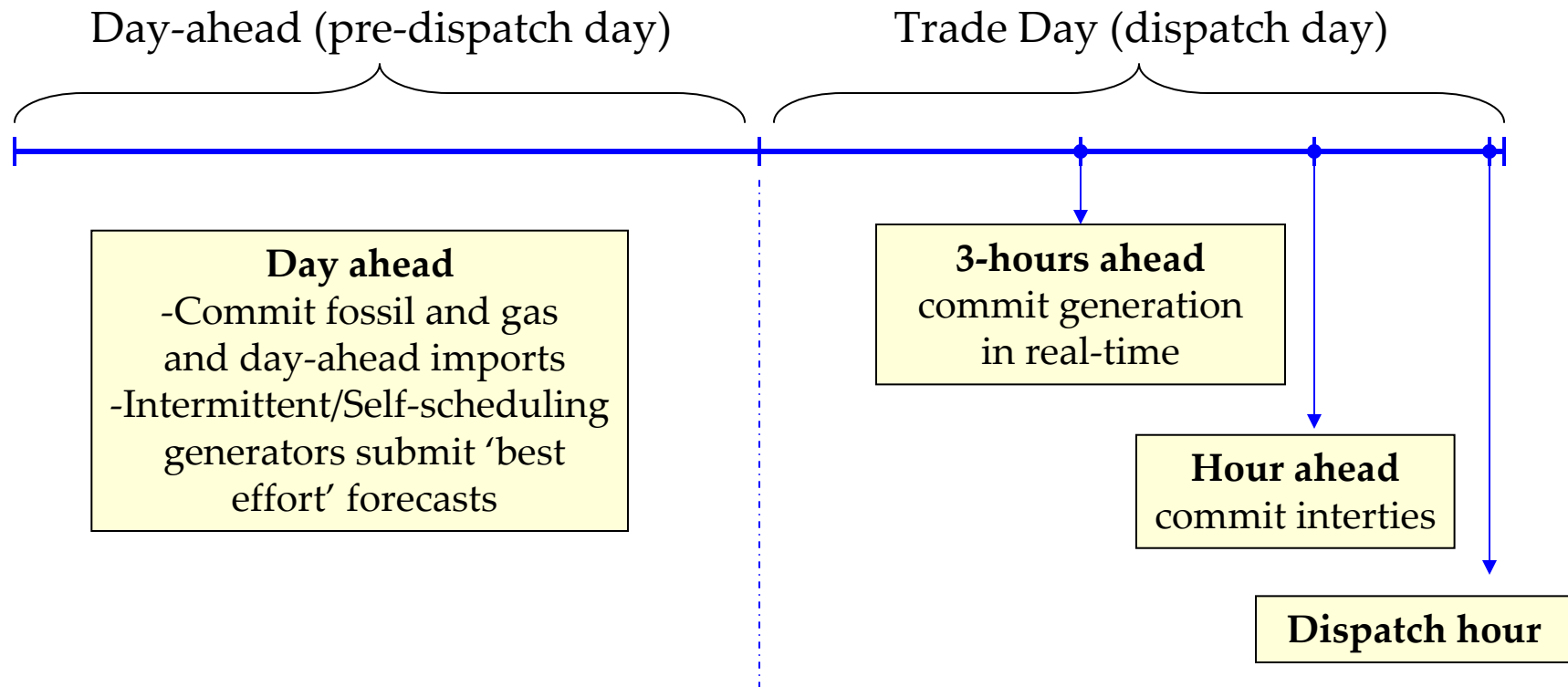


Installed Wind Power Capacity by Province



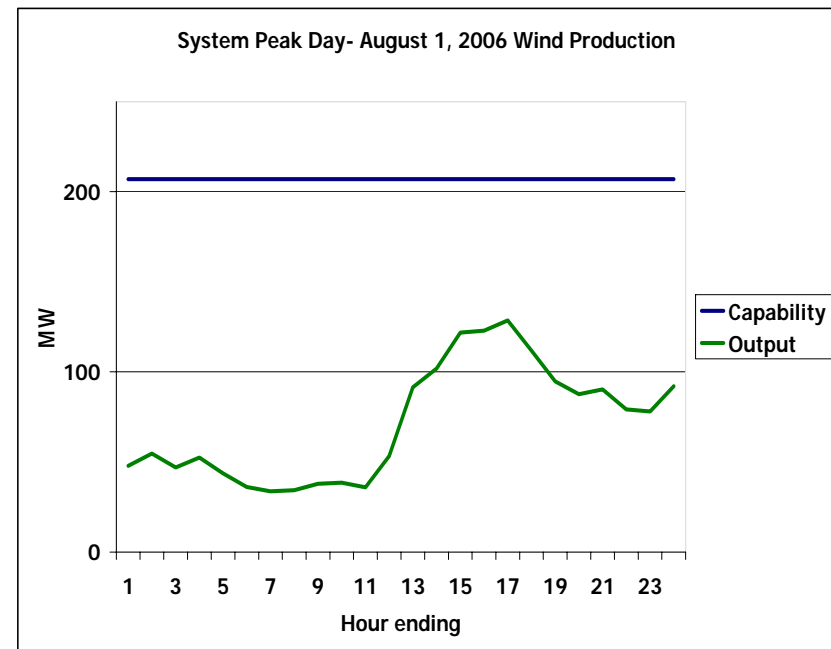
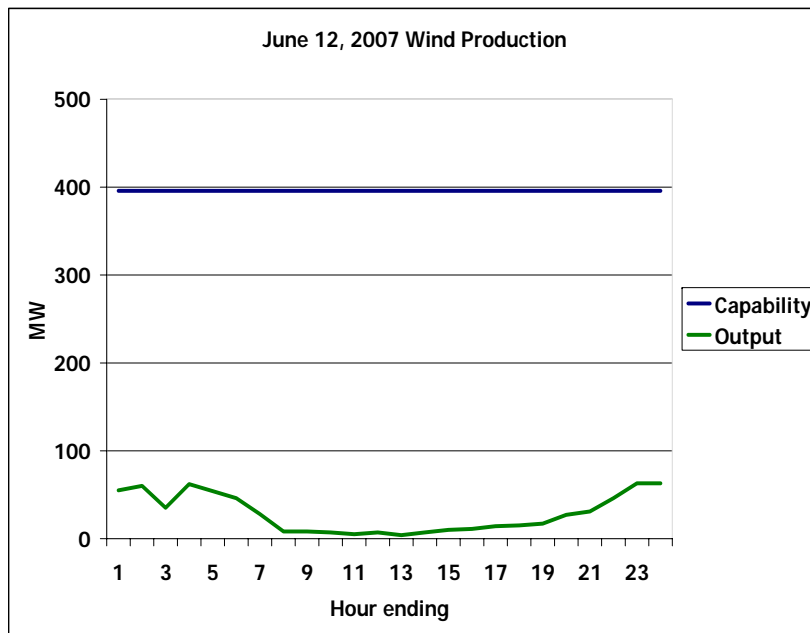
(Source: CanWEA, BMO Capital Markets)

Resource commitment and dispatch timeline



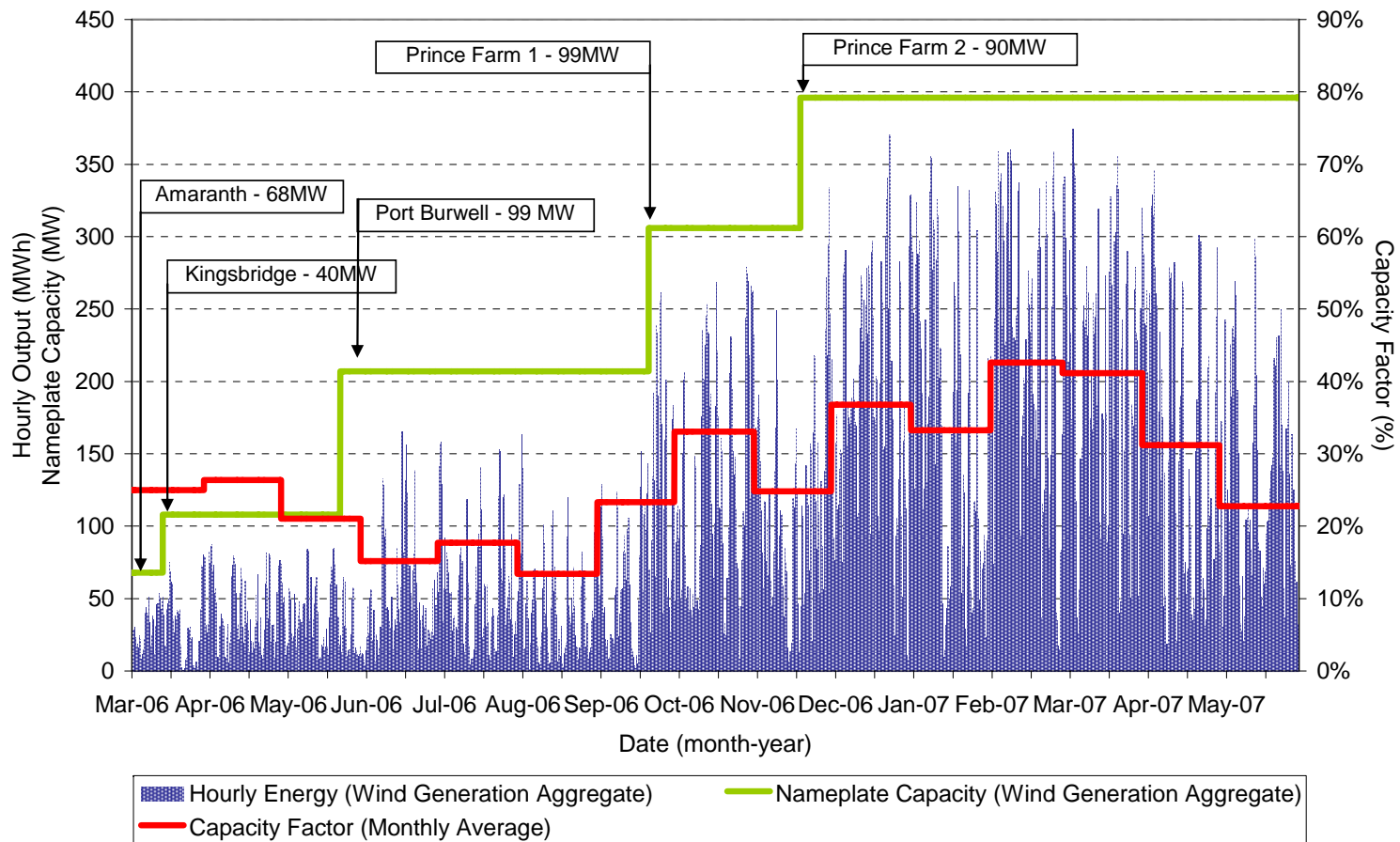
- One year of experience with 400 MW installed capacity
- Overall monthly average capacity factor of 28%
 - Highest monthly capacity factor in February 2007 of 43%
 - Lowest in August 2006 of 13%
- Average capacity factor during summer peak hours of 2006 was 42%

Operational Experience Wind Variability - Example



Ontario Wind Generation Data: Aggregate Values

March 4, 2006 to May 31, 2007



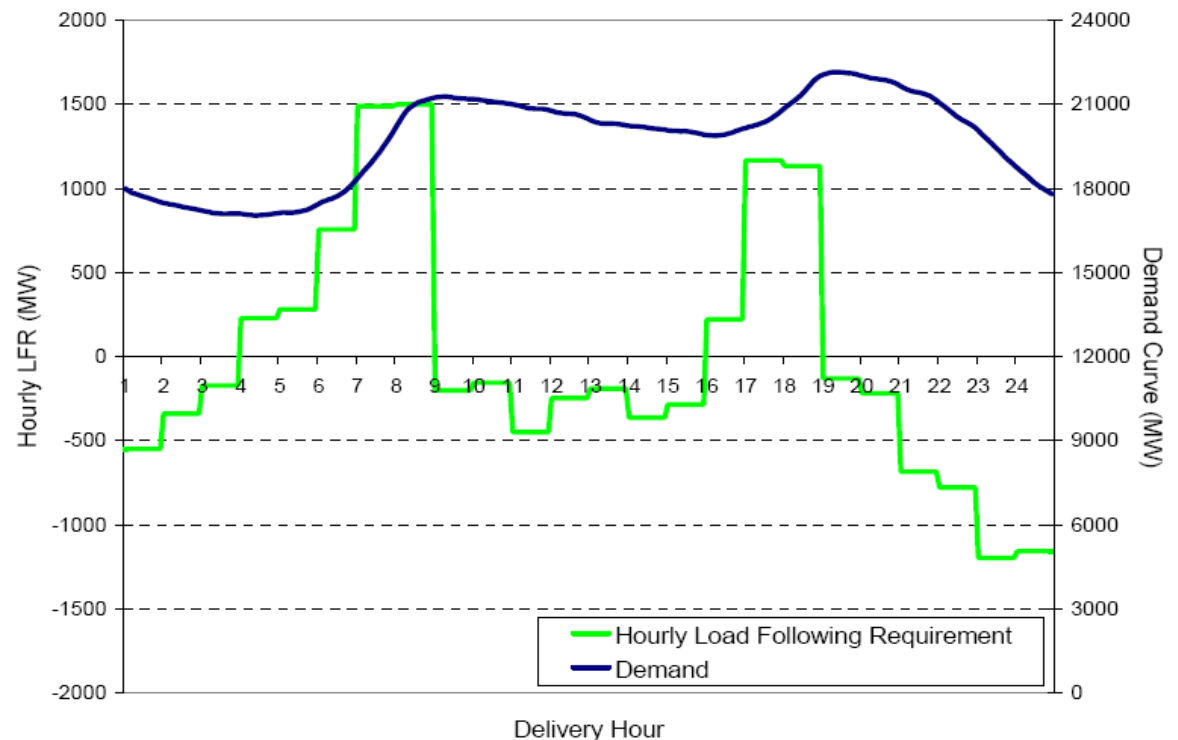
- Generation and load must always be in balance
- Variability at extremes must be planned for and accommodated
- Management through rigorous planning and market processes leading up to real-time



Operational Experience Load Following Capability

- Operational challenges exist with current resource mix, especially during periods of large demand changes
- The IESO and stakeholders are working towards solutions to new challenges that may arise with increasing wind capacity

Hourly Load Following Requirement vs. Demand Curve





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Power to Ontario.
On Demand.

2006 GE Wind Power Study/2007 AWS Report Conclusions

- Overall, Ontario has good wind development potential
- Minimal system operation impacts for levels of wind capacity up to 5,000 MW
 - Larger penetration levels could impact pre-dispatch and dispatch scheduling
- 2007-AWS Truewind 'Wind Generation Data' Report
 - 20 years of hourly wind generation data
 - Further work/analysis continues

- Finding simple ways to manage wind “capacity” and “variability”
 - Wind/water partnerships?
 - Recognizing wind variability in advance plans and process through improved forecasts
 - Potential market changes to improve system response to variability
 - Identify simple mechanisms to “control” wind farm production when needed

- Ontario Wind Power Integration Group established in 2006
- IESO is working with wind stakeholders to:
 - Identify potential barriers to wind integration
 - Minimize adverse effects on current and future operations
- Issues include:
 - Wind capacity forecasting
 - Telemetry of wind facilities
 - “Control” of wind facilities

