

2024 Atlantic Canadian Conference on Energy System Modelling

Moncton
June 19, 2024





over 2,600
employees



379,418
direct customers



14
generating stations



46,365
indirect customers



3,802 MW
total generating capacity



13,315 GWh
total in-province sales



6,868 km
transmission lines



8,363 GWh
total out-of-province sales



21,717 km
distribution lines



\$2.8 billion
in total sales of electricity



Énergie NB Power

the power of possibility
débordant d'énergie



Wind Balancing and Integration Costs Study

New Brunswick Balancing Area

- Consists of New Brunswick, Northern Maine and Prince Edward Island
- Existing Wind Resources
 - 391.25 MW of capacity in New Brunswick
 - 42 MW of capacity in Northern Maine
 - 202.5 MW of capacity in Prince Edward Island
- Future Wind Resources
 - 26 MW of capacity in New Brunswick



Study Rationale

- Non-dispatchable resources increase variability
- NB Power resources are utilized to meet and perform balancing services for this increased variability
- Study objectives
 - What does this cost?
 - How does it change over time?
 - How do costs change with additional wind?



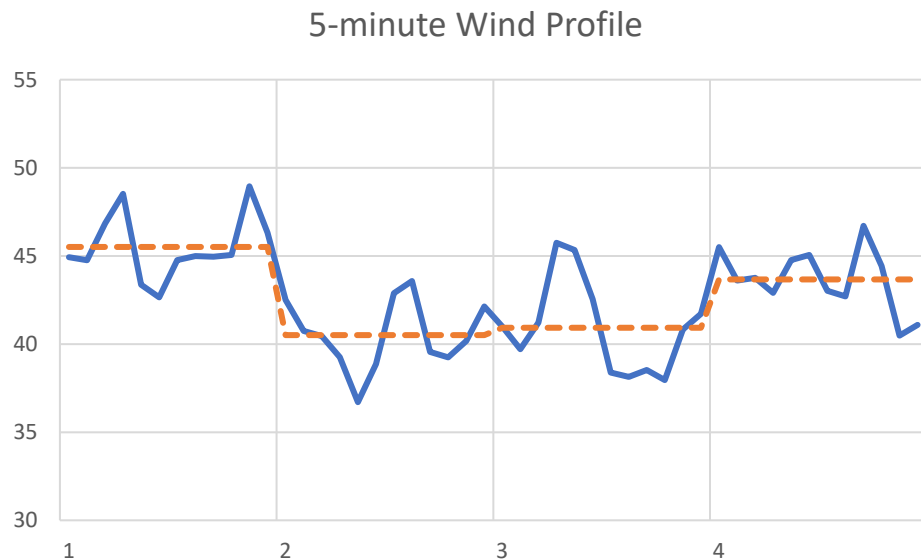
Cost Drivers

- **Intra Hour Variability**
 - Impact of wind generation output changes second-to-second and minute-to-minute
 - Met by fast acting generation sources
- **Inter Hour Variability**
 - Impact of wind generation output changes hour-to-hour
 - Met by generation dispatch and system posturing
- **Wind Forecast Error**
 - Differences between forecasted and actual wind generation
 - Met by system re-dispatch and fast acting generation sources



Intra Hour Variability

- Short term variability met through capacity based ancillary services
 - Automatic Generation Control (AGC)
 - Load Following
- Compare dispatch of actual wind against average hourly wind

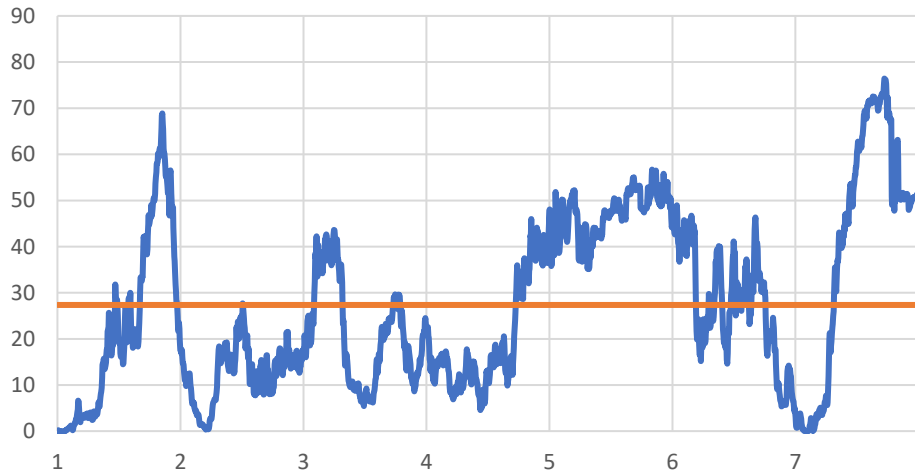


- Scenario 1
 - Actual wind profile
 - Actual AGC and Load Following
- Scenario 2
 - Hourly Average Wind
 - AGC and Load Following without wind impact

Inter Hour Variability

- Cost impact of natural hourly variability of non-dispatchable wind
- Compare dispatch of actual wind against average weekly wind

Weekly Wind Generation

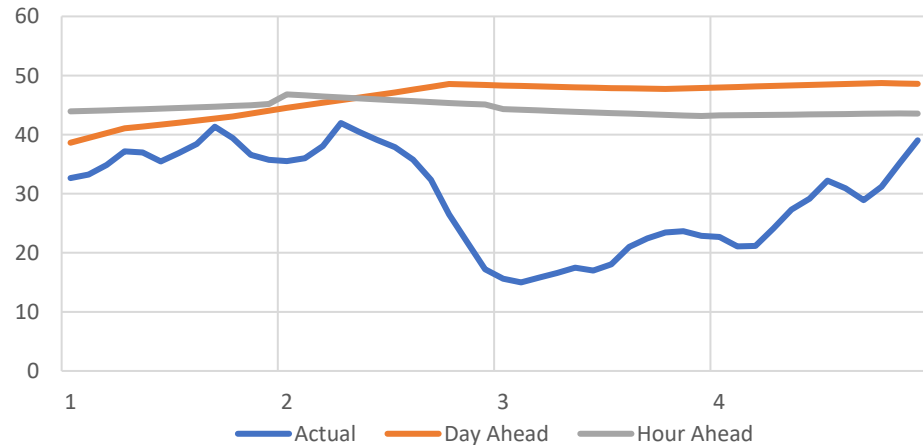


- **Scenario 1**
 - Actual wind profile
 - Actual AGC and Load Following
- **Scenario 2**
 - Weekly Average Wind
 - AGC and Load Following without wind impact

Wind Forecast Error

- Cost impact of variation between day-ahead wind forecast, hour-ahead wind forecast and actual wind generation
- Compare dispatch without wind forecasts against dispatch resulting from inclusion of wind forecasts

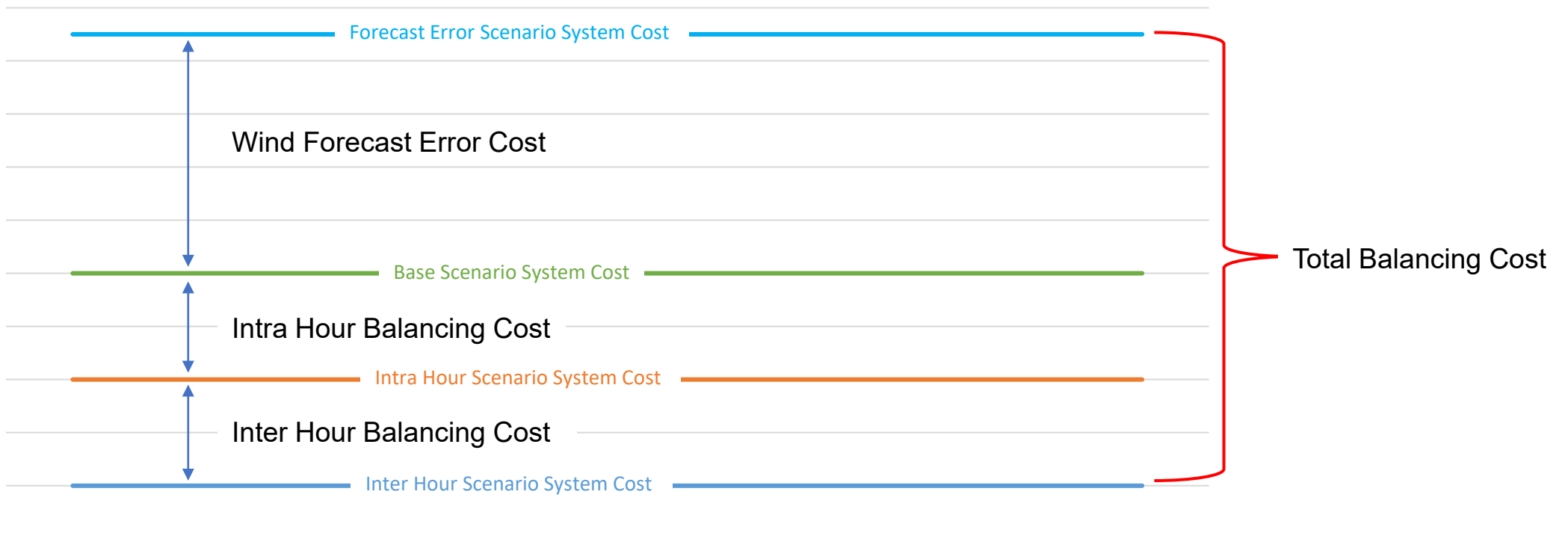
Day Ahead vs Hour Ahead vs Actual Wind



- **Scenario 1**
 - Actual wind profile
 - Actual AGC and Load Following
- **Scenario 2**
 - Day Ahead Forecast (Unit Commitment)
 - Hour-Ahead Forecast (Interchange Schedules)
 - Actual Wind (Final Dispatch)

Summary

- Differences between the scenarios determine each component of the balancing cost



Now What?

- **Total Balancing Cost**
 - Inform developers of anticipated costs
 - Inform pricing of power purchase agreements
 - Set rates for providing balancing services
- **Future Expansion Planning**
 - Include balancing cost when comparing future generation options



QUESTIONS?

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