



# UNCERTAINTY RESERVE PRODUCT

KATHRYN DIAL

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the lights on... today and in the future.*



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# UNCERTAINTY PRODUCT CONSIDERATIONS

Increasing penetration of Variable Energy Resources

Conventional generation retirements

Market may commit all short-lead generation as the most economic solution leaving little offline capacity to respond to intra-day uncertainty

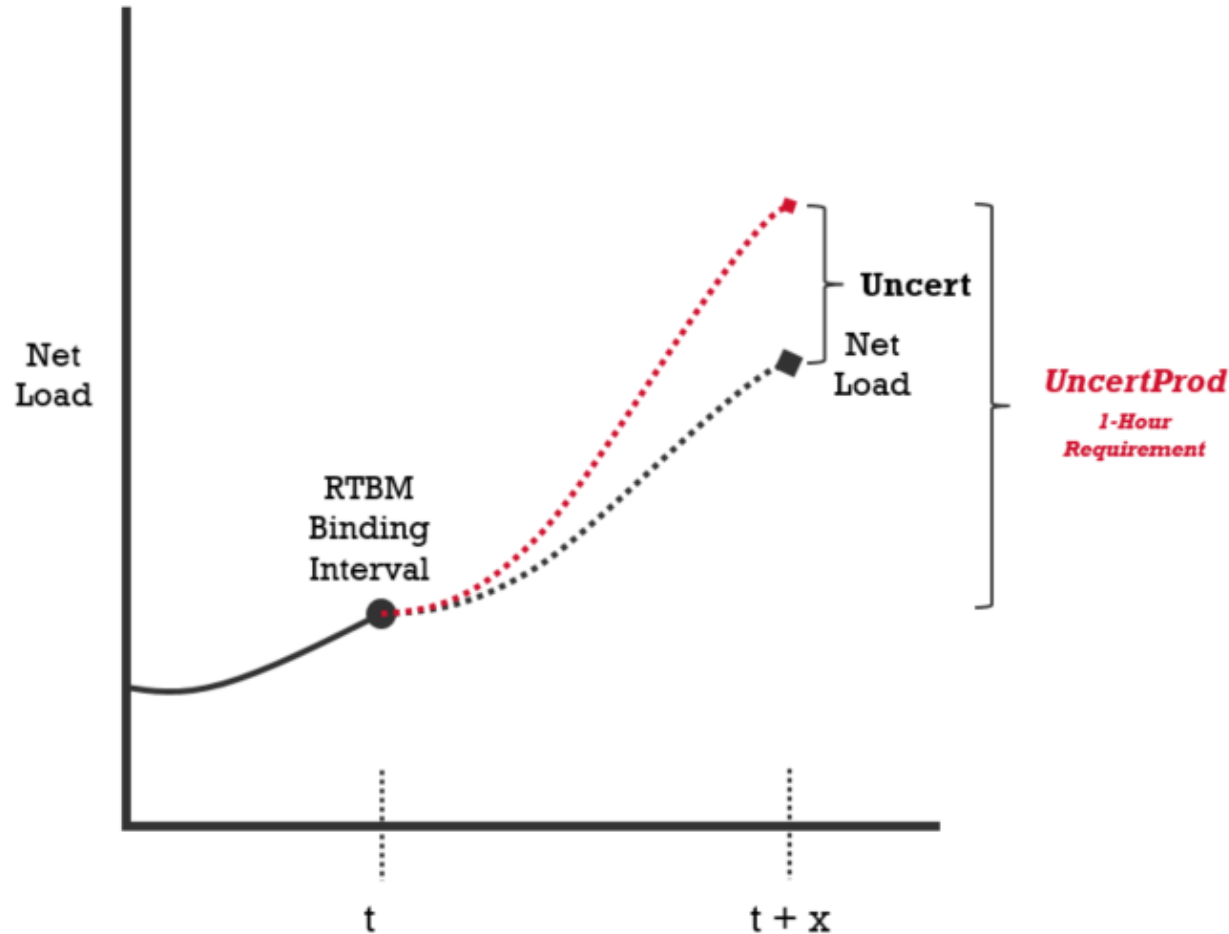


# UNCERTAINTY PRODUCT OVERVIEW

- Applied to all market studies
- Online & offline resources are eligible
- 1-hour horizon
- 97.5<sup>th</sup> percentile forecast error coverage



# UNCERTAINTY PRODUCT CONCEPT DIAGRAM



- " $t$ " represents the current interval (Ex: 13:05)
- " $x$ " represents the time-horizon of the product (1-hour)
- " $t + x$ " takes place 1-hour after " $t$ " (Ex: 14:05)
- "**Net Load**" represents the overall obligation at " $t + x$ "
- "**Uncert**" represents the statistical 97.5<sup>th</sup> percentile upward uncertainty for the hour (Ex: hour 13)
- The "**UncertProd 1-Hour Requirement**" is the expected hourly change in "**Net Load**" b/t time " $t$ " and " $t + x$ " plus the upward uncertainty "**Uncert**"
- " $t$ " interval will secure enough rampable online and offline capacity to meet the "**UncertProd 1-Hour Requirement**" or go scarce

# CALCULATING PRODUCT REQUIREMENTS

- The Planned component is the planned ramp from existing forecasts over the specified time horizon
- The Uncertainty component will be based on forecast errors over the specified time horizon
- One Hour Flexibility Requirement = Planned + Uncertainty ramps
- Uncertainty Reserve Requirement = One Hour Flexibility Requirement – (REGUP + CR + Ramp Capability Up Requirements)
- There is no downward product for the Uncertainty Reserve
- The ramps defined are for **Net Load**

# EXAMPLE PRODUCT REQUIREMENT CALCULATION

|                                                 | 13:00    | 14:00    | 15:00      | 16:00      | 17:00    | 18:00    | 19:00    |
|-------------------------------------------------|----------|----------|------------|------------|----------|----------|----------|
| Forecasted Net Load                             | 28,000   | 29,000   | 30,000     | 32,500     | 34,500   | 34,000   | 33,000   |
| One Hour Planned Ramp                           | 1,000    | 1,000    | 2,500      | 2,000      | -500     | -1,000   | -        |
| 97.5 <sup>th</sup> Percentile Uncertainty Error | 947      | 755      | 492        | 657        | 525      | 733      | -        |
| One Hour Flexibility Requirement                | 1,947    | 1,755    | 2,992      | 2,657      | 25       | -267     | -        |
| REGUP + CR + Ramp Capability Requirement        | 2,000    | 2,000    | 2,000      | 2,000      | 2,000    | 2000     | -        |
| <b>Uncertainty Reserve Requirement</b>          | <b>0</b> | <b>0</b> | <b>992</b> | <b>657</b> | <b>0</b> | <b>0</b> | <b>-</b> |



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