Agenda

- Recap of Regulation Energy Management (REM) Model in the framework of Non-Generator Resource (NGR)
- Highlights of Business Requirements Specifications
- Market Simulation Planning
- Questions & Answers
Non-Generator resources operate as both generation or load and can be dispatched seamlessly within their entire capacity range, inclusive of the generation and load. They are also constrained by an energy (MWh) limit to generate (curtail the consumption of energy in the case of demand response) or consume energy on a continuous basis. Such resources can participate in the ISO’s energy and ancillary services market when they meet eligibility requirements. REM is being implemented in the framework of the non-generator resource market enhancements.

Under the REM policy initiative, non-generator resources that require an offset of energy in the real time market to provide regulation can elect to participate only in the ISO’s regulation markets. REM functionality will allow a non-generator resource to purchase or sell energy in real-time to meet the continuous energy requirements for regulation in the day-ahead market and real time market. When a resource elects REM option, the regulation capacity awarded in the day-ahead market is evaluated as four times the regulation energy it can provide within 15 minutes. A non-generator resource electing REM may only provide regulation service to the market.
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<td>REM</td>
<td>SC Bid</td>
<td>No</td>
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Highlights of Business Requirements Specifications

- NGR is a device that has a continuous operating range from a negative to a positive, i.e., it can seamlessly switch between generating and consuming electrical energy.
- NGR can be used to model a Limited Energy Storage Resource (LESR) or the demand response from a Dispatch-able Demand Resource (DDR).
- NGR does not have start up constraints.
- The minimum or maximum capacities can be negative. The maximum capacity is greater than the minimum capacity.
- For LESR, the maximum capacity (positive) represents the MW inject to the grid when it is discharging at maximum sustainable rate, minimum capacity (negative) represents the MW withdraw from the grid when it is charging at maximum sustainable rate.
- For DDR, its operation is as negative generation. The maximum capacity (negative or zero) represents the lowest load level it can be reduced to; minimum capacity (negative) represents the maximum load level at which it can consume energy.
Highlights of Business Requirements Specifications

- LESR has distinct ramp rates for operating in a consuming mode (charging) or in a generating mode (discharging). DDR has one ramp rate for curtailment and restoring the load;
- NGR is an Energy-Limited Resource (ELR);
- For an LESR, the energy limit (MWh) is the maximum energy the device can store;
- For DDR, the energy limits (MWh) are the maximum energy the DDR can be curtailed for the day.
- LESR and DDR can provide energy and Ancillary Services (AS).
- LESR can provide Ancillary Services (AS). A LESR providing AS must ensure that there is sufficient stored energy in the device to dispatch the AS when they are called upon.
- NGR can provide regulation from anywhere within its operation range.
- NGR resources will be subject to ancillary service non-compliance rules based on the device energy limit.
Model NGR in EMS with supply range of negative to positive

- EMS shall model NGR as a generation resource with supply range of negative to positive.
  - For LESR, the operation output is positive when the LESR discharging and inject the power into the grid; the output is negative when the LESR is charging and withdraw the power from the grid.
    \[ \text{Ex: A battery is discharging at 2 MW, the operation output will be 2MW. A battery is charging at 2 MW, the output will be -2 MW.} \]
  - For DDR, the operation output is non positive.
    \[ \text{Ex: DDR Load level is 10 MW, the operation output = -10 MW. DDR load level is curtailed by 2 MW, operate at 8 MW, the operation output = -8 MW.} \]

- EMS AGC module shall dispatch NGR for regulation up and down
  - NGR provides regulation up if AGC dispatches the NGR above its DOT
  - NGR provides regulation Down if AGC dispatches the NGR below its DOT
EMS shall receive NGR telemetry every four (4) seconds;

- EMS shall receive NGR telemetry of the following data every four (4) seconds:
  - Resource Instantaneous Output (MW);
  - State of Charge (SOC), which is the actual stored Energy (MWh) in the device;

  *LESR Instantaneous Output (MW) telemetry is negative when the LESR is charging.*
  *LESR Instantaneous Output (MW) telemetry is positive when the LESR is discharging.*
  *DDR Instantaneous Output (MW) telemetry is negative for its load level. DDR Instantaneous Output (MW) telemetry is zero if the load shut down totally*

- EMS shall send to RTM every minute the SE solution and all telemetry for each NGR, including the state of charge (SOC) for LESR
DAM/RTM model NGR as a generation resource with supply range of negative to positive

- Optimize NGR energy and AS awards in DAM/RTM subject to:
  - Capacity Constraints;
  - Ramping Constraints;
  - State of Charge (SOC) constraints for LESR;
  - Daily energy limits for DDR;
- NGR optimal schedule and AS awards shall be based on its Energy bid curve and AS bids.
- For LESR (non-REM), SOC constraint is enforced in the IFM, RTPD and RTD
- DAM/RTM will model NGR with energy and/or AS bids as on-line unit; No binary commitment decision variables are needed for NGR. No start up cost /time, No commitment cost recovery.
- RTM shall receive from EMS telemetry for each NGR, including the actual SOC for each LESR, to calculate initial condition. LESR optimal schedule and AS awards shall be limited by the available SOC.
NGR Settlement

- NGR shall be subject to all existing AS/RUC No Pay categories.
- LESR shall be subject to a new AS/RUC No Pay category: Insufficient Stored Energy
  - The relevant No Pay quantity (MW) shall be calculated for each dispatch interval to see if SOC level can provide enough energy once the awarded AS is called upon
- Settle the NGR energy schedule at LMP in IFM and RTD.
- Settle the NGR AS awards same as Generators in IFM and RTPD.
- NGR is eligible for Bid Cost Recovery (BCR) for the energy and AS bids. NGR is not eligible for commitment cost recovery.
- DDR shall be subject to the applicable cost allocation the same as Participating Load.
- LESR shall be subject to applicable cost allocation same as generator.
NGR with REM option

- IFM/RTPD shall optimize the REM regulation awards based on the regulation bids.
- REM will not bid or self-schedule Energy in DAM/RTM.
- The SOC constraints will be enforced only in the RTD market for REM. SOC constraints and regulation awards will determine energy schedule DOT.
- AGC will dispatch REM based on DOT and regulation awards. REM must response AGC dispatch.
- Settle Regulation Awards in DAM and RTPD.
- Settle REM at RTD LMP for regulation energy and real time energy.
- REM shall be subject to existing Regulation Non-Compliance rules.
- LESR shall subject to a new category of Regulation Non-Compliance for Insufficient Stored Energy.
- REM is not allocated the uplift costs that apply to measured demand.
- REM is only eligible for regulation bid cost recovery.
Market Simulation Planning

• REM is planned for deployment in Spring 2012
• In order to participate in the REM market simulation, you must notify the ISO by July 1, 2011:
  – Submit the WDAT (Wholesale Direct Access Tariff)
  – If you intend to connect to the transmission system directly, participate in the fast-track interconnection process (for less than 5 MW)
• This lead time is needed to ensure time for data to be populated in the full network model and Master File for internal testing purposes and preparation for market simulation
• After July 1, the ISO will make an assessment as how the market simulation will be conducted
Next Steps

- End to end market example will be provided at the Market Performance and Planning forum on June 22
- Business agreement timelines will be provided for:
  - Participating Load Agreement
  - Participating Generator Agreement
  - Metered Entity
  - Scheduling Coordinator
  - RIMS Process
  - Telemetry Databases