

# **Economic Dispatch: Concepts, Practices and Issues**

Presentation to the Joint Board  
for the Study of Economic Dispatch

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## **Overview**

- What is economic dispatch?
- Day ahead planning and market implementation
- Real time dispatch and market implementation
- Possible objectives and issues for the joint board report

## **What is economic dispatch?**

- The definition of economic dispatch provided in EPC Act section 1234:

“The operation of generation facilities to produce energy at the lowest cost to reliably serve consumers, recognizing any operational limits of generation and transmission facilities.”
- There are two fundamental components to economic dispatch:
  - Day-ahead planning for dispatch
  - Real-time dispatch
- In the organized markets of the Northeast and Midwest, these components are implemented through:
  - Day ahead markets to schedule power for the next day
  - Real time markets to dispatch power during the day

## Day Ahead Planning and Market Implementation

- All power systems operations develop schedules for generating units to dispatch each hour of the next day (unit commitment)
  - Based on forecast load for the next day
  - Commit generating units based on unit characteristics and limitations, purchased power and operating reserves
  - Ensure there are sufficient reserves so that scheduled generation dispatch and be delivered to forecast load reliably, given transmission conditions
- RTO/ISOs in the Northeast and Midwest develop regional day ahead schedules using Day Ahead Markets
  - Security Constrained Unit Commitment (SCUC)
    - Based on supply offers, load forecasts, and demand bids from market participants
    - Simultaneously considers both cost and reliability limits to develop hourly dispatch schedules that minimize the cost of serving load over the day.
    - Produces hourly prices at each location (LMPs)
    - Ensures that the day ahead commitments are feasible within the reliability limits of the power system.
  - Ensure there are sufficient reserves available to meet the RTO's forecast of load for the next day.

## Real Time Dispatch and Market Implementation

- In real time, all power system dispatch operators:
  - Monitor load, generation and interchange (imports/exports) to ensure balance of generation and load, and maintain system frequency
  - Monitor flows and voltage levels on the transmission system and adjust dispatch when needed to keep flows and voltage levels within reliability limits
  - Manage dispatch using Automatic Generation Control (AGC) and, when needed to comply with reliability limits, take corrective actions using reliability protocols (e.g., TLRs for congestion management in the Eastern Interconnection.)
- RTO/ISOs in the Northeast and Midwest manage real time dispatch using Security Constrained Economic Dispatch (SCED)
  - SCED considers both the generation and transmission reliability limits every five minutes
  - SCED is based on supply offers and demand bids given to the RTO/ISO by market participants
  - SCED sends dispatch instructions to generation and dispatchable load, and calculates LMPs.
  - RTO/ISO may take corrective when needed to ensure compliance with reliability limits.
- Attributes of SCED in these markets:
  - Real time market prices are consistent with the dispatch and show the price of power at each location in the transmission grid
  - Online resources are the lowest cost dispatch based on bids given to the RTO/ISO by market participants
    - Every five minutes, regional online resources are economically dispatched within reliability limits of both generation and transmission
    - Non-economic redispatch, such as TLR for congestion management, is minimized or eliminated

## **Possible Objectives and Issues for the Joint Board Report**

- Describe current application of economic dispatch in region
  - Scope
    - Geographic
    - Resources included in the economic dispatch
  - Implementation/practices
    - Who performs the economic dispatch?
    - What tools/software is used?
    - How are individual economic dispatches in the region coordinated?
    - How is economic dispatch communicated to affected generation operators?
    - Are there technical/infrastructure impediments to implementing economic dispatch?
  
- Consider improvements to current economic dispatch practices
  - What improvements could be considered?
  - What are the potential benefits and costs of those improvements?
  - How would those improvements affect reliability?
  - Are there institutional, regulatory, or statutory impediments to the identified improvements?