

# Midwest ISO Long-Term Load Forecasts – Source and Applications



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# Overview

- The Midwest ISO does not prepare a long-term load forecast, instead load projections are reported by members under various sections of the Energy Markets Tariff
- Historically, reported load forecasts have been accurate as each member has expert knowledge of their individual loads
- Midwest ISO Planning utilizes load forecasts from two sources:
  - Load Serving Entities (LSEs) – Module E Forecast
  - Transmission Owners (TOs) – Powerflow Models

# LSE Supplied Forecasts

## Module E Data Requirements

- Module E is the Resource Adequacy section of the Midwest ISO EMT
  - Requires LSEs to designate adequate resources to meet their forecasted demand plus reserve requirements
- Forecasts are reported monthly for two years and seasonally for ten years
- LSEs are required to submit weather normalized 50/50 gross demand forecasts at a CPNode granularity
  - 50/50: “Best Guess” forecast or the mean of a standard probability distribution (50% chance the actual load will be an excess of the forecast and a 50% chance the actual load will be lower than the forecast)
- Additionally, LSEs supply Load Modifying Resource (LMR) forecasts so a Net Demand forecast can be obtained
  - **Direct Control Load Management (DCLM):** DCLM is the magnitude of customer service (usually residential) that can be interrupted at the time of peak by direct control of the applicable system operator
  - **Interruptible Load (IL):** IL is the magnitude of customer demand (usually industrial) that, in accordance with contractual arrangements, can be interrupted at the time of peak by direct control of the system operator (remote tripping) or by action of the customer at the direct request of the system operator
  - **Behind the Meter (BTM) Generation:** Load that is offset by non-Market generation

# LSE Supplied Forecasts

## Calculating Midwest ISO Forecasts

- Net Demand = Gross Demand – DCLM – IL – BTM Generation
  - An LSE's Net Demand is what is expected to be metered during the LSE's peak
- Aggregating LSEs' forecasts produces a Midwest ISO non-coincident forecast
  - Expected Midwest ISO peak demand values and reserve margins are based on coincident net demand
  - Because of the differing time zones and large geographic size of the Midwest ISO footprint the (coincident) system wide peak is ~4% lower than the aggregate
    - Using historic market data, a ~4% load diversity factor was calculated by observing the individual peaks of each load zone and comparing against the zone's demand during the system-wide peak
- MISO Coincident Net Demand =  
$$\Sigma(\text{Gross Demand}) * (1 - .04) - \Sigma(\text{DCLM}) - \Sigma(\text{IL}) - \Sigma(\text{BTM Gen})$$

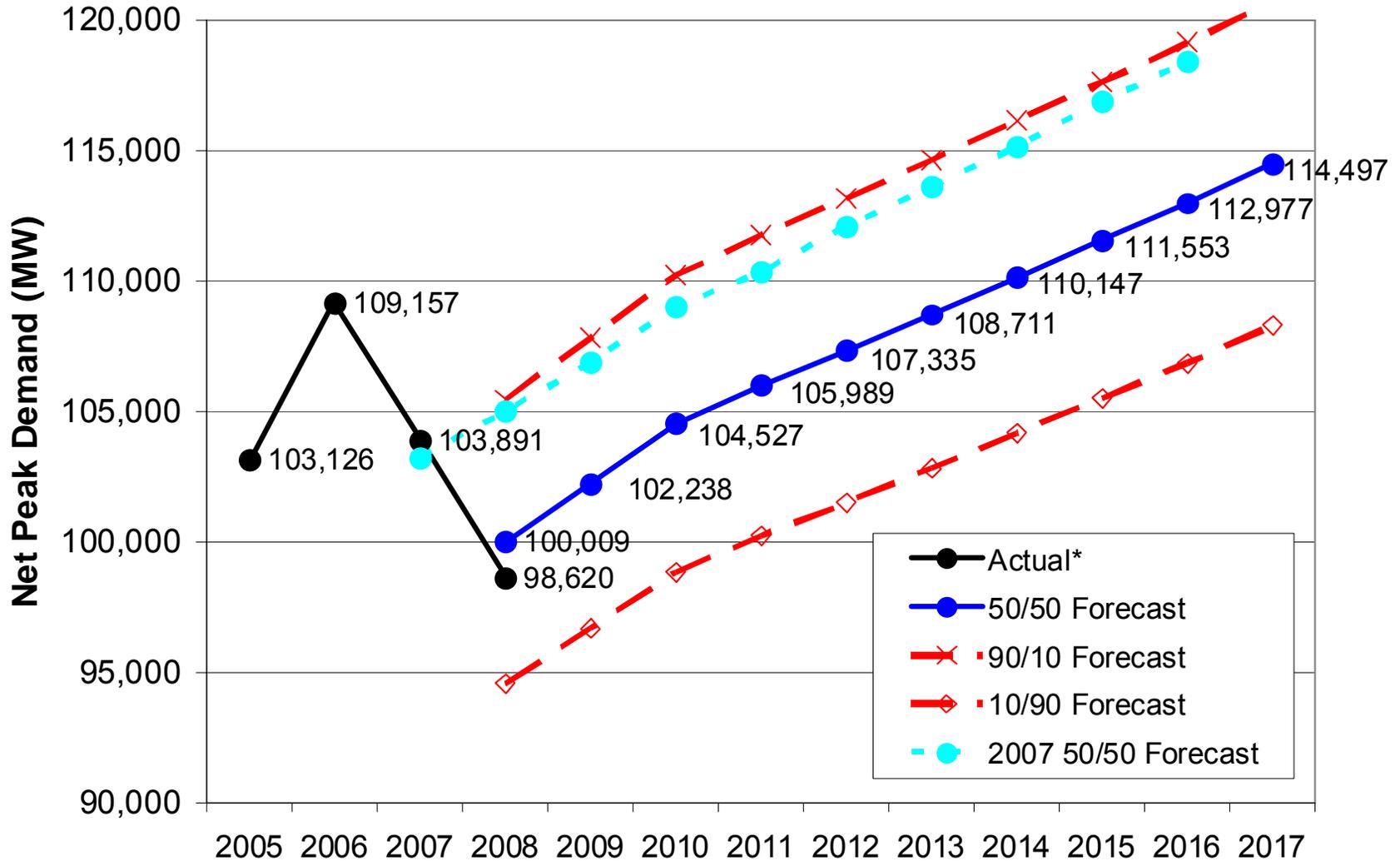
# LSE Supplied Forecasts

## Forecast Uncertainties

- Historically, reported load forecasts have been accurate as each member has expert knowledge of their individual loads
  - If an LSE's forecast is determined to be under-forecasted after weather normalization by a statically significant amount (1 standard deviation) for 3 consecutive months or 1 summer peak month, the applicable State Authorities will be notified
- To account for uncertainties in the load forecasts, the Midwest ISO applies a standard deviation (LFU – Load Forecast Uncertainty) to consider a larger range of forecasted demand levels
  - LFU is derived from variance analysis between historic forecasts and real-time data for the same time period

# LSE Supplied Forecasts

## 2008 Module E Net Coincident Load Forecast



\*Adjusted to reflect the departure of E.ON US

# TO Supplied Forecasts

## Used in Reliability Planning Models

- Base Models (PSS/E) for MTEP Reliability Analyses
- Base Models (PSS/E) for MTEP Economic Studies (Additional post processing out-side MOD will be needed to prepare PROMOD economic models)
- Base Models (PSS/E) for Generator Interconnection Studies
- Base Models (PSS/E) for Transmission Service Request Studies
- Base Models (PSS/E) for other Non-cyclical planning studies

# Reliability Planning Models

- **Att FF states:** “Planning Models: The Transmission Provider shall collaborate with Transmission Owners, other transmission providers, Transmission Customers, and other stakeholders to develop appropriate planning models that reflect expected system conditions for the planning horizon. The planning models shall reflect the projected Load growth of existing Network Customers and other transmission service and interconnection commitments. ...Load forecasts applied to models will consider the forecast Load of Network Customers reported to the Transmission Provider in accordance with the requirements of Module B and Module E of this Tariff, and the Business Practices Manuals of the Transmission Provider...The Transmission Provider will provide an opportunity for stakeholders to review and comment on the posted models before commencing planning studies...Stakeholders shall be afforded opportunities to provide input on Load projections from Tariff reporting requirements or from Transmission Owner forecasts...”

# TO Supplied Forecasts

## Used in Reliability Planning Models

- Load demand will generally be modeled as the most probable (50/50) coincident load projection for each Transmission Owner service territory, for the study horizon under study.
- TO provided load forecast is compared with the load forecast data collected by Midwest ISO from LSE's. Coincident loads of each balancing authority are reflected in the base models for the Midwest ISO reliability footprint.
- The external area load is modeled as represented in the NERC series models or the neighboring coordinated system used to develop the MOD base models. Conforming and non-conforming loads need to be differentiated when submitting load data through MOD. Controllable demand-side management (interruptible load that can be curtailed, during emergency conditions only) and uncontrollable demand-side management (peak shaving) are identified when submitting load data to the MOD.
- Remote loads (loads that belong to a company but physically located in another control area) are identified in the inter-area transaction lists submitted through the MOD for proper accounting and modeling.