Smart-Grid Load-Forecasting Under Cooperative Solicitation

by Nick Clark | Published April 25, 2026

What Cross-Utility Forecasting Requires

Smart-grid load forecasting today operates per-utility. Each utility forecasts its own load based on its own historical data, weather inputs, customer-demand patterns, and operational state. The forecasts inform per-utility operational decisions: generation commitment, transmission scheduling, demand-response activation.

Cross-utility events — heat-dome heat waves affecting many utilities simultaneously, polar-vortex cold events, wildfire-driven transmission constraints, EV-charging-load growth pattern that crosses utility boundaries — produce dynamics that no single utility's forecast captures. The cumulative forecast across utilities is more than the sum of per-utility forecasts because cross-utility coupling matters.

Why Per-Utility Forecasting Misses Cross-Utility Dynamics

The 2021 Texas grid event illustrates the structural pattern. Each Texas utility forecast its own load and generation; the forecasts didn't capture the cross-utility cascade dynamics that emerged when generation failed across multiple utilities simultaneously. The cumulative effect was system-level failure that no single utility's forecast (or response) could prevent.

Cross-utility forecasting under cooperative solicitation provides what per-utility architectures cannot. When forecast uncertainty grows in any utility's region, the solicitation propagates across the credentialed topology to neighboring utilities; coordinated observation and forecast refinement across utilities reduces collective uncertainty in ways that per-utility refinement cannot.

How Cooperative Solicitation Operates Across Utilities

Each utility runs its own forecasting engine producing credentialed forecasts within its own scope. NERC and ISO/RTO operations operate as credentialed coordination authorities: they consume per-utility forecasts and produce composite forecasts that span the utilities under their authority. When composite forecast uncertainty exceeds threshold, the coordinating authority issues solicitation observations to participating utilities, requesting additional observations or forecast refinement.

Utilities respond through their own admissibility frameworks. The response — additional observation contributions, forecast model updates, capacity-coordination commitments — is itself a credentialed observation. The cycle operates at the timescale of grid forecasting (hours to days) rather than at the per-second tempo of grid protection.

What This Enables for Grid Resilience

NERC reliability standards' emerging requirements for cross-utility cascade-aware operation gain structural support. The architecture provides the cooperative-forecast substrate that current per-utility architecture cannot produce, supporting the reliability frameworks that have been moving toward cross-utility coordination for years.

ISO/RTO operations (PJM, ERCOT, MISO, CAISO, NYISO) gain cooperative-forecast capability across their member utilities. Cross-RTO coordination during major events gains the same foundation. The patent positions the primitive at the layer where smart-grid resilience has been moving toward cross-utility coordination without architectural support.