California ISO

Emerging Large Loads in CAISO: Bridging Market Design, Operations, and Data Requirements

Amber Motley
Director, Short Term Forecasting

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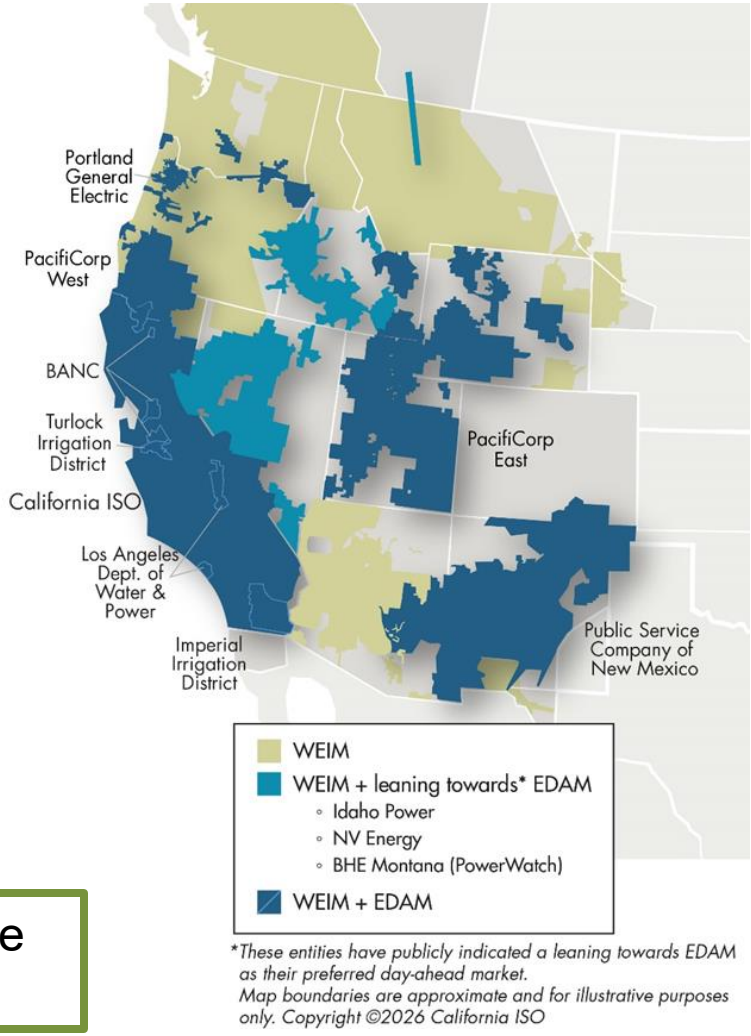
System Transformation and Emerging Load Challenges

System Trends

- Growing electricity demand, increasing extreme weather, and rapid expansion of DERs and emerging large loads are reshaping system operations, driving new coordination challenges, and increasing the need for visibility across the T&D interface

Emerging Operational Large Load Challenges

- Scale and behavior introduce forecasting uncertainty
- Often treated as conforming demand, despite non-conforming characteristics
- Leads to data and visibility gaps (e.g. telemetry)
- No requirement for non-conforming participation



*These entities have publicly indicated a leaning towards EDAM as their preferred day-ahead market.
Map boundaries are approximate and for illustrative purposes only. Copyright ©2026 California ISO

Regional markets like EDAM and the WEIM create new opportunities to capture and scale demand flexibility, if it is measurable, visible and coordinated.

CAISO Visibility: Supply Side and Demand Side

Supply Side

Load Modifying

Emergency

Distributed Energy Resource (DER) Aggregation: Aggregation of bidirectional DERs into one resource; min 100 kW

Reliability Demand Response Resource (RDRR): "Emergency DR" Triggered only under certain emergency conditions; min 500 kW

Proxy Demand Response (PDR): "Economic DR": Enables utilities or 3rd parties to bid demand response into the CAISO market; min 100 kW

Visible to CAISO

In Front of the Meter Market Models: *Ex: Non-Generator Resource, Participating Generator, Eligible Intermittent Resource, etc.*

Incremental & emergency load-flexibility programs

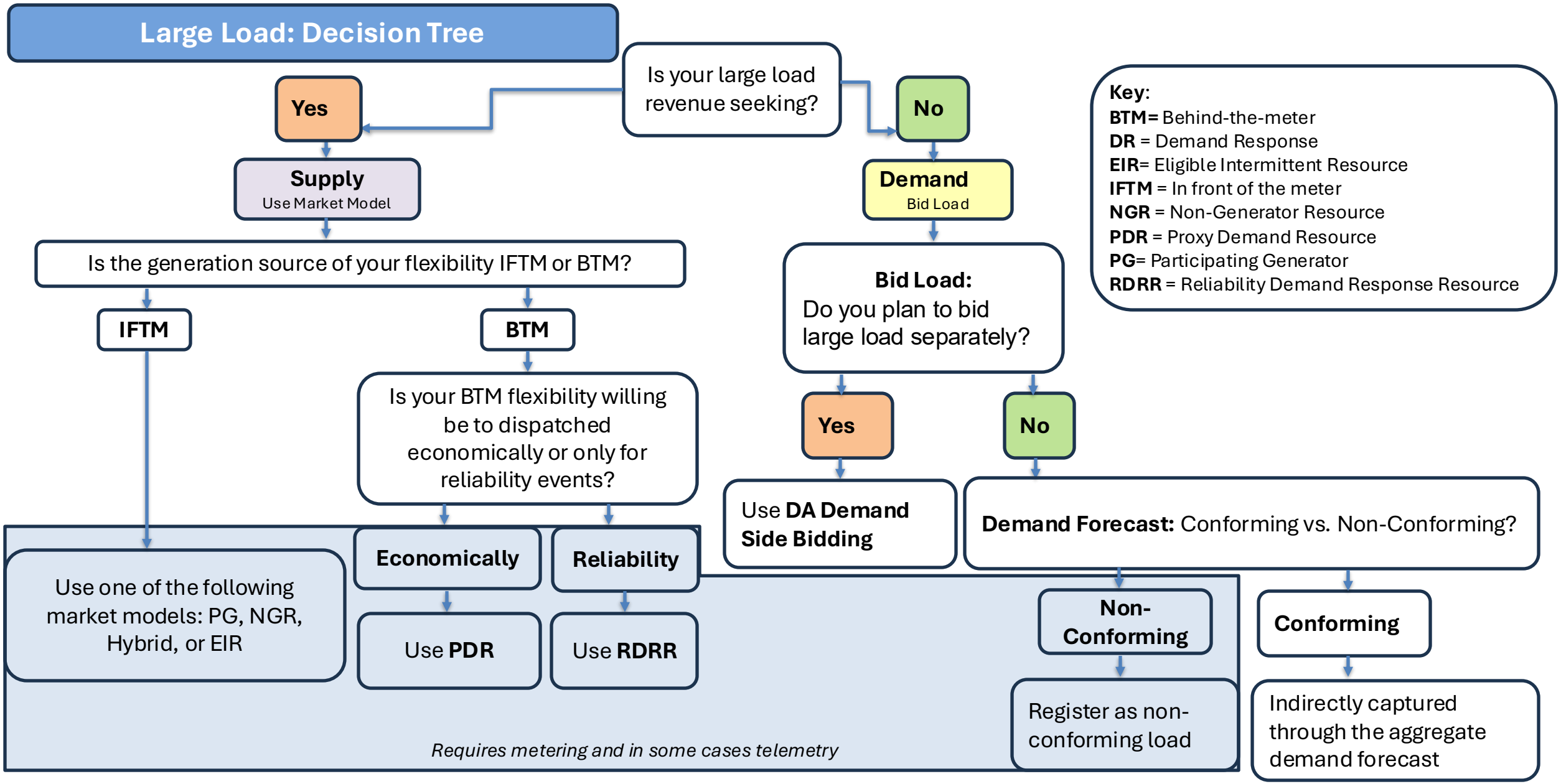
Limited Visibility for DO

Utility Rates (e.g., tiered, time of use, dynamic, real time)

Utility Programs: DERs that participate in utility programs not integrated into the CAISO market

Limited/Lack of Visibility for CAISO

Large Load: Decision Tree



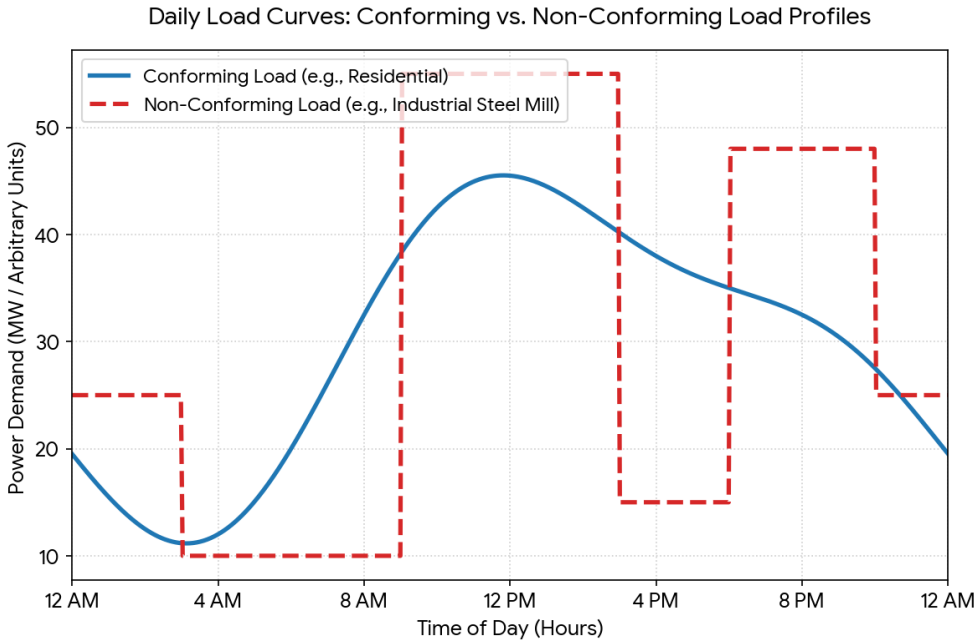
Conforming vs. Non-Conforming Load

Conforming Load

- Predictable patterns driven by:
  - Weather (temperature, seasonality)
  - Calendar effects (hour, day, weekday/weekend)
- Can be reliably forecast using standard CAISO models
- Forms the basis for:
  - Historical load actuals
  - Balancing Authority (BA) load forecasts
  - Core CAISO / WEIM / EDAM market operations

Non-Conforming Load

- Does not follow typical weather- or time-based patterns
- Cannot be reliably captured in standard load forecasts
- To avoid distorting forecasts, it is:
  - Excluded from conforming load and historical datasets
  - Modeled separately
- Used in CAISO / WEIM / EDAM for:
  - Operational modeling
  - Market participation and settlement



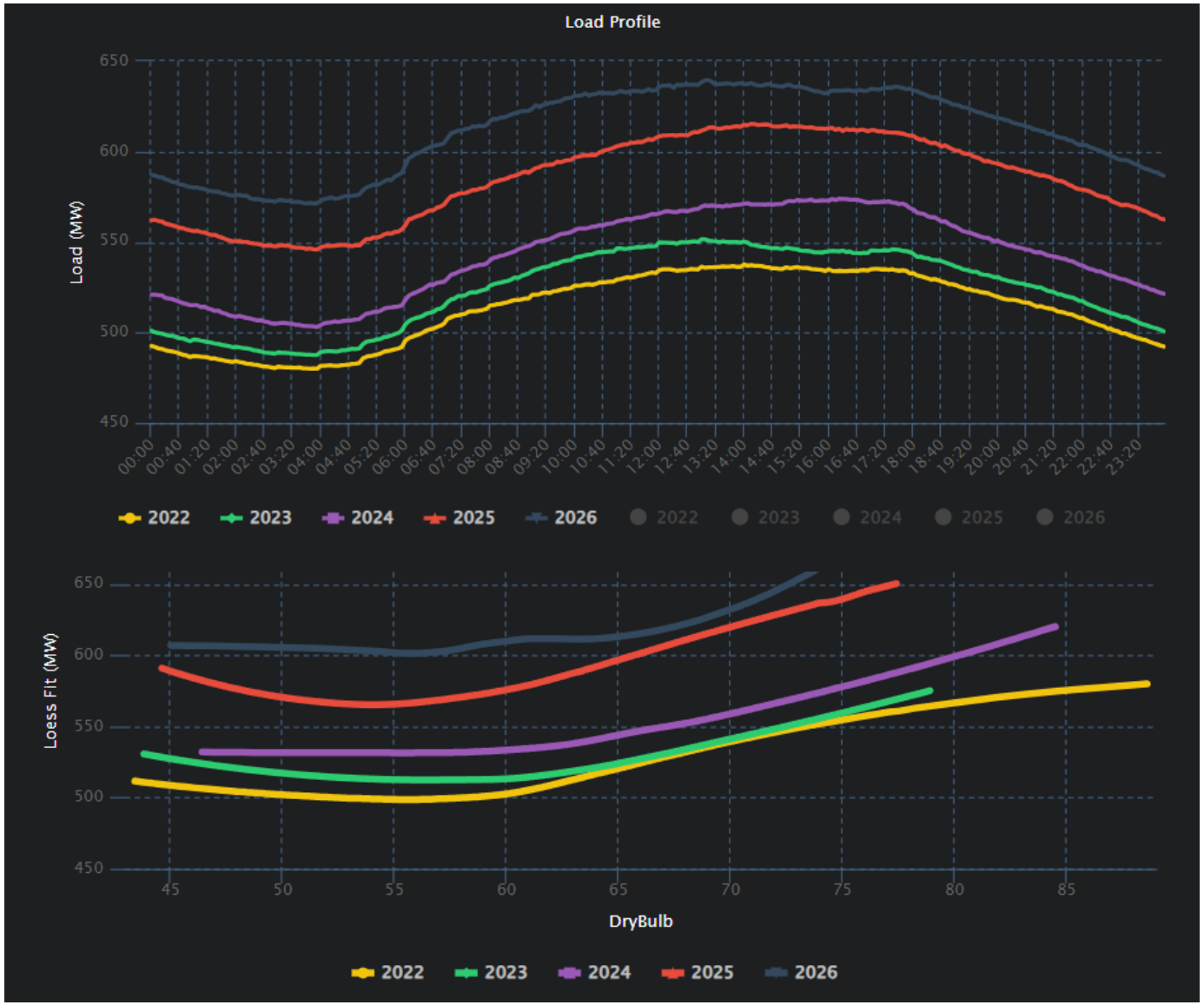
Current Options of Incorporation Large Load into Market Optimization

Data Characteristic Consideration	Conforming Demand	Non-Conforming Demand	PDR	RDRR
Demand or Supply Side	Demand	Demand	Supply	Supply
Telemetry Requirements	Could account for Telemetry and Non-Telemetry	Y	> 10 MW = Y < 10 MW = N	> 10 MW = Y < 10 MW = N
Schedules/ Bid	Y/N	Y/Y	N/Y	N/Y
Availability/ Performance Accounting	No	Uninstructed Deviation	Y/Uninstructed Deviation	N/Uninstructed Deviation
Uncertainty Requirement Coverage	Yes	Only in Regulation Requirement	No	No

DEVELOPING DATA REQUIREMENTS FOR LARGE LOAD

Large Load Driven Demand Growth

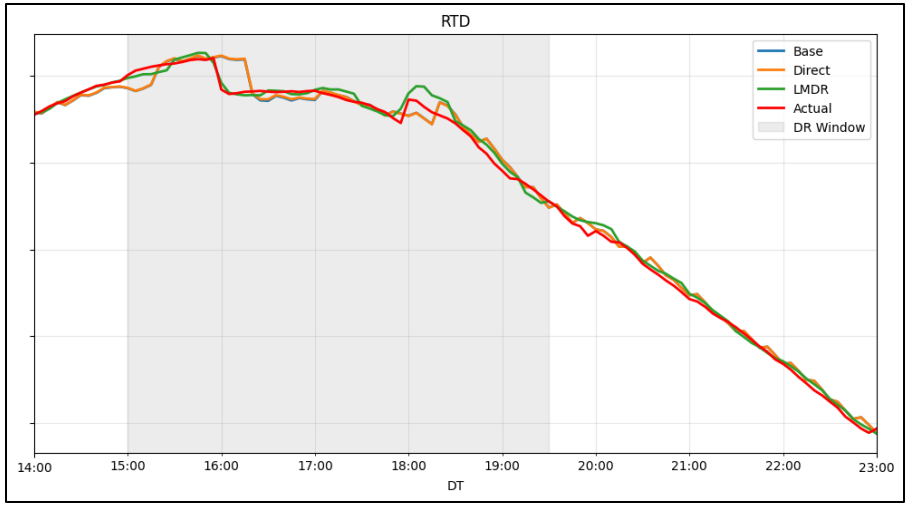
- Demand forecasting model training data spans a certain timeframe (e.g. 2022-Present).
- When year-over-year growth trend appears, conforming forecasts may become low-biased because the model is basing the relationship on years with lower load.
- Weather based models particularly exhibit reduction in forecast accuracy.

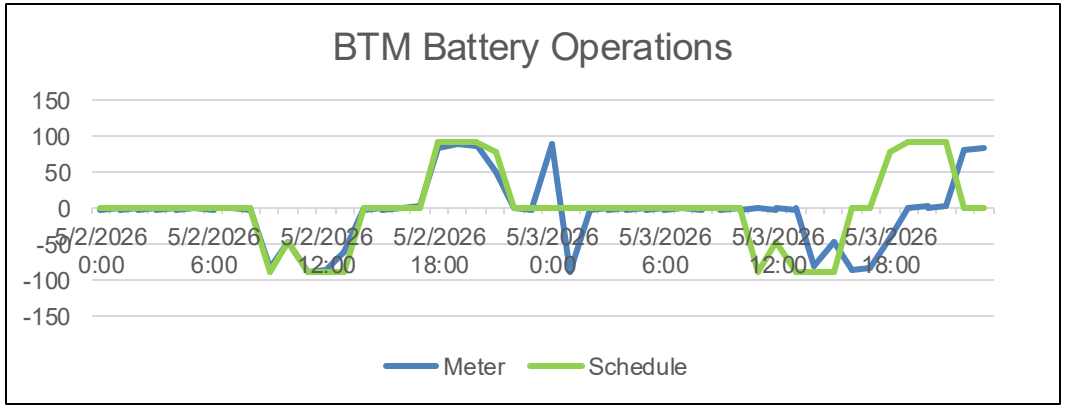


Background: Incorporating scheduled demand fluctuations

- Current demand forecast model suite can incorporate non-market demand response schedules to preemptively account for scheduled effect of program.
- Similarly, large BTM battery (~100 MW capacity) submit schedules which can be incorporated into demand forecast.
- Schedules and actuals are the data streams needed to handle Non-Conforming Load Movement.
- When large loads are subject to operating limits, schedules can be incorporated to handle movements, preserving forecast quality.

Demand Forecast vs Actual





Potential data elements that could support improved visibility and forecasting of large load

1

Load Growth Information: Transparent visibility into expected load additions over time, including raw capacity development trajectories and energization timelines.

2

Effective Operating Profiles: Representative demand characteristics for large loads, such as median or typical daily demand profiles, to support baseline forecasting assumptions.

3

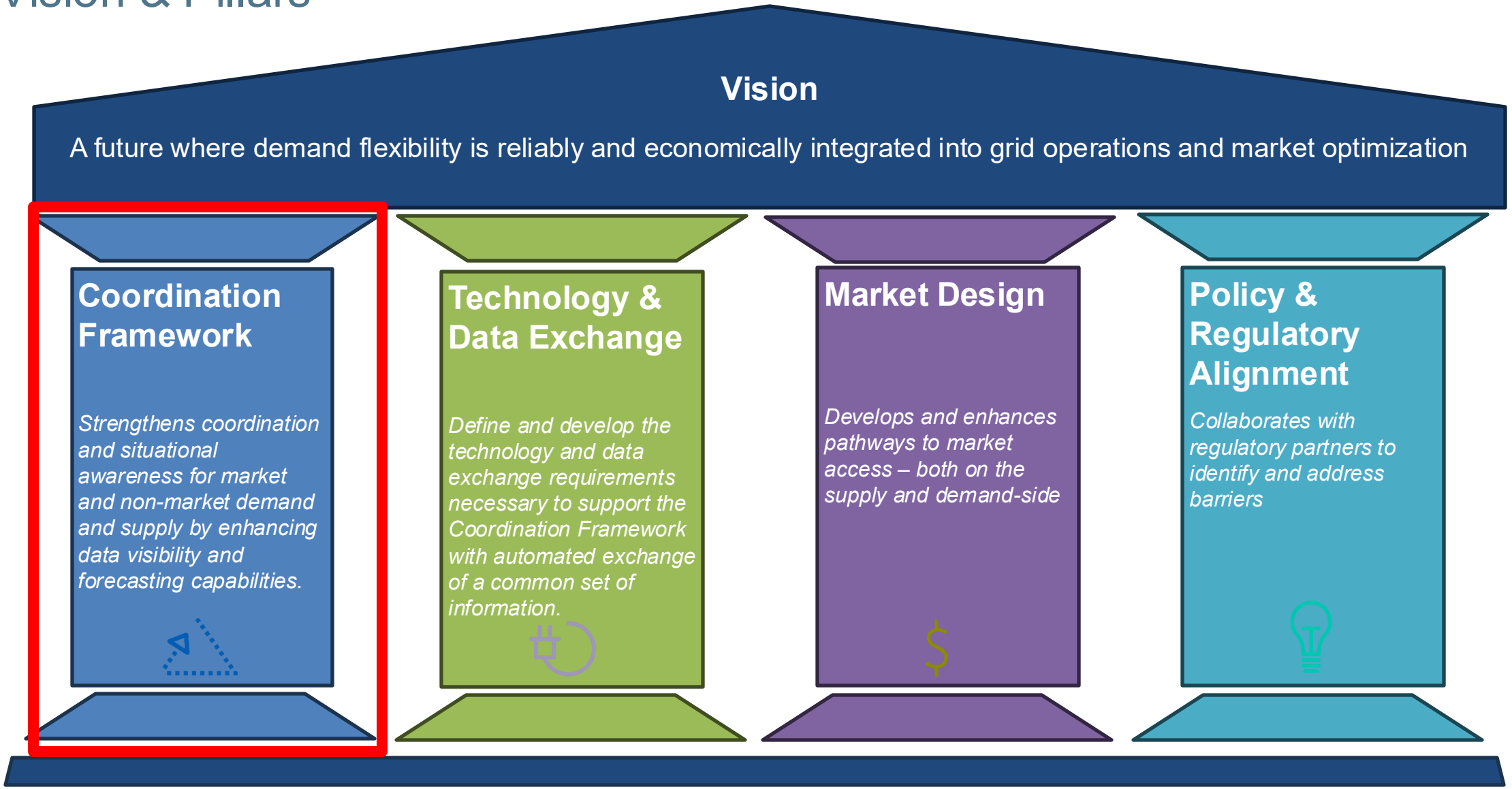
Load Movement and Variability: Operational visibility through submission of schedules and actual metered demand for large loads, enabling improved tracking of intra-day and day-ahead deviations.

4

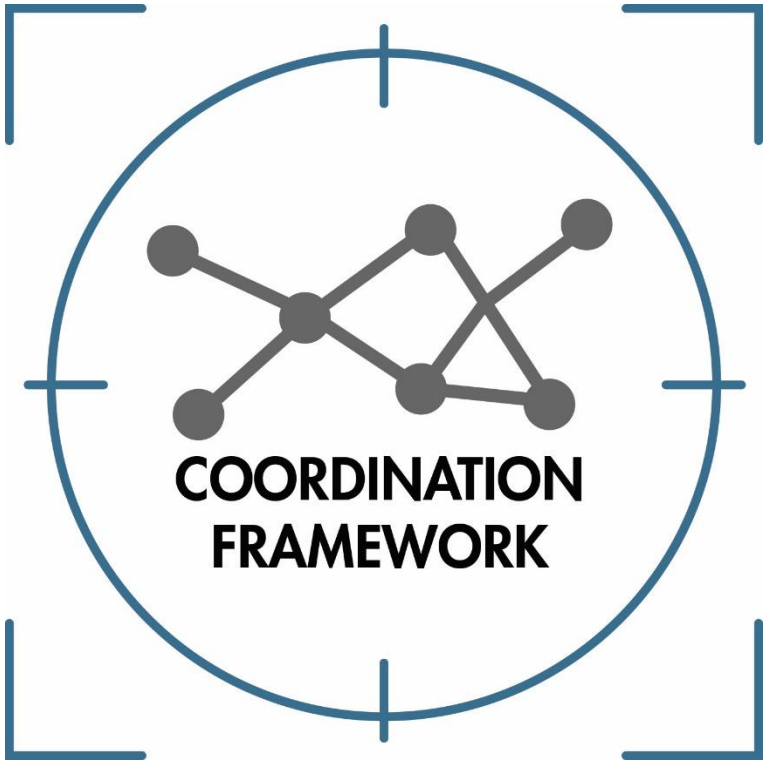
Operating Limits and Constraints: Information on operational bounds, including minimum and maximum consumption levels, ramping characteristics, and any flexibility or curtailment capabilities that may influence dispatch and system balancing.

OPERATIONAL COORDINATION FRAMEWORK

Vision & Pillars

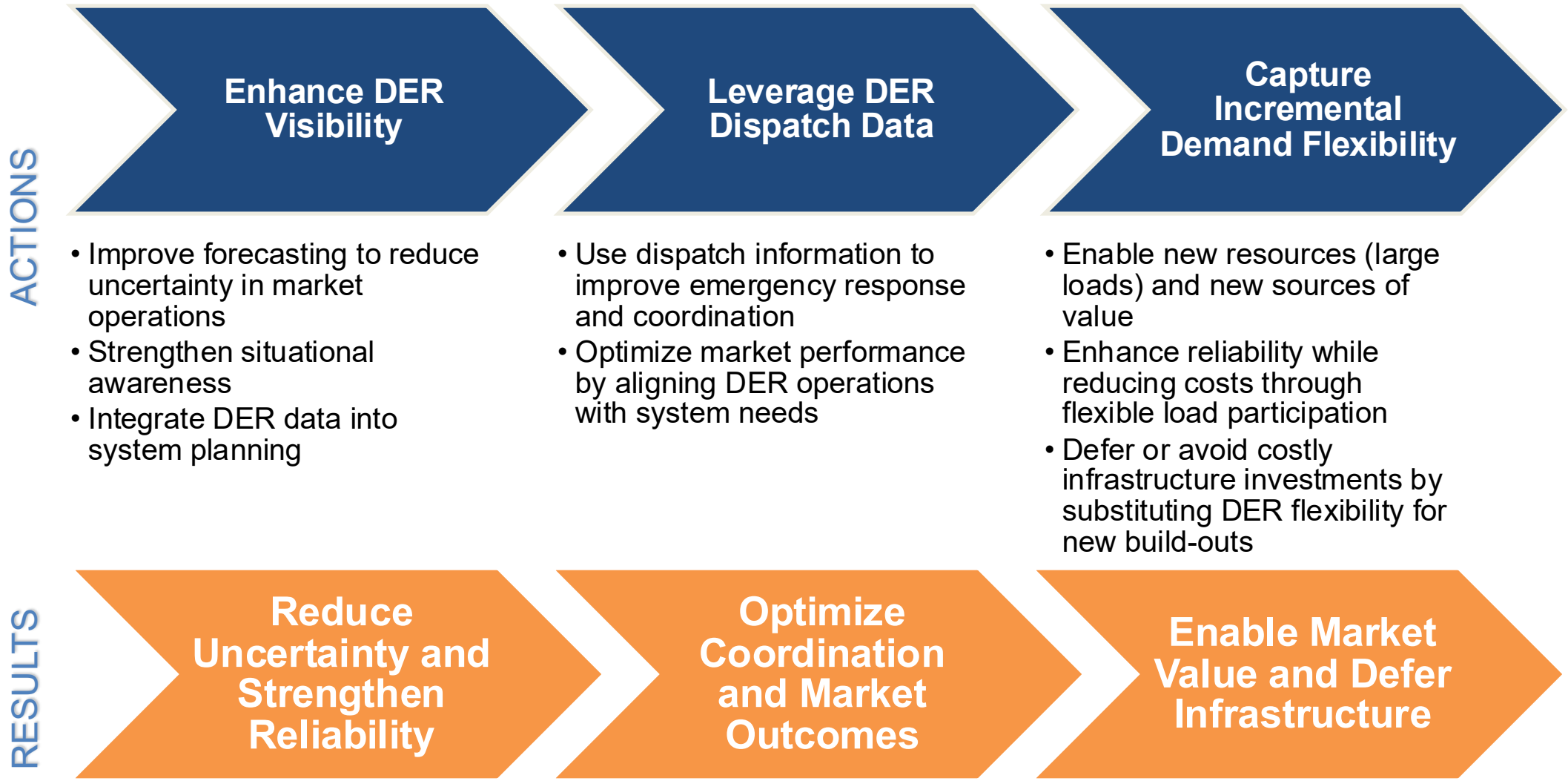


Focus areas of coordination framework



- Enhanced Operational Coordination
- Information and Visibility
- Operational Forecasting

From challenges to future opportunities



APPENDIX

Business and Reliability Impact

Reliability

- Increased operational uncertainty
- Reduced ability to proactively manage distribution and transmission constraints
- Higher risk of last-minute operator intervention

Affordability

- Increased reserve procurement driven by forecast uncertainty
- Inefficient market dispatch due to incomplete DER and demand visibility
- Deferred or missed utilization of lower-cost DER and demand flexibility resources

Strategic

- Demand Flexibility potential remains under-captured
- Fragmented program structures constrain customers ability to unlock the full economic value of DER investments