

# ESIG Large Loads Task Force

## Forecasting for Large Loads: Current Practices and Recommendations

Pre-Release Webinar



**John D. Wilson and Sophie Meyer, Grid Strategies LLC**

**December 2025**

# Load Forecasting Project Team



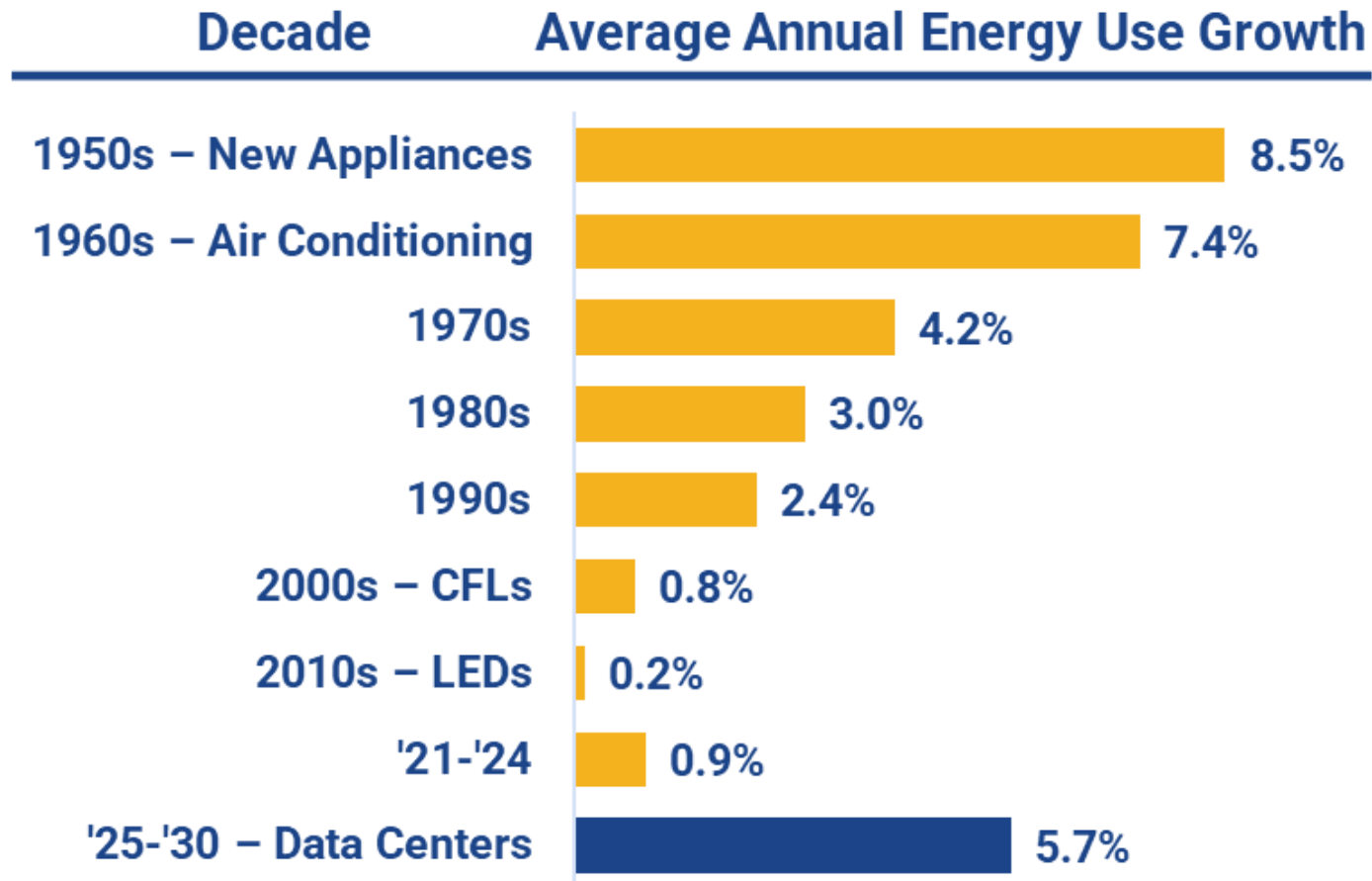
## **Background**

- Met 6 times, from scope development through to final report review, plus an in-person workshop in October
- Also hosted 17 webinars to better understand existing practices used in load forecasts
- Most active participants were on the editing committee, with substantial content and editorial input from the initial report outline through the final draft

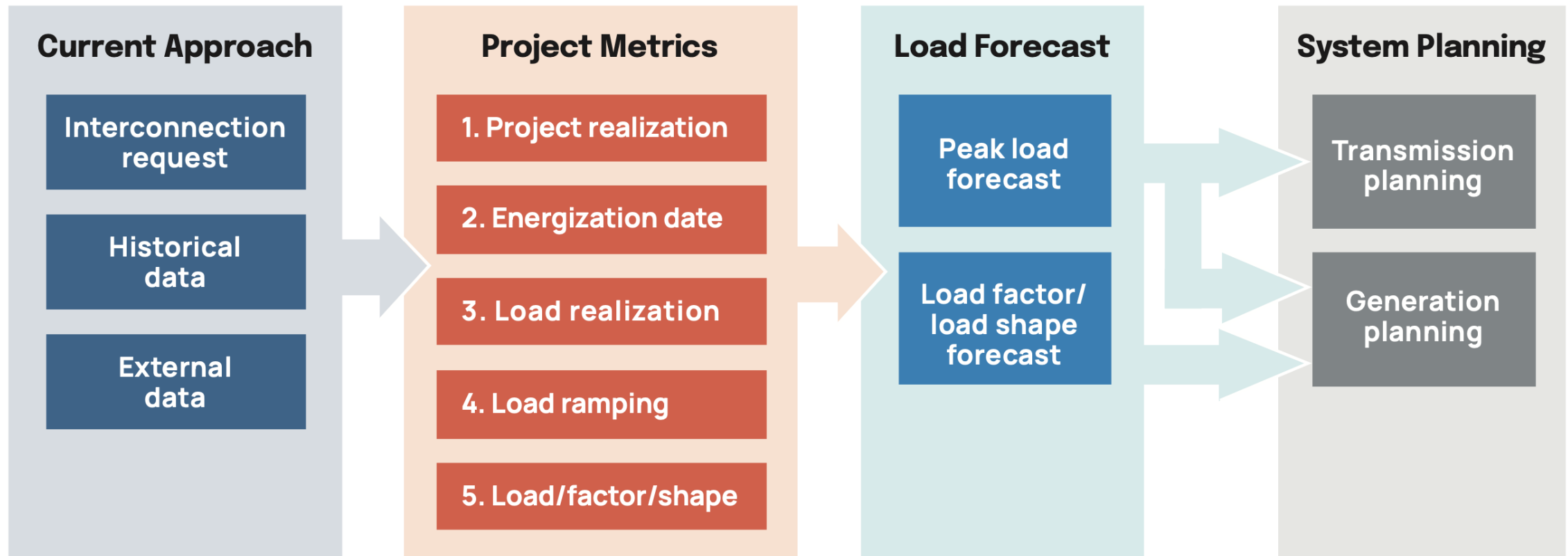
## **Editing Committee**

- Jenny Conde, PG&E
- Jeffrey Deason, LBNL
- Natalie Mims Frick, LBNL
- Christopher Gonzales, SRP
- David Farmer, NRECA
- David Larson, EPRI
- Luke Lavin, NREL
- Molly Mooney, PJM
- Matteo Muratori, PNNL
- Shivani Nathoo, Ontario IESO
- Nina Peluso, Energy Futures Group
- Isabelle Riu, E3
- Lauren Shwisberg, RMI
- Anna Sommer, Energy Futures Group
- Priya Sreedharan, GridLab
- Jeff Sward, RMI
- ESIG Team

# Load Growth Over the Decades



# From Data to Planning



# Report Recommendations



1. **Use all five large load metrics to create a large load forecast.**
2. **Develop a consistent framework to differentiate among large load types.**
3. **Account for uncertainty.**
4. **Increase certainty through large load financial requirements.**
5. **Reduce uncertainty in regional large load forecast practices.**
6. **Improve geographic detail.**
7. **Seek continuous improvement through forecast validation.**
8. **Collect large load forecast data in a shared database.**
9. **Apply consistent load weighting and modeling practices.**
10. **Adopt forecast standards for load flexibility.**

**Go to [slido.com](https://slido.com) and enter code ESIG17**



# What's Going Well



**Large load forecasts are almost never the same as the large load pipeline**

*... there may be exceptions at smaller utilities*

Large load forecasting practices are almost all under active reform

*... new practices, in most cases just a few years old*

In many cases, forecast practices are aligned with large load type

*... industrial and data center loads are forecast differently*

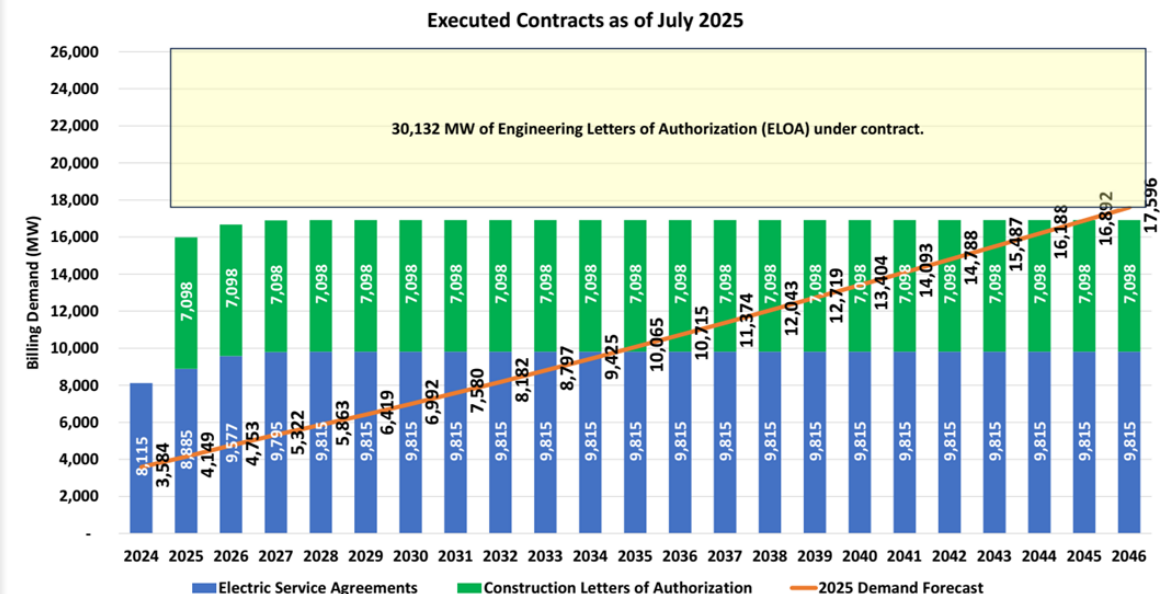
Substantial investments in studying data center loads

*... top priority is operational risk,  
but front-end planning risk is also a priority*

Utility rate tariff reforms are helping to reduce uncertainty

*... these reforms do not reduce all sources of risk*

## Dominion Energy Virginia 2025 Large Load Forecast



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## STRATEGIC ISSUE

Develop and implement strategy to mitigate load forecast risk and its influence on system planning

## KEY IMPACT

- The Load Forecasting Task Force has developed a strategy which seeks to:
- Increase consistency between forecasts used for Resource Adequacy and Transmission Planning purposes
- Increase consistency and transparency in forecasting practices among Load Responsible Entities (LREs)
- Develop in-house load forecasting expertise to better understand quality and accuracy of LRE-submitted forecasts

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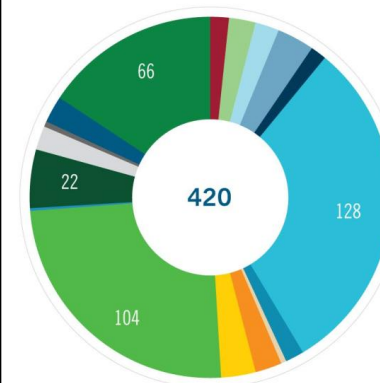
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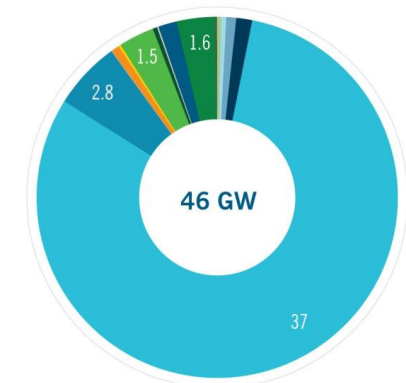
## Carolinas Economic Development Pipeline

as of October 8, 2025

Project Count



Estimated GW



Note: The Economic Development Pipeline includes all currently active inquiries related to service in the Carolinas, including those that are more speculative in nature as well as projects that are performing competitive multi-state searches for what will be a single project. For resource planning purposes, the Companies assume only a small subset of such projects progress to receive service. Slide 11 describes the methodology applied to incorporate economic development projects in the load forecasts used for resource planning purposes.



Large Load Electric Additions | 4



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The slide features the NERC logo (North American Electric Reliability Corporation) in the top left. The title "Large Loads Task Force Objective" is in the top right. The main objective text is "Understand the reliability impact(s) of emerging large loads on the BPS". Below this, three document covers are shown: "Characteristics and Risks of Emerging Large Loads" (dated July 2025), "Assessment of Gaps in Existing Practices, Requirements, and Reliability Standards for Emerging Large Loads" (dated Q4 2025), and "Risk Mitigation for Emerging Large Loads" (dated Q2 2026). A yellow star is placed over the third document. A large "DRAFT" watermark is visible across the documents. The footer includes the number "2" and the text "RELIABILITY | RESILIENCE | SECURITY".

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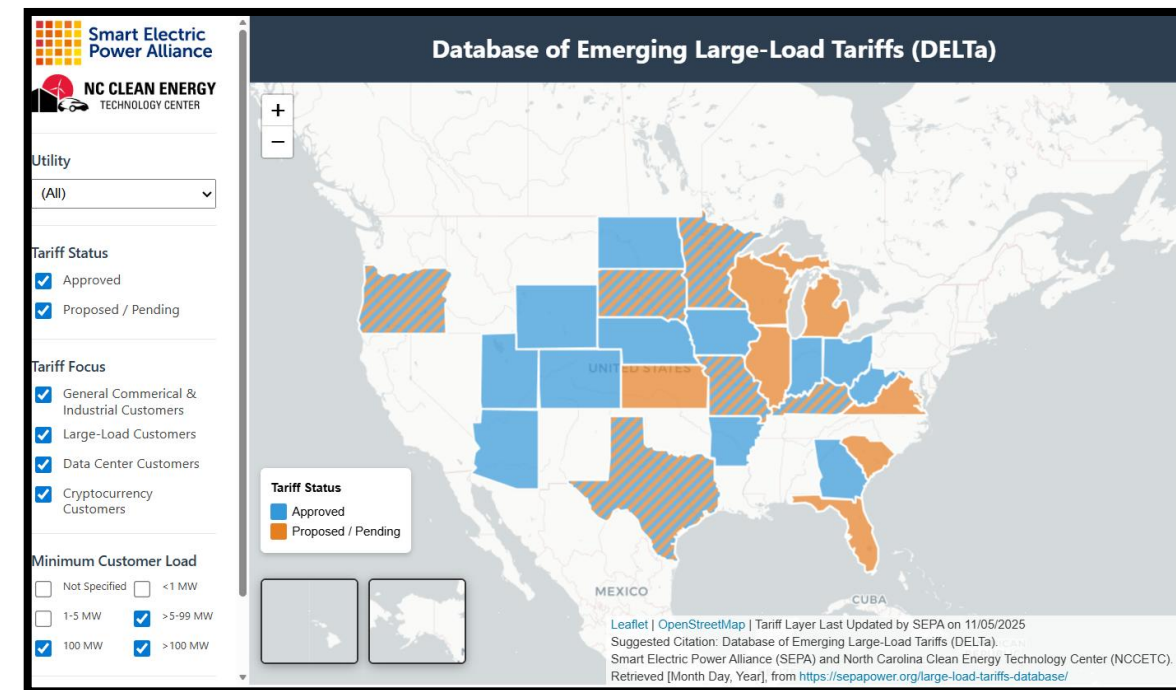
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# What Needs Improvement



## **Transparency and consistency**

- Large loads are not described or assessed in a consistent manner in load forecasts.

## **Insufficient data**

Particularly an issue for data centers – from multi-tenant to AI

- Early-process customer-supplied data are unreliable in certain respects
- Difficult for many utilities to obtain useful historical data, especially if they don't have a strong history with data centers

## **Alternative site data not shared**

- Planners are only beginning to request information on this topic
- Practices for interpreting these data are probably not yet developed.

## **Load flexibility is not included**

- No forecasts include load flexibility for future large loads
- Load flexibility planning practices may be complicated.



# Lack of Consistent Definitions



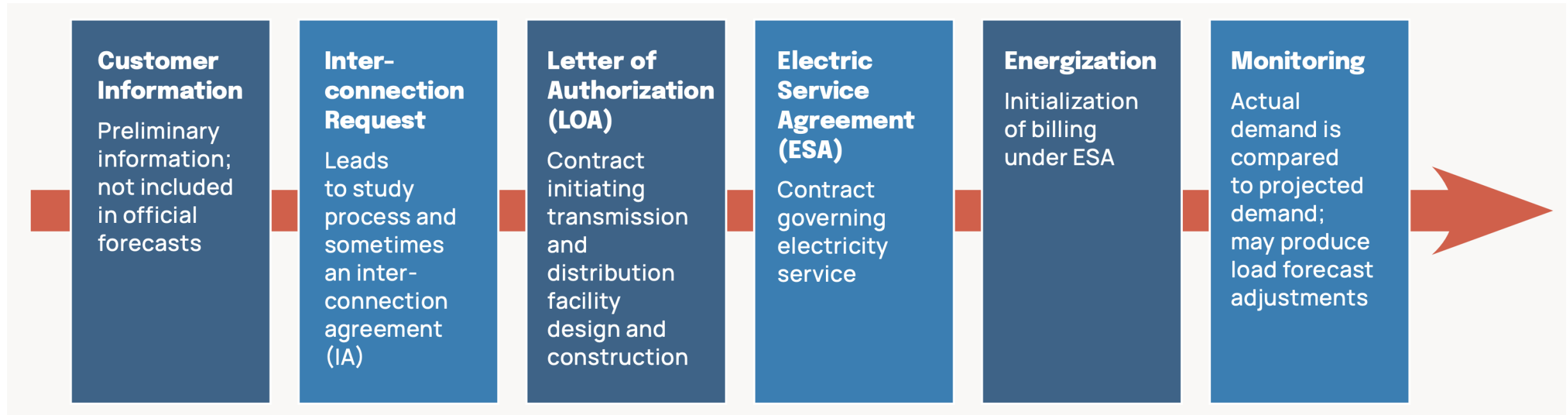
# Large Load Characteristics and Forecast Metrics



Project Realization	Energization Date	Load Realization	Load Ramping	Load factor or load shape
<p>The rate at which projects included in the load forecast are placed in service</p> <ul style="list-style-type: none"><li>• Often presented as a percentage of project requests expected to come to fruition</li></ul>	<p>The beginning of commercial operation by projects, including anticipated delays</p>	<p>The forecast peak load that the project is expected to require once it's fully scaled up</p> <ul style="list-style-type: none"><li>• Often presented as a percentage of requested peak load</li></ul>	<p>The monthly or annual forecast of demand during the startup period of commercial operation</p> <ul style="list-style-type: none"><li>• Often presented as a percentage of requested peak load</li></ul>	<ul style="list-style-type: none"><li>• <b>Load factor:</b> Actual energy use as a proportion of facility capacity</li><li>• <b>Load shape:</b> More detailed information on power needs, for example, an hourly schedule of energy use</li></ul>



# Large Load Interconnection Milestones



# Selected Recommendations



# Addressing Back-End Risk



- **How much load? When?** Front-end risks addressed through weighting factors, stochastic modeling, and scenario-based forecast.
- **Back-end risk:** Not currently addressed in load forecasts, either at project level or for systemic risks (correlated loads).
  - If data center forecasts turn out to be a development bubble, could lead to attrition of existing projects.
  - Demand falling below expectations could lead to stranded transmission and generation investments.
  - Recently-adopted tariffs provide some protection, but does not eliminate risks.
  - No studies of how well matched such attrition might be to other future load growth.

# Sharing Large Load Data



- **Default option:** Wait several years until each utility gains experience
- **Commercial vendors:** Load and estimated energization date, probably no load ramping or load factor/shape data
- **Customer privacy is main barrier:** Legally complex to share data, EPRI has made some progress in obtaining data but cannot share widely
- **Steps to a database**
  - Collect data where possible – at least the first four load metrics
  - Simplest metrics first – project realization, load realization, and energization date
  - Define large load types – similar metrics and common characteristics
  - Add complexity – load ramping, load factor and load shapes; more types
- **Design large load forecast validation practices**

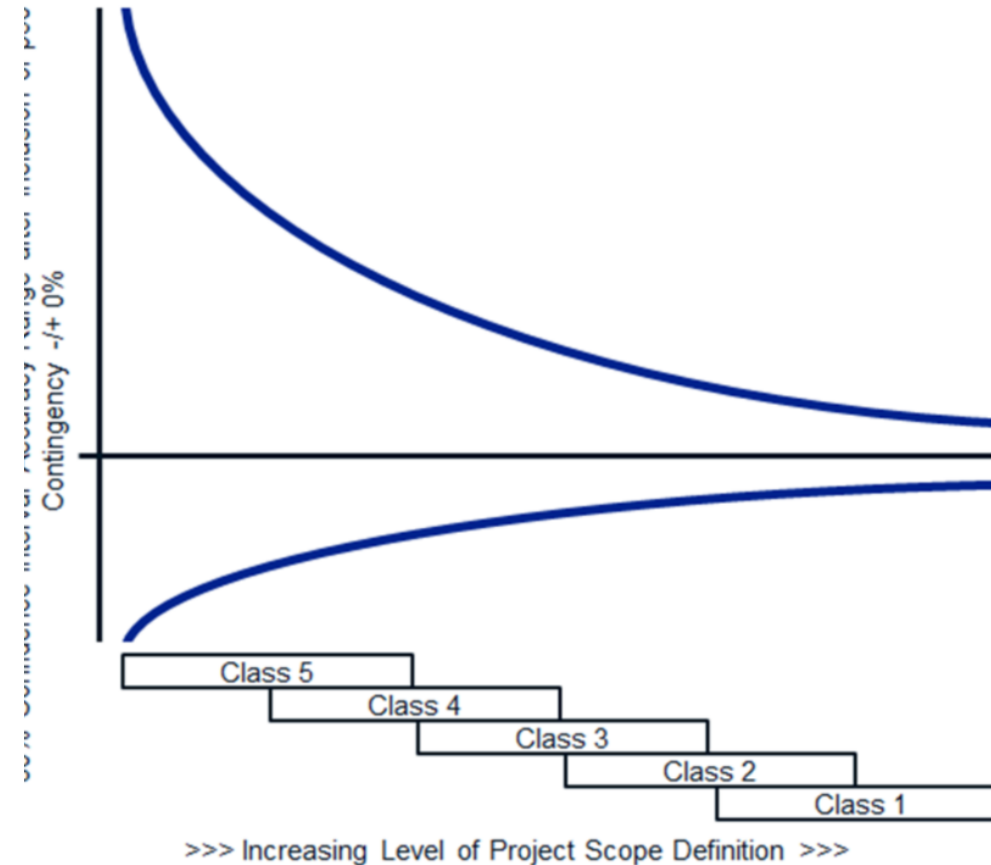


# Maturity Assessment Framework



## NERC Preliminary Draft Reliability Guideline

- Use project milestones to assess project maturity
- Potential model: AACE cost estimate classification system (at right)
- As projects mature towards higher classifications:
  - Weighting factors increase
  - Forecast accuracy range narrows





Thank you!



**ESIG**

ENERGY SYSTEMS  
INTEGRATION GROUP

# Load Forecasts for Regional Planning



## Post-Hoc Adjustment

Aggregate member forecasts, then  
adjust

## Scenario Overlay

Aggregate member forecasts, then  
apply scenario overlays

## Regulatory Approach

Direct LSE forecasting practices  
for consistency  
(in progress)

CEC	-	✓	✓
ERCOT	✓	-	✓
NYISO	-	✓	-
PJM	✓	-	✓
SPP	✓	-	-

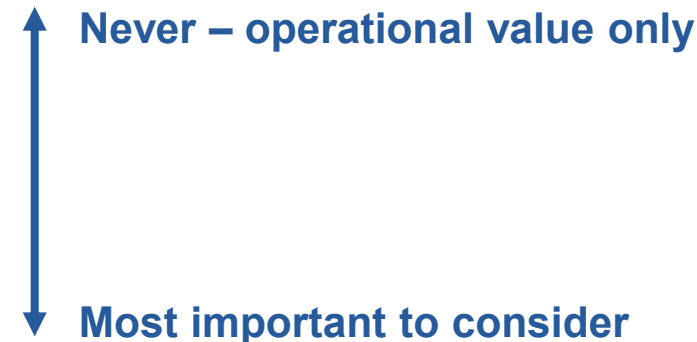
# Forecast Standards for Load Flexibility



- **Where does load flexibility belong?** Long-term forecast OR supply-side resource?
- ERCOT: “forecasting flexible behavior is difficult.”
- **What types of load flexibility belong in long-term load forecasts?** Not all of them, and treatment varies for transmission, capacity, and energy planning.

EPRI’s draft “tiers”:

- Supports grid during disturbances
- Self serves during transmission outages
- Supports grid during peak stress
- Provides fast or long flexible response
- Acts like dispatchable capacity



- **How to measure load flexibility?** Components of load forecast metric:
  - Measurements of program use (when/how) and effectiveness
  - Forecast of enrollment (customers and capacity commitment)