



# Grid Integration of Large Loads

## Introduction to the Large Loads Task Force, Data Needs, and Flexibility

### EXECUTIVE SUMMARY



Electric power systems across the country are experiencing a new era of demand growth driven by the rapid emergence of large, complex electricity consumers such as data centers, oil and gas operations, energy-intensive manufacturing, hydrogen electrolysis, and transportation fleets. Unlike traditional loads, new large loads are often far larger, at hundreds of megawatts or more; have short development timelines; are geographically clustered; and interface with the grid through power electronics. These characteristics can create resource adequacy and reliability risks including fault ride-through failures, control interactions and oscillations, and power-quality issues.

Recent utility and regional forecasts project sharply accelerating demand growth through 2030, far exceeding expectations just a few years ago. But there is substantial uncertainty regarding timing, location, and actual load that will materialize. At the same time, the mismatch between short development timelines for large load facilities (often just two to three years) and long lead times for development of generation (often more than three years) and transmission (often more than 10 years) complicates resource and transmission planning, resource adequacy assessments, market design, and infrastructure investment decisions.

See the full report—  
[Grid Integration of Large Loads: Introduction to the Large Loads Task Force, Data Needs, and Flexibility](#)



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The Energy Systems Integration Group (ESIG) convened the Large Loads Task Force to examine each of the areas heavily affected by the increase in large loads on the grid and to provide a neutral, technically focused forum for collaboration among utilities, regional system operators, load developers, technology providers, researchers, and regulators. The task force reports focus on large load forecasting, interconnection processes, performance requirements, modeling, transmission planning, resource adequacy, and market design. In addition, spanning these focus areas are two major cross-cutting topics, expanded on in this introduction report:

- **Insufficient data.** Utilities and regional system operators frequently lack timely, standardized, and sufficiently granular information on large loads' characteristics, ramping behavior, disturbance ride-through capabilities, and flexibility capabilities. Without such data, planning and operational studies rely on assumptions or proxy models that may under-estimate reliability risks or drive overly conservative and costly infrastructure solutions. The industry encountered similar challenges during the early integration of inverter-based generation (wind, solar, and battery

storage), requiring coordinated improvements in modeling, high-resolution on-site measurements, and interconnection performance requirements.

- **Potential large load flexibility.** Many of these large load facilities have advanced control systems. Some facilities have associated generation or storage that can enable rapid load modulation, peak shifting, or self-supply during system stress. If large load flexibility is integrated with interconnection, planning, and market frameworks, it could mitigate near-term infrastructure constraints, support resource adequacy, improve operational reliability, and reduce total electricity system costs. However, realizing these benefits requires early consideration of flexibility in facility design, appropriate incentives, regulatory clarity, and sufficient grid operator visibility and confidence in load performance.

This introductory report offers common definitions and an overview of large load growth, system impacts, data needs, and flexibility considerations, and sets the foundation for the coordinated series of reports by the ESIG Large Loads Task Force.

*Grid Integration of Large Loads: Introduction to the Large Loads Task Force, Data Needs, and Flexibility*, by the Energy Systems Integration Group's Large Loads Task Force, is available at <https://www.esig.energy/reports-briefs/large-load-task-force-introduction>.

To learn more about ESIG's work on large loads, please see <https://www.esig.energy/working-groups/large-loads/> or send an email to [info@esig.energy](mailto:info@esig.energy).

The Energy Systems Integration Group is a nonprofit organization that marshals the expertise of the electricity industry's technical community to support grid transformation and energy systems integration and operation. <https://www.esig.energy>.

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