Virtual Power Plants: What Boards of Large Load Companies Need to Know

Grid flexibility is becoming a strategic issue for data centers, manufacturers and other energy-intensive businesses

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Market Challenges: Why This Matters for the Board

For most commercial and industrial companies, electricity was long treated as an operating expense. It mattered, but it was rarely strategic. Reliability was assumed. Costs were predictable. Growth planning focused on land, labor and capital, not grid capacity.

That assumption is no longer safe. Across global markets, electricity systems are under growing strain. Rapid expansion of data centres, advanced manufacturing and logistics infrastructure is pushing energy demand faster than grids can adapt. The International Energy Agency (IEA) estimates that global data center electricity consumption alone could double by 2030, reaching roughly 945 TWh, driven largely by AI and digital infrastructure growth.

This pressure is no longer theoretical. In many regions, grid constraints are already shaping where companies can locate, how quickly they can expand, and what it costs to operate. Power availability is becoming a strategic variable, not a given.

Energy is shifting from a background operating cost to a board-level constraint with direct implications for growth, margins, resilience and reputation.

Virtual Power Plants: What They Are and Why Momentum Is Building

A Virtual Power Plant (VPP) is not a physical facility. It is a digital system that coordinates many distributed energy assets, often located behind the meter at customer sites. It operates them collectively as a flexible resource for the electricity grid.

For large load companies, these assets typically include

- Battery energy storage systems
- Flexible electrical loads, such as cooling or non-critical processes
- EV fleets and managed charging
- On-site generation or backup power systems

The defining feature is control and optimisation. VPPs allow companies to provide flexibility to the grid within customer-defined limits, without compromising core operations.

This is fundamentally different from traditional demand response. Older programmes were manual, infrequent and often disruptive. Modern VPPs are automated, predictable and designed to operate continuously within strict governance boundaries.

VPP Market Is Accelerating

VPP adoption is accelerating because utility and regulatory incentives are converging.

Utilities are using VPPs to manage peak demand, defer infrastructure investments and improve grid reliability. Regulators are enabling this. In the U.S., **FERC Order No. 2222** requires wholesale electricity markets to allow aggregated distributed energy resources to participate directly in energy, capacity and ancillary services. As a result, VPPs are moving out of pilot programmes and into mainstream grid operations. Wood Mackenzie estimates global VPP capacity reached 37.5 GW, growing 13.7% year-on-year.

Data Centres Deserve a Special Callout

Data centres represent the fastest-growing and most concentrated large load segment. In several markets, grid operators are proposing new frameworks for large loads tied to AI and data centre growth, recently by PJM. These include requirements to bring self-supply, participate in managed curtailment, or demonstrate flexibility as a condition for connection.

Looking ahead, it is increasingly plausible that

- Flexibility participation becomes a prerequisite for large-load interconnection
- Backup power and storage are expected to support grid stability
- Utilities prioritise growth for customers that act as grid partners

For boards overseeing digital infrastructure expansion, VPP readiness is evolving from an innovation option to a strategic requirement.

Board Takeaways: What Should Boards Internalise

1. Grid flexibility is becoming a prerequisite for growth and capital deployment.

VPP do not add grid capacity, but they reduce execution risk for large load expansions. By improving approval certainty and enabling conditional interconnections, they help protect expansion timelines and reduce the risk of delayed projects or unplanned capital upgrades.

2. Energy cost volatility is structural; VPPs provide leverage, not exposure.

Rising energy cost is structural - rising congestion, capacity and peak demand charges are driven by grid constraints. Behind-the-metre assets provide the physical capability to manage this exposure, while VPPs provide the orchestration and market access needed to optimize and monetise flexibility at scale.

3. Properly governed VPP participation can reduce risk while improving asset returns.

VPPs operate within company-defined boundaries, with grid participation always subordinate to core operations. Assets already deployed for resilience such as batteries, controls and flexible loads can generate incremental value without increasing operational or reliability risk.

4. Early engagement strengthens ESG positioning and preserves strategic optionality.

VPPs primarily help utilities avoid operating high-emission peaker plants (sometimes called peaking power plants). Large load companies benefit by demonstrating that their growth supports grid decarbonisation rather than undermining it. Early participation improves ESG credibility and preserves influence over how future grid rules and programmes are designed.

Virtual Power Plants are not an energy programme. They are a strategic positioning tool in an increasingly constrained power system. For boards, the risk is not participation. The risk is ceding control over growth, cost and optionality as grid rules evolve.