

POWERGEN 2027 Topics

Market Drivers and Planning

Markets and Load Growth: Electricity demand growth is reshaping power markets, development pipelines and long-term planning assumptions across the industry. This topic examines how data centers, industrial expansion, electrification, market pricing, capacity signals and customer behavior are changing dispatch strategies, resource adequacy decisions, investment priorities and commercial risk. For generation stakeholders, understanding load growth is now central to building and operating the right portfolio.

Data Centers: Data centers are becoming one of the most important drivers of new electricity demand, capacity planning and onsite generation strategy. This topic explores how large-load growth is changing generation development, interconnection priorities, procurement decisions, reliability expectations and commercial structures. For utilities, developers, EPCs and technology providers, serving data centers now requires faster execution, new supply approaches and a clear understanding of load timing and risk.

Resource and Capacity Planning: As electricity demand rises, retirements accelerate and reliability margins tighten, resource and capacity planning has become more complex and more consequential. This topic covers the modeling assumptions, portfolio strategies, market signals and operational constraints shaping generation decisions, from new builds and life extensions to hybrid resources, firm capacity needs, reserve margins and the practical challenge of building financeable, deliverable supply.

Onsite Power: Onsite power is gaining momentum as large power users look for faster, more reliable and more controllable energy supply. This topic explores technology selection, permitting, fuel access, integration, economics and operating strategy for self-generation across data centers, industrial sites, campuses and other large-load applications. It is about what it really takes to develop, build and operate megawatt-scale generation at or near the point of use.

Interconnection: Interconnection is now one of the most important gating factors in generation development, repowers and large-load projects. This topic explores queue reform, study timelines, network upgrade costs, transmission constraints, site selection and the engineering and commercial decisions that determine whether projects move forward. For developers, utilities and large power users, interconnection risk increasingly drives schedule, cost and overall project viability.

Policy & Regulation: Policy and regulation continue to shape what gets built, how plants operate and where capital flows across the power sector. This topic examines the practical effects of federal and state policy, environmental rules, market design changes, permitting requirements and reliability directives on generation strategy, investment planning, compliance, dispatch and long-term asset decisions. The implications are operational, financial and immediate.

Financing: Financing has become more complex as capital costs, technology risk, interest rates, market uncertainty and project timelines influence which generation and infrastructure projects move ahead. This topic focuses on capital formation, offtake structures, credit considerations, investment thresholds and the financial realities behind development decisions. It is about what makes projects bankable, financeable and executable in the current market.

From Concept to Commercial Operation

Project Development & Delivery: Project development and delivery are under growing pressure as demand rises, timelines compress and execution risks multiply across the power sector. This topic covers how projects move from concept to commercial operation, including siting, permitting, contracting, procurement, engineering, sequencing, risk management and delivery strategy. The emphasis is on lessons that help developers, utilities, EPCs and suppliers execute better and bring capacity online successfully.

Permitting, Siting and Community Engagement: Permitting and siting have become more difficult as project timelines stretch, local scrutiny increases and infrastructure needs grow more urgent. This topic explores environmental review, land use, stakeholder strategy, public acceptance, local engagement and the practical steps developers take to reduce friction and keep projects moving. For generation and infrastructure development, technical viability alone is no longer enough to secure project success.

EPC Contracting & Risk Management: As project schedules tighten and costs become harder to control, contracting strategy has become a defining factor in project success. This topic examines EPC and EPCM structures, scope definition, risk allocation, change management, guarantees, supply chain exposure and lessons from recent project execution. For developers, utilities, EPCs and OEM partners, better contract decisions can materially improve bankability, schedule certainty and overall delivery performance.

Supply Chain and Procurement: Supply chain and procurement decisions now shape project outcomes as directly as engineering and construction. This topic covers long lead times, equipment availability, sourcing strategy, contracting, vendor management, spares

planning and procurement risk across new builds, outages and major upgrades. In a constrained environment, the ability to secure the right equipment and services at the right time can determine whether projects advance at all.

Generation Pathways and Technologies

Gas Turbine & Combined Cycle: Gas turbine and combined cycle assets remain central to capacity growth, dispatch flexibility and grid reliability through the late 2020s. This topic covers new build execution, major maintenance, performance tuning, uprates, fuel strategy, emissions compliance, cycling impacts and supply chain constraints. For utilities, IPPs, OEMs and EPCs, these technologies remain both a near-term growth area and a long-term operational priority.

Steam Cycle & HRSG: Steam cycle and HRSG performance remains critical as combined cycle plants operate more dynamically and aging equipment faces new thermal and mechanical stress. This topic addresses inspection, chemistry, failure prevention, maintenance strategy, bypass systems, outage planning and upgrade opportunities. For operators and engineers, good steam-side decisions directly affect reliability, output, heat rate, outage scope and the long-term health of major plant assets.

Boilers: Boiler performance and reliability remain essential across many conventional and industrial generation applications, even as fleets change and operating profiles evolve. This topic focuses on combustion performance, tube failures, materials issues, maintenance strategy, emissions-related upgrades, outage execution and life-extension decisions. For plant teams, boiler problems are rarely isolated. They affect safety, output, efficiency, compliance and the economics of continued operation.

Nuclear: Nuclear has re-emerged as a strategic priority as utilities and power producers seek firm, dispatchable capacity with long operating life. This topic spans the current fleet and the next wave of development, including uprates, license extensions, unretirements, outage performance, new build considerations, supply chain readiness and capital planning. The conversation is increasingly practical because nuclear decisions now intersect reliability, load growth and investment strategy.

SMRs and Advanced Reactors: SMRs and advanced reactors are moving from concept toward early deployment, but the path remains defined by execution challenges as much as technology promise. This topic examines licensing, siting, supply chain readiness, project delivery, owner-operator interest, commercial models and lessons from first-of-a-kind development. For the power sector, the key questions are practical: what can be built, by whom, when and at what risk.

Hydropower: Hydropower remains a critical source of dispatchable and flexible generation, but many facilities face aging infrastructure, modernization needs and changing water management pressures. This topic addresses equipment upgrades, dam safety, operational optimization, relicensing, workforce needs and the practical realities of maintaining and improving hydro assets. For many operators, hydropower strategy is increasingly about preservation, modernization and extracting more value from existing infrastructure.

Solar PV: Solar PV continues to expand its role in generation portfolios, but deployment today is shaped by more than module supply and installed cost. This topic covers project development, hybrid integration, interconnection, performance, O&M, supply chain considerations, land use and the operational lessons that matter once projects are built. For many stakeholders, the challenge is not whether solar fits, but how it fits reliably and profitably.

Wind: Wind remains an important generation resource, but project development and operations continue to evolve amid transmission constraints, market dynamics, siting pressure and equipment performance considerations. This topic examines turbine technology, project execution, O&M, repowers, reliability, supply chain issues and integration with broader portfolios. It is relevant to developers, owner-operators and service providers focused on getting more dependable long-term value from wind assets.

Geothermal: Geothermal is drawing renewed attention as the industry looks for firm, low-carbon generation options with long operating lives and limited fuel risk. This topic explores project development, drilling and subsurface risk, technology approaches, power cycle design, financing and lessons from emerging deployments. For power stakeholders, geothermal is increasingly relevant not as a concept, but as a project development and execution challenge.

Energy Storage and Hybrids: Energy storage and hybrid configurations are becoming more important as operators seek flexibility, resilience and better ways to optimize generation portfolios. This topic examines storage integration, controls, dispatch strategy, project economics, reliability considerations and the practical lessons emerging from paired and hybrid systems. It is relevant to utilities, IPPs and large power users looking to capture more operational and commercial value from their assets.

Long-Duration Energy Storage: Long-duration energy storage is attracting more interest as planners look for ways to improve system flexibility, support reliability and manage longer imbalances in supply and demand. This topic examines competing technologies, use cases, project economics, integration challenges and development considerations. The emphasis is on where long-duration storage may provide real grid or portfolio value, and what developers and owner-operators need to evaluate before investing.

Carbon Capture and Sequestration (CCS): Carbon capture and sequestration remains a major strategic consideration for thermal generation, especially where owners want to preserve dispatchable assets while addressing emissions requirements and policy pressure. This topic explores capture technologies, project development barriers, transport and storage considerations, permitting, economics and integration challenges. The focus is on what CCS deployment actually looks like for power generation projects in the current market.

Hydrogen and Alternative Fuels: Hydrogen and alternative fuels remain active areas of interest as the industry looks for pathways to lower emissions while preserving thermal generation flexibility. This topic covers fuel blending, combustion impacts, infrastructure needs, supply availability, storage, retrofit considerations and project economics. The key issue is practical deployment: how plants evaluate readiness, manage technical risk and decide where these fuels fit into near-term operating strategies.

Cogeneration / CHP: Cogeneration and combined heat and power remain practical solutions for facilities that need reliable electricity, useful thermal energy and better overall efficiency. This topic examines project economics, technology choices, thermal integration, fuel strategy, emissions considerations and the operational realities of CHP in industrial, institutional and commercial settings. It is especially relevant where resiliency, energy cost control and onsite performance remain primary business drivers.

Microgrids: Microgrids are attracting greater interest as utilities, campuses, communities and industrial operators seek more resilient and controllable power systems. This topic covers design strategy, controls, islanding capability, generation mix, storage integration, utility coordination and the business case behind deployment. The focus is on practical implementation and operating lessons, especially where reliability, resilience and flexibility matter more than a one-size-fits-all grid solution.

Plant Operations, Maintenance and Performance

O&M, Reliability and Asset Life: As fleets age and operating patterns change, owner-operators must balance day-to-day performance with long-term reliability and asset preservation. This topic covers maintenance strategies, reliability programs, inspection practices, forced outage reduction, failure analysis and life-extension decisions across generation fleets. The emphasis is on practical actions that improve availability, manage risk, control costs and help plants perform under more demanding market and operating conditions.

Outage Planning & Execution: Outage execution is under greater pressure as plants cycle more frequently, maintenance windows narrow and skilled labor becomes harder to secure. This topic focuses on outage scope definition, planning discipline, contractor coordination, parts readiness, schedule control, safety and return-to-service performance.

The goal is practical: reduce risk, improve execution and get critical assets back online on time and on budget.

Lifecycle Management: Generation owners are under pressure to get more value from existing assets while deciding where and when to invest in upgrades, life extension or replacement. This topic examines lifecycle planning across equipment, systems and entire plants, including maintenance strategy, capital allocation, obsolescence, failure risk, modernization timing and operating profile changes. It is about extending useful life without compromising reliability, economics or long-term fleet strategy.

Rotating Equipment: Rotating equipment performance remains fundamental to plant reliability, efficiency and maintenance planning across thermal generation fleets. This topic covers turbines, generators, compressors and associated systems, with a focus on inspection, repair, uprates, outage execution, condition monitoring, failure prevention and lessons learned from real operating environments. These decisions directly affect output, availability, maintenance costs and long-term asset performance.

Electrical & Balance of Plant: Electrical systems and balance-of-plant equipment often determine whether a facility performs reliably under changing operating demands. This topic addresses the design, maintenance, upgrade and troubleshooting of the critical systems surrounding generation assets, from transformers, switchgear and motors to pumps, valves, cooling, water and auxiliary systems. For owner-operators, these are often the issues that drive outages, risk and modernization priorities.

Power Systems & Upgrades: As demand grows and new generation takes longer to bring online, upgrades to existing assets are becoming an increasingly important path to faster capacity, better performance and improved reliability. This topic explores the planning and execution of upgrade strategies that help owner-operators increase output, improve efficiency, modernize plant systems and get more value from existing sites and infrastructure. The emphasis is on practical, executable upgrades that fit real operating schedules, reduce development hurdles and help assets respond to changing market and system needs.

Efficiency & Emissions: Efficiency and emissions remain core priorities as owner-operators work to improve performance, manage compliance and extend the life of existing assets. This topic covers heat rate improvements, combustion optimization, controls, aftermarket upgrades, emissions control systems, maintenance strategy and the operational tradeoffs that shape plant performance. For many facilities, incremental improvements still matter because they directly affect cost, output, compliance and competitiveness.

Renewable Integration: Renewable integration has become a central operational and planning challenge as portfolios diversify and system conditions grow more dynamic. This topic explores how utilities, grid operators, power producers and large users are managing

variability, flexibility needs, transmission constraints, storage pairing, dispatch implications and reliability requirements. The emphasis is on practical solutions that help generation and infrastructure assets perform effectively in a more complex resource mix.

Digital, Controls and Future-Readiness

Controls: Control systems sit at the center of plant performance, flexibility and operating stability, especially as assets cycle more often and staffing grows leaner. This topic explores DCS upgrades, tuning, automation, alarm management, controls integration and field lessons from troubleshooting and modernization projects. For operators and engineers, better controls can improve heat rate, reliability, start performance, safety and response to changing dispatch needs.

Digital Modernization: Digital modernization is increasingly necessary as plants face tighter margins, more complex operating demands and pressure to do more with leaner teams. This topic explores the upgrade of controls, software, connectivity, workflows and digital tools that improve visibility, execution and decision-making across operations, maintenance and engineering. The emphasis is on practical modernization that supports reliability, performance and long-term operational resilience.

Data Analytics: Data analytics has become essential as power companies seek better visibility into asset condition, performance, maintenance needs and commercial outcomes. This topic examines how practitioners are using operational and fleet data to improve decision-making, reduce downtime, optimize maintenance, benchmark performance and support planning. The focus is on useful analytics, not dashboards for their own sake, and on turning plant data into measurable results.

AI: Artificial intelligence is moving from concept to practical application across power generation, but the value depends on real use cases and disciplined implementation. This topic explores where AI is helping today, including predictive maintenance, fleet analytics, outage planning, engineering support, knowledge capture and operational decision-making. It also addresses governance, data quality, workforce adoption and the limits of AI in critical power environments.

Cybersecurity: Cybersecurity is now inseparable from reliable plant operations as generation assets become more connected, digital and exposed to operational technology risk. This topic focuses on OT security strategy, plant network architecture, vendor access, monitoring, incident response, compliance requirements and the practical realities of protecting control systems without disrupting operations. The stakes are high because cyber risk is also operational risk.

Emerging Technologies: Emerging technologies matter when they solve real operational or commercial problems, not when they remain stuck in pilot mode. This topic highlights new tools, systems and approaches with potential relevance to generation development, plant operations, maintenance, flexibility and performance. The focus is on early lessons, adoption barriers, implementation risk and where new technologies may offer measurable value to utilities, power producers and industrial users.

People, Safety and Organizational Readiness

Workforce, Safety & Compliance: Workforce, safety and compliance have become central business issues as experienced personnel retire, labor markets tighten and operational standards continue to rise. This topic explores training, knowledge transfer, contractor oversight, culture, workforce planning and compliance execution across plants and projects. Reliable operations depend on people. So do safe outages, successful projects and the ability to sustain performance across an aging fleet.