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Global Trends in Utilities

Global Utilities and Energy Outlook

Whitepaper

An RPG Company

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Two significant shifts are evident: utilities are beginning their largest investment cycle to date, and AI data centers have ended two decades of stagnant electricity demand in the US.

A trillion-dollar utility capital cycle is underway:

US investor-owned electric utilities will invest more than $1.1 trillion between 2025 and 2029 to meet rising demand (EEI, October 2025) - the largest capex program in industry history. Morningstar DBRS projects $1.4 trillion in investment across the broader US utility sector through 2030, double the level of the prior decade. The UK water sector has just approved £104 billion for AMP8, a near-quadrupling of the £44 billion approved for AMP7.

AI data centers are rewriting the demand curve:

Approximately 75% of the top 35 US electric power utilities have reported rising electricity demand from data centers. Deloitte data shows the share rising from 6% – 8% of US electricity in 2024 to 11% – 15% by 2030. McKinsey, cited by EEI, projects global data center demand will grow from ~60 GW today to 170 – 220 GW by 2030 (~20% CAGR), with high-side scenarios reaching 300 GW.

Sources: Edison Electric Institute (EEI) Financial Review 2024; Morningstar DBRS Oct 2025; Ofwat PR24 Final Determinations Dec 2024; PRSIndia Demand for Grants 2026-27; Deloitte 2024 Power & Utilities Industry Outlook; McKinsey / EEI data center demand analysis.

Global Utilities and Energy Sector Overview

A total of eight major forces are transforming the way utilities and oil and gas firms generate value. While most operators experience all these forces, the extent of their impact varies with their unique combinations and speeds.

• **Electrification at unprecedented pace:** EV adoption, building electrification, industrial decarbonization, and AI data center loads are pushing demand growth that grid planners had not modeled. US peak demand is expected to increase by 2% – 4% annually through 2030, compared to the flat growth seen in the previous decade. India's peak demand has set new records year after year.

• **Aging infrastructure colliding with new load shapes:** The same grid that was built to push power from large central plants to acquiescent consumers is now being asked to absorb variable renewable input, two-way flows from prosumers, and surge loads from EV fast-chargers and AI training clusters. Nearly 70% of North America's electric infrastructure is over 25 years old (DOE), with much of it operating beyond its design life.

• **Aging infrastructure facing new load dynamics:** The current grid, which was initially created to distribute electricity from large central power stations to passive users, now needs to handle varying renewable energy sources, two-way energy flows from prosumers, and high demand from rapid chargers for electric vehicles and AI training clusters. Approximately 70% of North America's electrical infrastructure is over 25 years old (DOE), with a significant portion functioning beyond its intended lifespan.

• **Climate-driven outages are the new normal:** Since 1980, the US has experienced 400-billion-dollar-plus weather and climate disasters; weather has driven roughly 80% of major US power outages between 2000 and 2023. UK water companies are undergoing recapitalization as incidents of sewage overflow linked to climate change have become intolerable in the political arena. Resilience capex is no longer optional.

• **The energy transition is uneven but irreversible:** Coal retirements in South Africa are scheduled around 2029 – 2030 (~9.5 GW); the UK is largely coal-free; India is adding both coal and renewables in parallel under its 500 GW non-fossil target for 2030; the US is restarting and extending nuclear units. Oil and gas firms are simultaneously expanding LNG and committing to renewables.

• **Regulators are insisting on digitalization and transparency**: Ofwat now requires water companies in the UK to demonstrate their digital and data-driven operations as a prerequisite for receiving funding. India's CEA enforces adherence to the DPDP Act for RDSS smart metering. The US EPA's updated methane regulations mandate continuous monitoring for midstream and upstream

operators. NERSA has approved a 12.74% tariff increase for 2026 in South Africa, contingent on specific reform requirements.

• **Cybersecurity has become a board-level issue:** As OT/IT convergence accelerates, the attack surface of grid and pipeline networks grows. NERC CIP enforcement in the US, NIS2 in Europe, and India's CERT-In requirements are forcing utilities to treat cyber resilience as a primary capital category. Ransomware against water utilities has spiked globally.

• **Customer expectations have collapsed the gap to consumer apps:** Customers who manage their banks, pharmacies, and groceries through real-time digital experiences will not tolerate paper-based utility billing systems. The shift from passive consumer to active prosumer turns customer experience into an asset-utilization lever rather than a satisfaction metric.

• **Workforce attrition meets a knowledge cliff:** The UK water sector requires approximately 100,000 additional employees by 2030 to meet the demands of AMP8 and to account for retirements. Similarly, US utilities are encountering comparable demographic challenges. The digitalization of institutional knowledge via digital twins, knowledge graphs, and agentic AI is now considered a workforce strategy rather than merely an efficiency initiative.

Sources: US Department of Energy infrastructure assessments; NOAA Billion-Dollar Weather Disasters; Ofwat PR24 Final Determinations; PRSIndia RDSS analysis; NERSA tariff decisions; Water UK workforce planning; Deloitte 2024 P&U Outlook.

Key players in the market

in New York and Massachusetts combined ($21B NY, $14B MA). The Upstate Upgrade alone involves over $4 billion in investments across more than 70 transmission projects through 2030.

Eskom and NTCSA (South Africa): Eskom's Generation Recovery Plan successfully restored 5,506 MW within a year; the Energy Availability Factor improved from below 60% to over 70%. In July 2024, NTCSA underwent legal separation; ministerial approval for the subsequent phase of unbundling was received in December 2025, resulting in the formation of NEDCSA, GxCo, TraderCo, and Eskom Green.

Tata Power, Adani Transmission, PowerGrid (India): Significant investments from both private and public sectors have been made in transmission, sub-transmission, and renewable integration. Smart grid pilot projects are transitioning toward commercial deployment under the RDSS initiative.

United Utilities, Severn Trent, Thames Water (UK): AMP8 capital initiatives are accelerating network upgrades through data-driven asset management. In May 2026, United Utilities secured £800 million in equity to increase their AMP8 expenditure to around £11.5 billion.

Hyperscale continues to drive demand. Across the US, UK, South Africa, and India, major organizations are leading the way in transforming the industry.

Electric power utilities and transmission system operators are driving this change.

National Grid (US/UK): Committed $75 billion across the US and UK over five years (May 2024 announcement) - including $35 billion

01. Grid Modernization and the Two-Way Network

At a glance

The most significant infrastructure transformation this decade is occurring within the electricity grid. US investor-owned electric utilities plan to invest over $1.1 trillion from 2025 to 2029 (EEI, October 2025), marking the largest capital program in industry history. Morningstar DBRS projects total US utility-sector investment will reach $1.4 trillion by 2030, doubling the level of the previous decade.

This investment pressure extends beyond the US. Eskom in South Africa anticipates that generating capacity will grow from 66 GW in 2024 to 107 GW by 2034. In December 2025, the South African government approved Eskom's next restructuring phase, establishing NEDCSA, GxCo, TraderCo, and Eskom Green.

Key market patterns

ADMS, DERMS, and OMS as an integrated stack: Modernization is no longer about adding sensors to a legacy SCADA. The advanced distribution management system integrates fault location, isolation, restoration, and Volt/VAR optimization into a single observable platform. DERMS treats thousands of distributed resources as a single manageable asset, while OMS uses smart meter data to pinpoint outages to the transformer level.

Grid-enhancing technologies: Dynamic line rating uses real-time sensors and weather data to unlock 15% – 40% additional line capacity from the wires already in the ground - at a fraction of the cost of new transmission. Topology optimization and advanced power flow controllers act as software-defined power routing, mitigating congestion without breaking ground.

On-site generation and co-location: Utilities and hyperscalers are co-locating data centers with generation to ease transmission constraints; behind-the-meter gas, solar, and battery installations are becoming standard at hyperscale sites. Nuclear restart and small modular reactor siting at retiring coal plants offer near-term firm capacity.

Capital-cycle re-opening: US transformer supply chain bottlenecks are delaying grid upgrades and forcing utilities to pre-order multi-year quantities. UK water companies are re-opening price reviews mid-cycle: United Utilities raised £800m equity in May 2026 to expand its AMP8 capital program to roughly £11.5 billion.

Initiatives by major players

National Grid (US/UK): Committed $75 billion across the US and UK over five years (May 2024 announcement) - including $35 billion in New York and Massachusetts combined ($21B NY, $14B MA). The Upstate Upgrade involves over $4 billion in investments in more than 70 transmission projects through 2030.

Eskom and NTCSA (South Africa): Generation recovery plan restored 5,506 MW within one year; energy availability factor recovered from below 60% to over 70%. NTCSA was legally separated in July 2024, with the next stage of unbundling approved in December 2025.

Tata Power, Adani Transmission, PowerGrid (India): Major private and public investments in transmission and renewable integration. RDSS sanctioned for 45 DISCOMs across 28 states and UTs; AT&C losses reduced from 21.91% (FY21) to 15.04% (FY25).

United Utilities, Severn Trent, Anglian Water (UK): AMP8 capital programs accelerating network modernization with data-led asset management; the £104B AMP8 envelope is conditional on demonstrating digital, data-led ways of working.

Key imperatives

Treat the grid as a software platform: Modernization is a software re-platforming of the entire distribution operation, not asset-by-asset replacement. Smart meters, ADMS, DERMS, and OMS should form a single, observable, API-driven stack - not four procurements with four interfaces.

Sequence digital ahead of steel: Grid-enhancing technologies deliver capacity at a fraction of the cost of new transmission and in a fraction of the time. Sequence software-led capacity additions ahead of major capex wherever the regulator permits - and use the time to build the case for the harder builds.

Reframe outage management as customer experience: Predictive outage management, ETR accuracy, and proactive customer communication during events directly drive trust. Outage performance now affects regulator scorecards in every major market - not just operational metrics.

Plan for resilience as a primary KPI: Storm hardening, undergrounding, and microgrid investments should be evaluated on customer-minutes-of-interruption avoided. Capex per mile is the wrong denominator once climate-driven outages account for the majority of unplanned interruptions.

Sources: *Edison Electric Institute Financial Review 2024 (Power Magazine, Utility Dive); Morningstar DBRS Oct 2025; National Grid investor announcements May 2024; Eskom Holdings statements Dec 2025; PRSIndia Demand for Grants 2026-27.*

02. AI Data Centers Rewrite the Demand Curve

At a glance

US electricity demand remained nearly flat for two decades, but AI has altered this trend. Deloitte projects data centers will consume 6% – 8% of US electricity in 2024, increasing to 11% – 15% by 2030. Approximately 75% of the top 35 US electric utilities report increased demand from data center customers.

This shift represents a long-term trend rather than a temporary cycle. According to McKinsey (cited by EEI), global data center demand is projected to increase from approximately 60 GW today to 170 – 220 GW by 2030, with some estimates reaching 300 GW. This trend is a primary driver for all IRPs filed in 2026.

Key market patterns

Co-location and on-site generation: Utilities and tech companies are co-locating data centers with power generation to ease transmission constraints - the data center moves to the megawatts rather than the other way around. Behind-the-meter gas, solar, and battery installations are becoming standard at hyperscale sites; the campus increasingly resembles a small utility in its own right.

Nuclear restart and SMRs: Major hyperscalers have signed long-term off-take agreements with nuclear operators, including the restart of Three Mile Island Unit 1 - economically infeasible without 24/7 AI load. DOE assessments support significant new capacity at existing nuclear sites and repurposed coal sites; as a direct result, small modular reactor commercialization timelines have shifted forward.

Grid-enhancing technologies as a bridge: DLR, advanced power flow controllers, and topology optimization deliver capacity faster than new lines and at a fraction of the cost. Reconductoring with advanced conductors offers a near-term path to substantial transmission expansion without new rights-of-way.

Water as the second constraint: Liquid-cooled AI data centers consume significant water, making the water utility an unexpected stakeholder in site selection. UK and Indian regulators are increasingly co-evaluating power and water permitting - siloed approvals are no longer viable.

Initiatives by major players

Hyperscalers (Microsoft, Amazon, Google, Meta): Multi-billion-dollar nuclear and SMR off-take agreements; gigawatt-scale renewable PPAs; direct utility partnerships for co-located capacity. The buying motion has shifted from spot market to multi-decade contracts.

American Electric Power (US): Doubled firm contracted load additions to 56 GW - serving aluminum smelting, large industrial customers, hyperscalers, and large data center developers - a historic shift for what was a flat-demand business.

Dominion Energy (US): Boosted five-year capital investment plan to $50.1 billion through 2029 to support demand from large-load customers, with Northern Virginia data center load nearly doubling in contracted capacity year-on-year.

Key imperatives

Reframe demand forecasting around AI loads: Traditional load forecasting based on GDP and population growth misses the step-change of AI. Re-baseline IRPs and capital plans around hyperscaler-driven demand scenarios - and stress-test for both build-out delays and cancellations.

Build the hyperscaler customer motion: Hyperscalers buy differently from residential customers: long-term contracts, on-site presence, integrated power+water+land deals. Treat them as B2B accounts with dedicated teams. The relationship is closer to that of an industrial gas supplier than to a retail energy supplier.

Plan for the firming problem: AI workloads are 24/7 and intolerant of variability. Renewable PPAs alone cannot serve them. Pair renewables with firm capacity - gas, nuclear, hydro, or long-duration storage - and price firmness explicitly in the offering.

Coordinate power and water permitting: Liquid-cooled data centers make water utilities a primary stakeholder, not a peripheral one. Build joint power-and-water site-evaluation capability - siloed evaluation will lose deals to integrated competitors.

Sources: *Deloitte 2024 Power & Utilities Industry Outlook; McKinsey / EEI data center demand analysis; AEP and Dominion Energy investor disclosures; S&P Global Market Intelligence April 2026.*

03. Smart Metering and the Meter-to-Cash Reset

At a glance

India is implementing the world's largest smart meter deployment. By December 2025, 52.8 crore smart meters were installed across all programs, including 39 crore under RDSS. The Center is expected to raise the FY27 RDSS allocation to ₹18,000 crore. AT&C losses decreased from 21.91% in FY21 to 15.04% in FY25, strengthening the case for discom reform.

In other regions, focus has shifted from the meter to data integration and utilization. In South Africa, Eskom has installed 72,499 smart meters toward a March 2026 target of 577,347 on feeders impacted by load reduction, with program completion expected in 2027. In the US and UK, AMI is widely adopted, and the primary concern is how utilities will leverage the data.

Key market patterns

Smart meter operations centers: Real-time view of meter rollout status, communication health, billing run rates, and field operations - operating a 50-million-meter estate is not a project; it is a discipline. Auto-filtered, actionable alerts replace raw alarm streams; ML-driven prioritization reduces truck rolls and revenue leakage simultaneously.

Grid management via meter data: Voltage and load imbalance detection turns every meter into a sensor; nested outage identification pinpoints failures to the transformer. This is the foundation for non-wire alternatives and the only way to maintain an accurate meter-to-transformer map at scale.

Consumption analytics and revenue protection: Granular customer micro-segment profiling enables peer-comparison anomaly detection - material for theft and tampering reduction. AI-led consumption insights drive dynamic tariff design and demand-response targeting, turning the meter into a revenue tool rather than just a billing one.

Prepaid as a financial inclusion tool: India and South Africa are using prepaid smart metering to improve discom cash flow and bring informal customers into the formal grid. Advance revenue collection, reduced receivables, and lower interest costs are material; Indian discoms have cited working-capital improvements as a direct result.

Initiatives by major players

Genus Power, HPL, Secure Meters (India): AMISPs deploying tens of millions of smart meters under RDSS. Genus crossed 1 crore smart meters in February 2026 across nine states - Indian AMISPs are operating at a scale no other geography matches.

Itron, Landis+Gyr, Honeywell, Aclara (US/global): Next-generation AMI platforms with head-end-to-meter cybersecurity, multi-utility (electric, gas, water) metering, and cloud-native MDM and analytics.

Eskom Distribution (South Africa): Smart metering program targeting 577,347 high-loss-area meters by March 2026; integration with load-reduction elimination strategy and revenue protection.

UK water companies: AMP8 is rolling out smart meters for water and wastewater at scale for the first time, with leakage detection through customer-side flow analytics and affordability protection through usage-aware tariffs.

Key imperatives

• Treat AMI as a data platform, not a device program: The value is in the analytics layer, not the meter itself. Most of the ROI sits downstream of installation. Plan for AMI-to-ADMS/OMS/CIS integration from day one - retrofitting it after the rollout costs significantly more.

• Build a meter operations center: A unified, real-time view of rollout status, operational health, and analytical outcomes is the difference between a smart meter project and a smart meter program. This is also where the regulator's questions get answered - be ready before the first audit.

• Use meter data for grid edge intelligence: Voltage, phase, and outage data from meters can replace expensive purpose-built sensors and unlock non-wire alternatives. Precondition: a clean meter-to-transformer map. Most utilities discover at this point that theirs is not clean.

• Design for cyber and data protection from inception: AMI infrastructure carries near-real-time consumption data - a regulatory sensitivity that compounds rapidly at scale. DPDP (India), GDPR (UK/EU), and CPRA (California) all impose obligations that are best built in rather than bolted on.

Sources: *PRS India Demand for Grants 2026-27; SolarQuarter, Feb 2026; Eskom Power System Status, Dec 2025; Energetica India; Prayas Energy Group.*

04. The Water Sector's Digital Reset

At a glance

Water utilities are entering their largest investment cycle to date. Ofwat approved £104 billion for AMP8 (2025 – 2030), nearly four times the AMP7 allocation. Of this, £12 billion targets a 45% reduction in storm overflows from 2021 levels by 2030; £6 billion addresses nutrient pollution; and £3.3 billion supports nature-based solutions.

This investment plan requires the sector to expand its workforce and skill base, which has not yet occurred. The UK water sector needs approximately 100,000 new workers by 2030, making workforce development, knowledge management, and digital twin adoption as critical as capital projects. In May 2026, United Utilities raised £800 million in equity to increase its AMP8 program to about £11.5 billion.

Key market patterns

Digital twin hydraulic modeling: Real-time hydraulic simulation of water networks enables proactive combined-sewer-overflow prevention rather than reactive cleanup. Network digital twins are emerging as a regulatory expectation under PR24, not just a productivity tool - the question from Ofwat is no longer "do you have one" but "how mature is it."

Smart water metering and customer-side leakage: Customer-side AMI deployment unlocks personal leak alerts, dynamic tariff design, and demand-side conservation programs. Integration with billing, CRM, and self-service portals is the meter-to-cash modernization story repeating itself in water - the playbook from electricity is directly transferable.

Nature-based solutions: Sustainable drainage systems, biodiversity net gain, and wetland restoration have moved from CSR into capital portfolios. The £3.3 billion allocated across AMP8 makes nature-based solutions a formal regulatory category - not an optional add-on.

Net-zero operations: The UK water industry has committed to net-zero operational emissions by 2030 - 20 years ahead of the broader UK economy. Pump and treatment electrification, methane capture from wastewater, and on-site renewables move the carbon ledger from a corporate-affairs concern to an operational one.

Initiatives by major players

Severn Trent, United Utilities, Anglian Water: Largest AMP8 capital programs; integrated

digital, asset management, and customer transformation. United Utilities raised £800m equity in May 2026 to scale AMP8 to roughly £11.5 billion.

Thames Water: Financial restructuring underway; AMP8 delivery contingent on stabilization. Turnaround focused on customer service and pollution incident reduction - the political tolerance for further sewage events is now zero.

Suez, Veolia (Global): Global water operators bringing operations expertise to private concessions; digital twin platforms and smart-metering integration packaged as managed services.

Indian state water boards (BWSSB, MJP, DJB): SCADA modernization, smart bulk metering, and non-revenue water reduction programs, being scaled under the Jal Jeevan Mission and AMRUT 2.0.

Key imperatives

Treat AMP8 as a digital re-platforming: The £104 billion is conditional on demonstrating digital, data-led ways of working. Sequence platform investments ahead of asset replacement - the regulator's evidence test is about capability, not just spend.

Build the workforce-as-a-platform: 100,000 new UK workers cannot be hired through traditional recruitment alone. Digital twins, AI-augmented field workflows, and structured knowledge management become workforce strategy - institutional knowledge has to survive the retirement wave.

Make storm overflow prediction a board KPI: AMP8 ties both capital and reputation to reducing CSO events. Digital twin modeling shifts overflow management from reactive cleanup to predictive prevention - the only economically viable path to the ~45% target.

Sequence nature-based solutions alongside **grey infrastructure:** Ofwat now incentivizes nature-based solutions explicitly through the AMP8 framework. Treat them as a portfolio category with their own return profile, not a CSR add-on or an offset against grey-infrastructure delays.

Sources: *Ofwat PR24 Final Determinations Dec 2024; New Civil Engineer; Water Magazine May 2026; Causeway AMP8 skills report; Water UK workforce planning.*

05. Oil and Gas Goes Digital-First

At a glance

Oil and gas companies have invested in digital technology for two decades, but in 2026, digital capability will become the primary determinant of long-term competitiveness. Methane regulations, AI-driven drilling, autonomous operations, and refinery digital twins have transitioned from pilot projects to major investments.

India is driving regional growth. Refining capacity is projected to increase from 258 MMT in FY25 to 309 MMT by 2028, with long-term targets of 450 – 500 MMT by 2030 (IBEF). The US EPA's interim final rule in July 2025 postponed the methane Super-Emitter Program to 2027, but core standards remain robust, ensuring continued investments in monitoring.

Key market patterns

• **Methane monitoring and continuous detection:** Sensor networks, drone fleets, and satellite-based detection are moving from voluntary to mandatory across most major markets. Compliance data uncovers energy losses; firms recover part of the investment through recovered hydrocarbons and avoid both penalty exposure and carbon-cost-of-capital impact.

AI-led drilling and autonomous operations: Machine-learning-guided drilling lowers well cost and non-productive time across major operators - BP, SLB, Shell, ExxonMobil's XTO are all in production deployment. Pilots are scaling to autonomous well sites and predictive failure prevention; the economic case is hardest in lower-priced environments, where it matters most.

Refinery and asset digital twins: Real-time process unit optimization and predictive maintenance reduce unplanned downtime materially - Lighthouse-class facilities recognized by the World Economic Forum have demonstrated significant GHG and maintenance cost reductions. The twin is also a workforce-strategy investment: it preserves operator expertise as the experienced cohort retires.

LNG and petrochemical pivot: LNG infrastructure is expanding across India, the US, and Asia, with India's gas demand growth among the fastest in the IEA's outlook. Petrochemical integration captures crude-to-chemical margins as transport fuel demand plateaus - the long-term portfolio shift, not just an opportunistic add.

Initiatives by major players

Saudi Aramco: Multiple Global Lighthouse Network facilities recognized by the World Economic Forum for digital transformation in upstream and downstream operations - among the most extensive enterprise AI footprints in the sector.

Shell, BP, ExxonMobil: AI-led upstream programs, large-scale data-platform consolidation, and deepwater AI partnerships with SLB. The capex line is now treated as a hedge against price volatility.

Reliance Industries (India): World's largest single-site refining complex at Jamnagar; deep digital integration across refining, petrochemicals, and retail - the integrated operating model that majors elsewhere are still trying to assemble.

ONGC, BPCL, HPCL (India): Public-sector oil and gas majors pursuing energy transition investments alongside core hydrocarbon operations; renewable acquisitions and CCUS feasibility studies underway.

Key imperatives

Make methane-zero an operating discipline: Continuous monitoring, automated leak detection, and Scope 1 disclosure are becoming both regulatory and capital-market necessities. The cost of carbon is increasingly the cost of capital - methane intensity is the most visible metric to lenders and rating agencies.

• **Treat upstream digital as a hedge against price volatility:** AI-led drilling and predictive maintenance reduce breakeven costs - most valuable precisely when prices are low. In a long-cycle, lower-price environment, digital is the highest-leverage capex category. Defer it at your peril.

• **Plan the energy transition portfolio explicitly:** Mature oil and gas players are simultaneously growing LNG, petrochemicals, and renewables. Portfolio rebalancing - not pivoting - is the operating model. Communicate it that way to investors and to the workforce.

• **Build the cybersecurity case for OT/IT convergence:** Connected operations expose decades-old control systems to internet-borne threats. Cybersecurity capex is now a precondition for operational digitalization, not a separate budget, and a precondition for insurer cooperation.

Sources: *Deloitte 2026 Oil and Gas Industry Outlook; IBEF Indian Oil and Gas Industry Analysis; US EPA methane rules; World Economic Forum Global Lighthouse Network.*

06. Agentic AI in the Utilities Back Office

At a glance

Back-office automation is the most underutilized method for increasing productivity in utilities, surpassing field automation. Tasks including regulatory filings, engineering schematic reviews, customer service triage, and investment decision modeling require significantly skilled time. Agentic AI is the first technology capable of accelerating these processes end-to-end.

Investment commitment remains robust. Gartner forecasts global IT spending in the power and utilities sector will increase from $249.3 billion in 2025 to $379.2 billion by 2029, reflecting a 10% annual growth rate. Among those surveyed, 94% of power and utility CIOs plan to increase AI investments in 2025, with an average increase in spending of 38.3%. Gartner also predicts 40% of power and utility control rooms will utilize AI-driven operators by 2027.

Key market patterns

Regulatory workload management: AI summarizes new regulations, automates data collection and validation, and formats reports for FERC, Ofwat, NERSA, and CERC filings. Continuous monitoring of regulatory websites means compliance teams are alerted to relevant changes before peers - turning regulation from a tax into a competitive signal.

Engineering schematic validation: Generative AI trained on grid connection schematics flags pattern violations and compliance gaps before they reach an engineer's desk. Engineers focus on complex cases; routine reviews are materially compressed, thereby accelerating connection queues and capital deployment.

Investment-decision modeling: AI models scenarios for renewables, batteries, hydrogen, and emerging technologies across changing regulations and operational cost curves. Particularly valuable in evaluating industrial-scale batteries, small modular reactors, and CCUS, where the unknowns dominate the case.

AI-driven customer support: AI help desks handle outage and billing queries with predictive proactive alerts; sentiment analysis identifies dissatisfied customers and routes them to retention specialists. Omnichannel support with seamless human escalation - the chatbot era is over; the agentic-AI service era has begun.

Initiatives by major players

Octopus Energy (UK): AI-led customer service handling a majority of inbound contact; sentiment-aware routing; integration of agentic AI with operational decisioning. The Kraken platform is licensed to other utilities globally as a productized capability.

Exelon, Duke, Southern Company (US): Generative AI piloting across compliance filings, customer service, outage triage, and asset-condition monitoring - the back-office is the visible frontier of adoption.

Microsoft + Indian utilities and oil and gas: Enterprise platform partnerships supporting digital transformation across refining, marketing, and customer-engagement operations. India is increasingly an AI adoption testbed at scale.

Key imperatives

Begin with areas where regulations impose the greatest burden: Compliance, filings, and engineering-schematic review present the most beneficial initial focus. A defined scope, quantifiable results, minimal operational risk - and the regulator is becoming more of a facilitator rather than a hindrance.

Start where regulation creates the most workload: Compliance, filings, and engineering-schematic review are the highest-leverage starting points. Bounded scope, measurable outcomes, low operational risk - and the regulator is increasingly an enabler, not an obstacle.

Establish AI governance before scaling: Utilities operate under stringent regulatory oversight; model risk management, audit logs, and explainability frameworks must exist from the pilot stage. Retro-fitting governance after a scaled deployment is more expensive than building it in, and a single explainability failure can stall the whole program.

Combine agentic AI with workflow redesign: AI does not pay back on top of broken processes. Use agentic AI as the trigger to redesign end-to-end workflows - the technology is the catalyst, not the solution by itself.

Treat the AI platform as enterprise infrastructure: Avoid stranded point solutions: a common platform - data fabric, identity, model registry, observability - multiplies the return on every new use case. Without it, each use case has to repay the foundation costs from scratch.

Sources: *Gartner Forecast: Enterprise IT Spending for Power and Utilities, 2Q25 Update; Gartner Press Release Jan 15 2025; company disclosures.*

07. OT/IT Cybersecurity and Operational Resilience

At a glance

As grid edge devices, smart meters, distributed energy resources, pipelines, and refinery control systems become interconnected, the cybersecurity perimeter for utilities extends far beyond the corporate firewall. Cyber risk is now a board-level operational concern, attracting scrutiny from regulators, insurers, and capital markets.

Regulatory expectations are explicit. NERC CIP enforcement in the US, NIS2 in Europe, and CERT-In requirements in India are prompting utilities to incorporate cybersecurity into capital budgets. In India, the RDSS Standard Bidding Document mandates AMI service providers to comply with cybersecurity standards, cloud security, incident management, and the Digital Personal Data Protection (DPDP) Act.

Key market patterns

Expanding OT attack surface: The convergence of operational technology with IT exposes legacy control systems - built for isolated environments - to Internet-borne threats. Every new connected meter, DER controller, and field device expands the perimeter to be defended.

Regulation as a capital driver: NERC CIP (US), NIS2 (Europe), and CERT-In (India) are converting cybersecurity from a discretionary cost into a mandated capital category. In India, the RDSS bidding framework embeds security, cloud, and DPDP obligations directly into AMI contracts.

Third-party and supply-chain risk: AMI vendors, DERMS providers, and managed-service partners now operate inside the critical-infrastructure perimeter. A breach in a supplier's environment is effectively a breach in the utility's.

Insurer and capital-market scrutiny: Cyber insurance underwriters and rating agencies increasingly require evidence of minimum controls. Cyber posture now influences both premiums and the cost of capital.

Initiatives by major players

Major US IOUs: Dedicated OT security teams; NERC CIP audit programs; cyber-physical resilience exercises with DOE and DHS-CISA. The regulatory floor is high and rising.

UK utilities + NCSC: Joint exercises and threat intelligence sharing under critical national

infrastructure mandates; sector-specific scenario planning.

Indian discoms + CEA: Cybersecurity guidelines for the power sector; sectoral CERT coordination; DPDP compliance programs at AMI service providers. The regulatory framework matured significantly through 2024 – 2025.

Specialist OT cyber vendors: Dragos, Claroty, and Nozomi Networks are providing OT-specific monitoring; integration with traditional SIEM and SOAR platforms is now the standard architecture.

Key imperatives

Move from compliance to capability: NERC CIP, DPDP, and NIS2 are floors, not ceilings. Benchmark against threat-intelligence-driven adversary tactics - the regulators are catching up to where the attackers already are.

Integrate OT and IT SOCs: Separate IT and OT security teams create blind spots in exactly the gaps adversaries target. A unified SOC with OT-trained analysts is essential as smart meters, DER controllers, and field devices multiply.

Stress-test third-party risk: AMI vendors, DERMS providers, and managed-service partners now sit inside the critical infrastructure perimeter - their breach is your breach. Continuous vendor risk monitoring is no longer optional; quarterly questionnaires do not survive contemporary threat models.

Plan for the regulator and the insurer: Cyber insurance underwriters and regulators are increasingly aligned on minimum controls. Build the program once; satisfy both audiences - and avoid the trap of optimizing for the audit at the expense of underwriting.

Sources: *NERC CIP filings; UK NCSC guidance; India CERT-In and CEA directives; Digital Personal Data Protection Act 2023.*

08. ESG, Carbon Management, and Sustainable Finance

At a glance

Carbon accounting has become a critical determinant of capital costs, extending beyond corporate responsibility. Utilities and oil and gas companies with robust decarbonization plans gain access to larger and more affordable capital sources. Those without such plans face higher costs, divestment pressure, and an increased risk of stranded assets.

Sustainable finance, such as green bonds, sustainability-linked loans, and transition finance, has become a primary funding mechanism for utility modernization. Investors now require not only targets but also auditable monitoring. This underscores the importance of Scope 3 measurement and continuous MRV monitoring.

Key market patterns

Scope 3 measurements: Supply chain, capital goods, employee travel, and end-use of sold products are the largest and least measured emissions categories. It is becoming a board-level priority as disclosure rules tighten and credible measurement becomes commercially material, not just reputationally material.

Carbon capture and last-mile emissions: CCS, CCUS, and carbon dioxide removal are moving from pilot to industrial deployment, particularly in hard-to-abate sectors. Methane abatement, F-gas, and residual fossil-fuel use are the targets of last-mile reduction - the cheap abatement is already done.

Sustainable finance scale-up: Green bonds, sustainability-linked loans, and transition finance are funding utility modernization at scale. These instruments are tied to verifiable KPIs - emission reductions, renewable energy share, water-leakage targets - thereby turning ESG performance into a treasury function.

Continuous-monitoring MRV: Sensor-driven monitoring of emissions and carbon flows replaces annual self-reports and survives auditor scrutiny. Tamper-proof, auditable, regulator-grade verification is becoming the default in voluntary carbon markets and will be the default in mandatory disclosure, too.

Initiatives by major players

Prominent European utilities (Iberdrola, Enel, Ørsted) are leading in ESG transparency and green bond issuance; they are expanding their

portfolios in CCUS and offshore wind, and their TCFD-aligned reporting serves as a benchmark for other regions.

Key Indian oil and gas companies are currently making renewable energy acquisitions, conducting CCUS feasibility studies, and launching green hydrogen pilot projects alongside their core hydrocarbon operations - this transition is evident, though still in an earlier phase than that of their European counterparts.

Sasol (South Africa): Largest single-site GHG emitter in South Africa; coal-to-gas pivot and CCUS feasibility under regulatory and investor scrutiny. A live case study of how energy-transition pressure plays out for a fossil-heavy operator.

Key imperatives

Build Scope 3 measurement now: Scope 3 is the next disclosure boundary; the firms still building it in 2026 will face cost-of-capital penalties through 2027 – 2028. Those who move early gain access to transition finance and the lower-cost end of the green bond curve.

Pair carbon strategy with transition financing: Green bonds, transition finance, and sustainability-linked loans require credible KPIs - the same KPIs the regulator wants. Use them to subsidize the digital-and-decarbonization capex rather than treating ESG as a parallel program.

Adopt continuous-monitoring MRV: Sensor-driven, auditable monitoring of emissions replaces annual self-reports and survives auditor scrutiny. The cost of monitoring infrastructure is now less than the cost of disputing a single contested disclosure.

Frame ESG as a capital strategy: ESG performance now sits in treasury and investor relations, not just corporate affairs. Boards should treat it accordingly - and the CFO, not the CSR officer, should own the headline metrics.

Sources: *TCFD recommendations; IEA Net Zero Roadmap; Sasol annual report; PRSIndia renewable purchase obligation trajectory.*

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This paper, published by the TMT Industry Solutions Group (ISG) at Zensar, presents our perspective on the global trends shaping utilities, oil and gas, and water companies in 2026 and beyond.

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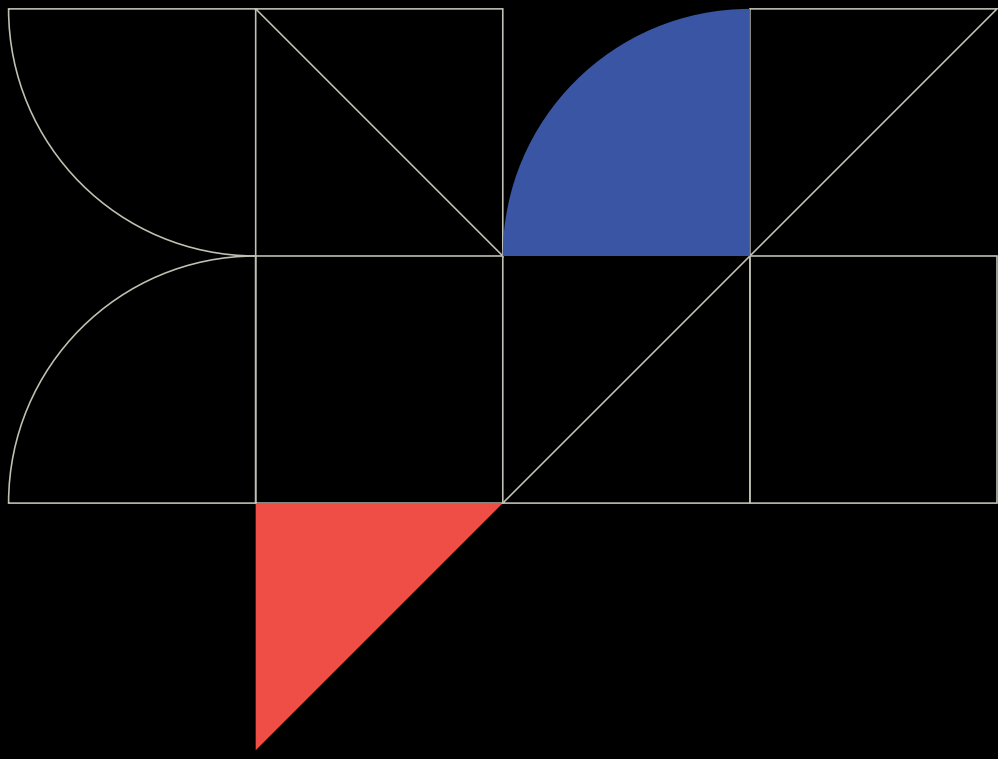

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Glossary

EEI – Edison Electric Institute
DBRS – Dominion Bond Rating Service (Morningstar DBRS)
AMP7 / AMP8 – Asset Management Plan 7 / 8 (UK water sector five-year investment cycles)
Ofwat – Water Services Regulation Authority (UK)
GW – Gigawatt
DOE – (US) Department of Energy
NOAA – National Oceanic and Atmospheric Administration
IRP – Integrated Resource Plan
SMR – Small Modular Reactor
DLR – Dynamic Line Rating
ADMS – Advanced Distribution Management System
DERMS – Distributed Energy Resource Management System
DER – Distributed Energy Resource
OMS – Outage Management System
SCADA – Supervisory Control and Data Acquisition
AMI – Advanced Metering Infrastructure
AMISP – Advanced Metering Infrastructure Service Provider
RDSS – Revamped Distribution Sector Scheme (India)
AT&C – Aggregate Technical and Commercial (losses)
DISCOM – Distribution Company (India)
MDM – Meter Data Management
CIS – Customer Information System
DPDP Act – Digital Personal Data Protection Act (India)
GDPR – General Data Protection Regulation (EU/UK)
CPRA – California Privacy Rights Act
CSO – Combined Sewer Overflow
MRV – Measurement, Reporting, and Verification
CCS – Carbon Capture and Storage
CCUS – Carbon Capture, Utilization, and Storage
TCFD – Task Force on Climate-related Financial Disclosures
ESG – Environmental, Social, and Governance
LNG – Liquefied Natural Gas
IEA – International Energy Agency
IBEF – India Brand Equity Foundation
EPA – (US) Environmental Protection Agency
MMT – Million Metric Tonnes
NERC CIP – North American Electric Reliability Corporation – Critical Infrastructure Protection
NIS2 – Network and Information Security Directive 2 (EU)
CERT-In – Indian Computer Emergency Response Team
SOC – Security Operations Center
SIEM – Security Information and Event Management
SOAR – Security Orchestration, Automation, and Response
NCSC – National Cyber Security Centre (UK)
CISA – Cybersecurity and Infrastructure Security Agency (US)
NERSA – National Energy Regulator of South Africa
NTCSA – National Transmission Company of South Africa
CEA – Central Electricity Authority (India)
PPA – Power Purchase Agreement
ETR – Estimated Time of Restoration
CIO – Chief Information Officer
OT/IT – Operational Technology / Information Technology
WEF – World Economic Forum
AMRUT – Atal Mission for Rejuvenation and Urban Transformation (India)
CAGR – Compound Annual Growth Rate
TMT – Technology, Media, and Telecommunications
ISG – Industry Solutions Group