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Intelligent Choice Architectures in the Energy, Resources, and Utilities Sectors

by Michael Schrage and David Kiron

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As AI-driven decision environments evolve, the question for energy, resources, and utilities leaders is not whether to automate but how to architect decision-making and decision rights.

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As power grids become more complex and critical infrastructure faces increasing regulatory scrutiny, companies in the energy, resources, and utilities sectors must redefine the relationship between human expertise and machine intelligence. Artificial intelligence is no longer just optimizing processes in these sectors — it is reshaping how these companies structure, make, and delegate decisions. These decisions address better maintaining load balance and sustainability; anticipating, managing, and recovering from destructive wildfires and other weather-related events; and enhancing customer experience.

Leading energy, resource, and utilities companies are navigating this shift in distinct ways. Enbridge, one of North America's largest midstream pipeline operators, is deploying AI to enhance capital allocation, reduce energy costs, and optimize predictive maintenance, balancing automation and human oversight in critical infrastructure management. Southern California Edison (SCE), a major U.S. electric utility, is using AI to improve customer relationships and ensure that high-stakes operational decisions are more transparent, adaptive, and risk-informed. Energy management and digital automation multinational Schneider Electric began using AI at scale three years ago to create new options for increasing internal efficiency and boosting its customers' energy efficiency with the same goal it had set for itself: to increase productivity and sustainability.

Intelligent Choice Architectures (ICAs)

Intelligent choice architectures are dynamic systems that combine generative and predictive AI capabilities to create, refine, and present choices for human decision makers. They actively generate novel possibilities, learn from outcomes, seek information, and influence the domain of available choices for decision makers.

As AI-driven decision environments evolve, the question for energy leaders is not whether to automate but how to architect decision-making and decision rights: These actions are essential to determining when AI should suggest, augment, or take direct control of any given operational process. This industry brief examines how AI is transforming decision-making in the energy, resources, and utilities sectors, drawing lessons from real-world deployments.

A New Decision-Making Paradigm

We envision the future of energy being shaped by intelligent choice architectures (ICAs). These decision frameworks use predictive and generative AI to expand and refine the choices available to both human operators and autonomous systems. Building on the concept of choice architectures, which organize the context in which people make decisions, ICAs integrate machine intelligence to construct adaptive and context-aware decision environments. They do more than automate workflows; they expand and refine choice sets, ensuring that decision makers — whether human operators or AI agents — have the best possible options to consider and act upon.

ICAs in the energy, resources, and utilities sectors are enabling organizations to:

- Enhance asset efficiency by dynamically optimizing energy usage and infrastructure reliability.
- Improve predictive maintenance with AI-driven models that anticipate failures in order to proactively intervene.
- Enhance customer support and engagement with real-time outage communication, more accurate bill prediction and explanation, and fraud detection.
- Advance grid operational management through adaptive automation that balances resilience, sustainability, and financial performance.
- Manage risk and compliance by embedding AI-driven governance into mission-critical decision-making.

ICAs in Energy, Resources, and Utilities Operations: Lessons From Leading Organizations

While the three organizations we interviewed operate in different corners of the energy, resources, and utilities industries, they must overcome similar challenges to succeed. Already-high costs — thanks to significant capital requirements, fierce competition, and volatile market conditions — are increasing further due to economic volatility, growing demand for sustainable energy production and consumption, and an increasingly complex regulatory environment.

ICAs are playing a central role in helping organizations meet these challenges, by facilitating the development of more effective decision environments for leaders. As Funmi Williamson, chief customer officer at SCE, notes, "I generally start with the outcomes, and the outcomes lead me to insights or questions I'm trying to answer, which then lead me to data." This logic of reverse engineering from well-defined objectives ensures that the customer — not the data or the dashboard — is the true anchor of digital transformation. Below, we discuss three aspects of Enbridge's, SCE's, and Schneider Electric's AI implementations — adopting a decision framework, allocating decision rights to humans and machines, and establishing a data governance framework — and the key lessons they have to offer.

AI-Powered Capital and Energy Optimization

Both Enbridge and SCE are using AI to maximize capital efficiency and optimize their customers' energy consumption.

Enbridge has deployed its proprietary Energy Optimizer tool to better control energy demand in its pipeline operations, reducing energy costs across a billion-dollar annual energy expenditure by more than 10%. This AI-driven system applies multiple machine learning models that together minimize daily fuel consumption, maximize throughput, and calculate the optimal volume for gas pipeline operations. While the system makes recommendations, human operators oversee the process, making final implementation decisions. As Bhushan Ivaturi, the former CIO of Enbridge, explains, "AI is enabling us to optimize energy demand consumption and significantly reduce costs, but it requires human collaboration to ensure effective implementation." Such human-machine collaborations lead to achievements that neither human nor machine could accomplish alone.

SCE is cautiously but increasingly integrating AI-driven demand forecasting into a system that analyzes historical data and current conditions to forecast energy loads, which helps operators anticipate peak demand periods and allocate resources accordingly. This transforms load management decisions from reactive interventions to proactive, predictive planning. "In an era of increasing volatility and demand complexity, we see AI as a critical tool for improving customer experiences," Williamson says. "Using AI to predict and detect outages enhances outage response speed and accuracy. It also enables us to predict with more precision when power will be restored, a key customer pain point."

Schneider Electric, meanwhile, is harnessing AI to formulate optimal manufacturing setups for its clients. Its cloud-based Ecostruxure Microgrid Advisor platform, for example, uses predictive algorithms to help users make decisions about when to consume, produce, and store energy from distributed sources. The system analyzes usage patterns to recommend the most cost-effective and sustainable energy management approach.

Key takeaway: Energy, resources, and utilities companies must move beyond traditional management models and adopt AI-driven decision frameworks that continually learn and optimize for capital and energy efficiency.

Automation Versus Augmentation: The Decision Rights Balancing Act

AI adoption in utilities is not necessarily about full automation but rather about effectively structuring decision rights. Enbridge, SCE, and Schneider Electric are balancing machine-driven automation and human oversight in critical areas.

At Enbridge, predictive maintenance models are used to anticipate equipment failures, allowing operators to intervene proactively. The system uses machine learning to predict failures well before they may occur, transforming maintenance from reactive repair to strategic asset management. However, human operators remain in the loop for high-stakes decisions to ensure regulatory compliance and safety. "In critical infrastructure, the human element remains indispensable," Ivaturi notes.

At Schneider Electric, safety criticality determines automation levels. Philippe Rambach, the company's senior vice president and chief AI officer, explains its approach: "For home energy efficiency, we have it working in full autonomy because the worst case is, it doesn't generate the savings. If the worst case was that the house is set on fire, we could not have it be autonomous." Conversely, for customer service interactions involving technical guidance, human agents review AI-generated responses because "we cannot rely on the probability of generative AI alone," Rambach says.

Key takeaway: As energy, resources, and utilities companies pursue ICAs, they must develop a decision rights matrix that explicitly defines which AI-generated choices should be fully automated rather than augmented or overseen by human decision makers.

Data as a Strategic Asset: Spotlight on Governance, Not Growth

Energy, resources, and utilities companies can integrate and correlate significant volumes of data to potentially transform operations and decision-making. However, the three organizations we spoke with rightly emphasize structured data governance over indiscriminate data accumulation.

SCE deploys AI incrementally, starting within well-understood customer segments — aligning insights with higher data integrity pockets and using early successes to expand scope and scale. "For the population that I feel pretty good about, I start deploying in that smaller circle, and then, as it gets better, I expand," Williamson says. This iterative, grounded strategy reflects a disciplined, outcomes-first governance philosophy that prizes meaningful experimentation over speculative data mining and is central to managing both customer expectations and experiences.

This emphasis on outcomes influences Enbridge's application of AI across its vast data assets. "There's data

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everywhere, but we're not going to boil the ocean of data," Ivaturi says. "That can become a never-ending exercise in cleansing, organizing, and governing, and we'll never get started on the application of these AI capabilities on top of data to unlock value and get the returns now rather than later." Instead, the company is prioritizing data and applications that will deliver clear returns. This ensures "that AI is built on high-quality, valuable data rather than accumulating noise," Ivaturi explains. Enbridge has adopted a federated governance model, wherein individual business units steward their own data sets while a centralized data platform provides transparency, security, and accessibility.

Both the quantity and quality of data are crucial for Schneider Electric's AI applications. So is security. The company opted to deploy an internal version of OpenAI's GPT AI model whereby data never leaves the company's network. The company uses it to provide a secure, conversational AI assistant to its employees. Finance Advisor, another tool, surfaces information to aid financial analysts in their decision-making.

Key takeaway: Having a well-designed, AI-ready data governance framework in place ensures that energy and utility companies can extract maximum value from AI investments while maintaining regulatory compliance and operational agility.

Risk, Compliance, and AI Ethics in Critical Infrastructure

Energy, resources, and utilities companies operate under tight regulatory constraints that require AI deployments to be explainable, auditable, and resilient. Schneider Electric, Enbridge, and SCE are constructing risk-aware AI architectures to mitigate unintended consequences.

Schneider Electric has a responsible AI workgroup focused on frameworks and legislation to ensure that its AI use cases comply not only with established ethical and regulatory guidelines but also with the internal ethical standards outlined in its code of conduct.

Enbridge likewise has adopted a responsible AI framework, embedding ethics, compliance, and cybersecurity reviews into AI model deployment. Machine-driven pipeline monitoring, for example, detects vegetation overgrowth, pipeline leaks, and security threats, and human oversight ensures regulatory adherence. As Ivaturi explains, "We have the working committee that has membership from not just technology and the product owner from the business but also from ethics, from compliance, from legal, from privacy, from cybersecurity."

Key takeaway: AI risk management in energy must incorporate more than model performance metrics and include regulatory readiness, ethical oversight, and adaptive compliance mechanisms.

A New World of Workforce Allocation With AI

ICAs in the energy, resources, and utilities sectors are not just revolutionizing infrastructure, capital, and risk management decisions — they are also redefining how work is assigned, optimized, and configured. Enbridge and SCE offer compelling examples of how AI is being used to improve workforce allocation, technician dispatching, and operational staffing. Both organizations use AI to balance workloads, assign resources more efficiently, and ensure operational resilience. Enbridge has applied AI in customer service operations to optimize agent workloads

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and improve service quality. An AI-powered customer care assistant automatically triages and routes requests based on issue complexity and necessary expertise. “AI has helped us deflect a number of customer calls in a way that allows people to self-serve,” Ivaturi says. “For complex cases, our AI-driven copilot ensures that agents are equipped with the right insights.”

By incorporating these perspectives and practices into workflows, SCE demonstrates that even within complex constraints, AI can be shaped into a system that augments decision-making, elevates customer outcomes, and builds trust — not just with customers but across the energy ecosystem.

Enbridge uses predictive AI to assist in pipeline maintenance staffing by forecasting equipment failures and strategically positioning personnel for rapid intervention. “We’re leveraging AI-driven insights to make sure our teams are deployed efficiently, ensuring that we’re balancing safety, compliance, and operations,” Ivaturi says.

These applications of workforce allocation ICAs, from customer service triaging to field technician deployment to emergency response staffing, elucidate some emerging trends in this area, including the following:

- **Shifting from reactive to proactive staffing:** AI enables predictive workforce planning, ensuring that the right resources are deployed ahead of demand. ICAs can also be used to address talent shortages in the oil and gas industry by sourcing workers in adjacent industries with transferable skills, thus expanding workforce planners’ options.
- **Deploying AI-generated decision sets to supercharge resource allocation decisions:** AI can quickly present multiple staffing scenarios to decision makers, along with the likely impact of each (e.g., the cost-benefit trade-off between specialist teams versus generalist dispatchers in field operations).
- **Fostering human-AI collaboration in staffing and workload decisions:** AI augments rather than replaces workforce decision-making, helping managers make more data-informed, strategic work allocation decisions. By formalizing AI-driven workforce decision models, energy companies can balance automation and augmentation, ensuring that human expertise remains a core driver of intelligent decision-making.

The Future of AI-Driven Decision-Making in the Energy, Resources, and Utilities Sectors

The next evolution of ICAs will redefine decision-making in energy, resources, and utilities companies by delivering AI-driven recommendations that are more context-aware, risk-sensitive, and operationally integrated.

However, leaders in these sectors must be deliberate and thoughtful in their approach to developing and scaling ICAs. Some critical steps energy, resources, and utilities leaders can take to set their organizations on the right path include:

1. Formalizing AI-driven decision governance to optimize automation-versus-augmentation trade-offs.
2. Strengthening AI data infrastructure to enable real-time, high-confidence decision-making.
3. Aligning AI models with regulatory requirements to balance innovation with compliance.
4. Using AI to create financial and operational optionality, treating efficiency gains as strategic assets.
5. Committing to human-AI collaboration, ensuring that their workforces evolve along with technology.

As AI matures, organizations in the energy, resources, and utilities industries that structure decision-making around intelligent, risk-aware, and adaptive AI choice architectures will lead the industry’s transformation. Leaders who embrace this opportunity should meet with their teams and consider asking specific questions about whether the company is ready to implement ICAs:

1. Do we have the talent and data infrastructure to support the development of trustworthy intelligent choice architectures and their integration into work processes?
2. What investments do we need in order to cultivate trustworthy ICAs?
3. What functions with which pain points would most benefit immediately from ICAs?

Appendix:
ICAs Transform the Decision Environment

The table below outlines the capabilities of intelligent choice architectures to change decision environments.

Intelligent Choice Architecture (ICA) Capabilities	How ICA Capabilities Change Decision Environments
Elevating Decision Quality Through Expanded Choice Sets	ICAs bring a wider array of high-quality, contextually relevant choices to the forefront. Unlike traditional decision tools, which often present static or limited options, ICAs dynamically generate new alternatives based on evolving data patterns and contextual insights. This expansion means that decision makers are not confined to conventional or habitual choices; instead, they can consider innovative options that may have been previously hidden or overlooked. This boosts the quality of decisions by ensuring that people's choices reflect a more comprehensive understanding of the decision context.
Anticipating Outcomes With Predictive Foresight	By integrating predictive modeling, ICAs provide decision makers with insights into potential outcomes for each option in real time. This anticipatory capacity helps decision makers weigh trade-offs and risks more effectively. For example, a retail manager assessing inventory decisions might see not only the immediate costs but also the projected downstream impacts on sales, supply chain dependencies, and seasonal trends. This predictive foresight helps decision makers align their choices with longer-term strategic goals rather than just short-term gains.
Adapting Choices Through Continuous Learning and Feedback	ICAs learn from previous outcomes, continuously refining their own architecture based on new data and feedback. This means that decision environments are not static; they evolve and improve over time, becoming more aligned with organizational goals and individual decision makers' preferences. In a talent management scenario, for instance, an intelligent choice architecture might identify patterns in employee performance and turnover to adjust its recommendations for promotions, training, or transfers. This adaptability ensures that the system remains relevant and valuable as situations and objectives shift.
Enhancing Decision Confidence by Revealing Hidden Interconnections	ICAs expose the interdependencies between different choices, making it easier for decision makers to understand how one choice impacts others across the organization. This interconnected view is particularly valuable in complex environments where decisions in one area can have cascading effects in others. For example, a marketing manager at a global retailer like Pernod Ricard could see how adjustments to campaign targeting affect inventory needs, distribution channels, and customer engagement. By making these connections transparent, ICAs help decision makers feel more confident and informed since they can see the broader implications of their choices.

Intelligent Choice Architecture (ICA) Capabilities	How ICA Capabilities Change Decision Environments
Decentralizing Decision-Making With Tailored Choice Architectures	By providing context-specific guidance directly to individuals at all levels, not just top leaders, and tailoring decision environments to the needs of different roles, intelligent choice architectures enable more agile and decentralized decision-making across the organization.
Reducing Cognitive Load by Streamlining Complex Information	ICAs filter and prioritize information, presenting decision makers with the most relevant data and choices, which minimizes cognitive overload. Rather than wading through endless reports or raw data, decision makers receive streamlined insights and summaries that highlight essential patterns, anomalies, and recommended actions. For example, in supply chain management, an intelligent choice architecture could surface key inventory adjustments or supplier choices based on real-time demand fluctuations and historical trends, sparing managers from unnecessary complexity. By simplifying complex information, ICAs allow decision makers to focus their attention on critical decisions with clarity and confidence, improving both speed and accuracy in decision-making.
Personalizing and Interacting With Decision-Making Environments	ICAs create an interactive, engaging, and highly customized environment that adapts to each decision maker's preferences, needs, and goals. Rather than offering a one-size-fits-all interface, these architectures adjust dynamically, using user interactions and feedback to shape how information and options are presented. For instance, a retail executive might prioritize metrics like customer lifetime value or churn predictions, while a store manager may need insights on daily inventory and staffing. ICAs can personalize dashboards and recommendations accordingly, making interactions feel more intuitive and responsive. Additionally, intelligent choice architectures can incorporate interactive tools like what-if scenarios, simulations, and decision trees, enabling decision makers to explore potential outcomes in real time and test various options before committing to a course of action. This interactive engagement not only makes the decision process more enjoyable but also boosts confidence, since users can see the immediate effects of adjustments and tailor their decision pathways to better align with strategic priorities.

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