From Generation to Supply: Electricity Regulators (Part 6)

With AI, regulators can enhance market surveillance capabilities, streamline compliance processes, and gain valuable insights to make informed decisions.

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“From Generation to Supply: How AI is Transforming the Energy System” is a six-part series on the many ways in which AI is helping to transform the energy sector at every stage of the generation, transmission and distribution, system operation, supply, and regulation cycle. This is Part 6 and the final part of the series.

Picture this: you experience some problem with electricity in your home, so you call up your electricity supplier only to wait on hold for 30 minutes (or more), listening to an automated message or terrible music. Sound familiar? If, in those moments, you’ve ever wondered, “Who can I call to complain about my supplier?” the answer is simple: your electricity regulator.

Mostly remembered in moments of crisis or scandals, electricity regulators serve as the gatekeepers of the energy system, balancing the interests of consumers, utilities, and,

more recently, the environment. Their role extends beyond traditional regulation, encompassing the facilitation of the energy transition and the integration of renewable sources. This may all sound simple, but their tasks are incredibly challenging considering the diversity of stakeholders, the constant necessity to balance affordability, reliability, and sustainability, and the different interests across the electricity value chain. For these reasons, it's common to see market players nudging regulators to respond more quickly or change the rules of the game to accelerate the transition to a decarbonized electricity system.

And the effort to push toward energy transition is not the only pressure that regulators have to deal with; the digitalization of our electricity system imposes similar challenges to whether regulators will act as a blocker or an enabler of the current transformation pace. As I've discussed throughout the series, every energy player has the potential to leverage advanced data analytics and AI models to become more efficient and innovative. But who guarantees these models are reliable, accountable, fair, and transparent (RAFT)? And how can electricity regulators stop playing catch-up and leverage all their data access to improve their own efficiency?

What Are Electricity Regulators?

First, let's make sure we've defined all of our terms.

Electricity regulators are independent entities entrusted with overseeing the electricity market, ensuring fair competition, and safeguarding the interests of both consumers and industry players. These regulatory bodies operate at national, regional, or local levels, depending on the market

structure, and their primary focus is to create a level playing field, promote market efficiency, and maintain grid reliability. A few examples are Ofgem in the United Kingdom, AER in Australia, and PUC in Texas/US.

Electricity regulators rely on data as a core input to increase market transparency, guarantee agents' compliance, identify bad behavior, and anticipate policy impacts on the broader system. Through constantly monitoring and regulating the operation of the market, regulators can supervise the allocation of resources, enable new pricing structures, and promote the optimal utilization of infrastructure. By fostering competition, regulators encourage innovation, increase the system's cost-efficiency, and improve service quality, benefiting consumers through lower prices and enhanced choice.

Regulators have a wide range of responsibilities, but regulating how electric utilities deploy AI in their operations usually is not one of them. Governments worldwide are speeding up AI regulations to guarantee models' benefits are leveraged and risks diminished. However, even the most advanced ones, like the EU AI Act, are still generic and don't include a clear path for aligning AI frameworks to national electricity regulation. Different regulatory structures will emerge from these global discussions, and electricity regulators will have an essential role to play in bringing their domain expertise to ensure AI's RAFT development.

AI for Electricity Regulation

While electric utilities look to AI to become more efficient and benefit their operations, electricity regulators have to

consider two paths along their journey to operational efficiency. There is the possibility of utilizing AI to improve their efficiency when regulating the market (regulation through AI), but there is also the necessity of overseeing the market utilization of the technology (regulation of AI), for which they may become fully or partially responsible in the near future.

Regulation Through AI

The interconnection of our energy system creates a lot of pressure on electricity regulators when it comes to making decisions that can impact millions of consumers. No one wants to trade off more renewable energy connected to the grid at the expense of vulnerable consumers paying more for their electricity. On the other hand, regulation needs to enable the pace required for transitioning our energy system into a cleaner, fairer, more digitized one.

AI serves as an accelerator for electricity regulators looking to perform their responsibilities more efficiently. Running complex analyses, like the impact of new players on the market, or rigorous stress tests to guarantee their financial health during a crisis, or even simulations of CO2 emissions scenarios from a growing renewables matrix, are great examples of AI's potential for regulators. And delivering regulators' digital transformation requires them to deploy similar technologies (e.g. digital twins) as the players they are responsible for regulating to keep up with market speed and provide faster responses.

Electricity regulators can adopt modern approaches to enhance customer service and improve communication with consumers. Just as electric utilities are utilizing Large

Language Models (LLMs) to improve response time and quality in addressing customer queries, regulators should also embrace the development of their own models to increase efficiency in market communication. Moreover, there is an opportunity for innovative use cases to emerge, like monitoring customer sentiment towards electricity providers through social media. According to Mckinsey, half of consumers express their dissatisfaction publicly on these platforms after a negative experience. By leveraging social media, regulators can monitor customer sentiment and address issues promptly, further enhancing consumer awareness, satisfaction, and overall service quality in the electricity market.

Regulation of AI

Setting up an effective AI and data strategy for an organization goes beyond developing models. There is an essential need for building robust governance frameworks that outline the ethical considerations and principles to be followed throughout the AI lifecycle. These guidelines define how technologies and users collect, store, and use data, ensure privacy protection, and address biases and fairness in AI algorithms. And after development, regulators must regularly monitor and audit models to guarantee they continue to follow established principles and that their outcomes do not breach regulations.

For a single organization, doing all of this properly is a massive challenge; regulating the whole electricity market's use of AI technology and accounting for its impacts requires deep transformations to enable the benefits without ignoring the risks. Whether these responsibilities lie entirely under their purview or are shared with a dedi-

cated data & AI regulatory arm, electricity regulators must build their capacity to understand the technology, develop new policies and methods that allow them to access and monitor specific models utilized by electricity players, and implement policies that foster Responsible AI in practice. But it is also their role to ensure that the market understands how existing regulations apply to AI and to build guidelines that bring transparency to this process, especially for end-consumers, who need to clearly understand their rights.

Market manipulation is an excellent example of a potential use case for electricity regulators to regulate AI with their own AI models. Deploying automated trading robots or algotrading in the energy sector is getting more frequent, especially due to battery storage becoming a key asset for the broader electricity system. Needing to oversee hundreds of thousands of daily operations, not always with full access to data on-time, makes it harder for electricity regulators to spot anomalies in the market. With advanced machine learning, regulators can make their detection capabilities more accurate and efficient than with traditional methods, even when access to information is constrained.

Everyday AI in Electricity Regulation

The digitization of the electricity system creates a window of opportunity for every player in the market to transform their processes, develop new products and services, and become more efficient in their operations. Electricity regulators are a crucial enabler of this transition, but they are currently at risk of never getting over the phrase: “Do as I say, not as I do.”

The electricity market can accelerate its AI adoption, piggybacking on successes and lessons learned from other industries like pharma and financial services. Whether they improve their regulatory capabilities through or of AI, there is a growing demand for electricity regulators to respond better and faster, and even to anticipate shocks while navigating the energy transition with complete oversight of customer protection.

For some electricity regulators, an end-to-end platform like Dataiku has been an important piece of their digital transformation to enable their multiple teams to kickstart their advanced analytics and AI journey without relying on extended programs. This approach directly and positively affects regulators' ability to generate more value from constrained budgets. The possibility of accessing different data sources, including unstructured data, allows domain experts to enhance how they monitor the market and respond quickly to signals. They are also upskilling their employees — facilitated by both the possibility of using the platform without relying only on coding skills, and also a wide range of courses instructing those for whom data and AI aren't already bread-and-butter tools.

Furthermore, Dataiku emphasizes transparency, explainability, and governance in AI deployment. The platform allows regulators to enforce the right level of governance to ensure that the models they deploy meet public scrutiny and performance expectations while securing consistent, documented processes. Regulators can audit model performance, monitor data quality, and ensure that AI models meet regulatory requirements and ethical considerations.

Conclusion

Transparency is paramount in AI deployment. Regulators must enforce stringent standards that require electric utilities to provide clear explanations of how AI models make decisions, the data used, and the potential impact on consumers. By enforcing transparency, regulators can minimize the risk of discriminatory practices, bias, and unfair outcomes. But these requirements cannot be only for the external market; electricity regulators must leverage AI themselves. Regulators can enhance market surveillance capabilities, streamline compliance processes, and gain valuable insights to make informed decisions. AI tools can enable regulators to analyze vast amounts of data efficiently, detect anomalies, and identify potential non-compliance issues.

And with that, we've reached the final blog of this series, "From Generation to Supply: How AI is Transforming the Energy System." Throughout the six blogs, we've seen how digitalization is the basis of the energy transition and directly impacts the whole energy value chain. If in the past, energy generation was only centralized within large fossil-fuel powered plants, today developers are competing for building renewable assets like solar and wind turbines. But decentralizing these assets creates many challenges for transmission & distribution network operators, as well as for electricity system operators.

With more equipment connected to the grid and a multidirectional power flow across the cables, balancing and guaranteeing a reliable, affordable and green operation has become more complex for these companies. And for electricity suppliers, democratizing access to new technologies and moving their business models from only sup-

plying electricity to multiple products and services requires a new way of thinking about customer relationship management and experience.

And of course, all ends of the chain are invested in the transition to a decarbonized new energy system, and ensuring our electricity and equipment cope with the pressure of a low-carbon economy. AI is not a magical journey but can be simplified with the right strategy and the right platforms, which can enable organizations to navigate the energy transition faster and more smoothly.