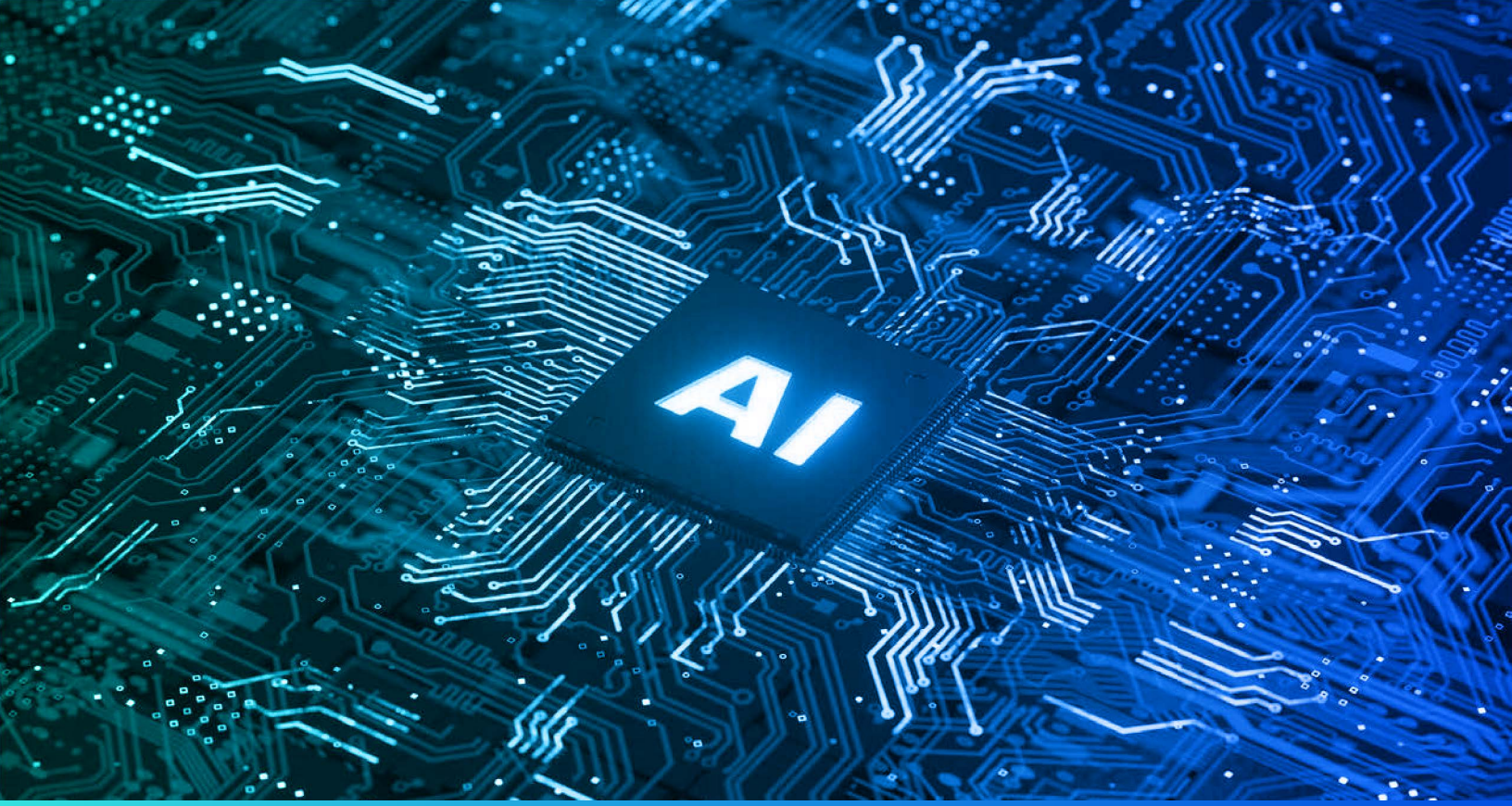bidgely

EXPANDING THE ENERGY AI VALUE STACK:

Built on AI/ML Models <> Delivering Personalization with Applied AI <> Empowering With Generative AI

AUGUST 2024

At the same time that generative AI is capturing headlines and the world's attention for its creative potential, applied AI continues to win accolades for its problem solving and practical applications — including automating processes, informing decision making, improving operational efficiencies, and accelerating innovation.

The transformative power of applied AI was highlighted in Fast Company's ranking of the "World's Most Innovative Companies of 2024." The magazine praised its applied AI winners for facilitating "the convergence of advanced algorithms, massive datasets, and computing power" to enable "breakthroughs in everything from medicine and biotech to law and entertainment."

Bidgely was proud to be included with Google, Salesforce and other technology pioneers on Fast Company's list of "Most innovative applied AI companies" — recognizing both the world-changing potential of applied AI in the energy sector and Bidgely's leadership in the space.

For utility leaders, it's important not only to understand how to leverage applied AI to improve business processes today, but also how to look ahead to identify the new applied AI and generative AI use cases of tomorrow.

AI and data science will continue to bring new operational possibilities to fruition at an ever-accelerating pace. As those opportunities unfold, understanding the potential for each form of AI and how to integrate their distinct capabilities is a strategic imperative. At the same time, de-risking these AI solutions is also critical. De-risking AI requires specially trained energy data models, expertise in maintaining the fidelity of customer information and the proven ability to safeguard customer security and privacy.
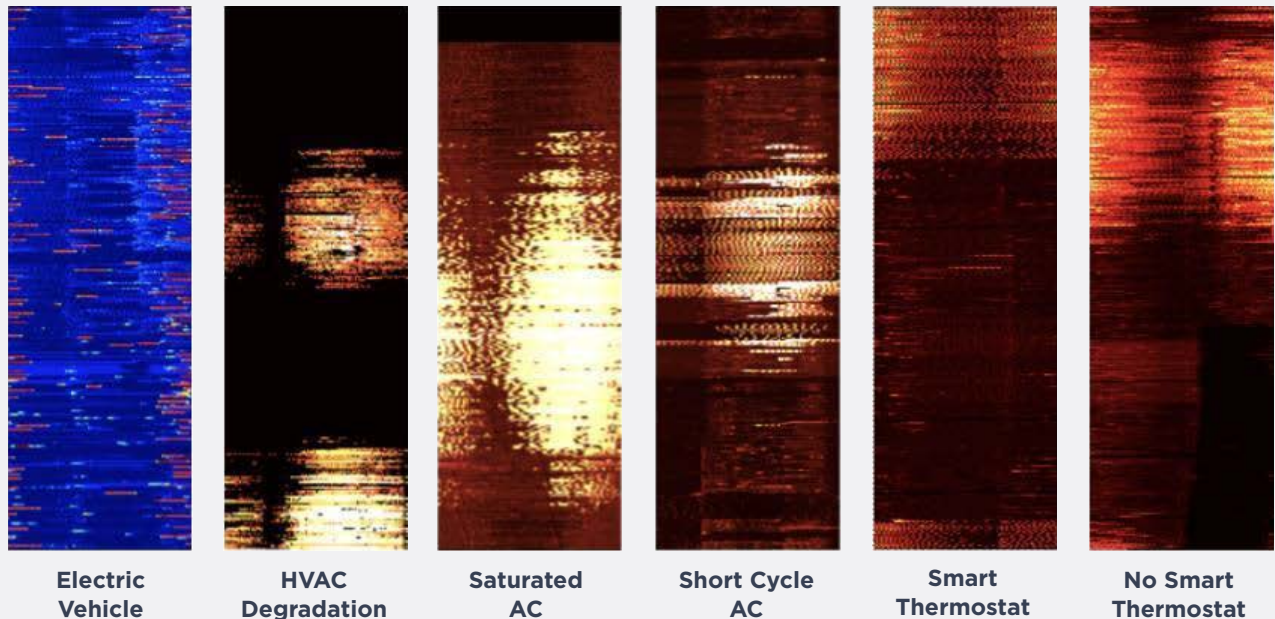
Learning how to safely and effectively build and expand an energy AI value stack starts with an examination of the use cases that are already generating long-term operational value to utilities worldwide, as well as looking ahead to the AI applications poised to accelerate the industry's transformation even further.

LEVERAGING APPLIED AI TODAY: USE CASES IN PRACTICE

The data science of applied energy AI can be better informed and amplified by behind-the-meter true disaggregation.

Every appliance has its own unique energy signature. Using applied AI techniques, utilities are now able to disaggregate detailed appliance profiles from within a household's overall energy usage, identifying:

- Appliance ownership
- When specific appliances are used and for how long
- Appliance inefficiencies
- Consumer usage habits

| Electric Vehicle | HVAC Degradation | Saturated AC | Short Cycle AC | Smart Thermostat | No Smart Thermostat |

Utilities are then able to leverage this behind-the-meter intelligence to create new products, services and experiences that are informed and enhanced by the insights extracted from the data — ultimately to solve some of the industry's greatest challenges around customer satisfaction and the clean energy transition. Consider these important use cases:

Use Case 1: Customer Engagement

Applied AI enables utilities to implement more personalized, energy-data-driven engagement strategies that are tailored to each consumer's unique energy profile.

With behind-the-meter visibility into every home across an entire customer base, utilities are able to target the right customers (based on appliance usage) with highly relevant messaging as a means to improve customer engagement, program participation and satisfaction.

When program marketing is built on a foundation of behind-the-meter intelligence and insight, utilities more readily meet savings and demand response goals, cost effectiveness tests and program enrollment numbers. In fact, behind-the-meter targeting improves overall program cost efficiency with:

Up to 60% greater customer engagement with program marketing material	**20% higher** program uptake compared to mass marketing
25% improved program performance	**33% cumulative** cost savings

For example, PSEG Long Island is using EV load disaggregation to detect which of its customers have electric vehicles and when they are charging.

Using smart meter data and applied AI, Bidgely was able to leverage applied AI to help the utility detect more than 16,500 EV owners within its service territory.

With that intelligence, PSEG Long Island was able to build a unique EV profile for each customer to inform its EV engagement strategies on a household-by-household basis. By implementing a program that included personalized monthly EV tracker emails, charging alerts and an EV dashboard for each customer, the utility successfully recruited 5 percent of its EV owners into its TOD rates during the first three months of the program and continued to grow recruitment to 18 percent in the first year.

Use Case 2: Grid Operations

Applied AI also equips utilities to manage their grid from the meter level up, rather than the traditional top-down approach starting from transformers and feeders — thus maximizing load shift and efficiency gains.

Reinforcing the importance of applied AI to grid operations, Fast Company highlighted Bidgely's 8760 Energy Model in its applied AI feature story for transforming consumer energy usage data to equip utilities with insights that help "better manage the way they move power on and off the grid" and "understand which appliances are contributing to high strain during peak hours and then, perhaps, offer the consumer a rate incentive to use any power-hungry appliances — such as EV chargers — during off-peak hours."

Hydro One is doing just that, leveraging applied AI as part of its EV driver engagement and charging load management program. Hydro One used Bidgely's 8760 Energy Model to identify not only a total residential charging load for a given year, but also the day and hour of its peak EV charging demand.

8760 Demand Curve (Total Demand)
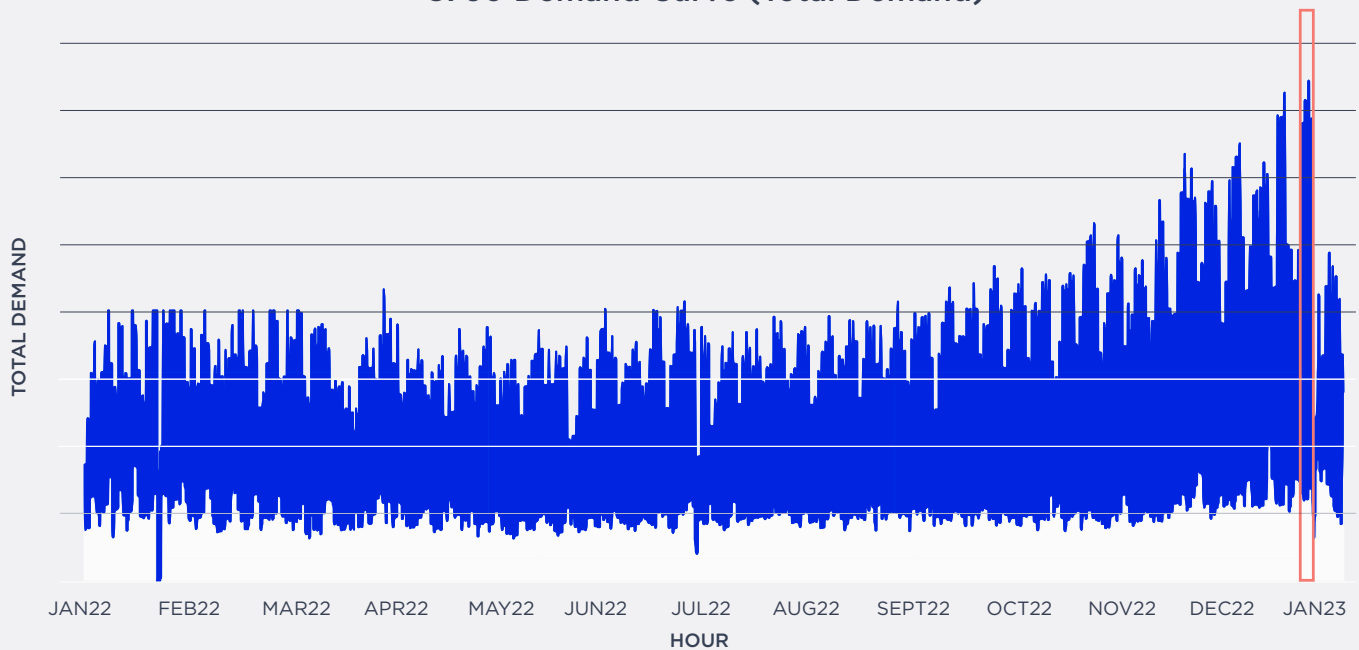
Similarly, the utility is able to determine the total MW and kW/EV that residential EV charging load contributes to its annual system peak.

kW per EV on 2022 System Peak Day
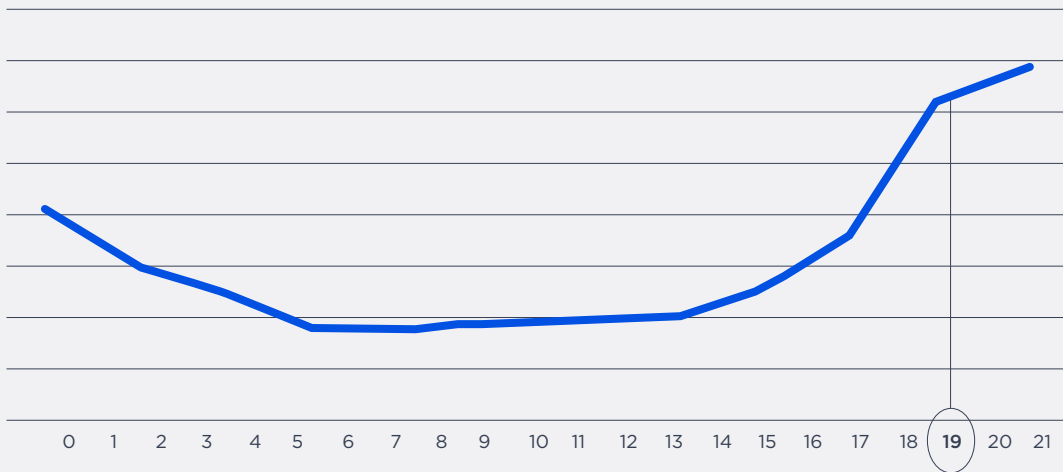
> Prior to this, in order to compute the EV charging load on our system, we would assume that each customer was going to draw 2500 kilowatt hours per year, and then multiply that by the number of customers we estimated to have an EV to arrive at a total charging load figure, explains Phoebe Chang, Network Management Engineer at Hydro One. "But now we can disaggregate it straight from our smart meter data and determine the amount of residential Level 2 charging that we're seeing on our system today."

Use Case 3: Grid Edge Intelligence

At the same time that applied AI is becoming increasingly sophisticated, so too are the next generation of grid edge behind-the-meter technologies.

First generation smart meters recorded energy data at 15/30/60-minute intervals, which was then sent to the cloud — typically at the end of the day. Applied AI could then be used to extract useful insights.

In the case of EV charging, this would leave utilities to discover the next day if a customer charged a vehicle during a peak hour.

Next generation smart meters incorporate distributed intelligence (DI). Just as mobile smart phones have compute and storage power that enables data to be analyzed on the device itself, next generation smart meters can apply AI at the meter to extract real-time insights at the edge, where the data is generated.

Again using EV charging as our example use case, with applied AI sitting on the grid edge, utilities can be alerted in real time when a customer charges their car — including whether that charging activity is happening during a peak time and/or if it is happening in an area of grid congestion. This empowers the utility to take immediate action to optimally distribute and balance grid load.

Early adopters are already seizing this new opportunity. For example, one southeastern utility has deployed next generation meters and is actively leveraging DI for localized analytics use cases like detecting theft, high impedance and broken neutral. However, in the near future, they are expected to pursue more advanced use cases, including EV peak pricing alerts and active demand response.

Going from this

to this

across 12 appliance categories takes a lot of computing power
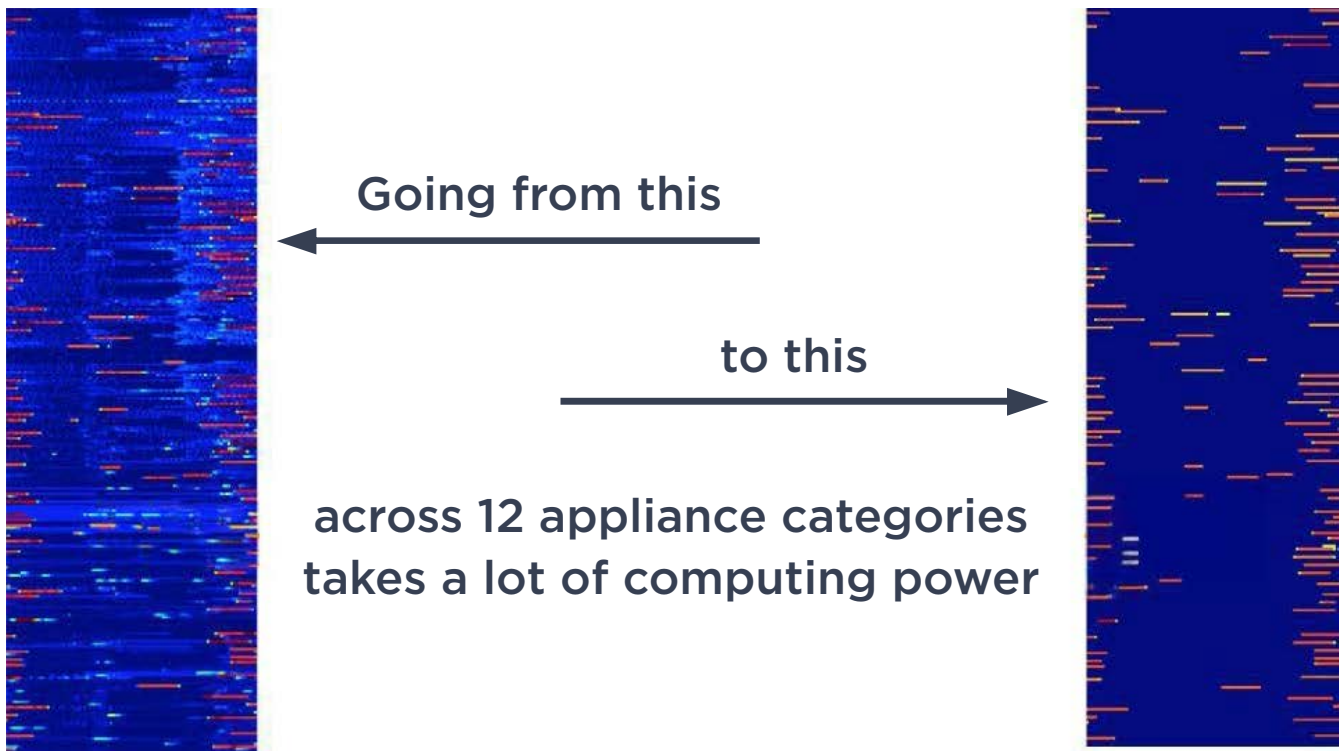
As the grid becomes more varied in energy resources, and requires greater agility, having the ability to respond quickly to even small scale events will become increasingly important for maintaining flexibility and resiliency. Successfully managing peak events and demand-side management demand faster insights, communications and customer response.
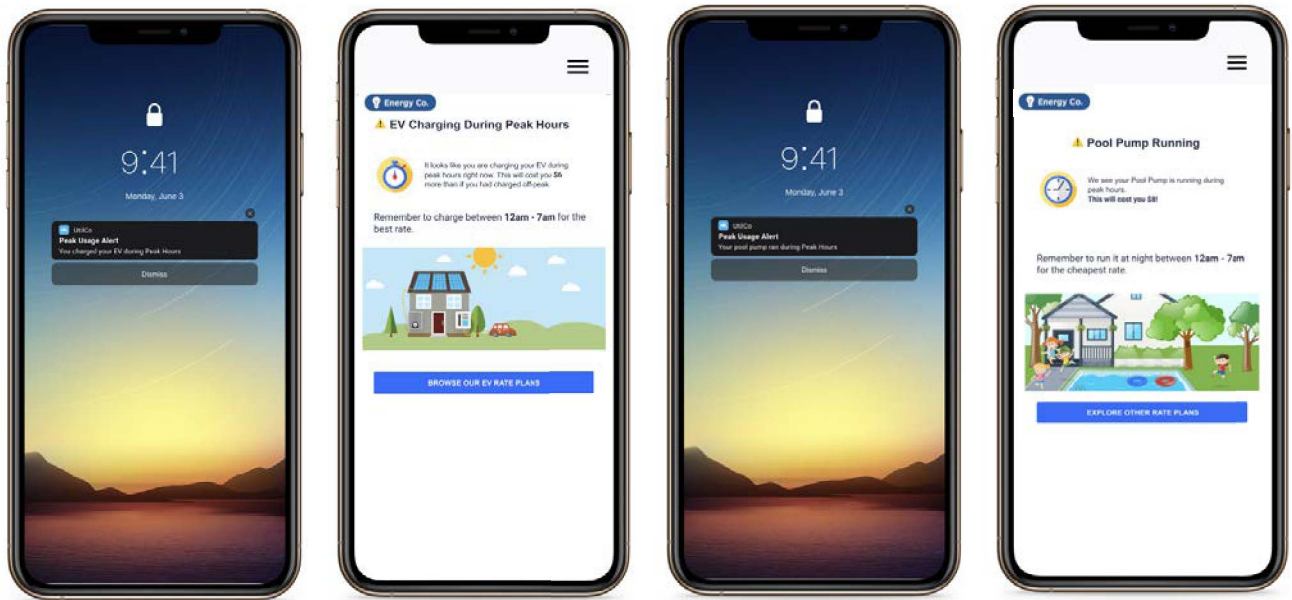
Developing New Use Cases

The next generation of applied AI features an even more advanced ability to anticipate problems and make the necessary adjustments to keep energy flowing. It is also filled with AI-enhanced customer experiences that strengthen the partnership between utilities and customers when it comes to maintaining grid resiliency.

Utilities must remain focused on applying AI to specific, high value use cases that are critically important to modern utility operations, such as:

• Understanding customers better and engaging with them in personalized ways

• Enabling customers to save money on their energy and optimize their energy use

• Managing the rise of DERs, like solar and batteries

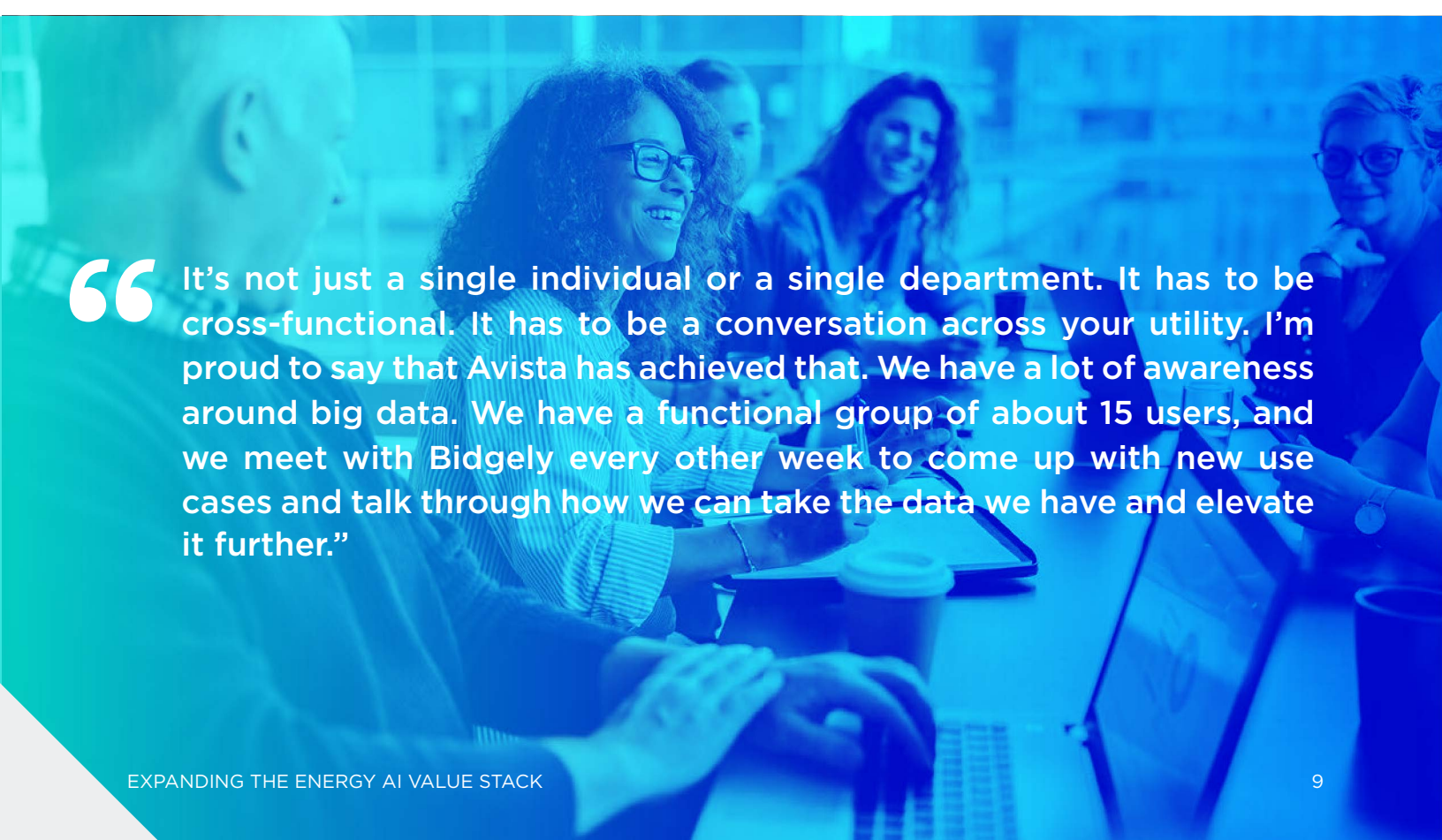• Revealing new opportunities to improve reliability

All of these use cases are possible. The key is to create an organization-wide culture of AI opportunity spotting to continue to identify new applied AI use cases. Opportunity spotting requires ongoing ideation informed by diverse perspectives. It's important to think as broadly as possible and step beyond the obvious in order to drive innovation, including:

- **Customer-centered:** What are customers' biggest pain points?
- **Data-driven:** What data is available within the organization that can be tapped or better leveraged to inform decision-making?
- **Business-driven:** What are the utility's biggest costs? How might employee morale, performance, stress and retention be improved or made more effective by alleviating repetitive or under-stimulating tasks? How can accuracy and decision making be enhanced?
- **Tech-driven:** What AI software tools are available to fast track progress? What new AI applications are demonstrating promise? What turnkey solutions could empower you to scale rapidly?

The goal of AI ideation is to create the broadest list of possibilities. The next step is assessment according to three important criterias:

- **Feasibility:** Is it technically possible? How complex is it?
- **Viability:** Does it make business sense? What are the costs and returns? Can we mitigate any risks?
- **Desirability:** does this help our utility and our people? How?

Bidgely regularly facilitates ideation and design thinking sessions with its customer partners. For example, Avista Products and Services Manager Andrew Barrington says Bidgely's UtilityAI™ solutions have acted as a "use case generator" for the utility.

> It's not just a single individual or a single department. It has to be cross-functional. It has to be a conversation across your utility. I'm proud to say that Avista has achieved that. We have a lot of awareness around big data. We have a functional group of about 15 users, and we meet with Bidgely every other week to come up with new use cases and talk through how we can take the data we have and elevate it further."

AUGMENTING ENERGY AI APPLICATIONS WITH GENERATIVE AI SOLUTIONS

Applied AI is just the beginning. Generative AI will be a game changer.

Where applied AI uses machine learning to harness insights from large datasets to understand, reason and apply knowledge like a human, generative AI emulates human creativity to go beyond prediction to the actual generation of new and original content and data outputs in the form of images, text, music and video.

In the utility context, that means that just as applied AI has empowered utilities with more accurate means to detect appliances, profile household consumption, granularly segment customers and intelligently plan grid infrastructure, generative AI promises to further amplify operations with its design, composition and storytelling capabilities.

Bidgely has already started innovating in this space and is exploring a wide-range of potential generative AI use cases.

Consider generative AI's impact on customer experience. A customer becomes alarmed that his or her electricity bill is much higher than normal. The customer tells a generative AI-powered interface that something abnormal is happening this month. Generative AI analyzes the customer's energy data and provides a coherent and contextually relevant language response that confirms the household's costs have gone up nearly 40 percent even though usage is normal, explains the cause of the spike, and recommends a fix for the issue.

Generative AI will improve grid operations as well. Imagine an operational manager who wants to see an 8760-hour visualization of power consumption for a substation for the entire year. Generative AI is able to use its visual design capability to create an easy-to-comprehend chart that breaks down consumption hour-by-hour for each day of the year.

Generative AI will handle the most complex inquiries with ease. How many EVs do we have? Generative AI will provide an accurate count and create a map to illustrate exactly where they are located. How many of those EV owners have solar installed? Generative AI will pinpoint the residences that have both an EV and solar, and illustrate when renewable generation is highest at each home to identify the optimal time for EV charging on a household-by-household basis.

THE NEW ENERGY AI VALUE STACK

Together, applied AI and generative AI will equip utilities with transformational opportunities. In fact, it is applied AI coupled with the unlimited creative potential of generative AI that will reveal new opportunities and amplify a utility's ability to achieve operational efficiencies, innovation, and profitability every day.

Realizing the power of generative AI to deliver value to energy customers and the grid is built on a strong foundation and mastery of applied AI — including proven accuracy and a deep understanding of how to safely and securely harness the power of behind-the-meter data.

To continue to explore the potential for AI in the energy industry, learn more about Bidgely's **EmPOWER AI annual conference.** Hear directly from industry experts and your peers as they share firsthand experiences and insights on leveraging AI for smarter energy decisions, as we collectively shape the future of UtilityAI.

Built on AI/ML Models

Delivering Personalization with Applied AI

Empowering with Generative AI
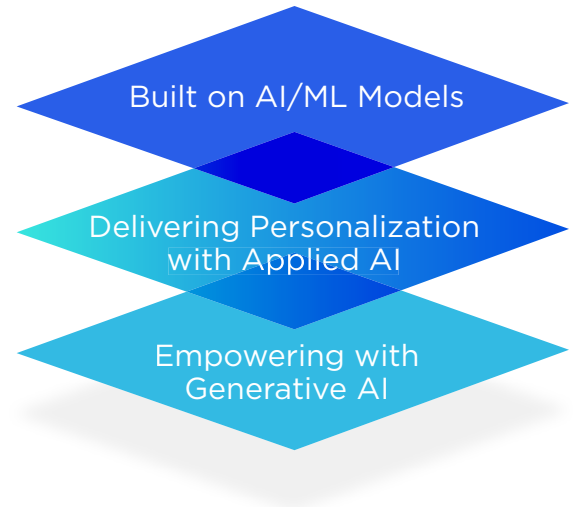
EMPOWERING PROGRESS

Be sure to check out other publications in our EmPOWERing Progress Series:

- **Adoption of Time of Use (TOU) Rates: Enhance the Value of Your Customer Experience (CX) Platform**

- **How Behind-the-Meter Intelligence and Targeting Can Change the Utility Calculus of Widespread Heat Pump Adoption**

- **EV Preparedness Starts with EV Intelligence**

- **Leveraging Behind-the-Meter Intelligence to Better Inform and Achieve Clean Energy Plan Targets**

- **Grid and Customer Convergence: Leveraging Energy Intelligence to Achieve Business Transformation**

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