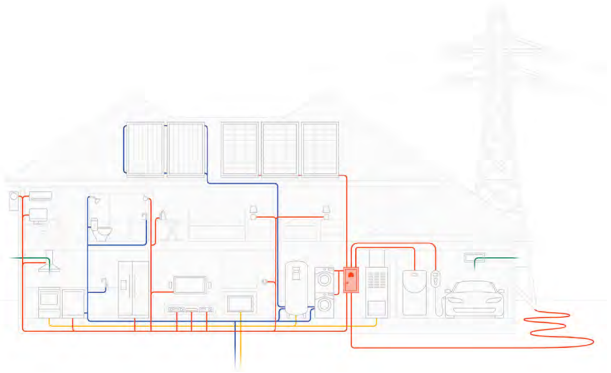
Ask the Expert

Making Sense of Energy Usage with the Help of Enabling Technology



Better visibility into energy usage not only helps consumers save money, but also allows utility owners to manage grid availability and improve service.

Smart meters, which have been around for decades, are foundational to providing this visibility. Since their introduction, smart meters have helped utility companies improve customer service, increase grid reliability, reduce carbon emissions, and save money. But utility companies have barely scratched the surface of the ways smart meters can help manage consumption and improve environmental stewardship.

Mike Phillips, CEO and founder of Sense, a company providing embedded intelligence that helps providers and consumers manage energy usage, explains how software can transform utility meters and fast-track decarbonization.

Mike Phillips
CEO, Sense

What are the shortcomings of the traditional view of smart meters?

"People think of a smart meter as a data collection device," Phillips says, "but with the right architecture, they can become the distributed sensing and computation network for applications at the edge. Those applications can deliver big rewards for utilities and consumers alike."

The industry has been focused on hardware-based solutions, but there needs to be a shift away from hardware and toward enabling software.

The commonly used Advanced Metering Infrastructure (AMI) employs digital meters and two-way communication technology to collect and manage customer energy usage data. Typically, this means 15-minute interval data sent to the utility hours later. This is insufficient for detailed energy insights and the delay precludes a real-time experience for consumers and real-time visibility for grid operators.

"Think of it this way," Phillips explains. "If Google Maps on your phone relied on location data sent at 15-minute intervals to the phone company, which then made it available to Google, there would be no real-time mapping capability! Nobody would use it." This is exactly how AMI works today. The industry has spent $100 billion on meters that cannot deliver a real-time picture of energy usage.

"We have to change the mindset that meters are simply data-collection devices and recognize that changing the architecture is the key to unlocking the value of the data," Phillips says. "We need high-resolution data, edge computing, and real-time networking."

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How can energy providers make this change?

Metering decisions are being made today for devices that will be in homes for 20 years. The energy transition is happening now; so we need a platform in place that accommodates software that facilitates evolution.

Traditional architecture is not equal to the task.

A new generation of AMI meters can sample data at high-resolution tens of thousands of times per second. With this high-resolution data, machine-learning-based software is able to detect how energy is being used at the device level and can see detailed operation of the grid from the edge — including detecting faults and failures.

At even the lowest-resolution deployments, Sense software processes 50 million times more data than 15-minute interval AMI data. This high data volume necessitates a change in architecture that allows the data to be processed locally instead of relying on meters to send the data to the utility for processing. Real-time insights and interaction require meters using low-latency networks to be able to do things like connect to Wi-Fi or cellular networks in parallel with the utility network.

“Utilities can use software like Sense to understand load details to form a real-time picture of the entire grid,” Phillips says. They will know when a transformer is overtaxed, when and where a line is down in a distribution or transmission network, and when vegetation is encroaching on a power line.

For the first time, it is possible to have a real-time localized view of the entire grid. And by shifting the focus to software, applications can be deployed without costly hardware upgrades.

“If utilities install the latest-generation AMI meters, they have the high-resolution data and edge computing built in to manage usage,” he explains.

How are consumers using the Sense app to manage energy usage?

People now have a tool that provides the information they need to save money by saving energy.

By downloading an app, consumers get real-time visibility into energy usage and control of energy use in their homes. The app provides a real-time picture that allows consumers to save energy and take advantage of time-varying rates (and other programs utilities use) to shift energy usage.

This demand flexibility delivers real value, Phillips says.

“For the most part, people don’t care when their EV is charged as long as it is charged when they need to use it,” he explains. “Once they know the best time to charge their vehicles, they can make adjustments or opt into automation to take advantage of lower rates and lower usage times, which not only benefits consumers but grid operators as well.”

How do you know demand flexibility works?

Sense and Singularity Energy, a company that provides innovative products and intelligent tools for building data-driven decarbonization solutions, carried out a study to find the carbon impact of charging an EV and adjusting charge times based on dynamic carbon intensity. Using more than 100,000 sessions of in-field EV charging data, they analyzed the location- and time-based fuel mix of the power grid to characterize the carbon intensity of common EV charging patterns.

Combining these data sets, researchers found that optimizing EV charging for carbon intensity would yield 8-14% reductions in related carbon on average across 44 states and an average reduction of 43% in California, which has a higher proportion of renewable energy in the state’s energy mix.

“The proof is compelling, and the solution is already in our hands,” Phillips says.