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**Customer:** eSmart Systems

**Website:** [www.esmartsystems.com](http://www.esmartsystems.com)

**Customer Size:** 35 employees

**Country or Region:** Norway

**Industry:** Utilities—Power utilities

Customer Profile

Based in Halden, Norway, eSmart Systems creates smart grid solutions for energy companies worldwide.

Software and Services

* Microsoft Azure platform
* Microsoft Azure HDInsight
* Microsoft Azure Machine Learning
* Microsoft Azure Storage
* Microsoft Power BI

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|  | |  |  | Making cloud technologies the brain of the modern smart grid | |
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“We’re providing the brains of the smart grid…. We’re using a lot of different Microsoft Azure technologies, including Azure Machine Learning, but the core solution is to help operators predict issues to prevent blackouts.”

Knut Johansen, CEO, eSmart Systems

eSmart Systems keeps the lights on with an automated energy management system based on Microsoft cloud services, including Microsoft Machine Learning. Now, utility companies anywhere can connect sensors, smart meters, and software to forecast consumption, reduce outages, and monitor assets to improve efficiencies. This means that utilities can avoid costly investment in both grid and IT infrastructure while serving an ever-growing population.

Talking to the grid

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For most people, turning on a light is as easy as flicking a switch, and we rarely think about the technology behind that simple gesture—until it doesn’t work. eSmart Systems helps the lights stay on by creating next-generation, smart-grid software that optimizes the exchange of energy and data.

What does data have to do with the flow of electricity? As it turns out, a lot. Today’s electrical grids include power plants, transmission lines, and a network of substations that serve hundreds if not thousands of buildings as well as public infrastructure. These complicated networks are powered by data stored in customer information systems, building meters, and in the supervisory control and data acquisition (SCADA) systems used to manage the grid.

Although the data is available, pulling it together can be a challenge. “There are a lot of applications that don’t talk to each other,” says Knut Johansen, CEO at eSmart Systems. “For example, when a customer calls a utility company about a problem, a technician would need to find the customer ID, and then look in another system that manages the meters just to find out what’s going on.”

Disparate software and data sources are just one problem, however. Built decades ago, many electrical grids are strained by population growth as well as the advent of new, often erratic sources of energy such as wind and solar power. Utilities typically can’t afford the cost and downtime of big infrastructure upgrades, but they are increasingly investing in technology such as smart sensors and meters that could potentially improve efficiency in multiple ways, such as monitoring current quality, and detecting and preventing failure.

But even with the adoption of new technologies, the problem remains the same—utilities still struggle to get value from their data. “Utilities have a lot of possibilities for collecting information, but they don’t have a central way to bring it all together and use it in their operations,” says Johansen.

Building the Brains

eSmart Systems knew that the cloud would provide the only viable solution. “The new sensors monitor on a microsecond-level, and that’s a lot of data,” notes Johansen. “So we need a cloud solution that really scales, and we also need the computing ability to perform big data analysis and predictions.”

For eSmart, that meant turning to the Microsoft Azure cloud platform, and using Azure Machine Learning (ML) as the brains of the modern smart grid. “What we really like about Azure ML, and Azure in general, is that we don’t need to use virtual machines,” says Johansen. “Everything we do is through services available in Azure, and I don’t think we could do the same thing with Google or Amazon.”

eSmart Systems designed an automated demand response solution that collects data from virtually any type of meter or sensor. It then runs predictive models in Azure ML to forecast potential capacity problems and automatically control load to buildings or other infrastructure to prevent outages. The solution provides a short-term 24-hour forecast, a long-term monthly forecast, and a temperature forecast, and it offers a centralized way to monitor and manage the entire grid. “You might have one system with customer information, one that operates the meters, and another that operates the grids,” says Johansen. “What we’re doing now with our Azure-based platform on top of all these systems is connecting all of that data together and providing grid managers with a single user interface for all of their tasks.”

Data is collected from smart sensors and meters in Azure Storage blobs, and then run through predictive models on Azure ML. Next, the information is analyzed on a Hadoop cluster with Azure HDInsight for a closer look at usage. eSmart provides access to the data in several ways. For example, the data is either visualized by grid operators through an interface created by eSmart, or made more widely available to business users through interactive Microsoft Power BI dashboards. Power BI provides the additional advantage of on-the-fly, custom analytics.

Initially focused on demand response management, the company plans to extend its solution to include predictive maintenance. By taking advantage of Microsoft cloud services, the eSmart System Platform can easily optimize virtually any energy management scenario, such as specialized deployments for commercial buildings and electric vehicles. The company is also working on more features for consumers, including pushing status updates to smartphones.

Smarter Grids

Energy companies can meet complex challenges—including massive population growth—more easily and affordably by using eSmart and Microsoft technologies to monitor assets and improve efficiencies.

**Keeps the lights on**

Energy companies face many complex challenges, including balancing supply and demand as well as integrating new energy sources and technologies. Consumers’ requirements are much simpler—they just want things to work. With eSmart technology running in the Microsoft cloud, everyone has less to worry about. “We’re going into a new world with all of these new sensors and data, and also new problems, but that’s where we come in,” says Johansen. “We’re providing the brains of the smart grid—the software platform that operates the grid. We’re using a lot of different Microsoft Azure technologies, including Azure Machine Learning, but the core solution is to help operators predict issues to prevent blackouts.”

**Meets new challenges in a smarter way**

Aging infrastructure is another concern—for example, eSmart Systems recently ran a pilot project with a utility company in Norway that maintained a grid dating in part from the 1950s. It’s close to reaching capacity, but the company, like most utilities, can’t afford to replace it. But by monitoring assets to improve efficiency, the utility can meet new challenges with its existing grid. “Utilities try to stretch their investment by moving some of the load from peak to off-peak hours, because it’s quite costly to upgrade the grid,” explains Johansen. “Using our energy management platform based on Azure, they can cut those peak hours, avoid the upgrade, and save a lot of money.”

**Simplifies IT with cloud services**

Running the brains of the smart grid in the cloud is also easier and more affordable. “The IT systems typically used to keep the grid up and running can also cost a lot of money to maintain,” says Johansen. “But with our eSmart System Platform on Azure, utilities don’t need an IT technician because we’re offering it as a service. We spin up an Azure environment for them, and it just works. All they need is an Internet connection.”