

Energie Baden-Württemberg lays the groundwork for “smarter” energy consumption and generation

Overview

■ Business Challenge

With its power generation reliant on more variable sources, EnBW sought to add a corresponding flexibility on the demand side by empowering its customers to make “smart” power consumption decisions that lessened energy demand at peak times.

■ Solution

EnBW worked with IBM to put in place a first-of-a-kind solution that generates and displays the underlying price of electricity as it changes throughout the day. In addition to providing a basis for changing consumption behavior, it also establishes a low-cost platform for changing EnBW’s customer-facing processes like billing.

■ Key Benefits

- Lower cost and more efficient power generation through reductions in peak energy consumption
- Improved ability to absorb alternative energy sources into the power grid
- Lower energy costs for the customer



With some six million energy customers and about 15,000 megawatts of electric generating capacity, Energie Baden-Württemberg (EnBW) is the third largest energy company in Germany. Based in Karlsruhe, the company generated annual revenue in excess of €14 billion and has more than 20,000 employees.

As the world struggles to meet its growing appetite for energy while lowering its “carbon footprint,” renewable energy sources—such as wind and solar power—have assumed a central role in many countries’ long-term energy strategies. While the vast majority of countries are still in the process of sketching out their renewable energy plans, Germany stands apart. With strong support from the national and state governments, Germany has emerged as a world leader in generating electricity from renewable energy sources. Its leadership is most pronounced in the use of wind power, with Germany’s nearly 20,000 wind turbines—the most in the world—accounting for more than a third of

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– Hellmuth Frey, Project Manager, Energie Baden-Württemberg

Providing customers a window into the grid to change power consumption patterns

Business Benefits

- Lower cost and more efficient power generation through reductions in peak energy consumption
- Improved ability to absorb alternative energy sources into the power grid
- Lower energy costs for the customer
- Stronger competitive differentiation through transparent pricing and usage-based billing
- Established technical platform for future process transformation initiatives

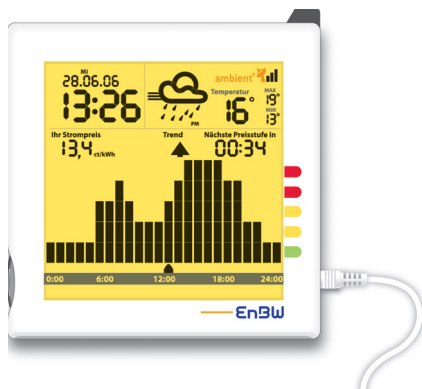
global capacity. Even more impressive is the fact that in 2007, more than 14 percent of Germany's electricity was generated from renewable sources, putting it ahead of the already ambitious target of 12 percent set forth in the country's Renewable Energy Sources Act.

For all its tremendous benefits, Germany's growing reliance on wind power has also presented the utilities that manage the nation's electric power grid with a new set of challenges. Perhaps the most basic yet important of these is the need for utilities to adapt their capacity planning to the fluctuating nature of wind. Historically, the generation, or "supply," side of utility operations has been fairly stable and predictable, which has made it easier to balance supply and demand across the grid. With wind generated electricity fed into the grid, however, utilities need to leave enough spare grid capacity to absorb it and—because of the unpredictability of wind—an extra margin of safety.

New power challenges

This requirement introduces new kinds of challenges to the efficient operation of the grid. For one, it compels utilities to operate their traditional generation sources at a lower than optimal capacity, thus raising their cost. The more complex challenge, however, is the need to keep a more variable supply in balance with customer demand. To a large extent, this means minimizing the impact of demand peaks, when customer usage outstrips core generating capacity, requiring utilities to purchase electricity at considerably higher cost.

In addressing this issue, Energie Baden-Württemberg (www.enbw.com), one of Germany's largest utilities, saw not only the operational benefits, but also a key opportunity to differentiate itself in an increasingly competitive market. EnBW believed that the best way to offset supply-side variability was to enable flexibility on the demand side by giving customers the information they need to alter their energy consumption patterns—specifically, the cost of power at any particular time—such that they consumed less during more expensive peak hours. Having observed similar initiatives in Europe with interest—most notably IBM's work in Italy involving "smart" metering technology—the company selected IBM to help put its own unique vision into place.



EnBW's tariff display device enables customers to view the cost of electricity at different times of the day using a "traffic light" motif.

The simplicity of the project's key goal—making the underlying cost of power, in the form of a tariff, transparent to the customer—masks the complexity of the steps needed to achieve it. In designing the solution, IBM Global Business Services needed to pull together the many data inputs that make up a tariff, develop an

algorithm to generate that tariff, and then display that information to customers. For the core of the tariff, EnBW's solution automatically extracts the "next-day" wholesale electricity price from the Leipzig-based European Energy Exchange (EEX) through a custom data feed at periodic intervals. To transform this "raw" information into a tariff, IBM Global Business Services—leveraging its deep background in the utility industry and its processes—developed an algorithm that incorporated other important tariff determinants. This enabled EnBW to present an effective price level to household customers in a simple, easy-to-understand format.

To deliver this information to the customer, IBM designed a communications infrastructure that leverages an existing commercial paging network within Germany. IBM also teamed with Ambient Devices to design a compact and easily readable device capable of displaying the cost of power at any given point in time, as well as the 24 hourly cost points (looking both backward and forward) over the course of a day. Because the solution was ultimately designed to change customer behavior, an intuitive, easy-to-use interface was absolutely essential. To that end, the device employs a "traffic light" motif, in which the "best" (i.e., lowest priced) time intervals are displayed with a green background, the most expensive with a red background, and intermediate or "normal" prices in yellow. With electricity pricing information readily visible at the point of consumption, customers using the EnBW system now have the means to put off high-consumption activities—such as the use of major appliances—until non-peak times of the day.

A foundation for change

While an important, first-of-the-kind achievement by itself, the solution—now being piloted among 1,000 EnBW customers—in many ways represents a building block of a more far-reaching set of capabilities. When IBM designed the solution, it also incorporated the ability to remotely measure each customer's power consumption on a continuous basis using "smart" meters. The implication is significant: by matching time-based pricing and with advanced metering capabilities, EnBW has put into place the basic elements needed to conduct true usage-based billing, a practice that, while common among larger commercial customers, represents a marked departure from the estimate-based billing employed for residential customers. The fact that IBM designed this technical capability to be delivered at a low cost gives EnBW the means to profitably offer usage-based billing despite the small average monthly bill of residential customers.

Solution Components

Services

- IBM Global Business Services
 - IBM Global Technology Services
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Smarter Energy and Utilities

By being the first utility in Germany to provide residential customers with a window on the changing cost of power over the course of the day, EnBW has put in place the means to fundamentally transform power consumption patterns for the betterment of the consumers as well as the environment. By enabling true usage-based billing, EnBW also redefines its value proposition and stands out in the German marketplace.



Taking it further, IBM Global Business Services also conducted a thorough analysis of the process implications of changing its residential billing practices. Following IBM's Component Business Modeling approach and interacting with EnBW staff through workshops, IBM laid out in actionable detail the steps EnBW would need to take to make this transformation. This puts EnBW in an even stronger position to differentiate itself as the industry's innovation leader.

The power of knowledge

The most basic benefit of EnBW's demand-side initiative can be summed up by the aphorism "knowledge is power." Because pricing transparency gives customers knowledge of when peak electricity prices apply, they have the means to make informed judgments about when to use electricity. By encouraging lower peak consumption, the initiative will have the effect of leveling of electricity usage, thereby improving EnBW's ability to plan its capacity requirements and meet them at the lowest possible cost. Moderating consumption peaks will also facilitate EnBW's efforts to cope with the greater fluctuation of supply that accompanies the integration of wind power into the grid.

Last but not least, providing its customers with more sophisticated energy management capabilities will also make EnBW a stronger company by improving its overall value proposition to those customers. As a commodity business, power companies have traditionally had few tools to differentiate themselves in a positive way. In this respect, EnBW's solution has the potential to redefine the utility customer's experience by giving them an unprecedented amount of control in the way they manage their own electric consumption. In a market where the number of customers is—for all intents and purposes—fixed, such an advantage gives EnBW a powerful means to attract new customers as well as to retain existing customers.

Project Manager Hellmuth Frey sees EnBW's investment in such programs as evidence of its commitment to remain a leader in promoting "smart" energy consumption. "Our goal is not just to adapt to the changing energy industry, but to help shape it in a way that helps our customers and improves our efficiency," says Frey. "With IBM's vision and expertise in this area, we are well along this path."

For more information

To learn more about how IBM can help transform your business and help you innovate, please contact your IBM sales representative or IBM Business Partner.

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