



MVV Energie creates the foundation for a smarter energy market

Overview

The Need

MVV Energie AG sought to create an intelligent grid services platform that would serve as the foundation for a “marketplace” of smart grid services.

The Solution

MVV Energie engaged IBM to design a framework for integrating devices and energy sources across the grid. The solution “virtualizes” power generation sources, enabling customers to select more cost-effective decentralized power sources.

What Makes it Smarter

The solution enables customers to extract real-time information from the grid and automatically apply rules that optimize consumption patterns to minimize their power costs.

The Result

“With IBM’s experience and technology, we’ve made a major stride toward realizing our vision of a smarter grid.”

– Dr. Britta Buchholz, head of grid and plant planning, MVV Energie AG

As with any complex forecast, no one knows for sure what the world’s energy consumption will be in the next decades. But it’s certain that the way the world will consume energy—in terms of technologies, lifestyles, business practices and the like—will be radically different than it is today. The path to tomorrow’s energy landscape is equally hard to predict. Given the scope, complexity and cost of addressing the energy challenge, it’s no surprise that the vast majority of countries have adopted an incremental approach to changing their energy practices. While such countries support future energy programs like alternative sources, demand-side management and smart grid operations, these initiatives are largely independent of one another—not part of a coordinated framework for delivering tomorrow’s needs.

Ultimately, however, such a framework will need to be in place for the future energy landscape to take shape. One defining quality of this landscape will be a vast increase in the flexibility of consumers to make key energy choices, such as when they consume power and from whom they source it. Another will be a reshaping of the energy value chain, with consumers not only having more sources of power to choose from, but also becoming producers of power—or “pro-sumers”—that sell their power back into the grid. The trouble is the energy market isn’t set up to work this way, so an equally profound transformation in the underlying infrastructure, process flows and information exchange is needed to make it happen. It was toward this end that MVV Energie AG—a diversified and progressive utility based in Mannheim—decided to work with IBM.

Enabling “active” power distribution

No country takes future energy policy more seriously than Germany. When the German Federal Ministry of Economics and Technology put forth a challenge to energy providers to propose an “Energy System of the Future,” MVV Energie worked with IBM Global Business Services to design a technology and process infrastructure to support new, more flexible relationships among generators, distributors and consumers of power. Known as Model City Mannheim, the solution proposal was selected from the 28 the competition generated on the basis of its projected benefits, technical sophistication and economic viability.





Business Benefits

- More sources of energy for customers to choose from—including renewable and local sources
- Reduction in transmission loss through the use of more local distributed sources
- Lower cost and more efficient power generation through reductions in peak energy consumption
- Estimated average reduction in customer energy costs of five percent
- Stronger competitive differentiation through wrap-around energy services

MVV Energie's Model City Mannheim solution stands out because it facilitates an "active" distribution network, in which customers can leverage real-time information from the grid to change key parameters of their power consumption. Under passive distribution, customers have no say over where their power comes from and lack the information needed to coordinate their energy consumption with underlying changes in power prices (e.g., putting off consumption during peak hours). The foundation of active distribution is the ability for customers to extract real-time information from the grid and automatically apply rules that optimize consumption patterns to minimize the cost and/or amount of power they consume.

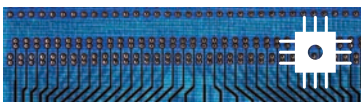
Under the most basic use case for MVV Energie's solution, customers can view the real-time cost of power at each time of the day through a connected device in their home. Empowered with this knowledge, customers have the discretion to put off high-consumption activities like clothes washing until non-peak times of the day when network utilization—and energy prices—fall. With the addition of more advanced reporting, analytics and algorithms, the MVV Energie solution enables customers to achieve an even higher level of optimization. For instance, in cases where electricity load is used for refrigeration or cooling, buildings, refrigeration units and the like can be programmed to automatically "store up" excess cold when power is less expensive (i.e., evenings), enabling less power draw when prices go up. This practice—known as distributed cooling storage—has the effect of reducing the customer's power costs and shaving peak power demand on the grid.

Freedom to choose

In addition to facilitating efficient demand practices among customers, the MVV Energie solution also enables them to make smarter choices about where their energy comes from. In the traditional energy delivery model, "the grid"—from the customer's perspective—is a monolithic source, a single option. The MVV Energie solution redefines the

Smarter Grid:

Customers gain choice through "virtualized" power generation



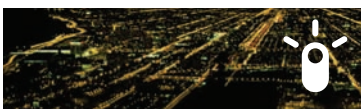
Instrumented

Real-time power costs from various generation sources are fed into MVV Energie algorithms and displayed on customer premises devices.



Interconnected

An SOA-based integration framework weaves all grid elements together to enable services across the entire value chain.



Intelligent

Access to customer preferences and real-time market pricing data enables the formulation of customized supply plans for customers.



Solution Components

Software

- IBM ILOG JRules
- IBM Lotus® Expeditor Integrator
- IBM Tivoli® Access Manager
- IBM Tivoli Directory Server
- IBM WebSphere® Enterprise Service Bus
- IBM WebSphere Message Broker
- IBM WebSphere MQ
- IBM WebSphere Portal Server
- IBM WebSphere Process Server

Services

- IBM Global Business Services
 - IBM Global Technology Services
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“We see the solution as an enabler of smart grid services, a virtual marketplace where all the key elements needed to build a smart grid can be traded.”

– Dr. Britta Buchholz

grid by expanding it to include a wider range of alternative energy sources (e.g., photovoltaic, wind and biomass) and the means for customers to choose from among them. In essence, the MVV Energie solution virtualizes the grid by unbundling the various sources of power generation and giving customers the information they need to set up their own sourcing plans. One key benefit of this approach is that it gives customers the option to buy their power from distributed local sources, which—because they experience less transmission loss—are more cost effective.

In designing the solution’s architecture, IBM and MVV Energie placed a high priority on flexibility and modularity, since the market’s constant change would place the solution under constant pressure to adapt. Another key requirement was the need for tools and intelligence to help customers make smart energy choices. Leveraging its experience with other energy projects, IBM Global Business Services followed an SOA approach that was heavy on reusability. To connect all the devices in the grid, the solution is going to leverage the city of Mannheim’s widely deployed broadband over power-line backbone. The core of the solution is an integration framework that gathers real-time information from across the grid, from generation to consumption and all points in between. IBM WebSphere® Process Server and IBM WebSphere Enterprise Service Bus will be used to integrate business applications like billing and metering, while IBM WebSphere Message Broker and IBM WebSphere MQ were used to integrate grid devices. IBM ILOG manages business rules within the solution.

Seeing the big picture

In describing the solution, it’s important not to lose sight of the larger strategic picture for MVV Energie. While the government’s call for innovative energy ideas was a trigger for the project, it also reflected a clear-eyed recognition of the opportunities presented by an increasingly deregulated German energy market, one in which the importance of choice and quality service will be paramount. Against that backdrop, MVV Energie and IBM have in effect conceptualized an open energy marketplace that directly addresses the needs of tomorrow’s energy market, says Dr. Britta Buchholz, MVV Energie’s head of grid and plant planning. “We see the solution as an enabler of smart grid services,” says Buchholz, “a virtual marketplace where all the key elements needed to build a smart grid can be traded.”

Participants access this marketplace through the solution’s portal interface, built on IBM WebSphere Portal Server and secured by IBM Tivoli® Access Manager and Directory Server. For customers, the portal provides consumption history, hourly energy prices and other data that can be used to formulate a household energy demand strategy. Customers can also use the portal to specify their preferences

as to specific power sources, including traditional utilities, alternative energy sources and pro-sumers who generate their own electricity and wish to sell their excess on the market. Based on these preferences, the solution feeds real-time pricing into algorithms to generate a personalized energy-sourcing plan, which customers can either accept or modify. IBM and MVV Energie are now working toward deploying a pilot solution among 3,000 households in Mannheim, followed by an additional field test in Dresden. When fully deployed, MVV Energie's Buchholz expects the solution to become an important part of Germany's future energy roadmap. "Tomorrow's grid will be more distributed, flexible and intelligent," says Buchholz. "With IBM's experience and technology, we've made a major stride toward realizing our vision of a smarter grid."

For more information

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