

DONG Energy: Making the most of the intelligent electrical grid

Overview

■ **Business Challenge**

Increasing marketplace and regulatory demands along with a need for future infrastructure reinvestment drove Danish utility company DONG Energy to look for a way to better manage and utilize its electrical distribution network in order to respond to outages faster and more efficiently.

■ **Solution**

DONG Energy teamed with IBM to implement an Intelligent Utility Network, installing remote monitoring and control devices that give the company an unprecedented amount of information about the current state of the grid. The new solution also involves extensive analysis of the data provided by the remote devices, as well as reengineering of DONG Energy's business processes.

■ **Key Benefits**

- *Potential to reduce outage minutes by 25-50 percent*
- *Fault search time reduced by one-third*
- *Estimated capital savings on planned grid reinforcements of up to 90 percent, when fully implemented*



DONG Energy: moving towards the future

DONG Energy is Denmark's largest energy company, formed in March 2006 by the merger of six diverse companies in the fields of electrical and gas distribution and sales, power generation, and oil and gas exploration; it is an energy company in the truest sense of the word.

The electrical distribution arm of DONG Energy faces a number of challenges going forward:

- *Regulations require DONG Energy to meet benchmarks for capital and operating expenditures.*
- *New regulations for quality of service (outage frequency and duration) will become effective in 2008.*
- *DONG Energy will soon become a publicly traded company, which means it will have to meet not only regulatory standards, but shareholder expectations as well.*

These existing and impending factors drove DONG Energy to look for ways to optimize its operations, specifically with regard to quality of service. The company's ability to find problems in the grid and repair them quickly had to be improved.

Enter the Intelligent Utility Network

Electrical distribution companies around the world are facing challenges similar to those confronting DONG Energy. The demand for energy is increasing, and electrical grids are being severely stressed. The path forward is the Intelligent Utility Network (IUN), which uses information technology to improve the management—and therefore the performance—of electrical grids.

Leveraging information about the electrical grid to improve quality of service

Business Benefits

- Potential to reduce outage minutes by 25-50 percent
- Fault search time reduced by one-third
- Estimated capital savings of up to 90 percent, when fully implemented
- Provides competitive advantage by improving the quality of electrical service through faster, more efficient response to outages
- Allows DONG Energy to more fully utilize existing assets to respond to surges in demand, helping the company avoid capital expenditures for additional capacity
- Enables more effective long-term capital investment planning based on live data, helping DONG Energy to invest in new infrastructure more wisely

“It turns out that the real key isn’t the fact that we’ve got visibility into the grid, though that was our initial goal. It’s that we now have information available on grid performance that we didn’t have before. We can do a lot with that information.”

– Peter Vinter, power grid specialist, DONG Energy

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While companies all over the world are investigating IUN initiatives, DONG Energy has taken a leadership role and is one of the first in Europe to actually implement an IUN solution in a distribution network.

A key limitation of existing grids is a lack of information about what’s going on in the field. While major assets such as generation plants and transmission lines are monitored, electrical companies today have little or no visibility into the current state of the entire distribution grid—in many cases they do not know a failure has occurred until customers start calling and complaining that their power is off, and finding the fault literally means sending a truck out to isolate the problem by a process of elimination. In this respect, the way electrical grids operate has not changed for many years.

One form of the IUN solution—the one that DONG Energy is implementing—eliminates this limitation by deploying inexpensive remote monitoring devices from IBM Business Partner PowerSense out in the grid. The devices employ unique optical current sensors and tell the company instantly not only that a fault has occurred, but where it is. Devices like this can also, in some cases, control other equipment such as substation switches, raising the possibility of remotely isolating the fault, rerouting power and getting much of the grid back up and running in a matter of minutes.

Building a business case with unexpected benefits

The ability to quickly locate and isolate faults was the capability that drew DONG Energy to the idea of an IUN, says Peter Vinter, power grid specialist at DONG Energy. “For a couple of years, we’d been working on ways to introduce measurements on equipment that was previously inaccessible,” he says. “But we needed to know if it would be a cost-effective way to meet our quality of service goals. Would it be better to monitor old equipment or invest in new, more reliable equipment that would go unmonitored? We had to develop a business case that would let us make that decision appropriately.”

DONG Energy engaged IBM Global Business Services to help build a business case that would assist DONG Energy in making the decision. IBM was chosen because it has taken a leadership role in developing IUN solutions, and also has deep industry-specific expertise in the energy sector. Working with DONG Energy, IBM was able to uncover significant additional benefits

beyond improvements in operational efficiency, showing how the company could not only improve its asset utilization, but also make far more informed and intelligent decisions about future capital expenditures.

The business case confirmed that DONG Energy's pursuit of an IUN solution was a good move, according to Vinter. "Our quality of supply will improve considerably. We can reduce minutes of power lost by 25 to 50 percent and reduce our fault search time by one third."

But the IBM Global Business Services consultants helped DONG Energy see that an IUN solution could do far more. "It turns out that the real key isn't the fact that we've got visibility into the grid, though that was our initial goal," Vinter says. "It's that we now have information available on grid performance that we didn't have before. We can do a lot with that information."

One of the additional benefits is being able to drive equipment closer to its true limits. All such equipment has a rated capacity, which is set conservatively to ensure reliable, continuous service. It is possible to overload the equipment for a certain time without it failing—but to do so safely, one must know its current status. With remote monitoring technology, DONG Energy now has that information in real time and is able to intentionally drive its equipment safely up to—or even beyond—100 percent of rated capacity when needed to respond to temporary peaks in demand. In this way, the company can defer investing in new capacity and make better use of its current funds.

A second, and far more significant, benefit of the information provided by the IUN is its applicability to long-term planning. An electrical distribution infrastructure has to be designed to handle peak loads. Historically, utility companies have had to estimate these loads based on usage patterns and anticipated growth, and build in enough capacity to handle any eventuality. This means that most electrical grids are overbuilt. "With the information provided by the new solution, we have real peak load data for individual grid components to work with, so we can optimize our capital expenditures," Vinter says. "It can make those investments far more cost-effective—we estimate we can save as much as 80 to 90 percent on reinforcement of the existing grid by making use of the hidden grid capacity. It's an entirely new dimension that's been added to our planning process, and it's transforming the way we do business."

Key Components

Software

- WebSphere® Application Server
- WebSphere MQ
- WebSphere MQ Explorer
- WebSphere Message Broker
- WebSphere Message Broker Toolkit
- WebSphere Eclipse Platform
- Rational® Software Architect
- JRules software

Services

- IBM Global Business Services

IBM Business Partner

- PowerSense
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Why it matters

By leveraging the information provided by devices that monitor and help manage the electrical grid, DONG Energy is able to not only respond to outages faster, but also make more efficient use of existing electrical infrastructure assets and plan more intelligently for future improvements. This leading solution, one of the first implemented in Europe, helps DONG Energy maintain a high quality of service for its customers, reduce capital expenses and more effectively plan for the future.

Reinventing the business

An important consideration in the implementation of an IUN is how to handle the flood of new information that the technology generates. To achieve the long-term planning benefits uncovered by the IBM team, a great deal of analysis must be performed using new analytic tools, and the information needs to be integrated with the company's existing IT systems and applications.

The IBM Global Business Services consultants worked closely with DONG Energy to model the company's existing business processes, determining what changes would need to be made based on input from DONG Energy. The IBM team then took the new processes and designed service-oriented architecture (SOA) IT infrastructure to accommodate them, integrating it with DONG Energy's existing systems. SOA makes IT processes far more flexible and scalable, improving DONG Energy's responsiveness.

Vinter notes that by going beyond DONG Energy's original goals, the solution has the potential to radically change the business. The company is looking into merging new data with its business processes, to improve outage management, network operation and planning. "The transformational part of this is really the information. The real question is, what can we do with all this information now that we've got it? With this solution, we're able to take that raw data and turn it into actionable business knowledge. That's what's going to allow us to succeed in the future, helping us make the best possible use of our existing assets and enabling us to identify where we need to make investments later on."

For more information

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

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11-07
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