

PowerSense and IBM: optimizing future power grids



Creation of an Intelligent Utility Network that meets future smart grid demands

Highlights:

- Enabling 'Smarter Planet™' technologies to operate tomorrow's electrical grids
- Quickly locating and isolating faults on the network
- Combining PowerSense's unique sensor technology with IBM's software infrastructure
- The ability to drive electrical equipment closer to true limits
- Serving clients with multiple solutions

The partnership between PowerSense and IBM provides electrical utilities with an unprecedented amount of information about the current state of their grids. This enables them to meet an array of challenges such as accommodating renewable energy and distributed generation as part of their networks.

The partnership combines PowerSense's remote monitoring and control capabilities with IBM's Solution Architecture for Energy and Utilities Framework (SAFE), a powerful software platform that provides numerous solutions across the energy and utility value chain. The SAFE framework includes IBM's WebSphere® Application Server and other products. The result is an Intelligent Utility Network (IUN) that dramatically reduces outages and fault search times, and creates smart grid opportunities.

Electrical utilities face enormous challenges to meet the demands of current and future customers. That includes integrating more renewable energy into their systems, coping with aging infrastructures, providing customers with information and products to improve energy efficiency, and "rethinking power" to accommodate advances like electric vehicles.

But one formidable hurdle hampers such innovation – the need for controlled supervision of the grid. Electricity networks are currently operated with very little visibility of realtime activities on their low and medium voltage areas. They cannot track developments in the field, especially about when and where outages occur. Often, they don't learn of outages until a customer complains.

To create tomorrow's smart grids, power distributors need this information and more.



PowerSense, a spinoff of Denmark's largest utility, DONG Energy A/S, provides high quality monitoring and control equipment together with integrated supervision to help distribution companies meet these monitoring challenges. The PowerSense DISCOS system helps distribution companies obtain comprehensive information from their complete grids at a level of detail never before seen in the utility sector.

DISCOS has created unique optical current sensors that provide medium and low voltage supervision, instantly informing a distributor when and where an outage has occurred. The solution focuses on fault and asset management perspectives including predictive fault location, rapid fault location, optimized usage of the grid, load balancing, overload detection and centralized production supervision.

In addition, DISCOS technology enables integration from power sources including solar panels and wind turbines into the power distribution grid. Other technologies such as energy storage from electric vehicles can also be integrated into the grid. In short, DISCOS technology can be the eyes, ears and hands of an IUN that improves the management and performance of electrical grids.

Putting that valuable data to work is the job of partner IBM, a global provider of IUN solutions with its vast expertise in the energy and utility sector enabled by its SAFE platform. IBM products such as its WebSphere software turn PowerSense's collected data into useful information that enables companies to quickly identify and repair outages, and even anticipate problems in advance.

With PowerSense as an industry innovation partner within IBM's Energy & Utilities Industry framework, they jointly offer world class smart grid solutions that rely on PowerSense's unique sensor technology and IBM's software infrastructure to aggregate data from sensors to analyze, visualize and control the grid. The result is a whole new level of control and optimization of power grids.

The benefits of this new capability are immediate and profound for distributors and their customers, especially the reduction in the System Average Interruption Duration Index (SAIDI). For example, in a pilot involving DONG Energy, benefits included the potential to reduce outage minutes by 25-50 percent, and estimated capital savings of up to 90 percent based on full implementation.

“By implementing the DISCOS system, our customers benefit significantly from improvements in reliability through reduction in SAIDI as a result of faster fault type identification and location.”

— Brian Sørensen, CEO of PowerSense A/S

Electricity generators throughout the world are benefiting from the PowerSense IBM partnership in numerous ways. For example, EnergyAustralia (EA) obtains a realtime street-by-street view of its network as well as granular data on a second-by-second basis. Previously, such information was obtainable only on an annual basis, says an EA executive.

EA and DONG Energy claim they were both drawn to the ability to quickly locate and isolate faults. Also valuable are the technology's remote control capabilities that allow the device to open and close switches remotely in the field as requested by controllers.

The two companies have also engaged IBM to help build a business case for their respective decisions – relationships that quickly grew in size and scope. DONG Energy says IBM uncovered significant additional benefits beyond improvements in operational efficiency. For example, it showed the company how it could improve its asset utilization while also making more informed and intelligent decisions about future capital expenditures.

By merging existing and new power infrastructures into their existing SCADA (Supervisory Control and Data Acquisition) and IT systems, the two companies achieve major cost savings with the improvement of asset management.

Additional benefits also accrue from the partnership. Among them:

- **The ability to drive equipment closer to its true limits.** All electrical equipment has a rated capacity which is set conservatively to ensure reliable service. By knowing its current status, companies can safely overload the equipment for brief periods when needed to meet temporary peaks in demand.
- **Its applicability to long-term planning.** Most electrical grids are overbuilt to provide sufficient capacity to handle any eventuality, with limits based on estimated loads. But with information based on actual peak loads for individual grid components, capital expenditures can be optimized. DONG estimates it can save as much as 80-90 percent on reinforcement of the existing grid by making use of the hidden grid capacity.
- **Reinvention of the business.** How to handle the flood of information generated by the new technology is a pressing issue. To achieve the long-term planning benefits uncovered by IBM, much analysis must be performed using new analytic tools. So IBM has designed service oriented architecture (SOA) infrastructure to accommodate those needs, integrating it with existing systems.

Under its partnership with IBM, PowerSense is able to serve clients with world class turnkey solutions through Global Business Services (GBS) as well as with other customer engagement solutions involving different IBM units and partners. For example, smaller utilities might find it advantageous to process PowerSense-monitored data via a technology stack of varying components under a hosted arrangement, either independently or in groups.

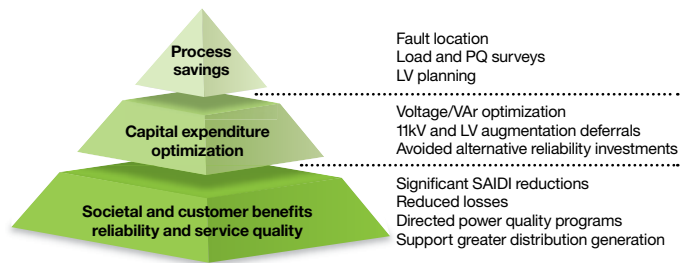
The PowerSense and IBM solution: a closer look

The PowerSense technology can digitalize and retrofit existing power infrastructure globally, saving power utilities an enormous amount of money and providing the foundation for the smart grid applications of the future. The DISCOS system has been developed to meet the specific needs of providing fault information and accurate current measurements over an extended current range. This is all done without the saturation characteristics of traditional current transformers.

The solution monitors the grid and sends measurements and alarms via its SmartCOM RTU module. The data are sent via GPRS/3G/Ethernet/Fiber back to a device gateway (WebSphere Datapower X150). From the Real Time Integration Services Bus, different applications have access to the data such as an IBM DB2® and an IBM Tivoli® Netcool®/OMNIBus where the grid topology, measurements and alarms are displayed.

Smart grid business drivers for monitoring distribution grid

Areas identified to benefit from DGM solution



Rely on PowerSense and IBM experience

The IBM PowerSense relationship enables clients to reap enormous benefit from PowerSense's accumulated data and IBM's decades of experience in hardware, software and communications solutions in support of electric utilities all over the world. Such partnerships truly build a Smarter Planet.

PowerSense

- **Technology** – the DISCOS system has been in operation in Europe since 2004, where it is helping a steadily growing base of power generation clients to meet their future goals.
- **Global applicability** – the PowerSense technology can digitalize and retrofit existing power infrastructure globally, from the oldest transformer stations of the 1930s to today's new equipment.
- **Sector experience** – as a former unit of DONG Energy, Denmark's largest energy company, PowerSense enjoys vast expertise in all facets of the power generation field.

IBM's SAFE platform with WebSphere and Tivoli products

- **Global experience** – IBM is a global provider of smart grid solutions with vast experience in assisting organizations throughout the world with its insights for their enterprise assets.
- **Flexibility** – IBM provides a wide array of expertise to assist clients in the fast-changing field, including its SAFE platform, its WebSphere and Tivoli family of products and broad management capabilities.
- **Dependability** – IBM technology can satisfy tough utility requirements and offer solid, innovative solutions to complex and critical energy infrastructures.

For more information

To learn more about IBM in energy and utilities, contact your IBM sales rep or visit:

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Route 100
Somers, NY 10589
U.S.A.

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