EnergyIP – smart grid application platform for processing large data volumes in a network

Siemens has further evolved EnergyIP, the meter data management system from US specialist eMeter, of San Mateo, California, into an upscalable Smart Grid application platform. Siemens acquired the company in January 2012. Today, as a data hub and platform for Siemens Smart Grid applications, EnergyIP supports the integration of all involved systems – from the smart meter infrastructure to a company-wide enterprise resource planning system (ERP) – and converts meter data to information for the operations of both the utility company and its customers.

EnergyIP gathers, processes and links together consumption data with information from a variety of other sources in a power utility company, and provides them to a large number of applications. That makes the platform a hub for process data, contract data, billing and status information as well. So EnergyIP can also be used for strategic planning, and can control billing for a large number of generating sources and consumers.

The application platform is composed of many distributed servers that gather and process data. The operator can run software applications on it that execute business processes for electricity or similar products on the basis of that data. These applications include such possibilities as virtual power plants, EnergyIP Analytics, outage management, asset optimization, load management, and customer management and information systems. The applications use the same master data and communication channels to customers and their systems. Since the appropriate connections are already available, there are no media disruptions that would otherwise occur because of database differences and setup times.

Other sample applications are changing electric power suppliers, billing for network use between the network operator and power supplier, and billing for units.
integrated into a virtual power plant. EnergyIP is designed for tens of thousands of participants and can process the immense amounts of data that will accumulate, for example, when some of the intelligent meters of the future transmit a reading every 15 minutes. Another important feature is the ability to securely carry out business processes between partners – specialists here speak of role and permissions management. And new members of the system can connect with little effort and expense, so that the solution also makes economic sense for a great many small electricity providers.

The DEMS distributed energy management system from Siemens recently started running on EnergyIP. Through this system, Siemens offers electric utilities, grid operators and utilities a foundation on which to build a new generation of a virtual power plant. DEMS on EnergyIP makes a virtual power plant a core application for planning, optimizing, marketing and actuating not just distributed power generating facilities, as was the case before, but also combinations that include thermal power plants. For that purpose, EnergyIP is supplemented with the classic telecontrol protocols for transmission system operators (DNP 3.0, ICCP, IEC 60870-5-101) and classic systems (IEC 60870-5-104) and substations (IEC 61850). DEMS also supplies predefined data models for different systems like wind power stations, flexible loads, cogeneration, energy storage and run-of-the-river hydroelectric plants.

Those participating in the virtual power plant transmit their availability and power generation data to the EnergyIP application platform, which uses them to generate projections for the total amount of energy available. Electrical power is traded on that basis via a separate system. The system makes it possible to form plant pools for operating reserves, day-ahead and intraday trading, and in the future will permit pooling depending on the distribution networks’ topology. It is multitenant-compatible and thus permits new models for cooperation and marketing between energy traders and such entities as municipal utilities that want to draw on services of a virtual power plant through energy traders.

Hitherto, a virtual power plant could handle only a limited number of participants. To change that, so as to operate tens of thousands of decentralized plants and integrate power generation data directly into electricity trading processes, DEMS was ported to EnergyIP. That's because EnergyIP is intrinsically highly scalable. This high scalability makes it possible to manage, optimize and control anywhere
from a few tens of plants up to several thousand within a single system. A larger
genco – a power generation corporation – or a coalition of multiple small power
utilities would be able to operate a virtual power plant with such a large number of
distributed plants by way of a cloud-based solution.

www.siemens.com/press/PR2016020157EMDE

In the RWE Smartpool project, Siemens and RWE are jointly developing the next
generation of an IT system to connect a large number of distributed energy systems
– and are thus making it possible to pool distributed energy systems on the
EnergyIP Smart Grid application platform. Within Smartpool, RWE is setting up, with
EnergyIP, a system that enables a large number of actors in distributed energy
systems – like generators, consumers (loads) or storage units – to connect with the
new IT system in a multitenant-compatible way suitable for the mass market. The
platform is set up as an energy information and control system, and provides
important functions for the distribution network operator in light of the impending
transition to a new energy mix.

RWE Smartpool goes well beyond a classic virtual power plant that focuses mainly
on direct marketing or operating reserves. Smartpool makes it possible to tap
different or new application fields, such as supporting distribution network operators.
Distribution network operators must contend at times with network overloads,
especially because of the increasing amount of distributed feed-ins from renewable
power generation units. The operators intervene in the distribution network to keep
the network status from turning critical. This can be done, for example, with feed-in
management, or in the future, when the German Association of Energy and Water
Industries’ traffic-light concept has been realized, through the selective control of
individual generating plants, for example by running up flexible loads at the right
point in the distribution network. Distribution system operators can use the IT
platform to identify, aggregate and control individual plants selectively, depending on
the network’s topology.

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Within the cooperative sales arrangement in intelligent metering systems between
E.ON Metering and Siemens, EnergyIP is a significant technical component of the
capability on offer. EnergyIP enables E.ON grid operators to integrate their smart
meter infrastructure into the IT systems in the best possible way, and to use the
delivered reading data both for network operation and for billing and visualization. In the future, readings can also be used for smart market applications like variable rate plans or for controlling feed-in plants.

www.siemens.com/press/PR2016020161EMDE

With EnergyIP, Siemens enables electric power utilities and grid operators to get a deeper understanding of their Smart Grid data. For that purpose, Siemens has expanded EnergyIP Analytics, an application that runs on the application platform, to include a big data option. The Analytics application today uses a variety of big data options today for data-intensive processes in administering smart meter gateways and processing meter readings for outside market participants in the German market. These include analyzing complex data patterns to identify energy theft and identifying endangered or overloaded equipment and plants within the distribution grid, as well as preparing load projections for various levels of the distribution network on the basis of highly granular meter data.

www.siemens.com/press/PR2016020154EMDE

Siemens is expanding EnergyIP with application software components specifically intended for the German smart metering market. Thus Siemens provides utilities with a centralized IT solution for administering smart meter gateways and processing encrypted, signed energy consumption meter data. Using this solution, utilities can connect intelligent metering systems comprising a smart meter gateway and intelligent base meters to their central IT system. In matters of data protection and data security, the IT solution meets the requirements established by the German Federal Office for Information Security (BSI) in the Technical Directive for Smart Energy, TR-03109.

Siemens has conceived its solution as a multitenant system. This means that, in compliance with market regulations, it can recognize the roles of distribution system operator, measuring point operator and gateway administrator. The software design already allows for the expansion of market communication that is currently being specified by the German Association of Energy and Water Industries. The expansion pertains to data exchange among all roles within the market. Thanks to the EnergyIP platform concept, total setup and operating costs can be reduced, thus increasing cost-effectiveness. The current version of the EnergyIP application supports BSI-compliant business processes for setting up a secure connection. It
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Background Information

Furthermore supports the configuration of smart meter gateways and base meters, processing encrypted and signed meter data, and monitoring intelligent metering systems.

www.siemens.com/press/pi/ICSG201402044d

With the aid of Mitsubishi Electric as a systems integrator, Siemens implemented EnergyIP in Japan for the first time in 2015. The system there is being used by power utility company Shikoku Electric as part of a smart meter rollout, where it serves as the central platform for meter data management via the Meter Data Management (MDM) application. The Smart Grid application platform pools the data processing processes, gathers power consumption data via the MDM application, and readies them for further processing. The Japanese utility plans to install and commission up to three million smart meters. EnergyIP, as an MDM application solution, will gather and further process the consumption data from all these meters and support the transmission of data for downstream business processes.

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The NTL EnergyIP application is a solution to combat so called non-technical losses (non-equipment-based losses). It gathers, pools and processes meter data. The application includes rules, algorithms and alarm thresholds that help distribution network operators track irregularities in their customers’ power consumption. The aim is to detect non-technical losses at major consumers, especially in commerce and industry, and/or among private customers in areas where such losses occur on a rather large scale. It can then help counteract these losses and thus enable power utilities to reclaim additional payments where applicable. Energy losses are inevitable in transmission and distribution grids. Some of the losses are equipment-based. Losses like these can be reduced by better technology and by renovating the infrastructure. But there are also non-technical losses that cause problems for many utility companies around the world. A large share of these losses is the result of energy theft, which costs the energy industry billions of dollars every year.

In its 2015 Magic Quadrant Report on meter data management systems (Meter Data Management, MDM), the Gartner market research and consulting firm placed meter data management specialist eMeter far in the lead of the leaders’ quadrant. Siemens acquired eMeter at the beginning of 2012, to expand its Smart Grid portfolio with eMeter’s EnergyIP management platform and application development.
environment. The company, headquartered in San Mateo, California, appeared in the Gartner report for the second year in a row.

In its Magic Quadrant Reports, Gartner assesses companies in a four-field matrix in terms of the maturity of their corporate vision and their competence in executing it, and graphs the relative positions of competitors within the market. Execution competence includes such aspects as products and services, profitability, response to market needs, net success, marketing measures, and customer experience. In assessing maturity of the corporate vision, Gartner evaluates understanding of the market, strategies, innovations and business models.

In its report on meter data management systems, Gartner expects leading companies in this market to have advanced technology, broad offerings, rich functionality and the capability to configure their solution to different needs. They must also offer their solution both on premises and in the cloud. They must as well be able to demonstrate the financial viability needed to fuel research and development on new technology, such as Web services and service-oriented architecture. The ability to integrate business processes across functional boundaries within utility companies must also be included.


EnergyIP is being developed further and adapted to market needs at the Digital Grid Business Unit of Siemens’ Energy Management Division. The business unit offers energy utilities, grid operators, industrial firms and municipalities a consistent portfolio of products and solutions for building up intelligent power supply networks – Smart Grids. Within Smart Grids, both energy and data flow in all directions. Thus intelligent grids are a prerequisite for incorporating more and more renewable energy sources into the grid. With the data gathered in Smart Grids, energy utilities can also operate their systems more cost-effectively. For that reason, software solutions that analyze data from Smart Grids will grow more and more important. Here the Digital Grid unit uses its own proprietary developments, but also relies on a system of software partners.

Smart grid solutions based on EnergyIP are part of the Siemens Division Energy Management's product portfolio. The Division offers as a product supplier, system integrator, and solution and service provider, power supply companies and industry cost-efficient, reliable, and intelligent solutions for the transmission and distribution of electrical power. The portfolio ranges from products and systems for low-voltage and distribution networks and Smart Grid and energy automation solutions to high voltage transmission systems. With a presence in more than 100 countries, the Siemens Division earned approximately €11.9 billion in sales and €570 million in profit and employed just under 53,000 employees worldwide last fiscal year, which ended on September 30, 2015.

For further information on Siemens’ Energy Management Division, please see www.siemens.com/energy-management

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