

Many foreseen and unanticipated events are conspiring to push utilities, operators and producers critically closer towards smart energy preparedness. Navita Systems' Anette Nordskog and Jo Morten Sletner discuss the move

TAKING THE LEAP INTO SMART ENERGY MARKETS

Political and market change

With a view to introducing smart energy markets – the European Union (EU) has set determined energy targets for 2020 and heightened its focus on energy efficiency and future load profiles, while there have been new governmental requirements for grid operators – the strategic importance of grid operators and suppliers is being advanced. In addition, since the nuclear incident in Fukushima, Japan, earlier this year, steps towards phasing out nuclear production in Europe have increased and spread from Germany to Switzerland, and now likely to France and beyond. Among the many aspects to phasing out nuclear energy, security of supply is a particularly significant concern. Much of central Europe's renewable production stems from weather-dependent sources, such as wind and photovoltaics, which means their renewable supply is unstable, difficult to regulate and difficult to control. Phasing out nuclear therefore increases dependency on gas and coal-produced power to which renewables are supplemental.

On the market side, regulatory reporting is becoming increasingly strict and incentive schemes designed to conform consumption patterns to production (load) patterns are beginning to emerge, resulting in calls for future-focused IT systems capable of handling the new regulations and schemes. While end-users do their bit as part of the green certificates bill, feed-in tariffs and the need for investments in new renewable production, governments are introducing incentives to reduce



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end-user energy consumption and bolster supplier and operator support of such behaviour.

IT impact

Regulatory changes, as well as the introduction of automated solutions within the smart energy markets concept, will require utilities to change their behaviour not only in procurement, hedging and deliveries, but also in network operations, nominations and physical transfers. This holds true for operators in the deregulated electricity and gas markets as they appear today, but also considering the market conditions that will accompany the introduction of the third EU directive, a common Nordic end-user market – currently under debate in the Nordic power market –

and possibly a future common European end-user market.

Given the current focus on compliance and reporting, and the short lead times between the implementation of new regulations and the beginning of compliance reporting, there will be a rapid increase in the volume of data for IT systems to handle. At the same time, IT systems' processing times will need to be reduced, requiring them to operate with a large measure of flexibility and scalability.

In response to the changes and challenges, the market is in search of new central systems for the collection and storage of all electricity, gas and heat-metering point data. By gathering all data into a single system, an information database is created that may be further processed by other systems.

Operational impact of regulatory and market changes

In operations, new routines will be enforced for metering, settlement, billing and reporting of any energy service rendered – electricity, gas or heat. Today, utilities operate as lenders to their customers as power is delivered, metered and settled before it is invoiced and paid for. The lending period can be up to two months and represents a substantial risk to suppliers. In future, automated processes for change of supply management, asset management and operations, as well as metering and invoicing of delivered energy – called 'meter to cash' – will be key.

New automated processes with

instant meter reading and smart infrastructure will significantly shorten this lending period, lower risk and create better credit terms for suppliers.

Further, meter-reading management requirements will increase significantly throughout the process, particularly external and internal requirements. Accordingly, future meter-reading systems will constitute a key component of meter-reading management systems in utilities' distribution operations.

Risk reduction in the meter-to-cash process is, therefore, the driving force behind this development for operators. Current meter-to-cash operations are based on existing external demands and are focused on meter-reading management as the basis for invoicing customers' energy consumption, as well as the basis for the settlement and reporting of physical deliveries to players in the electricity and gas markets.

The meter-to-cash process is further divided into several sub-processes that are all included in new software requirements. Advanced metering infrastructure (AMI) has already been implemented and new technologies are developing rapidly. Integrations are becoming tighter, the amount of data that can be handled is increasing and metering time is decreasing.

Measuring electricity includes the measurement of physical energy at the consumer end and in the distribution network. Apart from the energy value, measurement-related events and measurements other than energy – such as voltage quality, flow and temperature – are also collected. This information can subsequently be used to steer production and consumption, possibly from central units.

The AMI evolution also includes interval metering – on an hourly or more frequent basis – and smart grid functionalities, such as grid metering, substation automation and outage management.

External requirements

There are many external requirements that utilities must be able to process and IT systems need to support in the future – for example, tighter changes in electricity supplier (daily),



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demands for the registration and reporting of short power outages at the consumer level, and proposals regarding lowered limits for hourly measurements. The current proposal in Sweden, which represents one of the most advanced countries in this field, is greater than 8,000 kilowatt hours per year, which means inclusion of private households. There are also proposals for a common Nordic end-user market for electricity and a common European end-user market.

Smart grid functionality

Smart grid functionality entails the use of all data from measurements at the consumer end and in the distribution network in various parts of operations. In addition, there are increased requirements for measurements and monitoring of the distribution network, for continual operational efficiency enhancements and a continued focus on process orientation.

Settlement methods

The introduction of new settlement methods, in conjunction with increased hourly measurements and a common end-user market, will provide utilities with the opportunity to invoice end-users for actual consumption quicker, and make use of the consumption load data to better their hedging and procurement decisions on an hourly basis.

Reporting requirements

There is an expectation for faster reporting of meter values and accounting reports, both internally and externally, as well as for automated and efficient processes for meter-reading management and account settlement, which in turn lead to demands for efficient and flexible tools for analysis and reporting.

Making the switch to smart meters capable of automatically and wirelessly transmitting meter-reading data eliminates costly site-based meter readings, enables data analysis to better align daily energy demand with supply, and allows for differentiated pricing based on demand trends. To support these kinds of innovations, designers of IT systems are working with customers, and within the borders of different research and development projects, to find solutions for future handling and use of real-time data from automated readings.

Conclusion

Utilities are crossing a threshold of dramatic change as the consequences of already imposed and pending regulatory changes manifest. As the volume of data increases and new types are being collected, a whole new way of steering energy consumption is opening up to suppliers and producers.

However, solving the consequent operational and compliance challenges and seizing the new efficiency and market opportunities is dependent on provisional IT solutions. IT companies, which will be a key link in living the smart energy life, are increasing efforts to support operators and producers in smart energy preparedness.

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