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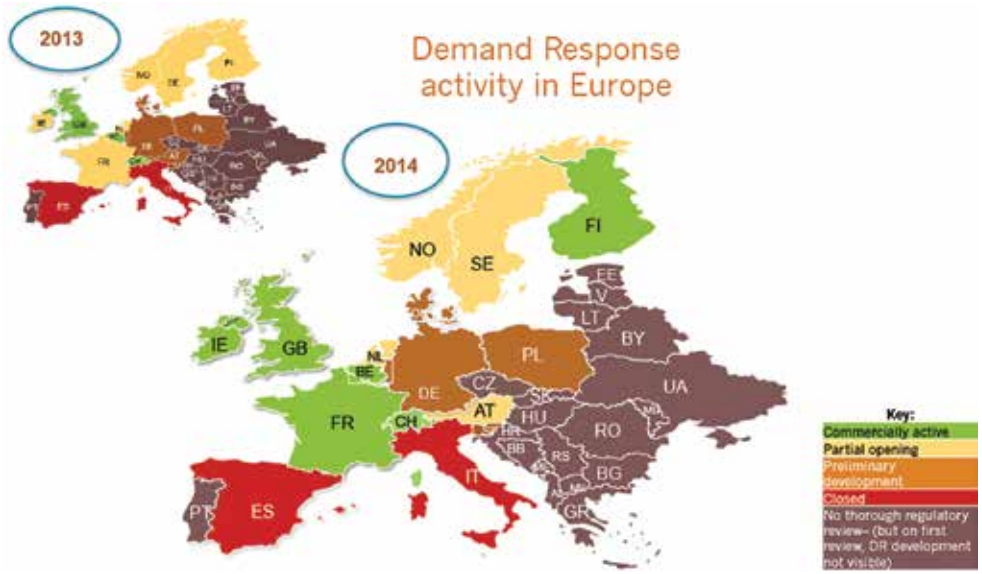

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INNOVATION CHANGES OUR WORLD

Claire Volkwyn
Editor
claire@metering.com

I have recently had the opportunity to travel to some of the countries which are leading smart grid and smart metering innovation. I had the pleasure of spending time in the United States where I got to visit some of the companies making up the Raleigh Research Triangle Cleantech Cluster, and then spend some time on the opposite side of the country in Silicon Valley, meeting with some of the companies that are household names in smart energy.

Additionally, I had the pleasure of joining some of my colleagues at the European Utility Week conference, which took place in Amsterdam.

It was brought home to me again that despite the similarities to the challenges faced by utilities globally, it is the objective and specific need behind the technology that drives innovation. So while in the US the drive has been around getting more clarity on consumption and proactive outage management (among other things) the drivers in Europe are slightly different, and in some parts – Germany particularly – it is less about efficiency or proactive management, and more about integrating renewable energy.

Editor, Claire Volkwyn, with Sales Director Gerald Schreiner during a recent trip to San Antonio, Texas.

Innovation takes many forms – from the ability to manage your thermostat or building's energy usage – to equipment that enables a utility to retrofit older mechanical meters and turn them into fully functional smart meters. From games which encourage consumers to be more conscious about their energy usage, to algorithms which can analyse energy consumption, and even predict when equipment may fail.

Dinner with members of the Metering & Smart Energy International advisory board during European Utility Week in Amsterdam.

I had the opportunity to meet with a start up in Silicon Valley that is using video connectivity to enable technicians to get expert advice in real time – regardless of their location, or that of the expert. The truly amazing thing is that your expert could be based in Hawaii on vacation, but if he has an Internet connection, he can be addressing a problem in the furthest reaches of Alaska, or downtown New York.

The Big Question

Based on a number of conversations I had during my travels, I wanted to pose a question to the greater Metering & Smart Energy International readers: **Is the term 'smart grid' past its sell-by date?** And if so, what term or buzz word will replace it?

We welcome your comments on this question and on the items within the publication.

ITRON LAUNCHES LEARNING UNIVERSITY IN SOUTH AFRICA'S UTILITY SECTOR

Itron has opened its Learning University at the Riversands Incubation Hub in Johannesburg, training students to implement and manage electricity and water systems including metering, prepayment systems and data management software. The programmes offered are accredited with the Energy and Water Sector Education and Training Authority of South Africa (EWSETA) and will focus on the principles of prepayment and vendor practice. The initiative is born out of a partnership between Itron's customer Century Property Developments and South Africa's National Treasury to support enterprise development, fostering entrepreneurship and advancement of SMEs in the country.

Managing Director of Itron for sub-Saharan Africa Damian Padachi said, 'Our investment in this corporate social responsibility programme forms part of an ongoing initiative to support enterprise development in the communities where we do business.'

The programme will support, provide mentorship and 'incubate' SMEs, assisting them to become viable large-scale businesses. The hub will take on the role of an 'on-site practical business university' offering industry relevant training and skills development.

Mark Corbett, Century Property Developments CEO concluded that, 'The project is set to transform the socio-economic fabric of the nearby township … We are convinced that this project may be replicated in other parts of the country to stimulate the economy with the public and private sectors working hand in hand.'

SOUTHEAST ASIA PLANS TO INVEST $13.6 BILLION IN SMART GRID BY 2024

Washington based research and consulting firm Northeast Group has conducted a study stating that Southeast Asian countries will invest $13.6 billion in smart grid infrastructure over the next ten years (2014-2024). Modernisation efforts will include investments in smart metering and the upgrade of transmission and distribution infrastructure networks with sensors, communications and software.

It is reported that Thailand, Indonesia, Malaysia, Singapore, Vietnam and the Philippines will become the largest smart grid markets in 2024.

President of the Northeast Group, Ben Gardner said: 'Southeast Asian countries are just beginning on the path of modernising their electric infrastructure. Strong GDP growth of nearly 6% through 2018 and corresponding growth in electricity demand will help lay the foundation for investment. Electrification programmes and growth in renewable resources will also drive investment.'

Southeast Asian countries will deploy $37.3 million smart meters between 2014 and 2024, with an additional $2.5 billion investment in distribution automation upgrades with sensors and communication technology. Countries in the region have prepared for grid modernisation efforts, having drafted smart grid roadmaps with pilot projects already underway.

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EIB APPROVES €600 MILLION FOR ENDESA DISTRIBUTION GRID UPGRADE

A €600 loan from the European Investment Bank will provide the required financing for Spanish utility Endesa to upgrade its distribution networks between 2013 and 2015. The loan will boost the utility's liquidity position and extend the lifespan of its corporate debt. The funds will be invested in the utility's peninsular and non-peninsular electricity distribution grid – meeting market demand and regulatory requirements. The upgrades are expected to improve energy security and compliance with safety and environmental legislation.

Endesa has allocated €1.725 billion to its distribution business, having invested €574 million in 2013, €547 million in 2014 and with provision for €604 million in 2015. The first three years of the 15-year loan agreement will be a critical period in which the bank will provide support to help Endesa's investments in infrastructure and demonstrate the utility's creditworthiness.

ENERGY EFFICIENT CUSTOMERS WEAKEN MERALCO ELECTRICITY SALES

The Philippines' largest electricity distributor, Meralco, whose revenue is almost solely dependent on electricity sales, has reported weaker earnings with only a 2.3% increase in electricity sales for the period between January and September 2014. Electricity consumption amongst residential customers has decreased significantly due to customers taking steps to be more efficient in the way they use energy.

According to Meralco's president Oscar Reyes, 'The way we see it is consumers are now aware of their energy usage in addition to the availability of newer energy efficiency appliances. Even industrial and commercial customers are also sensitive to energy and efficiency measures. But, we at Meralco, (are) advocating that.'

Industrial and commercial customers in comparison have collectively boosted sales by 7%. Reyes says that a cooler tropical climate and a typhoon that swept through the country earlier this year – causing the collapse of its electricity facilities – have been factored into the 'slightly negative' result in sales. *Rappler.com* reports however that before typhoon Glena, the utility reported a humble 2% increase in net earnings.

A NOTE FROM THE EDITOR:
How do utilities deal with the paradox of encouraging energy efficiency when it is contrary to their main function which is to sell power to consumers? Share your thoughts: editor@metering.com

TRILLIANT SOLUTION FOR SECURE DATA SHARING IN UTILITY SMART ENERGY SYSTEMS

Trilliant's new Smart Energy Access Layer (SEAL) was created to bring together multiple smart metering and smart grid IT systems – new and legacy – for safer access to consumer data and meter device activity by third party companies. The nature of its design enables a 'utility, or third party as a smart meter system operator, to manage the communications with their fleet of smart assets independently'. SEAL also offers the benefit of security, low cost, speed to market and compliance with industry standards to utilities seeking to build smart energy systems and manage distributed assets.

ENEL'S INCENSE PROVIDES €6 MILLION IN FUNDS FOR CLEANTECH START-UPS

The Enel Group has announced its first open call for clean tech start-ups to submit proposals for project funding, part of the INternet Cleantech ENablers Spark project (INCENSe). Through the project, 42 European SMEs will be awarded a share of €6 million (US$7.6 million) to assist them to develop their ideas relating to energy efficiency, automation, renewable energy, smart grids, storage, automation, e-mobility, security and digitisation.

INCENSe was created to promote innovation and employment in the energy industry through the development of environmentally friendly products and high tech services. INCENSe is a business incubator and clean technology accelerator co-financed by the European Union and supported by EU's FIWARE Accelerator Programme. Endesa, Accelerace and FundingBox Accelerator are the project and research partners.

Companies have two opportunities to put forth their ideas. The first open call, focused on CleanTech, is open until 15 January 2015. The second open call will run from June to September 2015. The first 14 winners will receive a non-reimbursable grant of €150 000 no equity and will benefit from support services provided by the consortium's partners.

MICROGRID ADVANCED CONTROLS TESTING BEGINS IN MARYLAND, US

The design, simulation and testing of microgrid control systems has begun in Maryland as part of an $8 million Department of Energy (DoE) initiative for the rollout of a further seven microgrid projects.

The two Maryland deployments funded by the DOE's National Energy Technology Lab (NETL) will be used as field tests to compare the control systems of the two test microgrid deployments. The NETL has allocated $1.2 million for the initiative, known as the 'Olney Town Center Microgrid project'.

Steve Pullins, advisor to the DOE project and co-founder of Green Energy, told *Smart Grid Today* that community microgrids should have the ability to meet certain requirements. These included being able to manage various types of local energy resources, control the two-way flow of energy; and forecast load and generation schedules as a cost-effective, environmentally friendly, small scale energy system for large scale deployment.

Pullins said: 'We feel that it is important for the microgrid controls to be open-source, cloud based, cyber secure and architected to allow ease of integration and update of software over time.'

One microgrid will serve a multi-property while the other will serve a single property. Pullins added that the project allows comparisons to be drawn between community and university microgrids. These minigrids not only fulfil local energy needs but also contribute to presidential mandates to reduce carbon emissions and increase system reliability.

Project partners including Schneider Electric, Burr Energy and Pepco will provide their expertise and services. The evaluation of the microgrid controls developed, says Pullins, will be conducted at North Carolina State University.

He concluded: 'We are not building these microgrids yet. This two-year project is to develop the advanced controls only. We expect the controls to be developed, tested and proven worthy by November 2016.'

RENESAS ANNOUNCES NEW PRODUCT VERSIONS OF ITS RX111 GROUP MICROCONTROLLERS

Renesas Electronics has added new product versions to its RX111 Group of 32-bit microcontrollers (MCUs) predominately used in industrial equipment, building automation and healthcare device applications. The new product versions offer increased flash memory and RAM capacity for sensors, measuring and detection devices for building automation systems that require high computational processing performance for filtering at high speed. These devices also require lower power consumption to achieve prolonged battery life.

Developers are seeking microcontrollers with high performance and increased flash memory capacity, due to the increasing complexity of software systems, which often means opting for the undesirable high power consumption MCU. The RX111 product versions offer developers common components, keeping costs down, while still offering differentiation through extended functionality.

Key features of the new MCU is that it offers a variety of memory capacities to match different applications, it contains a CPU core that combines high performance and low power consumption and boasts special features that extend operation on battery power.

ADD AWARDED CONTRACT FOR ROLLOUT OF 18 000 METERS IN MACEDONIA

EVN, an Macedonian energy company whose primary focus is power distribution and supply, has awarded ADD Bulgaria a tender to deploy 18 000 AMI meters.

ADD GRUP will provide EVN with an end-to-end solution: smart meters, data concentrators and head end solution based on ADDAX technology. The project will be based on S-FSK IEC 61334-5-1 communication technology and will build on successful previous deployment of ADDAX at EVN Macedonia.

According to the company: 'After projects in many developing countries in Eastern Europe, Asia and Africa, ADDAX embedded in its design most efficient tools to tackle all sorts of electricity theft: from meter tampering and illegal connections to collusion with dishonest utility employees.'

NIST ISSUES 3.0 FRAMEWORK FOR SMART GRID INTEROPERABILITY STANDARDS

The National Institute of Standards and Technology (NIST) has released its 'Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0'. The document, a collaborative work between NIST and other industry stakeholders, is an updated plan for the transformation of the aging electric power system into an interoperable smart grid.

NIST was tasked with developing a framework to achieve interoperability of smart grid devices and systems in accordance with the Energy Independence Security Act of 2007. The updated framework was deemed necessary in light of progress in grid modernisation and addresses the widespread rollout of smart meters in recent years. The federal technology agency has identified 74 standards and protocols supporting smart grid interoperability in its 3.0 framework and contains revisions to the reference architecture model of the smart grid to reflect the importance of distributed energy resources.

The new release also discusses smart grid standards and testing and includes details on new developments and published works on cybersecurity. Included with the 3.0 framework is a revision of NIST's original 'Guidelines for Smart Grid Cybersecurity' (NISTIR 7628).

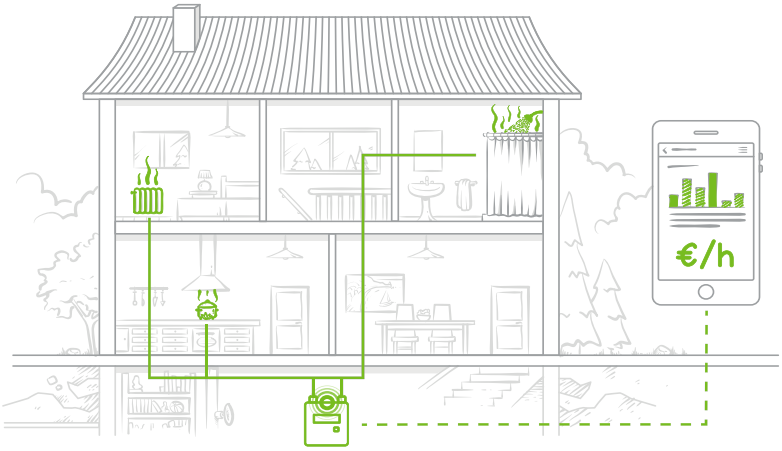
QUEENSLAND UTILITY SELECTS S&C STORAGE SOLUTION TO BOOST RURAL GRID RELIABILITY

Australian utility Ergon Energy has signed a contract with S&C Electric to improve the reliability and efficiency of its single-wire high voltage distribution lines, also known as single wire earth return (SWER) lines – servicing more than 26 000 of its customers in remote Australian communities. S&C's battery based storage solution, PureWave Community Energy Storage Systems (CES), will be utilised to support Ergon's Grid Utility Support Systems, 'increasing line capacity' and allowing customers to maintain their current usage during peak times. S&C will also implement S&C's IntelliTeam Distributed Energy Management System to centrally control the fleet of the [20] CES units throughout its SWER network, by optimising voltage to match demand on the grid.

Smart Gas Metering

Microthermal mass flow meter for reliable gas meters

Sensirion's new mass flow meter is suitable for G1.6 and G2.5 residential gas meters. It boasts impressive reliability, long-term stability, dust and dirt resistance and a compact design that enables easy integration in gas meters. The digital flow meter is fully calibrated for air and natural gas and is temperature-compensated and pressure-corrected. Furthermore, it features the newest generation of gas quality compensation mechanism.



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LOAD AUTOMATION SOLUTION DEMONSTRATED IN GRID4EU PROJECT IN GERMANY

An 'advanced load-grid automation solution', which has been integrated into the European Union's Grid4EU project, has been launched by ABB. The project tests the potential of smart grids in areas such as renewable energy integration, electric vehicle development, grid automation, energy storage, energy efficiency and load reduction.

Grid4EU Demo 1, Reken, Germany
The grid automation technology has been integrated into the local grid network and monitors load conditions in order to facilitate automatic adaptation to changes in demand. The solution features various control functions, that enhance the reliability of the electricity network, assist in the detection of faults and allow generators to supply consumers directly, reducing the probability of line losses.

ABB is participating in three of the Grid4EU's six demonstration installations, collaborating with RWE and TU Dortmund in Demo 1 situated in Reken, Germany. ABB has also contributed its remote terminal units which determine and optimise conditions in medium voltage networks.

The objective 'is to demonstrate that autonomous systems using agent functions for surveillance and automated control of medium-voltage networks can become an industrial solution for better management of medium-voltage networks'.

WSU RECEIVES $500 000 GRANT TO BUILD SMART GRID LAB

Washington State University (WSU) has received a $500 000 grant from the MJ Murdock Charitable Trust to build the 'most comprehensive' smart city lab for the testing of smart grid technologies. The university plans to 'build a city of the future' simulating a real-life smart city complete with windmills, fuel cells, solar panels, power substations and smart meters.

Chen-Ching Liu, director of WSU's Energy Systems Innovation Center and leader of the project, said: 'Smart grid technology is at a critical stage with a need for successful demonstration.

'Large-scale deployment will provide great opportunities to improve energy efficiency and grid reliability. A realistic test bed will enable us to make sure our research will be practical in the real world.'

Research conducted at the WSU lab aims to assist utilities to determine how to manage and prevent power outages, save energy and improve the integration of smart meters. The test bed will demonstrate the interactions between power grid subsystems and components on a systems level. Researchers will have the facilities to simulate automation, power substations, renewable energy devices and communication technology. Smart meters used in the project, says WSU, will be implemented with wireless links. Data collected from the meters will enable the design and implementation of demand response programmes.

'With this comprehensive test bed, we will be among the best in the country. This will speed up adoption of smart grid technologies, which are difficult to test in real-life', said Liu.

ITRON INTRODUCES NEW EDGE INTELLIGENCE PLATFORM

Itron has launched its new edge intelligence platform Itron Riva supporting sensing technologies and dynamic applications at device level. It offers adaptive communications, which selects the network path RF or PLC to optimise communications.

Itron Riva builds on Cisco's IPv6 network and IOx fog computing platform, enabling Itron and Cisco to deliver robust edge computing capabilities through distributed computing power, control and analytics. Edge computing enables analytics and knowledge generation to occur at the source of the data. The intelligence platform 'enables easy integration of third party devices, creating numerous possibilities for realising the promise of IoT to empower smarter utilities and smarter cities worldwide. Itron Riva also embeds an operating system and processor into field devices and sensors, enabling real-time decision-making at the device level'.

It takes Cisco's IPv6 multi-application smart grid reference architecture a step further, providing true plug-and-play wireless and wired communication infrastructure for the Internet of Things. This supports distribution automation, demand response, grid sensing and integration of distributed energy resources.

Kip Compton, vice president, IoT Systems and Software Group at Cisco said, 'The connectivity of the IoT means more data, gathered from more places, with more ways to increase efficiency and improve safety and security. We are proud to work with companies like Itron to create an ecosystem addressing today's biggest IoT challenges.'

SMART METERS AUSTRALIA: REGULATOR LOOKS TO INCREASE COMPETITION AMONG PROVIDERS

Australia's energy regulator is considering opening up the country's metering sector to allow competition between providers in a bid to give consumers greater choice.

The Australian Energy Market Commission (AEMC) is looking at proposals to allow open access to meter functionality and information, said Michelle Groves, CEO of Australian Energy Regulator, in a speech at a trade conference in Melbourne earlier this month.

Groves highlighted how smart meters offer consumers greater participation and choice in the market by allowing them to switch to a flexible retail offer or take up demand-side participation products, which she said 'could also be provided competitively'.

Regulation however has not kept pace with advances in metering technologies, said Groves.

She said: 'The existing arrangements inhibit investment in the provision of metering technology that can support the uptake of a range of new and innovative energy products and services.

'There is currently a degree of exclusivity in who can provide metering services in the National Electricity Market.'

Australian metering rules still mandate that regulated networks are exclusively responsible for provision of the meters that the majority of residential customers have on their premises.

Groves also hinted that metering reform will be considered by AEMC as part of a wider transformation of the industry towards a 'smart grid future'.

ECHELON FINALISES SALE OF ITS SMART GRID BUSINESS TO S&T AG

S&T AG, a European IT solutions provider, has purchased Echelon's Smart Grid Modernisation business, which will be operated through Networked Energy Services Corporation (NES), an S&T affiliate based in the US. The sale of Echelon's grid operations for $4.9 million was finalised in early October.

NES will continue its R&D efforts in Silicon Valley, California and maintain its application and software innovation centre in Fargo, North Dakota. Sixty former Echelon employees will run the NES grid business whilst S&T continues to grow its Smart Energy Business and continues supporting grid industry standards and groups including the Open Smart Grid Protocol (OSGP).

In a statement Hannes Niederhauser, CEO of S&T, said, 'Acquiring Echelon's grid business means an important expansion of our Smart Energy capabilities, further demonstrating our commitment to the energy market and our belief in the smart grid opportunity.'

Ron Sege, chairman and CEO of Echelon, said, 'This transaction represents a significant step in our long-term strategy focus on the Industrial Internet of Things market, while improving our operating results as we position our technology to capitalize on this emerging opportunity.'

S&T plans to collaborate with members of the Grid Modernization VAR programme, adding its product portfolio in order to extend the number of products and services the programme can offer.

WHICH? CEO APPEALS TO BRITISH GOVERNMENT TO REDUCE SMART METER COSTS

Richard Lloyd, Executive Director of Which?, the UK's largest consumer body, has submitted a letter to Energy Secretary Ed Davey in which he puts forth an appeal for British government to reduce the installation costs of smart meters, ahead of the nationwide rollout scheduled for the end of 2015.

Through its Fix the Big Six campaign, Which? has proposed ways in which government can go about controlling and reducing costs of smart meter deployment. To this end, Lloyd proposed that the Department of Energy and Climate Change consider the following recommendations: the 'centralised procurement of meters'; a 'coordinated and more efficient approach to the purchase and installation of communications infrastructure'; and that suppliers follow 'all reasonable steps' in order to avoid excessive costs when installing smart meters and ensure the efficient deployment especially in high rise and 'difficult' buildings.

Lloyd said: 'Without immediate action the cost of the smart meter rollout is in danger of spiralling out of control, while consumers' foot the bill. The energy market is undergoing a full-scale investigation, so the Government cannot expect competition alone will keep costs low.

'Major reforms are needed to Fix the Big Six and restore trust in this broken market. At a time when energy bills continue to squeeze household budgets, the Government must urgently explore ways to ensure consumers get value for money from the smart meter rollout.'

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WATER COMPANY PERSONALISES APPROACH THROUGH DATA ANALYTICS

Glendale Water & Power (GWP) are implementing a meter data analytics solution, CustomerIP, in partnership with Detectent, an analytics software company based in San Diego.

The Californian utility will use CustomerIP to leverage its investment in their digital meter infrastructure, across areas such as billing, metering services, revenue protection and customer programmes planning and delivery. The solution will assist GWP design programmes and market them geared towards specific customer groups that will help them conserve and save money. The utility will also utilise the benefits of CustomerIP to assist with billing accuracy and to curtail energy theft.

'Detectent brings to GWP a powerful and flexible meter data analytics solution that will allow us to take further advantage of our digital meter data. The initial scope of the project includes the application of analytics to ensure that we are billing our customers correctly as well as assist us in safeguarding against customer tampering. CustomerIP will also help us to better target customers with efficiency opportunities,' said Steve Zurn, General Manager of Glendale Water & Power.

'GWP is a very progressive utility that has always maintained a significant focus on customer experience and satisfaction,' said Michael Madrazo, CEO Detectent. 'In addition to applying meter data analytics to their electric service, we look forward to the opportunity to work with them on delivering value on their water service as well.'

SOUTH KOREA'S KEPCO READY TO EXPORT SMART GRID TECHNOLOGIES

South Korea's state-run utility Korea Electric Power Corp (KEPCO) has unveiled a strategy to turn its smart grid technologies into a global export.

A report by the Korea Times stated the company had unveiled a three-stage plan during an electrical power trade conference on Monday in a bid to 'develop smart grids into a business model and an export item', according to Hwang Woo-hyun, vice president of KEPCO.

KEPCO will spend US$155 million between 2015 and 2017 on developing technologies that will reduce spending on power, as well as boosting energy saving and efficiency, Mr Hwang said.

The electric utility envisages applying smart grid technologies across the country by 2030 for power generation, distribution and consumption, according to a KEPCO spokeswoman. At the same time it will try to export smart technologies to developing nations in Southeast Asia.

In September, KEPCO signed an agreement to sell its smart grid technologies to the Canadian power company PowerStream in its first export of this kind.

Under the deal, the two companies will cooperate to develop a large-scale application of the technology for North America.

In 2011, KEPCO earmarked investment US$7.18 billion in its smart grid business by 2030. Of the total investment 400 billion won (of US$365 million) per year will be spent in the next five years, to upgrade power transmission and distribution systems and switch meters, the company said in a statement.

Earlier this year, the utility announced it would soon be buying electricity stored in car batteries through a vehicle-to-grid pilot scheme planned for the end of this year.

SMART METER TRIAL STARTS IN HAWAII

Hawaiian Electric Company (HECO) has finalised the installation of 5 200 smart meters for customers in Moanalua Valley, portions of Pearl City, Kaimuki, Diamond Head, Kahala and Waikiki.

With the accompanying web portal, the meters provide data by day, time of day and even 15-minute increments. This installation is part of a smart meter pilot programme to trail the technology on the islands. If the smart grid plan proposed by HECO is approved by the Public Utilities Commission, the utility plans to incorporate smart grids across Oahu, in Maui County and on Hawaii Island by 2018.

According to Hawaiian Electric, 'The development of smart grids is a key part of Hawaiian Electric's energy transition plan.' This plan included providing more than 65% of the state's energy through renewable energy sources, lowering customer bills by 20% and nearly tripling the amount of rooftop solar energy by 2030.

The smart grid programme will be wireless enabled to integrate it into the existing grid, and will enable outage detraction, automated system controls and advanced metering.

There is no charge to customers for the switch to smart meters, HECO said.

EU GREEN eMOTION PROJECT DEMONSTRATES INTEROPERABILITY OF EV CHARGING INFRASTRUCTURE

An EU funded initiative, Green eMotion – an electromobility project – brought together teams from EDF (Strasbourg), ESB (Belfast), RSE (Milano), TÜV Nord (Hanover), and Verbund (Austria) in an electric car rally, driving from their respective countries to Brussels using different charging stations along the way. The project's aim is to 'demonstrate an interoperable electromobility system with easy access to charging infrastructure all over Europe'. The demonstration ended in a high-level conference during which Eurelectric Secretary General Hans ten Berge said: 'Shifting to electricity is key to making European transport more sustainable and contributing to the EU's decarbonisation efforts. This move can only happen if consumers are convinced that electric vehicles can provide a convenient and easy-to-use driving experience. The interoperable e-mobility system demonstrated by the Green eMotion project today represents an important step forward in this regard.'

The conference highlighted that owners of electric vehicles (EVs) are able to charge their cars from different operators throughout Europe – irrespective of geographical location and 'independently from their local infrastructure operator'. A Eurelectric press statement said that the charging infrastructure for the demonstration was provided by EDF, Endesa, Enel, ESB and RWE of Germany. The Green eMotion marketplace platform was made possible through IBM's ICT Infrastructure and clearinghouse service from SAP. Cars that were used in the rally, says the statement, were charged with their own user-ID at the charging stations of the other project partners.

EPRI DEMONSTRATES ITS OPEN VEHICLE-GRID INTEGRATION PLATFORM FOR PEVs

The Electrical Power Research Institute (EPRI), along with 15 utilities and 8 vehicle manufacturers including BMW, Chrysler and Mercedes-Benz, have partnered to 'develop and demonstrate an open platform that would integrate plug-in electric vehicles (PEV) with smart grid technologies enabling utilities to support PEV charging regardless of location.'

The Open Vehicle-Grid Integration (VGI) Platform software system was demonstrated at the Sacramento Municipal Utility District's Customer Service Center in October.

According to the EPRI, the open VGI platform facilitates communication between utilities and electric vehicles. It affords utilities the opportunity to capitalise on 'built-in smart charging capabilities' and enables them to deploy PEVs to support efforts towards grid reliability and stability. The platform is based on the principles of demand response and peak load reduction as utilities are able to send requests to motorists either to charge or stop charging their vehicles to support off-peak charging and load reduction.

EPRI manager of Electric Transportation Dan Bowermaster said: 'A key aspect of the platform's benefits will be giving customers flexibility and choices. It can help the PEV customer determine the value of using their parked vehicle as a grid resource, and help the industry develop a convenient, user-friendly customer interface. We see this as the foundation for future developments to integrate PEVs with the grid.'

2030: EU MEMBER STATES SETTLE ON 40% EMISSIONS CLIMATE TARGET

After talks concluded between EU leaders on 24 October, the European Council agreed on the 2030 climate and energy policy framework for the European Union.

EU member states have reportedly settled on a greenhouse gas emission reduction target of 40% by 2030. The Commission also proposed a combined target of 27% – increasing the share of renewable energy consumed by European countries by 2030. The EC also introduced an efficiency target of 27% for increased energy savings while the EU emissions trading system (ETS) is to be strengthened and reformed. The EU's energy package states that a '43% greenhouse gas reduction target in 2030 in the ETS translates into a [emissions] cap declining by 2.2% annually from 2021 onwards, instead of the rate of 1.74% up to 2020.'

The 2030 targets build on existing 2020 goals, with emissions already down by 20% against 1990 levels.

The new proposed target gave rise to mixed reactions. According to the *BBC*, a spokesperson for the Climate Commissioner Connie Hedegaard said: 'Our 40% target is in line with science as it puts us right on track to meet our 2050 goal of cutting emissions by 80%-95%'.

Opposing this view are a number of environmentalist and climate groups, some stating that the 40% target is 'too weak'. Brook Riley, climate justice and energy campaigner for Friends of the Earth Europe, stated: 'To describe 40% emissions cuts as adequate or ambitious, as EU leaders are doing, is dangerously irresponsible. 40% is off the radar of climate science.' '40% is still not enough to put the EU on a path to net zero emissions by mid-century and kick start the transformational change we need. 40% must be seen as a floor which opens the door to increased ambition,' said Mark Kenber, CEO of The Climate Group.

EU RELEASES 'ENERGY SUBSIDIES AND COSTS IN THE EU' REPORT

The study conducted by the European Commission was aimed at quantifying the extent of public interventions in energy markets in all 28 EU Member States.

Günther H. Oettinger, vice president responsible for energy, said: 'We now have a set of data on subsidies and costs in the field of energy that is more solid and comprehensive than anyone before. We are now better informed about the size of public subsidies in recent years and the costs for power generation across all technologies.'

The report presents data on the costs and subsidies across the various generation technologies in the electricity sector as well as the cost competitiveness of the different power generation technologies. The European Commission reports that the cumulative value of public interventions in energy, across all 28 EU Member States, totalled between €120-140 billion. A significant portion of the total was attributed to investments in renewable energy. Solar energy received the largest amount of support (€14.7 billion) followed by onshore wind, biomass and hydropower, while coal received the largest investment (€10.1 billion) for conventional power generation sources.

The report also takes into account estimates on external costs across power generation technologies not accounted for in market prices. It considers the environmental, health and climate impacts of each power generation technology.

Justin Wilkes, chief executive officer of European Wind Energy Association (EWEA), said: 'This report highlights the true cost of Europe's dependence on fossil fuels. Renewables are regularly denigrated for being too expensive and a drain on the taxpayer.

'We are heavily subsidising the dirtiest form of electricity generation while proponents use coal's supposed affordability as a justification for its continued use.'

Frauke Thies, European Photovoltaic Industry Association (EPIA) policy director, commented: 'Despite decades of heavy subsidies, mature coal and nuclear energy technologies still rely on similar levels of public support as innovative solar energy is getting today. However, support for solar electricity is already coming down, in line with the rapid technology cost reduction, as opposed to coal and nuclear energy which remain locked into subsidies as they have been for the last 40 years.'

ENTSO-E RELEASES POLICY RECOMMENDATIONS IN SUPPORT OF EU'S ENERGY AND CLIMATE TARGETS

The European Network of Transmission System Operators for Electricity (ENTSO-E) has released two policy papers, part of a series of recommendations to assist the European Union lay the foundations towards meeting the objectives of its 2020 climate and energy package, as well as its emissions and renewable energy targets for 2030.

ENTSO-E's recent reports entitled 'Demand-Side Response' and 'Market Design' address the challenges finalising the EU's Internal Energy Market (IEM) and outline the key issues and recommendations for facilitating demand side response (DSR).

Through these reports, ENTSO-E highlights the importance of DSR and the creation of a competitive and internal energy market toward meeting 2030 goals.

Both papers are available through ENTSO-E's website: www.entsoe.eu

POLISH UTILITY SELECTS OSGP BASED SYSTEM FOR SMART CITY PROJECT IN WROCLAW

Open Smart Grid Protocol (OSGP) member LGG CNS, a subsidiary of the LG Group and global IT service provider, has led a consortium bidding interoperable OSGP meters from Networked Energy Services Corporation, Echelon's former Grid Modernisation division and Polish company Adaptor SA. The multivendor OSGP based system has been chosen to kickstart Tauron Dystrybucja S.A.'s advanced meter infrastructure (AMI) deployment to 330 000 households in Wroclaw, Poland. Tauron, the largest utility in the country with more than five million household customers, has been mandated to exchange 80% of its existing meters for smart meters by 2020, says OSGP. Deployment of smart meters in Wroclaw is planned for the fourth quarter of 2014.

President of Tauron Distribution Piotr Kolodziej said: 'This project in Wroclaw is the first in Poland, in which meters will be delivered by two manufacturers: Adaptor and Networked Energy Services Corporation. It is also the largest in single deployment of this project scope in such a big city like Wroclaw.

Kim Ji-seop, vice president of the LG CNS' Smart Green Business Unit, commented: 'We are pleased that our first win is with a utility of the reputation and sophistication of Tauron and look forward to many more OSGP systems in the future. It is a great milestone for the consortium and for the entire OSGP ecosystem.

'Through successfully completing the project, we will not only accelerate our effort to enter the European power management industry, but also become the leader in the energy industry.'

EDSO PROPOSES RECOMMENDATIONS FOR EU'S NIS DIRECTIVE

The European association for the network of distribution system operators (DSOs) in the region, EDSO for Smart Grids, has released a new report presenting its recommendations for the EU's proposed Directive 'to ensure a high common level of network and information security (NIS) across the European Union' (NIS Directive). EDSO's report entitled 'Network and information security (NIS): Recommendations for information sharing and risk management' was prepared for organisations managing critical infrastructure and vital public services to use as a guideline for implementing information sharing platforms and creating a culture of risk management.

The paper was a response to the European Council and the growing need to protect pertinent national infrastructure against cyber-attack. EDSO attributes the likelihood of these offences to the electricity system becoming increasingly reliant on ICT and communications technologies.

In an earlier statement, Catherine Ashton, high representative of the Union for Foreign Affairs and Security Policy/vice president of the Commission, said: 'For cyberspace to remain open and free, the same norms, principles and values that the EU upholds offline, should also apply online. Fundamental rights, democracy and the rule of law need to be protected in cyberspace.'

EDSO sets out its recommendations for cyber security risk management and, information sharing as well as highlighting case study examples and lessons learnt from the United States and the Dutch government.

UTILITIES, SIMPLICITY IS KEY TO ENGAGE CUSTOMERS, SAYS NEW SGCC REPORT

Smart grid stakeholders must communicate to consumers that energy programmes are practical, affordable and simple, according to a new report from the customer-focused organisation Smart Grid Consumer Collaborative (SGCC).

'Motivations and Emotions of Engaged Consumers', a random sample telephone survey completed between July and August this year, split 493 adults into three groups depending on their level of engagement with energy – high, average and low.

The report, which aims to help energy companies find ways to better engage consumers, suggests ways to transition customer groups to deeper levels of interaction with utility-led programmes.

On the subject of moving low engaged but energy-conscious consumers to higher engagement, the report states: '[this group] is hampered by life-stage issues such as income and housing.

When it comes to moving low engaged as well as low-energy conscious customers to higher engagement, SGCC said: '[This is] a more difficult task – these consumers are not only not engaged, but less interested.

'However, it shouldn't be lost here that this group will make changes to reduce their bill, but whatever they do must be simple to enroll in and use and must communicate extrinsic benefits such as saving money.'

The executive summary of the report added: 'Start by designing programs/technologies that actually are easy-to-use and convenient. Then message the programs as being convenient and providing money saving opportunities.'

ENCS AND CSSC AGREE TO FURTHER COLLABORATION ON SECURITY FOR CRITICAL INFRASTRUCTURES

European Network for Cyber Security (ENCS) has signed a letter of intent with Japan's Control System Security Centre (CSSC), a research association committed to the testing, international standardisation and certification of the security of essential assets including gas and electrical generation and distribution fleets.

The agreement ratifies a MoU signed between the two organisations last year and pledges ENCS and CSSC to share knowledge and expertise concerning cyber security in relation to industrial control systems and critical infrastructures in Europe and Japan.

According to the ENCS, both parties will participate in 'mutual research topics, jointly support workshops and training courses and share best practices on the development of security test-beds for critical infrastructures such as gas, water management, telecommunication, chemical processing, building automation, and transportation.'

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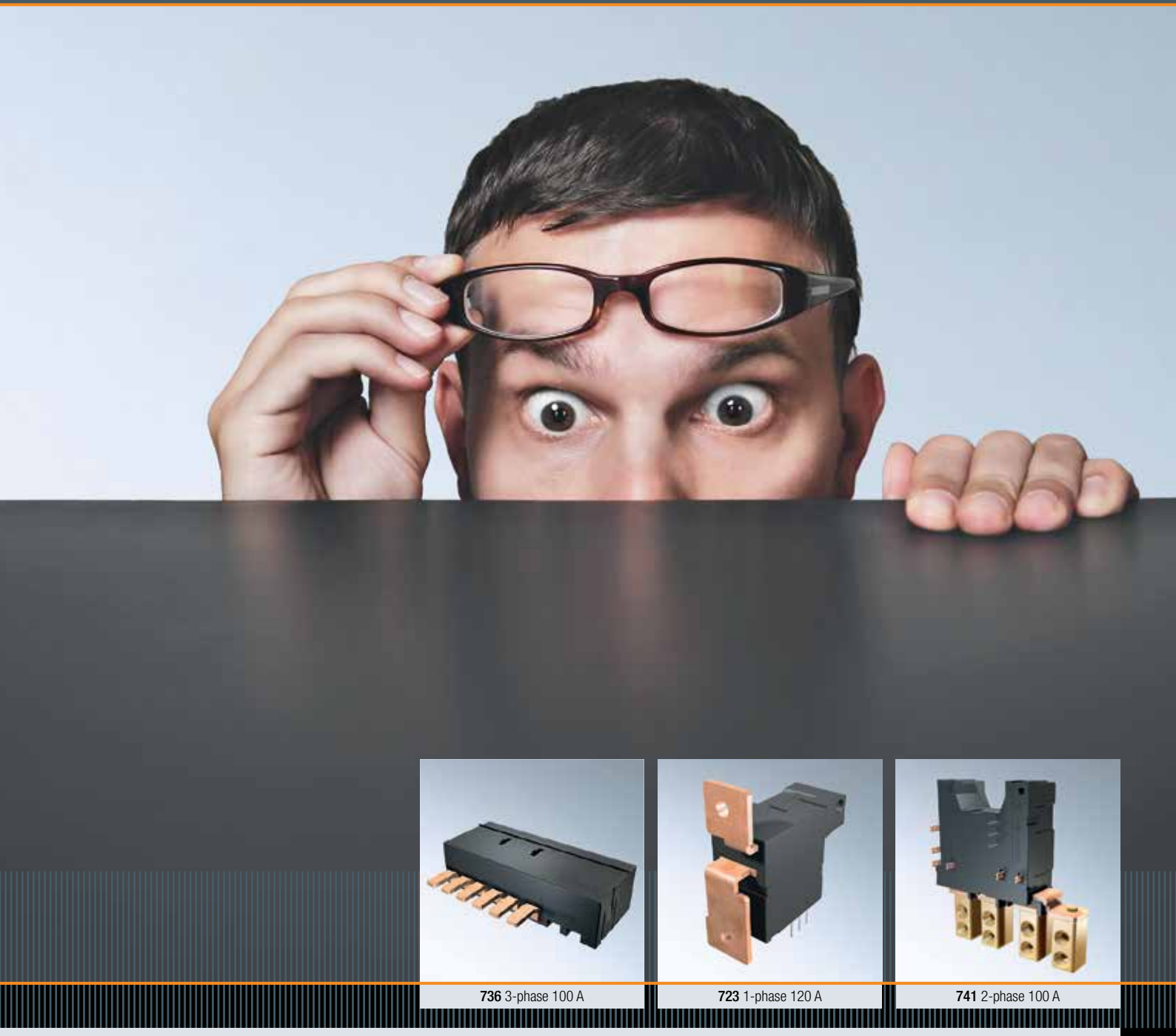

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Schalten und Bewegen

WHO WILL BE THE 'GAME CHANGERS' IN THE SMART METERING RACE?

John Peters, Engage Consulting

From the end of 2015, the smart meter roll out will begin in earnest in Britain. By 2020, more than 53 million old-style gas and electricity meters will be replaced by new digital smart meters to more accurately measure and bill gas and electricity usage. The UK government predicts this will 'revolutionise' the energy market, whilst at the same time cut the cost of energy bills and reduce greenhouse gas emissions.

This £11 billion national programme is expected to bring a raft of benefits to consumers and the wider economy, and it presents energy suppliers large and small with a major business opportunity to acquire new customers and engage existing ones.

A recent report from the UK National Audit Office noted that only two of the big six suppliers had installed a 'significant number of meters' – so the market is wide open. For independent suppliers in particular, there is a real opportunity not just to level the playing field, but also to become 'game changers' in the market.

You only need to look to the world of Formula one motor racing where recent rule changes have upset the pecking order and allowed the lower order teams to challenge the major players. Innovative F1 teams such as Force India are doing well under the new regime and the number one team, Red Bull Racing, seems to have slipped off its top perch.

Another good example is how personalised card specialist Moonpig has shaken up the greetings card industry. Such change is possible in the utilities sector too.

The market is wide open

There are signs that independent energy suppliers are already starting to create waves in the market. The Which? 2014 energy satisfaction survey published in January revealed that several independent suppliers achieved the highest customer satisfaction ratings – putting them well ahead of the largest suppliers.

Good Energy, a green and independent supplier, topped the league table and other independent suppliers (including Ecotricity, Utility Warehouse, Ebico and Ovo Energy) were all ahead of larger competitors. Like Moonpig, many of these independent energy suppliers are bringing fresh ideas to the industry and adopting a very customer-centric approach.

You only need to look at Formula One motor racing where recent rule changes have upset the pecking order and allowed the lower order teams to challenge the major players

Open Utility is a great example of this. It is championing the idea that customers should be able to buy electricity directly from renewable generators in their area. It also believes that suppliers should offer customers a personalised tariff – putting their customers firmly in charge of their energy and by doing so creating rapport, fostering goodwill, and building trust.

A common denominator of these independent suppliers is that they are working hard to differentiate themselves – whether it is through promoting their green credentials or ethical brand values, or by investing in customer services so they are becoming known as a 'friendly and easy supplier to deal with.'

Such differentiation is vital in a crowded market place and building these 'points of difference' must be a key part of any smart metering business strategy to ensure success.

Don't forget the basics

However, suppliers mustn't lose sight of the underlying operational processes that underpin their businesses; and they will also need to continue to deliver on their promises. In the next 18 months, they must get the basics right to be ready to take advantage of the smart world. This will involve them in taking a step back to examine their operations and in investing time and effort in getting them right.

In the first six months of this year complaints more than doubled, from 10 598 to 22 671 for the same period in 2013 – with 84% related to billing

Ensuring robust business operations involves a number of key areas – all of which pose potential risks. Suppliers need good procurement processes and financing for smart meter equipment and assets; they need to select the right technology partners; and there needs to be truly robust testing and trialling, which includes

testing various scenarios and leaving time for solving any system integration problems. They will also need to recruit the right people with the right expertise to deliver their solutions.

One of the biggest challenges ahead for all suppliers will be consumer engagement. In July the Energy Ombudsman reported that complaints about energy companies had risen to their highest level. In the first six months of this year complaints more than doubled, from 10 598 to 22 671 for the same period in 2013 – with 84% related to billing.

Earlier this year, the government announced plans to make the process of switching energy suppliers much easier and quicker. By 2018 it is expected that next-day switching could be in place – making it more crucial than ever for suppliers to look after and retain their customers.

Smart Energy GB, an organisation set up by Energy UK to promote smart meters, recently produced a research report that showed that while most people (84%) have heard of smart meters, fewer than half (44%) want one. In July, they launched a national publicity campaign to garner support, led by Sir Bob Geldof and two cartoon mascots called 'Gaz' and 'Leccy.' Obviously, it is early days but Smart GB has its work cut out both in terms of educating people about the benefits of smart meters and changing their perceptions.

Other considerations for smaller independent suppliers include the need to stay on top of regulatory obligations. They also need to ensure they are not leaking profits, that they have the most cost effective and efficient business processes in place and that they are responding to their customers' evolving needs.

We are working with a number of independent suppliers – helping them get their planning and strategies in place. Suppliers who get this part of the equation right and keep innovating and injecting fresh ideas, are on the road to being real 'game changers', with the potential to transform the industry. MI

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	Between Contact & Coil	4000 VAC 50/60Hz (1 minute)]
Vibration Resistance		10-55Hz, 0.5mm (Double Amplitude)
Shock Resistance		98m/s² (Functional) 980m/s² (Destructive)
Insulation Resistance		1000 MΩ(500VDC)
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COMMISSION RECOMMENDATION ON THE DATA PROTECTION IMPACT ASSESSMENT TEMPLATE FOR SMART GRID AND SMART METERING SYSTEMS

By Valérie Lorgé, Directorate General for Energy, European Commission

Under the 2030 policy framework, smart grids alongside interconnectors and storage will facilitate the transformation of energy infrastructure in order to accommodate higher shares of variable renewable energy and ensure security of energy supply.

Indeed, smart grids enable instant responsiveness, support flexibility, and can cost-effectively help to integrate variable generation and storage to improve grid control and security of supply, and modulate consumption according to changing situations and market signals. Smarter grids will also be able to integrate new loads such as electric vehicles. This is cardinal as Europe now aims at the electrification of transport.

Our networks should therefore be ready to cope with increasing demand and provide a technology platform for the development of novel services and smart solutions in grid infrastructure and related ICT, but also in home automation and appliances.

However, to achieve all of these benefits, due attention must be paid to the corollary that is inherent to smart grid's wide integration of ICT into energy systems and to the enhanced personal data processing[1] they entail: guarantees for data protection, privacy and security are vital for smart grids' uptake, their proper functioning and for consumers' acceptance.

The European Commission (DG ENER) has therefore initiated action on security, data protection and privacy in the smart grids field. The Commission Recommendation of March 2012[2] on preparations for smart metering rollout included guidance to Member States with respect to data protection and security requirements. The Recommendation called for the creation of a Data Protection Impact Assessment (DPIA) Template for smart grid and smart metering systems, and its submission for opinion to the Article 29 Data Protection Working Party.

The Template therefore facilitates the application of the principle of Data Protection by Design, allowing data controllers to anticipate a potential impact on data protection and privacy, avoid costly redeployment, and implement adequate safeguards

The DPIA Template constitutes an evaluation and decision-making tool for entities planning or executing investments in the smart grid sector. It guides them through the process of the identification of data protection and security risks according to concrete circumstances but also describes the most suitable safeguards and control measures in proportion to the identified risks. The Template therefore facilitates the application of the principle of Data Protection by Design, allowing data controllers to anticipate a potential impact on data protection and privacy, avoid costly redeployment, and implement adequate safeguards.

This development is fully in line with DG JUST General Data Protection Regulation currently undergoing co-decision[3]. Article 33 of the General Data Protection Regulation seeks to render impact assessments mandatory under certain conditions. The General Data Protection Regulation considers DPIAs as a key instrument to help ensure data controllers' accountability.

Steered by the Commission (DG ENER and DG JRC), the main representatives of the smart grid sector (stakeholders from the energy and ICT sectors, consumer associations and energy regulators) drafted the Template through a dedicated Expert Group (EG2) under the umbrella of the Smart Grids Task Force (SGTF). The experience gained from the 'Industry Proposal for a Privacy and Data Protection Impact Assessment Framework for RFID Applications' was taken as a starting point.

Furthermore, and most importantly, CNIL[4], EDPS[5] and ICO[6] attended the workshops as observers on behalf of Article 29 Data Protection Working Party. This translated into the issuance of two WP29 opinions[7] on

1 According to the Article 29 Data Protection Working Party's Opinion on Smart Metering, the operation of smart meters – and by extension any further developments of smart grids and appliances – entails the processing of personal data as defined by Article 2 of Directive 95/46/EC

2 Commission Recommendation of 9 March 2012 on preparations for the roll-out of smart metering systems (2012/148/EU, OJEU of 13.04.2012, L 73/9)

3 The Commission (DG JUST) issued two legislative proposals for a comprehensive reform of Directive 95/46/EC on Data Protection in order to strengthen trust and innovation in the digital market. The proposal for a Regulation setting out a general EU framework for data protection is of particular interest for the smart metering and smart grid contexts. It is still under discussion in the European Parliament and Council.

4 La Commission Nationale de l'Informatique et des Libertés, French national supervisory authority for the protection of personal data.

5 European Data Protection Supervisor, supervisory authority for the protection of personal data by EU Institutions and Bodies.

6 Information Commissioner's Office, national supervisory authority for the protection of personal data of the United Kingdom

7 Opinion 04/2013 on the Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems ('DPIA Template') prepared by Expert Group 2 of the Commission's Smart Grid Task Force, *00678/13/EN, WP205, 22 April 2013;* Opinion 07/2013 on the Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems ('DPIA Template') prepared by Expert Group 2 of the Commission's Smart Grid Task Force, *2064/13/EN, WP209, 4 December 2013;*

Generic threat assessments from the Template which affect confidentiality, personal data or availability. These are a few examples covered in the template.

Generic threats	Explanation of threats	Specific Energy industry examples of supporting asset vulnerabilities	Questions for guidance	Controls (example)
Abnormal use of hardware	Use of USB flash drives or disks that are ill-suited to the sensitivity of the information; use or transportation of sensitive hardware for personal purposes, etc.	The use of uncontrolled hardware can introduce viruses in a normally clean environment. Energy companies which think they are secured against Internet threats become vulnerable from unexpected malware. 2nd: the use of hardware, which is not secure by energy companies, can cause serious risks (not able to mitigate DDoS attacks, the use of hard coded high privileged accounts with the use of simple username/password, not able to use VPN connections etc.).	1. Are unknown devices accepted to use in the IT/OT environment? 2. Are anti-virus and anti-malware measures present on all I/O-ports? 3. Are crucial systems protected against the use of unknown storage devices (e.g. USB-devices)?	Reducing software vulnerabilities Reducing hardware vulnerabilities Reducing the vulnerabilities of computer communications networks

Generic threats	Explanation of threats	Specific Energy industry examples of supporting asset vulnerabilities	Questions for guidance	Controls (example)
Non legally based personal data processing	Processing of personal data is not based on consent, a contract, legal obligation, or other relevant legal ground as per Article 7 of Directive 95/46/EC.	(1) A smart grid operator shares collected information with a third party without notice, consent or as otherwise legally allowed. (2) New parties connect to the grid and use information for purposes not specified in the electricity law, although highly related (e.g. petrol stations connect for the purpose of charging vehicles but also need to maintain stability in energy supply).	1. Is the collection of personal data based on explicit consent and/or legitimate grounds? 2. What is the legitimate ground for collection the personal data?	Obtaining the consent of data subjects Minimizing the amount of personal data Make a privacy policy, code of conduct or certify the processing of the data to be more transparent

Generic threats	Explanation of threats	Specific Energy industry examples of supporting asset vulnerabilities	Questions for guidance	Controls (example)
Hardware loss	Theft of a laptop from a hotel room; theft of a professional mobile phone by a pickpocket; retrieval of a discarded storage device or hardware; loss of an electronic storage device, etc.	Every device which contains sensitive data about the smart grid environment will cause unacceptable risk of alteration and abuse of those data. When information is retrieved about brand and type of firewalls, IP-ranges, OS and SCADA-system brand and type, a serious attack is made easy.	1. Are hardware devices containing data protected against abuse? (password, Pin code, biometrical recognition, pattern recognition) 2. Is the data in the hardware encrypted?	Reducing hardware vulnerabilities Reducing vulnerabilities related to the circulation of paper documents

A few of the proposed privacy targets.

Safeguarding quality of personal data	Data avoidance and minimisation, purpose specification and limitation, quality of data and transparency are the key targets that need to be ensured.
Legitimacy of processing personal data	Legitimacy of processing personal data must be ensured either by basing data processing on explicit consent, contract, legal obligation, etc.
Legitimacy of processing sensitive personal data	Legitimacy of processing sensitive personal data must be ensured either by basing data processing on explicit consent, a special legal basis, etc.
Compliance with the data subject's right to be informed	It must be ensured that the data subject is informed about the collection of his data in a timely manner.
Compliance with the data subject's right of access to data, correct and erase data	It must be ensured that the data subject's wish to access, correct, erase and block his data is fulfilled in a timely manner. Implementation of the right to be forgotten and the right to data portability should be encouraged
Compliance with the data subject's right to object	It must be ensured that the data subject's data is no longer processed if he or she objects. Transparency of automated decisions vis-à-vis individuals must be ensured especially in the case of profiling.
Safeguarding confidentiality and security of processing	Preventing unauthorized access, logging of data processing, network and transport security and preventing accidental loss of data are the key targets that need to be ensured. Breach notification procedure should be promoted
Compliance with notification requirements	Notification about data processing, prior compliance checking and documentation are the key targets that need to be ensured. DPIA shall be considered as a determinant tool for this target
Compliance with data retention requirements	Retention of data should be for the minimum period of time consistent with the purpose of the retention or other legal requirements.

More information is available from http://ec.europa.eu/energy/gas_electricity/smartgrids/taskforce_en.htm

Member States should encourage data controllers to consider Best Available Techniques (BATs) that will be defined for the common minimum functionalities as a complementary element to the DPIA Template

the DPIA Template, which EG2 members endeavoured to integrate to the greatest extent.

Following the approval of this Template by the SGTF Steering Committee, the European Commission adopted Commission Recommendation 2014/724/EU on the DPIA Template in October 2014[8], aiming to:

- Formalise and promote the Template's take-up as widely as possible and as soon as possible in order to ensure coherent attention to data protection and security in the smart grid environment throughout the EU. As the template should generate benefits not only for the industry and consumers, but also for Data Protection Authorities, its wide dissemination is in the interest of all parties involved.
- Clarify that the use of the Template should be seen as a means to comply with a future legal obligation under the General Data Protection Regulation.
- Encourage Data Protection Authorities to use the information from the Template to monitor and oversee the processing of personal data.
- Member States should encourage data controllers to consider Best Available Techniques (BATs) that will be defined[9] for the common minimum functionalities as a complementary element to the DPIA Template. Indeed, the mitigation of risks that the DPIA template should stimulate can be made more effective if the DPIA template is complemented by the identification of Best Available Techniques mitigating security and privacy risks inherent to each of the smart meter functionalities recommended in COM Recommendation 2012/148/EU[10].

More specifically, the Recommendation promotes the organisation of a two-year test phase, in accordance with WP29 and EDPS request, in order to encourage data controllers to apply the Template to real life cases. To fulfil this goal, Member State public authorities should engage in positive and wide-ranging recognition of the Template, including seeking voluntary beta testers. The Recommendation also stresses to Data Protection Authorities the importance of providing guidance to beta testers during the implementation/testing phase, as recommended by WP29.

The centralisation and dissemination of information feedback between testers, industry, data protection authorities, energy regulators and civil society representatives will take place in the Smart Grid Task Force throughout this two-year test phase

The centralisation and dissemination of information feedback between testers, industry, data protection authorities, energy regulators and civil society representatives will take place in the Smart Grid Task Force throughout this two-year test phase. Based on this stakeholder feedback and in light of the upcoming Data Protection Reform[11], the Template will then be further fine-tuned to enhance its efficiency and user-friendliness as required by WP29 and EDPS.

The Recommendation will therefore ensure that the Template is implemented and reaches industry as soon as possible. Indeed, the number of smart grids projects – including the rollout of smart meters – is growing. Based on formal commitments already adopted by Member States regarding smart metering rollout, around €50 billion (€35 and €15 billion in electricity and gas meters, respectively) will be spent; and 250 million smart meters (170 in electricity and 80 in gas systems) will be installed in EU-27 by 2020.

Smart grids open doors to a world of exciting prospects for our 21st century energy systems as well as a thriving ecosystem of new actors and applications. Yet, its concrete ramifications are still largely unknown. One variable is however incontrovertible: industry investment and consumer acceptance need to be secured at the earliest stages of smart metering rollout and smart grid deployment, to avoid future hindrances in technological deployment and policy formulation[12]. The Commission, national regulators, Data Protection Authorities and market players therefore need to give due "by Design" consideration to data protection, privacy and security aspects[13].

The DPIA Template and the Commission Recommendation supporting its use represent two seamless tools in this "by Design" approach to smart grid deployment. They can also be considered as a pioneering development in the energy sector – through their anticipation of an upcoming legal obligation, increased emphasis on accountability, and wide-ranging stakeholder mobilisation fostering ownership and incentivising implementation – that could inspire other sectors concerned with massive personal data processing and ICT integration, in light of the impending Data Protection Reform. MI

8 Commission Recommendation of 10 October 2014 on the Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems (2014/724/EU, OJEU of 18.10.2014, L 300/63).

9 The selection of Best Available Techniques is organized through a formal exchange of information between the Commission, Member States (mainly Data Protection Authorities) and industry. A formal BREF (BAT Reference) process was launched in October 2014. This process will generate a BREF document (BAT Reference document) identifying the most suitable, advanced and effective techniques for security in smart metering.

10 Defined in points 3.f and 18 of the Recommendation

11 On 25 January 2012, the Commission adopted a package for reforming the European data protection framework. The package includes (i) a 'Communication' (COM(2012)9 final), (ii) a 'Proposed Data Protection Regulation' (COM(2012)11 final), and (iii) a 'Proposed Data Protection Directive' (COM(2012)10 final).

12 Valerie Lorgé, "Ensuring data protection, privacy and security in the smart grid and smart metering environments in the EU", The Energy Infrastructure of the EU, EU Energy Law, volume VIII, ed. Claeys & Casteels

13 Valerie Lorgé, "Ensuring data protection, privacy and security in the smart grid and smart metering environments in the EU", The Energy Infrastructure of the EU, EU Energy Law, volume VIII, ed. Claeys & Casteels

ABOUT THE AUTHORS:
Valerie Lorgé joined the European Commission in 2011, where she started working within the Directorate General for Energy on the OPEC and GCC files. Since October 2011, she has worked as Programme Manager within the Smart Grids team - with an emphasis on privacy and data protection issues, as well as the Benelux retail market country desk.

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MODERN ENERGY-METER NETWORKS

CORRECT CROSS-WIRE FAULTS AUTOMATICALLY

By Thomas Kugelstadt, Texas Instruments

Worldwide energy metering networks use differential data transmission based on RS-485 technology to span long distance data links. To overcome large ground potential differences between remote bus nodes, transceivers are galvanically isolated from their node circuitry.

An e-meter network is a master-slave system with a host processor (master) that is located in a control center. The master addresses multiple slave nodes which are located in the end user premises along the bus.

A single network typically comprises up to 60 nodes, making the potential for cross-wire faults of the twisted-pair bus cable during installation rather high. To assure reliable data transmission, modern transceivers apply automatic polarity correction (POLCOR) of the bus signal polarity.

Figure 1 shows a typical e-meter network with POLCOR transceivers.

The master node determines the signal polarity on the bus via a failsafe-biasing resistor network (R_{FS} and R_T). The transceiver in the master node requires no polarity correction.

The slave transceivers, however, do require integrated polarity correction to sense and, if necessary, correct the bus signal polarity during bus idling. That is when no node is actively driving the bus.

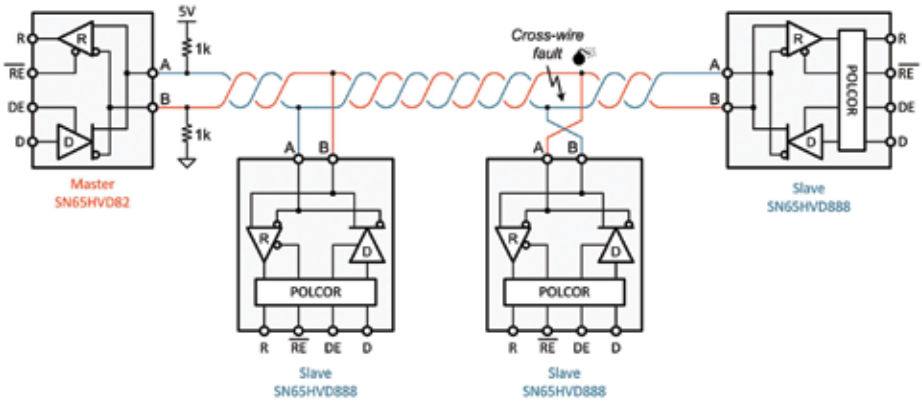
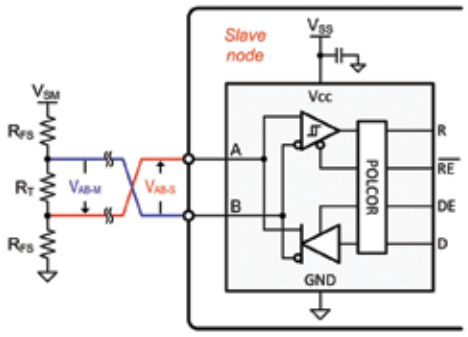


Figure 1: Typical e-meter bus with polarity-correcting transceivers



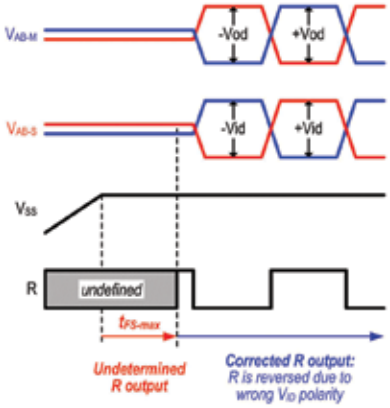


Figure 2: Polarity correction timing after power-up

Each slave transceiver contains an internal timer reversing the polarity of transmit and receive data, if the receiver output state is logic low for a specified time span. Due to the wide operating temperature range of POLCOR transceivers, this time varies between a minimum of 44 ms (t_{FS-min}) and a maximum of 78 ms (t_{FS-MAX}).

Polarity correction might, therefore, be initiated by a constant bus voltage present for as short as 44 ms duration. Hence, data strings of consecutive 0-bits must be shorter than 44 ms to prevent false polarity correction.

On the other hand, polarity correction automatically initiated after power-up requires the bus-idle voltage to be present for at least 78 ms to ensure the polarity correction process is complete.

After the initial correction the bus polarity status is latched within the transceiver and maintained for all following data transmissions. This means that switching between drive and receive modes will not lose the bus polarity status.

Figure 2 shows polarity correction after a power-up sequence. During power-up the receiver output, R, is undetermined. Once the slave node supply, VSS, is stable, the bus must idle for at least t_{FS-MAX} to ensure the completion of a polarity correction. Because of the cross-wire fault, the positive bus voltage at the master's failsafe network, V_{AB-M}, appears negative at the transceiver input. Thus, after completion of t_{FS-MAX} the transceiver's internal polarity is switched to invert receive and transmit data. Hence, the negative input voltage, VAB-S, is converted into a positive output voltage.

Long data strings of *ones* and *zeros* exceeding the minimum polarity correction time t_{FS-MIN} also can trigger a polarity correction. To prevent such incidents, e-metering standards such as DL/T645 add a fixed-bit pattern to the transmit data within the driving node and subtract it from the output data in the receiving node.

Bus loading

Because an e-meter bus uses galvanically isolated transceivers, ground potential differences between bus nodes do not

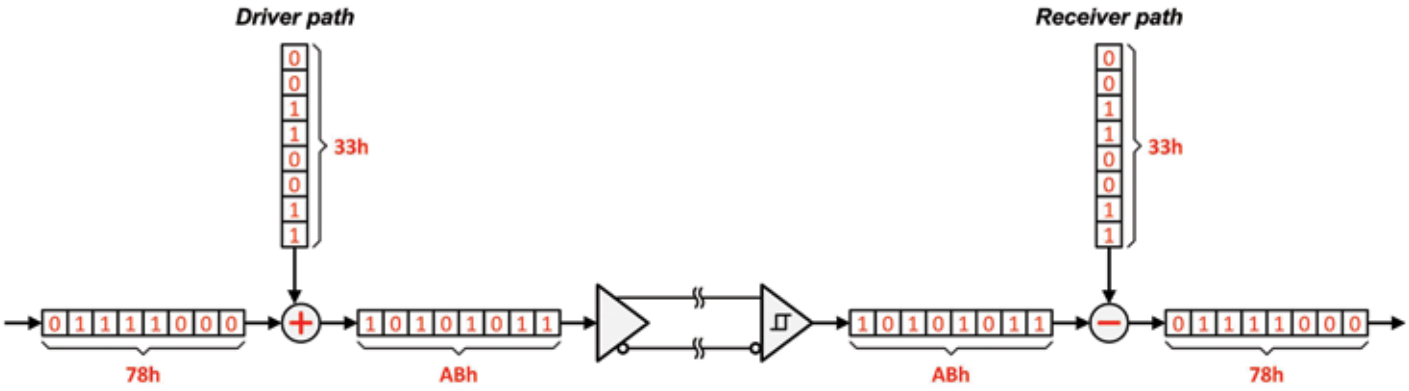


Figure 3: DL/T645 avoids long bit strings of ones and zeros by adding and subtracting 33h to and from data stream

appear as common-mode voltages on the bus. Neither will the transceiver input impedance pose common-mode loading on the bus. The resulting load conditions are, therefore, reduced to the dc-loading during bus-idling and the ac-loading during transmission (Table 1).

DC-loading applies to an idle bus condition when a minimum failsafe voltage, V_{FS}, must be created enabling each transceiver to sense the bus polarity at its input. Here V_{FS} depends on the voltage divider action between the failsafe resistors and the parallel combination of all resistive loads connected to the bus. These include the combined differential input resistance of all transceivers, R_{INEQ}, and the optional termination resistors, R_{T1} and R_{T2}. Optional means that e-meter networks do not necessarily apply the RS-485 recommended bus termination of both cable ends. Table 1 shows three configurations of real word e-meter busses which, depending on the data rate, apply either no termination at all, terminate just the master node, or terminate both bus ends for maximum data rate transmission.

AC-loading applies to an actively driven bus. Here the series connection of the two failsafe resistors, 2RFS, lies in parallel to the total differential DC load. Because RS-485-compliant drivers are able to generate a differential bus voltage of 1.5V across a differential load of 54Ω, total AC-loading could be as low as 54Ω. Modern e-meter networks, however, connect up to a maximum of 100 nodes only and present rather light loading conditions to a driver. Table 1 provides the necessary equations for determining the resistor values for the three termination cases under light and full loading conditions.

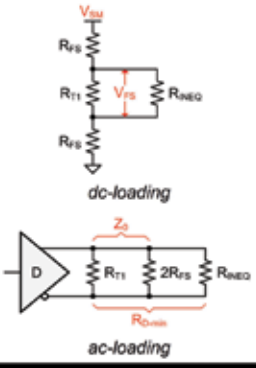
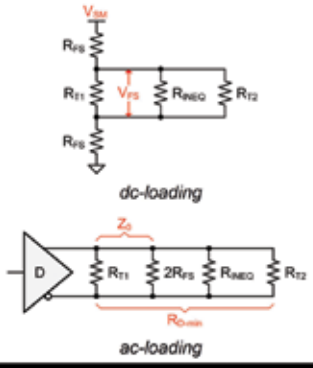
Unterminated bus (up to 10 kbps)	Termination at master node only (up to 25 kbps)	Termination at both bus ends (up to 250 kbps)
		
dc-loading	dc-loading	dc-loading
ac-loading	ac-loading	ac-loading
Light differential loading: R_D » 54Ω		
$R_{FS}=\left(\frac{V_S}{V_{FS}}-1\right)\cdot\frac{R_{INEQ}}{2}$	$R_{FS}=\frac{V_S}{V_{FS}}\cdot\frac{1}{2\left(\frac{1}{R_{INEQ}}+\frac{1}{Z_0}\right)}$	$R_{FS}=\frac{V_S}{V_{FS}}\cdot\frac{1}{2\left(\frac{1}{R_{INEQ}}+\frac{2}{Z_0}\right)}$
Maximum differential loading: R_D = 54Ω		
$R_{FS}=\frac{V_S}{V_{FS}}\cdot 27\Omega$	$R_{FS}=\frac{V_S}{V_{FS}}\cdot 27\Omega$	$R_{FS}=\frac{V_S}{V_{FS}}\cdot 27\Omega$
$R_{T1}=R_{T2}=\infty$	$R_{T1}=\frac{2R_{FS}\cdot Z_0}{2R_{FS}-Z_0}$	$R_{T1}=\frac{2R_{FS}\cdot Z_0}{2R_{FS}-Z_0}$, $R_{T2}=Z_0$
$R_{INEQ}=\frac{(R_{FS}/2)\cdot 54\Omega}{R_{FS}/2-54\Omega}$	$R_{INEQ}=\frac{Z_0\cdot 54\Omega}{Z_0-54\Omega}$	$R_{INEQ}=\frac{(Z_0/2)\cdot 54\Omega}{Z_0/2-54\Omega}$
$n=\frac{368\,k\Omega}{R_{INEQ}}$	$n=\frac{368\,k\Omega}{R_{INEQ}}$	$n=\frac{368\,k\Omega}{R_{INEQ}}$

Table 1: Load conditions during bus-idling (left) and an actively driven bus (right)

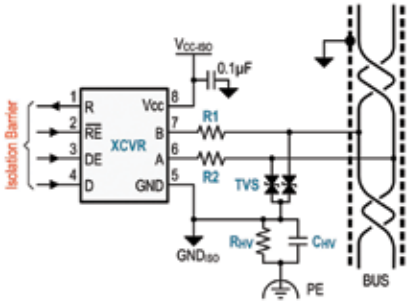


Figure 4: Lightning protection for an isolated RS-485 bus node

Device	Function	Order No.	Vendor
XCVR	250 kbps, RS-485, POLCOR transceiver	SN65HVD888D	Texas Instruments
R1,R2	10Ω, pulse-proof thick-film resistor	CRCW0603010RJNEAHP	Vishay
TVS	400W, 1.2/50µs transient suppressor	CDSOT23-SM712	Bourns
	300W, 10/700µs transient suppressor	TClamp1202P	Semtech
C_{HV}	4.7nF/2kV high-voltage capacitor	1812B472K202NT	Novacap
R_{HV}	1MΩ/2kV high-voltage resistor	HVC20101M00GT3	Vishay (TT electronics)

Protective Earth Ground, Equipment Safety Ground

Floating RS-485 Common

Transient protection

For example, the transient immunity of the SN65HVD888 is rated for ±12 kV IEC61000-4-2 ESD contact discharge and ±4 kV IEC61000-4-4 electrical fast transients (EFT, criterion B). Additionally, external transient voltage suppressors are implemented to protect the POLCOR transceiver against surge transients due toinductive load switching or lightning strikes specified in IEC61000-4-5. The two types of transient suppressors shown in Figure 4 are recommended for two different current pulses, though.

The 400 watt SM712 is rated for the shorter, 1.2/50 µs – 8/20 µs and the TClamp1202 for the significant longer 10/700 µs – 5/320 µs combination waveform. In both cases the surge generator test voltage can be up to

1 kV. Good analog circuit design techniques suggest the implementation of pulse-proof series resistors R1 and R2 to prevent the transceiver's internal electrostatic discharge (ESD) circuitry from shunting the external transient voltage suppressor (TVS) diodes, which can occur when the TVS clamp voltage exceeds the trigger voltage of the internal ESD circuit.

Also, a high-voltage capacitor, CHV, is used to divert the transient energy from isolated circuit ground towards protective Earth

Also, a high-voltage capacitor, CHV, is used to divert the transient energy from isolated circuit ground (GNDISO) towards protective Earth (PE) which is commonly connected to equipment chassis. An optional high-voltage bleeder resistor, R_{HV}, can prevent static charge build-up on GND_{ISO}.

Conclusion

Modern POLCOR transceivers, such as the SN65HVD888, enable e-meter networks to perform cross-wire fault corrections automatically. This correction is typically performed at power-up and then latched for all further transceiver operations. The SN65HVD888 also has high ESD and electrical fast transient (EFT) immunity ratings. Adding external transient suppressors extends this immunity to severe lightning strikes.

Texas Instruments provides a wide portfolio of RS-485 transceivers with high ESD and EFT ratings, some of which even contain integrated transient suppressors. MI

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ABOUT THE AUTHOR:
Thomas Kugelstadt is a senior systems engineer with Texas Instruments. He is responsible for defining new, high-performance analog products and developing complete system solutions for industrial interfaces with robust transient protection. He is a Graduate Engineer from the Frankfurt University of Applied Science.

PROJECT H2O

THE MADISON WISCONSIN ADVANCED METERING PROJECT

Briefly put:
Wireless AMI is making it possible for Madison Water Utility to provide metered readings from their customers in a more timely fashion; however the implementation of the project has had other (unexpected) benefits.

Madison Water Utility (MWU), Wisconsin, recently finished upgrading customer water meters to a wireless AMI network that reads and transmits water consumption on an hourly basis. The project has seen more than 67 800 new metering systems installed in homes and businesses across Madison and allows MWU to remotely access and analyse meter data.

Reasoning for the move to AMI

AMI was examined as an option as the utility wanted to move from semi-annual billing to a more regular billing schedule. The previous metering regime had seen three full time meter readers working on a rotational basis and covering readings across the six utility areas, which service more than 250 000 people across the city of Madison, village of Shorewood Hills, town of Blooming Grove, village of Maple Bluff, parts of the city of Fitchburg, the town of Madison and the town of Burke. As an added impetus to change the metering infrastructure, the remote reading registers which had been widely used in the previous metering programme were no longer being manufactured – hence, the reasons for replacement were two-fold in some cases.

The implementation of what became known as Project H20 was driven by the vision of providing monthly bills, and a desire to provide customers with more information on their water consumption. The utility determined the benefits of the move to an AMI system would include improved cash flow, better resource management, an opportunity to improve customer service, better access to data and the chance to become an industry leader. Additionally, the utility didn't have sufficient clarity on the actual amounts of non revenue water (NRW) in the area and were confident that the increased amount of data would mean more clarity on where the water was being delivered. In 2011, about 76 million gallons of water were lost to consumer leaks; however, because of Project H2O, that's been changing.

'Over the next several months, we will be phasing in a new online tool that uses detailed data provided by the Project H2O system to give customers the information they need to monitor their own conservation efforts. Customers will even have the option to be alerted when usage goes over a specific number of gallons,' says Robin Piper, Customer Service Manager for MWU.

'We had originally wanted to provide a dollar threshold too, but have decided not to implement this notification now. We bill for multiple services and a dollar notification on water usage may confuse the customer when they receive their bill as water is only about 30% of the entire amount due. The current usage notifications can be set by day, week or month.'

The project has involved retrofitting 90% of MWU's customers' existing meters, using the services of a subcontractor and replacing 10% with new smart meters using MWU staff. The retrofitting was easily accomplished and the meters that were replaced were done so as part of MWU's 12 year change-out schedule.

One of the changes that has been implemented in terms of the billing is that the amount reported is in US gallons instead of hundred cubic feet (ccf), as MWU wanted to help customers understand what they are using in practical terms, and not as an abstract value.

The meter data has been integrated with the utility's SCADA and GIS systems, and it was initially thought that this would require a project time-line of 5 years. However, MWU wanted to get the project up and running within a 24 month period and has successfully managed to do so.

LESSONS LEARNED:

Lesson 1: Effective communication is key

MWU discovered that internal communication was as important as external communication. Says Robin

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Piper, Customer Service Manager for MWU: 'The business case had to be sold to the utility employees as well as to the customers. Management across customer service, finance, engineering, water supply, meter readers and inspectors, water quality and operations all needed to be included in the discussions. They needed to feel that this was an inclusive project and we needed to highlight the benefits that would accrue across the whole utility. We set up an AMI implementation team that met weekly initially, and then monthly in order to discuss any challenges, and to keep on top of deadlines.'

External customers need to be kept informed and educated around the programme and the benefits as well. This included meetings with the mayor and Madison's Common Council, the water utility board and customers. Education initiatives included developing an opt-out programme in response to customer requests for such; hosting open houses; developing education packs; updating the utility website to include information around the benefits and address public concerns around the use of RF and any potential health issues; and answering frequently asked questions.

The message to the customers is clear – you get to track your own daily consumption and thereby manage it and your bills.
The website element of the AMI programme was launched on 15 October 2014 with the result that customers now have hourly, daily and monthly insights into their water consumption and the resulting bills.

'We transitioned to monthly billing in mid 2014', says Piper, 'and this has allowed us to spot costly residential water leaks and alert customers, with the result that hundreds of customers have been alerted to 'continuous use' issues thus far. Additionally, we no longer have to issue leak credits, which is a bonus.'

This mock up was used to show consumers what the meter would look like in their homes, and how the new meter installation compared with that currently in place.

'We will be better able to track our unaccounted for water usage,' says Piper. ' In the past with semi-annual billing we had to estimate how much of the water that was pumped by the end of the year had actually gone through customer meters and was billable. With monthly billing we don't have to wait for up to six months to know how much was actually used by our customers. We will also be able to monitor water usage through district or zones. We can compare metered customer usage with data from our SCADA system for water pumped into the district. This helps us to locate distribution system leaks and reduce the amount of water that we need to pump and treat.'

'The city was divided into 6 areas that corresponded to our 6 semi-annual billing cycles. Installation began in July 2012 in the Pilot area and then the project began in earnest in Area 1 on August 15, 2012. The plan was to spend approximately 2 months in each area and finish up the customer installation phase after 12 months.'

Lesson 2: Selling the projects again
The second lesson learned was to expect the unexpected. In the run up to the rollout of the AMI system, a change in the political landscape meant that the AMI project spend was removed from the capital as part of cost cutting measures within the city. This meant a delay in getting the project started, and required another round of 'selling the project' to the necessary political decision makers.

Lesson 3: Turnkey does not mean hands off
'We learned a valuable lesson here', Piper explains, when speaking about the reality of an outsourced implementation and the continued need for the utility to be involved in the project.

'We needed to address the issue of potential health effects of radio frequency (RF) on customers, and provide a sense of comfort around privacy concerns. Initially, we did not consider the need for an opt-out policy, but after a complaint was filed with the local public service commission, we needed to factor this into our overall programme.'

'We now offer two options to our customers. The first is to have an electronic read transmitter (ERT) installed on the outside of the building, which comes at a non-standard, one-time charge of $50.69. This charge reflects the additional average costs for customer-requested placement of ERTs on the outside of the building.

'The other option is to have no electronic read transmitter on the property for those customers who have health or privacy concerns. Some customers have expressed a concern that the utility will be able to tell when they are at home and when they are out, and we have provided for these customers as well. For these customers, there is a $7.78 monthly charge and we estimate consumption for two months, and read the meter every third. This charge ensures that we can meet the cost of reading the meters of the customers who have chosen to forego installation of the new metering system.'

Of the 68 000 metering points, 460 opted out of an electronic read transmitter and 1 000 chose to go with the outside electronic read transmitter installation.

Lesson 4: You find out a lot about your neighbours
'We learned a lot about our neighbours during this project. In particular, we discovered that we have a great relationship with our colleagues at Madison Gas and Electric, who have worked with us by providing us access to their infrastructure and allowed us to use street poles for our transmitters and routers.'

'In one of the other areas of the city, we weren't as lucky and instead of working with the local power utility, we are working with the Traffic Engineering Department, using some of the street light poles as an alternative to position our repeaters on.

Lesson 5: You find out a lot about your system
The rollout has given MWU a chance to verify the system, check the meter types being used and even discover one or two legacy meters, which they were unaware were still operational.

Piper continues: 'We've had a chance to update and verify customer records and add missing information to the system. This makes our data a lot more reliable and up to date.' MI

BENEFITS TO DATE:

Proactive leak detection
In 2011, 76 million gallons were credited to customer accounts by MWU due to leaks. Most recently leaks wasted about 30 million gallons of water which cost the city about $200 000 in reimbursements. Piper estimates that up to 80% of the leaks could be from toilets or taps which haven't been closed properly.

Technical system information
Meter data is transmitted using cellular and Ethernet communications. As the rollout continues across the wider Madison area, fibre optic cables will be used as well.

Daily system reports are provided which give insights into system performance and even provide details around tampering.

SMART ENERGY DOMINATES IN NORTH CAROLINA

Silicon Valley in California is known as the home to some of the 'smart' industry's best-known startups, including Trilliant, eMeter and Opower. However, innovation in the smart grid sector is not limited to the West coast of the United States. During a recent visit to North America, Metering & Smart Energy International had a chance to meet with Lee Anne Nance, Managing Director of the Research Triangle Cleantech Cluster (RTCC) in Raleigh, North Carolina.

RTCC is a non-profit economic development organisation 'on a mission, with a mission.' Their goal: to facilitate collaboration between companies, institutions and government agencies.

Lee Ann Nance, managing director of the Research Triangle Cleantech Cluster.

'By working together, we will grow the cleantech sector in the Triangle while maintaining its leadership role throughout the world,' says Nance.

Yet, what is it about this region specifically that has drawn so many clean tech companies to this region? Nance believes that the region's cleantech cluster started to develop in 1954 with the arrival of Westinghouse Corp.'s electricity metering division, followed a decade later by IBM. Computer networking giant Cisco Systems later joined them. The region is today 'a one-of-a-kind intersection for the convergence of hardware, software, network solutions and business analytics'.

Today the Research Triangle Region includes hundreds of companies that cover a vast spectrum of the cleantech industry—with names like Elster, Itron, SAS, Siemens and Schneider Electric.

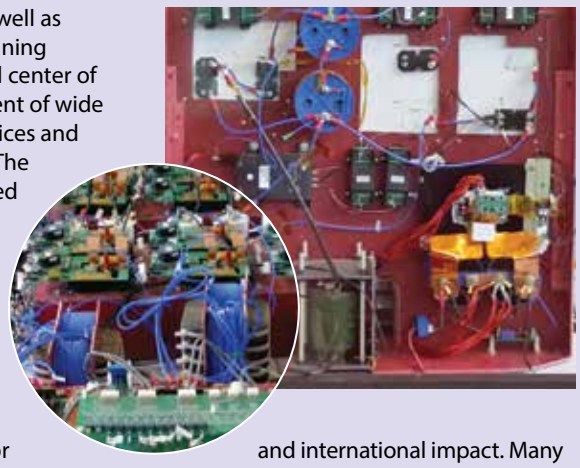
Nance is a firm believer in being 'intentional' and says this focus will continue to drive the development of the RTCC going forward. 'While we have a great heritage of innovation in the area, RTCC plans on leveraging this by intentional development of cleantech. The best way we can do this is through collaboration and cooperation, and we have seen some great examples of this within RTCC already.'

NC State benefits from Obama announcement

President Obama made an historic announcement at NC State University, establishing the Next Generation Power Electronics Manufacturing Innovation Institute. This new $140M Department of Energy (DoE) supported private-public partnership capitalises on the successful innovation ecosystem pioneered by the NC State University FREEDM Systems Center.

This is the second Institute announced as part of the National Network for Manufacturing Innovation. The new Institute will focus on developing wide bandgap semiconductor manufacturing technology that will help to support the supply chain and manufacturing base for the US semiconductor industry, creating jobs and growing the economy.

The research mission of the Institute will support innovation in new product and process technologies as well as education, and workforce training programs to become a global center of excellence for the development of wide bandgap semiconductor devices and industry-relevant processes. The Institute will be headquartered on North Carolina State University's Centennial Campus. The university will host shared research and development facilities, testing equipment, and workforce development and education programs for wide bandgap semiconductor technology.



This DoE award is testimony to the effectiveness of the Engineering Research Center model, in which system driven research and industry-university partnerships can have prodigious national and international impact. Many of the FREEDM Systems Center faculty will participate in activities of the Institute, primarily in the area of wide bandgap power device development and power electronics. The Institute builds on the success of FREEDM but will operate as a separate entity.

Trust can open the door to information

Privacy is a top concern for consumers regardless of the sector seeking to leverage information around its customers. Add to this the increasing desire to personalise marketing offers and the extent of the challenge emerges.

According to a new survey from SAS, 'Finding the Right Balance Between Personalization and Privacy', there is a strong link between 'trust and willingness to share information on the part of the consumer'.

'Trust in data security is by far the biggest factor when customers decide to provide information.'

According to the report, consumers don't feel companies are upfront about privacy, while still wanting the companies they do business with to 'understand them'.

'To build trust, brands can assure customers that their data is managed well and give customers options to decide how their personal information is used,' said Wilson Raj, global director of customer intelligence for SAS. 'Consumers are OK with giving up some of their personal information for greater personalization – as long as they get to make that choice themselves.'

Financial services enjoy high trust levels

The report further states that 'nearly three in four respondents are likely to share information with banks or credit unions, who require significant personal information to be a trusted financial intermediary. Customers rely heavily on an institution's integrity to protect their assets and their information'.

However, other sectors don't fare as well, with retail and travel particularly falling into 'the "as-needed" category where customers easily switch loyalties and engage with multiple businesses at once'.

Give something to get something

It has been shown that customers are willing to trade information if they feel they will get something in return. According to the report, 69% of respondents would share hobbies and/or interests. Three-quarters of customers are willing to provide their birthday month and year.

Companies that use data in ways that customers expect and trust will gain advantage. Companies must set clear expectations with the customer and then build that trust through parallel internal and external activities. Internally they can achieve this through the development of guidelines for collecting, using, analyzing and disseminating data, and establishing processes to ensure compliance. Frameworks can be built to monitor ongoing consistency. Externally clear communication with customers on how their data is stewarded and used helps provide transparency and increases trust.

'While it's difficult to get people's attention today, it's more difficult to get their personal information from them,' said Brent Leary, CRM Analyst and Managing Partner of CRM Essentials. 'Getting people to like you on Facebook or Twitter is more driven by emotion and impulse. Getting them to divulge personal information addresses their practical side. And as this study shows, proving that you can safeguard their information and use it to provide them with value in return can win both their head and their heart.' MI

A NOTE FROM THE EDITOR:
How utilities are able to leverage this information stands to be seen. However, there is no doubt that as the level of customer engagement by utilities continues to grow, trust will become a key ingredient in the relationship with consumers. Utilities no longer have the luxury of being merely providers of a service, but now have to prove themselves to be custodians of information with the ability to ensure its security, and leverage the information extracted therefrom.

RELAY WEBLOG 250 – THE NEXT GENERATION

German company Relay presents a new datalogger based on the M-Bus. The M-Bus is a cost optimized field bus for readout and transfer of energy consumption data for accounting and monitoring purposes.

Founded and developed by Prof. Dr Ziegler at the University of Paderborn in the late 1980s, the main goals were to create a bus system that was easy to handle and low cost. This led to the development of a 2 wire bus line with a master-slave architecture. In the M-Bus system all slaves are supplied by the bus and so no additional power supply for the meter is necessary. It allows extremely large bus extensions (several kilometers) and has no special requirements for the cable or wiring topology. Due to these advantages more and more manufacturers have implemented an M-Bus interface in their meters. In the mid-1990s the first European standard was defined. Today the M-Bus is one of the most important fieldbus systems for reading gas, water, heat and electricity meters.

The brand new WebLog 250 will be the replacement for Relay's proven Digital Master Series and is able to drive, readout and manage installations with up to 250 M-Bus meters. During development, customer needs from a daily technical support perspective were considered, along with current standards and innovations in hardware and software.

For these reasons the device is equipped with a 7-LED touch screen for intuitive operation, has an integrated web server that allows it access with the standard web browser of a PC and provides the user with all actual interfaces such as RS232, USB, TCP/IP and optional modem or WLAN. The logged data can be exported to USB flash drive, FTP server or sent via email in csv, xlsx or xml file formats. Two inputs for potential free contacts (status indicator) and three relay outputs complete the functionality of the WebLog250.

As Relay's customers are located all over the world, a universal power supply with an input range of 110-250VAC is integrated. The internal software uses a database structure to store the readout meter data on the 1GB memory. This allows a structured export of the readout data across various meter groups or different reading intervals on one hand and user management with various access rights on the other hand. Versions which integrate for fewer meters and without display are being developed in preparation of new level converters with integrated TCP/IP and USB interfaces for 120 and 250 meters. MI

ABOUT THE AUTHOR:
Jörg Fischer, deputy managing director at Relay GmbH, has been working for the company for more than 10 years and has a good view of what customer's need by way of daily technical support. Along with his colleagues he works on practical improvements of M-Bus devices.

Relay GmbH
As one of the M-Bus pioneers, Relay has beeen developing, manufacturing and selling all kinds of M-Bus devices for more than 20 years. Today's product portfolio includes all kinds of M-Bus devices.

WHERE SMART BUSINESS BEGINS

ISSUE 3 | 2014

SMARTENERGY INTERNATIONAL

• Mapping demand response • European Utility Week feedback
• Rough ride for GB smart meter programme

MONITORING ELECTRICITY SUBSTATIONS

AS A STRATEGIC PART OF THE SMART GRID

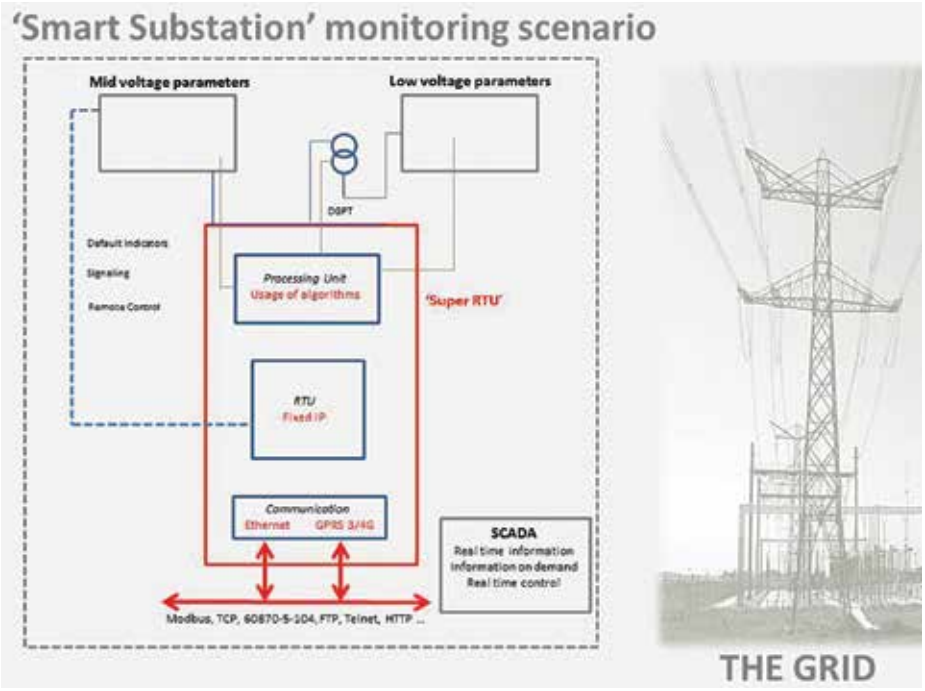
Cost effective retrofit of innovative sensors for mid-voltage infrastructures and substations.

In the Infrax 10 kV distribution network each 10/0.4kV transformer substation is guarded and monitored.

European electricity distributors are compelled to comply with European standard EN 50160 and in many cases offer additional service level agreements to their customers in order to reduce voltage fluctuations of the required standard (norm) consumption. Taking into account voltage variations of high and mid-voltage infrastructure, voltage variations of low-voltage supply remain in many cases.

Lifetime and physical boundaries of infrastructure and short circuit events make it necessary to (tele)monitor mid-voltage substations. The WAN communication of these parameters is in many cases through GPRS/3G TCP/IP communication to a SCADA master setup.

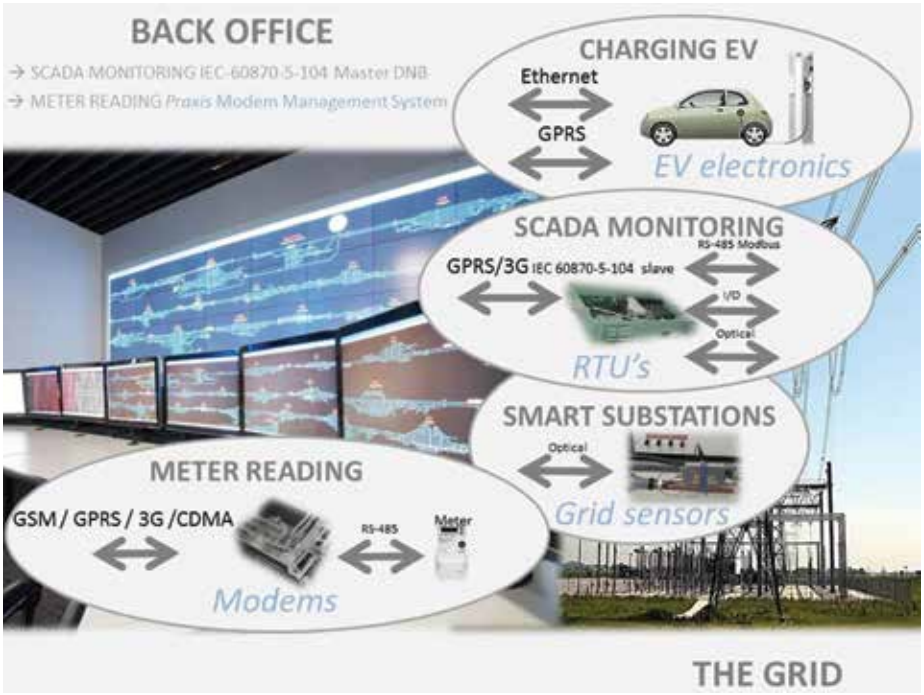
The 'active substation' concept is generating more and more support and investments. The idea of a 'smart substation' monitoring power quality, directional fault passage, partial discharge of transformers information etc. and communicating this information online (GPRS or 3G) to a SCADA back office is clearly becoming more and more important. Additionally, the usage of generally accepted communication protocols (such as IEC 60870-5-104) is more and more part of a proven strategy.



Low and mid-voltage parameters are monitored, the information is processed and sent to the SCADA Master system using the IEC 60-870-5-104 protocol over GPRS or 3G.

Bausch Datacom is one of the key partners of Eandis and KU Leuven/ Energyville in the further development of a patented mid-voltage sensor technology. Additionally, KIC InnoEnergy supports the development of this technology. The technology is capable of measuring and monitoring voltage parameters at medium voltage without opening the XLPE cable to the core. The technology will result in compact and low cost sensor solutions that can be easily retrofitted in the field. The aim is to offer products worldwide by 2016/17.

Bausch Datacom specialises in modems and RTU hardware with the integrated IEC 60870-5-104 protocol for SCADA applications



Electricity distribution companies such as Infrax (Belgium), SIG Geneva (Switzerland) f.i. use the DinBox RTU SL to monitor their network.

Bausch Datacom continues to develop external modems for meter reading applications

Bausch Datacom continues to develop external modems for meter reading applications along with Praxis, a modem management system. Praxis enables the modems to be grouped and monitored remotely. Firmware updates, RSSI monitoring, changing from GSM to GPRS and vice versa…

The company focuses on 4 major (communication) aspects of the electricity grid: IEC 60870-5-104 SCADA communication, external meter reading communication, EV charging infrastructures and 'active substation ' technology.

Communicating: 'Modem grouping' and IEC-60870-5-104 slave RTU's and modems. Bausch Datacom specialises in modems and RTU hardware with the integrated IEC 60870-5-104 protocol for SCADA applications. These products communicate as 'slave' hardware over integrated GPRS (3G). Aim is to offer cost effective hardware to communicate with master IEC 60870-5-104 host systems.

CASE STUDIES

Case 1:
Infrax (Belgium): 'In the Lommel 10 kV distribution network we want to guard and monitor each 10/0.4kV transformer substation. The 10/0.4kV distribution transformer is guarded by measuring voltage, active power, reactive power and currents. For this purpose, we use an A2000 Gossen-Metrawatt multifunctional power meter and a Bausch DinBox RTU SL. The power monitoring device measures four important parameters of the distribution network (U,I,P,Q) and is connected to the DinBox RTU SL over RS-485 Modbus RTU. The DinBox RTU SL will communicate the information over GPRS to the SCADA-DMS system SPIDER (ABB) of Infrax.'

Case 2:
For 'smart substation monitoring' a typical setup is described hereunder: Low and mid-voltage parameters are monitored, the information is processed and sent to the SCADA master system using the IEC 60-870-5-104 protocol over GPRS or 3G. A 'SuperRTU' capable of collecting and processing both the data of the LV and MV parameters and sending this to the SCADA could be used for this scenario. This 'SuperRTU' is already in prototype phase and could be a very effective tool for the monitoring of substations in the near future. MI

ABOUT THE COMPANY
Bausch Datacom presents a portfolio of RTU's, GPRS modems, EV charging infrastructure electronics and is participating in the engineering of innovative sensor technologies for electricity substations for the years to come. The company focuses on 4 major (communication) aspects of the electricity grid: IEC 60870-5-104 SCADA communication, external meter reading communication, EV charging infrastructures and 'active substation ' technology. www.bauschdatacom.be

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Featured publication

Introducing the 40 Most Influential People in European Smart Grid

This is your exclusive guide to the movers and shakers in Europe's smart grid sector. These key stakeholders are driving the development of smart grid by the roles they play within their organisations or industry associations; through the technology they champion; or the policies they develop.

www.metering.com/introducing-the-40-most-influential-people-in-european-smart-grid/

Featured white paper

Energy consumption: customer feedback works, says Norway Vaas-aETT report

Norway in-home displayIn Norway, changing customer behaviour through feedback on energy consumption could save around seven TWh within two years, or NOK 900-950 (€110) for an average household.

This is according to the Norwegian Water Resources and Energy Directorate (NVE), which commissioned VaasaETT to compile a study on how consumption information can help change consumption behaviour.

Vaasa ETT estimates that the seven TWh of power could be saved following the rollout of smart meters, due to take place in Norway by January 1, 20149, assuming an 80% IHD usage rate.

http://www.metering.com/energy-consumption-customer-feedback-works-says-norway-report/

PLC COMMUNICATION – THE WEAKEST LINK?

There is no doubt that power lines are part of critical infrastructure. Power engineering is now in its most dramatic development phase. Unfortunately, progress in technologies and political decisions tend to complicate development.

After the EU strategic plan 20-20-20 is realised, we are likely to face the paradox of a reliable supply of power still not being ensured. Fortunately, however, even empty slogans such as 'smart grid' bring rational considerations and decisions to the area of stability and safety of power supply.

The way to control end devices, including residential e-meters, is very clear ... despite reservations PLC technology will prevail. It is the only technology with reliability that equals that of the power supply.

Shannon schematics of communication systems reveal the structure of both modem and surroundings that influence total efficiency of transferred information. A real communication system is obviously significantly more complicated; however, this simplified model is sufficient to identify the key effects (See Figure 1).

The theoretical calculation for the highest possible transmission capacity C_0 (Shannon–Hartley theorem) looks as follows:

$C_0 = B \log_2 (1+ \frac{S}{N})$ [bit/s; Hz; W; W]

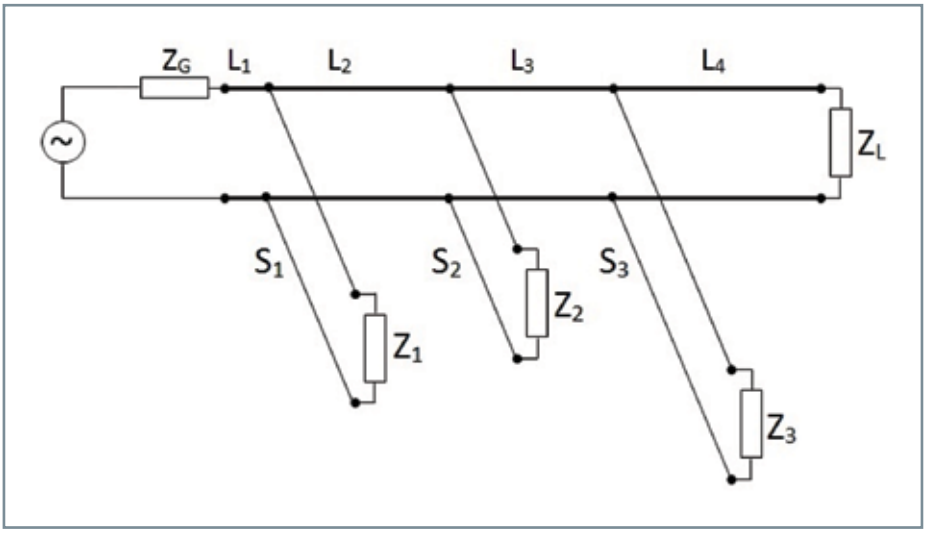

Figure 2: Idealised distribution network. Elements $L_{1,2,3}$ and $S_{1,2,3}$ have character of lines and they could be described by spare schematics – see Fig. 3 Elements Z_G (source impedance), and Z_L and $Z_{1,2,3}$ (load impedance) describe both the source and appliance part of the power network (impedance characteristics defines that elements have frequency dependency).

where B is equal to bandwidth; S is equal to signal power over bandwidth and N is equal to noise power over bandwidth.

Based on this, it is clear that transmission capacity does not depend on how we wish it to look, but depends on the characteristics of the transmission channel. In the case of PLC technology, that channel means power lines. The distribution can be generalised on serial-parallel structures with relatively high attenuation (because of significant parallel capacity and serial inductance). Parallel ordering of single consumption places with highly dynamic connection and disconnection brings strong and very dynamic change of impedance. Unfortunately, there is always the customer's consumption at the end. Customers can through their behaviour influence the distribution network and therefore the communication channel (see Figure 2).

The spare schematic characteristics shown in Figure 3 highlight the real value of power

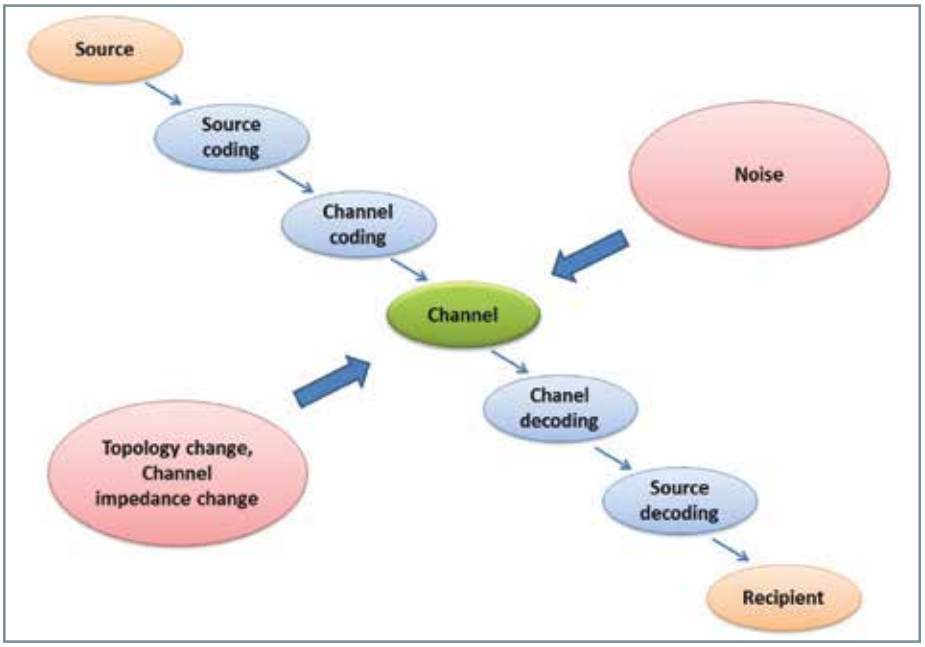

Figure 1: Shannon schematics of a communication system, highlighting negative effects.

The communication channel is always the weakest link in the transmission chain. It would seem that based on the frailties of this channel, it would be more convenient to leave this channel ... the exact opposite is, however, true

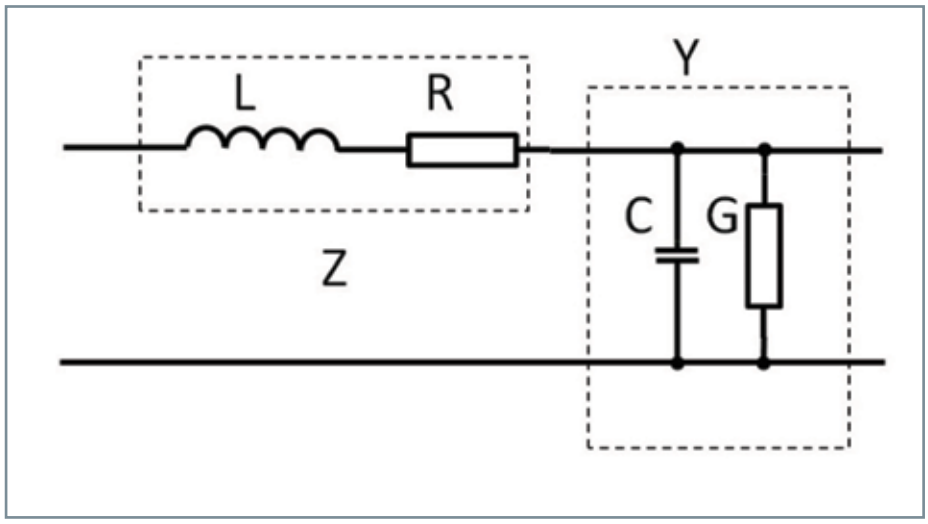

*Figure 3: Spare schematics of lines with highlighted longitudinal impedance **Z**, and transversal admittance **Y**, where **L** equals inductance; **R** equals active resistance; **C** equals capacity and **G** equals conductivity.*

lines which are frequency dependent. This capacity in transverse admittance leads to high noise attenuation at higher frequency (this is one of the reasons why BPL communication has a limited reach).

The communication channel is always the weakest link in the transmission chain. It would seem that based on the frailties of this channel (disturbance, dynamic topology change), it would be more convenient to leave this channel. The exact opposite is, however, true. The reason is the unique characteristics of PLC, such as enabling power supply together with immediate availability of the communication channel. It is enough to accept the characteristics of this channel, and not to add expectations around unrealistic communication rates.

Next steps

We cannot increase emitted power due to legislation. Neither can frequency range increase be considered. There are two reasons for this:

(i) We are limited by assigned frequency, and

(ii) Channel characteristics at higher frequencies do not physically allow higher reach (not more than a few hundreds of meters).

Using this trendy OFDM system, which reaches high transmission capacity on other transmission channels, across the power line environment means that we sow the seeds of a serious problem

New 'interoperablility' standards (i.e. PRIME, or G3-PLC) show 'how not to move ahead'. Using these trendy OFDM systems, (PRIME, G3-PLC), which reach high transmission capacity on other transmission channels across the power line environment, means that we sow the seeds of a serious problem. Furthermore, if we add ineffective transmission protocols (DLMS), and reduce processing capacity to enable a low-cost solution, we will reach satisfactory results on paper only, not in field.

It is also necessary take into account requests at the output stage. The output stage and method of modulation have to be designed in such a way that significant changes to impedance will not influence the stability of this stage. That is why this stage has to have low inner impedance, which is a request hardly applied at OFDM, which needs a linear output amplifier in order to eliminate distortion, and at the same time, disruption of sub-carriers orthogonality. The input circuit of the receiving modem must be able to change its amplification in a very dynamic way, in order to maintain the level of the processed signal.

Nowadays, there are two possible choices. The first one is already being used in realised projects. It assumes a significant reduction in transferred data volume. These proprietary solutions do not need to transmit ballast information. They thus reach high reliability during data transmission, and they are also competitively priced.

Even the DLMS protocol transmission could not be unfulfilled utopia

The second scenario takes into account prevailing requests for transmission of higher volumes of real information. In this case, it is necessary to increase the complexity of both transmitting and receiving modem parts significantly. The growing element integration of silicon chipsets could help, as it enables turbo code implementation (for transmitted information renewal) and efficient usage of the soft decision approach (decision by code words). If these methods are expanded on, together with a suitable form of modulation, we find the only way for PLC communication development to progress. It ensures transmission of higher data volume, and, in such a case, even the DLMS protocol transmission could not be unfulfilled utopia.

We are convinced that the progress in the nearest future will continue by a parallel process. On one hand, we believe that there will be a public rational interoperable protocol, and, on the other hand, technological progress in the field of a single communication channel performance – all geared towards increased robustness and defined latency conforming – which is the key request for proper smart grid functioning. MI

ABOUT THE AUTHORS:
Jiri Zaoralek joined ModemTec in 2004 as Chief Executive Officer. He is responsible for business development, and strategic partnerships. He graduated as an engineer from the University of Economics in Prague, specializing in corporate management and economics.

Bedrich Benes is a manager for strategic planning at ModemTec, responsible for research and development activities. As mayor of the City of Sezimovo Usti he was a member of the Board of Directors in the biggest South Bohemian water operating company. He is a successful patent holder in the electromechanical engineering area.

ABOUT THE COMPANY

Based in the Czech Republic, ModemTec is a leading R&D company within smart metering/smart grids area. Cooperating with large utilities (CEZ, PRE), ModemTec is a well-known producer of products based on reliable PLC communication – modems for transmission over LV, and MV power lines, PQ meters, data concentrators and units for distribution station control. The company also develops multi-utility solutions and implements security standards.

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UNLOCKING DEMAND RESPONSE POTENTIAL IN EUROPE:

By Marcelo de Moura Torres, Smart Energy Demand Coalition

Briefly put:
Adapting demand may be the key to managing grid instability and demand spikes, especially in the face of increasing renewable energy penetration. However, effective regulation is needed to make this a workable, long term option.

Key barriers to tackle

The European energy system is facing critical challenges as a significant part of its old peak generation capacity is coming offline, demand spikes are rising and the penetration of intermittent renewables on a physically timeworn grid infrastructure is increasing. One option to alleviate these problems and keep the grid in balance is demand response: adapting demand instead of generation.

Traditionally, demand response programmes have used incentives to encourage electricity customers to modify their electricity consumption when system reliability was threatened or market opportunities arose. Time-based programmes, on the other hand, send price signals to electricity customers who voluntarily choose to modify their electricity consumption in response to these signals.

Demand response programmes are consumer centred. They offer a direct source of revenue to households and businesses as well as unique benefits to the markets. In 2013 in the USA, businesses and homeowners earned over $2.2 billion[1] in revenues from demand response, over and above avoided investment in grid infrastructure and power plants. This source of direct revenue can also be made available in Europe and would release money into the local economies. In practical terms, this means that hundreds of millions of euros could be directed toward local business (hospitals, schools, hotels, office buildings, industries ...) through demand response earnings, as of today.

In 2013 in the USA, businesses and homeowners earned over $2.2 billion in revenues from demand response, over and above avoided investment in grid infrastructure and power plants

1 *Joule Assets 2014*

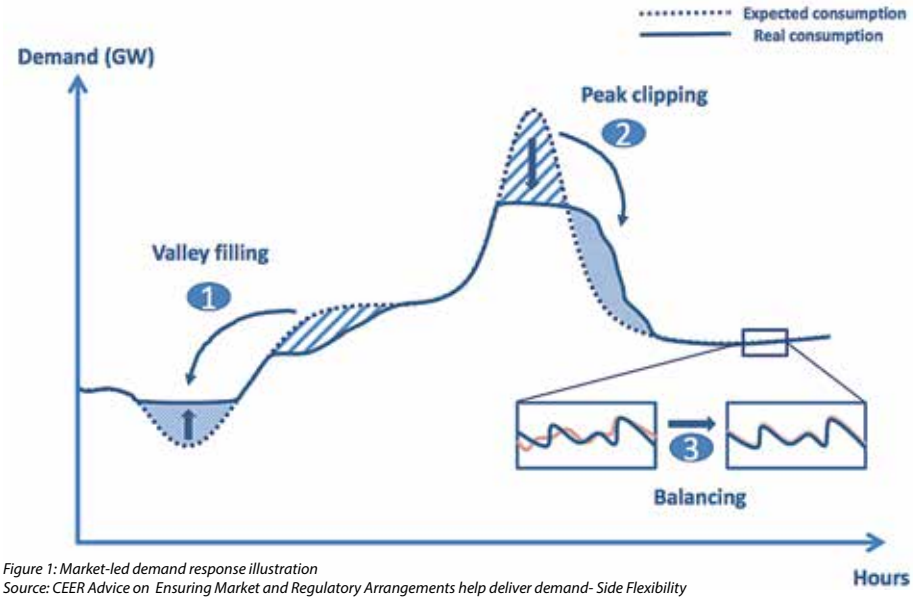


Figure 1: Market-led demand response illustration
Source: CEER Advice on Ensuring Market and Regulatory Arrangements help deliver demand- Side Flexibility

Demand response has been in use in some form for over 40 years. Its global track record has led to a widespread agreement on the potential for demand-side flexibility to benefit the electric system as a whole; for example by contributing to generation adequacy, increased RES penetration, and reduced balancing costs.

The European Commission has voiced its strong support to demand response in the Energy Efficiency Directive (2012/27/EU). The Article 15.8 of the Directive requires national regulators and TSOs (Transmission System Operators) to allow consumer access to markets through demand response programmes, to enable the participation of service providers, such as aggregators, and encourage programme development. Most Member States have now submitted their National Action Plans, in which they describe how they plan to implement Article 15.8 and stimulate demand response development within their borders.

The European Commission is not alone in this effort. There is a widespread support of demand response growth voiced by stakeholders, policy-makers and associations in Europe. The Council of European Energy Regulators (CEER) and ENTSO-E – the association of Europe's transmission system operators for electricity – has been in the frontline for creating a fair environment for demand-side resources.[2]

2 *CEER (2014). CEER Advice on Ensuring Market and Regulatory Arrangements help deliver Demand-Side Flexibility, Ref: C14-SDE-40-03. Available at: http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/Tab3/C14-SDE-40-03_CEER%20Advice%20on%20Demand-Side%20Flexibility_26-June-2014.pdf*

Primarily through the drafting of the Network Codes, but also with its recently published recommendations to enable demand response to fulfil its potential, a process in which TSOs will have a lead role.[3]

That said, a repeated pattern of regulatory barriers stretching across almost the entire European Union remains, effectively halting the establishment of the programmes and the ability of third parties to enter these markets. There is a measurable gap between political promises and market reality.

The first step to narrowing this gap is accurate information to answer the question: 'which are the main barriers?' and 'how to overcome them?'. The SEDC, in its report titled 'Mapping Demand Response in Europe Today', studied the regulatory structures of 15 European countries: Austria, Belgium, Denmark, France, Finland, Germany, Great Britain, Ireland, Italy, the Netherlands, Norway, Poland, Spain, Sweden and Switzerland, in order to collect information on their efforts to improve access of consumers to the markets through demand response programmes.[4] Demand response development was examined from a market access point of view instead of a quantity-based one. This is because some European countries may have high volumes of load under some form of control, but only the largest industrial consumers can participate in these programmes with bilateral agreements. The information on Member States was gathered through desk research, and expert interviews with TSOs, DSOs (Distribution System Operators), retailers, aggregators, regulators and technology providers. Therefore, the findings reflect the experience of the players on the ground.

Although progress is remarked, only Belgium, Great Britain, Finland, France, Ireland and Switzerland have already reached a level where demand response is a commercially viable product offering

Main findings: The research indicated measurable progress between 2013 and 2014 in response to the Energy Efficiency Directive requirements. This clearly demonstrates a gradual improvement in the national regulatory frameworks and can be seen as a first positive step towards the implementation of the Directive. However, it is important to note that although progress is remarked, only Belgium, Great Britain, Finland, France, Ireland and Switzerland have already reached a level where demand response is a commercially viable product offering. Sweden, the Netherlands, Austria and Norway may remain 'yellow', depending on regulatory developments. In these countries, while companies that offer demand response products or services may be established, regulatory barriers still hinder market growth[5]. The remainder of European Member States will stay orange or red – meaning that aggregated demand response is either illegal or impossible due to regulation.

Here we see a critical disconnect between political promises and regulatory reality. While policies promise consumer benefits, regulation hinders their delivery to consumers. The main regulatory barriers found can be grouped into four categories:

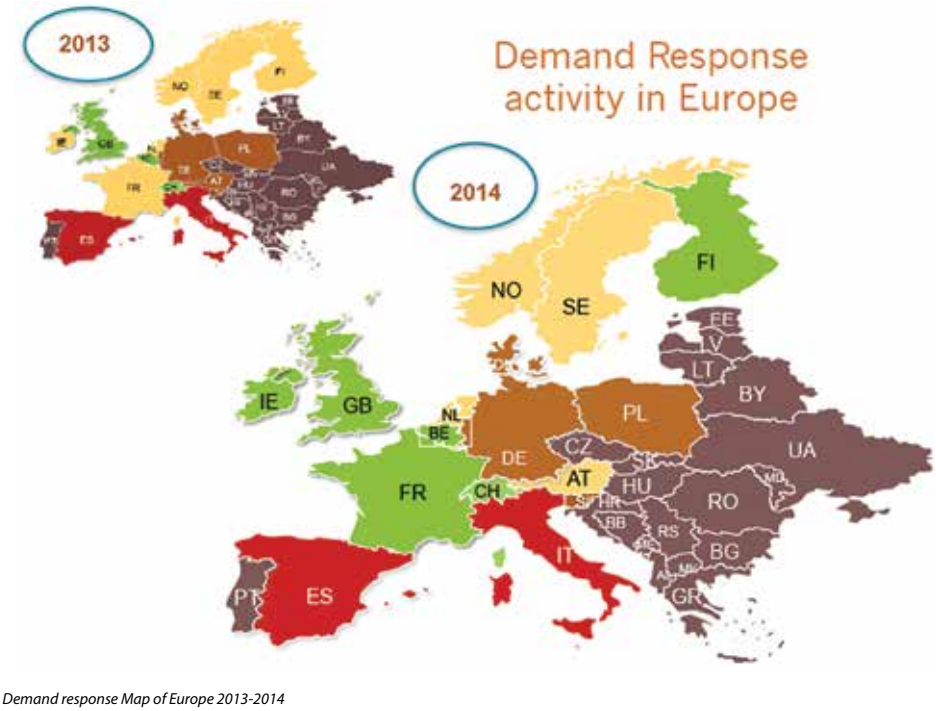
1. Market access

Enabling consumer participation in demand response may be the most problematic barrier for regulators. Either demand is not accepted within the national markets as a resource (*demand response is illegal*) or the market roles and responsibilities do not allow for direct access of consumers to service providers and therefore a clear path to market. The more in-depth the analysis, the more this issue is understood as a critical barrier throughout Europe. In interview after interview, complaints were made of inappropriate or incomplete regulation defining roles and responsibilities between market participants: in particular the retailer, the Balancing Responsible Party (BRP), the aggregator and the consumer. This lack of appropriate definition increases risk for all parties and enables abuse. When roles and responsibilities fail to enable the clear and direct access of consumers

3 ENTSO-E (2014). Demand Side Response Policy Paper. Available at: https://www.entsoe.eu/Documents/Publications/Position%20papers%20and%20reports/140915_DSR_Policy_web.pdf

4 Northern Ireland has its own regulator for electricity and system operator, the Utility Regulator and the System Operator Northern Ireland (SONI) respectively. Norway and Switzerland are not EU Member States; therefore the Energy Efficiency Directive does not apply in these countries.

5 It should be noted that although Austria is now coloured yellow, the market may change to green, if the significant regulatory changes planned for 2014 are implemented successfully.



Demand response Map of Europe 2013-2014
(Source: SEDC 2014. Mapping demand response in Europe Today)

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CLARION EVENTS

to aggregation service providers, free market competition around demand response services is impossible. Member States in the process of overcoming this barrier are Switzerland, France, Belgium and Austria[6].

2. Programme requirements/Product description
The balancing market participation requirements were historically designed around the specifics of generators. However, today these narrow criteria are no longer justifiable as they block low-cost demand side resources and artificially inflate the cost of balancing. When regulators and TSOs neglect to adjust programme descriptions, they generally assume *their* particular national businesses and households are simply not 'interested' in demand response, when in fact it may be the historical and inappropriate programme requirements blocking participation. However, when they set out to improve programme descriptions, in order to allow a range of resources to compete, the SEDC's findings are positive. Here dialogue and close cooperation with demand response providers, such as aggregators, retailers and large consumers, has been a critical element in moving the markets forward: for example in Finland, France, Austria and Belgium.

3. Measurement and verification
In many Member States the regulation concerning measurement and verification does not yet exist. In other words, there are no standardised and transparent requirements for how energy consumption reductions should be measured and therefore also how they should be valued. Each TSO may establish their own criteria or have no publicly published criteria. Often the TSO will have one set of criteria, the DSO will have another and the BRP will maintain a third. This is a market barrier, as a consumer's consumption reductions will be measured according to three different standards. Another issue will arise if the measurement and verification takes place at the consumer's level rather than for the aggregated pool of consumption. In some cases, the single household will have to fulfil the same pre-qualification and measurement criteria as a 500MW power plant. However, these issues tend to be resolved as the market matures and opens. A significant improvement is already visible between 2013 and 2014.

4. Payment and risk
This area shows the least improvement between 2013 and 2014. Though penalties for non-performance generally correspond to the responsibility of providing services to a TSO,[7] adequate payment for demand response is more problematic. Demand response may be paid less megawatt to megawatt than generation. This can be due to multiple factors. For example, a reserves market may provide an availability payment of 50% of the operational costs of the resource. However, demand response has very low operational costs compared to generation. This means that a consumer will earn significantly less per megawatt of flexibility than a generator. Add to this the fact that multiple markets in almost every Member State are shut to demand entirely, that payments may be negotiated individually per player, are not decided through a market or auction process, are not published etc, and there emerges a picture of the level of the issue. Standards of transparency and reporting must be created and enforced, both within the wholesale and balancing markets, to ensure a level playing field and access of new entrants.

Though the measurable improvement between 2013 and 2014 is encouraging, the overall result of the SEDC review reveals multiple remaining barriers to the establishments of consumer centred demand response services. If one considers the entire EU and all 28 Member States, the majority does not enable demand response. Taking into account the potential benefits of demand response and the regulatory barriers in place, clear and objective demand side targets will be required at a European and Member State level to ensure real progress. These should include logical step-by-step strategies for market development of consumer demand side services, measured and verified against well-defined key performance indicators. Only a planned and coordinated effort can hope to overcome the systematic historical barriers to demand response.

Timing is crucial. Intermittent generation is increasing and new back-up generation and grid investments are being planned and implemented. New demand side sources are also appearing: server farms, heat pumps, cooling units, and air conditioners. To fully realise the potential of demand side programmes, they must be implemented during this phase of the European electricity market development, so that they can be built as an integral part of the new system. As unnecessary investments in traditional generation, backed either with direct subsidies or by the market design, receive a green light from Brussels, part of the potential value of demand side programmes, both to European consumers and to the electricity industry, will be lost. MI

In some cases, the single household will have to fulfil the same pre-qualification and measurement criteria as a 500MW power plant

Timing is crucial. Intermittent generation is increasing and new back-up generation and grid investments are being planned and implemented

ABOUT THE AUTHOR:
Marcelo works as Energy Policy Analyst for the Smart Energy Demand Coalition (SEDC). He specialises in demand response as well as market structures and regulatory requirements for program development. His work in the SEDC aims at enabling the demand side participation in the European energy markets in cooperation with policy makers, utilities, aggregators and technology companies.

About the organisation:
The SEDC is an industry group, which supports the deployment and utilisation of smart energy demand in order to further the development of the Smart Grid and ensure improved end-consumer benefits. The SEDC focus is to promote demand side programmes such as: demand response, energy usage feedback and information, smart home, in-home and in-building automation, and other programmes related to making demand a smart, interactive part of the energy value.

6 GB is marked green in this area, but in fact, this issue has been rather ignored than solved. Retailers/BRPs have no right to block participation of consumers in Demand response, but neither they are protected from risk or paid for lost energy sales. In the long term GB will need to undergo the same regulatory review as other Member States.

7 An exception appears to be the UK where consumer involvement in the Capacity Market may be blocked due to penalty design.

MANAGING THE EVOLUTION
OF PLC STANDARDS

Do current PLC standards fulfil current and future requirements and is there a 'best way' to deal with the plethora of standards? As always, it's not only the technical aspects, but also the commercial ones.

Communication technologies and related standards have probably been one of the most discussed topics in the past two decades when it comes to smart metering or smart grid installations as they have the potential to revolutionise the smart grid. The whole industry was claiming the lack of 'open standards' covering the needs for smart metering and smart grids overall. For power line communication, as for other technologies, thousands of experts have been working on standards since then and now they are in place, in abundance.

Looking to the European utility landscape, there are variations from country to country. For instance, monopolist electricity markets like France or Italy, with one dominant distribution company. Countries with a small number of big distribution companies like Spain, and the very fragmented markets with multiple utilities. The large installations and pilot trials in Europe so far show that power line communication is the most adopted technology and this is probably valid independent of the market fragmentation. The requirements for power line technology have changed since 2001 when Enel of Italy deployed the first smart metering solution in the world. The application requirements evolved from AMR (automatic meter reading) over AMI (advanced metering infrastructure) to AMM (automated meter management) with requirements reaching from low data rate single directional communication, to real time bi-directional communication. The latter required in smart grid applications for demand response and supply management to control peak demand and overall load balancing. The trend is not expected to stop here.

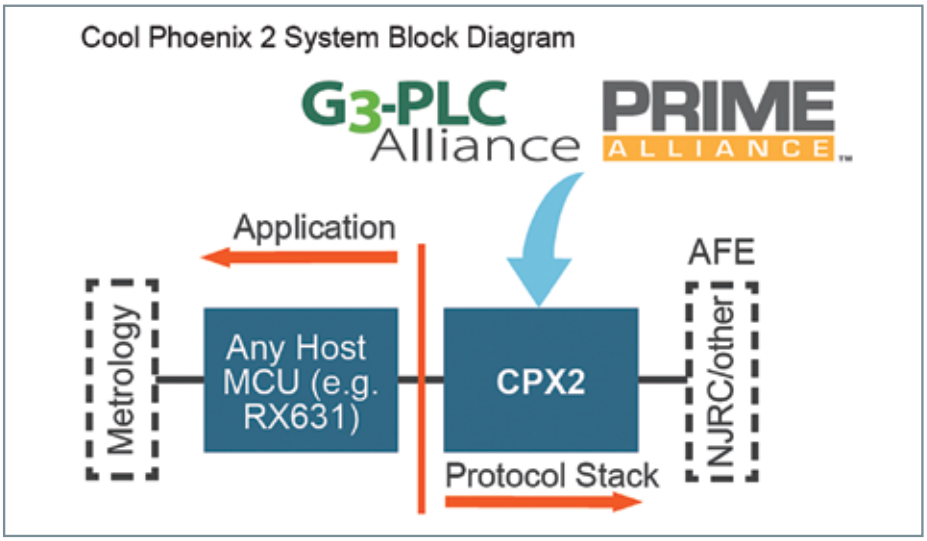
As a result, there is continuous evolution in standards. If we consider power line communication there is a plethora of types: low speed / medium speed narrowband technology, high speed or broadband technology. All use some form of modulation technique; DCSK, FSK, SFSK, OFDM etc. If we consider OFDM based narrowband technology alone, then there too are many standards – PRIME versions 1.3.6 and 1.4, ITU-T G.9903 (G3 PLC) and IEEE P1901.2 – to name a few. So where have they come from?

The most important of these is the EU's ambitious 20:20:20 target which states that EU member countries must 'ensure the implementation of intelligent metering systems' with 80% coverage by 2020 and full deployment by 2022. Local regulations then mandate the use of open standards

Driving factors

Probably the most important driving factor behind these standards is the utility companies themselves. If we delve deeper we could probably say that these are driven by the utility companies operating in the monopolist electricity markets or certainly ones with a very large share of a fragmented market. One of the original standards was PLAN or IEC 61334-4 developed by ERDF who are now one of the driving forces behind the ITU-T G.9903 (G3-PLC) standard. Another of the most widely adopted standards – PRIME – as driven by Iberdrola, and the aforementioned Enel is behind the Meters and More Alliance. The major advantage of a standard is that it can be adopted by industry as a *de -facto* technology. This leads to multiple interoperable implementations by the suppliers to the utility companies or meter makers, which provides a choice of vendors, increases competition and ultimately drives down the cost of the solution.

In recent years we have seen the introduction of government imposed targets. Arguably the most important of these is the EU's ambitious 20:20:20 target which states that EU member countries must 'ensure the implementation of intelligent metering systems' with 80% coverage by 2020 and full deployment by 2022. Local regulations then mandate the use of open standards. Overall, this forces utilities to act quickly and select an open standard to start deployment of meters within already tight timescales. However, this doesn't just affect the utility companies. Because a standard exists or is open, does not mean there are many implementations of it, or that they are interoperable. When you consider the scale of the deployments, these factors become critical.



Consider the Zigbee Alliance … the Alliance was formed in 2002 but it wasn't until 4 years later that the first Zigbee products became available. It was then another 2 years before certified products were available. For smart metering, the semiconductor companies must have a device capable of implementing the lower layers. Then there are the protocol stacks, which need development by semiconductor vendors, 3rd parties or meter makers. These solutions need integrating into meters and extensive testing in pilot trials. These factors help explain why the utility companies themselves are driving the standards.

Even when we consider narrowband OFDM based PLC solutions the differences span many layers of the OSI Model. At the physical layer, there are differences in the carrier frequencies and spacing, the number of constellations used in the mapping, repetitions in the encoders and different error correction techniques. These all affect the robustness and the achieved data rates of each standard at the theoretical level. At the MAC layer, there are subtleties in the channel access, security, tone mapping, addressing and sizes, segmentation lengths – which again all have an effect on the throughput of data frames and arguably the robustness of the solution. Next is the network layer; here the differences are even more varied: compression techniques, header sizes, maximum transmission units, routing protocols (on-demand or table based and the different topologies that are formed – mesh, star, tree…). We could of course continue through the rest of the OSI layers. Whilst there is no obvious leader or best performing PLC standard for smart metering, the meter makers are almost forced to support them all.

Looking to the investments that are required for semiconductor solutions as well as the development cycles, the most efficient approach to support the on-going evolution and the variety of standards is to implement a purely software based solution. Renesas has launched Cool Phoenix 2 (CPX2), the second-generation device of the award winning Cool Phoenix family, which keeps the flexible concept allowing a single device to support multiple standards – for instance G3 and PRIME. Whilst the device is pin compatible to its predecessor, it offers more memory as well as higher performance supporting multiple frequency bands like CENELEC, FCC and ARIB. The AES security engine features ECB, CBC and CCM modes with key lengths of 128, 192 or 256 bit respectively. This kind of flexible, software-based solution is advantageous for meter makers who are targeting worldwide markets. Multiple standards and/or frequency bands can be supported with a single platform, which significantly reduces the design effort and cost. Any potential changes or enhancements to the standards can be integrated seamlessly by reprogramming installed meters remotely, and this is a benefit for any market, independent of its fragmentation.

Whilst the software-based architecture of CPX2 offers flexibility, the integrated analogue front end (AFE) with an adaptive gain amplifier and automatic gain control (AGC) functions, ensures exceptional signal quality. This results in outstanding robustness especially important in highly dynamic and harsh network environments as found in metering applications. The very low power consumption is also one of the major selection criteria from utilities. In combination with a wide range of Renesas pin, software compatible and scalable microcontrollers for metering applications, the CPX2 power line modem solution provides a perfect fit for cost sensitive smart meter platforms. Renesas also offers fully certified protocol stacks for PRIME and G3, free of charge.

As time to market is of similar essence to the technical features, Renesas offers the 'Connect it! – Powerline Communication Solution Kit'. This simple to use tool enables customers to evaluate the robustness of the CPX2 PLC solution in all frequency bands. The PC GUI allows flexible device configuration and power line communication analysis. In combination with the worldwide support infrastructure and Renesas' commitment to its customers, everything is available to ensure an efficient and short development time.

There has been a lot of activity around communication standards over the past few years, especially for power line communication. During this time there have been major advancements made and driven by the utility companies, but most of these have been for the smart metering market. There have also been industry discussions within Europe to open up the spectrum and allow the use of frequencies up to 500 kHz for smart metering or smart grid applications. However, it is difficult to imagine that these advancements will meet the requirements of tomorrow's smart energy demands. The recent introduction of IPv6 goes a long way to solve the vast number of connected devices but the standards will continue to evolve. The applications that could be added to this infrastructure appear endless: demand management via appliance control, home automation, car charging, security etc. As each new application is added, the demands on communication increases and so too the demands on the devices running these protocol stacks. All told, the only way to future proof any design is to select a well-founded roadmap and ensure its flexibility. MI

Features	Benefits
High performance DSP for PHY	Enables easy design of a single meter platform ready to support multiple standards and frequency bands
Competitive roadmap	Future-proof solution, today fully supporting global mainstream powerline communication standards OFDM PRIME and G3
AFE integrated with adaptive gain amplifier and AGC function	Superior dynamic range and sensitivity assuring optimum output performance and robustness
Very low power operation	Helps reducing overall system power consumption, as one important selection criterion from utilities
Small 48-pin QFP package	Saves PCB board space thus BoM cost; enables the design of small form factor PLC add-on modules
Embedded hardware security engine supporting multiple modes	Simplifies the design of secure smart meters
Combination with wide range of application microcontrollers	Open architecture that allows flexible system partitioning by selection of best fit application microcontroller to save BoM cost

ABOUT THE AUTHOR:
Kevin Jones graduated with an MEng in electrical and electronic engineering from the University of Nottingham. He has worked as an applications engineer for Hitachi Europe, Toshiba Electronics and Renesas Electronics. In his current position he is working as a senior applications engineer within the smart energy team of Renesas Electronics Europe with over 8 years' experience in the field of power line communication.

ABOUT RENESAS ELECTRONICS
Renesas Electronics is the world's number one supplier of microcontrollers and a premier supplier of advanced semiconductor solutions, including system-on-chip and a wide range of discrete analogue and power devices. Established in 2010, Renesas Electronics combines the collective semiconductor expertise of Hitachi, Mitsubishi Electric and NEC Electronics, encapsulating more than 200 years' experience.

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G3-PLC Alliance

PRIME ALLIANCE

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RENESAS

EUROPEAN UTILITY WEEK DELIVERS AGAIN!

European Utility Week has announced that the event will be moving to Vienna in 2015, and this move has been met by excitement by attendees at the event. Says Paddy Young, Show Director for European Utility Week: 'The move is really simulated by popular demand, and the response [to the announcement] has been excellent.'

Young continues: 'For three days Amsterdam was the place to be for anyone who's anyone in the smart utility sector. Ultimately, all involved agreed on the importance of co-operation for future energy innovation.

'We would like to thank everyone who contributed to the success of the show, and hope to see them all next year in Vienna!'

Elisabeth Brusse, "General Manager at Synergy, speaking about the programme and trends in the industry, told Metering & Smart Energy International: 'We see an increasing interest in the topics around consumer engagement; consumers will play a vital role in the smart energy transition.

'On the smart grid programme, it's been around data analytics, data management, ICT infrastructure and renewable integration – you can see this by the fact that we have four sessions running around the grid & renewable integration – and this, of course, has a tie in with storage. The interest in storage has boomed in the last year, the programme has been extended and we expect this trend to continue.

'There are a lot of storage pilots which are turning into business cases, which is again an improvement on two years ago, or even on last year.'

'Data, and everything you can do with it becomes of greater interest and with that data analytics – a crucial tool for grid modernisation and effectively providing the business case for that modernisation to take place. The meter is obviously important, but using the information in the right way becomes even more important. This will improve network management and strengthens the utility position.

In this regard security issues will increase over the upcoming years" – Brusse says that they have more utilities attending sessions on grid security than at any previous time. 'Cyber and grid security is a massive issue which we in the utility industry need to manage correctly to avoid problems further down the road. It's not just security which is important, but also privacy. Both angles need to be considered. The system is becoming more vulnerable, across more points than ever before.

'Sensor development in medium voltage networks will become prevalent, but on low voltage networks, especially those that are buried, there is a lot of information on the status of that network that is not currently available. Smart grid development will focus more and more on low voltage networks in order to monitor and manage these efficiently.'

Brusse further told Metering & Smart Energy International that the new event location of Vienna 'reflects the needs of the market in terms of interesting regions, such as Germany and Central/Eastern Europe. There is a lot happening in Germany in terms of renewable energy; and Eastern European countries are putting efforts into developing their grids and establishing best practice models for smart metering and smart grids.

'The new Innovation Area has been very successful and will expand next year, providing a great opportunity for startup companies to get involved and bring new technologies to European Utility Week.'

Start ups battle it out for $100 000 Google credits

24 top startups displayed their innovative products and services during the event, all vying for the honour of being the Initiate Start Up of the Year and a prize of $100 000 worth of Google Cloud Platform credits for the winner!

Says Matthew Feigal, Cloud Platform Solution Architect for Google Cloud Platform and a judge of the awards: 'Google works hard to support innovation worldwide – that is why we helped judge the Initiate awards for the most innovative start up. Our contribution of $100 000 credit really added some spice to the competition, as we will not only provide access to the Google Cloud platform, but will also provide advice and help them get started so they can accelerate really fast.'

Winners Venios GmbH grabbed the first prize with their 'cloud software'

Winners Venios GmbH grabbed the first prize with their 'cloud software for big data analytics, live monitoring, optimisation and control of distributed power systems'.

The company provides cloud-based Geo Information System (GIS), and detects and analyses critical conditions in power grid infrastructure (including individual forecasts for all photovoltaic arrays in Germany with live data feeds).

According to a company spokesperson: 'Our software is able to identify critical areas in the power grid and provides grid operators with the detail and grid transparency required to optimize both grid maintenance and expansion, while also enabling the control of intelligent grid components (e.g. variable transformer substations, energy storage systems, etc.).

'Our solution helps system operators and other stakeholders to assess investments into power infrastructure and to find the optimum balance between investments in conventional grid upgrades and in the intelligent utilisation of existing infrastructure.'

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ANNOUNCEMENTS

OSGP – one year anniversary

The OSGP Alliance had a great year after its relaunch at EUW 2013. Many global companies have joined the Alliance to show their support and commitment for OSGP (Open Smart Grid Protocol). These include manufacturers like Mitsubishi Electric, Viko Panasonic, Apator, ModemTec, ConLog and EDMI. Integrators like Kapsch, RMS, Cedrus, Asay, and S&T have joined the Alliance and are implementing OSGP in their hardware or software solutions and services.

Many global companies have joined the Alliance to show their support and commitment for OSGP

Focus on security
The OSGP Alliance hosted a pre-conference workshop for utilities, as well as hardware and software developers who wanted to increase their understanding of the Open Smart Grid Protocol.

Global focus
Tauron, the largest utility in Poland with over 5 million residential customers, selected the award-winning OSGP based smart grid infrastructure solution for its complete, turnkey system that will serve approximately 330 000 end users as part of its Smart City Project in Wroclaw, the largest city in western Poland.

PRIME 1.4 released

PRIME version 1.4 represents an extension of version 1.3 that includes changes at the PHY and MAC level bringing improvements such as increased robustness and throughput, band expansion, band-plan flexibility and IP version 6 support whilst ensuring backwards compatibility. This new release keeps all of the benefits and lessons learned from 5 million installed PRIME smart meters, confirming it is a proven technology that performs in large-scale, future-proof smart grid deployments.

New Specification Features
PRIME specifications now support frequency ranges going from the CENELEC A-band (<95kHz) up to 500 kHz, allowing for optimum usage in electric grids all over the world. This expansion to FCC and ARIB band and the associated data-rate upscale opens up new geographic markets, meeting needs specifically for America, Asia Pacific and European electrical grids.

The inclusion of these new elements implies that PRIME v1.4-compliant devices will be able to support scenarios where they co-exist with legacy PRIME v1.3 meters not implementing these new features

Additional robust transmission modes have been introduced, designed to improve system performance against both high power impulsive noises and interfering noises. PRIME can be fitted for multiple applications – IEC 61334-4-32, IPv4, IPv6 – which enables a variety of services beyond smart metering.

Backward Compatibility
The inclusion of these new elements implies that PRIME v1.4-compliant devices will be able to support scenarios where they co-exist with legacy PRIME v1.3 meters not implementing these new features. This attention to establishing backwards capability is focused on understanding the utilities' need to protect investments in existing deployments. PRIME Alliance and its members are committed to protecting any investments with PRIME technology and will provide backward compatibility in the evolution of the PRIME specifications.

Security
Security functionality in PRIME has been engineered to the needs of the technology adopters and PRIME v1.4 specifications include state-of-the-art cryptographic protection mechanisms at MAC Layer, enabling deployment of a PLC network that is secure even at the lowest levels. Two distinct security profiles allow users to optimise security and performance in their networks. Both profiles utilise 128-bit AES-CCM authenticated encryption; and recognised standards for key management, distribution and generation.

PRIME v1.4 changes are the result of field experience, and no change has been introduced without extensive measurement campaigns in existing deployments plus intensive simulation and verification of technical alternatives.

PRIME specification has experienced an important evolution in order to improve system performance. PRIME v1.4 can be deployed globally, even in the harshest network conditions. PRIME has already been extensively deployed for smart metering applications, and with v1.4 specifications it places itself as a valid alternative for other evolving smart grid applications. Medium voltage scenarios, feeder and phase connectivity identification/mapping for smart meters, low voltage remote-control applications now become a reality with PRIME v1.4.

PRIME specification has experienced an important evolution in order to improve system performance

Product Innovaton Award winners

Alstom Grid has been awarded the Product Innovation Award in Energy Storage at the European Utility Week conference and exhibition in Amsterdam, gathering over 350 Smart Grid solution providers.

Alstom's winning entry is MaxSineTM eStorage, a smart converter solution for energy storage selected according to 4 main criteria: innovative originality, practicality, sustainability and design.

Tollgrade's LightHouse MV Power Sensor, was selected as the category winner of product innovation in the Grid/Renewables category.

Tollgrade's LightHouse MV Power Sensors are the world's first battery-free, 'all-in-one' Smart Grid Sensors capable of monitoring real-time voltage on distribution networks within 0.5% accuracy. MI

POWERING COMMUNICATIONS WITH TLI BATTERIES –

POWERING COMMUNICATION WITH SMART ELECTRICITY METERS

Smart meter applications require some kind of power engine that enables the meter to communicate with the utility and – ultimately – the consumer. Tadiran's new TLI battery is an ideal solution.

Some smart electricity meters have a power supply problem, as they cannot take the energy needed for communication, via the GSM network, from the meter circuit. This means that a separate battery is required. Given the circumstances of the smart metering business, not just any rechargeable battery is suitable for this application.

Tadiran has just introduced the TLI Series of batteries, a new family of rechargeable lithium-ion cells designed specifically for use in harsh environments. This battery series is ideally suited for the application as it has excellent long-life characteristics and operates in a wide temperature range.

Standard rechargeable lithium-ion cells have inherent drawbacks, including short operating life (maximum 5 years), low maximum cycle life (1 000 cycles), high annual self-discharge (up to 60% per year) and a limited temperature range (0°C to 60°C) with no possibility of charging at low and high temperatures.

Designed specifically for use in harsh environments as it has excellent long-life characteristics and operates in a wide temperature range

By contrast, the TLI series of batteries utilises technology found in Tadiran's patented hybrid layer capacitor (HLC), which stores the high current pulses required for two-way wireless communications. Tadiran's technology has been field-proven in millions of cells to deliver 25+ years service life. TLI series batteries modify this technology to deliver reliable, long-term performance under extreme environmental conditions.

Their features include:

- wider operating temperature (- 40°C to 85°C, with short term storage up to 90°C)
- ability to deliver high current pulses (up to 5 A)
- low self-discharge rate (less than 5% per year)
- up to 5 times more life cycles (5 000 full cycles)
- longer operating life (>10 years)
- charging possible at extreme temperatures
- glass-to-metal seal

TLI Series cells can be recharged using DC power such as can be provided by an electricity meter. They can also be used in conjunction with photovoltaic solar systems or other energy harvesting devices to deliver reliable long-term power. They are available in several standard configurations: 1550 (AA-size), 1530, and 1520, as well as custom battery packs. MI

TADIRAN BATTERIES

ABOUT THE AUTHOR
Thomas Dittrich studied physics and physical chemistry at the Bonn University in Germany. He joined Sonnenschein in 1980. As manager of Quality Assurance, he led Sonnenschein Lithium GmbH to ISO 9001 certification in 1993. Since 2002, he has been Manager of Applications Engineering. In 2006, Sonnenschein Lithium changed its name to Tadiran Batteries.

ABOUT THE COMPANY
Tadiran Batteries is a leader in the development of lithium batteries for industrial use. Its technology has been well established for more than 30 years. Tadiran Batteries are suitable where utility meters require a single long term stand-alone power source, even if it has to supply high pulse currents for a GSM module.

WHAT UTILITIES FACE

AFTER THE SUCCESSFUL SMART METER ROLLOUT

By Angus Panton, SQS Group Ltd

Briefly put:
What is the importance of assured reliability connecting devices? How can utilities increase performance and reliability of the functionality in connected devices?

The figures are enough to make any mind boggle, even in the burgeoning technology of machine to machine (M2M) communications and the wider 'Internet of Things'. Just take what's happening in homes: by 2020, there will be more than 850 million smart electric energy meters alone in the world's major economies – about half in China, according to a report by communications provider Telefónica. And smart meters are just the tip of the iceberg – all manner of other utility and home appliance systems will be communicating with consumers and providers: from smart thermostats to alarm systems to the butt of many jokes, the fridge that tells you when it's running out of milk.

The rapidly expanding home automation and M2M markets give traditional utility suppliers not only a new route to greatly improving customer engagement and value, especially with the Smart Meter Implementation Programme, but also a way of moving beyond their core business into all manner of new home systems.

But there's a 'perfect storm' of factors that could derail efforts to develop this market.

The sheer volume of device rollout and the subsequent amount of data involved takes companies – and their customers – firmly into the realm of 'big data'. This brings challenges in data processing, performance, storage and security. At stake is the trust of customers in their suppliers and in the technology – and already there are movements to resist the installation of smart meters owing to the 'big brother' aspect of their ubiquitous presence in people's homes.

Consider conventional utility meter reading, done manually by customers or a doorstep agent every quarter – and then compare that with the readings that would come in every half hour from millions of smart meters as they monitor energy usage in real time

That the amount of data will increase exponentially is not in doubt. Consider conventional utility meter reading, done manually by customers or a doorstep agent every quarter – and then compare that with the readings that would come in every half hour from millions of smart meters as they monitor energy usage in real time. Moves to extend into other home systems will only up the magnitude of the data and communications technology needed, and will place great pressure on the operational, billing and customer relationship system of utilities, which in countries such as the UK have not been shining stars in having user-friendly IT systems.

But utility firms are among the pioneers in customer-facing M2M – and they have to be, as there are regulatory mandates from governments to roll out smart meters, as Vodafone's latest M2M barometer report confirms. A move in the next few years for all industrial sectors will be from using M2M in internal systems such as operations and inventory, to externally with customers. Vodafone says the sector is currently among the leaders in external M2M adoption – already 20% of utilities and energy firms it surveyed have now adopted smart grid and smart metering systems, and 17% have also introduced smart home and office offerings – a category that includes home automation, intelligent heating and security systems.

As mandated, the rollout target for the UK's smart meter programme is to replace 53 million conventional domestic power and gas meters in about 30 million premises by 2020. This is Britain's biggest home energy technology change for more than 40 years. The European Union has set a target of 80% of electricity meters within the EU to be 'smart' by 2020.

Major challenges for companies lie in developing IT applications that underpin these rollouts – these are systems that combine new devices and usability issues, integration across networks to company operations and billing systems, and sheer scale. One of the key issues at stake is user acceptance and experience of new home automation technology. Once consumers install devices such as smart thermostats, they will expect operation to be at least as reliable as old mechanical or electrical timers. Dangers lie not just in initial hardware and operating software but in regular updates, which could break functionality owing to

inadequate testing or unforeseen design problems. And a recent study by Hewlett-Packard has found that the majority of home app products it tested have security vulnerabilities, including a smart thermostat, although HP didn't name names.

In the UK, the government has awarded a licence granted to services giant Capita to run the Data and Communications Company (DCC), a special company set up to manage the centralised smart metering service and manage the contracts for the communications and data infrastructure. Their focus is on connecting smart meters in homes and small businesses and in turn on connecting with the business systems of energy suppliers. Even so, energy firms are concerned. For example, as Neil Pennington, Smart Programme Director at RWE Npower, one of the UK's big energy players, said recently at an industry seminar: 'Testing must be robust – end-to-end across industry parties and the DCC, and in live situations. If interoperability is not consistent and systems and processes not failsafe, it risks undermining consumer confidence.'

With so much at stake, the stage is set, we believe, for more interest in techniques for improving software testing and quality with so-called 'agile approaches' in the project development lifecycle. In particular, we have found that the usability of devices is critical for energy-use devices and applications, many of which will be new to the market. A test lab that simulates real-world use is one approach, as is a 'quality barometer' that reports throughout the testing lifecycle.

The multivendor, mixed hardware/software environment of the smart meter programme, in particular, requires testing coordination and risk management of a

high order, given the government interest in these programmes and past experience with other high profile public IT projects in several countries.

To summarise success factors for these and other issues in meter and home automation programmes, it is critical to:

Ensure a good customer experience – Consumers will be using smart energy devices every day and so user interfaces and usability are especially critical for the rollout of connected devices and home energy applications. Home environments vary widely and utilities need to be confident that their devices will work in most homes: test labs can be used to replicate common variables such as wireless signal strength and meter location.

Integrate core IT systems – CRM and billing are at the heart of utility company operations, and 'end-to-end' integration really is important. The last thing a utility company wants is to lose the immense value that new apps and mobile communications can bring. The smooth integration of core IT systems and customer communications is critical.

Recognise the big data challenge – The huge volume of meters and data generated presents a 'big data' challenge so testing of simulated large loads on billing and data analysis systems is essential.

Adopt best practice – Meter systems can involve several different suppliers, including special companies set up to manage communications and infrastructure, as in the UK the need for clear communication with all parties is vital, and best practice should be a shared testing in a repository so all parties have a single view of the project.

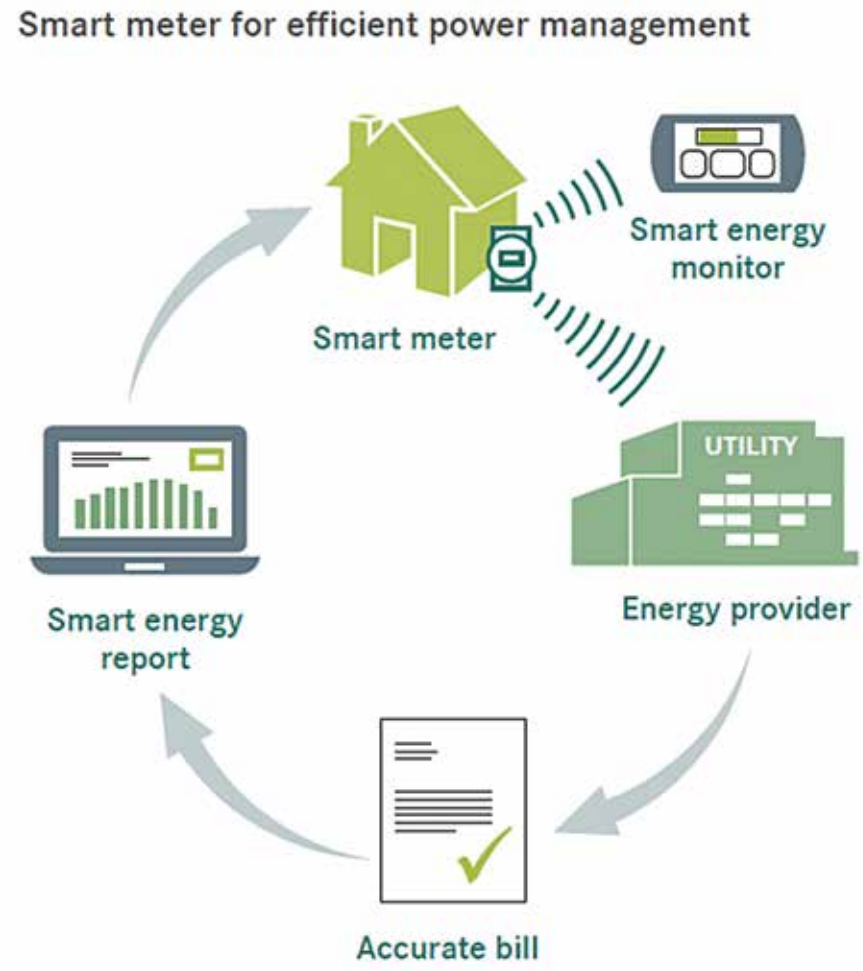
Consider the growth of open platforms – Many connected energy systems are proprietary applications based on customised hardware. Now the market is moving rapidly towards customer choice driven by smartphones and new smart home development platforms for certain operating systems, such as Apple's HomeKit. This will increase the amount of integration and testing needed but will be vital to compete in the market.

Adopt software quality – Rapid, agile software development aims to embed quality and testing earlier in the project development lifecycle. This can be a big change in mind-set for in-house software teams, but it is important in new application areas that have complex integration needs or require the involvement of consumers and regulators.

Recognise the complexity of end-to-end testing – Testing needs to be conducted in both lab and live environments. Hardware issues can be more difficult to solve than software problems and fixes can take longer to implement, so testing needs to take into account these differences.

In the UK, one of the big energy firms, British Gas, is on the record as embracing the challenge of these new systems. The company has already rolled out 1.4 million smart meters in the UK, and is having success with its Hive smartphone-controlled thermostat application. The company's ambition was summed up recently at the Smart Energy conference in London by Nina Bhatia, commercial director, who said: 'You might ask, does an energy company have the right or the capability to move into the connected home? The answer is emphatically yes – perhaps the boundaries between what we have thought of as an energy company are changing.'

She added: 'I am recruiting software engineers, user experience designers and data scientists from NASA' – a neat summation of the expertise needed for 'lift off'. MI



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Angus Panton heads the Power and Comms business unit within SQS, focused on the utilities, energy trading and communications sectors. With ten years' experience specialising in software testing at SQS, he has seen how important systems quality is to underpinning change in these areas.

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This column is to create a forum for ideas, passions and perspectives on our industry that are controversial, provocative and energising. The views expressed here may be unpopular, politically incorrect, heretical or simply humorous. They may be ideas that all of us have had but didn't care (or dare) to articulate. The opinions expressed are those of the author alone, but are probably shared by many who have yet to say so.

ROUGH RIDE AHEAD FOR GB SMART METERING PROGRAMME

By Compos Mentis

Her Majesty's Government smart metering programme for Great Britain is destined to give all those who are mandated to mount the horse a very rough ride. Each person or company expecting to ride this beast had better be prepared for it.

Meter manufacturers, in their rush to get first mover advantage and fulfil contract obligations, will need to produce and prove designs is a great hurry. On the face of it, this should be easy; after all this is what meter manufacturers do for a living. Reality will bite once systems integration issues with HAN and WAN communications, protocol nuances, key distribution problems etc. begin to show up. With three agencies, albeit co-ordinated by the Data & Communications Company (DCC), all faced with many manufacturers nearly all at the same time, it will be a bumpy ride to success and scale. They can expect rocketing costs as they pay DCC for the privilege of having their meters certified as fit for use. Not to mention stop – start deliveries against contracts as they improve products on the fly.

Meter installers too will find their life hard. For starters they install four items: an electric meter, a gas meter, a communications hub and an in-home display (IHD) in every home. Establishing radio communications between four devices in every customer's home, by itself, is not trivial. Add to it the complexity of having to deal with three different agencies for WAN communications and commissioning and you have the recipe for a long install time and an expensive installation. The ride to a smooth install process will be a very bumpy one with a number of process changes, which will be needed to be effectively understood by thousands of technicians in vans, before it becomes efficient.

Energy suppliers, responsible for providing smart meters to their customers, will have the hardest time of all. First of all they have the critical decision to make – are the IT processes delivered by DCC robust enough to really begin a mass scale rollout? If they get this judgment wrong, they will have some very upset customers, a situation every supplier will want to avoid like the plague. This writer predicts that the route to this decision is paved with problems. Each supplier, each meter manufacturer and each communications provider will appear different to the DCC (in theory they should not, but anyone who knows protocol standards will understand) and each will demand their bits get sorted out more or less at the same time. Nearly all suppliers begin with very limited skills in metering, so one can expect a lot of finger pointing and damages claims between suppliers, meter manufacturers and the three DCC constituent contractors. Of course, while all this is happening, the supplier has to keep their revenues from legacy meters flowing and will bear the cost of running two systems. How long this pain lasts depends on how quickly the transition can be made. 2020 says the Government. At least 2022, says common sense.

DCC is really only a contracting agency and as they have contracted out various bits, they have contracted the service they would provide. Today, they expect 'Initial Live Operation' (ILO) by end 2015. As Compos Mentis reported in an earlier piece, this date is already impossible to meet. Rollout will only start once suppliers make the decision that the service is Robust Enough to Sustain a Rollout (RESR). Between ILO and RESR will be many months, change notes and change-associated costs. It will take someone braver than Compos Mentis to predict these. It will only take common sense to recognise reality and reset the ambitious timescales.

Ofgem, the energy regulator, will have a hard ride on this one too. At present it is probably happy that the programme was taken away from its hands by the Government. But it is bound to have its hands full with customer complaints and settling the consequences of the major cost and time escalations from this programme. The least it can do today, is to make a realistic assessment of the status of the programme and alter the licence conditions of the suppliers to reflect reality.

And last, but not least, what of the energy user for whose benefit this programme was launched? Many users can expect lengthy and failed installations and more than one installation visit. They can expect to receive an IHD, which most will find an interesting toy for the first couple of weeks and then it will be promptly misplaced. They can also expect the unwelcome consequence of bigger energy bills, much bigger than most imagine.

A programme as complex as this smart meter rollout needed a programme management team of the type a Heathrow Terminal 5 or London Olympics 2012 had. What it has got so far is a complex web of committees that have set out regulations which will bind the industry for the next 15 or 20 years in an expensive, almost National Health Service like, IT program. Committees that believe that their work is good enough to place a moratorium on innovation for the next twenty years in the area of equipment installed in every home.

So where will this leave the Government and the Programme Delivery Body tasked with ensuring a smooth rollout with full user engagement? Definitely not in a very happy place. Unless, of course, the next election in May 2015 finds a Secretary of State of a different colour in office. That will, at least for starters, allow the old political game of blame-it-on-the-previous-government to be played with some legitimacy. But then the stark reality of the complex task of unravelling this expensive mess will dawn. Can the position be retrieved without even more costs? There is an easy way, visible for all to see today: energy supplier led early phase installations, nearly a million of them, all working well and serving customers cost effectively at a cost energy suppliers can afford. MI

ABOUT THE AUTHOR:
Compos Mentis is Latin for "a sound mind." This is the chosen pseudonym of a prominent European expert with more than 20 years of direct experience in metering, AMI and smart grid applications worldwide. The cloak of anonymity allows him to insightfully "pop the balloons" of conventional utility industry thinking.

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