ENERGY 3.0

AN INDUSTRY IN TRANSFORMATION

white paper

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The electricity industry is one of the last to undergo the major transformation required to shift it into the digital economy. The political necessity of keeping electricity prices as low as possible led to severe under-investment in electrical infrastructure and sidelined important issues such as energy efficiency, the integration of renew-able energy sources, and consumer tools to manage home energy use.

Today, all stakeholders realize that the electricity industry must change. It is facing massive disruption to its business model through the requirement to reduce its fossil fuel use and the rise of increasingly viable, technology-based solutions to grid power (such as distributed generation, smart grid devices and electric vehicles).

The development of the smart grid is essential to achieve goals for energy security, economic development and climate change mitigation, Smart grids enable increased demand response and energy efficiency, integration of variable renewable energy resources and electric vehicle recharging services, while reducing peak demand and stabilizing the electricity system.

Globally, utilities have tended to view the required transformation in functional terms, managing incremental change with technology or application releases such as advanced metering infrastructure (AIVII).

TRANSFORMATIONS IN INDUSTRIES SUCH AS TELECOMMUNICATIONS AND FINANCIAL SERVICES HAVE SHOWN THAT THERE IS A NEED TO BUILD "TRANSFORMATIONAL CAPABILITY" TO ACHIEVE THE FUTURE VISION. WITHOUT IT, A BUSINESS IS SETTING ITSELF UP FOR FAILURE.

SMART GRID 1.0

Such initiatives are the first steps on the transformational journey, often described as Smart Grid 1.0. The "1.0 enterprise" seeks smart grid functionality and sophistication, but tries to isolate the disruptive impact on technology, people and process. What we have learned from Smart Grid I.0 rollouts suggests that it is becoming increasingly difficult to contain new technologies within existing capabilities. There are prohibitive costs associated with such an approach, not least the integration headaches and negative consumer reaction.

SMART GRID 2.0

Smart Grid 2.0 is a vision of a more holistically designed network architecture, interoperable across common standards and with robust security that is agnostic to particular configurations and applications. Such a design centric approach to the electricity grid would alleviate costly integration issues and build consumer engagement as a key focus of development activity.

Smart Grid 2.0 is transformational in that it challenges traditional thinking of the network and the energy value chain. Although many in the industry believe it is inevitable, large-scale, system-wide demonstrations are needed to identify solutions that can integrate the full set of smart grid technologies with existing electricity infrastructure.

SMART GRID 3.0

We believe that there is a third stage, which we have called energy 3.0. In this stage of development, new business models will quickly emerge to take advantage of the changes that are already in place.

The dramatic shift away from fossil fuel energy will be well under way, with the smart grid enabling small-scale producers to provide energy into the grid. The grid itself will be an enabler in a world that creates and markets energy to support new devices and new business models. As in any major transformation, the disruption in the industry will be substantial; there will be winners and losers. We see an environment where new business models will combine products and services in such a way that they are indistinguishable from the energy they rely on.

For example, when you purchase an electrical device in 2020 you might also purchase enough energy to run it and other services such as finance and insurance.

1.1. PURPOSE OF THIS PAPER

The purpose of this paper is to describe the transformational elements of the smart grid. It highlights the evolution of Smart Grid 1.0 from isolated, incremental technology rollouts through to blueprinting and intelligent design.

The shift from Smart Grid 1.0 to 2.0 is already under way. It should be welcomed, as it will simplify complexity and accelerate the move to a more network-oriented perspective, with a more end-to-end process perspective for the consumer.

The estimated expenditure on smart grid conversion for the United States (US) alone is USS 165 billion (A$183 billion) over the next 20 years, Therefore, the smart grid represents an opportunity for any business that has skills or expertise in any part of the energy value chain. In addition, businesses in communications and information technology with the relevant capabilities will find ample opportunities.

Research shows that the smart grid journey is a business-wide transformation comprising technical and non-technical initiatives and noncore, enterprise-wide capability.

Transformations in industries such as telecommunications and financial services have shown that there is a need to build "transformational capability" to achieve the future vision. Without it, a business is setting itself up for failure.

THE SMART GRID IS TRANSFORMATIONAL BECAUSE IT ENABLES A PARADIGM SHIFT FROM DISTRIBUTING CENTRALLY PRODUCED POWER DOWN THE LINE IN A ONE-WAY FLOW OUT TO THE EDGE OF CONSUMPTION TO THE NEW PERSPECTIVE OF A NETWORK THAT DISTRIBUTES POWER, FROM A MORE DIVERSE POOL (LARGE AND SMALL AT DIFFERENT NODES OFTEN CLOSER TO THE CONSUMER) AND POTENTIALLY FACILITATING TWO-WAY ENERGY FLOWS.

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The smart grid is transformational because it enables a paradigm shift from distributing centrally produced power down the line in a one-way flow out to the edge of consumption to the new perspective of a network that distributes power from a more diverse pool (large and small at different nodes often closer to the consumer) and potentially facilitating two-way energy flows.

In our view, the traditional capabilities such as people, process, data and technology will need to be optimized and re-imagined to meet the demands of the advanced grid. Pilots have taught us that attempting to contain effects on core capabilities proves to be more costly and complex in the long run.

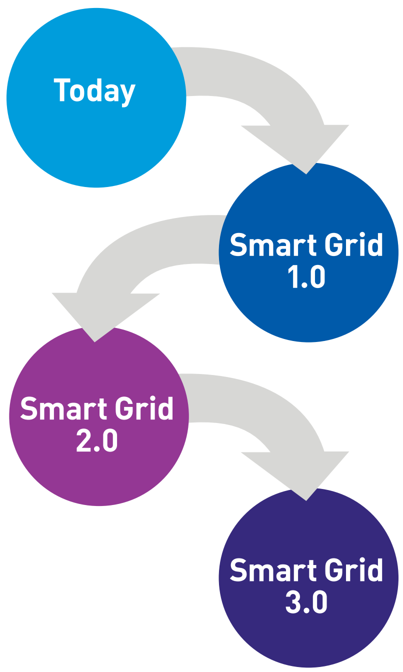
This paper will detail the journey so far, highlighting what has been learned and describing how organizations can meet the aspirations of Smart Grid 2.0. Opportunities and challenges will be highlighted. We will introduce energy 3.0, showing how the transformation offers a glimpse of a clean, efficient energy network of the future. For us, energy 3.0 provides integrated energy production, transportation, use and a utility that goes beyond the meter and into aspects to do with how consumers gain benefit and utility from the energy itself.

Our position is that Smart Grid 1.0 is managed functionally to control effects, and Smart Grid 2.0 needs to embrace change and engage early with all stakeholders as the true benefits can only be realized with a cross-functional, multi-stakeholder approach. In energy 3.0, we are just as much focused on the energy consuming devices as we are on the generation of the energy.

Later, we will publish a series of papers highlighting specific aspects of the energy 3.0 environment and discussing specific issues and challenges raised here.

THIS JOURNEY WILL BE HIGHLY DISRUPTIVE, AFFECTING INDIVIDUAL ENTERPRISES, THE INDUSTRY VALUE CHAIN AND SOCIETY AT LARGE.

JOURNEY TO ENERGY 3.0



2. THE SMART GRID STORY SO FAR . . . SMART GRID 1.0

2.1. APPROACH

The power industry's infrastructure and configuration are predicated on concepts and principles (arid in some instances technology) emanating from the 19th century. This has encouraged conservatism and specialism.

As a result, utilities have viewed the smart grid with a mixture of skepticism, awe and fear. However, external pressures are becoming overwhelming. Increasing energy costs, demands for greater energy output and efficiency, the focus on carbon emissions and the integration of renewable energy resources have highlighted the present grid's outmoded configuration and modeling. The industry has also seen how the telecommunications industry has been transformed by digitization, standardization and the rise of the Internet.

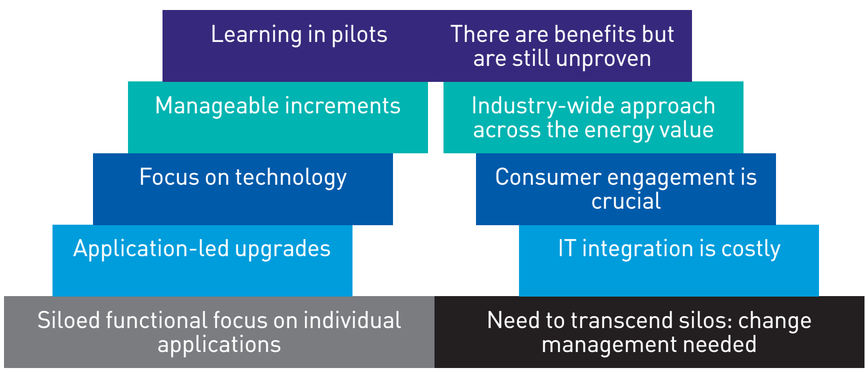
THIS HAS BEEN CONSISTENT ACROSS THE GLOBE, WITH INITIAL PILOTS AND APPLICATION-LED ROLLOUTS BEING CHARACTERIZED BY A SILOED, FUNCTIONAL FOCUS ON INDIVIDUAL APPLICATIONS. THIS HAS ENABLED AFFECTED ENTERPRISES, PARTICULARLY DISTRIBUTION BUSINESSES, TO MANAGE ASSOCIATED EFFECTS AND CHANGE VIA TRADITIONAL IN-HOUSE PROCESSES.

Faced with increasing pressure for massive change, utilities have attempted to manage it through pilots, scaled technology and application-led upgrades.

Smart Grid 1.0 focuses on containing the transformational impact to manageable increments. However, early lessons from such initiatives suggest that a better option would be an industry-wide approach across the energy value chain with robust consumer engagement. Furthermore, in the long run technology or application-led initiatives will create costly IT integration and change management issues.

Designing and building a holistic, intelligent platform that suits multiple applications and technologies (some yet to be imagined) may prove to be more cost efficient and effective for the long term.

SMART GRID 1.0



2.2. GLOBAL TRENDS

Globally, many utilities have begun the smart grid journey, investing and making business cases for applications and technology rollouts. Some have specific budgets, and those that do not are still making smart grid investments as part of the usual research and development process. The general market is characterized by pilots and trials as enterprises, operating in their traditional silos, begin to take a few tentative steps.

Pilots, particularly in the US, have highlighted the importance of intelligent design of smart grid enterprise architecture, starting with customer engagement and service goals and objectives. This focus on the customer allows the enterprise to develop an end-to-end process view, which in turn drives the design and development of the appropriate infrastructure, data and application strategies and architecture.

2.3. ADVANCED METER INFRASTRUCTURE

Advanced meter infrastructure (AMI) has been the most public aspect of the smart grid rollouts, led by several mandated schemes and trials across Europe, the US and Australia. AMI is a typical example of an application-style initiative in the context of Smart Grid 1.0. In some cases, the "smartness" of the meters is a matter of conjecture as often their "intelligence" is not used and they continue to be run as old-style analog meters. The supporting infrastructure for the meters is an issue so many initiatives have been contained to the physical meter.

Energy companies are playing catch-up with a range of other systems that can facilitate and integrate data flows and information management. Investment in the coming years will focus on re-equipping the back office and continuing data integration via distribution management systems (DMS), supervisory control and data acquisition (SCADA) and a range of ICT solutions. Eventually, incremental upgrades and application-led rollouts will prove too costly and complex, which will push development more towards information systems design.

Preliminary analysis indicates that implementing smart grid technologies in Australia could deliver at least A$5 billion of gross annual benefit. This includes improvements in the operation of the power industry and the monetized benefits of reduced greenhouse gases and improved power grid reliability. The US has announced US$4.5 billion in smart grid funding, while Europe has mandated smart meters as a critical component of a broader smart grid. In France, EDF is deploying 300,000 Meters as a pilot as a precursor to a system-wide deployment of 35 million meters at a cost of €4 billion.

The potential benefits have attracted enormous interest in smart grid technologies and their implementation. Governments around the world are making power grid upgrades a priority.

THE POTENTIAL BENEFITS HAVE ATTRACTED ENORMOUS INTEREST IN SMART GRID TECHNOLOGIES AND THEIR IMPLEMENTATION. GOVERNMENTS AROUND THE WORLD ARE MAKING POWER GRID UPGRADES A PRIORITY.

Appendix 1 shows examples of initiatives around the world.

3. FROM PILOTS TO SMART GRID 2.0

3.1. KNOWLEDGE IN PILOTS

We define Smart Grid 2.0 as end-to-end intelligent network with associated flows of data and energy — a more holistic, network designed approach is used. Operations will need to be reorganized horizontally, mimicking the end-to-end flow of digitized data and energy.

The pilots undertaken in the Smart Grid 1.0 phase have provided valuable knowledge on how we should undertake these next steps.

CRITICAL STEPS

For utilities to capture the business benefits inherent in a deployed smart grid they will have to master three critical steps:

1. Identify the business process changes needed to maximize the value of smart grid deployment.
2. Ensure that new systems are in place to support those processes.
3. Manage the impact on people while building new skills in the organization.

By demonstrating mastery in these three steps, utilities will increase the likelihood of securing regulatory approval for subsequent waves of technology deployment and pilots (which will provide opportunities to further build knowledge about these three steps).

The task of moving from vertical (within a business unit) to horizontal networks (across multiple business units and potentially businesses) will be transformational and disruptive. Integration becomes even more critical when we take into account the fundamental changes that will be needed in how energy supply and demand actually works in the real world. For example, how will customer empowerment systems engage the network, processing terabytes of data?

NETWORK ARCHITECTURE

The network architecture will support and integrate present and emerging domains. Present domains start with the centralized generation and automated generation control (AGC) systems that support reliable dispatch.

Other domains involve generation market operations and systems operations of the utility, which support transmission and data acquisition, asset management systems, outage management systems and distribution management systems.

Emerging domains that need to be factored into the smart grid design include demand response systems, while distributed energy resources include distributed generation (DG), electric vehicles (EV) and distributed energy storage.

GRADUAL EVOLUTION

We believe this gradual evolution is moving towards a vision of a more coherent, coordinated and designed smart grid — Smart Grid 2.0. It defines the future landscape as an intelligently designed architecture and environment rather than one based on a single solution. It acknowledges the criticality of a whole-of-business approach, across all business units within a utility. Each business case is prepared with this as the context, to meet the prudent investment requirements of regulators. Importantly, it broadens the application of the smart grid to encompass the consumer and consumer behavior as a key determinant to drive investments.

EMERGING DOMAINS THAT NEED TO BE FACTORED INTO THE SMART GRID DESIGN INCLUDE DEMAND RESPONSE SYSTEMS, WHILE DISTRIBUTED ENERGY RESOURCES INCLUDE DISTRIBUTED GENERATION (DG), ELECTRIC VEHICLES (EV) AND DISTRIBUTED ENERGY STORAGE.

3.2. MOVING TO COMMERCIALIZATION

There are clear opportunities to extract more insight and value from pilot investments made by the industry. However, the absence of agreed standards for smart grid technology and applications is a significant investment risk for the wider adoption of smart grids.

KEY CHALLENGES

These are the key challenges we see for today's smart grid demonstration pilots as they move towards commercialization.

- There are technological, regulatory and business questions that need to be decided.
- Setting and managing customer expectations. Pilots are finding it difficult to engage consumers because of ineffective communication and variable implementation in unpredictable field environments.
- Developing a smart grid business case. It is difficult to create a strong smart grid business case because regulatory incentives have not evolved to reflect today's policy agenda.
- Future legislation is uncertain and disaggregation of the utility value chain is increasing complexity, which makes it more difficult to align and allocate risk and reward.
- Information management. Challenges remain around data privacy, cyber-security, interoperability and standards. A key aspect of the smart grid is that it will generate vast amounts of data about network performance and customer usage. There are significant concerns about how this information will be managed.
- Process flexibility — implementation of end-to-end processes with a clear customer focus that respond to a more dynamic marketplace.
- The immaturity of many technologies and standards. There are examples of fusing of objectives, where new technologies and pricing structures are rolled out in parallel. This makes it difficult to understand cause and-effect when customers react poorly to the change.

3.3. FROM PILOTS TO SCALE

How do you move from an application-led Smart Grid 1.0 to a network-led Smart Grid 2.0?

Building the new technology successfully piloted in Smart Grid 1.0 into the grid at a system-wide scale will be the largest challenge in Smart Grid 2.0. What might work on a pilot scale will not necessarily be effective across large areas of the grid without a change in thinking by grid operators.

As technology progresses and as energy users gain new awareness,_ integration of new elements with the smart grid becomes more essential, suggesting that the smart grid should be designed with future needs in mind.

A smart grid built on siloed technology implementations and slow, functionally led, incremental rollouts is difficult to manage, costly to integrate and difficult to coordinate in the long run. Some utilities are learning how complex an AMI rollout is to manage when the integration elements of present and potentially future applications are factored in. This often is occurring without the framework or guidance of an overall application blueprint.

THE END-TO-END PROCESS AND SERVICE OPERATIONS NEED TO BE CENTERED ON CONSUMERS AND THEIR DEMAND AND NEED CYCLES.

Focus areas

Based on such experiences, we advocate a focus on:

1. Designing the smart grid architecture first using strategy documentation and architectural principles.
2. Defining and implementing appropriate organizational and cultural changes.
3. Evolving processes with a focus on enterprise-wide process integrity.

The end-to-end process and service operations need to be centered on consumers and their demand and need cycles.

3.4. EFFECTIVE CUSTOMER ENGAGEMENT IS CRITICAL TO SUCCESS

Most utilities have realized from initial pilots and trials that the customer is integral to the smart grid business case. The smart grid cannot be successful without reasonable customer engagement. From changing consumer behavior to gaining regulatory approval for network augmentation, substantial evidence-based work will be needed to prove to all parties that the smart grid investment is appropriate and worthwhile.

Securing consent to use personal data and managing and analyzing this data will be a new core competency for distribution companies. It will provide new insights on the network side in terms of factors such as load management and phase balancing_ But it is the customer side where the changes will be most profound.

Companies with existing brand presence, data mining and business intelligence skills will be best positioned to exploit the new opportunities that will emerge.

One only has to look to the UK supermarkets' entry into the energy retail and solar markets to see how this model might develop.

The UK experience has evolved without the use of interval data; with more information, much more sophisticated models will be deployed.

3.5. KEY ISSUES IN SMART GRID 2.0

3.5.1. Standards

Most electricity distribution businesses are driven by a policy framework and regulatory regime with a five-year model of access arrangements, and by the behaviors that are encouraged by this model. Retail, data access and other policy areas need to be overhauled to provide a consistent framework. The road to the smart grid will depend on how and when the fragmented policy framework driving the regulatory environment motivates the distribution companies to change and adapt.

We believe that taking an aggressive, proactive approach to aligning with international standards is important for supporting the rapid introduction of smart grid technologies.

3.5.2. More formal international linkages are required

While there are some formal arrangements in place between distributors and trade associations and their industry counterparts, we believe there needs to be more work done to ensure that international experience and lessons are formally channeled into initiatives being undertaken locally. We believe this can be done through better international linkages.

3.5.3. Rejuvenation of the workforce

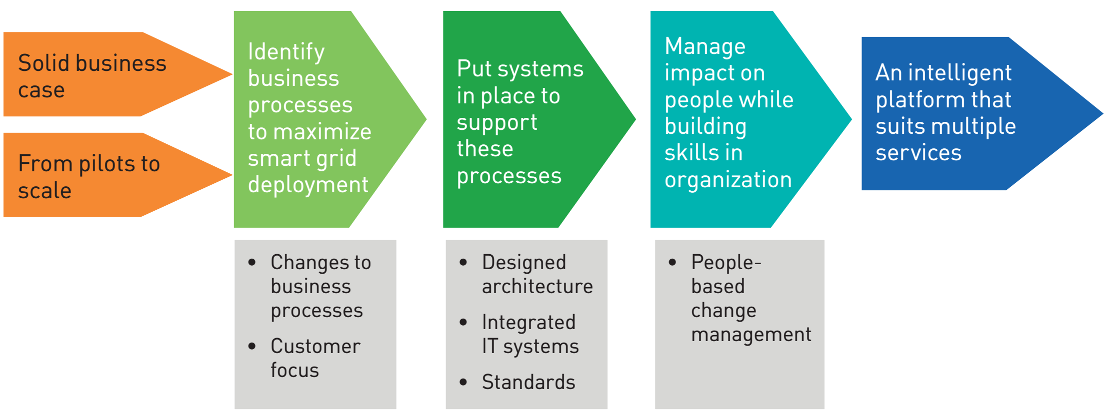
We believe that smart grid projects can be used to leverage individual skills and boost the power industry's human resources strategy. The industry has an aging workforce and changing social demographics, making it harder to recruit and retain key people. This will be exacerbated by the smart grid as the demand for modern IT skills increases to support delivery.

Forward-thinking utilities see the smart grid as an opportunity to rejuvenate and reinvigorate the workforce by attracting new employees into an industry previously regarded as mature and unexciting. Smart grids are capable of attracting young university graduates to the energy sector, and the universities are responding with renewed interest in graduate programs for power engineering and related fields. The smart grid provides an opportunity to redefine the roles and status of electricity industry employees and to remake the work environment with a focus on innovation and the future.

3.5.4. Planning now is essential

Regulatory periods drive planning cycles and in the smart grid environment it is difficult to project needs in a detailed way into a five to 10 year timeframe. Technology will change dramatically over these timeframes, but waiting is not an option and we would argue that the direction of the transformation is clear, So enterprises will need to improve planning processes and approaches to deal with this more dynamic environment. In the Smart Grid 2.0 world this capability will become more future scenario based, increase in complexity and require a view not only across the enterprise but also across the full value chain. Planning will become the most important core competency in successful industry players.

THE ROAD TO SMART GRID 2.0



4. VENTURING TOWARDS ENERGY 3.0

This paper has described the transformational journey, beginning with application-led solutions via smart meters and other specific applications, that is gradually evolving into a more holistic approach to designing a common, interoperable smart grid. However, this is only part of the journey. The greatest opportunities and greatest challenges lie ahead as the transformation continues towards an advanced energy 3.0 environment.

energy 3.0 embeds transformation into a utility, putting it on the path for constant and incremental change and innovation. This will entail a radical re-imagining of business models, which in some cases have remained wedded to static 1900s concepts and sporadic capital investment allocations.

4.1. OUR DEFINITION OF ENERGY 3.0

In our definition of an energy 3.0 environment we find not only the physical network and the merger of electricity consumption with supply characteristics. We see potential in the implementation of advanced services offered through the network and, importantly, the rise of an intelligent "prosumer" class. These entities will both produce electricity and consume energy, providing opportunities for existing players to expand revenue-generating opportunities. The prosumer will be a producer and consumer with different patterns of use and production than previously experienced.

energy 3.0 offers a vision of peer-to-peer energy transactions over the network, roaming of energy, and a multiplicity of generation and storage options. The backbone of the network will be a pervasive Internet protocol configuration with the co-mingling of energy and information about the energy, i.e. data.

The future offers a vision of accessibility and connectivity of energy and data similar to the Internet. Potentially, this network will be clean and sustainable, allocating and managing energy flow in an efficient and robust manner.

We will see new business models that bring together the utility of devices and the energy that drives them. So a prosumer might purchase a device, say a television, with five years of electricity, finance and insurance as part of the arrangement, with a feed-in offset.

"New business models bring energy use and devices together".

4.2. CHARACTERISTICS OF AN ENERGY 3.0 ENVIRONMENT

We consider that the advent of robust two-way communications, two-way flow of energy, advanced sensors and distributed technologies will improve the efficiency, reliability and safety of power delivery and use.

In our definition, these aspects will be increasingly affected and influenced by consumer behavior and the integration into this environment of energy using devices. This opens the potential for entirely new services or improvements to existing ones and the business model opportunities that go with this environment.

Specific potential characteristics include:

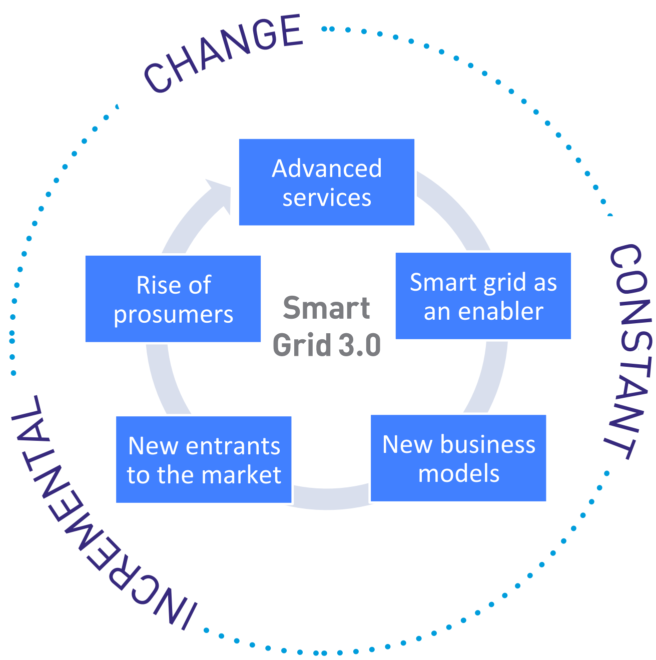
- Advanced services such as premises monitoring, fire monitoring and device management that merges data, energy and telecommunications capabilities.
- Development of advanced devices that manage their own energy usage.
- Deployment of new business models that merge premises-based services, such as telecommunications, white goods supply, insurance, and other lifestyle gadgets into one integrated and most likely service based offer.

ENERGY 3.0 EMBEDS TRANSFORMATION INTO A UTILITY, PUTTING IT ON THE PATH FOR CONSTANT AND INCREMENTAL CHANGE AND INNOVATION.

4.3. AN OPPORTUNITY, OR A THREAT?

There are interesting perspectives on whether this environment should be seen as an opportunity or a threat. Threats could be concentrated on aspects such as lack of regulatory incentives, falling retail margins and lower revenues, but these do not take into account the many new business models and opportunities possible in the energy 3.0 environment. Opportunities could include new technologies and the new business models that en-able new methods of service delivery and customer engagement.

We believe that the energy 3.0 environment provides massive opportunities for industry players who are for-ward thinking and dynamic, as well as new entrants. When introducing new services, speed to market becomes more important for both leaders and followers. So processes and IT systems must be able to adapt quickly to changes in the market. Utilities will look for first-mover advantage and will offer a range of new products and services made possible by smart grid technologies.



5. CONCLUSION

Beyond the hype of the smart grid, there is a reality. The era of smart grids is set to deliver real improvements. A range of technological innovations is expected to: make possible a step-change in grid efficiency; facilitate automation to reduce cost and improve quality; enable the integrated and optimal use of distributed and renew-able generation; and promote interaction between supply and demand technologies and between the consumer and the utility that will provide benefits for both.

But this future will come at a cost and with immense challenges. It requires substantial capital investment. It means transforming the grid from an electromechanical system to a fully digital system. Its full potential requires much to happen on many different fronts. Companies face tough choices on the timing of investment.

"THE MOVE TO AN ENERGY 3.0 ENVIRONMENT WILL ALSO PROVIDE MASSIVE OPPORTUNITIES FOR THOSE WHO ARE PREPARED TO EMBRACE THE FUTURE. FOR UTILITIES WHO DO NOT EMBRACE THIS FUTURE, A SLOW DECLINE INTO HISTORY AWAITS".

APPENDIX

The following has been prepared to describe selected national smart grid demonstration initiatives and pilots. There is a wide range of substantial initiatives under way.

China

The government has developed a large, long-term stimulus plan to invest in water systems, rural infrastructure and power grids. The State Grid Corporation outlined plans in 2010 for a pilot smart grid program that maps out deployment to 2030. Smart grid investments will reach at least US$96 billion by 2020.

United States

US$4.5 billion has been allocated to grid modernization under the American Recovery Reinvestment Act of 2009, including: US$3.48 billion for the quick integration of proven technologies into existing electric grids, US$435 million for regional smart grid demonstrations, and US$185 million for energy storage and demonstrations.

Italy

In 2011 the Italian regulator awarded eight tariff-based funded projects on active medium voltage distribution systems. The aim is to demonstrate at-scale advanced network management and automation solutions necessary to integrate distributed generation. The Ministry of Economic Development has also granted more than €200 million for demonstration of smart grid features and network modernization in southern Italian regions.

Japan

The Federation of Electric Power Companies is developing a smart grid that incorporates solar power generation by 2020 with government investment of more than US$100 million. The government has announced a national smart metering initiative.

South Korea

The Korean government has launched a US$65 million pilot program on Jeju Island in partnership with industry. The pilot consists of a fully integrated smart grid system for 6000 households, wind farms and four distribution lines. Korea has announced plans to implement smart grids nationwide by 2030.

Spain

In 2008, the government mandated distribution companies to replace existing meters with new smart meters. The utility Endesa aims to deploy automated meter management to more than 13 million customers on the low voltage network from 2010 to 2015, building on past efforts by the Italian utility ENEL. The utility lberdrola will replace million meters by 2015.

Australia

The Australian government announced the A$100 million "Smart Grid, Smart City" initiative in 2009 to deliver a commercial-scale smart grid demonstration project. Additional efforts in the area of renewable energy deployments are resulting in further study on smart grids.

Brazil

APTEL, a utility association, has been working with the Brazilian government on narrow band power line carrier trials with a social and educational focus. Several utilities are also managing smart grid pilots, including Ampla, a power distributor in Rio de Janeiro, which has been deploying smart meters and secure networks to reduce losses from illegal connections. AES Eletropaulo, a distributor in Sao Paulo state, has developed a smart grid business plan using the existing fiber-optic backbone. The utility CEMIG has started a smart grid project based on system architecture developed by the IntelliGrid Consortium, an initiative of the California-based Electric Power Research Institute.

United Kingdom

The energy regulator OFGEM has an initiative called the Registered Power Zone, which will encourage distributors to develop and implement innovative solutions to connect distributed generators to the network. OFGEM has set up a Low Carbon Networks fund that will allow up to £500 million support to DSO projects that test new technology, operating and commercial arrangements.

France

The electricity distribution operator EDF is deploying 300,000 smart meters in a pilot project based on an advanced communication protocol named Linky. If the pilot is deemed a success, EDF will replace all of its 35 million meters with Linky smart meters from 2012 to 2016.

Germany

Over the last couple of years "smart" topics in utilities have been fostered and stipulated by the government through changes in legislation and various programs concerning research and pilots. However, the implementation of smart meters is only mandatory for newly build/renewed house, if the yearly private consumption is larger than 6.000 KWh per household or in case of decentralized energy production plants. A standardized metering infrastructure open to connect different devices is yet to come, a nationwide smart grid roadmap is wishfully demanded.

ABOUT NORTH HIGHLAND

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