SMART ENABLERS FOR THE UTILITY INDUSTRY

TRANSFORMATION IN A DATA-DRIVEN ERA

DECISIONPOINT™ by WNS

DECISIONPOINT™ by WNS

Overview

Smart metering is an important lever for the utility industry's next generation services. It empowers customers to take control of their usage and bills, and enables suppliers to reduce outages, implement dynamic pricing and improve the quality of grids. The potential impact of smart meters cuts across key business outcomes of customer experience, reliability, revenue optimization and operational efficiency.

The implementation of smart metering infrastructure by the U.K. government since 2016 is an interesting case in point. The program aims to install smart meters in approximately 50 million domestic properties and smaller non-domestic sites by the end of 2020. Estimates point at a gross benefit of GBP 16.73 Billion over a cost of GBP 10.98 Billion across energy savings, network related benefits, peak load shifting, carbon saving and air quality benefits.

Smart metering is a foray into the age of data-driven utilities, necessitating businesses to build analytics and technology capabilities. The industry is already witnessing acquisitions of technology and analytics firms by utility companies in a bid to add these competencies. The ability to capture, organize, store and analyze data to drive business decisions will be a key differentiator in the immediate future, amidst increasing competition. Transformation is a necessity for all players, both large and new, to maintain competitiveness amidst changing regulations, business models and competition.

WNS DecisionPoint™ takes a deep dive into the transformation in the utility sector driven by smart meters and beyond. The report reflects upon the need to institutionalize analytics, its impact and key aspects of building a data empowered ecosystem.

Key highlights

- Between 2011 and 2018, the electricity and gas market share of the largest six suppliers in the U.K. dropped from nearly 100 percent to 78 percent and 77 percent respectively, due to increase in the number of energy retailers, change in market dynamics, business models and regulations
- The initiative of the U.K. government to install 50 million smart meters across domestic properties and non-domestic sites is a significant step in the transformation of the utilities industry
- Smart meters will open the doors to data-driven utility services for which companies will need to develop capabilities, institutionalize analytics and build a data ecosystem

DECISIONPOINT™ by WNS

INTRODUCTION

Economies around the world are witnessing changes in the energy landscape with the advent of new technologies, rising customer expectations and changing regulatory regimes. Advanced technologies such as smart meters, smart grids, sensing devices along with communication networks and data management systems have significantly impacted the management and operation of the energy sector.

Smart technologies are making the energy system more flexible, reliable, environmentally sustainable and affordable. These digital trends are supporting greater control, real-time optimization of consumption, production and interaction with customers. Moreover, smart technologies are making the system more efficient by creating new services for customers. The convergence of the latest technology systems with legacy systems has also led to the emergence of new cross-sectoral partnerships to deliver the necessary infrastructure and develop innovative business models. However, an efficient transition into the new technology system requires active processes to create policy, establish operational and planning practices and facilitate and manage requisite changes. Some areas that require special focus are: data security and privacy, modern infrastructure for enabling the new electricity system and a dynamic workforce that can handle technology and deliver a new set of services.

This report looks at the current scenario of the changing energy landscape with the emergence of one such technology – the deployment of smart meters in the utility industry. Smart meters hold immense potential, providing benefits across the value chain – from network optimization to improving retail operations and enhancing customer support services. This paper assesses the case of the U.K. which has committed to the deployment of smart meters in households by 2020. Further, the report focuses on how the future of utilities will change with the use of data generated from smart meters, making businesses more efficient and effective.

SMART METERING: CHANGING TRENDS

Smart metering is a business initiative to make the utility industry smarter through intelligent accounting of electricity consumption. Smart meters have the potential to benefit customers by giving them the control of energy usage and reducing their electricity bills through efficient monitoring and improved usage information. On the other hand, suppliers are able to monitor and balance supply and reduce outages. It provides them with real-time data and helps them in setting dynamic pricing and providing better customer service. Some of the benefits of smart meters are listed in Exhibit 1.

Exhibit 1

Benefits of Smart Meters

Customer Experience	Reliability	Revenue Optimization	Operational Efficiency
▪ Improved services with increased efficiency of system operations ▪ Customer profiling and segmentation – providing accurate picture of customer needs and preferences ▪ Personalized energy advice to the consumers on energy consumption ▪ Behavioral changes from displaying real-time energy usage resulting in reductions in overall and peak time energy use	▪ More effective monitoring and proactive maintenance ▪ Improved demand forecasting and streamlined power consumption ▪ Understanding and mitigating hidden risks – reducing public safety hazards ▪ Automatic outage detection and restoration	▪ Identification of power theft and abnormal demand patterns – minimize bad debt, tampering and theft cost ▪ Improved settlement and billing – disconnecting non-pay accounts ▪ Targeted investment by operators	▪ Reduced operating expenses by managing manual operations remotely ▪ Reduced need for generation capacity ▪ Load analysis, modeling and forecasting (for energy markets, network operations and energy savings)

The widespread application of smart meters is likely to make utilities data-driven, and improve the quality of the grid and further expand the potential use cases of data in the coming years. It will also help utilities create new types of services driven by data, analytics and digital technologies.

UK: TOWARDS BECOMING A SMART METER ECONOMY

As per the estimates by Ofgem[1] (2017), domestic and non-domestic consumers spend around GBP 50 Billion on gas and electricity each year in the U.K. Over the span of 10 years starting 2006, the average annual energy consumption has fallen by about 20 percent, but the retail prices have increased by 46 percent for gas and 28 percent for electricity. These energy statistics reflect the changes that are being introduced through new regulations, technology and business models.

One such recent measure introduced by the government has been the implementation of smart metering infrastructure from 2016 onwards. The government has committed to offer 50 million smart meters to all homes and small businesses in the country by the end of 2020. During this period, approximately 30 million domestic properties and smaller non-domestic sites in the U.K. are expected to get smart gas and electricity meters.

The Implementation of Smart Meter Program has Taken Place in Two Stages:

2011 Trial and Test Stage	2016 Installation Stage
Government engaged with industry, consumers and other stakeholders to form regulatory framework based on the lessons learned from early installations	Installation of smart meters in households and small businesses by 2020

As per the classification by the Department for Business, Energy and Industrial Strategy (BEIS), the U.K. has (as of Q3 2018) 14 large energy suppliers who have at least 250,000 domestic customers in any fuel, and 63 small energy suppliers supplying to less than 250,000 customers by the end of 2017. The energy suppliers are responsible for planning and installation of smart meters for their customers as per their suitability, and are required by law to roll out smart meters across households and small businesses by 2020.

Expected Savings from Smart Meters

As per the government published 'Impact Assessment' or 'Cost-Benefit Analysis' of the program in 2016, by 2030, the smart meter rollout would deliver a net benefit of GBP 5.75 Billion, based on costs of GBP 10.98 Billion, and a gross benefit of GBP 16.73 Billion.

Total Benefits: GBP 16.73 Billion

- Energy savings – GBP 5,302 Million
- Supplier cost saving – GBP 8,250 Million
- Network related benefits – GBP 839 Million
- Peak load shifting – GBP 943 Million
- Carbon saving and air quality benefit – GBP 1,329 Million

Total Costs: GBP 10.98 Billion

- Meters – GBP 2,809 Million
- In-Home Displays – GBP 551 Million
- Installation – GBP 2,077 Million
- Communication hubs - GBP 1,082 Million
- Data and Communications Company services – GBP 2,044 Million
- Supplier costs - GBP 1,001 Million
- Other costs - GBP 1,418 Million

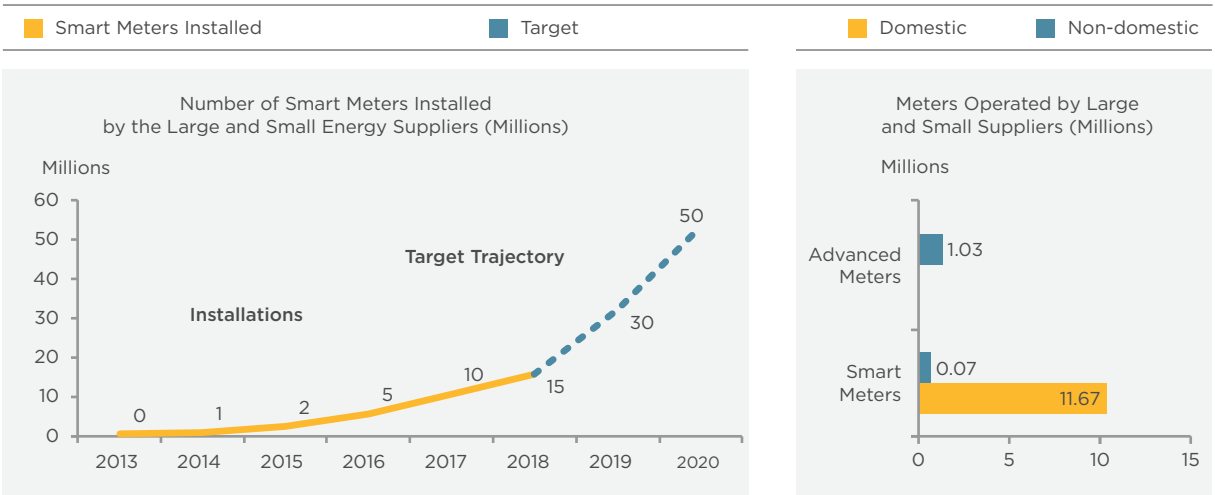
1. The Office of Gas and Electricity Markets, also known as Ofgem, is a non-ministerial government department and an independent National Regulatory Authority, recognized by EU Directives.

Implementation of Smart Meters: Current Status

According to the smart meter quarterly report released by the BEIS to end September 2018, around 14.70 million smart and advanced meters were installed across the U.K. by large and small energy suppliers. Of this, 13.64 million (92 percent) were installed in domestic properties and just over one million in smaller non-domestic sites. At present, 12.8 million smart and advanced meters are operational. Around 11.67 million (91 percent) are operating in domestic properties and a further one million in smaller non-domestic sites.

Exhibit 2

Number of Smart Meters Installed and Operated



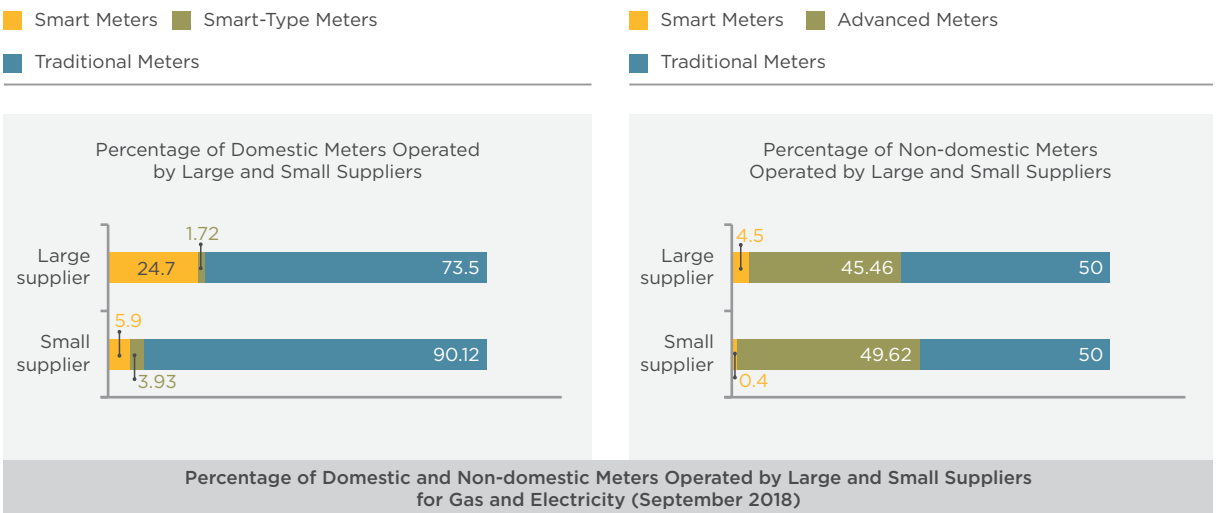
Source: Department for Business, Energy & Industrial Strategy, Smart Meters - Quarterly Report to end September 2018 United Kingdom; WNS DecisionPoint™ Analysis

Classification: Types of Gas and Electricity Meters Operating in the U.K.

Smart Meters:	**Smart-type Meters:**	**Advanced Meters:**	**Traditional Meters:**
They offer intelligent functions and are offered with In-Home Display (IHD) showing the energy consumption and its cost in near real time. A smart meter is compliant with the Smart Meter Equipment Technical Specification (SMETS) and has functionality such as being able to transmit meter readings to energy suppliers and receive data remotely. Currently offered in different types – SMETS 1 (first generation) meter and SMETS 2 meter (second generation smart meters, compliant with the latest version of the SMETS).	They are without the full functionalities included in SMETS. They are not classed as 'smart meters' and, therefore, do not count towards the supplier's roll-out obligation in domestic sites and need to be replaced by 2020. However, they exceed the minimum specification for advanced meters and count towards supplier roll-out obligations in smaller non-domestic sites.	Advanced meters are, at a minimum, able to store half-hourly electricity and hourly gas data to which the customer can have timely access and the supplier has remote access. They are only installed in smaller non-domestic sites.	They are currently found in most domestic and smaller non-domestic sites and do not have any smart capability.

Exhibit 3

Percentage of Meters Operated by Large and Small Suppliers



Percentage of Domestic and Non-domestic Meters Operated by Large and Small Suppliers for Gas and Electricity (September 2018)

Source: Department for Business, Energy & Industrial Strategy, Smart Meters - Quarterly Report to end September 2018 United Kingdom; WNS DecisionPoint™ Analysis

Changing Scenario of Utilities

Until recently, the U.K. had only six large suppliers of gas and electricity – Centrica, EDF Energy, E.ON UK, RWE NPower, SSE, and ScottishPower. Each of them generates electricity and retails both electricity and gas. Centrica is also involved in gas production. They collectively supply most of U.K.'s electricity and gas with a market share of 78 percent and 77 percent (2018) respectively.

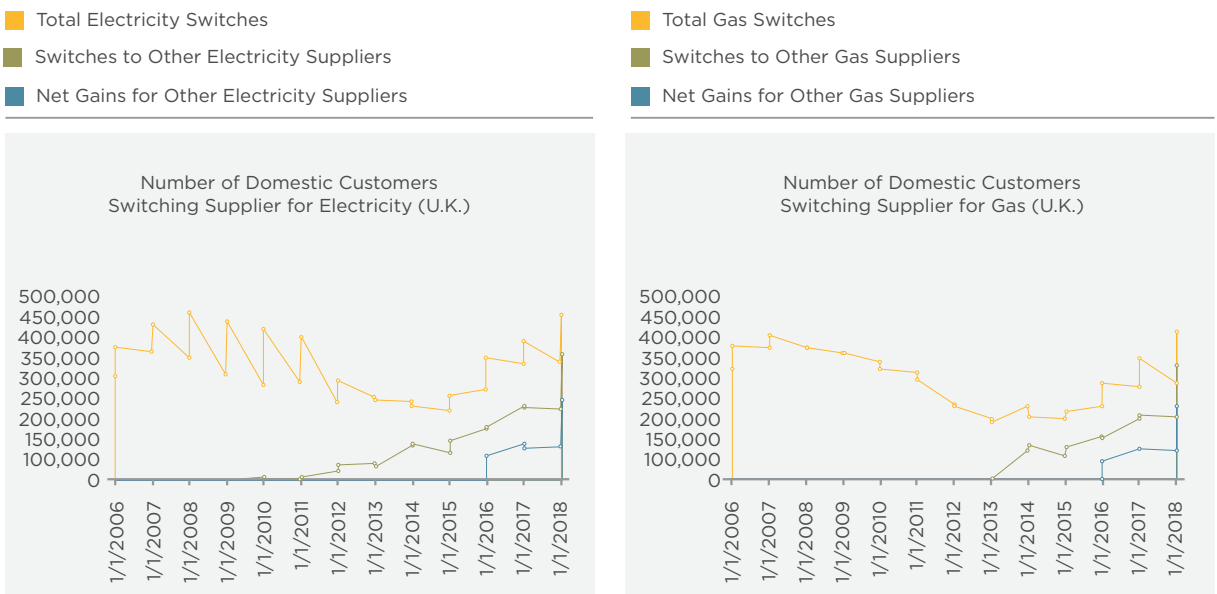
Apart from the introduction of the smart meter program, there have been many other transformations that have changed the face of energy system and networks in the U.K. Ofgem focused on opening the market to new suppliers. These big suppliers faced stiff competition from new players in the market. Around 60 active energy retailers cut into their share with more customer offerings, and increased switching and engagement opportunities. Intensified competition has led to increase in switching rate (Exibit 4). However, the internal switching rates (i.e. customer changing tariff, payment method or account management with existing supplier) among the six large suppliers have been consistently higher than external switching rates.

The supplier performance on customer satisfaction in 2018 shows that, on average, customers are getting better experience from their suppliers than in 2016. As per the Ofgem survey[2], overall satisfaction with complaint handling for domestic and small business has improved significantly, from 27 percent in 2016 to 32 percent in 2018.

2. Citizens Advice and the Ombudsman publish complaints statistics, June 2018

Exhibit 4

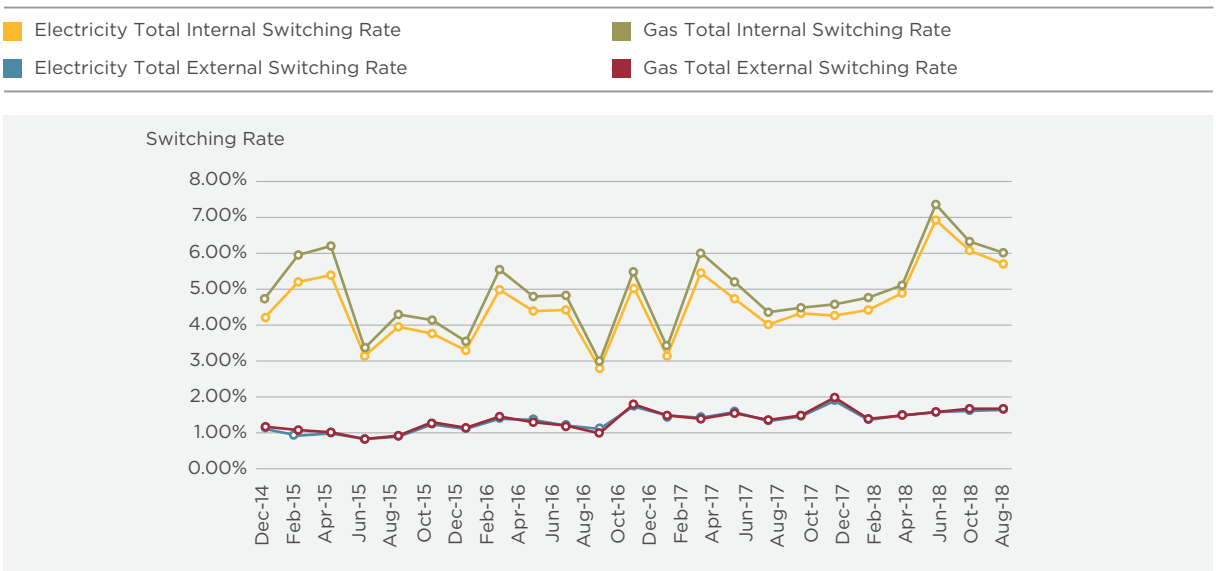
Domestic Customers Switching Supplier for Electricity and Gas



Source: Compiled from Ofgem Smart Meter Statistics; State of the Energy Market Report 2017; WNS DecisionPoint™ Analysis

Exhibit 5

Large Suppliers: Internal and External Switching Rate by Fuel Type



Source: Compiled from Ofgem Data Portal; WNS DecisionPoint™ Analysis

In the coming years, all the major players are likely to face increasing competition with more innovative tariffs and service offerings as the smart meter program aims to increase competition through an engaged and better informed consumer. However, despite increasing competition, these major players still capture a large market share, and are spearheading the smart meter installation through early adoption of technologies to enhance their energy management services. In addition, the entry of many new players has led to problems related to unsustainable business models. Ofgem is working towards developing more robust models to ensure the quality of customer services with reliable and minimum standards.

As per the estimates in the 2016 report of the BEIS, supplier costs savings will account for 49 percent of the smart meter program's entire GBP 16.7 Billion gross benefit figure.[3] Benefits will also be achieved in terms of energy savings (32 percent of total benefits), carbon savings and air quality benefits (8 percent), peak load shifting (6 percent), and network-related benefits (5 percent). To comply with the smart meter timelines, suppliers have set individual annual targets for installation of smart meters. Monitored by Ofgem, if suppliers fail to meet their roll-out targets, they are held accountable for not being able to meet the stated targets and are charged fines of up to 10 percent of their turnover for non-compliance. A key challenge for suppliers is securing installation appointments with customers. For this, new schemes, incentives and other engagement approaches have been proposed by suppliers.

Despite smart meters providing benefits to the consumer and the industry, the deployment of nearly 36 million smart meters by the end of 2020 presents a challenge to suppliers and is unlikely to be met. Apart from the installation deadlines, a few inadequacies have been reported related to the functionality of smart meters after the first set was installed. Some of the meters are reported to be operating in 'dumb' mode. In other words, they stop communicating with the supplier. In some areas, due to poor mobile connectivity, nearly 10 percent of smart meters are not working. The National Audit Office have also estimated that 70% of SMETS 1 “go dumb” due to switching. Due to these reasons, energy suppliers have proposed installation of smart meters in around 70 to 75 percent homes and small businesses by 2020, accepted by Ofgem[4]. While smart meters are an upgrade for the energy ecosystem, consumers need to be made aware about the benefits of smart meter roll-out and made part of the transition. Overall, policies, customer behavior and technology are moving the economy towards a smarter change. The benefits enabled by smart meters are likely to be realized in the long run, with data playing a key role in every aspect of decision-making for utilities and consumers.

3. BEIS, Smart meter roll-out cost-benefit analysis – Part I, August 2016
4. Rolling out smart meters, Report by the Comptroller and Auditor General, 23 November 2018

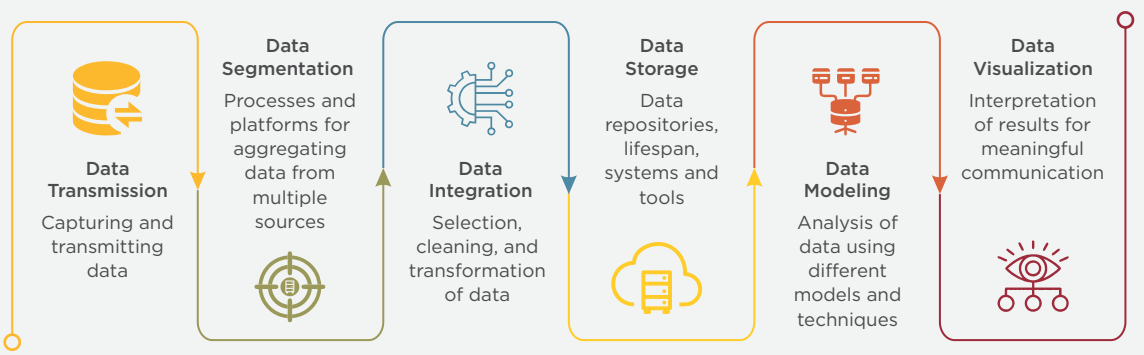
PATH TOWARDS SMART FUTURE: BEYOND SMART METERS

The benefits of smart meters may be realized in a phased manner and may take some time to cover the initial costs of installation and infrastructure. Various studies have shown that benefits to consumers through reduction in energy consumption and better information on cost is driving behavioral change and shift in demand from peak time to off peak time. The Department of BEIS estimates that smart meters are also expected to reduce the demand on call centers for billing issues, notching a savings of GBP 2.20 per meter per year and another GBP 2.2 per year from better debt management. Managing and detecting theft will also be easier for suppliers, reducing it nearly by 10 percent and resulting in benefits of GBP 0.29 per meter per annum for electricity and GBP 0.36 per meter per annum for gas. Apart from the immediate benefits of smart meters, the future of home energy management will experience changes with significant opportunities related to automation through analytics.

While utilities are currently focusing on the effective installation of smart meters, the next phase for smart utilities is the management of influx of data and utilizing it to generate and maximize benefits from these technologies. Data management involves data capturing, transferring, structuring, storing, analyzing and visualizing (Exhibit 6). To smoothen the transition into new technologies, utilities are acquiring players in the analytics domain and gaining early benefits from these technologies.

Exhibit 6

Process of Data Analysis



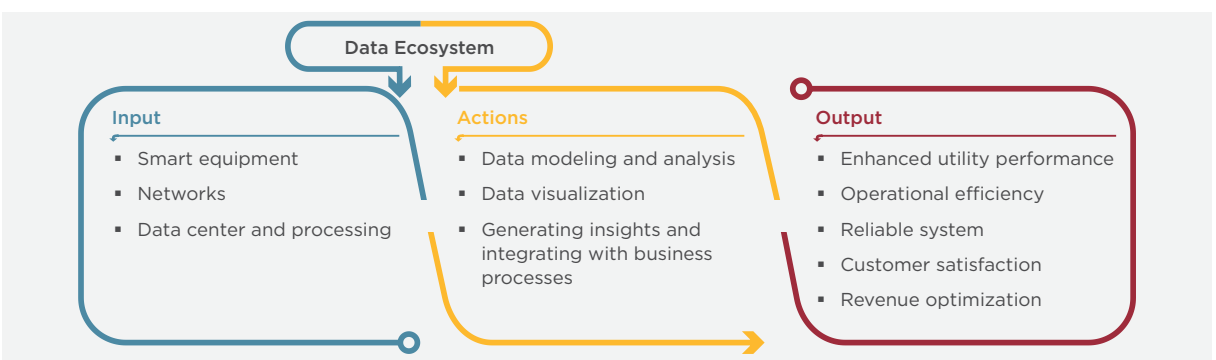
One of the key elements in the roll-out of smart meters is the development of a centralized smart metering communications infrastructure. The metering infrastructure will ensure that suppliers, network operators and consumers receive the necessary information. In the U.K., this service is being provided by the Data and Communications Company (DCC), a subsidiary of Capita PLC. The DCC is required to develop a national smart grid, maintain and provide smart meter data to network operators to support the digitalization of the energy market. The government and Ofgem are also launching an Energy Data Taskforce to use data more efficiently and propose recommendations to the stakeholders.

Data will be a critical asset for businesses. Data-driven insights will not only improve business performance but also help introduce new business models. Data utilization involves mapping business needs and requirements against the various analytical techniques and tools which will provide the required output. In order to realize operational, financial, customer and strategic benefits, utilities will have to institutionalize analytics in business processes, frameworks and functions. It is also important to understand the inter-relationships between business processes. For instance, customer data could be used for ramping up billing services and payment plans, as well as for improving customer interaction at each touchpoint. Both require different data and analysis based on need – like text analytics for customer satisfaction and predictive analytics for payment collection.

The process of integrating data analysis with business objectives comes with the challenge of setting up methods for data storage, understanding data complexity and ensuring data security and privacy.

Exhibit 7

Data Ecosystem



Source: WNS DecisionPoint™ Analysis

Once the data processes are identified and placed in the utility chain system, businesses will realize their value / potential and ease in the decision-making process. Combining various analytical techniques will make the system more intelligent and efficient. Some energy suppliers are already using analytics to analyze consumer data to offer better services. The big suppliers are at the forefront of adopting such techniques and are increasingly using data to forecast demand and also improve customer services.

Data-intensive technologies are going to present opportunities to uncover new customer patterns, forecast demand better, prevent fraud and loss, enhance services and improve compliance.

The increasing focus on using data efficiently with smart meter analytics is going to be the potential area to explore. Some of the potential areas of analytics are customer analytics, grid analytics, device analytics, work and asset analytics and advanced metering infrastructure analytics, a few of which are discussed in the table below.

ANALYTICS IN SMART UTILITIES

Analytics	Challenge/Problem Area	Process	Immediate Impact	Long-term Impact
Asset Management Analytics	▪ Aging assets pose a challenge in terms of unexpected failures with economic and financial losses.	▪ Predictive asset analytics solutions: Accurately assess probability of asset deterioration and forecast failure risk and annual performance of assets.	▪ Issue identification through hotspot analysis and peak demand forecasting and assessing weather impacts.	▪ Analyze, identify and address major drivers affecting asset performance. ▪ Optimize asset utilization by identifying underperforming assets and prioritizing maintenance. ▪ Predict equipment failure and help avoid unplanned interruptions.
Outage Management Analytics	▪ Aging infrastructure, natural disasters and increasing demand for energy create stress on the electrical grids and cause outage.	▪ Conducting geo-spatial and power reliability analysis: Producing geo-spatial visualization and reports to correlate outage with features such as weather, vegetation, rainfall, etc. ▪ Developing outage risk models using past outage data, geo-spatial data and other internal and external factors for predicting outage propensities across time periods and their severities at circuit levels.	▪ Computing and analyzing the magnitude and nature of electricity consumption in distribution networks and the potential impact of outage. It will also reduce the cost of overtime wages of crew and managing inventory.	▪ Increase the reliability of accurate predictions and prevent outages. ▪ Assist by foretelling asset need such as replacing failing equipment in advance. ▪ Estimate future outage severity to manage contingency spend by avoiding false call-outs and enable mutual assistance.
Customer Operations Analytics	▪ Customer service and engagement is a critical facet of any industry. Digital age requires businesses to predict customer purchasing behavior by analyzing their purchase history, buying power and product selection.	▪ Customer 360-degree viewer provides a consolidated view of customer behavior and attributes across billing, customer relationship management (CRM) and social media platforms.	▪ Ability to proactively provision outage alerts and maintenance schedules leading to higher customer satisfaction (CSAT).	▪ Ability to offer relevant schemes/incentives based on consumption and behavioral data. ▪ Greater insights into long-term customer behavior, drop-off points, and broader segment attributes which can inform engagement strategies and investments. ▪ Improvement in first call response time and average handling time.
		▪ Evaluate customer's willingness to pay through conjoint analysis and pricing products to increase sales.	▪ Customer data will help in building targeted customer base assisting in sales and marketing for different segments.	▪ The two-way link between households and utilities will enable other revenue streams such as smart home automation or connected homes.

Analytics	Challenge/Problem Area	Process	Immediate Impact	Long-term Impact
Revenue Protection and Theft Reduction Analytics	▪ Non-technical losses have been common for utilities such as electricity theft by meter tampering and meter malfunction. Identifying suspicious patterns and activities pose a challenge, requiring extra time and effort. Another area of concern has been debt collection, requiring an efficient process.	▪ **Fraud and theft analytics** to assess fraud/theft by monitoring patterns in the consumer usage data.	▪ Real-time information about load can help detect energy leakages through fraud or theft, helping realize significant financial benefits.	▪ Data modeling will help in identifying fraud profiles and eliminate the threat of such cases in the long term.
		▪ Usage insights and consumption forecast analysis contain contingency costs and utility bills, and formulate consumption-based strategies for customer engagement.	▪ Improved CSAT levels due to proactive customer communication; higher ROI of recovery from fraudulent conditions due to process vigilance. ▪ Reduction in unbilled revenue through analysis of aggregated interval meter data.	▪ Analytics will help in reducing cost-to-serve, and enable the organization to chalk out long-term investment plans towards distribution planning. ▪ Gaining insights into revenue leakages will aid in regulatory compliance at an organizational level.
Demand-Response Analytics	▪ Rising energy consumption necessitates load management at peak periods.	▪ Demand Forecasting: Forecasting the consumption pattern at each level of distribution (customer/grid etc.). ▪ Demand Response Targeting: Segmentation of the consumers served, on consumption and attitudinal data, targeting of the appropriate segments with suitable DR products/programs.	▪ Accurate and real-time energy demand forecasting will assist in timely and economical demand and supply management. ▪ Demand response schemes can help reduce frequent severe spikes, transmission and distribution costs.	▪ Optimized procurement costs. ▪ Efficient power distribution resulting in reduction in asset maintenance costs. ▪ Enhanced marketing ROI for demand response initiatives through accurate scheme targeting and customer selection.

Source: WNS DecisionPoint™ Analysis

The data-driven era will require businesses to adapt to new skills and technologies. This will enhance business performance leading to greater efficiency and increased productivity. The utility industry is evolving and competing in an environment of changing government regulations, increased competition and evolving consumer demand. Smart utilities will have to establish mature business processes and analytics. Aligning their organizational goals and priorities with the changing data landscape will help forge a way for a smart transformation.

About DecisionPoint

Making key decisions that improve business performance requires more than simple insights. It takes deep data discovery and a keen problem solving approach to think beyond the obvious. As a business leader, you ought to have access to information most relevant to you that helps you anticipate potential business headwinds and craft strategies which can turn challenges into opportunities finally leading to favorable business outcomes.

WNS DecisionPoint™, a one-of-its kind thought leadership platform tracks industry segments served by WNS and presents thought-provoking original perspectives based on rigorous data analysis and custom research studies. Coupling empirical data analysis with practical ideas around the application of analytics, disruptive technologies, next-gen customer experience, process transformation and business model innovation, WNS aims to arm you with decision support frameworks based on 'points of fact.' Drawing on our experience from working with 200+ clients around the world in key industry verticals, and knowledge collaboration with carefully selected partners including Knowledge@Wharton, each research asset comes up with actionable insights with the goal of bringing the future forward.

DECISIONPOINT™ by WNS

A credible insights hub for companies looking to transform their strategies and operations by aligning with today's realities and tomorrow's disruptions.

Email: **perspectives**@wnsdecisionpoint.com
Website: wnsdecisionpoint.com