The Smart Meter (R)Evolution

Maximizing the Technology Dividend & Transforming Your Utility
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Introduction

When utilities began deploying advanced metering infrastructure (AMI), the primary business case was fairly straightforward. New meters would enable utilities to provide dynamic rate structures to customers, aligning rates more closely with the cost of providing electricity and cutting peak demand. New meters would also decrease the time and costs associated with the meter-to-bill process by eliminating the need for monthly manual meter reads.

However, as AMI and other grid sensor deployments began to mature, utilities began to realize that they could more fully leverage their initial AMI investment to transform their customer relationships and increase enterprise-wide operational efficiencies in dramatic ways.

Today, utilities are poised to drive a new smart meter (R)Evolution that captures the next generation of AMI benefits, transforming their relationships with their customers and dramatically improving their operations.

Why now?

First, while an impressive 313 million smarter meters were installed globally by 2013, that number is expected to grow to 1.1 billion by 2022. As AMI and other grid sensor deployments continue to progress and mature, the abundance of new data is providing utilities with a wealth of new opportunities to draw fresh value out of their deployments.

Second, exponential improvements in software and computing power now enable the aggregation and analysis of large volumes of data in ways that unlock new value from AMI investments.

Given these developments, utilities are now poised to leverage AMI to deliver new customer programs that increase customer satisfaction while lowering cost to serve. Further, this creates a foundation on which to implement advanced operational analytics that improve grid efficiency and reliability while decreasing operational costs.

Welcome to the next smart meter (R)Evolution.

1 “Smart Electric Meters, Advanced Metering Infrastructure, and Meter Communications: Global Market Analysis and Forecasts”, Navigant Research, 3Q 2013.
The (R)Evolution: Earning the Next Generation Technology Dividend

In this new data rich world, leading utilities are leveraging their AMI investments to strengthen both the customer side—by engaging their customers in more cost efficient and effective ways—and the operations side—increasing grid operational efficiencies, reliability and safety—of their business.

These efforts are often associated with hype like big data, data analytics, and cloud computing. However, when we move beyond the buzzwords, these new technologies can deliver real economic value to utilities. We refer to these benefits as the technology dividend.

**Technology Dividend**: The increasing economic benefits utilities can derive from AMI investments. This dividend is directly proportional to the degree to which utilities leverage their AMI data across their organizations to transform the way they engage their customers and operate their infrastructure.

The list of benefits will continue to grow over time and in ways that we cannot yet imagine. What is clear is that these tools are rapidly moving from “state of the art” to “best practices” and will soon simply become “the norm,” only to be replaced by newer and even more complex analytics. As innovation accelerates, the technology dividend will create the gap between leading and lagging utilities.

**NEXT GENERATION BENEFITS**
Transform Your Utility with Best-of-Breed Platforms

Deep Expertise, Innovation Leaders, Proven Results

After massive investments in advanced transactional hardware and software systems, many utilities are realizing that leveraging data is more difficult than it may seem. This challenge, combined with the exponential pace of technological innovation and the growing value of technology to the utility sector, means that choosing the right platform partners on both the customer and operations sides of their business will be critically important.

One way in which utilities can earn the largest dividend is to partner with best-in-class Software-as-a-Service (SaaS) providers who provide deep expertise and investments in innovation and who have demonstrated proven results. By investing in a best-in-class customer platform and a best-in-class operations platform, such as those provided by Opower and Oracle Utilities, utilities will obtain a best-of-breed solution that is optimized for the specific needs of each area and drive much more value than with a generic, one-size-fits-all approach.

In combining Oracle’s expertise in data management and utility technology with Opower’s expertise in utility customer engagement, the two solutions providers have crafted the most comprehensive enterprise-grade utility analytics platform in existence today.

Best-in-Class Customer Engagement Platform

The initial focus of utility smart meter initiatives was often utility-centric, with minimal effort devoted to ensuring customers understood the information derived from and the value delivered by new meters. But in order to truly deliver customer value, utilities must engage customers proactively. Analytics can assist in these efforts, and increase customer satisfaction through targeted customer interactions; reduce the utility’s cost to serve (particularly around call center processes); increase energy efficiency and demand response/peak demand reduction opportunities; and more.

Customer Engagement Benefits

- **Boosting Customer Satisfaction**: Empowering customers with the right data at the right time can unlock dramatic increases in customer satisfaction. Consumer-facing companies like banks and mobile phone providers have already upped their game and customers are now expecting other companies with which they do business to deliver meaningful insights in engaging ways as the price for their attention and engagement. Related, a recent J.D. Power study showed that by increasing customer acceptance of new programs utilities are able to increase their customer satisfaction scores. (See Figure 1)

- **Reducing Cost to Serve**: Proactive customer outreach through a customer’s preferred communications channel, such as a high bill alert text message to the right customer at the right
time, can significantly reduce call center calls. Since the average utility receives between two and six calls per customer each year and those calls cost anywhere from $3 to $9 each, the savings upside is significant.

- **Strengthening Energy Efficiency**: Better analysis of usage data can expose new ways for customers to save energy, through tip targeting that delivers the right energy saving tip to the right customer at the right time, and through support for new technologies like solar and electric vehicles.

- **Enhancing Demand Response**: Granular visibility into usage enables device-free demand response achieved purely through customer behavioral changes. While many utilities are testing these programs in an opt-in fashion, the scale of an opt-out program will require advanced analytics to measure response in targeted geographical areas, target customer messages and forecast when-to-call events.

- **Increasing Program Effectiveness at Lower Cost**: Usage data can increase and enhance utility propensity scoring models to identify customers most likely to take an action, improving marketing ROI with greater return on fewer dollars invested.

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**J.D. Power found in a study in 2013 that creating awareness and motivating customers to engage in new energy programs, or products and services, offers a massive opportunity for utilities to increase customer satisfaction.**

- Survey data indicated overall customer satisfaction of the utility at **58.2%** among those who are unaware of any utility offerings.
- Overall satisfaction rose to **64.2%** with customers who are aware of offerings but choose not to participate.
- Among customers who participate in one or more of their electric utility’s offerings, overall satisfaction reached **67.9%**.


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**Figure 1 – J.D. Power 2013 Consumer Engagement Study**

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2 Opower call center benchmarking.
Best-in-Class Operations Platform

On the operations side, new business case value can include improved reliability through monitoring and proactive maintenance of assets, enhanced operational efficiency aided by better planning and execution, or increased safety (for employees, customers and the general public) through a clearer understanding and mitigation of hidden risks. Some examples include better management of misread meters to reduce truck rolls, the use of meter voltage readings to better manage distribution line voltage, and distribution transformer loading analysis to better manage the transformers’ effective life expectancy. The arguments for implementing analytic processes fed by AMI data are extremely compelling, and the use cases they enable are mounting.

Operational Efficiency Benefits

- **Reducing Cost to Serve**: Analytics and operational system automation are enabling utilities to reduce their operational costs by eliminating manual processes, better prioritizing resources and eliminating unnecessary work.

- **Improved Reliability through Monitoring and Proactive Maintenance**: Operational data analytics provide a utility with both an historic and a real-time view of its operations. By adding predictive analytics, the utility can begin to compare historical data to identify trends in usage and asset health, overlay weather maps and forecasts, and forecast demand more accurately to predict future usage, grid impact of renewable generation, and more. Being able to better analyze and predict asset health and manage potential outages or leaks turns what has historically been a reactive, “run-to-failure” approach to asset and outage management into a much more proactive, predictable, cost-reductive process.

- **Improved Operational Efficiencies through Better Planning and Execution**: From revenue assurance and employee utilization and prioritized field work to the reduction of infrastructure and asset replacement costs, analytics leverage data from multiple sources, across the enterprise, for new insights into utility operational performance. Utilities surveyed last year strongly indicated they expect to achieve the greatest value from new data in areas including revenue protection, reduced asset maintenance and asset replacement costs, reduced infrastructure costs, and the ability to analyze distributed generation. 3

- **Improved Safety by Understanding and Mitigating Risks**: Analytics can be used to proactively approach both asset management and vegetation management, as well as to improve public safety. As we see on the customer-facing side of the utility, where usage spikes can be analyzed for the benefit of the customer, usage spikes can also indicate a potential safety hazard a utility can quickly identify and act upon.

The Best-of-Breed Solution: Opower & Oracle

Opower and Oracle understand the need for utilities to be able to deliver quick, actionable results from new investments. Both companies’ proven expertise in energy management and operational analytics means we can deliver quickly, so you can begin seeing significant results right away in your customer relationships and day-to-day operational processes.

Opower: Customer Engagement Leader

Opower empowers utilities with the tools to become trusted energy advisors for their customers by providing better and more personalized insights to their customers and new tools that unlock digital channels and self-service via lower cost channels.

Opower does this by leveraging its core pillars of behavioral science, data science and computer science to deliver the right message to the right customer at the right time in ways that boost customer understanding, engagement and satisfaction.

- **Behavioral Science** – we design experiences based on how people behave to motivate them to act.
- **Data Science** – we constantly measure how people engaged and interacted with the experiences we design for them.
- **Computer Science** – we take all this data, and feed it into our high computation analytics system to dynamically design and personalize the right interaction for the right customer at the right time.

Every Opower solution is the result of a collaborative design process that has behavioral science at its core. We draw upon experts from inside and outside of Opower to deploy innovative behavioral strategies that are tested and verified across millions of energy consumers in both homes and businesses. Founded in 2007, Opower currently works with more than 90 utilities across 8 countries and our behavioral science insights are drawn from hundreds of billions of observations gathered across 3,600 months of utility program experience, giving us an unique perspective on how people use energy and interact with their energy provider.

Opower’s newest Opower 5 Flex platform offers the only cloud-based customer platform operating at scale, processing data from more than 52 million households and businesses and growing at a rate of more than 100 billion meter reads per year.

- **Concurrent Outbound Messaging**: Capable of delivering millions of outbound messages in short time frames to meet the time sensitive objectives of utilities. Our system synchronizes delivery of content across all channels – email, postal mail, SMS and IVR – and provides customers with a single control interface.

- **Web & Mobile Frameworks**: Opower’s self-service capabilities provided through visualizations across the desktop and mobile help customers understand energy use through interactive data analysis. Opower 5 enables utilities to customize content and design to support their individualized platforms and goals. Using Opower’s Extensibility Web Framework, utilities can develop new functionality on the platform, powered by over 35 platform integrated APIs, with simple JavaScript changes.
• **Personalization Engine:** Opower 5 is built to translate large volumes of data into personalized and actionable insights for customers. Integration with our Big Data Analytics Engine allows us to perform sophisticated Visual Segmentation in real-time, tailor content, and trigger messages to each individual customer. Opower’s real-time segmentation enables rapid development of new customer segments across hundreds of variables. These segments can be updated daily to deliver millions of personalized experiences.

• **Big Data Analytics:** Recognizing the massive increase in energy data resulting from AMI, network-enabled devices and digital engagement channels, Opower has built an analytics engine capable of storing massive, dynamic data and conducting real-time analysis across the store.

• **Data Integration System:** Opower can import massive and diverse datasets into one system with many sourced data import capabilities and robust and redundant validation.

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**Use Case: Opower’s Customer Engagement Platform**

Customer adoption and acceptance of AMI technology has been a challenge. Consumer advocates and other groups have opposed smart grid projects on claims that smart meters provide higher costs and no consumer benefit. Until recently, this claim had been difficult to refute. However, forward leaning utilities are taking steps to transform their customers into smart meter advocates with proactive communications and by providing tools that help customers take advantage of this new technology.

Opower has become the leading partner to utilities in these efforts. In one instance, a utility planning its smart meter rollout had already engaged Opower in a small energy efficiency pilot. When it began installing smart meters in its residential service territory, it began a series of proactive outreach
campaigns. This included smart meter education mailers, community outreach, and a rollout of new Opower customer-facing tools enabled by smart meter data. Homes that received smart meters had access to Opower’s AMI-enabled web portal (white-labeled under the utility brand), and would receive Home Energy Reports with energy use insights enhanced by access to the AMI data. Over time, sophisticated analytics and personalization enabled customers to receive personalized energy usage updates and unusual usage alerts between bills. No longer were utility customers in the dark about their usage. Their utility was engaging them in new and innovative ways, transforming the way their customers thought about them.

Result: Increase in positive customer sentiment by an average of 10 percent across 6 metrics

The utility and Opower conducted a customer survey to identify the smart meter project’s impact on customer attitudes toward smart meters. The study found that by translating raw interval data into meaningful insights and efficiency actions for customers, positive sentiment increased by an average of 10 percent across 6 different metrics as compared to a statistically equivalent control group that did not have access to the tools.

Opower has replicated these results at other smart meter enabled utilities, demonstrating that utilities can not only win the smart meter perception battle, they can increase customer satisfaction and engagement if they proactively communicate about smart meters and provide customers with personalized insights to derive meaningful value from their smart meters. The next generation Opower platform, with increasingly sophisticated segmentation analytics and accompanying messages, enables utilities to drive metrics like customer satisfaction even higher.

Opower is continually investing in its best-in-class customer analytics platform and to make its customer analytics and behavioral science-based communication even more powerful.
Oracle: Operational Analytics Leader

Oracle is keenly focused on enabling utilities to run their businesses more efficiently.

We bring together a worldwide team of utility experts who understand utility operations and business processes. Built leveraging world-class transactional systems and big data technology, Oracle’s analytics solutions cover a breadth of functional areas, and have been developed with a keen understanding of the underlying data structures. Backed by decades of experience in helping utilities meet the challenge of change, Oracle brings analytics into the day-to-day operational processes. By doing so, we provide utilities with the insight to gauge and modify their current performance in real time, as well as to prevent future problems from occurring by proactively addressing operational efficiency and optimization concerns on an enterprise-wide basis in order to drive cross-functional operational cost savings.

Oracle Generates Impactful Results by Orchestrating a Closed-Loop Analytics Process

Oracle provides solutions that can help utilities realize more value from the smart grid. Oracle does this through its comprehensive operational analytics platform that includes:

- **Sophisticated, Proven, Out of the Box Analytics**: (See Figure 2 for a list of use cases) Oracle offers a library of pre-configured analytics for complex utility use cases to ensure fast time to benefits. Oracle has extensive knowledge of smart meter-related business problems and benefits, the skills to do complex interval data analytics and an understanding of how to use data to drive improved business performance whether it is to increase revenue capture, reduce break-to-fix time,
improve operational metrics (e.g., on-time and accurate billing), prevent potential safety hazards, enable preventative maintenance or improve load management.

- **Operationalized Results:** Oracle brings analytics back into your business processes to ensure maximum benefits – making analytics no longer a theoretical exercise but a part of your day-to-day operational business processes. The Oracle Analytics platform provides operational benefits across the utility functional areas from Customer Billing to Meter Operations to Revenue Protection and Distribution Operations and Planning.

- **Proven Expertise:** Oracle provides a team of utility analytics experts to help bridge the skills gap at utilities and remove a major barrier to taking advantage of advanced analytics to drive improved business performance. The Oracle team has worked with a network of utilities from water, gas and electric, both large and small, and keenly understands the areas where utilities need to focus to deliver the most utility benefit.

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**Figure 2**  
Oracle Operational Analytics Use Cases

**Use Cases: Oracle’s Operational Analytics Platform**

Of the many compelling reasons large utilities are deploying automated metering infrastructure (AMI) meters, reducing bad debt, kilowatt hours lost to inactive consumption, and unaccounted-for usage...
often rank at the top of most utilities’ lists. Having new usage and operational data from advanced meters is the first step in reaching these goals, but forward-looking utilities are also recognizing that adding a data analytics component is the key to realizing them. Here are some examples of how Oracle is helping utilities address their operations in a new way.

**Distribution Operations**

Oracle offers both near real-time monitoring/operations and long-term system planning analytics solutions. In the area of near real-time monitoring and operations, it offers analytics applications spanning overload management, outage management, conservation voltage reduction, phase balancing, the localization of non-technical losses, and new equipment deployment health. The applications for long-term system planning are nearly as broad, and include device capacity planning, device lifecycle management, EV planning, connectivity model audits, and stressed asset identification.

The greatest value in these analytics capabilities include:

- Increased customer satisfaction with reduced outages and momentaries
- Improved communications performance
- Enhanced network management system (NMS) analytics performance
- Avoidance of unnecessary capital projects
- More efficient monitoring of existing assets
- The ability to better meet regulatory reporting on requirements for efficiency and effectiveness

**Results:** Using Oracle’s platform, one large U.S. electric and natural gas utility was able to target overloaded transformers. This utility leveraged predictive analytics to reduce the number of transformer failures by more than 20 percent through preventative maintenance and proactive replacements.

**Improve Public Safety**

Oracle has created a multi-variable test which focuses on proactively discovering meter temperature-related problems (such as overheating from the socket or installation issues) before they turn into critical issues. Oracle uses advanced statistical analytics to eliminate false positives, and flags meters for the utility to conduct proactive field investigation. This service has enabled utilities to avoid the potential of highly publicized meter fires. Oracle also performs these types of analytics calculations to identify spikes in gas consumption and water leaks.

**Results:** Reduced safety hazards in the community, reduced write off from unaccounted usage, reduced unbilled and unused commodity resources and cost avoidance of damages and legal fees associated with a potential safety incident are some of the benefits of proactively identifying these types of safety hazards. Through this service, Oracle has identified more than 2,000 potential meter issues and public safety hazards for utilities.
Building Metering Operations Capacity

Oracle analytics solutions enable utilities to better manage meter deployments, inventory, and communications network performance. These services eliminate the need to have designated resources to manually perform these business functions by providing automated and timely insights for tracking smart meter deployment, monitoring new meter performance, tracking existing meter inventory, identifying meter malfunctions and monitoring and reporting on network performance.

**Results:** Using Oracle’s Platform, utilities have been able to achieve the following results:

- Break-to-fix time reduced from 90 days to 30 days, and re-bills cut by as much as 50 percent
- Four-fold improvement in identifying zero-consumption meters, resulting in 75 percent fewer truck rolls to fix the same number of broken meters
- Identification of thousands of energy theft situations, leading to the recovery of millions of dollars in lost revenue
- 70 percent reduction in the number of field appointments required to settle high bill disputes through proactive identification of problematic meters
- Reduction in premature asset failures and outages through identifying overloaded transformers

<table>
<thead>
<tr>
<th>BILLING OPERATIONS</th>
<th>METER SERVICES</th>
<th>GAS SAFETY</th>
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<tbody>
<tr>
<td>• Over 75% reduction in manual exception review</td>
<td>• Cut break-to-fix time by 50%</td>
<td>• Over 15 Gas Leak emergencies identified annually</td>
</tr>
<tr>
<td>• Over 2000 previously unmitigated malfunctioning meters</td>
<td>• Improved meter malfunction detection before back bill needed</td>
<td>• Avoided millions in damages and legal costs</td>
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The Road Ahead

The list of benefits will continue to grow. Using data and analytics is an evolution of learning and integrating. Over time, new analytics processes will migrate into standard operating procedures, to be replaced by newer and even more potentially complex analytics issues, as utilities continue to more finely hone their processes and pursue new opportunities.

On an enterprise level, the growth in analytics capabilities will continue to turn new and increased data from utility operational systems into actionable information that will drive and feed both improved business processes and new customer programs.
The Smart Meter (R)Evolution

Getting Started – Call to Action

Technology has become a mission-critical tool for utilities in their efforts to engage customers—whose attention is becoming increasingly scarce—and for managing day-to-day and critical-event operations. It is therefore increasingly crucial for utilities to fully leverage their AMI for both sides of the business by making wise technology investments that will deliver quick and proven results. This is one of the most important investments a utility will make between now and 2020, and utilities that are able to invest wisely in utility-proven solutions will maximize their technology dividend.

In this paper, we have shared just a few of the many analytics use cases. Because Oracle’s and Opower’s solutions are use case-driven, you are able to decide what you need and what you don’t, increasing flexibility and ability to customize the right solution for each utility and each utility customer.

To us, analytics must be practical to get the most out of a utility’s operations, both customer-facing and behind the scenes.

By leveraging Opower’s and Oracle’s combined data management and utility technology expertise and proven results in customer engagement and utility operations, utilities can look to the following benefits of a combined, best-of-breath platform to best leverage AMI and other grid sensor data for actionable results:
• **The advantage of scope:** Together, Opower and Oracle provide the most comprehensive enterprise-grade utility analytics platform in existence.

• **The advantage of experience:** Together, we are acknowledged leaders in enterprise technology, customer engagement and behavioral science.

• **The advantage of technology:** Together, our combined capabilities allow us to process more complex utility “big data” than other analytics providers.

• **In combining the talents and expertise** of the best customer analytics and engagement firm with those of the best operations and data management firm, it is our intent to build utility solutions that span the specific needs of every utility enterprise, combining two best-in-class platforms into a best-of-breed utility solution.
About Opower

Working with 93 utility partners and serving more than 32 million households and businesses across eight countries, Opower is a leading provider of cloud-based software to the utility industry. Opower’s platform uses big data analytics and behavioral science to enable utilities to achieve energy outcomes, including energy efficiency, customer engagement and demand response. Founded in 2007, Opower is headquartered in Arlington, Virginia, with offices in San Francisco, London, Singapore and Tokyo. For more information, please visit www.opower.com and follow us on Twitter @Opower.

About Oracle Utilities

Oracle Utilities delivers proven software applications that help utilities of all types and sizes achieve competitive advantage, business performance excellence and a lower total cost of technology ownership. Oracle Utilities integrates industry-specific customer care and billing, network management, work and asset management, mobile workforce management, meter data management applications and cloud analytics with the capabilities of Oracle's industry-leading enterprise applications, business intelligence tools, middleware, database technologies, as well as servers and storage. The software enables customers to adapt more nimbly to market deregulation, meet ever-evolving customer demands and deliver on environmental conservation commitments. Additionally, Oracle Utilities helps utilities prepare for smart metering and smart grid initiatives that enhance efficiency and provide critical intelligence metrics that can help drive more-informed energy and water usage decisions for consumers and businesses. For more information, visit www.oracle.com/goto/utilities.