Increasing Operational Efficiency

BPM in Utilities
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Introduction: The Efficiency Imperative

Today’s utility companies face a convergence of several powerful forces and market developments. They must respond to global political upheavals that impact the cost of energy, navigate an increasingly complex supply chain that crosses state boundaries, contend with rising environmental consciousness in both the public and private sectors, and confront challenging new business initiatives centered around smart grid technology and Big Data analytics. From electricity generation to demand response, gas transmission to delivery, water purification to wastewater disposal—and all the maintenance and metering in between—utility companies need flexible enterprise business processes to help them meet these challenges while delivering vital services to customers.

Today, utilities are faced with capital-intensive investments in upgrading to smart-grid/metering infrastructures and consumer-centric revenue models such as net-metering and time-of-use pricing. These new business requirements could potentially drive down revenues as consumption shifts to off-peak periods. Hence, utilities can no longer afford to neglect operational efficiencies.

The graphic below depicts the factors that exert profitability pressure on utilities companies, especially downstream operators.

<table>
<thead>
<tr>
<th>Shrinking Margins</th>
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<tbody>
<tr>
<td><strong>Declining Revenues</strong></td>
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<tr>
<td>Price Erosion</td>
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<tr>
<td>Demand shift to Low-price Off-Peak Periods</td>
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*Figure 1. Pressures and challenges facing today’s utility companies.*

Most utility companies depend on software applications to meet their service-delivery objectives, but meeting customer needs requires innovative technology that extends beyond the most comprehensive packaged or custom-built business applications. Processes that originally
resided within a single application now extend beyond traditional application boundaries. These business processes are not confined to one set of data or one discrete information system. They are better described as multifaceted implementations of real-world activities—logically organized into steps that span multiple IT systems, departments, channels, and touch-points. Some activities are automated and performed by machines; others are manual and performed by people, both inside and outside of the company.

To create new business processes that accommodate these complex, multi-faceted implementations, astute utility companies rely on Oracle Business Process Management (BPM) Suite, a complete set of tools for managing all types of business processes. This solution brief explains how essential business processes such as Meter-to-Cash, Demand Response, and Governance Risk & Compliance can be improved with Oracle BPM technology.

**Use Case #1: Meter-to-Cash**

Acquiring meter data, generating invoices, and receiving payments are fundamental processes that lie at the heart of every utility company. However, the complexity of meter data management and the rising cost of collections are motivating many utility companies to take a fresh look at the Meter-To-Cash cycle. One of the primary factors is the rise of smart meters and smart grid deployments. These initiatives create an immense volume of data that impacts many fundamental operations, from distribution to regulatory affairs to credit & collection policies. Accessing, analyzing, managing, and delivering all of this information to optimize business operations and enhance customer service is a complex task.

In the past, Meter-to-Cash processes often moved raw meter data directly into the billing system. Today, however, the dramatic increase in interval data has encouraged many utilities to deploy autonomous Meter Data Management (MDM) applications into the Meter-to-Cash process. MDM systems offload major tasks from the billing system, including loading, validating, editing, and estimating meter data, storing meter data and events, and producing billing determinants. For the Meter-to-Cash process to work correctly, however, utilities must not only integrate MDM applications with billing applications, but often pull in data from metering head-end systems, field data collection devices, and a variety of intermediary applications. They may also need to address inconsistencies that arise when synchronizing these different types of data, which often span multiple applications across complex heterogeneous, legacy IT environments.

Integrating billing with meter data management on a custom basis exposes utilities to considerable cost and risk. Custom integrations between systems require implementation teams to define requirements, construct designs, and then build and test code. Errors during this process can delay implementation or, worse, permit errors in the Meter-to-Cash process. Custom integrations also impose post-implementation costs on utilities, as they must be maintained and changed when the integrated applications are upgraded.

For example, Meter Data Management applications gather and process data from many types of meters, store that data, and format it so that it can be used by business processes throughout the company. While the data may be standardized, utilities often have to integrate it with data arising from other applications in the Meter-to-Cash cycle, including other systems within the Automated Metering Infrastructure (AMI) along with invoicing, revenue recognition, and collection. While the goal is to help customers to monitor
and manage energy use with greater flexibility and control, inconsistencies among these information systems and processes make it difficult to offer a unified customer experience, as shown in Figure 2.

Figure 2. Synchronizing information across the Meter-to-Cash Cycle.

There are no complete, packaged software solutions that encompass the entire meter-to-cash process. Thus it is imperative that utility companies can bring the disparate components of these solutions together in a consistent way that doesn’t constrain flexibility. Oracle BPM Suite introduces standardization to streamline these system integration projects and minimize risk. It removes complexity from process design, development, deployment, monitoring, and execution with a unified process engine and pre-integration of process subsystems. This is especially important when developing new Meter-to-Cash processes and addressing exceptions that extend outside of application boundaries, such as when a customer changes his or her residence and requests a manual bill prior to a batch billing cycle. It is precisely at these hands-offs between applications, overlaying processes, and human representatives that BPM technology can help by structuring a workflow, routing a request to an alternate channel, or triggering a sub-process to engage a representative in the call center.

Consumer-centric revenue models such as net-metering and time-of-use pricing can reduce revenue as consumption shifts to off-peak periods. Hence, utilities can no longer afford to neglect efficiencies in their meter-to-cash cycle. Using Oracle BPM Suite, utility companies can also integrate new business models with legacy systems, ensure consistent use of master data for key data elements such as Customer and Rate, and manage exceptions to an established workflow, such as when the Meter Data Management system must re-bill a customer in response to an incorrect billing determinant. Built-in audit capabilities let you record and review multi-step workflows, so you can make sure all customers receive exceptional treatment, and no service request goes unresolved.

Use Case #2: Demand Response

Demand Response programs allow subscribers to reduce their electricity usage in a given time period, or shift that usage to another period in response to price incentives, an environmental condition, or a reliability signal. Today’s smart metering initiatives have penetrated many geographic regions, enabling utilities to introduce and test a variety of initiatives for a broad spectrum of customers. These programs are designed to enable electricity suppliers and grid operators to minimize stress on the electric grid by reducing demand. Grids are thus stabilized and electricity can be provided to all customers more reliably.
Successful Demand Response programs have demonstrated load balancing during peak and non-peak hours, and cost savings for both consumers and distributors. Demand response programs may also prevent rolling blackouts by offsetting the need for more electricity generation.

Demand Response programs are typically targeted at large commercial and industrial customers that can measure energy usage in one-hour intervals or less. It is also becoming increasingly common for residential consumers to balance seasonal energy needs. As more smart meters and smart grid technologies are deployed, Demand Response programs can receive real-time updates about energy supply, demand, and pricing fluctuations.

BPM technology assists utilities at each critical juncture of these initiatives including during program design, technology rollout, system configuration, customer signup, maintenance, reporting and auditing. For example, during the early phases of program design and development, Demand Response Management Systems must be integrated internally with MDM systems, enrollment applications, Accounts Receivable applications, customer information portals, and credit management and collection systems. In addition, external links may need to be established to share information between Independent System Operators, power generators, and consumers. In order to enable a seamless set of services that will attract and retain customers, new processes and workflows must be defined for common activities, including the following:

- Defining programs for new markets
- Signing up and registering customers
- Monitoring participation/gauging demand
- Interfacing with other corporate applications
- Managing, measuring, and verifying network events
- Connecting to self-service portals
- Reporting on cost and consumption metrics

Process stakeholders may also need to interface dispatching systems, metering systems, settlement systems, and customer information systems. These connections imply tight integration of fundamental back office systems including customer care and billing, network management, work and asset management, mobile workforce management and meter data management, as well as seamless connections to business intelligence tools, middleware and a variety of database technologies. BPM streamlines these interfaces and connections.

In conjunction with Oracle Utilities Customer Care and Billing (CC&B) and Oracle Utilities Meter Data Management (MDM), Oracle BPM technology helps utilities tackle Demand Response initiatives, enhancing efficiency and providing critical intelligence metrics that can reduce costs for the utility while helping to drive more-informed energy and water usage decisions for customers.

Use Case #3: Governance, Risk and Compliance (GRC)

As we have seen, utilities are committing to capital-intensive investments in upgrading to smart-grid/metering infrastructure driven by government regulation and consumer awareness. However, the digitization of the grid is blurring the lines between operational, information and communication technologies. This inadvertently makes the grid highly vulnerable to cyber-attacks, physical sabotage and equipment malfunction in the “last-mile” of the Automated Metering Infrastructure (AMI). The
following figures outline the key implications of AMI security failure and how these issues can be addressed with BPM technology.

<table>
<thead>
<tr>
<th>Utilities Industry Trends</th>
<th>Operational Challenge</th>
<th>AMI Security Implications</th>
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<tbody>
<tr>
<td>• Increasing government regulation and/or incentives to upgrade to smart grid infrastructure e.g. Low-carbon Network Funding</td>
<td>• Bi-directional information flow increases likelihood of data confidentiality breaches</td>
<td>• Revenue Loss from energy theft and erroneous billing due to</td>
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<tr>
<td>• Blurring lines between OT and IT increases vulnerability of smart-grids to cyber-attacks</td>
<td>• More inter-connections in AMI increase opportunities for “denial of service” attacks</td>
<td>• delayed response or failure to detect smart-meter sabotage</td>
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<tr>
<td>• Drive to establish new standards or adapt existing standards for smart-grid security e.g. NIST IR 7628, ISO/IEC 27001/27002</td>
<td>• Digitization of the last mile increases attack surface and increases potential for cascading failures</td>
<td>• corruption of MDM repository resulting in under-charging for billing discrepancies</td>
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<td></td>
<td></td>
<td>• Legal Costs of dispute resolution, penalties and settlements arising from</td>
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<td></td>
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<td>• use of meter data in unsolicited ways both deliberately and inadvertently</td>
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<td></td>
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<td>• service disruptions due to unwarranted disconnections and delays in outage management</td>
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Figure 3. Smart-Grid AMI security breaches have serious implications, including revenue loss from energy theft and incorrect billing and legal costs of dispute resolution, penalties and settlements.

The National Institute of Standards and Technology (NIST) has established hundreds of communication protocols, standard interfaces, and other widely accepted technical specifications necessary to build an advanced, secure electric power grid with two-way communication and control capabilities. Governed by the United States Department of Commerce, cyber security experts at NIST are intent on ensuring that the nation’s vast infrastructure upgrade—extending from homes and businesses to fossil-fuel-powered generating plants and wind farms, affecting nearly everyone and everything in between—is central to national efforts to increase energy efficiency, reliability, and security; to transition to renewable sources of energy; to reduce greenhouse gas emissions; and to build a sustainable economy that ensures future prosperity. According to NIST, cyber security for the power industry covers all issues involving automation and communications that affect the operation of electric power systems and the functioning of the utilities that manage them and the business processes that support the customer base.¹

As utilities and regulatory commissions work to obtain a progressively higher percentage of energy from renewable resources, as well as to and remove polluting plants from the grid, utility companies must comply with a variety of regulations aimed at reducing emissions, optimizing infrastructure investments, and pursuing cost-recovery strategies with state public utility commissions. As a result, environmental risk management and sustainability initiatives are growing in importance. BPM can drive improvements in energy distribution, lower regulatory risk, and improve customer satisfaction by enforcing smart-grid security guidelines and regulations, as illustrated below.

BPM Technology for Utilities

Figure 4. BPM technology helps utilities to reduce cyber threats, lower regulatory risk, and improve customer satisfaction.

Applying Oracle BPM Suite

Utilities commonly use Oracle BPM Suite to model, simulate, execute, and optimize, business processes across divisions, systems, and applications. The suite includes the technology these companies need to create, document, and modify business processes quickly and drive process changes in a nontechnical, business-friendly manner, along with technology for implementing, executing, and monitoring end-to-end processes.

Oracle’s comprehensive BPM technology enables complete introspection into business processes so analysts can predict, architect, and enable interactions through multiple channels and touch-points. They can model processes by defining the logical structure and sequence of events, rather than its underlying technical implementation—without any knowledge of service oriented architecture (SOA), Web services, or XML.

Oracle developed a unified process foundation that simplifies and removes complexity from process development, deployment, monitoring, and execution. In addition, Social BPM interaction simplifies collaboration among people and applications by incorporating the latest in social computing technologies and enabling a wide choice of communications channels, as shown below.
Finally, Oracle’s unique BPM toolset enables utilities to lower the risk of process “gaps” within common business processes including account creation, accounts receivable, and customer support. Over time, the toolset enables developers to shift their focus from managing individual functions to integrating activities into interconnected processes. In addition, it helps utilities to share information and optimize visibility as stakeholders create, manage, and audit new types of end-to-end business processes.

Integration with SOA

Service-oriented architecture (SOA) has become a popular method for linking legacy applications across many different departments, thereby creating a single end-to-end process and improving efficiency. SOA interoperates with all parts of the IT architecture to integrate business applications, moving them on to a common service bus and a common workflow engine. It brings reusability to the IT infrastructure, but how can you leverage this IT infrastructure efficiently while accommodating human intervention and introspection at key junctures within the business process?

This is where BPM technology comes in. It is the vehicle that business analysts use to optimize a process, improve visibility, check statistics, perform activity monitoring, combine elements of social collaboration, and a host of other tasks.

Oracle BPM Studio works with Oracle SOA Suite to create end to end business processes that can be triggered, executed, and monitored from browser-based Web interfaces. Another browser-based application, called BPM Composer offers insight into BPM process definitions and enables business analysts to document and edit these definitions online.

Analyzing and modeling business processes with these Oracle tools can lead to a seamless implementation of process activities through services and human tasks. Execution of process instances is centrally coordinated and monitored—allowing for real-time insight into exceptions and bottlenecks as well as on-the-fly intervention and improvements within the process flow.

The combination of Oracle Business Process Management Suite 11g and Oracle SOA Suite 11g provides everything utility companies need to implement, execute, and monitor end-to-end business processes as well as individual sub-processes and tasks. As part of the Oracle Fusion Middleware family, these
products are based on industry standards and provide “design time at runtime” support to allow for
dynamic, business-driven, on-the-fly reconfiguration and restructuring of business processes.

Conclusion

Today’s utilities need information systems that can adapt to market deregulation, meet evolving customer
demands, and deliver on conservation commitments. Oracle recently surveyed 151 North American
senior-level executives at utilities with smart meter programs in place and gauged their perceptions on the
business impact of big data initiatives. The executives responded about their organizations’ preparedness
to handle data growth, as well as their plans to extract optimal business value from this data to better
target, engage with, and serve customers. Utilities with smart meter programs in place said they were
somewhat prepared to manage the data deluge, rating themselves a 6.7 on a scale of 1 to 10. However, 45
percent of utilities still struggle to report information to business managers as fast as they need it and 50
percent miss opportunities to deliver useful information to customers, the survey revealed.

As demand response and other smart-meter based programs gain momentum, utilities need flexible tools
for creating, deploying, and managing the IT infrastructure and related information systems. BPM helps
utilities to transform the fundamental processes surrounding smart metering/smart grid programs with
attention to deployment, procurement, installation, testing and configuration. These processes impact
major initiatives related to Meter-to-Cash, Demand Response, and Governance Risk & Compliance.

Oracle BPM Suite structures and orchestrates these interactions:

- A unified process foundation reduces complexity while pre-integration of process subsystems
  brings together existing applications, enabling you to react quickly to new business requirements.
- A user-centric design simplifies process modeling, execution, and participant interaction and
  provides tools for both business and IT.
- Social BPM interaction encourages collaboration in the context of BPM and adds the richness of
  modern social communication tools.