Strategy

The smart grid is a transformation of the utility. The smart grid introduces new technologies and new processes to enable utilities to better understand their infrastructure and their customers. The smart grid enables utilities to improve the way they operate and increase customer satisfaction.

Many utilities have taken a foundational step in implementing the smart grid by deploying an advanced metering infrastructure (AMI) and a meter data management system (MDMS). This foundation results in significant operational improvements in meter reading and meter operations.

Some utilities have begun building upon this foundation by using the information gleaned from the grid and from customers. Understanding when power is out, empowering customers to manage and control their energy usage, and optimizing their system by reducing losses, utilities and their customers are realizing further, tangible benefits.

A few utilities are on the cusp of transforming their operations and relationships with customers by:

- Implementing a new way to pay for energy (aka prepay)
- Reducing energy consumption by consumers without degrading their service (aka volt var optimization)
- Implementing new rates and tariffs based on unique usage patterns (aka big data analytics)
- Enhancing customer communications and education through consumer web portals
- Maximizing the use of existing infrastructure based on an understanding of its actual loading (aka asset management/utilization)
- Improving reliability and outage response (aka integration of AMI with OMS)

Moving beyond the foundational implementation of the smart grid and realizing further benefits for utilities and customers is the DAY2 opportunity. VASS Solutions helps clients achieve its DAY2 opportunities.

State of the industry

The smart grid is a portfolio of solutions designed, integrated and implemented to improve operational efficiencies and increase customer satisfaction. Smart grid solutions span the breadth of the utility and can include advanced metering infrastructure, data analytics and business intelligence, distribution management and automation, and customer communications and engagement. The smart grid partners, solutions and opportunities available for consideration for utilities are in a constant state of innovation and change. VASS Solutions applies its rich and broad background of utility, vendor and consulting experience to each Client's individual program and circumstances. No two utilities are alike! Customer profile, distribution profile, regulatory environment, enterprise solution profile, and business process drivers all have unique characteristics and level of maturity that require consideration independently.

- VASS Solutions employees have worked at large IOUs, Municipalities and Cooperatives in the areas of Information Technology, Account Management, Marketing, Customer Services, AMI/AMR Meter Reading Technology, Project Management, Distribution Planning, Distribution Construction, Distribution Operations, and Telecommunications.
- VASS Solutions employees have worked for leading AMI technology vendors and deployed those solutions at Municipalities, Cooperatives, and IOUs.
- VASS Solutions employees have worked for large and boutique consultancies successfully implementing smart grid programs covering over 15 million metering end points.

Client	Smart Grid Program
NV Energy (Western US IOU with 1.3 million electric and 156k gas meters)	VASS Solutions is providing program integrator services and subject matter expertise as NVE implements its NVEnergize program (AMI, MDMS, DRMS, Customer Portal) and its DAY2 opportunities (AMI-DMS integration, customer communications management, prepay).
CPS Energy (San Antonio, TX municipal utility with 770,000 electric and 350,000 gas meters)	VASS Solutions is providing project management services, strategic direction, and subject matter expertise as CPS Energy implements its Grid Optimization program (AMI, MDMS, DA, OMS, data presentment).
Sask Power and Sask Energy (Saskatchewan, Canada provincial utility with 472,000 electric and 374,000 gas meters)	VASS Solutions serves as trusted advisor to a large Canadian utility's AMI architecture and integration team as it implements an AMI and MDMS solution.
Southern Maryland Electric Cooperative (Maryland electric utility with 144,000 electric meters)	VASS Solutions is providing Smart Grid technical consulting and implementation support including requirements development, RFP/procurement, contract negotiation, and vendor solution implementation for SMECO's smart grid solution (AMI, MDMS, SI and End Point).
Pepco Holdings, Inc. (East Coast utility with 1.9M electric and 135k gas meters)	VASS Solutions employees provided subject matter expertise, business case development, change management, vendor management, procurement services, and testing and solution performance verification services as PHI deployed its AMI and MDMS solution.
Alliant Energy (Wisconsin utility with 650k electric meters)	VASS Solutions employees provided subject matter expertise, project planning, business case development, requirements gathering, vendor management, solution verification services, and procurement services as Alliant Energy implemented its AMI and MDMS program.
City of Fort Collins Utilities (Colorado utility with 65k electric and 35k water)	VASS Solutions employees provided Smart Grid technical consulting and implementation support including requirements development, RFP/procurement, contract negotiation, and vendor solution implementation for Fort Collins' AMI and MDMS implementation.
Colorado Springs Utilities (Municipal electric, gas and water utility)	VASS Solutions employees provided Smart Grid technical consulting and implementation support for AMI deployment. Support includes requirements development, RFP/procurement, contract negotiation, and vendor solution implementation for AMI and End Point installation vendor contracts.

- ■ VASS Solutions applies this experience to Client smart grid projects. VASS Solutions engages with Clients to address individual circumstances and questions and provide a comprehensive understanding of potential smart grid solutions.
- ■ VASS helps clients to better understand the existing capabilities of the smart grid; the potential, but not yet realized capabilities of the smart grid; and the unrealistic hyperbole promised by the smart grid.

Business drivers

Business drivers are the key elements that influence a utility's implementation of its Smart Grid strategy. VASS Solutions helps Clients identify the key Business Drivers that influence smart grid strategy.

- What strategic, commercial, competitive, regulatory, political, and/or customer (or other external stakeholder) needs does the Client have or face?
- Which of these needs can be addressed by implementing smart grid?
- Which of these needs have priority over others and why?
- What level of internal and external support do these needs have, or what hurdles does your utility currently face?

These needs become the business drivers for implementing smart grid.
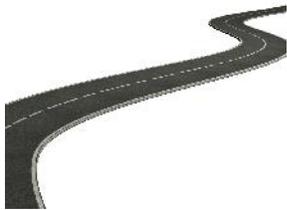
ROADMAP

Smart Grid Roadmaps help clients understand the current status of their smart grid and defines the options and opportunities for their future smart grid.

- VASS Solutions helps Clients prioritize project implementations over time based on investment required, capabilities today and in the future, and the benefits to be achieved.
- VASS Solutions helps its Clients develop near term and long term smart grid strategic plans and translate those plans into a tactical roadmap consisting of phases or business releases to be implemented.
- VASS Solutions facilitates strategic plan development via multi-day workshops that result in a high-level strategic framework. VASS Solutions facilitates a more extensive workshop approach used to gather utility-wide perspectives to identify the priorities to be addressed by a smart grid solution.
- VASS Solutions helps its Clients translate their strategic plans into strategic and tactical implementation roadmaps. Roadmaps articulate a realistic set of product, program and "services" or "business" releases. Roadmaps sequence such releases in a manner that maximize benefits to Clients over a realistic timeline.

Business case

Smart grid investments typically represent a significant, multi-year investment. Understanding the costs, benefits and returns on these investments is critical. VASS Solutions helps Clients assess the costs versus benefits over time and provide the quantitative justification for smart grid implementation.

- A business case consists of the benefits to be realized and the costs necessary to achieve these benefits. The net of benefits and costs, and the timing of when such benefits and costs are realized, are key drivers in the decision to proceed with a project.
- VASS Solutions understands the quantitative and qualitative benefits associated with smart grid implementations.

  - VASS Solutions works with the Client business units to develop and model the quantifiable benefits that are specifically applicable to the Client and to determine how qualitative benefits contribute to the strategic value of a business case.
  - VASS maintains a knowledge base of actual benefits from other Client business cases to ensure a complete capture of benefits.

- Benefits drive functional solution requirements.

  - The functionality required in smart grid implementation is strongly influenced by the benefits that can be achieved. VASS Solutions identifies the high-level functional, performance, systems, and integration requirements that "enable" the selected and quantified benefits.
  - VASS Solutions maintains a knowledge base of functional, performance, and commercial information for the majority of the commercial and emergent smart grid technologies and vendors.
  - VASS Solutions possesses expertise in the areas of metrology, communications, data collection, meter data management, systems integration, distribution systems and hands-on solution implementation necessary to fully understand and assess these technologies.

- Functional solution requirements drive Costs.

  - The costs to implement smart grid solutions include both vendor and Client costs occurring during the solution deployment period and the subsequent solution operating life.
  - VASS Solutions' model, based on extensive work with its utility clients and knowledge of the industry, estimates the project implementation costs, as well as the on-going sustaining costs of smart grid solutions.

SOLUTION ARCHITECTURE

Solution architecture represents the utility specific collection of applications and their integrations necessary for smart grid implementation. The development of the solution architecture is a cross-utility effort that is designed to capture decisions that impact the smart grid solution implementation – providing the "reference map" from which solution implementation will be designed and implemented.

- Evaluation of the holistic enterprise architecture and identification of gaps in primary solution applications and integration points will be translated into the Enterprise Roadmap necessary to achieve the business benefits
- The architecture of the solution encapsulates common standards and ensure a minimized level of customizations to ensure low cost out-of-the box sustainability in the very complex IT environments.
- Understanding this architecture as a key part of the smart grid programmatic design that ensures an accurate understanding of utility life cycle costs. VASS Solutions understands the utility application landscape and how new applications and processes fit into that landscape.
- Developing an architectural implementation methodology will ensure common re-use of services and non-redundant data models are in place to minimize the operational complexity and risk of data integrity.
- Cyber and physical security solutions are absolutely critical in all enterprise IT and networks solutions. VASS leverages partner experts to assess NERC / CIP assessments, and recommend enhancements to achieve compliance.

SENIOR MANAGEMENT/REGULATORY APPROVALS

To proceed with any implementation, the Client must secure the budgetary, managerial and, in some cases, regulatory approvals to proceed. VASS Solutions helps Clients prepare for and present to the regulatory authority throughout the approval process and provides the subject matter expertise to support Clients in their approval processes.

Project implementation and oversight

Successful smart grid project implementation requires a tightly integrated plan whose framework necessitates a wide range of expertise involving virtually all core lines of the utility business, yet provides the flexibility to adapt to the inevitable changes that will occur.

PROJECT MANAGEMENT (PM)
PROGRAM MANAGEMENT OFFICE (PMO)

Establishment of a program management team and framework is a foundational element for successful smart grid program implementation.

- VASS Solutions provides overall project management throughout the lifecycle of the project and ensures a quality implementation on scope, on time and on budget.

- VASS Solutions works closely with the Client and vendor partners to manage the activities of the team and establishes strict project governance to ensure consistent and appropriate communication with internal and external stakeholders.

- VASS Solutions utilizes standardized tools and approaches to manage and track the scope, roles and responsibilities, deliverables, risks, and overall schedule.

SOLUTION REQUIREMENTS

Solution requirements define the smart grid solution and ensure that its objectives are achieved.

- Solutions Requirements are defined as part of the business case development process. Requirements validation and refinement processes define the detailed integration and application scope to be provided by the vendors. Interactive workshops conducted with Client and vendor personnel ensure common understanding of the requirements, applicable business rules, and necessary integrations with existing operational and billing systems.

- Solution requirements become the technical baseline for the project. Architectural, functional, performance, and integration specifications for both Client and vendor partner must deliver to these requirements. Maintaining traceability between the solution requirements and the various smart grid vendor requirements is an important aspect of project implementation.

- Once established, the baseline must be managed through the project and testing executed to verify that the final system meets the Client's needs and expectations.

SOLUTION ARCHITECTURE

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■ Successful integration of a Client solution into existing IT infrastructure is ensured by assessing the current environment and adjusting the architecture accordingly. This includes:

- Implementation of a Design Review Board ("DRB") to ensure enterprise architectural standards and integration components achieve the desired successful integrated results. The DRB consists of the technical experts in each representative enterprise solution application, and provides a formal structure for information flow design verification and collaborative technical change request processes to achieve a successful and well documented as-built solution.

- Assessing and documenting the solution impact on network security, bandwidth, and configuration, and support/construct plans (both Strategic and tactical) required to support any changes required during the project timeline.

- Assessing and documenting the solution impact on existing system infrastructure currently supporting systems and constructing plans to support any changes required during the project timeline.

- Examining other more administrative functions such as business continuity policies, to ensure the additional environments adhere to Client policies and reuse where possible the existing data center level mechanisms to support these policies.

- Performing activities related to the requirements gathering, procuring, installation and maintenance of the environment for the development and integration testing.

Procurement

The design and implementation of a well-defined procurement process that meets or exceeds utility standards and rules, provides traceability throughout the smart grid decision process.

■ VASS Solutions helps its Clients procure the vendor products and services necessary to successfully implement its smart grid solutions. VASS Solutions applies its knowledge of the smart grid industry to help Clients determine which vendor partners should be considered for what elements of their smart grid programs. VASS Solutions has helped Clients successfully negotiate multiple contracts for various smart grid technologies.

■ Key to the procurement process is an understanding of the comprehensive requirements necessary to achieve business case benefits. Requirements are translated into a request for proposal (RFP) that is distributed to qualified vendors. Vendor proposals are screened and evaluated by Clients in a facilitated, objective, defensible, repeatable process. Costs proposed by vendors are evaluated independently of requirements to ensure an independent, un-biased assessment. A total cost of ownership model ensures that all costs, both proposed and ongoing utility, are understood. The outcome of this process is short list of vendors with which negotiations are executed.

■ A successful vendor negotiation results in a contract that benefits both the Client and the vendor partner and ensures a successful, long-term relationship. VASS Solutions works with Clients to develop a negotiation plan for each vendor contract and helps facilitate successful negotiations.

TESTING – TECHNICAL AND SYSTEM

The development of a comprehensive testing methodology, coupled with the execution of carefully defined test cases traceable to the solution requirements, is critical to successful smart grid project implementation.

■ To ensure that the scope associated with each key milestone and release is achieved, VASS Solutions helps Clients implement a comprehensive System Test effort. This effort validates that the functionality and data expected from each system and interface occurs as expected with a high degree of quality. Testing is conducted for each Release and occurs in a building block approach. The functionality of each application must be validated before the interactions between applications can be validated. Likewise, the interactions between applications must be validated before the

series of interactions comprising a business process can be validated. In this manner, elements of each Release are tested and must pass before proceeding to the next level of testing. The entirety of System Test must pass successfully before a Release is promoted to production.

- The comprehensive effort may include the following:

  - First Article Testing: verification that new technologies meet basic client and industry standards

  - Technical Acceptance Testing: lab-based testing and acceptance of new technology

  - Field Acceptance Testing: field-based testing and acceptance of new technology

  - Application Functional Testing: regression testing of existing application functions and capabilities and verification of new capabilities introduced

  - System Integration Testing: verification that integrations transmit and translate data according to requirements

  - System Testing: end-to-end testing and verification that applications and their integrations work together according to design

  - User Acceptance Testing: introduction of users in the end-to-end testing process to ensure that business processes work as expected and results are satisfactory to users

  - Performance Testing: verification that high-volume transactions occur within specified performance thresholds

  - Security/Vulnerability Testing: verification that systems and integrations meet internal and external security standards; verification that any vulnerabilities identified are remediated

  - Final System Acceptance Testing: verification that all previous testing has been successfully completed and defects resolved as necessary

Vendor management

Smart grid vendors are partners in the implementation of a client's smart grid solution. These partners bring the expertise necessary to provide specific technologies and knowledge to successfully fulfill the smart grid objectives.

- Vendors exhibit varying degrees of implementation and project management capability. Some require minimal oversight while others require comprehensive management to ensure that milestones and capabilities are achieved.

- VASS Solutions can manage vendors across the varying scope of capabilities.
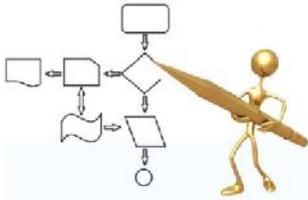
BUSINESS PROCESS ENGINEERING AND REDESIGN

Successful project implementation and benefits realization requires a keen understanding of the utility's current business processes, potential business process impacts, and future business processes enabled by the smart grid solution. Business process engineering and redesign results in future state business processes that incorporate the solution architecture and requirements to achieve the solution benefits.

- VASS Solutions facilitates business process assessment sessions with the Client to identify the day-to-day business processes that will be affected by the project. VASS Solutions uses its experience working with other Clients to facilitate these sessions and provide a baseline set of future state business processes. These "to-be" business processes are reviewed to ensure alignment with the Client culture, organization, and any other applicable constraints (regulatory).

- Business process impact assessments are also a starting point for the detailed operational training and organization change management that must be performed during project implementation.

Release Strategy and Release Management

Smart grid solutions represent a complex set of technologies and applications that require careful and thoughtful implementation. Solutions are implemented in strategic and tactical pieces or phases. The development and maintenance of a Release Strategy provides the roadmap and plan for implementing each release. Release management ensures that releases are coordinated and delivered on time, on scope and on budget.

- The Release Strategy serves as foundational information for program scoping and preplanning, an integrated master schedule, and the release of systems and functionality over time. A Release Strategy is a dynamic, living plan that evolves as priorities, capabilities, and resources change.

- The Release Strategy is influenced by the Solution Roadmap and articulates a realistic grouping of functionality and business process changes. Each release is comprised of an independent series of requirements definitions, integration definitions, and systems testing. The strategy further defines the application and integration changes necessary to achieve each release.

- Release management requires the application of rigorous project management to coordinate the efforts of Client IT and business personnel with vendor partners. VASS Solutions' release management encompasses planning, designing, coding, testing, and delivering release capabilities while managing and delivering on the expectations of internal and external stakeholders.

CUSTOMER ENGAGEMENT

Successful project implementation requires proactive and careful communication with Client customers. Smart grid technology projects create profound changes to "business as usual" within the utility. Utilities must communicate with and educate consumers so they buy-in to the opportunities presented by the smart grid. Maximizing benefits of the smart grid requires empowering customers to own the smart grid.

- Utilities across the country are implementing components of the smart grid. While the smart grid will ultimately result in significant benefit to consumers, utilities must incur up-front cost to realize those benefits – costs that are passed on to the consumers. Through taxes that fund federal grants, and rates that fund their utilities, consumers are investing in the smart grid.

- Consumers want to understand their investment in the smart grid: what benefits they can expect, how their utilities will assure delivery of the benefits, and how their utilities will efficiently manage costs and risks. Consumers want to be assured that their bills will continue to be accurate, their personal information will continue to be private, and utility networks will continue to be safe.

- Consumers want confidence in their utilities. Confident consumers will support the development of the smart grid, and will learn to use it to their benefit. VASS Solutions works with Clients to develop and implement the strategies to build consumer confidence.

Regulatory strategy and Support

Understanding necessary regulatory and governmental approvals and the development of appropriate strategies to address these is often a critical gate through which the project must pass before significant expenditure of resources can occur.

- Regulatory matters can be both expected and unexpected. Securing approval for the regulatory recovery of smart grid assets requires development of a strategy, capture of necessary information, address of questions, and clear, concise regulator communication. VASS Solutions has helped Clients realize regulatory approvals.

- Unexpected regulatory issues, such as concerns related to perceived technology flaws, can arise that threaten to derail a project. VASS Solutions has helped Clients quickly address issues such as opt-out and RF safety/privacy by crafting and implementing a regulatory mitigation plan.

- VASS Solutions supports Client regulatory needs by developing appropriate strategies, providing data as requested to support regulatory filings or data requests, and testifying on behalf of utilities in regulatory proceedings.

- VASS Solutions helps Clients address regulatory questions and secure necessary regulatory approvals.

Change management

The implementation of smart grid technologies touches virtually all parts of the utility organization. Successful smart grid solution implementation is not based solely on technology, but also on how well the utility employees and its customers adopt and embrace the solutions that these smart grid technologies enable.

- Change management recognizes the company culture and represents the structured approach that leads employees, various interested stakeholders, and, ultimately, customers, through the successive project phases to successful implementation.

- While success is measurable in many ways, it is certainly measured by the degree of success that the utility achieves as it moves from its current state practices, through the temporary or interim states that are necessary during deployment, through final completion and sustaining adoption. Change management is a perpetual process.

Performance Measurement

Well defined performance metrics delineate and support successful smart grid solution implementation. Clearly defined metrics allow the utility to measure progress at key implementation phases and verify that the expected results are achieved.

- Service Level Agreements should be embedded in key requirements of not only the major smart grid vendor contracts, but are also applicable to internal Utility service providers n whom the success of the smart grid solution and sustaining operation depends.

- Key Performance Metrics (Key Performance Indicators—KPIs) should also be adopted to assess and measure the attainment of actual benefits achieved as compared to the expected benefits derived during the business case assessment. Finally, customer satisfaction surveys can be restructured to measure the impact and adoption