Where to begin your Smart Grid Journey?

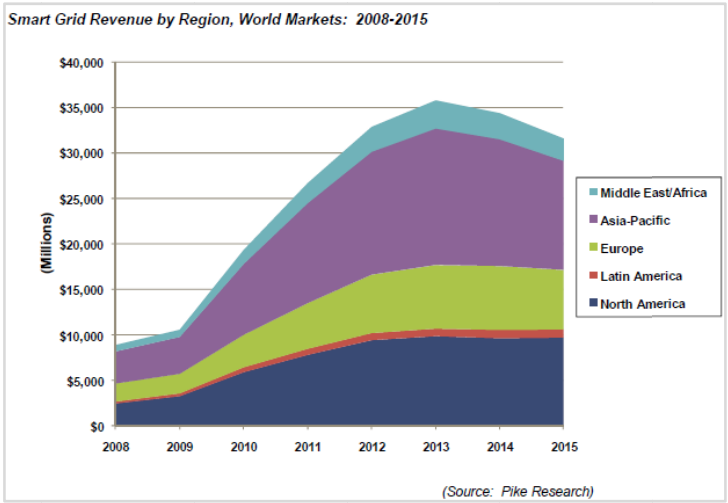
Introduction:

Most of the electric utilities in the world are taking steps towards implementing Smart Grid technologies irrespective of their size. Governments are providing grants to support investments aimed at modernizing the existing grid. Standards bodies and user forums have been engaged in creating mechanisms to support mass deployment of Smart Grid components and to facilitate interoperability between different pieces of hardware and software. Product vendors are keeping themselves busy in developing suitable equipment and applications to meet the future needs of Smart Grid. While a lot is happening around Smart Grid, several utilities are uncertain on the starting point of the whole journey.

Let us discuss these aspects in detail and understand as to why it is so and what can help utilities.

Worldwide Smart Grid Spending:

American Recovery and Reinvestment Act of 2009 set aside $11 billion for grid modernization. The Chinese government planned to invest $7.3 billion into the creation of an efficient Smart Grid. The IEEE Standards Association, the standards development body of the Institute of Electrical and Electronics Engineers, predicts India would emerge as the world's third largest smart grid market after the United States and China.Governments and utilities are expected to ramp up their investments in the electrical smart grid, spending a total of $200 billion worldwide from 2008 through 2015, according to Pike Research.



All these statements reflect the growing attention towards creating a smarter, stronger, more efficient and reliable electric system.

Interoperability Standards:

Despite the strong interest and generous funding from the government agencies and private bodies, there are certain barriersto be crossed for successful implementation of Smart Grid technologies. One such barrier is the interoperability of IT and operational systems which are used to manage and operate the grid. Interoperability refers to *the ability of two or more systems or components to exchange information and to use the information that has been exchanged.*This can only be achieved through the use of internationally recognized communication and interfacing standards.

Many standards bodies, including the National Institute of Standards and Technology (NIST), International Electrotechnical Commission (IEC), Institute of Electrical and Electronic Engineers (IEEE), Internet Engineering Task Force (IETF), American National Standards Institute (ANSI) and North American Reliability Corporation (NERC) are tackling these interoperability issues for the power industry. Users groups and consortia such as the Utility Standards Board (USB) and UCA International Users Group (UCAIug) are working to provide input and guidance for the development and implementation of these standards.Though some standards are evolved and are in practice, the electric utility industry is still far away from having common standards in place across all the Smart Grid functions. Industry experts believe that Smart Grid can be realized only when the standards are fully evolved and implemented.

Technology Evolution:

Another aspect of Smart Grid evolution is about the innovations, technological advancements andintroduction of new products and services to help achieve the Smart Grid objectives.Over the last fewyears, meter manufacturers were successful in developing advanced meters which allow two-way communication and interface with in-home display devices and data concentrators.Consumer technology vendors have been busy in transforming their appliances into smarter devices.Automobile industry has shifted its focus towards producing plug-in hybrid vehiclesthat work as an alternative source of energy in emergencies. Energy storage technology is taking a new shape, byrealizing new and improved ways of storing huge amounts of energy – some of the promising emerging technologies are Flywheels, Sodium–Sulphur Batteries and Superconducting Magnets.Clean energy policies have promoted the need of installing

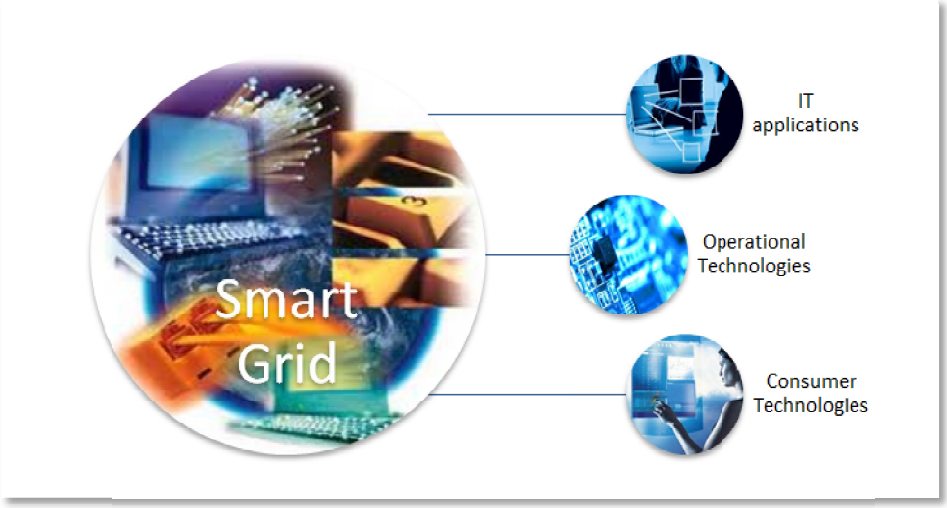
roof top solar panels and setting-up of more offshore / onshore wind farms.Last but not least, information technology companies have been investing time and money to develop Smart Grid 'killer applications' and in building capabilities to provide 'glue' services.

Emerging Trends:

There is a lot that is happening in and around Smart Grid. While some technologies have become matured enough for immediate implementations, some are still in the development stage. To quote a few examples, Meter Data Management (MDM) and Demand Response(DR) are fast emerging IT applications. In the operational technology segment, an increased trend is observed towards implementing Advanced Distribution Management System (ADMS). ADMS combines the functionality of both outage management and distribution management systems. On the devices side, Intelligent Electronic Devices (IEDs), advanced protection and restoration devices, and Phasor Measurement Units (PMU) are getting more attention because of their ability to make the grid self-healing and help in improving the reliability.In the consumer technology segment; smart thermostats, in-home displays, and smart appliances are the perceived leading trends. These are followed by technologies that enable electric vehicle integration in utility networks and incorporation of distributed generation resources (consumer-owned energy technologies).

What's Next?

From the above text, it is clearly evident that developing a smart grid implementation road map is a challenging task since it must address a number of important complexities. An individual/group that is responsible for developing a Smart Grid road map has to look at various aspects like maturity of the technology, availability of open standards, solution scalability, industry best practices and many more. This is where I believe there is a need to employ proven methodology / framework that can help assess the



current state of organization's readiness towards Smart Grid, identify priority areas and recommend next course of actions.

About SGMM:

The SGMM is a management tool that helps utilities plan their smart grid journey, prioritize options, and measure progress. Developed by utilities for utilities, the model is hosted by the Software Engineering Institute (SEI) at Carnegie Mellon University. The SEI, a global leader in software and systems engineering, security best practices, process improvement, and maturity modeling, is maintaining and evolving the SGMM as a resource for industry transformation with the support of the U.S. Department of Energy.

The SGMM describes eight domains containing logical groupings of incremental smart grid characteristics, which represent key elements of smart grid strategy, organization, operation, and capability:

- Strategy, Management, and Regulatory
- Organization and Structure
- Grid Operations
- Work and Asset Management
- Technology
- Customer
- Value Chain Integration
- Societal and Environmental

SGMM Approach:

SGMM Navigators are industry experts who have been trained and certified by SEI to guide utilities through the SGMM Navigation process. The Navigator works with the utility's smart grid team to complete the SGMM Compass on a consensus basis in a workshop setting—promoting valuable internal discussion of shared objectives. After scoring and analyzing the survey, the Navigator leads a second workshop to review the findings and use them to set consensus aspirations for an agreed planning horizon—and to discuss related motivations, obstacles and required actions. These outputs are valuable inputs into the utility's smart grid planning and implementation process and set the stage for using the SGMM as a progress tracking mechanism for smart grid implementation. Many utilities report that the interaction, discussion, and consensus building that occur in the two workshops is a substantial additional value from the SGMM Navigation process.

Applying the model begins with an assessment using the SGMM Compass, a survey instrument containing questions corresponding to each of the characteristics in the model, as well as demographic and performance information. Completing the Compass and having it scored yields a maturity rating for each of the model's eight domains. The levels of maturity represent defined stages of an organization's progress toward achieving its smart grid vision in terms of automation, efficiency, reliability, energy and cost savings, integration of alternative energy sources, improved customer interaction, and access to new business opportunities and markets. By assessing its current maturity level in each domain and taking steps to increase its levels as appropriate, an organization will move closer to obtaining the desired benefits of implementing smart grid features. The flexibility of the model allows a utility to establish its own unique target maturity profile as a target for smart grid implementation.

In addition to the maturity ratings, each Compass scoring report also includes aggregate data from all of the utilities that have completed the survey. Using this data, a utility can compare its survey responses and maturity profile to the community of SGMM users. Many utilities have reported that this comparison yields additional insights about their smart grid progress and plans.

SGMM Benefits:

SGMM navigation can help utilities to assess their current state of smart grid implementation, define their goals for a future state, and generate inputs into their roadmap preparation, planning, and implementation processes. Major investor-owned utilities and small public power utilities alike, in the US and around the world, have reported finding the model a valuable tool to help them:

- Identify where they are on the smart grid landscape
- Develop a shared smart grid vision and roadmap
- Communicate with internal and external stakeholders using a common language
- Prioritize options and support decision making
- Compare against themselves over time and to the rest of the community
- Measure their progress
- Prepare for and facilitate change

Conclusion:

Smart Grid is all about transformation from current state to being a self-healing and more reliable grid. It changes the way the utilitiesforecast the demand, restore outages, make decisions, and interact with their customers. The first step of any transformation is to be familiar with the present state, and to have a solid foundation to accommodate the upcoming changes to the system. After ensuring that the required foundational components are in place, the subsequent step is to make those components ready to meet new opportunities / challenges that Smart Grid creates.

As a licensed partner of SEI, Infotech can help utilities overcome those challenges and prepare better to begin their Smart Grid journey by conducting SGMM navigation process. Infotech's in-depth understanding of utility organizational models, network assets, spatial data, and industry trendsensures a thorough and comprehensive strategy for Smart Grid deployment.

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- Paper Reference No.: PN-15
- Title of the paper: Where to begin your Smart Grid Journey?
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