

## THE JOURNEY TO A SMART GRID

As we look to the future of the electric utility industry, visions of smart products and services provide an enticing glimpse into the possibilities ahead. A wide-ranging set of smart grid initiatives are now underway, sponsored and conducted by policy makers, utilities, technology providers and consumer/environmental groups. But the road ahead is unclear due to the fragmented way initiatives are being approached and the numerous challenges that must be overcome. We have not yet defined a shared vision and an orderly path forward with all stakeholders of the future electric power system. The purpose of the New Brunswick Smart Grid Summit is to establish a shared roadmap for the Information and Communication Technologies (ICT) sector for smart grid which we can accomplish together.

### What is a Smart Grid?

Over the past several years, many common characteristics of a smart grid have been defined (a summary view is depicted in Table 1). In simple terms, a smart grid is:

*The 2-way flow of energy and information to manage energy delivery (generation and control), consumption (demand), cost (to deliver and maintain) and impact (both societal and environmental).*

The goals of a smart grid are to smooth energy need and flow, managing to a dynamic, optimized balance point. Through features such as advanced metering and grid management, demand response, home automation, distributed generation and energy storage, we will reduce the need for costly infrastructure improvements. In turn, these features will increase reliability, flexibility, efficiency and safety from generation to consumers.

The transformation from the electric delivery system of today to a smart grid will incorporate existing and advanced technologies for integrated communications, sensing and measurement, controls, interfaces and decision-support. These will be deployed along with new regulatory and operational models that enable innovative products and services across the entire value chain.

Table 1: Common Characteristics of a Smart Grid

Smart Grid Value Chain Characteristics
(Merged from NRC Canada and US DOE - NETL Views)
<b>Enhanced and distributed power generation</b> - Accommodating all generation and storage options
<b>More efficient transmission and distribution</b> - Self-healing from power disturbance events - Operating resiliently against physical and cyber attack - Providing power quality for 21st century needs - Optimizing assets and operating efficiently
<b>Enhanced demand management</b> - Enabling active consumer participation in demand response
<b>Supporting integration and evolution</b> - Enabling new products, services, and markets

## *The Challenges are Our Opportunities*

Smart grid is not a short term goal, but rather a continuing journey that will take us into the next decade and beyond. We will move forward through a series of steps that must balance cost versus value, impact versus need and capability versus desire. Many initiatives are underway worldwide today, and we will be able to leverage the experiences – both positive and negative – from those endeavors. As recent news has shown with several advanced metering implementations, there are still many issues that must be resolved, both real and perceived, before large scale smart grid capabilities are a reality:

- Legislative and regulatory environments
- Standards to enable interoperability
- Cost versus benefit
- Privacy and security
- Acceptance among diverse stakeholders
- Scalability from proof of concepts to full implementation

But each of these issues is an opportunity waiting for feasible solutions.

During 2008 and 2009, global participants of the Smart Grid Maturity Model assessment have indicated that over 90% of utilities are just beginning their smart grid efforts. Early focus has been on the application of technology, but not its long range impact to the business or customer. As noted in the report, R&D Opportunity Description NB Smart Grid (NRC Canada, January 2010) future opportunities will be, “less focused on infrastructure and more focused on driving the concept... to extract meaningful value from the vast quantity of information that will be associated with the grid.”

Of the smart grid initiatives underway, most have scope limited to short term objectives and targeted solutions given today’s technologies and standards. To prove out the more extensive application of smart grid capabilities, we must move from narrow projects and point solutions (non-standard and vendor technology specific) to broader integrated deployments that force resolution of the difficult interoperability challenges. This cannot be undertaken alone. It will require a unique blend of policy makers, utilities, technology providers and consumers.

## *The Path Ahead*

Smart grid will come to pass as steps are taken, lessons learned and opportunities seized. As we reach one summit on the journey new challenges and opportunities will come into view. There will not be a one size fits all solution, but rather a set of products and solutions that can be molded into a smart grid that makes sense in each local instance. These will fit together into a broader system of systems smart grid that offers even greater benefits.

The promise of a smart grid will only be reached through an evolving journey. While we may have a sense of where we are going, nobody knows for certain where we will end up. Through focused efforts, an innovative spirit, calculated risk taking and our ICT community collaborating with all stakeholders, we can influence the future and accelerate the journey – together.