Siemens Integrates Utility Transformation and Community Energy Planning

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At the same time as Siemens Business Transformation & Solution Engineering (BTS) is executing Smart Grid Compass® Phase 3 (Routing) with a progressive Ontario Local Distribution Company (LDC), it is putting the utility at the centre of its innovative new Community Energy Planning (CEP) strategic framework, engaging the broader thought leadership/stakeholders of the LDC’s customers.

Introduction
Technology advancements like distributed energy resources (DERs) and digitalization enable energy infrastructure to regain a driving role in enabling economic, social and environmental value. Therefore, it is time for utilities to get back to their roots and drive infrastructure to enable increased prosperity in their communities. Led by Siemens BTS, in a progressive Ontario city the LDC is leading the charge in an innovative new form of energy planning that takes the community beyond efficiency and greenhouse gas reduction and into cooperative business model generation.

A successful infrastructure strategy requires a strong alignment between the utility providing services around infrastructure and the other participants consuming these services for value creation in this energy ‘ecosystem’. To avoid trial and error in achieving this alignment, Siemens is developing a new approach to modeling and planning the interaction of the participants within the energy ecosystem, including the utility. As a consequence, energy-based services can be seen as an abstraction of current infrastructure and open up possibilities for the community to exploit energy efficiency potentials and improve energy productivity.

An integrated utility transformation program, guided by Siemens’s Smart Grid Compass® methodology, and innovative enhancements to the community energy planning process aligns the efforts of the utility and the community to achieve the common goal of empowering communities to drive economic, social and environmental value (see Figure 1). The integrated plan serves both the utility and the community, addresses key energy usage (fossil or electrical from production to transportation), ensures that plans are actionable and fundable, and forms the core of an innovation ecosystem centered around energy.
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Figure 1 - Integrating Utility Transformation and Community Energy Planning

Siemens Smart Grid Compass®

Systems and solutions at local electric distribution utilities are often commissioned with well-defined expectations and are installed in order to address particular problems. However, when it comes to transition towards a smart grid, utilities face a profound paradigm shift. No single product or solution turns a legacy grid into a smart grid or a ‘utility of the future’. In the smart grid space with its high complexity and massive interdependencies, focusing on a single product for a single problem often does not work well. Business cases focused on one problem or objective often become negative and are not able to justify the required investments.

In today’s paradigm, the process of finding and leveraging synergies between different technology investments has become a key success factor for smart grid implementation programs. Although a plethora of technologies and products are available on the market, their complex features, described in dense jargon, make it unclear how synergies can be realized in real-world application or in a sequential implementation program.

To address these challenges, Siemens has developed the Smart Grid Compass® approach. The approach is comprised of four modular phases: Orientation, Destination, Routing and Navigation, with a view on six functional domains of a distribution utility’s business as follows:

- Smart Network Operations
- Smart Customer Service
- Smart Asset and Workforce Management
- Smart Energy
- Smart Organization
- Smart Product Portfolio Management

The first key goal of the Siemens Smart Grid Compass® is to support the internal alignment of the utility to create or strengthen a shared vision across departments, and to mobilize the entire organization around this unified vision.

The second key goal is to provide a structured set of programs and projects that will transform the utility into an organization capable of driving increased prosperity in its community. This community prosperity
goal is what ties the actions of the transformation program to community energy planning initiatives, described next.

**Community Energy Planning**

Community energy planning takes varying forms in various geographies, jurisdictions and regulatory regimes. The goals of community energy plans are primarily to improve energy efficiency, reduce greenhouse gasses and drive local sustainable energy initiatives within the community. The intent is to quantify energy consumption in the community and use this data to prioritize initiatives and efforts to achieve the stated energy goals and lead the community towards a defined energy vision.

Approaching these goals from a community point of view is intended to drive action in the form of energy generation and consumption related initiatives, but the authors found that it potentially leaves many opportunities for enhancing community competitiveness unaddressed and untapped. Ensuring the local utility is at the table and that they are in the process of pursuing their own vision of a utility of the future to support the community enables the utility to be at the forefront of community economic, social and environmental development.

**Framework**

The framework originated by placing the utility at the intersection of technology and human values, in the manner in which utilities were originally created. The long-term planning requirements of utilities, however, are frequently at odds with the often short-term and rapidly evolving demands of the modern economic system. So positioning the utility’s technological and human values-based origins alongside the demands of the organizations that consume the utility’s services leads to a framework wherein the community’s energy needs can be anticipated and met by the utility while the energy ecosystem is used as a platform for achieving the community’s objectives.

By integrating established methods like Siemens’s Smart Grid Compass® and Business Model Canvas [1], we have created a new modeling framework to capture energy-based interactions in the ecosystem of a community. In the third step of the method outlined below, we use this framework to identify opportunities for energy services and related value propositions (see Figure 2). This allows both utility and consumer to understand the added value, and therefore supports the effective definition and evaluation of potential new energy services.

![Figure 2 - Driving New Business Models Based on Energy Value Propositions](Adapted from Osterwalder, 2010)
Method

The method consists of three steps. The steps are conducted in a facilitated workshop setting designed to stimulate multi-stakeholder conversations around community energy. While the central objectives in conventional community energy planning are widely known, the present method is designed to extend the discussion beyond energy flows and inventories into a holistic discussion centered around higher order objectives in the economic, social and environmental space.

At the centre is the utility, as both a participant in the discussion and as a stakeholder in the outcome. And while the community energy plan may be a required product of such a discussion, the value to the community is in the planning itself. Outcomes are generated long before the plan is published, as stakeholders are motivated to act in concert and start to think in cooperative business models.

Figure 3 - Steps in the Method

Step 1 - Entity Classification & Energy Inventory

In the first step, organizations operating within the ecosystem are classified in an overall community energy ecosystem ontology. Groups of similar organizations form entity types with shared attributes. The key attributes that differentiate entity types in the energy ecosystem pertain to energy and include the overall energy profile, including types and quantities of energy consumed; peak power demand; energy uses (e.g. process heat, space heat, lighting, mechanical); and any amounts of shiftable load.

In parallel with the entity classification discussions, an energy inventory of the community takes place. However, the energy inventory step is where conventional community energy planning initiatives often end. Once the inventory is created the analysis often focuses on methods to improve energy efficiency, reduce energy consumption, and reduce greenhouse gas emissions, but sustainment of the plan execution has proven notoriously difficult. Going beyond the inventory and into the dialogue of energy use (and potential misuse) within the community can itself be a source of initiatives targeting the community’s socio-economic and environmental objectives.
Step 2 – Ecosystem Mapping
The second step involves extending the classification and energy flow analysis of step 1 into flows of other value currencies within the ecosystem. A value currency is defined as any form of value that can be exchanged between two ecosystem entities. Energy and money are two examples and are examined in detail in step 1. Others include finished goods, professional services, health & education services, as well as non-economic values such as safety & security. Mapping value suppliers and consumers, along with their inputs and outputs, using the ontology developed in step 1, facilitates the recognition of sources of value as they flow between entities. This can lead to a deeper understanding of the needs and requirements of entities within the ecosystem, facilitating the discovery of potential relationships that allow further value generation within the ecosystem.

These newly identified interactions provide the core of the idea generation that takes the community beyond energy transactions and into value creation.

Step 3 – Business Model Generation
The increased understanding of the identified and analyzed interactions between entity types discovered and described in steps 1 and 2 form the basis of the business modeling phase of the framework. In the third step, this deeper understanding of energy users, along with the forms, types and flows of value produced within the ecosystem, facilitates the creation of new business ideas and entirely new business models. As the understanding of value propositions within the ecosystem grows, and the language and tools of describing these value propositions are developed within the community, the divergent and analytical phase can begin to give way to the convergence and synthesis of new ideas. It is these new ideas that contribute to achieving the economic, social and environmental objectives that must guide infrastructure planning in this new framework.

Conclusion
This innovative framework and method for integrated utility transformation and community energy planning is guided by traditional planning principles, but takes the process beyond the analytical, data driven approach. The method enables users to synthesize new business ideas centered around energy in the community, using established methods including the Siemens Smart Grid Compass® approach, community energy planning, design thinking, and the business model generation method. Together, the method provides a powerful structure for utilities to get back to their roots and drive infrastructure to enable increased prosperity in their communities.

References