Collaborate to Innovate

Realizing the innovation potential of Canada's electricity system through cross-sector collaboration

ADVANCED ENERGY CENTRE
MaRS Cleantech | Ontario, Canada

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A joint activity of the Advanced Energy Centre and Siemens

Electricity markets around the world are in the midst of a major transition. The pace of technology advancement, changing customer expectations, emergence of new market entrants and increasing pressures from environmental policies, are leading to a paradigm shift in how future electricity needs are met.

This is all set against a backdrop of a multitude of other challenges with which electricity utilities are currently grappling. The current market situation in Canada shows increasing electricity costs, aging infrastructure, constrained operating budgets, increasing security threats and rising incidents of extreme weather events impacting the electricity system.

> The Conference Board of Canada estimates that some $350 billion must be invested in infrastructure by 2030, just to maintain the reliability of the Canadian electricity system.[1]

This 'perfect storm' has the potential to affect all areas of the electricity value chain, at a scale and pace not seen in the previous 100+ years of this industry in Canada, posing fundamental questions about the role of the traditional electricity utility. Many utilities are asking themselves what is required in order to become future-ready in this changing energy landscape.

Faced with this new reality, utilities must become more agile and adopt alternative approaches to how they do business. As new technologies become available and customer demands evolve, new business models are needed to operationalize technology innovations and drive value for the utility and the electricity sector as a whole. Technology readiness needs to be married with business and system readiness, in both regulations and policies.

The complexity and scale of the transformation in this sector requires a truly collective effort across the entire electricity system to overcome challenges and find opportunities amid this disruption. Players will need to understand the drivers and perspectives of other stakeholders. Aligning on common goals and forming mutually beneficial partnerships are the most efficient, high-value approaches navigating this changing landscape and creating a future-ready electricity sector.

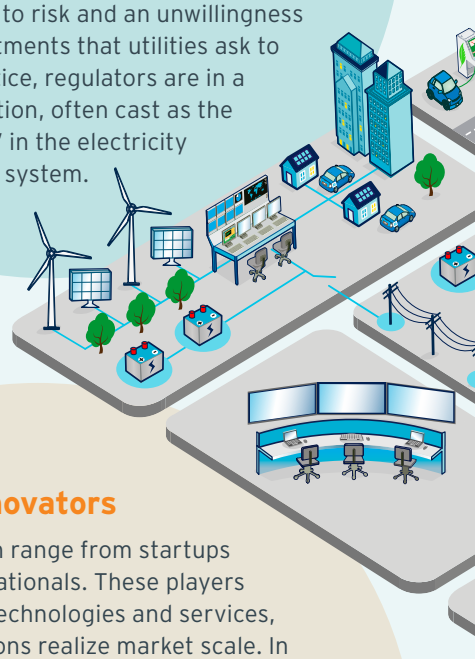
Perspectives on Innovation

The MaRS Advanced Energy Centre has surveyed players from across the energy system, including utilities, government, regulators, large corporates and innovators. A key finding was that the vast majority do agree that innovation is key to a future-ready electricity sector. And yet, many innovative projects and initiatives in this sector are still occurring at the pilot scale only, with minimal commercial scale, sector-wide adoption. The pace of the transition from pilot project to scaled adoption must fundamentally increase.

The Advanced Energy Centre has found that each player is, for the most part, acting rationally given their respective positions in the energy sector and the corresponding risks, rewards, pressures and expectations. However, each has their own motivations, perceived mechanisms and interpretations of how best to implement innovation. Even though energy players are supportive of innovation in the sector, progress towards this common vision can be stifled as each entity faces barriers and makes assumptions based on their individual position within the system.

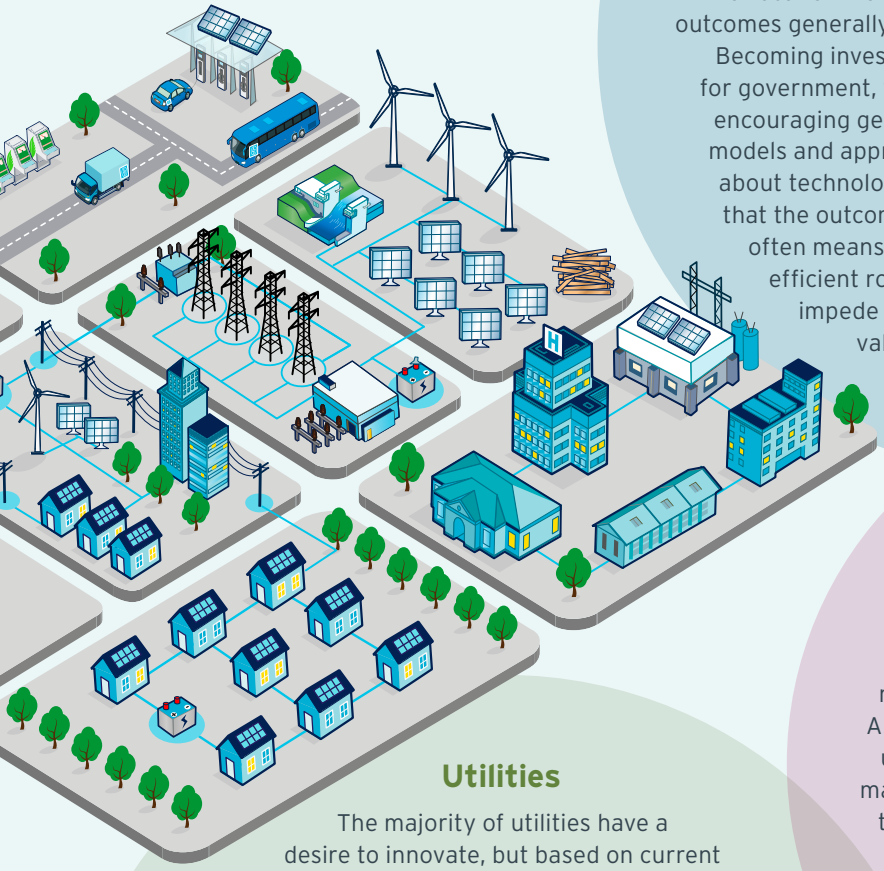
Regulators

Regulators want innovation to occur as a pathway to a flexible system that lowers rates for customers. They see their role as protecting the ratepayer and feel that there needs to be appropriate sharing of risk and reward in new investments on behalf of the utility. Like all players in the system, they have to balance near-term needs of the system with longer-term vision. This often is framed as aversion to risk and an unwillingness to approve investments that utilities ask to make. In practice, regulators are in a difficult position, often cast as the 'bad guy' in the electricity system.



Innovators

Innovators can range from startups to large multi-nationals. These players want to sell their technologies and services, and see their solutions realize market scale. In general, they will find the path of least resistance to market, which often means selling incrementally better solutions through existing supply chains. Both startups and corporates want access to customers, with startups being constrained by limited access to capital in particular. Although startups are often more flexible and nimble than other players in response to market changes, the energy decision cycles and market structure are not conducive to a quick and scaled adoption of their new approaches and solutions.



Government

Government wants to encourage innovation, and sees it as a means to demonstrate progress, enlightened policy and economic growth. However, given the need to demonstrate clear correlations between policy and results – often in relatively quick timeframes, defined by electoral cycles – government can struggle with developing effective innovation policy in the energy sector, where outcomes generally take longer and can be difficult to attribute. Becoming invested in specific outcomes is commonplace for government, which is not conducive to incentivizing and encouraging genuine innovation (in technology, business models and approaches to the market). Being prescriptive about technologies (e.g. install xMW of solar PV), rather that the outcome (e.g. x% reduction in GHG emissions), often means that policy does not achieve the most efficient route to the end goal and can actually impede new innovations that offer higher value solutions at a lower cost.

Customers

For the most part, consumers see electricity as a right. They have an increasing awareness of technology alternatives, ith media coverage around big brand names like Tesla EVs and Powerwalls, the rise of residential solar and home energy efficiency. As a result, they are becoming more engaged with the use of innovative technologies for their own energy management and potential load defection, especially in the face of increasing electricity costs. With the rise of personalized service delivery and engagement in other sectors, there is a growing expectation among customers of similar engagement levels in their electricity use. As such, they are a key driver for change in utility operations and business models.

Utilities

The majority of utilities have a desire to innovate, but based on current business models, generally assume that the path to innovation adoption is through the rate base. In most sectors, innovation is viewed through a lens of risk and reward: higher risks, when well managed and executed, leads to increased rewards. The challenge with pursuing innovation through the rate base is that risks are not properly allocated and rewards are fixed (based on rate of return). Often for utilities, innovation is constrained by business models that depend on fixed rates of return, and not on risk investments with commensurate rewards (or losses). In addition, system reliability is generally viewed as paramount – limiting opportunities for even managed risk inside electricity systems. Real or imagined, they generally feel constrained by regulatory structures and decision cycles. In addition, utilities often have difficulty attracting and building entrepreneurial talent in their organizations, with many worrying about the skills and resources gap they may face with the impending sector transformation.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The Path to Innovation

Aligning perspectives and collaboration

The path forward is not to independently navigate energy sector transformation, but to collaborate with other players to fulfil common sector interests.

The changes happening in the electricity sector are complex, interdependent and occurring at an unprecedented rate. As such, true innovation cannot happen through the siloed actions of each player, but will require coordination across the entire system – in policy, regulation, infrastructure, operations, customer relationships and business models. This level of collaboration will push energy players past their comfort zones, yielding different priorities and fresh perspectives.

One of the first steps to identifying areas of collaboration and mutually beneficial partnerships, is to adopt an opportunity-centred or problem-centred model for stakeholders, rather than an organizational-centric model.[2] Traditionally, organizations place themselves at the centre of stakeholder models and view partnerships only in terms of the relationship to their organization.

With the increasing complexity of the electricity sector, thinking in a siloed and linear way about identifying stakeholders stifles the ability to find holistic solutions and new areas of value. Instead, organizations should identify the problem or opportunities in the context of the entire system.

- Who are the stakeholders that are impacted by this problem or opportunity?
- Who are the stakeholders that might impact our ability to achieve the desired outcome?
- Who are the stakeholders we may impact when achieving this?
- What are the perspectives of these players?
- Are there areas of alignment between these different stakeholders?

Seek out partnerships that challenge conventional thinking

In understanding these other perspectives, utilities can uncover unexpected and complimentary motivations of other energy players and find a shared vision for what needs to be achieved.

Motivations for fostering cross-sector collaboration may include:

- Understanding perspectives allows for fresh views on problems and opportunities
- Sharing competencies in the form of knowledge, skills and new ideas
- Sharing resources in the form of financing, technology capabilities and assets
- Finding new streams of business or organizational value
- Creating the conditions for innovation to meet societal needs

Sharing Competencies and Resources

With few exceptions, Canada's electric utilities have largely divested themselves of their in-house research and development (R&D) arms. In addition, with the changing needs of customers, emerging business models and the digitalization of the grid, utilities require an increasingly diverse skills set, over and above the traditional engineering-based workforce. Attracting this new talent can be difficult for utilities, as they are competing against private sector players and the excitement and fast-paced nature of the startup community.

Partnering with private companies, innovators and startups can allow utilities to enhance their competencies and available resources, without having to spend time and money on building this technology, knowledge and talent base internally from scratch. Through collaboration, utilities can leverage diverse expertise, bridge the emerging skills gaps and bring new ideas and technologies to the fore for the benefit of their customers and bottom line.

For private sector players, innovators and startups, utilities often have the desired infrastructure, critical scale and customer-base to test and commercialize their solutions. They can leverage the expertise and feedback from the utility to design whole solutions for the grid and electricity customers, which can be integrated with existing infrastructure to meet compliance standards and operating requirements.

Collaboration between larger private sector players and early stage innovators, such as universities and startups, can also deliver the benefits of shared competencies and resources. Startups are often resource constrained. They want to test and deploy technologies and are looking for access to market intelligence, customers and finance. Private sector businesses often have the budget and risk capital to fund innovative projects. These private players benefit from a preview of emerging technologies, and they also may possess the complementary platforms, technologies or supply chains to enhance these new market offerings and add additional levels of value.

The Smart Grid Innovation Network (SGIN), Brooklyn Microgrid (BMG) and Zibi case studies (pages 14 to 17) provide examples of projects and partnerships that exhibit these competency- and resource-sharing motivations. Through SGIN, innovators at various stages of commercialization can test their technologies in sandbox and grid interoperability environments. Siemens and NB Power have exposure to emerging technologies that could soon be deployed across the sector, with the bonus of being able to test the interoperability of these technologies with their own assets and infrastructure.

In the BMG case study, LO3 is developing the project as well as providing its blockchain platform, and were able to build off Siemens Digital Grid's existing microgrid technologies to deliver a more holistic solution. Siemens next47[3] provided financing, project expertise and advice, as an entity focused on supporting potentially disruptive technologies like peer-to-peer trading of electricity.

Discovering New Value Streams

The Brooklyn Microgrid is an example of innovators and the private sector partnering to deliver cutting-edge technologies that could have a potentially significant impact on future utility business models. Transactive energy and peer-to-peer energy markets challenge the traditional centralized grid delivery model, through two-way decentralized transactions. Although the utility was not involved in this project directly, blockchain technology is an area where the utility has the potential to play a big role.

In the Zibi case study, a One Planet Living development under construction in Ottawa, the real estate developer and the local utility — Windmill Development Group and Hydro Ottawa, respectively — are partnering to create a concept micro utility to serve the energy needs of this new community. This project is an example of how collaboration across the sector can help deliver new value streams and business opportunities.

The creation of the Zibi micro utility allows the developers to leverage the electricity distribution experience and expertise of the local utility. For Hydro Ottawa they have maintained a relationship with the customer, and will deliver new behind-the-meter services through this micro utility. Traditionally, these large scale developments entail the utility delivering electricity to a campus submeter, with the project owner and developer holding the relationship with the final end user.

However, in this project the local utility maintains a connection to customers and uses this position to develop alternative business lines behind-the-meter. The innovation community will also have the opportunity to demonstrate and showcase their technologies and solutions in this high-profile and large-scale development, while the micro utility can leverage these to deliver cutting-edge energy solutions to benefit residents and business owners.

With disruptions in the traditional business models of other sectors, such as accommodation and transport through AirBnB and Uber, customers are increasingly expecting the same level of convenience and tailored service from their utilities. New non-traditional players are entering the energy industry, to deliver energy services directly to customers, such as self-generation, energy storage and energy management solutions. The conventional customer/utility relationship is being disrupted. With the market competition heating up and the need to meet evolving customer expectations, utilities will likely find it increasingly difficult to maintain their position in the sector.

Customer-Centred Approach

However, by partnering with the private sector and innovators, utilities can discover areas of new value for customers and construct new business models to deliver this value. In the Zibi project, the utility partnered with the Advanced Energy Centre at MaRS to host a design charrette workshop,[4] with the aim of creating an energy vision for the community. This workshop brought together potential energy stakeholders such as end users, technology providers, policy makers and industry experts. Attendees used human-centred design thinking to surface energy solutions and services that the micro utility could offer, that were tailored to the needs, expectations and everyday experiences of the Zibi residents and business owners.

Utilities should also consider how they could develop mutually beneficial partnerships with customers. Technology advancements and the increasing desire for customers to manage their own energy presents opportunities for utilities to derive customer value and grid management opportunities simultaneously. The rise of personal EVs, vehicle-to-grid (V2G) technology could allow utilities to reach into the customer's home and leverage their EV battery for demand management purposes. Similarly, the Vermont-based utility Green Mount Power recently piloted an initiative where they provided customers with various affordable purchasing models for the Tesla Powerwall battery. Under the shared access purchasing models, the utility can use the Powerwalls for demand management purposes.

Creating the Conditions for Innovation

According to a 2016 study by PWC, 71% of Canadian utility executives surveyed felt that government policy and regulation have the most impact on their companies at this point in time, compared to 52% of the counterparts globally.[5]

In understanding the perspectives and constraints of other electricity system players, policy makers and regulators have the power to create better incentives and mechanisms that accelerate innovation for economic, social and environmental gain.

For example, the main catalyst for much of the innovation occurring in New York, including the BMG project, is New York's Reforming the Energy Vision

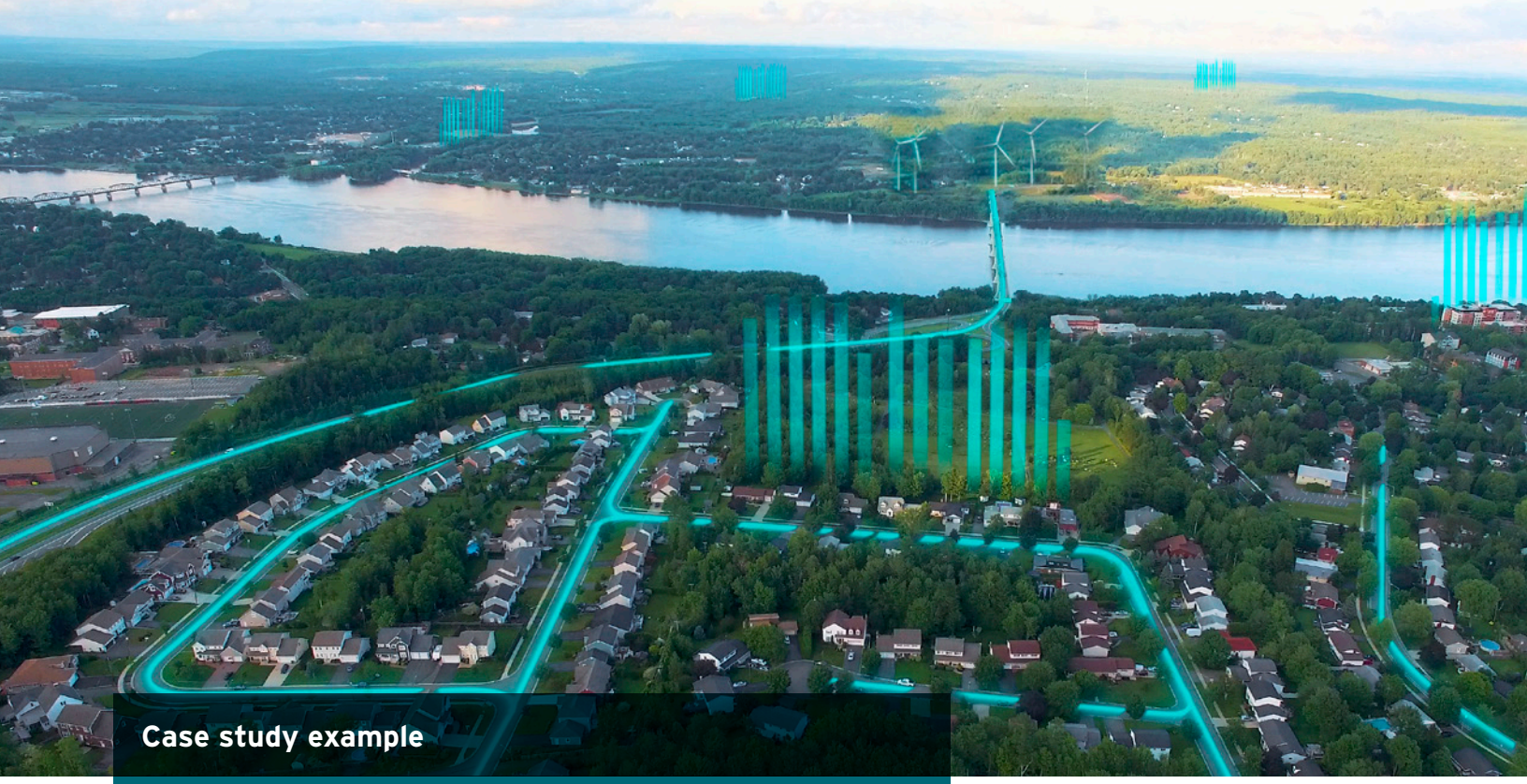
(REV). The policy vision laid out by REV creates the conditions for advancing the State's electricity sector and uncovering alternative business models for utilities amidst this changing energy landscape.

Societal goals were the main driving force behind this new regulatory approach. In the aftermath of Hurricane Sandy, Governor Cuomo, the New York Public Service Commission (PSC), the New York Energy Research and Development Authority (NYSERDA), the New York Power Authority (NYPA), and the Long Island Power Authority (LIPA) worked together on REV to move towards making the energy system cleaner, more resilient, and more affordable. This plan seeks to actively spur energy innovation, bring new investment into the State and improve consumer choice.

Current regulations often negate the ability and incentive for utilities to innovate at scale. There is a need for regulators to consider how to appropriately create risk and reward dynamics in the system to drive innovation. This is challenging, but a focus on regulating for outcomes, with much broader discretion provided to utilities in terms of investment decisions (and even investment modes), and more creative return models that do not simply reward capital investments, would be a good start.

For government, collaboration around innovation extends further than simply conducting consultations with industry and the public on specific policy instruments. This has never been more true than today, with the increasingly complex sector, rising electricity prices in most provinces and mounting pressures to decarbonize our energy systems. Pooling of expertise and resources across the sector is needed to surface the holistic solutions required to tackle these issues.

Outcomes-based procurement models are gaining traction on the international stage, with organizations such as the World Bank highlighting this as a key area of focus for improving procurement efficiency — especially when it comes to public dollars.[6] Under this model, a customer contracts and pays for results delivered rather than a defined activity, task, or asset — a move from focusing on the "how" of traditional procurement to the "what." Without prescriptive process specifications, the innovation community is free to propose any solution that delivers the desired outcome. Payment is based on the delivered outcome, incentivizing suppliers to find the most efficient, cost effective and high-value approach.



Case study example

Smart Grid Innovation Network (SGIN): Igniting the Energy Economy

Overview

Aligning with New Brunswick's vision for a sustainable electricity future, the Smart Grid Innovation Network (SGIN) was launched in Fredericton, Canada by founding partners Siemens Canada, New Brunswick Power (NB Power) and University of New Brunswick (UNB). SGIN is a joint smart grid testing platform for vendors that aim to serve as a catalyst for innovation and the development of a next generation electricity eco-system in New Brunswick, while supporting opportunities for business and technology innovation that can be taken to the global energy marketplace.

The Partnership

The Smart Grid Innovation Network supports businesses to design, develop and test smart grid related products, services and solutions, by offering them access to a unique smart grid lab environment that spans the technology maturity spectrum, from research through to grid-ready. This one-of-a-kind environment provides vendors an opportunity to overcome complex technology hurdles in order to evolve their product or service to the next level of 'smart and connected', so it can communicate with other products and the electrical grid. SGIN will allow vendors to get ready for smart grid opportunities not only for NB Power smart grid related deployments, but also the opportunity to take their product or service to other markets around the world.

The SGIN is centered around three interconnected labs, each with a number of virtual and physical elements. Each lab is led by one of the SGIN partners and will serve as on-ramps to business and organizations from New Brunswick and around the world, to innovate, design, test and take to market, products and services in the smart grid, smart energy, and sustainable electricity space.

Perspectives

Education: University of New Brunswick

The Smart Grid Research Lab at the University of New Brunswick provides R&D support in the early stage of the innovation cycle, providing a platform for developing new smart grid concepts, models and algorithms to feed into technology development, as well as to support testing in a simulated grid environment. This lab also supports advanced power systems research and education, coupled with hands-on real world experience. This lab environment provides startups and technology innovators with access to UNB's researchers and resources to support further development of their ideas.

"At UNB, we're very proud to be at the forefront of smart grid research and development. Our collaboration with NB Power and Siemens on the Smart Grid Innovation Network is one of the many examples of the rich ecosystem of innovation we have in this province. Investments such as the SGIN are incredibly important to the work we do at UNB and enable our researchers to work together with other stakeholders and innovators to the benefit of all. We see immense potential for the SGIN to foster the co-creation of intellectual property at the cutting edge of smart grid technology."

– Dr. David Burns, Vice President, Research, University of New Brunswick

Private Corporation: Siemens

The Interoperability Lab at Siemens conducts R&D testing to allow vendors to advance the interoperability of their products' various smart grid related components, by providing a configurable sandbox environment.

"We are incredibly excited about SGIN as a catalyst for innovation and development in the business community with smart grid ready products and services as the outcome — not only to support smart grid deployment here in NB but to promote it throughout the Siemens world and beyond."

– Robert Hardt, President & CEO, Siemens Canada Limited

Utility: NB Power

The Products and Services Lab at NB Power conducts R&D and testing on utility grid operability, and acceptance testing by validating product requirements and compliance readiness. This lab also supports training and provides a platform for outreach and demonstration activities to advance smart grid knowledge in the region. This partnership allows NB Power to be a pioneer at testing new innovative technologies and bringing these technologies and solutions to their customers.

"While our primary goal is to transform the electricity system in New Brunswick to bring customers greater value and services, we also have a tremendous opportunity here to help local businesses get their smart energy products market-ready. This new network will provide local and global companies a chance to build on the R&D already happening here and promote greater innovation for the benefit of New Brunswickers."

– Gaëtan Thomas, President and CEO, New Brunswick Power

Innovators

The SGIN provides all types of smart grid related established businesses and vendors, as well as new innovators and startups, with access to various lab environments to support the development and solidification of heir concepts and ideas. SGIN provides an environment to test products and services for interoperability, as well as conduct utility grid impact and customer acceptance testing.

Case study example

Brooklyn Microgrid: Innovative Microgrid Solution

Overview

LO3 Energy, a startup company in New York, is working with Siemens Digital Grid and Siemens startup financer next47, to develop a blockchain-enabled microgrid in Brooklyn. The Brooklyn Microgrid (BMG) is a network of energy relationships supporting the generation of renewable energy within the local neighbourhood. BMG is a demonstration of many of the objectives of New York State's "Reforming the Energy Vision" (REV), an initiative aimed at increasing the penetration of Distributed Energy Resources and remodeling the electric grid in New York.

The Partnership

LO3 Energy and Siemens have partnered to jointly develop a blockchain-enabled microgrid with local energy trading capabilities which operates in parallel to the main grid. This pilot project was possible because of collaboration amongst different partners within the energy space.

LO3 Energy's "TransActive Grid" is a blockchain platform that records each transaction within a chain of secure blocks, which documents energy generation, consumption, and transactions. Siemens Digital Grid offered its' microgrid-specific technical solutions – Microgrid Energy Management Platform – and Siemens start finaner next47 supports potentially disruptive technologies like TransActive Grid through financing, project expertise, and advice. This demonstration project will integrate Siemens Microgrid controller and LO3 Energy's blockchain platform to control generation assets and enable peer-to-peer (P2P) trading.

This project began in early 2015, with the first-ever peer-to-peer transactions occurring in April 2016 between one neighbour who didn't have solar panels and another who produced excess solar power.

Perspectives

Startup: LO3 Energy

The Brooklyn-based startup is developing several projects nationally and globally to demonstrate how the technology can enable new markets within the electricity sector, resulting in new value and services for grid operators and customers. BMG was the first of these projects and allows LO3 Energy to serve as a project developer in addition to technology provider and market maker. By partnering with a large corporation like Siemens and their startup financer next47, LO3 Energy acquired additional funding to connect their transactive platform with Siemens, work with Siemens experts and institute the Siemens microgrid control solutions for use in BMG.

"LO3 Energy is focused on allowing utility grid participants to have more choice. That means providing consumers with choice about where their energy comes from — we think they will prefer local, clean energy — based on their values and economics. That also means allowing prosumers to choose what they do with the energy they produce or store. As customers become active participants, there is a huge opportunity to provide the new services these customers are seeking."

– Lawrence Orsini, Co-founder and CEO, LO3 Energy

Private Corporation: Siemens

Siemens Digital Grid in the US and the startup financer next47 capitalized on the opportunity to be involved in this pioneer project supporting the movement toward a distributed energy supply system that draws on renewably-generated sources. The microgrid control solutions, provided by Siemens, controls the operation of microgrids in all circumstances, including traditional grids. Traditionally the innovation cycle in large corporations is of a longer duration than startups. By partnering with LO3 Energy on this innovative project, Siemens is able to use this as a platform to quickly assess blockchain technology in creating new business potentials and go-to-market strategies.

"Just as our partner LO3 Energy, we are envisioning tremendous opportunities for the application of the blockchain technology, especially in microgrids with distributed and decentralized energy systems. Its big benefit is that it permits transparent and efficient trading between multiple participating systems and various stakeholders, while taking grid-specific requirements into account."

– Thomas Zimmermann, CEO,
Siemens Digital Grid Business Unit

Residents

Consumers can purchase renewably-generated electricity and prosumers can become electricity suppliers.

Consumers are becoming more engaged in their energy usage and are demanding new technologies for energy management. The Brooklyn Microgrid enables residents with a level of self-sufficiency, whereby residents who are ideally situated for solar generation become prosumers and sell their excess energy to consumers that don't have solar installations. These consumers can choose to purchase local energy generated from renewable sources or from the nearest conventional power plant. This microgrid provides consumers with self-sustainability and resiliency to environmental disasters and helps reduce their carbon footprint."

"Having that local control and owning your own home, as a lot of people in Park Slope do, are some of the things that also empowered people to put value into action and go out and install solar panels."

– Bob Sauchelli, one of the first participants in the Brooklyn Microgrid

Future Utility Involvement

Although the local utility is not currently an active participant in this project, this kind of application holds the promise of potential new business opportunities for these players. At present, utilities' views are mixed on the topic of peer-to-peer energy trading, but many are interested in understanding the concept and how it can fit into their current businesses. Utilities are learning and exploring whether the blockchain peer-to-peer trading could play a significant role in whatever new business models emerge.

Case study example

Zibi Community: Customer-Centered Design and a Micro Utility

Overview

Zibi is a brownfield redevelopment currently under construction in Ottawa, Canada. The 40-acre site will include a mix of commercial and retail properties, condominium developments, a hotel, waterfront parks and open spaces. Led by Windmill Development Group and Dream Unlimited Corporation, the Zibi community has been identified by Bioregional as Canada's first One Planet Community and only the tenth worldwide. The project represents an opportunity to deploy innovative technologies and solutions that will result in heightened consumer engagement, decreased carbon emissions, guaranteed cost-savings, and increased resource efficiency.

The Partnership

The local electricity distribution company, Hydro Ottawa, and Windmil Development Group are partnering to deliver the sustainable energy goals of the Zibi development. They created a concept micro utility, that will serve all elements of the development's energy needs, including heating, cooling and electricity. In addition, they have employed a user-centred design approach to develop an energy vision for the site, and demonstrated a commitment to collaborating with the innovation community to realize this vision. This micro utility adopts a holistic approach to energy consumption and delivery, in ways that integrate investments in efficiency, ongoing conservation, and energy management into the business model of the micro utility itself. This is a marked departure from traditional models that stops at the simple delivery of energy to residential and commercial units.

Perspectives

Utility: Hydro Ottawa

The utility has the opportunity to maintain the customer relationship and explore new business models for delivering behind-the-meter energy services.

Often, for a large campus development like Zibi, Hydro Ottawa would be limited to delivering electricity to the private campus meter. The customer relationship would be confined to the campus owner and operator. The micro utility partnership will be executed through Hydro Ottawa's non-regulated affiliate. This unique structure allows for a more seamless customer-centric offering, spanning both energy delivery and other energy services, unconstrained by the traditional demarcation of the meter. There is potential for this business model to be repeated in other brownfield redevelopments, enhancing the addressable market for the utility in the longer term.

"We decided to partner with Windmill on this project because quite frankly we couldn't afford not to. This is an exciting partnership which gives Hydro Ottawa the opportunity to work on a zero carbon project initiative whilst making a foray into the district energy arena. We believe our experience in electricity distribution, energy management services and renewables will be a valuable contribution to this One Planet Living development."

– Mark Fernandes, Chief Information and Technology Officer, Hydro Ottawa

Private Sector: Windmill Development Group

The developers benefit from Hydro Ottawa's existing talent base, expertise and experience in energy distribution, as well as the ability to leverage the trusted relationship the utility has with its customers.

Windmill recognized the immense benefit of partnering closely with the local utility, in being able to leverage Hydro Ottawa's experience and skills in energy distribution. Windmill wished to integrate this knowledge into the design of Zibi's energy system, and to the benefit of the residents and business owners.

"At Zibi, we are striving to build one of the first zero carbon District Energy systems in North America, which will be at the core of this future community. While we had the inspiration and the drive, this project wouldn't have moved forward without the innovation and expertise of Hydro Ottawa, who brought both credibility and success. Hydro Ottawa has clearly demonstrated themselves as a utility thought leader, and an excellent partner to drive innovation."

– Jeff Westeinde, Founding Partner, Windmill Development Group

Zibi Future Residents and Business Owners

The end-users benefit from an energy system that is customer-centric in its design.

Lifestyle choices and responsible energy consumption patterns are integral factors in achieving the objectives laid out in the One Planet Living standard. The community itself has been design with the residents' experiences and behaviour choices in mind. This human-centred design extends to the energy system design also.

In May 2016, Hydro Ottawa partnered with the Advanced Energy Centre at MaRS to convene a group of innovators and energy experts to identify alternative, customer centered solutions for incorporation into the energy system at Zibi. The attendees started by defining the human experience for the energy system, and then examined how tools and technologies can augment or enable good behavioural choices.

Innovation Community

The innovation community has the opportunity to test and showcase their technologies and solutions in an innovative, high-profile and large-scale development.

Following from the May 2016 brainstorming session, the ideas generated have been refined and prioritized by Hydro Ottawa and Windmill. Current technologies under consideration for integration in the community are district heating and cooling, a consumer-facing sustainability concierge application, and visualization tools to encourage net-zero lifestyles within Zibi.

The developers are currently exploring the opportunity — within an Energy Innovation District — to test and validate new energy technologies within Zibi, as well as showcase tools and systems from Canadian entrepreneurs.

Conclusion

> The knowledge base of today's electricity sector is both complex and expanding, with the sources of expertise widely dispersed. The locus of innovation will be found in diverse networks, rather than within individual organizations.[7]

As the landscape that utilities are operating in evolves, awareness and recognition of each player's perspective within current structures is critical to better understand how to adopt innovation at an accelerated pace. When dealing with a highly complex challenge, like that currently facing utilities, new perspectives and varied skillsets are essential to problem solving and taking full advantage of the opportunities that this transition presents. Partnerships and collaboration will be key to helping utilities successfully navigate, thrive, and develop robust business models and strategies in this rapidly changing sector.

Utilities should employ a problem/opportunities-centred approach and ask critical questions about what they are trying to achieve and who could potentially impact their ability to achieve it. This approach helps to uncover areas of alignment with other stakeholders, as well as new partnership opportunities.

The benefits of cross-sector collaboration include the ability to share competencies (i.e. knowledge, skills and new ideas) and resources (i.e. financing, technology capabilities and assets) on a mutually beneficial basis. This level of collaboration can help energy players find new streams of organizational or business value.

This is especially true when it comes to the evolving relationship between the utility and customers, where the emergence of new market entrants is accelerating the erosion of the traditional utility value proposition and revenue stream. By partnering with the private sector and innovators, and employing a customer-centric design approach, utilities can discover new areas of value and construct new business models to deliver this value. Partnering directly with customers to deliver new products and services is becoming an increasingly viable option as technology progresses.

Regulators and government have a pivotal role in incentivising innovation. A focus on regulating for outcomes, with much broader discretion provided to utilities in terms of investment decisions — and even investment models — as well as more creative return models that don't simply reward capital investments, would be a good start. The adoption of outcomes-based procurement models can also be used as a means of incentivizing suppliers/service providers to deliver the most efficient, cost effective and high-value approaches.

The electricity sector is going through a transition and stakeholders cannot afford to adopt a "do-nothing" approach. Cross sector partnerships are needed to bring electricity innovation to scale. To date, the vast majority of these initiatives and projects have occurred at the pilot and demonstration level. Today's sector players have the will and the capacity to identify interventions that enable the systemic adoption of innovation. However, each player cannot achieve this alone. Collaboration is key to realizing the true innovation potential of Canada's electricity system.

ADVANCED ENERGY CENTRE
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The Advanced Energy Centre (AEC) is a public-private partnership with the mission of fostering the adoption of innovative energy technologies in Canada, and leveraging those successes and experiences into international markets. The AEC is a part of MaRS Discovery District, one of the world's largest urban innovation hubs. Recognizing the difficulty of adopting innovation in a highly regulated energy sector, the AEC works through its network key sector players to enact change. Using strategic programming to overcome the systemic barriers to market entry, scale-up and export, the AEC is a catalyst for the adoption of leading edge energy technologies. It works with over 150 Canadian ventures in the cleantech and energy sectors, actively developing partnerships that will help bring their technologies to global markets.

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