

 #FutureLDC



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Mattamy Athletic Centre

THE LDC OF THE FUTURE

Conference Proceedings

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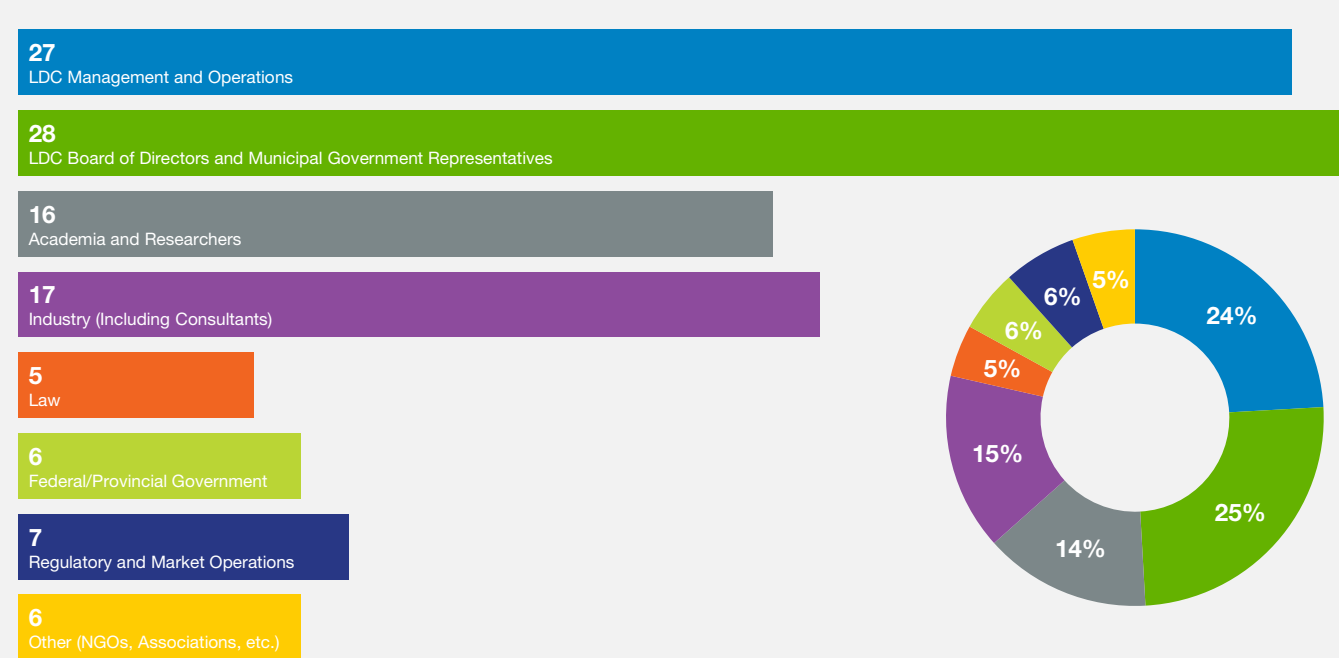
Norm Fraser
Chief Operating Officer, Ottawa Hydro

Timothy Curtis
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Michael Angemeer
President and Chief Executive Officer, Veridian

We also extend our thanks to the over 110 conference attendees who enlivened the day with thought-provoking questions and discussion.

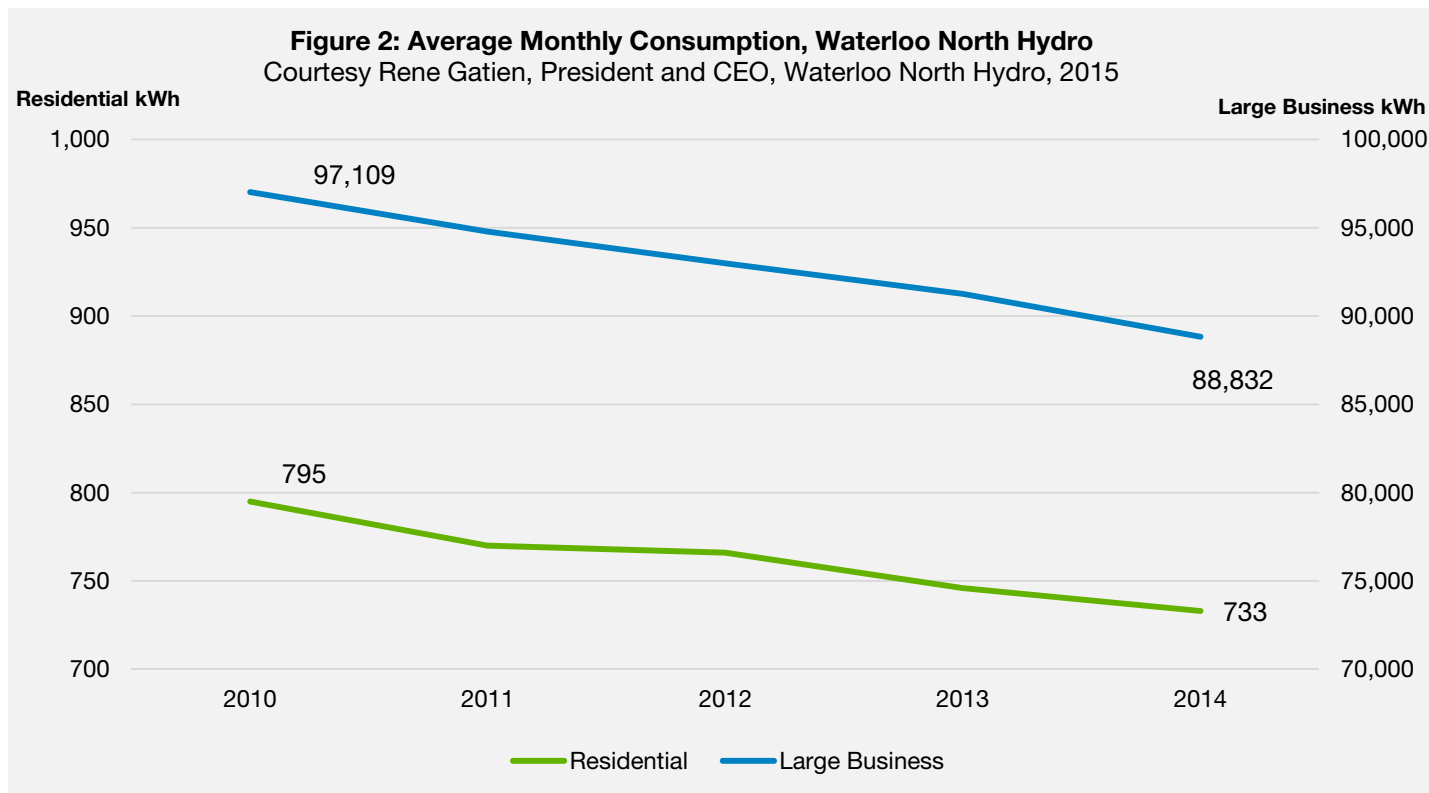
Figure 1: Participants by Professional Association



Session 1: The Challenge

Dr. Dan McGillivray, Dr. Bala Venkatesh and Sean Conway (Moderator)

Our day began with Dr. McGillivray outlining the challenges LDCs face. Their workforces are aging at a time when the grid is in need of substantial refurbishment. Climate change is increasing the frequency and intensity of severe weather events. The market for electricity is in a period of negative wholesale pricing and ever increasing customer rates, while rising supply and falling demand levels have led to a surplus of electricity outside of the Greater Toronto Area. All the while, the average electricity consumption is showing signs of decline (Figure 2).



The emergence of new, disruptive technologies poses a significant challenge. “Moore’s Law” defines the rate of innovation in the computing community: the processing capacity and speed of a processor doubles every two years. Today’s iPhones have greater computing power than the Apollo spacecraft. It is becoming apparent that innovation in the electricity sector is accelerating at a similar pace. Further, the rate of customers adopting new technologies is also accelerating. Five dimensions control the velocity of these changes: market demand, technological innovation, alternatives to the grid, the regulators ability to regulate, and competition from new entrants to the market (Aliff 2013).

Today, the typical home draws electricity from a centralized grid. Many Ontarians have installed solar (photovoltaic) panels. These panels are the vanguard of the changes ahead. Soon a household-sized battery will allow consumers to store the electricity they generate. Dr. Venkatesh believes that in the coming decades, micro-grid controllers, batteries, solar panels, and natural gas microturbines will allow Ontarians to generate and store their own electricity, reducing their need to be connected to the LDC network.

The rising popularity of the electric vehicle presents both challenges and opportunities. A charged electric vehicle can act as another store of energy for the consumer. Yet, these chargers represent a significant, instantaneous electrical load that a grid-isolated household may not be able to handle.

“It has been written that the battle now is for the customer interface. Uber, the largest taxi company in the world, owns no vehicles. Facebook, the world most popular media site, creates no content. Alibaba.com, the world’s largest retailer, has no inventory. And Airbnb, the world’s largest accommodation provider, owns no real estate. The world is changing; the LDC of the future may have no poles or wires.”

— Dan McGillivray

“As a professor in 1910, I would tell the horse buggy industry that the Ford is here and your business is dead. In 1980, I would tell landline manufacturers that the mobile telephone is here and your business is dying. I might be saying the same to you today...”

— Bala Venkatesh

These technologies will integrate into existing home networks: the “Internet of Things” will allow appliances to “talk” to microgrid controllers and optimize their energy usage, resulting in a “smart” building. The private sector has championed the synergy of electricity and networking: from integrated energy management from Next, home monitoring and Internet from Rogers Communications, to future technologies on the way from Apple, Tesla, and Google.

Emerging energy technologies will present economically feasible alternatives for homeowners in the very near future. Alternative options will soon reach the point of grid parity, where the cost of producing your own electricity is equal to or less than buying it from the centralized grid. In New York State, the falling price of solar panels

plus the increasing effectiveness of energy storage may result in grid parity within five years (Rocky Mountain Institute 2014). Grid parity could result in the centralized grid moving from the *only* source to the *backup* source of electricity for many consumers. To mitigate this risk, LDCs must approach their business differently if they are to remain viable entities into the future. From asset management, to electricity rate-setting, to the unchanged business model of electric utilities in Ontario, proactive evolution is possible and necessary to prevent LDCs from becoming redundant.

Session 2: The Evidence

Mike Matthews, Atul Mahajan, James Keech and Sean Conway (Moderator)



What are distributors seeing on the ground today? In our presenters’ service areas, the uptake of these new technologies has had a minimal impact on LDC operations thus far. Solar panels and electric vehicle chargers have only begun to penetrate the market.

Where these LDCs see change today is in the mindset of the consumer. Recent outages have demonstrated that the customer base is splitting into two. The traditional ratepayer is more tolerant of outages, prefers to call their LDC for billing guidance, and prefers speaking to a person. The new customer is more concerned about reliability. Outages of even a few seconds can be disruptive. Their computerized world requires a

constant flow of electrons to live, work, and play. They demand more information from their distributor: when the lights go out, they want to know why an accurate estimate of when they will come back on. The new paradigm is one where the customer base is no longer homogenous. LDCs need to employ new communication strategies to engage with all types of energy customers.

Weather will be of increasing concern into the future. The decision to harden certain assets is constrained when much of an LDC’s capital is dedicated to replacing aging assets. Here again, customers’ views are evolving. Although a little more forgiving of an outage caused by severe weather, customers will likely become less tolerant as the frequency of severe weather increases. LDC assets, once thought to be insulated from the effects of severe weather, may need to be hardened. Mr. Keech cited underground cables, which may be more vulnerable to damage due to increasingly frequent flooding.

LDCs face the challenge of maintaining the grid of today, addressing a rapidly changing customer base, and preparing for an uncertain

“There is a fraction of customers who expect the LDC to know when the power will go out before it does ... They may not know that the LDC does not know their power is out, and that they may actually have to call their utility.”

— Mike Matthews

future. They have seen disruptive technology before, but never to an extent that would result in upending the traditional LDC business model. It is unclear when the tipping point will occur, but LDCs know it is coming and are getting ready by actively studying these disruptive technologies.

What will the business model of the future look like? It is clear that one size does not fit all. For some, amalgamation of all municipal services (like water and street lighting) will lead to business synergies. Some LDCs may become providers of complete energy solutions for their customers. Facilitating behind-the-meter services is an option that would see LDCs providing expertise and knowledge to customers interested in taking more control of their energy usage. For others, mergers and acquisitions will be critical to creating economies of scale. Regardless of the shape it takes, a new business model is required.

Keynote Address: Tyler Hamilton



Disruptive technologies are not decades away; game-changing energy technologies are here now. Consider solar panels: just over a decade ago, there was only 12 MW of mostly off-grid solar generation in Ontario. Today, there is approximately 1,700 MW of grid-connected solar energy.

Though still behind previous projections, the growth in the electric vehicle market has been stunning. In 2003, Tesla was formed. Elon Musk joined a year later. By 2008, market analysts were wagering on the probability of the company's failure. Yet, the company survived and catalyzed the electric car industry. General Motors responded with its own electric car; the Chevrolet Volt entered the marketplace in 2010. Now, most major car manufacturers offer

hybrid and electric vehicles, and there are more Level 2 electric chargers in North America than Walmart or Starbucks locations.

Many companies are already offering large-scale electricity storage and the technology is becoming much more affordable. Since 2007, the cost of storing a kWh of electricity has fallen from \$1,000 to under \$400, and this trend is continuing. Elon Musk's announcement of the Powerwall – home-scale electricity storage – has generated significant consumer interest, much as Steve Jobs did with the iPhone. Tesla's technological leadership in the energy storage market will likely encourage other companies to enter in the same space.

Mr. Hamilton believes that pace of adoption of new energy technologies will accelerate with the global transition to a low-carbon economy. He cited the fact that pension funds are divesting from petrochemical companies; the G20 and the Bank of England are worried about a "carbon bubble."

Session 3: Financial and Regulatory Implications Karen Taylor, Karen Farbridge and Robert Warren (Moderator)

The government reform of the electricity sector in 1998 had two significant implications for LDCs: they became for-profit corporations and became subject to more powerful regulation, introducing a degree of transparency and external control to their businesses. Accordingly, the profit motive now coexists with keeping the lights on. How might government, LDCs, and the regulator address the regulatory and financial implications of the change ahead?

Ms. Taylor provided an overview of the regulatory implications of change from an equity investor's perspective. The regulator protects customers who must obtain an essential commodity from a monopoly provider in the absence of competitive market. It is responsible for ensuring that the LDC sets "just and reasonable" electricity rates, and that

distributors meet standards of service, policy requirements, and technical specifications. Finally, it balances the needs of the customer with the equity investor's desire for a reasonable return on investment.

The regulator will have to consider how it approaches its role in the future. A key question is whether the customer – through electricity rates – should carry the cost of some of these new technologies. From an economic perspective, costs should enter the rate base if the most cost effective way to deliver technologies is through a centralized, natural monopoly (e.g. through one set of poles and wires). If, however, the cost of technology can be driven down in a competitive marketplace, private companies should replace the monopoly provider. For example, in the case of solar panels, many companies have the capability to produce these. The competition between producers drives the price of solar panels down in a way that a single producer would not be able to achieve. In other words, if the technology is better implemented in a natural monopoly, put it in the rate base. If competition works, don't.

The regulator will have to facilitate the transition between the LDC business models of today and tomorrow. To do so, it must be proactive, understand the business risks ahead – either from the government or new technology itself – and effectively communicate, regulate, and assign those risks. It must be able to provide advice to the government while maintaining its independence. Either the marketplace or the government will determine the path forward: if government policy embraces a low-cost approach that encourages defection, a vastly different regulatory model is required.

What principles should guide the future regulator? Consumer electricity pricing should reflect the cost of their commodity usage and share of the cost of infrastructure. It should continue to emphasize effective utility asset management to ensure efficient investments and operations. It should limit the subsidization of certain customer groups and price distortions created by provincial policy objectives. It might also consider segregating distribution rates from commodity charges.

Those who choose to abandon the grid present a challenge. The electricity system was built for the past, present, and future use for all Ontarians. The regulator can act to ensure that those who defect from the grid pay their fair share of the cost of existing infrastructure. Some regulatory options available for this include exit fees that would subsidize the portion of the generation, transmission, and distribution assets built on their behalf, and standby fees to cover the cost of grid connection in case of an outage in the home or microgrid. It is important that when some customers isolate themselves, those who remain do not bear a greater cost burden for electricity infrastructure.

Recall that *LDCs* operate under a *regulatory bargain*, where in return for providing reasonably priced and reliable electricity to those who want it, while their shareholders should earn a reasonable dividend. The regulator must also consider the *regulatory compact*: how *the regulator* strikes a balance between these two goals. It is important that the equity investor understand the latter to assess business risk, both now and into the future. This compact must evolve in a transparent way. Recent decisions from other domestic regulatory bodies suggest that the burden of stranded assets will remain with the equity investor and not the ratepayer. The policy that the regulator ultimately adopts on stranded assets – which dictates the sharing of risk between customer and LDC – must be clear to equity investors.

The regulator should be involved in developing new LDC business models to maintain the financial viability of the LDC while protecting the customer. The regulatory compact must evolve alongside the development of new LDC business models. It is incumbent upon the equity investor to ensure that their boards of directors can meet the change ahead. The cumulative effect of these actions will fairly distribute the cost and risks in the distribution sector, and provide clarity for equity owners to make investment decisions.

Ms. Farbridge reminded us that new technology brings significant financial implications for LDC owners, who are mostly municipalities¹. Municipal owners must be engaged to ensure the continued viability of the LDC that serves their community.

Municipal councillors who are also directors of LDCs are subject to different, sometimes opposing, fiduciary duties. The responsibilities of a director of an Ontario corporation and those of a councillor or mayor are very different: an elected official has a duty to act in the interests of the electorate while considering their own political future. In contrast, an LDC

“Consolidation is a business transaction when we need a business transformation ... Building a bigger stranded asset is clearly not the answer ... A perfect storm of new technology, aging infrastructure, the inherent limitations of a centralized and fragmented energy system, and climate change is changing the business environment for electric utilities ... Are you going to sell the family silver and allow others to be the beneficiaries of the strategic shifts?”

— Karen Farbridge

¹ Some LDCs are privately owned, for example FortisOntario is a private company that owns Algoma Power, Canadian Niagara Power, and Cornwall Electric

director's duty is to ensure the financial viability of the corporation. For owners, looking ahead at the boardroom table does not help govern a city today.

Municipal owners of LDCs earn revenue from these corporations from promissory note interest and dividends. An LDC unable to issue a dividend may have a significant impact on the municipal budget. Furthermore, as wealthier customers defect from the grid, the risk of loading more of the cost of LDC infrastructure onto low-income customers and small businesses. Although this is a regulatory issue, cities will be drawn into the fight. Finally, municipalities will have to respond if their LDC cannot maintain its end of the "regulatory bargain": the delivery of reliable and low-cost electricity. In such a case, Municipalities may have no choice but to infuse equity into their distributor to protect their communities from a LDC that fails to keep up with the changing business environment.

These financial implications represent a worst-case scenario. There are a number of opportunities that exist for LDCs to remain viable enterprises and continue to contribute to their communities. What is required is for the LDC to innovate in all aspects of its business. This will prove to be a challenge: a low-risk regulated environment may not be conducive to the risks inherent in innovating. The hesitation to take on significant risks may be prevalent throughout the corporate culture of an LDC.

How can LDC owners address these implications? First, the business model must change. Many of the aforementioned options are viable, including moving from an electricity distributor to a complete municipal utility. Mergers, acquisitions, and sales can be smart decisions, but are only one part of a holistic business model. LDCs can leverage their expertise in electricity distribution to have a greater influence on the economic growth and social development of their municipalities. LDCs can become a platform for various stakeholders and professions to discuss innovation throughout the region. They can act as a cornerstone of comprehensive municipal, urban, and regional planning. LDCs have the expertise to help integrate all energy networks within a community and better coordinate their usage. With much of Ontario's emissions coming from cities and electricity generation, LDCs can help shape regional climate change plans. They can discover local energy opportunities to bring jobs to their area. In sum, LDCs can lead the charge towards building smart energy communities across the province.

How LDCs respond to technological change affecting their service areas is critical to their future success. Instead of driving transformation at the provincial level, communities and regions may provide the impetus for change. Good governance will be critical from the board of directors, to the regulator, and all the way to the province. Finally, the customer is key: LDCs must increase their efforts to build trust and engage with the customer.

Session 4: The Owners

Adrian Foster, Glenna Carr, Jim Hogan and Paul Murphy (Moderator)



Every municipal owner has a distinctive relationship with its LDC. Some owners are engaged with their utility and are well aware of the uncertainties lying ahead. In other cases, councils allow the LDC to operate at arm's length and are perhaps less cognizant of upcoming challenges in the sector. For some communities, LDCs have no problem raising capital, while their dividends represent only a small portion of the municipal budget. For others, the loss of LDC revenues would force councils to raise tax rates substantially. In short, perceptions of the challenges, their degree of urgency, and the potential consequences of failure are unique to each community.

For owners, LDCs provide important jobs for its citizens, promote economic

development, and help strengthen the social fabric of the community. For councillors that sit on LDC boards, their role goes beyond that of ensuring the financial viability of the company. They provide insights and influence for the board to consider how the LDC supports and adds value to the area. Smart communities and synergies between LDCs and major

public works seem to be top of mind. With the substantial changes coming to the sector, there is also a need for LDC executives to engage beyond the boardroom, educating council and councillors about the challenges ahead. At the same time, councils should seek to appoint board members with an interest and ability to understand the complicated world of electricity.

In considering new business models, Mr. Hogan of Entegrus espoused the benefits of private investments and partnerships. In the case of Entegrus, Union Gas brought valuable experience to help the corporation form and establish a relationship with the regulator. Further, a private minority partner provides their own expertise to help the LDC, and can offer financial resources if the municipality is unable to do so. Mayor Foster noted that a merger, acquisition or sale of a local LDC really depends on the nature of the community, and with a sale comes a trade-off between an immediate cash payout versus a long-term revenue stream. Further, the price premium on purchasing an LDC has risen to the point where outright purchases are much more costly than they were only a few years ago. Remaining independent but working together is an attractive option for LDCs. For instance, cooperation will be needed in the Eastern GTA to support the electrification of GO Transit train service and the construction of Highway 407 East.

The owner's representatives also questioned the workings of the regulator. All panel members agreed that the rate filing process was too onerous and costly. They proposed to establish a regulatory framework that would protect LDCs from substantial risk arising from government policy and other changes to the LDC financial and operational environment. The regulator should continue its mandate to keep rates reasonable, but in doing so, not restrict the LDC to their core business. Although the regulator has recently loosened rules about LDC involvement in areas beyond poles and wires, there is more room for LDCs to expand into other areas to generate value for their shareholders.

That said, the owner's group was unanimous that the cost of stranded assets should not be borne by the province or the regulator. Instead, strong asset management practices, innovation, customer engagement, good corporate governance, and finding business efficiencies can mitigate the impact of stranded assets.

"The sector is changing in ways that unengaged outsiders cannot appreciate ... Solar power is free power from the sun. How can free power from the sun drive electricity prices up? And good luck explaining that simply to a shareholder that is not engaged."

— Adrian Foster

Session 5: The Path Forward

Norm Fraser, Timothy Curtis, Michael Angemeer and Paul Murphy (Moderator)

Technology is rapidly advancing on both sides of the meter. Private companies are entering the electricity sector behind the meter and establishing their own relationships with the customer. This is partially owing to the fact that the acceptance of new technologies is higher among customers than it is within risk-averse, regulated LDCs. Consumers are the new masters of their own energy decisions: they will soon be able to select their entire generation portfolio, completely or at least partially replacing the centralized grid. That grid comes at the cost of many subsidies and charges on the monthly bill, while cheaper generation from the private sector can establish a price ceiling for electricity below the regulated rate charge. This might paint a dismal picture, that LDCs are facing a "death spiral" into irrelevance. Nevertheless, most of the conference participants expressed optimism for the future.

"When the internet can provide instant answers, why should customers accept slower answers from utilities?"

— Norm Fraser

Institutions need to adjust to the changing environment. All three presenters agreed that regulatory reform is needed to fully realize the innovative potential of LDCs, while the government should only set policy for the general direction of the electricity sector. That said, these institutions can also provide a valuable "push" to LDCs in their otherwise risk-averse environment.

So what are these LDCs doing today to position themselves for the future? Hydro Ottawa is participating in an interesting plan that might form the basis of a future LDC business model. Ottawa-Gatineau's "Zibi" project, currently under construction in a former industrial area on the Ottawa River, is the tenth One Planet Community development worldwide, and first in Canada. The project incorporates green building standards and a commitment to sustainability over the whole lifetime of the community. The Zibi development plan includes a district-wide energy system that integrates renewable energy generation and can provide the community with zero-carbon energy by 2020 (Zibi 2015). Hydro Ottawa is collaborating with the project's developers to provide energy services to the community far outside the traditional LDC business offering. They will advise on combined heat and power, battery storage, microgrids, and smart homes. They will

"Don't panic ... Think about electricity. Think about all the appliances you have in your home... you need to think about getting them replaced periodically, repaired periodically. With your electricity, you can go for years or decades without any servicing; as long as you are paying your bills, it is there for you as much or as little as you need. It is an incredibly convenient service. There's value in that service. So when people talk about grid parity, sure they talk about comparable costs, but... you also have the cost of maintaining this infrastructure in your house versus the convenience of it just coming to your door"

— Tim Curtis

also build the Zibi community grid - separate from Hydro Ottawa's own distribution assets - and help to connect the Zibi community to one bulk meter for off-site renewable electricity. They will additionally facilitate the organization of *all* public utility charges on a single bill for every user. To encourage an innovative mindset, the LDC assigned their newest engineers to work on this project and encouraged them "to think outside the box," disregarding any regulatory or financial consequences. Hydro Ottawa's collaboration with the Zibi One Planet Community will be instrumental in demonstrating the innovative capabilities of an LDC.

For Niagara-on-the-Lake Hydro, their vision of the future looks much like their business today. Though uptake of solar generation has been very high in their service area, it is unlikely that solar will ever be able to generate the level of power required for most of the homes and businesses in the mostly rural service territory. They believe that the private sector will ultimately be the most cost effective way to deliver technologies like solar power and subsequent repair services. They hope to continue to build on their strengths: a significant focus on the customer and engineering capabilities. By building that trust and expertise, they see a future of a modern distribution grid while providing a few other services to their customers, such as advice on their generation options.

Veridian's focus will be to maintain an optimal customer base to maximize efficiency, and seek additional value creation opportunities. They believe a customer base of 400,000 to 500,000 is ideal to maximize the back office and service centres². Future value creation opportunities include creating better customer experiences, and looking into new business areas such as district energy, and smart communities. They are also sharing their expertise internationally by working with a Caribbean utility.

All three agreed on the common themes of the day: the business model needs to change, and the customer relationship will be increasingly important going forward. Further, LDCs can generate value beyond the delivery of electrons by helping to plan smart communities, enable economic growth, participate in regional planning, and lead the charge on climate change.

Today, linespersons are heading out in trucks with tablets and more often act as the first line of communication with the customer. IT and customer communication skills will be of greater importance to the LDC workforce going forward. The opportunity exists today for LDCs to tap into the thinking of young employees to understand the consumers of the future. Mr. Angemeer predicts that into the future the LDC labour force will become less stable, while the distributor will provide a more exciting environment.

² Veridian serves a number of communities in the Eastern Greater Toronto area and several areas due north, like Gravenhurst and Port Perry.

Conclusion: What Did We Hear, What Does it Mean, and Where Do We Go from Here?

Sean Conway, Robert Warren and Paul Murphy

New technologies such as energy storage, solar panels, and electric vehicles are becoming more efficient and affordable. LDCs have yet to see significant market penetration of these disruptive technologies, but they know they are coming and present a significant threat to their assets and business model. The implications could be profound: a possible dissolution of the regulatory compact, a substantial amount of expensive stranded assets, even the eventual decline of the sector into redundancy. Yet, much of the commentary throughout the day was optimistic about the opportunities ahead.

Mr. Warren suggested there is a need for the whole sector to step back and look at the big picture of what is happening in the province. The current wave of reform in the electricity market will be the fourth or fifth attempt by the government in the last two decades. If we are to implement the right reforms, we need to ask the big questions: what is the role of the government? What is the regulator doing and is it doing it well? What is the role of the modern LDC?

It is clear that the business model must change, but there are many different models to choose. Finding efficiencies, strong asset management, and the drive to innovate are all pieces of the puzzle, but one size does not fit all. Sales and mergers may work for some LDCs to an extent, but they are only transactions; what we need is transformation. We also must remember in moving forward that we will never know the right path, but we must not be afraid to move ahead because of a fear of getting it wrong. Mr. Conway reminds us that we should learn from earlier mistakes to gain customer confidence for the task ahead, one that will not be easy.

“Maybe we do not need to worry so much about driving everyone in the province in the same direction, all at the same pace. Sometimes when you have a hammer, everything looks like a nail”

— Paul Murphy

Part of that transformation should include the broader role that LDCs can play, from climate change, to regional planning, to community energy plans. We need to think about LDCs as drivers of economic development, not just revenue streams. Several participants highlighted the importance of synergies, either with other public utilities or with the private sector.

There are some certainties ahead. In the new energy paradigm, the customer will have choice over their electricity needs, turning them into the ultimate decision maker in the sector. The new customer lives in a digital world. Concerns about power quality will increase. Tolerance

for outages will decrease. Customer demand for more information from LDCs will increase. They will demand accurate estimated times of restoration and timely information presented through social media and the Internet. Accordingly, understanding and communicating with the customer will be a key to success.

Business models are starting to change. These changes are having an impact upon those governments that own LDCs. Municipalities may soon have to make an investment in their distributor to ensure that they have the capacity to meet the present and future needs of their citizens. Moreover, as an integral part of the community and its economy, we must remember that the LDC has an important social justice mandate. Those municipal owners must be involved and informed for reasons beyond their dividend.

The regulator has a challenging role. They must be strong and clearly independent, while acting as a mediator between political and other competing interests. They will need to find the right balance between protecting the customer and addressing the risks that distributors face in an uncertain future. The customer it protects is also changing: they are more actively involved in the electricity sector, and to an extent, less patient. In a time when LDCs may look to equity investors to maintain and upgrade distribution networks, those investors need to understand the regulator and its decisions. Hard choices may be ahead if stranded assets become a significant issue, or if the need for a new pricing mechanism arises.

Canada’s energy policy and posture will almost certainly face stiffer international challenges over their impact to the environment: the battle over Keystone and the environmental consequences of Alberta’s oil developments are not isolated cases. The energy debate is a “proxy” for fundamental quality of life issues, and energy and environmental policy will go hand in hand into the future on matters such as carbon pricing.

For Ontario, energy has been a core component of our economic development strategy for over a century. Cheap, homegrown energy drove the economy of the Greater Toronto and Hamilton Area and much of the Ontario of the 20th century. However, many of those good, high-paying industrial and resource-related jobs have disappeared as they have in most of the Great Lakes Basin of North America. What is to replace that former wealth? Moreover, how will the new energy policy provide of the kind of growth and opportunity that Ontarians have come to expect?

For the past century, one of the basic tenets of Queen’s Park policy was to use the abundant energy –mostly hydroelectric– resources of Ontario to support the development and expansion of economic opportunity in all parts of the province. With

the current trends toward urbanization –especially in the Greater Toronto Area– and de-industrialization, how will energy policy –with its focus on pricing carbon– be able to meet the “quality jobs” agenda?

Ontario Hydro played a powerful, almost mythical role in the life of one of the most successful economies of the developed world. The legacy of Adam Beck – *power for the people and their betterment* – continues to fuel important elements of our energy policy debate. The current plans for Hydro One will surely take us all to the core of that question.

“This is a conversation that is alive and needs to continue. We need to broaden the community with which we have this conversation.”

— Paul Murphy

Mr. Murphy pondered if the Ontario electricity distribution sector is perhaps overly concerned with lessons and mistakes made by other jurisdictions in reshaping their own systems for the future. He proposed that there is perhaps no major disadvantage to leaving some small LDCs whole (in terms of sector-wide consolidation), especially if the majority of customers in the province are going to be served by the new regional distributors. Small LDCs have an intimate connection with the communities they serve. That is one of their greatest strengths and perhaps something worth preserving. Large-scale, efficient, but more expensive regional distribution may not be the most appropriate solution for all Ontarians, and this factor should be given due consideration as we shape the LDC of the future.

Works Cited

- Aliff, G. 2013: *Beyond the Math: Preparing for disruption and innovation in the US electric power industry*. Deloitte Centre for Energy Solutions. Westlake, TX: Deloitte University Press, 21 Mar. 2013. Web. 20 June 2013. <<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/dttl-er-beyondthemath-07082013.pdf>>. 4-8.
- Rocky Mountain Institute (2014), Homer Energy, and Cohn Reznick Think Energy. *Economics of Grid Defection: When and Where Distributed Solar Generation Plus Storage Competes with Traditional Utility Service*. Boulder, CO: Rocky Mountain Institute, Feb. 2014. Web. 30 Jun. 2015. <http://www.rmi.org/electricity_grid_defection>. 7.
- "Sustainability - Zibi." Zibi. Windmill Developments. Web. 6 July 2015. <<http://www.zibi.ca/sustainability/>>

Appendix

- I. Conference Program
- II. Presentation by Dan McGillivray
- III. Presentation by Bala Venkatesh
- IV. Notes from Robert Warren
- V. Presentation and notes from Karen Taylor
- VI. Presentation and notes from Karen Farbridge
- VII. Presentation by Adrian Foster
- VIII. Presentation by Timothy Curtis
- IX. Presentation by Michael Angemeer

AGENDA

8:00am	Registration Continental Breakfast Networking	10:45	Networking Break	12:15pm	Lunch and Keynote Future Energy Technologies	3:00	Session Five The Path Forward
8:45	Welcoming Remarks Video: The Schneider Electric Smart Grid Lab	11:00	Session Three Financial and Regulatory Implications	1:30	Session Four The Owners		What are the possible solutions to these challenges? One possible solution is a change to the regulatory model governing LDCs. Such a change might involve a movement away from traditional solutions based on cost recovery methods, and towards one that encourages value creation. Among the questions this session will address are the following: <div>1. If the regulatory system encourages or requires the development of new business models for LDCs, what would those new models consist of?</div> <div>2. What should be the role of the regulatory system, and of provincial government policy, in enabling the creation of those new business models?</div> <div>3. Is consolidation of LDCs into fewer but larger units an adequate solution to these challenges?</div> <div>4. Is size alone sufficient or are new business models necessary?</div> <div>5. What can and should be the role of the private sector in enabling LDCs to meet these challenges?</div>
9:00	Session One The Challenge - Technology Developments New and rapidly improving technology – particularly in the form of distributed generation, storage, and conservation – provide consumers with the opportunity of not just reducing their electricity consumption, but of ultimately leaving the grid altogether. Is this a serious threat or an important opportunity for LDCs? Featuring: Dan McGillivray Bala Venkatesh Sean Conway (Moderator)		New technology presents both financial and regulatory implications for LDCs and their owners. As some consumers reduce their demand, the cost of maintaining existing infrastructure will fall on an increasingly smaller group of consumers, particularly low-income consumers. This raises questions of social justice. Further, declines in revenue create the risk that LDCs and their owners will have to bear the costs of stranded assets, which could seriously affect municipal budgets across the province. Can existing regulatory and policy mechanisms protect LDCs and their owners from the impact of these challenges? LDCs have operated under a “regulatory bargain,” where they are compensated for their obligation to serve their communities by earning a fair return on their investment. Can – and should –this “bargain” protect LDCs from the effects of shifts in consumer expectations and competition? This panel will consider this and other questions, including: <div>1. Should the provincial government assume responsibility for the costs of stranded assets?</div> <div>2. Should the regulatory system rely on traditional cost accounting tools – like increasing fixed charges – to address the challenges?</div> <div>3. Are those traditional regulatory tools effective in the long run?</div> <div>4. Are they appropriate as a response to technological, policy, and cultural changes?</div>		This session asks the owners of LDCs (mostly municipalities) for their perceptions of these challenges and how they might be addressed. Key questions for the owners are: <div>1. Do municipalities regard the challenges to their LDCs as real and pressing?</div> <div>2. How important is the revenue from LDCs to the finances of municipalities?</div> <div>3. Do municipalities believe that the provincial government has a responsibility to either protect LDCs from competition or assume the costs of stranded assets?</div> <div>4. What role do municipalities believe the regulator should play in assisting LDCs to meet these challenges?</div> <div>5. To what extent, if at all, is the sale of the LDC, the acquisition of another LDC, or a merger with another LDC, a viable option for municipalities to preserve an important source of revenue?</div>		Featuring: Norm Fraser Timothy Curtis Michael Angemeer Paul Murphy (Moderator)
9:45	Session Two The Evidence LDCs face a challenge in addressing changing customer preferences. The demand for reliable electricity will increase with the continued adoption of high-tech devices and electric vehicles. To keep up, LDCs must bear the cost of renewing aging infrastructure. At the same time, government policies also require LDCs to encourage conservation and distributed generation, which further increases their costs while cutting into their revenues. Customers and businesses alike are also employing new technologies to reduce their demand, resulting in both further reduced revenue for LDCs and new competition for the delivery of electricity services. The question remains: what are LDCs actually seeing in their networks, in their communities, and on their balance sheets? How has this challenge manifested itself today, and how might it practically affect the LDC of the future? Featuring: Mike Matthews Atul Mahajan James Keech Sean Conway (Moderator)		Featuring: Karen Taylor Karen Farbridge Robert Warren (Moderator)	2:45	Networking Break	4:15	Wrap-Up What have we heard? What does it mean? Where do we go from here?
						4:45-5:30	Adjournment and Reception

The LDC of the Future

Welcome



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Protocol



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Agenda

- 8:45 Welcome
- 9:00 Session 1: The Challenge – Technology Developments
- 9:45 Session 2: The Evidence
- 10:45 Break
- 11:00 Session 3: Financial and Regulatory Implications
- 12:15 Lunch and Keynote: Tyler Hamilton
- 1:30 Session 4: The “Owners”
- 2:45 Break
- 3:00 Session 5: The Path Forward
- 4:15 Wrap-up: What have we heard? What does it mean? Where does it take us?
- 4:45 Reception





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hydro 
one

 **TORONTO
HYDRO**

ONTARIO
POWER AUTHORITY 

 **ieso**
Power to Ontario.
On Demand.



Schneider
Electric

 **Ontario**
MINISTRY OF ENERGY

**Power
Stream** 



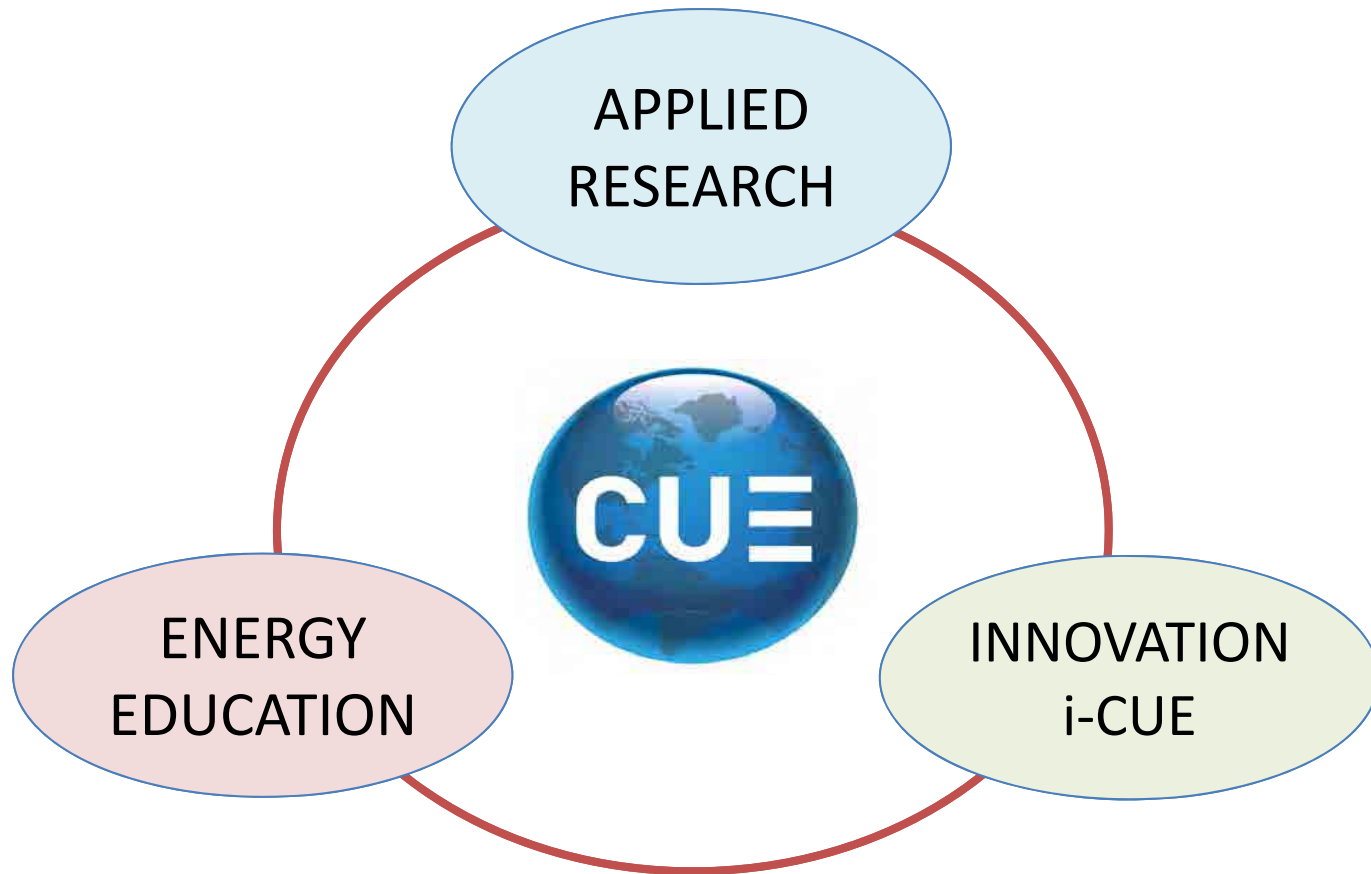
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ENGINEERING... SCIENCE... URBAN PLANNING
...PUBLIC POLICY... BUSINESS... JOURNALISM...



APPLIED
RESEARCH

Schneider
Electric

IP MANAGEMENT
COMMERCIALIZATION

INNOVATION
i-CUE

Digital
Media
Zone

Entrepreneur-in-Residence,
Marzio Pozzuoli



NETWORK

ENERGY
EDUCATION

TALENT DEVELOPMENT
& ENTREPRENEURSHIP

*The Norman Esch Innovation
and Entrepreneurship Awards*



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Energy Storage ✓

Smart Buildings & Net-Zero
Homes

Power Generation & Transmission
Systems

Efficiency, Conservation &
Demand Management

Environmental, Social & Economic
Impacts

Electric Vehicles & Infrastructure

Energy Policy & Regulatory Issues

Renewable Energy

Smart Grid ✓

Microgrid

Intelligent Infrastructure

APPLIED
RESEARCH



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Schneider Electric Smart Grid Laboratory



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The LDC of the Future

The Challenge



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Dan McGillivray
June 3, 2015

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Important Trends in Ontario's Energy Sector...

1. Our workforce is aging and in decline at the very time that our infrastructure is in desperate need of repair and refurbishment.
2. We have rising supply and falling demand for power and we have a surplus of power for the foreseeable future, except in the Greater Toronto Area, where demand is encroaching on supply.



Important Trends in Ontario's Energy Sector...

3. We have an energy market challenged by negative pricing and a consumer market challenged by rising prices.
4. Energy consumers in Ontario have been raised on a culture of plenty and expect cheap, limitless reliable power without any generation or transmission in their own backyards.



Important Trends in Ontario's Energy Sector...

5. Climate change is causing an increase in many types of extreme weather. Heat waves are hotter, heavy rain events are heavier, and winter storms have increased in both frequency and intensity. These kinds of severe weather are among the leading causes of large-scale power outages...

Kenward, A. and U. Raja, 2014: Blackout: Extreme weather, climate change and power outages, Climate Central, Princeton, 23 p.



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Important Trends in Ontario's Energy Sector...

6. As we respond to climate change and strive to reduce our dependency on carbon, we note that technological advances in shale gas extraction have changed the global outlook on oil and gas from one of SCARCITY to one of ABUNDANCE.
7. We persist in developing renewable generators of intermittent power without the capacity to effectively store that power.



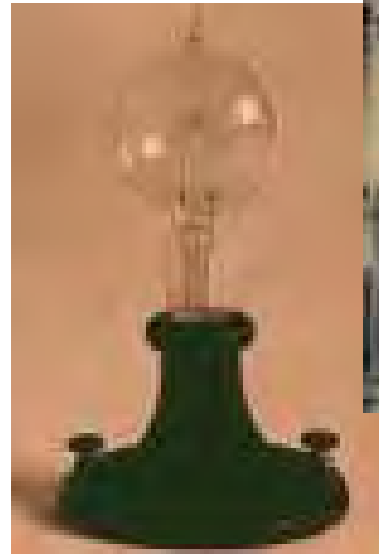
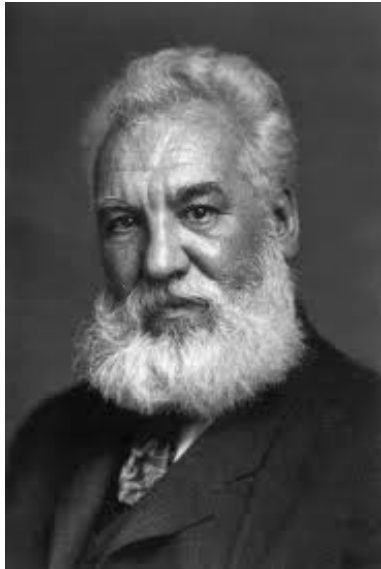
Important Trends in Ontario's Energy Sector...

8. The pace of energy technology development is accelerating, particularly in the areas of solar PV and battery storage, which are reaching grid parity, making the electrical grid optional for consumers, reducing the revenues received by utilities and threatening to strand billions of dollars of energy assets.

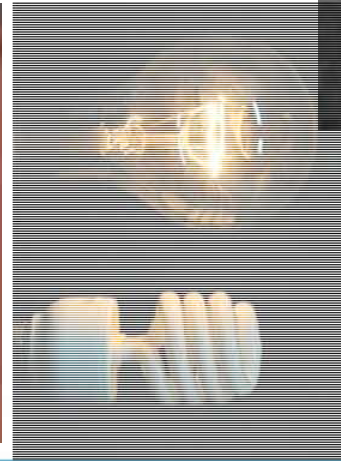


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Innovation



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1 The accelerating pace of change ...



2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

COMPUTER RANKINGS

By calculations per second per \$1,000



Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems.



Colossus
The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



UNIVAC I
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.

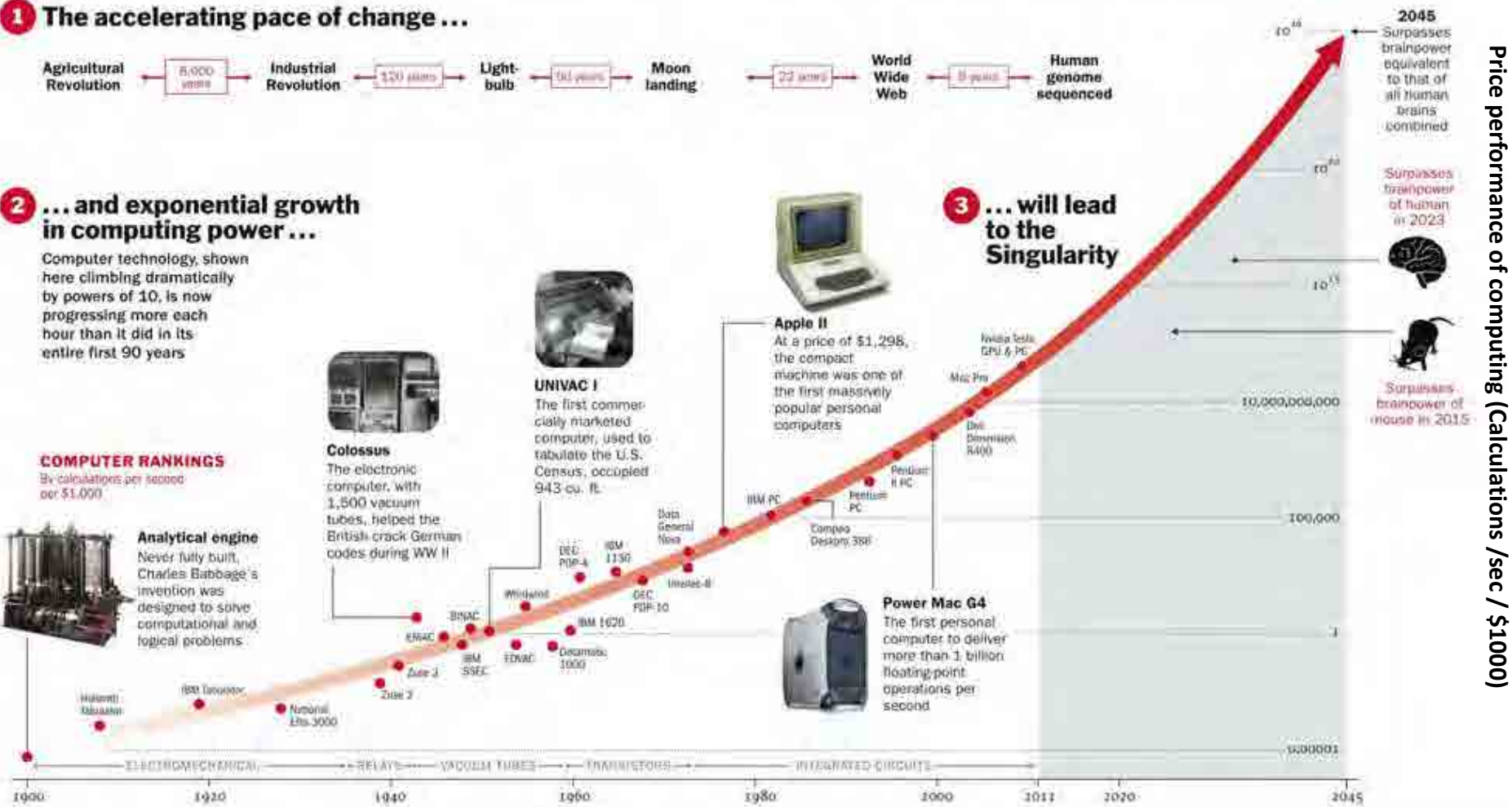


Apple II
At a price of \$1,298, the compact machine was one of the first massively popular personal computers



Power Mac G4
The first personal computer to deliver more than 1 billion floating-point operations per second

3 ... will lead to the Singularity



Time: February 2011

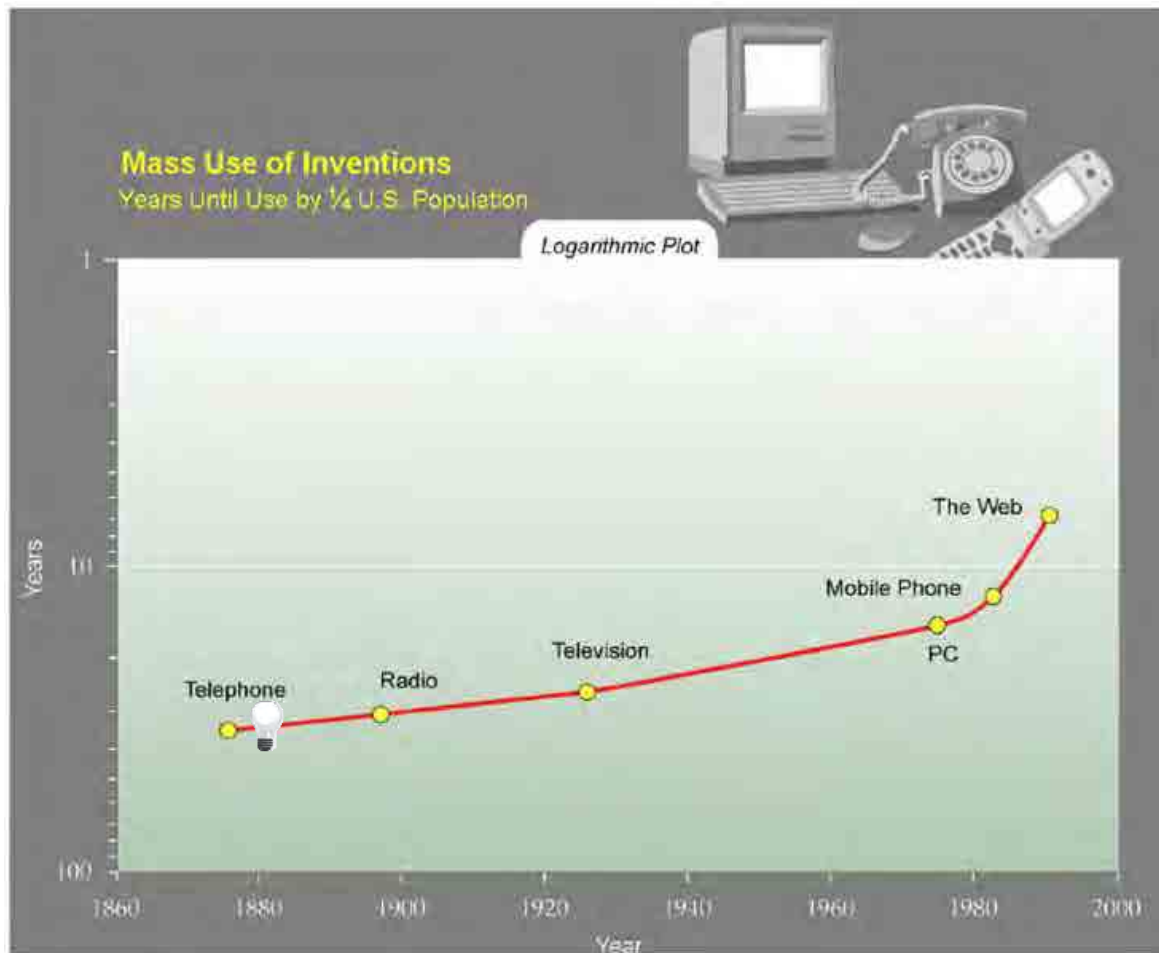


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<http://www.kurzweilai.net/time-2045-the-year-man-becomes-immortal>

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Mass Use of Inventions



The overall rate of adopting new technologies, parallels the rate of technology progress. It is currently doubling every decade.

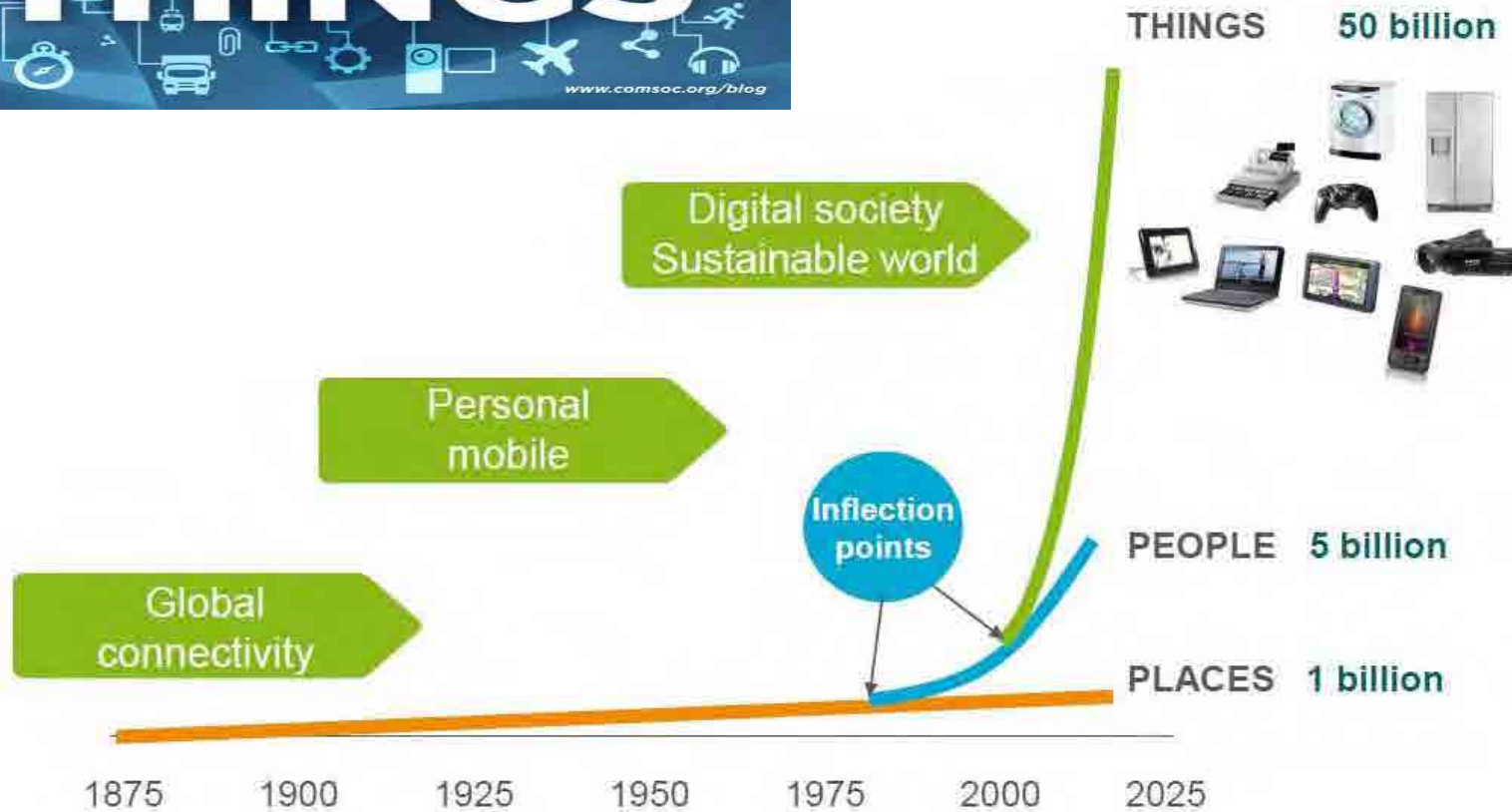
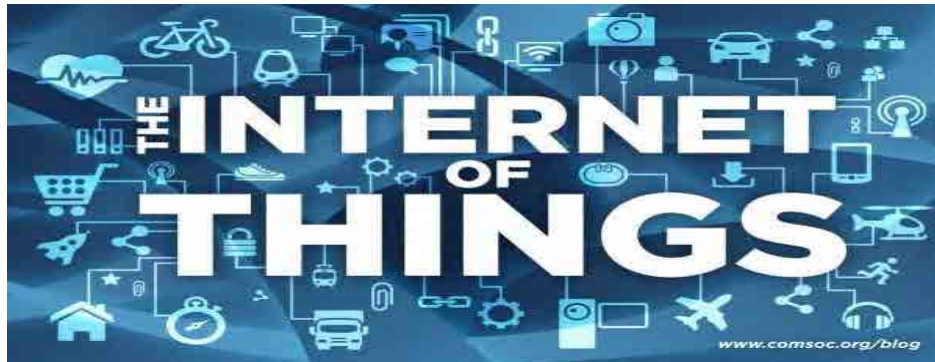
Kray Kurzweil, 2005: *THE SINGULARITY IS NEAR: When Humans Transcend Biology*, Viking Press.



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<http://scalometer.wikispaces.com/singularity>

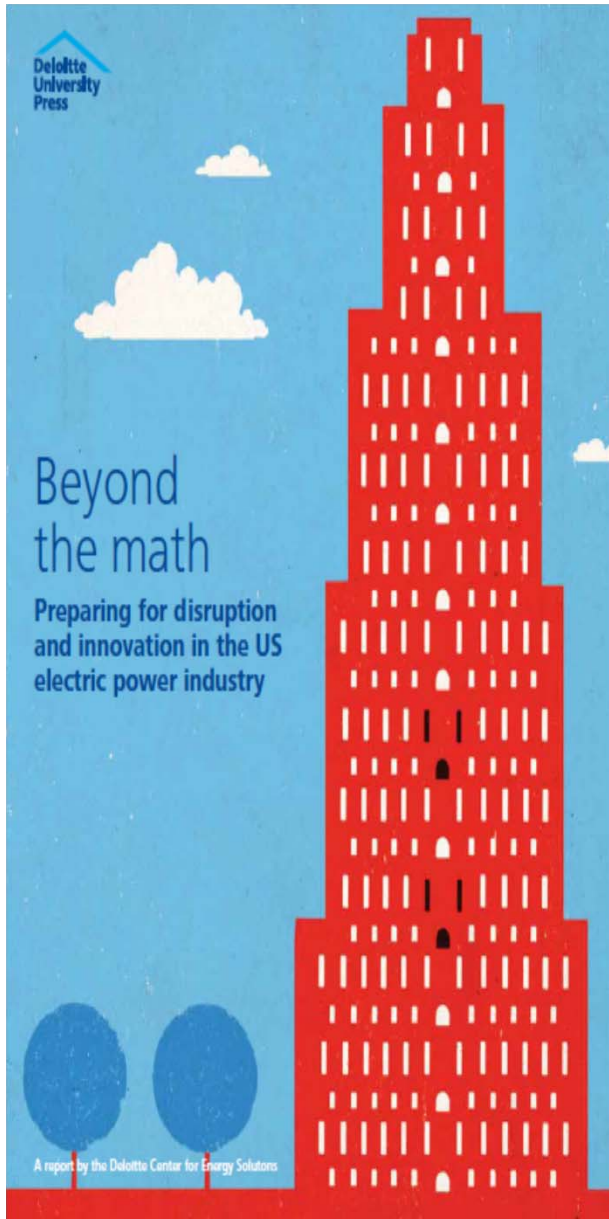
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Jack Uldrich, 2012: <http://jumpthecurve.net/internet-information-tech/10-unexpected-ways-the-internet-of-things-will-open-up-a-future-of-opportunity/>

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Gregory Aliff, 2013: Energy & Resources, Deloitte LLP

- ❖ The electric power industry could soon be facing the most disruptive period of change since the commercialization of electricity in the 19th century.
- ❖ Distributed renewable generation, demand side management technologies and energy storage technologies are breaking the traditional boundaries between LDC and customer.
- ❖ The customer is being enabled to produce, conserve, shift and store energy.

<http://dupress.com/articles/beyond-the-math-preparing-for-disruption-and-innovation-in-the-us-electric-power-industry/>



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Five Dimensions Controlling Velocity of Change

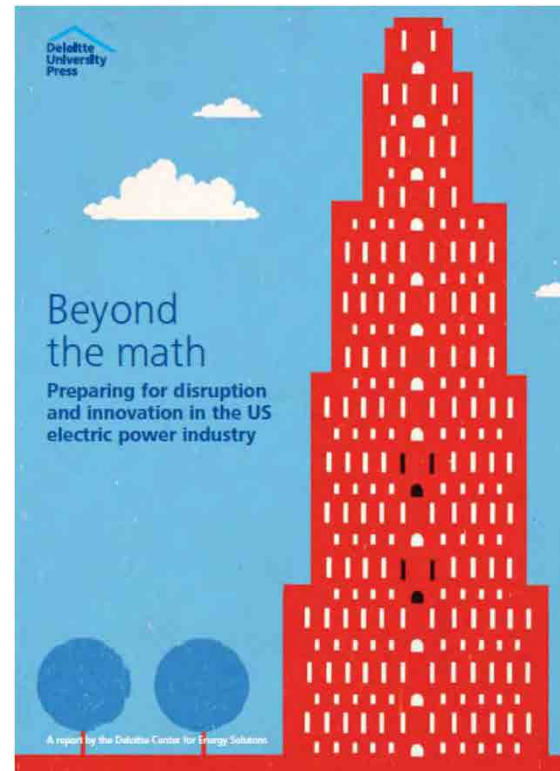
Demand

Technology

Regulations

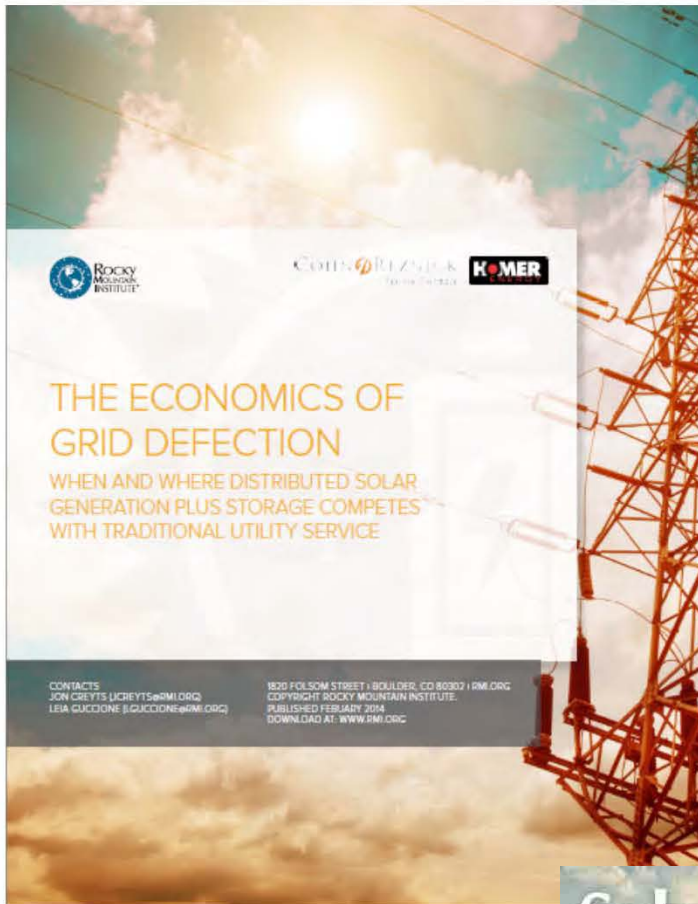
Alternatives

Competition



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Rocky Mountain Institute, February 2014:

- Will the Electricity Grid Become Optional?
- Report identifies when and where solar-plus-battery systems could enable affordable customer defection from utilities.
- Grid parity exists today in Hawaii for commercial customers, and will rapidly expand to reach residential customers as early as 2022.



http://homerenergy.com/pdf/RMI_Grid_Defection_Report.pdf

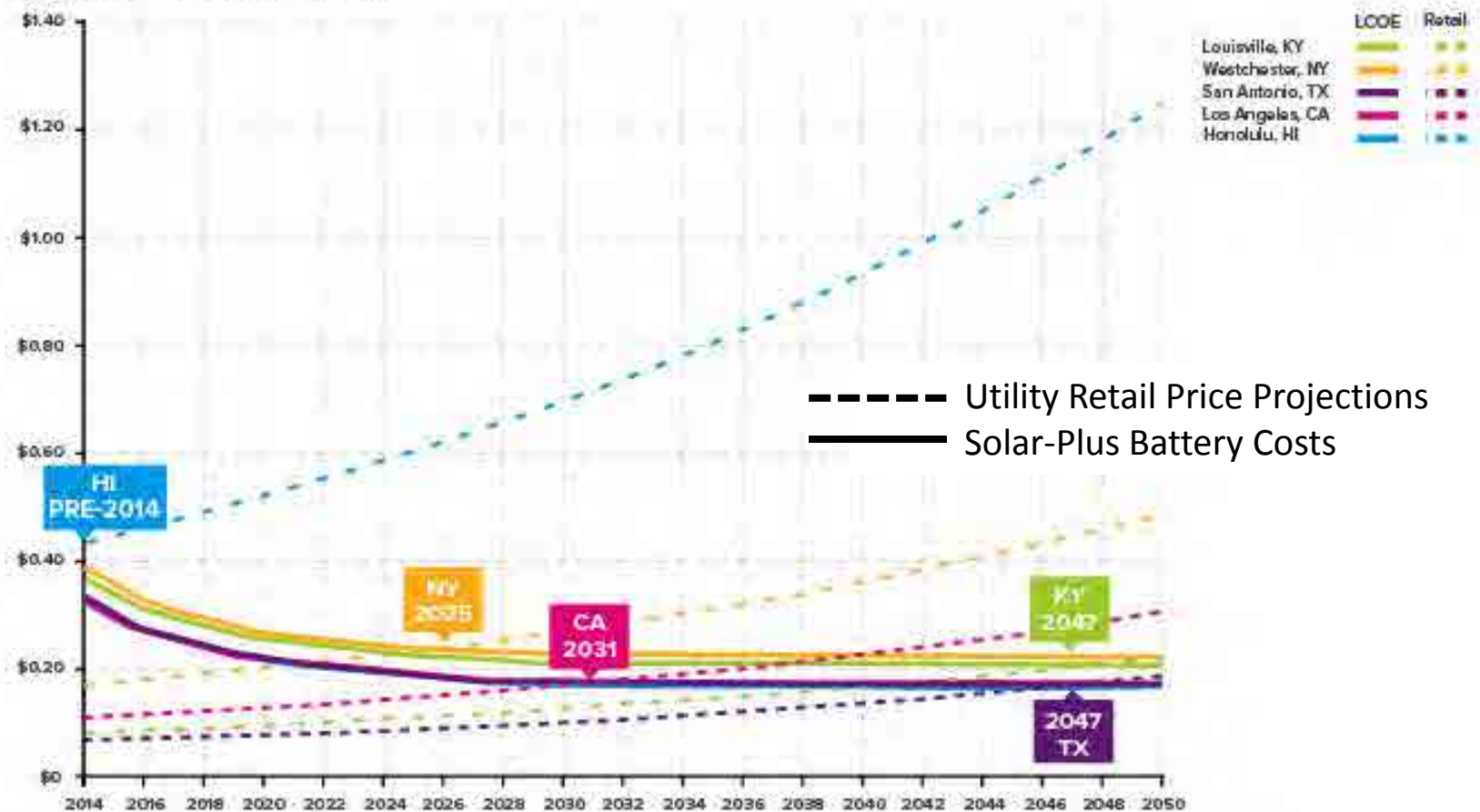


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Rocky Mountain Institute, February 2014:

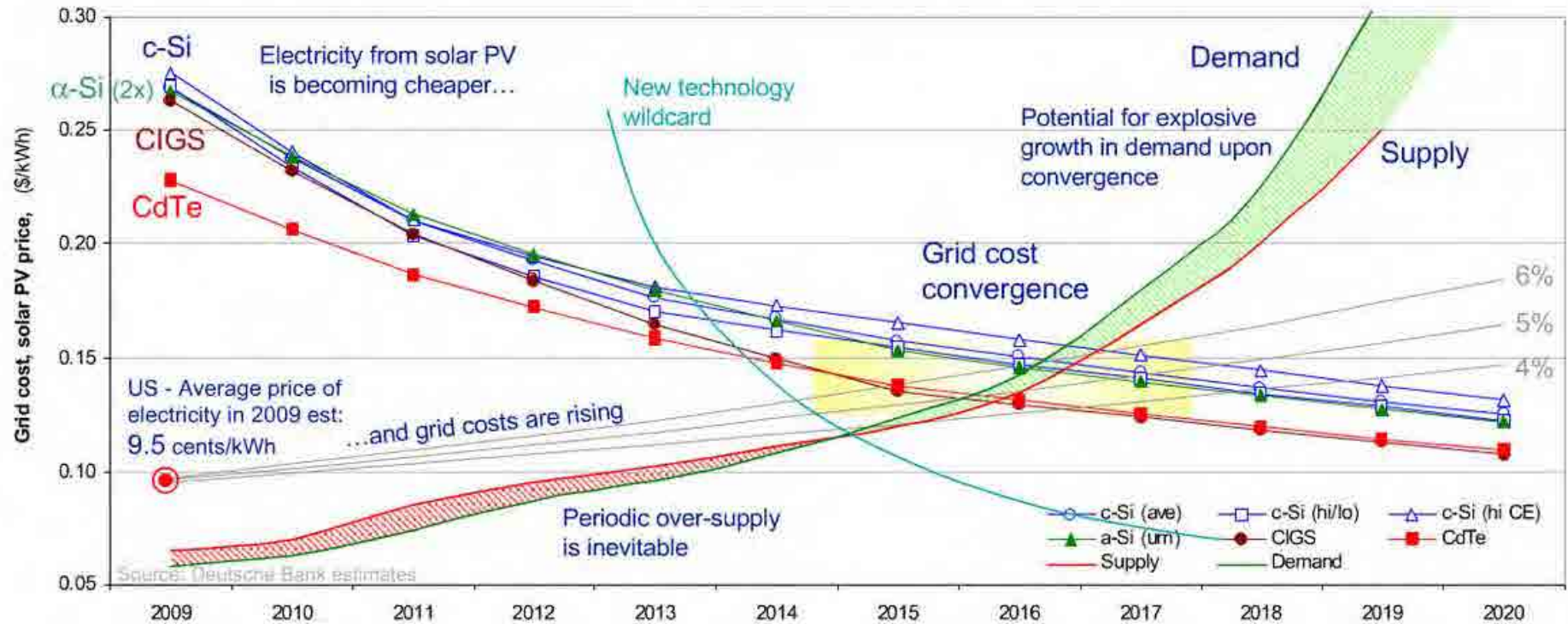
SOLAR-PLUS-BATTERY LEVELIZED COST OF ELECTRICITY (LCOE)
VS. UTILITY RETAIL PRICE PROJECTIONS
COMMERCIAL - BASE CASE (Y-AXIS \$/kWh)



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Solar PV industry – long-term outlook



Source: Stephen O'Rourke, 2009: Deutsche Bank Securities



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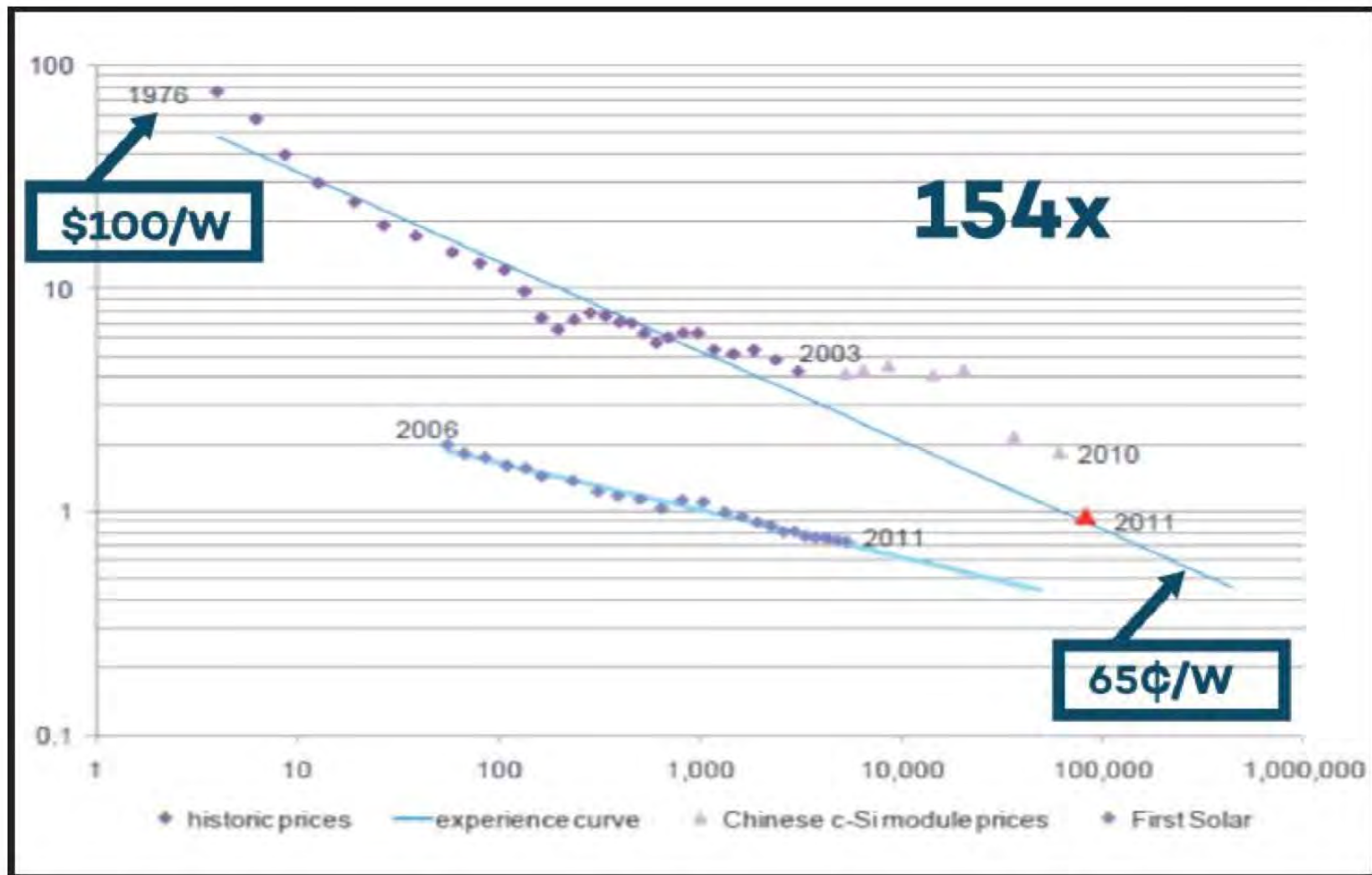


Figure 1.5—Solar photovoltaic cost curve. Since 1970, PV has improved its cost per watt by a factor of 154 times. (Graph Source: Bloomberg New Energy Finance.)



Rocky Mountain Institute (April 2015)



1. **Lowest-Cost Economics:** When grid-connected customers have the option to source their entire load either from a) the grid, b) a solar-plus-battery system, or c) some combination of the grid, solar PV, and batteries, how does that configuration change over time based on lowest-cost economics for the customer? And how do the relative contributions of grid- and self-sourced electricity change over time to meet customer load?

2. **Implications:** What are the potential implications for utilities, third-party solar and battery providers, financiers/investors, customers, and other electricity system stakeholders? And what opportunities might be found in grid-connected solar-plus-battery systems?



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Rocky Mountain Institute (April 2015) **Findings: (based on analysis of 5 US cities).**



- Solar plus battery systems are rapidly becoming cost effective.
- Solar PV supplants the grid supplying the majority of customers electricity... customers reduce grid purchases and eventually using the grid only as back-up.
- Large kWh defection could undermine revenue for grid investment under current rate structure and business models.
- Eliminating net metering only delays the kWh loss; fixed charges don't fix the problem.
- **Path forward = pricing & rate reform, new business models, new regulatory models leading to integrated grid or grid defection.**



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NRG Energy Inc. of New Jersey buys Toronto based residential roof-top solar installer Pure Energies Group Inc.

Richard Blackwell, Globe and Mail, October 3, 2014

Why?



- Solar systems more cost effective
- Innovative financing (LIC Bylaws)
- In 10 US states solar power @ grid parity; 10 more in 2 years
- Cost of customer acquisition cheaper in Toronto.
- In Ontario, we have seen a dramatic increase in rooftop solar due to the FIT.

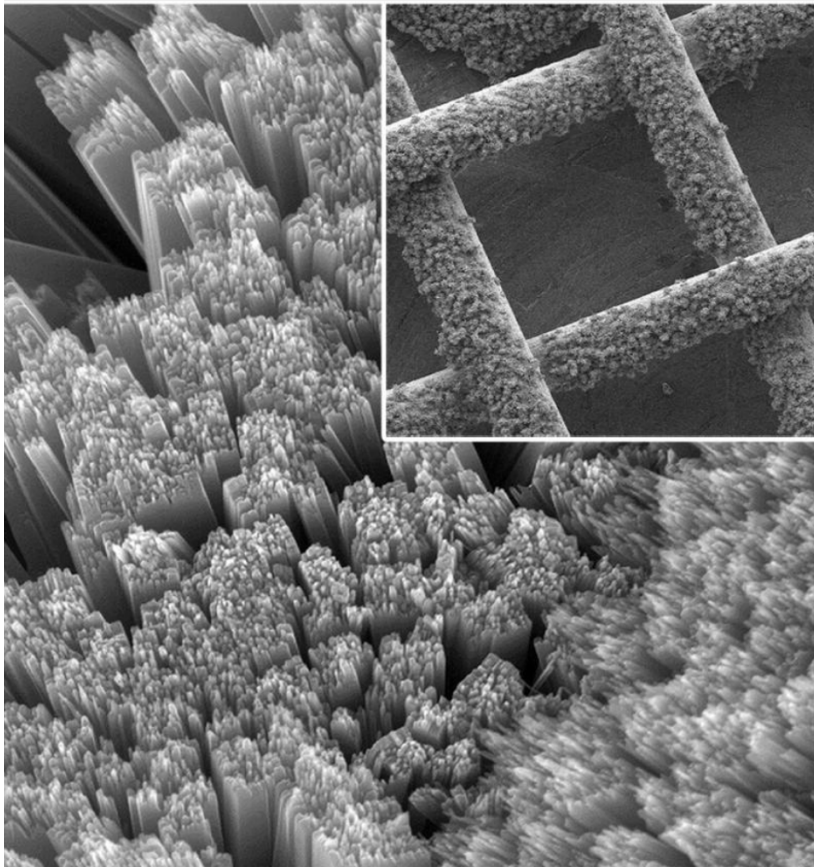


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World's first solar battery runs on light and air

BREAKTHROUGH



Researchers at the Ohio State University have invented a solar battery -- a combination solar cell and battery -- which recharges itself using air and light. The design required a solar panel which captured light, but admitted air to the battery. Here, scanning electron microscope images show the solution: nanometer-sized rods of titanium dioxide (larger image) which cover the surface of a piece of titanium gauze (inset). The holes in the gauze are approximately 200 micrometers across, allowing air to enter the battery while the rods gather light.

Credit: Yiying Wu, The Ohio State University.

Read more at: <http://phys.org/news/2014-10-solar-cell-power-world-battery.html#jCp>

October 3, 2014: Nature Communications



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Elon Musk: The master plan is...

- Build sports car.
- Use that money to build an affordable car.
- Use *that* money to build an even more affordable car.
- While doing above, also provide zero emission electric power generation options.
- Don't tell anyone.



Tesla
Powerwall

Conclusion

- The pace of energy technology development is accelerating.
- Solar PV and battery storage are reaching grid parity. Micro-grids and micro-turbines are entering the scene in distributed generation.
- The velocity of change will be controlled by market demand, technological innovation, alternatives to the grid, the regulators ability to regulate, & competition from new entrants to the market.
- The electrical grid could become optional for many consumers, reducing the revenues received by utilities and threatening to strand billions of dollars of energy assets.
- The pace of change will be altered by at least three forces which may act to slow down or speed up grid defection: **reliability, electric vehicles, and regulatory innovation.**



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Final Thoughts...



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Jeremy Rifkin sees a global economy in which the marginal costs of producing some goods is lowered to zero...



Globe & Mail, June 24, 2014

In Ontario, the power grid frequently has a surplus of electricity ... such that wind and solar producers push the price of electricity into negative territory.

We are witnessing the emergence of the third industrial revolution:

The 1st industrial revolution was driven in part by coal and the locomotive.

The 2nd ... by electricity and trucks.

The 3rd ... by the Internet, renewable energy and the exponential growth in digital sensors, moving, tracking and transporting goods.



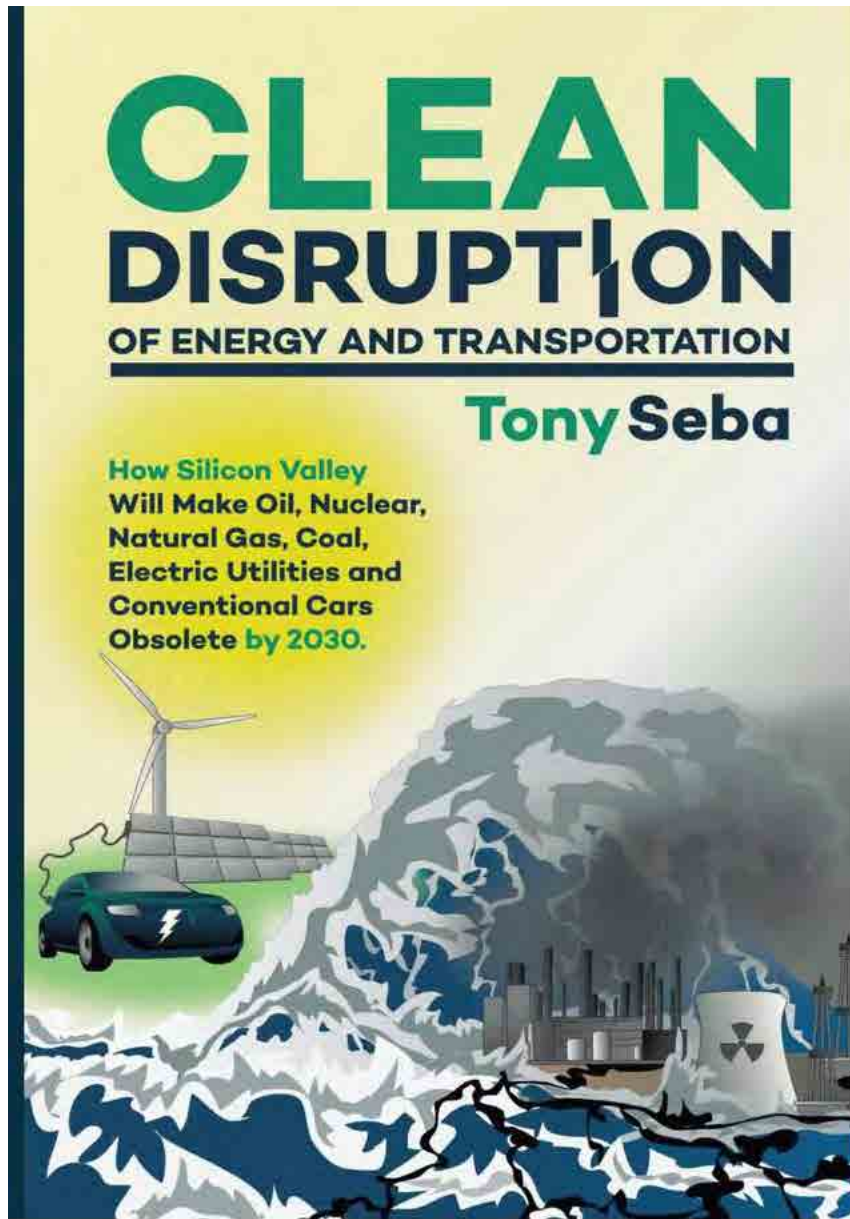
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Business Models are Changing: ... the battle now is for the customer interface...

- Uber, the world's largest taxi company, owns no vehicles.
- Facebook, the world's most popular media owner, creates no content.
- Alibaba, the most valuable retailer, has no inventory.
- Airbnb, the world's largest accommodation provider, owns no real estate.





Tony Seba (2014)

“The Stone Age did not end because humankind ran out of stones... The age of centralized, command-and-control, extraction-resource-based energy sources (oil, gas, coal and nuclear) will not end because we ran out of petroleum, natural gas, coal, or uranium. It will end because these energy sources, the business models they employ and the products that sustain them will be disrupted by superior technologies, product architectures, and business models. Compelling technologies such as solar, wind, electric vehicles, autonomous (self-driving) cars will disrupt and sweep away the energy industry as we know it.”



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dan.mcGillivray@ryerson.ca

Next Generation Consumer – who will LDCs serve

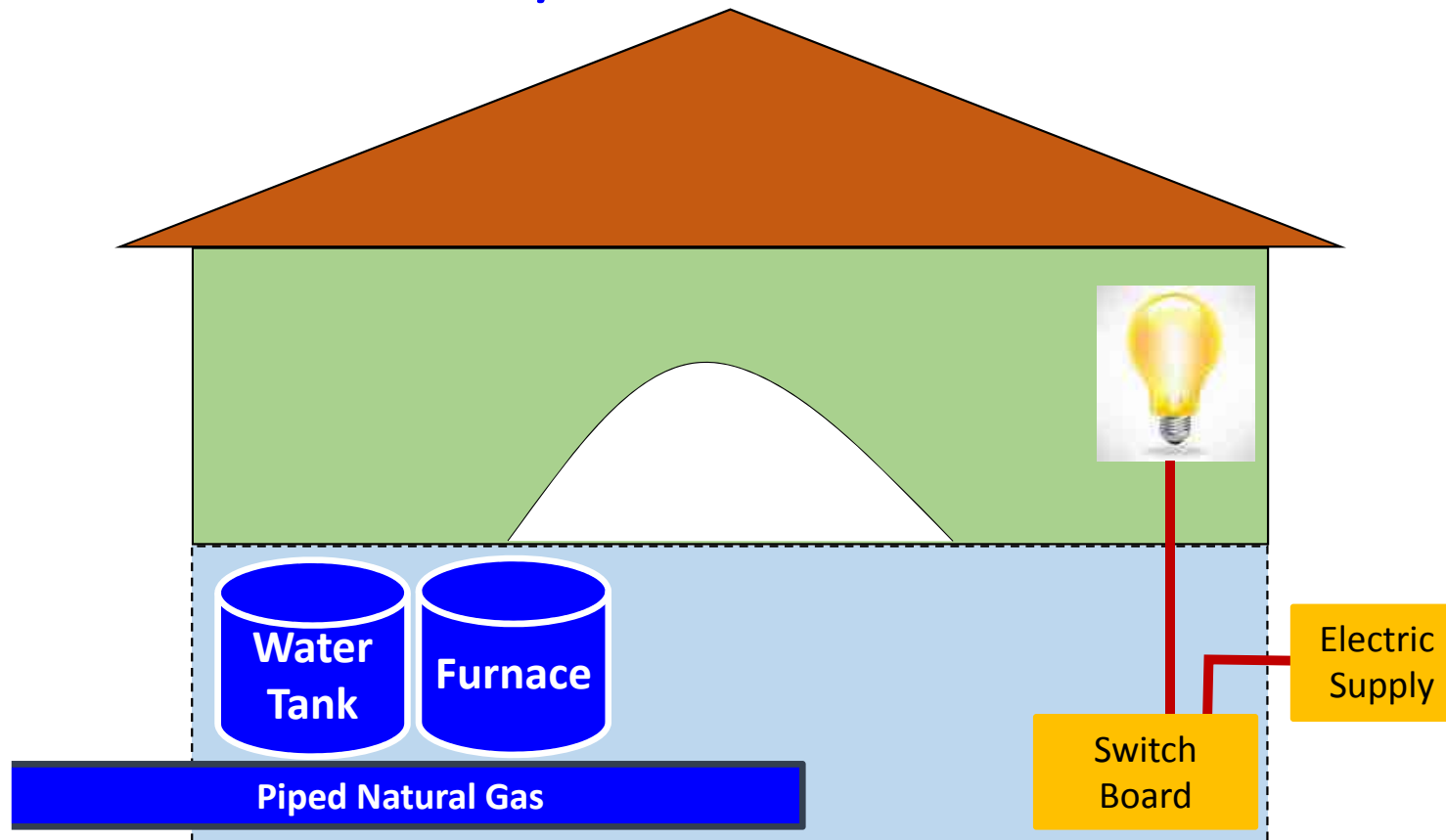
Bala Venkatesh



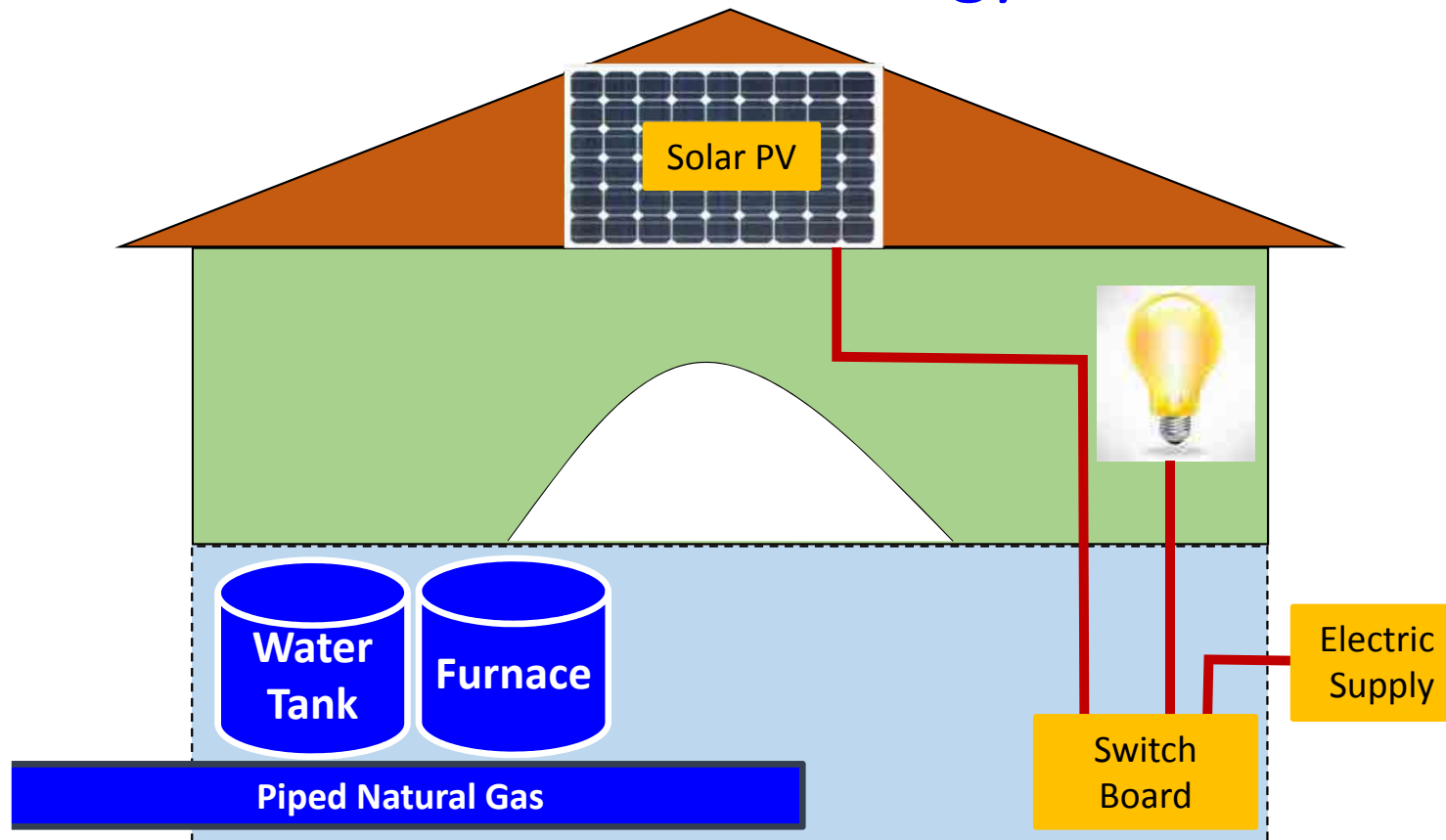
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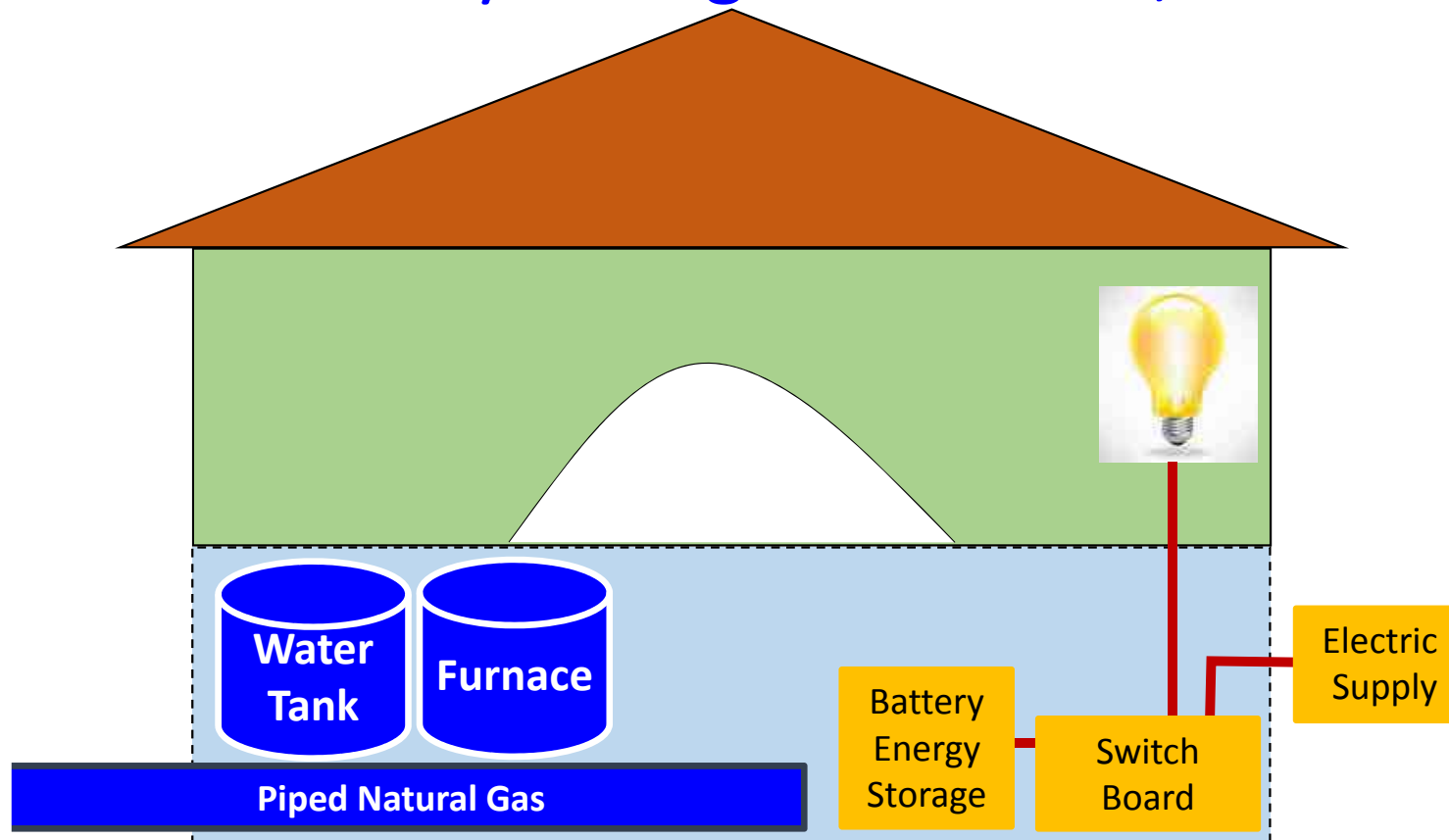
Today: House, Gas and Electric



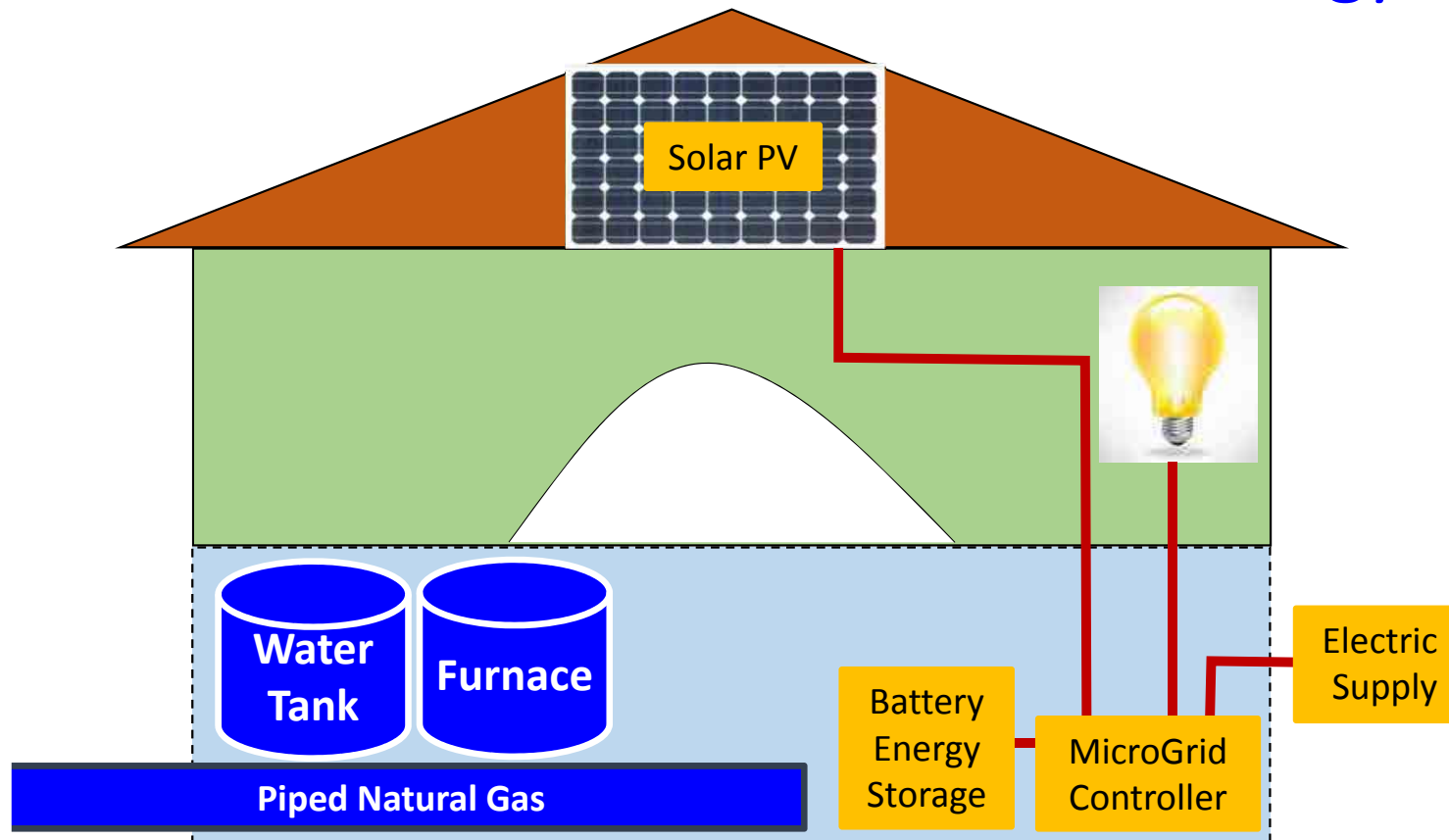
Solar PV: Old Technology, New Price



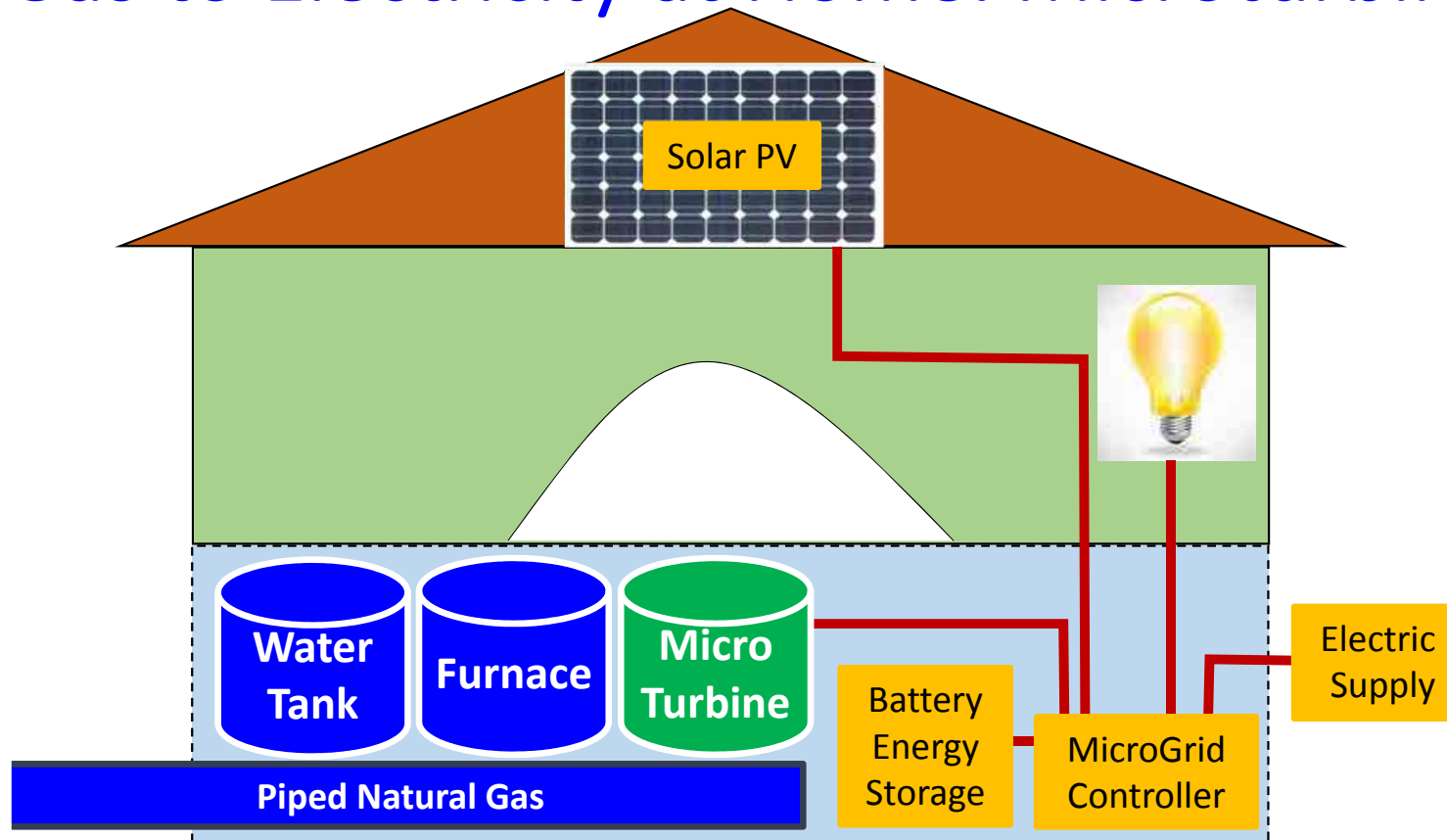
Battery Storage: New Tech, New Price



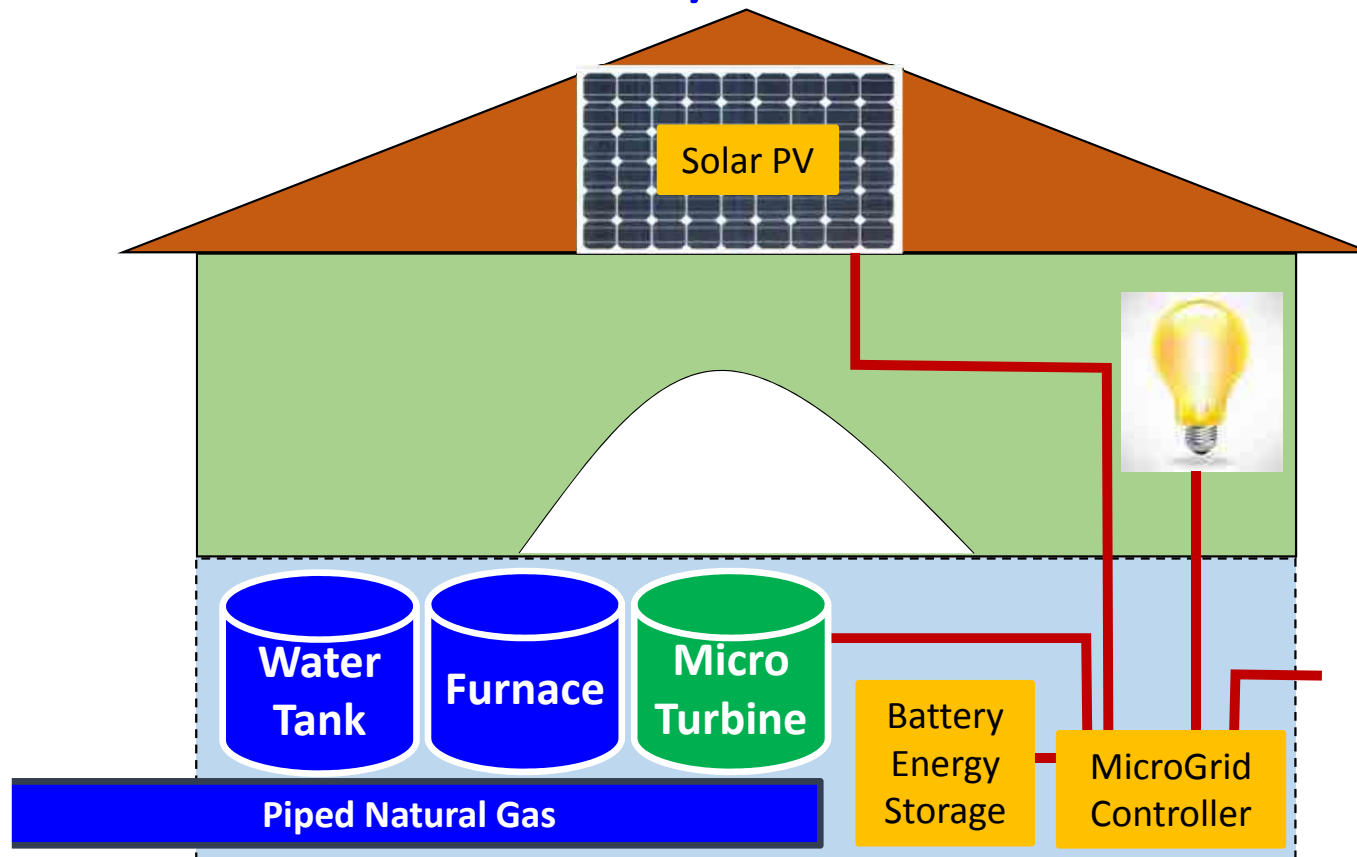
Micro Grid: New Technology



Gas to Electricity at Home: Microturbines

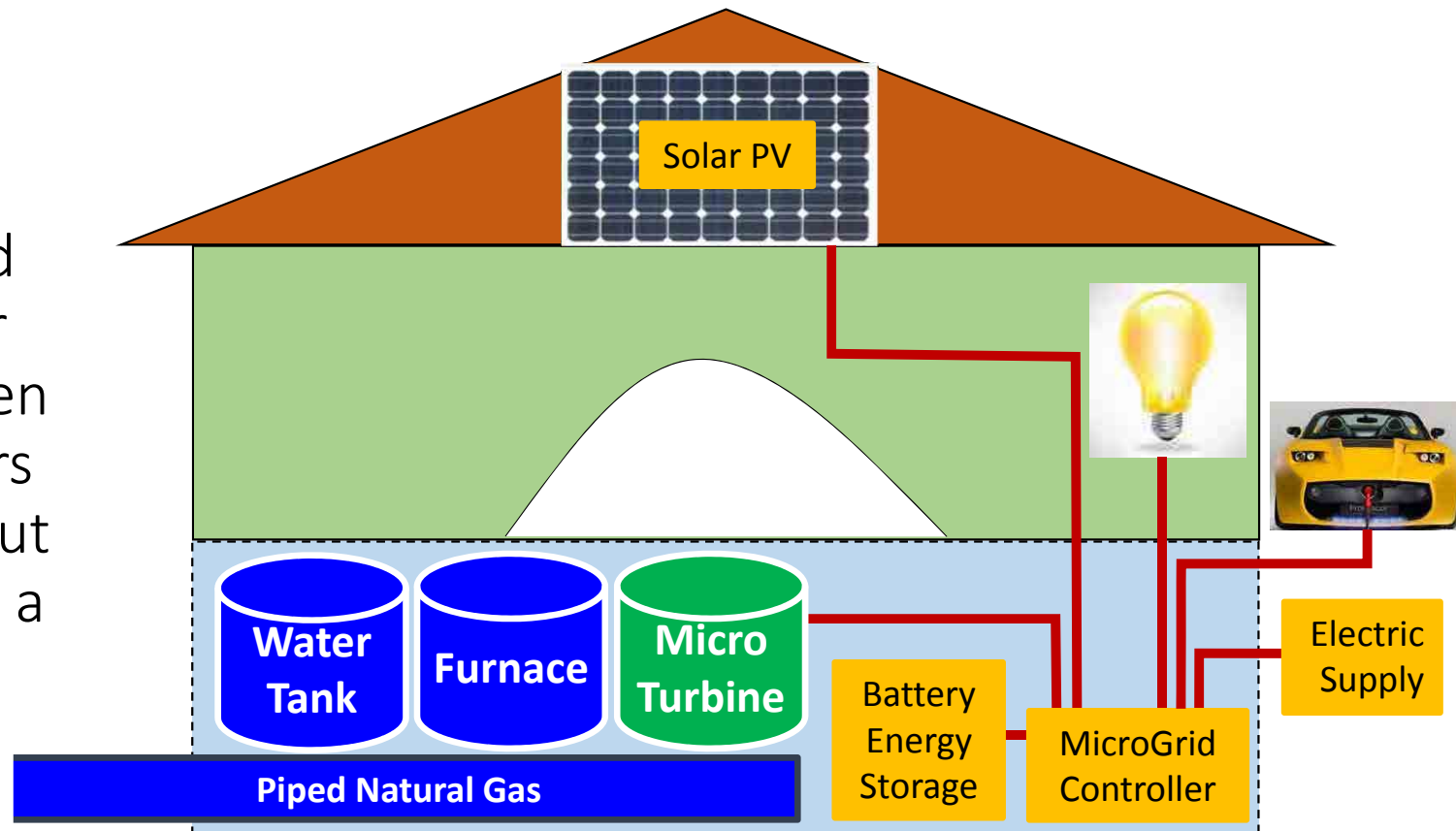


Reliability: with No Electricity?



The New Home Load: Electric Cars

Increased agony for LDCs when customers remain but consume a little.



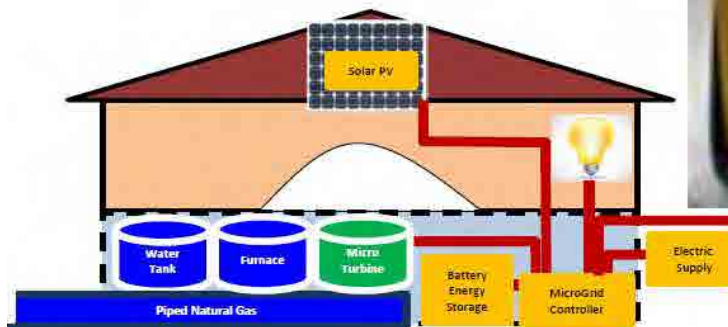
Charge EVs Faster: Think Again (EMAP)



Homes
with Gas
heat
consume
2 kW
peak

and

Tesla is
10 kW



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Confluence of Technologies

Energy Storage



Confluence of Technologies

Microturbines –
coupled with
abundance of
natural gas



Confluence of Technologies

Renewables
such as PV,
etc.

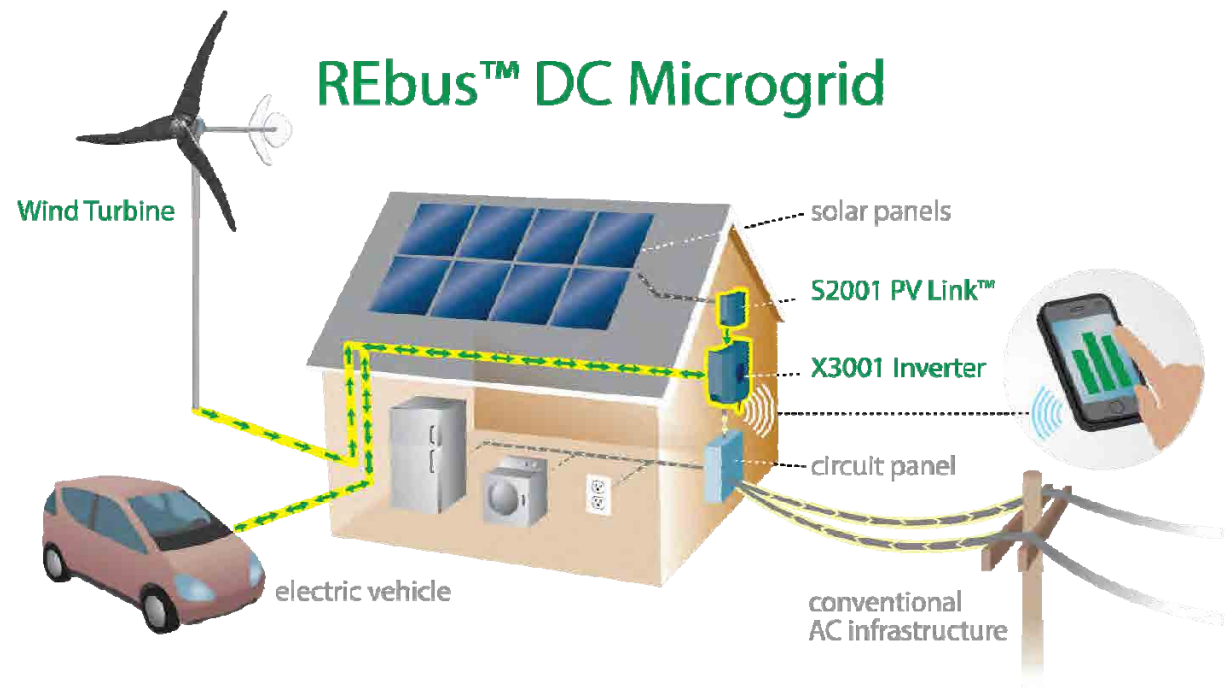


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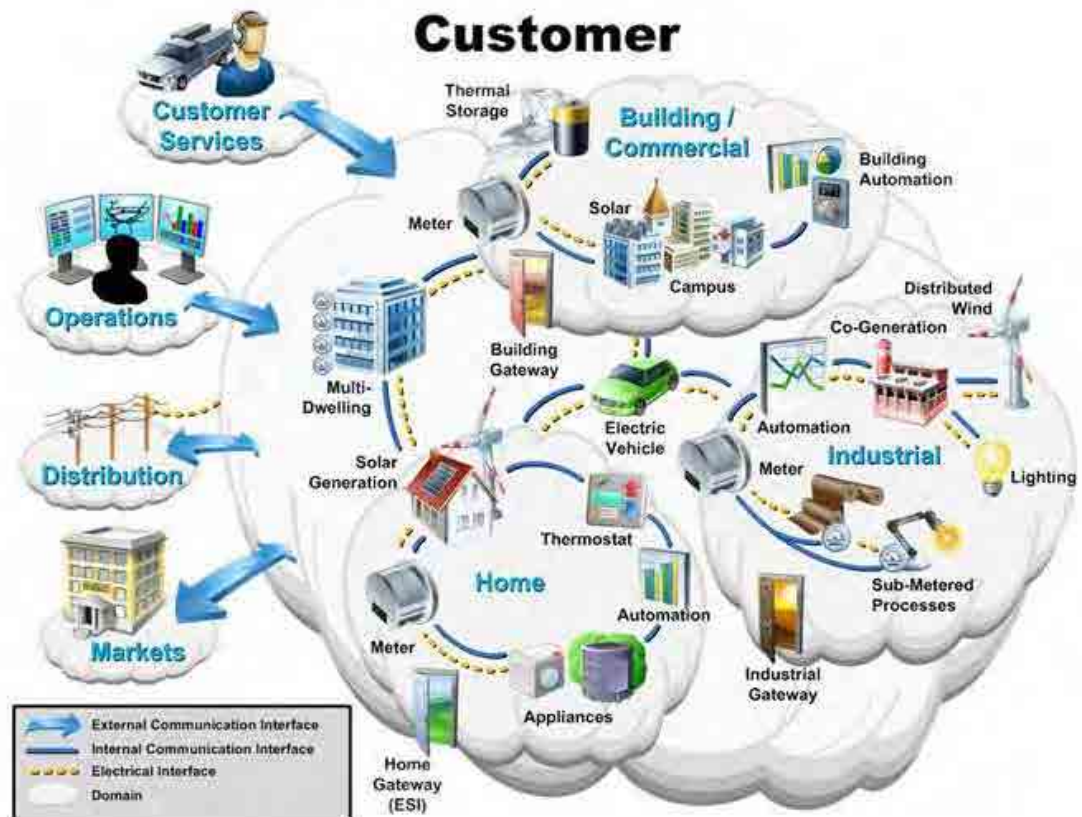
Confluence of Technologies

Microgrid Technology

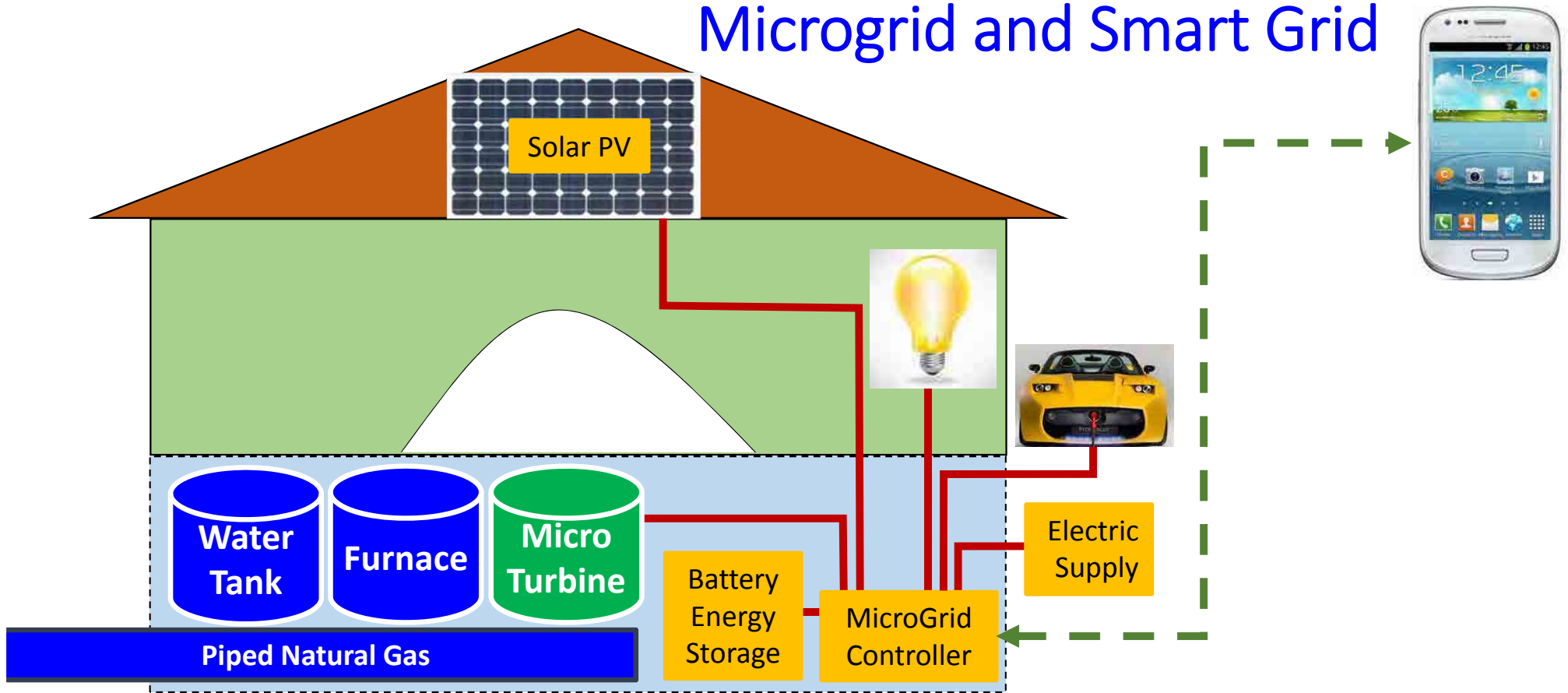


Confluence of Technologies

Smart Grids – information and communication technologies



New Landscape: Energy Storage, PV, Microturbine, Microgrid and Smart Grid



**Notes for a Presentation by Robert B. Warren to the Centre for Urban Energy Conference:
“The LDC of the Future”, June 3, 2015**

Part 1 - Introduction

I Introduction

- the first two sessions have canvassed the challenges facing LDCs and their owners
 - challenges from technology, economic and social factors
- we turn now to the consideration of how those challenges might be addressed
 - in this panel we will canvas what the provincial government and the regulator, the OEB, might do to assist LDCs in addressing the challenges
- before beginning, I will provide a brief overview of the role of the provincial government and the OEB in the structuring and in the operation of LDCs
 - this is relevant because of the mechanisms or tools which both might employ to assist LDCs and their owners
 - it is also relevant because LDCs and their owners might turn first to the provincial government and the OEB for assistance
 - finally, it is relevant because of fundamental policy choices about whether the province or the OEB should do anything to assist LDCs

II The Role of the Province

- background
 - the 1998 re-structuring of the electricity sector made two major changes for LDCs
 - LDCs went from what amounted to departments of municipalities to OBCA corporations with municipalities as shareholders
 - the intention was to provide a source of revenue for municipal governments
 - LDCs were to be regulated by the OEB
 - this represented at least two profound changes
 - the ownership of an OBCA corporation created opportunities for revenue but also unique governance obligations

- regulation created obligations for transparency and accountability, and subjected LDCs to external controls
- municipalities had regarded LDCs as an essential part of their service obligation to their residents and businesses
 - as OBCA corporations, whose operations were regulated, that role was arguably very different
 - some LDCs understood the impact of these changes
 - but not all
 - even today some municipalities may be reluctant to sell or merge their LDCs out of a fear that they would violate an obligation they, as the shareholders of an LDC, have to their residents
- the province retained a significant degree of control over LDCs
 - the control took several forms
 - the most basic was the obligation to sell electricity to everyone connected to the distribution system, an obligation imposed by s. 29 of the *Electricity Act*
 - the controls, direct and indirect, on the rates that LDCs could charge
 - rates have been frozen, unfrozen, and subject to rebates
 - the obligations imposed for conservation, demand management, and the connection to renewable energy sources
- provincial control has been effected through legislation, policies, and directives which the OEB is required to implement
- provincial controls have had a material impact on the revenue LDCs could earn and the costs they must bear
 - this has had an impact on, among other things, the LDCs' ability to replace aging infrastructure
- and now the provincial government is promoting consolidation of smaller LDCs
- given all of that, it would be natural for LDCs and their owners to look to the province to assist them in dealing with the challenges and, in particular, to keep them whole in the face of stranded assets or relieve them of the obligation to serve

III The Role of the OEB

- the OEB regulates many aspects of LDCs operations
- it does so through
 - the imposition of licence conditions
 - the establishment of codes of conduct, particularly those governing relationships with affiliates who in engage in unregulated businesses
 - the approval of rates
 - including rate design
- OEB oversees the so-called regulatory compact
 - LDCs have a monopoly for the distribution of electricity
 - they are entitled to earn a fair return on their investments
 - in return their rates are regulated
 - LDCs have an obligation to act in the best interests of ratepayers
- OEB balances the interests of ratepayers and shareholders
 - ensures the health of the LDC as part of the regulatory bargain and in the interests of preserving an essential service
- given the role of the OEB in ensuring the health of LDCs, it is natural that LDCs would look to the OEB to assist them in addressing the challenges
 - protect them from declining revenue trends by adjusting the rate structure to provide more fixed as opposed to variable costs
 - including new technologies in rate base
 - expanding the range of services they can engage in
- Karen Taylor and Karen Farbridge will canvass those and other ways in which the LDCs and their owners might seek to address the challenges they face

Part II - Governance Issues*

- the considerations which Karen Taylor and Karen Farbridge have canvassed give rise to questions of governance
 - particularly to questions of how municipal councillors who are members of the board of an LDC should approach their obligations
 - questions of governance arise regardless of whether a municipality decides to hold its LDC, sell it, or merge it with one or more other LDCs
- I propose to cover three main points:
 1. the governance obligations of the officers and directors of an LDC are those of the officers and directors of an OBCA corporation
 2. those governance obligations must be distinguished from the obligations which municipal councillors owe to the municipality
 3. the governance obligations are affected by the fact that LDCs are regulated
- it is essential to distinguish between the obligations which a municipal councillor owes as a member of the board of an OBCA corporation from those owed to the municipality.
 - LDCs are not line departments of municipalities, required to be responsive to requests or directions from municipal councillors or staff
- it is important to not conflate the obligations municipalities owe to residents with the obligations LDCs owe to ratepayers
 - the obligations which LDCs owe to ratepayers are regulated by the OEB
 - that regulation limits the extent to which municipalities can use LDCs as instruments of municipal social or economic policy
- as a result, the decision whether to own, sell or merge a LDC is arguably basically a business decision
 - whether the municipality will earn a greater return by owning its LDC, selling it, or merging it with another LDC
- what are the basic obligations of the directors of an OBCA corporation?
 - duty of loyalty and duty of care
 - S. 134(1) of the OBCA

- Every director and officer of a corporation in exercising his or her powers and discharging his or her duties to the corporation shall,
 - (a) act honestly and in good faith with a view to the best interests of the corporation; and
 - (b) exercise the care, diligence and skill that a reasonably prudent person would exercise in comparable circumstances
 - what does the duty of loyalty entail?
 - duty to avoid conflicts of interest
 - duty not to use director's position for personal gain
 - duty to serve the corporation selflessly, honestly and loyally
 - duty to exercise independent judgment
 - the Supreme Court of Canada has recognized that the duty to act in the best interests of the corporation includes the duty to treat individual stakeholders affected by corporate actions equitably and fairly
 - the directors must do so in a fair manner commensurate with the corporation's duties as a responsible corporate citizen
- BCE Inc. v. 1976 Debentureholders* [2008] 2 S.C.R. 560
- the stakeholders of an LDC might include
 - ratepayers
 - residents
 - local environment
 - employees
 - debt holders
 - conflicts of interest
 - S. 132(1) of the OBCA

A director or officer of a corporation who,

- (a) is a party to a material contract or transaction or proposed material contract or transaction with the corporation; or
- (b) is a director or an officer of, or has a material interest in, any person who is a party to a material contract or transaction or proposed material contract or transaction with the corporation,
- shall disclose in writing to the corporation or request to have entered in the minutes of meetings of directors the nature and extent of his or her interest
 - requires a director to have a pecuniary interest or a connection to a contracting party
- what are the basic obligations of councillors to their municipality?
- section 224 of the *Municipal Act* lists the following obligations of council:
 - (a) to represent the public and to consider the well-being and interests of the municipality;
 - (b) to develop and evaluate the policies and programs of the municipality;
 - (c) to determine which services the municipality provides;
 - (d) to ensure that administrative policies, practices and procedures and controllership policies, practices and procedures are in place to implement the decisions of council;
 - (d.1) to ensure the accountability and transparency of the operations of the municipality, including the activities of the senior management of the municipality;
 - (e) to maintain the financial integrity of the municipality; and
 - (f) to carry out the duties of council under this or any other Act. 2001, c. 25
- is there an inherent conflict of interest for municipal councillors who are also directors of the LDC?
 - do their obligations to their municipality and to their LDC conflict?
 - there is no conflict *per se* arising from the different roles of a member of council and a director of an LDC
 - section 132 of the OBCA is breached only if there is a pecuniary interest or a connection to a contracting party
- do the directors of a regulated OBCA corporation have different obligations?

- the regulatory compact and its attendant obligations distinguish the LDC from other OBCA corporations
- "[50] The principles that govern a regulated utility that operates as a monopoly differ from those that apply to private sector companies, which operate in a competitive market. The directors and officers of unregulated companies have a fiduciary obligation to act in the best interests of the company (which is often interpreted to mean in the best interests of the shareholders) while a regulated utility must operate in a manner that balances the interests of the utility's shareholders against those of its ratepayers. If a utility fails to operate in this way, it is incumbent on the OEB to intervene in order to strike this balance and protect the interests of the ratepayers."

Toronto Hydro-Electric System Limited v. Ontario (Energy Board), (2010) 99 O.R. 3d 481. at 484

- the differences which the Court of Appeal identified arise from the fact that the LDC is regulated and not from the fact it is owned by a municipality
- the role of the OEB in regulating matters of good governance
 - imposes rules, codes, etc. ex ante
 - approves rates ex ante but based in part on an ex post review of LDC decision-making
 - approves transfers and mergers ex ante
- what is the effect of the OEB on the governance obligations of the directors and officers of LDCs?
 - generally
 - directors and officers must ensure that the LDC complies with the rules imposed by the OEB and that the LDC appropriately balances the interests of ratepayers and shareholders
 - with respect to mergers and acquisitions
 - in deciding whether to approve the sale or merger of an LDC, the OEB employs the “no harm” test
 - “no harm test”
 - whether the transaction will have an adverse effect relative to the status quo in terms of the OEB’s statutory objectives

- does not include a determination of whether another transaction, real or potential, can have a more positive effect than the one that has been negotiated to completion by the parties

OEB Decision in EB-2005-0234/0254/0257 (the “Combined Decision”) dated August 31, 2005

- selling price relevant only if the price paid is so high as to create a financial burden on the acquiring company
 - whether future revenue requirements will unduly burden ratepayers
 - fact that purchase price too low is not relevant
 - conduct of seller, including the extent of due diligence or degree of public consultation, not an issue for the OEB
 - no harm test is not a process test that addresses the rationale for or the process underlying the transaction
 - customers of LDCs and residents have rights under the OBCA
- what are the governance obligations in light of the OEB’s role?

considerations:

- the LDC as a source of revenue for the municipality
- an ongoing benefit to the shareholder and its residents
- if continued ownership reflects inefficiencies that drive up rates, then the obligation to protect the interests of ratepayers may be breached by continuing to own
- if a sale or merger would result in efficiencies that would improve service or reduce rates, it would be in the best interests of ratepayers
- how is that balanced against the impact on the municipality and its residents of a loss of ongoing revenue
- considerations where the price offered is above market value or book value of assets
- benefit to shareholder and residents
- does it benefit ratepayers if rates increase in the longer term

- in light of the OEB’s application of the “no harm” test, the interests of ratepayers are protected
 - as a result, the governance obligations are arguably those that apply to any OBCA corporation

* These observations on governance reflect work done by my partner, Dan Ferguson, and me.

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The LDC of the Future

Remarks by Karen Taylor, for Centre for Urban Energy

Session Three: Financial and Regulatory Implications

Should Disruptive Technologies be included in Rate Base?

➤ Five Key Questions:

1. Do new natural monopolies result?
2. Are costs the same for similar customers?
3. Are there market failures?
4. Are there principal-agent problems?
5. Is there a lack of incentive to be operationally efficient?

If the answer to these questions is “No” – rate regulation probably not optimal business model.

What is the Role of the Regulator?

- Regulator should facilitate a smooth transition to a “new world”.
- Proactive rather than reactive.
 - Articulate how energy policy creates risks and devise appropriate regulatory policies.
 - Explain regulatory policy trade-offs, including who bears what risk.
 - Interact with government in transparent manner to inform energy policy.
 - Sort out intended consequences from those that are unintended.

Regulation cannot stop change. It may be able to ensure that the transition to a new paradigm is an orderly one.

What Tools Can a Regulator Use?

- Reduce cross subsidization between customers.
- Align cost recovery with cost causation or benefit.
- Reduce social policy loading.
- Insist on effective utility asset management and regional planning.
- Reduce free riders – impose exit fees and standby fees.
- Avoid transferring costs to remaining customers.
- Thoughtful use of net metering.
- Decouple distribution rates if used with other approaches.

Regulatory tools are focused on mitigating stranded costs arising from uneconomic by-pass or free-riding.

Regulatory Compact is Evolving

- Equity investor should assume that it is at risk for the undepreciated cost of assets that are no longer used and useful.
- New technologies empower customer choice – inherently at odds with centrally planned and procured electricity resources.
- Grid-parity may be an illusion.
- Greater clarity with respect to the allocation of risk.

We're really taking about effective change management.
Good corporate governance practices are essential.



Thank you!

Karen Taylor
The LDC of the Future
June 3, 2015
Mattamy Athletic Centre, 50 Carlton Street, Suite 4109

Session Three: Financial and Regulatory Implications

Thank you Robert.

It has been a very interesting morning thus far, and the overall theme of this conference is a timely one.

The future is by no means clear or predestined. It will be subject to any number of twists and turns, driven by the rate of technological advancement, government policy, availability of capital and the tolerance for risk, and whether new energy technologies can deliver the benefits thought without reliance on pricing distortions, subsidies, and free-riding on the existing system.

Given the uncertainty with which we are faced, I would like to approach our topic from an equity perspective. That is, what an equity investor should probably assume when making an investment in local distribution assets, new energy technologies or both.

Slide: Should Distributed, Disruptive Technologies be in Rate Base?

It has been very interesting to me to observe that energy industry participants often argue that the regulator should allow the scope of the business subject to rate regulation to expand, to include new, disruptive technologies. To be clear, there are some technologies that indeed should be included in rate base, as they perform network monopoly functions in a smarter or more advanced way. But that's not really what we're talking about here today. We're really talking about technologies that erode the network monopoly business model.

It is not surprising that so many espouse the notion that the regulator should intervene. It is after all, a business model that works relatively well.

However, this is not a one-size fits-all model, and it is not clear that it best suits the disruptive technologies that we're discussing here. If we want to be intellectually honest, we really need to ask ourselves a few questions, keeping in mind that the point of asking these questions is for the equity investor to determine whether these disruptive technologies require rate regulation:

Question 1: Are these new technologies such that new natural monopolies result – that is, are they characterized by economies of scale and scope such that a single firm can produce or provide service at a lower cost than multiple firms or suppliers?

Question 2: Is the cost and nature of providing service to large numbers of similar customers fairly homogeneous, such that it is not in the public interest to allow for price differentiation or discrimination?

Question 3: Are there market failures – is the price discovery process prohibitively expensive for a customer to undertake, largely due to the absence of alternative service providers of these new technologies?

Question 4: Are there principal-agent problems – conflicts of interest and significant information asymmetry?

Question 5: Is there a lack of incentive to be operationally efficient?

If we can agree that the answer to these 5 questions is likely to be “no”, then it would probably also be safe to suggest that it would not be optimal to expand the scope of the rate regulated entity to include these technologies in rate base.

I would suggest that rolling the cost of many of these technologies into rates would probably not create a sustainable or workable arrangement. Such an arrangement would likely be under constant pressure by other entities willing and able to provide access to these technologies and services at prices or rates lower than those imposed by the regulator.

Cost allocation and rate design related to the use of micro-grid and other technologies may also prove to be challenging, as the value derived from these assets may apply to single or narrowly defined groups of customers, even within the same customer groups, resulting in cross-subsidies.

Slide: What is the Role of the Regulator?

So what is the role of the regulator? The regulator serves a necessary and legitimate role protecting the public interest as it relates to transmission and distribution network monopolies. The regulator acts as a surrogate for competition, establishing processes to determine rates that are just and reasonable. It also delineates

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principles and guidelines that govern the conduct of rate regulated entities in terms of service quality, standards of service, use of information, and approaches that govern the overall relationship between the distributor and its customers. The regulator balances the interests of the equity holder and those of the customer in the rate setting process.

It is important to note that although the distribution sector has not been subject to significant change, it is not inviolate. A regulator cannot stop change and I would suggest that the appropriate role of the regulator is to facilitate a smooth transition to a new world.

The obvious question is, of course, “how could this be done?”

Let me suggest a few things.

First, the regulator needs to be proactive rather than reactive.

Second, the regulator should be able to articulate how the energy policy of government creates risks for the existing system. It should be able to devise appropriate regulatory policies to address these risks.

Third, the regulator should be able to explain the regulatory policy trade-offs being made, including where risk resides and who is responsible for bearing that risk.

Fourth, the regulator should be able to interact with government in a transparent manner to provide expert advice on energy policy, however it must do so in a way that does not compromise its actual or perceived independence and objectivity. This latter requirement is essential for maintaining the credibility of the regulator’s adjudicative work and the social licensing that results therefrom.

Finally, the regulator should be able to determine whether the changes facing the industry are intended or unintended consequences of energy policy. This may seem to be of limited relevance, but the distinction matters. For example, if the erosion of the network monopoly business model is a desired policy outcome, then it may be that the obligation to serve needs to be reconsidered. If not, then other regulatory strategies may need to be considered.

Slide: What Tools Can a Regulator Use?

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The regulator has a number of tools at its disposal – most of which are focused on mitigating stranded costs arising from uneconomic by-pass or free-riding.

There is a list of potential tools on the slide, in no particular order:

First, reduce cross subsidization between customer classes and between new customers and existing customers. Costs should be transparent and comprehensible.

Second, reduce socialization of costs broadly across the system, particularly if benefits are not shared broadly system-wide. Align cost recovery with cost causation or benefit.

Reduce social policy loading on the electricity system to reflect the actual cost of providing electrical service.

Insist on effective utility asset management, planning, and prioritization to ensure that the system is built out in a prudent manner and is cost-effective.

Reduce free riders – in this context, free riders are customers who adopt new technologies to island themselves from the grid permanently, notwithstanding the fact that generation, transmission, and distribution has been put in the ground to meet their needs. Exit fees could be assessed. This would also include a generation exit fee to capture the capacity value of installed generation, rather than just an energy-related charge associated with existing mechanisms that capture the difference between energy costs incurred and collected in the short term.

Similarly, the regulator could design and implement standby charges to accommodate customers who chose to temporarily island themselves from the grid. The standby charge should reflect the fact that the system investment required to serve this type of customer may be the same as the investment required to serve the customer who continually draws service. The nature of system use changes – its now episodic rather than continual, but the utility asset configuration does not necessarily change. The nature of installed generation may not change either. The customer may reconnect to the grid when the system is near peak. Standby charges must recover capacity on a peaking basis and investments made to ensure system reliability.

Avoid transferring costs to customers who remain on the system while others depart.

Examine depreciation rates and other conventional asset recovery assumptions to determine whether extended recovery periods remain appropriate.

Be thoughtful with respect to the implementation of net metering, which can result in double subsidies accruing to customers who adopt behind the meter generation.

Finally, some jurisdictions have moved to decouple distribution rates from energy usage. At first blush, decoupling may help offset some of the risks associated with the adoption of disruptive technologies. However, used alone, without the implementation of exit fees and/or standby fees, decoupling may result in the loading of cost onto customers who remain on the system, while others depart.

Slide: The Regulatory Compact is Evolving

Regulation is not static – to remain relevant and fulfill the purpose it is intended to have, regulation must evolve to reflect the policy objectives of government, technological innovation, financial and other considerations.

Equity investors should understand how the relevant regulator makes decisions – identify the framework used to inform the regulator's decision process on a particular matter. Many regulators develop regulatory policies that set out these decision frameworks in a transparent manner. However, regulatory policy more often than not is set out in a regulator's reasons for decision in one or a series of decisions over a number of years.

The sum of a regulator's decision processes is often referred to as the regulatory compact – a term generally meant to describe how the regulator balances the interests of consumers and the utility in the rate setting process. Equity investors have traditionally relied on this "compact" to assess investment risk and formulate expectations regarding the likely approach a regulator may take on an issue.

There have been a number of relatively recent regulatory decisions in other jurisdictions that have seemingly shifted the "regulatory compact", unsettled the

utility community and its investors, and raised concerns that the business risk profile of the network utility business is increasing.

In November 2013 the Alberta Utilities Commission released its Utility Asset Disposition Decision. This Decision sets out 19 principles relating to the assets of the utility - for example, one of the principles states that utility assets are the property of the utility. Customers do not obtain a property interest in utility assets by virtue of receiving and paying for, utility service. A further decision that was issued in January 2015, takes these principles a step further – that the treatment of gains or losses relating to the property owned by the utility, or to assets no longer used, required or necessary to provide utility service, is symmetrical. The owners of the utility have the benefit of any gains on assets and have the risk of losses, inside or outside the normal course of business.

The National Energy Board made a number of findings similar to those of the AUC in its March 2013 Decision RH-003-2011 relating to Tolls and Tariffs for the TransCanada Mainline. In its Reasons for Decision, the NEB stated that “a regulatory rule that compels the Board to set tolls that allow the return of and on investment, irrespective of whether assets associated with that investment are used and useful for providing service, erodes management’s responsibility for its investment decisions...”¹. The Board also stated elsewhere in the same decision that its “conclusion is consistent with the principle that the ultimate risk of asset ownership is placed on the pipeline company and not its customers”².

Before I move on, I want to point out that the issues raised in the Alberta and NEB processes have not yet been as extensively tested here in Ontario and where the issues have been tested, the determinations have been somewhat different.

So what are the key takeaways from this discussion?

1. Rate base: the equity investor should assume that it is at risk for the undepreciated cost of assets included in rate base that cease to be used and useful and therefore must be removed from rate base. The industry generally refers to this as “stranding”, although assets may cease to be used and useful for any number of reasons. Given the decisions of regulators in

¹ National Energy Board. RH-003-2011. Page 40.

² Ibid. Page 41.

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various jurisdictions, simply because an investment was found to be prudent by the regulator and included in rate base does not mean it will stay in rate base until it is fully depreciated. This is particularly true if the asset no longer serves a utility purpose – that is, it is no longer used and useful.

2. New distributed, disruptive technologies create the potential for greater customer choice, customized energy technology solutions and value for money propositions that can differ between customers, even those living next door to one another. Customer choice and price visibility are inherently at odds with the centralized procurement of electricity generation, monopoly transmission and distribution solutions, and regulatory practices including cost socialization, cost allocation and rate design. Different business models should be used.
3. Pricing-distortions and the presence of energy subsidies may create the illusion that new technologies have reached grid-parity, potentially resulting in the mis-allocation of capital.
4. The continued evolution of the so-called “regulatory compact” has resulted in a clearer articulation of the role of equity, the risks the equity investor is expected to assume or conversely, the risks for which customers are not responsible.

Finally, I would like to suggest that this discussion is really about effective change management and appropriate governance at the Board of Directors of Ontario’s LDCs. The Board should be actively engaged in the development of new business models to pursue innovative, energy technologies, ensure that management is proactively seeking rate relief to avoid free riding and uneconomic bypass of the its own distribution system, and adequately fund the LDC to ensure credit metrics are stable during periods of above-average investment to connect new customers or renew existing infrastructure.

Together, management, the Board, and the controlling shareholders have the responsibility to ensure that the organization has the right strategy, skill sets, and resources to meet future challenges and opportunities. The glass is, as we say, half full, rather than half empty.

Thank you and I look forward to any questions you may have.


The LDC of the Future

FINANCIAL AND REGULATORY IMPLICATIONS

KAREN FARBRIDGE, URBAN CONNECTOR



Three key messages

1. The changing world of electric utilities
 2. The implications for local government
 3. The opportunity for innovation
- 
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1. The changing world of electric utilities

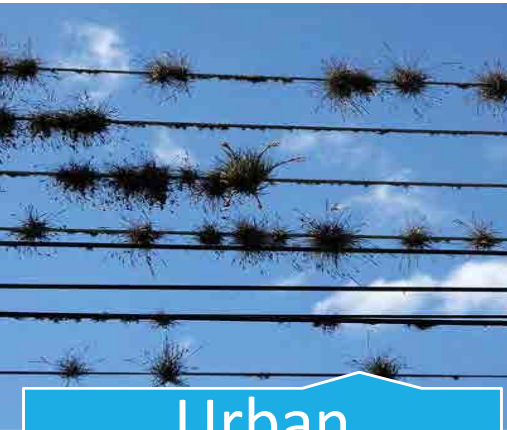
A perfect storm of new technology, aging infrastructure, the limitations of a centralized and fragmented energy system, and climate change is changing the business environment for electric utilities.

2. The implications for local government

There are several risks associated with the changing business environment for electric utilities that municipal governments (owners and non-owners alike) should be aware of.

3. The opportunity for innovation

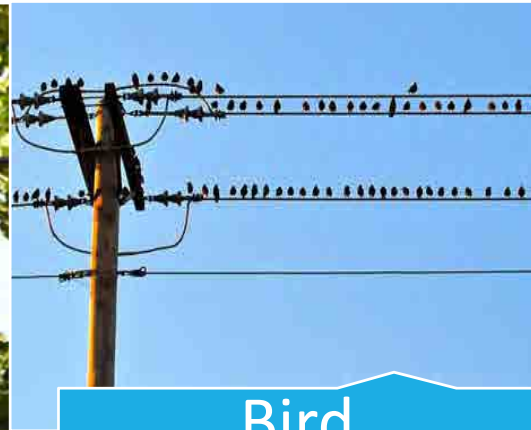
Municipal owners of electric utilities should understand their options to mitigate the risk of a changing business environment, including opportunities for their community to be the beneficiaries of this strategic shift.



Urban
greening



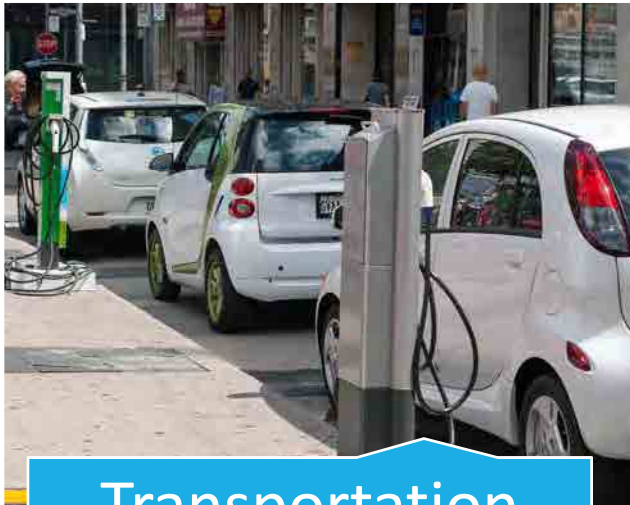
Wildlife
corridors



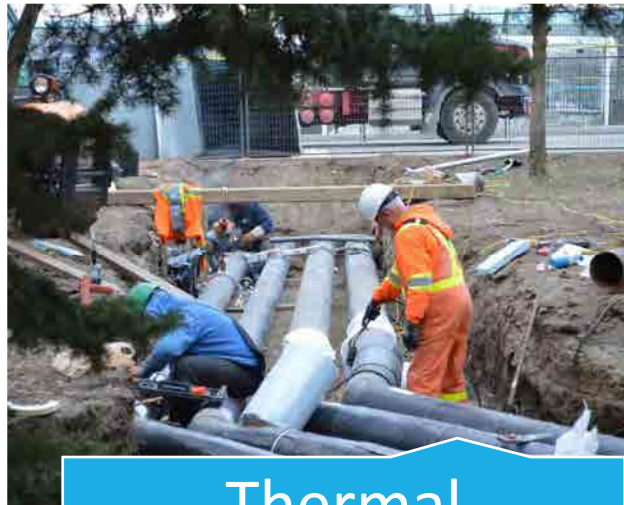
Bird
habitat



Sneaker
tossing



Transportation
Network



Thermal
Network



Microgrids

Thank you

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Karen Farbridge, Karen Farbridge & Associates

The LDC of the Future

Session Three: Financial and Regulatory Implications

Introduction

I would like to thank the Urban Energy Centre for convening this timely conversation.

There is an exciting transformation underway in our energy system which is driving towards a cheaper, cleaner, decentralized and integrated future.

As with any system change, there risks, barriers and opportunities.

As part of Ontario's energy system, there are implications for LDCs.

Municipal owners of LDCs will need to be actively engaged if they want to ensure they protect the value of their asset, minimize their risks and advance the best interests of their community.

My presentation will discuss touch on three themes:

The first theme addresses the changing world of electric utilities.

My interest here is to highlight that there are several interconnected factors - in addition to the emergence of new technology - that are impacting Ontario's LDCs.

The second addresses the implications for local government.

My interest here is to highlight the risks extend beyond a financial risk for LDCs and their owners.

And the third theme addresses the opportunity for innovation.

Lastly, my interest here is to highlight that, while consolidation is frequently presented as the solution, I think we need to break out of the regulatory box we have created and imagine how we can leverage our investment in LDCs to build Smart Energy Communities.

The changing world of electric utilities

A perfect storm of new technology, aging infrastructure, the inherent limitations of a centralized and fragmented energy system, and climate change is changing the business environment for electric utilities.

We have heard how new technologies are giving electricity customers more control over how much energy they use and what energy source they choose.

Technology is relentlessly driving towards “grid-parity” which is threatening the monopoly enjoyed by utilities for generations.

A reduction in demand along with fewer customers means a smaller revenue base for LDCs to operate and fund needed infrastructure.

At the same time, there is a growing need for revenue to fix an aging system. This is increasing costs which, in turn, increases pressure from consumers, regulators and elected officials for electric utilities to find efficiencies.

Electric utilities are also under pressure to increase the resilience of the grid to increasingly more frequent and severe extreme weather events.

The new technologies are not just disturbing the historical stability of LDC operating statements, they are reshaping the energy system through greater integration and local control over energy decision making.

This is a real test for a system that is centralized and fragmented.

These factors, and I am sure there are others, represent an unprecedented strategic risk for LDCs and their municipal owners.

Will LDCs be able to adapt to the new business environment, implement relevant business plans and strategies and effectively allocate resources?

What are the risks for municipal owners if they don’t?

And what are the risks for our communities?

The implications for local government

There are several risks associated with the changing business environment for electric utilities that local governments (owners and non-owners) should be aware of.

LDCs have historically been owned by municipal governments in Ontario.

With the regulatory reforms of the late 1990s, LDCs became a source of revenue for their municipal owners.

Two revenue streams were established: interest payments on a promissory note; and an annual dividend payment.

As their revenue base declines some LDCs may find that they are unable to issue a dividend to their municipal shareholder.

The potential loss of this revenue represents a financial risk for municipalities that own all, or part, of their LDC.

The relative importance of this revenue loss will vary among municipal owners depending on municipal structure, the history of consolidation and local decision making – so it is difficult to draw any general conclusions.

Guelph still owns its LDC. The City called the promissory note several years ago and currently receives an annual dividend payment of \$1.5 million.

To put this in perspective, the dividend payment represents less than a 1% increase in the tax rate so the loss of the dividend would not represent an insurmountable challenge, especially if it was anticipated and phased out over time - not that I am suggesting this is desirable.

However, the risks to municipal owners and their communities extend beyond the loss of a revenue source.

LDCs convey electricity from the provincial grid and distribute it to customers within their communities.

There is an important regulated social responsibility that comes with this function and that is to deliver electricity to anyone who wants it, to do so reliably and at a just and reasonable rate.

As LDCs lose customers to distributed energy, there is a risk that the remaining customer base will be disproportionately comprised of low income households and small business.

Municipal governments, whether an owner or not, will inevitably be drawn into this social justice issue.

The long-term risk is that that an LDC, and therefore its owner, will have find they have to bear the costs of a stranded asset – an asset that has lost much of its value or has become a liability.

A municipal owner might find one day that they are compelled to make to make an equity investment into their LDC to meet its regulatory obligations.

Significant change is needed to adapt to the new business environment yet the sector acknowledges there are tremendous barriers to innovation that are unique to the utility industry and include: *“the relatively limited competitive advantage and shareholder returns to be gained from innovation by regulated monopolies; the mismatch between the relatively low-*

risk, conservative utility business and regulatory model, and the risk profile of innovation; and issues of culture and core competencies at utilities.”¹

The role of an LDC in a community goes far beyond the distribution of electricity or issuing a dividend – despite the regulatory reforms of the late 1990s.

They are an integral part of the economic growth and development of a community and its quality of life. Their success, or lack thereof, is very much a concern of local governments.

Whether the energy transition underway represents a threat or an opportunity for LDCs, municipal owners, or communities depends entirely on our response, and the motivation behind that response.

Who will survive – those that defend the status quo or those that embrace the transforming market?

The opportunity for innovation

Municipal owners of LDCs should understand their options to mitigate the risk of a changing business environment, including opportunities for their community to be the beneficiaries of this strategic shift.

Consolidation options

After the regulatory reforms of the 1990s, some municipalities sold their LDCs as they were too small to operate efficiently under the new rules.

Other LDCs sought efficiencies through mergers, maintaining the involvement of their respective municipalities in the electric utility, while others purchased smaller LDCs with the same intent.

The timely divestment of an asset that is at risk of becoming stranded can be a wise business decision.

However, while the sale of an LDC might bring short-term benefits to its ratepayers and be a financial windfall for the municipality, it will not address the long-term risk to ratepayers especially those on low incomes.

¹ *Stimulating Innovation on behalf of Canada's Electricity and Natural Gas Consumers: A discussion paper (2014) Canadian Gas Association and Canadian Electricity Association*
<http://www.electricity.ca/resources/publications/stimulating-innovation.php>

Likewise, a merger with another LDC might mitigate the impact of a declining revenue base in the short-term but on its own is not a response to the new business environment – and while additional resources might better position an LDC to respond effectively that very much depends on strategy and culture.

Consolidation of LDCs into fewer but larger units is not an adequate solution to these challenges. Consolidation is a business transaction when we need a business transformation.

Without an integrated strategy, consolidation may simply perpetuate the status quo – a status quo that is proving unsustainable.

Building a bigger stranded asset is clearly not the answer.

Regulatory options

I think we are at great risk of doing the wrong thing for the right reasons if we do not question the current regulatory regime in light of the transformation underway.

Without more conversations like this one today, the risk of short-termism is high.

Long-term thinking may be hampered by institutions which, owing to their origin in different time, *“have long frozen all human relationships into patterns and customs and law which resist change not because of conservative tradition or evil intent but because of rigidities inherent in the structure of every established order”*.²

Simply put, the status quo is a fortress and it has outposts in our minds.

Whether an LDC is able to adapt to the new business environment will depend upon good corporate governance along with clarity from the regulator and province.

The development and execution of the right business strategy is a shared responsibility between management, the board and their shareholder – and this means good healthy dialogue between all three players.

Local governments will be increasingly drawn into regulatory discussions as the risks to LDCs grow as does their understanding of their role in community energy planning.

Karen Taylor has already discussed some regulatory options and this afternoon the role of the regulator in enabling the creation of new business models that would allow LDCs to create value in the new energy market will be discussed.

² Leopold Kohr (1966)

Non regulatory options

Are there opportunities, outside of the regulatory framework, that could assist in the transition to a new energy future?

The good news is that the transformation occurring in the energy sector is being driven by multiple benefits: increased system efficiency, lower system costs, reduced energy bills, increased clean vehicles, increased energy efficiency, increased competitiveness, reduced emissions, increased system resilience and reliability, and increased energy security.

The question for municipal LDC owners is whether your community is interested in benefiting from the inevitable reshaping of the energy market, or – as a colleague of mine likes provoke – are you going to sell the family silver and let others to be the beneficiaries of the strategic shifts.

When gas and electricity markets began to open up in the European Union in the early 1990s, a handful of municipal utilities successfully embraced the change as a competitive opportunity for their communities, the vast majority, to their loss, did not.

The “LDC of the Future” will need to offer a wide range of energy services tailored to the needs of differing customer groups or even individual customers.

Energy services to typical end users will be broadly defined and include electricity, heating, cooling, thermal fuels, energy efficiency and energy information.

In the future, water and wastewater could be considered as an integral part of the utility offering.

Energy services to communities could additionally include infrastructure for electrification of transport, waste-to-energy infrastructure and services, and energy information to enable active integration of energy into urban planning decisions

In other words, today's single-service energy providers will become multi-service energy providers offering a constantly evolving portfolio of offerings structured to meet customer needs.

They should be municipally-oriented and would naturally include multi-municipal groupings.

The electricity sector is recognizing opportunities to innovate in areas of demand response, the facilitation of distributed generation and electric cars, optimization of asset use, fault detection,

mitigation and storage³. How can the regulator support innovation and value creation by utilities?

What can an LDC do? Embrace the transition. Extract value out of distributed energy. Work hard to keep the customers they have. Build on the high level of trust that they enjoy as an energy service provider today.

As natural monopolies, LDCs generally have not learned to engage their customers well.

Engagement means more than sending a bimonthly bill and sponsoring the local hockey team.

Smart meters offer a tremendous platform for customized service and happy customers. LDCs need to help them manage their energy bills.

Rather than contemplate a loss of municipal revenue, let's consider Epcor, an unregulated, multi-faceted energy services company, contributing 17% of Edmonton's operating budget.

Conclusion

As a fully leveraged asset, electric utilities can be an important part of building Smart Energy Communities.

And in closing, what is a Smart Energy Community?⁴

First, it integrates conventional energy networks. That means that the electricity, natural gas, district energy, and transportation fuel networks in a community are better coordinated to match energy needs with the most efficient energy source.

Second, a Smart Energy Community integrates land use, recognizing that poor land use decisions can equal a whole lot of energy waste.

Third, a Smart Energy Community harnesses local energy opportunities...

...and in doing so, is fully engaged in the energy transition.

Thank you.

³ Electric Utility Innovation: Toward Vision 2050 (2015) Canadian Electricity Association
<http://powerforthefuture.ca/electricity-411/innovation/adding-to-the-innovation-conversation/>

⁴ QUEST – Quality Urban Energy Systems of Tomorrow www.questcanada.org

The “Owners”

Presentation by Clarington Mayor Adrian Foster, Chair of Veridian

To LDC of the Future Conference

June 3, 2015

Agenda

- Welcome to Session Four: The “Owners”
- Thank you for the opportunity to speak to you to today
- Chaos Theory
- Who is Veridian?
- What is a Clarington?
- 5 questions – and my answers
- Quote

Chaos Theory

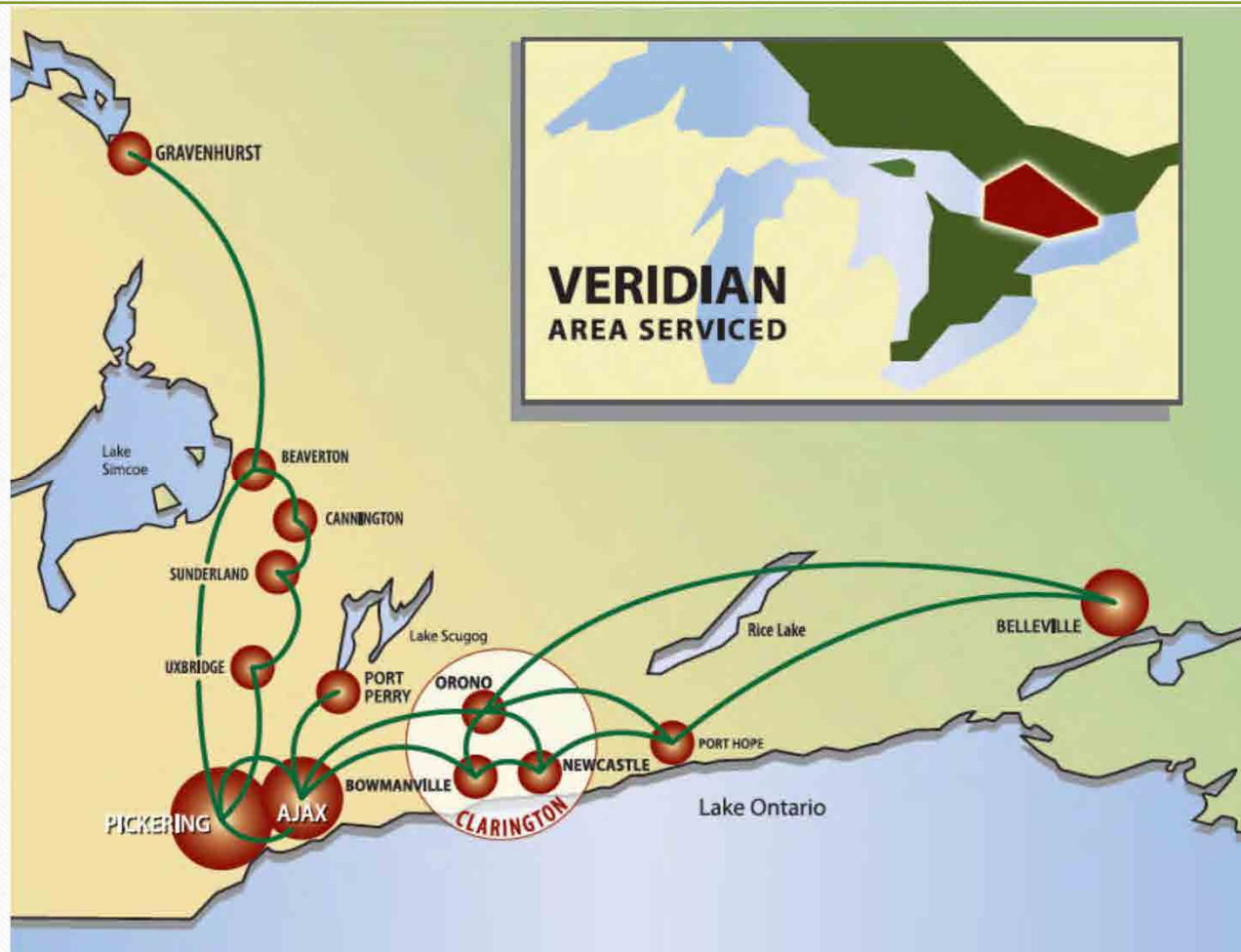


Who is Veridian?

- Veridian is 7th largest municipally owned LDC (about to become 5th largest after west GTA Megamerger)
- Owned by Pickering, Ajax, Clarington and Belleville with each shareholder having influence and none having “control”
- Veridian has successful history of M & A with 2 mergers and 5 acquisitions – resulted in better customer service; better top quartile returns to shareholders and a more safe and engaging place to work with more opportunities

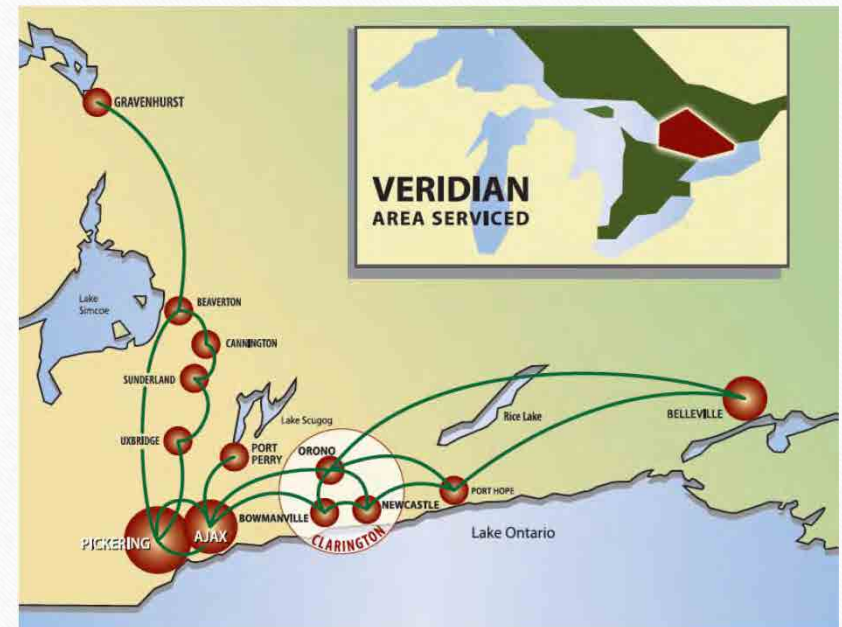
Who is Veridian?

- Growth has worked for Veridian in the past and will continue to serve shareholders well into the future with more growth
- Steady stream of dividends is important for shareholders
- Veridian has 120,000 customers
- I am Hydro One customer in Clarington – not happy that I pay almost \$500 more per year than customers across the street served by Veridian



What is a Clarington?

- Eastern most municipality of the GTA
- Population of 85,000



5 Questions

- Do municipalities regard the challenges to their LDC's as real and pressing?
- How important is the revenue from LDC's to the finances of municipalities?
- Do municipalities believe that the provincial government has a responsibility to either protect LDC's from competition or assume the costs of stranded assets?
- What role do municipalities believe the regulator should play in assisting LDC's to meet the challenges?

5 Questions

- To what extent, if at all, is the sale of the LDC, the acquisition of another LDC, or a merger with another LDC, a viable option for municipalities to preserve an important source of revenue?

Famous Quote



LDC of the Future

Consumer Led Generation

Niagara-on-the-Lake Hydro

June 3, 2015



Niagara-on-the-Lake Hydro

Niagara-on-the-Lake
Hydro

- Lowest Delivery Charge in the Niagara Region
- 8,600 customers, 133 sq. km
- Own transmission stations feeding Town
- NR Canada 2014 Energy Star Utility of the Year – Regional
- Zero Quest Platinum Safety Award 2012



NOTL Solar Generation

Niagara-on-the-Lake
Hydro

- > 130 solar installations in NOTL (FIT, MicroFIT, Net Meter)
- High level of interest in additional solar
- < 1,000 kWh per Micro Fit installation
- 1:65 solar to customer ratio
- 1.2% of load



Consumer Led Generation

Niagara-on-the-Lake
Hydro



Propositions – New Generation

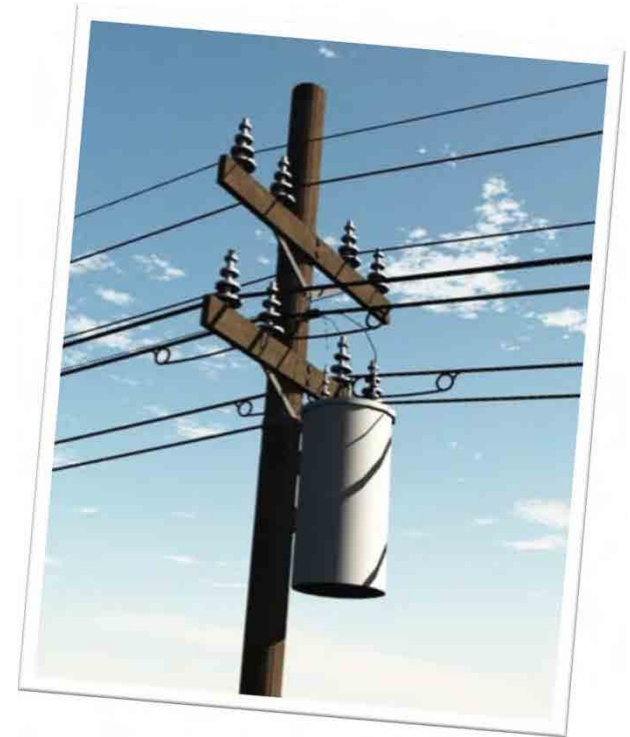
1. Technological changes and improvements will continue to reduce the cost of micro generation
2. Micro generation includes solar (primarily), small wind, battery, small gas generators, etc.
3. Micro generation will be driven by consumer choice; not centralized planning

Consumer Led Generation

Niagara-on-the-Lake
Hydro

Propositions – Impact on the LDC

1. Micro generation will be a competitor to the grid but not a replacement (integrated approach)
2. Micro generation will define the limit of the LDC monopoly
3. Micro generation presents a safety concern



Consumer Led Generation

Niagara-on-the-Lake
Hydro

Propositions – LDC of the Future

1. Future LDC must be aligned with current strengths and weaknesses
2. LDC will complement electricity provision with independent, neutral advisory services





THE PATH FORWARD

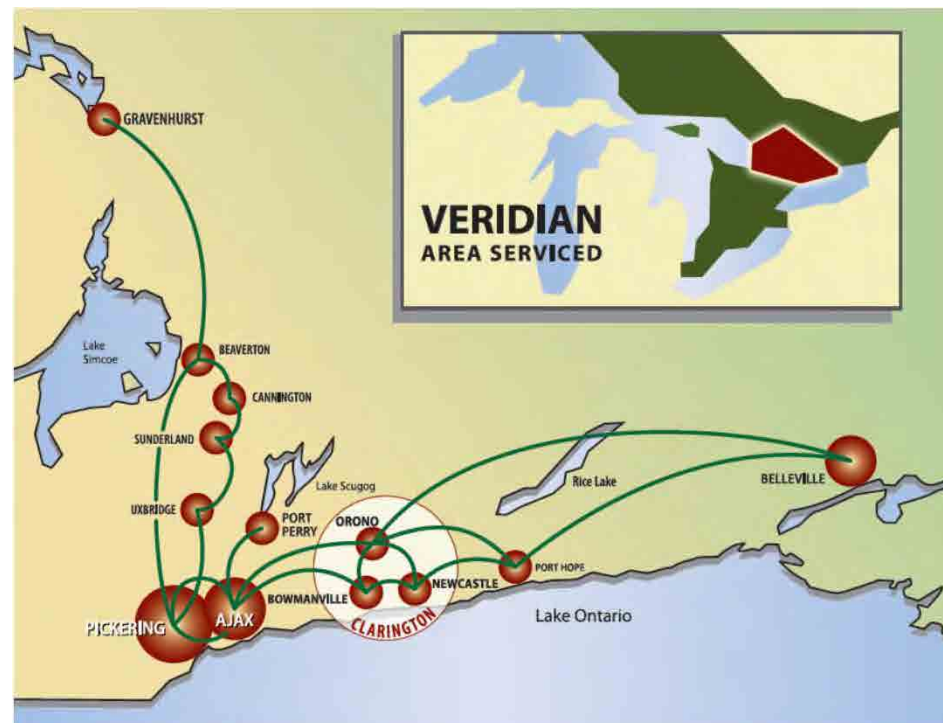
The LDC of the Future



Presentation by:
Michael Angemeer
President & CEO
Veridian Corporation
June 3, 2015

Veridian

- 7th largest Ontario LDC (about to become 5th largest)
- Serves the growing region east and north of Toronto
 - 407 extension, Seaton, Darlington refurbishment, Pickering airport, growing innovation community



Goldilocks Principle

The Goldilocks Principle states that something must fall within certain margins, as opposed to reaching extremes.



Veridian

Veridian has had a consistent model of value creation

- Merge or acquire service area blocks and leverage back office to become more efficient and offer a better customer, shareholder, and employee experience
- Diversify the business to enhance returns

This has resulted in:

- Rates of return among the highest in the province
- High dividend payout ratio
- Rate base growing at 6% per year
- Entry into renewable energy generation (FIT)
- Additional shareholder value in supporting economic development, environmental and social initiatives
- One of Canada's Greenest Employers – a great place to work

The Path Forward

- Build on Veridian's consistent model and maximize value for all shareholders
 - Others have been inconsistent
 - One large utility first looking to grow, now looking to sell
 - Other large utilities now looking to grow to mega-utility size – Two large utilities have shown that it can be difficult to be effective or efficient at this size

The Path Forward

How do we accomplish this?

- Optimize the back office to ~ 400,000 customers as outlined in the distribution sector panel report
 - At this level, we can maximize the value of existing IT systems and still provide a valuable connection to the customer and influence for the shareholders
 - Mega IT systems with inherent cost and delivery risks are avoided
 - Ours is possibly the most efficient and effective model
 - We would remain of a size with sufficient scale and scope to respond to challenges and opportunities
- Find “service blocks” of complementary territory which can be run locally on an efficient basis

The Path Forward

How do we accomplish this?

- Further diversify the business
 - Cogeneration – CHP
 - Renewable Energy – FIT and net metered
 - District Energy
- Capitalize on the “trusted” customer relationship
 - Energy and other products
- All of these things will maximize shareholder value and the customer experience and result in:
 - Improving dividends over time
 - Electricity rates lower than they otherwise would have been
 - Increasing value of the business and higher premium due to scale
 - Better service

The Path Forward

Regulatory Model

- Required to support smart sustainable growth of cities, regions and businesses
 - Clean air, water and climate change will continue to become bigger factors for municipalities
 - Capital for building infrastructure – energy, water, transit may need to come partly from private sector partnerships with utilities and municipalities
 - Regional energy planning, energy efficiency of generation and end use will become increasingly important
- Required to support utilities that have the scale to partner with private sector and educational institutions
 - Market Ontario Expertise and Products to the world
 - Example – Veridian Caribbean experience
 - Bring worldwide solutions to Ontario
 - Example – Scandinavian utilities district energy expertise

Conclusion



At Veridian we have the model that is “just right” for the future of Local Distribution Companies and Municipalities in Ontario



Centre for Urban Energy
Energizing the Future

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