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Analyzing the FITness of the Ontario grid for energy storage: Studying the potential of energy storage and the impact that FIT policies have had on the storage market.

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Energy storage has been cited as the missing link to the adoption of renewable energy. As global momentum shifts to bringing the climate change debate into focus, the value of energy storage alongside renewable generation is beginning to be highlighted.

The race for the cheapest battery has begun (Donald Sadoway, 2012) and the cost of energy storage continues to decline, with some technologies already shown to be cost competitive with Photovoltaic, PV, applications in European markets (Germany Trade and Invest, 2015). However, a look at the Ontario electricity market shows limited deployment of storage technologies until the IESO received a directive from the Ministry of Energy to proceed with an OPA led energy storage procurement initiative for 50 MW of storage capacity (Bob Chiarelli, 2014). While there is over 4 GW of installed contracts issued under the Feed in Tariff, FIT, program as of 2013 (OPA, 2013), the FIT program does not provide any incentives for energy storage technologies. The disconnection between policies to promote energy generation and energy storage creates a situation where benefits of neither technology are fully realized.

This paper analyzes the challenges with distributed energy generation that can be resolved with energy storage technologies and contrasts the policy instruments used to promote their adoption. It concludes with making recommendations for how policy instruments need to adapt to allow new disruptive technologies like energy storage to be integrated into the grid.

Introduction to FIT and energy storage:

In 2009 Ontario first introduced the FIT program to fight climate change by increasing the adoption of new renewables (IESO, 2009). The program promoted independent operators to generate power through renewable sources that would be purchased by the grid at a fixed rate. The program had incentives for the development of distributed generation to integrate renewable technologies that range in size from 10-500 kW (IESO, 2015). Distributed power generation is the production of electricity at smaller generation sites within the electrical system. Applicants are required to make investments to produce renewable energy that will be sold back into the Ontario grid at specified rates. The FIT program is designed to offer incentives to producers to invest in clean renewable generation technologies by ensuring a favorable return on their investment (IESO, 2015). Distributed generation is more beneficial for integrating renewables because it has a lower capital cost requirement and can be more adaptable (Scott, 2000). The incremental cost of building capacity in the grid through distributed generation is also lower than the overall cost of building out the grid through traditional generation means (Scott, 2000).

When the FIT program was designed, energy storage was not a main consideration (Source, 2015). Storage technologies were not mature enough to be seen as becoming integrated within the grid or playing a major role in the near future. Energy storage was expensive and inefficient. The main advocates for energy storage were technology enthusiasts. Therefore when FIT was designed policies were not created to consider the impact that storage technologies could have on the grid. The only real hint at storage comes in the FIT rules where it is indicated that to be qualified, “a Project must not comprise a Behind the Meter Project” (IESO, 2015). Figure 1 illustrated the role of the meter in the FIT rules.

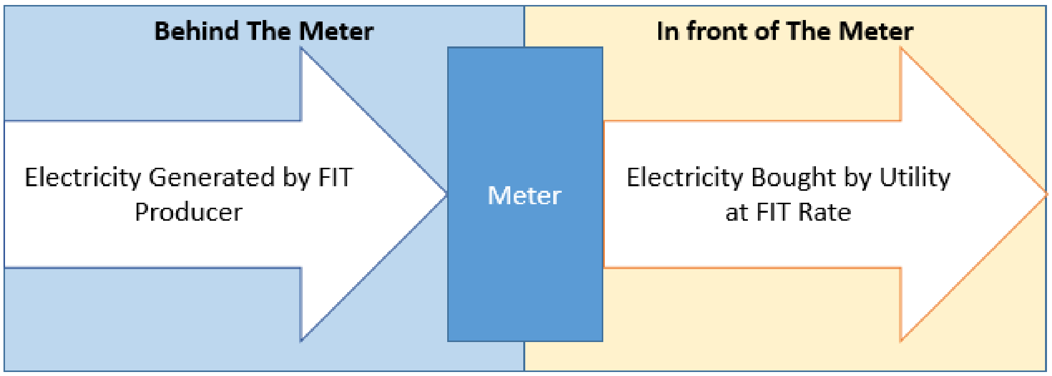

Figure 1 FIT qualified projects

Behind the meter, the electricity is in the control of the producer who is generating the electricity. Once the electricity passes through the meter it is passed on to the LDC and the producer loses their ability to use it. Figure 2 illustrates a project that would not be eligible under the FIT rules. To be eligible for FIT the producer cannot consume the electricity they are producing. Such a configuration would be classified as a “behind the meter” project.

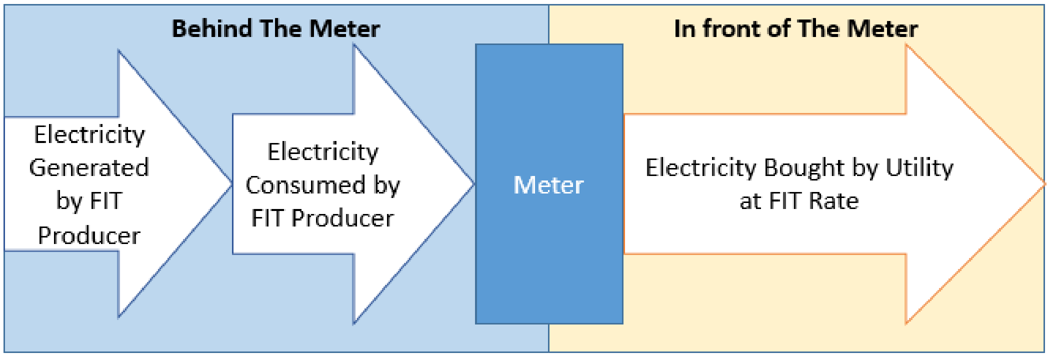

Figure 2 Project not eligible for FIT

This limitation would extend to energy storage devices as illustrated in Figure 3. If the energy storage device is placed in front of the meter, on the Local Distribution Companies, LDC, side, then the project would qualify for FIT. The existing rules disqualify smart grids and energy storage from the FIT program as they would be considered "behind the meter" configurations. The only configuration that would qualify is where the electricity is produced and directly sold into the grid or if energy storage is placed in front of the meter (Source, 2015). This constraint limits the potential benefits that can be realized from integrating renewables in the grid. While not intentionally done to limit smart grids or energy storage technologies, the limitation on FIT projects creates barriers to applying these configurations closer to the distributed energy generation site. Many benefits such as demand-side management of consumption would be difficult to realize without creating behind the meter configurations.

The following section will detail some of the key benefits and challenges associated with distributed energy. It will also highlight the role of energy storage in realizing these benefits.

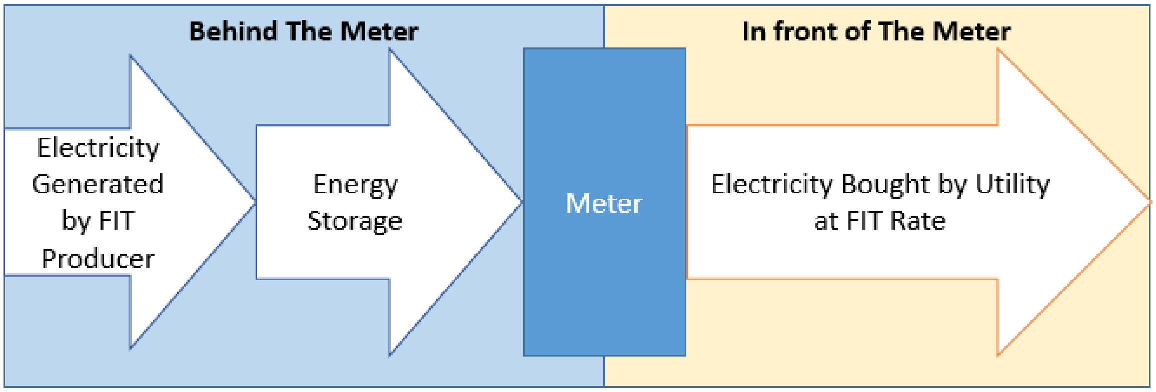

Figure 3 Energy storage configuration not eligible for FIT

Renewable Distributed Generation:

Distributed generation is low-voltage electricity produced that is closer to the source of consumption and easier to integrate within the distribution grid without needing to go through the high voltage transmission system (Angelo L'Abbate, 2008). In Ontario the distribution grid is

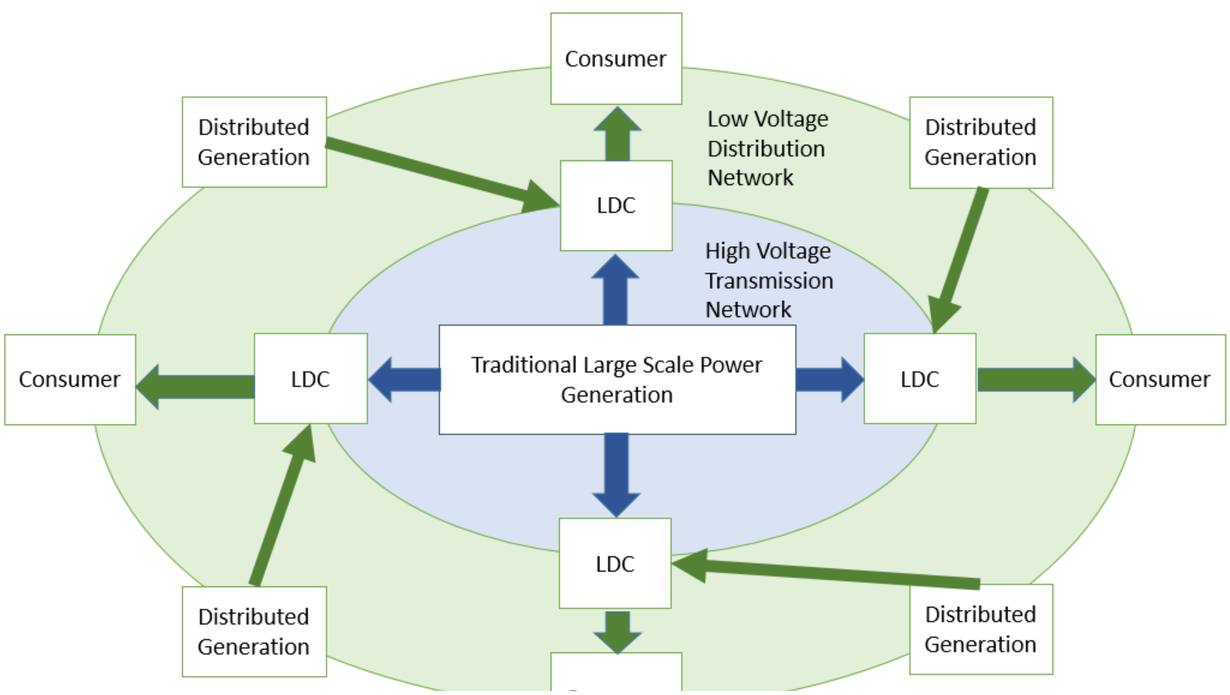

Figure 4 Simplification of Transmission and Distribution Network

generally within the control of local distribution companies while the transmission grid is largely operated by Hydro One (97%) and a few other licensed transmission operators (Ministry of Energy, 2010). Upgrading the transmission network to incorporate new renewables would be costlier than plugging in low voltage renewable generation into the distribution grid and updating the distribution infrastructure (Scott, 2000). Figure 4 illustrates a simplified view the transmission and distribution network. It should be noted that under the current design of FIT one way flow of electricity is maintained. Electricity does not flow bi-directionally. This set up puts strain on LDCs who are increasingly experiencing the emergence of a new role whereby they are not only receiving electricity from traditional sources but also from new distributed generators. Additionally, while there are many advantages in decentralizing power through distributed generation, two key technical challenges are power quality and intermittence.

Power Quality

Power quality affects the ability of electronics to operate normally without adversely impacting the operation of other electronic devices connected to the system (Hydro One, 2007). One main concern with power quality is voltage limits. Fluctuation in voltages can cause damage to electronic devices. Distributed generation can cause variations in the quality of the voltage that is received by other users of the distribution grid especially when facilities like wind farms start up or stop (J.A. Pecas Lopes, 2006).

Another noted challenge with renewable integration is its intermittent nature. When considering wind and solar energy, electricity planners are challenged with the variability of when the electricity will be produced. Electrical networks need to have predictability to allow operators to plan for supply however due to the intermittent nature of the renewable technology the planners are forced to build in reliable sources of electricity to compensate for their variability. This forces the system to be overbuilt (Ontario Society of Professional Engineers and Professional Engineers of Ontario, 2013). Therefore while renewable energy becomes a larger share of the overall installed capacity, planners still need to be able to ensure the reliability of the grid, leading them to build additional capacity to ensure that supply is readily available when demand is high.

The true opportunity with distributed generation would be realized when the distribution grid not only shares electricity between LDCs, but also when electricity produced closer to the consumer can be more efficiently dispatched and utilized by the grid. Energy storage dispersed throughout the grid would decouple energy supply from energy demand (Policy Department A, 2015). Decoupling supply and demand of electricity would allow for resources such as wind to be more effectively integrated within the current grid.

The following section is a brief overview of energy storage technologies and how they can be useful within the grid.

What is in a name? An overview of energy storage benefits for the grid

Energy storage technologies can temporarily store energy for a period of time and then release that energy back into the grid when it is desired (Policy Department A, 2015). These technologies can be used to store electricity for a few seconds, a day or even a few months. The type of storage technology used will be dependent on the need for storage within the system. Utility scale storage projects would be large and comprise of technologies such as pumped hydro while distributed generation technologies may benefit more from small scale thermal storage or battery banks. Table 1 illustrates how energy storage can be a valuable asset at various locations within the electricity supply chain. It is key to note that the transmission and distribution networks have some overlap. The data has been adapted from a European context to fit the Ontario view where LDCs play a large role in the distribution network.

Table 1 Energy storage in the electricity supply chain

Electricity Supply Chain	Large Scale	Small Scale	Advantages	Actors that benefit
Gas/ Fuels	Yes	No	1. Mitigates fuel dependency 2. Increases energy security 3. Improves resource use efficiency	Energy Producers
Generation	Yes	No	1. Improves efficiency of generation 2. Support growth of renewables 3. Provides arbitrage for baseload	Energy Producers
Transmission	Yes	Yes	1. Support grid stability and flexibility 2. Support system optimization 3. Facilitates integration of renewables	1. Transmission system operators 2. Large consumers 3. Service producers
Distribution	No	Yes	1. Supports reliability and resilience 2. Facilitates smart grid solutions 3. Integration of distributed energy generation 4. Integration of renewables	1. Distributed energy producers 2. Local system operators 3. Business and households 4. Service providers

Electricity Supply Chain	Large Scale	Small Scale	Advantages	Actors that benefit
Self-Generation	No	Yes	1. Supports integration of decentralized production 2. Increase energy access options 3. Supports demand response 4. Increases the offer of energy services	1. Consumers who also produce electricity 2. Business household consumers

Source: (Policy Department A, 2015, p. 17 & 18)

Creating incentives for behind the meter energy storage applications would help realize benefits at both the distribution and the self-generation stage. In addition to helping integrate renewables, the key benefits of storage would be supporting grid stability. The benefits of increased grid stability and reliability would extend to the distribution companies who would not have to spend to upgrade infrastructure. In addition to the location in the supply chain where storage could help, it would also be able to provide several key services that can help the overall grid. These key services are summarized in Table 2. While each service is highlighted independently, storage can be used to realize multiple benefits at every stage of the supply chain.

Table 2 Key services provided by energy storage technologies

Service Type	Service application	Size	Discharge Time	Technology
Bulk Energy Storage	1. Central electricity or gas storage 2. Seasonal storage for electricity or hear	Large scale	Days to months	Gas, SNG, Hydrogen, PHS, Redox Flow Batteries
Renewables and other integration	1. Variable supply resource integration 2. Waste heat utilization 3. Support combined heat and power plants 4. Power to gas or power to heat 5. Transport sector electrification 6. Charging stations	Mid to large	Up to a day	Batteries, Hydrogen, Gas, PHS (CHP)
Ancillary	1. Frequency regulation 2. Load following 3. Voltage support 4. Black start 5. Spinning reserve 6. Non spinning reserve	Small to large	Up to a day	DLC, SMES, FES, Batteries, Hydrogen, gas
Transmission and distribution	1. Congestion relief 2. Uninterrupted power supply	Mid to large	Minutes to hours	Batteries, Flywheels, SMES, Small CAES, PHS
Customer energy management	1. Demand response and peak reduction 2. Integration of Electrical Vehicles (EV) 3. Enabling self-sufficiency of a building or small community 4. Maximizing electricity self-production and consumption	Small or mid-scale and off-grid	Minutes to hours	Batteries, Gas, Hydrogen

(Policy Department A, 2015, p. 21&22)

Four key services in Table 2 can be stacked in behind the grid applications. These services would be renewables and other integration, ancillary services, transmission and distribution and customer energy management.

Renewables and other integration and ancillary services

One key benefit in using energy storage would to decouple supply from demand. Building in up to a day's worth of electricity in the distribution grid would enable system operators to better plan and manage the supply. If each electricity supplier is contracted to provide a minimum amount of electricity each day, they could get incentives to build their systems to ensure supply reliability. Although storage technologies are currently expensive and not economically viable for all producers, incentive schemes such as FIT should encourage behind the meter installations that can help reduce supply instability. Encouraging installations such as the recently launched Sonnenbattierie virtual storage network (Metering and Smart Energy International, 2015) would help create unique solutions to supply issues faced by the grid. The Sonnenbattierie virtual storage network connects PV electricity suppliers to storage facilities that can take the excess energy and store it when the demand is low, selling it back into the grid when the demand is high.

One notable concern with behind the-meter solutions for FIT was cited to be the concern for electricity arbitrage (Source, 2015). Given the low price of electricity in Ontario a concern was that electricity from the grid could be stored in battery banks when the demand was low, only to be sold back into the grid when the demand was high. The architects of FIT noted that this would not guarantee that the electricity entering the grid would be produced from renewable sources.

Although there does exist the possibility of electricity arbitrage, it should be noted that the economic case for buying enough electricity, storing it and then selling it back to the grid is not favourable. The only market where energy storage has achieved grid parity is in PV installations as highlighted by the German Trade and Invest commission (Germany Trade and Invest, 2015). Thus the likelihood of electricity arbitrage offering a favourable rate of return is remote at best.

While the economics of electricity arbitrage may not currently exist, consider the case for offering incentives for such activity. Ontario has a current oversupply of electricity largely from its nuclear production (Global News, 2014). Nuclear plants are baseload generators and not very reactive to supply conditions, as such cannot be easily turned off or turned back on. Ontario has been paying New York to take its oversupply electricity in the past. Rather than pay New York to buy the electricity when demand is low and then produce more electricity when demand is high, storage facilities could capture the excess supply, selling it to the grid when demand is high. Creating incentives for these arbitrage opportunities would help stimulate innovation in storage technologies by creating a market for their application. Additionally, providing distributed generators with incentives to store excess power and sell it to the grid at peak time would help push out the cost of capital infrastructure investments that would need to be made to ensure peak supply of electricity.

Storage can also help integrate sources like wind power into the grid more effectively. While solar power is generated when the demand is high, wind power is usually generated when the demand is low (Ontario Society of Professional Engineers and Professional Engineers of Ontario, 2013). This mismatch between supply and demand prevents the investments in wind power to be truly realized. If wind generators are given incentives to produce a reserve of electricity that would be supplied back into the grid when the demand is high, then wind installations would be more effectively used. Currently as wind power is generated during periods of existing oversupply, FIT rates are paid to generators but the electricity produced cannot be usefully integrated within the grid. This leads to a grid that is built to supply peak demand and resulting in excess capacity.

While FIT was designed to increase the adoption of renewables, the effectiveness of the program should consider how well integrated the renewable technology is. If the administrators of the program need to account for how much of the electricity produced comes from renewable sources, technical solutions exist that can help gain this information from behind the meter. More adaptive meter technology can also be implemented to ensure that the renewable share of the electricity supply can be accurately measured. By discounting behind-the-meter storage technologies in the FIT program to prevent electricity arbitrage, the overall potential benefits from integrating renewable technologies is not realized.

Additional ancillary services that could benefit the grid include frequency regulation and voltage support. These services would improve the overall power quality of the grid and would help ensure signal stability. Placing storage both behind the meter and in front of the meter would ensure that these fluctuations are mediated throughout the grid and that the generation assets dispersed throughout the grid could be connected without impacting the overall quality of the power.

Transmission and distribution

Two critical services that energy storage can provide during the dispatching of electricity are congestion relief and uninterrupted supply. Congestion occurs in transmission grids when the flow of electricity is restricted by the existing infrastructure. In such a scenario while demand may be high and supply may be available, the existing infrastructure may not be able to move the amount of supply needed to the areas of high demand (New York Energy Solutions, 2015). Storage technologies dispatched near these areas can help to provide an uninterrupted supply of electricity when it is needed. Energy storage can also be paired with distributed generation sources to ensure that an area prone to congestion would have a reserve supply of electricity that could easily be dispatched. This would help defer the cost of building out expensive transmission infrastructure while maintaining a stable supply of electricity.

Customer energy management

A critical area where energy storage can help the overall integration of renewables is in the area of customer energy management. Four key advantages of energy storage are noted in this area, demand response and peak reduction, integration of electric vehicles, enabling self-sufficiency of a building or small community and maximizing electricity self-production and consumption.

Demand response and peak reduction is a reaction to grid conditions when consumption is high. During high peak volumes customers can manage their local demand by depending on technologies such as energy storage and help reduce the overall load on the electric grid (IESO, 2015). Customers could make use of energy storage technologies to either generate or store their energy or to take electricity from the grid during off-peak hours and use that electricity when demand is high rather than drawing electricity from the grid during that time. Additionally, distributed generators could serve as stored electricity banks that help facilitate this function on the grid. Facilities like the Sonnenbattierie storage network (Metering and Smart Energy International, 2015) can offer these services to local electricity producers. The cost of demand response and peak reduction should be measured against the development facilities needed to supply peak demand. Creating incentives for energy storage rather than investing in peak power plants would defer the cost of infrastructure and also create a more stable electric grid. Additionally energy storage has a quick response rate and can have more effective demand response when placed close to the consumer and distributed generation source.

Electrical Vehicle, EV, adoption and electrification of transportation is another unique service that can be provided by energy storage and can also be provided by the EV themselves. As EVs begin to take up a larger share of the vehicle market more attention needs to be paid by policy makers regarding their impact on the existing grid. With the existing infrastructure, attention needs to be given to technical considerations like transformer capacity, load profiles of different EVs on the grid and charging rate (Jian Xiong, 2015). The faster EVs charge, the more load is drawn from the transformer, and more EVs charging will put additional strain on the existing transformers. If the amount of electricity being drawn from the grid through the transformer is too high then the transformer will fail. Including energy storage to serve as a bank of electricity that the EV can draw from for charging would help buffer the system from overloads. Energy storage at multiple levels—consumer, neighbourhood, generators amongst others—would act as temporary reservoirs that can be drawn upon.

A second case for larger EV penetration on the grid can be made as the EV can serve as a means of storage itself. EVs, like other storage devices, can be used to help with demand shifting and peak demand reduction. Vehicle-to-grid (V2G) technologies are already being used and commercialized to help with grid stability (Greentech Media, 2015). This technology takes advantage of user habits where cars spend most of their life parked in parking lots. This presents an ideal opportunity for vehicles to be used as energy banks that can be utilized when they are not in use. Traditionally cars are parked and stationary during the day when electricity demand peaks. This provides an ideal opportunity to gain more from EV technology. While independent owners of vehicles would should be able to participate in such transactions, the proliferation of car share services like Car2Go and Zipcar provide for a base of vehicles that have known designated locations which can be utilized for this service.

Self sufficiency for a building or community is closely related to maximizing independent consumption and production of electricity. It is important to recognize that while a connected grid may be more effective and efficient overall, there are motivating factors that would encourage communities to operate without being connected to a large centralized network. Once such case is for remote communities that cannot easily be connected to a large grid. These communities operate independently through micro grids with their own distributed energy generations. Currently these communities use diesel or other fossil fuels to power generators that provide them with electricity (RESTco, 2015). Electricity is a critical resource for many communities where the loss of power in the winter can have serious life-threatening consequences. Remote communities in the Canadian north have a large potential for wind/diesel generation (Pembina Institute, 2007). However without storage these communities would not have access to reliable supply of electricity due to the intermittent nature of wind. For such communities the incentives for energy storage should be compared to the existing high cost of transporting fuel and operating these generation facilities.

Buildings and communities that are connected to a larger grid may also have strong motivations to become self sufficient. One example of such infrastructure is hospitals and facilities that need to be able to maintain reliable electricity supply to provide critical care. Most hospitals have backup generators that run on fossil fuels to ensure reliable energy supply. Communities may also want to build their own microgrids to be able to run them while connected to the grid (non islanded) or enable them to be self sufficient and run on the power they generate (islanded). One significant saving of having communities generate their own electricity and manage their own supply and consumption is the overall demand reduction seen by the grid. Communities with excess demand would then be able to supply the grid with this electricity, store the electricity or directly share it with neighbouring communities that may need it.

Energy Storage and Smart Grids

Another key advantage of energy storage is its ability to facilitate a new network of smart grids. While there is no industry standard definition of a smart grid, they can be defined as "[grids] entailing new communications-and-control capabilities, energy sources, generation models and adherence to cross-jurisdictional regulatory structures" (IEEE, 2015). Energy storage technologies are a key component of smart grids. Smart grids decentralize energy production and move it closer to the consumer. The traditional view of the consumer is also challenged in the idea of smart grids, where the consumer can also be a producer of electricity. In such a system electricity would move from areas where there is excess to areas where it is needed. This transit of electricity would be facilitated by integrated networks that would cross jurisdictional boundaries and control the flow of electricity. A large suite of technologies would need to be complimented by a radical shift in policy to facilitate the movement to a smart grid that would help facilitate a larger adoption of renewable technologies on the grid.

Square peg, round hole-Policy challenges for energy storage

Energy storage technologies are recognized by policy makers as being critical components of the new grid (IESO, 2015). However policy makers face several challenges when designing programs to help integrate these technologies within the existing grid. The challenges can be grouped into technical and jurisdictional. Energy storage challenges existing paradigms and definitions of how the grid is designed and operated.

The first key challenge is that energy storage provides a complex set of benefits that are interlinked and cannot be separated into different stages of the electricity supply chain without compromising some functionality. An energy storage device is not just a device that stores energy. It is a device that stores energy, provides demand side management, has ancillary benefits and also helps integrate renewables. Storage technology that is only utilized for storage is akin to a modern smart phone only being utilized for making phone calls.

The current FIT policy where behind-the-meter storage is restricted limits the ability of distributed generators to participate in demand side management, efficient integration of renewables, smart grids and limits the benefits that can be realized from distributed generation. Once the electricity is fed into the LDC grid, the LDC takes ownership of how to manage the resource and further complicates the ability of a producer to help manage the system. While it is acknowledged that the IESO has new programs in place to encourage storage on the grid, this capacity is part of a separate program that is not connected to FIT. Having multiple policy instruments that are not integrated provides limited space for knowledge sharing.

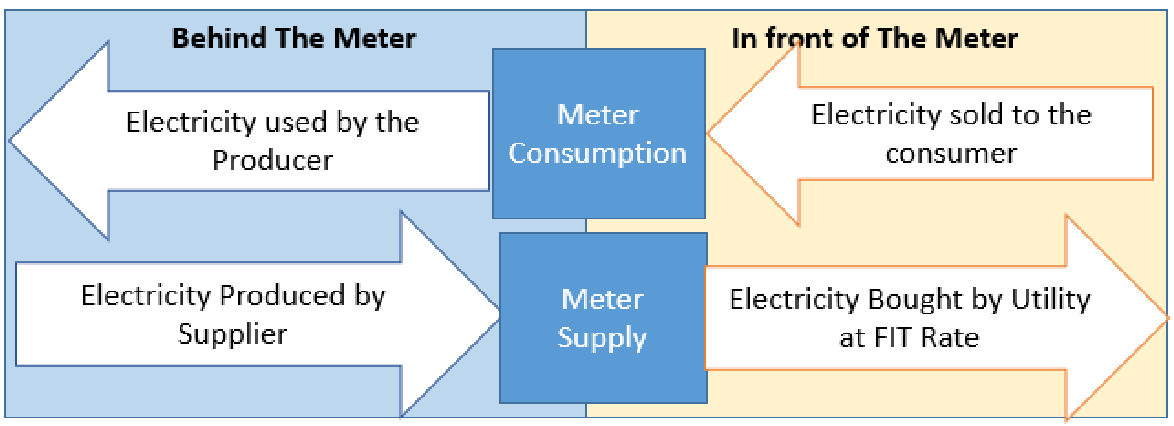

Figure 5 Limits on demand management

Figure 5 illustrated one case where the FIT policy is restrictive to realizing benefits from demand side management. Currently distributed generators would supply electricity directly into the grid at FIT rates. These suppliers would also be consumers of electricity and would buy electricity from the grid for their operations. In the existing system, these suppliers buy electricity at market prices and sell it at FIT rates. They reflect a load on the system and an input into the system. The utility would record how much electricity is put into the system separately from how much is being consumed. It should be mentioned again that if this producer is using wind power then it is producing electricity that is not being effectively used by the grid when it is produced because of low demand, therefore the facility is likely using nuclear energy, given the Ontario grid, for operations but producing renewable wind power. If storage is allowed in behind the meter configurations then the system is simplified in Figure 6. In this configuration the FIT producer could produce the electricity when the resource is available and store it if grid conditions reflect low demand. They can also utilize the electricity they have generated to run the facility resulting in less electricity drawn from the grid, reducing their own demand on the grid. If the storage device is placed in front of the meter, the producer now needs to rely on the LDC to store the electricity they produce and then sell it back to them. Additionally, where in a behind the meter installation the producer would simply pay for less electricity, creating a connection in front of the meter would result in the producer paying market rates for using the electricity while getting FIT rates for the electricity they produce.

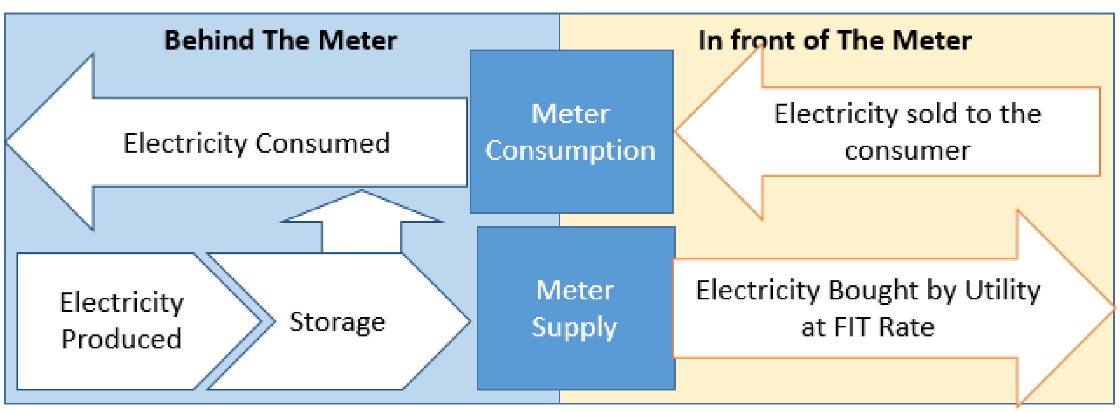

Figure 6 Advantage of behind the meter storage

This case also brings into focus a second challenge that arises when looking at the role of existing players as it relates to developing a more integrated grid. In the scenario described in Figure 6, the FIT producer would pay for the storage device. If the device is placed after the meter then additional issues arise such as who pays for the storage? LDCs are increasingly seeing pressure to not only distribute electricity but to have a growing role in managing grid stability and generation. This shifting role dynamic is challenging how traditional players see themselves in the system. The more connections in the distribution grid between prosumer, producers who are consumers, the less pressure will be felt by any one player. However, these changing roles also present challenges and require new incentives for new players to help with the overall grid design.

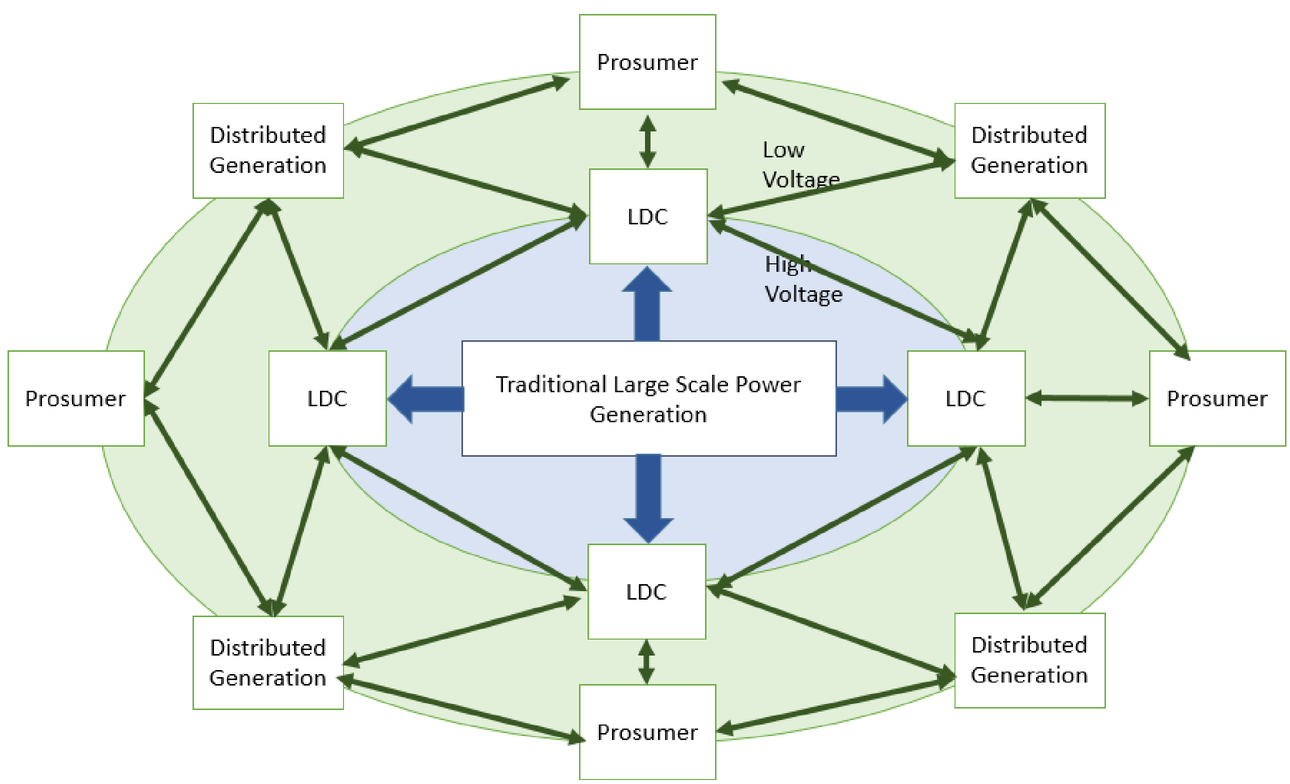

Figure 7 Increasing connectivity and energy storage challenge existing paradigms

The benefits of energy storage and distributed generation would be best realized with a more interconnected distribution grid as simplified in Figure 7. Where energy could be more easily shared between players in the grid. This requires a more interconnected network of LDCs as well. LDCs are also being forced to redefine the role that they are playing as they change from just distributing electricity to playing a larger role in managing supply assets on the grid and ensuring its overall stability.

Recommendations:

Three main recommendations are made to help facilitate the new grid of the future:

1 Policy players and technology players need to have more cohesive discussions when developing policies

It is noted that the existing FIT program had a mandate to only increase renewable energy penetration while discouraging energy arbitrage (Source, 2015). However, technical solutions exist that could give utilities and program creators with the visibility needed to meet objectivise without restricting the use of energy storage. An understanding of the policy implications from the perspective of technology complications would help enable the creation of policies that are better suited to facilitate the technology shift needed for the integration of renewables.

2 Evolve existing programs to integrate lessons learned to capitalize on investments

Using learnings from existing programs like FIT to help integrate new ideas would help create policies and solutions that would be better suited to understand existing barriers. Using the expertise and knowledge gained by producers and policy makers of FIT to evolve the program to include technologies like storage into the incentives would help build on existing success and integrate knowledge gained through prior evolutions of the program.

3 Incentivise energy storage in behind the meter applications

Incentives need to be developed to help integrate storage more organically into the grid. These can include measures made in European markets where for a given capacity of renewable generation, an amount of storage is required to be built into the grid (Policy Department A, 2015). Additionally grid fees can be charged to renewable producers that do not have storage capability and these fees can be used to build grid level storage.

Conclusion

The current utility grid is designed to be safe, reliable and resistant to fluctuations. The technical design of the grid is mirrored in the policies used to govern it. There are clear roles, clear distinctions in jurisdictions just as each technical issue that could arise has a defined processes for risk mitigation. As this existing paradigm meets technologies like energy storage that disrupt its architecture, both politically and technically, new instruments need to be created to adjust to these changes. While the technical solutions and potential for energy storage is far reaching, it is only in concert with political will and innovative public policies that these solutions can be realized. Policy makers need to recognize how small restrictions in policy can create technical complications that can limit the potential benefits of technologies like energy storage. Policies like FIT have a large potential and are encouraging steps to the overall integration of renewables.

However, policy instruments, like the electric gird itself, can only be effective if they are linked and connected to each other to capitalize on efforts made.

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