Vulnerable Households and Distributed Renewable Electricity in Ontario: Emerging Challenges and Opportunities

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Prepared for the Climate Change and Renewable Energy Policy in the EU and Canada Workshop held at Carleton University, Ottawa on October 1-2, 2015.[2]

Introduction

Approximately 2 million Ontarians live in low-income households, many allocating a significant portion of their finances to powering their homes.[3] In such situations, electricity costs can force individuals to decide between paying energy bills and providing for other essential food, shelter, and clothing needs. Such "energy poverty" can lead to significant hardship, adverse health effects, and utility disconnections for a range of vulnerable households. Meanwhile, electricity systems – of the kind that have served Ontario communities effectively for more than a century – are undergoing unprecedented degrees of change. They are moving from systems of relatively static, centralized transmission channels to integrated, intercommunicating networks of distributed power resources, producing and consuming electricity dynamically in response to shifts in demand and supply. Distributed renewable electricity is increasingly a critical part of this transformation, and it is expected to continue to be so in the future.

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[2] This workshop was supported by the Canada-Europe Transatlantic Dialogue (CETD) and the Centre for European Studies (EU Centre of Excellence) at Carleton University. CETD receives funding from the Social Sciences and Humanities Research Council of Canada (SSHRC), and CES receives funding from the European Union and Carleton University. The views expressed in this document are solely those of the presenters/authors, and do not reflect the views of CETD, CES, the European Union, SSHRC, or Carleton University.

[3] Author's note: this paper draws heavily upon Ian H. Rowlands and Gord Stephen, *Vulnerable Households and the Smart Grid in Ontario: Emerging Challenges and Opportunities* (Toronto, ON: Metcalf Foundation, forthcoming). Copies of this report will be available from the author in the near future. Readers are also encouraged to review the acknowledgements in that report for a full list of those who helped in the development of thinking on these issues.

To date, discussions in these two sets of issues in Ontario – that is, on the one hand, advocacy and analysis on the part of vulnerable households and, on the other hand, consideration of distributed renewable electricity – have largely been separate from each other. The purpose of this paper is to begin to bridge this divide through a consideration of how each relates to the other. It does so by highlighting the impact of greater data availability and the importance of partnerships, as well as offering a longer-term view focused upon energy producer-consumers and the emerging sharing economy. It concludes by presenting a few areas for priority consideration, with the intention of sparking a continuing dialogue. Some of the key themes developed in the presentation are highlighted here in this brief paper.

Setting the Context

Before links between the two areas – that is, "vulnerable households" and "distributed renewable electricity" – are identified and discussed, this section briefly introduces them individually.

There are various definitions with respect to terms like "energy poverty," "energy precariousness," "energy vulnerability," and "fuel poverty."[1] For the purposes of this paper, it is sufficient to identify, broadly, the kinds of households under consideration. To do that, a few pieces of data are presented. Almost 12% of Ontario's households were categorized as "low-income" in 2011.[2] Lone-parent households are more likely to be low-income, for more than 20% of them are so characterized.[3] Renters show similar patterns: almost 26% of them were "low-income" in 2011.[4] Put another way, note that while 28.4% of all households rented in Ontario in 2011, 63.2% of low-income households did.[5] Thus, characteristics that often correlate with vulnerable households include low-income, single-parent, and renter households.

Turning to distributed renewable electricity, definitions also sometimes vary. Again, a few data-points are presented here for the sake of illustration of the broader area in question. In terms of installed generation (referring to the capacity and the performance of energy plants), those powered by non-renewable resources dominate in Ontario: nuclear power accounts for 37% of capacity in 2015 and 62% of generation in 2014; similarly-high figures exist for hydropower (24% and 24%, respectively) and gas/oil (29% and 10%, respectively). Of the renewables, wind is most prominent, with figures of 8% and 4%, respectively.[6] Solar falls below 1% on both measures. If one also included "embedded resources," the solar figure would rise just above, in total, 1% in terms of generation.[7] Finally, noteworthy is the province's Long-Term Energy Plan, in which the Government lays out what its plans for future energy will be. The expected shares of generation for wind and solar in Ontario in 2025, for instance, are 11% and 3%, respectively.[8]

Connections

Electricity data

The increased presence of distributed renewable electricity in energy systems goes hand-in-hand with a number of other, broader developments (which serve to encourage – and are encouraged by – distributed renewable electricity). These include the data generated by more measurements on the demand-side of the electricity system. While greater availability of electricity data provides numerous opportunities for "better energy management" for all customers, there are nevertheless also concerns about associated privacy and security issues. For vulnerable households – some of whom wish to stay "under the radar" – should "more energy data" lead to "more Big Brother," then active participation in advanced energy systems, including involvement with distributed renewable electricity, could prove to be extremely difficult to realize.

Electricity partnerships

Another of these aforementioned broader developments associated with the continued modernization of the province's electricity system (including the increased presence of distributed renewable electricity) is the growing and deepening network of relationships among various actors. With respect to distributed renewable electricity, in particular, we already see it in terms of new entrants in the electricity space for generating and managing the electricity produced, as well as the various public, private, and civil society groups that are working together to develop projects.[9]

A question that immediately arises relates to the relative attractiveness of vulnerable households with respect to their "electricity accounts." While the "average Ontarian" may be courted by many electricity sector companies, vulnerable households may not have particularly lucrative accounts to offer (lower energy consumption, fewer discretionary loads, less space for siting renewable energy or storage technologies, more fragile credit ratings, higher transaction costs arising from more frequent relocations, etc.); consequently, they may have fewer suitors with less attractive offerings.

Prosumers

"Prosumer" is a term being used to describe what the traditional electricity consumer will become (or is becoming). It refers to (in its broadest understanding) a householder that not only consumes electricity, but also generates electricity (perhaps by means of solar photovoltaic panels on the rooftop), stores electricity (through, for instance, batteries in the basement), and exchanges electricity and other ancillary services in the marketplace.

A future full of prosumers is conceivably a much more capital-intensive future – in other words, to participate, upfront investments are needed. For those with access to inexpensive capital and resilience in the face of uncertainty, it is a feasible and potentially-attractive "play." Vulnerable households, however, may not have those characteristics. Consequently, there are risks that must be acknowledged and managed. Indeed, we have already seen that access to capital can be a significant barrier to entry in the case of feed-in tariffs.[10]

The fact that many vulnerable households are tenants exacerbates the situation. In particular, private renters paying their own utility bills find themselves in a 'split incentive' situation where economically-attractive energy management investments are greatly disincentivized, as the building owner (i.e., the landlord) and the ratepayer (i.e., the tenant) are financially distinct entities.[11] Tenants do not have any guarantee that their tenancy will be sufficiently long so as to recoup that initial investment in, say, a solar panel. Nor are they likely to have the authority to install such technologies. For their part, landlords would ideally like to see such technologies installed, so that the value of the unit is increased, but there are not sufficient financial returns to them to encourage action.

The sharing economy

Technological innovations in terms of advances in information and communication technologies are contributing to the development of significant social innovations that enable decentralized exchanges of excess capacity (i.e., use-time in a capital-intensive resource, like a house or a vehicle for an individual) and personal resources. Such discussions about a "sharing economy" are going on in the electricity industry.[12] Some envision a situation in which an individual in Ontario, looking to get a boost for their mobile device on a community wireless charger, logs into an "electricity-sharing" site, submits their "need" – in terms of kWh, charge-time, electron "source" (e.g., wind or solar), business "standing" of the

generator and cost – and then waits for suppliers' offers to come in. While we in Ontario might only be able to imagine something like this,[13] those in Europe can use services offered by companies like Vandebrong, a startup in the Netherlands, to do just that right now.[14] What would such developments mean for vulnerable households?

The importance of energy partnerships is certainly highlighted. Additionally, should the sharing economy spark demands for new kinds of energy generation, there may be more and more energy project-siting choices that are decided by those who are the most politically powerful; as a consequence, low-income neighbourhoods could be left to host those kinds of distributed energy facilities (or, alternatively, "back-up facilities") that no other neighbourhood wants.[15] And, finally, should local electric distribution utilities truly be forced to re-think their roles – in the wake of widespread "grid defections" (wealthier, larger-load customers leaving the centralized electric grid altogether) – then these utilities' subsequent re-examinations and potential re-inventions could have important implications for how they serve vulnerable households.

Summary

There are both opportunities and challenges when assessing the potential impacts upon vulnerable households of increased deployment of distributed renewable electricity technologies in Ontario. Opportunities stem from the fact that the benefits of such developments could lead to increased local job creation, improved air quality, heightened system reliability, and so on – benefits that have the potential to improve the well-being of all Ontarians; and thus, policy-makers must ensure that distributional impacts are monitored and, where appropriate, managed. Indeed, ensuring that the "value proposition" reaches all of the province's citizens would seem to be a precondition for success. Similarly, the challenges that could emerge from increased use of distributed renewable electricity – many of which are noted in this paper – would appear to require action in anticipation. "Communication," "engagement," "education," "consideration," and "holistic thinking" would seem to be among the most critical watchwords going forward.

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[1] See, for instance, Stefan Bouzarovski, "Energy Poverty in the European Union: Landscapes of Vulnerability," *Wiley Interdisciplinary Reviews: Energy and Environment* (Vol. 3, 2014), p. 276-289.
[2] Statistics Canada, 2011 National Household Survey, data table 99-014-X2011028.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Independent Electricity System Operator, "Supply Overview," http://www.ieso.ca/Pages/Power-Data/Supply.aspx. (Note: generating resources as of 22 June 2015. These figures do not include generators that operate within local distribution service, except for those that participate in the IESO-administered market.)
[7] Calculations following Independent Electricity System Operator, "Power to Ontario. On Demand," http://www.ieso.ca/.
[8] *Achieving Balance: Ontario's Long-Term Energy Plan*, Toronto, ON: Ontario Ministry of Energy, 2013, p. 31.
[9] "The power of collaboration continues to be a fundamental current of change in the [energy] industry," *The New Energy Consumer: Understanding Business Value in a Digital World*, London: Accenture, 2015, p. 37.
[10] It has been noted that feed-in tariffs, for instance, are "likely to have a regressive impact unless accompanied by other policies to encourage take-up among low income households." (William Baker and Vicki White, *Towards Sustainable Energy Tariffs* London: Centre for Sustainable Energy for the National Consumer Council, 2008, available at: https://www.cse.org.uk/downloads/reports-and-publications/policy/pub1111.pdf)
[11] Stephen Bird and Diana Hernández, "Policy Options for the Split Incentive: Increasing Energy Efficiency for Low-Income Renters," *Energy Policy* (Vol. 48, 2012), p. 506-514.
[12] See, for instance, Matthew Crosby, "An Airbnb or Uber for the Electricity Grid?" Rocky Mountain Institute, 2 September 2014, available at: http://blog.rmi.org/blog_2014_09_02_an_airbnb_or_uber_for_the_electricity_grid).

[13] Arguably, Ontario has not been subject to the same kinds of pressures – cost, environmental, geographical, etc. – as Europe with respect to energy system transformation. With, however, significant attention being paid to the opportunities offered by electricity innovations (as well as those continuing pressures to change), jurisdictions around the world are reconsidering the future of their energy systems.

[14] Ben Schiller, "The Sharing Economy Takes On Electricity, So You Can Buy Your Power From Neighbors," 30 September 2014, available at http://www.fastcoexist.com/3036271/the-sharing-economy-takes-on-electricity-so-you-can-buy-your-power-from-neighbors.

[15] State of New York, Department of Public Service, *Case 14-M-0101 - Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Staff White Paper on Ratemaking and Utility Business Models*, 28 July 2015, p. 45.