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Making electricity billing fair

How Alberta's billing system disadvantages small solar generators

by Barend Dronkers and Sara Hastings-Simon | June 2017

Summary

The rules in Alberta governing the billing of electricity from microgenerators like solar photovoltaics (PV) are unusual in their approach to evaluating generator cost and benefits to the electric system. These rules place utilities at a long-term advantage and customers at a disadvantage. If Alberta had the same rules as elsewhere and used net metering, solar PV system owners would earn up to 30% more revenues from their investments, which would reduce their payback and help grow the Alberta market for solar PV.

The value of distributed solar PV generation

As prices fall for renewable energy technologies[1] like solar photovoltaics (PV), consumers (including homeowners, renters, businesses and non-profit organizations) are benefiting directly by generating their own power. But they also provide benefits to the grid and grid users. When they are connected to the electricity grid, homes and businesses with solar PV systems can use the electricity they generate and send any excess to neighbours connected to the same grid. This type of "distributed generation" works in combination with centralized power plants across the transmission grid to ensure a reliable, cost efficient, secure supply of electricity with a balanced mix of generating sources.

Distributed generation is valuable in several ways.[2] Locally installed solar PV can reduce demands on grid infrastructure by generating electricity when and where it is most needed. Solar PV is increasingly suited for this role in the south and central regions of Alberta where the summer demand peak is larger and growing faster than the winter peak. The demand is largest during the hottest periods of the day — exactly when electricity generated from the sun is greatest,[3] and can help displace expensive power generators. Moreover, when electricity is generated and used in the same place, losses in transmission are reduced, especially compared to when electricity travels long distances. In 2017, transmission losses accounted for 3.8% of total energy generation.[4]

Distributed solar PV also helps manage congestion issues in the distribution and transmission networks. In the long run, it can help defer grid and generation investments otherwise needed

to handle higher peak loads and greater demand in general, thereby generating savings that benefit all customers by lowering average costs for electricity.

A growing body of evidence from studies in different jurisdiction shows "that the economic benefits of net metering actually outweigh the costs and impose no significant cost increase for non-solar customers. Far from a net cost, net metering is in most cases a net benefit—for the utility and for non-solar rate-payers."[5] Further benefits include lower greenhouse gas emissions and net economic returns such as creating more jobs and businesses.[6]

The electricity bill

Utilities pass on the costs of electricity generation, transmission, and distribution through the electricity bill. Depending on the type of customer — e.g. residential, farmer or industry — different systems of rules are used to calculate electricity charges. These rules are set by utilities in their rate schedules, laying out how revenues from non-energy charges are allocated to grid owners and operators, municipalities and the retail company.

Non-energy charges include tariffs used by utilities to recover the cost of transmission and distribution grid investments. They are divided among all users, in a way that attempts to fairly share the cost of operating the grids. Other charges include an administration fee paid to the retail company, a local access fee paid to the municipality, and "rate riders" — payments or credits that reflect ongoing investments to the electricity system. All these charges include variable and fixed components: the variable component depends on the amount of energy used (per kWh) and capacity charges (per kW), while fixed components stay the same.

The customer also pays energy charges for their net consumption of electricity, calculated from the amount of energy used (per KWh) and their retail electricity rate.

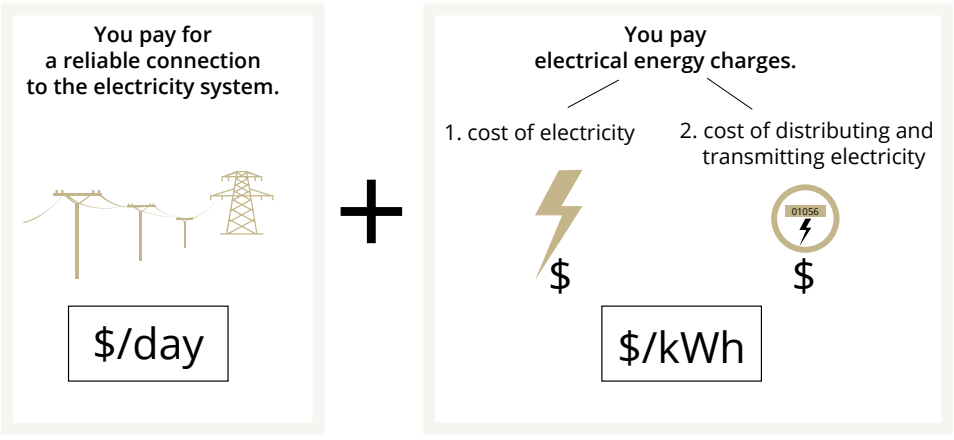

Figure 1. Components of the electricity bill in Alberta

How does Alberta's billing approach for microgenerators compare to elsewhere?

Unlike most North American jurisdictions and others around the world, Alberta utilities do not recognize the full value of distributed generation to the grid. The recently revised microgeneration regulation places homeowners and others wanting to generate their own power at a disadvantage.

The Alberta approach

In Alberta, the microgeneration regulation sets the rules on how utilities compensate customers that own solar PV for the excess electricity they generate. The Alberta approach is called net billing (Figure 2). It subtracts the amount of electricity sent to the grid from the amount used. The costs for this net-used amount is reflected in the billed charges on the utility bill. Any excess electricity from solar PV may not be used to offset other charges during the month; instead a credit for the retail value of this amount is applied to the next bill.

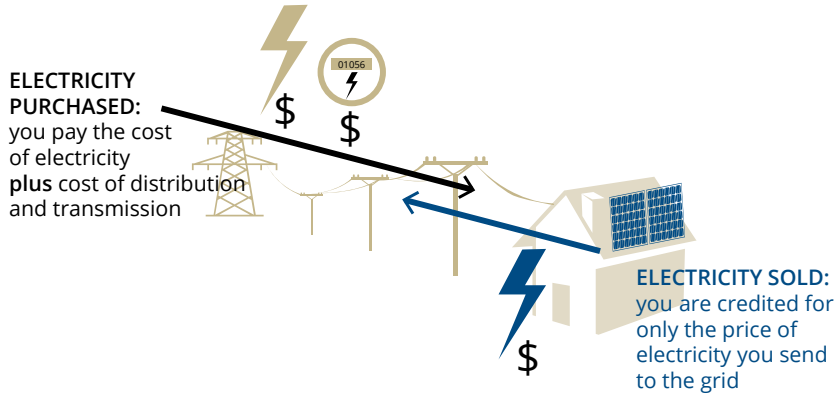

Figure 2. Alberta's net billing approach

Approaches elsewhere

In most other jurisdictions, excess solar generation *is* used to offset other charges during subsequent billing periods, an approach called net metering. As the name suggests, the electricity meter simply runs in both directions and the customer is billed at the end of the month for the energy and non-energy charges based on the net energy used. In this way, the customer with their own solar PV system receives both the retail energy amount *and* the transmission and distribution charges. This approach is an alternative method of estimating the true value of solar.

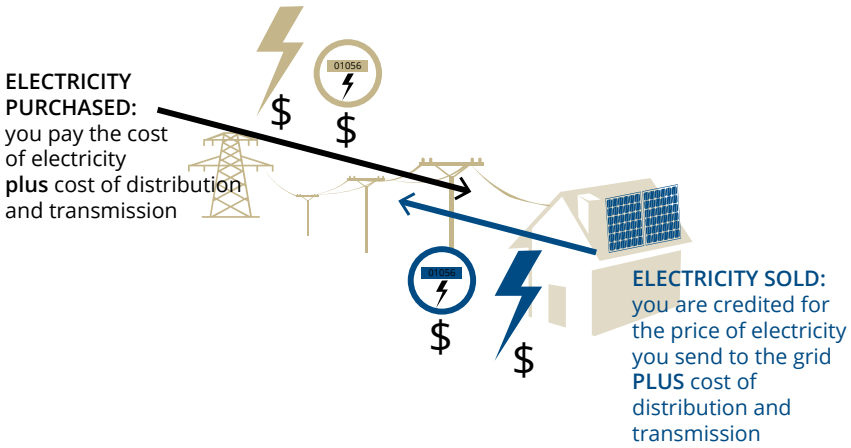

Figure 3. The net metering approach

The consequence of the Alberta net billing approach is that microgenerators are unable to capture the true value of the electricity they generate and hence have an unattractive return on investment. If Alberta had the same rules as other jurisdictions, typical solar PV system owners would earn up to 30% more revenues from their investment.

Where do we go from here?

As the use of distributed generation such as solar PV grows in the province, Alberta can learn from other jurisdictions how to evolve regulations to reflect the changing value of solar to the grid. Some regulators, working with utility companies, are testing alternative approaches to define a more complex solar compensation tariff[7] for jurisdictions with high amounts of solar where the net metering approach may overvalue the distributed generation. Leading jurisdictions pioneering this approach include California, New York, Hawaii and Minnesota.[8] This is emerging as the preferred approach over minimum bills,[9] or providing customers access to wholesale markets.[10] For now, Alberta can deploy solar with a tried and tested net metering approach as used elsewhere. This will kick-start Alberta's distributed solar industry and bring the full benefits of solar electricity.

[1] Pembina Institute, *True price of wind and solar electricity generation* (2016). http://www.pembina.org/pub/true-price-of-wind-and-solar

[2] SolarCity, *A Pathway to the Distributed Grid* (2016). http://www.solarcity.com/sites/default/files/SolarCity_Distributed_Grid-021016.pdf

[3] Pembina Institute, *Solar is right where and when you need it* (2016). https://www.pembina.org/blog/solar-right-where-and-when-you-need-it

[4] Alberta Electric System Operator, "Loss Factors: 2017 loss factors." https://www.aeso.ca/grid/loss-factors/

[5] Mark Muro and Devashree Saha, "Rooftop solar: Net metering is a net benefit," *Brookings Institution,* May 23, 2016. https://www.brookings.edu/research/rooftop-solar-net-metering-is-a-net-benefit/#

[6] Barend Dronkers and Sara Hastings-Simon, "Renewable energy can power Alberta communities," *Pembina Institute* July 7, 2016. https://www.pembina.org/blog/renewable-energy-can-power-alberta-communities

[7] Herman K. Trabish, "As states debate solar, contentious rate cases give way to broader valuation proceedings," *Utility Dive,* August 18, 2016. http://www.utilitydive.com/news/as-states-debate-solar-contentious-rate-cases-give-way-to-broader-valuatio/424415/

[8] Ibid.

[9] Josh Cornfeld and Shayle Kann, "Why a minimum bill may be a solution to net metering battles," *Green Tech Media,* July 24, 2014. http://www.greentechmedia.com/articles/read/why-the-massachusetts-net-metering-compromise-could-be-a-model-for-other-st

[10] Silvio Marcacci, "Net metering fights are bad for business. Here's how utilities and solar advocates can avoid them," *Green Tech Media,* April 19, 2016. http://www.greentechmedia.com/articles/read/net-metering-fights-are-bad-for-business.-heres-how-utilities-and-solar-adv