

Intelligence MEMOS



From: Blake Shaffer

To: Canadian Energy Policymakers

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Re: **YOU GET WHAT YOU PAY FOR: COST AND VALUE IN RENEWABLES PROCUREMENT**

When buying a car, one tends not to look only at cost. For example, some, such as myself, require a ridiculous number of seats. Others may desire the luxuries of leather. In short, buyers consider both cost and value.

Electricity is no different. When designing renewable procurement policies, policymakers need to consider both cost and value.

Which takes us to Alberta's renewable electricity program. By using the power of competitive forces in an auction design, Alberta has once again put to rest the tired refrain that renewables, in and of themselves, are expensive. At an average price just under \$40 per megawatt-hour (four cents per kilowatt hour), this is cheap power.

But a focus solely on facility cost is misguided. Rather than lowest individual costs, the objective should be to add power that delivers the lowest system costs.

Why the difference?

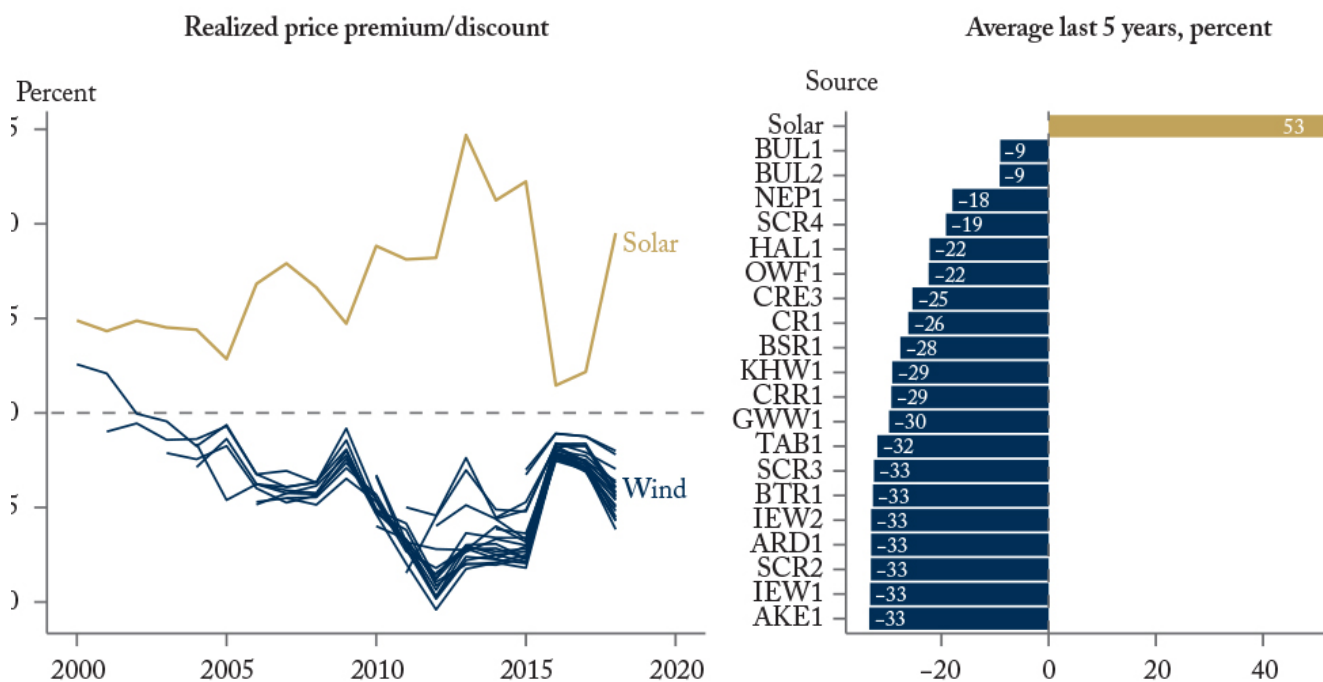
Electricity may seem a homogeneous good, but its value varies greatly over time and space. Power on a cold Monday morning in December is worth a lot more than power at midnight on a balmy day in May.

Power plants that can align with this changing value offer more value than those that don't.

To illustrate, the Figure plots the realized price received by individual generators as compared to the average market price.

Over the past five years, wind facilities sold their power at a 9 to 33 percent price discount to the average market price. They aren't paid less for their power *per se*, it is simply that the price during which the hours they generate are worth less (e.g., evenings). Whereas solar, whose production is concentrated during the midday hours of higher prices, receives a whopping 53 percent premium to the average price.

If we consider the future price of power to be \$50 per MWh in Alberta—roughly in line with market forward prices—then this would imply the value of wind is roughly \$35 to \$45 per MWh. Meanwhile, solar at \$75 would provide the same net benefit due to its higher value.



What does this mean going forward?

To be fair, at these auction prices, there is no imminent issue. At a minimum, one can think of wind simply as a displacer of fuel from otherwise running natural gas plants. At \$3 gas, a natural gas plant's operating costs are roughly \$25 per MWh, or \$45 once we include the cost of GHG emissions (valued at \$50 per tonne). So wind at \$40 is a reasonable price to pay.

But as more wind gets added, and to the extent it gets increasingly concentrated geographically, the risk of curtailment will rise, and that minimum value as a fuel saver will no longer be valid. A little wind is fine; a lot of wind blowing at the same time can reduce its value dramatically.

To avoid this situation, policymakers should consider several options.

First, renewable policies should recognize value, not simply cost. Ensuring renewable policies solve the right objective function is critical – in this case minimizing total system costs rather than individual unit costs. There are several ways to mitigate risk for generators while aligning incentives to deliver value, on which I elaborate in a forthcoming C.D. Howe Institute research paper.

Second, we should already start thinking bigger. Regardless of policies of future governments, renewables will continue to grow in Alberta and across Canada. Their costs have simply fallen too much. Policymakers need to consider grids of tomorrow that will include higher shares of variable energy and the policies needed to best to integrate and maximize that value.

Lastly, when it comes to electricity grids, broader is better. Policymakers should be actively pursuing opportunities to increase interconnections between relatively isolated grids. B.C. and Alberta, for example, offer extremely complementary grids, with B.C.'s flexible capacity and Alberta's more robust (and cheaper) wind resource working well in tandem. There is a role for the federal government to play in making larger inter-provincial transmission connections a reality.

The bottom line is that, yes, this round of Alberta's renewable electricity program is a success. One simply cannot argue this is expensive power. But as more renewables are added to the grid, a focus on value, not simply unit cost, is imperative.

Blake Shaffer is an Energy Policy Fellow at the C.D. Howe Institute. He has advised the governments of Canada and Alberta, as well as the Canadian Solar Industries Association. All opinions expressed are his own.

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