

# How solar lowers your power bill

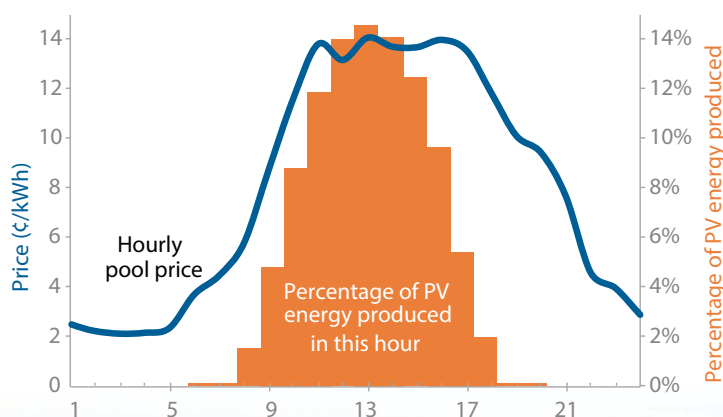
## Understanding renewable energy prices in Alberta

Alberta's Micro-Generation Regulation, which was adopted in 2008, opened the door for consumers to generate their own renewable energy and sell what they don't need to the province's electricity grid. But today the system is buying electricity from solar photovoltaic (PV) producers — who make up 90% of micro-generators — for far less than it's worth. That may be good for consumers, but it's not fair to solar energy producers.

### How does that lower electricity costs?

Solar PV produces electricity at specific times of the day — that is, when the sun is shining. That correlates closely with the hours when electricity demand is highest in the province's electricity market.

Figure 1 illustrates this situation: the orange bars show how much electricity a typical solar PV system produces in each hour of the day in Alberta. The blue line shows the price of electricity in Alberta's market (the "pool" price) for each of those hours, averaged over one year.

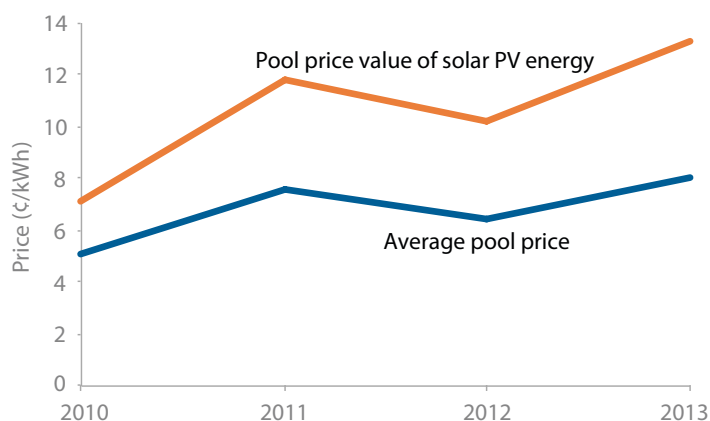


▲ **Figure 1: Solar PV production compared with average pool price in 2013.** Calculated using data from PVWatts for Calgary and Edmonton solar output, and data from the Alberta Electricity System Operator for average pool prices.

Higher demand typically translates into higher prices. However, solar micro-generators are paid a fixed rate, which is equal to the price they pay when using electricity

from the grid. As a result, they don't get the market value of the electricity they generate during high-demand hours, unlike other electricity producers.

In 2013, the average pool price of the energy produced by solar PV in Alberta was more than 13 cents per kilowatt-hour (¢/kWh), but producers are only paid between around 7¢/kWh and 11.5¢/kWh. In other words, they're selling at a discount. And as Figure 2 shows, that discrepancy is getting worse as time goes on.



▲ **Figure 2: Growing discrepancy between value of solar PV energy and average pool prices.** Calculated using data from PVWatts for Calgary and Edmonton solar output, and data from the Alberta Electricity System Operator for average pool prices.

### What does it mean for Alberta?

By selling at discounted prices, solar PV producers are subsidizing your electricity bill. That lowers your power bill in the short term, but it also discourages people from becoming solar micro-generators. As a result, Alberta is only capitalizing on a fraction of our nation-leading solar energy resource.

That can hurt consumers in the long run, since solar power helps us hedge against volatile fuel prices as Alberta's electricity grid becomes more reliant on natural gas. The province will also miss out on the valuable carbon and air pollution reductions that solar energy offers.

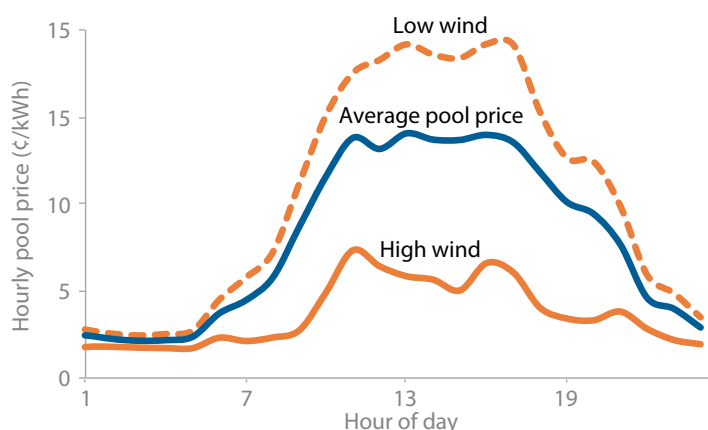


# How wind lowers your power bill

## Understanding renewable energy prices in Alberta

Wind energy has a 20-year history of success in Alberta, with the province taking an early lead in Canada on wind development. Though development has slowed since those early days, the province's wind power capacity exceeded 1,400 megawatts (MW) as of 2014. That's enough to power more than 600,000 homes.

Because they have no fuel costs, Alberta's wind turbines bring down electricity prices for consumers whenever the wind blows. Figure 1 shows how, on an annual average, the price of electricity in Alberta's market (the "pool" price) is lowest on the days when Alberta's wind turbines are producing the most.



▲ **Figure 1: Wind energy's impact on pool prices in 2013.** Calculated using data from the Alberta Electricity System Operator for hourly pool price and capacity by fuel type.

Averaged across all hours of the day and night in 2013, electricity was 65% less expensive when wind is generating over 600 MW of electricity, compared to the days with low wind production (under 300 MW).

### Why does wind bring down prices?

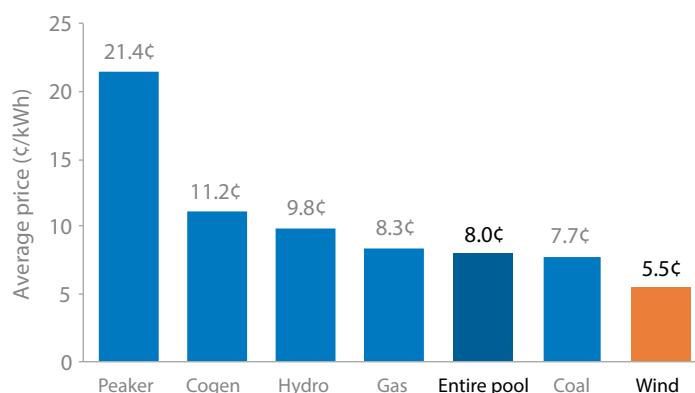
All of this runs counter to what some people think about renewable energy costs, so it deserves an explanation. The wind itself is free, so when it feeds electricity into the grid, we can avoid using higher-priced sources with fuel costs. Without the wind, we

have to turn to higher-cost sources of electricity. That increases the energy market price as a whole for that hour, since all electricity generators are paid a uniform price. That higher price gets passed on to consumers, so more wind energy in a given hour means lower electricity prices for the grid as a whole.

### What does it mean for Alberta?

Alberta's experience so far suggests this is good for consumer power bills. Unfortunately, it isn't as good for wind energy producers.

Because wind energy is lowering prices precisely when it's selling electricity to the grid, wind operators are paid the lowest price by a long shot. Figure 2 shows how they are selling at rates that are 30% below the grid average.



▲ **Figure 2: Average 2013 pool prices by fuel type.** Calculated using data from the Alberta Electricity System Operator.

All of this makes it hard to build new wind projects in Alberta. Recent analysis from the Alberta Electricity System Operator and Lazard shows that wind energy is one of the lowest-cost options for supplying new electricity. However, electricity companies can make much larger profits on electricity produced from natural gas. This can hurt consumers in the long run, since wind helps us hedge against volatile fuel prices as Alberta's electricity grid becomes more reliant on natural gas.

