PEMBINA institute

Market structured contracts for procuring renewable energy

Technical note

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Recommendation

The Pembina Institute recommends that for future rounds of renewable energy procurement the province of Alberta consider a market-structured contract approach, a hybrid of the renewable energy certificate and contracts for difference approaches that delivers the benefits of each.

Background

- Alberta is phasing out all coal fired electricity generation in the province by 2030. The province has also set a target for 30% renewable energy generation by 2030.
- A key consideration for this additional renewable energy generation capacity is that it be provided at the lowest price for Albertans.
- The first round of renewable energy procurement (REP 1) in Alberta will take place in 2017 using contracts for difference, one of the standard approachs that has been used in other jurisdictions. The second commonly used approach is renewable energy certificates. Each approach has its own benefits and drawbacks.
- There is also a third, hybrid approach that has not been discussed: market-structured contracts. This paper examines the benefits of market-structured contracts compared to other approaches.

Considerations

- The cost of capital is one of the key drivers of the overall cost of renewable energy projects because of the higher upfront capital cost of renewables, and lower variable operating cost. The cost of capital is heavily dependent on the level of certainty of returns.
- Renewable energy certificates (RECs) provide an additional fixed payment for the environmental attributes of a renewable project, while the power itself is sold into the Alberta power market. This ensures that new renewable energy development is exposed

to wholesale market pricing, and that highest-value renewable resources get built based on wholesale market valuing.

- Under a REC approach, the province will pay higher prices for renewables due to a lack of certain revenue leading to higher cost of capital. In addition, the fixed payment means developers may also receive windfall profits when the pool price rises, as it is expected to do.
- Contracts for difference (CfDs) provide full revenue certainty for renewable projects. In this approach, the government pays the difference between the 'strike price' — the price that renewable generation bids — and the average market price for electricity. This revenue certainty lowers investment return requirements, leading to lower capital costs and ultimately lower costs for renewables. In addition, the CfD also provides a hedge that protects ratepayers from volatile gas prices, delivering the full value of renewables to the system.
- Over the long term, however, use of the CfD for many rounds of renewable procurement distorts the market structure by providing no incentive to developers to build in regions where they can recieve higher pool prices. This does not encourage geographical distribution and could erode the value of existing projects. CfD procurements could instead be designed to optimize geographical distribution through defined adders in the bid process, but determining the right value for these adders would be complex and the market is best placed to determine which projects have the highest value. CfDs also remove the incentive to integrate storage into project design.
- Market-structured contracts (MSCs) (see Annex 1) take the strike price approach of the CfD, but use the average pool price of all generators of one type (e.g., wind) in the market rather than the pool price received by an individual project. As with RECs, higher-value projects realize a higher price and thereby gain a competitive advantage. Using this approach allows wind, solar and all other resources to compete in the market.
- The MSC approach delivers the benefits of both RECs and CfDs in the short and long term. The revenue certainty reduces the rate of return required by investors, lowering cost of capital and ensuring the lowest price for renewables. The MSC system also lets the market choose the highest-value projects, protects the value of existing projects and encourages geographical distribution. The market exposure ensures that other factors that influnce project value such as integration of storage or new technologies can compete on a level playing field. It also provides a hedge against future wholesale price increases that can result from volatile fossil fuel prices.

Annex 1

Additional details on the MSC approach

Procurement

Under the MSC approach, much like a CfD auction, each generator submits a bid for the effective price at which they would receive a contract. However, the actual payments are made using the average renewable energy pool price for a given technology. Projects that expect to capture a higher pool price than the average will reduce their bids, so the difference between their bid and the higher pool price will be additional revenue for them. Higher value projects will thus bid lower prices and win the reverse auction.

In order to compare the bids across project types, a technology-neutral "effective REC" is created for each technology type. For example, the weighted average of the pool price received by all wind generators in a set period becomes the index wind price in $/MWhr. For each bid the "effective REC" is the difference between the bid and the index price.

The same process is repeated for other technology types. For those technologies such as solar without sufficient historical pool price data, an index is calculated by comparing the hours of expected generation in the previous years to the pool prices. For equal asset bids the technologies that capture higher pool prices will have a lower effective REC, reflecting that the CfD payments will be lower for the same bid value as the index price is higher. This selects for the resource types with the best differential between energy cost and wholesale market value and will allow all resource types to compete.

The effective RECs are compared in a traditional reverse auction, and projects are procured at increasing price until electricity needs are met.

A fixed budget for renewables can be achieved by calculating the total government exposure based on conservative pool price assumptions. Additional budget not used in a given year can then be banked for future years.

Operation

At the end of each month the weighted average pool price received by all generators of a specific type (e.g., wind) is calculated based on price and generation. The total payment to each generator is the difference between their winning bid and this average pool price, multiplied by the total number of MWh generated.

If the weighted average pool price exceeds the bid by the project — price increases could come from large generator closures or outages (a risk with aging coal plants), or from increases in

global natural gas prices — the difference is paid back by the generator to the program. Program costs would be lower than budgeted. In these circumstances, consumers could be paid a "renewable energy hedge" that would protect them against the higher electricity costs.

We propose that calculations and payments to generators be made on a monthly basis. This should average out high-frequency fluctuations, but still maintain regular payments for business planning. This time frame could be altered depending on specific concerns from AESO or the generators.