

The Cost of Energy from Independent Power Producers Backgrounder

The cost at which BC Hydro (“BCH”) acquires energy from independent power producers has been frequently misunderstood and misinterpreted. In particular, the average adjusted firm energy price from the 2009/10 Clean Power Call (“Clean Power Call”) has been compared to the non-firm spot market price for imported energy from the U.S. This inappropriate price comparison is then used to attack the government’s policy of self-sufficiency in critical water conditions.

It is also inappropriate to compare the cost of new clean renewable energy to the cost of electricity from BCH’s heritage hydro assets, which represents the cost of running depreciated assets built decades ago for a fraction of the price that they would be built for today.

It is alleged that BCH’s ratepayers will suffer a significant economic disadvantage if they rely on domestic sources of renewable energy rather than taking advantage of cheap imported energy to the fullest extent possible. The allegation continues that the policy of self-sufficiency in critical water conditions will lead to large surpluses of expensive power that will have to be sold into the much lower priced spot market.

The crux of the allegation seems to be that IPP energy will be costing \$124 to \$140/MWh while spot market energy is available for \$40/MWh, and therefore ratepayers will suffer a cost burden of up to \$100/MWh times many millions of MWh per year.

This “fear founded” allegation is due to a misunderstanding of both the cost of IPP energy and the cost and nature of the spot market energy. To address these fears and allegations there are a number of salient facts that need to be explained.

Spot market energy from an imported source is not remotely the same product as firm and reliable renewable energy at long-term contracted prices from domestic sources. There are a number of significant differences:

- Firm energy can be relied upon in times of shortages, and the price is known and contracted. Spot market energy may or may not be available, and the price may be any amount the market will bear, depending on the supply and demand at the time.
- Spot market energy is only available because every utility in the western region has contracted for enough long-term firm energy to take care of its domestic customers. This contracted supply experiences short-term operational surpluses from time to time, and these surpluses are exchanged on the spot market.
- When there are adequate surpluses, the spot market price drops until it will only cover the variable cost of production. It provides no return for the capital required to build new capacity. If every utility relied increasingly on these spot market surpluses, then no new capacity would be built and the cheap surplus pricing would completely disappear within a few years.
- In periods of extreme shortages, such as the California shortage in 2001, spot market energy prices reached thousands of dollars per MWh for short periods, and held levels of \$300 to \$800/MWh for months at a time.

- Domestic sources also provide clean and renewable energy, with no greenhouse gas emissions. The cheapest imported spot market energy is often from coal or gas-fired generation.
- Purchases from domestic sources also contribute as much as \$50/MWh to government revenues and local economies. Imported spot market purchases support the economies in other jurisdictions.

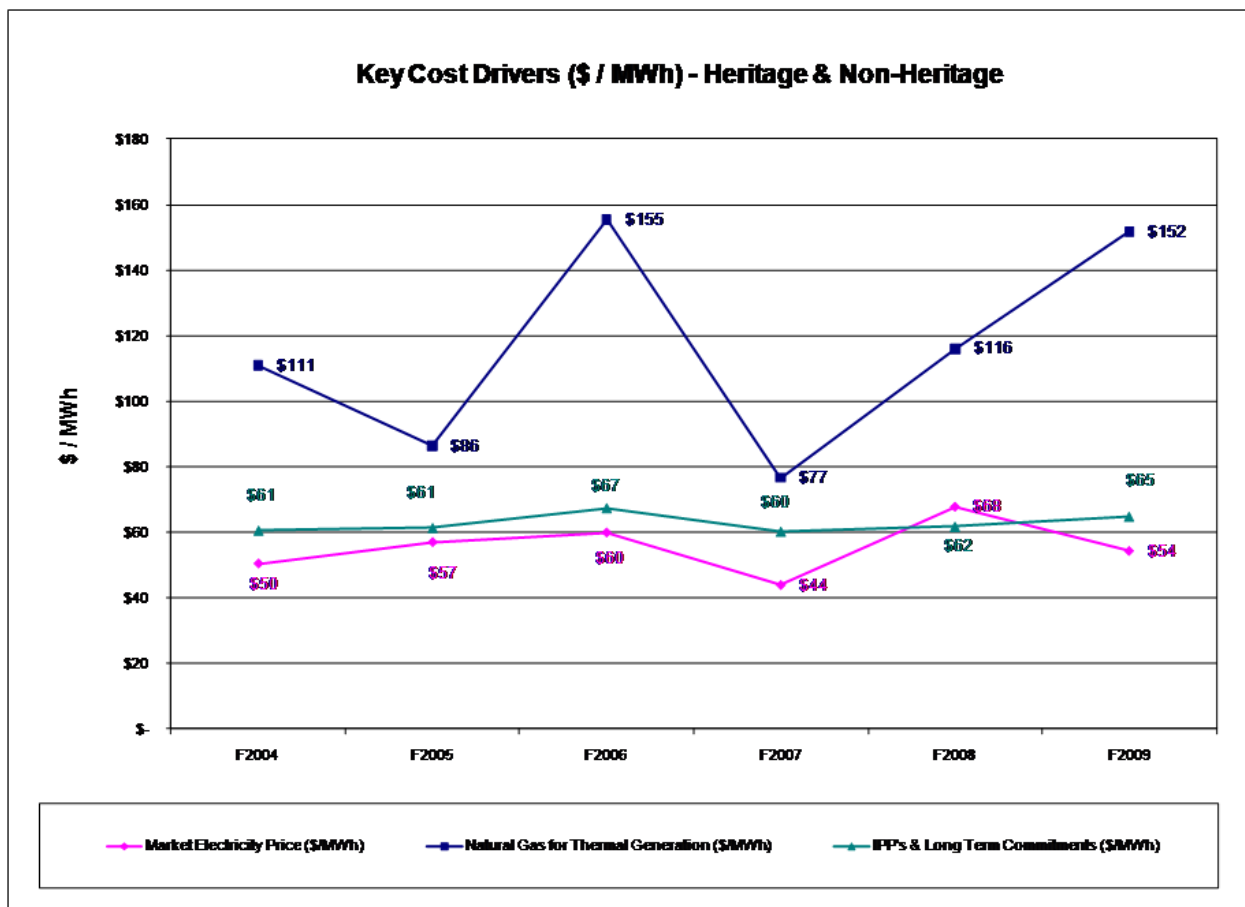
BCH has repeatedly confirmed that comparing long term IPP prices to spot market prices fails to take into account the differences in the products¹. For example IPP prices are stable and spot prices highly volatile. Even though any comparison is on an “apples” to “oranges” basis, the market price usually doesn’t include the cost of wheeling it to B.C.’s borders which is about \$5² and rarely if ever is the long term weighted average price of IPP electricity used. The following graph which has been derived from a BCH graph³ compares this price to the market price, to which the wheeling cost has to be added⁴:

¹ Appendix 1, as attached.

² Appendix 2, as attached.

³ Appendix 3, as attached. The data for F2010 and F2011 on this graph has been omitted from the derived graph because it is based on estimates of water conditions which on the basis of actual data did not materialize with the result that electricity imports were higher than expected. The larger the volume of imports, the less likely BCH can purchase electricity at the lowest prices in the electricity market because of the volume available, transmission constraints etc. The Association does not have the actual price data for F2010 and F2011 including any adjustments to the cost of IPPs and long term commitments resulting from new projects coming on line. Irrespective the comments in the text of this Backgrounder about the need to view any differences in the price spreads over the long term still hold.

⁴ BC Hydro, F2011 Revenue Requirements Application, Exhibit B-6, BCUC IR 1.62.1.1.



It is only with the arrival of the recession in 2008 and falling natural gas prices that the prices have really spread and when the \$5 wheeling charge is added, the spreads throughout the period F2004-F2009 narrow even further. Other additional benefits such as revenue accruing to BCH from the sale of renewable energy credits would also decrease the IPP price. The spreads have to be tracked over a long period (i.e. the length of IPP contracts) before any meaningful comparisons can be made. If an investor made a long term investment in stocks in 2007 for a registered retirement savings plan and the merits of this investment were assessed in 2008, they would be terrible. In 2011, the outcome would be very different but the real assessment has to be made when the investor retires.

The quoted price of firm energy from the Clean Power Call is for a very specifically defined product, and the price has already been subjected to a number of cost adders.

- Each project awarded in the Clean Power Call must guarantee the amounts of firm energy it will deliver at different times of the year. If it fails to deliver the energy, then it must pay liquidated damages to BCH, and BCH can go to the market and replace the shortfall energy and charge any extra cost to the project.
- The price most often quoted from the Clean Power Call is \$124/MWh, which is known as the average adjusted levelized price for the firm energy component only.

- Any additional energy delivered by a project will be paid only the non-firm energy price of about \$48 (levelized) times a time-of-delivery factor, which can reduce that amount to \$35 if the additional energy is delivered during the freshet season. All of this is designed to make the non-firm price essentially the same as the forecast of the spot market price.
- A number of adjustments are made in arriving at the firm energy price which is notional and does not represent the price received by IPPs. These may or may not represent real costs to BCH, and they include:
 - A charge for the assumed transmission losses, at a standard designated rate from each region;
 - The cost to the project for providing BC Hydro with a letter of credit to secure 150% of the cost of any interconnection facility;
 - A further charge to the project for repaying 150% of the cost of any interconnection facility and any network upgrades required downstream (any interconnection costs are paid for twice times 150%);
 - A charge to the project for a share in the possible cost of future incremental firm transmission capacity, even though none of these projects would result in any new transmission capacity being required; and
 - A \$10 charge for the theoretical lost opportunity cost of integrating wind energy, even though that charge was calculated for a penetration of 15%, and the amount of wind contracted was less than 7%.

The quoted price of firm energy from the Clean Power Call is not the price that will impact BCH's customers' monthly bills.

- For planning purposes it is prudent that BCH should rely on energy that is either statistically or contractually firm, however the final cost to the ratepayers for this energy will actually be based on the total energy delivered, not just the firm energy. A considerable portion of the total energy will be delivered for the non-firm energy price of \$48 /MWh.
- BCH has calculated that the proportion of non-firm energy from small hydro projects is approximately 30%. This would bring down the weighted average cost of the total energy from \$124 to just \$101/MWh.
- Even for the firm energy component, not all of it is purchased for the Firm Energy price because, statistically, there will always be under-deliveries during some periods every year, and BCH can replace this shortfall energy at the market price – and at a time of its choosing. BC Hydro can also charge the project \$5/MWh as liquidated damages. This would bring the weighted average cost of total energy down further, to \$95/MWh.
- Renewable Energy Credits -- BCH is also presently able to sell renewable energy credits or “RECs” for any wind energy it procures, and in the future will likely be able to earn the same revenues for small hydro energy. These REC revenues will bring down the effective cost for renewable energy by another \$30-\$40/MWh, and so the cost that will actually impact the BCH customers' monthly bills will likely be in the range of \$70/MWh or less, rather than the alleged \$124/MWh.

Importing US spot market power may appear to be marginally cheaper today, but relying on it for the future involves several significant price risks.

- Today's spot market prices reflect very low natural gas prices. BCH's most recent natural gas price forecast scenario shows them doubling by 2020⁵. The prices for domestic renewable energy are guaranteed not to escalate at more than 50% of inflation as measured by the Consumer Price Index.
- Today's spot market prices reflect no charges for GHG emissions and no B.C. carbon tax is payable when the underlying energy is imported into B.C. What will happen to spot market prices when those charges rise to \$50 or \$60 or even \$100 per tonne, as is BC Hydro's GHG price forecast shows them rising to \$50 to \$100 per tonne over the next decade⁶.
- For its own evaluation purposes, BC Hydro has used an average of 550 kg of GHG emissions per MWh of imported energy. That means an additional charge of \$27 to \$55/MWh will be added to the average MWh of imported spot market energy – with a very distinct possibility that the charge may be double that amount, if governments act in unison to slow the pace of global climate change.
- BC Hydro's customers bear this GHG offset cost. Domestic IPP renewable energy contains no GHG offset risk. In fact it can earn renewable energy credits.

The quoted price of firm energy from the Clean Power Call is definitely not the cost of the surplus energy that BCH will accumulate in non-critical water years. Also, the average spot market price is definitely not the price at which BCH would ever choose to sell any surplus energy.

The “buy high, sell low” scare scenario is really a mythical invention.

- When surplus energy is generated in times of better-than-critical water flows, it is generated at an extremely low cost. The vast majority of this surplus energy, perhaps 90%, will come from BCH's own system at purely the cost of water rentals (\$7/MWh, which at any rate is revenue to the provincial taxpayer, so the cost is essentially zero).
- The remainder of the surplus energy is acquired from independent power producers at the non-firm energy price, which approximates the expected market price at the time of delivery.
- BCH has a tremendous amount of operational flexibility. It almost never has to sell into low markets. Because of its storage capabilities, in most cases BCH can hold energy and sell it at a time of its choosing.
- BCH will first use the energy from wet years to refill the reservoirs when they have been depleted by dryer years, or it will carry the energy over to the following year as protection against subsequent water shortages.
- Even if it does have to export some of the energy, this is not an onerous occurrence, because BCH already typically exports around 10,000 GWh in almost every year. It can generally sell at least this amount into the on-peak hours at a time of its choosing. The only difference is that it won't have to acquire that energy on the spot market, import and then resells it as an export.

⁵ Appendix 4, as attached, page 3, real prices x 1.23 for 10 years inflation

⁶ Appendix 4, as attached, page 2, real prices x 1.23 for 10 years inflation

- If it does find itself unable to assimilate more energy during the freshet season (which happens, statistically, less than 5% of the time), that surplus energy has been acquired at a cost ranging from free to market price, so there is no great loss or burden to BCH's customers if the energy needs to be resold immediately.
- If the freshet problem does occur in some wet years, it is not caused by lack of storage capacity, as is often alleged. Rather it is caused by lack of load, especially in the overnight hours⁷. With the expected increase in demand by the industrial sector in B.C., and in particular the oil and gas industry which operates on a 24 hour a day basis, then to the extent to which the absence of load is a problem, this problem will be alleviated or eliminated.

The quoted price of firm energy from the Clean Power Call is derived from a bidding process that covers a particular period in time and is based on the terms and conditions of a specific contract. It is not representative or predictive of the prices of future bidding processes.

- As noted above with respect to “cost adders” the contractual terms and conditions affect the IPP's bid price. It is not always a question of covering off a risk. Sometimes there is no real risk, merely a feared risk. For example, under the terms of the Clean Power Call contract, IPPs are required to provide a letter of credit for the continuing performance of their project including the period after commercial operation date. In almost all cases, the project will be the subject of project financing and the lender will ensure that the project performs, including taking it over and selling it to someone else if the original owner is unable to perform. Accordingly, the cost of the letter of credit which will be built into the bid purchase is for “insurance” that is not really required – it's like paying for a belt plus suspenders. This is but one instance of a term or condition in a BCH electricity purchase agreement that is causing a higher IPP price than is necessary.
- BCH has confirmed that for the purposes of independent power producer contracts, the terms and conditions might affect the price that is bid⁸.
- IPP prices can and do change with the availability of equipment and changes in technology. In certain periods in the 1990s combined cycle turbine manufacturers couldn't keep up with the demand and increased or held prices at higher levels than they should have been. Once manufacturing capability increased and/or demand fell, so did the prices.
- When bids were first entered in the Clean Power Call, there was a worldwide shortage of wind turbines and manufacturers had the upper hand in price negotiations. By the time this call was completed, manufacturing capability had been increased and demand had fallen. Some bidders who prudently locked in prices at the time of shortages couldn't take advantage of the falling prices and reduce their bid prices.
- In the 1980s and 1990s there were efficiency improvements in combined cycle turbines. Wind and other renewable generating technologies have also seen these improvements. For example⁹:

⁷ Appendix 5, as attached.

⁸ Appendix 6, as attached.

⁹ Boston Consulting, “What's Next for Alternative Energy”, November 2010, pages 20-21, Appendix 7, as attached.

“Onshore wind generation costs have declined substantially over the years – today, prime wind sites can deliver and LCOE of \$0.09 or \$0.10 per kilowatt hour. Given the relative maturity of the technology, cost declines for onshore wind will be incremental in nature and driven primarily by learning curve effects: we expect an approximately 15 per cent reduction by 2015, which would drive onshore wind power’s LCOE to \$0.07 to \$0.09 per kilowatt- hour for prime sites and roughly \$0.10 per kilowatt-hour for less attractive sites. Onshore wind is well on its way to producing power at rates competitive with traditional energy sources and is rapidly moving beyond subsidy-driven growth.”¹⁰

Conclusion

The cost comparison between IPP energy prices and spot market purchases has been frighteningly misstated.

The real impact of IPP energy prices on the ratepayers’ monthly bills will be closer to \$70/MWh than to \$124/MWh – once the blended price of firm and non-firm energy is considered, and the value of renewable energy credits is taken into account.

If the contributions to government revenues and local economies are also taken into account, then the net cost to British Columbians is probably well below the \$48 forecast of the average spot market price for imported power.

Spot market imports involve many risks, not the least of which are the price risks associated with higher natural gas prices in the future, as well as the imposition of GHG offset costs. Placing reliance on imported spot market power to serve firm domestic load also exposes the ratepayers to the possibility of extreme price swings and even the total inability to obtain supplies during periods of water shortages and the failure of other utilities to be self-sufficient in firm energy or capacity.

¹⁰ Footnotes omitted from the quote. “LCOE” means levelized cost of energy.