***British Columbia Electricity Supply Gap Strategy: A Redefinition of Self-Sufficiency***

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## Overview

The Province of British Columbia faces growing electricity demand and yet is severely constrained by legislation in how it can meet the estimated supply gap. The 2010 BC Clean Energy Act requires clean and renewable energy projects for 93% of provincial supply. Ambitious greenhouse gas reduction targets are embedded in legislation as is electricity self-sufficiency. Government policy further requires British Columbian electricity rates to be amongst the lowest in North America. At the same time the province is strongly encouraging electricity-intensive resource extraction projects such as mining, oil and gas production and liquefied natural gas export projects. The means by which British Columbia rectifies its impending supply gap will impact the Province’s electricity rates; market purchases may be the most cost-effective means of ensuring supply over the next ten years. This could be achieved by redefining self-sufficiency to reference net export revenue rather than electricity volumes.

## Methodology

## We examine the existing domestic resource options which include:

## • Power Smart (demand side management program).

## • Heritage Hydro (existing hydroelectric units and the proposed Site C facility)

## • Heritage Thermal (existing thermal units)

## • Resource Smart (upgrades to existing heritage hydro facilities)

## • Downstream Benefits (the Canadian Entitlement from the Columbia River Treaty)

## • Non-Firm /Market Imports 2,500 GWh allowance

## • Electricity Purchase Agreements (EPAs) with Independent Power Producers

## Results

## British Columbia trades electricity with Alberta and the U.S. In the first nine months of 2012, the province’s gross trade revenue was $460 million, a decrease of $136 million compared to the same period in 2011. BC Hydro attributes a portion of the revenue decline to lower Pacific Northwest electricity prices resulting from higher hydro and wind generation in the region.

## Electricity prices within the Western Electricity Coordinating Council (WECC) are likely to remain low as renewable and underutilized natural gas capacity is predicted to increase until at least 2020. As electricity demand growth within the region is expected to remain low, electricity prices within the region are also likely to remain low. Given the expectation of continued low prices in the region, BC could manage to meet its electricity needs, at least over the near and medium-term through market purchases. Although this option violates the electricity self-sufficiency requirements, the independence requirement as it relates to energy could be redefined as revenue self-sufficiency, demanding that the revenue from exports exceeds the cost of imports.

## The current configuration of the BC’s intertie connection with the Pacific Northwest potentially allows for a maximum of 3,150 MW per hour export and 2,000 MW per hour of import capacity. This translates to maximum potential annual export and import energy values of 27,600 and 17,500 GWh respectively, although constraints can reduce actual transmission capacity. However, given that the largest forecasted supply gap is 12,300 GWh in 2031, the existing transmission infrastructure should be adequate to meet import requirements. Although the interties can be constrained during peak hours, BC’s storage capacity is flexible allowing the utility to import electricity and store water during off-peak hours.

## In addition to the increased cost associated with purchasing energy from IPPs, there are other reasons not to add these generators to BC’s electricity supply. Most of the IPP projects provide non-firm, non-dispatchable energy to the system. The addition of this intermittent energy requires BC Hydro to restrict potential trading volumes, holding back its firm energy to backstop any variation in these intermittent resources. This firming need reduces the system’s supply flexibility. With 34,000 MW of renewable capacity expected in the WECC by 2020 , supply flexibility is a valuable commodity in areas lacking it. Regions that have already integrated high levels of intermittent resources, including Alberta, Bonneville Power Administration (BPA) and California Independent System Operator (CAISO), require short-term, fast ramping energy to backstop the variability of supply. British Columbia’s hydroelectric system can ramp its output by 200 MW/minute. This capability is highly valued. In Alberta, on average in 2011, active spinning reserve was paid $55/MW and over 26% of Alberta’s spinning reserve was provided by the AB-BC tie line.

## Revenue from electricity trading is one of the chief reasons that BC Hydro was able to keep rates low in the past. Restricting the Province’s ability to trade will reduce profits and require rate increases. The BC Hydro Review, completed in 2011, found that the “BC Hydro system has significant flexibility to import power at times of the day or year when market prices are low. As a result, BC requires additional flexibility in its energy policy. Additional flexibility for BC Hydro, including increased access to low cost energy from the market, could reduce costs significantly for ratepayers”

## One consideration related to imported energy is the carbon content of the purchased electricity. British Columbia imports mostly low carbon energy from Washington state as the fuel mix is almost 80% low carbon (wind, hydroelectric and nuclear). The carbon content may be lower than 20%, as British Columbia would purchase low-priced electricity which results from coincident high water and high wind conditions.

## British Columbia would be diminishing a valuable resource in adding energy-only resources to the system as it would have to use the flexibility of the Heritage hydro assets to manage its own variability rather than being paid to provide this service to other electric grids.

## Conclusions

## The magnitude and timing of the provincial electricity shortfall depends on whether BC Hydro supplies most of the potential LNG loads. LNG proponents may not want to purchase electricity from the utility particularly as they have the input fuel at hand, With the July 24, 2012 Clean Energy Act Regulation 572 exempts exporting LNG facilities from the 93% renewables requirement, it is expected that some LNG proponents will self- supply electricity with behind-the-fence generating units.

## Even if some (or all) of the LNG plants decide to generate their own electricity, BC Hydro’s electricity system will become supply constrained in the next decade. Although growth in industrial electricity demand would exacerbate shortfalls, the many legislated constraints limit how any supply shortfall will be alleviated. Electricity purchase agreements with independent power producers are one possible solution, although this course of action would likely violate the rate requirements as it is by far the most expensive option. Redefining self sufficiency to require export revenue to exceed import costs would allow the supply gap to be filled at the same time keeping energy costs low. Surplus supply conditions in Washington state resulting from high wind and water conditions can even lead to zero or negative prices at Mid-C. British Columbia has storage capacity and flexibility to buy low cost electricity and store water in its reservoirs for future use or to sell into the market when prices are high. Electricity self-sufficiency restricts electricity trade which means that those foregone revenues cannot be used reduce electricity rates.