Comments on Panel September 20th Preliminary Report

BCUC Site C Inquiry

The Commission Panel in their Preliminary September 20th report acknowledged that it is "*difficult to forecast future electricity demand given the considerable uncertainty surrounding economic growth, demographic variables, resources acquisition costs, future policy changes, technological and efficiency advancements, changes in customer behaviour and many other factors*". However the Panel also indicated that "*an effective forecast model is one that produces results reasonably close to actual with equal instances of over and under forecasts."* Forecast inaccuracy usually cost rate payers; if the forecast underestimates load growth the utility may have to purchase expensive power from the wholesale market, if the forecast overestimates load growth, rate payers may be required to pay for supply and infrastructure that they do not need. The latter is actually the case at the present time.

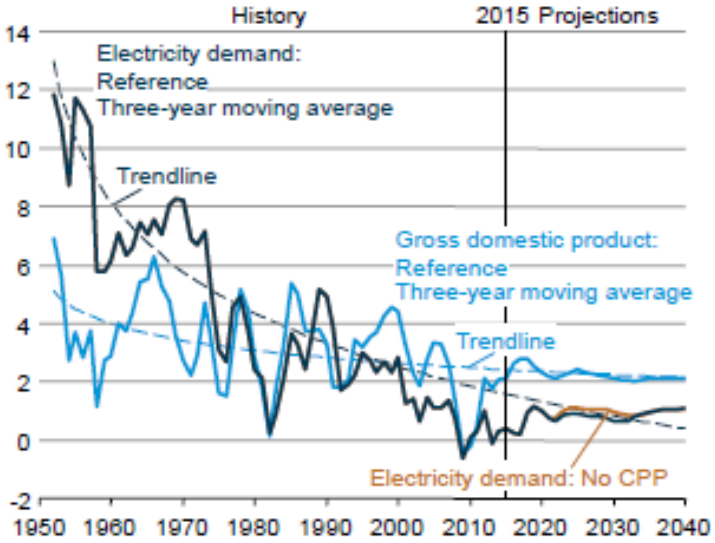
The Commission is encouraged to recommend to the Government and BC Hydro that the process for forecasting the domestic load be enhanced and revised using the latest data analytical tools. It is suggested that this recommendation would be suitable regardless of the recommended option for Site C.

Over spending on energy supply can be quite expensive. For example if BC Hydro pay for 2% more power than they need it could cost rate payers $50 million per year. The backup calculations are in the attached appendix. Accordingly, it would seem prudent to make a significant effort to accurately determine the load forecast on an ongoing basis by making use of the data analytical methods that are now available.

Many utilities in North America have had difficulty developing reasonable forecasts because of the uncertainties mentioned by the Panel and also because society's consumption patterns have changed over the last 15 years. The U.S. Energy Information Administration (EIA) has described this change in consumption in their 2016 Energy Outlook Report[1]. The following graph from the EIA report indicates the historical growth trend of electricity consumption in the U.S. and their forecast of future growth.

[1] U.S. Energy Information Administration – Annual Energy Outlook 2016

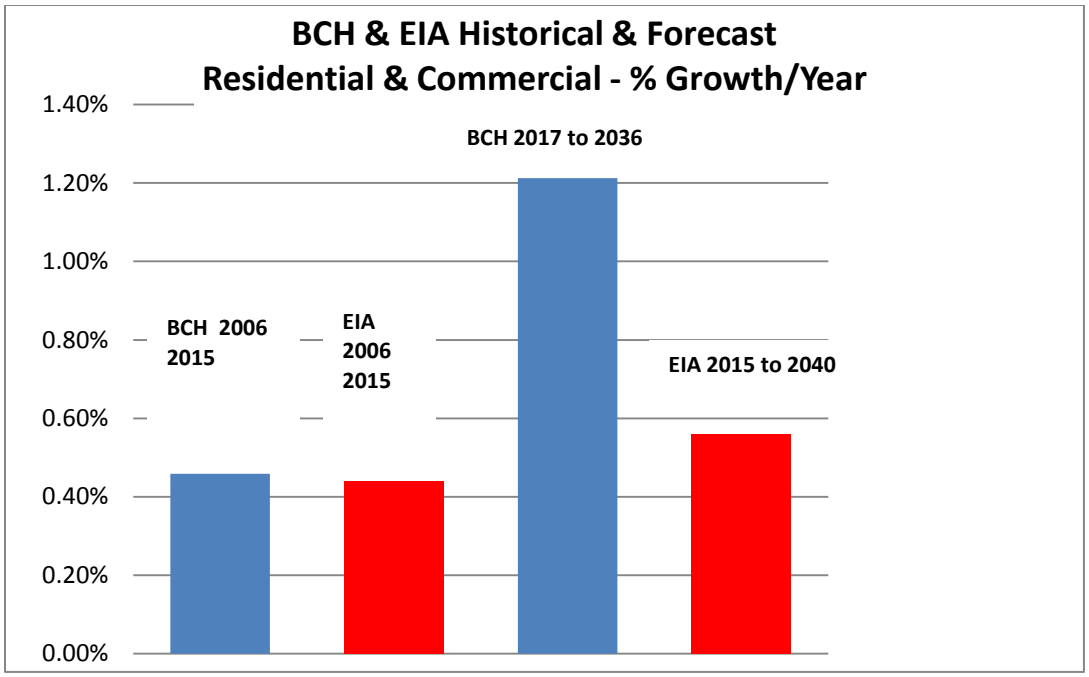
Figure MT-27. U.S. gross domestic product growth and electricity demand growth rates, 1950–2040 (percent, three-year moving average)



It is interesting to note that in recent years the growth has actually been negative in some years. The EIA is forecasting a continued low growth rate because they are expecting efficiency gains to offset most of the increases from population and economic growth.

It is difficult to compare the growth in industrial consumption in British Columbia with industrial growth in all of the U.S. because a few large projects can significantly change the picture for B.C. However long-term trends in the residential and commercial sector can often be compared meaningfully. The following graph taken from EIA data[2] and BC Hydro's F2017-F2019 Revenue Requirement Application compares the U.S. historical trends and the EIA forecast with BC Hydro's historical trend and projections with respect to the Residential and Commercial sectors.

[2] Page MT-5, ibid



The historical trends for the U.S. and B.C. have been quite similar for the last 10 years; 0.46% per year for B.C. and 0.44% per year for the U.S. However BCH is projecting more than twice the annual growth rate than the EIA for the next 20 years; 1.21% per year for BCH and 0.56% per year for the EIA. It is hard to understand why there should be this much difference in projections since historically the trends have been quite similar and also because BCH has such a strong conservation program in place. Keep in mind that this is for the residential and commercial sectors and does not take into consideration large industrial projects that may be coming or going.

The purpose of this submission is not to suggest that the forecast be revised but to recommend that for future forecasts the methodology be updated regardless of the decision on Site C. If the project proceeds there is a strong probability that BCH will have a surplus for a number of years and if the project is terminated there is a likely hood that BCH will need to obtain alternative resources. In either case forecast accuracy will reduce costs to rate payers. In the case of oversupply, surplus power can generally be sold at a higher price if it is known as precisely as possible the exact amount of surplus available for a given period of time into the future. Similarly, if more resources are needed accurate forecasts will reduce the cost of purchasing additional power. This is true with respect to short and long term forecasts.

With the implementation of smart meters and the development of increasingly sophisticated software tools for analyzing “Big Data” from sources such as smart meters, it is now possible to determine trends in consumption much better than we were able to do in the past. For example there has been a lot of discussion about price elasticity and the quantitative factor which indicates the magnitude of change in consumption versus change in price. In general this discussion is often at a highly aggregated level where price elasticity is estimated for the whole residential sector or for the whole commercial sector. In fact for the forecast that BC Hydro submitted for the 2017-2019 Revenue Requirement an elasticity

factor of - 0.05 was used for all of the customer segments[3]. It is suggested that price elasticity can be predicted much more accurately if it is analyzed on a finer granular level. As an illustration the residential customer base for BCH is probably getting older and older customers generally are more restricted to fixed incomes which will most likely make them more sensitive to price increases. At any rate by using smart meter data it is possible to analyze how a sample of this customer group and other customer groups react to price changes quite accurately. The overall impact of price change can then be built up by combining the analysis of different groups.

The increasing popularity of electrical vehicles (EVs) has been mentioned as a reason for energy consumption to increase. There are approximately 6,000 EVs operating in the province now and BC Hydro in their forecast[4] are projecting that there will be 580,000 by 2036 consuming an estimated 1,760 GWh annually. This would be a significant load and the peak demand that could be caused by most of these vehicles charging at the same time may even be more significant. As the use of EVs increase it would be useful to monitor them closely by analyzing information from smart meters at public and home charging stations.

A more advanced forecasting system would involve monitoring on an ongoing basis (monthly for example) samples of smart meter data from a variety of customer groups and then combing this data with weather, economic and demographic data to determine different trends. Information security would need to be dealt with by obtaining customer volunteers to agree to their data being used and by ensuring that the data would be collected in such a way that individual customers could not be connected to their specific data. Many market sectors are already doing this; Starbucks I am sure will know on a week basis whether customer's consumption of mild or bold coffee strains are decreasing or increasing and they plan accordingly. Most companies could not survive if they forecast the way utilities do; every two or three years analyze aggregate yearly consumption data and combine it with similar aggregated economic, technological and population data. Utilities can get away with this very high level approach because they are monopolies and their rate payers have to foot the bill of forecast inaccuracies.

The Government, BC Hydro or for that matter the BCUC could issue an RFP requesting data analytical firms to submit proposals for providing a load forecasting framework that would monitor consumption on a monthly basis and that would track technology impacts, customer preference changes, reaction to price changes and other key factors. With such a framework in place a sophisticated forecasting process could be implemented and it is suggested that the investment in such a procedure would be well worth the investment considering the cost of forecasting inaccuracy.

[3] Page 3-4, Fiscal 2017 to Fiscal 2019 Revenue Requirements Application
[4] Page 3-15, ibid

Appendix - Example Calculation

Cost of Over Supply

Annual Domestic Consumtion	50,000 GWh
Overestimate Amount Percent	2%
Overestimate Amount GWh	1,000 GWh
Assumed Price of Domestic Sales	10.00 cents/kWh
Assumed Price of Export Sale of Surplus	5.00 cents/kWh
Annual Loss from Selling Surplus to Export Market versus to Domestic Market	**$50,000,000**