The Daily Gleaner

December 11, 2010

**Putting Lepreau in Context**

I have been wanting to write about Lepreau for some time now, but the timing has never seemed quite right. We can't pick up a newspaper without seeing how far over budget and behind schedule the project is. What I haven't been seeing throughout all of this is anything putting the project into context.

The cost overruns at Lepreau appear staggering - $1 billion over budget, putting the total project cost at $2.4 billion. These are massive numbers, and seeing them out of context is sure to make anyone mad. So I want to spend some time looking at how the updated project costs compares with a selection alternative options.

Every power project is different, but things can really be simplified if different power generation technologies are broken down into a capital cost and an operating cost. Certain technologies tend to have lower capital costs but higher operating costs (such as natural gas, and coal), while others tend to be more capital intensive, but cheaper to operate (such as nuclear, or wind).

On the capital cost side of things, at a simplistic level, we tend to compare technologies by their cost per kW of capacity. Lepreau has a capacity of 635MW, so we are looking at a capital cost of roughly $3600 per kW – this is far less than any estimate out there for a new nuclear plant, where estimates range from anywhere between $5,000 and $8,000 per kW (you'll quickly see there are no accurate numbers when looking at power projects!). So compared to a new nuclear plant, even with the cost overruns, we are still getting a reasonable price. But what about other technologies?

The one people suggest to me most often as an alternative is wind. If we take a look at the capital cost of onshore wind power projects, we are probably going to see a range of cost estimates from $2,500 to $5,000 per kW. Immediately, it looks far cheaper than new nuclear, and even a good chance that it is cheaper than our refurbished Lepreau. The problem here is that the amount of energy generated by a kW of wind, is not the same as the amount of energy generated by a kW of nuclear.

We have to build into the cost model something called capacity factor. A power plant does not run at full capacity 24 hours a day, 365 days a year. There are maintenance periods, times when electricity isn't needed, and in the case of wind, a lot of time when the wind isn't blowing as hard as the turbine is designed for. Typically, a well situated and well designed onshore wind turbine will only produce at about 30% of its rated capacity over a full year. Compare this with nuclear, where capacity factors of 85-90% are fairly typical (Lepreau was at 75% in the last few years before refurbishment).

This means that 1kW of nuclear at 90% capacity factor is able to generate three times more electricity than 1kW of wind at 30% capacity factor. So that cheaper capital cost for wind power isn't looking so good anymore.

Assuming the midpoint of my estimate, replacing Lepreau with wind would cost somewhere in the $7 billion range. Capital costs are only one piece of the puzzle obviously, and a complete analysis requires looking at lifetime operating costs, which I don't have room for here. The majority of studies will put the lifetime cost of a new nuclear plant ahead of a new wind farm – and our refurbishment is cheaper still than a new nuclear plant.

In my opinion, we need Lepreau and more wind. A diversified electricity generation system incorporating wind, solar, hydro, nuclear, and even fossil fuels (with district heating of course) is going to be essential to providing secure, affordable, and (relatively) clean electricity going forward.

*Brian McCain is Executive Director of The Gaia Project, a New Brunswick based charity focusing on sustainable engineering education, and an engineering consultant in the power generation sector. You can visit his website at www.thegaiaproject.ca*