The Value of the Water in the Churchill River

The Production Process

The output of electricity from the Churchill Falls Generating Station can be expressed as the following production function:

Q= f(K,L,E,M,S,W) (1) where

K= capital asset services coming from the machinery (e.g. turbines) and structures (and buildings)

L= Labour Services

E = Energy, which would be some oil and internally produced electricity

M= Purchased Materials

S = Purchased Services, such as insurance and communications

W = The natural resource water from the Smallwood Reservoir

This production function is associated with and dual to a cost function.

$$qQ = p_i X_i \quad (2)$$

where q is the price of the output electricity and p_i is the price of the ith input described in equation 1.

We note that the price of capital services (p_k) would include a normal rate of return on those capital services.

The problem is that we do not have a market-determined price for water. The owners of the water may determine a price

Differential (or Ricardian) Rents

- The Government of Newfoundland and Labrador has stated that the major benefit of the proposals under the MOU for NL is that it unlocks the “value”.
- The question arises of how to determine the value of a natural resource.
- In the case of CF, the natural resource is the “water” that powers the turbines that produce electricity.
- In our case, I will define rent loosely as the difference between the **price** the output would have in an open market and the **cost** of producing and transmitting that output. Costs for this purpose would include operating costs + depreciation and amortization + any other expenses directly related to production, other than existing water rents.

Calculating Value for Imports Using Differential Rents

- If the market for CF electricity were not restricted by the 1969 contract with Quebec and the stranding of CF so that it must run through Quebec to reach provinces and states beyond, then differential rents for CF electricity could be determined.
- If Quebec imports power for its own domestic use, then I believe that the rent would be equal to the price of a MWh of electricity at the border – transmission costs – the cost of producing a MWh of electricity at the CF generating plant. My rough calculations of costs in 2024, using data from CF(L)Co's **Consolidated Statement of Comprehensive Income,** do not make sense. I estimate the cost for CF at the station at 0**.33¢/kWh.** Since HQ's power cost is 0.2¢/kWh, this would imply a **loss**. However, the 2024 audited statement reported a profit of $81.5M. My estimates of the average cost are too high. The NLH could calculate the cost per kWh.

- A crude estimate of the differential rent per kWh, using the data above along with the approximate, would be equal to 4.1¢ - .33¢ - transmission costs. NLH can provide an accurate estimate of the AC (average cost) and transmission costs, as it exports electricity to the USA.
- A couple of other observations are relevant:
  - Depreciation and amortization expenses decline as the capital assets (the dam and buildings) age. Such expenses are less than the operating costs.
  - The free-market price of electricity in New England in 2025 has already increased by 48%. As experts predicted, given the increased demand for electricity, for example, from digital hubs.
  - Remember that electricity prices vary throughout the year primarily due to shifts in demand. Setting annual wholesale prices is not the norm!