

McCULLOUGH RESEARCH

ROBERT F. MCCULLOUGH, JR.
PRINCIPAL

Date: October 5, 2016

To: Mr. Ken Boon

From: Robert McCullough

Subject: Renewables Cost Report

Dear Mr. Boon:

I am pleased to enclose our report detailing the continued decline in cost of solar and on-shore wind energy.

This assessment only reinforces the conclusion I reached in my report last year – renewables such as solar and wind are less than half the cost of hydro.

Average Levelized Cost of Energy for Selected Renewable and Site C Generation

| Type of Energy | Average Levelized Cost of Energy (2016 Can\$/MWh) ^{1,2,3,4,5} |
|--|---|
| Utility-Scale Solar PV (crystalline and thin film) | \$59.29 |
| Onshore Wind | \$72.57 |
| Site C | \$83.91 |

¹ Solar and wind estimates from Lazard. “Levelized Cost of Energy Analysis – Version 9.0.” November 2015. Accessed October 5, 2016. <<https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-90/>>. See page 2.

² Site C estimate from British Columbia Legislature. “Site C Final Investment Decision Technical Briefing” December 2014. Accessed October 5, 2016. <http://docs.openinfo.gov.bc.ca/d7689015a_response_package_gcp-2014-00162.pdf>. See page 111.

³ Solar and wind estimates converted to 2016 \$USD using the Bureau of Labor Statistics Consumer Price Index Inflation Calculator. Accessed August 28, 2016. See: <<http://data.bls.gov/cgi-bin/cpicalc.pl>>.

⁴ Solar and wind estimates stated in \$CAD using Oanda Currency Converter. Accessed October 5, 2016. See: <<https://www.oanda.com/currency/converter/>>.

⁵ Site C estimate stated in 2016 \$CAD using the Bank of Canada Inflation Calculator. Accessed October 5, 2016. See: <<http://www.bankofcanada.ca/rates/related/inflation-calculator/>>.

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While there would be costs associated with suspending or halting construction of Site C, I remain of the view that BC Hydro could save Can\$112.74 million on an annual basis by instead building wind and solar.⁶ This amount could be higher if tax credits for renewable energy were considered.

To put it another way, BC Hydro could free up an estimated Can\$112.74 million annually to spend on other pressing infrastructure projects. Alternatively, BC Hydro could write a cheque for Can\$57.84 to every BC household every year.

Some critics say that wind and solar are not viable options because they are intermittent, not firm sources of power. However, hydroelectric projects also provide energy subject to monthly and annual variability. As penetration of renewables increases, the portfolio effect of many different projects has reduced the overall variability of output very significantly in recent years.

Sincerely,



Robert McCullough

⁶ This calculation compares Lazard's estimates for the levelized cost of renewable energy to the levelized cost of energy for Site C, and assumes that Site C would generate with a 65% capacity factor. For levelized cost estimates of Site C, see: McCullough Research. "Site C Business Case Assumptions Review." May 25, 2015. Accessed October 4, 2016. <http://www.mresearch.com/pdfs/20150525-SiteC_Economic_evaluation.pdf>. See page 10.