



## CLEAN BALANCE POWER INC.

1615 W. 4<sup>th</sup> Ave.  
Vancouver, B.C.  
Canada V6J 1L8  
Tel. (604) 566-9310  
Fax. (604) 566-9309  
www.cleanbalancepower.com

**BCUC INQUIRY RESPECTING SITE C**

**F 33-2**

October 3, 2017

Mr. Patrick Wruck,  
Commission Secretary  
B.C. Utilities Commission  
Sixth Floor, 900 Howe Street  
Vancouver, BC Canada V6Z 2N3

### **CLEAN BALANCE POWER INC. COMMENT TO BCUC ON SEPTEMBER 20, 2017 PRELIMINARY REPORT**

**John Johnson – Principal and Director, Clean Balance Power Inc.**

Dear Mr. Wruck:

Clean Balance Power (CBP) comments herein refer to the Order-In-Council Terms of Reference pertaining to:

“What portfolio of generating projects and demand-side management initiatives could provide similar benefits?”

Specifically, CBP is addressing assumptions and calculations relating to pumped storage hydro (PSH) projects and the impact this would have on the Alternative Portfolio analysis.

#### **1. Table 32, Page 88 “Alternative Block UEC”**

CBP questions the usefulness of adding certain Levelized Unit Capacity Cost (UCC) operating components to Levelized Unit Energy Costs (UEC) to derive a higher UEC to compare with Site C’s UEC. UCC’s and UEC’s are sufficiently different to be considered separately. In fact, CBP would submit that if Site C were considered separately as a capacity resource, it would be considered quite expensive and not optimally located.

A more useful comparison might be the differences in UCC value to the BC Hydro system of having 1,100 MW of capacity located in the Lower Mainland (LM) as opposed to northeastern BC. While PSH does consume off-peak energy, CBP respectfully submits that the relative incremental UCC value of having 1,100 MW located in the LM could be significant. Specifically, this comparison could include:

- the deferral of long-term, future transmission losses and transmission investments required to address peak loads in the LM from a capacity resource located in northeastern BC; that may ultimately include the need for a new 500kV line from Prince George to the LM, in this or the subsequent BC Hydro planning period
- the relative value of ancillary services being located in the LM as opposed to northeastern BC. Ideally, this would include a relative assessment of the following values:
  - reactive power and voltage control services
  - scheduling and dispatch
  - energy imbalance services and spinning reserves
  - regulation and frequency response service
  - black start and emergency back-up power value
  - day forward Powerex trading opportunities

**2. Tables 33-35, Pages 95-96 in which the UCC of Pumped Storage is included at \$124/kW-year**

The UCC of PSH is identified at \$124 per kW-year in Tables 33-35 of the Preliminary Report (reproductions of BC Hydro analysis). BC Hydro reports this cost estimate was derived from the 2010 Knight Piésold Consulting Screening Assessment Report<sup>1</sup> which undertook a screening level assessment of potential PSH projects in the LM and on Vancouver Island. To prepare for this report, Knight Piésold assessed over 200 potential sites and provided high level cost assessments based on a number of common assumptions applied to the sites. The minimum capacity constraint for the 121 sites assessed in the LM was 1,000 MW, and the minimum generation was 6 hours per day.

CBP has been assessing PSH sites in the LM for roughly 10 years. In November 2016, six years following the Knight Piésold report, CBP hired the same consultants to do a far more comprehensive cost estimate for eight PSH sites being assessed by CBP. In this study CBP provided 1 metre LiDAR contour and orthographic data for the work, and specific cost quotes from large European turbine/generator suppliers were solicited by Knight Piésold for the projects. Knight Piésold looked at CBP capacity projects varying in size from 102 MW to 1000 MW and included estimates for site access, transmission and interconnection in its estimates. A 30% contingency on all estimated construction costs was used. The operating constraint was to provide a minimum of 10 hours of generation per day.

---

<sup>1</sup> BC Hydro Evaluation of Pumped Storage Hydroelectric Potential – Screening Assessment Report. Knight Piésold Consulting. November 30, 2010.

The resulting construction costs were significantly below the estimates derived in 2010, with two projects coming in at just over \$1 million per MW. Based on a real rate of return of 5%, ***CBP estimates the UCC of the lowest cost 1,000 MW site is roughly \$60/kW-yr, half of the \$124/kW-yr estimate used by BC Hydro in the alternative portfolio. CBP would like to suggest that this more recent, more comprehensive and more accurate PSH capacity cost data be considered in any reassessment of an Alternative Portfolio.***

Moreover, CBP would suggest that to maximize ratepayer benefit, future portfolio analysis should consider a variety of capacity products in addition to just PSH, including battery storage, and not be constrained at 1,000 MW. It is very possible that the optimal capacity portfolio may include a variety of capacity products of different sizes and technologies located in various locations around the province.

Finally, CBP submits that if energy and capacity had been assessed separately, and if a UCC of \$60/kW-yr had been used in the alternative portfolio as the PSH UCC and not \$124/kW-yr, it is conceivable that the optimal Alternative Portfolio would have been presented as a lower cost alternative to ratepayers than Site C, even before factoring in the significant reduction in UEC's of renewable energy (wind, solar) that have occurred since the Site C investment decision was made.

Kindest regards,

John Johnson  
Principal and Director  
Clean Balance Power Inc.