

**EVIDENCE OF THE CLEAN ENERGY ASSOCIATION OF B.C.**

**British Columbia Utilities Commission**

**British Columbia Hydro and Power Authority Waneta 2017 Transaction  
Application**

Project No. 1598933

March 12, 2018

## 1. Introduction

There have been some significant changes in the electricity industry that are not fully reflected in B.C. Hydro's ("BCH") calculation of the Long Run Marginal Cost ("LRMC") that is used in the business case for the proposed acquisition of the remaining two thirds interest in the Waneta Generating project ("Waneta Business Case"). As noted in BCH's evidence<sup>1</sup>:

"LRMC is a proxy for the avoided cost of purchasing new greenfield clean or renewable resources. The determination and usage of BC Hydro's LRMC is outlined in Chapter 3 of BC Hydro's Fiscal 2017 to Fiscal 2019 RRA."

In the British Columbia Utilities Commission's ("BCUC") Final Report to the Government of B.C. ("*Final Report*") regarding the Site C Inquiry, there is an extensive analysis of the evolving electricity industry and the impact this evolution has had, and is expected to have, on the cost of the alternatives to the Site C project. Illustrative Draft Alternative Portfolios ("*Alternative Portfolio*") were modeled and used as a comparator to this project. In addition to the industry changes, the Alternative Portfolio contained common financial assumptions for the Site C project and the Alternative Portfolio.

In his capacity as the Executive Director of the Clean Energy Association of B.C. ("CEABC") and on behalf of the CEABC, Mr. Jae Mather provides details of some of these common financial assumptions and unreflected industry changes, primarily as noted in the Site C Final Report, but also as updated by a recent competitive bidding process for renewable generation in Alberta. The use of these updated assumptions and changes in the Waneta Business Case would lead to a more balanced comparison with the renewable generating alternatives.

For reference Mr. Mather's resume is appended as Attachment 1.

## 2. Site C Determinations

In the Final Report there are a number of Determinations that if included in the Waneta Business Case would lead to a more balanced comparison with the renewable generating alternatives. It is recognized that some of the Determinations are evidence of trends rather than hard business case inputs. However, given the Waneta Business Case is for a 40 year term, trends are as important as hard inputs. The selection by BCH of the Waneta project as an investment opportunity will effectively be "*locking out*" other alternatives that are becoming superior on an exponential trend line.

**2.1 *"The Panel finds the capital and operating costs and capacity assumptions used for wind generation in the Illustrative Draft Alternative Portfolio to be reasonable. However, the Panel agrees with BC Hydro that it is appropriate to apply a cost adder to capital and operating costs to account for network upgrades<sup>2</sup>.***

*The Panel notes that BC Hydro believes the assumed unit energy cost figure for wind to be too low. However, it also considers that other submissions have highlighted further cost reductions that may be possible beyond the levelized costs assumed in the Illustrative Draft Alternative Portfolio (for example CanWEA, CEABC, McCullough). The Panel agrees with CanWEA and CEABC in finding that the NREL 2017*

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<sup>1</sup> Exhibit B-1, Appendix N, page 19 of 20.

<sup>2</sup> All references in this sub-section 2.1 can be found in Appendix A to the Final Report, page 32 of 79.

*Annual Technology Baseline represents an appropriate resource for estimating the levelized cost of wind, and believes that this estimate strikes an appropriate balance with regard to future cost forecasts.*

*BC Hydro submitted that a \$6/MWh network upgrade cost should be added to the cost of wind power. The Panel notes that the Cost of Incremental Firm Transmission (CIFT) is not included in BC Hydro's portfolio analysis, but rather BC Hydro models specific transmission upgrade requirements and their associated costs. The Panel therefore finds that it is appropriate to update the Illustrative Draft Alternative Portfolio so that capital costs and operating costs also account for transmission and road costs with values derived from the project specific cost estimates from BC Hydro's resource options spreadsheet. The Panel considers the network upgrades would have a lifetime of 50 years, therefore capital cost adders are not assumed to apply to the first tranche of refurbished wind generation.*

***Regarding the cost of wind integration, the Panel determines that the cost in the Illustrative Draft Alternative Portfolio should be reduced from \$2.50/MWh to \$1.0/MWh. The Panel also determines that Site C should receive a "wind integration credit" of \$1/MWh for each MWh of wind generation it is able to integrate."***

***2.2 "The Panel finds that utility scale solar projects have the potential to reduce the NPV of the illustrative Alternative Portfolio, and notes the "behind-the-meter" residential and commercial solar also have the potential place downward pressure on BC Hydro's load forecast over time<sup>3</sup>."***

***2.3 "Regarding the use of single cycle gas turbines, the Panel finds that they could be a cost effective source of new capacity, however they have a GHG impact if fueled by natural gas. The Panel notes, however, that the GHG impact could be small if they are only operated as peaking plants for a few hours each year, and BC Hydro could potentially offset any GHG emissions by reducing its operation of IG in order to support the Powerex trade exports<sup>4</sup>."***

***2.4 "The Panel finds that it is reasonable to exclude pumped storage from the Illustrative Alternative Portfolio. While pumped storage is a commercially feasible means of providing capacity, the Panel is concerned with the large size of the project (1,000 MW with a capital cost of \$1.32 billion), facility development time of around 8 to 10 years, and environmental considerations specific to pumped storage<sup>5</sup>."***

***2.5 "The Panel finds that the utility scale battery storage has reached the early stages of commercial feasibility. However, the Panel agrees with BC Hydro and submitters that the cost estimates for batteries included in the October 11 Illustrative Alternative Portfolio model were understated and batteries should therefore be screened out of the Alternative Portfolio as a means of meeting short term capacity gaps<sup>6</sup>."***

*However, over the longer term the Panel considers that batteries could become a cost competitive supply of capacity for BC Hydro as increased volumes drive down costs. For example, a report prepared for the US Department of Energy categorized 2015 as the start for a new period of utility scale battery deployment, with the 145 MW lithium ion projects coming online, more than the previous five years combined...*

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<sup>3</sup>Final Report, Appendix A, page 52 of 79.

<sup>4</sup>Final Report, Appendix A, page 60 of 79.

<sup>5</sup> Final Report, Appendix A, page 67 of 79

<sup>6</sup> All references in this sub-section 2.5 can be found in Appendix A to the Final Report, pages 69 to 70 of 79.

*Regarding vehicle-to-grid applications, the Panel considers that they are currently at an early stage of development with small-scale utility and micro-grid pilot projects underway to establish proof-of-concept. The Panel therefore finds that they should not be included in the Alternative Portfolio. However, the Panel considers the vehicle-to-grid innovations could become a low cost source of capacity over the long term as BC Hydro would not have to own its own batteries...”*

**2.6** *“The Panel has concluded the following with regard to assumptions for capacity focused DSM in the Illustrative Alternative Portfolio<sup>7</sup>:*

- ***The Panel finds the assumptions for capacity reductions from optional time-based rates to be reasonable;***
- ***The Panel has considered its appropriate to reduce the estimated capacity savings from Capacity DSM Programs and update the cost assumptions; and***
- ***The Panel finds that greater capacity savings can be achieved form Industrial Load Curtailment that assumed in the Illustrative Alternative Portfolio.”***

### **3. Other Assumptions**

In addition to the above determinations, certain other assumptions were expressed in the Alternative Portfolio that should be included in the Waneta Business Case.

**3.1 Financing costs** – *“The financing costs of the Alternative Portfolio are assumed to be the same as BC Hydro’s financing cost for Site C (100% debt financing at a cost 3.43%)...”<sup>8</sup>*

CEABC agreed that this uniform financing cost assumption removed some of the inherent bias against the Alternative Portfolio. However, it still does not account for the vastly higher risks associated with the much larger, more complex, and longer term projects like Site C and now the Waneta Business Case.

Although the Waneta project is much smaller in scale than Site C the underlying asset being purchased is, similar to Site C - a complex and longer term asset for which most of the benefits will not be realized for 20 to 30 years. It represents “locking in” to an old technology, during a period while the competing alternative technologies are improving exponentially.

It would therefore be more appropriate to have a higher financing cost assumption in the Waneta Business Case than for the competing alternatives.

**3.2 Wind refurbishment** – In the Alternative Portfolio it was assumed that: *“...Wind farms are assumed to be refurbished at the end of 25 years at a cost of 30% less than the cost of a new wind farm.”<sup>9</sup>*

The CEABC agrees that this is a reasonable assumption that may actually be higher depending on the circumstances of a particular project. It should be included in the Waneta Business Case.

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<sup>7</sup> Final Report, Appendix A, page 79 of 79.

<sup>8</sup> BCUC Inquiry Respecting Site C, Exhibit A-22, page 5 of 8.

<sup>9</sup> BCUC Inquiry Respecting Site C, Exhibit A-22, page 7 of 8.

#### 4. Comments on BCH's Response to BCUC Information Request ("IR") 2.80.1

The CEABC provides the below comments with respect to BCH's responses to BCUC IR 2.80.1<sup>10</sup>. The sub-headings are the same as those in the response to this IR.

**4.1 Location and terrain** – Using data for projects built in B.C. and Alberta in 2012 to conclude that the location and terrain in B.C. account for a 38% price differential is a sample set of n= 1 and thus not a terribly useful exercise. How Capital Power allocates costs as between its projects, particularly in the same year, is completely unknown.

**4.2 Wind service sector** – The four large wind projects in northeast B.C. have already resulted in the establishment of a wind service sector in this portion of B.C.

**4.3 Size of developer** – CEABC's members include some of the same large national or global developers that participated in the Alberta bidding process and/or were awarded contracts.

**4.4 Brownfield vs greenfield development** – There are large wind sites in B.C. that are considered to be brownfield sites. However, with advances in technology this does not necessarily mean the brownfield sites have a cost advantage.

**4.5 Financing assumptions** – Large national or global developers have already participated in the development of large wind projects in B.C. Their financial resources are not exclusive to Alberta.

**4.6 Terminal Value** – BCH's decision to not assign a terminal value of at least 30% at end of life is not realistic. The reality is that at the end of a 25 - year contract there is considerable terminal value in a large wind site including infrastructure, local relationships and knowledge of wind conditions.

**4.7 Bidding Strategy** – Developers are not in the business of developing projects to achieve sub-optimal returns. For example, there is no evidence that building one large wind project will necessarily result in the development of another immediately adjacent large project. It depends on the circumstances including technological advances.

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<sup>10</sup> Exhibit B-18.

**Attachment 1**

Resume of Jae Mather, CEnv.

# Jae Mather, CEnv.

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## **PROFILE**

Recognised as a leading figure in the renewable energy, low-carbon / cleantech, zero carbon construction, sustainability and Environmental Social Governance (ESG) sectors. Extensive technology & innovation commercialisation experience and an international contact base spanning industry, private equity, central & local government, government delivery agencies and academia. Expertise in facilitating organisational transformation. Previous directorships on the operational boards and on the main boards of private companies and associations.

Articulate, collaborative, commercial and credible, able to navigate a range of strategy, development and growth pressures to shape organisational priorities. Adept at forming alliance partnerships and managing multi-stakeholder engagements at the highest levels within industry, government and finance. Strong understanding and ability in risk analysis and mitigation.

Current, senior relationships within leading environmental industry associations in UK & Worldwide and public / private funders in Canada and the EU. Extensive social media base with over 6500 LinkedIn connections.

Noted during current role for creation of collaborative, cross-agency and cross-company partnerships between UK, EU and Canadian Government agencies (SDTC), Vancouver Economic Commission, British Consular General, UKTI (DTI), IEMA, GACSO, DECC) – to enable positive, measurable and highly visible industry sector outcomes.

## **VERTICAL SECTOR EXPERIENCE**

Zero Carbon Construction, CSR, reporting, Multi stakeholder project management, housing, government program leadership, environmental services, Low carbon technology, renewable energy, energy & carbon auditing, training, public speaking, CEO Cleantech Alliance (Vancouver), policy and strategy development; Government (Central, Local, Municipal, Government Delivery Agencies, charities and NGOs), technology due diligence and Corporate and SME Development.

## **CAREER SYNOPSIS**

**Executive Director**  
[www.cleanenergybc.org](http://www.cleanenergybc.org)

**Clean Energy British Columbia, Vancouver, Canada Oct 2017-present**  
**Professional Membership Association**

**Achievements:** Conceived, developed and launched the organization's Electrification Now campaign, white paper and global summit. Liaised with senior government ministers, officials and decision-makers about B.C. independent power producers accomplishments, capabilities and investment opportunities.

**Co-Founder, Co-Chair**  
[www.carbonfreegroup.com](http://www.carbonfreegroup.com)

**Carbon Free Group, Vancouver, Canada & Dover, UK Jun 2007-present**  
**Cleantech innovation Consortium**

**Achievements:** Conceived, developed and lead the organisation's overall business and fiscal strategy: to function as connections hub to bring together some of the best organisations within the Canada/UK/Global sustainability & "cleantech" sector and provide an engagement bridge between public & private sector investment and SME's, University R & D and knowledge transfer. Supported the commercialisation of innovative energy reduction and generation technologies into the build environment. Facilitated the design and construction of the first zero carbon commercial building in the UK (<http://pinescalyx.co.uk/>) and one of the first Passive House in the UK. Designing sustainability policy and strategy for local government and companies such as Finger Food Studios, Heitman, ARM, The Port of Ramsgate, University of Coventry, Fairtrade Foundation, Sound Channel's Obonjan Island (Croatia) and Footlocker.

Currently building 47 carbon positive (beyond zero carbon) houses in Corby, UK. Developing 2 low/zero carbon affordable housing projects on Bowen Island. Wrote the Sustainable Procurement strategy for the City of Mississauga. Improved energy efficiency and devised renewable energy generation opportunities in the built environment through delivering 100+ forensic energy and carbon audits for commercial, governmental and community clients. Recruited teams to provide strategic assurance support as the Principle Forensic Energy/Carbon/Environmental Auditor. Lead teams in auditing sites, collation of data, metric calculations, report writing and presentation. Reduced carbon emissions for largest local government authority in the EU, Birmingham City Council's 65K social houses through designing energy efficiency Victorian home renovation strategy. Designed, facilitated and chaired 100+ sector specific networking and training events through the "Sustainability Explored" event series, which have attracted 5,000+ commercial, governmental and NGO senior industry delegates in the UK designing, facilitating and delivering. Oversaw implementation of all marketing & communications, including sponsorship development and social media. Increased transparency and enabled financial decision making through initiating Sustainability Progress Audit Reports for 40+ clients including designing project plans, establishing life cycle analysis and reporting tools, writing policy and strategy, leading cross-functional teams, managing design and marketing, and contributing content.

# Jae Mather, CEnv.

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**Associate Partner**  
[www.greenbackers.co.uk](http://www.greenbackers.co.uk)

**Greenbackers Investment Capital, Glasgow, UK Oct 2016-Present**  
**Clean Technology Funding Brokers**

**Achievements:** We are specialists working exclusively in the low carbon, cleantech and climate change sector. GREENBACKERS™ Investment Capital has a deep understanding of what today's investors look for when qualifying funding opportunities. We pride ourselves in helping businesses - large or small - to unlock and access growth capital.

**North American Ambassador**  
[www.iema.net](http://www.iema.net)

**Institute of Environmental Management & Assessment (IEMA), Lincoln, UK**  
**Nov 2015-Present**  
**Environmental Professional Membership Organization**

**Achievements:** Enabling the world's largest environmental professional membership organization to strengthen its presence in North America and launch the Chartered Environmentalist (CEnv.) qualification. Facilitating the liaison between the institute and Universities and professional organizations already working in the space.

**Head of Sustainability**  
[www.apc-plc.co.uk](http://www.apc-plc.co.uk) & [www.minimisegroup.com](http://www.minimisegroup.com)

**Advanced Power Components (APC) & the Minimise Group, Rochester, UK Jan 2015**  
**Electronics Industry Supplier**

**Achievements:** Headed up APC and the Minimise Group of companies efforts in embedding sustainability in everything they do. Created a social, environmental, financial and reputational and sustainability model for the group. Acted as the catalyst of change in the pursuit of delivering a sustainable business. Facilitated business development across the group and introducing new products and solutions to the market place. Oversaw sales pipeline within Minimise Generation and delivered over £800k of revenue within 9 months.

**Guest Lecturer**  
[www.cisl.cam.ac.uk/](http://www.cisl.cam.ac.uk/)

**University of Cambridge, Cambridge, UK Apr 2013-Sept 2015**  
**Cambridge Institute of Sustainable Leadership**

**Achievements:** Enabling senior sustainability practitioners to new business models through challenging decision-making frameworks as guest lecturer on the University of Cambridge Institute for Sustainable Leadership (CISL) Masters and Executive Education programs. The mission is to empower individuals and organisations to take leadership to tackle critical global challenges. Some topics covered included: "Procurement as a lever for change" & "Performing for sustainability: Influencing employee behavior to achieve sustainability".

**Visiting Lecturer**  
[www.birmingham.ac.uk/](http://www.birmingham.ac.uk/)

**University of Birmingham, Birmingham, UK Jul 2009-Jul 2015**  
**Birmingham Business School**

**Achievements:** Lectured on macro trends in business, sustainable procurement and sustainable decision-making frameworks on the MBA, MSc and undergraduate Economics, Business and Accountancy programs.

**Director of Sustainability**  
[www.hwfisher.co.uk](http://www.hwfisher.co.uk)

**HW Fisher & Company, London, UK Apr 2011-Nov 2014**  
**Top 25 UK Accountancy Firm**

**Achievements:** Enabled 50 clients to identify sustainability opportunities through designing and leading HW Fisher's sustainability services department, developing strategies and policies, and influencing buy-in for new business models, and presenting to 22 Executive Boards including ARM & Compass Group. Spearheaded company-wide sustainability & energy efficiency strategy for \$30B global property management fund, Heitman, through producing policy assessment against best practice and influencing strategic decision making of global Board members on prioritising issues. Influenced and convinced 1500 leaders on how sustainability and global macro trends are affecting the accounting industry as key note speaker at the global Leading Edge Alliance largest international conference.

**Eco-Enterprise Manager**  
[https://en.wikipedia.org/wiki/Business\\_Link](https://en.wikipedia.org/wiki/Business_Link)

**Business Link Kent, East Malling, UK Sep 2006-Jun 2007**  
**Former UK/EU Business Support Agency**

**Achievements:** Lead the first EU-funded environmental technology (cleantech) support program in the UK. Supported 450+ businesses with business development, sales support, product development and introductions to clients. Coordinated a multitude of cross border strategic partnerships and lead cross border missions. Aligned 35 companies of builders, architects, and technology providers through establishing the UK's first Sustainable Construction Consortium.

# Jae Mather, CEnv.

Environmental Service Development Officer  
[www.maidstone.gov.uk](http://www.maidstone.gov.uk)

Maidstone Borough Council, Maidstone, UK Oct 2003-Sep 2006  
UK Local/Municipal Authority

**Achievements:** Informed EU policy development through designing and implementing a multi award winning sustainable cleaning policy for UK local authority, including testing solution, running procurement, overseeing 5-year contracts of £600K, and speaking at multiple UK & European conferences. Envisioned, secured resources for, recruited and lead a cross Council Geographic Information System (GIS) department that identified over £500K annual savings in waste collection, street cleaning and grounds maintenance costs; through efficiency improvements. Responsible for the Environmental Services departments annual 2.5% efficiency improvements.

## **CHAIRMANSHIPS, MEMBERSHIPS AND PROFESSIONAL QUALIFICATIONS**

### **Chairmanships**

- Co-Chair Carbon Free Group – (2017-Present)
- Chairman, Wye Community Farm ([www.wyecomunityfarm.org.uk/](http://www.wyecomunityfarm.org.uk/)) – (2011-2015)

### **Memberships**

- Board member of the Cove Bay, Bowen Island, Municipal water committee
- Spokesperson and Board Member of the Board of Change ([www.boardofchange.com](http://www.boardofchange.com))
- Strategic Advisory Council Member of the Global Association of Corporate Sustainability Officers (GACSO) ([www.gacso.org](http://www.gacso.org)) and the Institute of Environmental Management & Assessment (IEMA) ([www.iema.net](http://www.iema.net))
- Fellow Institute of Environmental Management & Assessment (FIEMA) ([www.iema.net](http://www.iema.net))
- Fellow Royal Society for the encouragement of Arts, Manufactures and Commerce (FRSA) ([www.thersa.org](http://www.thersa.org))
- All Party Parliamentary Panel on Climate Change Group (APPPCCG) (<http://www.policyconnect.org.uk/appccg/home>) – Former Member
- Finance Innovation Lab (<http://financeinnovationlab.org/>) – Former Member

### **Professional Qualifications**

- Post Graduate Diploma (PGradDip), Environmental Decision Making, Open University, UK (2005)
- Bachelor of Arts (BA), Geography, Simon Fraser University, Canada (1996)
- Global Reporting Initiative (GRI) G4 Accredited Practitioner (2014)
- Chartered Environmentalist (CEnv.) ([www.socenv.org.uk/cenv/#](http://www.socenv.org.uk/cenv/#)) (2013)
- Principle Environmental Auditor (PEA) ([www.iema.net/membership-environmental-auditor](http://www.iema.net/membership-environmental-auditor)) (2016)
- ISO 14001 EMS Implementation (IEMA) (2014)
- Private Pilots License (PPL) with Night and Mountain Endorsements (1987)
- Permaculture Design Certificate (PDC) ([www.permaculture.org.uk/](http://www.permaculture.org.uk/)) (2012)
- Sales Management, Measurement and CRM training: Salesforce.com (2015)
- MapInfo Professional GIS Level 1 and 2 (2003)

## **INTERESTS**

Sustainable food and community development, permaculture, hiking, travel, flying and RPG's.

References available on request.