

**Review of WREZ's analysis of renewable energy resources in British Columbia,
and the results shown on the Draft Preliminary Qualified Resource Areas Map**

We represent five environmental organizations in British Columbia (B.C.) monitoring the Western Renewable Energy Zone (WREZ) Initiative of the Western Governors' Association (WGA).

This submission provides our comments on the B.C. portion of the "Draft Preliminary QRA Map" (Draft QRA Map) issued by the WREZ Zone Identification and Technical Analysis (ZITA) Task Group and the methodology that went into creating the map.¹ We appreciate this opportunity to provide input into the WREZ process.

Support for the development of low-impact renewable energy

Climate change is rapidly eclipsing every other environmental issue and will result in major impacts on biodiversity, the economy and society. Humanity's efforts need to be focused both on reducing GHG emissions and readying the landscape for climate-induced adaptations.

Our organizations stress that increased energy conservation and efficiency are the lowest-impact and lowest-cost means of meeting increased energy demands, and must be our first priority.

However, we also recognize that for all of the large gains that can be achieved through the maximization of energy efficiency and conservation efforts, there will be a need for more clean/renewable energy generation. There is a need to replace existing fossil fuel electricity generation throughout the Western Interconnection as quickly as we can manage to sources that do not emit greenhouse gases if we are to avoid a truly dangerous level of climate change, and prevent catastrophic impacts on our environment, society and economy. We also foresee that a general shift away from conventional oil and gas coupled with more demand for electricity from ground and plug in hybrid vehicles will drive increased demand for renewable energy.

The need for effective resource planning in British Columbia:

We are very concerned about the manner in which the development of new renewable energy generation has been occurring in recent years within B.C.

Key among our concerns is that the development of new power generation in B.C. has proceeded in the absence of a strategic assessment where these new power generation facilities (e.g. run of river and/or small hydro plants built by independent power producers (IPPs) should, and should not, be located. This has led to concerns that:

- IPPs are being proposed for sites that are clearly not appropriate; and that

¹ While we do not discuss the need for a robust environmental lands screen in this submission, our coalition is also actively engaged with the B.C. representative of the WREZ Environment and Lands Task Group with regard to this part of the WREZ analysis.

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

- The cumulative environmental impact of multiple IPPs in a geographic area has not been sufficiently considered.

The development of new power generation in B.C. needs to be managed through a rigorous, science-based and publicly-transparent strategic assessment of where new power generation plants should - and should not - be located. The process should uphold the precautionary principle, involve all interested stakeholders, and respect aboriginal rights and title. Power developments must be in the interests of the people of B.C., and minimize public risk.

In sum, B.C. needs to maximize the potential of energy savings through efficiency and conservation, but we also need to ensure that there is an effective policy and regulatory framework in place that ensure renewable energy is developed in a way that avoids or minimizes impacts on biodiversity. We need to maximize renewable energy opportunities while protecting intact ecosystems and other important biodiversity values. A crucial prerequisite to conduct a strategic assessment of this nature is to conduct a broadly-scoped and unbiased assessment of the total potential of renewable energy resources within British Columbia – a transparent and credible process where stakeholders could have confidence in the results of the assessment process.

Support for the stated goals and methodology of the WREZ Initiative

We stress that the WREZ Initiative itself is not a sufficient substitute for a rigorous, comprehensive, transparent and strategic assessment of our energy resources within B.C. at regional and provincial scales. However, it is currently the only strategic management process relevant to the development of new power projects in B.C. that allows for any public input.

In light of the above, we are supportive of the stated goal of the WREZ Initiative to:

“generate reliable information for use by decision makers that supports the cost-effective and environmentally sensitive development of a specified amount of renewable energy in certain identified renewable energy zones as well as the conceptual transmission plans needed to deliver the renewable energy to load centers.”²

We believe that in conjunction with the section 5 Inquiry that the British Columbia Utilities Commission has been mandated to undertake in 2009, the outcomes of Phase 1 of the WREZ initiative has considerable potential to address B.C.’s existing gap in effective energy governance.

We are also strongly supportive of the mission and methodology set out in the *Western Renewable Energy Zones Committee Charter (WREZ Charter)* and the *WREZ Zone Identification and Technical Analysis Task Group Workplan (ZITA Workplan)*. We

² (2008) Western Governors’ Association. *Western Renewable Energy Zones Charter*. <http://www.westgov.org/wga/initiatives/wrez/wrez-charter.pdf>

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

believe that these documents, and others, set out a robust and effective framework to identify and assess potential low-impact renewable energy resource areas within B.C. and the other participating WREZ jurisdictions.

In particular, we note that:

- the Mission of the *WREZ Charter* states: “Included will be identification of developable resources that are not suited for aggregation into Renewable Energy Zones.”³
- The “Committee and Work Group Consensus and Collaboration Obligations” in the *WREZ Charter* state that:

“All Committees and Work Groups in the WREZ effort will be informed and guided by the Enlibra Principles adopted by the WGA, including the following:”

...

“4) Science For Facts, Process for Priorities - Separate Subjective Choices from Objective Data Gathering”; and

...

“7) Recognition of Benefits and Costs - Make Sure All Decisions Affecting Infrastructure, Development and Environment are Fully Informed.”⁴

- The *ZITA Workplan* states
 - “At every step, document the development of the criteria and assumptions. Make information available for public review and comment.”
 - “Develop an informational tool that can be enhanced and adjusted over time.”

Finally, it is our understanding that the preparation of the Draft QRA Map is to have been done in the manner set out in the *WREZ Workplan*, namely to:

“identify all commercial renewable resource potential [within each jurisdiction] in the Western Interconnection, and aggregate the best potential” into Qualified Resource areas”

We refer to the above statements collectively as the “WREZ Methodology”. We contrast this with the “WREZ Analysis” that was actually carried out, as evidenced by the B.C. portion of the Draft QRA Map, ZITA teleconference minutes, and information from B.C. representatives in the WREZ Initiative.

General assessment of the WREZ analysis as carried out to date, and the Draft QRA Map

³ Ibid.

⁴ Ibid.

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

Despite the strengths of the WREZ *Charter*, WREZ and ZITA work plans and analysis noted above, we were dismayed by the assessment of renewable energy resources within B.C. as depicted in the Draft QRA Map.

Upon investigation of the process used to generate these results, we believe that the WREZ Analysis of B.C.'s renewable energy resources was not performed in a manner compatible with the WREZ Methodology, that the results shown are not credible, and that the work done to date undermines the goals of the WREZ initiative as a result.

In particular, we suggest that within B.C.:

- a) *The sources of datasets on renewable energy resources potential have not been sufficiently transparent;*
- b) *The analysis of these datasets is not compatible with the stated WREZ Methodology, and differs from that used in other WREZ jurisdictions;*
- c) *The resulting renewable energy resources shown on the Draft QRA Map are underrepresented relative to other jurisdictions; and*
- d) *The renewable energy resources that are displayed are strongly biased towards already-proposed energy developments.*

We also call on WREZ to re-consider including biomass resources in B.C. as a sustainable energy resource capable of helping to define an REZ.

We will detail these concerns as they relate to the resources being assessed.

Concerns re: wind energy resources in B.C.

We believe that both the analysis of the wind energy resource in B.C. and its depiction on the *Draft QRA Map* are fundamentally flawed, and need to be redone. The WREZ Analysis actually performed is not compatible with the WREZ Methodology set out in the *WREZ Workplan*.

The analysis of B.C.'s wind energy resource was based solely on a 2008 B.C. Hydro study which involved intensive wind speed modeling of five discrete regions of the province covering approximately two-thirds of the total area of the province.⁵ We note that this study appears to have been made publicly available only as of Wednesday, February 24, 2009, hampering independent review of the WREZ Analysis and violating the spirit of the *ZITA Workplan's* commitment to transparency.

⁵ (2009) *Draft BC Hydro Wind Data Study*. Prepared for B.C. Hydro by DNV Global Energy Concepts Inc. http://www.bchydro.com/planning_regulatory/energy_technologies/wind_energy/wind_data_study.html

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

Exclusive reliance on the 2008 B.C. Hydro study means that there has been no assessment of the wind resource in one-third of B.C. – an area comparable in size to the entire state of Wyoming – despite the existence of several publicly-available wind energy modeling datasets covering the entire province.⁶

The reason given by the WREZ process for the exclusive use of the 2008 B.C. Hydro study data is that it provides a more accurate assessment of the wind resource within the area covered by the study than the province-wide data available through a BC Hydro wind modeling effort in 2000, or the wind modelling data presented in the Canadian Wind Energy Atlas of 2003.

We believe efforts should have been made to incorporate the existing, albeit lower-quality, data for the remaining areas of the province in order that a high level assessment of wind resources throughout the whole of B.C. could have been achieved. Failure to do so effectively writes off the wind energy potential for entire regions of the province, including areas like the Stikine which are expected to have enormous wind energy potential.

Beyond this, we are especially concerned by the manner in which the data generated by the 2008 B.C. Hydro study was used in the WREZ Analysis. Rather than using the wind data generated for the total area modelled, we are informed that the WREZ Analysis considered only data for the specific areas already under investigation for wind power development - a tiny fraction of the total area modelled. There are serious concerns with this approach:

- 1) Wind resource areas have not been identified by means of a uniform and unbiased assessment of the actual wind resource. Instead, wind resources have been defined on the basis of assessments by independent power producers (IPP) that they would be able to generate cost-competitive electricity at these locations given the existing configuration of the transmission grid. Use of this approach prevents the application of a standardized WREZ wind energy threshold to identify wind resources in B.C. in a manner comparable to US jurisdictions. We note that the WREZ process also recognizes the importance of prioritizing low-cost energy resources, but rightly does so at a later point in Phase 1 of the process. Cost-competitiveness should be evaluated only after all potential QRAs have been defined, not before the wind resources have even been identified.
- 2) By considering only those areas where investigative use permits have already been granted the 2008 B.C. Hydro study also looked at areas immediately adjacent to investigative permit areas, where the wind resource was thought to be adequate], the WREZ Analysis of the resources effectively writes off the wind energy potential for

⁶ These datasets are:

1) (2003) Natural Resources Canada, Canadian Wind Energy Atlas.

<http://www.windatlas.ca/en/index.php>

2) (2000) B.C. Hydro. British Columbia Predict3ed Wind Speed Map.

http://www.bchydro.com/planning_regulatory/energy_technologies/wind_energy/wind_mapping.html

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

all regions of the province not currently under active consideration by project developers. Because there is no mechanism to bring additional land areas into consideration at a later stage of the process, we believe the initial stage of the WREZ process must err on the side of inclusion (on the resource side), and err on the side of exclusion when excluding ecologically sensitive lands. This approach will capture the maximum number of resource possibilities while excluding the maximum number of areas with high ecological land values.

- 3) This shrunken and distorted picture of the wind energy resource in B.C. is also profoundly skewed by the location of the existing transmission grid, since most areas under consideration by IPPs are located in relatively close proximity to the current grid.
- 4) The presentation of the WREZ Analysis results on the QRA map also creates the impression that all viable wind energy areas in the province have already been identified – and been claimed by firms already active in the field. The effect is to create a false impression of a relatively scarce wind energy resource in B.C., one which can only be accessed by purchasing development rights from an existing IPP.⁷

In summary, a large proportion of the viable wind resource within B.C. was never considered for inclusion within QRAs (and thus displayed on the Draft QRA Map). As a result, the B.C. wind resources displayed on the Draft QRA Map greatly under-represent the amount and distribution of wind resources in BC relative to other jurisdictions. The B.C. wind energy resources that are displayed are strongly biased towards already-proposed energy developments. The WREZ Analysis actually done was therefore fundamentally different from, and incompatible with, the WREZ Methodology, and threatens to undermine the integrity of the overall WREZ Initiative.

We suggest a straight-forward set of actions to address the problems with the analysis and depiction of the wind resource within B.C.

- 1) Use the wind modeling data produced by the 2008 B.C. Hydro wind study, which covers 2/3 of the province covered by this exercise. Then use CanWEA or Canadian Wind Atlas data for the remaining portion of the province, as the best available information for this area.
- 2) Apply the same methodology as was used in the US states to analyze the B.C. wind resource. In doing so we fully expect that a large percentage of the high wind speed areas in B.C. would be removed from consideration because they are undevelopable mountaintops or wetlands. Many other areas would likely be too small or marginal to help define a QRA. Finally, we fully expect that many high quality wind resource

⁷ A particularly striking example of this is the single tidy rectangle of offshore wind potential shown on the Draft QRA map, which corresponds to the investigative permit area for the Nai Kun Project. In fact, all wind models agree that the entire offshore region stretching from the base of the Alaskan Panhandle to northern Vancouver Island is a nearly-uniform extremely high quality wind energy resource area. – A total area many hundreds of times larger than the Nai Kun lease.

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

areas would fall within land areas that need to be excluded from consideration because of their legally protected status and/or because of their ecological value.

However, even with these exclusions noted above, we are confident that the total amount of high-energy low-impact lands suitable for wind energy development identified by means of a process compliant with the WREZ Methodology will far exceed the amount shown on the current draft QRA map.

Concerns re: hydroelectric energy resources in B.C.

We believe that both the WREZ Analysis of the hydroelectric energy resource in B.C. and its depiction on the Draft QRA Map are fundamentally flawed, and need to be redone. The WREZ Analysis actually performed is not compatible with the methodology set out in the *WREZ Workplan*.

We agree with the B.C. representatives to the WREZ Initiative that hydro resources should be included within the WREZ Analysis for B.C., since the geography and climate of B.C. provides many potential locations for development, and of sufficient density and magnitude to potentially define, or substantially define, a REZ of 1500 MW or more of installed capacity. Indeed, because of the local environmental impacts that can result when hydro projects are poorly sited, we believe it is particularly important that new hydro development be contained within pre-determined REZs of demonstrated high energy potential and low environmental impact.

As with the wind energy analysis discussed above, we are dismayed by the extremely selective use of data when analyzing the potential for hydroelectric energy in B.C. We were led to understand that the WREZ Analysis of B.C.'s potential for small hydro was based on the findings of a 2007 Kerr Wood Leidal (KWL) study commissioned by the B.C. Transmission Corporation (BCTC). Although this report is not publicly available, we were provided with a printout of the KWL small hydro resources map by the B.C. representative to the ZITA committee. This map shows a huge number of potential small to medium-sized hydro sites throughout virtually all mountainous areas of the province.

However, the depiction of hydro resources on the Draft QRA Map is not consistent with the total small hydro resources identified by the 2007 KWL study. Instead, of a showing a large number of resources around the province, the Draft QRA Map shows only a very limited and highly-skewed selection of potential hydro sites.

The resources shown on the Draft QRA Map appear to consist of B.C. Hydro's proposed large hydro projects at Site C, along with projects to add additional turbines at the Mica Dam and the Revelstoke Dam, and a single, unidentified hydro project of unknown size in the Mt. Currie – Lillooet region. Most remarkably, however, there is a dense clustering of 40 or 50 potential hydro resources situated on the western side of the Coast Mountains, between Squamish and the headwaters of Knight Inlet. There appears to be a good correlation between this cluster and the particular hydro projects proposed by the Plutonic Power Corporation.

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

We believe the best explanation for the peculiar pattern of hydro resources in B.C. shown on the Draft QRA Map is found in the ZITA Task Group's minutes for the meeting held August 15, 2008 where "Canadian Exceptions" for were discussed. The minutes state that "B.C. is conducting a study under their transmission policy to identify clusters and zones for renewable energy, a process similar to WREZ," and that the "B.C. Transmission Corporation will provide their data on developing incremental resource areas to NREL."

We want to stress that the work done by BCTC under their Transmission Expansion Policy (TEP) in the summer of 2008 bears little resemblance to the WREZ Methodology. Under the 2008 TEP process, all IPPs in B.C. were invited to submit any projects they wished to have considered for inclusion in an energy "cluster" with a shared transmission line. This request garnered an uneven response from IPPs, and of the ten potential clusters originally identified, only two were selected by BCTC for further study. We assume that the cluster of hydro sites shown on the Draft QRA Map constitutes at least one of the clusters defined by BCTC.

In reviewing BCTC's own methodology for this transmission planning work, it is crucial to note that the renewable energy potential of B.C. was never assessed. Instead, as with the wind assessment methodology reviewed above, planning focused on existing IPP proposals, resulting a drastic understatement of the total renewable energy resource, and skewed the identification of resource areas. Even most of the potential hydro resources identified at the front end of the BCTC process have not been identified on the Draft QRA Map.

As with the wind resource assessment noted above, the WREZ Analysis of B.C.'s potential for small hydro has been flawed by the selective use of an already-restricted dataset, even though data covering the entire province is available. As a result a large proportion of the viable hydroelectric resource within B.C. does not appear to have ever been considered by the WREZ Analysis; nor is information on B.C.'s hydro resource displayed on the Draft QRA Map. The few B.C. hydro resources that are displayed are strongly biased towards already-proposed energy developments. As such, the WREZ Analysis actually done is different from and fundamentally incompatible with the WREZ Methodology and undermines the integrity of the overall exercise.

We suggest the following actions be taken:

- 1) Use the findings of the KWL study as the basis for identifying QRAs, in particular applying an analogous methodology to that used to determine the cost of linking numerous small-scale solar, geothermal and wind resources into a bulk transmission line.
- 2) In doing so we fully expect that a large number of the potential small hydro sites identified in the KWL study would be removed from consideration because of cost concerns. In addition, we would fully expect that many high quality hydro resource sites would fall within land areas that need to be excluded from

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

consideration because of their legally protected status and/or because of their ecological value, including their value as fisheries or riparian habitat.

- 3) Even with these exclusions, however, we are confident that the total amount of high-energy low-impact lands suitable for hydro energy development identified by means of this process will far exceed the amount shown on the current Draft QRA Map.

Concerns re: Geothermal Resources in B.C.:

We believe that the analysis of the geothermal energy resources in B.C. is not based on the best information available, and should be redone.

In general, what is striking on the Draft QRA Map is how much of the known hot geothermal resource in B.C. is not included, and how questionable some of the few points that do make it on the map are:

Our understanding is that the B.C. representatives of the WREZ Initiative submitted a digitized version of a geothermal resources map prepared in the early 2000s (based on information collected in the 1980s), which likely constitutes the best publicly available information on this resource. However, the resulting depiction of the B.C. geothermal resources bears little resemblance to the information sent. In several instances the few mapped geothermal resources shown fall outside of any known areas of geothermal potential.

The reason for this disconnect may be that the B.C. geothermal resource assessment has actually been based on the findings of the California Renewable Energy Transmission Initiative (RETI) process. According to the minutes of the ZITA meeting on August 1, 2008 “Canada and Northern Mexico are not considered high potential,” and “the group will use ... the CA RETI process as an example for the WREZ process in determine[sic] geothermal resource zones.”⁸

Based on our communications with the President of the Canadian Geothermal Energy Association (CanGEA), we understand that the RETI study presented an extremely low estimate of B.C.’s geothermal energy potential. Moreover, it is clear that CanGEA has not been contacted directly for their information on well-quantified conventional (i.e. non-EGS) geothermal resources, since they were only informed about the existence of WREZ during our conversation with them in late February, 2009.

Despite the limited amount of publicly assessable data on B.C. geothermal resources, CanGEA estimates B.C.’s total potential for geothermal energy at 3,000 to 6,000 MW. We also note that B.C. Hydro’s 2002 Green Energy study identified six specific conventional geothermal energy sites in B.C. with a total potential of 670 to 1070 MW.

⁸ 2008. WREZ Initiative. Zone Identification and Technical Analysis (ZITA) Working Group; August 1, 2008 Call Summary – Geothermal. <http://www.westgov.org/wga/initiatives/wrez/zita/calls/8-1-08sum.pdf>

We strongly recommend that the geothermal analysis for B.C. be redone on the basis of input from CanGEA, particularly since several of the resources mapped appear to be in error, and the total resource assessment has been called into question by Canadian experts on geothermal resources. We further suggest that the potential resources identified by CanGEA be assessed by the same resource screen methodology as was used to assess geothermal resources in the US states.

Concerns re: the inclusion of Biomass Resources in the WREZ methodology

We note that there is currently no information shown on the Draft QRA Map regarding biomass resources in B.C. However, we note the WREZ Initiative has permitted B.C. and Alberta to treat biomass as an energy resource capable of defining an REZ, and we understand that information about biomass resources in B.C. may yet be added to the analysis and may define REZs in B.C.

We are aware that the B.C. government views biomass as an important “renewable” energy resource for B.C., especially in the context of logging areas affected by the mountain pine beetle infestation. However, we strongly oppose the inclusion of biomass as an energy technology that can define, or help define, a REZ within B.C. on the grounds that biomass energy exploited on a sufficiently large scale to affect the definition of REZs cannot be “sustainable.”

We note that while there are forest companies throughout B.C. which burn mill residues to create electricity, they do not produce enough for in-house needs and they do not export electricity to the grid.

We also note, however, that the BC_CT QRA centered on Prince George roughly outlines the Omineca Beetle Action Coalition (OBAC) boundary. We are aware that new biomass proposals in this area are designed to use beetle-altered forests as their supply. These projects are based on a 20 year horizon of availability for beetle-killed wood with no viable options for long term fibre. Since these plans were made, the shelf life of beetle-killed trees has diminished rapidly, with current estimates of 12 to 15 years as the norm. Clearly, biomass electricity is not sustainable beyond the 15 year horizon unless chipping of whole green trees logs is initiated.

We believe the economics of biomass electricity may also be problematic, given that the high costs of transporting biomass to a dedicated energy facility would not be offset by the sale of relatively high-value products like dimensional timber.

It is highly unlikely that biomass electricity could provide more than a small percentage of the energy in a QRA. The estimates of wood available for biomass electricity in the QRA centered on Prince George⁹ show that even if all other problems could be

⁹ (2008) Omineca Beetle Action Coalition. Future Forest Products and Fibre Use Strategy.
<http://www.ominacacoalition.ca/Strategies/ForestAndFibre/StrategyDocs.html>

*Renewable energy resources in British Columbia and the
WREZ Draft Preliminary Qualified Resource Areas Map*

overcome, the available wood supply, if fully utilized, could only produce approximately 185 MW, less than 13 percent of the WREZ threshold.¹⁰

In sum, combined with CO2 emissions problems created by logging, we believe the option of large-scale biomass electricity is neither sustainable nor economically feasible. In our opinion, biomass technology cannot provide a significant amount of low-impact power to the provincial grid over the long term. We therefore call for biomass to be removed from consideration as an energy source that could define or help define a REZ in British Columbia.

Sincerely,

Nicholas Heap
Climate and Energy Policy Analyst
David Suzuki Foundation

Dave Neads
Director, Bioenergy Program
B.C. Spaces for Nature

Merran Smith
Director, Climate Program
ForestEthics

Greg Gowe
Staff Counsel
West Coast Environmental Law

Wendy L. Francis
Director of Conservation: Science and Action
Yellowstone to Yukon Conservation Initiative

¹⁰ The OBAC report estimates a biomass resource of 1,850,000 cubic metres per year. Assuming each MW installed capacity of biomass generation consumes an average of 10,000 cubic metres of wood per year, this is equivalent to an installed capacity of 185 MW.