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Scaling-up *Renewable Electricity* in BC: Tackling the Institutional and Political Challenges

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1. ISSUE

The rapid worldwide "scale-up" of electricity generation from renewable energy is critical for reducing greenhouse gas (GHG) emissions to avert major climate change. However, although renewables (hydro, wind, solar, biomass and geothermal) are sometimes referred to as "green" or "clean" energy sources, their development does cause environmental and social impacts. These impacts are often difficult to compare to those of climate change, and societal decision-making on renewable energy projects involves difficult trade-offs between the immediate and local environmental, social and economic impacts of a given project, and the uncertain local and global impacts from climate change if scaling-up of renewables does not occur. As an additional complexity, the development of renewable electricity generation has significant consequences for the planning and regulation of the electricity system, already a challenging responsibility in its own right, and exacerbated by the desirability of using electricity in industry, buildings and vehicles as part of a GHG reduction strategy. And finally, in British Columbia the rights of Aboriginal Peoples to land and water resources must also be considered.

To effectively address these multiple dimensions, the effort to develop renewable electricity must therefore integrate in a coherent decision-making framework the following three elements: (1) setting of GHG abatement targets and implementation of policies and actions to achieve them; (2) ongoing planning, development and operation of the electricity system; and (3) environmental assessment of individual renewable projects within the broader environmental management framework, including the need to consider the land and resource rights of Aboriginal Peoples.

In January 2007, BC made a policy decision to forego fossil fuel-based electricity generation (which followed a previously established moratorium on nuclear power), thus making the province a leading jurisdiction in the promotion of renewable electricity. Not surprisingly, this also means that BC is already experiencing conflicts over the development of renewable electricity projects, especially in response to the many recent proposals by independent power producers (IPPs) to develop run-of-river (RoR) hydropower and the ongoing efforts of BC Hydro to build a large hydropower facility at Site C on the Peace River.

The challenges BC currently faces with scaling-up renewables are common to virtually all developed countries, and are also emerging in developing countries. Although the dominant form of renewable energy differs among jurisdictions, similar types of conflicts are commonplace. Undoubtedly, there are lessons BC might learn from other jurisdictions while, at the same time, BC may show leadership in innovating institutional arrangements and decision-making processes that could become models for other jurisdictions.

In this policy briefing, we assume that substantial renewable electricity will be required to mitigate climate change, and that, as a wealthy industrialized jurisdiction, BC has a responsibility to take steps that if adopted around the world would significantly reduce the risks of serious disruption to the climate. In this context, we probe this major challenge for environment-energy sustainability. Specifically, we ask how BC could rapidly scale-up renewable electricity generation while ensuring that this development occurs without unacceptable impacts to the province's environment and society. We begin by describing the current approach to renewable electricity planning, development and regulation in BC. We then describe and assess the merits of changes to this approach. We conclude with a set of recommendations for the province, including amendments to the Clean Energy Act, which was initially adopted in 2010. This policy brief is based on a larger, detailed research paper, recently published in the journal *Energy Policy* (Jaccard et al., 2011).

2. RENEWABLE ELECTRICITY AND HYDROPOWER IN BC

The BC government established a number of energy goals for the province in its 2010 Clean Energy Act. One of these goals was a requirement that at least 93% of electricity be generated from clean or renewable resources, ensuring that virtually all future power projects will be zero-emission.[1] The act sustains the policy, originally adopted in 2003, that allocates to IPPs exclusive rights to develop new electricity supply, with the exception of major hydropower projects that remain the exclusive domain of BC Hydro. When this policy is combined with the province's climate policies, which promote increased electricity consumption in industry, buildings and transportation, there is a clear sense of urgency to the development of renewable electricity in BC.[2]

Presently, large-scale hydropower provides just over 90% of BC's electricity (Statistics Canada, 2010). Among possible future energy sources that will be required to meet demand while replacing some portion of aging heritage assets in BC, run-of-river (RoR) hydropower is a leading contender. This type of hydropower typically diverts some of a river's flow through a pipe or tunnel leading to electricity generating turbines and subsequently returns the water downstream. Unlike hydropower megaprojects, RoR does not require large dams or reservoirs and hence is generally assumed to be less environmentally intrusive.

Current IPP initiatives are especially concentrated on RoR because these are most competitive with BC's other forms of renewable generation. In its 2008 bidding process, RoR accounted for over two-thirds of projects that were issued contracts (BC Hydro, 2010b). At present, 38 RoR facilities are operating in BC with a total installed capacity of 779 MW, which in 2010 supplied 8,893 GWh of electricity to BC Hydro (BC Hydro, 2010a). BC Hydro has also awarded 35 new contracts for RoR projects, with a combined capacity of 1,004 MW, which are expected to be in service by 2016.

RoR in BC has a great potential. As part of its 2011 Integrated Resource Plan, BC Hydro (2010a) commissioned a study examining potential electricity resources in the province. It identified 2,119 potential RoR projects with a total installed capacity of 12,330 MW (Figure 1). According to BC Hydro, this capacity would be capable of producing around 36,802 GWh/yr of firm energy, equivalent to approximately 60% of all current electricity generation in the province.[3]

2.1 Impacts of RoR

Even if only a fraction of this capacity were developed, the implications for BC's land and water resources would be substantial. RoR impacts aquatic and terrestrial ecosystems, as well as recreational and aesthetic values. Moreover, where numerous projects are developed in a given area, the effects of each project may interact with those of other projects to cause more significant cumulative effects. For example, successive modifications to stream flows within a watershed may negatively impact fish productivity. Alternatively, landscape fragmentation associated with the access roads and power lines required to connect numerous power stations might adversely affect large mammal habitats and migration patterns.

[1] The remaining 7% allows for some cogeneration retrofits using natural gas and new off-grid fossil fuel-fired generation.

[2] See BC (2008) and Clean Energy Act S.B.C. 2010, c.22, s.2.

[3] Total electricity generation in BC is around 60,000 GWh/yr (Statistics Canada, 2008).

Competing demands and values placed on watersheds in BC – including water use, recreation, biodiversity protection, nature conservation, fish protection and land use claims by Aboriginal Peoples – all create challenges for energy and land use planning. This has led various organizations in BC to raise concerns about the scale of potential RoR development in the province and its effects on the natural environment (for example, see Douglas, 2007; DSF et al, 2009).

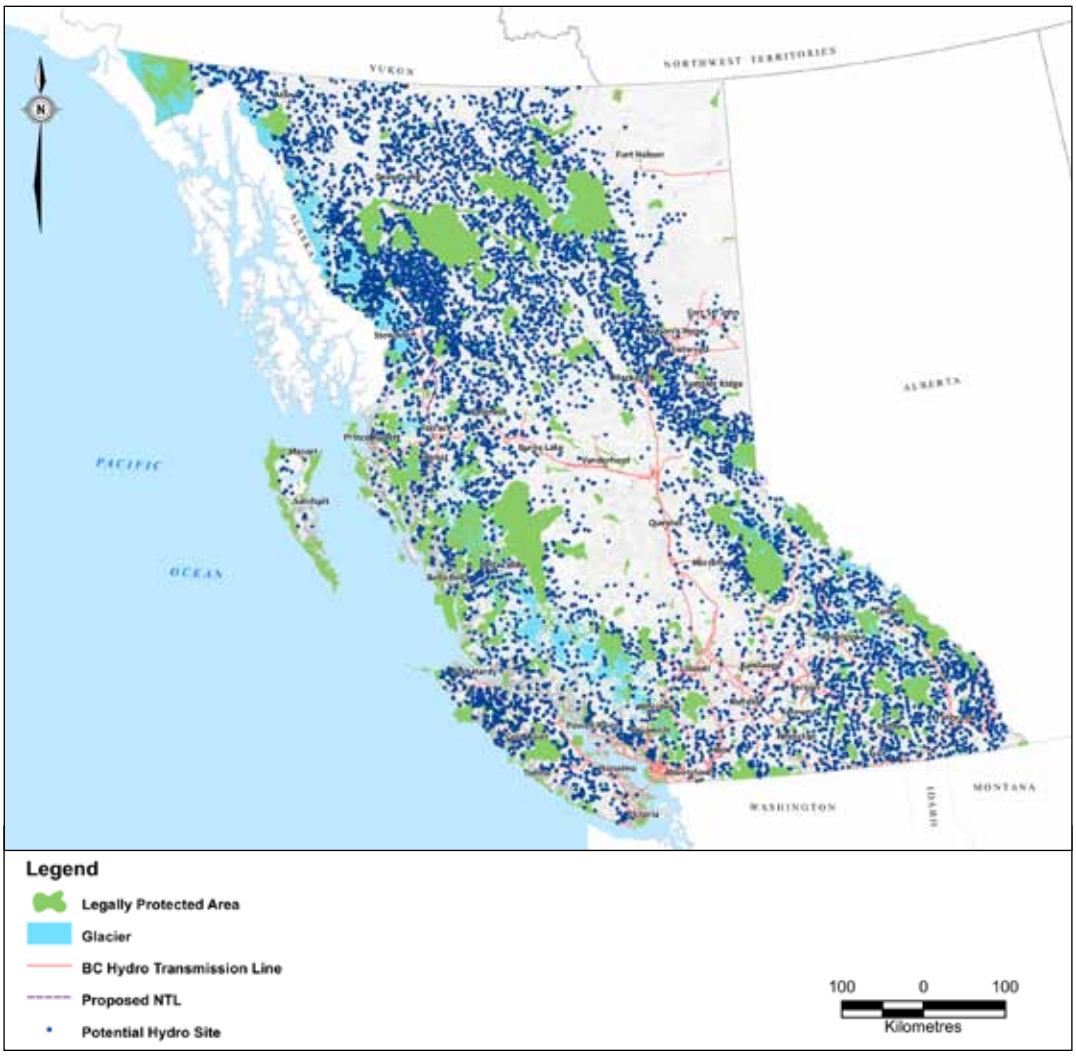

Figure 1: Potential run-of-river hydro sites in British Columbia
Source: BC Hydro (2010a, DRAFT Appendix 2.j - Run-of-River)

2.2 Site C Dam Project

Concurrent with its policy encouraging IPP development of renewables, the BC government is also directing BC Hydro to continue its planning and assessment of the Site C dam project on the Peace River, a conventional hydropower megaproject of about 1,000 MW. The Clean Energy Act exempts BC Hydro from regulation by the BC Utilities Commission, although the project is subject to the province's environmental assessment process. The Clean Energy Act states that this project would be the last hydropower megaproject in BC, justified in this unique case by the fact that it exploits a river system already affected by hydropower megaprojects, especially the W.A.C. Bennett dam, which is upstream.

Like other jurisdictions in developed countries, BC long ago created institutions and processes for assessing electricity megaprojects. Indeed, 30 years ago the Site C dam project underwent a major hearing to assess its need, design, economic benefits, and environmental and social impacts, with the BC Utilities Commission (1983) ultimately submitting recommendations to the provincial government. Certain jurisdictions have also grappled with the challenges of developing many small-scale renewables projects, an example being the Northwest Power Planning Council in the US northwest, which created processes for assessing multiple renewables projects in the 1980s, including RoR hydropower (Eckberg, 1986; NPCC, 2000). However, few jurisdictions have experience with the simultaneous consideration of a multitude of small-scale renewables projects alongside one or more renewable megaprojects, all within the ambit of electricity system regulation, aggressive climate policy, and competing land-use claims from Aboriginal Peoples.

3. INSTITUTIONS AND PROCESSES FOR RENEWABLE ELECTRICITY DEVELOPMENT

A variety of processes and institutions, as described in Table 1, determine where and how electricity projects are developed in BC. As noted, provincial climate policy requires that virtually all future generation be zero emission, and the Clean Energy Act requires BC Hydro to develop an Integrated Resource Plan describing how it will meet this requirement. Electricity project proponents, including BC Hydro for its Site C project, must obtain a range of agency approvals, such as a water license and, depending on project size and impact, possibly complete a full environmental assessment. In addition, all new power projects must align with existing land use plans that prohibit energy development in protected areas.

Table 1: Processes and institutions related to renewable electricity development in BC

Process	Institution	Description
Climate policy	Provincial government	The Clean Energy Act sets several greenhouse gas goals for the province, including that 93% of electricity be generated from clean or renewable sources
Integrated resource planning	BC Hydro & BC Utilities Commission	BC Hydro develops a plan for how it is to meet anticipated demand
Land use planning	Integrated Land Management Bureau	Prohibits energy development in protected areas
Agency approvals	numerous	Various approvals and permits are required for power projects, including a water license and land tenure (for projects on Crown land)
Environmental assessment	Ministry of Environment (provincial); Environment Canada (federal)	Formal process for mitigating effects of projects 50MW or larger (and various criteria for the federal process)

3.1 Existing Deficiencies

The effectiveness of these institutions and processes at minimizing the local environmental effects of specific projects is, however, limited by a number of factors. First, existing land use planning and regulations are not particularly helpful for guiding development, given that low density renewable generation may impact a substantial portion of the land base outside of protected areas and planning authorities. Second, although the assessment of cumulative effects, of particular concern when dealing with a large number of projects, is purported to be a factor considered in the environmental assessment process, project-level assessments are inherently limited for dealing with such effects (Noble, 2005). Lastly, a majority of RoR projects do not require a formal environmental assessment in any case, because they do not trigger a federal environmental assessment and fall under the provincial assessment threshold of 50MW.

Thus, a key deficiency of renewable electricity planning and development in BC is that no broad mechanism exists for identifying in advance the relative vulnerability of individual locations, watersheds or regions to the harm or disruption caused by particular types of development in terms of their type and intensity. This is somewhat troubling when one recognizes that the US Pacific northwest developed and applied processes to address this deficiency over a decade ago with the creation of comprehensive mapping overlay techniques to identify areas that are most vulnerable to harm from a particular type of development and areas where competing values from other non-energy uses are especially high, such as sacred or valued aboriginal land, high value recreational uses, or important wildlife habitat (NPPC, 2000).

3.2 The Strategic Assessment Approach

We believe that the continued development of renewables, especially RoR, can minimize contentious conflicts if BC adopts a similar process for ranking regions or watersheds in the province in terms of their acceptability for RoR development. Such ranking would help guide the development efforts of IPPs, and could also be designed to ensure that Aboriginal Peoples have an opportunity to identify areas where development is unwelcome – while also participating in the development of RoR where they see it as providing them with net benefits, whether via equity participation or simply employment, training and local investment.

This form of environmental planning and assessment is sometimes referred to as "strategic assessment," in that its focus is at the broader, strategic level rather than at the level of individual projects (Noble, 2005). Strategic assessment can be an effective tool for mitigating or preventing the cumulative effects; by implementing an overall plan to guide RoR development, a strategic assessment could explicitly identify in advance areas where RoR development should be more strictly controlled and perhaps prohibited, beyond existing protected areas, and areas where development would be encouraged. The assessment could also tackle questions such as whether to concentrate development in certain locations or whether to spread development out more broadly, a level of analysis that is not possible using a more ad hoc and project-specific approach to development. Various stakeholders, such as DSF et al. (2009) have expressed their interest in the adoption of this type of approach in BC.

3.3 Moving toward Institutional Coordination

It is a mistake, however, to assume that the use of strategic environmental assessment would eliminate controversy surrounding the rapid scale-up of renewables in BC. Quite simply, such a disparity exists in the distribution of costs and benefits related to renewable electricity projects, large and small, that some individuals and interest groups will remain unconvinced that a given project or series of projects are socially desirable. BC and other jurisdictions must therefore be capable of approving some projects that are nonetheless subject to vociferous opposition from those facing direct costs for which they feel have not been adequately compensated and from those who simply do not believe that the correct decision has been taken. While responsibility for such decisions must ultimately reside with elected officials, there may be merit in the delegation of some decision-making to publicly-owned corporations like BC Hydro, publicly-appointed regulatory boards like the BC Utilities Commission and perhaps some form of new energy planning and decision-making entity – potentially modeled on the US Northwest Power Planning Council but with more regulatory authority, like the California Air Resources Board.[4]

It may not be necessary that BC create a new institution along these lines immediately; at first, it could explore other options, the most pressing being to ask the BC Environmental Assessment Office and the BC Utilities Commission to be more explicit and transparent in meshing the environmental assessment functions of the former with the electricity system planning (including transmission planning) and regulation functions of the latter. This may include a more pro-active approach that generates joint review processes by the two organizations to conduct strategic assessments of regions that are already facing intensive and apparently contentious development pressures from IPPs.

This model of close institutional coordination should also be pursued for the evaluation of the BC Hydro Site C project. While the environmental assessment of Site C will be valuable for reducing uncertainty about the project's impacts and identifying opportunities to mitigate some of these, it is nonetheless inevitable that as a hydropower megaproject, Site C will have significant environmental effects. For effective trade-off decision-making, however, the provincial cabinet needs to hear from impartial experts in environmental assessment and electricity system planning on the implications of not developing Site C. In other words, how much more quickly and with how much more environmental, social and economic impacts, would BC have to scale-up other renewables (including RoR) were Site C to be postponed or cancelled? And how do these projects and their cumulative impacts compare to Site C and its impacts? Only through the integration of electricity system planning and broad-based strategic environmental assessment can British Columbians and their elected officials be adequately informed of the trade-offs inherent in one development path versus the other. At this time, it appears that BC needs at least greater integration of these two institutions and their functions related to planning and approval of electricity generation projects of all sizes.

[4] The California Air Resources Board is a creation of by the California legislature, but it has been delegated substantial regulatory authority with respect to the control of air emissions, including GHGs.

The good news is that both the BC Environmental Assessment Office and the BC Utilities Commission have experience in involving stakeholders in their assessment processes, including negotiated settlement processes in the case of the utilities commission. If the parameters are clear, opportunities may exist for successful negotiations in establishing areas where RoR and other renewables developments are more welcome and areas where they are less welcome. Certainly, merit exists in trying to achieve this outcome, provided all participants understand that if negotiations fail, the final decision will be made, as in the past, by provincial elected officials.

In the case of Site C, a negotiated settlement is unlikely. Therefore, a political decision must be made and there will be opposition regardless of the outcome. Nevertheless, it is important that the Site C decision be informed by a clear understanding of the implications of its abandonment in terms of additional development of small-scale renewables of various types – which of course necessitates a closer integration of the environmental assessment office and the utilities commission in terms of institutional function and evaluative processes.

4. SUMMARY AND RECOMMENDATIONS

A rapid scale-up of renewable energy is a prerequisite for substantive climate change mitigation. Such a scale-up, including that of RoR power in BC, will be associated with a range of local and broader-based cumulative effects due to the low energy density of renewable energy resources. Trade-off analysis in determining BC's direction and rate of scale-up will be difficult, and decisions controversial. Fortunately, the government has taken some helpful measures, especially in terms of its clear direction to the electricity sector regarding climate policy. Because the government requires that the electricity sector only develop zero-emission projects, difficult trade-offs between emitting and non-emitting projects need not be considered. This limits the energy planning system decision to (1) the type of small-scale renewables and where they will be concentrated; and (2) whether Site C will also be developed or whether it will be abandoned, the latter of which would then require an even faster scale-up of renewables.

In order to make planning decisions that minimize harm to the environment and ensure continued support for climate change mitigation through renewable development, policy makers in BC need to give appropriate consideration to both global and local environmental concerns.

We present several recommendations for how BC should address the interrelated challenges of climate change mitigation and least-impact renewable electricity development:

1. **Conduct a strategic assessment of the cumulative effects of run-of-river electricity generation in BC and perhaps other renewables.** The government should amend the Clean Energy Act to include explicit provisions that direct the Environmental Assessment Office to work with other key ministries to conduct a strategic assessment for the purposes of identifying areas where RoR development will be more strictly controlled and areas where it will be encouraged. This assessment would attempt to balance provincial objectives for zero-emission electricity capacity with the need to minimize the environmental impacts of new generation. In drafting the amendments, the government should carefully consider the following points to ensure that zero emission electricity development in the province is not excessively delayed:

a. The assessment process should be limited in both mandate and time in order to reduce the risk that it be delayed by unproductive debate.

b. The assessment should not impact projects currently under development or those that will be considered for development prior to any final policy decision by government arising from the assessment's recommendations.

c. The assessment could be funded by an additional charge levied through the water license fee structure.

2. **Establish a formal or informal mechanism to coordinate institutions and processes in the province for environmental assessment and electricity system planning and regulation.** Project approval decisions made by the environmental assessment office must be informed by an understanding of the implications for alternative electricity supply options in BC. Since current policy bans nuclear power and fossil fuel combustion, the key decision facing the province is between a rapid scale-up of small-scale renewables with concurrent development of the Site C megaproject, or an even more rapid scale-up of small-scale renewables – the latter of which likely resulting in more significant cumulative effects, even with the application of a strategic environmental assessment process. The integration and coordination of environmental assessment with electricity planning and regulation processes will help reveal the true trade-offs facing the province as the provincial cabinet prepares to make a final decision on the Site C dam.

3. **Communicate the dual challenges of mitigating climate change and the effects of renewable electricity development to the public.** The trade-offs between mitigating climate change and minimizing the cumulative effects of renewable electricity are complex and likely poorly understood among the general public. The government should articulate this policy challenge with the goals of (1) increasing understanding; and (2) reducing public opposition to both individual electricity projects and any constraints placed on electricity development in the province.

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