Institutions and processes for scaling up renewables: Run-of-river hydropower in British Columbia

Mark Jaccard, Noel Melton*, John Nyboer

School of Resource and Environmental Management, Simon Fraser University, Vancouver BC, Canada, V5A 1S6

Abstract

The dramatic scale-up of renewable energy over the coming decades is likely to pose significant challenges for coordinating land use allocation, environmental assessment, energy system planning and the design of greenhouse gas abatement policy. Of particular concern is the establishment of institutions and processes that enable consideration of multiple objectives and attributes, with adequate representation of affected interests, and without resulting in excessive delays in the development of renewable energy as part of a greenhouse gas abatement strategy. This paper uses the Canadian province of British Columbia as a case study for describing these challenges and the responses of policy makers seeking to rapidly scale-up renewables. Using evaluative criteria to assess this experience, we identify lessons that may be applicable to other jurisdictions seeking to quickly expand the production of renewable energy. These lessons include the design of institutions and processes that would likely be required in almost any jurisdiction with similar aims.

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1. Introduction

For decades, most environmentalists and the advocates of renewable energy have argued that these sources of energy are benign in comparison to fossil fuels and that humanity should rapidly shift toward them in order to reduce local environmental impacts and, more recently, greenhouse gas (GHG) emissions. At a global level, the advantages of renewable energy are largely undisputed—renewable sources of energy emit little or no GHG emissions and thus represent a key mitigation action for combating climate change. However, at a local level, the environmental attractions of renewable energy are less clear due to a range of impacts including visual intrusion, noise, land and water alienation, ecosystem disturbance and in some cases local pollution of air, water and land (Walker, 1995).

Given that all energy options have impacts and risks associated with them (Jaccard, 2005), it is not surprising that renewable energy deployment has found more resistance in many jurisdictions than advocates had originally anticipated. One lesson from these recent experiences is that policy makers and regulators need to be more effective at balancing the range of goals and interests, from global to local, associated with renewable energy and its impacts. This task is particularly important because the demand for renewable energy is likely to accelerate dramatically even if substantial deployment of nuclear power, the capture and storage of carbon from fossil fuel conversion, and great gains in energy efficiency are all achieved (IPCC (Intergovernmental Panel on Climate Change), 2011, projected).

In this paper, we explore institution and process designs amenable to the rapid expansion of renewable energy production. Our specific objectives are to (1) develop criteria that should be considered when designing institutional arrangements and planning processes that affect energy–environment issues related to renewable energy expansion; and (2) use the Canadian province of British Columbia (BC) as a case study to illustrate the implications of applying these criteria for the design of institutions and processes in a specific jurisdiction with its own unique renewable resource potential, interest groups and social values.

The paper is structured as follows. First, we describe some of the key institutional challenges for jurisdictions trying to expand renewable energy capacity. Second, we develop a set of evaluative criteria with which to assess the institutions and processes related to renewable energy deployment. Third, we conduct a case study of BC by assessing existing policies and options for policy reform in that province. We conclude with some suggestions that we feel are applicable to most jurisdictions looking to rapidly increase renewable energy capacity.

2. Challenges for renewable energy expansion

Although the earth’s renewable energy resources far exceed current or future anticipated human demand for primary energy,
these resources are often intermittent, of relatively low energy density and inconveniently located. In order to overcome these challenges on any substantial scale, land use conflicts, environmental impacts, high costs and technological development will need to be addressed (Jaccard, 2005; Walker, 1995). Indeed, a range of land use conflicts has arisen across many jurisdictions where governments have pushed for renewable energy development. Examining these experiences leads to several general observations.

First, land use planning and related processes have played a role in determining the success of drives for renewable energy deployment around the world. In particular, different institutional arrangements among jurisdictions (and in the same jurisdiction over time) have played important causal roles in generating local public acceptance, with impacts for the amount of generation capacity achieved. For example, substantial local government discretion coupled with a lack of participative approaches to land use planning appears to have hampered renewable development in the United Kingdom (Breukers and Wolsink, 2007; Cowell, 2010; Hedger, 1995). Meanwhile, renewable energy capacity has been expanded significantly in other countries, such as Denmark, Sweden and Germany, with much less public opposition (Keenleyside et al., 2009). Institutional factors that have helped spur this development include community ownership in Denmark, a more consensual political and institutional environment coupled with longer term land use planning in Sweden, and legally binding local plans supported by a hierarchy of regional and national guidance and legislation in Germany (Keenleyside et al., 2009; Mendonça et al., 2009; Walker, 1995).

Second, it follows that in order to maximize the success of efforts to build renewable capacity, national or regional energy policies need to be closely aligned with local land use planning processes and institutions (Cowell, 2010; Walker, 1995). Hedger (1995) argues that the controversy surrounding wind farms in the United Kingdom resulted from the inadequate integration of energy and land use planning, reflecting over-rapid development in the absence of a strategic framework integrating national energy policy with planning processes. And in BC, the focus of our case study, some interest groups make a similar case by claiming that a disconnection exists between provincial energy/ climate policy and land use planning (DSF (David Suzuki Foundation) et al., 2009).

Given the goal of reducing GHG emissions and the ambitious targets for renewable energy capacity in many countries, land use conflicts related to renewable energy seem likely to intensify in the future. Consideration of multiple goals and interests—always a challenge for energy planning and policy—may therefore be especially critical for enabling the expansion of renewable energy.

These goals and interests can be categorized according to scale, ranging from a global level to more local contexts (see Fig. 1). It is this wide range of competing goals and interests that often causes conflict within the process of land use planning approval (Walker, 1995). At the global end of the spectrum, concerns include climate change mitigation, cost of energy supply, energy security, economic growth and technological development. Meanwhile, concerns of a more local nature include environmental impacts to land, air and water, land conservation for purposes such as preservation and recreation, economic benefits arising from project development and power generation, and social impacts such as the accrual of local benefits or costs to aboriginal people.

Of course, the global/local division is somewhat arbitrary in that some issues may be of concern to a range of scales. For example, energy supply and security of supply may be equally important as concerns to local communities, especially those that are more isolated. Nevertheless, this division illustrates the diversity of interests related to renewable energy expansion as well as the possible tensions among them, the most relevant for this study being the tension between mitigating climate change through substantial renewable energy deployment and the local environmental impacts associated with this deployment.

Integrating and balancing these competing interests are institutions and processes related to energy and climate policy (typically involving central and regional governments), energy system planning (government agencies and public and/or private utilities), land use planning (local and regional governments) and environmental/strategic assessment processes (central and regional governments).

Challenges for these institutions and processes in balancing global and local interests is likely to lead to either renewable generation goals not being achieved (with implications for GHG abatement) or to excessively negative local impacts and the potential loss of public support for government renewable policy. It is this concern which is the focus of our analysis: what institutions and processes associated with renewable energy expansion are best able to integrate and consider trade-offs related to goals and interests at different scales of decision making?

3. Criteria for evaluating institutions required for renewable energy expansion

Energy policy has been typically evaluated in terms of effectiveness (reliability, security), economic efficiency, environmental impacts and political feasibility. While such criteria are important, they fail to account for the range of competing goals and interests which are relevant to renewable generation. Following a review of energy policy in the United States and Denmark, Mendonça et al. (2009) propose a number of criteria for analyzing renewable energy planning including local acceptance and participation, and the degree to which investment is open to all sources. Non-energy-specific literature also provides ideas for generic criteria, including disciplines related to planning (e.g., Bregha et al., 2004) and sustainable development best practices (e.g., Brinda et al., 2004; OECD (Organization for Economic Cooperation and Development), 2006).

Based on conventional policy evaluation criteria and consideration of the variety of interests associated with renewable energy, we establish a set of criteria with which to evaluate the institutions required for renewable energy expansion. These criteria are described in Table 1 and include policy integration, leadership, economic efficiency and stakeholder participation. Some of the criteria are more commonly used in policy evaluation analysis than others (e.g., economic efficiency) although in each case we provide our own unique definition. While we do not quantitatively weight the criteria, they are not necessarily of equal importance.

Policy integration refers to the ability of institutions to effectively consider and trade-off multiple local and global factors without becoming administratively overburdened and thus ineffective. This criterion includes elements of environmental effectiveness (achieving local and global environmental goals), administrative efficiency (avoiding policy paralysis due to political stalemates

2 For example, the European Union has set a target of meeting 20% of its energy requirements from renewable sources by 2020 (CEC, 2007). In BC, the government is requiring that 93% of electricity be produced from clean or renewable sources (Clean Energy Act, 2010).

3 Strategic assessment goes above the project-level of environmental assessment to that of policies, plans and programs (Noble, 2005).
among competing interests) and political feasibility (the extent to which government finds a strategy that enables it to avoid excessively negative public reactions while evaluating the trade-offs between achieving its GHG mitigation goals and addressing local concerns about renewable energy projects). The remaining criteria of leadership, economic efficiency and stakeholder participation follow more traditional themes from the policy evaluation field. Leadership describes the clarity and comprehensiveness of the government's strategy; economic efficiency, the financial investment in generation capacity and its cost; stakeholder participation, the ability of the decision-making process to consider the views of a variety of interests.

Most of the criteria are process-based, which is inevitable given that almost all jurisdictions, including BC, are still at an early stage of renewable development. Outcomes of policy efforts provide, thus far, only a preliminary sense of the likely relative performance of different institutional and process policies. In the following section, we turn to BC, the focus of our case study.

4. Case study background: energy and land use planning institutions in BC

BC is Canada's western-most province, covering approximately 945 thousand square kilometers (roughly the size of France and Germany combined) with a population of just over 4.5 million. Despite comprising diverse topological and climatic zones, much of the province is mountainous and conducive to hydropower, such that large-scale hydropower provided nearly 90% of its electricity in 2008 (Statistics Canada, 2010). We begin our case study by providing an overview of the energy and land use planning institutions which are shaping renewable energy in BC, and subsequently propose and evaluate options for policy reform in the province.

4.1. Energy planning

In the 1990s, the BC government launched two major initiatives related to energy–environment planning and assessment. The BC Utilities Commission, which regulates BC Hydro, the dominant and state-owned electric utility in the province, mandated integrated resource planning (IRP) that required utilities to engage consumer groups, independent power producers (IPPs) and environmentalists in open, trade-off decision making processes for setting long-term acquisition of conservation and supply options. The Ministry of Environment also established environmental assessment requirements for all projects, with the intensity of scrutiny, within government and through public processes such as hearings, depending on the size and potential impacts of a given project.

At the time, concern existed that the differing objectives of the energy–environment planning and review processes of the Ministry of Environment and the utilities commission would impose...
an onerous regulatory burden with much duplication and lengthy delays facing electricity supply projects, be these BC Hydro or IPP projects. Although a formal process to address this concern was never clearly established, considerable inter-agency discussions took place at the time and the resulting, somewhat ad hoc approach, has been that proposed projects should first achieve preliminary support through the IRP process from BC Hydro (whether for its projects or those of IPPs) and the utilities commission before advancing to the full environmental assessment step of the Ministry of Environment. It was also agreed, again informally, that the subsequent assessment of electricity projects should include staff participation from the utilities commission and that any environmental assessment hearing panel for energy projects should include a commission panel member, or at least someone with comparable energy system expertise. Finally, it was informally agreed that evidence developed and presented to the utilities commission process as part of BC Hydro’s IRP should be included in the environmental assessment process.4

The reality, however, was that the government never formalized an institutional linkage between the electricity planning process of the utilities commission and the environmental assessment process of the Ministry of Environment. This is primarily because the government in the late 90s decided to exclude BC Hydro from commission regulation so that it could reassert government control over electricity generation investment decisions. Without commission control over BC Hydro, the IRP process was gutted and planning decisions were taken away from the participation or even the purview of interest groups, the general public and the media.

With a change of government in 2001, this policy was gradually reversed and commission control over BC Hydro was re-established in 2003. Also, with the exception of large hydropower investments, for which BC Hydro would remain solely responsible, the government allocated exclusive responsibility for new electricity supply to IPPs. BC Hydro’s role was changed to managing a competitive bidding process leading to long-term supply contracts between it and IPPs. The government also established requirements for IPP projects, the most notable being that 50% of new power must be “clean,” in that it be a net zero source of GHGs.

The government sustained and extended this policy direction with an energy plan in 2007 and then a Clean Energy Act (2010). The act set out a number of energy goals for the province, including generation of at least 93% of electricity from clean resources. This requirement assures that virtually all future power projects will be zero-emission, with the remaining 7% allowing for some cogeneration using natural gas and off-grid diesel generation. In addition, the act requires that BC Hydro submit an IRP to the government for review and approval which will set out how BC Hydro intends to meet the government’s energy objectives and the province’s future electricity needs for the next 30 years. Although BC Hydro is to develop its IRP with stakeholder input, the act does not establish the process for how this must occur.

The new act continues the role of IPPs in providing all new power supply, with the exception of major hydropower projects, and indeed it may lead to acceleration in this expansion depending on future demand. In particular, provisions in the Clean Energy Act require that (1) BC is electricity self-sufficient, even under low water conditions, by 2016 and (2) provincial GHG emissions be reduced, which is likely to entail greater electricity use in industry, buildings and transportation than would otherwise have occurred.5

Because the BC Utilities Commission Act and the Hydro and Power Authority Act require that resources be developed at the lowest possible cost for consumers, current IPP projects are especially focused on run-of-river (RoR) hydropower, which is often most competitive—even though BC Hydro pays lower rates for power provided by such projects during the spring freshet, when the water has a lower value. RoR schemes divert some of a river’s flow through a pipe or tunnel leading to electricity generating turbines and subsequently return the water downstream. Unlike conventional hydroelectric installations, RoR projects do not require large dams and reservoirs, and hence are typically assumed to be less environmentally intrusive.

However, RoR projects do cause local impacts to land and water, creating challenges for coordinating energy and land use planning. An example is the effort in the 1980s and 1990s in the US Pacific Northwest Power Act to establish a regional process of the Ministry of Environment. It was also agreed, informally, that the subsequent assessment of electricity generation proposals for RoR power, representing a capacity of over 1400 MW (see Table 2) Almost 600 MW of this capacity involves projects which have yet to be constructed, many of which will follow an environmental assessment process.

4.2. Land use planning and environmental assessment

BC adopted a collaborative model of land use planning in the early 1990s to address major conflicts among government, industry, aboriginals and the public, particularly as it concerned to the relationship between the forest industry and competing users (Day et al., 1998). The majority of the provincial Crown land base (which in itself represents the majority of land in BC) is covered by 26 broad regional land use plans (BC ILMB (British Columbia Integrated Land Management Bureau), 2006). These plans, most of which are now completed, were developed by stakeholder tables and submitted to government for approval, and are now supplemented by 195 sub-regional plans.

Table 2
Independent power producers supplying renewable energy to the BC Hydro service area4.
Sources: BC Hydro (2010a, b).

<table>
<thead>
<tr>
<th>Status</th>
<th>Run-of-river</th>
<th>Other renewable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of projects</td>
<td>Capacity (MW)</td>
<td>Number of projects</td>
</tr>
<tr>
<td>Developed</td>
<td>42</td>
<td>809</td>
</tr>
<tr>
<td>Planned</td>
<td>17</td>
<td>502</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>1401</td>
</tr>
</tbody>
</table>

Note: other renewable includes storage hydro, biomass and wind. The data exclude the Rio Tinto Act because it is likely not indicative of future development in the province. Planned projects represent those issued contracts but that are not yet producing power.

4 For a more detailed review of BC Hydro and electricity generation in the province, see Jaccard (2001).

5 See BC (2008) and Clean Energy Act SBC (2010), c. 22, s. 2.
These plans allocate land to specific zones, including protected areas where no resource development is allowed and areas allowing various intensities of resource extraction activities. However, the plans were often developed with forestry, mining and tourism in mind, and do not specifically address electricity generation because the scope of private power production has only recently expanded in BC. Indeed, outside of protected areas these plans generally allow for unlimited energy resource development. In addition, in 2006 the BC government enacted legislation restricting the ability of local governments to implement land use zoning in relation to energy projects because of its concern that such zoning represented a veto power which could limit investment in electricity generation and hinder attainment of the province’s electricity and GHG goals.6

All power projects must obtain a variety of agency approvals before being developed. Key among these approvals is a water license, which is necessary for any use or diversion of water for power generation purposes. In assessing a water license application, the government considers existing license holders or earlier applicants, minimum in-stream flow requirements, other users and the interests of aboriginals (BC MoE, 2010a). A Crown land tenure is also required if the project is to be constructed on public land.

Federal and provincial environmental assessment processes are required for certain power projects. The federal process is triggered by a range of factors, such as impacts to fish habitat or work across a navigable waterway, while the provincial process is required for all power projects of 50 MW or more.7 Projects under the provincial threshold still require agency approvals (including a water license), but a formal process for stakeholder engagement and impact mitigation is avoided. Developers can request that a project under the threshold go through the environmental assessment process, and the Environmental Assessment Office can designate such projects as reviewable if it deems significant impacts may occur—as may be the case for the construction of multiple projects in a given watershed. When a project triggers both the federal and provincial environmental assessment, a single process is provided that meets the requirements of both levels of government.

As already mentioned, concerns exist about the potential cumulative environmental effects of a large number of RoR projects. The assessment of cumulative effects, which is increasingly purported to be a factor to consider in the environmental assessment process in some jurisdictions, including BC, requires project proponents to determine the impacts of that project in combination with those of other past, present and potential future human activities. It is one thing for agencies to claim they are considering cumulative effects. It is quite another, however, for this to actually occur as the cumulative effect of a project with global scale impacts (such as a coal-fired electricity plant) is logically its impact in concert with all other similar projects built throughout the world.

Strategic environmental assessment, which generally involves applying environmental assessment above the project level to that of plans, programs and policies, evolved in part to tackle some of the deficiencies associated with project-level assessment, including assessing cumulative effects, development alternatives and non-project impacts (Noble, 2005). With respect to renewable electricity development in BC, a strategic assessment at a regional level has been suggested as a tool for minimizing the cumulative effects of numerous but relatively small generating stations (DSF et al., 2009). Such a framework, linked to project approval processes of the Ministry of Environment and perhaps local land use authorities (regional districts, municipal governments) could involve multi-attribute trade-off decision making for multiple use and single use allocations with more extensive processes for public involvement.

This discussion illustrates how land development pressures for renewable generation create a new challenge for energy–environment land use planning and allocation; the focus has shifted from a single project at one location to the cumulative effects of multiple projects. In the case of RoR, these effects include water and land alienation, impacts on fish and other species, and possible impacts on recreation and conservation objectives. Another level of complexity is introduced when we consider that several sources of renewable energy might be developed in the same ecosystem. Therefore, land use planning must not only consider trade-offs among energy and non-energy initiatives, but also among alternate energy supply options. In BC, it is possible that a given watershed be amenable to RoR, wind, biomass and possibly other development as well, which if developed in concert could result in a range of cumulative effects.

From an energy–environment perspective therefore, BC now faces the challenge of coordinating and integrating at least four separate processes that in concert determine where and how electricity supply projects will be planned, assessed and—hopefully in enough cases—approved. These four processes are:

- River basin planning and project approval.
- Electricity system planning and approval of long-term acquisition plans.
- Environmental assessment and
- GHG emission reduction planning and policies.

5. Case study: evaluation of proposals for energy–environment reform in BC

In this section, we evaluate two options for policies and institutional arrangements to enable RoR development in BC, using the criteria we previously described as a basis for the analysis. These options are summarized in Table 3. The first is maintaining the current system of energy planning, as described in Section 4. We label this option the “status quo,” which can generally be described as provincial targets for renewable electricity being met against a backdrop of project-level assessment requirements and other agency approvals.

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Status quo</td>
<td>The Environmental Assessment Office mandate of project-specific environmental assessment is maintained and supplemented by other existing legislation, including especially that related to regional land use planning and water permitting. However, government and other actors (IPPs, BC Hydro and aboriginals) do a better job of communicating how the system functions to generate support.</td>
</tr>
<tr>
<td>2. Strategic assessment</td>
<td>The Clean Energy Act is revised 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 perhaps prohibited) and areas where it will be encouraged. The assessment includes public consultation.</td>
</tr>
</tbody>
</table>

6 Bill 30—Miscellaneous Statutes Amendment Act (No. 2), 2006, s. 53.

7 This threshold was relaxed from 20 MW in the Reviewable Projects Regulation of the Environmental Assessment Act (2002). The majority of RoR projects selected by BC Hydro following its most recent competitive bidding process in 2008 were less than 50 MW (BC Hydro, 2010b).
The second option involves approaching the challenge of minimizing local environmental impacts in a more deliberate manner. Specifically, it entails a strategic assessment to determine a pattern for RoR development that would allow provincial objectives for zero-emission electricity capacity to be met with the least impact to the local environment. The assessment would explicitly identify in advance areas where RoR development would be more strictly controlled and perhaps prohibited, beyond existing protected areas, and areas where development would be encouraged. Potential outcomes of the assessment could range from recommending more severe restrictions being placed on RoR development in certain areas, to recommending no additional restrictions in order to ensure that emissions abatement objectives are met. Recommending the latter approach would essentially be an endorsement of the status quo, although an endorsement via this process would enhance the legitimacy of that policy direction.

To estimate cumulative effects, the strategic assessment would take into account the local impacts of renewable generation and other human activity as well as the need to abate GHG emissions, since without such an effort at the global level the local environmental effects may be particularly significant, in terms of for example, biodiversity loss. The assessment process would be bounded by the spatial extent of possible RoR initiatives in the province, or alternatively it could focus first on regions which may be subject to the greatest development. In any case, watersheds represent a convenient unit of analysis for the assessment although consideration of some cumulative effects, such as impact to bear habitat for example, may require a broader scale.

Focusing on RoR projects, and not all renewable generation, seems a reasonable starting point for the assessment because these projects represent a significant share of anticipated electricity development in the short to medium term, especially in terms of number of projects, and because the assessment process would be greatly simplified, allowing it to conclude earlier and thus have a greater influence on energy development in the province. That being said, even if the assessment did not initially provide guidance on where or to what extent other renewable development should proceed, it would still need to consider the potential of other energy sources in order to assess cumulative effects and the challenges related to emission abatement. Follow-up assessments could then be more prescriptive with respect to alternative generation sources, analyzing trade-offs among developing different sources in a given watershed and identifying a generation mix that results in the greatest capacity with the least cumulative effects to the local environment.

While an array of alternate proposals could be developed, we limit our analysis to these two proposals in order to focus the discussion on the ability of a more broad and inclusive approach to improve the status quo. Furthermore, other proposals may not necessarily align well with existing institutions in BC. For example, an alternate model could involve returning local governments their zoning authority related to energy projects and assigning legally binding targets for generation to each region. Such a proposal may be a promising option for certain jurisdictions, but would likely strain the capacity of local and regional governments within BC.

Next, we evaluate these two policy options according to the criteria defined in Section 3. For each criterion, we assess whether it is met, partially met or not met. We begin by providing a summary of the evaluation results.

### 5.1. Summary of proposal evaluation

Table 4 summarizes the results of the proposal evaluation. The status quo scores moderately well according to each of the criteria, while the strategic assessment scores well according to leadership, economic efficiency and stakeholder participation, and moderately well according to policy integration.

Although the strategic assessment scores better according to three of the criteria, the key criterion of policy integration remains only partially met for both proposals. The strategic assessment directly aims to tackle the issue of policy integration – that is, integrating local and global concerns – but it carries with it risks that developing a process to systematically evaluate these concerns may hinder climate change mitigation efforts, just as the status quo may lead to effective climate change mitigation at the expense of excessive local impacts. In an ideal world, the strategic assessment would be able to respond to concerns over policy integration without risking administrative efficiency. Unfortunately, competing interests and imperfections of the bureaucratic process complicate this proposal.

The analysis thus highlights a trade-off for policy makers in BC. The status quo risks potentially larger than necessary local environmental effects and dissatisfaction among the public, but a broader and more inclusive process to balance global and local effects risks a delay to renewable electricity development and climate change mitigation. Next, we discuss the evaluation in more detail.

#### 5.2. Evaluation of proposal 1: status quo

##### 5.2.1. Policy integration (assessment: partially met)

The provincial government’s approach of mandating requirements for renewable generation capacity and restricting the ability of other interests to impede project development increases the likelihood that generation targets will be met. However, this approach may reduce the effectiveness with which local environmental and social concerns are addressed by planning processes, so the policy integration criterion is only partially met.

In terms of mitigating local environmental concerns, BC Hydro’s competitive bidding process makes no distinction among the level of environmental impact associated with alternate technologies, other than whether or not they meet the low-emission requirement. Such an approach is effective at achieving low-cost renewable generation, but may not minimize local impacts.

In addition, project-level environmental assessments have inherent limitations in terms of considering cumulative effects and development alternatives (Noble, 2005). These effects may be exacerbated if a substantial portion of projects do not undergo a formal assessment (i.e., only those 50 MW or larger or those designated as reviewable by the Environmental Assessment Office). At present, the only broad spatial mechanism for determining renewable project siting is the existence of protected areas in regional land use plans that prohibit power project development. Unfortunately, these plans are not particularly helpful for guiding development outside these areas, especially given that low density renewable development has the potential to impact a substantial portion of the land base.

Lastly, the status quo is likely to be less administratively onerous than if greater inter-jurisdictional debate and stakeholder
involvement were required in planning and evaluation processes. Even though stakeholders may raise dissatisfaction with government strategy at environmental assessment hearings, such dissatisfaction is unlikely to impede assessments themselves which are governed by strict terms of references. The greater risk is that the status quo alienates stakeholders and makes the government increasingly unpopular with each project that is built, leading to strong local resistance to renewables projects and perhaps a political challenge.

5.2.2. Leadership (assessment: partially met)

Although the government has articulated a strategy for renewable electricity development and enshrined this policy in legislation, it has not elaborated mechanisms for reconciling local land use priorities with provincial energy policy beyond project-specific permitting and approvals. As such, an element of leadership is missing in terms of describing a spatial vision of the landscape of BC’s energy production in the future.

5.2.3. Economic efficiency (assessment: partially met)

The present planning regime is likely to result in government targets for renewable capacity being met at a relatively low financial cost. Nevertheless, a substantial decrease in economic efficiency would occur if current planning processes fail to adequately mitigate local environmental impacts. In our discussion about policy integration, we argued that the current strategy may reduce the effectiveness with which local environmental concerns are addressed by planning processes, so this potentiality reduces the economic efficiency of the status quo.

In terms of the financial cost component of economic efficiency, the status quo however scores well. IPPs have shown significant interest in the province, as evidenced by their response to new requests for power from BC Hydro as well as the large number of water license applications received by the Ministry of Environment for the purposes of power generation (on the order of several hundred between 2001 and 2008) (BC MoE, 2010b). More importantly, the financial cost of this generation to BC Hydro – and hence ratepayers, representing the majority of BC residents – should be minimized to the extent that a competitive bidding process exists. Unlike other procurement options, such as a feed-in tariff that attaches a fixed price to different forms of renewable generation, the flexibility of BC Hydro’s bidding process leads to competition among proponents and among all possible energy sources, while guaranteeing that only clean generation resources are developed. This process is designed to get zero-emission electricity at the lowest possible cost with little regard to the type of clean energy.

5.2.4. Stakeholder participation (assessment: partially met)

Although various avenues exist for stakeholder participation in renewable energy planning in BC, from setting of emission targets to project-specific development, formal processes do not exist for stakeholder views to inform decision making regarding smaller projects (those under 50 MW) or the spatial distribution of development in general. Without the ability to influence decision making on either of these fronts, this criterion is not fully met. Below we describe the participative processes in BC, some of their limitations and the potential for enhanced communication regarding existing processes to improve stakeholder participation.

In 2007, the government established the Climate Action Team, a voluntary advisory committee, to offer expert advice on actions to reduce GHG emissions and the setting of emission reduction targets. The first report produced by the Team was subject to public consultation and helped refine provincial interim targets for emission reduction. Specifically related to power development, stakeholder participation occurs as part of the environmental assessment for projects 50 MW or larger. Some stakeholders are dissatisfied with this process because (1) the majority of projects are below the 50 MW threshold, even though projects under the threshold may be designated reviewable if the government deems a risk of significant impacts exists and (2) of the lack of cumulative assessment of water basin land and water impacts through a regional strategic assessment. Some stakeholders were also dissatisfied with the 2006 removal of local zoning authority related to energy development, although others (including IPPs and some environmental and aboriginal groups) supported this policy change because they did not want local governments to be able to impede project development.

Another avenue of stakeholder engagement existed when the utilities commission required stakeholder involvement for approving BC Hydro investments, for which stakeholder funding and a negotiated settlement process was in place. To the extent that the new major long-term supply contracts to IPPs by BC Hydro will not be subject to this process, this opportunity for stakeholder engagement has been lost.

Lastly, enhanced communication about government policies – including the need for renewable generation to mitigate climate change, the benefits of BC Hydro’s competitive bidding process, the various agency approvals required for power projects and the ability for projects below the threshold to be designated reviewable – could increase stakeholder understanding and perhaps improve participative processes. Indeed, a general lack of appreciation for the range of issues and concerns related to renewable energy likely contributes to stakeholder dissatisfaction and disengagement. Nevertheless, without the ability to inform project development in a more comprehensive manner – either in terms of having a greater influence on the development of smaller projects, or the overall spatial pattern of RoR development – stakeholder participation is unlikely to be dramatically improved.

5.3. Evaluation of proposal 2: strategic assessment

5.3.1. Policy integration (assessment: partially met)

This proposal aims to directly tackle the issue of policy integration and could lead to a more balanced consideration of global and local impacts relative to the status quo. In particular, the strategic assessment would more thoroughly address concerns about cumulative effects than could project-level assessments. By implementing an overall plan to guide RoR development, the assessment could tackle questions such as whether to concentrate development in certain locations or whether to spread development out more broadly, questions which are not possible to address using a more ad hoc and project-specific approach to development.

However, the strategic assessment only partially satisfies the policy integration criterion because of the difficulties of actually implementing the assessment. Implementation would be made challenging by several factors, including the complexity of the required multi-attribute trade-off analysis, the variety of competing interests, and the fact that no widely accepted framework for conducting strategic assessment exists (Noble and Storey, 2001; Gunn and Noble, 2009a). The framework would have to be designed in such a manner as to minimize risks to administrative efficiency and the possibility of the process getting bogged down by competing interests. In this respect, the assessment should be viewed as generating an analysis which would be used by
decision makers, not as representing a policy decision in and of itself. It is out of concern for these challenges that the strategic assessment process would need to be limited in mandate and time, although with a promise that ongoing review would continue for some years into the future. The risk of not placing such limitations on the assessment is that it be delayed by unhelpful debates which would in turn delay development of renewable generation capacity and possible achievement of GHG targets.

Funding would also be required to orchestrate a more comprehensive land use planning process in advance of developing any projects. As demonstrated by previous collaborative planning exercises in the province, these funds may be substantial. The government might have to develop new revenue sources to cover costs, such as perhaps changing the fee structure associated with water licensing. Lastly, additional costs may be borne to the extent that the assessment results in a delay to project approval and electricity must be purchased from other sources, possibly outside the province.

5.3.2. Leadership (assessment: met)

A strategic assessment of RoR development in BC would enhance the vision and comprehensiveness of the provincial Energy Plan, demonstrating significant leadership on the part of the government. Indeed, one of the primary goals of strategic assessment is “to establish a regional vision and bring focus to regionally significant environmental issues” (Gunn and Noble, 2009b, p. 285).

5.3.3. Economic efficiency (assessment: met)

Although the strategic assessment has the potential to reduce private sector interest in generation and increase project costs to the extent that it restricts power development in certain regions, a number of other factors tend to increase the economic efficiency of this proposal. Ultimately, the key for minimizing financial costs is to maintain BC Hydro’s competitive bidding process for proponents and zero emission energy sources, and the key for guaranteeing adequate energy supply is to ensure that the strategic assessment outcomes are bounded by consideration for the need to reduce GHG emissions through renewable deployment. Below, we describe the factors that increase the economic efficiency of this proposal.

First, any increase of project costs resulting from development being barred in certain areas, with perhaps cheap renewable potential but high environmental sensitivity, would be offset by the preservation of non-financial values. The strategic assessment would therefore be internalizing, to a certain extent, the negative externalities associated with RoR development.

Secondly, the strategic assessment could facilitate an efficient and orderly development of the transmission network to connect RoR projects to customers. For example, it seems likely that reducing the amount of transmission line per unit of electricity investment by clustering development could also help minimize cumulative effects associated with the transmission network; such relationships could be more fully explored by a strategic assessment. Lastly, the proposal could lower public opposition to specific projects, facilitating and streamlining project-specific siting and environmental assessment reviews.

5.3.4. Stakeholder participation (assessment: met)

The current lack of a strategic process for project siting seems to be frustrating for some stakeholders that are concerned about the local effects of RoR development. Public involvement in a strategic assessment could therefore help improve engagement among these stakeholders in both regional and project-specific processes. Appropriately implemented, a provincial strategic assessment could also improve the accountability and credibility of government, and possibly improve the environmental assessment process itself by eliminating the need to address broader issues at project stage. Nevertheless, stakeholders representing power project development and climate change mitigation interests may be concerned that a strategic assessment limit investment in renewable generation.

More fundamentally, this option presents challenges related to the nature of stakeholder participation. Given that stakeholders include representatives from diverse groups such as government, industry, environmental organizations, aboriginal groups and landowner associations, complete consensus is unlikely to be achieved. As such, we would advocate a process whereby stakeholder views help inform the assessment but that any form of consensus decision making is avoided. Such a process aligns with what Noble (2002) characterizes as the objective of strategic assessment, which he argues is not to necessarily garner complete consensus, but rather to explore various perspectives concerning a given policy such that the final decision-making authority can make an informed decision.

6. Conclusion

A large deployment of renewable energy technologies is a prerequisite for substantive climate change mitigation. Such deployment will be associated with a range of “local” and often cumulative effects due to the low energy density of renewable energy sources. In order to minimize harm to the environment and to ensure continued support for climate change mitigation through renewable deployment, policy makers need to design institutions and processes that are able to integrate and balance a range of concerns related to different scales, from local to global.

To this end, we developed a set of criteria with which to evaluate the institutions and processes that enable renewable energy expansion. These criteria include policy integration, leadership, economic efficiency and stakeholder participation. Although these criteria can be used to evaluate proposals for renewable energy policy design in any jurisdiction, each jurisdiction has a unique context in terms of resource potential, ecological setting, electricity demand, social values and existing governance structures, such that value judgments will be required for their application in different places.

Using our case study of British Columbia, we assessed the possibility for a more strategic and inclusive approach to renewable energy planning to reconcile global and local concerns, and generate support for renewable deployment. We found that the current system of project-based approvals risks larger than necessary local environmental effects and dissatisfaction among the public, but a broader and more inclusive process to balance global and local effects risks a delay to renewable electricity development and climate change mitigation. This analysis thus highlights the trade-off between the need to quickly increase renewable generation capacity to protect the local environment from climate change, and the need to protect the local environment from poorly implemented renewable projects. This trade-off should be of concern to all jurisdictions aiming to rapidly increase their renewable energy supply.

A key consideration for any renewable policy proposal is the inter-related aspects of public support and stakeholder participation. To enact policies, governments require a minimum amount of support from the population, and because renewable electricity generation tends to affect large areas of land and perhaps water, this support is particularly important to advance their development. Policy makers desiring to aggressively expand renewable energy in any jurisdiction need to consider how to get enough
support to enact and maintain their renewable policies, whether that be by providing stakeholders a forum in which to raise their concerns, providing incentives by facilitating community ownership structures or by some other means altogether. Unfortunately, participatory processes can be gamed by groups that want to slow down or stop progressive policy due to entrenched interests.

Strategic assessment holds much potential as a framework for renewable energy planning, although the methodologies for such frameworks are not well developed and must be implemented carefully in order to avoid process deadlock and delay to renewable deployment. Part of the challenge relates to the nature and extent of stakeholder participation in such processes, which it seems in some cases may be a restraint and not necessarily in the common good.

References


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