STRATEGIC ANALYSIS OF RENEWABLE ENERGY OPTIONS FOR THE CENTRAL COAST, NORTH COAST AND HAIDA GWAII

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Disclaimer

This report was commissioned by the Ecosystem Based Management Working Group (EBM WG) to provide information to support full implementation of EBM. The conclusions and recommendations in this report are exclusively the author's, and may not reflect the values and opinions of EBM WG members

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Executive Summary

OnPoint Consulting Inc. was retained by the Central and North Coast Ecosystem Based Management (EBM) Working Group to prepare a Strategic Assessment of Renewable Energy Options for the Central and North Coast and Haida Gwaii. The objectives of the study include:

1. To identify which renewable energy technologies have the best potential in the Central and North Coast and Haida Gwaii.

2. To evaluate the associated renewable energy transmission issues.

3. To identify the key policy, legislative and fiscal issues affecting renewable energy development that require resolution by the federal, provincial or municipal governments.

4. To outline the basic elements of a renewable energy strategy for the Central and North Coast and Haida Gwaii that will deliver economic opportunities and benefits to communities in the region.

Using a broad range evaluation criteria, it is apparent that wind, hydro and biomass resources have the greatest viability in the short and medium term. This is evident by a number of projects already under development in the Central and North Coast and Haida Gwaii area. Other technologies such as geothermal, solar and ocean are currently less viable; that being said, there may specific opportunities where the technology and the renewable resource support a viable project.

While the viability of the technology is critical to developing successful renewable energy projects, the availability of renewable resources will determine how many projects are ultimately developed and where they are located. The renewable energy resource assessment identified significant wind and small hydro resources spread throughout the Central and North Coast and Haida Gwaii. Ocean resources (wave and tidal) are clearly available through the region, and is expected to have moderate to high resource levels in the Central Coast and Haida Gwaii area. Biomass is also clearly available throughout the region, but limited information is available about the quantity and quality of the biomass. It is therefore not possible to accurately assess the biomass resource potential.

A number of renewable wind and small hydro energy projects are in various stages of development, driven largely by the BC Hydro Call for Clean Power. The Central and North Coast and Haida Gwaii significantly lag behind the rest of the province in the number of proposed renewable energy projects, largely due to limited transmission infrastructure to connect remote projects.

Given its importance to renewable energy development, transmission is a priority area for leaders in the Central, North Coast and Haida Gwaii to focus their attention. The most immediate potential for new transmission infrastructure is the Highway 37 Electrification Project, which has the support of both the Provincial Government and the mining and renewable energy sectors. The BC Utilities Corporation (BCUC) has initiated a review of transmission infrastructure needs in British Columbia – the infrastructure needs and renewable energy goals of the Central and North Coast and Haida Gwaii must be clearly communicated in this review.

With available transmission, renewable energy projects in the Central and North Coast and Haida Gwaii will likely have market opportunities that will drive development. The Province's Energy Plan will be a major driver for renewable energy development. Renewable Portfolio Standards in the Western United States will provide opportunities for renewable energy producers to market their production either indirectly through BC Hydro or on their own.

First Nations in the Central and North Coast and Haida Gwaii will benefit from the development of renewable energy. Development will bring direct employment and economic opportunities, as well as the potential for agreements that provide a steady and reliable flow of benefits to communities. First Nations need to carefully consider their relationships and roles with renewable energy developers and understand the implications associated with different levels of involvement in a project. Given that renewable energy projects vary considerably, there is no "one-size fits all" approach to First Nation involvement in project development.

Of upmost importance and immediate priority is the development of a Renewable Energy Strategic Plan for the Central and North Coast and Haida Gwaii. The development of the Strategic Plan requires the involvement of the people of the Central and North Coast and Haida Gwaii to help guide and shape its overall form and direction.

Introduction

The ***Central and North Coast Ecosystem-Based Management (EBM) Working Group*** recently completed a strategic review of economic activities and initiatives being pursued in the Central and North Coast. Renewable energy was identified as having significant potential that a coordinated approach to policy, infrastructure and project development could help to realize.

In October 2008, the EBM Working Group retained OnPoint Consulting to conduct a strategic analysis of renewable energy production and transmission opportunities in the Central and North Coast and Haida Gwaii with a view toward providing the framework for the future development of a regional renewable energy initiative that delivers economic opportunities and benefits to local communities.

The Goal:

The goal of this project is to, "…provide the working group with independent, accurate and comprehensive information about renewable energy options to position the Central and North Coast to maximize renewable energy opportunities."[1]

The Objectives:

1. To identify which renewable energy technologies have the best potential in the Central and North Coast and Haida Gwaii.

2. To evaluate the associated renewable energy transmission issues.

3. To identify the key policy, legislative and fiscal issues affecting renewable energy development that require resolution by the federal, provincial or municipal governments.

4. To outline the basic elements of renewable energy strategy for the Central and North Coast and Haida Gwaii that will deliver economic opportunities and benefits to communities in the region.

The Scope:

A detailed workplan described each of the proposed sections including:

1) The state of renewable energy technology;
2) Renewable energy resources in the Central and North Coast;

[1] Project work plan and scoping outline are attached under Appendix 1.

3) Current renewable energy projects;
4) Transmission issues;
5) Customer demand and regulatory issues;
6) Elements of a renewable energy strategy;
7) Conclusions and recommendations.

The authors were guided by the principles established in the Ecosystem Based Management (EBM) Handbook, (a key tenet to land and resource management planning in the Central and North Coast and Haida Gwaii). The EBM principles include:

- ***Maintain ecological integrity*** — by sustaining the biological richness and services provided by natural terrestrial and marine processes, including the structure, function, and composition of natural terrestrial, hydroriparian, and coastal ecosystems at all scales through time.
- ***Recognize and accommodate aboriginal Rights and Title, and interests*** — by respecting First Nations governance and authority, and by working with First Nations to achieve mutually acceptable resource planning and stewardship, and fair distribution of economic benefits.
- ***Promote human well-being*** — by assessing risks and opportunities for communities, by facilitating and enabling a diversity of community economic and business activity, and by planning for local involvement in existing and future economic activities.
- ***Sustain cultures, communities, and economies within the context of healthy ecosystems*** — by sustaining the biological richness and ecological services provided by natural ecosystems while stimulating the social and economic health of the communities that depend on and are part of those ecosystems.
- ***Apply the precautionary principle*** — by recognizing uncertainty and by working to establish and implement management objectives and targets that err on the side of caution. The onus is on the proponent to show that management is meeting designated objectives and targets.
- ***Ensure planning and management is collaborative*** — by encouraging broad participation in planning; by clearly articulating collaborative decision-making procedures; by respecting the diverse values, traditions, and aspirations of local communities; and by incorporating the best of existing knowledge including traditional, local, and scientific knowledge.
- ***Distribute benefits fairly*** — by acknowledging the cultural and economic connections that local communities have to coastal ecosystems, and by ensuring that diverse and innovative initiatives increase the share of employment, economic development, and revenue flowing to local communities, and maintain cultural and environmental amenities and other local benefits derived from land and water resources. [2]

[2] Principles adapted from Coast Information Team. 2003. Ecosystem-based Management Framework

The report has been broken into two parts. **Part I** assesses the resource potential in the Central and North Coast and Haida Gwaii and explores key factors that will determine which resource supplies are most likely to get developed in the region and why. Part I has been divided into the following seven sections:

Section I: provides a brief overview of the geography, cultural history and socio-economic climate of the Central and North Coast and Haida Gwaii.

Section II: provides a critical analysis of renewable energy technologies and assesses which ones have the best potential for success in the Central and North Coast and Haida Gwaii.

Section III: provides an inventory of known renewable energy resources in the Central and North Coast and Haida Gwaii.

Section IV: identifies and maps current commercial interest in renewable energy projects as a way of gauging the development potential of the in the Central and North Coast and Haida Gwaii.

Section V:provides an overview of the energy transmission system in British Columbia, and looks at potential corridors for expansion in the Central and North Coast and Haida Gwaii.

Section VI: identifies potential markets for renewable energy in British Columbia, Alberta and the western United States and considers the implications for renewable energy development in the Central and North Coast and Haida Gwaii.

Section VII: provides an overview of the regulatory environment in British Columbia as it relates to renewable energy development.

As the reader progresses through Part I of the report, a funneling effect takes place. The inter-related factors that affect the nature and scope of future renewable energy development are identified and discussed. When applied in the context of the Central and North Coast and Haida Gwaii, these factors become a filter, helping to isolate the most viable and promising renewable energy opportunities in the area. Understanding the many factors that determine the future development potential of an area is a critical first step in developing a regional renewable energy strategy that delivers economic opportunities and benefits to local communities.

Part II of the report provides some general direction to leaders of the Central and North Coast and Haida Gwaii to assist them to position themselves to capitalize on the economic and social benefit potential created by renewable energy development in the area. It provides a starting place for discussions as leaders engage First Nations, local communities, industry, government, environmentalists and other stakeholders to develop a regional strategy for renewable energy development. Part II includes the following sections:

Section VIII: explores aboriginal rights and titles in British Columbia and considers the implications for renewable energy development and associated benefits for First Nations communities in the area.

Section IX: explores the project cycle and identifies key factors that help to determine which renewable energy projects are successful over the long-term and what local communities can do to leverage those successes into tangible benefits.

Section X:outlineskey elements of a renewable energy strategy for the Central and North Coast and Haida Gwaii and provides a high-level critical path to design a transparent and comprehensive process.

The resulting report is a critical first step toward the development of a regional renewable energy strategy that delivers benefits to local communities – an overarching goal for the EBM Working Group. It does not identify a strategy for renewable energy development along the Central and North Coast and Haida Gwaii. It is the authors' strong belief that such a strategy can only be developed through a consultative process that includes First Nations, communities and other stakeholders in the region. Instead, the report provides an informed and unbiased assessment of the resource potential in the Central and North Coast and Haida Gwaii, makes some preliminary observations about the 'best bet' opportunities and offers some advice about the next steps required to develop a regional renewable energy strategy that positions this area to turn existing potential into tangible outcomes that benefit communities throughout the region.

PART I:

A STRATEGIC ANALYSIS OF RENEWABLE ENERGY OPTIONS IN THE CENTRAL AND NORTH COAST AND HAIDA GWAII

I. Contextual Background

The following section provides a brief overview of the Central and North Coast and Haida Gwaii. It looks at their unique landscapes, their peoples and the economies that sustain them.

REGIONAL OVERVIEW – AREA DESCRIPTION

The Central and North Coast and Haida Gwaii covers a rich and diverse landscape characterized by dramatic coastlines, marshy bogs, old growth forests and a fantastic array of wildlife including a rare form of black bear known as the Kermode or Spirit bear. It includes some of the largest tracts of pristine, intact, temperate rainforest in the world.

In the late 1990's and early 2000's, the Government of British Columbia began engaging key stakeholders and First Nations in discussions to develop land use and resource development plans. In 2006, following government to government discussions between First Nations and the Province, Premier Gordon Campbell announced strategic land use agreements covering the Central and North Coast of British Columbia. In 2007, a similar agreement was announced between the Council of Haida Nations and the government of British Columbia for the Islands of Haida Gwaii. The following section provides a general overview of the areas covered under these agreements. It is these areas which are the focus of this report.

Haida Gwaii

Haida Gwaii is an archipelago of more than 150 Islands bordered by the Hecate Straight to the east and the continental shelf to the west, (Figure 1). Within a few kilometres of its western coastline, the ocean floor drops to over 1000 meters. Haida Gwaii is 250 kilometres long and 80 km wide and has a total land area of just over one million ha. Its isolated landscape,

diverse wildlife and rich cultural history draw people from around the world to its shores.

Haida Gwaii is home to approximately 6000 residents. The largest community on the Island is located in ***Masset***, just 3 kilometres from the village of ***Old Masset***. Together, these two communities have a population base of approximately 1,928 residents (Haida Gwaii Tourism Association). Haida Gwaii is part of the traditional territory of the Haida First Nation, who have villages at Old Masset and Skidegate.

Figure 1: Haida Gwaii SLUA Area

The North Coast

The North Coast area encompasses 1.8 million ha that spans the coast of northern British Columbia from Aristazabal Island in the south to near Stewart in the North, (Figure 2). ***Prince Rupert*** (Pop. 15,000) is the largest community and accounts for almost 90% of the population in the region. Prince Rupert is the administrative and service centre for the region and is a transportation hub for marine, rail and highway traffic. It supports a newly expanded ice-free deep water port which is seen to be a key component to its long term economic viability.

Figure 2: North Coast

Prince Rupert lies in the traditional territory of the Tsimshian First Nation. This territory is bordered by the traditional lands of the Gitxsan, Nisga'a, Haida and Heiltsuk people, many of whom today make their home in Prince Rupert as well as in their traditional communities along the coast.

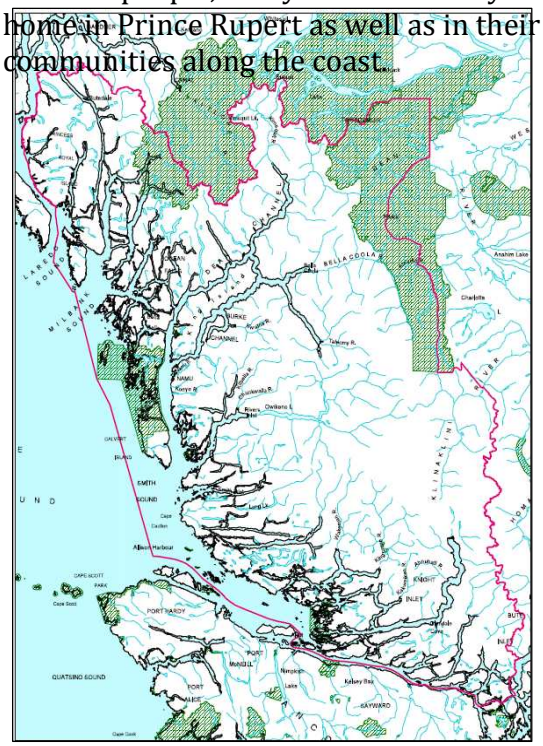

Figure 3: Central Coast

Central Coast

The Central Coast encompasses 4.7 million ha that span the coast of British Columbia from Bute Inlet in the south to Princess Royal Island in the North and Tweedsmuir Park in the east, (Figure 3). Much of the Central Coast is accessible only by boat or float plane. ***Bella Coola***, (pop. 1000) is the largest community in the Central Coast region and a major supply area for delivery of goods and services. It is the terminus of the Discovery Coast Ferry Service and the start of Hwy.20 that climbs to the Chilcotin Plateau and onto Williams Lake. It is the only Central Coast community with a highway link to the rest of

Canada. ***Bella Bella*** is the largest outer coast settlement area and the home of the Heiltsuk Nation, who number near 2200, with 1200 living on the Campbell Island reserve. Bella Bella serves as the main supply and communication center for the North Central coast.

REGIONAL OVERVIEW – HISTORY AND ITS PEOPLE

Long before European explorers arrived, the Northwest Coast was one of the most densely populated areas of North America. Archeological evidence dates some communities back more than 10,000 years.[3]The First Nations that occupied the coast of British Columbia belonged to a number of distinct cultural and linguistic groups that included the Haida, Tsimshian, Nuxalk (Bella Coola), Northern Wakashan, Kwakwakw'wakw (Kwakuitl), Nuu-chah-nulth (Nootka) and the Coast Salish.

Coastal First Nations had well established, thriving communities that flourished on the bounties provided by land and sea. They lived in cedar long-houses, used cedar and birch canoes to move along coastal waterways and demonstrated a rich cultural heritage evidenced through their well developed arts and crafts. The First Nations had great respect for the natural environment which sustained their way of life for thousands of years. This relationship with nature continues to be paramount to their coastal cultures today.

Early European contact with First Nations was driven by the fur trade which brought European traders to the area in search of valuable sea otter pelts. Over time, the Europeans came to recognize the untapped wealth of the salmon fishery. By the end of the 19th century dozens of canneries and processing plants were scattered throughout coastal British Columbia – particularly in the north where they took advantage of the rich salmon runs of the Skeena and Nass rivers. European and Chinese immigrants made their way to coastal British Columbia to fill the growing demands and associated opportunities created by a thriving fishery. Over time, forestry and to a smaller degree, mining created additional economic opportunities.

The Coastal First Nations and the European settlers did not sign land treaties. Today, questions remain as to the nature and scope of First Nations rights and title to the lands and resources along British Columbia's coast. A number of Coastal First Nations are in negotiations with the Provincial and Federal governments to establish modern-day treaties. Many are part of the *New Relationship* with the Province of British Columbia – an initiative that encourages government-to-government relationships and interim agreements to bring increased social and economic prosperity to First Nations communities.[4]The Central and North Coast land use decisions and the Haida Gwaii Strategic Land Use Agreement (SLUA) are both cited as examples of the progress being made under the *New Relationship.*

[3]British Columbia Archives http://www.bcarchives.gov.bc.ca/exhibits/timemach/galler07/frames/main.htm
[4] For more information, see Section XIII

REGIONAL OVERVIEW – SOCIOECONOMIC INDICATORS

Population

The Central and North Coast and Haida Gwaii are sparsely populated, the largest urban center being Prince Rupert on the North Coast, population of approximately 15, 000. More importantly, the population along the coast of British Columbia is in a period of continued decline. Between 1996-2006, the North Coast experienced a 5.2 % decline in population while the Central Coast saw a 16.9% decline.[5] As of 2006, North Coast had a population of approximately 15,900, while the Central Coast had approximately 4000 inhabitants.[6]Between 1996 and 2001, Haida Gwaii saw population declines of 12% (due in part to the closure of the Masset CFB). At the time of the 2001 Census, Haida Gwaii had a population of 4,935.[7]

Socio-Economic Indicators

Household income distribution and employment rates vary considerably among communities within the Central and North Coast and Haida Gwaii as do education levels, life expectancy and infant mortality rates. In almost all cases, aggregate data for these regions falls below the provincial average.

Regional Economy

Communities in the Central and North Coast and Haida Gwaii have experienced a prolonged state of economic decline due to continued challenges in the fishing and forestry sectors and a lack of a secondary value-added industry. The key economic generators for these regions to day include:

> ***Public Sector***: The Public Sector is the largest employer in the Central and North Coast and Haida Gwaii(includes regional, provincial and federal governments, school boards and band councils).
>
> ***Fisheries:*** The fishery, despite significant economic losses due largely to declining fish stocks, the fishery,(which includes wild stocks, aquaculture and processing activities), continues to be an important employer, particularly in the Central Coast region.
>
> ***Forestry:*** The forestry sector has also experienced a significant period of decline, due in part, to the loss of traditional markets, low returns on investment and international pressure to implement eco-certified sustainable forestry practices. It

[5] The Sheltair Group. "The 2006 Human Wellbeing Indicators Report prepared for the Central and North Coast Ecosystem Based Management Working Group". September 2008
[6] Ibid.
[7] Gary Holman. "Haida Gwaii – Queen Charlotte Islands Land Use Plan Socio-Economic Base Case". 2004 http://www.agf.gov.British Columbia.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/HG-QCI_SE_basecase_mar2004.pdf

remains the second largest employer in Haida Gwaii, employing about 33% of the population in 2001.[8] It is the third largest employer in the Central and North Coast regions.[9]

Tourism: Tourism is becoming an increasingly important sector in the Central and North Coast and Haida Gwaii and is expected to continue to grow as people from around the world are drawn to the unique ecosystems of this area. Its growth remains constrained however by infrastructure limitations and challenges associated with the regions' remoteness. Its seasonal nature is another limiting factor in its ability to contribute to regional economic sustainability.

Natural Resource Development may offer some future economic stimulation, however the resource potential in the Central and North Coast and Haida Gwaii is largely unknown and difficult to quantify. Mineral exploration is occurring in limited pockets across the regions, while offshore oil and gas development is currently barred by a moratorium on drilling.

Communities in the Central and North Coast and Haida Gwaii have a long and rich history, largely supported by resources from the surrounding land and sea. The industries that heralded the rapid development that occurred in the late19th and 20thcenturies, (namely fishing and forestry), have subsided, making way for new economic opportunities. Could renewable energy become a viable economic driver for British Columbia's coastal communities heralding new prosperity for the 21st century? *Perhaps*. This report will explore this question in more detail, providing in-depth analysis of the state of renewable energy technology, the degree of renewable resources in the area, and the many other factors that will determine the development potential of renewable energy resources on the Central and North Coast and Haida Gwaii.

[8] Ibid.
[9] The Sheltair Group. "The 2006 Human Wellbeing Indicators Report prepared for the Central and North Coast Ecosystem Based Management Working Group". September 2008

II. The State of Renewable Energy Technology

The following section provides an overview of the current state of renewable energy technologies in Canada and abroad. It assesses each one against a number of criteria, including capital and operating costs, potential for on-grid / off-grid operations, siting issues, environmental impacts, employment potential and examples in operation, with an eye to the unique interests of the Central and North Coast and Haida Gwaii. The outcomes of this assessment are identified in the summary table below. They point to those renewable technologies that, at the time of this report, are considered to be the most viable for the Central and North Coast and Haida Gwaii. A more detailed explanation of each technology follows.

Table 1: Summary Table – State of Renewable Energy

	Wind	Solar	Hydro	Bioenergy	Ocean	Geothermal
Current State of Technology	Moderate - High	Moderate	High	Moderate	Low	Moderate
Capital Cost	Moderate	High	Low-Moderate	Moderate	High	Moderate – High
Operating Cost	Moderate	Low	Low	Moderate	Insufficient information	Moderate
Off-grid Operations	Moderate	High	High	High	High	Moderate
Siting and Environmental Issues	Moderate - High	Moderate	Moderate – High	Low – High Dependant on technology	Low – High Dependant on technology	Low – Moderate
Issues Mitigation Potential	Moderate – High	Low	Moderate	Low – High Dependant on project	Low – High Dependant on project	Moderate
Employment Potential - Construction	High	Moderate	High	High	High	High
Employment Potential– Operations	Low	Low	Low	Moderate	Low	Low
Market Readiness	High	Moderate – High	High	Moderate – High	Low	Moderate – High

The technologies associated with harnessing energy from wind, hydro and biomass offer the best short-medium term potential for large and/or district scale renewable energy development in the Central and North Coast and Haida Gwaii. They offer proven, market ready technologies that require a low to moderate capital investment. Biomass and hydro offer strong opportunities for off-grid applications and while both have potentially significant siting issues, these issues can be mitigated. Solar, tidal and geothermal offer less developed technologies requiring higher up-front capital costs. That being said, solar and geothermal offer opportunities for small scale energy applications for individual buildings.

ENERGY SYSTEMS

Before looking at the various renewable energy technologies, it is useful to first review the energy system in British Columbia and then look more closely at the energy systems in use in the Central and North Coast and Haida Gwaii areas.

British Columbia's energy system is comprised of large scale (Province wide), mid-scale (district), and small-scale(unit) energy supply and use systems. Each has an important role to play in addressing British Columbia's growing energy needs.

Large-scale energy systems include energy production facilities, and the transmission systems that move the energy to distant markets. Large scale energy production facilities in British Columbia include large dams and powerplants, and oil and gas wells. Transmission infrastructure includes the integrated high voltage electricity grid and the oil and natural gas pipelines. Large-scale renewable energy sources can include hydro, wind, and biomass conversion facilities at mills for fuel, electricity, and heat. The BC Hydro transmission grid and Pacific Northern Gas line along the Skeena River corridor are the only large-scale energy systems in the Central and North Coast and Haida Gwaii.

District scale energy systems occur at the community level. They include remote, off grid BC Hydro generation and distribution systems. Other examples could include district scale heating systems installed for groups of buildings, and local electricity generation from renewables operating as a "micro-utility" for local electricity supply. Local renewable generation could include forest biomass, wind, solar, geothermal, small hydro, and ocean (tidal or wave) energy to supplement diesel or storage hydro generation.

Small-scale energy systems occur atthe individual level, for example, addressing the heating, lighting, hot water, and appliance needs of individual houses and buildings. Small-scale renewables could include solar, thermal hot water and ground source geothermal heating systems.

Most renewable energy technologies – wind, solar, run of river, tidal, biomass, geothermal - can be scaled in size to fit a large, district, or small-scale energy system. While the scalability is particularly attractive, the financial outlay associated with renewable energy initiatives, (particularly up front capital costs), remains a detractor.

Energy Systems in the Central and North Coast and Haida Gwaii

Currently, natural gas and petroleum products provide for about 60 % of British Columbia's energy needs. The remaining 40% comes from renewables in the form of hydroelectricity and biomass. Existing BC Hydro and Independent Power Producer (IPP) electricity generation facilities located in the Central and North Coast and Haida Gwaii are listed in the table below.

Table2:Hydro and Independent Power Producer (IPP) Electricity Generation Facilities in the Regions

Vicinity	Type	Owner	Grid-Connected	Name	Installed Capacity	Annual Generation
Bella Bella	Hydro	Central Coast Power[10]	No	Ocean Falls	15 MW	10 GW.h
Bella Bella	Diesel	BC Hydro	No	Bella Bella	4 MW	
Bella Coola	Diesel	BC Hydro	No	Ah-Sin-Heek	7 MW	
Bella Coola	Hydro	BC Hydro	No	Clayton Falls	2 MW	
Prince Rupert	Hydro	BC Hydro	Yes	Falls River	7 MW	45 GW.h
Prince Rupert	Gas turbine	BC Hydro	Yes	Prince Rupert G.S.	46 MW	19 GW.h
Prince Rupert	Hydro	EPCOR	Yes	Brown Lake	7 MW	57 GW.h
Masset	Diesel	BC Hydro	No	Masset	11 MW	
Sandspit	Diesel	BC Hydro	No	Sandspit	10 MW	
Sandspit	Hydro	Coastal Rivers LP	No	Queen Charlotte Power	6 MW	20 GW.h

Only Prince Rupert and adjacent communities are served through the integrated electricity grid. Most other communities in the region require on site diesel or gasoline generators. There is a large net inflow of electricity into the Prince Rupert area from the rest of the BC Hydro system, as the Prince Rupert gas generating station normally operates only in emergencies, such as when the transmission line from Terrace is knocked out of service, or when the entire BC Hydro system is nearing its limits on a very cold day.

A Note on Capacity and Energy Units

Kilowatts (kW), Megawatts (MW), and Gigawatts (GW) measure the capacity to produce electrical energy, which in turn is measured in kilowatt hours (kWh), Megawatt hours (MWh), or Gigawatt hours (GWh). 1 GW is equal to 1000 MW which is in turn equal to 1,000,000 kW. A one kilowatt generator operating for ten hours can produce ten kilowatt hours of electricity. Capacity, whose Imperial measure is the more familiar “horsepower”, is the maximum sustainable amount of power that can be produced at any instant.

No machine is 100% efficient, and very few can operate all 8760 hours in a year, for example, because the wind is not blowing or the stream dries up in summer. To account for real world operations, a capacity factor needs to be applied. Multiplying the capacity of a device to generate electricity (kW, MW, GW) by its capacity factor gives a good estimate of the energy (kWh, MWh, GWh) it is likely to produce. A 1 MW wind turbine would produce

[10] Central Coast Power is in the process of being sold to "Boralex Ocean Falls LP"; the BCUC has given the sale conditional approval, and awaits Boralex's concurrence with the conditions.

8760 MWh or 8.76 GWh per year if the wind is blowing constantly. At a capacity factor of 40 % (favourable for a wind turbine), it would generate 3.5 GWh per year.

Depending on the resource mix of any given power system, wind and other renewable resources can be integrated with more reliable or back-up resources like storage hydro or diesel generators to offset short-term variability. This creates a firmer, and sometimes greener, product.

COMMUNITY ENERGY PROJECTS

When considering opportunities to harness renewable energy to support regional development, it is important to realize the potential offered through community energy projects. When thinking about renewable energy opportunities, people tend to think of Independent Power Producers (IPPs) that develop substantial projects to sell energy to BC Hydro and provide returns to investors from outside the region. Sometimes these larger initiatives bring technologies and skill sets that are only viable through economies of scale. However, it is important to note the many examples of smaller scale projects that are viable at the community level. In fact, these types of projects provide opportunities for sustainable economic development by helping to ensure that the associated economic benefits are realized directly within the communities in which they are developed. As such, they may provide significant opportunities for communities in the Central and North Coast and Haida Gwaii regions currently relying on expensive diesel generators for their energy needs.

A community energy system, also referred to as district heating or district power system, is an integrated and flexible way to distribute heat or electricity to a number of houses or buildings. Their significance to this report is their potential to alleviate demand for large-scale energy supply though the use of local renewable energy resources at scales beyond the capacity of most individual houses and buildings.

Investments in energy conservation and renewable energy sources result in greater job creation than investments in supplying conventional energy: in other words, money spent on conservation or alternative energy creates more jobs than money spent on buying more fuel. A study for BC Hydro[11] estimates a million dollars in consumer spending on energy retrofits creates 30 person years of employment. A million dollars in consumer spending on alternative energy creates 10 person years of work, but only 4 to 6 person years of work is created for a million dollars spent on conventional energy like oil and gas. Moreover, jobs in energy retrofits and alternative energy tend to be located in the community, while spending on fuel supplies tends to create jobs far away from the community.

[11] G.E. Bridges and Associates. "Employment Impacts: Power Smart and Provincial Building Targets", prepared for BC Hydro Customer Care and Power Smart. 2004.

Two basic types of district energy supply are available: local electricity generation from renewables (either tied to a grid or operating as a micro-utility), and district scale heating systems.

District Energy Systems

Smaller, off grid, or remote communities offer good potential for district energy systems. They may also offer attractive niche markets for new district energy supply technologies. Demonstration projects are important in order to commercialize small-scale renewable technologies helping, for example, to improve capacity factors and reduce capital and operating costs.

Biomass, municipal solid waste, landfill gas, and geothermal plants can have capacity factors in the 80 to 95% range, and at current capital costs in the $2000 to $5000/kW ($ 2 to $ 5 million/MW) range[12], may be sufficiently competitive to encourage investments to displace diesel. Hydro, often offering capacity rates in the 50% range, is also a potential candidate. Solar, wind, and ocean generating plants have lower (15 to 40%) capacity factors. This means that larger capacity plants (measured in kilowatts) are needed to generate the same energy output as plants with higher capacity factors, such as hydro and the thermal renewable sources. The price of energy to repay the initial investment in district systems increases for lower capacity factor technologies.

Technical advances are expected to improve both capital cost and capacity factors for solar, ocean, wind, and other technologies. The $ 7 million "Hydrogen Assisted Renewable Power" (HARP) project is particularly noteworthy, as it is scheduled for installation in Bella Coola on the Central Coast in the summer and fall of 2009. HARP is collaboration among BC Hydro, Sustainable Development Technology Canada, and GE Canada to develop integrated electricity storage and smart grid technology to increase the use of renewable power in remote communities. HARP will use an electrolyser to make hydrogen from water using surplus renewable electricity from the Clayton Falls small hydro plant. The stored hydrogen will generate electricity during times of peak demand using sixty 2kW Ballard Power Systems fuel cells that will be stored in vanadium batteries. An optimizing smart grid control system will reduce or perhaps eliminate the use of BC Hydro's diesel plant at Bella Coola.[13]

The technology developed by the HARP project may have broader applications in thousands of non-integrated communities around the world. It may also have ancillary benefits, such as enabling internet and remote medical diagnostic services to remote communities using the HARP system computer network linked to BC Hydro by satellite.

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[12] Globe Foundation. "Endless Energy Project: A Blueprint for Complete Energy Self Sufficiency in British Columbia". January 2007, pg. 33.

[13] For more information on HARP, contact BC Hydro's Powertech Labs, (www.powertech.bc.ca; e mail info@powertechlabs.co). Staff contacts are Allan Grant or Joe Wong.

District Heating Systems

District heating is the other way renewable energy may be incorporated in a community. Most systems today use hot water as the means to distribute heat, although some use steam. Individual buildings no longer need boilers or furnaces; electric baseboards may serve as a back-up. From a system efficiency perspective, a central plant is typically more efficient than small individual furnaces. From an environmental perspective, district heating can reduce fossil fuel consumption and greenhouse gas emissions. And for users, district heating can result in lower heating and maintenance costs.

The most common sources of heat in district systems are biomass and cogeneration. (Cogeneration is the simultaneous production of electricity and useful heat; a district system can make use of heat otherwise vented to the air in the production of thermal electricity). In remote communities with diesel generators, heat can be recovered from the existing plant; in others, a cogeneration plant could be built to provide heat for a district system, with the electricity sold locally or to the grid. In addition to biomass and cogeneration, district scale geoexchange, biogas, and solar hot water may be suitable sources.

The preferred candidates for district heating are higher density developments, recreation complexes, and multiple unit residential clusters. Low density single family housing may be less suitable due to the longer distances over which heat must be distributed.

An initial scoping study to investigate a community's potential for district heating may cost $10,000 to $15,000. Companies involved in developing these systems may be willing to assist with initial assessments.

British Columbia's $20 million "Remote Community Clean Energy Program" provides funding to remote and off-grid communities to support sustainable community energy solutions. The program provides funding for energy advisors, project studies, design capital costs, and project management. Eligible communities can submit an expression of interest via www.empr.gov.British Columbia.ca/EAED in order to access the program, and receive free energy savings kits.

The federal "EcoEnergy for Aboriginal and Northern Communities" program, which began in April 2007, provides $15 million in funding over four years to support work on renewable energy and energy efficiency projects, capacity building, and community energy planning. In addition, about 90 First Nations in British Columbia are undertaking Comprehensive Community Planning, with funding through Indian and Northern Affairs' First Nations Infrastructure Fund and BC Capacity Initiative programs. Energy efficiency and renewable energy can be effective tools in planning processes that help to build healthy and sustainable communities.

RENEWABLE ENERGY TECHNOLOGIES

The following section explores the current state of each of the renewable energy technologies with a view towards the needs and interests within the Central and North Coast and Haida Gwaii.

Wind Energy

Wind energy is the fastest growing energy source worldwide. Wind turbines come in a variety of sizes and shapes, and may be located on land or in the water. The most common turbines are at opposite ends of the size spectrum:

Large wind turbines - 2 to 4 MW turbines found in commercial wind farms on towers up to 100 meters high, and

Micro wind turbines (typically 1 kW, or 1/1000 of a MW) used to recharge batteries in off-grid applications.

Power output is a function of the swept area of the blades and the wind speed. Sites with average annual wind speeds of 6 to 8 meters per second (about 20 to 30 km/hr) are considered to have good potential; mountains and coastal areas tend to fit these criteria.

Onshore wind turbines (wind turbines on land), operate satisfactorily in a wide range of climates and weather conditions. Onshore projects account for about 95% of global investment, and are expected to continue to dominate on a worldwide basis. Offshore projects will increase their contributions as technology improves and costs are reduced. At present, offshore turbines are mostly located in shallow waters of northern Europe, with the United Kingdom and Denmark leading the way. Offshore wind tends to be more constant and predictable, and offshore turbines are larger and more efficient, with capacity factors up to 20 % higher than the same turbines on land.

At the smaller scale, wind energy can make a significant contribution to the electricity needs at the district and individual building level, though wind turbines tend to perform poorly when mounted on buildings.

Global and Canadian Outlook

Wind energy has dominated recent growth in renewable energy. Since the late 1990s, installed capacity has grown at an extremely rapid rate of 30% to 40% per year. Total global installed capacity is over 75,000 MW, and global capital investment in wind energy projects is $15 to $30 billion per year[14]. In Canada, installed capacity has increased by an

[14] Globe Foundation. 2007. Pg. 41

average of 65% per year, to over 2000 MW at 85 wind farms in 2008[15]. (The Mica Dam, British Columbia Hydro's third largest, is 1805 MW). The Canadian Wind Energy Association claims that with effective government policies and incentives, wind energy in Canada could grow to 55,000 MW by 2025. This would represent five times BC Hydro's current installed generation.

Wind in British Columbia

British Columbia's on and offshore wind resources are extensive, but vary from one region to another. Three wind projects were accepted by BC Hydro in its 2006 call for power:

- British Columbia's first wind farm, ***Earthfirst's*** 180 MW Dokie project under construction near Chetwynd, had expected to begin delivery to BC Hydro in early 2009, but is in financial difficulty.
- The ***Bear Mountain Wind Park*** near Dawson Creek, planned as a 34 turbine, 102 MW project, is under construction.
- The 25 MW ***Mount Hayes*** wind farm near Prince Rupert is in the preconstruction phase.

A fourth proposal, the 58 MW ***Holberg project*** on northern Vancouver Island, received a contract from BC Hydro in the 2003 Green Power Call, but did not proceed.

Costs of Wind Electricity

Worldwide expansion of wind generation is largely due to technology advancements (e.g. larger rotors and improved output that has driven down the unit costs of generation), rising and volatile fossil fuel prices, and policies to encourage renewable electricity generation. The fuel is air in motion, which is free. However, the turbines, towers, and transmission connections can be expensive. The cost of wind electricity depends on the upfront capital investment and maintenance costs and the amount of electricity produced. For projects on Crown land, British Columbia plans to impose a modest royalty after ten years in operation that will vary with actual capacity factors.

BC Hydro's report to the BC Utilities Commission seeking approval for contracts under the 2006 Call for Power notes contract prices for the wind projects in the $71 to $91/MWh range.[16](By comparison, contract prices for biomass projects ranged from $78 to $92/MWh and $56 to $95/MWh for hydro projects). More recently, BC Hydro's 2008 Long Term Acquisition Plan ("LTAP") estimates the cost of electricity from wind ranges between $70 and $155/MWh (weighted average unit energy cost at 6% discount rate), with North Coast

[15] For a complete list, see the Canadian Wind Energy Association's website under "Wind Farms" (www.canwea.ca/farms)

[16] This is the levelized plant gate price, before credits, adders, and line losses adjusted the bid prices. See page 14 of the BCUC's Reasons for Decision, Appendix B to Order E-7-06, BC Hydro's Report to the BCUC on the F2006 Call pages 47, 50, and 51, and the 2006 Integrated Electricity Plan and Long Term Acquisition Plan Proceeding Exhibit B1, pages 5 and 6.

offshore projects at the upper end of this range.[17] The Holberg project was not viable at the $55/MWh price offered. Electricity from smaller wind systems has higher costs, usually in the $180 to $440/MWh range.[18] The ultimate cost depends on the site, in particular the wind speed and constancy. Sites that can deliver a capacity factor of 40% (i.e. the blades are turning 40% of the time) or higher are considered very good. A difference of one or two percentage points between a forecast capacity factor and what actually materializes can mean the difference between a profitable project and one that loses money.

A small-scale wind turbine (10 to 100 kW) will cost between $3000 and $8000 per kilowatt. Large turbines are made by only a handful of companies globally, and wait times can be a few years or more as demand has exceeded manufacturing capacity.

The federal government supports wind–generated electricity through a four year, $1.5 billion eco-Energy program for renewables (not just wind), that pays developers a pre-tax subsidy of one cent per kWh for up to ten years to help make them competitive with gas, coal, and large hydro. The program is oversubscribed; the entire amount may be allocated by the end of 2009. The United States offers a more generous subsidy program, with an after-tax Production Tax Credit of 2.1 cents per kWh, or about two and a half times the Canadian subsidy. This on-again, off-again U.S. program has a destabilizing influence, and its existence at any given time influences the economics of long-term renewable exports from British Columbia.

Off Grid Potential

Remote and off grid communities that have sites with average annual wind speeds of around 5 meters per second are potential candidates for wind generation to offset or supplement diesel generation. Wind power can reduce costs while reducing greenhouse gas emissions and other pollutants.

Opportunities also exist in grid-connected communities. Dockside Green in Victoria is piloting the installation of wind turbines on the roof of a building, and the City of Richmond has installed a pilot hybrid wind-solar system, storing the electricity in a battery to power streetlights. The City of Dawson Creek is evaluating the potential for a City-owned wind power project as part of BC Hydro's "standing offer" program, or other types of feed-in tariffs as a way to finance the project.

Siting and Environmental Matters

Wind turbines produce no greenhouse gas emissions, or other emissions to the air and water.

[17] BC Hydro. LTAP, June 2008, Table 3.14 and pg.3-19.
[18] Marbek Resource Consultants. "BC Hydro Conservation Potential Review", p.43. See also CanWEA's website: http://smallwindenergy.ca/en/overview/costs

As wind becomes a mainstream generation source, the number of turbines and their proximity to communities is increasing. The most common criticisms about wind energy are related to impacts on birds and bats, noise, and visual impacts.

While a typical rotation of a rotor blade is relatively slow—perhaps 15 to 18 times a minute—the speed at the tip can reach 250 km per hour. Site selection is key to prevent collisions with birds. Bats can also die from rapid changes in air pressure in the vicinity of the blades.

The economics of wind generation require turbines to be located in areas of reliable, moderate to high wind speeds, frequently along coasts and the tops of ridges and mountains. Visual impacts are associated with the turbines and towers themselves, and their interaction with the landscape. Each turbine in a typical wind farm is about 80 meters high at the hub—or around the height of a 26 storey building—which means they can be seen from up to 25 kilometres away. For some people, wind farms spoil the beauty of the natural landscape. “Shadow flicker” and “blade glint” can result in additional visual impacts.

Operating wind turbines create sound - the rotating blades make a swishing sound and the mechanical components produce a whine or hum. British Columbia is one of five provinces with sound regulations or guidelines. For wind projects on Crown land, British Columbia has a maximum acceptable sound level setback measured at existing residences or property lines.

The sound and visual impacts of offshore wind farms are often greatly reduced due to their remoteness. However, in addition to the potential impacts on birds and sea floor creatures, offshore wind farms may affect fish and marine mammals.

Employment, Social, Cultural, and First Nations Considerations

Table 3shows the employment levels in the construction and operational stages for British Columbia wind project proposals, as reported to the Environmental Assessment Office. While construction employment varies widely, a typical 100 MW onshore wind project would need around 125 person-years of construction labour over one to two years. Most of this work is performed by civil, structural, mechanical, and electrical contractors employing skilled trades people, usually supervised by the turbine manufacturer. Operational jobs tend to be in the 7 to 12 range per 100 MW of installed capacity; most of this work is physically demanding and requires specialized training.

Table 3: British Columbia Wind Proposals: Employment and Investment[19]

Name	Capacity	Capital Cost	Construction Jobs (person years)	Operating Jobs
Banks Island	700 MW	$1400 million	250	70
Bullmoose (Finavera)	112 MW	n/a	125	7
Mt Clifford (Finavera)	80 MW	n/a	125	7
Nahwitti Pt Hardy	200 MW	n/a	125	7
Naikun Offshore	396 MW	$1600 million	2500	30-50
Tumbler Ridge (Finavera)	100 MW	n/a	125	7
Bear Mtn Dawson Ck	102 MW	$240 million	n/a	5
DokieChetwynd	300 MW	$600 million	300	30
Holberg	58.5 MW	$120 million	100	6
Knob Hill	99 MW	$500 million	360	45
WartenbeChetwynd	70 MW	$140 million	50	9

Most turbine and rotor manufacturers are located in Europe; the market is dominated by Vestas, GE Wind, Gamesa, and Enercon. Canada hosts some local manufacturing facilities for complete small wind packages. In Quebec, large blade manufacturing is a "local content" condition of successful bids in the Hydro Quebec requests for proposals. In British Columbia, Vestas had considered Squamish as a possible location of a tower and blade manufacturing plant, which would have created 125-200 direct jobs.

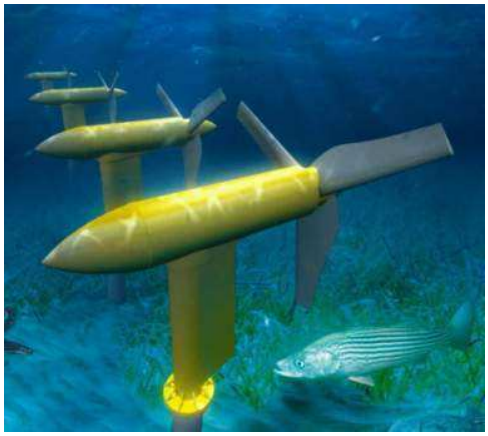
Rural communities hosting wind farms benefit from additions to the property tax base, and private landowners (often farmers and ranchers) from leasing the land on which the towers and transmission line rights of way are located. Community benefits agreements may include amenities such as visitor centres and park improvements. Assembly workers and labourers are needed to install the turbines and towers, but once operational, employment is limited to skilled technical, operations, and maintenance jobs.

Wind power generation—off grid, on shore, or off shore—can be consistent with the principles of the BC First Nations Energy Action Plan, drafted at a province wide forum in 2007. The Plan notes that First Nations creativity, entrepreneurship, and initiation in developing renewable energy resources such as wind, solar, hydro, and biomass could be extremely important in "powering" the future, both for First Nations communities and the Province overall, in a sustainable manner. Wind power may play a prominent role in Coastal First Nations Comprehensive Community Plans, Energy Action Plans, and other opportunities for benefits agreements and equity participation.

[19] Summarized from BC Environmental Assessment Office Project Information Centre, Project Detail Report (http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_detail_report.html)

Ocean Energy

Ocean energy refers to all forms of renewable energy derived from the sea. Canadian technologies concentrate on developing wave and tidal current power generation.



Wave systems capture the energy present in ocean waves and convert it into mechanical energy and then electricity, often using a "displacer" that moves with the waves and a "reactor" that resists the movement of the displacer; and

Tidal current systems that capture the kinetic energy from tidal streams, which are in turn caused by rising and falling tides; most devices being developed for tidal stream energy use some form of underwater windmill to drive a generator.

Ocean thermal gradients and salinity gradients also create currents that offer long-term potential if cost effective energy conversion technologies can be developed.

Global and Canadian Outlook

The World Energy Council estimates that the equivalent of twice the world's current electricity production could be generated by the oceans. The greatest wave energy potential is in mid-latitudes on the eastern side of oceans, including British Columbia. Annual global capital investment in wave systems and tidal systems is $1.2 billion and $1.4 billion respectively. As technologies become more competitive, wave and tidal power "farms" may be built, similar to today's offshore wind farms.

Canada's wave and tidal resources are recognized as among the richest in the world. Should Canada choose to aggressively pursue renewable energy, the National Energy Board forecasts that the country could install up to 21,000 MW of ocean energy projects in British Columbia and Atlantic Canada, which is twice BC Hydro's existing installed hydro capacity.

Ocean Energy in British Columbia

The Ocean Renewable Energy Group (OREG) is a Canadian organization headquartered in British Columbia. OREG asserts Canada's most promising wave energy resources include Vancouver Island and Haida Gwaii, and Canada's most promising tidal stream resources include the waters between northern Vancouver Island and the mainland. The National Research Council estimates wave power off British Columbia could generate 37,000 MW over 915 km of ocean, and the tidal power potential at 89 identified sites is estimated at 4000 MW.[20]

[20] National Research Council of Canada. "Inventory of Canadian Marine Renewable Resources", 2006.

British Columbia is home to several ocean energy development companies, and small-scale demonstration projects like Race Rocks should spur additional development. The tidal turbine operating at Race Rocks, 17 km southwest of Victoria, is British Columbia's first operating ocean energy project. It was developed as a partnership among Clean Current Power Systems, Encana Corporation, Pearson College, and the federal and provincial governments. Using a current-driven 65kW turbine submerged below the ocean surface, the project is producing about 77,000 kW of electricity per year, enough to meet the needs of eight households. A solar PV system and battery bank complement the tidal generation, enabling the Race Rocks lighthouse, foghorn, and marine education centre to operate without diesel generators.

Costs of Ocean Energy

Most ocean energy conversion technologies are at the research, development, or demonstration stages. The challenge is to reduce costs by commercializing the technologies, as happened in the 1980s and 1990s with wind generation technologies.

BC Hydro's 2004 Integrated Electricity Plan estimates of ocean energy costs of $100 to $360/MWh may be on the low side. A recent feasibility study by Hatch Energy on a demonstration tidal power plant on Haida Gwaii estimated energy costs of $660-$880 /MWh (including debt servicing and operations and maintenance), based on a capital cost of $10.6 to $11.6 million/MW.

Off Grid Potential

As technologies improve and costs fall, it is likely there will be commercially attractive applications in coastal British Columbia in future, particularly at locations that are close to high cost diesel generation stations and their distribution systems.

Most off-grid ocean energy systems will need to be designed to run with complementary diesel backup. The Hatch Energy report notes the diesel generators on Haida Gwaii can only accommodate a small amount of intermittent power as currently configured, as they are not designed to stop and start twice a day with the tidal currents.

Siting and Environmental Matters

Worldwide, several tidal barrage plants are in commercial operation, including one in Nova Scotia. Barrages allow tidal waters to fill an estuary at high tide via sluice gates, and then empty at low tide through turbines. Any proposed energy project that would block an estuary is unlikely to proceed because of environmental concerns and interference with navigation. Submerged tidal turbines are much less disruptive.

Ocean energy is a clean and renewable energy resource that emits no greenhouse gases or other emissions. The environmental "footprint" will vary with size, but the area needed is

expected to be smaller than wind or solar installations of similar capacity due to the higher energy density of wave and tidal current resources.

Ocean energy facilities are usually floating moored structures, or built on the ocean floor in shallow water. Proponents suggest that ocean power plants and their exclusion zones can become artificial reefs to enhance biological productivity in the area.

Employment, Social, Cultural and First Nations Considerations

OREG estimates 50 to 100 jobs per 10 MW in manufacturing and installing ocean energy projects, and one operating and maintenance position for every 10 MW of installed capacity.

Hydroelectric Energy

Water turbines used in hydroelectric plants are mature, reliable technologies. The amount of energy generated depends on the volume of water going through the turbine and the height from which it has fallen. A watercourse is either dammed bank to bank (storage hydro), or some of the water is diverted into a penstock (pipe) and flows into turbines on a shallow gradient (run of river hydro). Run of river projects may include low dams or weirs to keep the top of the penstock submerged. The definition of "run of river" is often based on the amount of water stored, usually no more than two days' worth of storage capacity.

Definitions of "small" and "micro" hydro also vary. A common cut-off point in British Columbia is 10 MW for "small", as 10 MW has been a threshold in past BC Hydro calls and is the threshold for the standing offer program. "Micro" may be anything below 2 MW, and in some jurisdictions is considerably lower.

Global and Canadian Outlook

There are over 45,000 large hydroelectric dams in operation worldwide, and97% of world hydropower is supplied by plants with more than 10 MW of capacity.[21] Annual global investment fluctuates as a result of the scale of individual construction projects (e.g. China's Three Gorges dam), varying between $2 and $8 billion a year. At least 40 countries have small hydro plants under construction, and many more are planned.

[21] German Advisory Council on Climate Change, cited in Globe Foundation, pg. 42.

60% of Canada's electricity generation comes from hydro sources. The three provinces where Crown-owned hydroelectricity dominates—British Columbia, Manitoba, and Quebec—are also the jurisdictions with the lowest electricity rates in North America.

Hydro in British Columbia

Over 90% of the electricity generated in British Columbia comes from large storage hydro plants. This generation is the foundation for a reliable, low cost, resilient system, which is clearly advantageous to British Columbia's consumers and the province's competitiveness. The environmental and social costs associated with flooding huge areas were high, and some would probably not have been built if current assessment standards and criteria applied at the time. Also, today's low cost hydroelectricity poses a challenge for other renewable sources seeking to supply the British Columbia market.

In British Columbia there are about 36 small hydro plants generating 3000 GWh per year. 29 of the 39 electricity purchase agreements were awarded to small hydro IPP proposals by BC Hydro in its 2006 call. These 29 projects will generate about 2800 GWh annually, equivalent to the electricity consumed by 280,000 homes.[22]They range in size from the District of Lake Country's 800 kW micro hydro turbine to be installed in a community water reservoir, to the 196 MW Toba-Montrose projects in the watershed to the east of Bute Inlet, which is the southeast boundary of the Central Coast plan area.

With its mountains, streams, and precipitation, British Columbia has significant opportunities to develop small and micro hydro resources. Kerr Wood Leidal undertook a study for BC Hydro entitled "Run of River Hydroelectric Resource Assessment for British Columbia"[23]in November 2007 using a Geographic Information System-based tool to assess the energy and capacity potential of every watershed in the province, and performed a high level cost assessment of developing generation at the sites which the tool indicated to be feasible for development. Over 8000 potential projects were identified.

Costs of Small and Micro Hydro

Most of British Columbia's heritage hydroelectric infrastructure has been paid for, and most of the power so produced is inexpensive. The cost of new hydroelectric power is much higher, given the need for large up-front capital investment. Access to transmission or distribution lines can also be a costly or prohibitive barrier.

While costs are highly site-specific, $2 million per installed megawatt is often used as an order of magnitude. BC Hydro's 2008 LTAP estimates there are 197 potential small hydro projects in the province, with a total potential capacity of 1982 MW and firm energy of 6791 GWh per year, at unit energy costs ranging from $60 to $110/MWh. Unit costs are higher for micro hydro systems.

[22] BC Hydro 2006 Call for Tender: List of Successful New Projects. Assumes average residential consumption of 10,000 kW.h per year.
[23] See Appendix F5 of the 2008 LTAP for further details.

Off Grid Potential

The ability to replace, reduce or supplement expensive and polluting diesel generation is an obvious advantage to developing small and micro hydro in off grid areas. Four hydro projects have been built or renovated by IPPs in off-grid areas (Haida Gwaii, Bella Bella, Dease Lake, Atlin) in response to non-integrated area requests for proposals from BC Hydro.

Opportunities range from tiny systems for individual houses to larger systems in rivers for off grid communities. For smaller systems, handbooks and guides are available from Natural Resources Canada, BC Hydro, and the British Columbia Ministry of Agriculture and Lands, that can help identify opportunities at specific sites, and provide advice on planning, financing, procurement, construction, and interconnection.

Siting and Environmental Matters

Small and micro hydroelectricity is a clean and renewable energy source that releases no greenhouse gases or other emissions. However, they need to be carefully designed and assessed. River ecology can be affected upstream of the powerhouse.There can be terrestrial effects associated with construction, access roads, and power lines in what was an inaccessible area. In general, small hydro installations without storage are less damaging. There have been concerns raised regarding impacts of small and micro-hydro projects in British Columbia on recreation and conservation interests.

In British Columbia, the Comptroller of Water Rights may grant a conditional water license on a first come, first served basis. Critics of this policy suggest this has created a "gold rush" to in effect stake claims on the most promising sites for a minimal up-front fee. The Ministry of Environment keeps an on-line inventory of the status of water licences.

Employment, Social, Cultural, and First Nations Considerations

British Columbia has workforce skills and experience developed over decades of hydro power engineering, development, operations, and environmental management. Given that the resource potential is distributed throughout the province, there are opportunities to diversify regional economies.

Small and micro hydro projects can be developed and owned through a range of partnerships among First Nations, local governments, IPPs, individuals, and co-operatives. Examples include:

- The Squamish First Nation participates financially in the Furry Creek and Ashlu hydro projects;

- The Hupacasath First Nation created the Upnit Power Corporation to develop the 6.4 MW China Creek small hydro plant near Port Alberni. Minority partners include the Ucluelet First Nation, Synex Energy, and the City of Port Alberni; and

- The 2 MW Atlin small hydro project is under construction, initiated by the Taku Tlingit Development Corporation, to displace BC Hydro's Atlin diesel generation station.

Table 4shows expected construction and operation jobs, as well as capital cost and installed capacity amounts, for many of the province's mid-sized private hydro projects.

Table 4:British Columbia Hydro Proposals: Employment and Investment[24]

Name	Capacity	Capital Cost	Construction Jobs (person Years)	Operating Jobs
Crab Europa	134 MW	$150 million	n/a	4
Europa Plutonic	83 MW	$180 million	240	2
Glacier Howser	90 MW	$240 million	450	4
Kokish	55 MW	$130 million	70	2
Nascall R.	71 MW	$150 million	100	6
Kwoiek Cr.	50 MW	$137 million	60	6
Cascade	25 MW	$24 million	105	3
E.Toba/Montrose	169 MW	$250 million	580	13
Forrest Kerr	112 MW	$195 million	130	8
Pingston Ck	45 MW	$35 million	127	1
Upper Harrison	102 MW	$262 million	400	20

Most of the employment opportunities are focused around the development and construction phases, most being skilled trades employed by civil, structural, and electrical contractors. Ongoing labour needs are typically limited to a few full time operators with technical and mechanical skills. Specialized maintenance technicians travel from urban centres for annual turbine and generator maintenance work, and local contractors are hired seasonally for building and road maintenance, and silt and debris removal.

Geothermal Energy

At depths of 1 to 4 km below the surface, highly pressurized water can be superheated to over 100 degrees C. To generate electricity, hot, high-pressure geothermal water is piped to power plants on the surface where much of it explosively boils ("flashes") to steam. The steam drives a turbine and generator to produce electricity, and the residual water is usually returned to the source rock through injection wells to help maintain pressures and

[24] Summarized from BC Environmental Assessment Office Project Information Centre, Project Detail Report

prolong productivity. For lower temperature geothermal reservoirs, the hot geothermal waters are passed through a heat exchanger to heat a secondary working fluid that vaporizes at a lower temperature than water.

"Geothermal" is not the same as "geoexchange". In geoexchange systems, also called ground source heat pumps, heat is pumped from or into the ground through a closed loop pipe system for space heating and cooling of individual or groups of buildings. No electricity is generated. For heating, geoexchange systems extract heat from the earth, relying on a constant ground temperature of around 10 degrees C at depths of 3 meters or more.

Global and Canadian Outlook

Geothermal technologies are mature, combining oil and gas drilling and production technology with conventional steam generation. Size of the resource, temperature, drilling depth, and site and grid access are the main factors affecting commercial viability. Annual global capital investment in geothermal energy is estimated at around $2 billion per year.[25] In Iceland, over 50% of the country's total energy needs are met by geothermal energy, in the form of electricity generation (18%) and space heating (60%).[26] Industry, greenhouses, fish farming, swimming pools, and snow melting account for the rest of Iceland's geothermal use.

There are no operating geothermal power plants in Canada. Drawbacks to development include the high upfront cost of drilling deep wells into rock to confirm the temperature and extent of the resource, and the porosity of the rock in which it is found.

Geothermal Energy in British Columbia

British Columbia has extensive high and mid grade geothermal developments potential in most regions. The hottest known sites, with hot springs at the surface, are often protected areas. Depending on stakeholder considerations, it may be possible to directionally drill under protected areas to deliver steam to a remote plant without affecting the surface of the protected area.

The most promising site in British Columbia is the Meager Creek project north of Pemberton, under development by Western Geopower. While wells have been drilled, the project has yet to demonstrate commercial viability. Its estimated development potential is in the 100-250 MW range.

[25] Scottish Enterprise Report on Alternative Energy, 2004, cited in Globe Foundation, pg.39.
[26] National Energy Authority and Ministers of Industry and Commerce. "Energy in Iceland: Historic Perspective, Present Status, Future Outlook", February 2004, Chapter 5.

Costs of Geothermal Energy

The capacity cost for a geothermal plant is approximately $5million dollars per MW. The 2007 British Columbia Energy Plan's estimated cost of $44to$60 per MWh for electricity from geothermal plants may be low. BC Hydro's 2008 LTAP estimates the unit energy cost of a 100 MW Meager Creek plant configuration at $59/MWh (6% discount rate) to $68/MWh (8% discount rate).

Off Grid Potential

Because they operate at higher capacity factors, geothermal electricity generation offers more firm energy than most other renewable resources. This would reduce the dependence on diesel back-up in off grid locations. While small-scale plants are likely uneconomic with current technology, larger plants developed in response to BC Hydro's needs could also provide clean electricity or displace diesel generation in the vicinity of the plant.

The better potential for geothermal energy in off grid communities may lie in geoexchange systems, which may be suitable for both individual building and district heating. There are about 50,000 ground source heat pumps in Canada, and the estimated growth rate is 40% per year despite high up-front installation costs.[27]Milder coastal climate regions are the preferred locations in British Columbia for geoexchange, although the cost of installing the piping is higher in bedrock.

Siting and Environmental Matters

Geothermal power is a clean and generally sustainable resource that produces few emissions. Impacts of exploratory drilling for the resource are similar to those of oil and gas well drilling. The steam from an operating plant can contain dissolved gases, including carbon dioxide and hydrogen sulphide that can be emitted in the absence of control technologies. Water is normally re-injected, but there may be environmental effects if it is discharged into nearby streams or lakes.

Employment, Social, and Cultural and First Nations Implications

Socio-economic considerations associated with a geothermal plant are similar to those of a biomass plant of similar size, except wells need to be drilled, and there would be no trucking otherwise associated with delivering biomass and removing ash.

In Iceland, geothermal plants are popular tourist and visitor attractions, as most offer a combination of spas and hot springs, interpretation centres, hiking, and other recreation opportunities.

[27] Community Energy Association. "Heating Our Communities: A Module of the Renewable Energy Guide for Local Governments in BC", September 2007, pg. 16.

Bioenergy

Bioenergy, (also referred to as biomass), is "renewable carbon energy", since it is the result of the conversion of biomass (the product of photosynthesis) into two useful forms of energy:

1. Heat and electricity from solid biomass (including wood pellets) or biomass that has been converted to a gas; and

2. Biofuels, such as ethanol from grain or cellulose, or biodiesel from oilseeds and waste greases to replace or supplement gasoline and diesel fuel.

Sources for bioenergy include trees, logging debris, agricultural wastes, food processing, and manure. It tends to be a low-density energy resource with two main advantages - reasonable cost and carbon neutrality.

The forest industry uses residues for fuel when it is less expensive than buying heat or power. Sawdust, bark, shavings, and pulping liquor can provide process steam, heat for kiln driers, and some or all of a plant's electricity requirements. For heat and power generation, combustion is the conversion technology of choice for almost all existing plants. Gasification, which converts biomass into a synthetic gas, is being commercialized as a "low emissions" alternative.

Global and Canadian Outlook

Worldwide, biomass is the fourth largest energy resource after coal, oil, and natural gas.[28] More wood is used throughout the world for heating and cooking than is used for forest products manufacturing.

Global sustainable bioenergy potential is estimated at 100,000 petajoules (PJ) per year, or about one hundred times British Columbia's needs. Forty percent would come from forest residues and by-products, 30% from energy crops, and 17% from agricultural wastes.[29] Biomass is an important contributor to northern Europe's energy mix, driven by a combination of renewable portfolio standards, carbon taxes, government subsidies, and "green power" options for consumers. Global capital investments in electricity generation from biomass were estimated to be $21 billion in 2007, up from $10 billion in 2002[30]. The largest biomass electricity plant in the world is a 240 MW facility in Finland, which has been operating successfully since 2001. The largest in North America is EPCOR's 60 MW Williams Lake Generating Station, which began commercial operation in 1993.

[28] B.W.McCloy, RPF. "The Business Case for Wood Energy", prepared for the Ministries of Forests and Range, Energy, Mines and Petroleum Resources, and BC Hydro, 2006, p. 1.
[29] German Advisory Council on Global Change, cited in Globe Foundation, p. 43.
[30] Scottish Enterprise Report on Alternative Energy, cited in Globe Foundation, p. 47.

Canada has about 7% of the world's landmass and 10% of its forests. Unused biomass from Canada's forestry and farming operations that is not otherwise needed for ecosystem health could provide up to 27% of Canada's energy needs. Bioenergy already complements and extends Canada's fossil fuel resources and its forests and plants sequester 70-100 million tons of carbon dioxide per year. Thanks in part to government funding in research, development, and demonstration projects, Canada is a world leader in the science and technology of biomass conversion to energy.

Bioenergy in British Columbia

The province is supporting the development of British Columbia bioenergy resources through the Bioenergy Strategy, released in January 2008 and available at www.energyplan.gov.britishcolumbia.ca/bioenergy. Much of the focus of the Bioenergy Strategy is in response to the mountain pine beetle kill. Beetle damaged pine provides a major, but not sustainable, supply of biomass that can be used for fuel. The "window of opportunity" for standing dead trees is around 15 years.

Use of British Columbia's biomass for energy may grow from the current 225 PJ to 300 PJ per year over the next decade.[31] Increasing energy self sufficiency in forest industries (by replacing gas and electricity), expanding electricity generation through BC Hydro's bioenergy calls for proposals, expanding British Columbia's pellet production (currently 12 PJ per year), and increased use of municipal solid waste and landfill gas should contribute to this growth. Sustainable biomass supply in the Province is about 400 PJ per year[32], assuming that much of the beetle killed wood can be replenished. Already, British Columbia is home to about half (800 MW) of Canada's biomass electricity generating capacity[33], enough power to meet the electricity needs of one third of BC Hydro's residential customers.

The Ministry of Forests and Range has begun work on wood biofuel supply estimates, but to date there are no specific estimates for the Central and North Coast and Haida Gwaii. BC Hydro issued a Request for Proposals in February 2008 for electricity from projects that do not need new tenures from the Ministry of Forests and Range. Twenty proposals for 4100 GWh per year were received, mostly from existing forest products industries in the Cariboo, Central Interior, and Bulkley-Nechako regions. Four projects, three at existing pulp mills in Prince George, Kamloops and Castlegar, and a fourth at a small biomass facility in Prince George have been offered contracts. A second call involving proposals needing new tenures is expected in 2009.

Not all biomass is turned into electricity. The City of Revelstoke owns a district energy system where woodwaste from a sawmill fuels a boiler that provides heat for drying

[31] Globe Foundation, p. 8, 19, and 48.
[32] Globe Foundation, p. 48.
[33] Forintek Canada Corporation. "A Bioenergy Strategy for British Columbia", prepared for the Ministries of Forests and Range, Energy Mines and Petroleum Resources, and BC Hydro, 2006, p. i.

lumber and for buildings in downtown Revelstoke. Larger landfills have methane gas collection systems that can heat greenhouses as well as generate electricity. A pulp mill in Quesnel provides hot treated water to heat an adjacent tree nursery greenhouse. An urban biomass generation project in Victoria is nearing completion. Using heat and pressure, British Columbia produces over 900,000 tonnes of wood pellets, of which 90% are exported for thermal power production overseas.

Costs of Biomass Electricity

The cost to generate electricity from wood residue is highly sensitive to the cost to acquire and transport the resource to the plant.

The Williams Lake generation station is estimated to sell electricity to BC Hydro at prices in the $60 to $65/ MWh range. A frequently-cited BIOCAP Foundation study estimated the cost of electricity from a 300 MW plant in the Quesnel region to be in the $68-$73/MWh range; however it used outdated labour and equipment costs and assumed a very low cost to supply and deliver the fuel, guaranteed for the life of the plant. More recent estimates for this size of plant are over $95/MWh. This is also the expected contract price range for the Mackenzie Green Energy Centre, the only wood residue biomass project offered a contract in BC Hydro's 2006 call. Other estimates put the cost of electricity using distant standing pine beetle infested wood, or roadside slash, at up to $180/MWh. BC Hydro's 2008 LTAP (page 3-16) estimates the costs of electricity from sawmill woodwaste at $104/MWh, from roadside woodwaste at $132/MWh, and from standing dead trees at $158/MWh. Capital costs for the generating plant depend on the size and technology used (direct combustion, or gasification followed by combustion) are in the range of $2.5 to $3 million per MW of capacity.

Because conventional combustion and steam boiler power generation has strong economies of scale, small plants can rarely compete with grid-supplied power. Capital costs do not fall appreciably below 20 MW, so plants smaller than this are typically cost prohibitive, unless used equipment is bought or the plant is located at an existing forest products facility. However, as described below, there may be opportunities for small-scale generation using wood gasification.

Off Grid Potential

Small-scale wood residue power projects may be feasible in off grid communities, provided there is a readily accessible source such as mill residues or harvesting debris. The use of synthetic gas from wood in a conventional internal combustion engine may be viable for communities now paying over 20 cents/kWh for diesel-generated electricity.

Dupont Canada is exploring the possibility of building small combined heat and power systems from wood residues in northern British Columbia. These would be in the one to three MW range: a one MW plant would need two to three chip truckloads a day, and provide enough electricity for up to 650 homes. The heat released could also fuel a district heating system.

Two established British Columbia firms, Pristine Power and Nexterra Energy, are also examining wood gasification for small, community based power plants at generation costs in the $90 to $120/MWh range. They propose a "British Columbia Bioenergy Network" to convert forest slash and residue into clean, renewable electricity.

A 6.75 MW biomass plant proposed by North Island Power for a site near Port Clements was offered a contract by BC Hydro in 1994. The project did not proceed because of financing and wood supply issues, and the contract was eventually terminated.

Moisture content may be a problem for biomass proposals. Typical interior British Columbia wood residue fuel is 50% water. As a result, much of the inherent energy in wood fuels is consumed in boiling off the water before any useful energy is produced. With coastal wood fuels, moisture content can exceed 80% in winter, making it virtually impossible to burn. Some coastal pulp mills employ hog fuel presses to squeeze out water. Boiler efficiency is also affected by high moisture content wood fuel.

Siting and Environmental Matters

When used for energy, biomass is considered clean and carbon neutral because it releases no more carbon to the air than it absorbed during its lifetime. When used to replace non-renewable sources of energy, bioenergy reduces the amount of greenhouse gases released to the air.

Biomass generation plants or expansions are usually strongly supported by host communities, as air quality often improves due to the closure of beehive burners. Flue gas conditioning is needed to comply with particulate emission regulations, unless the wood is first gasified or transformed into a liquid bio-oil.

Employment, Social, Cultural, and First Nations Considerations

Table 5 shows investment and employment estimates for the Mackenzie Green Energy Centre, and a more recent biomass proposal for Hanceville in the Chilcotin.

Table 5: British Columbia Biomass Proposals: Employment and Investment[34]

Name	Capacity	Capital Cost	Construction Jobs	Operating Jobs
Mackenzie Green	59 MW	$225 million	260	26
Tsilhqotin Power	60 MW	$200 million	150	33

35. Summarized from the BC Environmental Assessment Office Project Information Centre, Project Detail Report.

As with most other thermal plants (e.g. coal, oil, nuclear), biomass generation plants employ more operational staff per unit of installed capacity than wind or hydro. (Bioenergy generation also enjoys higher capacity factors than wind and non storage hydro, so may be more suitable when matched with diesel generation as a backup). Most positions are skilled trades. Truckers are also needed to transport the fuel and haul away ash.

According to British Columbia's Bioenergy Strategy, the Province will create First Nations bioenergy opportunities and invite representatives to speak about biomass community energy systems. However, the First Nations Forestry Council has expressed concerns about the lack of engagement and consultation around the BC Hydro bioenergy call. The pulp and paper industry has also noted that bioenergy plants employ a fraction of the people employed in pulp and paper (9200 jobs in 18 communities). It is concerned that bioenergy plants could create a bidding war for wood residue, forcing pulp mills to curtail production or close. The lower level of competition for available wood residue in much of the Central and North Coast and Haida Gwaii could give these areas a locational advantage for new, small bioenergy facilities.

Solar Energy

Solar energy technology captures incoming solar radiation (sunlight) to create heat and electricity. Solar thermal technologies are commonly used in water heating applications. Photovoltaics (PV) are a semiconductor-based technology, converting light energy into electricity that can be used immediately or stored in batteries. Solar power is intermittent and diffuse, so storage technologies are essential. In addition to solar PV, emerging technologies that concentrate and store solar power offer the best hope of reducing costs.

Global and Canadian Outlook

Global capital investment in solar energy generation is in the $1 to $2 billion per year range. The US Department of Energy forecasts continual cost and efficiency improvements for large scale solar, focusing on concentrator technologies. Most applications in Canada are in remote and off grid areas, and in low-demand circumstances such as communication towers.

Solar in British Columbia

British Columbia has considerable solar energy potential, but it comes as no surprise that average daily solar radiation received in the Central and North Coast region is among the

lowest in the Province, at less than 8.5 MJ/m2.[35] Solar thermal (not PV) is receiving more attention as it is cheaper and the focus of a $5.5 million "Solar BC" program that targets 2000 residential hot water installations by the end of 2010. Solar BC has also selected six "solar communities", including Tofino and the West Moberly First Nation, for additional programs.

British Columbia is also home to solar energy companies (e.g. Carmanah Technologies) which manufacture solar panels, increasingly in plants outside of North America.

Costs of Solar Energy

Solar PV electricity is relatively expensive. The high costs of materials mean the upfront costs are high and payback periods long. Solar PV electricity in British Columbia is expected to cost between $500 and $1700/ MWh[36]. As PV grows worldwide and technology improves, unit cost may decline to under $100/MWh within 20 years in sunny, low latitude locations. A very small household sized (3 kW) solar PV system costs $20,000 to $30,000. A household solar thermal hot water system costs $5000 to $10,000, and would likely be eligible for grants of $1625 through Solar BC.

Off Grid Potential

Solar PV systems may be grid connected or stand-alone. Some British Columbia communities use solar PV to power parking ticket dispensers and pedestrian-activated crosswalk lights. Solar manufacturers may supply systems that also act as roofing or cladding material, offsetting building construction costs. Like wind turbines, solar PV can be a highly visible symbol of a community's commitment to renewable energy.

Siting and Environmental Matters

Solar PV and solar thermal energy are clean and renewable sources that have no fuel costs and no emissions to the air or water. Large "solar farms" require land for vast PV panel arrays which can have significant local siting impacts.

Employment, Social, Cultural, and First Nations Considerations

As with wind projects, most solar PV employment occurs at the off-site manufacturing and on-site construction stages. For solar thermal, Solar BC is sponsoring a registered solar installer contractor program to encourage local job creation and training. Natural Resources Canada is initiating 13 solar demonstration projects across Canada through a $9 million "EcoEnergy for Renewable Heat" program.

[35] Acres Consulting Services Ltd. "Solar Energy Resource Assessment Study for BC Ministry of Energy, Mines and Petroleum Resources, 1980.
[36] BC Hydro's 2004 Integrated Electricity Plan ($700 to $1700/MWh); Marbek Resource Consultants BC Hydro Conservation Potential Review ($500 to $900/MWh).

Perhaps the most ambitious and exciting renewable energy projects in Canada involving First Nations are the solar thermal and PV installations scheduled for 2009 by the T'Sou-ke First Nation, west of Victoria. $400,000 from the Province's Innovative Clean Energy Fund will help finance a 75 kW PV energy system to generate solar power. It will be the largest grid-connected PV system in British Columbia, and it will help meet the T'Sou-ke First Nation's objective of becoming a sustainable solar community. A second 48 kW system is planned. In addition, the federal "EcoEnergy for Renewable Heat" program is assisting in the installation of solar thermal hot water systems on most homes in the T'Sou-ke community. Several T'Sou-ke members are being trained as solar thermal installers through Malaspina College. T'Sou-ke is planning to hold a Solar Community Forum for all British Columbia off-grid First Nations in June, 2009.

Summary and Conclusions

Viable market ready technologies exist to support renewable energy development in the Central and North Coast and Haida Gwaii. Wind and hydro offer the best opportunities in the short to medium term. They use proven technologies requiring low-moderate capital investment. While they have moderate to high siting issues depending on the nature and location of the project, these issues can often been mitigated. The high capital costs associated with ocean, solar and geothermal make them potential candidates in the longer-term as improvements in technology bring down costs.

Biomass may offer some short to medium term viability but the technology is heavily reliant on a readily available supply of wood residue. Small scale biomass projects may be feasible in off grid communities, and larger projects may take advantage of existing infrastructure at sawmills or the mothballed pulp mill facilities at Port Edward. The technologies that support synthetic fuels and bio-refineries are still in the development stages and are generally not yet economically viable.

III. Inventory of Renewable Energy Resources

Section II assessed of the state of various renewable energy technologies and concluded that wind and hydro offer the best potential in the short to medium term for the Central and North Coast and Haida Gwaii. Section III will turn attention to the *known* resource potential in the area.

The following inventory provides a high-level overview of the nature and scope of renewable energy resources in the Central and North Coast and Haida Gwaii. It is based on the best data available at the time of the report. In some cases, raw data was available. However in most cases, the data provided had already been put through a feasibility screening that took things such as access and transmission costs into account.

In all cases, the data that was used for this inventory was considered preliminary in nature and would require additional work to verify findings and support future development decisions. In many cases, the data relates to areas outside the scope of this report. Where possible, the authors have attempted to extract data for the Central and North Coast and Haida Gwaii and make rough approximations.

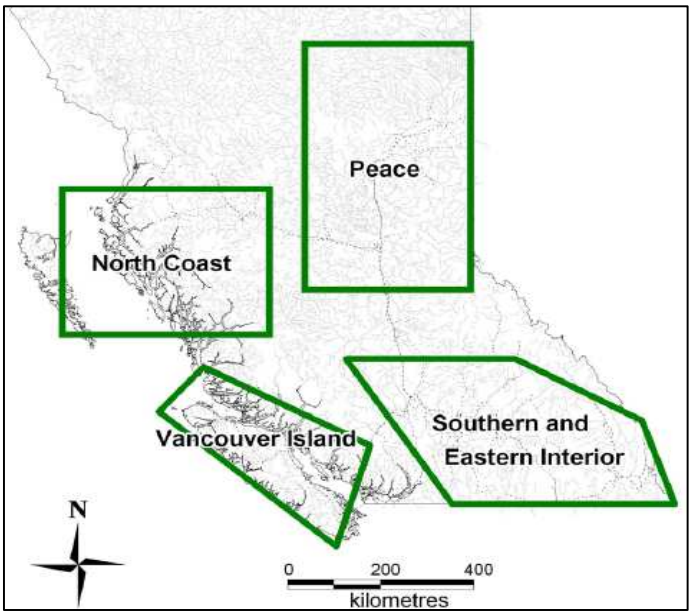
Table 6 offers a summary of the findings in this section. It is based on current inventories about known resources and may not reflect the real potential of any given resource. Quick analysis of the resource potential (in the absence of other limiting factors, such as access to transmission, or market ready technology) suggests that wind, hydro and ocean energy offer the strongest potential for renewable resource development in the Central and North Coast and Haida Gwaii. Further information about the scope and locations of these resources follows.

Table 6: Summary of Inventory for Renewable Resource for the Central and North Coast and Haida Gwaii

	Central Coast	**North Coast**	**Haida Gwaii**
Wind	Uncertain	High	High
Ocean **Wave Energy** **Tidal Energy**	 Moderate - High High	 Low Moderate	 Moderate – High Moderate
Small Hydro	High	High	Moderate
Geothermal	Low-Moderate	Low-moderate	Low-Moderate

Biomass	Uncertain	Uncertain	Uncertain
Solar	Moderate	Low	Low -Moderate

Wind Energy

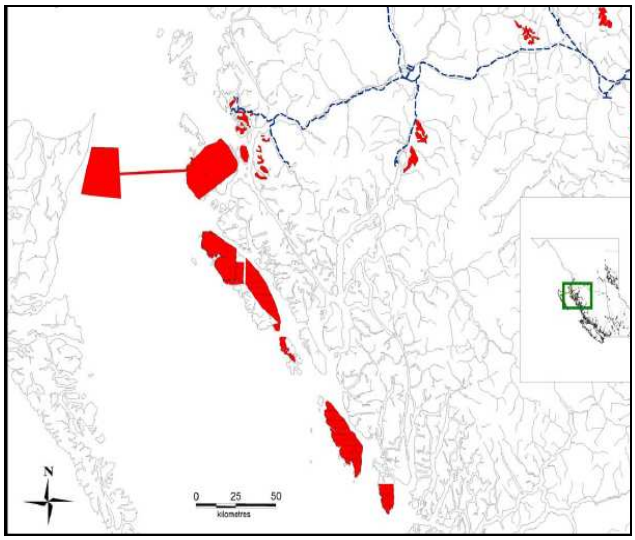


In 2008, BC Hydro released a report by Garrad Hassan that provides an independent assessment of the wind energy potential and the estimated costs of wind energy power generation in British Columbia.[37] The report focused on four regions in the Province that were seen to have the best wind energy potential (Figure 4).

Figure 4 - Four Wind Regions of British Columbia

North Coast / Haida Gwaii

The findings indicate that the North Coast of British Columbia offers some of the best potential for wind energy in the Province. Observation sites used in the Hassan Report included large offshore areas in the Hecate Straight (off the coasts of Haida Gwaii and the Porcher Islands); onshore coastal areas on the east side of the Hecate Straight; and inland areas located near Prince Rupert, Kitimat, Terrace and Smithers (See Figure 5).



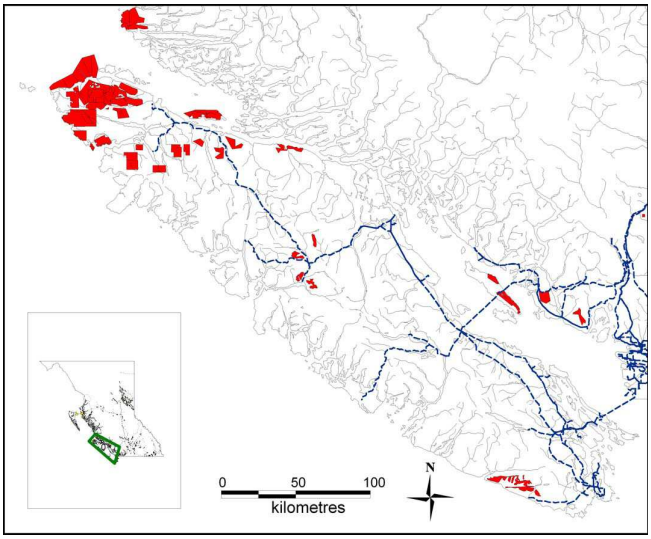
[37] Garrad Hassan "Assessment of the Energy Potential and Estimated Costs of Wind Energy in British Columbia". For British Columbia Hydro and Power Authority. February 2008.

Figure 5: Investigative Use Permit (IPU) Sites of the North Coast Region[38]

The report estimated that offshore sites along the North Coast would receive a mean annual wind speed of between 9.0 m/s and 10.0 m/s at an estimated hub height of 70 m.

Onshore and inland sites were estimated to receive annual wind speeds of between 6.5 m/s and 8.5 m/s at a hub height of 80m. Assuming that 10% of the theoretical wind energy is achievable, the authors projected a total rated capacity of 13GW for offshore initiatives (with capacity estimates after production losses to be in the range of 27-40%.); and 5.0GW for initiatives in coastal and inland areas (with capacity factors expected to be in the range of 34% - 40% on a net basis after production losses).

Central Coast



At the time of Hassan study, only one IUP site existed on the Central Coast (See Figure 6). Data from that site suggests an estimated capacity of 100 MW with site capacity factors estimated at 25%-38% net after production loses. There may be other potential sources of wind energy along the Central Coast, however they have yet to be identified and inventoried.

Figure 6: IUP Sites for the Vancouver Island Region[39]

Ocean Energy

In 2006, the Canadian Hydraulics Centre at the National Research Council released a report providing a preliminary assessment of Canada's wave and tidal energy resources.[40]The report identified a number of areas along British Columbia's coast as having significant potential for ocean energy.

Wave Energy

[38] Ibid. Figure 2.4
[39] Ibid. Figure 2.2
[40] A. Cornett. "Inventory of Canada's Marine Renewable Energy Resources". National Research Council, Canadian Hydraulics Centre. Canada. April 2006.

Wave energy in the NE Pacific is largest in the open ocean and decreases as you cross the continental shelf and approach land. Figures from this study suggest considerable potential along deep water sections of British Columbia's Coast, such as the west coast of Haida Gwaii.
Wave power along the coast can vary significantly from place to place making it difficult to estimate the wave potential of any given point. It also experiences significant seasonal variation with the mean wave power measuring 6-7 times greater in the winter than in the summer.

In the deep waters off British Columbia's coast, the mean annual wave energy flux ranges from 45-55kW/m. There is also significant wave energy potential along the western shores of Haida Gwaii and Vancouver Island with mean annual wave power estimated between 30-40 kW/m. Sheltered inshore locations have relatively mild wave climates and are not strong sources of potential wave energy. Figure 7identifies areas along British Columbia's Coast with the greatest potential for wave energy.

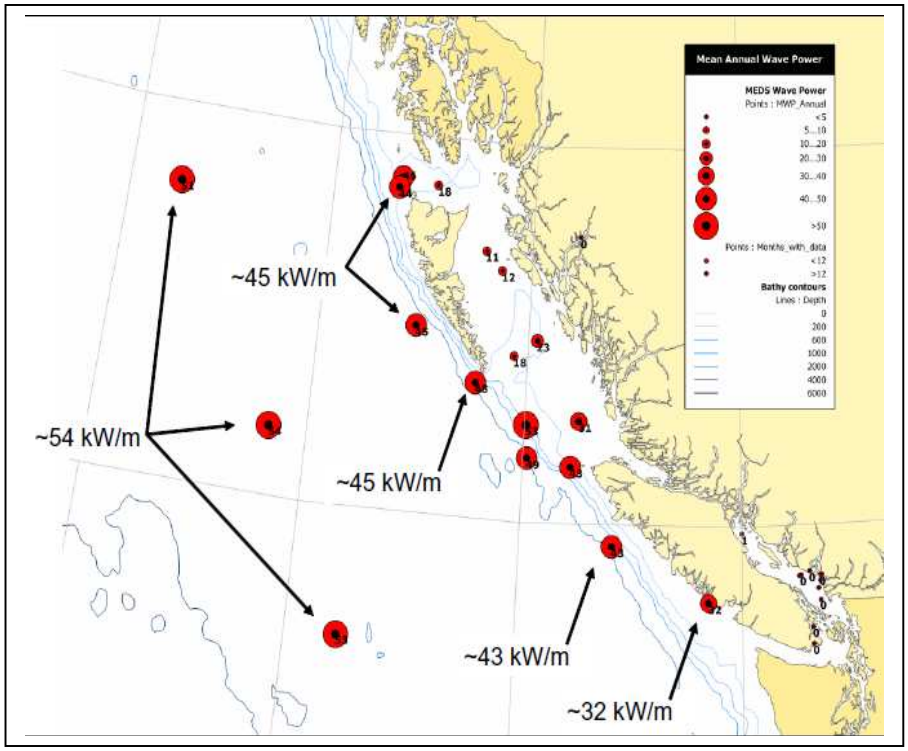


Figure 7 - Annual mean wave power for sites in the NE Pacific[41]

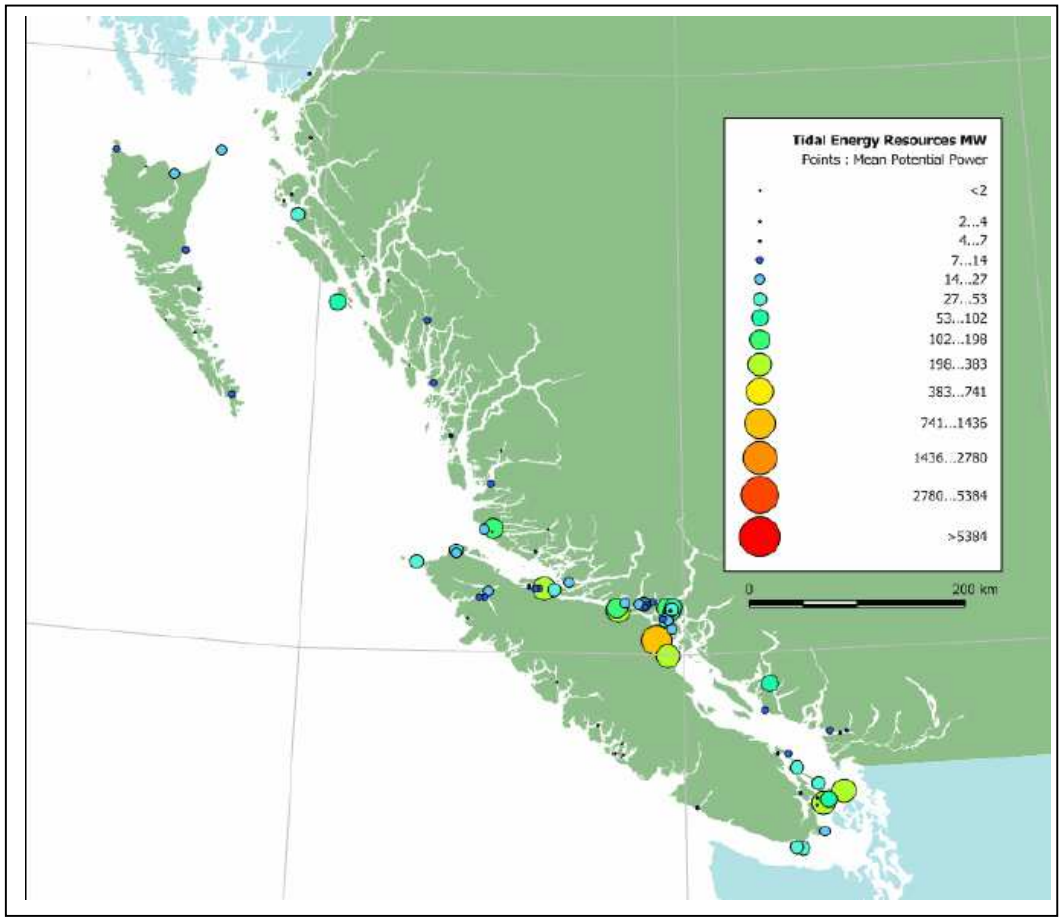
Tidal Energy

Tidal energy is derived from the flow of coastal ocean waters in response to the tides. It is regular, predictable and renewable. Two important factors that influence the magnitude of tidal currents are the phasing of the tides (location and timing of high and low tides) and the presence of narrow passages (concentration of tidal flow). High velocity / high energy flows, (those offering the best opportunities for energy extraction), tend to be confined to very small areas. It is thus very difficult to quantify and assess tidal current energy along an expansive coastline. That being said, they are most often found at entrances to estuaries and coastal embayments, narrow channels or passages between islands, and major headlands. Haida Gwaii, areas off Banks Island (North Coast) and areas between the Central Coast and Vancouver Island are likely spots for strong tidal action (See Figure 8).

[41] Ibid., p. 22

The NRC's study identified 89 sites along British Columbia's coast with a potential mean power greater than 1 MW with a combined total of 400MW.The sites are captured below in Figure 8.

Figure 8: Leading Tidal Current Power Sites, Coast of British Columbia[42]



Of those 89 sites, 18 are along the North Coast, and 9 sites along Haida Gwaii. The Central Coast data is lumped together with Vancouver Island making it difficult to extrapolate.

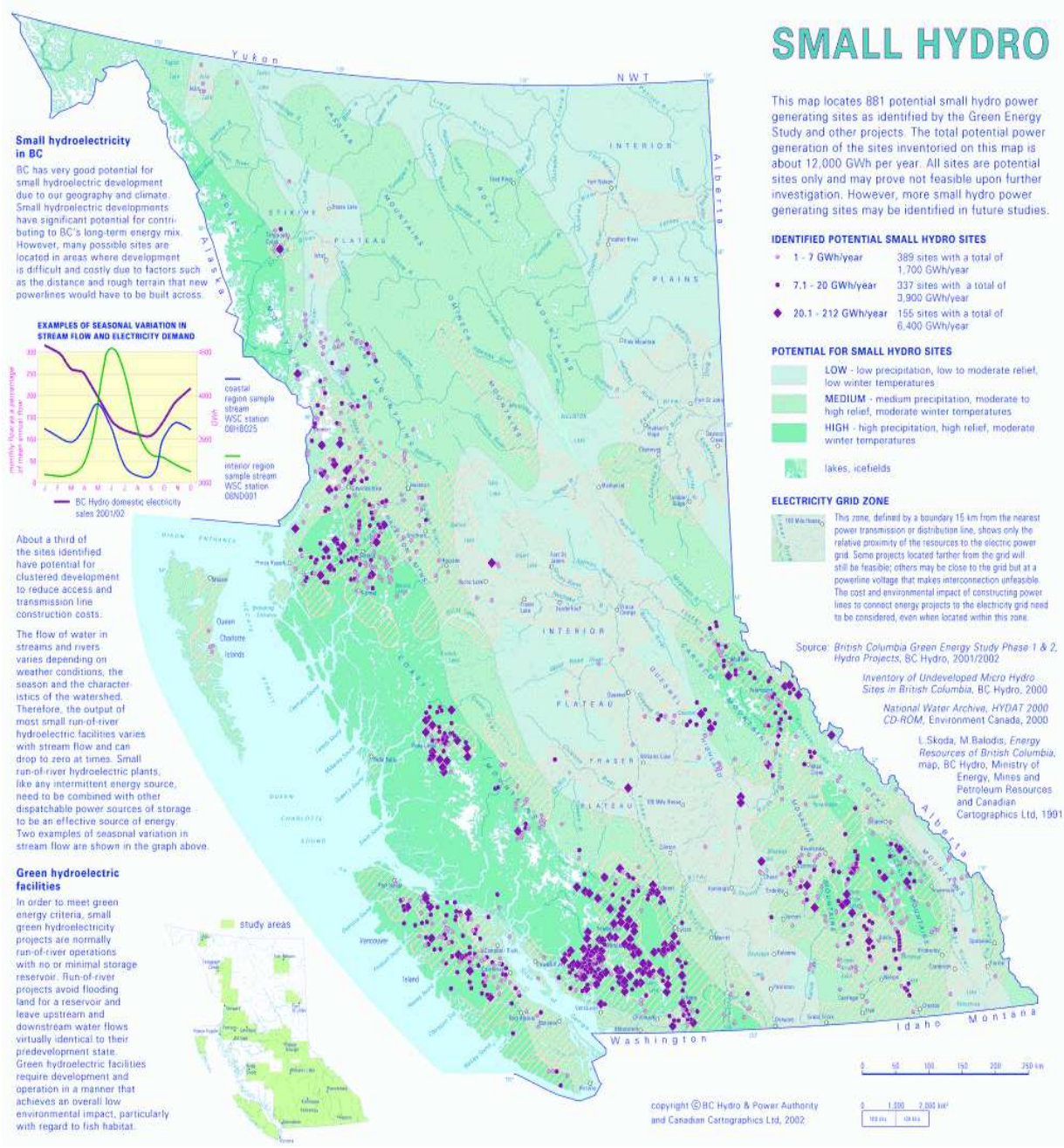
In 2007, the Ministry of Energy, Mines and Petroleum Resources, BC Hydro, and Natural Resources Canada partnered in financing a study of the tidal energy potential at various sites in Haida Gwaii. Detailed data from that study has yet to be released.

Small Hydro

[42] Cornett. 2006. pg. 95

In October 2002, BC Hydro released a report that identified and evaluated small hydro potential across British Columbia using run-of-the-river configurations[43]. Access to transmission lines was considered in potential site selection although opportunities made possible by larger projects, clustering, and future transmission line expansion were considered. Their findings are captured in Figure 9.

Figure 9: Small Hydro Opportunities in British Columbia



[43] Small hydro projects in the inventory include projects between 500kW - 47MW in size.

The findings suggest high potential for small hydro on the Central and North Coast with a number of sites identified. The potential on Haida Gwaii is identified as moderate with several potential sites noted.

In November 2007, BC Hydro and the BC Transmission Corporation commissioned a report by Kerr Wood Leidal to inventory all potential run-of-river power development in the province to complement the 2002 report that focused on small scale operations with access to transmission lines. The 2007report provides aggregate data that does not correspond to the regions of interest in this study. However, the report includes a detailed map that displays the potential power at associated sites which, when enlarged, identifies sites within the Central and North Coast and Haida Gwaii. The map confirms the findings in Figure 9.

Geothermal

British Columbia is located on the Northwest subduction zone on the North American continental plate creating significant potential for geothermal resources. Much of British Columbia's geothermal resource potential is unidentified and largely unknown. To date, the only geothermal project in British Columbia under exploration is the Meager Creek project, located in the Garibaldi Volcanic Belt.

A report produced by BC Hydro in October 2002 identified 16 perspective geothermal sites in British Columbia based on their geologic settings (volcanism faults), evidence of repeated volcanism and the occurrence of hot springs and other geothermal manifestations.[44] Of these 16 sites, 6 sites were felt to offer the greatest potential for commercial production based on their resource characteristics and distance to existing transmission lines. None of those 6 sites fall within the boundaries under discussion in this report. The closest was the Lakelse Lake region near Terrace. The data from this study have not been made public, nor have the names and locations of the other 10 potential sites identified.

Work conducted in the early 1980's by the Ministry of Energy and Mines found high to moderate potential for low grade[45] geothermal energy reserves in the Central and North Coast and Haida Gwaii. Their findings are displayed on the map below (Figure 10). There is one area located south of Bella Coola, in the Central Coast region, as well as two small areas on Haida Gwaii that are listed has having high to moderate potential for high grade[46]geothermal energy.

[44] The full report and associated findings is not being made public. BC Hydro released a summary of findings in its Green Energy Study.
[45] Gradient heat up to 200° F
[46] Gradient heat greater than 200° C, directly convertible to electricity.

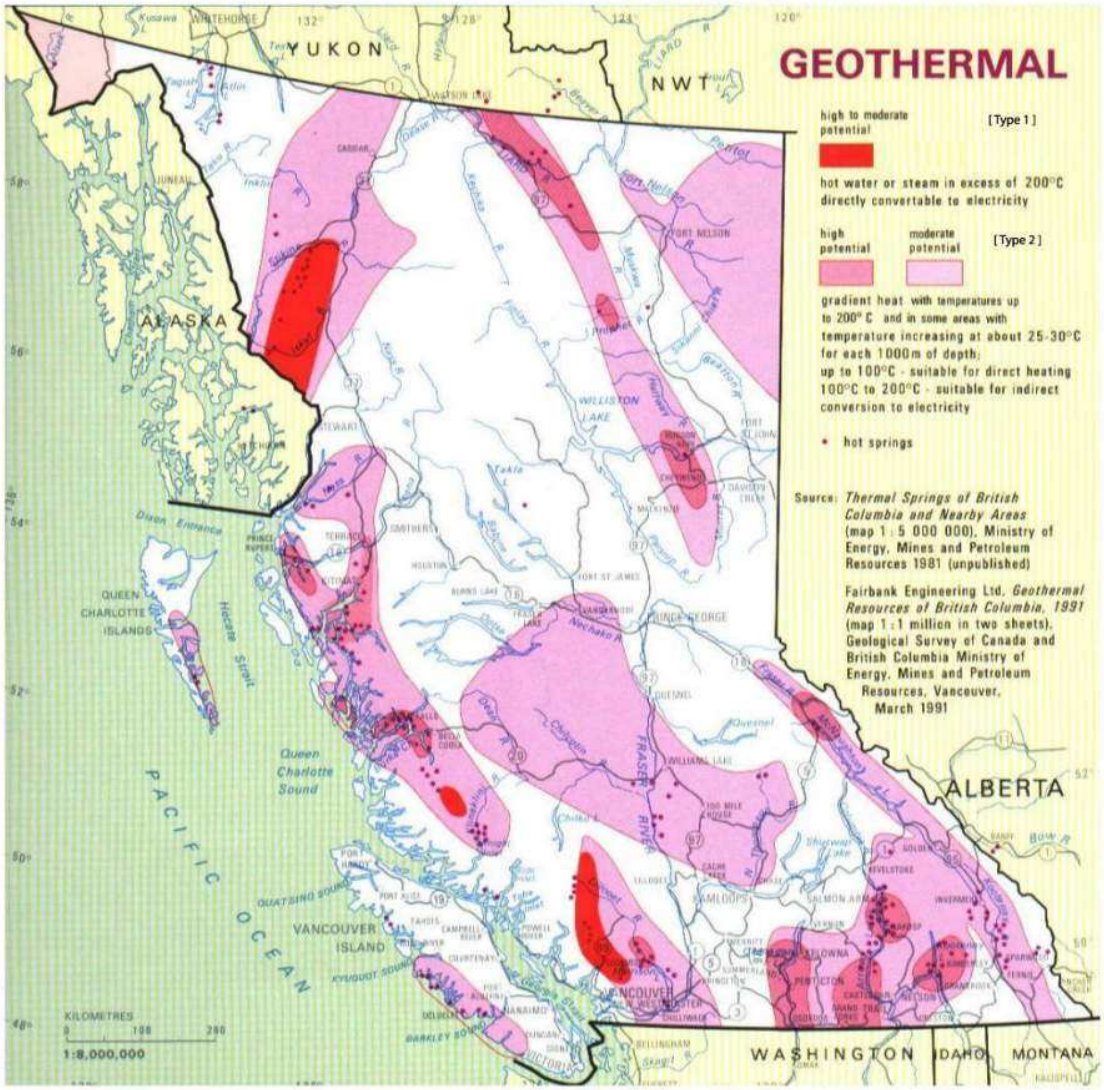


Figure 10: Geothermal Energy Potential in British Columbia

Biomass

Woodwaste provides the largest potential source of biomass in British Columbia. At present, there is a high degree of uncertainty regarding the potential supply - no inventory has been done for the Central and North Coast and Haida Gwaii. While significant attention has been paid to opportunities created by pine beetle kill[47], questions remain as to whether this could be an economically viable source of biomass for the Central and North Coast and Haida Gwaii.

[47] The Ministry Energy, Mines and Petroleum Resources and the Ministry of Forests had a report prepared called *An Information Guide on Pursuing Biomass Energy Opportunities and Technologies in British Columbia*, that suggests pine beetle kill could support 11,014,618 dry t/yr for a period of 20 years.

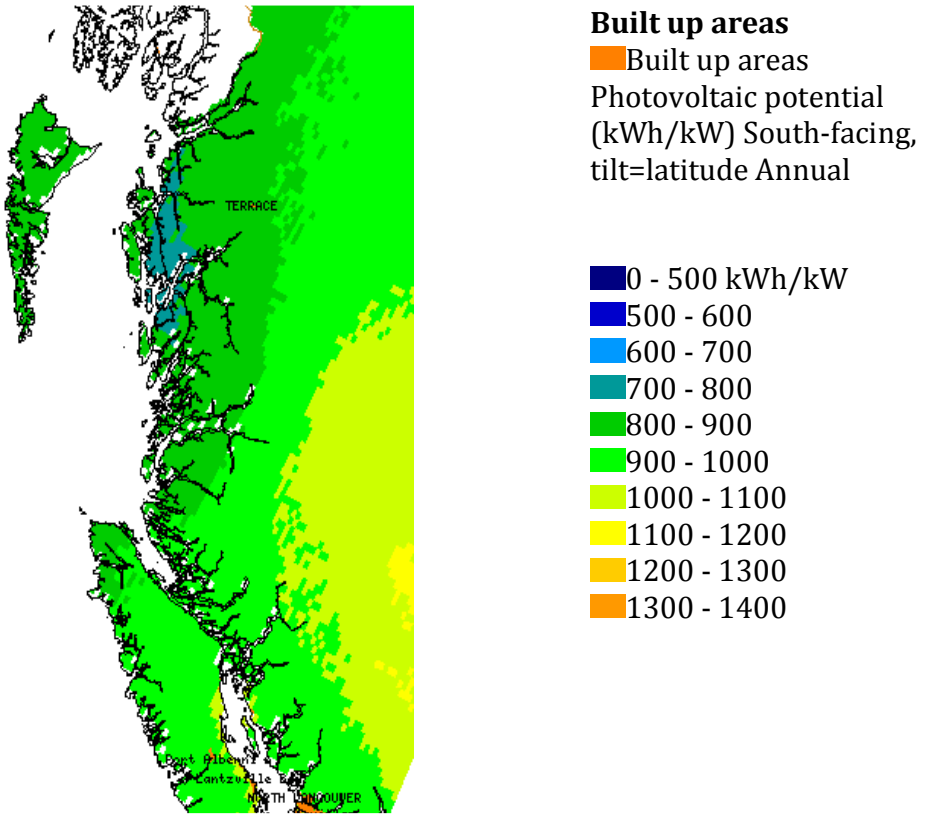
The most abundant source of woodwaste is wood residue, which comes from saw mills and other forestry operations. New co-generation facilities and a growing wood pellet industry are expected to consume much of the available resources. Opportunities associated with harvesting residue are also difficult to quantify, and at this point, considered cost prohibitive.

Other sources of biomass energy include municipal solid waste (landfills being the primary source), demolition and land clearing waste, and agricultural waste. Again, no inventories identifying this potential exist. Current technologies and economies of scale limit these activities to areas with close proximities to urban centres.

Solar

Solar energy potential in British Columbia varies greatly between summer and winter. Photovoltaic and solar resource maps for Canada were developed by the Canadian Forest Service (Great Lakes Forestry Centre) in collaboration with CANMET Energy Technology Centre, Natural Resources Canada. They can be accessed at https://glfc.cfsnet.nfis.org/mapserver/pv/index.php Figure 11, which was generated from this site, gives a rough indication of the annual photovoltaic potential of the areas under study.

Figure 11: Annual Solar Photovoltaic Potential, south facing panel.



As Figure 11 indicates, the Central and North Coast and Haida Gwaii have only moderate solar energy potential at best which fluctuates greatly throughout the year.

Summary and Conclusions

The available renewable energy resource inventories clearly signify that wind, ocean and hydraulic energy are the most abundant and promising renewable energy resources in the Central and North Coast and Haida Gwaii. When considered in isolation, (in the absence of other constraints such as technology readiness and transmission capacity), they provide some of the best renewable energy opportunities for the area in the short to medium-term.

The potential strength of biomass is currently unknown but may prove to be significant, offering additional opportunities for renewable energy development. Solar and geothermal resources are relatively weak and offer limited potential in the Central and North Coast and Haida Gwaii in the foreseeable future.

When one pairs the findings in Section III regarding resource potential with the findings in Section II – the state of renewable energy technology – a picture begins to emerge that favours the development of wind and hydraulic energy over the short to medium term. While ocean energy offers some exciting potential, high start-up costs and the risk associated with the relatively new and untested technologies will likely delay development interest in the short-medium term.

IV. Current Renewable Energy Projects

The inventory in Section III confirmed that the Central and North Coast and Haida Gwaii are endowed with significant renewable energy resources, in particular from wind, water and ocean. When combine with the findings in Section II (State of the Technology), a picture of potential development opportunities for the Central and North Coast and Haida Gwaii begins to form. However, as we will see, market ready technology and the availability of renewable energy resources alone are not an accurate indication of the renewable energy development potential of an area. There are a number of additional factors that influence whether a resource is developed or not, many of which will be explored throughout this report.

Section IV looks at current and pending renewable energy projects within the Central and North Coast and Haida Gwaii in an effort to better understand the 'real' development potential of the area. It identifies and maps the interests of :

- proponents involved in varying stages of provincial regulatory processes,
- proponents who have responded to BC Hydro's Clean Energy Call, and
- projects that are awaiting construction, under construction or operational.

When combined, these indicators provide a snap-shot of current development interests in the Central and North Coast and Haida Gwaii. While limited by its time-sensitive nature, (a slight change in the development environment, e.g. the introduction of a new transmission corridor, could rapidly change the picture), it provides a baseline for the Central and North Coast and Haida Gwaii by indicating current development interests under the current constraints.

Table 7 provides a summary of the renewable energy projects currently being pursued within the Central and North Coast and Haida Gwaii

Table 7: Summary of Renewable Energy Projects Underway in the Central and North Coast and Haida Gwaii

	Central Coast	**North Coast**	**Haida Gwaii**
Total Number of Project Sites as of Nov. 2008	Wind: 6 Water: 63 Ocean: 14	Wind: 29 Water: 30 Ocean: 0	Wind: 2 Water: 2 Ocean: 0

	Central Coast	North Coast	Haida Gwaii
Total Number of Wind Power Projects at Licence of Occupation (Monitoring) Stage as of Nov. 2008	1	14	1
Total Number of Projects Bid into the BC Hydro 2008 Call for Clean Power (2008 Call Bid)	1	2	1
Total Number of Projects Currently in the BC Environmental Assessment Act (EAA) Process	2	3	1
Total Number of Projects with Existing BC Hydro Electricity Purchase Agreements (Operational and Not Operational)	1	4	1

***Note: Any particular project may appear in more than one category

A quick analysis of the renewable energy development interest in the Central and North Coast and Haida Gwaii suggests several things. Firstly, when compared to other regions in the province, the development interest in this region is currently quite small. Secondly, development has been focused on hydro and wind with a growing interest in ocean energy (this should not come as a surprise based on the findings of Section II and III). Thirdly, the areas of interest follow existing transmission lines, which not surprising considering the costs associated with constructing long transmission lines to connect with the existing transmission grid. In fact, transmission constraints in the Central and North Coast and Haida Gwaii may be one of the biggest factors in determining development interest. (Issues related to transmission are discussed in detail in Section VI).

IPP'S PURSUIT OF PROJECTS – AN INDICATION OF INTEREST

A useful indicator of development potential for renewable energy resources in the Central and North Coast and Haida Gwaii is the interest that has been shown by independent power producers (IPPs) through the pursuit of projects. This interest may be demonstrated by:

1. submission of applications for provincial authorizations;

2. bidding into a BC Hydro Call for Electricity and being awarded an electricity purchase agreement (EPA); and,

3. entering into the British Columbia *Environmental Assessment Act* (EAA) process.

IPP projects are seldom if ever built on speculation as financial institutions require proof of a guaranteed revenue stream before lending money to construct a facility. Companies generally begin the project development process with the submission of Crown land applications. They then, with the exception of large, financially robust proponents, await

the award of an EPA before commencing the costly process of collecting data, undertaking studies, designing a project and completing the various federal, provincial and local government regulatory processes. Identifying proponents engaged in these various processes provides useful insight into the development interest in Central and North Coast and Haida Gwaii.

It is important to note that none of the above-mentioned actions guarantees that a project will be constructed. Of the more than 700 applications for waterpower IPP projects the Province received over the last 20 years, only about 35 projects, or 5%, have actually been constructed. This is also true of projects which have received an EAA Certificate and/or an EPA. Recent examples include the 58.5 MW Holberg wind farm on northern Vancouver Island and the 112 MW Forrest Kerr waterpower project on the Iskut River, both of which received EAA Certificates and were awarded EPAs in 2003 but have not been constructed.

An Overview of the Development Process

The development process varies slightly depending on the renewable resource in question. For example, with run-of-river proponents, the provincial regulatory process begins with the submission of applications for both a water licence and Crown land tenure. Wind power and ocean energy proponents follow a different process. Their process begins with the submission of an application for an investigative (use) permit. This permit allows the proponent to conduct studies to identify potential monitoring sites– it does not provide for the installation of improvements or works. After suitable sites for monitoring the wind or ocean energy resource have been determined, an application for a licence of occupation (monitoring) is submitted. Issuance of this licence would allow the installation of monitoring equipment such as anemometers on the top of towers. If monitoring confirms that the resource potential is sufficient, an application for a licence of occupation to construct a wind farm or ocean energy facility would then be submitted.

A provincial EAA Certificate may also be required if the generating capacity is equal to or larger than 50 MW, the transmission line is equal to or longer than 40 kilometres, the proponent requests that the project be included in the EAA review process, or the Minister designates the project as being reviewable.

The following sections identify and map proponents at varying stages of the development process.

1. Sites for which Crown Land Tenures have been Issued or Applied

The submission of applications for a water licence and/or Crown land tenure may be considered the first step in building a project (after a preliminary assessment of the resource potential at that location). The Province uses a "first-in-time, first-in-right" approach to providing opportunities at any given location. Submission of these applications provides the proponent with a level of exclusivity at the site of interest. While the submission of an application gives no certainty that a project will proceed, completion of these and other regulatory processes does confirm that a proponent is serious in

pursuing a project, whether those processes involve water licences, Crown land tenures or EAA Certificates. A proponent who has obtained the necessary authorizations is also better positioned to bid into a BC Hydro call for electricity, as any risk associated with potential failure to obtain those authorizations will have been eliminated.

Figure 12identifies and maps all of the IPP sites applied for and tenured in the Central and North Coast and Haida Gwaiifor water, ocean and wind power as of November 2008.It provides a sense of how and where the development interestsare divided among the three regions.Figure 13 and 14 look in more detail at each of the regions of interest.

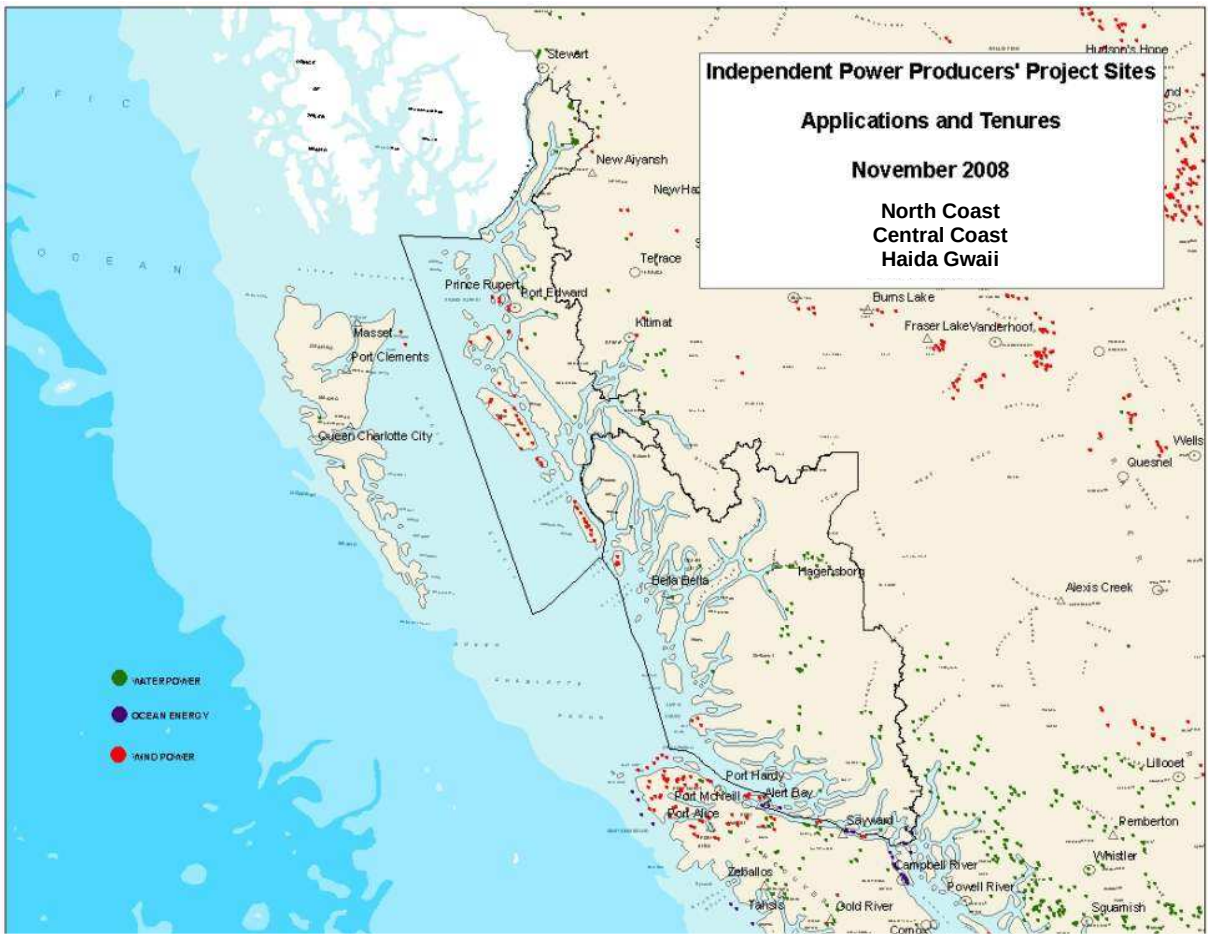


Figure 12: IPP Sites, Wind, Ocean and Waterpower - Central and North Coast and Haida Gwaii

North Coast and Haida Gwaii

In the North Coast and Haida Gwaii, 11 companies have applied for or obtained Crown land tenures and water licences for waterpower projects at 32 sites and 10 companies have applied for tenures for wind power projects at 31 locations. They are captured in Figure 13 below. (See Appendix 2 Table 1 for raw data).

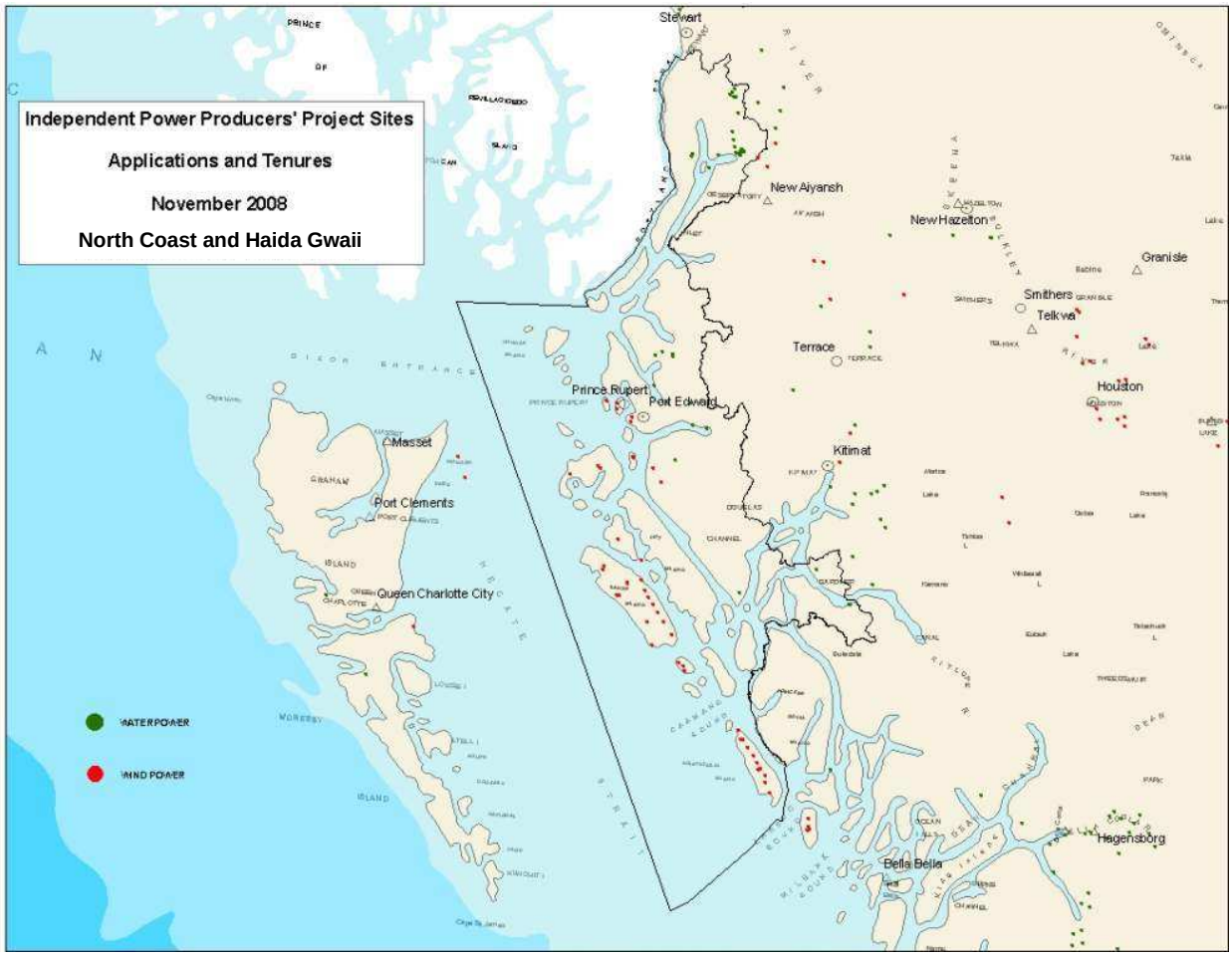


Figure 13: IPP Applications and Tenures for North Coast and Haida Gwaii

Central Coast

In the Central Coast, 3 companies have applied for or obtained investigative permits for tidal energy projects at 14 sites in the straits and narrows between Vancouver Island and the mainland, 13 waterpower companies for water licences and tenures at 63 sites, and one (1) company for investigative permits for wind power at 6 sites. These sites are captured in Figure 16below. (See Appendix 2 Table 2 for the raw data).

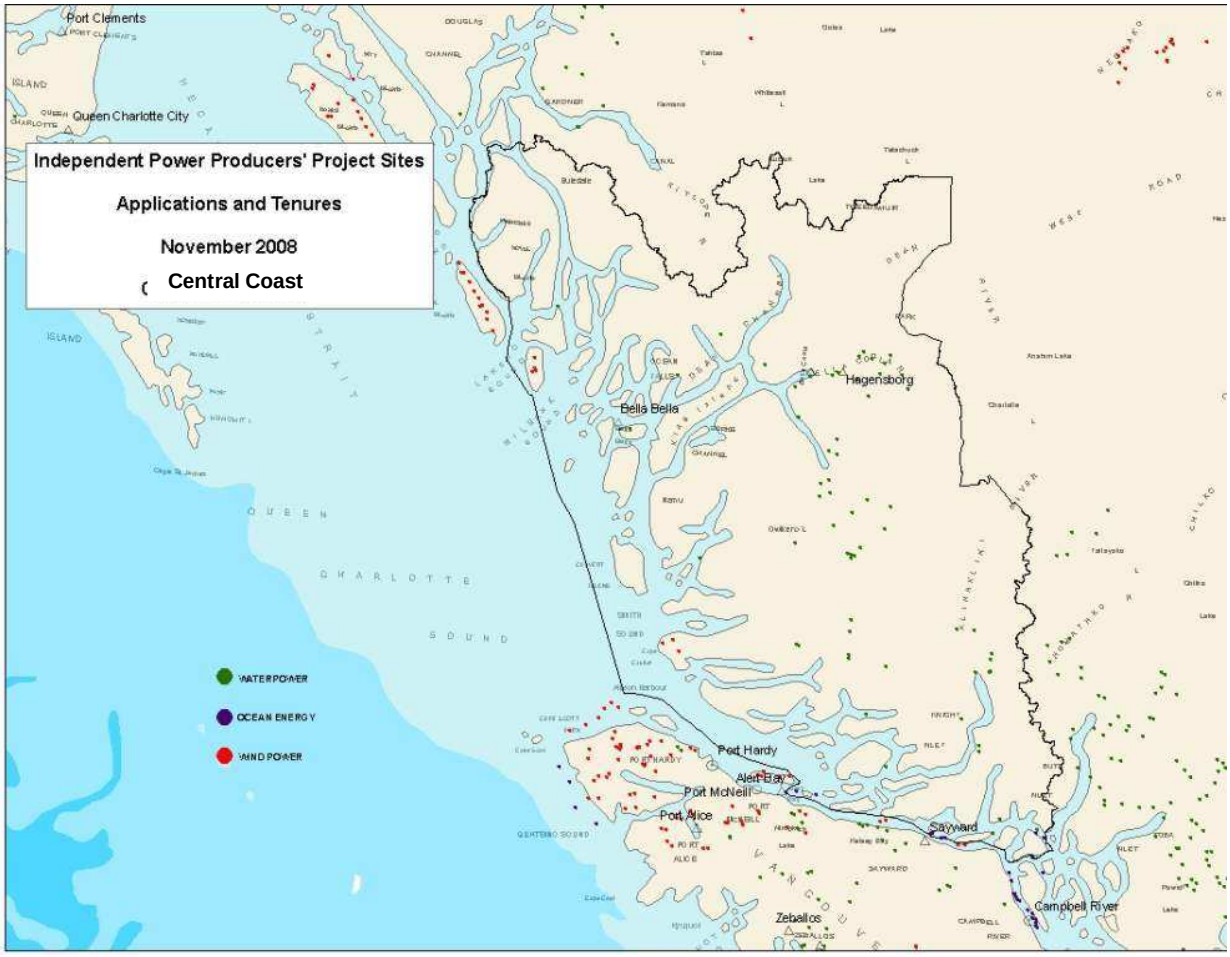


Figure 14: IPP's Project Sites Application and Tenures in the Central Coast

British Columbia-Wide Picture

It is useful to compare the IPP development interest in the Central and North Coast and Haida Gwaii to that within the province as a whole. Figure 15shows the distribution of applications and various Crown land tenures issued for waterpower, wind power and ocean energy sites throughout the province.

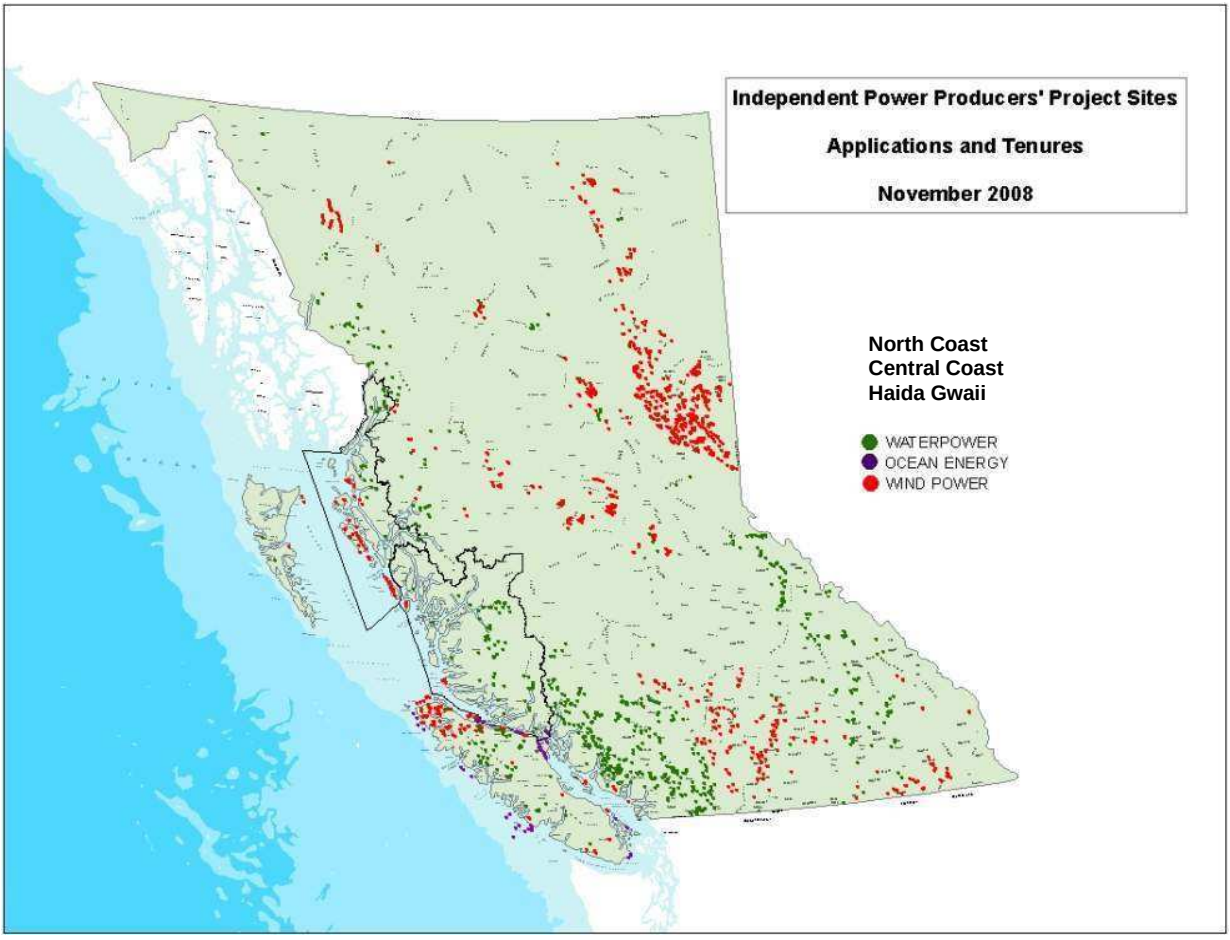


Figure 15: IPP Project Sites Applications and Tenures for British Columbia

It is readily apparent that in spite of the renewable energy resource potential within the Central and North Coast and Haida Gwaii, this region lags behind other regions of the province for IPP renewable energy development. This is primarily due to constraints with existing transmission infrastructure and is not reflective of the resource potential. The cost of constructing long transmission lines to connect with the existing transmission grid can be prohibitive for many proponents. Unless the potential generating capacity is large enough to create sufficient revenue to offset these costs, and also compensate for the electricity lost in transmission, renewable energy development may be limited to large projects, or those located close to existing transmission infrastructure. Figure 16 shows the provincial transmission grid. When compared to Figure 15 above, one notes the clustering of renewable energy projects with easy access to the current transmission infrastructure. (Transmission is dealt with in detail in Section V)

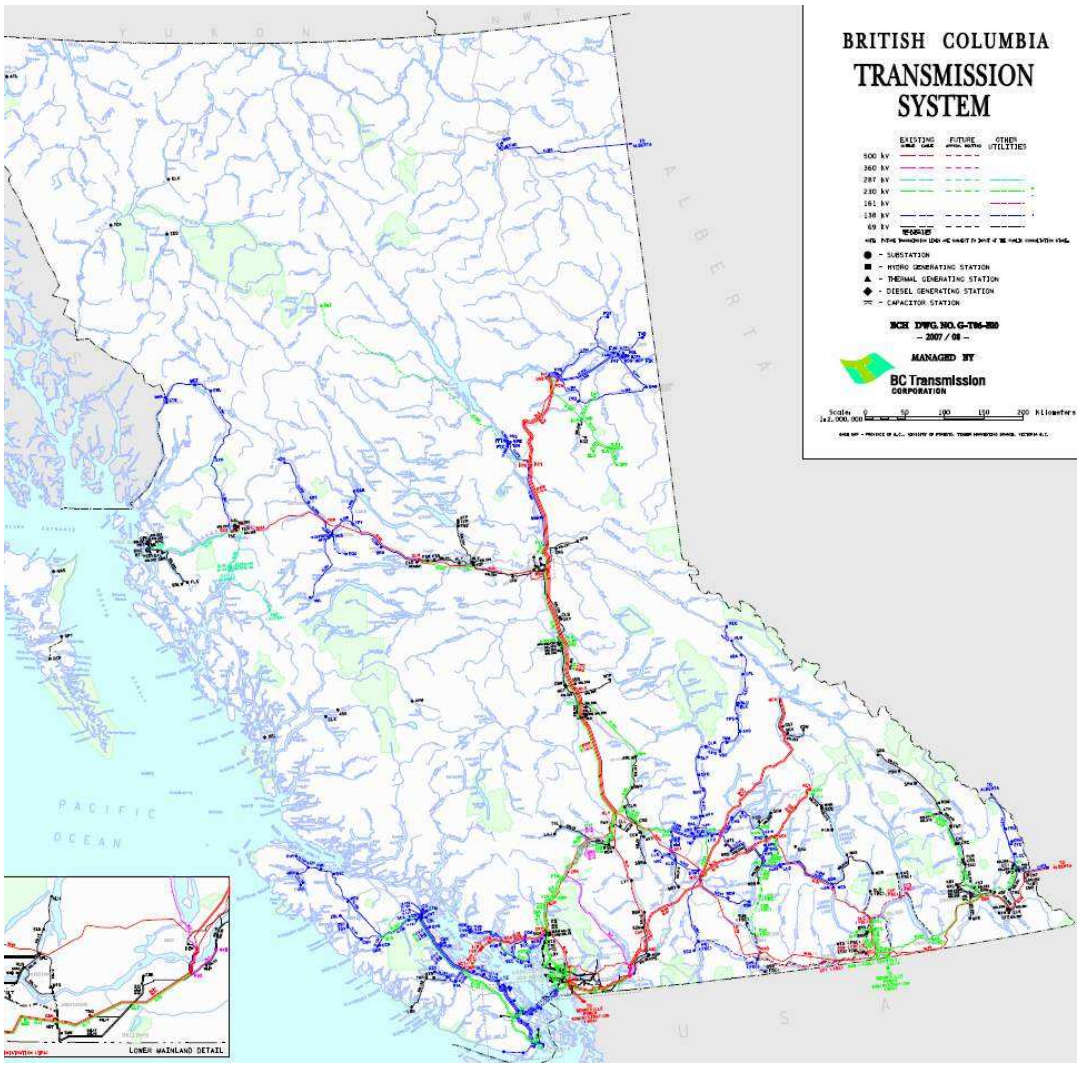


Figure 1**6:** British Columbia Transmission Grid

2. WIND ENERGY – LICENCES OF OCCUPATION

Mapping the sites of wind power applications and tenures (i.e. Investigative Permit) identifies preliminary interests in developing wind energy within the Central and North Coast and Haida Gwaii (See Figures 12). This picture is further enhanced by the study of requests for Licences of Occupation (Monitoring).

A Licence of Occupation (Monitoring) is a better indication of a company's progress in pursuing a project than an Investigative Permit. It authorizes the installation of wind monitoring towers to collect the data necessary to verify the potential of the wind resource at that site. Wind towers typically cost $100,000 to install and thus demonstrate a

significant financial commitment in pursuit of a project. Figure 17 shows the locations of those sites in the Central and North Coast and Haida Gwaii for which a Licence of Occupation (Monitoring) has either been applied for or issued.

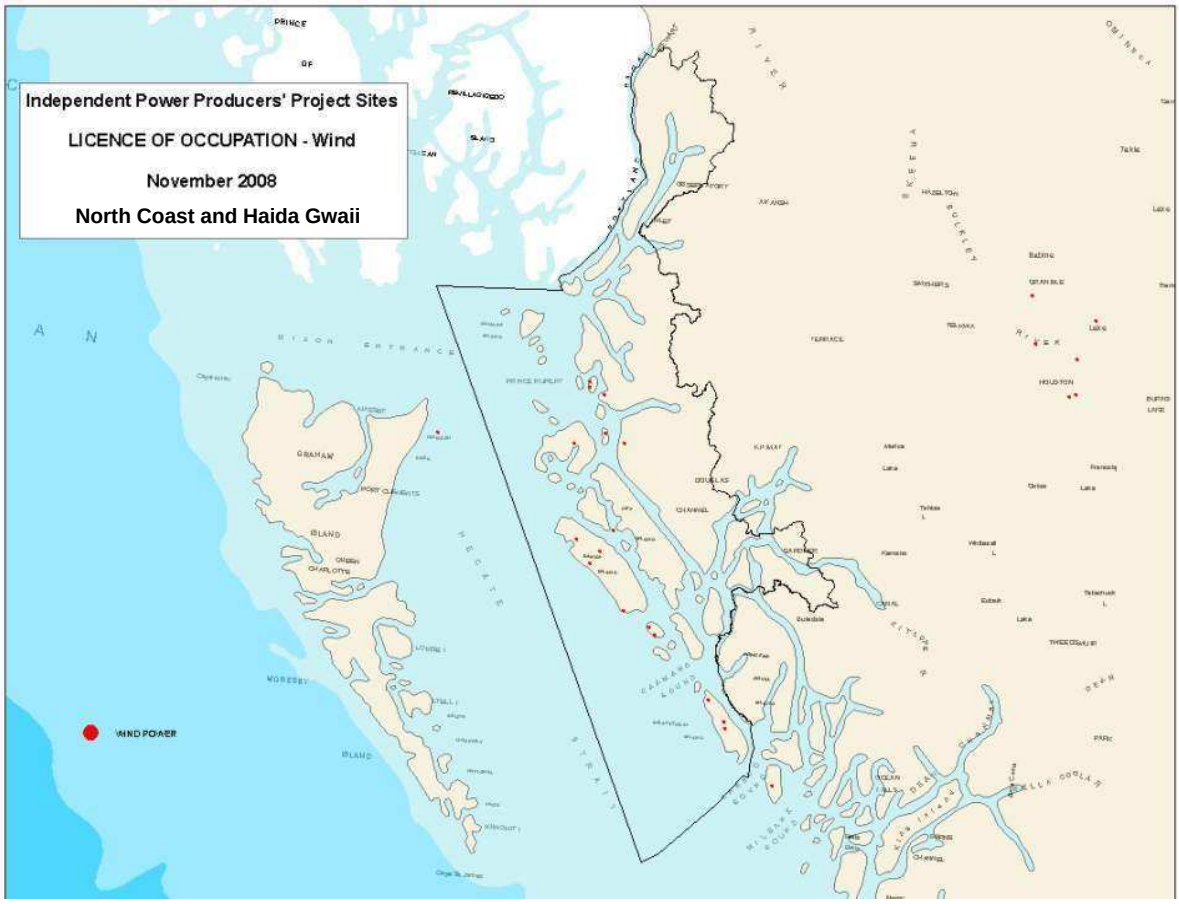


Figure 17: Wind Power Project Sites - Licence of Occupation (Monitoring) in the North Coast and Haida Gwaii

Figure 17 confirms that as of November, 2008, there were 15 sites along the North Coast and Haida Gwaii for which wind data is being, or will be, collected to support a potential wind farm at those locations. This is contrast to the 31 sites for which Investigative Permits have been applied for or issued that were captured in Figure 13.

Only one proponent has applied for a Licence of Occupation (Monitoring) to assess the wind resource potential in the Central Coast, at a site on Price Island south of Aristazabal Island.

Three wind energy projects in the Central and North Coast and Haida Gwaii have advanced beyond the Licence of Occupation (Monitoring) stage, demonstrating significant commitment to developing the resource potential. They are:

- Mount Hays wind farm near Prince Rupert (issued a Crown land tenure to construct the project),
- Nai Kun Wind Development, Inc. project located offshore in Hecate Strait, (in the EAA process), and
- North Coast Wind Energy Corp. project on Banks Island (also in the EAA process).

3. BRITISH COLUMBIA HYDRO 2008 CALL FOR CLEAN ELECTRICITY (EPA)

BC Hydro implemented another call for 5000 gigawatt hours per year of clean electricity in 2008. On November 25, 68 proposals were received from 43 registered proponents in response to the call. In aggregate, the 68 proposals represent a total firm energy output of approximately 17,000 gigawatt hours from 45 hydro projects, 19 wind projects, 2 waste heat projects, 1 biogas project and 1 biomass project.

Four companies submitted bids for electricity-generating facilities located within the Central and North Coast and Haida Gwaii. They are Confederation Power Hydro Limited Partnership (formerly known as Alice Arm Hydro Electric Corp.), Kleana Power Corporation, Naikun Wind Generating Incorporated, and North Coast Wind Energy Corporation (a joint venture between Katabatic Power Corp. and Deutsche Bank AG). A fifth proponent, Plutonic Power Corporation and GE Energy Financial Services Company, proposes to build a cluster of 17 waterpower generating stations for which a portion of a transmission line would be located just inside the southern boundary of the Central Coast. These projects are identified and marked in Figure18 and 19 and described in more detail below.

In January 2009, BC Hydro advised the BCUC that it planned to reduce to its call of clean electricity by 40% (from 5,000 GWh to 3,000 GWh) in response to a falling demand for energy resulting from the global recession. Some proponents, who had committed resources to bid into the call, were extremely disappointed by the reduction. BC Hydro subsequently filed additional information to the BC UC, which indicated that a number of factors could lead BC Hydro to acquire the originally planned 5,000 GWh, and possibly greater amounts, of renewable power.

BC Hydro has subsequently advised the BCUC that it will continue with the Call for Clean Power and may award Electricity Purchase Agreements(EPAs) up to or greater than the original target of 5,000 GWh per year if the EPAs are cost-effective.

Confederation Power Hydro Limited Partnership

The Alice Arm Project Cluster consists of six run-of-river hydroelectric projects all located within 10 km of Alice Arm, British Columbia– all of which would connect to the existing BC Transmission Company (BCTC) transmission grid at Kitsault. Two of the projects, Clary Creek and Upper Illiance River, are located east of Alice Arm and north of Kitsault, while

the other four projects are located north of Alice Arm. Clary Creek flows into the Illiance River near its mouth at Alice Arm. This project is a 12 MW run-of-river hydroelectric plant utilizing a proposed 2.5 km transmission line to be constructed along the powerhouse access road. The Upper Illiance River Project proposes a 12 MW run-of-river plant using both the main stem of the Illiance River and a major tributary. A 4 km transmission line would be constructed to Kitsault. The Gwunya Creek Project is being designed as a 7.5 MW run-of-river plant utilizing Gwunya Creek which flows into the Kitsault River approximately 4 km upstream of Alice Arm. The project would connect to a 69 kV transmission line to be constructed and shared by the Alice Arm and Kitsault developments.

There are three additional hydroelectric projects in the Alice Arm Project Cluster; Falls Creek (2.5 MW), LaRose Creek (4.5 MW), and Klayduc Creek (4.0 MW). These are all run-of-river proposals. Each project would consist of a concrete gravity diversion weir, a penstock, a powerhouse, and a 69 kV interconnection to be constructed as part of a Kitsault Valley transmission system.

Kleana Power Corporation

The Klinaklini Hydroelectric Project is located in the Central Coast, on the east branch of the Klinaklini River near the head of Knight Inlet 150 km north of Campbell River. The proposed development would be a run-of-river hydroelectric generating facility with an average generating capacity of 280 MW (and ability to generate approximately 800 MW during peak flows) on the Klinaklini River above its confluence with Dorothy Creek. Electricity would be transmitted from the project via a proposed 180 km, 230 kV transmission line to the existing grid near Campbell River. The project is currently being reviewed under the EAA.

Naikun Wind Generating Incorporated

Naikun Wind Generating, Inc. is proposing to build an offshore wind farm below Rose Spit east of Haida Gwaii. The project would be similar to offshore wind projects in the United Kingdom and Denmark. The first phase of the project would use 3.6 MW Siemens offshore wind turbines and would have a total capacity of 400 MW. The ultimate build out would be 1750 to 2000 MW. The existing transmission grid from Port Edward is only capable of supporting another 320 to 400 MW, so future phases would require system upgrades to the provincial grid. The company is also proposing to build a transmission line to Haida Gwaii with a capacity of 20 MW to serve the existing 10 MW load. The company is planning to conduct geophysical studies and test drilling in the summer of 2009. If awarded an EPA by BC Hydro, the commercial operation date would be 2014.

Naikun Wind's project is currently under EAA review. As the project is located within Hecate Strait, for which ownership of the seabed is disputed between the federal and provincial governments, the company has requested tenures from both, as well as authorization from the Haida First Nation.

North Coast Wind Energy Corporation

North Coast Wind Energy Corp. is proposing to construct and operate the Banks Island North Wind Energy Project, located on the north end of Banks Island, south of Prince Rupert. The proposed project expects to generate 700 MW of electricity. The project would include the following components:

- Approximately 250 to 350 wind turbines of 2 – 2.5 MW capacity
- Access roads on Banks Island
- Substation
- Approximately 118 km of transmission line that will interconnect to an existing BCTC transmission line south of the Skeena River.

The project is currently under review by the BC Environmental Assessment Office. The project also proposes to connect to the same existing transmission infrastructure as Naikun Wind Generating, Inc. This infrastructure does not have enough existing capacity to handle both projects.

Plutonic Power Corporation

Plutonic Power Corp. has submitted a bid for a cluster of 17 hydroelectric generating stations with a combined capacity of 914 MW adjacent to Bute Inlet, immediately east of the south-eastern boundary and just outside of the Central Coast planning area. A portion of the proposed 360 kV transmission line from Plutonic's Bute substation to the Campbell River substation would be located within theplanning area.

4. PROJECTS WITHIN THE BRITISH COLUMBIA ENVIRONMENTAL ASSESSMENT PROCESS

Another indication of the level of interest in developing alternative energy projects within the Central and North Coast and Haida Gwaii may be drawn from looking at projects in the Provincial Environmental Assessment Act (EAA) process that do not have or have not yet applied for an electricity purchase agreement. Projects currently applying for EAA certification include (see Figure 19 &20):

Europa Creek Hydroelectric Project

Plutonic Power Corporation's Europa Creek project is currently being reviewed under the EAA. The project is located west of Kemano, just inside the North Coast region. Electricity from the proposed 83 MW hydroelectric generating station would be conveyed via a new 138 kV transmission line to the existing 230 kV line at either Kitimat or Kemano.

Crab/Europa Hydroelectric Development

The Crab/Europa Creek hydroelectric project is being proposed by the Kitimat Renewable Energy Corporation, whose majority partner is 728078 British Columbia Ltd. (which is a partnership between the Haisla First Nation and Dr. Alexander Eunall).

The project would consist of 2 run-of-river generating stations on the Crab River and Europa Creek, with installed capacities of 32 MW and 102 MW respectively. Electricity would be transmitted via a 138 kV line to the Alcan 230 kV line and thence to the BCTC grid, or directly into the BCTC grid at Kitamat. The proponent suggests that it has an exclusive arrangement with Alcan to use its transmission line. The Europa Creek component is in direct competition with the Europa Creek proposal by Plutonic Power Corp.

Nascall River Hydroelectric Project

The proponent, 445026 British Columbia Ltd., is wholly owned by Primex Investments Ltd. and proposes to build a two-site hydroelectric project with a combined capacity of 71 MW on two reaches of the Nascall River near Bella Coola. A 57 km long transmission line would connect the project with the existing BC Hydro distribution system at Bella Coola. The proponent also proposes to build a transmission line to service the community of Anahim Lake.

5. CONSTRUCTED AND PERMITTED PROJECTS

The following list includes renewable energy projects that have been constructed and/or are fully permitted. They include:

Permitted, Awarded EPA, and not yet under construction

Mount Hays Wind Farm Limited Partnership was awarded an EPA from BC Hydro in the 2006 call to provide electricity from the 27 MW Mount Hays Wind Farm located by Prince Rupert. Katabatic Power Corp. is a limited partner and the developer of the project. The necessary Crown land tenures have been obtained but construction has not commenced to date.

Permitted, Awarded EPA, and under construction

Crown land tenures and water licences have been issued to Anyox Hydro-Electric Corporation and Kitsault Hydro-Electric Corporation, in the Alice Arm/Kitsault River area. The companies have partnered, and the projects will have a combined capacity of 57 MW from sources on Kitsault River, Homestake Creek and Anyox Creek, with supporting

storage. BC Hydro awarded an EPA to the companies in the 2006 call for electricity and the projects are under construction.

Completed and fully operational

Epcor Power Holdings Corporation obtained an EPA from BC Hydro's 1996 call for electricity. The company has constructed a water power project at Brown Lake south of Prince Rupert with a capacity of 7.2 MW.

Central Coast Power Corporation[48] also has an EPA with BC Hydro for the refurbished Ocean Falls hydro-electric plant. The plant uses water from the Link River with supporting storage on Link Lake. The plant has a capacity of 12.2 MW but only a small portion is being used to satisfy local needs.

On Haida Gwaii, Coastal Rivers Power Limited Partnership has constructed a 6 MW hydro-electric generating station near Sandspit on Moresby Creek with storage in Moresby Lake. The company was awarded an EPA by BC Hydro in its 1990 call for electricity.

Figures 18 and 19depict those projects which have:

1. Been constructed and are operational;
2. Obtained EPA's but are not yet operational;
3. Bid into the 2008 BC Hydro Call for Clean Power; or are
4. Currently in the British Columbia EAA process (not bid into a call).

Together, they give a sense of sites with the most development potential based on level of commercial interest.

[48] Central Coast Power is in the process of being sold to "Boralex Ocean Falls LP"; the BCUC has given the sale conditional approval, and awaits Boralex's concurrence with the conditions.

Figure 18: Summary of IPP Project Sites - North Coast and Haida Gwaii

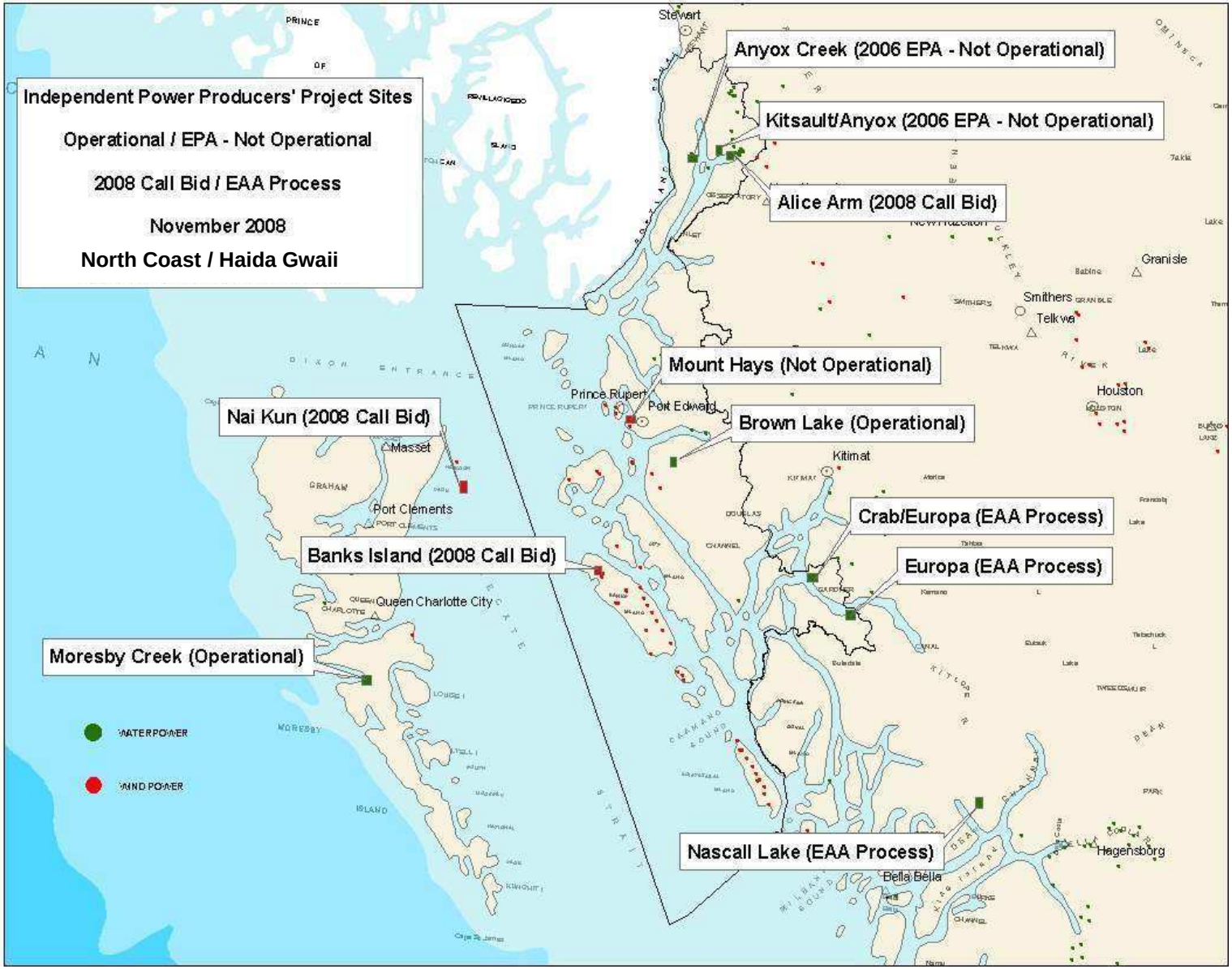


Figure 19: Summary of IPP Project Sites – Central Coast

Summary and Conclusions

The review of current and potential projects clearly demonstrates that there is commercial interest in wind, water power and ocean energy projects within the Central and North Coast and Haida Gwaii. While expressed interest does not always translate into future development, the existence of operational projects and projects under construction demonstrates that there is capacity for economically viable renewable energy projects in the study area.

It is difficult to quantify the potential economic impact that the potential projects identified in this section could have on the Central and North Coast and Haida Gwaii. To begin with, there are many factors that will influence whether the interest expressed results in actual development. As explained earlier in the report, very few of the expressions of interest actually come to fruition. The direct and indirect benefits that flow from those projects that do become operational are difficult, if not impossible to quantify and tend to be case specific. While general benefits to the community or region can be identified (e.g. additional transmission infrastructure, access to clean energy, construction and maintenance jobs or rents, royalties and/or an additional tax base), significant economic modeling would be required to assign a dollar value.

The most important lessons to be drawn from the information provided in this section are that:

1) Very few expressions of interest result in operational facilities. Learning how to effectively gauge the likelihood of success for a proposed project will be important in deciding where to target limited resources.
2) Easy access to transmission plays a significant role in determining proponent's development interests. The Central and North Coast and Haida Gwaii are currently transmission constrained.
3) Demand (measured here by BC Hydro's call for bids) can change suddenly with potentially negative impacts on the development environment.
4) Several projects are well along in the development and implementation process and indicate the potential for additional development along the Central and North Coast and Haida Gwaii. Developing mechanisms to measure the direct and indirect impacts to the community associated with each of these projects would be a useful undertaking as leaders in this region struggle to grasp the economic and social benefits that further development could bring to their communities.

V. Electricity Transmission

As was identified in Section IV, electricity transmission capacity plays a significant role in determining where future renewable energy development is likely to locate. The cost of constructing long transmission lines to connect with the existing transmission grid can be prohibitive for many proponents. Unless the potential generating capacity is large enough to create sufficient revenue to offset these costs, and also compensate for the electricity lost in transmission, renewable energy development may be limited to large projects, or those located close to existing transmission infrastructure.

As this section will confirm, at present, the Central and North Coast and Haida Gwaii are 'transmission constrained' meaning that future development of renewable energy is limited by the current reach of the transmission system in this region. While the major commercial centres and populated areas of the North Coast are relatively well served by the grid, much of the Central Coast and Haida Gwaii have little or no transmission capacity. Potential transmission corridors in the region are summarized in the table below.

Table 8: Potential Transmission Corridors for the Central and North Coast

Proposed Location	Description	Estimated Cost	Potential Benefits	Likelihood of Development Over Next Ten – Twenty Years
Highway 37 Corridor	517 kilometres from Terrace to Dease Lake	$600 million	$15 billion in investment, 10,700 jobs and generate $300 million in annual tax revenues to governments	High – Has Provincial Government and resource sector support
Highway 20 Corridor	457 kilometres from Bella Bella to Williams Lake	Unknown, but likely similar to Highway 37 Corridor	Undetermined Connects communities in the Central Coast to the grid	Low-Moderate– Has not been identified as a priority
Offshore Corridor	2454 kilometres from Prince Rupert to San Francisco	6.4 billion dollars	Undetermined	Low – Extremely high capital cost, inter-jurisdictional issues

Proposed Location	Description	Estimated Cost	Potential Benefits	Likelihood of Development Over Next Ten – Twenty Years
Haida Gwaii Mainland Connection	120 Kilometres from Masset or Tlell to Port Edward	Dependent on design and routing. Rough estimate between $300 and $500 million.	Largely undetermined Allows communities on Haida Gwaii to connect to the grid	High – High likelihood of Naikun project providing anchor, compelling desire to bring clean power to Haida Gwaii

The potential regional benefits associated with the development of any one of these corridors are expansive and range from the ability to lessen or eliminate reliance on unreliable and expensive diesel generators, new opportunities to attract development to the area (renewable or other) and to opportunities created by the construction and maintenance of additional transmission capacity. Identifying and assigning dollar values to costs and benefits received is extremely difficult without detailed engineering studies and well outside the scope of this report. The potential for renewable energy development in this area (as described in Section III of this report), without considering costs associated with transmission is sizable. From a purely economic perspective, the benefits of transmission development to surrounding communities are sizable and the construction of any one of these corridors would significantly open up renewable energy development for the region.

This section will review the process of transmission, look at the opportunities and challenges associated with developing new transmission lines, describe the process that determines transmission expansion and identify where future transmission corridors in the region are most likely to proceed.

ELECTRICITY TRANSMISSION

Electric power transmission is the process of the bulk transfer of electrical power to consumers. An electric power transmission network, or grid, typically connects power generating plants to multiple substations near a populated area. The wiring from substations to customers is referred to as electricity distribution. Electric power transmission allows for:

- development of low-grade fuel resources such as coal and biomass that are relatively expensive to transport;
- development of location dependent resources, such as hydro or wind, that would otherwise be impossible to transport to generating facilities;
- siting electricity generation facilities, such as nuclear and combined-cycle facilities, in optimal locations to maximize benefits for consumers.

Figure 20 shows typical connections between generation, transmission and distribution.

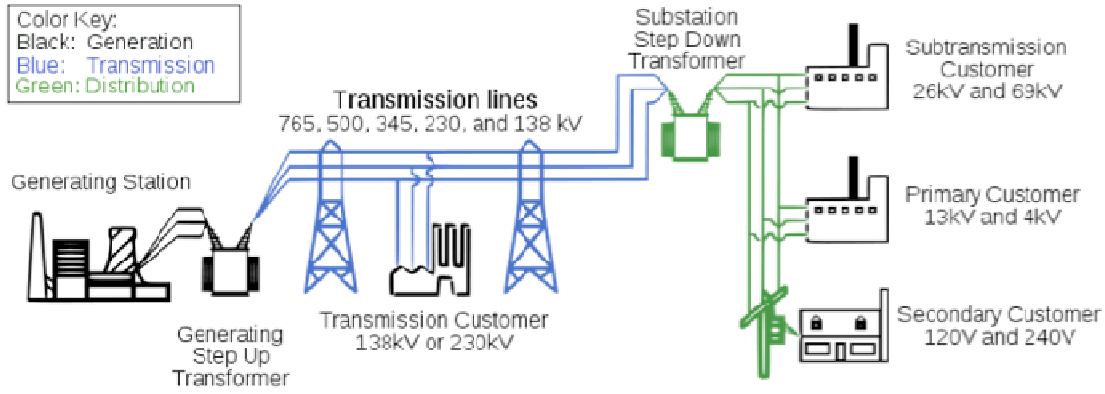


Figure 20: Typical Energy System [49]

In British Columbia, theBCTC is the Crown corporation that plans, operates and maintains the province's electrical transmission grid. BCTC's mandate is to ensure fair and open access to the grid and create value and new opportunities for its customers and other stakeholders by providing safe, reliable and cost-effective transmission services. However, the transmission system assets continue to be owned and financed by BC Hydro. BCTC only owns the control centre assets required for operating and controlling the transmission system. The British Columbia Utilities Commission (BCUC) regulates BCTC and approves the Corporation's revenue requirement, rates, tariffs and capital plan following an open and public process.

Formed in 2003, BCTC was created in response to the BC Government's 2002 Energy Plan. BCTC has powers and functions specified in the *Transmission Corporation Act*, which came into force in July 2003, and the Key Agreements with BC Hydro designated by Order-in-Council in November 2003. The Minister of Energy, Mines and Petroleum Resources is the Minister responsible for BCTC. A Board of Directors appointed by its Shareholder, the Province of British Columbia, governs BCTC.

BRITISH COLUMBIA'S ELECTRICAL TRANSMISSION GRID

Electricity is transmitted at high voltages (60kV or above) to reduce the energy lost in transmission as line losses. In addition to the approximately 18,300 kilometres of high voltage transmission lines that range from 60kV to 500kV, BCTC operates and manages an extensive network of facilities that includes 292 stations and over 100 microwave stations. British Columbia's integrated transmission network covers much of the province's land

[49] http://www.ferc.gov/industries/electric/indus-act/blackout/09-06-final-report.pdf Page 13 Title:"Final Report on the August 14, 2003 Blackout in the United States and Canada" Dated April 2004. Accessed on 2008-12-26

mass and interconnects with neighbouring transmission systems in Alberta and the United States.

Electricity is transmitted as alternating current (AC) through overhead lines. Underground power transmission is used only in densely populated areas because of its higher cost of installation and maintenance when compared with overhead wires, and the difficulty of voltage control on long cables. It is unlikely to be considered for areas in the Central and North Coast and Haida Gwaii, where the difficult terrain would make it prohibitively expensive. This should not be confused with underground distribution lines, which are common in many newer communities.

High Voltage Direct Current (HVDC) may also be used to reduce line loss and capital costs for longer transmission. HDVC is used for one of the connections between Vancouver Island and the Mainland. HVDC Vancouver Island is the name for the HVDC interconnection between the Vancouver Island Terminal (VIT) near North Cowichan on Vancouver Island and the Arnott Substation (ART) in Delta. HVDC Vancouver Island consists of 42 kilometers of overhead line and a 33 kilometers long submarine cable. In 1968 the first pole of the HVDC Vancouver Island went into service. The maximum transmission rate of this pole is 312 megawatts. Its transmission voltage is 260kV. In 1977 the HVDC Vancouver Island was supplemented by installing a second pole. This pole can transfer at an operating voltage of 280kV with a maximum power of 370 megawatts. BCTC has recently replaced and upgraded the existing 138 kV AC overhead transmission lines and one of the existing submarine cable circuits connecting southern Vancouver Island to the Lower Mainland with new 230 kV AC infrastructure. This upgrade was fully energized in late December 2008.

The following figure shows the high-level components of British Columbia's transmission grid. An extensive high voltage grid connecting generation facilities in the northeast and southeast areas of the province with major electricity consuming areas in the northern interior, Okanagan, Lower Mainland and Vancouver Island serves the majority of the province. A single 500 kV circuit runs from Prince George to the Terrace area.

Lower voltage circuits branch off the 500 kV line; the branches are relatively limited in their reach. Major communities and commercial operations in the North Coast area are relatively well connected to the province's grid. However, as shown on Figure 21, the Central Coast and Haida Gwaii have limited service through the transmission grid.

Figure 21: British Columbia's Transmission System

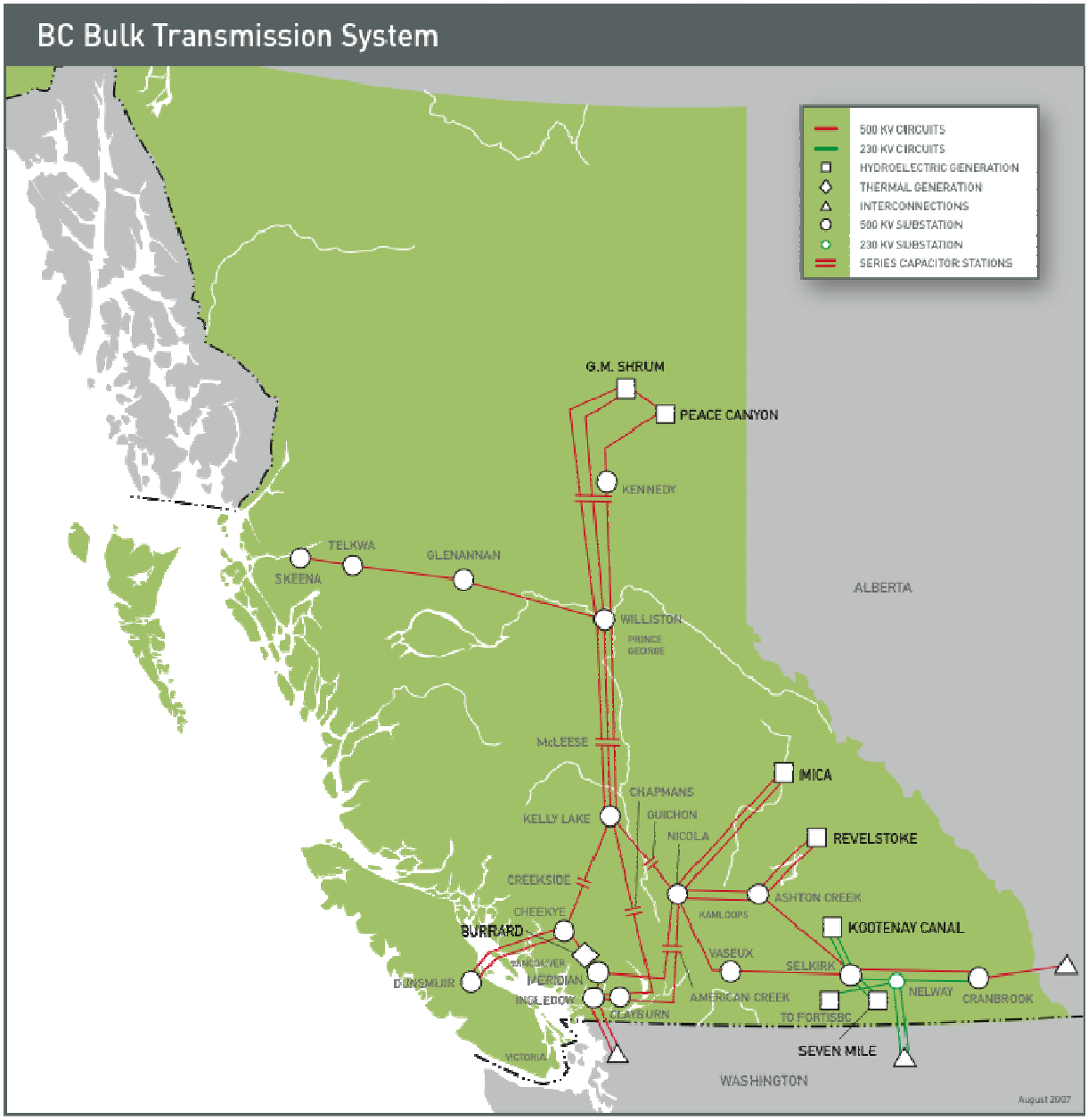


Figure 22: Transmission Capacity on the Central and

Figure 22 further emphasizes transmission constraints on the Central and North Coast and Haida Gwaii. The map shows distribution lines from the main transmission grid.

Communities in areas not served by the transmission grid are supplied with electricity from diesel generation or local renewable generation. In addition, these communities also rely on other sources for electrical power and heat such as small generators, propane, fuel oil and wood. Diesel generation, and the majority of other energy sources are generally viewed as being unreliable, expensive, and prone to failure. In addition, fossil fuel sources of generation create significant greenhouse gas emissions.

Extensions to the grid typically occur when and where there are either significant loads or generating capacity. The areas in the Central and North Coast where the grid does not extend are typically very remote with challenging geography and, most importantly, do not have significant electricity consumers (such as forestry or mining operations) or generating facilities. However, it is important to note that there is some degree of a "chicken and egg" situation with the development of transmission grids. The lack of sufficient transmission is often cited as an impediment to development of remote electricity generation or industrial development, and the lack of electricity generation and industrial scale development is often cited as an impediment to transmission development. This situation is best exemplified by the Highway 37 electrification issue, which will be discussed shortly.

Despite these and other challenges, BCTC has embraced an innovative approach to its development of transmission expansion policies and processes that support development of renewable resources in British Columbia. These policies and processes are described in detail below.

ELECTRICITY TRANSMISSION DEVELOPMENT ISSUES

There are a number of factors that influence when and where new transmission is located. While additional transmission is often cited as bringing a range of benefits to a region, projects may face objections due to the economic, environmental and social impacts that may result from the project. An appreciation of the potential benefits and challenges associated with new transmission is important to the overall success of any proposed transmission project. These issues are discussed in more detail below.

Land Use Plans– Land use plans play an important role in determining appropriate areas for transmission infrastructure development. Many land use planning processes have not included the planning for transmission infrastructure (specifically to support the development of renewable electricity projects).As the need for additional transmission to support renewable energy development in the Central and North Coast and Haida Gwaii is identified, the location of new lines will be partly determined by restrictions on land use that have been established under the land use decision plans. To the greatest extent possible, land use planning should take into account the future potential for renewable energy development and transmission needs.

Economic(Project Specific) – The cost of connecting a new electricity generation project to the transmission grid is dependent on the length of line that must be installed, the geography of the area the line will pass through, remoteness and the cost of any required mitigative measures. Given the variability of these factors, it is impossible to provide an estimate of the average cost for new transmission connections. However, for many projects in relatively remote areas, **electricity transmission may be one of the largest project costs**. In fact, the cost of electricity transmission is often one of the main reasons why renewable electricity project proposals fail to meet minimum economic thresholds. This is primarily due to the fact that many renewable electricity projects have relatively small generating capacity and capacity factors, and are unable to take advantage of the economies of scale that are available to larger conventional generation projects.

This is a particularly difficult situation when there are many potential small projects in a given area. No single project proponent may be able fund transmission development and it is difficult to coordinate multiple project proponents to develop a single transmission proposal.

Economic (Regional) – As new transmission infrastructure enables the development of renewable electricity projects, economic impacts on a regional basis are typically positive. New projects provide employment opportunities during construction and through the

ongoing operation of projects; therefore the majority of the economic impacts are positive for a particular region.

In addition, access to transmission may also provide the electricity required to support other types of industrial activity, such as mining and forestry operations. The development of new economic activities provides new economic and employment opportunities for communities.

Environmental – Electricity transmission infrastructure - the towers, lines and substations themselves - occupy limited area and do not have any GHG emissions and are, in those respects relatively benign. However, transmission infrastructure is necessarily constructed within linear corridors, and those corridors are more substantial in area and generally have quite substantial environmental impacts.

In undeveloped areas, linear corridors typically result in the following environmental impacts:

- Impacts from vegetation cutting and clearing operations to construct the corridor. While the width of the corridor is narrow, the aggregate clearing may be significant for longer transmission lines.
- Potential destruction of smaller unique habitats or species that are located within small unique habitats.
- Segmentation of habitat and creating habitat "islands" that are cut-off from larger habitat areas.
- Creation of corridors that may result in greater predation or movement of previously separated species.
- Creation of access for hunters and other recreational activities that may have an impact on habitat and wildlife.

Many environmental impacts can be avoided or mitigated through planning processes. As major transmission projects in British Columbia are captured under the environmental assessment process, environmental impacts are typically well understood and often addressed prior to project approval. The conservation-oriented stakeholders (including recreational stakeholders) feel very strongly however, that *all* significant environmental impacts, including minor ones that, as a result of a cumulative process are collectively significant should, at all times and in all locations, be assessed and meaningfully addressed, prior to final project approval.

In addition, as new transmission infrastructure provides a basis for additional economic development in the areas served, there is a potential for additional impacts from these new activities. While cumulative impacts are difficult to determine in advance of the development of new transmission infrastructure, it is even more difficult to determine the extent of any cumulative impacts which may also result from new economic development.

Visual – Visual impacts are the impacts of the visual disturbance created by the transmission facilities. Visual impacts are often subjective, but concerns may be also be based on lack of certainty regarding future transmission developments and the spectre of multiple transmission lines crossing a valley for example; a scenario which has been referred to as the clothes-line effect. Particularly on scenic routes, the potential for new transmission lines to impose social costs on the wider community needs to be recognized. Furthermore it is vital that a planning (or market) mechanism to minimize aggregate length and to absolutely minimize the chance of transmission line proliferation, be put in place at an early stage .

Social – Social impacts are those impacts that affect individuals and the broader community. These include:

- Visual impact of the transmission infrastructure, particularly in areas without other types of development;
- Impacts on traditional hunting, trapping and gathering;
- Impacts on eco-tourism and other economic uses of the land;
- Protection of cultural, archaeological and/or spiritual values of places;
- Changes to the social and cultural make-up of communities; and,
- Housing pressures such as affordability, availability and appropriateness.

BCTC EXPANSION POLICY AND PROCESS

As the entity responsible for managing the province's electric transmission grid, BCTC's expansion policies play a fundamental role in determining when and where new renewable energy projects develop. A firm understanding of these policies is important when developing a regional energy strategy.

In 2005, BCTC submitted to the BCUC a paper outlining its policy towards system expansion. The **Expansion Policy**, as outlined in the paper, identifies the opportunities for expansion, including:

1. A planned system upgrade for a Network, Point-to-Point, or interconnection customer that can be beneficially advanced, or accelerated. This will be beneficial where a project or group of projects is postponed due to delays from queuing applications.

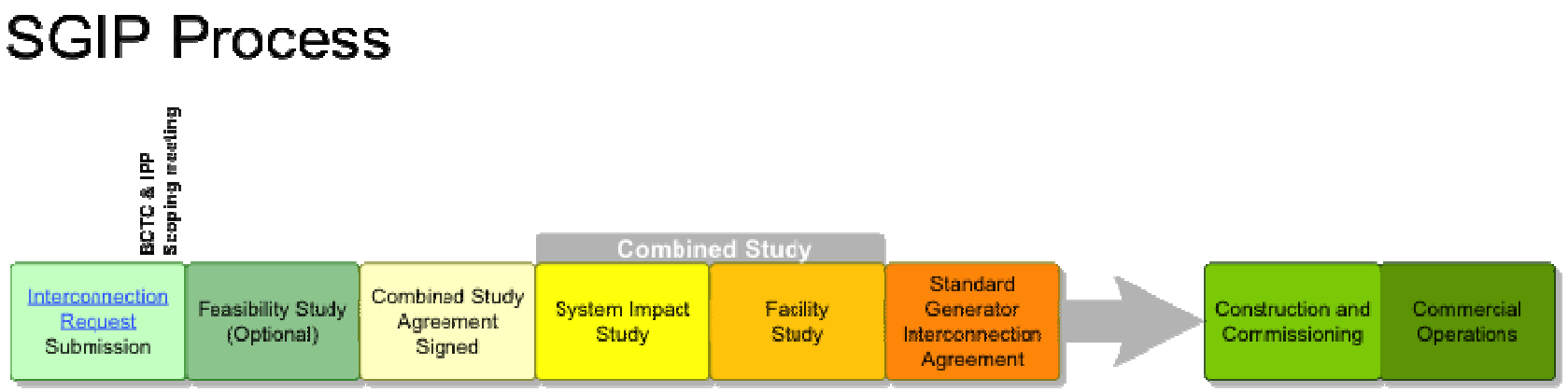
2. A system upgrade required for either a Network, Point-to-Point or interconnection customer that can be beneficially be made larger than the immediate requirement. This will benefit areas where there are potentially additional projects that may not be proceeding in the same time frame.

3. A project (or advance study work on a project) that BCTC identifies as having future benefits, but which has not been triggered by a customer request. Under this condition BCTC will identify system upgrades and expansions that it believes will be

beneficial, but for which there is little or no opportunity for immediate customer funding.

Proponents interested in building transmission infrastructure and connecting to the grid must follow BCTC's **Standard Generator Interconnection Procedures (SGIP) which** governs the procedures for interconnection to the BC transmission system. (See Figure 23) The SGIP is a structured procedure with defined "steps" and requirements in each step. IPPs must meet all of the requirements in each step before proceeding to the next step. The following figure shows the high-level process chart for the SGIP.

Figure 23: SGIP Process



1. ***Interconnection Request:*** To initiate an interconnection request (IR), a customer must submit to BCTC's Interconnections Group a $15,000 application. BCTC will assign a date and time stamp to the IR upon receipt of the $15,000 application deposit. It is at this point that the interconnection customer enters the interconnection queue.

2. ***Feasibility Study:*** This is an optional study. If the customer wishes for BCTC to conduct a Feasibility Study, the customer must:
    - Sign and return a Feasibility Study Agreement
    - Submit a $15,000 study deposit

    This study will consist of a power flow and a short circuit analysis and provide a list of facilities and a non-binding good faith estimate of cost responsibility and a non-binding good faith estimated time to construct. BCTC will use reasonable effort to complete this study within 45 calendar days.

3. ***Combined Study Agreement:*** To initiate the Combined Study, the IPP must within 30 days of receiving the Combined Study Agreement from BCTC:
    - Sign and return the Combined Study Agreement; and,
    - Submit a $75,000 study deposit.

    The IPP may also be required to provide additional technical data and demonstrate site control.

    Once signed, this agreement begins the combined study process. Although referred to as 'combined', these are two separate studies consisting of the ***System Impact Study*** and the ***Facility study.*** These studies must be completed before a Standard Generation Interconnection Agreement can be offered.

    a. ***System Impact Study:*** This study will evaluate the impact of the proposed interconnection on the reliability of the transmission system. This study will consider the Base Case as well as all generating facilities and identified network upgrades that may have an impact on the IR.

        The System Impact Study will consist of a short circuit analysis, a stability analysis and a power flow analysis. It will provide a list of facilities that are required to support this IR and a non-binding good faith estimate of cost responsibility by the interconnection customer and a non-binding good faith estimate of construction time.

    b. ***Facilities Study:*** This study follows the System Impact Study. To proceed with this study, the IPP must provide BCTC with:
        - Written notification that it would like to proceed with a Facilities Study;
        - A $150,000 study deposit; and,

- All additional technical data requested by BCTC.

The study will provide a cost estimate of the equipment, engineering, procurement and construction work needed to connect the customer to the transmission system. It will also identify: the electrical switching configuration of the connection equipment; the nature and estimated cost of upgrades to the interconnection facilities and network upgrades necessary to accomplish the interconnection; and, an estimate of the time required to complete the construction and installation of such facilities.

4. ***Standard Generator Interconnection Agreement:*** This agreement outlines the terms and conditions of the interconnection agreement. Following the signing of an agreement, IPPs move onto construction and commissioning of their project. Once online and operating commercially, BCTC continues to provide support to IPPs.

BCTC has also designed its SGIP approval process to coordinate with BC Hydro's Call for Power process.

POTENTIAL TRANSMISSION CORRIDORS

Given the lack of transmission capacity within the Central and North Coast, and the need to develop transmission to maximize opportunities for renewable energy development and local electricification, the development of transmission corridors must be a high priority.

Electricity transmission routes are selected based on a number of criteria, including:
- the route has favourable topography and foundation conditions;
- the route optimizes the incremental value to the existing transmission grid;
- the cost to construct, operate and maintain the transmission infrastructure; and,
- environmental, social and other impacts are minimized or mitigated.

For overland routes, the above criteria tend to direct transmission infrastructure expansion along existing transportation routes.

Given these criteria, four key potential transmission corridors have been identified that would assist in connecting renewable electricity projects in the Central and North Coast and Haida Gwaii to the existing provincial transmission grid. These include:

- Highway 37 Corridor;
- Highway 20 Corridor;
- Offshore Corridor; and,
- Haida Gwaii Corridor and the Offshore Corridor.

These corridors offer the best opportunities for additional transmission to open and expand opportunities for renewable energy development on the Central and North Coast

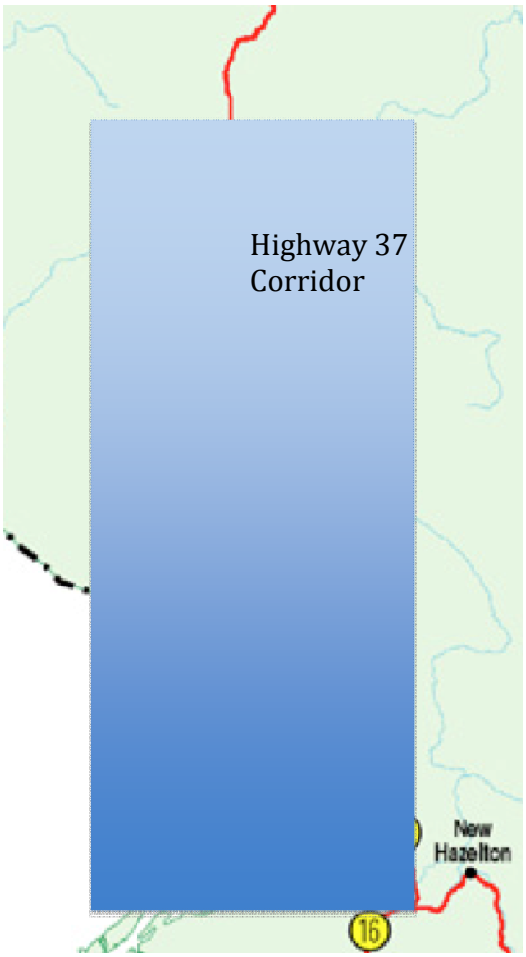
and Haida that bring social and economic benefits to the local communities. The potential corridors are shown on Figure 24. Project proponents may propose alternate corridors to these identified corridors that may ultimately prove viable; however, for the reasons discussed below, these are the most likely corridor routes.

Figure 24: Potential Transmission Corridors

Highway 37 Corridor

One of the most studied potential transmission corridors in British Columbia is the Northern Transmission Line (NTL)along the Highway 37 Corridor. The project proposes a new 287-kilovolt line that would extend 517 kilometres from Terrace to Dease Lake. Currently, the electrical power grid along Highway 37 ends at Meziadin Junction to the north and Stewart to the west.

Figure 25: Highway 37 Corridor



According to the Minerals Association of BC[50], expansion of the transmission grid up Highway 37 would result in significant benefits for the area. The report cites ten potential mining projects, and estimates that the power line has the potential to attract more than $15 billion in investment, create 10,700 jobs and generate $300 million in annual tax revenues to governments.

The line is expected to cost around $600 million and has the potential to attract power generation in excess of 2,000 megawatts each year. It could also be fed power from other sources in the northwest. There is significant potential for power generation in the region, from hydro and wind projects to geothermal and biomass.

Another benefit of the corridor is that connection to the grid would reduce the generation cost of the electricity presently consumed by these local communities and would reduce greenhouse gas emissions as they are transitioned from diesel generators.

Given the potential importance of this transmission line to opening up the northern area for development, the Province announced in September 2008 that it would spend $10 million to continue with the environmental assessment process and First Nations consultations on the project. This commitment was reaffirmed in the 2009 Throne Speech. The environmental assessment is the first stage of the project and must be complete before construction could begin.

While the potential for actually constructing the Northern Transmission Line increased as a result of the Province's direct involvement with the project, the project will not be able to proceed until a funding arrangement is developed with private sector partners. The Province is still seeking a partnership with the private sector to fund the total project. Given the current state of minerals and coal commodities, the likelihood of a project announcement in the short-term is limited. Realistically, it will be a minimum of five years before regulatory approval and construction of the proposed project could be completed.

[50] Mining Association of BC, *Report on Electrification of the Highway 37 Corridor*, September 2008.

Highway 20 Corridor

The Highway 20 Corridor would connect Bella Coola with the provincial electrical grid in the Williams Lake area, 457 km away.

No published material is available that estimates the cost to extend the transmission grid along Highway 20; however, given that it would be of similar length traveling through similar terrain as the Highway 37 Corridor, costs may be expected to be within the same range (+/- $600 million). Additional research is required to capture the potential economic benefits; however, they are expected to be significant.

A key benefit of expanding the transmission grid along Highway 20 is to connect communities along the route to the provincial transmission grid. Many communities along the route either use diesel as a primary source of power or as back-up generation. Opportunities to develop renewable energy resources would also be greatly enhanced by additional transmission.

Figure 26: Highway 20 Corridor

Offshore Corridor

Given the renewable electricity potential that has been identified in the Central and North Coast and Haida Gwaii, and the limitations associated with the existing transmission grid, other options have been considered to connect potential generation in the region with markets in the western United States.

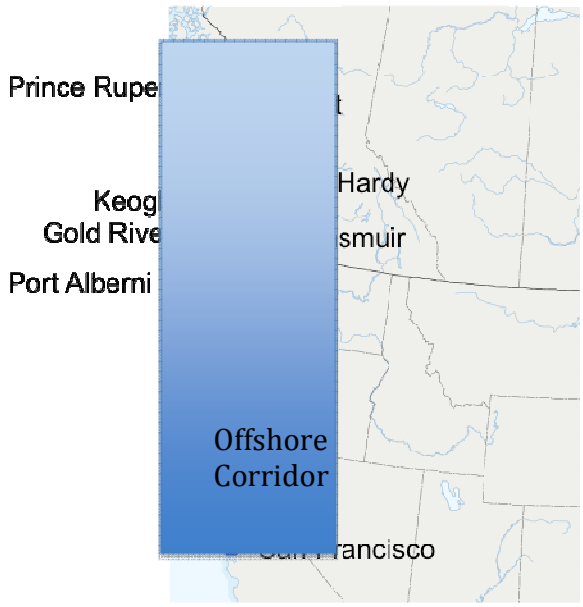
In 2004 the Northwest Power Pool[51] convened a study group to investigate options to increase the capacity of the transmission system between resources located in Western Canada or the Pacific Northwest and loads located in California. The group was known as the Canada-Northwest-California (CNC) Study Group and included representatives from Northwest and California utilities, merchant developers and other interested parties.

The Study Group developed an inventory of potential new generation resources in Western Canada and the Pacific Northwest that could be available for inter-regional trade. Using this inventory as a basis, eighteen AC and DC transmission options were considered ranging in capacity from 1500 MW to 3200 MW with costs ranging from $2.2 billion to $6.4 billion.

Included within the report is an option to connect Prince Rupert to San Francisco with a HVDC submarine cable running from Prince Rupert to Vancouver Island and then to San Francisco. This includes the following components:

- A 230 kV line from Kitimat – Minette – Skeena – Prince Rupert;
- Two 230 kV lines from Keogh – Gold River – Dunsmuir;
- A 500 kV DC submarine cable (SC) from Prince Rupert (RUP) – Port Hardy;
- A 500 kV DC overhead (OH) from Port Hardy – Dunsmuir (DMR) – Port Alberni; and,
- A 500 kV DC submarine cable from Port Alberni - San Francisco Bay area.

Figure 27: Off Shore Corridor



At a cost of $6.4 billion, the Offshore Corridor is the most expensive of the eighteen options reviewed. However, at 3,200 MW, it offers a large transfer capability between Prince Rupert and San Francisco via an undersea route that would bypass the congested Pacific Northwest grid and may face fewer local siting difficulties.

An alternative design to this proposal is Seabreeze Power's Triton Transmission proposal, which would link renewable energy producers in Alaska's Panhandle to an offshore cable supplying power to San Francisco. This proposal is only in the conceptual stage at this point and may proceed as a second phase to the development of an initial development connecting the Central and North Coast to an Offshore Corridor.

[51] Northwest Power Pool. Canada-Northwest-California Transmission Options Study, May 2006

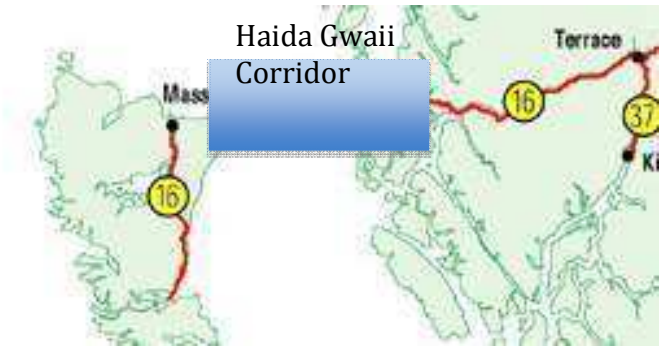
While likely significant, the potential regional economic opportunities associated with the development of an Offshore Corridor have not been assessed. There is little question that such expanded transmission capacity would create a number of opportunities along British Columbia's Coast. However, the offshore route would raise significant public policy issues; it would essentially provide limited designated points of power injection and withdrawal, and would be viewed primarily as transmission constructed to serve export markets. To date, British Columbia interconnections with export markets have been constructed in order to support the optimal design and operation of the domestic electricity system and to provide cost-effective rates for domestic customers. Constructing an export dependent transmission route would raise a number of significant policy questions such as what is the public interest of developing Crown renewable resources for export and what commitments under the North America Free Trade Agreement would be created from electricity exports.

Despite public perception issues, the development of an offshore transmission corridor would likely create a significant stimulus for development of renewable energy along the Central and North Coast and Haida Gwaii area.

Haida Gwaii Corridor

The Haida Gwaii Corridor would play an important role towards integrating renewable energy developments on Haida Gwaii with British Columbia's transmission grid, or potentially with the Offshore Corridor. Figure 28 depicts the proposed Haida Gwaii Corridor.

Figure 28: Haida Gwaii Corridor



The current lead proponent for the Haida Gwaii Corridor is NaiKun Wind Energy Group Inc., which is proposing to construct an offshore wind energy project off the northeast coast of Haida Gwaii.

In August 2008, NaiKun announced that it had completed a commercial agreement with the Lax Kw'alaams First Nation regarding transmission routing for NaiKun's proposed offshore wind project with a planned transmission interconnection point located south of Prince Rupert, in the traditional territory of Lax Kw'alaams. The Lax Kw'alaams-NaiKun agreement provides NaiKun with transmission access for the project.

The agreement is contingent upon NaiKun successfully completing the environmental assessment process. Currently, NaiKun is in the research and data collection phase of that

process and will apply for its Environmental Assessment Certificate, the final step in the process, in 2009.

NaiKun is currently completing transmission routing studies with Siemens Power, Transmission and Distribution and has bid into the 2008 BC Hydro Clean Power Call. There is currently no public information about technical and financial aspects to the potential transmission projects; however, it is likely to provide sufficient capacity for the initial phases of the Naikun development and would cost in the $300 to $500 million range.

BC UTILITIES COMMISSION SECTION 5 INQUIRY

In December 2008, the Minister of Energy, Mines and Petroleum Resources provided Terms of Reference(TOR) to the BC Utilities Commission (BCUC) for an inquiry required under Section 5 of the *Utilities Commission Act (Act)*. Section 5 requires the BCUC to conduct an inquiry to make determinations with respect to British Columbia's needs for electricity transmission, and requires the inquiry to be underway by March 31, 2009.

The TOR for the inquiry outline the areas for the Commission to assess. Key areas include (but not limited to):

- The general purpose of the inquiry is for the BCUC to make determinations with respect to British Columbia's electricity transmission infrastructure and capacity needs for a 30-year period.
- The BCUC must assess the generation resources in British Columbia that will potentially be developed during the 30-year period, grouped by geographic location.
- The BCUC must consider potential future market opportunities to export clean or renewable or low-carbon electricity to other jurisdictions that is surplus to the requirements of load-serving utilities in British Columbia.
- The BCUC must consider the cost-effective and most probably sequence of development by geographic area.
- The BCUC must make determinations respecting the need for, and timing of, additional transmission infrastructure and capacity, including allowing for improved electricity transmission intertie capacity between British Columbia and Alberta and the United States.

The BCUC will be inviting evidence and submissions from interested parties. This review will provide a significant opportunity for the Central and North Coast and Haida Gwaii to participate and assist in shaping public policy surrounding the development of critical transmission infrastructure.

Summary and Conclusions

The Central and North Coast and Haida Gwaii have limited access to provincial transmission infrastructure, which is focused primarily in the Northern Coast area along the Highway 16 corridor. Addressing transmission constraints is critical to creating a favourable and competitive environment to realise the maximum benefits to the region offered through renewable energy.

The development of transmission infrastructure is not unlike transportation infrastructure. There is a very high upfront cost to developing the infrastructure with benefits flowing well into the future. Leaders in the region must address these issues in a coordinated and collaborative way with the support of First Nations, local communities and other regional stakeholders as well as with potential developers to make the strongest case possible. Such work will be an important part of creating a favourable environment to support the success of any regional renewable energy strategy.

The extension of transmission capacity in the Central and North Coast and Haida Gwaii begs a coordinated approach that capitalizes on benefits to the region as a whole. Leaving IPPs to dictate future transmission expansion may result in an ad-hoc system that fails to support strategic regional development and in turn, fails to bring the desired benefits to local communities. A coordinated approach supported by First Nations, local communities and other stakeholders in the region (including IPP's) provides a much stronger position from which to request action on the part of the Transmission Corporation and its regulator to address current constraints.

Leaders in the Central and North Coast and Haida Gwaii must take steps to ensure that transmission expansion occurs to serve the best interests of their region as a whole. Short – term effort should focus on pursuing the Highway 37 and the Haida Gwaii Offshore Corridor. A second priority is to focus on the development of a Highway 20 Transmission Corridor. Efforts to pursue the Offshore Corridor should be left to the longer term following significant work to assess the resource potential, ongoing viability and more importantly, take the pulse of the stakeholders.

VI. Markets for Renewable Energy

Another key factor affecting the development potential of renewable energy resources in the Central and North Coast and Haida Gwaii relates to market demand. Current and future market demand has a direct impact on the price of renewable energy which in turn determines the short and long-term economic viability of a potential project. Market ready technology, a solid resource base, and access to transmission, in the absence of strong market demand, will not result in resource development. Is there enough demand to support renewable energy development along British Columbia's coast? The analysis in this report suggest YES.

British Columbia is integrated into the **western electricity grid** which includes British Columbia, Alberta and the western US states. Built around a network of transmission lines and trading agreements, it creates a vehicle to sell *surplus* power. This section identifies the current and future demand for renewable energy along the western electricity grid by considering the current policy environments of the connected provinces and states as well as the current and projected capacity requirements of those areas. The outcomes of this analysis provide a clear picture as to the nature and scope of potential demand for renewable energy generated in the Central and North Coast and Haida Gwaii.

Demand for renewable energy is dependent on several key factors. Perhaps the largest driver of demand for renewable energy is energy policy (set by provincial and state governments and regulators). As will be described in more detail in this section, the government of British Columbia and many of the State Governments in the western US have established energy policies with aggressive targets for reductions in greenhouse gas emissions paired with incentives to increase development of renewable electricity. These policies are expected to play an important role in maintaining a favourable environment for renewable energy development.

In addition, population and overall energy demand is expected to continue to grow, placing increasing pressures on current energy systems. The BC Energy Plan anticipates increases of 10,000 GWh of new electricity supply by 2016 and 18,350 GWh by 2025 to meet expected increased demand in British Columbia. Significant increases in demand for renewable energy are also expected to continue in the western US states – many of whom have legislated clean energy targets of between 15-25% of supply by 2020.

In the short-medium term, demand for renewable energy both in British Columbia and the western United States looks strong. Key findings are captured in the summary table below:

Table 9: Summary of Renewable Energy Policies

Province / State	Policy Highlights	Anticipated Demand for additional renewable (GWh)**
British Columbia	BC 2007 Energy Policy Self sufficiency by 2016 Clean energy - all new energy projects net 0 GHG emissions - maintain current standard - 90% energy from renewable - standing offer small-scale clean energy producers	10,000 by 2016 18,350 by 2025
Arizona	Renewable Portfolio Standard (RPS) target: 15% of energy from renewable sources by 2025.	10,922 by 2025
California	RPS target: 20% by 2010, 33% by 2020.	57,860 by 2020
Colorado	RPS target: - investor-owned utilities (IOU)20% by 2020 - Rural Electric Cooperatives (REC), 10% by 2020 - Municipal Utilities, (over 40,000), 10% by 2020	9,045 by 2020
Montana	RPS target: 10% by 2010, 15%by 2015	1,808 by 2015
New Mexico	RPS target: - IOU's 20% by 2020 - REC's 10% by 2020	3,552 by 2020
Nevada	RPS target: IOU's 20% by 2015	5,467 by 2015
Oregon	RPS target: - Lg. Utilities 25% by 2025 - Sm. Utilities by 10% by 2025	10,342 by 2025
Utah	RPS target: 20% of adjusted retail sales by 2025	5,148 by 2025
Washington	RPS target: (for utilities with >25,000WA customers) 15% by 2020	10,795 by 2020
Wyoming	Currently no incentive	NA
Idaho	Currently no incentive	NA

** demand figures listed in this table for the western US states are based on present consumption rates.

It is unlikely that many US states have the capacity to meet their RPS targets due to expected increases in demand. Many states will likely have to import renewable energy to meet their targets. The increased demand in British Columbia and the western United States suggests a favourable environment for renewable energy development in British Columbia for the foreseeable future.

Despite these positive long-term indications, continued demand for renewable energy is not 'guaranteed'. As we have seen over the past 6 months, for example, one of the impacts of the global recession was a decrease in the demand for energy resulting in price reductions and, in the case of BC Hydro, a decrease by 40% in energy sought under the 2008 call. One would imagine, that while unlikely, certain changes in today's favourable policy environment could also negatively affect future development.

RENEWABLE ENERGY POLICIES – A DRIVER OF DEMAND

With rising energy prices since early 2000, and growing public concern about the environmental impacts of energy choices, many jurisdictions have implemented energy policies to support research, development and commercialization of a broad range of renewable energy sources.

This section will provide an overview of renewable electricity regulatory regimes for British Columbia and the western US states that could potentially acquire renewable energy produced in British Columbia.

British Columbia's Electricity Generation and Renewable Energy Policy

Since the 1950's British Columbia has pursued development of large hydro-electric facilities as the backbone to the electricity supply framework. In 2004, domestic electricity generation in British Columbia was 61,588 GWh[52]. Approximately 88.2% of British Columbia's electricity generation came from hydro-electric sources, 7.0% from fossil fuels (primarily natural gas, and small amounts of coal and refined petroleum products) and 4.8% from biomass (mostly forestry related companies burning waste wood).

British Columbia is integrated in the western electrical grid, which includes Alberta and the western US states. Depending on electricity supply and pricing environments, BC Hydro trades electricity in order meet provincial electrical demand and cost objectives. Over the past several years BC Hydro has relied on importing electricity instead of operating the Burrard Thermal Plant, which is a relatively inefficient 950 MW conventional natural gas-fired generating station.

In 2007, the government of British Columbia released a new Energy Plan, which defines the province's approach to developing incremental renewable energy resources in British

[52] Statistics Canada. Catalogue 57-003. Report on Energy Supply-Demand in Canada 2006.

Columbia. Through the Energy Plan, British Columbia will be significantly changing the electricity generation landscape in the province. The key elements to the plan include:

- *Self-Sufficiency* – The Plan calls for British Columbia self-sufficiency in electric energy supply by 2016, and 3,000 GWh of "insurance" electricity by 2026 to provide back-up. BC Hydro estimates in its 2006 Integrated Electricity Plan that there will be a need for approximately 10,000 GWh of new supply requirements in 2016 and 18,350 GWh by 2025.

- *Clean Energy Commitment* – British Columbia has committed that all new electricity generation projects developed will have zero net greenhouse gas emissions. This creates a highly competitive environment for renewable electricity.

- *Clean Energy Standard* – Under the Energy Plan, British Columbia will maintain the current 90 per cent of its electricity from clean or renewable sources.

- *Small Power Standing Offer* – In order to facilitate the development of small scale clean and renewable electricity producers, BC Hydro is required to establish a Standing Offer Program with no quota to encourage small and clean electricity producers (greater than 0.5 MW, but under 10 MW).

These policies will create a significant demand for new renewable energy development in the province. In order to meet these requirements, BC Hydro issued a Call for Clean Power on June 11, 2008. The acquisition target of the Call was 5,000 GWh/year of seasonal and hourly firm energy through a competitive process. Proposed projects are required to have an in-service date of 2016. The response to this call was overwhelming – in late November 2008, it was announced that over 17,000 GWh of new renewable electricity was proposed through the call. Proposed projects include run-of-river, wind, waste heat, biogas and biomass power projects, demonstrating the range of renewable power sources available in the Province.

While the response to the Call was significant, it must be remembered that only a fraction of the proposed projects will actually be completed. Technical, economic, environmental and other a host of reasons will make a large percentage of these proposed projects unviable. As a result, BC Hydro will undoubtedly be required to conduct calls over the next number of years.

Western United States Renewable Energy Portfolio Standards and Electricity Trade

A Renewable Portfolio Standard (RPS) is a regulatory policy that requires the increased production of renewable energy sources such as wind, solar, biomass, and geothermal energy.

An RPS mechanism generally places an obligation on electricity supply companies to produce or acquire a specified fraction of their electricity from renewable energy sources. Certified renewable energy generators earn certificates for every unit of electricity they produce and can sell these along with their electricity to supply companies. Supply companies then pass the certificates to some form of regulatory body to demonstrate their compliance with their regulatory obligations. Because it is a market standard, the RPS relies almost entirely on the private market for its implementation. Those supporting the adoption of RPS mechanisms claim that market implementation will result in competition, efficiency and innovation that will deliver renewable energy at the lowest possible cost, allowing renewable energy to compete with cheaper fossil fuel energy sources.

As previously described, British Columbia has electricity inter-ties with neighbouring jurisdictions. These ties enable BC Hydro and IPP's to trade electricity with neighbouring jurisdictions, and any other jurisdiction connected to the Western Interconnection (WI). The WI is one of the two major alternating current (AC) power grids in North America. All of the electric utilities in the Western Interconnection are electrically tied together during normal system conditions and operate at a synchronized frequency operating at an average of 60Hz. The Western Interconnection stretches from Western Canada South to Baja California in Mexico, reaching eastward over the Rockies to the Great Plains.

British Columbia (through BC Hydro and BCTC) is a member of the Western Electric Coordinating Council (WECC).WECC is responsible for coordinating and promoting electric system reliability. In addition to promoting a reliable electric power system in the Western Interconnection, WECC supports efficient competitive power markets, assures open and non-discriminatory transmission access among members, provides a forum for resolving transmission access disputes, and provides an environment for coordinating the operating and planning activities of its members.

British Columbia also participates in the Western Renewable Energy Generation Information System (WREGIS). WREGIS is an independent, renewable energy tracking system for the region covered by the WECC. WREGIS tracks renewable energy generation from units that register in the system using verifiable data and creates renewable energy certificates (RECs) for this generation.

WREGIS was developed through a collaborative process between the Western Governors' Association, the Western Regional Air Partnership, and the California Energy Commission. The development was further guided by means of stakeholder input gathered over a period of more than 3 years from more than 400 participants from across the western region.

A key opportunity for British Columbia is to be able to sell electricity to jurisdictions with RPS's in order to help them achieve their RPS goals. The following tables outline the RPS's in the western US states that are within the BC Hydro inter-connection network.[53] As you will see, almost all western US states, with the exception of Idaho and Wyoming, have put

[53] 2008, Interstate Renewable Energy Council, information published at dsireusa.org.

regulations in place requiring that an increasing percentage of generated electricity comes from renewable sources. While there is some variation, targets tend to be in the 15%-25 % range by 2020. All indications suggest that renewable energy imported from British Columbia will count toward reaching these significant targets.

In general, most RPS's permit importing electricity to count towards RPS requirements. However, the true nature and scope of the renewable energy export opportunity lie in the details. Every State's RPS has numerous clauses that determine under what conditions imported renewable energy may contribute to their clean energy targets.
These nuances and evolving requirements create opportunities as well as challenges for IPPs interested in exporting credited renewable energy to the US. The reader is therefore cautioned that they should follow-up with an individual jurisdiction if they are interested in marketing electricity as a certified renewable energy source.

1. Arizona Renewable Portfolio Standard	
Eligible Renewable/ Other Technologies:	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps, CHP/Cogeneration, Solar Pool Heating (commercial only), Daylighting (non-residential only), Solar Space Cooling, Solar HVAC, Additional technologies upon approval, Anaerobic Digestion, Fuel Cells using Renewable Fuels
Standard:	15% by 2025
Technology Minimum:	By 2012, at least 30% of the standard must be derived from distributed renewable energy (4.5% of total electricity sales by regulated utilities in 2025)
Credit Trading:	Yes
Authority 1:	AAC R14-2-1801 et seq.
Date Enacted:	11/14/2006
Effective Date:	6/15/2007

2. California Renewable Portfolio Standard	
Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel, Fuel Cells using Renewable Fuels
Applicable Sectors:	Investor-Owned Utility, Electric Service Providers, Small and Multi-Jurisdictional Utilities and Community Choice Aggregators

2. California Renewable Portfolio Standard	
Standard:	Legislative mandate to increase the percentage of renewable retail sales by at least 1% per year to reach at least 20% by end of 2010; goal of 33% by end of 2020.
Technology Minimum:	No
Credit Trading:	Tradable RECs may be allowed after the California Public Utilities Commission (CPUC) and Energy Commission conclude that the Western Renewable Energy Generation Information System (WREGIS) is operational and when other criteria are met.
Authority 1:	CA Public Utilities Code § 399.11 et seq.
Date Enacted:	2002 (amended 2003, 2006)
Effective Date:	1/1/2003
Authority 2:	Public Resources Code § 25740 et seq.

3. Colorado Renewable Portfolio Standard	
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, "Recycled Energy", Anaerobic Digestion, Fuel Cells using Renewable Fuels
Applicable Sectors:	Utility, Municipal Utility, Investor-Owned Utility, Rural Electric Cooperative
Standard:	Investor-owned utilities: 20% by 2020 Electric cooperatives: 10% by 2020 Municipal utilities serving more than 40,000 customers: 10% by 2020
Technology Minimum:	Investor-owned utilities: 4% of RPS requirement from solar-electric generation technologies; half of solar requirement must be located on-site at customers' facilities
Credit Trading:	Yes
Authority 1:	CRS 40-2-124
Date Enacted:	11/2/2004
Effective Date:	12/1/2004
Authority 2:	4 CCR 723-3-3650 et seq.
Effective Date:	7/2/2006

4. Idaho Renewable Portfolio Standard	
EligibleRenewable/ Other Technologies:	No Renewable Portfolio Standard – a significant portion of electricity generation in Idaho is from renewable sources.

5. Montana Renewable Portfolio Standard	
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Fuel Cells using Renewable Fuels
Applicable Sectors:	Investor-Owned Utility, Retail Supplier
Standard:	5% in 2008; 10% in 2010; 15% in 2015
Technology Minimum:	None
Credit Trading:	Yes
Authority 1:	MCA 69-3-2001 et seq.
Date Enacted:	4/2005
Authority 2:	MONT. ADMIN. R. 38.5.8301
Effective Date:	6/2/2006

6. New Mexico Renewable Portfolio Standard	
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Zero emission technology with substantial long-term production potential, Anaerobic Digestion, Fuel Cells using Renewable Fuels
Applicable Sectors:	Investor-Owned Utility, Rural Electric Cooperative
Standard:	Investor-owned utilities: 20% by 2020; Rural electric cooperatives: 10% by 2020
Technology Minimum:	For IOUs only by 2020: 20% of RPS from solar (4% of total sales) 20% of RPS from wind (4% of total sales) 10% of RPS from geothermal and biomass (2% of total sales) 3% of RPS from distributed renewables (0.6% of total sales)
Credit Trading:	Yes
Authority 1:	NMAC 17.9.572
Date Enacted:	8/7/2007
Effective Date:	9/1/2007
Authority 2:	N.M. Stat. § 62-15-34 et seq.
Date Enacted:	3/5/2007
Effective Date:	7/1/2007
Authority 3:	N.M. Stat. § 62-16-1 et seq.
Date Enacted:	3/2004

7. Nevada Energy Portfolio Standard	
Eligible Renewable/Other Technologies:	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Waste Tires (using microwave reduction), Geothermal Hot Water District Heating Systems, Solar Pool Heating, Anaerobic Digestion, Biodiesel
Applicable Sectors:	Investor-Owned Utility
Standard:	6% in 2005, rising to 20% by 2015
Technology Minimum:	5% of the energy portfolio must be solar
Credit Trading:	Yes
Authority 1:	NRS 704.7801 et seq.
Date Enacted:	1997
Authority 2:	NAC 704.8831 et seq.
Effective Date:	2002
Authority 3:	LCB File R167-05 (Revised Regulations)
Effective Date:	2/23/2006

8. Oregon Renewable Portfolio Standard	
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Hydrogen, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Utility, Retail Supplier
Standard:	Large utilities: 25% by 2025 Small utilities: 10% by 2025 Smallest utilities: 5% by 2025
Credit Trading:	Yes
Authority 1:	ORS § 469A
Date Enacted:	6/6/2007
Effective Date:	1/1/2007
Authority 2:	OAR 330-160-0005 to 330-160-0030
Effective Date:	9/3/2008

9. Utah Renewable Portfolio Goal	
Eligible Renewable/Other Technologies:	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Municipal Utility, Investor Owned utility, Rural Electric Cooperative
Standard:	20% of adjusted retail sales by 2025
Authority:	SB 202
Date Enacted:	3/18/2008

10. Washington State Renewable Portfolio Standard	
Eligible Efficiency Technologies:	CHP/Cogeneration, Others not specified
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel
Applicable Sectors:	Utility, (with >25,000 WA customers)
Standard:	15% renewables by 2020 and all cost-effective conservation
Technology Minimum:	None
Credit Trading:	Yes
Authority 1:	RCW 19.285 - Energy Independence Act
Date Enacted:	11/7/2006
Authority 2:	WAC 480-109

11. Wyoming Renewable Resource Standard	
Incentive Type:	None

RENEWABLE ENERGY GENERATING CAPACITY AND FUTURE DEMAND

Western US Renewable Energy Generating Capacity

The above information shows that most states are targeting between 15% and 25% of sales to be sourced from renewable options. While these requirements appear relatively low compared to British Columbia's 90%+ renewable electricity capacity, for many this will

require significant changes to the way electricity is produced. In order to better understand how these RPS's will provide opportunities for British Columbia-based renewable electricity producers, the following section reviews existing renewable electricity generating capacity and consumption in these states. The difference between the level of renewable electricity that they are generating and consuming today, and where they intend to be in the next several decades gives a good indication of the anticipated market for renewable electricity.

The following tables show each state's 2006 sales and the generation source from renewable electricity. In addition, the table shows the required incremental GWh of electricity sales required to be sourced from renewable sources (assuming annual sales remain constant), by the target year.

Table 10 – 2006 Electricity Sales and Generation Source Share

State	Annual Sales (GWh)	Large Hydro Share	Other Renew. Share	Renew Target	Includes Large Hydro	Required Incremental Renewables (GHh)	Target Year
AR	73,300	6.5%	0.1%	15%	Y	10,922	2025
CA	263,000	22.2%	11.0%	33%	N	57,860	2020
CO	49,700	3.5%	1.8%	20%	Y	9,045	2020
ID	22,800	84.0%	5.2%	NA	NA	NA	NA
MT	13,800	35.9%	1.9%	15%	Y	1,808	2015
NM	21,400	0.5%	3.4%	20%	Y	3,552	2020
NV	34,600	6.5%	4.2%	20%	Y	5,467	2015
OR	48,100	71.0%	3.5%	25%	Y	10,342	2025
UT	26,400	1.8%	0.5%	20%	Y	5,148	2025
WA	85,000	75.8%	2.3%	15%	Y	10,795	2020
WY	14,900	1.9%	1.7%	NA	NA	NA	NA
Total	**653,000**	**29.2%**	**5.8%**	**18%**		**114,939**	
Source: Energy Information Agency, 2006 State Electricity Profiles							

Table 10 shows that, assuming sales remain constant over the period leading up to the target year, there is a need for approximately 115,000 GWh of renewable electricity in the western United States to meet existing renewable electricity requirements. By comparison, electricity consumption for 2006 in British Columbia was 61,600 GWh.[54]In order to meet renewable electricity targets, there will have to be either a significant increase in renewable electricity production within the states, or acquisition of renewable electricity from outside the states.

The availability of renewable electricity depends on renewable electricity generating capacity. The followingTable 11 showsthe generating capacity in 2006 for the western US

[54] Statistics Canada Catalogue 57-003, 2006 Report on Energy Supply-Demand in Canada.

states. Aside from a handful of states with significant large hydro-electric generating capacity, renewable electricity generation is very limited, with coal and natural gas making up the majority of electrical generating capacity.

Table 11: 2006 Electricity Generation Capacity and Fuel Source

State	Capacity (MW)	Coal	Large Hydro	NG	Nuclear	Other Renew.	Other*
AR	25,608	23%	11%	50%	15%	0%	1%
CA	63,213	1%	16%	60%	7%	9%	7%
CO	11,156	44%	6%	41%	0%	3%	7%
ID	3,210	1%	74%	20%	0%	5%	1%
MT	5,437	45%	48%	3%	0%	3%	1%
NM	7,102	56%	1%	36%	0%	7%	0%
NV	9,648	28%	11%	59%	0%	2%	1%
OR	12,333	5%	68%	22%	0%	5%	0%
UT	6,712	0%	0%	0%	0%	0%	0%
WA	28,224	5%	75%	11%	4%	4%	1%
WY	6,707	87%	5%	3%	0%	4%	0%
* Includes petroleum, pumped storage							
Source: Energy Information Administration, 2006 State Electricity Information							

In December 2008, the US Department of Energy released the 2009 Annual Energy Outlook. The outlook forecasts electricity production from the 2006 base year to 2030. The report shows that from an aggregate perspective, renewable energy production represented approximately 26% of electricity production in the western US states. However, the tables above demonstrate that from an individual state perspective, many states still require significant growth in renewable electricity generation.

The Annual Energy Outlook estimates that renewable electricity generating capacity in the western US states will increase from 61.48 GW to 73.70 GW, an increase of 20%. Electricity generation is forecast increase from 237,000 GWh to 297,000 GWh, an increase of 60,000 GWh, or 25%. Wind generation will be the major source of incremental renewable electricity generation, contributing 33,240 GWh, or 55%. Biomass is anticipated to contribute 12,940 GWh, or 22%, and Geothermal 6270 GWh, or 10% of incremental renewable electricity generation. The remaining contributions are from solar thermal, photovoltaic and municipal waste energy projects.

While renewable electricity production is increasing, so are forecasted electricity sales. Forecasted sales are anticipated to increase from 842,160 GWh in 2006, to 1,078,330 GWh in 2030. This is an increase 236,170 GWh, or 28%, over the forecast period. With only an incremental 60,600 GWh of incremental renewable electricity generation, and

236,170GWh of increased sales, the share of renewable will actually decrease relative to other generation.

While the majority of states have set RPS's that should lead to development of new renewable electricity, the Department of Energy forecast shows how difficult achieving this outcome will be for most jurisdictions. There are realistically three actions that states have to increase the portion of their electricity sales from renewable sources:

- Adjust pricing to encourage more local renewable energy development.
- Penalize electricity generators for failure to achieve the legislated renewable portfolio standard.
- Encourage acquisition of renewable energy generated within the Region.

All of the states are using one or more of the above actions to achieve their respective RPS's. Given the timelines for the development of new projects, renewable electricity generation project proponents that are able to sell their electricity into the grid will likely encounter significant market opportunity for their power.

The creation of a market for renewable electricity in the Western Interconnection is already well underway. In June 2007, the Western Renewable Energy Generation Information System (WREGIS) was created to serve as an independent, renewable energy tracking system for the region covered by the Western Electricity Coordinating Council (WECC). WREGIS tracks renewable energy generation from units that register in the system using verifiable data and creates renewable energy certificates for this generation.

WREGIS is meant for use in the region covered by the Western Interconnection. This region consists of all or part of 14 states, 2 Canadian Provinces, and Baja California. The 14 states in the region are: Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. The 2 Canadian provinces in the region are Alberta and British Columbia.

While renewable electricity project proponents may look at the market potential in the western United States as an opportunity to build projects specifically for export, this is a significantly more difficult proposition than entering into a long-term energy purchase agreement with BC Hydro. The electricity trade business is one of economies of scale; participating in the market requires significant generating capacity and the ability to buy and sell electricity according to market opportunities. BC Hydro, through it trading subsidiary Powerex, is already a significant participant in electricity markets. It is anticipated that Powerex will be able to aggregate renewable energy production to be able to effectively and efficiently participate in dedicated markets.

While an IPP with a single renewable electricity project is not realistically able to participate in the electricity trading market, a number of IPP's that have different types of production sources (wind, hydro, biomass or ocean energy) and are geographically separated could potentially commingle and market production. This scenario holds

considerable promise once IPP's begin to mature from small, highly leveraged companies into larger and more financially sound operations.

Summary and Conclusions

Renewable energy producers in British Columbia have perhaps one of the most favourable markets for development in North America.

- British Columbia's Energy Plan includes a combination of policies for self-sufficiency (with insurance),and calls for power for independent power producers. This combination will create a robust domestic market for good quality (technical, economic and environmental) renewable energy projects.
- The demand for clean energy in British Columbia has been projected to increase by 10,000 GWh by 2016 and 18,350 GWh by 2025.
- The majority of western US states have legislated RPS targets that will likely prove to be difficult to achieve from domestic production sources alone; there will likely be robust export markets for renewable electricity.
- The creation of a market for renewable electricity in the Western Interconnection is already well underway supported by an energy tracking system for the region covered by the Western Electricity Coordinating Council.
- Powerex is expected to be able to aggregate renewable electricity sales, thus allowing proponents in British Columbia to take advantage of the demand for additional renewable energy coming from the western United States.

These factors suggest a strong and favourable environment for the foreseeable future for renewable energy development in British Columbia. Will the Central and North Coast and Haida Gwaii benefit from this growing demand for renewable energy? Yes. The more pertinent question is to what degree they will benefit when compared with other areas competing to fill the same demand. The answer to this question will depend on a number of factors, some of which have been discussed already, others of which will be discussed in later sections of this report. But ultimately, it will depend on their ability to work together and position themselves for success as a region, working collaboratively with government, utilities, regulators, First Nations, local communities, industry and others to address constraints.

VII. Regulatory Requirements for Alternative Energy Projects

Another factor that plays a significant role in determining which renewable energy projects move forward is the regulatory environment in British Columbia. Section VII provides an overview of provincial, federal and local regulations that could be required in order to proceed with a renewable energy project. As well, it will include a discussion of the potential impacts of draft legislation resulting from the Central and North Coast and Haida Gwaii land use decisions.

The following summary assumes that alternative energy supplies will be developed by the private sector and/or First Nations, and broadly describes both as independent power producers (IPP's). As discussed in part in Section IV, IPP projects require a number of federal, provincial and local government authorizations before construction may commence. The regulatory procedures for adjudicating applications are typically detailed in the relevant statute, attendant regulations and/or supporting operational policies.

The statutes which apply will depend on the particulars of the project. For example, a waterpower project will require a water licence under the provincial *Water Act*, but a wind power project would not. If any part of a project is to be located on provincial Crown land, a *Land Act* tenure is necessary, but not if the project will be located entirely on private land. Environmental protection legislation does not distinguish between all Crown and private land and is required when a Certificate is required whenever a project meets or exceeds the criteria contained within the attendant Reviewable Projects Regulation, i.e. a waterpower project is equal to or greater than 50 megawatts.

The following provincial statutes may be applicable for an IPP renewable energy project:

- *Land Act;*
- *Agricultural Land Commission Act*;
- *Water Act*;
- *Environmental Assessment Act*;
- *Environmental Management Act*;
- *Forest Act*;
- *Heritage Conservation Act*;
- *Pipeline Act*;
- *Wildlife Act*;
- *Park Act*; and,
- *Geothermal Resources Act*.

Similarly, the following federal statutes may also apply:

- *Federal Real Property and Federal Immovables Act;*
- *Navigable Waters Protection Act;*
- *Canadian Environmental Protection Act;*

- *Fisheries Act;*
- *Species at Risk Act;*
- *Migratory Birds Convention Act;* and,
- *Canadian Environmental Assessment Act.*

Lastly, for local governments, the relevant legislation is:

- *Local Government Act; and,*
- *Community Charter.*

Regulators are required to make decisions which are transparent and objective, comply with the requirements of the relevant statute, and satisfy the principles of natural justice and administrative law.

The gathering of sufficient accurate information is fundamental to sound decision-making. The gathering of information may be accomplished through a variety of methods, all of which require some form of feedback from interested and potentially affected persons. These persons may include federal and provincial agencies, local governments, First Nations, existing water licence and Crown land tenure-holders and applicants, property owners, recreational users, and the general public.

A Note on Regulatory Considerations Emerging from the Central and North Coast and Haida Gwaii Land Use Decisions[55]

The outcomes of the North Coast and Central Coast Land Use Decision (February 2006) and follow-on government-to-government agreements will provide guidance to those projects which have not yet obtained the necessary provincial authorizations. Development of these plans led to the creation of "zones" or areas to protect and maintain specific values, such as environmental considerations. These zones include:

- Protection Areas;
- Biodiversity, Mining and Tourism Areas; and,
- Ecosystem-based Management Areas.

Legislation has been enacted to reflect the associated restrictions on land use in each of these zones. All but 4 small southern areas of the Protection Areas (July 2008) and the Biodiversity, Mining and Tourism Areas (January 2009) have been designated. Land Use objectives have been established under the Land Act (July and December 2007) which guide forestry practices in the Ecosystem Based Management Areas. These objectives are currently undergoing revision and public review with the goal of establishing the revised set by March 31, 2009.

[55] Based partially on personal communications with Dorthe Jakobsen and Lindsay Jones at the BC Integrated Land Management Bureau.

Similar designations have been identified in the Haida Gwaii SLUA and are expected to be carried forward into legislation shortly.

Protection Areas

The Province has designated 114 conservancies under the *Park Act* or the *Protected Areas of British Columbia Act* to protect some of the most spectacular and ecologically diverse regions in the world, including critical Spirit Bear habitat. Within these conservancies, commercial forestry, mineral exploration and development, and hydro-electric development are prohibited. Any other alternative energy projects or parts thereof which are proposed within these areas must satisfy the requirements of the *Park Act*. A park use permit will be required and a permit may only be issued if the use or activity will not hinder, restrict, prevent or inhibit the development, improvement or use of the conservancy in accordance with the four following reasons for setting aside a conservancy:

a) the protection and maintenance of their biological diversity and natural environments;
b) the preservation and maintenance of social, ceremonial and cultural uses of First Nations;
c) the protection and maintenance of their recreational values; and,
d) to ensure that development or use of their natural resources occurs in a sustainable manner consistent with the purposes of (a), (b) and (c).

Biodiversity Areas

The second set of areas, called Biodiversity, Mining and Tourism Areas (BMTAs), are defined as areas where commercial forestry and commercial hydro-electric development are prohibited.[56] Consistent with the Land Use Decision and government to government (G2G) agreements with First Nations, BMTAs are intended to contribute to the conservation of species, ecosystems and seral stage diversity by being located adjacent to the existing and proposed Conservancy Areasand by limiting the land uses within the zones.

A resume of the Order in Council for BMTAs can be found at http://www.qp.gov.bc.ca/statreg/oic/2009/RESUME01.HTM and the full OIC and maps can be found at http://ilmbwww.gov.bc.ca/slrp/lrmp/nanaimo/central_north_coast/biodiversity.html

Projects or parts thereof which are proposed within these areas will have to pass the legislative tests associated with these designations. Compatibility with the specific resource values of any particular area will be an important consideration of the Province.

[56] Commercial hydro-electric development is defined as providing power to the grid or for compensation.

Ecosystem-based Management Operating Areas

The remaining areas within the Central and North Coast and Haida Gwaii are available for the full range of economic uses, provided that such uses are consistent with the application of Eco-Based Management (EBM) principles (identified in the Introduction of this report).

For example, the principles in the North Coast LRMP recommendations are that:

- Ecological integrity is maintained;
- Human well-being is promoted;
- Cultures, communities and economies are sustained within the context of healthy ecosystems;
- Aboriginal Rights and Title;
- The Precautionary Principle is applied;
- Ecosystem-Based Management is collaborative; and,
- People have a fair share of the benefits from the ecosystems in which they live.

In addition, a Ministerial Order was issued under the Land Act that establishes land use objectives in EBM Operating Areas. Those objectives only apply to forestry activities and do not bring any additional regulatory constraints or requirements for renewable energy development

The Crown will look to this legislation for guidance as they move through the approval process for land-use development applications on lands in the Central and North Coast and Haida Gwaii.

PROVINCIAL REGULATORY REQUIREMENTS

Water Act

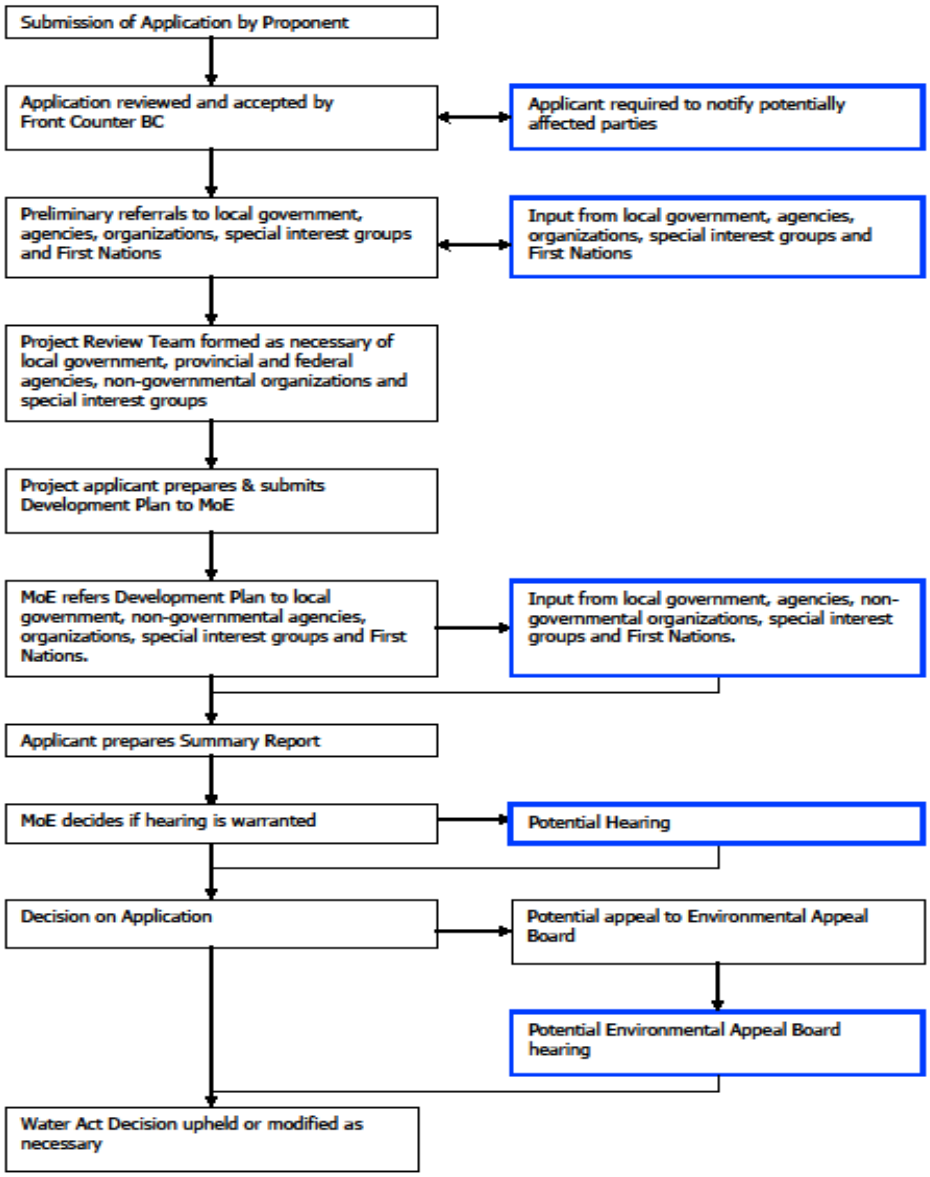
The *Water Act* is the provincial statute which provides for the orderly allocation of surface water in British Columbia, via a system of licences, approvals and orders. Adjudication of applications for water licences is a responsibility of the Water Stewardship Division of the Ministry of Environment.

Water licences are issued under Section 12(1) which states, in part "With respect to an application, whether objections to it are filed or not, the comptroller or the regional water manager may(a) refuse the application…[and] (c) grant all or part of the application…"

Following acceptance of the application (Figure 29), proponents are required to prepare a development plan containing a detailed project description and an impact assessment which summarizes and proposes mitigation measures for the following issues:

- Instream flow for fish and fish habitat
- Wildlife and habitat
- Instream flow for recreation
- Flood control
- Water quality
- Bridges and ferries
- Roads
- Crown-owned resources
- Existing rights
- First Nations
- Aesthetics
- Mineral claims
- Navigable Waters Protection Act
- Hazard to the public
- Hazard to the environment
- Public access

Figure 29: Typical Regulatory Process (Water Act)



Source: Ministry of Energy, Mines and Petroleum Resources

Decision-makers have a legal and fiduciary duty to consult with First Nations and to avoid potential infringement on aboriginal rights and title. Where potential infringement is unavoidable, the Crown may be required to provide some form of accommodation. Water licences for IPP waterpower projects are issued with a term of 40 years.

Land Act

The *Land Act* is the statute which provides for the disposition of provincial Crown land, including terrestrial and submerged lands.

Under Section 11(1) "the minister may dispose of surveyed or unsurveyed Crown land by any of the following means, as the minister considers advisable in the public interest, to a person entitled under this Act:(a) application;...". Pursuant to Section 11(2) the minister may: (a) sell Crown land; (b) lease Crown land; (c) grant a right of way or easement over Crown land; or(d) grant a licence to occupy Crown land.

The statutory decision-maker referred to in this statute is the Minister of Agriculture and Lands. Certain authorities, including decision-making on land applications, are delegated to specific staff positions within the Integrated Land Management Bureau, an agency for which the Minister is responsible.
The regulatory process for adjudicating applications for tenures under the *Land Act* is very similar to that for provincial water licences, and involves submission of a development plan. Crown land tenures are issued with terms equal to the term of a relevant BC Hydro electricity purchase agreement, to a maximum of 40 years.

Environmental Assessment Act

IPP projects which are 50 megawatts (MW) or greater, or include a transmission line equal to or greater than 40 kilometers in length require an environmental assessment certificate under Section 17 of the *Environmental Assessment Act* (EAA). Responsibility for administering the EAA and conducting environmental assessment reviews rests with the Environmental Assessment Office (EAO). The Minister of Environment is responsible for this agency.

Where an energy project does not constitute a reviewable project under the EAA regulations (i.e., is less than 50 MW), it may still be reviewed under the EAA. Project proponents may request that a project be designated reviewable under Section 7 of the EAA, and Section 6 of the EAA authorizes the Minister to designate a project, by order, as a reviewable project. The Minister may do so if he/she is satisfied that the project may have a significant adverse environmental, economic, social, heritage or health effect and the designation is in the public interest, and he/she believes, on reasonable grounds, that the project is not substantially started at the time of the designation.

If a local government or other interested party feels that a specific IPP project satisfies the criteria in Section 6, it may request that the Minister designate the project as reviewable under that section.A project may be subject to both the province's EAA and the *Canadian Environmental Assessment Act*. In these instances, the EAO works closely with the Canadian Environmental Assessment Agency and other federal agencies to ensure the environmental assessment requirements of Canada and BC are met and integrated through a coordinated work plan and process.

The EAA and accompanying regulations establish the framework for delivering environmental assessments. However, the scope, procedures and methods of each assessment are tailored specifically to the circumstances of the proposed project. This allows for each assessment to focus on the issues relevant to that project.
Although environmental assessments are customized for each project, in a typical review process, proponents are expected to undertake early and ongoing consultation with federal, provincial and local governments, First Nations and the general public in order to develop Terms of Reference for the project Application. The Terms of Reference, which must be approved by the EAO, includes all of the information requirements that must be provided for in the project Application for an environmental assessment certificate.

Once the EAO has accepted an Application for review, it has up to 180 days to complete that review. At the conclusion of the review, the EAO prepares an assessment report which is referred to the Minister of Environment and, in the case of energy projects, the Minister of Energy, Mines and Petroleum Resources, for a decision on whether or not to grant an EA certificate. The Ministers have 45 days in which to make their decision.

Agricultural Land Commission Act

Section 20 of the *Agricultural Land Commission Act* prohibits the use of agricultural land within the Agricultural Land Reserve (ALR) for non-farm use without permission.IPP projects located on ALR land will require permission under section 25 of the Act*, which* empowers the Agricultural Land Commission to grant permission for a non-farm use.

Except for an application from a First Nation government, an application may not proceed to be adjudicated by the Agricultural Land Commission unless authorized by a resolution of the local government if, on the date the application is made, the application applies to land that is zoned by bylaw to permit agricultural or farm use, or requires, in order to proceed, an amendment to an official settlement plan, an official community plan, an official development plan or a zoning bylaw.

Environmental Management Act

Pursuant to Section 14 of the *Environmental Assessment* Act, a director may issue a permit authorizing the introduction of waste into the environment subject to requirements for the protection of the environment that the director considers advisable. Waste includes: air contaminants; litter; effluent; refuse; biomedical waste, and hazardous waste.

Waterpower, wind power, solar and ocean energy projects are not expected to need this authorization. Biomass, biofuels and fossil-fuelled generation may have air emissions, effluent discharges or waste disposal which could require permits.

Forest Act

If an IPP proposes to construct any part of a project within a Provincial Forest, approval of the Chief Forester will likely be required. Section 5(5) of the *Forest Act* states that Crown land in a Provincial forest may be disposed of under the *Land Act* for:

> (a) an easement or right of way, or
> (b) any other purpose that the chief forester considers is compatible with the uses described in section 2 (1) of the *Forest Practices Code of British Columbia Act* or that is permitted by regulations made under that Act, but, except for the purposes of a highway, transmission line, or pipeline right of way, a disposition must not be made of the fee simple interest in the land.

IPP projects within the Provincial Forest may require removal of timber for works such as transmission lines, electricity generating facilities, penstock routes, and substation locations. In order to proceed, permission will be required under the *Forest Act*. Section 47.4 (2) states that (a) the regional manager or district manager may enter into(a) an occupant licence to cut with an owner or occupier of land, authorizing the person to cut Crown timber on the land, remove Crown timber from the land or do both.

An occupant licence to cutmust require its holder, if it authorizes its holder to both cut and remove Crown timber, to pay to the government, in addition to other amounts payable under this Act and the regulations,(i) stumpage under Part 7, and(ii) waste assessments for merchantable Crown timber, whether standing or felled, that could have been cut and removed under the occupant licence to cut, but, at the holder's discretion, is not cut and removed.

Heritage Conservation Act

The purpose of the *Heritage Conservation Act* is to encourage and facilitate the protection and conservation of heritage property in British Columbia. A**"heritage site"** means, whether designated or not, land, including land covered by water, that has heritage value to British Columbia, a community or an aboriginal people. Heritage value means the historical, cultural, aesthetic, scientific or educational worth or usefulness of a site or object. This statute is administered by the Ministry of Tourism, Culture and the Arts.

Pursuant to Section 12(2) the minister, including a person authorized in writing by the minister for the purposes of the section,(a) may issue a permit authorizing activity within a heritage site.

Under Section 12(3) a permit may: include requirements, specifications and conditions that the minister considers appropriate; be limited to a specified period of time or to a specified

location; and, require the holder of the permit to consult with or obtain the consent of one or more parties whose heritage the property represents or may represent.

Section 12(4) further statesthat a permit may specify the siting, dimensions, form, exterior design and finish of new construction or renovations to a building or structure."

Pipeline Act

The *Pipeline Act* is administered by the Oil and Gas Commission and a pipeline is defined as a continuous conduit between 2 geographical locations through which oil, gas or solids is transported under pressure. Companies proposing to use oil or natural gas-fuelled electricity generators may be regulated under this statute.

Pursuant to Section 10, a company must not begin to construct a section or part of a company pipeline until the commission has issued a certificate granting the company leave to construct the line.

Wildlife Act

Section 4(2) of the Wildlife Act states "With the consent of the Lieutenant Governor in Council, the minister may, by regulation, designate as a wildlife management area land that is under the minister's administration and is not in a park, a conservancy or a recreation area".

Section 4(4) also states "Despite any other enactment, a person may not use land or resources in a wildlife management area without the written permission of the regional manager."

IPPs who wish to construct works within a wildlife management area will therefore require a written permission under section 4 of the *Wildlife Act.*

Park Act

The *Park Act* is administered by the Minister of Environment. Section 8(1) stipulates that land in a Class A or Class C park must not be alienated except as authorized by a valid park use permit, and under Section 8(2) a park use permit may only be issued if it is necessary to preserve or maintain the recreational values of the park involved.

Similarly, under Section 8(3) an interest in land in a Class B park must not be authorized without a valid park use permit. And under Section 8(4) a park use permit referred to in subsection (3) must not be issued unless, in the opinion of the minister, to do so is not detrimental to the recreational values of the park concerned.

Pursuant to Section 8(5) Crown land in a recreation area is reserved from disposal under the *Land Act*, except as may be approved by the minister.

Under Section 8(6) an interest in land in a conservancy must not be granted, sold, leased, pre-empted or otherwise alienated or made the subject of a licence except as authorized by a valid park use permit.

Under Section 9 of the Act, for other than fish and wildlife, a natural resource in a Class A, B or C park must not be exploited without a park use permit. And a park use permit may only issue, if in the opinion of the minister, it is necessary to preserve and maintain the recreational values of the Class A or C park, or is not detrimental to the recreational values of the Class B park.

A natural resource in a recreation area must not be exploited without the approval of the minister under Section 9(6).

Within a conservancy a natural resource must not be exploited without a valid park use permit (Section 9(6.1)). Section 9(10) expands on that by stating "a park use permit must not be issued to authorize the following activities in a conservancy: commercial logging; mining; hydro-electric power generation, other than local run-of-the-river projects; and, any other activity unless, in the opinion of the minister, the activity will not restrict, prevent or inhibit the development, improvement or use of the conservancy."

Local run-of-the-river projects, in relation to a conservancy, means run-of-the-river projects supplying power for use only in the conservancy, or by communities, including First Nation communities, that do not otherwise have access to hydro-electric power.

Lastly, a person must not construct, install, erect or place any structure, improvement or work of any nature in a park, conservancy or recreation area, except under the authority of a valid and subsisting park use permit or resource use permit (Section 13).

Therefore, if works are proposed to be constructed within a park, conservancy or recreation area, specific statutory tests must be satisfied and the relevant permit or approval obtained.

Geothermal Resources Act

The *Geothermal Resources Act* is administered by the Ministry of Energy, Mines and Petroleum Resources. This statute defines geothermal resource as "the natural heat of the earth and all substances that derive an added value from it, including steam, water and water vapour heated by the natural heat of the earth...but does not include water that has a temperature less than 80^{o}C at the point where it reaches the surface, or hydrocarbons."

Proponents who propose to install wells or other facilities to use the geothermal resource to produce energy are regulated by this statute.

Under Section 5, the minister may issue a permit which requires the permittee to demonstrate diligent use by undertaking work annually within the permit area, similar in concept to a mining claim. The permittee has the exclusive right to apply for well

authorizations for wells to be drilled within the boundaries of the permittee's location. Section 12 empowers the division head to issue well authorizations.

If a drilling and testing program proves there is geothermal resource potential and the proponent submits a development plan, the minister may issue a lease under Section 8. The development plan is for the drilling of the number of wells that are, in the opinion of the minister, sufficient to enable production of a geothermal resource underlying a lease to begin, including providing piping, equipment, reinjection wells and controls required to produce the geothermal resource, but does not include plans for the commercial utilization of the geothermal resource or for converting it into any other form of energy. A production plan must be submitted and approved by the minister in order to produce energy from the resource.

FEDERAL REGULATORY REQUIREMENTS

Fisheries Act

The *Fisheries Act* will be triggered by impact on fish or fish habitat. Direct harm, such as fish kill from the turning of tidal energy turbines requires authorization under Section 32. The project may also bring into play Section 35(1), which prohibits carrying on "any work or undertaking that results in the harmful alteration, disruption or destruction (HADD) of fish habitat". This may result from alteration to the seabed, streambed or terrestrial land from the construction of works, or the reduction of flows in a stream. Such HADD is permissible if authorization is obtained under Section 35(2). It should also be noted that Section 35 is a trigger under the *Canadian Environmental Assessment Act* (CEAA). Section 36(3) will also apply if the construction, operation or decommissioning of the project involves the deposit of a deleterious substance into water frequented by fish.

Canadian Environmental Assessment Act

Application of this statute depends on whether any proposal meets the definition of "project" under the *Canadian Environmental Assessment Act* (CEAA). If a federal authority grants a permit or licence pursuant to a federal statute, then an environmental assessment will be triggered under Section 5(1)(d). If a federal authority sells, leases or otherwise disposes of federal lands or an interest in federal lands for the purpose of carrying out a project, Section 5(1)(c) will similarly trigger an assessment. Section 5(1)(b) triggers an assessment if there is federal funding involved in the project and Section 5(1)(a) acts as a trigger if the federal authority is the proponent of the project.

Permission may be given under section 20(1)(a) or 37(1)(a) of CEAA.

Species at Risk Act

The *Species at Risk Act* (SARA) sets out various prohibitions in order to protect listed endangered and threatened species, and the prohibitions could catch IPP projects depending on the technology, location and degree of impact. Section 32(1) prohibits persons from killing, harming, harassing, capturing or taking an individual of a wildlife species listed as endangered or threatened, while Section 33 prohibits persons from damaging or destroying the residence of one or more individuals of such listed species. Section 58(1) prohibits the destruction of critical habitat of any listed endangered or threatened species.

However, various ways are provided under SARA for activities to be exempted from the prohibitions. The exceptions include where a person engaging in an activity affecting a listed wildlife species obtains an incidental harm permit pursuant to Section 73 and where a person is engaging in activities permitted by a recovery strategy or action plan under Section 83(4).

SARA also imposes special environmental assessment requirements that might apply to IPP projects. Under Section 79, a person proposing a project subject to federal environmental assessment review must identify the adverse effect of the project on listed wildlife species. If the project is carried out, the person must ensure that measures are taken to avoid or lessen adverse effects and to monitor them.

Navigable Waters Protection Act

The *Navigable Waters Protection Act* (NWPA) applies to those situations which involve navigable waters, including rivers, lakes and the ocean. Navigable includes recreational use. Pursuant to Section 5, a permit is required for works to be built in, on, over, under, through or across navigable water. However, if the project is not considered to "interfere substantially with navigations", the approval requirement under Section 5(2) might not apply. It should also be noted that ministerial approval under Section 5(1)(a) is a CEAA trigger.

Federal Real Property and Federal Immovables Act

In the absence of specific legislation, the acquisition, administration and disposition of real property by the Government of Canada (i.e. the tenuring of federal Crown land) is done pursuant to the *Federal Real Property and Federal Immovables Act* (FRPFIA).

Under the FRPFIA, any Minister having administration of federal real property may grant a license or interest in respect of that property, pursuant to Section 6. Any transaction of this nature must be made in accordance with the Treasury Board of Canada *Policy on the Management of Real Property.*

Given that under the *Department of Natural Resources Act* the Minister of Natural Resources has residual statutory responsibility for all matters relating to natural resources within the federal government's jurisdiction, including renewable energy, the Minister of Natural Resources Canada (NRCan) has taken primary responsibility for the administration

of Crown lands for the purposes of such projects as wave and tidal energy, and offshore wind power. This department currently issues, manages, transfers, and registers federally owned mineral rights in the provinces and oil and gas rights for frontier land areas not covered by regional boards. It is unlikely that any other type of IPP project will require authorization under FRPFIA as the sites will likely be located on provincial Crown upland.

As this function has been newly acquired by NRCan, the necessary real property management framework, supporting policies and procedures are probably under development.

The Supreme Court of Canada has determined that the seabed off the west coast of Vancouver Island and the Queen Charlotte Islands falls under the jurisdiction of the federal government. The Supreme Court has also determined that the various straits between Vancouver Island and the mainland, known as the Strait of Georgia, are Provincial property. Ownership of the seabed in Hecate Strait and Queen Charlotte Sound is disputed.

Canadian Environmental Protection Act

The *Canadian Environmental Protection Act*(CEPA) is "An Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development."

Under Section 56(1), the Minister may require any person or group of persons to prepare and implement a pollution prevention plan in respect of a substance or group of substances specified on the List of Toxic Substances. Section 56(5) provides that upon a written request submitted by any person to whom a notice under subsection (1) is directed, the Minister may waive the requirement where the Minister is of the opinion that it is not reasonable or practicable to consider the factor on the basis of reasons provided in the request.

CEPA provides for certain instruments to be developed under the Act such as regulations, pollution prevention plans, guidelines and codes of practice. Under Section 62(1) for example, the Minister shall develop guidelines respecting the circumstances in which and the conditions under which pollutions prevention planning is appropriate. "Guidelines for the Implementation of the Pollution Prevention Planning Provisions of Part 4 of the *Canadian Environmental Protection Act, 1999* is one example.

Migratory Birds Convention Act

Most migrating birds found in Canada are protected under the *Migratory Birds Convention Act* (MBCA) of 1917. The Act fulfilled the terms of the Migratory Birds Convention of 1916 between Canada and the U.S.A. In Canada, the MBCA is administered by the Wildlife Enforcement Division of Environment Canada in cooperation with provincial and territorial governments.

The MBCA enables regulations to be made, including regulations respecting the conditions and circumstances under which migratory birds may be killed, captured, injured, taken or disturbed, or nests may be damaged, destroyed, removed or disturbed.
Under Section 4(1) of the Migratory Birds Regulation, the Minister of Environment may issue a permit, including conditions respecting the husbandry, release, scaring, capture, killing or disposal of migratory birds or any other matter for the conservation of migratory birds.

LOCAL GOVERNMENT REGULATORY REQUIREMENTS

Regional districts and municipalities, as local governments, have authority under the *Local Government Act* and the *Community Charter* with respect to planning and approving land use within their boundaries. Land use planning is typically undertaken through the development of Official Community Plans (OCPs) and Official Settlement Plans and the determinations therein are put into effect through the adoption of zoning bylaws, or the usage of development permits in areas without OCPs.

Almost the entire province falls within the boundaries of a local government. In some instances, those boundaries encompass submerged Crown land. While local governments may not impose zoning requirements on vacant Crown land, they may do so if the land is to be occupied and used under authority of a provincial Crown land tenure. If land is not zoned for the proposed purpose or land use, i.e. wind power production, the proponent may apply to have the zoning amended. The process by which rezoning applications are adjudicated is guided by legislation and is a public-participatory process.

A recent amendment to the *Utilities Commission Act* (UCA) clarified the respective roles of the Province and local governments in regards to IPP projects. The amendment essentially stated that a local government could not supersede or impair an authorization granted to a public utility if the public utility met certain prescribed conditions, and IPP projects are defined as public utilities.

The conditions which need to be met are: the public utility has an electricity purchase agreement with BC Hydro, Powerex, or Fortis BC; the project is located entirely on provincial Crown land; and, the public utility has acquired the following prescribed federal and provincial authorizations, where necessary:

(i) a lease, licence or right of way granted under section 11 of the *Land Act*;
(ii) a permission under section 25 of the *Agricultural Land Commission Act*;
(iii) a licence issued under section 12 of the *Water Act*;
(iv) an environmental assessment certificate issued under section 17 of the *Environmental Assessment Act*;
(v) a lease issued under section 8 of the *Geothermal Resources Act*;
(vi) a permit issued under section 14 of the *Environmental Management Act*;

(vii) an occupant licence to cut entered into under section 47.4 of the *Forest Act* and an approval of the chief forester granted under section 5 of that Act;
(viii) a permit issued under section 12 of the *Heritage Conservation Act*;
(ix) a certificate issued under section 10 of the *Pipeline Act*;
(x) a written permission under section 4 of the *Wildlife Act*;
(xi) a park use permit referred to in section 8 or 9 of the *Park Act*, an approval of the minister granted under section 9 of that Act, and a resource use permit referred to in section 12 of that Act;
(xii) an authorization under section 35 (2) of the *Fisheries Act* (Canada);
(xiii) an approval under section 5 of the *Navigable Waters Protection Act* (Canada);
(xiv) permission under section 20 (1) (a) or 37 (1) (a) of the *Canadian Environmental Assessment Act*.

Therefore, local governments may not prevent or otherwise impede a project which meets the necessary conditions from advancing, but may influence the project's configuration through re-zoning or development processes.

The regulatory environment plays a key role in determining if and where renewable energy projects are developed. Understanding the constraints established under the regulatory regime is useful in assessing where various development is likely to occur, or perhaps more accurately, where it will NOT occur. This understanding will be important to leaders in the Central and North Coast and Haida Gwaii as they develop strategies for renewable energy development and assess the 'real' potential,(remembering that only a small percentage of proposed projects make it to the development stage), of the many proposals that they are presented with in the coming years.

PART II:

ESTABLISHING A FRAMEWORK FOR SUCCESS - POSITIONING THE CENTRAL AND NORTH COAST AND HAIDA GWAII TO CAPITALIZE ON OPPORTUNITIES FOR RENEWABLE ENERGY DEVELOPMENT

This section has been developed as an addendum to the strategic analysis of renewable energy potential that forms Part I of this report. Part 2 offers 'things to consider' as well as general direction to leaders in the Central and North Coast and Haida Gwaii on how to capitalize on the opportunities for renewable energy development and in doing so, bring social and economic benefits to their communities.

The strategic analysis of renewable energy potential in the Central and North Coast and Haida Gwaii (Part 1 of this report) describes the existing known resource base and the many factors that will determine which resources are developed and where. This information provides the basis from which to grow a regional strategy that delivers economic benefits to communities – the ultimate goal of leaders in the Central and North Coast and Haida Gwaii. Part II of this report will offer further direction and advice about the kinds of things that should be considered and undertaken to achieve this longer term goal.

VIII. First Nations Considerations

Positioning the Central and North Coast and Haida Gwaii to benefit from renewable energy development means recognizing the unique and special interests of First Nations in the area. All parties involved must be cognizant of these interest and what they mean in terms of renewable energy development in the area.

First Nations have aboriginal rights and titles to the lands and must benefit from the resources and wealth generated on these lands. First Nations therefore have a unique and special interest in how renewable energy is developed. There is some concern that many proponents fail to appreciate and understand these rights and how they relate to, and impact development.

First Nations will be an integral part of future renewable energy projects. Numerous factors will influence the role they play, which may range from being a consulted party, to receiving shared benefits (such as royalties), to participating in aspects of the development and implementation, to being an equity partner. Their role will be project specific and

include some balance between the rights and interests of involved First Nations and those of other project proponents.

This section will outline the rights and responsibilities assumed by First Nations in British Columbia and consider what unique challenges and opportunities those rights create for First Nations communities in relation to renewable energy development in their traditional territories.

POLICY FRAMEWORK: BRITISH COLUMBIA'S NEW RELATIONSHIP WITH FIRST NATIONS

First Nations typically have a critical role in the review and success of any IPP proposal. The Province has made a clear commitment to meaningfully involve First Nations in the review of all IPP proposals. In addition, the provincial government and British Columbia's First Nations organizations are working together to develop a New Relationship founded on respect, recognition and reconciliation of aboriginal rights and title.

In March 2005, the Province began meetings with representatives of the First Nations Summit, the Union of BC Indian Chiefs and the B.C. Assembly of First Nations. The goal was to develop new approaches for consultation and accommodation and a vision for a New Relationship to deal with aboriginal concerns – a new relationship based on openness, transparency and collaboration, thus reducing uncertainty, litigation and conflict for all British Columbians.

A five-page document outlining the vision and principles of the New Relationship was developed as a result of these meetings. It broaches the topic of a new government-to-government relationship with First Nations, including new processes and structures for coordination and working together to make decisions about the use of land and resources.

PROTECTION OF ABORIGINAL RIGHTS AND TITLE

In 1982 existing aboriginal and treaty rights were recognized and affirmed in Section 35(1) of the *Constitution Act*. Court decisions have clarified the nature of these rights and the level of protection that section 35 provides. In short, government activities cannot infringe on aboriginal rights unless there is proper justification in accordance with legal criteria that have been developed by the Courts. Section 35(1) of the Constitution Act, 1982 provides general protection but does not define or set out particular aboriginal rights.

The courts have now clarified what aboriginal rights and aboriginal title mean, and have established tests for proving aboriginal rights. Aboriginal rights, which have been recognized in several cases across Canada, are distinct from treaty rights, which flow from particular treaties with various aboriginal peoples. The courts have clarified that an aboriginal right is a modern practice, tradition or custom that has a reasonable degree of connection with the practices, traditions or custom that existed prior to European contact. Activities that qualify as an aboriginal right may vary from group to group depending on

the customs that formed an important part of their cultures pre- contact. Examples of aboriginal rights may include the right to hunt or fish for sustenance, social, spiritual and ceremonial purposes.

In addition, the 1997 Supreme Court of Canada decision in Delgamuukw clarified that aboriginal title is a distinct type of aboriginal right. The content of aboriginal title and the test for establishing it are different than the content and test for establishing other types of aboriginal rights. For example, aboriginal title, if proven, confers a right on the First Nation to exclusively use and occupy the land for a variety of purposes. By contrast, a proven aboriginal right typically confers a non-exclusive right to carry out a particular activity in a specified area.

In 2004, the Supreme Court of Canada's decisions in the Haida and Taku River cases clarified that even before aboriginal rights and/or title are proven through a Court process, the Province has a duty to consult with First Nations when it has real or constructive knowledge of the potential existence of an aboriginal right or title and contemplates conduct that might adversely affect it. In addition, although it is Provincial authorities who are duty-bound to consult with First Nations groups, the proponent is often better placed to share information with the First Nation and to address particular First Nations' interests or concerns.

First Nations expressing an aboriginal right and/or title have a reciprocal duty to identify their aboriginal interests and concerns once they have had the opportunity to consider the information provided and must make a reasonable effort to inform the Crown about any impacts of the proposed activity on their aboriginal interests. First Nation communities' concerns typically relate to potential impacts on claimed aboriginal rights and title, including traditional practices and cultural resources, and environmental concerns including impacts on the land, air, water, forests, fish and wildlife.

DUTY TO CONSULT FIRST NATIONS

The Courts have held that the duty to consult is triggered when the Crown:

1. Has real or constructive knowledge of the potential existence of aboriginal rights or title; and,
2. Is contemplating conduct that might adversely affect such rights or title.

Court cases, including Haida, have clarified that the threshold for establishing the above two requirements is low.

Where a duty to consult is triggered, the requirements for fulfilling the duty will vary from case to case. The scope of consultation and accommodation (if any) required in any particular case is proportionate to:

1. A preliminary assessment of the strength of the First Nation's claim supporting the existence of the right or title; and
2. The seriousness of the potential adverse effects upon the right or title claimed.

The Court in the Haida decision applied the concept of a spectrum of "low" to "high" to indicate what might be required in particular circumstances:

> At one end of the spectrum lie cases where the claim to title is weak, the aboriginal right limited, or the potential for infringement minor. In such cases, the only duty on the Crown may be to give notice, disclose information, and discuss any issues raised in response to the notice. "`[C]onsultation' in its least technical definition is talking together for mutual understanding": T. Isaac and A. Knox, "The Crown's Duty to Consult Aboriginal People" (2003), 41 Alta. L. Rev. 49, at p. 61.
>
> At the other end of the spectrum lie cases where a strong prima facie case for the claim is established, the right and potential infringement is of high significance to the aboriginal peoples, and the risk of non-compensable damage is high. In such cases deep consultation, aimed at finding a satisfactory interim solution, may be required. While precise requirements will vary with the circumstances, the consultation required at this stage may entail the opportunity to make submissions for consideration, formal participation in the decision-making process, and provision of written reasons to show that aboriginal concerns were considered and to reveal the impact they had on the decision. This list is neither exhaustive, nor mandatory for every case. The government may wish to adopt dispute resolution procedures like mediation or administrative regimes with impartial decision-makers in complex or difficult cases.
>
> Between these two extremes of the spectrum just described, will lie other situations. Every case must be approached individually. Each must also be approached flexibly, since the level of consultation required may change as the process goes on and new information comes to light. The controlling question in all situations is what is required to maintain the honour of the Crown and to effect reconciliation between the Crown and the aboriginal peoples with respect to the interests at stake. Pending settlement, the Crown is bound by its honour to balance societal and aboriginal interests in making decisions that may affect aboriginal claims. The Crown may be required to make decisions in the face of disagreement as to the adequacy of its response to aboriginal concerns. Balance and compromise will then be necessary.

The Court also discussed the duty to accommodate and clarified that this duty may be revealed once consultations are underway. The Court discussed what the duty to accommodate may require in different circumstances:

> When the consultation process suggests amendment of Crown policy, we arrive at the stage of accommodation. Thus the effect of good faith consultation may be to reveal a duty to accommodate. Where a strong prima facie case exists for the claim, and the consequences of the government's proposed decision may adversely

> affect it in a significant way, addressing the aboriginal concerns may require taking steps to avoid irreparable harm or to minimize the effects of infringement, pending final resolution of the underlying claim. Accommodation is achieved through consultation, as this Court recognized in R. v. Marshall, [1999] 3 S.C.R. 533, at para. 22: ". . . the process of accommodation of the treaty right may best be resolved by consultation and negotiation".
>
> This process does not give aboriginal groups a veto over what can be done with land pending final proof of the claim. The aboriginal "consent" spoken of in Delgamuukw is appropriate only in cases of established rights, and then by no means in every case. Rather, what is required is a process of balancing interests, of give and take.
>
> This flows from the meaning of "accommodate". The terms "accommodate" and "accommodation" have been defined as to "adapt, harmonize, reconcile"... "an adjustment or adaptation to suit a special or different purpose...a convenient arrangement; a settlement or compromise": The Concise Oxford Dictionary of Current English 9th ed. 1995) at p. 9. The accommodation that may result from pre-proof consultation is just this -- seeking compromise in an attempt to harmonize conflicting interests and move further down the path of reconciliation. A commitment to the process does not require a duty to agree. But it does require good faith efforts to understand each other's concerns and move to address them.

The following list provides an overview of the types of questions that regulatory staff may consider in assessing the scope of the government's duties. While all of these questions may not be asked or answered, they present a range of questions that are reflective of the types of issues that staff must consider. The following list is by no means exhaustive or complete.

- What activities were (are) practiced by First Nations in the project area and in adjacent areas (currently and in the past)?
- How regularly did they (do they) practice those activities?
- How important are these activities to First Nations and why are they important?
- Are there archaeological sites in the area? What types of historical activities are suggested by these archaeological sites?
- Are there any existing or past First Nation settlement or village sites in or near the project area?
- How far away is the project area from existing Indian reserves or First Nation communities?
- Is the project area subject to a specific claim? If so, what is the nature and status of that claim?
- Has a First Nation continuously used the area since 1846?
- If use has not been continuous, what are the reasons for this? How long was the project area used / not used by the impacted First Nations(s)?
- Is the project area subject to overlapping claims by other First Nations?

- Is there evidence that the area was used by other First Nations, either historically or at present?
- Is there evidence of substantial First Nation connection to the land?
- How may the project impact aboriginal interest?
- Will the project interfere with aboriginal activities?
- How will the project interfere with those activities?
- Can those activities be practiced in adjacent areas?
- What is the nature/extent of interference of the project, with these activities?
- What is the present extent of pre-existing development in the project area?
- What can be done to avoid or reduce the interference or impacts?
- What are First Nation suggestions for mitigation/accommodation?
- Are potential impacts on aboriginal activities unreasonable?
- Will the potential impacts impose undue hardship on the First Nation?
- Will the potential impacts prevent First Nations the preferred means of exercising the right?
- Are the impacts to the land irreparable?
- Will the project result in long-term leases/tenures?
- Is the First Nation involved in treaty negotiations or other government-to-government negotiations?

Role of First Nations: The First Nation expressing an aboriginal interest has a reciprocal duty to identify their aboriginal interests and concerns once they have had the opportunity to consider the information provided. The First Nation must make a reasonable effort to inform the Crown about any impacts of the proposed activity on their aboriginal interests. The Courts have said that First Nations do not have the right to frustrate or veto Crown activities by refusing to participate in consultations, or by imposing unreasonable conditions. However, First Nations are entitled to a process of consultation that is separate and distinct from stakeholder processes.

Role of Third Parties: The Supreme Court of Canada clarified that the legal duty to consult and accommodate belongs to the Crown and not third parties or non-governmental actors. Although third parties may take on important roles in consultation processes and can legally be delegated authority to carry out "procedural aspects of consultation", the overall legal obligation for ensuring that consultation and accommodation requirements are met rests with the Crown. Government maintains oversight over consultations carried out by third parties, and retains responsibility and liability for ensuring that applicable duties are met.

Varying interpretations on the part of government and IPP's about when, and to what degree the 'duty to consult' exists at various stages of an IPP project has caused significant frustrations for some First Nations who feel that they have not gone far enough. This is further compounded by the fact that government, rather than the IPP pursuing approval(s) for development, holds the responsibility for consultation creating significant communication and information sharing challenges. In addition, there remains some uncertainity as to the nature and scope of accommodations, something that a paper on

Benefit Sharing Agreements, recently commissioned by the EBM Working Group will begin to address.

Treaty Rights

A treaty is a negotiated agreement that sets out the rights, responsibilities and relationships of First Nations and the federal and provincial governments. Like aboriginal rights, treaty rights are also recognized and affirmed under section 35(1) of the Constitution Act, 1982.

The Supreme Court of Canada concluded in the Mikisew decision that the Crown has similar consultation obligations with respect to treaty rights as it does for aboriginal rights. The Court applied the Haida consultation principles to Treaty 8 rights and confirmed that the honour of the Crown requires the Crown to consult meaningfully with aboriginal groups on government decisions that may adversely affect treaty rights.

Within Canada, British Columbia is unique because most of the province is not covered by treaties with First Nation groups. However, there are a number of existing treaties such as Treaty No. 8, the Douglas Treaties and the Nisga'a Final Agreement. The Nisga'a Treaty, which came into effect in 2000, covers land north of Prince Rupert. Proponents should also take care to be aware of treaty negotiations within the B.C. Treaty Process.

Proponent Involvement

While the duty to consult lies with government, the proponent is often better placed to share information with the First Nation and address particular First Nations' interests or concerns. Proponents are encouraged to initiate interaction with First Nations at the earliest possible stage in a project's development, and to maintain good working relations with First Nations regardless of the Provincial consultation process. The proponent can assist the process by exploring how they might facilitate information sharing and develop benefits and employment opportunities for First Nations. While this type of approach is generally welcomed by First Nations, First Nation accounts suggest that this does not always occur.

Although the duty to consult does not legally extend to IPP applicants, IPPs directly benefit from such engagement. Firstly, engaging with First Nations provides an opportunity to build a relationship with the community. These relationships are important factors in any project proposal and are critical to the effective exchange of information. Good working relationships can complement or expedite Environmental Assessment reviews and Crown consultation requirements. First Nation communities may know of sites that are culturally important and may require special historic or archaeological protection—information which could be invaluable in the early stages of identifying the proposed project site. Secondly, the Province may delegate aspects of the consultation process to proponents. Where this is the case, it becomes a requirement of the applicant, although the Province

remains responsible for the overall consultation process. A third party must remain communicative about consultation activities and outcomes.

IPPs are advised to determine early which First Nations may have interests in the region in which they wish to build a power production project. More importantly, they are advised to engage early with potentially affected First Nations to begin building relationships and informing communities of their proposed project.

The length of time required for consultations between the Province and First Nations will vary in each case, and may range from several months to several years. When an application is initially referred to a First Nation, comments are requested to be provided within 45 days. In many circumstances, consultation is expected to take longer as issues are identified and discussed. The Province cannot impose unreasonable timelines on First Nations. If proponents are actively engaged with First Nations, consultation timelines may be shorter.

CHALLENGES TO FIRST NATIONS' INVOLVEMENT

The Province envisions that IPP projects will provide benefits to First Nations and local communities. Regulatory agencies, proponents and First Nations all have integral roles to play in effectively and efficiently avoiding potential infringement on aboriginal rights and title.

While the Courts have clarified what is required of decision-makers, they have also confirmed that First Nations have an obligation to respond to the consultation efforts of the regulator. Responding to this obligation is a challenge for many First Nations.

Regulatory agencies use a referral process to engage stakeholders, agencies, First Nations and local governments. Many First Nations are overwhelmed with the sheer number of land use referrals received, including IPP projects, and experience significant stress in attempting to determine potential impacts, provide meaningful responses, attend meetings, review development plans, and monitor project construction effectively and efficiently. The information regulatory decision-makers require in order to answer the previously-mentioned questions will generally need to be provided by First Nations. Although First Nations are afforded extra time in which to respond to referrals, many suggest that they do not have the internal staff capacity necessary to meet those timelines, including technical capabilities and knowledge base. In addition, the cost of acquiring data and providing information to regulatory agencies and proponents may be prohibitive for some First Nations. A lack of accurate information could result in costly delays to a potential project, and may create negative feelings between parties.

First Nations have been raising the "lack of capacity" issue for a number of years. Although some proponents have provided financial assistance to First Nations to create extra capacity specific to their projects, and regulatory agencies have on occasion also provided funding, there has not been a consistent approach to overcoming this hurdle.

First Nations may also be well-positioned to assist proponents in collecting data and undertaking studies. While some proponents employ aboriginal people in this regard, others do not take advantage of this opportunity.

Although regulatory agencies encourage IPPs to engage at the earliest stage possible, inexperienced proponents may not have the capacity or willingness to do so, thereby limiting First Nations' ability to properly assess the potential impact of projects, provide information, suggest modifications, and fully evaluate opportunities to participate in the project, all in a timely manner. This has been cited by First Nations as a significant barrier to their meaningful participation in the process.

Some First Nations have also expressed frustration in regards to the lack of tangible benefits flowing from the "New Relationship" with the Province. Regulatory agencies continue to utilize historical processes, and have generally not been able to assist in accommodation (other than through project modification), relying instead on the proponent to enter into participation agreements with First Nations. Many IPPs fail to appreciate and/or act on the need for meaningful accommodation of First Nations interests. Some First Nations have expressed frustration with the Province for not taking a more proactive and aggressive stance with IPPs on this issue.

OPPORTUNITIES FOR FIRST NATIONSINVOLVEMENT

Aboriginal rights and title create a unique opportunity for First Nations to have a role in, and/or benefit from, all renewable energy development on their traditional lands. But what does this mean for First Nations communities in the Central and North Coast and Haida Gwaii? What will this look like?

The role and associated benefits for First Nations will vary depending the nature and scope of the project and the capacities and interests of the First Nations and IPP involved. It is worth noting that the potential benefits of renewable energy development to First Nations communities go beyond those accorded under rights and title. This section will explore some of the opportunities for First Nations created by renewable energy development in the Central and North Coast and Haida Gwaii – many of which may also be applicable to non-aboriginal communities as well.

First Nations want healthy, economically sustainable, vibrant communities in which future generations are able to prosper while retaining their cultural traditions and values. Renewable energy projects provide future-oriented economic development opportunities that are in line with First Nations respect and values for the land. They create an opportunity for First Nations to become leaders in an emerging, economically viable field that marries sustainable economic development with clean energy alternatives that, when developed responsibly, help to support long-term environmental sustainability.

The types of benefits derived from renewable resource development opportunities in the Central and North Coast and Haida Gwaii might include:

- Economic development benefits: including partnerships, benefit sharing agreements, leases and royalties, jobs, education and training, and other capacity building opportunities;

- Community development benefits: engaging communities to become active participants in defining and building agreement around community needs and interests and the best way to capitalize on them.

Each of these is explored in more detail below.

Economic Development

Economic development has been defined as the development of economic wealth, (in this case in a region), for the well-being of its inhabitants. From a policy perspective, economic development can be defined as efforts that seek to improve the economic well-being and quality of life for a community by creating and/or retaining jobs and supporting or growing incomes and the tax base.

The economic development opportunities that First Nations derive from renewable resource development are largely dependent on how they position themselves in this emerging environment.

Large-Scale Development opportunities are, in the short to medium term, likely to be led by IPP's who bring the experience, technical expertise and access to capital required to develop and manage a large-scale project. Some First Nations may be well positioned to partner with a proponent on the project or play a significant management role, such as in the Crab / Europa Hydro Electric Project, a partnership between the Haisla First Nation and Queen Charlotte Power Corporation.

Other First Nations may wish to play a more indirect role seeing their interests met through leasing agreements, benefit sharing arrangements and equity interest agreements. It should be noted that opportunities for interim benefit sharing agreements with the Province over land and resources rights on traditional territories may create additional opportunities not currently realised.

Opportunities for jobs, training and other capacity building initiatives may also be generated by large-scale renewable energy projects. For example, many of the renewable technologies offer opportunities for employment at the construction stage. Some offer limited opportunities for jobs to manage operations but these tend to be jobs of a technical nature requiring specific training. That being said, there may be an opportunity for First Nations leaders to work with project proponents to build in training and capacity building

commitments that enable First Nations community members to develop the skills necessary to facilitate longer-term sustainable employment.

Successful IPP's will work with First Nations to build strong relationships based on mutual respect for shared interests in the area. The nature and scope of economic benefits derived from any one project will depend on the project and on how effectively First Nations are able to position their needs and interests within the economic viability of the project.

Community energy projects offer another type of potential opportunity for First Nations communities. Unlike large-scale energy projects, community energy projects are small in scope and are designed to address the immediate energy needs of the community.

Many First Nations communities are not currently connected to the transmission grid and have to rely on diesel generators for their energy needs. This is a costly and restricted form of energy that has a significant impact on the environment. Community renewable energy projects may offer First Nations communities an opportunity to lessen or completely replace their dependence on diesel generators. The benefits of such an initiative would be immediately felt in the community.

Some First Nations communities may already have the capacity to develop, implement and manage such a project. Others may need to look for opportunities to partner with renewable energy companies with more technical expertise to assist them.

Small scale community projects create excellent opportunities for First Nations to build capacity and develop expertise in renewable energy solutions - expertise which can be used to assist other communities build similar community energy solutions and/or further developed to support larger-scale renewable energy projects. In the interim – the community directly benefits from cheaper, cleaner more dependable sources of energy with long-term sustainability.

Community energy projects may also create excellent opportunities to user-test newer technologies and in doing so, may garner additional funding and resources to support their development. Again, the experience gained could provide First Nations participants additional opportunities as the new technologies are rolled out into the broader market place.

Community Development

Community development seeks to empower individuals and groups by providing them with the skills they need to effect change in their own communities. These skills are often concentrated around building power through working together for a common agenda. Community development focuses on influencing power structures to remove the barriers that prevent people from participating in the issues that affect their lives.

Questions around how to best capitalize on the potential benefits associated with renewable energy development on traditional territories creates an opportunity for grass-

roots community development. The larger objective for the EBM Working group was to identify opportunities to deliver economic opportunities and benefits to local communities. For this to occur, communities, including First Nations communities, must first identify their shared needs and interests in regards to potential benefits resulting from renewable energy. Work in this area will help communities identify their priorities which will in turn determine how they approach and choose to work with future renewable energy developers.

Through working together and developing a shared vision for renewable energy development, First Nations communities will be placing themselves in a position of strength to more effectively set the course for engagement with renewable energy proponents.

There are clear opportunities in the short to medium-term for renewable energy development both at the large and district-scale levels. First Nations are positioned to benefit from the economic development opportunities generated from renewables. The challenges that limit potential benefits to First Nations communities are largely dependent on how effectively First Nations are able to position themselves in this quickly evolving environment. Section X and the Conclusions and Recommendations section of this report identify activities that could be pursued to help ensure that benefits from renewable energy flow to communities, in particular First Nations communities..

IX. Renewable Energy Projects

Given the significant renewable resource opportunities in the Central and North Coast and Haida Gwaii, particularly wind, run-of-river and tidal resources, it is expected that there will be increasing interest from IPP's to develop these resources. As already noted, there are a significant number of projects that are in various stages of development. This will increase with subsequent BC Hydro Calls for Power.

How community leaders deal with and manage this interest will largely determine the nature and scope of benefits to local communities. Section IX offers guidance to assist community leaders assess IPP proposals and identify,(or as the case may be, themselves *develop*), those that are most likely to succeed and bring benefits to local communities. It begins by providing an overview of the project development process, arming community leaders with an understanding of the process - associated timeframes, when and where they might need or choose to engage a proponent or what they will need to do to initiate a project themselves.

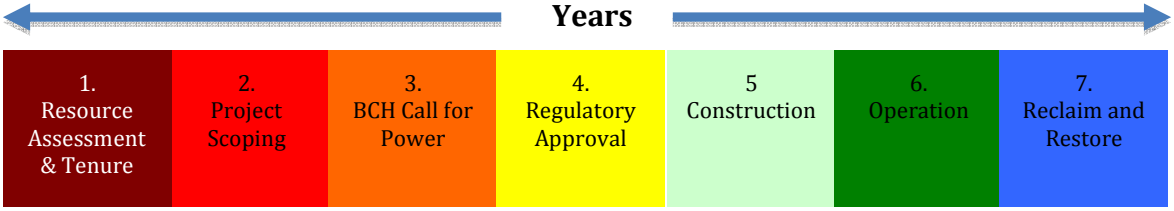
It then identifies common characteristics of project proposals that have a higher likelihood of success offering insight to assist communities that choose to play a more significant role in the project development stage. Finally, it offers some considerations for First Nations, local communities and governments as they consider how to build community benefits into project development.

THE PROJECT DEVELOPMENT PROCESS

The completion of a renewable energy project represents the culmination of a significant amount of effort by a project developer. This effort includes committing substantial human and financial resources to the project at the outset, well in advance of any revenue being generated and at considerable risk that a project may not proceed. (As identified in Section IV, of the more than 700 applications for waterpower IPP projects over the past 20 years, less than 5% have been constructed).

The project development process is outlined in Figure30 and described in more detail below.

Figure 30: The Project Development Cycle



1. ***Resource Assessment and Tenure*** – During resource assessment, the project proponent will review a potential renewable resource to determine if the resource is of sufficient quantity and quality to support a viable renewable energy project. This will include reviewing previous studies and may include undertaking independent studies to validate information. Independent studies typically involve undertaking site specific observations such as stream flow, wind speed and occurrence or tidal studies. If sufficient resource is not available, the proponent will abandon the project or seek another location.

   If the resource assessment indicates that there is sufficient resource, the project proponent will often secure Crown tenure at the site. In some instances, a proponent may secure the tenure without having done a resource assessment on speculation that sufficient resource is available, or that they may be able to later sell the tenure to another interested proponent.

   The resource assessment phase may take one to two years to complete. Many project proponents will continue to assess the resource through additional phases of project development to better understand the resource. For example, monitoring wind resources over a longer period will provide more reliable information during the project scoping stage and will inform important modifications to the project.

   The cost of the resource assessment is highly variable depending on the type of resource. For example, wind resource assessments require the installation of relatively inexpensive wind monitoring towers while testing for geothermal energy relies on costly test well drilling.

2. ***Project Scoping*** – During the project scoping phase, the proponent will scope the design of the project. This includes the development of all technical and economic aspects of the project, as well as undertaking project development planning. The project scoping phase is a key component to the development of a project, and is the point where a project proponent will make the decision to commit significant human and financial resources to further develop the project proposal. Discussions with BCTC will also typically begin during the project scoping phase. In addition, the project proponent will also begin discussions with financial institutions and/or private investors to support the subsequent phases of project development.

   This is often the phase when a project proponent will first approach local communities, First Nations and other stakeholders to introduce their project proposal and begin to get feedback.

3. ***BC Hydro Call for Power*** – The BC Hydro Call for Power is the key opportunity for project proponents to enter into negotiations with BC Hydro to establish a long-term power sales agreement. For smaller projects, under 10 MW, BC Hydro has established an open call where proponents may approach BC Hydro at any time to initiate negotiations for a long-term power sales agreement.

For larger projects, project proponents are required to respond to the timelines defined by BC Hydro. BC Hydro has typically issued Calls for Power annually. Given the overwhelming response to recent BC Hydro Calls for Power, project proponents are competing with one another to get their projects selected. Having a competitive project proposal is critical to success. This not only includes meeting the technical and economic requirements, but also demonstrating that there is support within the local community and among First Nations in the area for the project.

If selected, the project proponent will begin negotiations for final agreement terms with BC Hydro, as well as with BCTC.

4. ***Regulatory Approval –*** Assuming that a project is selected by BC Hydro, the project proponent will begin the regulatory approval process for the project, which will likely include an environmental assessment as required by the *Environmental Assessment Act*. The regulatory approvals required for a proposed project were outlined in Section VII in this report, and will not be discussed in detail. However, it is important to note that project proponents tend to plan on a minimum of one year to complete regulatory approvals. This timeline can be extended significantly depending on the project complexity and associated issues.

5. ***Construction –*** The construction phase of the project can begin once all of the appropriate approvals are in place, and financing is complete. The timelines for this phase are highly dependent on the nature and scope of project and the specific environmental conditions. Many project proponents choose to use construction companies that have experience building renewable energy projects.

6. ***Operation*** – The operation phase of the project is the longest component of the project. Once construction is complete, the proponent operates the project, ensuring the terms and conditions of the power sales agreement, regulatory approvals and any other agreements are maintained. While each renewable energy project will have a different design life, it could be anticipated that projects operate for a minimum of ten years, and more likely for several decades.

   The operation phase may include a number of significant refurbishments that extend the design life of the project. For example, wind towers, blades and generators can be replaced indefinitely. Run-of-river projects can also have significant design life extension as a result of turbine replacement and rewinding generators.

7. ***Reclamation and Restoration*** – The reclamation and restoration phase occurs once the operation period is ended and the project is over. Provincial regulation requires that project infrastructure be removed and sites reclaimed and restored back to their original condition. This is done at the expense of the project proponent. Depending on the type of project and the extent of reclamation work, this phase may go on for several years as components of the work are often seasonal, (e.g. seeding).

CHARACTERISTICS OF A SUCCESSFUL PROJECT

While individual renewable energy projects may fail for a number of reasons, there are certain key elements which are present in all successful projects. Failure to demonstrate these characteristics creates an additional level of risk that a project proposal may fail. The following list is intended to provide a high-level overview of these characteristics for success.

Resource Quality – The renewable resource quality should be well understood and high-grade. It may not be possible to have complete information about the resource quality; however, there are certain factors that can lead to a reasonable assumption that a high grade resource may exist. For instance, there is a high probability that geothermal resources are located in a particular location based on previous geological assessment. Information gathered during the resource assessment phase will add greater levels of certainty about the resource quality. Numerous renewable energy projects fail due to an inadequate understanding of the resource quality.

Technology – The renewable energy sector is littered with failed technology. It is important to note that each failure represents an important step along the path of innovation that is required to achieve successful technology. Successful projects often focus on proven technologies that are already in use in another, ideally similar, location with a good track record. As well, there are significant benefits to using relatively simple technology, particularly in remote areas. These two factors are important to ensure that projects come in on budget and operate according to design.

Economics – Most successful projects have strong positive economics, few have marginal economics and none have negative economics. While this may seem obvious, some project proponents attempt to develop projects with marginal economics. This creates significant risk and provides little flexibility to respond to changing construction costs, unexpected resource attributes (e.g. the wind doesn't blow as much as the resource assessment suggested) and other cost or price risks volatility.

Financing – Unless the project proponent has adequate internal resources to manage the proposed project through to the operation phase, external financing will be required. In as much as completing a renewable resource assessment is fundamental, so is project financing. In fact, project capital should be viewed at the same level as the renewable resource assessment. It is typically difficult for many project proponents to secure financing at the early stages of project development; however, it is critical that a financing strategy and seasoned project financial officer is leading finance acquisition. Access to capital will be difficult for proponents until the current global financial crisis has subsided.

Environmental – The environmental impacts from a project need to be well understood in advance and a ***mitigation strategy*** developed to respond to respond to them. The best renewable energy project will not proceed if it will irreparably damage a unique and highly valued environment. Project proponents should know early in the project scoping if there

are particular environmental issues that need to be addressed. If they cannot be effectively mitigated, the project must be relocated.

First Nations – As previously discussed, First Nations play a special role in the development of renewable resources. Project proponents that understand this role, and set out early to work with First Nations to develop a strategy for a collaborative approach to resource development have a higher likelihood of succeeding. A number of renewable energy projects in British Columbia include innovative approaches to working collaboratively with First Nations through creating equity interests, employment training and community development strategies.

Community Engagement – Successful renewable energy project proponents usually have a clear understanding of the importance of community engagement and a sincere commitment to work collaboratively with communities to design projects that support community values and offer community benefits.

Regulatory and Government Relations – Project proponents should have a good understanding of regulatory requirements in British Columbia. These include land use planning, provincial and federal environmental assessment processes, Crown tenuring processes and relevant municipal zoning. Many proponents use consulting firms specializing in these regulatory aspects to ensure appropriate planning and applications. In addition, proponents should have a constructive and positive relationship with key provincial ministries and agencies that have a role in policy development.

Executive and Project Management Teams – Fundamental to a successful project is a seasoned executive and project management team. It cannot be understated that the complexities and innovation required to bring a project concept to completion requires management that are experts in their respective roles and work together as a well-functioning team.

CONSIDERATIONS FOR THE CENTRAL AND NORTH COAST AND HAIDA GWAII

Various communities, First Nations and businesses in the Central and North Coast and Haida Gwaii are being approached by renewable energy proponents with project proposals. This is likely to increase over the next several years as subsequent BC Hydro Calls for Power are released and proponents seek opportunities to respond to British Columbia's Energy Plan.

The purpose of this section is to provide leaders with some of the key issues that should be considered when approached by renewable energy project proponents.

Project Consistency – Leaders may want to consider how the proposed project fits within the vision and specific attributes of the Central and North Coast and Haida Gwaii and their associated land use plans. Where land use plans do not address specific issues raised by the proposed project, the regions may want to consider how to approach "filing the gap".

To be clear, this is not suggesting that land use plans need to be re-opened to address the unique issues raised by a specific project. Re-opening land use plans may raise other non-related, but still important, issues that could significantly slow down resolving issues related to renewable energy development. In addition, land use plans are created under provincial legislation and require the support of the Province; which may not wish to see land use planning as a strategy to resolve development issues.

Instead leaders in the Central and North Coast and Haida Gwaii should consider what kinds of innovative strategies and solutions can be developed to resolve land use related issues. This might include, for example, working with communities, First Nations and interested stakeholders to develop a renewable energy strategy that, fits within the frameworks established under various land use decision plans and provides additional guidance for assessing and managing future development proposals.

Role –Leaders in the Central and North Coast and Haida Gwaii will need to consider what role they want to play in renewable energy projects. Ultimately, this role will have to be discussed and negotiated with individual project proponents; however, having clear principles and guidelines that establish under what conditions communities in the Central and North Coast and Haida Gwaii will take on what roles will greatly assist communities to maximise on the potential flowing from the development.

Roles for the local community or First Nation can range from no involvement, to being an equity partner in the project – and potentially being the project proponent. Communities should carefully consider the various pros and cons associated with the role it decides to play. While the concept of an equity interest may sound appealing, it also brings a number of responsibilities that may not be in the interest of the community . For instance, as an equity partner, the community may be required to assume some level of liability related to the project. Or, as an equity partner, the proponent may require the community to make representations on behalf of the proponent in regulatory or financing activities.

Employment and Training – In advance of the development of multiple projects, the region will need to consider opportunities for employment and training that may be associated with individual projects. Given the potential number of projects that may developed in the Central and North Coast and Haida Gwaii, there is a potential to develop a core skilled "green collar" labour pool that could support multiple projects within the Region, and potentially, in other areas of the province.

More importantly, a renewable energy employment and training strategy encompassing the Central and North Coast and Haida Gwaii would help provide guidance to project proponents and accelerate discussions with specific project proponents.

Community Benefits – Similar to employment and training, a regional approach to defining community benefits will help provide guidance to project proponents. There are a broad range of potential community benefits, including:

- The use of locally manufactured content
- The use of local contractors during construction
- Buying shares or other investment opportunity for local residents and businesses
- Land rental to the local landowner(s)
- Local community facility improvements
- Lump sum or regular payments into a fund for the benefit of local residents
- Employment of local people in the operation and maintenance of the renewable resource
- Visitor centres and tourist facilities
- Educational visits and school support
- Sponsorship of local groups and teams

An offer of, or request for, community benefits needs to be careful thought through by all parties since it may involve significant expenditure, require ongoing maintenance requirements, and be of limited benefit to many in the community. The following questions should therefore be considered by the Regions:

- Is the 'benefit' something the community wants?
- How is this known?
- Who benefits and in what way?
- Are the developer and their contractors the best people to provide the benefit (or would a financial contribution of equal value be more sensible)?
- Is the specification for what is being offered clear and realistic?
- Is there a clear timetable for provision of the benefit(s)?
- Are the resources available to maintain the benefit after it has been provided? If not, can these be provided through a community fund contribution of some kind?
- Who is going to be responsible for looking after the 'benefit' after it has been provided?
- How is the provision of this benefit going to be guaranteed to the agreed specification and timetable (including if the project changes hands between planning permission and construction)?

The project process for renewable energy development is long, involved and expensive, requiring significant outlays of capital in advance of any certainty regarding the nature, scope and development potential of the resource of interest. While most local communities and First Nations are unlikely to assume the role of proponent in the short-medium term, an understanding of the project cycle is critical for meaningful engagement with project proponents and regulators. As local groups begin to assume a more active relationship with project proponents and/or develop projects of their own, understanding what makes projects successful will assist them to affectively position themselves to reap the rewards of their efforts and bring benefits to their respective communities.

X. Towards a Renewable Energy Strategy

There are a significant number of renewable energy project proponents actively planning projects throughout the Central and North Coast and Haida Gwaii, and potentially numerous additional projects to come over the next several years. A more coordinated and collaborative government-to-government approach to planning, evaluating and allocating benefits generated by renewable energy development, and to creating a favourable policy and regulatory environment, would be beneficial to delivering economic opportunities and benefits to local communities. This section makes some preliminary recommendations to assist leaders in the Central and North Coast and Haida Gwaii as they embark on developing a regional strategy for renewable energy development.

BACKGROUND

All regions in British Columbia are facing challenges to meet their energy demands in an environmentally responsible manner. 133 local governments have committed, through the Climate Action Charter, to develop strategies and take actions to achieve a goal of being carbon neutral in their operations by 2012. 62 First Nations and local governments are participating in the Community Action on Energy and Emissions program, double the number of participating communities in 2006. Over 80 First Nations communities in BC are involved in Comprehensive Community Planning through the First Nations Infrastructure Fund and the BC Capacity Initiative programs. Many strategies and plans developed under these and other programs focus on ways communities can use energy more efficiently, and investigate ways they can develop their own renewable energy resources.

British Columbia residents support a range of policy and program options for future electricity resources. The broadest support is for conservation, investments in renewables, and reinvestment in existing generation. (There tends to be more modest support for new large hydro generation, and mixed opinions about purchases from IPP's). Environmental sustainability and a desire for self-sufficiency tend to be more important than cost considerations as criteria for future electricity planning.

First Nations, as the original inhabitants of the Central and North Coast and Haida Gwaii, and the holders of thousands of years of traditional knowledge about the land and water, are key players in ensuring the sustainable use of land and resources, including responsible renewable energy developments.

Despite this groundswell of interest, renewable energy projects in the region continue to be reviewed on an individual basis, without an overall evaluation framework. Often presented to communities by IPP's in response to BC Hydro calls for proposals, the impacts of

proposed projects and their transmission lines tend to be reviewed in isolation. A more strategic "roadmap" is needed that goes beyond individual responses to BC Hydro calls. This section describes the possible elements of a broader regional strategy for anticipating, planning for, developing, and managing renewable energy, in a way that demonstrates lasting benefits to residents and communities in the Regions. It concludes with a suggested process to prepare such a strategy.

Challenges and Opportunities

Leaders in the Central and North Coast and Haida Gwaii face a number of challenges toward developing a regional strategy to renewable energy development that delivers benefits to local communities. Many of these **challenges** have been highlighted throughout this paper and include:

- Small and dispersed population resulting in limited transmission and heavy reliance on diesel – an expensive and unreliable energy source.
- Renewable energy development limited to where the resource occurs (e.g. where the wind blows) – development will only happen to the degree that local infrastructure will support it.
- Heavy reliance on air and marine transportation due to the remoteness of much of the area.
- Significant interest in resource potential in the area in the absence of comprehensive assessment of potential siting and tenuring opportunities has resultedin a "gold-rush mentality" with speculators rushing to claim tracks of land and water with as of yet undetermined potential for resource development.
- Current lack of capacity among First Nations and communities within the area to effectively assess and manage this interest in a way that generates benefits for the region.
- Large number of parties involved with varying interests. Communication and coordination between these parties is challenged. Uncertainty as to who is in the lead creates further challenges for greater coordination.
- Poor understanding among some players as to the nature and scope of aboriginal rights and title and the duty for consultation and accommodation and/or failure to act in a way that First Nations feel adequately addresses these rights.
- Poor understanding and/or lack of capacity among some IPPs to build successful relationships with local First Nations. Lack of clarity and shared understanding about benefit sharing and other accommodations and how to determine their appropriate scope based on the specifics of each project.
- Perceived lack of coordination between regulators, policy developers, IPPs, First Nations, and other interested parties resulting in policies and practices that at times appear to work at cross purposes.
- Lack of awareness among some IPPs as to the implications of relevant land use planning decisions and associated governance structures.

- Impact of the BC Hydro call on establishing production and determining interest in development – a call which has been characterized by some as being unpredictable in both timing and the amount of power requested.

The challenges listed above create an environment where a lack of coordination and a strategic vision limit the ability for targeted development to manage the resource potential over the longer term in the most efficient method possible to deliver maximum benefits to local communities.

With these challenges come **opportunities:**

- The 2007 "BC Energy Plan: A Vision for Clean Energy Leadership" requires BC Hydro to acquire large amounts of new electricity supplies from IPPs in order to meet self-sufficiency policies and potentially replace energy from the Burrard Thermal Plant.

- Energy Plan policies establish a "standing offer" for clean electricity from projects under 10MW, requiring a call for proposals for electricity from biomass, and pursuing remote community electrification to expand or take over electricity service to remote communities, combine to provide opportunities for new renewable generation in the region to help meet growing provincial needs.

- Renewable portfolio standards in the western U.S., interest by U.S. utilities to import clean electricity from British Columbia, the self-sufficiency policies, and BC Hydro's ability though its Powerex trading subsidiary to use transmission and reservoir storage to sell when prices are high, together create considerable potential for new renewable generation projects to supply markets outside of the province.

- There are a growing number of programs and funding sources to assist with renewable energy opportunities, especially at the community level.

- Land and resource plans, as well as community plansin place to guide both developers and communities. By defining areas that limit or prohibit renewable energy development, regulatory risks are reduced.

- Commitments under the "New Relationship" coupled with the new government-to-government (G2G) relationship established under the Central and North Coast and Haida Gwaii land use agreementscreates a forum for First Nations and the provincial government to collaborate to address policy and regulatory issues and establish strategic direction to strengthen development and the associated benefits.

- Recent court decisions have provided increased certainty regarding aboriginal rights and title creating a context for the province and project proponents to consult with First Nations and accommodate infringements.

- Renewable electricity generation can become a key part of diversifying the regions' economies, supplementing dependency on forestry and fishing in some areas.

- First Nations' creativity, entrepreneurship, and initiative in developing renewable energy can provide significant new resources for the province, as well as helping diversify the regions' economies.

- The high cost of diesel electricity presents attractive opportunities to demonstrate leading edge technologies as reliable off-grid resources that are too costly to implement in grid-connected areas, while still using diesel generation as back-up.

- There is general public support for renewable energy projects that are thoroughly reviewed, technically sound, environmentally benign or beneficial, and socially responsible. The Energy Plan policies discouraging large-scale non-renewable electricity generation mean the Central and North Coast and Haida Gwaii will avoid the controversies that would accompany coal or gas-fired proposals.

- Greenhouse gas emissions can be reduced in off-grid communities, while improving local air quality.

- Improved electricity service in remote areas supports closing the economic and social gap between remote and grid-connected communities, and between First Nation and non-First Nation communities.

- There are serious and credible renewable energy proposals for the Central and North Coast and Haida Gwaii from reputable IPPs, and existing markets for renewable electricity both within and outside the province.

CONSIDERATIONS FOR A RENEWABLE ENERGY STRATEGY

Components of a renewable energy strategy for the Central and North Coast and Haida Gwaii can be grouped into two categories—those that relate to overall planning, and those addressing the review of specific projects.

Planning Assumptions

1. *Provincial strategic and land use plans will guide development:*

Pursuant to the land use agreements between the Province and First Nations in the Central and/or North Coast, the Province has established new conservancies and biodiversity areas which may restrict or limit renewable energy development (including small-scale community-based projects), and/or transmission lines. Renewable energy projects need to be located, designed, constructed, and operated in ways that conform to the First Nation and Provincial land and resource decisions.

The 'Joint Land and Resource Forum' (LRF)[57], for the Central and North Coast should develop a communication strategy to publicize land use plans and policies to ensure that IPPs and resource agencies are familiar with them.

A summary of the land use planning policies and designations as they apply to renewable energy developments may also be helpful.

The land use decisions provide high-level strategic direction. There may be additional areas, not currently captured in the land use decisions, where renewable energy development should not proceed if it is harmful to livelihoods, sacred or spiritual sites, or fragile ecosystems. Conversely, there may be future proposals enjoying wide community support that cannot proceed because of lack of conformity with recent land use decisions. Plans are living documents that cannot anticipate all future situations.

The LRF should consider future plan reviews that evaluate amendment requests, perhaps also establishing clear land use designations for different types and capacities of renewable energy technologies.

2. *First Nation and local plans and reports will also guide development:*

In addition to provincial-scale plans, many municipalities, Regional Districts, and First Nations communities have prepared plans and reports that address renewable energy policies and opportunities. These may include Official Community Plans, Community Energy Plans, First Nation Comprehensive Community Plans, and topic-specific reports. Examples from northwest British Columbia include:

- Hartley Bay Community Energy Plan
- Prince Rupert's greenhouse gas reduction report
- Masset's wind resources feasibility report
- BC Hydro's draft electricity strategy for Haida Gwaii
- Kitimat's ground source geothermal feasibility report
- Kitimat's housing design workshop report and Village Council's comprehensive community plan
- Haida Gwaii feasibility study for tidal electricity generation
- Metlakatla Indian Band's comprehensive community plan
- Oweekino First Nation (Rivers Inlet) small hydro proposal on Nicknaqueet River
- Gitga'at Development Corporation's small hydro proposal (Hartley Bay)
- Kitasoo First Nation's hydro power system expansion (Klemtu)

[57] A collaborative government-to-government forum for managing implementation of the land use agreements and any policy related issues. It includes representatives from First Nations and the province.

As part of a renewable energy strategy, the LRF should consider preparing a complete inventory of these plans and reports for the region, and summarize relevant findings and conclusions.

3. *Funds, resources, and partnerships should be actively pursued:*

There are an unprecedented number of programs that can provide funding and resource support for the pursuit of renewable energy opportunities, particularly at the district or community level. Examples include:

- BC Hydro's Remote Community electrification program, to provide eligible and willing communities with access to BC Hydro's non-integrated area electricity service.
- The province's Remote Community Clean Energy Program, to provide funds to remote communities to help them adopt more clean power sources and promote energy conservation. (Examples include energy efficient housing and a run of river hydro upgrade at Klemtu, and upgrades to buildings in Haida Gwaii).
- The $25 million Innovative Clean Energy Fund, to support new energy technologies that produce renewable energy and improve ways energy is used in BC communities.
- The $25 million Bioenergy Network, to encourage development in woodwaste cogeneration, biofuels, and wood pellets.
- $5 million to support the expansion of solar hot water systems through Solar BC.
- The Community Action on Energy and Emissions program.
- The Federation of Canadian Municipalities Green Municipal Funds.
- Indian and Northern Affairs Comprehensive Community Planning program, including the First Nations Infrastructure Fund and the BC Capacity Initiative.

The LRF should develop an inventory of sources for funding and support for renewable energy projects, in particular, those occurring at the community level.

4. *Regional expectations should be sensitive to investment risks:*

Despite the promising renewable energy potential of the Central and North Coast and Haida Gwaii, transmission constraints and line losses due to distance from markets, and regional infrastructure constraints, may negatively affect the current high level of IPP interest over the longer term. Most IPPs appreciate their host communities and regions must receive tangible benefits from a project. However, communities need to be mindful of the financial ability of a project developer to meet their expectations. Prudent investment organizations evaluate all types of costs and risks before deciding whether to fund IPP construction, and components that may jeopardize a reasonable return on investment may lead to financing refusal. The LRF should***:***

Create guidelines to assist local communities develop reasonable expectations of benefits based on project-specific factors.

Oversee the preparation of a plain-language document that assists IPPs to understand the need for consultation and accommodation to address aboriginal rights and title in the context of renewable energy development.

Develop best-practice guidelines to assist IPPs and First Nations engage in collaborative dialogues to develop accommodations for infringements.

Some of this work is currently underway in a project commissioned by the EBM Working Group on First Nations Benefit Sharing Agreements.

5. *Active Engagement in Provincial and Crown Corporation Processes*

The BCUC has initiated a process to review long-term electricity transmission requirements. The final report of the BCUC will play an important role guiding the development of transmission infrastructure over the next thirty years. The LRF has an opportunity to present a well-informed and compelling rationale supporting an orderly and expeditious development of transmission infrastructure in the Central and North Coast and Haida Gwaii area. In addition, BC Hydro will be undertaking a future call for clean energy, which will drive a significant volume of new investment in clean energy development in British Columbia. **The LRF should:**

Take an active role in the BCUC Section 5 inquiry to ensure the interests of the Central and North Coast and Haida Gwaii are fully represented in the inquiry. This will require undertaking additional research and analysis, and developing a common vision for the Central and North Coast and Haida Gwaii with respect to the development of renewable energy.

Develop collaborative working relationships with BC Hydro and BCTC to ensure both organizations understand the interests and objectives of the Central and North Coast and Haida Gwaii.

Project-Specific Elements

1. *Renewable energy projects are more likely to proceed with community support*:

Both First Nations and non-aboriginal communities need to be engaged to provide input and insights, preferably before any preliminary permits are issued.

The LRF should specify expectations re: consultation and engagement as part of a renewable energy strategy, such as the preparation of a community consultation plan and a public summary.

2. *Opportunities for partnerships, agreements, or equity participation should be part of large renewable energy proposals:*

The Squamish-Lillooet Regional District, Hupacasath First Nation, and Squamish First Nation have policies or examples supporting forms of financial involvement in IPP projects in their jurisdictions or traditional territories. As a possible element of a renewable energy strategy, the LRF should consider establishing an expectation of regional financial participation in large IPP projects by local governments and First Nations. This could be an impact and benefits agreement, a financial partnership, revenue sharing, and/or an option to purchase the project in future.

The LRF should consider establishing an expectation of regional financial participation in large IPP projects by local governments and First Nations.

3. *Renewable energy projects must be environmentally and socially responsible:*

As part of a renewable energy strategy, the LRF may want to consider establishing criteria for IPP projects, including a requirement that the resource must be replenished by natural processes, technically sound, avoid any significant environmental impacts, meet conditions set by environmental authorities, and be consistent with EBM principles, and other community values and priorities.

LRF may want to consider establishing criteria for IPP projects.

4. *Regional interests should be considered and regional benefits specified in the review of renewable energy projects:*

The LRF should emphasize local and regional interests in the review of projects, while also supporting the harmonizing of provincial and any local or regional reviews to minimize duplication and overlap. Through regular meetings, BC Hydro and the BC Transmission Corporation (BCTC) could be advised of regional issues and priorities, so these can be included in the utilities' system and project plans for the regions. Consideration could be given to encouraging IPPs to provide tangible regional and community benefits during both construction and operation, including local goods and services procurement, employment and skills training, business development opportunities and contracts, and property tax payments.

LRF should emphasize local and regional interests in the review of projects, while also supporting the harmonizing of provincial and any local or regional reviews to minimize duplication and overlap.

5. *Transmission lines should be located to benefit the region over the long-term, not for short-term expediency:*

Transmission lines are "electricity highways". Concerns have arisen on the Sunshine Coast and Howe Sound-Pemberton corridor that each IPP may be taking the shortest, least cost route to the BCTC grid, leading to the unnecessary proliferation of new rights of way. The LRF should consider policies addressing the use of existing powerline corridors, the shared use of any new lines, and the identification in plans of preferred corridors. Projects that can connect to existing transmission and distribution infrastructure with minimal impacts would be preferred. New major overland transmission corridors may be controversial: mitigation measures could include requiring public (i.e. BCTC) construction and ownership, the use of more aesthetically pleasing poles, benefits to the region through which they pass (e.g. providing transformers to electrify off-grid communities or customers), and avoiding areas of high tourism and scenic values.

The LRF should consider policies addressing the use of existing powerline corridors, the shared use of any new lines, and the identification in plans of preferred corridors.

6. *Performance agreements may help to ensure renewable energy projects deliver commitments*:

The LRF may suggest local interests be given the opportunity to review proposed legal agreements and performance bonds between IPPs and government regulators. These help to ensure that renewable energy projects are constructed and operated as agreed to in the review phase, and that any proposed changes are referred to affected First Nations and communities for review.

The LRF might suggest local interests be given the opportunity to review proposed legal agreements and performance bonds between IPPs and government regulators.

There are several key points for consideration in developing a renewable energy strategy worth reviewing, including:

- The need to develop a strategic renewable resource plan to help shape future decisions about renewable resource development in the Central and North Coast and Haida Gwaii and ensure that those decisions are made with an eye toward a bigger plan that will bring economic benefits to the region. This will help avoid ad-hoc decision making which can lead to inefficient use of resource potential and limit overall economic benefits.
- A renewable energy strategy is a proactive approach to support appropriate renewable energy development. A strategy would take steps to guide development rather than simply react to it – creating an opportunity to be strategic and find best-fit solutions for the region.

- The strategy would support the values and broad direction set forth in the land use decisions, complement the land use decision process, and strengthen the resulting outcomes.
- A renewable energy strategy must be consistent with provincial legislation, policies and regulatory approaches.
- The strategy would establish a long-term vision for renewable resource development in the North Coast, Central Coast and Haida Gwaii (15 – 20 years out). This vision will be made more tangible with the addition of some high-level goals and objectives and a list of key activities to get there.
- Engaging key stakeholders in the development of a strategic plan for renewable energy would bring additional certainty to the region, thus strengthening the development potential and helping to fast-track the project development phase.
- There is a need to determine what is the most appropriate organization best positioned to lead this initiative. This likely rests somewhere within the land used decision governance structure thus ensuring that it is a natural growth / outcome / evolution of the land use decision process. However, this will require support from members of the broader community and interested stakeholders. The LRF has both the appropriate representation and capacity to oversee this work, the question is who would manage it on the ground.
- There is a need to complete the strategy quickly. A multi-year process would create considerable uncertainty for both the region and potential investors. While the current economic recession provides some additional time, many project proponents are using this time to undertake preliminary resource assessments to be "first out of the gates" when the economy returns to an expansion phase.
- It is important that at an early stage, leaders from the Central and North Coast and Haida Gwaii demonstrate to the provincial government that it is in their best interest to support the development of a strategy. Without provincial support, there is little chance for success.

WHERE TO FROM HERE? A HIGH LEVEL PATH TO GUIDE THE DEVELOPMENT OF A RENEWABLE ENERGY STRATEGY

The scope of this report does not allow for the development of a regional strategy. Most importantly, the development of a regional strategy must involve a broad range of community stakeholders from the Central and North Coast and Haida Gwaii. Key elements of any regional development strategy might include the following;

Establish A Committee: The EBM Working Group should set up a committee to produce a strategy, including funding requirement and sources.

Define the Objectives: What will the "deliverable" look like? What elements above will be included or excluded, and what needs to be added? Who will implement the strategy, and under what authority, if any?

*Prepare "Issues and Options" Briefs: "*Perspectives" papers for use in consultation.

Community Consultation: Seek comments and feedback, perhaps using a combination of workshops, web-based seminars, presentations and discussions with First Nations and local government councils and boards, and community groups.

Prepare Draft Renewable Energy Strategy: Strategy drafting should be overseen by an Advisory Committee representing a range of interests from the Central and North Coast and Haida Gwaii.

Second Round of Consultation: Seek comments and feedback from federal and provincial government agencies and IPPs, as well as community organizations consulted earlier.

Complete the final Renewable Energy Strategy

Developing a regional renewable energy strategy that brings economic and social benefits to communities on the Central and North Coast and Haida Gwaii is significant undertaking. It will require leaders to engage and consult with a broad group of communities and stakeholders to build areas of agreement toward the development of a shared vision. The challenges are many, but there are equally as many opportunities waiting to be capitalized on – opportunities that could bring increased well-being to local communities in the region.

The development of a regional renewable energy strategy would empower communities in the Central and North Coast and Haida Gwaii to set the course for future development and the flow of associated benefits. It would put communities in the lead, developing the vision and associated actions to ensure that their needs and interests are better addressed in future development of renewable resources in their areas.In addition, a regional strategy would also bring additional certainty for proponents, which if fairly positioned, will have a positive effect on future development and assist in fast-tracking the project development process.

Finally, a regional strategy will greatly aid community leaders and members of the LRF to advocate for improvements in the policy and regulatory environment to support key outcomes in the strategy. Being able to demonstrate a shared regional vision with shared goals and objectives will place leaders in a position of strength in future dialogues with the province, IPPs, regulators and other stakeholders in renewable energy development.

The current economic environment has temporarily slowed interest in renewable energy development in created some breathing room for leaders in the Central and North Coast and Haida Gwaii. However, a return to the harried pace of years past is expected when the economy recovers. Leaders in the Central and North Coast and Haida Gwaii have an immediate and pressing opportunity to work with their communities to develop a regional renewable energy strategy in advance of the next wave of interest.

IX. Conclusions and Summary of Recommendations

CONCLUSIONS

The strategic analysis of renewable energy options for the Central and North Coast and Haida Gwaii includes a thorough review of renewable energy options. Significant resources have gone into research and development for renewable energy technologies over the past several decades. This has resulted in important advances in the viability of renewable energy technologies while minimizing potential impacts. By using abroadrange of evaluation criteria, it is apparent that wind, hydro and biomass resources are the technologies most viable in the short and medium term. This is evident by a number of projects already under development the Central and North Coast and Haida Gwaii area. Other technologies such as geothermal, solar and ocean are currently less viable; however, there may specific opportunities where the technology and the renewable resource support a viable project.

While the viability of the technology is critical to developing successful renewable energy projects, the availability of renewable resources will determine how many projects are ultimately developed and where they are located. The renewable energy resource assessment identified significant wind and small hydro resources spread throughout the Central and North Coast and Haida Gwaii. Ocean resources (wave and tidal) are clearly available through the region, and are expected to have moderate to high resource levels in the Central Coast and Haida Gwaii area. Biomass is also clearly available throughout the region, but limited information is available about the quantity and quality of the biomass. It is therefore not possible to accurately assess the biomass resource potential.

There are a number of renewable energy projects already in operation in the Central and North Coast and Haida Gwaii area. Most are small to medium scale hydro projects helping to meet BC Hydro requirements. A number of renewable wind and small hydro energy projects are in various stages of development, driven largely by the BC Hydro Call for Clean Power. The Central and North Coast and Haida Gwaii area significantly lags the rest of the province in the proposed renewable energy projects, largely due to limits to the transmission grid to connect remote projects.

Given the importance of transmission to renewable energy development, this is priority area for the LRF to focus its attention. The most immediate potential for new transmission infrastructure is the Highway 37 Electrification Project, which has the support of both the Provincial Government and the mining and renewable energy sectors. The challenge moving this project forward over the past several years points to the difficulties that transmission projects face. The LRF will need to take a long-term view to transmission

infrastructure development. Actively participating in the BCUC transmission review is a priority for the LRF.

With available transmission, renewable energy projects in the Central and North Coast and Haida Gwaii will likely have market opportunities that will drive development. The Province's Energy Plan will be a major driver for renewable energy development. Renewable Portfolio Standards in the Western United States will provide additional opportunities for renewable energy producers to market their production either indirectly through BC Hydro or on their own.

First Nations in the Central and North Coast and Haida Gwaii will benefit from the development of renewable energy. Their development will bring direct employment and economic opportunities and the potential for agreements that provide a steady and reliable flow of benefits to communities. First Nations need to carefully consider their relationships and roles with renewable energy developers and understand the implications of the level of involvement in a project. Given that renewable energy projects vary considerably, there is no "one-size fits all" approach to First Nation involvement in project development.

Of upmost importance and immediate priority is the development of a Renewable Energy Strategic Plan for the Central and North Coast and Haida Gwaii. The development of the Strategic Plan requires the involvement of the people of the Central and North Coast and Haida Gwaii to help guide and shape its overall form and direction.

SUMMARY OF RECOMMENDATIONS

The overarching recommendation of this Strategic Analysis is that the Joint Land and Resource Forum must proceed immediately with the development of a Renewable Energy Strategy for the Central and North Coast and Haida Gwaii. There are a number of sub-recommendations that will support the development of a Renewable Energy Strategy, as well as support ongoing discussions and relationships with IPP's, government and other parties. These include:

- **The 'Joint Land and Resource Forum' (LRF), for the Central and North Coast should develop a communication strategy to publicize land use plan plans and policies to ensure that IPPs and resource agencies are familiar with them**.

- **The LRF should consider future plan reviews that evaluate amendment requests, perhaps also establishing clear land use designations for different types and capacities of renewable energy technologies.**

- **As part of a renewable energy strategy, the LRF should consider preparing a complete inventory of these plans and reports for the region, and summarize relevant findings and conclusions.**

- **The LRF should create guidelines to assist local communities develop reasonable expectations of benefits based on project-specific factors.**

- **The LRF should oversee the preparation of a plain-language document that assists IPPs to understand the need for consultation and accommodation to address aboriginal rights and title in the context of renewable energy development.**

- **The LRF should develop best-practice guidelines to assist IPPs and First Nations engage in collaborative dialogues to develop accommodations.**

- **The LRF should take an active role in the BCUC transmission inquiry to ensure the interests of the Central and North Coast and Haida Gwaii are fully represented in the inquiry.**

- **The LRF and communities within the Central and North Coast and Haida Gwaii should develop a collaborative working relationship with BC Hydro and BCTC to ensure both organizations understand the interests and objectives of the Central and North Coast and Haida Gwaii.**

- **The LRF should specify expectations re: consultation and engagement as part of a renewable energy strategy, such as the preparation of a community consultation plan and a public summary.**

- **The LRF should consider establishing an expectation of regional financial participation in large IPP projects by local governments and First Nations.**

- **The LRF should emphasize local and regional interests in the review of projects, while also supporting the harmonizing of provincial and any local or regional reviews to minimize duplication and overlap.**

- **The LRF should consider policies addressing the use of existing powerline corridors, the shared use of any new lines, and the identification in plans of preferred corridors.**

- **The LRF may suggest local interests be given the opportunity to review proposed legal agreements and performance bonds between IPPs and government regulators.**

Appendix 1: Project Work Plan

Mr. Dan Cardinall
EBM Working Group
dancardinall@shaw.ca

October 29, 2008

RE: Central and North Coast Renewable Energy Options Work Plan

Dear Mr. Cardinall

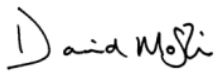
Please find attached the revised detailed work plan for the Central and North Coast Renewable Energy Options project.

The revised work plan reflects the discussions at the October 27, 2008 meeting between your and your colleagues and the consulting team.

The major change in the document is the addition of a new section to provide the key elements of a renewable energy strategy and high-level critical path to prepare a strategy. In addition, the work plan includes a more detailed overview of

Please feel free to contact me to discuss the work plan. Unless you have any suggested changes, I assume the work plan will be appended to the contract between the EBM Working Group and OnPoint Consulting Inc.

Sincerely,



David Molinski
Principal,
OnPoint Consulting Inc.

Cc: Mr. Peter Ostergaard
Mr. Neil Banera
Ms. **Error! Reference source not found.**

Eco-System Based Management Working Group

Central and North Coast Renewable Energy Options
Proposed Work Plan

OnPoint Consulting Inc.

October 29 2008

Background

The Central and North Coast EBM Working Group (working group) recently completed a strategic review of economic activities and initiatives being pursued in the Central and North Coast area. Renewable energy (e.g., wind power, run-of-river electricity generation, wave, tidal and biomass energy) was identified as having significant potential that a coordinated approach to policy, infrastructure and project development could help to realize.

The working group requires a strategic scoping analysis of renewable energy production and transmission opportunities in the Central and North Coast, with a view toward development of a regional renewable energy initiative that delivers economic opportunities and benefits to local communities.

OnPoint Consulting Inc. has proposed a Central and North Coast Renewable Energy Options project. The following provides a detailed work plan for the proposal.

Goal

Provide the working group with independent, accurate and comprehensive information about renewable energy options to position the Central and North Coast to maximize renewable energy opportunities.

Objectives

There are a number of key objectives to this project:

5. Identify which renewable energy technologies have the best potential in the Central and North Coast area.

6. Evaluate renewable energy transmission issues in the context of the Central and North Coast area.

7. Identify key policy, legislative and fiscal issues affecting renewable energy development that require resolution by the federal, provincial or municipal governments.

8. Outline basic elements of renewable energy strategy for the Central and North Coast and a high-level critical path to complete a transparent and comprehensive strategy development process.

Key Assumptions

The key assumptions will help guide the consulting team and working throughout the project.

Protection of Habitat and Wildlife – The habitat and wildlife resources in the Central and North Coast are unique and irreplaceable. This has been recognized with the protection of significant portions of the area by provincial legislation. The conclusions and recommendations of the report will be made in the context that renewable energy options should not irreversibly harm or degrade habitat and wildlife in the Central and North Coast.

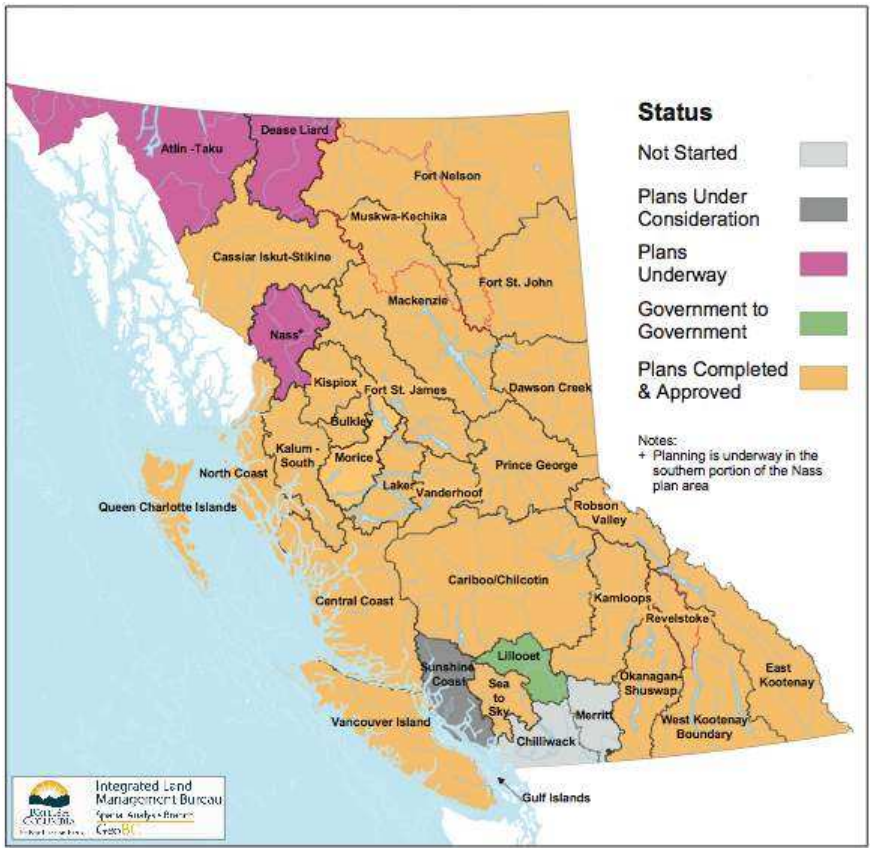
Historical and Cultural Values – First Nations have a historic relationship with the Central and North Coast area. First Nations' connection with the land is based on respect and using resources sustainably to ensure future generations are able to continue the connection with the land. The conclusions and recommendations of the report will reflect respect for the land and the principal of sustainability.

Long-Term Implications of Decisions – There are infinite ways to produce and consume energy, each with positive and negative implications. Choices made today about energy production and consumption will have short-term and long-term socio-economic and environmental implications for the Central and North Coast, and more broadly across British Columbia. This research will reflect both the short and long-term implications of decisions for renewable energy on the Central and North Coast.

Sustainable Economic Development – Sustainable economic development is a priority for the communities of the Central and North Coast and the provincial government. Sustainable economic development will provide good quality employment, support vibrant communities and healthy families. Renewable energy development supports the principle of sustainable economic development. In addition, the availability of high-quality energy also supports other economic activities in the Central and North Coast area that may contribute to sustainable economic development.

Area Description

The area included within the scope of this report is the areas defined within the Integrated Land Management Bureau's Strategy Land Use Resource Planning (SLRP) area. The area includes Haida Gwaii. The following map shows the areas included within the Central and North Coast SLRPs.



Map of SLPR areas – source ILMB.

Work Plan Scope

The following tables describe the work plan for each section of the report. These include:

1. State of Renewable Energy Technology
2. Renewable Energy Resources in the Central and North Coast
3. Current Renewable Energy Projects
4. Transmission Issues
5. Customer Demand and Regulatory
6. Elements of A Renewable Energy Strategy and Critical Path
7. Conclusions and Recommendations

1. State of Renewable Energy Technology	
Objective and Outcome	• Provide the working group with an overview of the current state of renewable energy technologies; including technical, economic, and environmental characteristics. • This will assist the working group establish which technologies should be considered as potentially viable for the Central and North Coast area.
Specific activities	• Prepare literature review of current state of renewable energy technology. • Consult with BC Hydro on the types of renewable energy technology included in responses to the BC Hydro call for "green power". • Consult with IPPs active in British Columbia to confirm commercial and near-commercial technologies. • Consult with the Ministry of Energy, Mines and Petroleum Resources to identify which renewable energy technologies are being promoted by the provincial government. • Prepare summary of information.
Information requirements	• Peer reviewed and published materials on renewable energy technologies. • Industry association articles. • Renewable energy manufacturer information.
Specific Technologies Evaluated	• Wind Energy • Solar Energy • Run of River • Micro-Hydro • Tidal • Biomass • Geothermal • Community Energy Projects
Evaluation Criteria	• Current state of technology • Capital cost • Operating cost • Potential for on-grid/off-grid operations • Siting issues • Environmental impacts • Employment potential • Examples in operation • Cultural impacts • Relationship with and benefits for First Nations

1. State of Renewable Energy Technology	
Consulting Resource	Peter Ostergaard

2. Renewable Energy Resources in the Central and North Coast	
Objective and Outcome	• Create an inventory of renewable energy resources on the Central and North Coast. • Understanding the types, quality and quantity of renewable energy resources on the Central and North Coast will help decision makers understand what is realistically possible given the right conditions for investment.
Specific activities	• Review materials published by industry associations, government and academia to create resource inventory. • Document comprehensive energy potential without consideration of environmental, social and economic issues. • Prepare matrix to summarize information.
Information requirements	• Published public material that is either peer reviewed or considered best available information.
Consulting Resource	David Molinski
Specific Resources Evaluated	• Wind resources • Solar resources • Hydraulic resources • Geothermal resources (High Grade/Low Grade) • Tidal resources

3. Current Renewable Energy Projects	
Objective and Outcome	• There are a significant number of renewable energy projects in various stages of development for the Central and North Coast. There are also a significant number of project proposals that are in various stages of development: from tenure acquisition to advanced project-planning stages. • Provide the Working Group with a clear picture of current and potential development based on known projects.
Specific activities	• Consult with the Ministry of Energy, Mines and Petroleum Resources and BC Hydro to determine the status of existing Electricity Purchase Agreements in the study area. • Consult with MEMPR, BC Hydro, and regulatory agencies to determine existing water licenses, Crown land tenure, and applications in the 2008 Clean Power Call. • In collaboration with MEMPR, prepare maps showing the locations of permitted sites, sites under application, and the 2008 Clean Power Call. • Contact renewable energy proponents to collect information on project plans, including information on community benefits.
Information requirements	• Publicly available Crown information. • Company announcements.
Consulting Resource	Neil Banera

4. Transmission Issues	
Objective and Outcome	• Renewable energy production must be transmitted from the production location to the consumers. Transmission is often a significantly more difficult issue and has been the cause of a recent high-profile project failure. • This section will provide an overview of transportation and transmission issues in the Central and North Coast. • Working group members will have a clear picture of the role of transmission in successful projects.
Specific activities	• Review transmission issues with a focus on electrical grid connection issues, including: o Technical feasibility o Cost and benefit of transmission development o Environment impacts o Timing issues. • Review potential transmission corridors. • Review and analyse potential for transmission options to move power from Alaska to the California market through the Central and North Coast area. • Review and analyze issues when more renewable electricity is available than the transmission system is able to accommodate. • Review the potential for electricity to be used locally to reduce reliance on fossil fuels. • Review provincial and BC Hydro plans to reduce remote community reliance on fossil fuels and evaluate the opportunity for renewable energy to replace fossil fuels. • Review regulatory approval of new transmission. • Review and analyze impacts of electricity availability for current and anticipated commercial/industrial uses, including: o Mining o Tourism o Forestry o Fishing o Others • Provide table with overview of costs/benefits and associated risks with each.
Information requirements	• Information prepared as part of land use planning exercises. • Consult with BC Transmission and BC Hydro.
Consulting Resource	Peter Ostergaard, Neil Banera

5. Customer Demand and Regulatory	
Objective and Outcome	• Review immediate and long-term markets for renewable energy. • Identify preferential policies, portfolio requirements and pricing schemes for renewable energy in other jurisdictions. • Identify specific regulatory issues that must be addressed by renewable energy producers in order to market renewable energy in other jurisdictions. • Working group members will have a clear picture of market opportunities for renewable power produced in the Central and North Coast.
Specific activities	• Collect energy supply/demand information for British Columbia, and external jurisdictions. • Collect information from external jurisdictions on renewable energy policies, portfolio requirements and pricing schemes.
Information requirements	• Energy supply/demand information from federal and provincial governments as well as various industry associations. • Information on individual provincial and state policies, portfolio requirements and pricing schemes is available through energy departments and regulatory bodies.
Consulting Resource	David Molinski
Included Jurisdictions	• British Columbia • Alberta • Washington • Oregon • Idaho • Montana • Utah • California • Arizona • New Mexico • Nevada • Wyoming • Colorado

5. Customer Demand and Regulatory	
Included Regulators	• BC Utilities Commission (BCUC) • National Energy Board (NEB) • Federal Energy Regulatory Commission (FERC) • Other provincial and state regulators

6. Elements of A Renewable Energy Strategy and Critical Path	
Objective and Outcome	• Identify the key elements that may be included within a renewable energy strategy for the Central and North Coast. • Create awareness about how a Central and North Coast Renewable Energy Strategy links with provincial strategies and land use planning processes. • The EBM Working Group has a clear understanding how to proceed with developing a renewable energy strategy for the Central and North Coast.
Specific activities	• Summarize British Columbia renewable energy strategy. • Review renewable energy strategies from other jurisdictions, including other regional, municipal or community renewable energy strategies in British Columbia. • Develop high-level critical path to guide the development of a renewable energy strategy.
Information requirements	• BC Energy Plan. • Renewable energy strategies from other jurisdictions and associations.
Consulting Resource	David Molinski, Peter Ostergaard, Neil Banera, **Error! Reference source not found.**

7. Conclusions and Recommendations

7. Conclusions and Recommendations	
Objective and Outcome	• Summarize key findings. • Provide a ranking of renewable energy options based on: o technical, economic and environmental impact o consistency with available Coast and North Coast renewable energy resources o supply/demand and regulatory issues o provides resource benefits for First Nations • Identify key issues for the Working Group members. • Provide advice on how to maximize renewable energy opportunities in the Central and North Coast.
Specific activities	• Produce ranking matrix
Information requirements	• NA
Consulting Resource	David Molinski, Peter Ostergaard, Neil Banera

Out of Scope

Renewable energy source are, by their nature, low or no carbon energy options. The report will identify specific carbon emission issues required to more clearly understand key elements of specific renewable energy technologies; however, the report will not address broader questions around provincial carbon reduction policies, carbon trading or carbon taxes.

The report will not address the potential for energy conservation or efficiency in the study area.

Project Deliverables and Timeline

Deliverable	**Date**
Project Work Plan	October 29, 2008
Project Status Meeting	Late-November
Draft Report	December 31, 2008
Report Review Meeting	Mid-January
Final Report	January 31, 2009

Final Product

The final submission will be in a fully referenced report format with maps, tables, charts and appendices as required. The length of the report will depend on availability and relevancy of the information.

OnPoint Consulting will provide the Central and North Coast EBM Working Group with three (3) bound copies of the final report and an electronic version in PDF format.

Consulting Team Contact Information

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Appendix 2:Alternative Energy Sites (Applications and Tenures)

Table 1 Alternative Energy Sites in the North Coast and Haida Gwaii (Applications and Tenures)

Technology	Proponent	Location	Lands file #	Project Description	Status
Water	0728078 BC LTD.	Crab Lake	6407841	LoO	Application
Water	0728078 BC LTD.	Europa Creek	6407697	LoO	Application
Water	ALICE ARM HYDRO ELECTRIC CORP.	Clary Creek	6407632	LoO	Application
Water	ALICE ARM HYDRO ELECTRIC CORP.	Stark Creek	6407637	LoO	Application
Water	ALICE ARM HYDRO ELECTRIC CORP.	Falls Creek	6407633	LoO	Application
Water	ALICE ARM HYDRO ELECTRIC CORP.	Gwunya Creek	6407634	LoO	Application
Water	ALICE ARM HYDRO ELECTRIC CORP.	La Rose Creek	6407635	LoO	Application
Water	ANYOX HYDRO ELECTRIC CORP.	Kelskiist Creek	6407636	LoO	Application
Water	ANYOX HYDRO ELECTRIC CORP.	Alice Arm	6407392	LoO	Tenure
Water	ANYOX HYDRO ELECTRIC CORP.	Anyox Lake	6407399	LoO	Tenure
Water	ANYOX HYDRO ELECTRIC CORP.	Anyox Lake	6407397	LoO	Application
Water	C-FREE POWER CORP.	Marion Creek	6408065	LoO	Application
Water	C-FREE POWER CORP.	Lachmach River	6408066	LoO	Application
Water	C-FREE POWER CORP.	Toon River	6408060	LoO	Application
Water	C-FREE POWER CORP.	Toon River South	6408061	LoO	Application
Water	C-FREE POWER CORP.	Mcshane Creek	6408064	LoO	Application
Water	C-FREE POWER CORP.	Toon River North	6408046	LoO	Application
Water	COASTAL RIVERS POWER LP	Moresby Creek	6000322	LoO	Tenure

Technology	Proponent	Location	Lands file #	Project Description	Status
Water	EPCOR POWER HOLDINGS LTD.	Brown Lake	6406066	LoO	Tenure
Water	GITGA'AT DEVELOPMENT CORP.	Hartley Bay	6407794	LoO	Application
Water	KITSAULT HYDRO ELECTRIC CORP.	Kitsault River	6407393	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	Kitsault River	6407389	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	Alice Arm/Kitsault	6407391	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	Trout Creek	6407544	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	West Kitsault River	6407385	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	Kitsault River	6407386	LoO	Tenure
Water	KITSAULT HYDRO ELECTRIC CORP.	Kitsault River	6407387	LoO	Tenure
Water	KITSAULT RESORT LTD.	Clary Creek	6407715	LoO	Application
Water	KITSAULT RESORT LTD.	Lime Creek	6407716	LoO	Application
Water	PATTISON, GEORGE H.	Van Inlet	6407631	LoO	Application
Water	PLUTONIC POWER CORP.	Europa Creek	6407639	LoO	Application
Water	SYNEX ENERGY RESOURCES LTD	Arden Lake	6407903	LoO	Application
Water	SYNEX ENERGY RESOURCES LTD	Ayton Creek	6407904	LoO	Application
Water	SYNEX ENERGY RESOURCES LTD	Khtada River	6407905	LoO	Application
Wind	ANEMOS ENERGY CORP.	Digby Island	6408102	IP	Application
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island	6407369	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island	6407710	LoO(M)	Tenure

Technology	Proponent	Location	Lands file #	Project Description	Status
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 1)	6407779	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 2)	6407891	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 3)	6407892	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 4)	6407893	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 5)	6407894	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 6)	6407895	IP	Tenure
Wind	BANKS ISLAND WIND FARM LTD.	Banks Island (site 7)	6407896	IP	Tenure
Wind	EARTH FIRST ENERGY INC.	Trutch Island	6407416	IP	Tenure
Wind	EARTH FIRST ENERGY INC.	Trutch and Barnard Islands	6407815	LoO(M)	Tenure
Wind	ENGLISH BAY ENERGY LTD.	Porcher Island	6407489	IP	Tenure
Wind	ENGLISH BAY ENERGY LTD.	Porcher Island	6407372	IP	Tenure
Wind	ENGLISH BAY ENERGY LTD.	Porcher Island	6407709	LoO(M)	Tenure
Wind	ENGLISH BAY ENERGY LTD.	Wright Island	6407708	LoO(M)	Tenure
Wind	ENGLISH BAY ENERGY LTD.	McCauley Island	6407411	IP	Tenure
Wind	KATABATIC POWER CORP.	Mount Hays	6407822	LoO	Tenure
Wind	NAI KUN WIND DEVELOPMENT INC.	Nai Kun	6407371	IP	Tenure

Technology	Proponent	Location	Lands file #	Project Description	Status
Wind	NAI KUN WIND DEVELOPMENT INC.	Dogfish Banks	6407436	LoO(M)	Tenure
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island	6407358	IP	Tenure
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island	6407866	LoO(M)	Tenure
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island NW	6407676	IP	Tenure
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island NW	6408032	LoO(M)	Application
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island NE	6407677	IP	Tenure
Wind	NORTH COAST WIND ENERGY CORP.	Banks Island NE	6408033	LoO(M)	Application
Wind	REGEN POWER CORP.	Kennedy Island	6407816	IP	Application
Wind	REGEN POWER CORP.	Kennedy Island	6407937	LoO(M)	Application
Wind	REGEN POWER CORP.	Dehorsey Is., Mt. Dodge, Brown Lk., Elwyn Mt., Kumealon Lk.	6407938	LoO(M)	Tenure
Wind	REGEN POWER CORP.	Telegraph Passage and Ecstall River	6407846	IP	Tenure
Wind	R. H. RESOURCES LTD.	Cape Chroustcheff	2410000	IP	Application
Wind	RUPERT PEACE POWER CORP.	S. of Port Edward	6407688	IP	Tenure
Wind	RUPERT PEACE POWER CORP.	S. of Port Edward	6407775	LoO(M)	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island A/B	6408082	LoO(M)	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island C	6408083	LoO(M)	Application
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island D/E	6408084	LoO(M)	Application
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island F	6408085	LoO(M)	Application
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 3	6407568	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 4	6407569	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 5	6407570	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 6	6407571	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 7	6407572	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 8	6407573	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 9	6407574	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 10	6407575	IP	Tenure
Wind	SEA BREEZE ENERGY INC.	Aristazabal Island - 11	6407576	IP	Tenure

Notes:

IP = Investigative Permit

LoO (M) = Licence of Occupation to install wind monitoring towers. Must have received an Investigative Permit first.

LoO = Licence of Occupation to construct an alternative energy facility

Application = Still in the application phase

Tenure = Tenure has been issued for this purpose

Wat. Lic. = Water Licence (precedes issuance of tenures for IPP projects)

Table 2 Alternative Energy Sites in the Central Coast (Applications and Tenures)

Technology	Proponent	Location	Lands file #	Project Description	Status
Ocean	BC TIDAL ENERGY CORP	Innes Passage E, Sonora Island	1412918	IP	Tenure
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Weynton Passage	1412948	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Kelsey Bay 1, Johnstone St.	1412941	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Current and Race Passage, Helmcken Island	1412942	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Ripple Shoal 1, Johnston Strait	1412944	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Ripple Shoal 2, Johnstone Strait	1412945	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Blackney Passage	1412946	IP	Application
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Blackney Passage	1412946	IP	Tenure
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Ripple Shoal 1, Johnston Strait	1412944	IP	Tenure
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Weynton Passage	1412948	IP	
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Kelsey Bay 1, Johnstone St.	1412941	IP	Tenure
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Current and Race Passage, Helmcken Island	1412942	IP	Tenure
Ocean	FRED.OLSEN MARINE RENEWABLES LTD.	Ripple Shoal 2, Johnstone Strait	1412945	IP	Tenure
Ocean	ORCA POWER INC.	Dent Rapids	1412127	IP	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
Water	0717016 BC INC.	Klinaklini River	1412647	LoO	Application
Water	0755748 BC LTD.	Wakeman River	5407353	LoO	Application
Water	0755748 BC LTD.	Sheemahant River	5407354	LoO	Application
Water	0755748 BC LTD.	Pashleth Creek	5407355	LoO	Application
Water	0755748 BC LTD.	Machmell River	5407310	LoO	Application
Water	0755748 BC LTD.	Stafford River	1413031	LoO	Application
Water	445026 BC LTD.	Lower Nascall River	5407131	LoO	Application
Water	445026 BC LTD.	Middle Nascall River	5407130	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Machmell River	5407417	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Bentinck Arm	5407418	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Atwaykelles SE River	1413096	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Waump Creek	1413095	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	ZZ Trib (Alison Sound)	1413101	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Powley Creek	1413115	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Wahpeeto Creek	1413114	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN	Lahlah Creek	1413094	LoO	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
	POWER CORP.				
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Sumquolt Creek	5407364	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Lemolo Creek	5407369	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Nahornyk Creek	5407368	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Ickna Creek	5407367	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Tributary of Taleomey R.	5407366	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Doos Creek	5407365	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Marble Creek	5407375	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Kull Creek	5407380	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Kilippi Creek	5407379	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Noeick River	5407378	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Smitley River	5407377	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Inziana River	5407370	LoO	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Powley Creek	1413115	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Wahpeeto Creek	1413114	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	ZZ Trib (Alison Sound)	1413101	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Atwaykelles SE River	1413096	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Lahlah Creek	1413094	LoO	Application
Water	6167047 CANADA LTD, Subsidiary of BRASCAN POWER CORP.	Waump Creek	1413095	LoO	Application
Water	CENTRAL COAST POWER CORP.	Link River			Wat. Lic.
Water	CLOUDWORKS ENERGY INC.	Machmell River	5407315	LoO	Application
Water	CLOUDWORKS ENERGY INC.	Noeick River	5407314	LoO	Application
Water	CLOUDWORKS ENERGY INC.	Washwash River	5407313	LoO	Application
Water	CLOUDWORKS ENERGY INC.	Pashleth Creek	5407312	LoO	Application
Water	ESTERO POWER CORP.	Estero Peak	2409488	LoO	Application
Water	GOOD HOPE CANNERY LTD.	Good Hope	5407416	LoO	Application
Water	HAWKEYE ENERGY CORP.	Sim River	1413241	LoO	Application
Water	HAWKEYE ENERGY CORP.	Mcmyn Creek	1413239	LoO	Application
Water	KITASOO HYDRO POWER	Klemtu Village	6407885	LoO	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
	LTD.				
Water	PLUTONIC HYDRO INC.	Bute Inlet/Campbell RIver	1413160	LoO	Application
Water	PLUTONIC HYDRO INC.	HooDoo Creek	1413036	LoO	Application
Water	PLUTONIC HYDRO INC.	Tumult Creek	1413034	LoO	Application
Water	PLUTONIC HYDRO INC.	Crevice Creek	1413035	LoO	Application
Water	PLUTONIC HYDRO INC.	Smythe Creek	1412872	IP	Application
Water	PLUTONIC HYDRO INC.	Fissure Creek	1412870	IP	Application
Water	PLUTONIC HYDRO INC.	Stanton Creek	1412871	IP	Application
Water	RUN OF RIVER POWER INC.	Upper Noomst Creek	5407431	LoO	Application
Water	RUN OF RIVER POWER INC.	Upper Nusatsumck	5407432	LoO	Application
Water	RUN OF RIVER POWER INC.	Noosgulch River	5407423	LoO	Application
Water	RUN OF RIVER POWER INC.	Nordschow Creek	5407424	LoO	Application
Water	RUN OF RIVER POWER INC.	Nusatsum River	5407425	LoO	Application
Water	RUN OF RIVER POWER INC.	Snootli Creek	5407426	LoO	Application
Water	RUN OF RIVER POWER INC.	Tastsquan Creek	5407427	LoO	Application
Water	RUN OF RIVER POWER INC.	Tseapseahoo LZ Creek	5407428	LoO	Application
Water	RUN OF RIVER POWER INC.	Tsinitsini Creek	5407429	LoO	Application
Water	RUN OF RIVER POWER INC.	Upper Clayton Creek	5407430	LoO	Application

Technology	Proponent	Location	Lands file #	Project Description	Status
Water	RUN OF RIVER POWER INC.	Cacoohtin Creek	5407420	LoO	Application
Water	RUN OF RIVER POWER INC.	Nooklikonni K Creek	5407421	LoO	Application
Water	RUN OF RIVER POWER INC.	Noomst Creek	5407422	LoO	Application
Water	RUN OF RIVER POWER INC.	Burnt Bridge Creek	5407419	LoO	Application
Water	SHEARWATER MARINE LTD.	Denny Island	5406851	LoO	Application
Wind	SEA BREEZE ENERGY INC.	Cape Caution	5406986	IP	Application
Wind	SEA BREEZE ENERGY INC.	Cape Caution	5406982	IP	Application
Wind	SEA BREEZE ENERGY INC.	Cape Caution	5406983	IP	Application
Wind	SEA BREEZE ENERGY INC.	Price Island 2	6407563	IP	Application
Wind	SEA BREEZE ENERGY INC.	Price Island 3	6408086	LoO(M)	Application
Wind	SEA BREEZE ENERGY INC.	Price Island 3	6407564	IP	Application
Wind	SEA BREEZE ENERGY INC.	Price Island 4	6407565	IP	Application

Notes:

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LoO (M) = Licence of Occupation to install wind monitoring towers. Must have received an Investigative Permit first.

LoO = Licence of Occupation to construct an alternative energy facility

Technology	Proponent	Location	Lands file #	Project Description	Status

Application = Still in the application phase

Tenure = Tenure has been issued for this purpose

Wat. Lic. = Water Licence (precedes the issuance of tenures for IPP projects

Appendix 3: Details from RPS's for the western US states

Arizona

A utility may use bundled Tradable Renewable Energy Credits (RECs)acquired in any year to meet its annual requirement. With the exception of incremental generation from hydropower facilities or hydropower output used to firm intermittent renewables, renewable energy from facilities installed before January 1, 1997, are not eligible. Energy produced by eligible renewable-energy systems must be deliverable to the state. Extra credit multipliers may be earned for early installation of certain technologies, in-state solar installation, and in-state manufactured content. The multipliers are additive, but cannot exceed 2.0.

RECs derived from renewables installed after December 31, 2005, are not eligible for multipliers. If a utility makes an investment in a solar electric manufacturing plant located in state or provides incentives for a plant to locate in the state, the utility can acquire RECs for the main RPS tier equal to the capacity of the panels produced multiplied by 2,190 hours, which approximates a 25% capacity factor. These RECs cannot account for more than 20% of the annual requirement. Utilities subject to the Renewable Energy Standard (RES)not defined must submit compliance and implementation plans annually to the ACC. Utilities recover RES costs through a monthly surcharge. Each affected utility may adopt their own surcharge but it must be substantially similar to the sample tariff provided in the rules, and it must receive approval from the ACC. Affected utilities also have the option to file a rate case with the ACC in lieu of a tariff.

California

California's Renewables Portfolio Standard (RPS) program requires retail sellers of electricity to increase their sales of eligible renewable-energy resources by at least 1 percent of retail sales per year, so that 20% of their retail sales are served with eligible renewable energy resources by 2010. Governor Schwarzenegger has set a longer-term state goal of 33% by 2020, and currently the California Public Utilities Commission (CPUC) and the California Energy Commission (Energy Commission) are considering ways to achieve that goal.

The CPUC has developed RPS compliance rules for investor owned utilities (IOUs), electric service providers, small and multi-jurisdictional utilities and community choice aggregators. Publicly-owned utilities are responsible for implementing and enforcing an RPS that recognizes the intent of the Legislature to encourage renewable resources, while taking into consideration the effect of the standard on rates, reliability, and financial resources and the goal of environmental improvement.

The law assigned specific roles to the CPUC and the Energy Commission and directed the agencies to work in collaboration to implement the RPS program.

The Energy Commission's roles are to:

- Certify eligible renewable resources that meet statutory requirements; and
- Design and implement a tracking and verification system to ensure that renewable energy output is counted only once for the purpose of the RPS and for verifying retail product claims in California or other states

The Energy Commission has adopted three Guidebooks describing its RPS program requirements:

- The Renewables Portfolio Standard Eligibility Guidebook describes the eligibility requirements and process for certifying renewable resources as eligible for California's RPS and SEPs and describes the Energy Commission's implementation of a tracking system to verify compliance with the RPS.
- The Overall Program Guidebook describes how the Energy Commission's Renewable Energy Program is administered.
- To meet California's RPS reporting requirements and the renewable energy tracking needs of 14 states and two Canadian provinces in the Western Electricity Coordinating Council (WECC), the Energy Commission and the Western Governors' Association have jointly developed the Western Renewable Energy Generation Information System (WREGIS), which began operation in June 2007.

The CPUC is charged with:

- Establishing the standard terms and conditions to be used by all IOUs in contracting for eligible renewable energy resources.
- Implementing flexible rules for compliance with annual renewable procurement targets, such as applying excess renewable procurement in one year to a deficit in another year. If a retail seller fails to procure sufficient renewable energy, the CPUC will impose penalties.
- Reviewing and approving each IOU's procurement plan and its process for selecting the least cost bidders of renewable energy that best fit that utility's resource needs. IOUs use these processes to select winning bidders from their solicitations to procure renewable electricity. The CPUC decision conditionally approving the IOUs' 2007 procurement plans is available here.

Determining market price referents (MPRs) for electricity from non-renewable sources. The MPR establishes a benchmark at or below which approved RPS bid contracts will be considered reasonable. If a contract is executed as a result of a competitive RPS solicitation and priced above the MPR, it may be eligible to receive SEPs from the Energy Commission.

Colorado

Colorado became the first U.S. state to create a renewable portfolio standard (RPS) by ballot initiative when voters approved Amendment 37 in November 2004. The original version of Colorado's RPS required utilities serving 40,000 or more customers to generate or purchase enough renewable energy to supply 10% of their retail electric sales. The original RPS also implemented a rebate program for customers of the state's two investor-owned utilities, Xcel Energy and Aquila. The rebate program is still in effect.

In March 2007, HB 1281 increased the RPS and extended the renewable-energy requirement to electric cooperatives, among other changes. Eligible renewable-energy resources include solar-electric energy, wind energy, geothermal-electric energy, biomass facilities that burn nontoxic plants, landfill gas, animal waste, hydropower, recycled energy, and fuel cells using hydrogen derived from eligible renewables. The Bill also requires municipal energy utilities to offer an optional pricing program that allows retail customers to support emerging renewable energy technologies through utility rates.

Colorado's RPS requires each investor-owned utility to provide specific percentages of renewable energy and/or recycled energy according to the following schedule:

- 3% of its retail electricity sales in Colorado for the year 2007;
- 5% of its retail electricity sales in Colorado for the years 2008-2010;
- 10% of its retail electricity sales in Colorado for the years 2011-2014;
- 15% of its retail electricity sales in Colorado for the years 2015-2019; and
- 20% of its retail electricity sales in Colorado for the year 2020 and for each following year.

For investor-owned utilities, at least 4% of the standard must be generated by solar-electric technologies. At least one-half of the solar requirement must be generated by solar-electric systems located on-site at customers' facilities. Eligible electricity generated in Colorado is favored; each kilowatt-hour (kWh) of eligible electricity generated in-state receives 125% credit for RPS-compliance purposes. The Colorado Public Utility Commission (PUC) has issued rules to implement the RPS. The PUC's rules generally apply to investor-owned utilities.

In addition, Colorado's RPS requires all electric cooperatives and each municipal utility serving more than 40,000 customers to provide specific percentages of renewable energy and/or recycled energy according to the following schedule:

- 1% of its retail electricity sales in Colorado for the years 2008-2010;
- 3% of its retail electricity sales in Colorado for the years 2011-2014;
- 6% of its retail electricity sales in Colorado for the years 2015-2019; and
- 10% of its retail electricity sales in Colorado for the year 2020 and each

following year.

In the service territory of electric cooperatives and eligible municipal utilities, electricity generated at a "community-based project" -- a project not greater than 30 megawatts (MW) in capacity that is located in Colorado and owned by individual residents of a community or by nonprofits, cooperatives, local government entities or tribal councils -- receives 150% credit for RPS-compliance purposes. There is no solar requirement for electric cooperatives and eligible municipal utilities, but solar electricity generated by a facility that begins operation before July 1, 2015, receives 300% credit for RPS-compliance purposes. (Solar electricity generated by a facility that begins operation on or after July 1, 2015, receives 100% credit.) System owners may not take advantage of both the community-based project multiplier and the solar multiplier.

Tradable renewable energy credits (RECs) may be used to satisfy the standard. Utilities that do not generate the required amount of electricity from eligible renewables may purchase RECs from utilities that exceed the requirement.

Montana

Montana's renewables portfolio standard (RPS), enacted in April 2005 as part of the Montana Renewable Power Production and Rural Economic Development Act, requires public utilities and competitive electricity suppliers to obtain a percentage of their retail electricity sales from eligible renewable resources according to the following schedule:

- 5% for compliance years 2008-2009 (1/1/2008 - 12/31/2009)
- 10% for compliance years 2010-2014 (1/1/2010 - 12/31/2014)
- 15% for compliance year 2015 (1/1/2015 - 12/31/2015) and for each year thereafter

Eligible renewable resources include wind, solar, geothermal, existing hydroelectric projects (10 megawatts or less), landfill or farm-based methane gas, wastewater-treatment gas, low-emission, nontoxic biomass, and fuel cells where hydrogen is produced with renewable fuels. Facilities must begin operation after January 1, 2005, and must either be located in Montana or located in another state and delivering electricity into Montana.

Utilities and competitive suppliers can meet the standard by entering into long-term purchase contracts for electricity bundled with renewable-energy credits (RECs), by purchasing the RECs separately, or by a combination of both. The law includes cost caps that limit the additional cost utilities must pay for renewable energy and allows cost recovery from ratepayers for contracts pre-approved by the Montana Public Service Commission (PSC). RECs sold through voluntary utility green power programs may not be used for compliance. Before entering into a

long-term contract to purchase RECs, with or without associated electricity, a utility must petition the PSC to certify that the RECs were produced by an eligible renewable resource.

For utilities operating in Montana within the geographic boundaries of the Western Electricity Coordinating Council, all RECs used to comply with the standard must be tracked and verified through the Western Renewable Energy Generation Information System (WREGIS). If WREGIS is not operational, the PSC will approve another tracking system. For public utilities operating in Montana within the geographic boundaries of Midwest Reliability Organization, all RECs used to comply with the standard must be tracked and verified through the Midwest Renewable Energy Tracking System (MRETS). If MRETS is not operational, the PSC will approve another tracking system.

A utility or competitive supplier unable to comply with the RPS during an annual period (there is a three-month grace period) must pay an administrative penalty of $10/MWh for RECs that the utility failed to procure. Penalty payments may not be recovered in electricity rates. Funds derived from penalties go into the universal low-income energy assistance fund. Alternatively, a utility may petition the PSC for a short-term waiver from full compliance. If a utility or competitive supplier exceeds the standard in any year, it may carry forward the amount by which the standard was exceeded to comply with the standard in either or both of the two subsequent compliance years.

Montana's RPS includes specific procurement requirements to stimulate rural economic development. For example, for compliance year 2010 through compliance year 2014, public utilities (not applicable to competitive suppliers) must purchase both the renewable-energy credits (RECs) and the electricity output from community renewable-energy projects that total at least 50 megawatts (MW) in nameplate capacity. For compliance year 2015 and each following year, utilities must purchase both the RECs and the electricity output from community renewable-energy projects that total at least 75 MW in nameplate capacity. In addition, public utilities must enter into contracts that include a preference for Montana workers.

While cooperative utilities and municipal utilities are generally exempt from these requirements, cooperative and municipal utilities with 5,000 or more customers must implement a renewable-energy standard that recognizes the "intent of the legislature to encourage new renewable-energy production and rural economic development, while taking into consideration the effect of the standard on rates, reliability and financial resources."

North Western Energy, the default electricity provider offers “green” power pricing options including:

- customers can pay as low as $2 extra a month onan electric bill to support the development of new renewable resources.

Through North Western Energy's E+ Green Program, customers can buy the environmental benefits associated with renewable energy that is being generated in the northwest and Wyoming

New Mexico

In March 2007, New Mexico passed SB 418, which directs investor-owned utilities to generate 20% of total retail sales to New Mexico customers from renewable energy resources by 2020, with interim standards of 10% by 2011 and 15% by 2015. The bill also establishes a standard for rural electric cooperatives of 10% by 2020 (see below). Furthermore, utilities are to set a goal of at least 5% reduction in total retail sales to New Mexico customers, adjusted for load growth, by January 1, 2020.

Renewable energy is defined as electric energy generated by low- or zero-emissions generation technology with substantial long-term production potential; solar; wind; geothermal; hydropower facilities brought in service after July 1, 2007; fuel cells that are not fossil fueled; and biomass resources, such as agriculture or animal waste, small diameter timber, salt cedar and other phreatophyte or woody vegetation removed from river basins or watersheds in New Mexico, landfill gas and anaerobically digested waste biomass. Renewable energy does not include electric energy generated from fossil fuel or nuclear facilities.

Utilities document compliance with the RPS through the use of renewable-energy certificates (RECs). A REC represents one kilowatt-hour (kWh) of renewable electricity. RECs used for RPS compliance on or after January 1, 2008 must be registered with the Western Renewable Energy Generation Information System (WREGIS). RECs not used for compliance, sold, or otherwise transferred may be carried forward for up to four years.

RPS for Investor-Owned Utilities

In August 2007, the PRC issued an order and rules requiring that investor owned utilities meet the 20% by 2020 target through a "fully diversified renewable energy portfolio" which is defined as a minimum of 20% solar power, 20% wind power, and 10% from either biomass or geothermal energy starting in 2011. Additionally 1.5% must come from distributed renewables by 2011, rising to 3% in 2015. Distributed resources counted toward the other portfolio requirements cannot also be counted for the distributed requirement. Utilities will be excused from the diversification targets should costs of achieving them raise the cost of electricity by more than 2 percent or if the targets cannot be accomplished without impairing system reliability.

PRC Case No. 04-00253-UT established a two-prong "Reasonable Cost Threshold" (RCT). One component is a cap on the price of resources by technology type, while

the second is an overall retail customer rate impact threshold. The technology cost caps were set at $0.049 per kilowatt-hour (kWh) for wind and hydroelectric resources; $0.06254 per kWh for biomass and geothermal resources; $0.15 per kWh for solar projects up to 10 kilowatts (kW) in capacity, and $0.10 per kWh for solar projects greater than 10 kW. The overall retail customer rate impact is capped at one percent (1%) of all customers' aggregated overall annual electric charges for 2006, increasing by one-fifth percent (0.2%) per year until January 1, 2011, at which time it will be two percent (2%). New Mexico investor-owned utilities must file by September 1, 2007, reports that reflect their positions regarding the RCT and whether the utilities believe the threshold should be changed. The NMPRC then will initiate a proceeding to review the RCT.

The additional cost of the RPS to non-governmental customers who consume more than 10 million kWh per year is also limited so as not to exceed the lower of 1% of that customer's annual electric charges or $49,000. This procurement limit increases by 0.2% or $10,000 per year until January 1, 2011, when it remains fixed at the lower of 2% of the customer's annual electric charges or $99,000. After January 1, 2012, the $99,000 limit is adjusted for inflation by the amount of the cumulative change in the Consumer Price Index, Urban (CPI-U) between January 1, 2011 and January 1 of the procurement plan year.

On July 1 of every year, investor-owned utilities must file a report to the PRC on its procurement and generation of renewable energy during the prior calendar year and submit a procurement plan.

RPS for Rural Electric Cooperatives

In March 2007, SB 418 created a separate renewables portfolio standard for rural electric distribution cooperatives: 5% of retail sales by 2015, increasing 1% per year to reach 10% renewables by 2020. Cooperatives are not required to incur RPS compliance costs that exceed the "reasonable cost threshold", which is set at 1% of the distribution cooperative's gross receipts from business transacted in New Mexico for the preceding calendar year.

In addition to the RPS, SB 418 established a "renewable energy and conservation fee" to support programs or projects to promote the use of renewable energy, load management or energy efficiency. Distribution cooperatives may collect from its customers a fee of no more than 1% of the customer's bill, not to exceed $75,000 annually from any single customer.

Distribution cooperatives must report to the PRC by March 1 of each year on its purchases and generation of renewable energy during the preceding calendar year.

In 2002, the New Mexico Public Regulation Commission (PRC) adopted a final rule that requires all public utilities in the state, including rural electric cooperatives, to offer a voluntary renewable energy tariff to their customers. The rule also requires

utilities to develop consumer education programs to raise awareness of the green power option and the benefits of renewable energy. The renewable energy tariffs must be filed with the PRC by the end of August 2003.

Nevada

Nevada enacted a renewable portfolio standard (RPS) as part of its 1997 restructuring legislation. Under the standard, the state's two investor-owned utilities -- Nevada Power and Sierra Pacific Power -- must use eligible renewable energy resources to supply a minimum percentage of the total electricity they sell. In 2001, the legislature revised the minimum amounts to increase by 2% every two years, culminating in a 15% requirement by 2013.

In Assembly Bill (AB) 3 of the 2005 special session, the portfolio requirement was further revised to increase by 3% every two years, to achieve 20% of retail sales by 2015. The 2005 revisions included a significant change allowing utilities to meet the standard through renewable energy generation (or credits) *and* energy savings from efficiency measures. At least 5% of the standard must be generated, acquired, or saved from solar energy systems.

Under AB 3, efficiency measures eligible for portfolio energy credits include those installed after January 1, 2005, must be implemented at a retail customer's location, and must be partially or fully subsidized by the electric utility to qualify. The measure must also reduce the customer's energy demand (as opposed to shifting demand to off-peak hours). The contribution from energy efficiency measures to meet the portfolio standard is capped at one-quarter of the total standard in any particular year. AB1 of 2007 expanded the definition of efficiency resources to include district heating systems powered by geothermal hot water.

Beyond solar, qualifying renewable energy resources include biomass, geothermal energy, wind, certain hydropower, and waste tires (using microwave reduction).

The Public Utilities Commission of Nevada (PUCN) has established a program to allow energy providers to buy and sell portfolio energy credits (PECs) in order to meet energy portfolio requirements. One PEC represents a kilowatt-hour of electricity generated by a portfolio energy system, with the exception of photovoltaics, for which 2.4 PECs are credited per one actual kWh of energy produced. An adder of 0.05 can be added to the 2.4 multiplier for PV if the system is deemed by the PUCN to be a customer-maintained distributed generation system; that is, customer-sited PV is eligible for a 2.45 multiplier. In addition, the number of kilowatt-hours saved by energy efficiency measures is multiplied by 1.05 to determine the number of PECs. For electricity saved during peak periods as a result of efficiency measures, the credit mulitplier is increased to 2.0. PECs are valid for a period of four years.

To help facilitate the renewable projects called for in the renewable energy

portfolio standard, the PUCN established the Temporary Renewable Energy Development (TRED) Program. The TRED program is meant to insure prompt payment to renewable energy providers in order to encourage completion of renewable energy projects. The TRED Program establishes: (1) a TRED Charge allowing investor-owned utilities to collect revenue from electricity customers to pay for renewable energy separate from other wholesale power purchased by the electric utilities; and (2) an independent TRED Trust to receive the proceeds from the TRED Charge and remit payment to renewable energy projects that deliver renewable energy to purchasing electric utilities.

Nevada Power and Sierra Pacific Power have both contracted to purchase enough PECs to meet their solar portfolio requirements through 2014 and their non-solar portfolio requirements through 2024.

Oregon

As part of the Oregon Renewable Energy Act of 2007 (Senate Bill 838), the state of Oregon established a renewable portfolio standard (RPS) for electric utilities and retail electricity suppliers. Different RPS targets apply depending on a utility's size. Electricity service suppliers must meet the requirements applicable to the electric utilities that serve the territories in which the electricity service supplier sells electricity to retail consumers.

Large utilities -- those with 3% or more of the state's load -- must ensure that a percentage of the electricity sold to retail customers in-state be derived from newer eligible renewable energy resources according to the following schedule:

- 5% by 2011
- 15% by 2015
- 20% by 2020
- 25% by 2025

Eligible “newer” resources are primarily those placed in service on or after January 1, 1995 as discussed further below.

Smaller utilities are subject to lower standards. Utilities with less than 1.5% of state load must meet a 5% RPS by 2025. Utilities with more than 1.5%, but less than 3% of state load must meet a 10% RPS by 2025. However, utilities that buy into a new coal plant or sign a new contract specifically for new coal power and publicly-owned utilities that annex investor-owned utility territory without consent are subject to the “large utility” standards.

The legislation also established a *goal* that by 2025 at least 8% of Oregon's retail electrical load comes from small-scale renewable energy projects with a capacity of 20 megawatts or less. In fact, the legislation modified Oregon's public purpose charge for renewable resources to focus on smaller projects of 20 MW or less and

extended the sunset date on the public purpose charge through 2025.

Eligible renewable resources include electricity generated from solar, wind, hydropower, ocean thermal, wave, and tidal power, geothermal, hydrogen derived from renewable sources, and biomass, including biogas. Incineration facilities using municipal solid waste or chemically-treated wood are not eligible. Eligible resources must be located within Western Electricity Coordinating Council (WECC) territory or must be designated environmentally preferable by the Bonneville Power Administration (BPA).

To qualify as an eligible renewable resource, electricity must be generated by a facility that becomes operational on or after January 1, 1995. Electricity from facilities operational before January 1, 1995 attributable to efficiency or, for non-hydropower facilities, capacity upgrades, on or after January 1, 1995 is a qualifying resource. A limited amount of hydropower from facilities operational before 1995 can qualify as an eligible resource under certain conditions.

RPS compliance must be demonstrated through the purchase of renewable energy credits (RECs) through the Western Renewable Energy Generation Information System (WREGIS). RECs may be either bundled with, or purchased separately from, electricity contracts. Unbundled RECs can only meet 20% of a large utility's compliance obligation and 50% of a large consumer-owned utility's obligation. RECs procured before March 31st of a given year can be used for a previous year's compliance, and RECs can be banked and carried forward indefinitely for future compliance. Note that bundled RECs must come from a facility in the U.S. portion of the WECC.

RECs cannot be counted toward compliance with both Oregon's RPS and an RPS of another state or use in voluntary “green power” programs. However, RECs can be counted toward both Oregon's RPS and a federal RPS should one be enacted.

There are two mechanisms that serve as cost protections for Oregon consumers -- an alternative compliance payment (ACP) mechanism and an overarching “cost cap” on utility RPS expenditures. In lieu of procuring renewable resources, utilities can pay an ACP to be placed in a holding account and may only be expended for eligible resources. The Oregon Public Utilities Commission (PUC) will establish the ACP rate by July 1, 2009 for investor-owned utilities and electricity suppliers. The governing body will establish an ACP rate for consumer-owned utilities. Electric utilities are not required to fully comply with a renewable portfolio standard during a compliance year to the extent that compliance costs exceed 4% of the utility's annual revenue requirement for the compliance year.

Utilities are also exempt from RPS compliance requirements if the purchase of electricity from eligible sources would:

- exceed a utility's projected load requirements;

- would require the utility to substitute eligible renewable electricity for sources other than coal, natural gas or petroleum;
- would require the utility to substitute eligible renewable electricity from existing large hydropower located on the Columbia River; or
- would reduce a consumer-owned utility's purchase of the lowest price electricity from the BPA.

Investor-owned utilities are allowed to recover all of their prudent costs associated with RPS compliance in electricity rates.

Investor-owned utilities and electricity service suppliers must submit a compliance report annually to the PUC. Consumer-owned utilities must submit the report to the members or customers of the utility. The PUC can impose penalties against investor-owned utilities or suppliers that fail to comply with the RPS in an amount the PUC determines -- in addition to any alternative compliance payment. Payments will be transmitted to the Oregon Energy Trust to support renewable energy and energy efficiency programs.

In addition to the RPS, utilities are required to offer a voluntary green power program whose subscriptions cannot be counted towards RPS compliance, as noted above.

Beginning March 1 2002, the 1.2 million electricity customers served by Oregon's investor-owned utilities (IOUs) will gain three new green power options. The state's electricity restructuring law requires the IOUs to offer a portfolio of service options to residential and commercial customers. Customers of Portland General Electric (PGE) and Pacific Power will have access to the following renewable energy options:

- New Wind Energy - Customers can choose to buy fixed blocks of new wind generation each month through PGE's Clean Wind program or Pacific Power's Blue Sky program. Pacific Power customers will pay an additional $2.95 monthly for each 100-kWh block purchased while each 100-kWh block will cost PGE customers $3.50 more per month.
- Renewable Energy Blend - Customers can purchase 100% of their actual electricity usage from wind and geothermal sources supplied by Green Mountain Energy Company. Pacific Power customers will pay 0.78¢/kWh more for this option, while PGE customers will pay 0.80¢/kWh more.

Renewable Energy and Habitat Restoration - Customers can purchase 100% of their electricity from renewable sources and also help restore native fish habitat. The power will come from Green Mountain Energy Company and the habitat restoration funds will be managed by For the Sake of the Salmon, a nonprofit conservation group. For this option, Pacific Power customers will pay the Renewable Energy Blend rate of 0.78¢/kWh plus a fixed $2.50 per month that will be applied to salmon restoration projects, while PGE customers will pay a premium of 0.99¢/kWh.

Utah

Utah enacted *The Energy Resource and Carbon Emission Reduction Initiative* (S.B. 202) in March 2008. While this law contains some provisions similar to those found in renewable portfolio standards (RPSs) adopted by other states, certain other provisions in S.B. 202 indicated that this law is more accurately described as a renewable portfolio *goal* (RPG). Specifically, the law requires that utilities only need to pursue renewable energy to the extent that it is "cost-effective" to do so. The guidelines for determining the cost-effectiveness of acquiring an energy source include an assessment of whether acquisition of the resource will result in the delivery of electricity at the lowest reasonable cost, as well as an assessment of the long-term and sort-term impacts, risks, reliability, financial impacts on the affected utility, and other factors determined by the Utah Public Service Commission (PSC).

While RPSs adopted by most states include interim targets that increase over time, Utah's goal has no interim targets. The first compliance year is 2025. Progress reports must indicate the actual and projected amount of qualifying electricity the utility has acquired, the source of the electricity, an estimate of the cost for the utility to achieve their target, and any recommendations for a legislative or program change.

Utilities may meet their targets by producing electricity with an eligible renewable or by purchasing renewable energy certificates (RECs). For the purposes of the law, eligible renewables include electric generation facilities that become operations after January 1, 1995, and produce electricity form solar; wind; biomass; hydroelectric; wave tidal or ocean –thermal; geothermal; or waste gas and waste heat. Electricity may be produced within the state, or within the geographic boundary of the Western Electricity Coordinating Council.

Washington

With the passage of Initiative 937 in 2006, Washington became the second state after Colorado to pass a renewable energy standard by ballot initiative. Initiative 937 calls for electric utilities that serve more than 25,000 customers in the state of Washington to obtain 15% of their electricity from new renewable resources by 2020 *and* to undertake all cost-effective energy conservation. Of Washington's 62 utilities, 17 are considered qualifying utilities, representing about 84% of Washington's load.

Utilities subject to the standard must use eligible renewable resources or acquire equivalent renewable energy credits, or a combination of both, to meet the following annual targets:

- At least 3% percent of its load by 1/1/2012, and each year thereafter through 12/31/2015;

- At least 9% of its load by 1/1/2016, and each year thereafter through 12/31/2019; and
- At least 15% of its load by 1/1/2020, and each year thereafter.

Investor-owned utilities subject to the standard are entitled to recover all prudently incurred costs associated with compliance.
“Renewable resources" include electricity produced from:

- water;
- wind;
- solar energy;
- geothermal energy;
- landfill gas;
- wave, ocean, or tidal power;
- gas from sewage treatment facilities;
- biodiesel fuel (must meet specified standards); and
- biomass energy based on animal waste or solid organic fuels from wood, forest, or field residues, or dedicated energy crops.

Specifically excluded from the definition are wood pieces that have been treated with chemical preservatives such as creosote, pentachlorophenol, or copper-chrome arsenic; black liquor byproduct from paper production; wood from old growth forests; and municipal solid waste.

Electricity from renewable resources other than fresh water is eligible for compliance if the generation facility begins operation after March 31, 1999. The facility must be located in the Pacific Northwest or the electricity from the facility must be delivered into Washington State on a real-time basis. Hydroelectric generation projects are eligible if incremental electricity produced as a result of efficiency improvements completed after March 31, 1999, are made to:

- hydroelectric projects owned by a utility subject to this standard and located in the Pacific Northwest; or to
- hydroelectric generation in irrigation pipes and canals located in the Pacific Northwest, where the additional generation in either case does not result in new water diversions or impoundments.

Distributed generation may be counted as double the facility's electrical output if the utility owns the facility, has contracted for the distributed generation and the associated RECs, or has contracted to purchase only the associated RECs. Eligible renewables from a facility that began operation after December 31, 2005 where the developer used an approved apprenticeship program during facility construction may count 1.2 times its base value.

Utilities subject to the standard must also pursue all available conservation that is cost-effective, reliable, and feasible. Specifically, by January 1, 2010, utilities must (1) identify achievable cost-effective conservation potential through 2019, with

reviews and updates every two years for the subsequent 10-years; and (2) establish and meet biennial targets for conservation. High-efficiency cogeneration owned and used by a retail electric customer to meet its own needs may be counted toward conservation targets.

On or before June 1, 2012, and annually thereafter, each utility must file a report with the Washington Utilities and Transportation Commission and the Department of Community, Trade, and Economic Development regarding its progress in meeting its conservation and renewable resource targets during the preceding year. Although some exemptions apply, a utility's failure to meet the energy conservation or renewable energy targets will result in an $50/MWh administrative penalty (adjusted annually for inflation) paid to the state of Washington. The funds will be deposited in a special account for the purchase of renewable energy credits or for energy conservation projects at public facilities, local government facilities, community colleges, or state universities.

Engrossed House Bill 2247, enacted in 2001, requires certain electric utilities in Washington State to offer their retail customers an option to purchase qualified alternative energy resources -- often referred to as "green power." The law gives utilities two options to provide qualified alternative energy resources: green power – the actual electricity produced by green power resources – and green tags. Green tags, often called "renewable energy credits," are a type of currency used in the electricity industry to represent the environmental and social benefits of clean electricity production. They are separated from the electricity produced and sold as a distinct product. A green tag represents the environmental attributes equivalent to a specific amount of electricity produced by renewable resources.

With green tags, the purchaser does not need to schedule or transmit the green power to a specific distribution utility or customer. Avista, Clark County PUD, Cowlitz County PUD, PacifiCorp, Puget Sound Energy, Seattle City Light, Snohomish County PUD and Tacoma Power sell green tags for their green power programs.

In 1999, the Bonneville Power Administration (BPA) began to sell a resource-specific electricity product, referred to as Environmental Preferred Power or EPP, to wholesale customers. EPP included a mix of renewable resources, not including large-scale hydropower. A small group of electric utilities in Washington began to purchase EPP prior to the establishment of green power programs and continue to purchase it. This product ensured that BPA's utility customers had ready access to a specific green power product. Clallam County PUD, Orcas Power and Light and Peninsula Light purchased EPP in 2005. Pacific County PUD began purchasing EPP in 2006.