OMINECA Beetle Action Coalition

Alternative Energy Sector Strategy



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Alternative Energy Sector Strategy

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OMINECA Beetle Action Coalition

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Definitions

In the framework of this OBAC Alternative Energy Strategy, the following definitions are used.

Alternative energy	Wind power, small and micro-hydro, biomass-based power, biogas, solar PV, geothermal power, solar thermal, geo-exchange systems, biomass heat, waste-to-energy, and landfill gas.
Biogas	A methane rich gas created from the biological decomposition of non-wood biomass in anaerobic digesters.
Cogeneration	The combined generation of heat and power. Used as equivalent to “combined heat and power” in this document.
Conventional energy	Fossil fuels like coal, petroleum products, and natural gas, as well as large-scale hydropower.
District energy	District energy is the distribution of thermal energy using a pipeline distribution system. The central thermal plants may use various types of fuel including natural gas, oil, or renewable energy. Heat may be generated from either purchased fuel or waste heat. The economic viability of district energy systems relates closely to the energy density of the thermal customers being served. Consequently, district energy systems tend to be located in urban cores serving commercial, institutional, and residential customers.
Distributed energy	Conventional, centralized energy systems produce energy at a central location and at a large scale, such as a hydro dam. Distributed energy sources are smaller and produce energy closer to demand. They can provide energy to a single building or facility, or be connected to a common distribution grid or heating system to serve multiple users.
Forest biomass	Forest biomass resources in the OBAC region are made up of three main sources: a) dead pine and other non-merchantable wood that is of no value to sawmills or pulp mills, but still has some energy value; b) roadside residue that consists of harvested material left behind in piles at the roadside, which are currently burned at the logging deck; and c) mill residues (chips, bark and sawmill dust) that are generated from wood processing and either used for energy purposes or burned in beehive burners.
Geo-exchange	Use of the earth’s natural warmth for heating, generally through the use of heat pumps to raise the temperatures to a useful level. Also known as ground-source heat pumps.
Geothermal power	Use of high temperature underground geothermal hot springs to generate power.
Gasification	Thermal conversion of solids to a gas that can be further refined or combusted.
Micro-hydro	Hydropower units up to a generating capacity of 2 megawatts (MW)
Small hydro	Hydropower units up to a generating capacity of 25 MW. Generally, run-of-river hydro is included in this category even if the project size is larger than 25 MW.
ULHH	Ultra low-head hydro is a sub-category of small hydro. It is generally defined as plants that make use of very low height differences (heads) to generate electricity – generally three metres or less. The technology employs a vertical axis turbine that is best installed in rivers with a strong and consistent flow. ULHH systems harness the energy from moving water without the need for dams, barrages, or penstocks and are characterised by low fish mortality rates due to slow rotational speed and open design.

Foreword

The Omineca Beetle Action Coalition (OBAC) was formed in 2005, with financial support from the provincial government, with the purpose "to work to ensure sustainable development and resiliency for the Omineca Beetle Action Coalition region". OBAC is led by a Board of Directors of the region's Mayors and Regional District Chairs. OBAC is working with its member communities, First Nations, all levels of government, industry and sector representatives, academic institutions, and allied partner organizations to develop regional diversification plans that build resilient communities during and after the pine beetle epidemic. OBAC is putting forward long-term strategies that are designed to mitigate the social and economic impacts of the mountain pine beetle epidemic.

The OBAC region spans more than thirteen million hectares from Smithers to Valemount, and includes two regional districts and their rural constituents, twelve municipalities, and more than twenty First Nations communities. At least fifty percent of our region's forests are pine and thirty-seven percent of the jobs in the region depend directly on forestry. Eighty percent of the mature pine forest is expected to be dead within six years as a result of the mountain pine beetle epidemic currently afflicting the forests of central BC.

The purpose of this strategy is to identify what actions need to be taken by the Provincial and Federal governments in order to support sustainable growth in the region's alternative energy sector. This strategy also identifies what actions local governments, First Nations, and industry leaders can take individually, collectively and in concert with senior governments to achieve this goal.

Alternative energy technologies that can be employed in the region include biomass for heat and power generation, wind power, small and micro-hydropower, geothermal power, geo-exchange systems, solar PV, solar thermal energy and energy from waste . The region is particularly well positioned to produce wood biomass based energy as a result of its very productive forests and its existing forest management and harvesting capabilities.

Currently the alternative energy sector in the region is small, however, there is considerable potential for growth. At present there is a very high demand for energy worldwide and both demand and prices are expected to continue to increase. The Alternative Energy Strategy is one of the first strategies to be developed, in part because the sector can provide substantial economic and environmental benefits to the region.

The communities look forward to working with the alternative energy sector and welcome the growth of this important sector in our region.

Executive Summary

The prosperity of the OBAC region has long been reliant on its timber resources. However, the mountain pine beetle epidemic is expected to diminish opportunities in the traditional forestry sector for several decades. The cost of conventional energy in North America has increased substantially over the last five years and is expected to continue to increase. The region is well positioned to use a portion of its considerable wood and other resources for the production of energy. The increased production and use of alternative energy in the region can provide important economic, social, and environmental benefits to the region. These benefits include the creation of new manufacturing and service businesses and related jobs, the maintenance of existing forest sector employment, reduced energy imports, and reduced emissions from fossil fuels.

The region has a number of existing alternative energy projects and good potential for further growth. The technologies include biomass for heat and power generation, wind power, small and micro-hydropower, geothermal power, geo-exchange systems, solar PV, solar thermal energy, and energy from waste. Their use can be accomplished in a way that maintains or improves the environmental quality in the region.

A total of 150 MW of alternative electrical power generation capacity is in place or is planned for the region. There is sufficient roadside wood residue available for another 200 MW. Therefore, based on the estimated current use of 400 MW, the region could become a net exporter of electricity if other resources, such as wind and hydro, were also developed. Likewise, natural gas and heating oil could be replaced with biomass and solar energy, as well as geo-exchange systems in many cases. It is not unrealistic to believe that net energy exporter status could be achieved within the next ten to twenty years. There are however major challenges which must be addressed if this is to be achieved. These challenges are described in Section 4 and include financing, energy pricing, and the availability of skilled workers. In the case of biomass power and heat production, a major barrier is the cost of collecting and transporting wood fibre from the land base to an energy facility.

At the present time, it is estimated that heating costs are reduced by 30 to 65% if wood is substituted for natural gas. This cost difference provides a strong incentive for industrial and other large consumers of natural gas for heating to utilize wood and alternative energy technologies. Reduced heating costs should make regional industries more competitive and also help to attract new industries to the region.

OBAC, working with various levels of government, education, and the private sector, invited a representative working group to develop a vision of how the region could look in ten years in terms of the use of alternative energy systems. OBAC envisions a future in which energy production from alternative sources is efficient, sustainable, makes effective use of local resources and provides tangible and substantial benefits to the economy and environment of the region. This vision includes a region where an alternative energy industry supports regional economic diversification through an integrated approach that complements its existing industry.

Through the implementation of the recommendations and actions, the objectives presented below can be achieved. This will ensure that the region is a leader in the use of alternative energy where its use provides economic, social and environmental benefits.

Objective 1. Meet a significant proportion of the region's energy needs from alternative energy sources in order to reduce or eliminate dependence on imported fossil fuels for heating and power generation, and to retain wealth generated from energy related products and services in the region.

Objective 2. Develop regional expertise in research, development, manufacturing and installation of alternative energy technologies that can be used regionally and exported elsewhere in Canada and to the world.

Objective 3. Make use of available fibre, including the fibre resulting from the mountain pine beetle epidemic, to produce bioenergy.

Objective 4. Retain regional expertise in the forest sector by creating new forest product opportunities in the alternative energy sector.

Objective 5. Grow regional capacities to train and retain the required workforce.

Objective 6. Contribute to the global effort to reduce greenhouse gas emissions from fossil fuels.

Recommendations and actions have been developed based on these objectives. There are five specific recommendations that OBAC believes will result in sustainable growth in the production and use of alternative energy in the OBAC region. Under each of these recommendations, specific actions are presented to serve as guideposts for future planning and implementation of the strategy. OBAC is confident that if these recommendations and the associated actions are implemented, the objectives listed above and the vision presented in Section 1 will be achieved.

The five recommendations are:

Recommendation 1. Remove impediments to the flow of wood fibre and other fibrous fuels to biomass energy projects.

Recommendation 2. Conduct research on alternative energy opportunities and make relevant information readily available to industry and government decision makers.

Recommendation 3. Provide 'Leadership by Example' alternative energy programs and initiatives at federal, provincial, and local government levels.

Recommendation 4. Increase the regional use of alternative energy systems in order to provide overall economic, social, and environmental benefits.

Recommendation 5. Provide training and certification for installation and systems operation to help build regional expertise in alternative energy.

Further engagement with and between leaders of OBAC communities and First Nations in order to identify regional and local interests and opportunities and make new relationships a reality is a very high priority for the initial implementation phase of all of the strategies. Alternative energy projects provide excellent opportunities for positive and mutually beneficial engagement at the community level.

Some of the recommended key actions include:

- When pine stands are no longer viable for the production of conventional forest products, provide financial incentives that encourage their harvest for the production of energy. These incentives should be in place where overall economic, social, and environmental benefits warrant this use;
- Consider direct public investment in large scale alternative energy projects where they can provide a significant portion of the region and province's future electrical needs;
- Conduct research into the feasibility of planting fast-growing tree species such as poplar on some parcels affected by pine beetle in order to generate a long-term biomass energy crop for electricity generation;
- Locate the new chair for Advanced Bioenergy Technologies at UNBC and survey the biomass energy industry to identify current key applied research needs and priorities;
- Review all local government planning documents and remove any unnecessary barriers to the use of alternative energy;
- Conduct energy audits and alternative energy assessments for local government, provincial, and federal buildings and determine the feasibility of retrofitting these buildings; and
- Provide training and certification in alternative energy technologies using partnerships and existing programs where possible.

These actions and overall implementation of this strategy will require key and timely decisions by the provincial and federal governments. Detailed actions, rationales, and timelines are presented in Section 6 under the five recommendations. There are 38 actions identified that can be taken by senior governments, local governments, and individual organizations, or groups of organizations, to enhance and build the alternative energy sector which will result in a stronger and more resilient region.

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1.0 Community and Regional Aspirations for Development

1.1 Regional Alternative Energy Vision

OBAC communities envision a future in which energy production from alternative sources is efficient, sustainable, makes effective use of local resources, and provides tangible and substantial benefits to the economy and environment of the region. OBAC sees a region in which the alternative energy industry supports regional economic diversification through an integrated approach that complements its existing industry.

Alternative energy can offer OBAC residents opportunities for the maintenance of existing employment, the creation of new business and jobs, reduced energy imports, and a better quality of life. Responsible and sustainable development of alternative energy resources adheres to the highest system standards and adopt a balanced use of resources.

A successful alternative energy industry supports balanced integration of cultural, social, environmental, economic, and political value streams and promotes sustainable footprint solutions.

Workshop Participant

Through the production and uptake of alternative energy, the OBAC region can become a provider of clean energy products and can continue to enjoy a healthy living environment for both residents and visitors. As well, both regional employment and wealth can be increased. Additionally, the diversion of wood biomass away from open-burning in the field to conversion to an energy product has the potential to significantly improve air quality in many parts of the OBAC region.

Our hope is that this Alternative Energy Strategy inspires the private and public sectors to drive toward enhanced use of alternative energy for industrial, commercial, institutional, and residential applications.

One of the main alternative energy opportunities in the OBAC region is the enhanced use of local biomass resources, leading to maintaining or perhaps increasing job creation in the collection, transport, and use of biomass. OBAC communities also aspire to create research and development capacities in the region, with a view to create local manufacturing businesses in biomass energy.

1.2 Strategy Objectives

The following objectives of this strategy guide the recommendations and actions explored in Section 6.

Objective 1. Meet a significant proportion of the region's energy needs from alternative energy sources in order to reduce or eliminate dependence on imported fossil fuels for heating and power generation, and to retain wealth generated from energy related products and services in the region.

Objective 2. Develop regional expertise in research, development, manufacturing and installation of alternative energy technologies that can be used regionally and exported elsewhere in Canada and to the world.

Objective 3. Make use of available fibre, including the fibre resulting from the mountain pine beetle epidemic, to produce bioenergy.

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1.3 Relationship with Other OBAC Strategies

This Alternative Energy Strategy covers areas that are coincidental with several of the other OBAC strategies. Since this is one of the first strategies to be developed, the points of intersection and integration are still emerging. The following list identifies some of the obvious places where OBAC strategies will complement each other.

Conventional Energy Strategy Conventional energy production can be expected to play an important role in the OBAC region for some time. The Alternative Energy Strategy excludes all fossil fuel-related activities addressed in the Conventional Energy Strategy. This strategy includes cogeneration with fossil fuels, as well as replacing one fossil fuel for another. Rural electrification and large hydropower would likewise fall into the area of conventional energy.

Agriculture Strategy Agriculture can contribute to alternative energy through biomass residues produced in the fields and from livestock. These residues can be used to produce energy in anaerobic digesters, although this is currently not economical in BC. Likewise, energy crops can be cultivated in order to produce biofuels, such as canola for biodiesel. The biofuel aspects of agriculture, and the extent to which they should be pursued in the region, will be considered in the Agriculture Strategy.

Integrated Regional Infrastructure Strategy This strategy will focus mainly on regional transit and transportation between OBAC member communities. Fuels for transportation are, however, an energy topic, and biofuels are discussed here. The decision to move towards hydrogen as a motor fuel, as is envisaged with the Hydrogen Highway in BC, is a decision that should be considered within a transportation strategy and is not discussed in the Alternative Energy Strategy.

Future Forest Products and Fibre Use Strategy Many uses for forest fibre can be grouped around energy. The Alternative Energy Strategy defines the general approach towards using fibre for energy usage, whereas the Forest Products Strategy will examine these aspects in more detail, as well as non-energy related uses.

Regional Cohesion, Branding, and Profile Strategy There is a potential overlap with this strategy if “green” energy becomes a main feature of the OBAC region. The Alternative Energy Strategy can be used to bring new industries to the region, increase the attractiveness and livability of the region, and help develop an “eco-tourism” market that looks for low-impact resorts and green communities that maximize alternative energy options.

Minerals and Mining Strategy There may be opportunities to use wood for cogeneration as an alternative heat source in mineral processing. Most mining operations in the OBAC region are currently related to mineral extraction, but some mineral processing uses natural gas as a heat source, such as the Endako Molybdenum processing plant near Fraser Lake. Gold mining may also require heat inputs that could be provided by biomass fuels. Another smelter may come to the region and could use wood or wood-charcoal for heat. Also, new remote mining projects may be able to provide power to existing off-grid communities in their vicinity.

2.0 Sector Profile

2.1 Alternative Energy Opportunities in the OBAC Region

The OBAC region offers resources covering all technologies targeted by this strategy. The assessments made below are based on BC Hydro's renewable energy maps (geothermal, solar, hydro, and wind), as well as on the authors' expertise and stakeholder input received. Forest biomass clearly is the most significant resource in the region. Beetle-killed pine represents a very large, albeit temporary resource, but there is also a very large amount of roadside residue that is currently unused and burned in the forest. However, other alternative energy types can also make a significant contribution to the region's economy.

Forest biomass The biomass that is available most easily and at lowest prices is hog fuel and other mill residues, where these are not yet spoken for. For example, hog fuel burners exist in Houston (Canfor), Valemount (Carrier), Smithers and Burns Lake (Hampton), Fort St. James (Apollo), Vanderhoof (BC Custom Forest Products, Canfor), McBride (McBride Forest Industries), and Mackenzie (Canfor). As well, on average, more than 20 percent of wood harvested is left behind at logging sites (roadside residue), which can be recovered and used for energy purposes. The Ministry of Forests and Range estimates that in the OBAC region (Lakes, Mackenzie, Morice, and Prince George Timber Supply Areas), 1.6 million tonnes of roadside residue are available per year—enough to power three power plants the size of the planned Mackenzie Green Energy Centre and equivalent to some five million barrels of oil in terms of energy. Other sources of residue are forest thinning and power line maintenance. Standing beetle-killed pine represents a large resource within a 10 to 15 year timeframe and presents a large challenge at the same time, since it is the most costly to recover. Likewise, stands of non-merchantable wood may also be a source of fibre for alternative energy. All in all, the forest biomass resource can be considered very substantial in the OBAC region. It can be used for individual space heating, district heating systems, and small- to large-scale cogeneration or power generation units. Many of the remaining cheaper residues are increasingly used to fabricate pellets for export to Europe. More advanced, emerging uses of wood are the conversion to ethanol, charcoal or bio-oil.

Agricultural biomass Straw and hay can be used for energy purposes. For example, power stations in Denmark use straw as a feedstock. Liquid manure and other livestock waste can be used in digesters to produce biogas. Agricultural lands can be used to grow bioenergy crops, such as canola or corn. As well, some alternative energy sources could support the agricultural industry in the production of food for local and export markets. Since the provincial government intends to mandate lower carbon contents in transportation fuels in order to reduce greenhouse gas (GHG) emissions, bioenergy crops may present a special opportunity for the OBAC region.

Wind Generally, wind potential is low in the OBAC region. Some small pockets of medium to good wind potential exist. This includes the area midway between Prince George and Fraser Lake. Very good sites exist near Mackenzie and Smithers. Some sites with high potential lie outside the "grid zone" defined by BC Hydro. This indicates that, at present, they are too far removed from existing power lines to be connected cost-effectively. Other high potential sites may be close to the BC Hydro grid, but are in terrain that is difficult to access.

Geo-exchange There are few limitations to the use of ground source heat pumps in the area, although different soil conditions may impact the size and cost of ground field installations. Geo-exchange systems have been used extensively in the Okanagan and the Prairies, with similar climates. They are growing rapidly in popularity in BC, including in the OBAC region.

Municipal Waste Landfill gas is a potent greenhouse gas, and reducing landfill gas emissions is a significant part of the BC government's GHG strategy. Landfill gas can be captured and used to produce heat and/or power. While this method has traditionally been used in larger landfills, smaller communities are now initiating these types of projects. A feasibility study is underway for the use of landfill gas in the Prince George area, and the option is also being considered for Bulkley-Nechako.

Biomass and plastics in municipal waste represent an energy resource that can be harnessed through waste-to-energy conversion. Conventional waste incineration systems require very large scales to be cost-effective and justify the extensive flue gas cleaning equipment necessary to deal with the problematic emissions from waste combustion. Second-generation systems are smaller and may

be suitable for the region if their emissions performance is adequate. Modern waste-to-energy plants burn cleanly and have very low emissions, but the technology may still be expensive or not completely commercial. Their usefulness also depends on costs and emissions saved from avoided transportation to remote landfills.

It is also possible to collect municipal biowaste separately from residences, supermarkets or food processing factories and use it in anaerobic digesters to produce power and heat, possibly in conjunction with agricultural residues or in existing sewage treatment facilities, such as in Prince George. Alternatively, biogas can be refined to methane and used as a transportation fuel, or fed into the local gas grid.

Small and micro-hydro The bulk of alternative energy projects developed in BC have been small and micro-hydro projects. The central part of the OBAC region generally has low potential for hydropower development. Medium potential exists around Smithers and Houston, as well as the Cariboo Mountains. There is high potential in the areas surrounding McBride and Valemount, with four major sites (> 5 MW) in this area, as well as several smaller ones. The only other major site in the OBAC region is situated north of Burns Lake. A small hydro market study completed by CETAC-West in 2006 found that the OBAC region has strong prospects for Ultra Low Head Hydro (ULHH) on local rivers (i.e., Fraser, Bulkley, Morice).

Solar While BC may not always be thought of as "sunny" in comparison to other jurisdictions further south, there is still enormous potential. The solar resource is rated as medium through most of the OBAC region. This is considered adequate for both solar thermal and photovoltaic applications. Localized conditions, such as shading from nearby mountains, may reduce the potential in some locations.

Geothermal power While geothermal power is used extensively in some parts of the world, there is currently no geothermal power production in BC. Several sites have been investigated, with most activity in the South Meager Creek area near Pemberton. The OBAC region has low to moderate potential for geothermal power production. The exception is around Valemount, which has high potential.

2.2 Current Use of Alternative Energy

Currently, electricity in the OBAC region is largely generated through BC Hydro's facilities. One wood-fired power generation unit, some smaller hydropower installations, and a small microturbine exist in the region, as well as several remote grid diesel generators. Heat is provided through grid electricity, natural gas, and some residential wood fireplaces. The forest products industry is increasingly using wood instead of natural gas as a heat source. Geo-exchange systems are being used for residences and at local government facilities. A growing export market is developing in terms of wood pellets that are mainly sold to overseas customers.

The following table was compiled from an Independent Power Producers of BC (IPPBC) map showing existing projects by IPPBC members in the OBAC region, and additional information on pellet producers. Power projects by non-IPPBC members are not listed.

Table 1 Examples of Existing Uses of Alternative Energy in the OBAC Region

Technology	Current Use in OBAC Region
Biogas	Prince George sewage treatment plant running a microturbine on digester gas.
Biomass heat	Used for residential heating and in 6-7 mills in the OBAC area.
Biomass power	Canfor Prince George has a 48 MW cogeneration plant.
Geo-exchange systems	Small-scale installations throughout BC, including the McLeod Lake Indian Band office. Large-scale installations becoming more common, including Houston community centre and proposed district heating expansion.
Geothermal power	No project developed to date in BC.[a]
Landfill gas	Currently not used in the OBAC region.
Pellet plants	Premium Pellet (Vanderhoof) Houston Pellet Ltd. Partnership (Houston) Pacific BioEnergy (Prince George)
Small hydropower	There are three small hydro IPPs with BC Hydro (East Twin Hydro, Robson Valley in McBride, and the 8 MW system at Hystad and Hauer Creek in Valemount.
Solar hot water	Small-scale installations.
Solar Photovoltaic	Small-scale installations.
Waste-to-energy	No municipal waste projects developed in OBAC region.
Wind power	No project developed to date in OBAC region.

a Assuming all licensing and permitting approvals are secured, the proposed 100 MW South Meager geothermal power project located 55 km northwest of the Village of Pemberton plans to be operational by 2012. It would be the first geothermal power project in Canada: www.geopower.ca

Two projects have signed power purchasing agreements with BC Hydro, but were not yet developed when this strategy was completed. These include the Mackenzie Green Energy Centre (72 MW forest biomass cogeneration plant) and the Tête (Hauer) Creek (2.4 MW small hydro plant) in Valemount.

So far, only a small fraction of local energy use comes from alternative energy sources. BC Hydro currently has more than 11,000 MW of on-grid power generation. Based on population, the OBAC region uses about 3.5% of this share, or close to 400 MW. In comparison, the proposed Site C hydro dam development would have a generation capacity of 900 MW. A total of 150 MW of alternative power generation capacity is currently existing or planned in the region (Table 1). Given that there is sufficient roadside residue available for another 200 MW[1], the region could become a net exporter of electricity if other resources, such as wind and hydro, were also developed. Likewise, natural gas and heating oil could be replaced with biomass and solar energy, as well as geo-exchange systems in many cases. It is not unrealistic to assume that net energy exporter status could be achieved within the next ten to twenty years.

The OBAC region could become a net energy exporter within the next ten to twenty years if all alternative energy resources were fully developed.

OBAC communities are beginning to seize alternative energy opportunities and Tables 1 and 2 provide an overview of current renewable and alternative energy initiatives within the OBAC region. Several wind monitoring assessments are underway in the region, but no detailed information is available at this time. Table 2 includes eight proposed projects that were put forward under BC Hydro's 2008 first biomass energy call. No project details were known at the time this strategy was completed but it is likely that these proposed projects may have a combined capacity of 100 MW or more. Another very large project is the planned 250 MW wind farm in the Prince George area.

1 Almost 3.5 million dry tonnes are estimated to be available in the Prince George Forest Region, and another 1.8 million tonnes in the Prince Rupert Forest Region. The power production estimate assumes two million tonnes of residues in the OBAC region. The estimate takes into account reduced harvesting rates in 2020, and conservatively assumes that roadside residue is 10% of total harvest.

Table 2 New Alternative Energy Plans and Proposals in the OBAC Region

Community	Technology	Description
Smithers	Wind	Chinook Power Corp set up wind monitoring stations in the Telkwa Microwave and Dome Mountains.
	Hydro	Norwest Green Power Corp plans potential micro-hydro development in East Boulder Creek.
	Renewables	The Renewable Energy Corporation is a current proposal looking at developing locally owned renewable energy within the region. Town of Smithers has supported the concept of the Smithers Renewable Energy Corp. with a letter of support.
Houston	Geo-exchange	Geo-exchange system installed in Houston for new community swimming pool and expansion into arena. System is to be expanded into a district heating system to serve nearby buildings.
Burns Lake	Alt. energy	Exploring waste-to-energy system for municipal waste, as well as forest residue use for energy purposes.
	Alt. energy	Burns Lake Alternative Energy Task Force established.
	Biomass	Pristine Power/Nexterra project (10 MW) with Cheslatta Forest Products near Burns Lake.
	Biomass	Babine Forest Products Ltd. power project.
	Biomass	Pinnacle Pellet Inc. power project.
Fort St. James	Geo-exchange	Several city buildings in Fort St. James heated with geo-exchange system; considering retrofit arena and curling rink.
Vanderhoof	Biomass	District of Vanderhoof is planning to undertake a feasibility study related to biomass commercialization, including a biomass inventory and Municipal Solid Waste and Wood Residue utilization.
	Biomass	Sunrise Energy application for funding from the Mountain Pine Beetle Community Economic Diversification Initiative for community energy system.
	Biomass	Pinnacle Pellet Inc. power project.
Prince George	Biomass	District heating system planned for downtown area.
	Wind	An environmental review is being completed for a 250 MW wind farm on George Mountain, 38 km south-east of PG.
	Landfill gas	Use envisaged together with Regional District Fraser-Fort George.
	Biomass	Canfor Pulp Ltd. power project.
	Biomass	LTN Contracting Ltd. power project.
	Biomass	PG Interior Waste to Energy Ltd. power project.
Mackenzie	Biomass	Renegy Holdings, Inc. power project.
McBride	Hydro	A local company has filed an interest in building a run of the river hydro plant in a tributary of Castle Creek, in the Cottonwood Valley near McBride.
	Alt. energy	Municipality looking for funding to complete community energy plan.
	Biomass	ecoPHASER Energy Corp. power project (likely McBride).
Valemount	Geo-exchange	Geo-exchange is envisaged for new hospital, school, senior housing, fitness centre.
	Alt. energy	Study on alternative energy opportunities planned.
University of Northern BC	Biomass	UNBC and the Wood Pellet Association of Canada have submitted a funding proposal to WED to conduct a feasibility study on the bioenergy potential of the University. This will involve a pilot project for pellets at the University's Enhanced Forestry Lab. UNBC also intends to create a Centre for Innovation on advanced biomass processing.
	Alt. energy	UNBC profiles itself as Canada's Green University and is exploring options for strengthening UNBC's environmental activities. The University has also sought expressions of interest from companies interested in providing the campus with alternative energy.
First Nations	Alt. energy	Mountain Pine Beetle Initiative (FNMPBI) looks at energy uses.

2.3 Supportive Federal, Provincial and Local Initiatives

National initiatives Programs and funds such as Green Municipal Funds, Sustainable Development Technology Canada, or the Community Energy Systems program at the CANMET Energy Technology Centre etc., could be leveraged in order to realize projects and programs in the OBAC region. The federal government also supports renewable energy systems and energy efficiency through the ecoENERGY Program: the Renewable Power initiative pays 1 cent per kilowatt hour for renewable power production from wind, hydro, solar, geothermal, and biomass; grants are available for private home renovations; and the Renewable Heat initiative assists with 25% of installation costs for solar water heating systems in the industrial/commercial/institutional sectors. There are also accelerated write-off provisions available for renewable energy equipment.

Provincial initiatives Provincial government initiatives include the $25M Bioenergy Network, $10M biodiesel production incentive, and $25M Innovative Clean Energy fund. The BC government also grants PST exemptions on all renewable energy equipment, such as solar thermal, geothermal, etc. The new carbon tax increases the cost of natural gas and diesel/gasoline over time, making the use of biomass energy resources a more attractive alternative. BC Hydro provides small incentives for energy efficiency measures in buildings through its PowerSmart program. BC Hydro offers net metering for home-based renewable energy systems. The BC Sustainable Energy Association (BCSEA) is running the SolarBC Project, which assists communities and households with the selection and installation of solar thermal systems. Provincial government strategies are discussed in Section 3.

Regional initiatives within the OBAC area The University of Northern BC (UNBC) has articulated plans to be Canada's Green University that would be connected to regional efforts for environmental and community sustainability. In this context, efforts are underway to install a biomass gasifier for campus energy needs. A Bioenergy Innovation Centre is also planned, which would support teaching and research on wood and resource management issues. UNBC has already built relationships with a number of research entities and research funders including FP Innovations, the Council of Forest Industries, Natural Resources Canada, individual forest companies, and communities. This research and teaching expansion would be expected to build on these partnerships and involve the private sector, communities, local organizations, First Nations, and others. It would offer an incubator for doctorate students and companies to develop technology ideas to a proof of concept stage over a six-month period.

The architecture of the University's Prince George campus and its location outside of the Prince George "Bowl" makes it particularly well-suited to implementing alternative energy. As a result, UNBC is interested in being a green energy showpiece and has submitted funding applications to the federal and provincial governments.

2.4 Key Institutions and Capacities in the Region

The OBAC region has great unexplored alternative resources and a highly-skilled workforce that can be used to develop the biomass energy sector. There are also several institutions and initiatives where expertise can be harnessed to develop the entire value chain from research over production to application and export of alternative energy products. Specifically, UNBC could become a biomass research centre, whereas other institutions could contribute to training, testing, and the sustainable development of alternative energy resources. Some key institutions are listed here by area of activity.

2.4.1 Wood Energy Resource and Technology Development

FP Innovations With a regional office in Prince George, FP Innovations is a wood products research institute active in the areas of pine beetle wood and wood for energy uses.
Web site: www.forintek.ca

Innovation Resource Centre This centre in Prince George was created to assist start-up companies in the region and to enable economic growth and diversification based on the commercialization of innovative technology in the central interior. It provides support to new and established entrepreneurs through both one-on-one advice as well as workshops and seminars, networking, and idea exchange opportunities. They pursue an active communications and research programme that creates a broader, better understanding of the role of technology in our economy.
Web site: www.innovate.bc.ca/irc

Progress House Based in Vanderhoof, Progress House is a federally-funded development corporation that concentrates on biomass technologies such as pellet water heaters and steam engines. Progress House has the task to develop a business plan for the development of a diverse sustainable biomass economy in Central BC. They also: provide technical, business, and financial support to commercial ventures; equip and train residents in CAD/CAM machine operation and machine component design; and deliver entry-level training to industrial engineering disciplines. The House will assist start-up companies with prototype development and certification. Services are provided on a fee-for-service base. Progress House has three full-time employees.

2.4.2 Training, Education, and Research

College of New Caledonia With campuses throughout the OBAC region, the college offers courses in power engineering, forestry, applied science (engineering), power engineering, and other technical courses. Web site: www.cnc.bc.ca

Energy Centre of the North (ECN) The ECN is under development and will offer training in energy efficiency, green buildings, and energy systems out of Houston. It envisages providing services to central BC, including energy audits, community energy planning, information on grants, and related issues. Currently only energy audits are offered as federal funding for other activities was discontinued. The centre is currently run by volunteer staff.
Web site: www.cfdcnadina.ca/html/environment/energycentre/

Northwest Community College Serving the OBAC communities of Houston and Smithers, the college offers several training courses for trades, such as electrician, millwright, and power equipment technician. Web site: www.nwcc.bc.ca

University of Northern BC (UNBC) UNBC has degree programs in Environmental Engineering, Environmental Planning, Environmental Studies/Science, and Forest Ecology and Management, which are all relevant to developing the Omineca region's energy resources. UNBC collaborates with three other BC universities on the new Pacific Institute for Climate Solutions in Victoria, which has the development of green technologies, including energy systems, into products as one of its mandates. Web site: www.unbc.ca

2.4.3 Strategic and Policy Advice

BC Sustainable Energy Association (BCSEA) The BCSEA has a chapter in Prince George and is a non-profit association of citizens, professionals, and practitioners that facilitates the transition to a sustainable energy future through education, advocacy, and tangible community projects.
Web site: www.bcsea.org

First Nations Mountain Pine Beetle Initiative The First Nations Mountain Pine Beetle Initiative deals with the pine beetle crisis from a First Nations perspective. Its office is in Prince George and its activities include community protection, ecosystem stewardship, and the creation of a sustainable economy. Web site: www.fnmpbi.com

Fraser Basin Council The Council's "Upper Fraser Region" includes much of the OBAC region. Working out of their regional Prince George office, the Council's activities include First Nations involvement, energy efficiency, economic diversification, and pine beetle issues.
Web site: www.fraserbasin.bc.ca/regions/ufr.html

One Sky From an office in Smithers, One Sky helps communities in Canada and elsewhere to implement "on the ground" practical solutions to sustainable living such as organic agriculture, renewable energy, and community-based natural resource management. One Sky works on energy-related issues at all levels and is promoting a global transition to energy conservation, efficiency, and low-impact renewable energy. Web site: www.onesky.ca

Resources North Association Combining the Integrated Resource Management Partnership of Northern British Columbia and the McGregor Model Forest Association, this association addresses forest management and sustainability for communities in the McGregor Model Forest area (Prince George, Fort St. James, Vanderhoof, Mackenzie, Fraser-Fort George, Fraser Lake), including First Nations in this area. Web site: www.resourcesnorth.org

3.0 Summary of Historical Sector Development Initiatives

3.1 Sector Strategies

3.1.1 Provincial and First Nations Policies and Strategies

Alternative Energy Task Force

In its Alternative Energy and Power Technology: a Strategy for BC, the Task Force builds on the Premier's Technology Council's report, *A Vision for Growing a World-Class Power Technology Cluster in a Smart Sustainable British Columbia* (2006), which explores economic opportunities to be found across the power supply, delivery, and end-use value chain.

The Council report claims that BC can be a world leader in alternative energy and power technology. It states that government and industry can together create high-value jobs in profitable businesses that supply sustainable power solutions to BC, Canada, and the world. Industries and companies that adopt sustainable power solutions will become leaders in sustainable business practices, and become both more efficient and more competitive.

We must apply our integrated and innovative solutions in BC first, and then showcase them to eager customers abroad.

BC Alternative Energy Task Force

Accordingly, the BC government said it will encourage the use and development of integrated solutions for the following five market opportunities:

1. Remote power solutions for rural communities, including off-grid distributed generation from a variety of established and emerging alternative sources.
2. Sustainable urban practices, including building designs and urban planning to reduce energy consumption and grid-tied sustainable distributed power to help offset peak power needs.
3. Sustainable urban transport, including application of natural gas and electric hybrid engines, fuel cells and hydrogen—areas in which BC is already recognized as a global leader.
4. Sustainable grid solutions, including the use of software, hardware, and electronics to increase the efficiency of power grids.
5. Large-scale clean power production to generate and deliver electricity to the western North American power market.

Points 1, 2 and 5 are especially relevant to the OBAC Alternative Energy Strategy. Distributed power generation can be used to strengthen urban distribution grids, and in turn, urban planning and design can be used to favour distributed and district energy systems. Large-scale power production may be possible in several locations. The provincial strategy does not focus on medium-sized power and cogeneration technologies, which may be more appropriate for the OBAC region than very small- or large-scale facilities. The Technology Council vision also states that BC should concentrate on technologies that the market demands, as opposed to those that are pushed for other reasons. Its goal is to create jobs in BC by deploying power technology solutions here first, then selling them abroad, while at the same time secure BC's reputation as a clean, sustainable place to live and work. This means the OBAC region may become an area where BC alternative energy technologies are applied, and possibly even developed, tested, and manufactured.

The Vision for Growing a World Class Power Technology Cluster also advertises the creation of Centres of Innovation in BC. These centres are to focus on the market-oriented development of new technologies in the alternative energy sector while cooperating closely with industry. They should be based on a collaborative research and development effort by universities, companies, labs, and other institutions and receive co-funding from federal sources. Some of the recommendations made by the Task Force appear in the 2007 BC Energy Plan.

2007 BC Energy Plan (BC Ministry of Energy, Mines, and Petroleum Resources)

The BC Energy plan sets the stage for the province's investment and policies in terms of energy, including power generation, heat, and transportation. One of the main conditions set out in the BC Energy Plan is the requirement that all new electricity generating facilities constructed in BC must achieve zero net greenhouse gas emissions. This is likely to create a strong preference for the alternative energy resources that are the object of this strategy. British Columbia has an electricity deficit, but intends to become self-sufficient in electricity by 2016. Other relevant elements of the Energy plan include:

- The creation of the Innovative Clean Energy Fund of $25 million to support the development of clean energy and energy efficient technologies in electricity, alternative energy, transportation, and oil and gas sectors.
- Develop a leading hydrogen economy by continuing to support the Hydrogen and Fuel Cell Strategy for British Columbia.
- The Ministry will actively seek leveraged funding opportunities for three new university chairs in Power Engineering, Ocean Renewable Energy Research and Development, and Advanced Bio-energy Technologies. UNBC could be supported by the region in obtaining one of these research chairs.

Furthermore, the Energy Plan obliged BC Hydro to create a Standing Offer Contract for power projects with an electrical generating capacity of up to 10 MW. The (draft) contract specifies a base power price of 7.2¢ per kilowatt hour for central BC. Including emission reduction benefits and increased revenues from power deliveries during peak consumption, a project may generate an annual average income of up to 7.8¢ per kilowatt hour. This price seems geared towards small hydro technology. Wind and biomass projects may not be competitive at this price level, and biomass may be restricted to cogeneration applications. Alternatively, project developers can apply under BC Hydro's regular requests for power project proposals, where they compete with other proponents in BC, but without a predefined price limit. The size of projects for these power calls will be defined in the terms of each individual call.

The BC Bioenergy Strategy (BC Ministry of Energy, Mines, and Petroleum Resources, 2008)

The Bioenergy Strategy covers all types of bioenergy, including forest residues and beetle-killed pine wood, agricultural residues, and municipal waste. Some planned actions relevant to this strategy include:

- Create a provincial biomass resource inventory;
- Phase in requirements to capture landfill gas at larger landfills;
- Eliminate beehive burners;
- Promote wood pellet production;
- Improve access to wood fibre feedstocks;
- Review the Safety Standards Act (which requires certified power engineers for both small and larger steam systems) to enable adoption of biomass energy technologies;
- Develop new particulate emission standards for industrial boilers; and
- Create bioenergy opportunities for First Nations.

A Bioenergy Network will be funded with $25 million and will pursue, among others, gasification research, development, and commercialization at UNBC and other universities, as well as pilot and demonstration projects in key biomass resource areas. The strategy also mentions agricultural residues, such as straw and corn stalks, but locates the main potential for producing biodiesel from canola in the Peace region.

BC Greenhouse Gas Reduction Targets Act

Passed on November 26, 2007, this Act specifies that British Columbia's greenhouse gas emissions must be reduced by at least 33 per cent below 2007 levels by 2020. Initial requirements included in the Act are aimed at provincial operations only. Additional regulations to be added later will target transportation fuels, large emitters, vehicle efficiencies, and landfill emissions. It is likely that local governments will be called upon by the Province to actively assist in reaching the provincial targets.

BC First Nations Energy Action Plan

Completed in June 2007, this Action Plan calls for the establishment of a First Nations Energy Council in order to implement the recommendations of the Action Plan in conjunction with a provincial body with technical expertise. The Plan calls for a process to incorporate consultation on energy projects affecting First Nations, for collaboration with industry to establish a common vision and strategy on energy development in the Province of BC, for education, training, and skills development within First Nation communities, for the development of energy efficiency in buildings and of community energy action plans, for the implementation of sustainable energy technologies, and for joint ventures and revenue sharing on power projects.

BC Pine Beetle Action Plan

This BC Ministry of Forests and Range document (2006) refers to economic diversification, increased harvest, and new tenure arrangements to tackle the pine beetle crisis. The Northern Development Initiative Trust is one of the vehicles designated to assist new efforts to create solutions for beetle-killed pine and local economic development in general. The Plan states that stumpage fees will be adjusted to reflect the value of the beetle-killed pine.

3.1.2 Community Energy Plans

Community Energy Plans have been developed by Vanderhoof, Smithers, and Prince George. Burns Lake is in the process of developing a plan. The Kwadacha and Tsay Keh First Nations, which are within the OBAC region, also have developed their own community energy plans.

District of Vanderhoof Vanderhoof's energy plan was completed in 2007. It included buildings, transportation, solid waste, water, and wastewater. Renewable energy supply was not specifically addressed. Energy consumption targets for buildings were identified and adopting a community-wide target was one of the recommended objectives. Other recommendations included reducing energy use in municipal operations and incorporating energy policies into District bylaws and the Official Community Plan.

Town of Smithers The town's March 2007 energy plan includes setting targets for greenhouse gas emission reductions, and a commitment to energy efficiency in new and existing buildings. For community operations, it states that energy efficiency standards should be set. For the Smithers community at large, it foresees both energy efficiency for residential construction (new houses to achieve EnerGuide rating of 80, plus energy use reduction targets for existing homes) as well as the development of renewable power generation. The plan also addresses transportation, green purchasing, waste reduction, and land use planning.

Specifically, alternative energy recommendations to the Town of Smithers include:

- Consider a district heating system for Willowvale subdivision and other new development areas;
- Explore use of geo-exchange technology for heating and cooling buildings;
- Develop pilot or demonstration renewable energy projects;
- Explore the use of local improvement charges to finance building renewable energy upgrades;
- Review the option of using revolving low-interest loan funds to support the development of local low-impact renewable energy;
- Develop local expertise, business incentives, and education on energy diversification; and
- Support low-impact renewable energy community power projects or invest in local corporations that are planning green power projects.

City of Prince George The City's March 2007 Energy and GHG Management Plan addresses action to be taken at the municipal operations as well as the community level. It identifies eight initiatives at the operations level, including energy efficiency in buildings, the implementation of a community energy system, fleet management and the use of biofuels, energy efficient practices and purchasing preferences, and improved utility operations.

Twelve more initiatives are envisaged to tackle community energy issues in Prince George. These include energy efficiency in residential buildings, energy conservation in the commercial, institutional and industrial sectors, transportation and transit, land-use planning, alternative energy supply, and Phase 2 of the community energy system, as well as stakeholder outreach.

At its first stage, the Prince George Community Energy System would provide over 5,000 MWh per year of heat to buildings in the downtown area. It would use biomass fibre or an industrial waste heat source to generate hot water and distribute it to municipal buildings, displacing natural gas currently used to heat these buildings. In a second phase, the district energy system is to be expanded to deliver 29,000 MWh of heat to both municipal and other buildings. In cooperation with the Regional District Fraser-Fort George, the City also wants to encourage the use of landfill gas to generate power.

First Nations The Tsay Keh First Nation and Kwadacha First Nation energy studies were compiled by the Pembina Institute and include pre-feasibility studies to explore the use of renewable energy to offset diesel generation in these off-grid communities. There may be potential around wind, biomass, and especially micro-hydro in these communities. In addition, discussions have been held with BC Hydro to see if the communities could be connected to the power grid.

3.2 Local Case Studies

The following are case studies reflecting experiences in the field of alternative energy development made in the OBAC region. They illustrate the difficulties, but also some of the ways to overcome them, when attempting to maximize the use of alternative energy at the local level.

Houston The District of Houston is in the process of developing a geo-exchange-based district heating project. Geo-exchange systems have already been installed for the community recreation complex. However, feasibility studies underestimated actual project costs, which has proven to be a problem for the District. In some cases, the estimates obtained from the first request for proposals exceeded projected costs by 100%. When funding or a grant is based upon the initial estimate, the project is in jeopardy until additional funding can be found. In the worst case, its profitability is so much reduced that the project cannot go ahead.

Prince George The City of Prince George has been working on a community energy system concept for seven years. In that time, there have been a number of proposals relating to its size and thermal and electrical outputs. There have also been a number of private partners that have wanted to be involved with the project, most of which pulled out for different financial reasons. The City has secured its own funding for a Phase One of its project which includes heat for a government building and the potential for one to two private buildings. This funding was obtained through the Federation of Canadian Municipalities, the Municipal Rural Infrastructure Fund, and the City's capital funds. Construction was only dependent on the Canadian Environmental Assessment and the Ministry of Environment regulation processes but strong concern among Prince George residents over particulate emissions from the new plant have made the envisaged concept difficult to realize. Prince George still wants to develop a district heat plant, but is now looking at other heat sources than its own wood waste, such as waste heat from existing or new industrial facilities.

Mackenzie Mackenzie Green Energy is developing a 72 MW cogeneration plant and obtained agreements for fibre supply, environmental permits, and a power purchasing contract. The project will create 28 permanent jobs plus transportation jobs needed for 70 truckloads of wood residue per day, and will pay about half a million dollars in annual property taxes to the District of Mackenzie. Up to six Tier-2 beehive burners will close operations due to the project, which will burn one million green tonnes of woody biomass per year. The biomass will come from the neighbouring saw mill, waste wood and sludge from the pulp mill, as well as several other mills within a 100-km radius. Some of the steam produced will be used to displace natural gas at the Pope and Talbot pulp mill, and possibly also at the nearby Canfor sawmill.

The construction phase is expected to take two years, and commercial production was expected for December 2009 until it became known at the end of 2007 that Pope and Talbot had entered creditor protection. Asia Pulp and Paper has made a bid for the Pope and Talbot mill and it is expected to continue operations. Mackenzie Green Energy's business plan is resilient enough to weather even the closure of the pulp mill, or the loss of steam sales, and the company is confident it can supplement wood from other sources if required, such as roadside residue or hog fuel from other mills. The project is therefore expected to move ahead, albeit with some delay.

More Canadian case studies can be found on the web site of the Federation of Canadian Municipalities (www.sustainablecommunities.ca/Search/Search/Search.aspx?lang=e).

4.0 Opportunity and Challenge Analysis

4.1 Benefits and Opportunities

4.1.1 Benefits

The regional benefits associated with developing the Alternative Energy Strategy are immense. Benefits can be accrued from research and development for equipment design and manufacture, financial services, energy services, equipment maintenance, and fuel supply (wood). There are multiplier effects from the production of high-value manufactured goods (either directly as a result of processes or as a result of cost-effective reliable clean energy supply). One of the most important benefits is a supply of clean energy for off-grid communities, including First Nations and rural residents. Following are specifics on these benefits.

Reduced spending on energy imported into the region

Currently, money spent within the region on energy is largely transferred elsewhere. Alternative energy technologies, especially where delivered by local companies, will reduce this outflow of "energy dollars" from the region. At the provincial level, B.C. was once self-sufficient in electrical power generation. It now relies on imports to meet up to 15% of the demand for electricity. As well, BC Hydro projects the demand for electricity to grow by up to 45% in the next two decades. Alternative energy technologies could help reduce the need to import electricity into the province.

Reduced energy costs

Alternative energy provides innovative, clean and sustainable energy that supports healthy communities.

Workshop participant

At the present time, it is estimated that heating costs are reduced by 30 to 65% if wood is substituted for natural gas. Similarly, costs are reduced by 50 to 70% if electrical heating is replaced by wood heat. These costs differentials provide a strong incentive for industrial and other large consumers of electricity or natural gas for heating to utilize wood and alternative energy technologies. As well, since fossil fuel prices are expected to increase in the coming years, the implementation of alternative energy systems will make wood even more attractive as a fuel for heating and reduce the impact of any natural gas price increases. Reduced heating costs should make regional industries more competitive and also help to attract new industries to the region.

In the case of electricity, replacing diesel generation in off-grid situations with alternative energy technologies will provide electricity at a stable price which will be lower than diesel generated electricity. This will provide benefits for remote communities and other off-grid users of electricity in the region.

Job creation and maintenance

Alternative energy systems create local jobs in construction and installation, operation, and servicing. Money that would once have been spent paying energy bills can instead support local energy businesses. Wood biomass-based energy systems also require people to work in forest harvesting and management. For other biomass energy systems, the biomass must be gathered and sorted. This can preserve existing employment in the wood harvesting and transport sector.

Reduced greenhouse gas emissions

Where alternative energy technologies are used to reduce the consumption of fossil fuels, there will be reductions in carbon emissions. BC Hydro currently imports coal-based power from Alberta and the OBAC region has several remote grids powered by diesel generators. Likewise, natural gas and heating oil can be displaced by alternative energy systems in many cases. This may create opportunities to access "carbon financing" from organizations seeking to purchase carbon offsets.

Improved air quality

Solar, hydro, geo-exchange, and wind energy systems displacing fossil fuels produce no particulate emissions and therefore contribute to better air quality in the region. Biomass energy projects do emit particulates, but also improve overall air quality whenever they reduce current practices leading to significant air pollution, such as the elimination of roadside residue through open burning in the forest. Although modern flue gas cleaning systems can reduce particulates from biomass energy systems to a minimum, their impact on local air quality needs to be assessed, and locations carefully considered.

4.1.2 Opportunities

In addition to reducing fossil fuel use, creating an alternative energy industry will create new employment opportunities in manufacturing, installation, and maintenance. Retaining wealth in the OBAC region is one of the main objectives when increasing alternative energy use. A significant opportunity exists within the forest products sector, since existing infrastructure (a highly-skilled workforce, harvesting and transport equipment, and logging roads) can be used for both conventional forest products and for a biomass energy industry. Existing forestry expertise, together with new opportunities, such as planting fast-growing trees for energy purposes, could be explored. With biomass being regenerative and carbon-neutral, there is a chance to create a sustainable regional energy infrastructure. The following are several specific circumstances that could drive the adoption of alternative energy and extend broader benefits to the region.

Pine beetle epidemic

While the pine beetle epidemic is having a negative effect on both the forest industry and OBAC communities, it also presents an opportunity to establish new industries, business practices, and access to wood. There is a very large supply of available wood in the short-term, which results in a need for broadening the forest products industry from traditional wood products to new uses, including energy production. The new employment opportunities created by the diversification of the forest products sector will help reduce the effects of mills downsizing their workforce as the supply of merchantable pine shrinks. Some of the immediate opportunities for bioenergy are:

- Using remaining mill residues that are still burned in beehive burners;
- Using some of the standing beetle-killed pine;
- Using sources of biomass that are coming on stream such as roadside residue and slash; and
- Increasing the use of biomass for heating public and residential spaces in the region, such as through district heating or pellet stove applications.

We must moderate the economic swings and cycles of resource based economies and create an alternative energy industry that is sustainable and climate friendly.

Workshop participant

Harvesting of standing beetle-killed pine is not economically viable for bioenergy purposes without some sort of incentive or cost improvement. However, the removal of these dead trees and replanting of the forests will accelerate the regeneration of affected stands, and reduce fire hazards, and erosion. Providing financial benefit for these values could make this resource available for the energy industry once it is no longer of any value for conventional forest products.

New technologies

There is great potential in higher-end uses of wood, such as the production of lignocellulosic biofuels, activated charcoal, and specialty chemicals. Some of these technologies are getting closer to commercialization, and the OBAC region could play an important role in their development and application. Manufacturing and export potential add value to this opportunity.

District heating systems

District heating systems are not in themselves an alternative energy technology, but they can facilitate the use and distribution of renewable energy to buildings within the community. District heating allows alternative heating technologies to be provided to customers much like renewable electricity projects, without requiring the technology to be installed in each building. District heating systems may be owned and operated by local governments or by the private sector, following a due diligence verification of the potential private partner. Prince George and Houston are currently in the process of developing district heating systems.

Energy efficiency

Energy efficiency projects provide an opportunity for the introduction of small scale alternative energy in communities. There is a great deal of overlap between energy efficiency and alternative energy, with efficiency improvements playing an important role in reducing the capacity requirements of alternative energy systems. Energy efficiency projects provide an opportunity to achieve cost efficiencies in alternative energy feasibility studies, design and engineering, and construction.

Community forests and new fibre sources

As access to fibre is one of the major concerns in the development of bioenergy systems, a community forest can provide a secure source of supply to local governments. Likewise, using agricultural

land to cultivate fast-growing trees as a source of energy may present opportunities. In-forest chipping may be a technology for delivering roadside residue. Possibly, slash from de-limbing, or Finnish-type slash bundlers may fit in better with harvesting operations and logging trucks. A pilot project in the OBAC region could help determine the most cost-effective technology for collecting and delivering roadside residue and thus help define pricing of this resource required to make it available to energy producers.

Remote communities

Diesel produces electricity at very high rates of 37¢ per kilowatt hour and above. There are seven off-grid communities in the OBAC region, as well as some remote buildings, which run on diesel engines. Hydro and wind power could supplement diesel generators and thus reduce the need for this expensive source of electricity. In the same way, remote communities that are in the vicinity of planned mining or other projects could either be powered by the same (alternative or conventional) generation unit as the new industrial site, or could be connected to the grid if new power lines are built to the mining site. The BC Government launched First Nation and remote community energy programs with BC Hydro to implement alternative energy, energy efficiency, conservation, and skills training solutions in a number of communities. By staying apprised of this work as it progresses and recording information from any projects located in the region, OBAC communities could maximize benefits from this program for their region.

Transmission and distribution grid upgrades

With new industrial projects coming to the OBAC region, power consumption will rise in some areas of the transmission and distribution grid. Instead of responding to increased power demand on a case-by-case basis, as it is currently done by BC Hydro and the BC Transmission Corporation (BCTC) when applications for grid connections are received, a more coordinated approach could identify new demand, existing infrastructure capacities, and the need for new, decentralized power generation which could stabilize the grid and even remove the need for power line upgrades in some cases. An informed planning exercise for the OBAC region that takes into account existing and anticipated power demand in the region due to new industrial activity could thus identify locations where new power generation should be located to maintain grid reliability, respond to increasing electricity demand, and possibly connect hitherto off-grid communities to the power grid. This approach could reduce costs for power grid upgrades and would lead to a more proactive approach towards new power projects in the region. OBAC could also assist developers by facilitating the collaboration between several project developers that would benefit from power line extensions in the same area, thus bringing down costs for transmission upgrades or extensions.

Carbon credits

The Province of BC has announced that a mandatory provincial carbon market will be established, and a federal market is in existence as of 2008. Carbon credits can also be sold into the voluntary market. Power projects selling electricity to BC Hydro are, however, automatically excluded from this opportunity since all the environmental benefits are sold to BC Hydro together with the electricity produced under current contractual agreements. The heat portion of cogeneration projects or heat-only projects that displace natural gas or oil may still be able to sell credits if the transaction cost is not too high. Carbon credits can only come from projects that are not required by law, (e.g., landfills will qualify until they fall under the upcoming provincial requirement for installation of a gas capturing system by 2016; smaller landfills in the OBAC region may be eligible without restriction). There is an opportunity for the OBAC region to position itself to engage in the carbon market, but opportunities would need to be assessed on a project-by-project basis.

Partnerships with First Nations

The provincial government is actively seeking treaty settlements with many BC First Nations, who have been pursuing their right to resources within their traditional territories. First Nations are looking for ways to bring jobs and income to their communities, and may be looking for partners with money and expertise. Alternative energy projects can be attractive to First Nations who possess natural resources, but wish to develop them in a long-term sustainable manner. For example, Pristine Power and Nexterra are hoping to implement a small biomass power plant with Cheslatta Forest Products, which will replace diesel-based power generation at the Cheslatta Carrier First Nation.

4.2 Barriers and Challenges

4.2.1 Common Barriers to Alternative Energy Development

Expertise and awareness

Most alternative energy technologies require specialized expertise in everything from the choice of an appropriate technology to installation. There is a lack of awareness of technology options, trained designers and installers in Canada, and the OBAC region is no exception. To develop a broad alternative energy industry, decision-makers need assistance, and the local workforce will need to be trained or outside expertise brought into the region. Some private project developers have experienced problems when negotiating with local governments in BC, which put undue financial burdens on projects, which did then not go ahead. In some jurisdictions, inspectors' lack of familiarity with solar heating and geo-exchange technologies has led to the refusal of permits. Training and information is sometimes necessary to overcome this barrier. To be at the leading edge of alternative energy development, research facilities would need to be established.

Financing

Our vision of an alternative energy industry emphasises network innovation, education and partnerships.

Workshop Participant

Many alternative energy projects require large amounts of capital. This can often be sourced through the private sector if the project is financially viable. However, small projects, new technologies, and projects with long paybacks may not be able to attract private capital. These projects will need to be financed through other means if they are to be successful. Funding for initial studies and project development work is also often required to carry a project through the stages prior to making a capital investment.

Other regions and countries have seen the emergence of community energy projects and local co-operatives that leverage financing for alternative energy. Local governments have often played a facilitating role in the development of these projects. OBAC communities may network with other regions that have successfully encouraged co-op ownership of alterative energy systems, and lobby the Province to create mechanisms, such as targeted financing, to support such local ownership models, which would retain most benefits from alternative energy projects within the region. Co-op ownership of alternative energy projects may also help reduce local resistance to alternative energy projects.

Electricity costs

BC has traditionally had very low energy costs, particularly for electricity. This makes it difficult for alternative energy projects to be cost competitive. The BC government is committed to maintaining low electricity rates for its heritage assets, and smaller rate increases envisaged by BC Hydro over the coming years will not substantially change the economics for alternative energy projects. Natural gas prices vary with the market and in recent years have risen substantially. On the other hand, they fluctuate up and down significantly, making future price predictions difficult. Regarding the Standing Offer Contract for power projects from 50 kW to 10 MW size, pricing in the OBAC region is very low (under 8¢/kWh), which is insufficient for biomass, wind and possibly also for some small hydro projects (see Figure 4.1 for a comparison of power pricing ranges from different energy technologies). Apart from net metering, there is no program in BC for small residential alternative energy systems, such as photovoltaics panels (generally 1-3 kW in size).

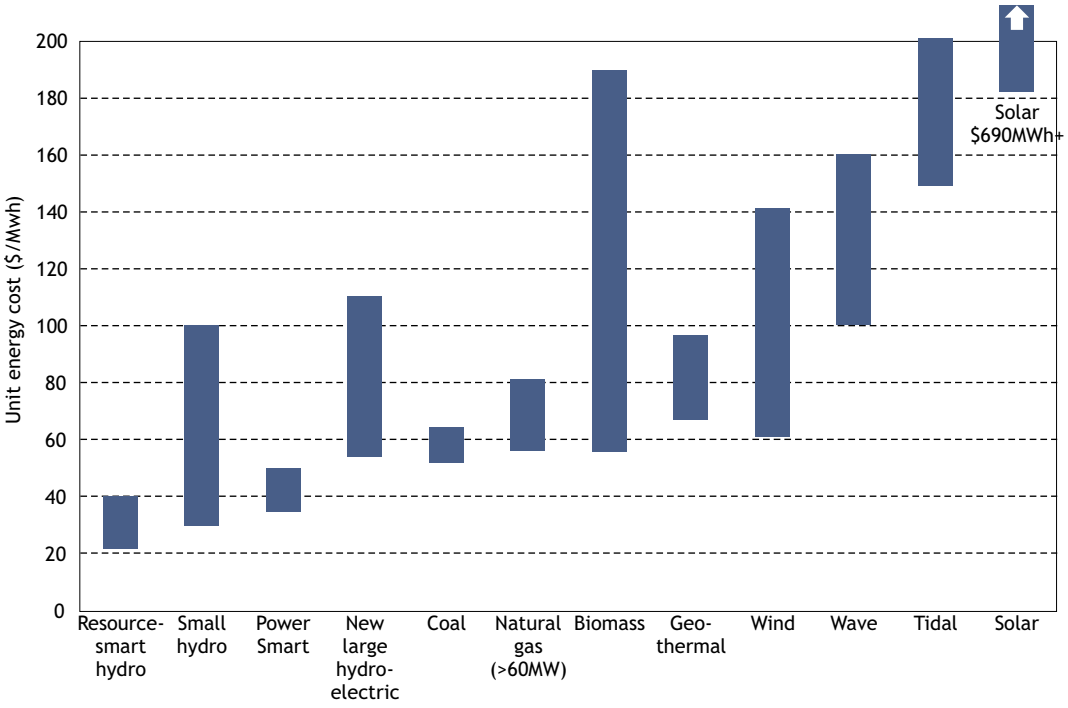

Figure 1 Power Pricing from Different Energy Sources

Source: BC Hydro 2004 Integrated Power Plan
Note: Estimated unit energy costs are based on: range of project prices for resource categories with more than one project; "price uncertainty" ratings for options with only one project price (wave);natural gas price range for natural gas projects.
Note: Thermal prices do not include a cost estimate for greenhouse gas offsets. Greenhouse gas costs are incorporated into the portfolio evaluation of the IEP.

Grid access

For residential projects, net metering provisions exist that facilitate grid access. For larger projects up to 10 MW, the Standing Offer Contract offers a fairly simple grid access process to all such projects. Many alternative power projects, however, are in locations without nearby grid access. This means these projects will not be retained in BC Hydro calls due to the elevated interconnection costs. Often, several projects in the same area could be connected together, thus reducing these interconnection costs. There is currently no process to assess such projects together since each bid is evaluated separately.

Transmission capacity

Generally, BC Transmission Corporation does not foresee any major transmission constraints for additional projects in the OBAC region, but some areas should be prioritized for scheduled upgrades in order to let new projects go ahead quickly. A project-based assessment may show the need for local transmission upgrades, but the cost for these upgrades is carried by BC Transmission Corporation (the bidder's price will, however, be adjusted based on upgrading costs). Usually no upgrades are required when connecting to a 230 kV line, whereas a 64 kV line is more likely to require an upgrade, especially for larger projects around the 50 MW range. Mills that are already connected to the grid and start exporting power should generally have low or no upgrading costs. A 138 kV line leading to Valemount may present problems when connecting major power projects and the McBride area also has capacity problems. Other, more remote, areas may have reliability problems, or no access to tri-phase power, curtailing economic activity. The BC government intends to invest several billion dollars into transmission line maintenance and upgrades over the coming decade.

CSA certification

Missing Canadian Standards Association certification has led to undue restrictions or permit refusals for alternative energy systems in some parts of BC. Building inspectors may also find it difficult to apply the building code to unfamiliar renewable energy technologies, which may lead to delays or permit refusals (this was a problem in other jurisdictions, such as Ontario). Local government guidelines for building inspectors may remove such barriers.

Skilled labour

There is a lack of industry capacity within the OBAC region for many distributed energy technologies. This includes a lack of qualified installers of solar hot water systems, geo-exchange systems, and heat recovery technologies, as well as a more general lack of electricians, plumbers and other technical skills. If distributed alternative energy technologies are to play an important role in the region, there is a need for training. However, much of the expertise will depend on the establishment of a market for alternative energy solutions. Local government projects may help foster industry capacity through creating some demand for these services. Large-scale energy facilities, such as power plants, are also in need of specialized personnel. Power engineers required to operate steam turbines, for example, are in short supply throughout Canada.

4.2.2 Technology-Specific Barriers

Biomass power and heat

Whereas biomass seems abundant in the OBAC region, there is growing competition for the resource and cheaper sources of fibre from sawmills and paper mills are often sourced by pellet plants. The tight economics of biomass power (especially in applications without cogeneration) requires fairly large plant sizes, which in turn requires large amounts of biomass at fairly low prices. The lowest-cost biomass resources are usually mill residues, which are almost all spoken for due to pellet plant expansions and currently planned biomass power projects. Securing such biomass resources through long-term contracts is therefore becoming increasingly difficult. The current economic crisis of the forest products sector in Canada contributes to the insecurity of long-term fibre supplies.

Another barrier to expanded use of biomass for energy is public perceptions about air quality. Portions of the OBAC region have had very poor air quality in the past, some of which continues today. Much of this has been a result of biomass burning by homeowners and the forest industry. Although modern biomass technologies are very clean burning, there may be a public perception of, and in some cases actual, increases in air pollution. The use of clean biomass, such as pellets, for heating purposes is currently curtailed in some areas by air emissions legislation. For example, in the Prince George airshed, including Vanderhoof, as well as Valemount, authorities demand that particulate emissions from projects emitting several tonnes of particulates per year or more be offset. Smithers and Houston are also problem areas in terms of particulate emissions. Although residential, institutional and commercial wood heating projects are exempt from such permit requirements, larger-scale (industrial) uses of wood for greenhouses, for example, may trigger the need for authorizations curtailing the use of biomass, or restricting it to certain types. Local bylaws may also require the use of pellets, rather than hog fuel, for heating. The Ministry of the Environment is currently working on standardized emission requirements for biomass energy plants of different sizes and applications. Linking offset requirements to each single project instead of having an accounting process that would allow several projects to go ahead if larger emitters, such as beehive burners, are eliminated, may represent an undue burden on new, low-emitting projects.

Many types of biomass are expensive to collect and to transport, which limits their applicability and the range over which they can be sourced. Traditionally, a maximum radius of 100 km for sourcing biomass resources for power projects was deemed acceptable. With low-cost residues almost all dedicated to existing and planned projects, only higher-cost resources, such as roadside residue, remain available for additional energy projects. This higher cost does, at current power pricing, reduce the economic transportation radius, and hence the total available resource for a project in any given location.

It is not clear whether BC Hydro will pay a premium for power projects that would use beetle-killed pine that has lost its market value, which would benefit the forest industry as a whole by accelerating regrowth. Large-scale projects can bid for power purchasing contracts with BC Hydro under its

periodic power calls. Smaller projects (under 10 MW) attempting to use the Standing Offer Contract may not succeed since the tariff offered is generally too low for bioenergy projects. Revised pricing for small projects should orient itself based on bids received under the upcoming biomass energy call, and should exceed that for large-scale projects by four cents per kilowatt hour.

The use of agricultural residues or municipal biowaste for anaerobic digestion is not economically feasible at current electricity rates offered by the BC Hydro Standing Offer Contract, and anaerobic digestion is therefore limited to some installations at municipal wastewater treatment plants in BC. These waste streams are utilized in other countries with higher electricity pricing, but cannot currently be exploited for energy purposes in BC.

Geo-exchange

Geo-exchange systems are very sensitive to the difference in price between electricity and natural gas. Current high gas prices have improved the economics of ground source heat pump systems (which run on electricity), but variations in the electricity/gas price relationship may change that. The lack of qualified installers in the OBAC region is another obstacle for wider adoption.

Geothermal power

BC is the only province with a policy in place for the production of electricity from geothermal resources. The best sources of geothermal heat are geologically aligned with areas of high seismic risk (i.e., the Pacific Rim). Geothermal drill holes go to an average depth of 7,000 feet and each hole costs between $5.5 million and $7.5 million to drill in order to fully evaluate the resource. Leveraging the funding for these assessments is usually the largest obstacle to their development. Other problems may be routing of power lines to the plant.

In terms of policy barriers, geothermal lease rights go up for competitive bid after being nominated by individual companies. This system may discourage geothermal exploration. In addition, there is a significant backlog of BC geothermal permits due to time, labour, and priority constraints within the Ministry of Energy, Mines and Petroleum Resources (MEMPR).

Hydro power

Often the cheapest renewable energy resource, small hydropower projects have flourished in BC in recent years. Some projects can still be expected to be economic under BC Hydro's proposed Standing Offer Contract pricing. However, there are major hurdles for micro-hydro projects in terms of the number of permits required, cost of licences, and distance from grid. The water license fee for commercial waterpower up to 499 kW and power plants up to 20 MW is $5,000 per project. These license fees are seen as excessively high for micro-hydro projects and often detrimental to project economics. Distance and difficulty of accessing the grid can also be a factor.

BC's small hydropower developers have experienced conflicts with other users of creeks and rivers, such as kayakers. Projects can be delayed or will fail due to the need for compensation for such groups when access rights to the water resource are disputed.

Landfill gas and biogas

The cost of installing the gas capture system is the biggest obstacle to using landfill gas. However, the BC government is planning legislation that will require methane capture from landfills. Once a landfill gas capturing system has been installed, using the gas for power generation is a much more straightforward option, although the economics may continue to be an obstacle for small systems.

Where municipal biowaste is collected separately, or where other food waste is available, as well as from agricultural residues like manure, these resources can be turned into a methane rich gas by anaerobic digestion. Digester economics usually require power pricing of 15 to 20 cents per kilowatt hour, which is currently not available anywhere in Canada. Some digesters exist for the treatment of municipal water treatment sludge (bio-solids). The technology is unlikely to be developed absent a mandate or a mechanism to improve economics, and its overall potential to contribute to power and heat generation in the OBAC region is small in comparison to other options.

Solar photovoltaics

The main obstacle to this technology's more wide-spread adoption is its high cost. Although prices are dropping, it will likely take several more years before substantial cost reductions can be achieved. Solar photovoltaics use is growing extensively in off-grid applications. There is also a lack of electricians in the OBAC region, which may lead to long delays before installations can be completed.

Solar thermal

This technology is well proven and available and is cost effective in many situations. The main obstacles are the up-front cost, difficulty of retrofitting into existing buildings, and a lack of awareness.

Waste-to-energy

In the past, air pollution concerns and the high price of such facilities were the main obstacles to this technology. Second-generation technologies are smaller, more affordable, and cleaner. Cost and technology readiness, however, continue to be obstacles.

Wind power

An obstacle to the adoption of wind power in the OBAC region is that only very few places exist where the wind power resource allows projects to become economically attractive. There may be local resistance to wind power projects because of concerns about their impacts on scenery and avian life. Distance from, and access to, the grid can play a major role in the economic feasibility of projects.

5.0 Land and Resource Management Issues for the Sector

5.1 Municipal Planning and By-Laws

An Official Community Plan (OCP) sets the vision and expectations of a community. Incorporating a vision for alternative energy within the OCP can help raise awareness and reduce barriers to implementation. The OCP for the Village of Burns Lake and the District of Houston already refer to alternative energy. Local governments can influence the uptake of alternative energy in several ways, such as:

- Developing district heating systems that allow connection of alternative energy sources;
- Planning future development with alternative energy and district heating in mind (e.g., compact development, mixed use, creating right-of-ways for distribution piping);
- Setting aside land for geo-exchange systems. These may be combined with other uses such as playing fields or parks; and
- Planning and development strategies to maximize solar orientation and access.

5.2 Access to Biomass

Access to secure, long-term sources of biomass is one of the largest barriers to bioenergy.

- The tenure for long term access to most biomass is already held by existing licensees in the existing forest industry mix.
- Tenure holders are usually burning their harvesting residues, since they are obliged by law to eliminate them to allow for new trees. Economic, regulatory, and contractual barriers exist for them to enable third party access. Energy companies are having difficulty working out long-term contracts for access to residues at a manageable cost.
- No separate tenure exists to guarantee long-term access to/supply of fibre that provides for an energy project's investment security.
- There is currently no incentive to harvest beetle-killed pine for energy purposes. With a delivered cost of around $100 per dry tonne, this resource is currently not economically feasible for energy production.

5.3 Permitting and Lease Agreements

Land and resource regulations and leasing agreements require improvement in three areas:

- Streamlining and expediting the processes associated with environmental permits and water license applications and lease agreement negotiations;
- Reducing the processing time it takes the governing body to respond to developers applications; and
- Using a consultative process to design and adopt best practice guidelines for turnkey systems. Such systems use standardized designs that reduce configuration requirements and improve performance reliability.

6.0 Sector Strategy

This is a broad strategy intended for all levels of government, the business sector, local community members, and First Nations. The strategy will be relevant to anyone interested in the implementation of alternative energy technologies and the considerable benefits they can provide.

Successful implementation of many of the recommendations and actions relies upon provincial, federal, and local government resources and their ability to make key decisions.

As well, this strategy must be actively discussed, adapted, and ultimately have buy-in by the communities, post-secondary institutions, the alternative energy sector, and other industries and businesses. These parties must seize the opportunities presented here and take the required actions if the benefits which can accrue to the region through the use of alternative energy technologies are to be fully realized.

This strategy is a living document. When new opportunities or challenges present themselves, the strategy can be adapted to meet the changed context.

6.1 Objectives

Through the implementation of the proposed actions, the objectives presented below can be achieved. This will ensure that the region is a leader in the use of alternative energy where its use provides economic, social and economic benefits.

Objective 1. Meet a significant proportion of the region's energy needs from alternative energy sources in order to reduce or eliminate dependence on imported fossil fuels for heating and power generation, and to retain wealth generated from energy related products and services in the region.

Objective 2. Develop regional expertise in research, development, manufacturing and installation of alternative energy technologies that can be used regionally and exported elsewhere in Canada and to the world.

Objective 3. Make use of available fibre, including the fibre resulting from the mountain pine beetle epidemic, to produce bioenergy.

Objective 4. Retain regional expertise in the forest sector by creating new forest product opportunities in the alternative energy sector.

Objective 5. Grow regional capacities to train and retain the required workforce.

Objective 6. Contribute to the global effort to reduce greenhouse gas emissions from fossil fuels.

6.2 Recommendations

The recommendations and actions have been developed based on these objectives. There are five specific recommendations that OBAC believes will result in sustainable growth in the production and use of alternative energy in the OBAC region. OBAC is confident that if these recommendations and the associated actions are implemented, the objectives listed above and the vision presented in Section 1 will be achieved.

The five recommendations are:

Recommendation 1. Remove impediments to the flow of wood fibre and other fibrous fuels to biomass energy projects.

Recommendation 2. Conduct research on alternative energy opportunities and make relevant information readily available to industry and government decision makers.

Recommendation 3. Provide 'Leadership by Example' alternative energy programs and initiatives at federal, provincial, and local government levels.

Recommendation 4. Increase the regional use of alternative energy systems in order to provide overall economic, social and environmental benefits.

Recommendation 5. Provide training and certification for installation and systems operation to help build regional expertise in alternative energy.

Each of the five recommendations are followed by a number of actions that can be undertaken by various parties, such as local governments, private and public institutions, the provincial or federal governments. The actions are derived from the information developed in preceding chapters and address policy, business and social development, infrastructure, training, and investment requirements. Recommendations 1 and 3 are particularly important at this juncture if the industry is to grow and make effective use of available resources.

Further engagement with and between leaders of OBAC communities and First Nations in order to identify regional and local interests and opportunities and make new relationships a reality is a very high priority for the initial implementation phase of all of the strategies. Alternative energy projects provide excellent opportunities for positive and mutually beneficial engagement at the community level. These opportunities are indicated in several of the recommended actions and it is likely that further opportunities will be identified as the strategy is implemented.

For the purpose of general guidance, responsibilities and time frames have been defined. Time frames are grouped into three categories:

- Short-term (actions to be realized within one year after the strategy is released);
- Mid-term (actions to be completed within one to five years);
- Long-term (ongoing actions and actions requiring more than five years to be completed).

Responsibilities will be refined as each of the actions are examined in more detail and implementation decisions are taken.

Recommendation 1 Remove impediments to the flow of wood fibre and other fibrous fuels to biomass energy projects.

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
a) Consider allocating the various types of wood fibre to energy and non-energy industries based on overall social and economic benefits.	• Should result in increased overall benefits to the region, and reduce the likelihood that the establishment of new industries will cause the loss of established enterprises.	• Province of BC	• Forest products industry	Short-term
b) Establish new forest tenures that provide the right to utilize roadside residue from ongoing forestry operations.	• Will provide greater certainty that long-term biomass supplies are available for energy production and will encourage increased investment and expansion of the industry. • Will help to maintain and create employment opportunities. • Will reduce emissions from in-forest burning which will improve air quality in many parts of the region.	• Province of BC	• Tenure holders	Short-term (underway)
c) Evaluate the economic, social, and environmental benefits of providing technology-specific power pricing regimes for biomass energy projects utilizing roadside debris and beetle-killed pine.	• If higher pricing is put in place they should result in an increase in the beneficial use of the regions wood fibre supply.	• Province of BC • BC Hydro	• To be determined	Mid-term
d) When pine stands are no longer viable for the production of conventional forest products, provide financial incentives that encourage their harvest for the production of energy. These incentives should be in place where overall economic, social, and environmental benefits warrant this use.	• Creates additional ways to improve the economics of harvesting dead pine for energy production. • Harvesting dead pine stands can accelerate regrowth and reduce fire hazard.	• Province of BC	• Forest products industry • Independent power producers	

Recommendation 2 *Conduct research on alternative energy opportunities and make relevant information readily available to industry and government decision makers.*

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
a) Create an Omineca Alternative Energy Office (OAEO) that provides alternative energy related services to the region (see Appendix 4 for additional suggested activities).	• Will provide the research, information and coordination needed by communities and industry to further develop the alternative energy sector. • Will assist investors to connect with communities, First Nations and other stakeholders • Can represent Omineca region interests towards governments. • Can actively promote the region for project development • Can advise local governments and First Nations on alternative energy.	• OBAC Board	• UNBC • ECN • Local governments	Short-term
b) Create an information portal that provides community-specific information to stakeholders on: • existing projects; • resource potential; • transmission infrastructure; • existing programs and initiatives; and • opportunities to work with First Nations. Investigate the potential for linkage to Front Counter BC and a GIS tool.	• When established, the portal will better inform the public about alternative energy projects and their impacts and benefits. • The portal will help to attract developers and projects to the region. • Will facilitate the sharing of regional expertise on alternative energy.	• OAEO	• Province of BC	Mid-term
c) Conduct research into the feasibility of planting fast-growing tree species such as poplar on some parcels affected by pine beetle in order to generate a long-term biomass energy crop for electricity generation.	• May facilitate the use of forest tenures by energy companies. • May help maintain higher harvesting levels with fast-growing species while the pine forest regenerates.	• Province of BC	• UNBC • Forest products industry • Independent power producers	Short-term
d) Locate the new chair for Advanced Bioenergy Technologies at UNBC.	• Will enable biomass research and development in the region. • Will facilitate the creation of an Innovation Centre around the chair.	• Province of BC • UNBC	• OBAC Board (to assist UNBC with letter of support)	Short-term
e) Survey the biomass energy industry to identify current key applied research needs and priorities for the Advanced Bioenergy Chair.	• Will prioritize activities of the new research chair.	• UNBC	• Forest products industry • Independent power producers	Short-term

Recommendation 2 Continued.

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
f) Create a Biomass Innovation Centre around the Advanced Bioenergy Chair.	• Will lead to the further development and deployment of alternative energy technologies in the region.	• UNBC		Mid term
g) Continue regional cooperation on alternative energy by: • creating an Omineca Alternative Energy email list to allow working group members to communicate and exchange information. • regularly convening a meeting of an alternative energy working group and other stakeholders to exchange ideas and information.	• Will facilitate the exchange and dissemination of alternative energy information which is needed by decision-makers in the region.	• OBAC	• ECN • One Sky • BCSEA	Short-term

Recommendation 3 Provide "Leadership by Example" alternative energy programs and initiatives at federal, provincial, and local government levels.

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
a) Provide a circular to Local Government, and senior government staff introducing the Strategy.	• Will raise the awareness of the objectives and priorities identified in this Strategy and facilitate alternative energy development in the region.	• OBAC	• Local government • Province of BC • Federal government	Short-term
b) Update OCPs to reflect the potential of alternative energy technologies.	• Will help to ensure that alternative energy sources are considered appropriately by industry and local government decision makers.	• Local governments	• To be determined	Short-term
c) Review all local goverment planning documents and remove any unnecessary barriers to the use of alternative energy.	• Will facilitate alternative energy development.	• Local governments	• To be determined	Short-term
d) Engage with First Nations communities and work on areas of mutual concern and interest relating to the use of alternative energy technologies.	• Alternative energy projects have the potential to benefit all communities in the OBAC region and benefits may be increased if projects are developed with multiple community partners.	• OBAC communities	• First Nations communities • Industry	Short- to mid-term

Recommendation 3 Continued.

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
e) Streamline the regulatory process and recognize the low environmental impacts of clean and sustainable projects in the permitting process by reviewing: • BC Building Code; • CSA approvals; and • Water licensing fees • Environmental Assessment Requirements.	• Reduces the regulatory barriers associated with alternative energy. • Will expedite alternative energy development. • Will demonstrate government leadership in developing the alternative energy market. • Will build on the relevant components in the BC Bioenergy Strategy.	• Province of BC • Federal government	• CSA	Long-term
f) Ensure that local government approaches to taxation, service areas, and zoning facilitate the appropriate use of alternative energy systems.	• Will increase alternative energy development in the region where its use will provide value to the communities.	• Local governments	• To be determined	Mid-term
g) Analyse each community's energy demand profile and the spatial arrangement of the loads; identify demand clusters where buildings have compatible load profiles. Install district energy systems where feasible.	• Improved management of community energy supply and delivery.	• Local governments	• To be determined	Mid-term
h) Conduct energy audits and alternative energy assessments for local government, provincial and federal buildings and determine the feasibility of retrofitting these buildings.	• Will demonstrate leadership by example and should lead to much wider use of alternative energy in the region.	• Province of BC • Local governments • BCCEA	• Federal government • OBAC	Mid-term
i) Develop an energy plan for each OBAC community.	• Will identify local opportunities and set alternative energy priorities in each municipality.	• Local governments	• To be determined	Mid-term
j) Deliver public outreach and education programs (see Appendix 3 for suggested measures).	• Will reduce local resistance to alternative energy. • Will showcase success stories and reward industry leaders.	• Local governments	• Province of BC	Short- to mid-term

Recommendation 4 *Increase the regional use of alternative energy systems to provide overall economic, social and environmental benefits.*

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
a) Implement alternative energy demonstration projects (see Appendix 2 for a list of potential projects).	• The province has already started to support this through a $25 million Bioenergy Network fund with a mandate to encourage pilot projects. • Will lead to more similar projects as problems are solved and knowledge is gained of the benefits and cost effectiveness of the various technologies.	• Industry • Province of BC	• NRCan • OBAC • UNBC • Local governments • First Nations	Mid- to long-term
b) Assess the potential for synergies between new alternative energy projects, industrial developments, such as mining, and the energy needs of First Nations and other rural communities.	• Should provide a cost effective approach to supplying power to some new industrial development and remote communities. • Replacement of costly diesel power generation in remote communities is an important potential benefit.	• Province of BC	• Federal government • Industry • First Nations	Long-term
c) Design a process that allows for transmission upgrades and extensions whenever several new alternative power projects exist in the same area and could be connected.	• Recognizes the benefits of combining several projects in transmission studies, rather than examining each one by itself. • Will enable project clusters to go ahead through cost sharing even if they are not close to existing transmission infrastructure.	• BCTC • BC Hydro	• Province of BC • Independent power producers	Mid-term
d) Develop innovative financing options to encourage new alternative energy projects in the region and consider the creation of a regional alternative energy utility that would develop and operate energy projects throughout the region on behalf of OBAC communities.	• Will help to overcome financing hurdles which currently impede the development of alternative energy projects. • The capacity of many OBAC communities to undertake large complex projects is limited. The proposed utility would reduce the burden of project development on local governments and leverage financing.	• Local governments	• OBAC	Long-term
e) Introduce and enhance provincial and federal tax credits for alternative energy technologies.	• Provides a transitional incentive to the energy market during its shift from fossil fuels. • Is a concrete example of how Government can invest in a cleaner energy future.	• Province of BC • Federal government	• OBAC	Mid-term

Recommendation 4 Continued.

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
f) Develop and launch a call for Expressions of Interest for public-private partnerships where local governments cannot develop projects on their own.	• Will help to address financing issues. • Reduces administrative burden for local governments. • Brings private expertise to the table.	• Province of BC • Local governments	• OBAC	Mid-term
g) Create a locally owned alternative energy co-op.	• Will increase alternative energy use and maximize local benefits.	• To be determined (local stakeholders)	• One Sky • BCSEA	Mid-term
h) Create a loan fund for co-op and other alternative energy projects.	• Will help to address project financing issues which currently impede some potential projects.	• Province of BC	• To be determined	Mid-term
i) Evaluate the economic, social and environmental costs and benefits of providing standard pricing regimes and streamlined processes for photovoltaic, wind and hydro projects under 50 kW in size.	• If the regimes are put in place they will enable the development of small systems (this is currently in place under Ontario's Standard Offer Program.[b]) • Would provide benefits such as peak shaving, deferred transmission upgrades, and reduced line losses.	• Province of BC • BC Hydro	• To be determined	Mid-term
j) Undertake strategic planning for energy generation. This is to include the evaluation of future power needs and, where appropriate, the issuance of RFPs for local generation projects.	• Will defer investments required for transmission upgrades. • Improved reliability of supply. • Better power quality and level (e.g., 380V tri-phase power to enable commercial activity).	• Local governments • BCTC • BC Hydro	• OBAC	Short- to mid-term
k) Consider direct public investment in large scale alternative energy projects where they can provide a significant portion of the region and province's future electrical needs. Public-private partnerships should also be considered.	• This will include an assessment of overall economic, social, and environmental benefits which will parallel the current practice for public investment in large scale hydro-electric projects. • Should allow large alternative energy projects to be developed when they are in the public interest.	• Province of BC	• BC Hydro • Federal government	Mid- to long-term

a For financing options e.g., see the Community Energy Association's Guide, Utilities and Financing at: www.communityenergy.bc.ca resources-introduction/utilities-and-financing-renewable-energy-guide-for-local-governments-in-bc

b Ontario Standard Offer Programs: www.powerauthority.on.ca/sop

Recommendation 5 ***Provide training and certification for installation and systems operation to help build regional expertise in alternative energy.***

Specific actions	Rationale	Primary responsibility	Additional implementation team members	Timeline
a) Add energy resource development and technical training to the curricula of appropriate post secondary institutions in the region.	• Providing local training opportunities will help to provide the skilled workforce needed by the industry.	• UNBC • Colleges	• OBAC • Province of BC	Short-term
b) Collaborate on the creation and funding for new courses in advanced biomass and other alternative energy technologies.	• Will help to provide the workforce required to implement this Strategy.	• UNBC • Colleges, etc.	• To be determined	Mid-term
c) Provide training and certification in alternative energy technologies using partnerships and existing programs where possible.[a]	• Will provide opportunities for training in the region that meet Canadian standards.	• Colleges	• To be determined	Mid- to long-term
d) Recruit experts in the field to train the first set of local alternative energy system installers, and then use a 'train-the-trainer' model.	• Will provide a self-sustaining training framework which will allow the workforce to be expanded as needed.	• ECN	• To be determined	Mid-term
e) Use local post-secondary students for alternative energy research in OBAC communities which support the Strategy Objectives. The Co-op program[b] is a very good vehicle for this approach.	• Will utilize local resources to undertake needed alternative energy related activities and will generate further interest in alternative energy as a career choice in the region.	• OBAC	• To be determined	Mid- to long-term
f) Design and host technical workshops and networking sessions and increase regional attendance at other alternative energy events.	• Local expertise will be increased which will facilitate the expanded use of alternative energy technologies in the region.	• Local government planners and decision-makers	• OBAC	Short-term

a For example, the City of Dawson Creek partnered with Northern Lights College to establish a solar hot water training course and the Canadian Geo-exchange Coalition has a national training and certification program for drillers and installers.

b Co-operative Education, or Co-op, is an integrated approach to higher education that enables bright, highly motivated students to alternate academic terms with paid, relevant work experience in their chosen field.

6.3 Making the Strategy a Reality: Moving to Implementation

To achieve the vision and make the Alternative Energy Strategy a reality, a clear and systematic implementation process must be developed. It is important that the strategy is used and implemented in a collaborative manner and benefits are realized for our communities, stakeholders, and businesses. Clearly the next step, beyond the presentation of this strategy, is the development of an implementation plan that is informed by our collective expertise and supported by shared resources.

As was indicated from the outset, this strategy presents information on "who needs to do what, when, where, and why". The "how, and how much" questions now need to be addressed. As part of that, we need to work together in more detail on the "by whom". The implementation plan will identify how the recommendations and actions will be accomplished and further identify champions who will help to ensure that each action is carried out.

Additionally, we will need to monitor plan implementation to ensure that we are making good progress in achieving the objectives, and that any necessary adjustments to the plan are made in a timely manner. We must now move quickly to implement the strategy in order to ensure the vision is achieved and that the resultant benefits begin to flow to the region.

Appendix 1 Alternative Energy Strategy participants

Alternative Energy Working Group Members

Name	Title	Organization
Sam Ahad	Managing Director	Progress House (Vanderhoof)
Gilles Archambault	Chief Administrative Officer	Village of Granisle
Nigel Black	CAO	District of Fort St. James
Jerry Botti	General Manager	Energy Centre of the North/Nadina Community Futures Development Corporation
Cress Farrow	Chair	Regional District of Bulkley-Nechako
Lana Fitt	Regional Strategic Development Analyst	Regional District of Bulkley Nechako
Don Gosnell	Assistant Director, Forest Analysis and Inventory Branch	BC Ministry of Forests and Range
Margaret Graine	Economic Development Officer	Village of McBride
Kathie Laforge	Economic Development Officer	District of Vanderhoof
Leslie Lax	Regional Project Manager	BC Ministry of Economic Development, Regional Economic Development Branch
Gina Layte Liston	Environmental Coordinator Utilities Division	City of Prince George
Bernice Magee	Mayor	Burns Lake
John Mosimann	Executive Director	Tl'azt'en Nation
Graig Pearen	Chair, Central Interior Chapter	BCSEA
Chris Ritchie	Provincial Beetle Response Project Manager	BC Ministry of Environment, Environmental Stewardship Division
Zandra Ross	First Nations Mountain Pine Beetle Initiative	
Kathy Scouten	Director, Economic	Initiatives Prince George
	Development	
Carla Seguin	Economic Development Officer	District of Mackenzie
Sharon Smith	Mayor	District of Houston
Graham Stanley	Business Analyst	Community Futures Development Corporation – Stuart/Nechako
Garth Thoroughgood	Senior Policy Advisor	BC Ministry of Energy, Mines and Petroleum Resources, Electricity/Alternative Energy Div.
Todd Walter	Vice President	Mackenzie Green Energy Centre
Shawn Wells	CAO	District of Houston
David de Wit	Natural Resources Manager	Wet'suwet'en First Nation
Stephen Cheesman	Chairman and CEO	Chinook Power Corp.
Claes Fredericksson	Business Development Specialist	Terasen Energy Services
Dolores Funk	Municipal Planner	Municipality of Valemount

Alternative Energy Strategy Email List

Name	Title	Organization
Edward Beggs	Owner operator	PlantDrive International, Salmon Arm
Cindy Shelford	EDO	Lakes District
Ken Church	Sustainable Buildings and Communities	CANMET
Mark Clark	Forester	Independent
David Conway	Community Relations Manager	BC Hydro
Alan Cornford	Research Partnerships Services Manager	UNBC
Tom Dall	Chief Administrative Officer	Village of Telkwa
Jim Davidson	Mayor of Smithers	Smithers
Steve Davis	President	IPPBC
Doug Fleming	Chief Administrative Officer	Village of Valemount
Bob Gammer	Community Relations Coordinator	BC Hydro
Dan George	CEO	First Nations Mountain Pine Beetle Initiative
Silvio Gislimberti	Economic Development Officer	Village of Valemount
Barb Hall	Environmental Protection Officer	BC Ministry of Environment
Ian Hartley	Associate Dean of Graduate Programs	UNBC
Steve Helle	Assistant Professor, Environmental Engineering	UNBC
	Environmental Engineering	
John Johnston	Trades Coordinator, Continuing Education	College of New Caledonia
Stephanie Killam	Mayor	District of Mackenzie
Steve Lamble	Air Quality Specialist	PG MOE
Jim Langridge	Director of Resource Tenures and Engineering	BC Ministry of Forests and Range
Bill McGill	Dean, College of Science and Management	UNBC
Doug MacFarlane	Director, Community Economic Development	Mountain Pine Beetle Emergency Response Team
Walter Matosevic	Chief Forester	Canfor
Cornelius Suchy	CEO	MAWERA (Canada) Ltd.
Lyn Synotte	Regional Campuses	College of New Caledonia (Burns Lake)
	Project Manager	
Judi Vander Maaten	Executive Assistant/Deputy Clerk	District of Mackenzie
Margo Van der Touw	Dean, Continuing Education & Industry Training	Northwest Community College
Ben Weinstein	Air Quality Specialist	Smithers MOE
Cathe Wishart	Vice President Student Services	College of New Caledonia
Donna Ward	Clerk/Treasurer	Village of Fraser Lake

Biomass Energy Information Series Speakers

Name	Title	Organization
Doug MacFarlane	Director, Community Economic Development	Mountain Pine Beetle Emergency Response Team
Michael Wilson	Senior Energy Planner	Community Energy Association
Ray Greene	Consultant	Independent
Martin Tampier	Director	ENVINT Consulting

Note: The Biomass Energy Information Series were a number of events held in OBAC communities in June 2007 which led to the development of this strategy.

Appendix 2 Recommended Alternative Energy Pilot Projects

1. **Roadside residue collection and transport pilot** This would demonstrate costs and best technologies to access this resource for energy projects. So far, the residue is mainly being used in Scandinavia, but there is little experience in BC with the use of these residues.
2. **Ultra low-head hydro** National assessments have been completed, but this technology is new and a first pilot plant could demonstrate its viability in the region.
3. **Hybrid systems options** Such as geo-exchange/solar thermal—these systems could be installed at municipal facilities, such as pools.
4. **Waste heat recovery from industrial processes** This is a very cheap resource and projects can be owned and operated by third parties.
5. **Non-wood waste to energy** Great benefits lie in the local use of municipal and commercial waste for energy production, as opposed to their transport to remote landfills. Small-scale technologies to address this problem are not proven yet but a pilot project may demonstrate their viability.
6. **Explore the use of fast-growing trees (such as willow or poplar) on agricultural lands to supplement wood supplies to energy projects** If indicated by the recommended feasibility study, a pilot project could demonstrate this opportunity in the region.
7. **Install power generation systems or alternative uses for landfill gas** **W**ith landfill gas capture mandated by the Province of BC for many landfills, power generation is a logical add-on.
8. **Installation of a cellulosic ethanol plant** Whereas this technology is not commercial yet, the installation of a demonstration facility in BC may show the way to a new high-end use of wood fibre, since the high value of ethanol and co-products allows for the use of high-cost fibre sources.

Appendix 3 Suggested Public Outreach and Education Measures

1. Holding public events to launch and publicise the Alternative Energy Strategy in OBAC communities
2. Developing an alternative energy brochure for the region (Smithers' existing brochure provides a good template).
3. Launching a public education campaign on the air quality impacts of high efficiency biomass systems and the benefits of alternative energy in general
4. Hosting annual regional awards for projects and programs that demonstrate innovation, education and partnership.
5. Establishing a regional clean energy interpretive site (e.g. at Mackenzie Green Energy Centre).
6. Monitor and inform about actual environmental impacts of alternative energy systems.
7. Create a web site that can respond to public information needs.

Appendix 4 Suggested additional actions to be undertaken by the Omineca Alternative Energy Office

1. Identify the key success factors for alternative energy projects and programs.
2. Prepare a list 'local energy leaders' of the region.
3. Collect information on employment potential to quantify direct and indirect jobs created from energy projects and programs.
4. Commission a study on the possibility of using FireSmart programs to source biomass for small-scale heating or power generation projects in OBAC communities.
5. Create a compendium of project development data from the design, application, approval and installation of projects in the OBAC region.
6. Carry out annual benchmarking studies that provide a snapshot of the value of the alternative energy industry in the OBAC region.
7. Prepare a list of alternative energy national associations and government programs and initiatives.

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