COAST OPPORTUNITY FUNDS BULLETIN SERIES

INFORMATION BULLETIN #1:
FIRST NATIONS RENEWABLE ENERGY ROADMAP

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ISIS, Sauder School of Business, UBC

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THE UNIVERSITY OF BRITISH COLUMBIA

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BULLETIN FORWARD

Welcome to the first information bulletin issued by Coast Opportunity Funds (Coast Funds), in partnership with ISIS at the Sauder School of Business. We would also like to acknowledge the generous financial support provided by The Nature Conservancy to complete this work. We hope this inaugural bulletin is the first of many such information bulletins that will be generated for our First Nations clients, with a focus on key economic sectors and opportunities.

This first bulletin acknowledges the pressing need for sustainable energy options for First Nations communities. As the title, 'First Nations Renewable Energy Roadmap' implies, this bulletin is meant to provide First Nations communities with information about the steps necessary to develop and implement an energy plan. It is important to note that this approach is not the only one; each First Nation is the ultimate decision-maker regarding which approach is taken.

Furthermore, it is important to acknowledge that communities should undertake comprehensive reviews of alternative technologies and business models to operate power production facilities. Fortunately, other First Nations organizations are actively working on these issues and opportunities at the political, policy, and implementation levels on behalf of their member First Nations. One such group is the Great Bear Initiative Society (Coastal First Nations)[1], whose current work on energy issues and opportunities complements and extends beyond the scope of this bulletin.

Reliance on non-renewable fuel sources (e.g. diesel) for the generation of power is the norm for many First Nations communities in British Columbia. Although diesel is readily available, rising economic and environmental costs are forcing remote communities to consider alternative sources of fuel (e.g. solar, hydro, bio-fuel, wind, etc) to provide important social and environmental benefits.

Nationally and internationally, governments are supporting initiatives to reduce carbon emissions, especially those initiatives that reduce the reliance on non-renewable fuel sources in favor of renewable fuel sources for the generation of power. As a result, private enterprise is increasingly focused on reducing the cost of generating power from non-renewable fuel sources through technological innovation to the point where incentives to take financial risk are high enough for private capital to fund large power projects. However, these large projects generate power mainly for grid-based distribution networks, which means that remote communities that are not on a grid system still depend on non-renewable fuel sources for the generation of power.

Approximately seventy First Nations and non-First Nations communities in British Columbia are not connected to a major gas or electric grid. Roughly half are First Nations, including communities in the Great Bear Rainforest. An opportunity exists for remote, off-grid communities in the Great Bear Rainforest to switch from non-renewable fuel sources to renewable fuel sources for the generation of power. To do so requires an understanding of the steps necessary for First Nations to develop and implement an energy plan.

Dave Mannix
CEO
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February 7, 2011

[1] See http://coastalfirstnations.ca for more information

INTRODUCTION

Energy is a resource that every individual, community, business and government utilizes on a daily basis. However, choices with respect to energy production and its use are often based on short-term needs, rather than taking a holistic and sustainable look over longer timelines. Access, cost and convenience have become the principal motivators of energy policy development within the world today, especially within First Nations communities.

This roadmap is a resource that has been developed based on feedback within communities along the central/north coasts and Haida Gwaii. Therefore, this document is intended to provide communities with strategic information and linkages specific to renewable energy and the potential it has to support the values and traditions of First Nations communities.

ROADMAP SUMMARY

1. DEVELOPING AN ENERGY PROFILE Section 1 of this road map walks communities through the process of developing an energy profile, which starts with effective community consultation at the outset. Committed advisory and technical teams made up of community members and other resources are necessary to identify the profile (and thus, a community's energy policy) by recognizing how energy is used, who uses it and what facilities help to deliver energy. This information is used in future planning sessions to inform project stakeholders. By the end of the section, communities will clearly understand their energy profiles.

2. CREATING A FIRST NATION ENERGY PLAN Building on this assessment and understanding, Section 2 informs communities of how the energy planning process is developed. This process first requires community feedback and understanding before moving forward with detailed options and plans. Along the way, key strategies to coordinate and engage with project stakeholders are outlined, which will establish goals, interests and values of the community. In addition, these strategies will help communities develop energy efficiency plans and future energy scenarios that consider both population growth forecasts and economic development opportunities.

3. IMPLEMENTING THE ENERGY PLAN Section 3 outlines implementation measures that effectively bring the energy plan to life. The first key strategy is to undertake business planning to best inform the implementation process, followed by a strong commitment to project management practices. In addition, communities learn about important agreements and contracts that must be negotiated to guide development of energy projects and which comply with applicable laws and regulations.

4. MANAGING ENERGY INFRASTRUCTURE The final Section of this road map introduces appropriate measures to maintain, manage and monitor energy generation assets when the project is successfully constructed and is in operation. Responsible care of these assets is crucial to protecting and enabling the energy development assets to meet the community's economic, social, environmental and cultural goals over the long-term.

Diagram 1: Navigating the roadmap

SECTION 1: DEVELOPING AN ENERGY PROFILE

1.1 GET ORGANIZED

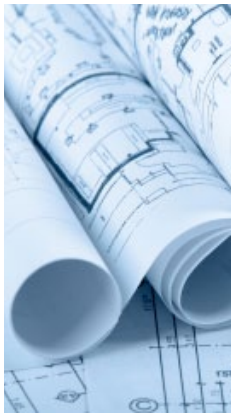
- Consult with community
- Establish advisory, technical teams
- Determine lead or 'champion'

1.2 REVIEW ELEMENTS

- Review energy assets, plans
- Review energy use and sources
- Assess equipment and building plans

1.3 FINALIZE ENERGY PROFILE

- Assess renewable resources
- Prepare next steps



SECTION 2: CREATING A FIRST NATION ENERGY PLAN

2.1 ENGAGE COMMUNITY

- Identify shared interests, values
- Develop energy goals for community

2.2 FOCUS ON ENERGY EFFICIENCY

- Assess demand side management, equipment upgrade options

2.3 DEVELOP ENERGY SCENARIOS

- Forecast energy demand
- Prepare feasible options through analyses

2.4 NARROW OPTIONS & FINALIZE FIRST NATIONS ENERGY PLAN

- Consult with community
- Prepare for implementation

SECTION 3: PLANNING AND IMPLEMENTATION

3.1 BUSINESS PLANNING

- Create detailed financial, HR and other business plans
- Organize implementation through project management plans

3.2 NEGOTIATE KEY AGREEMENTS

- Focus on strong communication
- Partner with similar organizations to support the community

SECTION 4: MANAGING ENERGY INFRASTRUCTURE

4.1 MAINTAIN PHYSICAL ASSETS

- Work with suppliers, contractors to transfer knowledge
- Provide training

4.2 MANAGE PROJECT TO SUPPORT GOALS

- Work from established O&M plans
- Regularly train and verify competencies

4.3 MONITOR, EVALUATE & COMMUNICATE

- Evaluate/revise as required
- Communicate performance to community

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SECTION 1: DEVELOPING AN ENERGY PROFILE

This section provides an overview of actions to take in pursuit of developing an energy profile. An energy profile is understood through reviewing existing energy operations (i.e. reflection of population as well as commercial and industrial activity) and supporting infrastructure to inform the community of its relationship with energy. Gaining an accurate understanding of this relationship will guide future energy decisions and choices for the community and its overall Nation. This process of developing an energy profile is summarized in Diagram 2 and is detailed further within Section 1.

At the end of this section, it will be clear that:

- Organizing the community through transparent consultation is the first key component of developing an energy profile.
- Dedicated teams of community and technical representatives are critical to informing the community and stakeholders of its energy profile. Leadership of this team would ideally be a 'champion' from within the community that has strategic links and relationship building skills.
- Knowledge of the community's energy demand (i.e. use, principal users, peak/average loads, capacity, reliability, cost) and production profile (i.e. capacity and excess capacity) are critical elements to correctly inform the community of its overall energy picture.
- Renewable energy resources may be a suitable solution to replace fossil fuel energy infrastructure, which may present additional opportunities (e.g. carbon finance, diversified business profile) for the community and Nation.

Diagram 2: Steps to Create Existing Energy Profile

1.1 GET ORGANIZED

- Consult with community
- Establish advisory, technical teams
- Determine lead or 'champion'

1.2 REVIEW ELEMENTS

- Review energy assets, plans
- Review energy use and sources
- Assess equipment and building plans

1.3 FINALIZE ENERGY PROFILE

- Assess renewable resources
- Prepare next steps

Photo credit: Hadfield (2006). Referenced with permission from http://www.flickr.com/photos/96452041@N00/146478979

1.1 GET ORGANIZED: ESTABLISH ENERGY ADVISORY TEAM AND TECHNICAL ASSESSMENT TEAM

- ENERGY LEADERSHIP: The energy advisory team is critical to provide input while also establishing plans and policies for energy development within the Nation. This group has the responsibility to consult with the community and to develop scenario strategies and decision frameworks. The team should be clearly supported by the community overall.

  - ACTION: Recruit key community members, industry partners (i.e. Independent Power Producer, BC Hydro), government officials (Provincial, Federal) and community 'champion'. Obtain commitment for the full initiative and schedule meetings, work plan and timeline. Further review community plans. If internal capacity is lacking to spearhead the initiative, hire technical expertise.

- TECHNICAL LEADERSHIP: The technical assessment team will inform the energy advisory team of technical elements related to energy generation (i.e. audit of current energy profile, demand reduction options, distribution system diagram, electricity supply options and implementation strategy). Provisions for the transfer of knowledge between community members and external technical experts should be made.

  - ACTION: Recruit key community members with an interest and background in energy (as well as potential technical expertise) to conduct the initial audit. Members of this team would provide expertise throughout this process.

1.2 REVIEW ELEMENTS: ASSESS CURRENT ENERGY PROFILE, CONDITION OF ENERGY GENERATION ASSETS AND BUILDING PLANS

- BASELINE INFORMATION: The assessment of the community's energy profile will provide a useful baseline of energy consumption and capacity in the community that will inform the planning process. The demand profile, peak demand, load factor, capacity from equipment and infrastructure, green house gas (GHG) emission data and direct fuel use are just some variables to be measured. As a result, the community's 'energy policy' will be determined and carbon finance opportunities[2] may be understood for potential, future financing of renewable energy.

  - ACTION: Task the technical team with auditing current electricity statistics by looking at the four key sectors of energy use: (1) residential (2) commercial (3) industrial and (4) municipal. Identify and track:
    - Generation capacity for electricity
    - Consumption patterns (i.e. peaks, lows, seasonal, average, load etc.)

[2] Carbon finance is a practice that attempts to put a price on carbon. It finances the generation of 'carbon offsets' (reduction in emissions to compensate for emissions elsewhere) that enable investment in renewable technologies that reduce emissions below business as usual levels. In return, 'carbon credits' (tradable permit representing the right to emit carbon dioxide) are produced and sold to buyers who are finding it harder to reduce their own emissions. E.g. a community that switches from fossil fuel use to renewable energy would generate GHG savings, which may then be sold as carbon credits. hoto credit: Hadfield (2006). Referenced with permission from http://www.flickr.com/photos/96452041@N00/146478979

- Diesel generator efficiency
- Primary electricity users (i.e. schools, homes, restaurants, fish plant, etc.)
- Cost of energy generation and consumption (i.e. actual dollars, % of budget, fixed and variable costs)
- Building efficiency ratings
- Logistics and operations of energy development through interviewing key staff/experts
- GHG emissions and opportunities for carbon finance

- EQUIPMENT REVIEW: The assessment of energy generation assets (i.e. equipment, distribution) is critical to inform the advisory team of useful life and safety implications as it directly relates to planning and well-being of the community.

  - ACTION: Determine condition of generating and distribution equipment (diesel or otherwise). Note the age, dependability, maintenance/repair records and other inefficiencies.

- EQUIPMENT/BUILDING PLANS: The assessment of planned renovations, new builds or new equipment acquisitions are important to understand as these decisions directly impact financial plans. Further, the quality of information is important to moving forward with capturing a snapshot of the current state of equipment and usage.

  - ACTION: Review build/acquisition plans with the energy audit, as some decisions may not be cost-effective when completed in conjunction with others. Verify metering of consuming facilities, fuel flow meter ratings, demand of usage from multiple generators, appropriate sizing of generators etc.

1.3 FINALIZE ENERGY PROFILE: AUDIT RENEWABLE RESOURCES

- RENEWABLE RESOURCE INVESTIGATION: Understanding the opportunity to utilize existing resources that might support renewable energy development is a critical piece and completes the energy profile. This assessment would provide stakeholders and funding organizations with the assurance that resources are available.

  - ACTION: Audit resources within community and territory (i.e. pre-feasibility assessments – hydrology, biomass inputs) through engaging with professional firms. Renewable energy resource information is located in Appendix 2. A detailed comparison of energy types according to positive and negative attributes, costs, and state of technology is illustrated in Appendix 3.

First Nations people gathering in the Heiltsuk territory

Photo credit: (1993) Referenced with permission from flickr.com. http://www.flickr.com/photos/un_photo/3312395424/credits.

SECTION 2: CREATING A FIRST NATION ENERGY PLAN

Diagram 3: Steps to Develop a First Nation Energy Plan

2.1 ENGAGE COMMUNITY

- Identify shared interests, values
- Develop energy goals for community

2.2 FOCUS ON ENERGY EFFICIENCY

- Assess demand side management, equipment upgrade options

2.3 DEVELOP ENERGY SCENARIOS

- Forecast energy demand
- Prepare feasible options through analyses

2.4 NARROW OPTIONS & FINALIZE FIRST NATIONS ENERGY PLAN

- Consult with community
- Prepare for implementation

Section 2 provides an overview of strategic steps to be undertaken in the development of an overall energy plan and builds from the profile assessment. The critical first step is to engage with the community to develop shared interests, values and goals as they relate to energy consumption and generation in the community. This is likely to foster a significant number of open and robust discussions, as economic, social, environmental and cultural aspects of the Nation will be affected from a new direction in energy policy. Further, analysis of energy efficiency options (including demand side management) will inform the development of energy scenarios and is the second step. Finally, advisory and technical groups develop energy scenarios and consult with the community to finalize a scenario where full feasibility of the opportunity is analyzed.

At the end of Section 2, it will be clear that:

- The energy plan development process must be inclusive of community input, dialogue and understanding to create a set of identified interests, values and goals of the community. This dialogue process approach is consistent with comprehensive community planning (CCP) or official community planning (OCP) processes.

- Energy conservation efforts through demand side management (DSM) practices are a critical piece of a community's energy 'policy' as it directly influences energy planning and comprehensive economic plans.

- Successful integration of these elements (matching projects with goals) may generate an implementation strategy (complete with a plan outline and timeline for next steps).

2.1 ENGAGE COMMUNITY: IDENTIFY COMMUNITY INTERESTS, VALUES AND GOALS[3]

- COMMUNITY ENGAGEMENT: For a First Nations energy plan to be effective, it must ensure that objectives and values of all community members have been incorporated and have support. In doing so, members must have the opportunity to be informed of the process while providing input into the development of plans.

  - ACTION: Develop a community engagement program through the use of public meetings, informal coffee sessions, online communications (i.e. website, blog), telephone access (i.e. 1-800 number) and traditional media such as flyers, newspapers and mail.

    Work with partners (both internal and external) that understand objectives of the community and are committed to long-term success.

- ENERGY INTERESTS, VALUES AND GOALS: The energy advisory team is responsible to engage with community members to clarify energy interests, values and goals. These variables will impact quality of life and economic foundations. Care must be taken to reasonably envision future economic growth that could come from access to resource tenures or licenses, developed partnerships and other factors.

  - ACTION: Conduct structured interviews and sessions with the community to understand how current energy sources impact the community. This process may be strengthened through the use of energy expert facilitators. Illustrate the impact of oil/fuel spills, emission data and health trends while introducing benchmark discussions of other similar Nations (where applicable).

    Further as a result of these conversations, seek to understand the desired equity position in the development of any energy project through a clear illustration of what is possible for the community and Nation.

2.2 FOCUS ON ENERGY EFFICIENCY: IDENTIFY AND EVALUATE WAYS TO MANAGE ENERGY DEMAND

- DEMAND SIDE MANAGEMENT: Energy conservation gains earned on the customer demand side are sometimes attributed to demand side management (DSM), which in addition to a focus on overall energy efficiency, can play a critical component in the development of energy policy. Discussions and analyses between the technical and advisory teams will reveal DSM options and barriers to implementation (see Appendix 4 for common examples and considerations).There are three major DSM areas for communities or advisory teams to note: (i) behavioural changes (ii) building improvements and (iii) equipment efficiencies.

[3] Much of this information adapted from: Haida Gwaii Community Electricity Plan. Prepared for the Council of the Haida Nation (CHN) on behalf of the Sheltair Group. February 2008, Revised April 2008. http://sheltair.com/haidagwaii/readingroom/index.html(2006).

i. BEHAVIOURAL CHANGES: Changing behaviour is the most challenging aspect of creating a demand side management program. Focused action to reduce homeowner costs (especially low-income households) may be a successful component of behaviour change.[4]

- ACTION: Identify barriers and challenges to create a plan that re-enforces positive behaviour. Key elements to focus on are:
  - Capacity building: through the promotion of energy efficiency (e.g. when constructing new residential buildings); through the training of retailers (e.g. promote energy efficient products); and through certifying more building inspectors (e.g. following building codes to be energy efficient).
  - Product incentives[5,6]: provide retailers and consumers with incentives to promote the adoption of efficient lighting systems, appliance trade-ins, hot water efficiency upgrades, solar hot water heating systems and programmable thermostats.

  Create educational and/or outreach programs that enable partnerships between consumers, retailers and youth organizations to change behaviour. Competitions for energy reduction have been shown to be engaging and often effective.

ii. BUILDING IMPROVEMENTS: Existing and new improvements to the 'envelope' of a building[7] is key to reduce energy consumption especially as it applies to communities that use significant electricity for space heating.

- ACTION: Conduct thorough inspections of existing building envelopes focusing on adequate insulation, while ensuring that new buildings meet higher efficiency standards.

iii. EQUIPMENT EFFICIENCY UPGRADES: The final key DSM element to analyze can often be a significant source of energy use if materials are old and outdated.

- ACTION: Replace outdated equipment with more energy efficient equipment (e.g. hot water tanks, lighting, appliances, programmable thermostats).

2.3 DEVELOP ENERGY SCENARIOS: FUTURE DEMAND AND SUPPLY

- SCENARIO DEVELOPMENT: The development of future economic and growth scenarios will support the creation of pre-designs for energy use in the community. Technical assessments are a key driver in developing these scenarios and should be a strong focus.

  - ACTION: The Advisory team should lead and conduct community consultations to determine how goals and visions are expected to impact economic development, employment, environmental stewardship and the preservation of cultural and social values.

[4] Haida Gwaii Community Electricity Plan, page 5-17. Prepared for the Council of the Haida Nation (CHN) on behalf of the Sheltair Group. February 2008, Revised April 2008. http://sheltair.com/haidagwaii/readingroom/index.html | [5] Natural Resource Canada's Office of Energy Efficiency offers grants and incentives to retrofit new and ageing infrastructure. For more information, visit: http://oee.nrcan.gc.ca/corporate/incentives.cfm?attr=4 | [6] BC Hydro Power Smart Program: http://www.bchydro.com/powersmart/ | [7] 'Building envelope' is defined as the separation of interior and exterior environments of a building.

- FUTURE GROWTH SCENARIOS: Informed with core knowledge of community interests, future growth scenarios are first developed with a modest 'base' (e.g. 0.5% to 1% growth) estimate, followed by scenarios that integrate community goals and visions (i.e. not simply population growth forecasts).

  - ACTION: The technical team should gather estimate data to inform future scenario development for energy generation and consumption. This would include:
    - Building improvements and construction figures.
    - Population growth rates and historical trends.
    - Fuel switching scenarios as customers previously electrified from fuel will place additional pressure on the system. This should be forecasted and limited through DSM measures.
    - Economic growth opportunities with longer (e.g. 20 year) timelines such as community business development and energy export opportunities to adjacent communities and operations.

- FEASIBLE OPTION IDENTIFICATION: Building from base scenario information that spells out the community's vision and goals from energy development, the following key developments typically outline the process to generate feasible options that enable objectives, goals and values: (i) develop multiple future scenarios (ii) identify electricity demand forecasts (iii) prepare pre-feasibility studies for energy generation supply options and (iv) develop technically feasible pre-design electricity supply options.

  i. DEVELOP MULTIPLE FUTURE SCENARIOS

  - ACTION: Integrate base scenario information with community vision and goals to develop multiple energy requirement scenarios.

  ii. IDENTIFY ELECTRICITY DEMAND FORECASTS

  - ACTION: Develop forecasts based on generated scenarios by the collaboration of the technical and advisory teams.

  iii. PREPARE PRE-FEASIBILITY STUDIES FOR ENERGY GENERATION SUPPLY OPTIONS

  - ACTION: Conduct pre-feasibility studies, which includes:
    - An inventory of energy options (e.g. solar, wind, geothermal)
    - Pre-design alternatives for each option
    - Relative costs and revenue associated with each energy option and design alternative
    - Decide which identified options will move to the feasibility assessment stage

  iv. DEVELOP TECHNICALLY FEASIBLE PRE-DESIGN ELECTRICITY SUPPLY OPTIONS

  - ACTION: The teams should use demand forecast information to create feasible energy supply options. The consideration of cost, technological availability and availability of

resources are some metrics to analyze[8]. Based on this information and analysis, generate feasible options to reflect goals, objectives and values.

2.4 NARROW OPTIONS AND FINALIZE FIRST NATIONS ENERGY PLAN

- ENERGY DESIGN CHOICES: Options identified in the demand analysis and pre-feasibility of energy generation supply options should be further refined using key evaluation criteria. The criteria would reflect community interests as defined through this process and would result in a short list of options.

  - ACTION: Through the identification of relevant community criteria, present and discuss options with the community. Specific criteria may include:
    - Estimated costs to individuals and community
    - Associated local employment
    - Importance of energy self-reliance
    - Environmental impacts: pollutants, noise, flora and fauna
    - Local ownership potential
    - Capacity of electrification assets
    - Resiliency of human resources available to manage assets

  Based on community feedback and potential referendum for final decision, conduct final feasibility of the selected energy generation project.

- FINAL ENERGY DESIGN: With the final decision made, it is important that the advisory and technical teams develop an implementation plan that details next steps, including how the energy project will be monitored when complete.

  - ACTION: Organize a meeting or workshop to develop a plan that enables goals and values of the community.

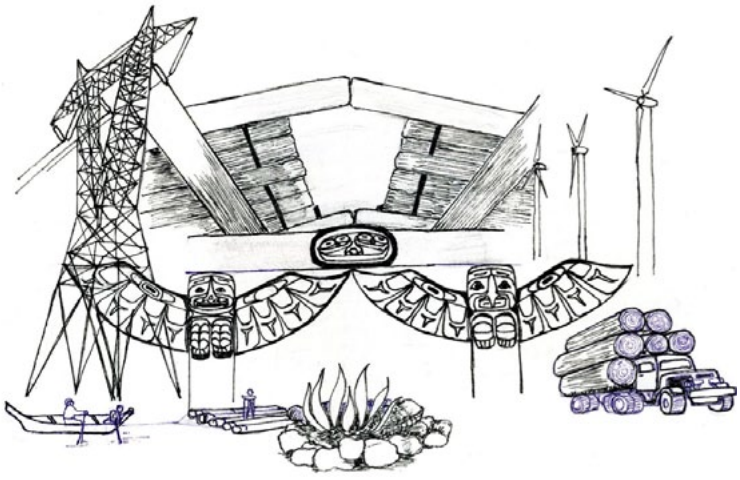

Illustration: Fundamental Truth 7 - Adapting to Change[9]

[8] Note: This is not an exhaustive list of variables that the team should analyze. Other elements may be included based on regional/political influence and other factors. | [9] Illustration credit: 'Yvxmi Hall, Shirl (2009); and Brown, F. and Y.K. Brown (compilers) (2009). Staying the Course, Staying Alive – Coastal First Nations Fundamental Truths: Biodiversity, Stewardship and Sustainability. Biodiversity BC. Victoria, BC. 82 pp. Available at: http://www.biodiversitybc.org.

SECTION 3: PLANNING AND IMPLEMENTATION

With the development of an official energy plan, business planning and effective project management should guide successful implementation of the energy project. At this stage, the technical team may need to be modified (i.e. add or subtract members) to ensure that appropriate implementation skills are retained within the committee (although it is a best practice to maintain some membership consistency to retain knowledge of the entire process).

Further, decision-makers should evaluate opportunities to align this process with other developments in the community (e.g. comprehensive community plans (CCP) or official community plans (OCP)). Finally, the process should be matched with the negotiation of key agreements with agencies, funding organizations, partners and stakeholders that have an interest in the project. Mapping out these activities in advance will allow communities to incrementally move forward with projects, capitalize on the overall vision and identify financing for resource allocations.

Thus, at the end of Section 3, it will be clear that:

- Business planning is required to ensure the funding and support is secured to move through the implementation process.
- Strong project management plans are required to organize resources, schedules and timelines.
- Effective communication with the community is important to maintain support.
- Multiple actions and significant effort to meet regulatory requirements is required, which includes negotiation of contracts, permits and licenses.

Diagram 4: Steps to Implement a First Nations Energy Plan

3.1 BUSINESS PLANNING

- Create detailed financial, HR and other business plans
- Organize implementation through project management plans

3.2 NEGOTIATE KEY AGREEMENTS

- Focus on strong communication
- Partner with similar organizations to support the community

Photo credit: Hadfield (2006). Referenced with permission from http://www.flickr.com/photos/96452041@N00/146478979

3.1 BUSINESS PLANNING: COMPONENTS, PROJECT MANAGEMENT & OTHER TOOLS

Business planning at the implementation stage of a renewable energy project is important for four reasons; it : (i) assists to obtain financing by clearly identifying financing terms (amount, type and timeline) (ii) creates accountability by creating checks and balances (iii) establishes control through the creation of benchmarks, and (iv) establishes the 'big picture' to encourage project realism.

BUSINESS PLANNING COMPONENTS:

- FINANCIAL: A financial plan is important to ensure communities have a succinct understanding of the financial implications the project will have. Revenues, costs (i.e. capital, financing and operational) should be outlined for the entire project.
  - ACTION: Determine forecasted revenue opportunities based on the project's design and consider the potential to generate income through carbon finance. Evaluate pre-construction, construction and post-construction costs based on size and type of project. Reduce costs through pre-feasibility studies that utilize advanced technology. Financial institutions and other lending agencies that specialize in energy development projects should be consulted.
- HUMAN RESOURCES: As new plans are developed, it is critical to build capacity of people within the community to be able to implement the project and properly manage and care for energy assets once complete.
  - ACTION: Ensure that proper training of facilities takes place and that standard operating procedures (SOP's) are well documented. Work with equipment suppliers and service vendors that focus on skills transfer to people within the community. Ensure that funds are effectively allocated to support this need from the overall budget.

PROJECT MANAGEMENT:

- PROJECT MANAGEMENT: A project management plan is critical to organize all project activities and identifies who will undertake the work and may be organized through a well-defined schedule. This will ensure appropriate resources are organized to bring the plan to life and maximum value to the community.
  - ACTION: The advisory and implementation teams should create a work plan for project execution to be communicated to project stakeholders.
- CONSULTANT AND CONTRACTOR INTEGRATION: For selected projects that require strategic monitoring of resources to support project implementation, professional assistance is often required. Key questions pertaining to (a) engineering studies, and (b) project design must be

asked, dependant on experience/expertise (internal and working with external firm), intent and budget. Appendix 5 contains a list of potential professional BC engineering firms that have experience in renewable energy.

- ACTION: When contacting professional firms, ask the following questions:
  - Has the firm undertaken this type of work?
  - What results can the firm show from completed projects? Can it provide references?
  - Can the firm assist with all project aspects (i.e. permitting, analysis of options, construction management)?
  - Can it provide a detailed proposal (i.e. activities, costs, timelines)?

- PERMITTING: The permit process can be lengthy and complex within a project's typical lifecycle of pre-construction, construction and post-construction. Proper care must be taken to effectively implement.

  - ACTION: Thoroughly assess Provincial regulations to understand the many licenses and permits related to water, road use, fisheries, crown land, waste disposal, environmental issues and other permits that may apply[10]. Engage with government agencies early and often to ensure regulations are met and costs are minimized. Government contact information is located in Appendix 7.

OTHER TOOLS:

- COMMUNITY COMMUNICATION: Similar to all other steps within this road map, effective community engagement is critical to ensure success of project implementation. See Section 2 Creating a First Nation Energy Plan for detailed communication steps and strategies.

3.2 NEGOTIATE KEY AGREEMENTS

- ELECTRICITY PURCHASE AGREEMENTS (EPA'S): For communities that can connect to the grid, negotiating an EPA can be a lengthy process and necessary to qualify for third party financing. Communities that are off-grid can negotiate an EPA with BC Hydro (selling power back to BC Hydro) if they decide to be customers of BC Hydro and meet eligibility criteria for the remote community electrification (RCE) program or if they are already non-integrated (NIA) customers. Under this scenario, this agreement is also important to obtain third party financing (i.e. from financial institutions).

- OWNERSHIP STRUCTURE: Some communities may be able to invest in renewable energy projects through internal capital budgets, private sources and/or government bodies. Communities may also generate equity through joint ventures with IPP's. It is common for projects to be constructed with a minimum 25% equity stake (e.g. purchase of/rights to shares), which is inclusive of entire project costs, not just construction.[11] Communities should seek assistance to establish corporate structures that protect assets and minimize tax impacts, especially for off-

[10] BC's Ministry of Agriculture and Lands (BCMAL) published an Inter-agency Guidebook for proponents, Independent Power Production in BC, which outlines the detailed permitting process.

reserve projects.

- INTERCONNECTION[12] (IF CONNECTED TO BC HYDRO TRANSMISSION LINES): The interconnection agreement refers to technical and legal requirements for a physical connection to BC Hydro's power lines, ensuring the connection is done in a manner that provides adequate protection from electrical faults originating from either party's system. The physical connection must also meet well-recognized industry standards in terms of quality of the energy provided.

- TRANSMISSION SERVICE: Communities that are able to connect projects to the grid require a Transmission Service Agreement if all energy at the generation site is not used. Excess energy must be transmitted through the grid to the consumption area. If energy is sold directly to BC Hydro, BC Hydro will look after the necessary transmission and distribution capacity, but if energy is sold to a party other than BC Hydro, the community or energy purchaser is responsible for energy transmission costs.

- LEGAL: To protect all party interests, communities must have appropriate counsel throughout the development process to ensure all activities are compliant with the rules and regulations of the Provincial and Federal Governments. This will include aspects of title certification, legal plans, land status, health and safety compliance and construction contracts.

- INSURANCE: Communities must consider appropriate insurance throughout the life of an energy project. Consult an insurance provider for information.

- MUNICIPAL AND REGIONAL: Some municipalities or Regional Districts may require additional fees and agreements. Ensure to communicate plans and objectives with adjacent government throughout the process.

- CONSTRUCTION: Construction agreements will outline labour rates, unit prices (or lump sums) and require significant effort to ensure that the community's interests are maintained. Consult Provincial resources for information.

- CONTRACTS: For a list of contracts that may be required for micro hydro energy projects in British Columbia, consult BC Hydro's Handbook for Developing Micro Hydro in British Columbia (March 2004), which also has a detailed list of contacts and literature. Visit: http://www.bchydro.com/planning_regulatory/energy_technologies/enabling_small_and_micro_hydro.html

- EMISSIONS REDUCTION PURCHASE AGREEMENT (ERPA): Communities that utilize carbon finance tools to generate revenue as a result of the energy project must finalize agreements with an ERPA. The International Emissions Trading Association outlines standards for this agreement. Visit: http://www.ieta.org/ieta/www/pages/index.php for more information.

[11] BC Hydro, 2004. Handbook for Developing Micro Hydro in British Columbia. March 23, 2004. http://www.bchydro.com/planning_regulatory/energy_technologies/enabling_small_and_micro_hydro.html | [12] BC Hydro, 2004. Handbook for Developing Micro Hydro in British Columbia. March 23, 2004. http://www.bchydro.com/planning_regulatory/energy_technologies/enabling_small_and_micro_hydro.html

SECTION 4: MANAGING ENERGY INFRASTRUCTURE

Diagram 5: Process to Maintain, Manage and Monitor Energy Assets

4.1 MAINTAIN PHYSICAL ASSETS

- Work with suppliers, contractors to transfer knowledge
- Provide training

4.2 MANAGE PROJECT TO SUPPORT GOALS

- Work from established O&M plans
- Regularly train and verify competencies

4.3 MONITOR, EVALUATE & COMMUNICATE

- Evaluate/revise as required
- Communicate performance to community

Section 4 provides an overview of issues to consider in the operational phase of a renewable energy project. Considerable time and resources have been invested into the operation by this stage and it is critical to install plans that preserve and enable the newly installed assets. Clear maintenance, management and monitoring steps must be developed (ideally with equipment manufacturers and professional firms that contributed to its design) to ensure benefits flow as intended. At this stage, it is important to note that human resource requirements might again involve a different set of people than those in earlier stages, although some consistency is preferred.

At the end of Section 4, it will be clear that:

- Positive and complimentary relationships with supplier and contractors are important to delivering an energy system that will meet present and future needs of the community.
- Appropriate management systems are required to encourage capacity building measures for all employees and management.
- Sound monitoring plans are required so that operational adjustments can be made to track performance of the energy assets, which also would create an environment for carbon finance to play a potential role in revenue generation.
- Strategic communication efforts that inform the public of energy generation results are important to generate awareness and participation.

Diagram 5 photo credit: Moy toy (Power meters) [CC-BY-SA-2.0 (www.creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons. http://commons.wikimedia.org/wiki/File:BC_Hydro_Ruskin_GS-3.jpg

4.1 MAINTAIN PHYSICAL ASSETS

- PLAN DEVELOPMENT AND TRAINING: It is important to have the supplier/installer assist with establishing appropriate controls for the technology and equipment. In addition, this group should establish and furnish comprehensive operation and maintenance (O&M) plans.

  - ACTION: Ensure that agreements and contracts are established with technology providers to provide desired services (e.g. O&M plans, after purchase service, warranties) for the community energy project.

    Implement the operation and maintenance plans with scheduled service, upgrades, training, and committed budget.

4.2 MANAGE ASSETS AND PROJECT TO SUPPORT GOALS

- MANAGEMENT AND LEADERSHIP: Effective management of the project as well as its ability to support the vision and goals established in the plans is important to ensure responsible value is generated.

  - ACTION: Budget and allocate time for continual education of employees to effectively manage the energy assets. Regularly train and verify competencies by keeping accurate records of training.

    Encourage capacity building of community members through skill transfer (both management and technical) through established agreements with suppliers and/or other technical professionals.

    Establish formal feedback mechanisms (e.g. periodic reviews) to ensure that learning is captured along the way and benefits are transferred within the community.

4.3 MONITOR, EVALUATE AND COMMUNICATE[13]

- COMMUNITY COLLABORATION: The advisory, technical and other committees established in support of the energy development should work together to monitor each project and determine if results are achieved. It is critical that the community is also involved throughout this process.

  - ACTION: Establish regular schedules to gather useful information on how the energy assets are working. In addition, monitor the energy plan, report at regular intervals (to the advisory group and community) and learn from progress.

[13] Arctic Energy Alliance website: http://www.aea.nt.ca/uploads/files/step_5_implement_and_monitor_the_plan-reduced.pdf. Page 5-12.

- RESPONSIBLE MONITORING: Effective monitoring of the energy generation is critical as it helps to evaluate: (i) the energy plan and its effectiveness, (ii) carbon finance opportunities, and (iii) opportunities to improve the plan.

  i. FEEDBACK OPPORTUNITY: The evaluation of the energy plan and its effectiveness is particularly important as it serves as a proxy for other, future energy developments that may be considered for development within the community.

  - ACTION: Continually gather technical, cost, human performance and environmental impact information through established scheduled and formal feedback mechanisms. Further, isolate variables that are under performing and make corrections.

  ii. INFORMATION TRACKING: Evaluation of the plan and its operational effectiveness will assist with the development of carbon finance revenue opportunities.

  - ACTION: Track energy generation data as it will directly support carbon finance opportunities. Consult professionals to provide an honest assessment.

  iii. PERFORMANCE ASSESSMENT: As part of ongoing tracking of energy performance according to plans, it is important to determine if adjustments are required and how often full reviews should take place (including sub-plans).

  - ACTION: Assess performance based on goals and create adjusted work plan if required. Ensure that honest performance assessments are catalogued and discussed.

    If it is determined that a full review should take place, start from the first step in this planning document to create a new plan that suits the goals of the community. Re-visit energy plans every 5 to 10 years to ensure the greatest amount of value is generated from energy assets.

- COMMUNICATE WITH COMMUNITY: The final aspect of maintaining, managing and monitoring energy assets is to directly inform the community of how the plan is working as it supplies the community with energy and supports its goals. Good public information increases awareness of energy issues and inspires people to participate.

  - ACTION: Provide monthly monitoring reports through local gatherings and media related to the success and progress of technical and overall energy aspects. It is important to ensure this progress is communicated with employees, as they are the key parts of energy success. Show yearly effects from changes that may include: less money spent on energy, less fossil fuels and GHG emissions, more energy efficient products in local stores and renovations of x buildings.

HIGHLIGHT: FIRST NATION RENEWABLE ENERGY EXAMPLES

BELLA BELLA (HEILTSUK): Independently owned, Non-Integrated Area (NIA): Hydro Generation. Energy generating assets for Bella Bella are owned by Boralex and are supplied from a 14.5 MW hydroelectric facility, constructed in the early 20th century, at Ocean Falls. The facility is operating below its installed capacity and is pursuing economic development opportunities with neighboring communities. Electricity is sold to BC Hydro for roughly $0.19 per kWh, which is re-sold to individual customers in Bella Bella at roughly $0.07 per kWh.

ATLIN (TAKU RIVER TLINGIT[14]): Independently owned (Nation), Non-Integrated Area: Hydro Generation. The hydroelectric project for the town of Atlin is 100% owned by the Taku River Tlingit First Nation (TRTFN) and began operating the 2.1 MW power generating station in April 2009. Replacement of diesel-generating infrastructure will save an estimated 150,000 tons of greenhouse gas emissions over the lifetime of the project. TRTFN contributed $1 million of its own source revenue and the Taku Land Corporation (TLC) was successful in raising $4 million in grants for equity financing to leverage $12 million in debt financing. A 25-year EPA was signed with BC Hydro.

KLEMTU VILLAGE (KITASOO/ XAIXAIS): Independently owned (Nation) – Non-NIA: Hydro Generation. The Kitasoo Power Corporation initially developed a run of river hydroelectric facility in 1980, with installed capacity of 525kW to power the community and processing plant. After more intensive feasibility studies and project scoping beginning in 2003, the facility was expanded to 800kW in 2008 with further expansion (to 1.7MW) planned. Project funding was obtained from the Kitasoo First Nation, program-based INAC sources (ANCAP)[15] as well as BC's Ministry of Energy.[16]

CHINA CREEK (HUPACASETH, UCLUELET[17]): Independent (Nation) Owned: Hydro Generation. The China Creek hydroelectric facility is controlled by Hupacaseth First Nation's Upnit Power Corporation (72.5% stake), with minority interests owned by Synex Energy (12.5%), the Ucluelet First Nation (10%) and the City of Port Alberni (5%). After a Community Energy Plan was created to guide the development (and one year of construction), the project officially began operating in 2005. Significant Federal support was utilized: $2 million equity match grant from INAC, $250,000 from ANCAP and a $945,000 loan from Western Economic Diversification.

[14] Information obtained from BC Hydro: http://www.bchydro.com/community/aboriginal_relations/key_initiatives/economic_development.html and: Taku River Tlingit Corporation http://susanthorne.com/Corporations%20Report%20FINAL.pdf | [15] INAC's EcoENERGY Program and Community Action Program (ANCAP) were utilized for project funding, however this program is no longer in existence. The EcoENERGY program is not accepting applications (as of October 1, 2010) and Instead, communities could look to the Climate Change Adaptation Program: http://www.ainc-inac.gc.ca/enr/clc/adp/index-eng.asp | [16] The Ministry of Energy: Remote Community Clean Energy Program. http://www.empr.gov.bc.ca/RET/COMMUNITYENERGYSOLUTIONS/RCCEP/Pages/default.aspx | [17] Information obtained from BC Hydro: http://www.bchydro.com/planning_regulatory/acquiring_power/green_ipps/project_updates/china_creek.html and Plutonic Power Corporation: http://www.plutonic.ca/i/pdf/china_creek_presentation.pdf

APPENDICES

APPENDIX 1: BRITISH COLUMBIA ENERGY LANDSCAPE

Internal assessments and plans must be developed in concert with an understanding of how electricity generation is governed within the Province of British Columbia. The next part of this section provides an overview of how this is managed and what organizations are involved.

INTEGRATED ELECTRIFICATION: Electricity generation within the Province of British Columbia is primarily controlled by BC Hydro[18], while the balance is controlled through independent operators. Over 90% of Provincial electricity needs are met through BC Hydro's integrated and heritage network of hydroelectric plants around the Province, with much of the remainder being supplied from natural gas[19]. BC Hydro's mandate calls for 50% of incremental energy supply requirements to be generated from renewable sources and has committed to being energy self-sufficient by 2016[20]. The BC Energy Plan (2007) illustrates implementation of these targets, which is inclusive of First Nation engagement through the First Nation and Remote Community Clean Energy Program[21].

Further, the Province, INAC, BC Hydro and the First Nations Technology Council are working together through a Remote Community Energy Network (RCE Network). The objective of this network is to assist remote BC communities with implementation of community energy solutions through the coordination of access to member programs. These programs include support for energy education and training, community energy planning, utility service provisions, clean energy development and energy efficiency/monitoring.

NON-INTEGRATED (OFF-GRID) ELECTRIFICATION: Communities not connected to BC Hydro's main transmission system[22] are considered to be 'off-grid' and reside within BC Hydro's 'non-integrated area' (NIA) where communities receive service from BC Hydro. The NIA is managed and operated through one of two basic business models: (1) BC Hydro sole ownership, or (2) independent ownership as illustrated in Appendix 1, Table 1.

Communities not part of BC Hydro's NIA still may receive service from BC Hydro as it is responsible for offering communities with utility grade electrical service in accordance with rules established by the BC Utilities Commission (BCUC). The program in which this is administered is the Remote Community Electrification (RCE) Program. Outside of this support, communities may also choose to independently manage electrification.

Table 1 seeks to capture these factors at play and provides examples of where and how various communities fit into the structure.

[18] Fortis BC is the other significant supplier of electricity as it owns and operates four hydroelectric generating plants on the Kootenay river (223 MW). These assets supply most of South Central British Columbia. Source: Community Energy Association. http://www.communityenergy.bc.ca/sites/default/files/Powering%20Our%20Communities.pdf | [19] Source: Powering Our Communities. Renewable Energy Guide for Local Governments in British Columbia. September 2008. Community Energy Association. http://www.communityenergy.bc.ca/resources-introduction/powering-our-communities-renewable-energy-guide-for-local-governments |[20] BC Energy Plan: A Vision for Clean Energy Leadership. http://www.energyplan.gov.bc.ca/ | [21] BC Government Remote Community Energy Program. http://www.empr.gov.bc.ca/RET/CommunityEnergySolutions/RCCEP/Pages/default.aspx | [22] The cost to connect these communities would be cost prohibitive (several times more than grid connected customers)

Table 1: Off-Grid Electrification Supply Options in British Columbia[23]

AREA	DESIGN	DETAILS
BC HYDRO'S NON-INTEGRATED AREA (NIA)	BC Hydro Owned	BC Hydro owns the assets and operates the system for the community. Examples: Bella Coola, Masset (diesel), Sandspit (diesel); Clayton Falls (Hydroelectricity).
	Independent Ownership; i.e. Nation, community or other ownership where other investors are involved (e.g. external IPP)	Community, Nation or other ownership owns the assets, sells electricity to BC Hydro through an established electricity purchase agreement (EPA), which is then sold back to the community (generally subsidized by BC Hydro) at the same rate as other off-grid communities. Examples: Bella Bella (through IPP Boralex).
AREAS OUTSIDE BC HYDRO'S NIA	BC Hydro's Remote Community Electrification (RCE) Program [24]	Eligible communities may have the following characteristics: • It is located in a rural area, established for a minimum of 20 years • It is has 10 or more permanent principle residences • It is listed on the Remote Community Regulation • Homes are within 200m of each other and less than 100m apart (avg.) • Homes are more than 1.5 km away from the BC Hydro grid, or, are disqualified from the UEA program[25] to connect to the grid • It is not a recreational property or commercial enterprise (i.e. apartment blocks, row house complex, motels, trailer parks, marinas).
	Independent Electrification	• Community Led Examples: Klemtu, Hartley Bay (in process of becoming part of the RCE program). • Community Led with Independent Power Producer (IPP).

[23] Diesel power generators, because of ease and low capital costs, are either continuing to supply 100% of electricity or act to generate when renewable sources cannot. | [24] BC Hydro's first RCE community was Toad River, electrified through a three unit (diesel generated) plant in 2009. http://www.bchydro.com/news/press_centre/media_updates/toad_river_power.html | [25] BC Hydro's Uneconomic Extension Allowance (UEA) is defined as 'an extension required to serve at least one principal residence, a residence on a productive farm or a productive farm irrigation load and which, in the determination of BC Hydro, qualifies for a contribution from the Uneconomic Extension Allowance Fund'. Source: Letter from Terasen Gas, Vice President of Regulatory Affairs, to BCUC Commission Secretary. July 22, 2004.

APPENDIX 2: RENEWABLE RESOURCE LANDSCAPE

RENEWABLE ENERGIES: Once a community understands its energy profile, the first logical step is to determine appropriate demand side management practices (Section 2) that would best serve the project. While new projects should be designed with DSM in mind, existing projects may have high capacity (i.e. meaning they are cost-effective) and DSM measures would limit cost effectiveness. The next step is to understand what renewable energy applications are available and which are best suited for energy generation within a Nation's territory. Table 2 introduces and generally describes renewable energy technologies, which is followed by an introduction of industry resources (i.e. firms, associations) that communities can contact for information.

Table 2: External Resource Assessment[26]

ENERGY	DESCRIPTION
BIOMASS	Biomass energy is generated through the burning of organic material (plants, wood, liquid) and can be utilized to create both energy and heat sources. It is a sustainable energy resource that emits low CO_2 and reduces waste. Areas not rich with significant organic material supply may find that transportation of these materials creates no advantage.
GEOTHERMAL	Geothermal energy is created through the conversion of heat under the earth's surface. It is well suited within some areas of British Columbia, but the technology is in the growth stage.
MICRO-HYDRO OR 'RUN-OF-RIVER'	Hydroelectric energy is a clean, renewable and predictable energy source and is created by converting mechanical energy from running water into electric energy. Substantial resource monitoring is required to ensure adequate water levels, as no site is the same. Thus, capital costs are significant, but well-managed sites can produce positive returns over the long-term. The flow volume, head and annual water capacity dictate the power generation potential of a micro-hydro site. Significant regulatory and permitting requirements are necessary.
OCEAN: TIDAL	Ocean energies are in the developmental stage and require site-specific assessments. Tidal energy is produced from the predictable rise and fall of tides from the gravitational influence of the sun and moon. While the energy is free, sustainable and reliable, installations must be designed to avoid conflict with marine life and transportation activities and commercialization is 15 to 25 years away.
OCEAN: WAVE	Wave energy is produced from ocean surface water movement derived from wind. Like tidal energy applications, designs must avoid conflict with the marine environment. Further, these ocean technologies are not likely to reach any broad based scale due to inexpensive power generated through BC's large-scale hydroelectric heritage assets.
SOLAR	Solar energy is the simplest form of renewable energy as there are no moving parts. Electricity is generated through the conversion of solar energy by photovoltaic (PV) panels and can either be used immediately (direct use or by selling back to the 'grid') or stored in batteries. Significant up front investment and space is required to install solar technology.
WIND	Wind energy reduces environmental impact because it requires no fuel and does not produce pollution or greenhouse gases. Moving air (containing kinetic energy) is converted into electricity by favourable wind turbine locations. Up front capital costs can be significant, but operational costs are relatively inexpensive. Application of wind technology in heavy precipitation areas (high cloud cover) may be limited.

Additional information (i.e. costs, advantages/challenges) on these technologies and other renewable energy technologies (e.g. groundsource heat, solar hot water and solarwall) can be found in Appendix 3.

[26] Most renewable resource information is adapted from Natural Resource Canada's CanmetENERGY: http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables.html BC Sustainable Energy Association: http://www.bcsea.org/ Clean Energy BC: http://www.ippbc.com/ Community Energy Association of BC: http://www.communityenergy.bc.ca/

RENEWABLE ENERGY RESOURCE CONTACTS; INDUSTRY ORGANIZATIONS: There are a number of renewable energy associations that communities can utilize to learn additional information about renewable energy technologies as well as companies that can be contacted. Some examples are:

- The BC Sustainable Energy Association (BCSEA): http://www.bcsea.org/
- Clean Energy BC (formerly IPPBC): http://www.ippbc.com/
- The Community Energy Association of BC: http://www.communityenergy.bc.ca/

At this assessment stage, communities should have a clear understanding of their energy profile as well as renewable energy technologies that may be applicable within specific regions. This information will inform communities that plan to undertake a First Nation Energy Plan as discussed in Section 2.

APPENDIX 3: RENEWABLE ENERGY OVERVIEW

- ENERGY TYPE: Biomass

  ADVANTAGES: 'Co-generation' designs (producing electricity and heat) reduce CO_2, sulfur and mercury emissions, waste reduction, economic development and cost efficiencies; more operational staff per unit than hydro or wind. 'Torrefaction'[27] of biomass is a relatively new method of creating dense biomass material inputs for use in energy plants.

  CHALLENGES: 'Feedstock' inputs need to be transported to regions not rich with biomass material (cost, environmental effects) – very sensitive factor; smaller plants not as effective as larger-scaled plants; mountain beetle stocks and/or harvesting of other stocks may not be sustainable.

  STATE OF TECHNOLOGY: Mature in large scale, emerging at 100kW to 500kW range.

  CAPITAL COST[28]: Dependent on size, tech.; between $2.5 to $3 million per MW (~ $3,000/kW).

  OPERATING COST: Dependent on inputs;[29] ranges between $65 to $158/MWh ($0.07 to $0.16/kWh); others range at $5.05/MWh.

- ENERGY TYPE: Geo-thermal

  ADVANTAGES: Strong prospect of generating power in BC (although none in Canada); best suited for large scale, grid-tied applications.

  CHALLENGES: Energy generation landscape in BC not supportive of higher cost, alternative energy sources and no operations are present in BC; scale is required to be economically viable.

  STATE OF TECHNOLOGY: Emerging at small scales.

  CAPITAL COST: Approx $5 million per MW (~ $5,000/kW).

  OPERATING COST: Estimated to cost $44 to $60/MWh[30] ($0.04 to $0.06/kWh).

- ENERGY TYPE: Ground source (Geo-exchange)

  ADVANTAGES: Heat is pumped from or into the ground through a closed loop pipe system for space heating and cooling of individual or groups of buildings. Est. growth rate of 40%/year despite high up front installation costs.

  CHALLENGES: Cost of installing piping is high (excavate ground and install); if generated via other commercial applications (i.e. oil/gas drilling), water may have contaminants and may endanger the environment; no electricity is generated.

  STATE OF TECHNOLOGY: Mature.

  CAPITAL COST: High up front installation costs – total between $18,000 to $30,000[31] for residential home.

  OPERATING COST: Estimated to cost $44 to $60/MWh ($0.04 to $0.06/kWh).

[27] The Heiltsuk First Nation is conducting feasibility studies into the viability of biomass 'torrefaction' to be used for inputs and the creation of renewable energy within the Nation (February 2011). Conclusive evidence illustrates the potential of opportunity – pending feasibility studies and due diligence. |[28] Significant capital cost and operating cost information obtained from OnPoint Consulting: Strategic Analysis of Renewable Energy Options for the Central Coast, North Coast and Haida Gwaii. March 2009. Other information sources are cited | [29] Inputs can vary; from infested (beetle pine) wood, sawmill wood waste, standing dead trees and roadside wood waste. BC Hydro Report: Anahim Lake Electrical Service Area Community Electricity Plan, Revision R01. July 3, 2010. Page 22. In addition, capital costs can rise to $5,600 per kW for varying types of this technology (I.e. gasification, pyrolysis – turbine). http://www.bchydro.com/etc/medialib/internet/documents/planning_regulatory/acquiring_power/2010q3/20100706_cbb_sch_8.Par.0001.File.20100706_CBB_Sch_8_Anahim_Lake_CEP.pdf | [30] BC Energy Plan (2007), Page 22. http://www.energyplan.gov.bc.ca/PDF/BC_Energy_Plan.pdf | [31] Canadian Geoexchange Coalition: http://www.geo-exchange.ca/en/cost_savings_questions_faq8.php

- ENERGY TYPE: Micro hydro

  ADVANTAGES: Limited environmental impact when designed correctly; low operational costs; remote communities come off diesel generation; employment strong in construction phase, limited during operation.

  CHALLENGES: Substantial up-front capital is required; generators can be many times the cost of diesel; access roads and transmission lines are visible disadvantages and costly; fish and fish habitats; cultural acceptance.

  STATE OF TECHNOLOGY: Mature – 'low-tech' schemes that are undersized are best.

  CAPITAL COST: Approx. $13 to $15 million per installed MW ($13,000 to $15,000/kW); highly site specific.

  OPERATING COST: Estimated $60 to $110/MWh[32] (small: $0.06 to $0.11/kWh) although micro hydro systems may be larger.

- ENERGY TYPE: Ocean, Tidal[33]

  ADVANTAGES: Predictable energy source as energy is dependent on gravity (sustainable, free and reliable); dense form of energy (less space required).

  CHALLENGES: Difficult to determine costs as installations are site specific; early development technology stages are expensive; recreational/commercial fishing implications.

  STATE OF TECHNOLOGY: Research, developmental.

  CAPITAL COST: Estimated $10.6 to $11.6 million/MW.

  OPERATING COST: Estimated to cost $100 to $360/MWh[34]; $660 to $880/MWh (including debt service).

- ENERGY TYPE: Ocean, Wave

  ADVANTAGES: Infrastructure could become part of the natural habitat for wildlife and fish; dense form of energy (less space required).

  CHALLENGES: Energy generation landscape in BC not supportive of non-heritage applications; marine traffic implications.

  STATE OF TECHNOLOGY: Research, developmental.

  CAPITAL COST: Estimated $10.6 to $11.6 million/MW.

  OPERATING COST: Estimated to cost $100 to $360/MWh.

- ENERGY TYPE: Solar

  ADVANTAGES: Some applications double as roofing/cladding material. Solar PV systems are a 'community signal' of being renewable energy supportive.

  CHALLENGES: Significant capital required; batteries required to store excess power if not grid connected; not suitable for most coastal BC regions; relatively expensive technology (materials); minimal employment opportunities.

[32] 'Small' hydro installations are typically referred to as 10MW or less, while 'Micro' may be considered as less than 2MW.' | [33] Most ocean energy technologies are at the research, development or demonstration stages. | [34] BC Hydro: 2004 Integrated Electricity Plan. http://www.bchydro.com/planning_regulatory/long_term_electricity_planning/past_plans/2004_iep.html

STATE OF TECHNOLOGY: Mature.

CAPITAL COST: Small (3kW) household (solar PV system costs $20,000 to $30,000)[35].

OPERATING COST: Between $500 to $1,700/MWh ($0.50 to $1.7/kWh). Cheaper costs ($100/MWh) in sunny areas.

- ENERGY TYPE: Solar Hot Water[36]

  ADVANTAGES: Offsets fossil fuel combustion (reduces GHGs and pollutants); reduces electricity consumption; rebate applicable[37].

  CHALLENGES: Technology is reliant on adequate sunlight (10:00 am to 4:00 pm clear access to sunlight).

  STATE OF TECHNOLOGY: Mature.

  CAPITAL COST: Typical systems costs approximately $7,000, but rebates can reduce by 50%[38].

  OPERATING COST: Up to 60% of hot water needs can be supplemented with this technology.

- ENERGY TYPE: Solarwall[39]

  ADVANTAGES: Applications work best in snowy areas (improving performance by 50% to 70%, greatly reducing CO_2); residential systems pay back investment in four years; tax incentives exist; LEED point eligible.

  STATE OF TECHNOLOGY: Mature.

  CAPITAL COST: Approx. $14/square foot[40].

- ENERGY TYPE: Wind

  ADVANTAGES: Compatible with other land uses; generates tourism opportunities; no harmful waste produced; relatively inexpensive to install and operate.

  CHALLENGES: Intermittent supply (load factors range between 27 to 40% (40% the minimum); off grid areas need costly batteries to store energy; minimal employment; bird habitat potential conflict; sound regulations; 1 year of monitoring required.

  STATE OF TECHNOLOGY: Mature, although some locations can present challenges.

  CAPITAL COST: Small-scale turbine (10 to 100kW) approximately $3,000 to $8,000 per kW[41].

  OPERATING COST: Small sites range between $0.18 to $0.44/kWh.

[35] BC Hydro Anahim Report (per footnote 26). Page 26: 'Typical installed cost for a small residential solar PV system (500W to 1.5 kW), comprised of solar panels, mounting, grid-tie converter, wiring and installation is approx. $4,000 to $15,000' | [36] SolarBC lists a directory of companies with expertise: http://www.solarbc.ca/learn/systems | [37] Rebates can come from Solar BC and other agencies. Visit http://www.solarbc.ca/learn/incentives-costs | [38] SolarBC: http://www.solarbc.ca/learn/incentives-costs | [39] For more information, visit (1) Solarwall: http://solarwall.com/en/home.php or (2) BCSEA: http://www.bcsea.org/learn/get-the-facts/renewable-energy-technologies/solarwall | [40] BC Sustainable Energy Association (BCSEA): http://www.bcsea.org/learn/get-the-facts/renewable-energy-technologies/solarwall | [41] Canadian Wind Energy Association (CanWEA): http://www.canwea.ca/images/uploads/File/NRCan_-_Fact_Sheets/10_building.pdf

APPENDIX 4: DEMAND SIDE MANAGEMENT (DSM) CONSIDERATIONS

DSM is seen in physical alterations of product (i.e. energy efficient appliances and buildings) as well as programs to change behaviour to reduce consumption (BC Hydro's two-step Conservation Rate Policy that discourages excessive energy consumption[42]). Behaviour change is arguably the most challenging component of any DSM/energy efficiency program and through progressive educational campaigns, citizens can learn how conservation efforts can better position the overall community to succeed in sustainable energy generation (reducing energy consumption) to prevent capital investments in energy infrastructure.

In developing a successful DSM program[43], communities are encouraged to undertake the following four steps as they relate to behaviour change:

1. Identify barriers to change;
2. Identify tools and approaches appropriate to the community;
3. Pilot the program in a small portion of the community;
4. Evaluate the program at different stages of implementation.

COMMON DSM BARRIERS AND SUGGESTED APPROACHES

- PERSONAL BEHAVIOUR:

  KEY CHALLENGES

  - Lack of education for consumers, retailers and suppliers on energy efficiency; perception that energy efficiency (and environmentally friendly) products are more expensive than counterparts.
  - Lack of leadership involvement and buy-in from public officials, which is crucial for programs to be successful at the community level.
  - There is general support for DSM although individual residents feel that they cannot make a difference.
  - Incomes in some areas are low; residents are unlikely to be replacing appliances or renovating homes.

  SUGGESTED APPROACHES

  - Educate the community on available energy efficiency measures; illustrate benefits of changing behaviour (e.g. washing clothes in cold water, dishwasher use outside of peak hours).
  - Educate leadership on community benefits from this process and seek endorsement of DSM recommendations; illustrate the business case for DSM adoption.
  - The DSM program should be easily accessible and messaging should be linked with outcomes that show benefit from effort.
  - Focus efforts on an outreach program that develops relationships with retailers and residents, incorporating home visits and communication to the community's youth. Develop social marketing campaign through use of social media - Facebook, Twitter etc.
  - The DSM program should make it easy to participate; incentives should be provided.

| [42] BC Hydro's two-step Conservation rate: https://www.bchydro.com/youraccount/content/conservation_rate_faqs.jsp | [43] Considered to be issues common to many First Nations, this framework and following table was adapted from: Haida Gwaii Community Electricity Plan. Prepared for the Council of the Haida Nation (CHN) on behalf of the Sheltair Group. February 2008, Revised April 2008. http://sheltair.com/haidagwaii/readingroom/index.html

BUILDINGS & EQUIPMENT:

KEY CHALLENGES

- Qualified building inspectors.
- Residential construction practices; lack of training opportunities for trades and construction workers.
- Energy efficient building materials difficult to obtain at retail outfits.
- Inconsistent supply of energy efficient products in local stores and lack of incentives to utilize.
- Weak, un-enforced or absent bylaws to ensure that building retrofits (e.g. installation of heating equipment) are done to code.
- Appliance costs generally more in remote areas due to shipping costs.
- The life cycle of appliances can be shorter (than mainland) due to inconsistent power quality.

SUGGESTED APPROACHES

- Capacity building and training to ensure buildings are kept up to code.
- Provide training to construction trades on building efficiency techniques, especially for building envelope upgrades and new construction suited to the climate/region.
- Evaluate joint purchasing through the Power Smart program[44]. Work with retailers (workshops, educational material) to ensure supply meets community needs.
- Provide incentives for lighting replacements, appliance trade-ins, hot water efficiency upgrades, solar hot water heating systems, programmable thermostats.
- Examine enforcement options collaboratively: capacity building and training.
- DSM programs should have no financial barriers to participation; work with adjacent communities to build scale and reduce costs.
- Work with government/suppliers to undertake assessment of power quality on newer Energy Star Appliances. Determine the value of surge protectors/other devices to protect them.

[44] BC Hydro's Power Smart Program: http://www.bchydro.com/powersmart/

APPENDIX 5: PROFESSIONAL ENGINEERING FIRMS IN BC

Appendix 5 is a list of professional engineering firms in BC that specialize in renewable energy. Please note that this is not a complete list and communities are encouraged to speak with reputable firms that have a proven track record of success.

Table 3: Professional Engineering Firms in British Columbia

ENGINEERING FIRM	FOCUS	RENEWABLE ENERGY EXPERTISE	WEBSITE ADDRESS
BARKLEY PROJECT GROUP LTD.	Studies, Design	Hydro	http://www.barkley.ca
EBA ENGINEERING	Studies	All energy types	http://www.eba.ca
HEMMERA	Studies	All energy types	http://www.hemmera.com
KERR WOOD LIEDEL	Studies, Design	All energy types	http://www.kwl.bc.ca
KLOHN CRIPPEN BERGER	Studies, Design	Hydro	http://www.klohn.com
KNIGHT-PIESOLD	Studies, Design	Hydro, Wind	http://www.knightpiesold.com
LEVELTON ENGINEERING	Studies, Design	All energy types	http://www.levelton.com
MCELHANNEY ENGINEERING	Studies	Hydro	http://www.mcelhanney.com
PGL ENVIRONMENTAL CONSULTANTS	Studies	Land use, Green energy	http://www.pggroup.com
POWERTECH LABS INC.	Studies, Design	Community Energy Planning	http://www.powertechlabs.com
SIGMA ENGINEERING	Studies, Design	Hydro	http://www.synex.com/sigma

APPENDIX 6: FUNDING RESOURCES

GOVERNMENT OF BRITISH COLUMBIA

REMOTE COMMUNITY CLEAN ENERGY PROGRAM: The Province of British Columbia, Indian and Northern Affairs Canada, BC Hydro, and the First Nations Technology Council are working together through a Remote Community Energy Network (RCE Network). The objective of this network is to assist BC remote communities in implementing community energy solutions by coordinating access to network members' programs. Supports from individual programs include energy education and training, community energy planning, utility service provision, clean energy development, energy efficiency and energy monitoring. http://www.empr.gov.bc.ca/RET/CommunityEnergySolutions/RCCEP/Pages/default.aspx

BC LOCAL GOVERNMENT INFRASTRUCTURE PLANNING PROGRAM: The Infrastructure Planning Grant Program offers grants to support local government in projects related to the development of sustainable community infrastructure. Grants of up to $10,000 are available to help improve or develop long-term comprehensive plans that include, but are not limited to: capital asset management plans, community energy plans and liquid waste management plans. http://www.cd.gov.bc.ca/lgd/infra/infrastructure_grants/infrastructure_planning_grant.htm

UNION OF BRITISH COLUMBIA MUNICIPALITIES (UBCM): The UBCM provides funding for BC local governments and First Nations for a variety of capital and planning projects. Project categories that are eligible for funding include solid waste, water and wastewater, and community energy[45]. http://www.ubcm.ca/EN/main/funding.html

REMOTE COMMUNITY IMPLEMENTATION (RCI) PROGRAM: Funded by the BC Ministry of Energy, RCI aims to develop, and distribute funding grants that support remote communities to implement clean energy and energy efficiency projects. Communities are invited to submit project proposals (for up to $300,000 in funding) for area-focused projects in: alternative power, demand side management, alternative heating, integrated smart grid and district energy. http://fraserbasin.bc.ca/programs/caee_rci.html

PPP CANADA: PPP Canada is a Crown Corporation established to support the development of public-private partnerships (P3) through a $1.2 billion fund to facilitate the development of the Canadian P3 market. First Nations may apply for green energy funding, with eligible funding up to 25% of direct construction costs. http://www.p3canada.ca/home.php

SMART DEVELOPMENT PARTNERSHIP (SDP) PROGRAM: The SDP program is a Ministry of Community Services initiative aimed at improving the land use planning and development system in BC. Each project developed under the program represents a new and innovative approach to specific issues or opportunities related to land use planning. The goal is to make improvements in the overall system by targeting opportunities that have significant potential for innovation and partnerships. http://www.cd.gov.bc.ca/lgd/intergov_relations/smart_development/index.htm

[45]Bulletin SST 011: Exemption for Material and Equipment Used to Conserve Energy. 'Alternative Energy Sources', page 8.

TOWNS FOR TOMORROW: The Towns for Tomorrow Program aims to invest in projects that address unique challenges (sustainability and infrastructure) faced by smaller communities in BC. Projects are accepted based on contribution toward reducing community greenhouse gas (GHG) emissions as well as public and environmental health benefits. http://www.townsfortomorrow.gov.bc.ca/

GOVERNMENT OF CANADA

FIRST NATIONS INFRASTRUCTURE FUND (FNIF): The fund's objective is to improve the quality of life and the environment for First Nation communities by assisting First Nations to improve and increase public infrastructure on reserves, Crown Land, land set-aside for the use and benefit of a First Nation, or off-reserve in the case of cost-shared projects with non-First Nation partners such as neighbouring municipalities. Energy projects must fall under one of the following two categories: (1) grid hook ups, (2) sustainable energy systems for facilities (solar walls ground source heat pumps and wind energy). http://www.ainc-inac.gc.ca/ih/ci/pubs/prg/prg-eng.asp

ECOENERGY FOR ABORIGINAL AND NORTHERN COMMUNITIES: The ecoENERGY for Aboriginal and Northern Communities Program is focused exclusively on providing Aboriginal and northern communities with funding support for clean energy projects. The program's objective is to reduce or displace coal and diesel generation of electricity, thereby reducing GHG emissions and criteria air contaminants, resulting in cleaner air. Successful projects will also produce social, environmental and economic development benefits for these communities. Note: program funding is currently suspended, but may resume in the future.
http://www.ainc-inac.gc.ca/enr/clc/pra/ovr-eng.asp
http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/aborignorth-autochnord-eng.cfm

INAC; ABORIGINAL BUSINESS CANADA: Aboriginal Business Canada provides a range of services and support to help promote the growth of a strong Aboriginal business sector in Canada. Our support varies depending upon client needs, availability and sources of funding, eligibility of costs, economic benefits, as well as reasonableness and timing of financial returns on investment. http://www.ainc-inac.gc.ca/ecd/ab/abc/abcnu-eng.asp

INAC; COMMUNITY ECONOMIC DEVELOPMENT PROGRAM (CEDP): CEDP provides core financial support for First Nation and Inuit communities for public services in economic development. Financial support is intended for community economic development planning and capacity development initiatives, development of proposals and leveraging financial resources, and carrying out economic development activities. http://www.ainc-inac.gc.ca/ecd/ep/ced/index-eng.asp

INAC; COMMUNITY ECONOMIC OPPORTUNITIES PROGRAM (CEOP): CEOP provides competitive, project-based support to First Nation and Inuit communities for public services in economic development. This program is expected to foster increased community employment, greater use of land and resources under community control, enhanced community economic infrastructure, more and larger community businesses, and a better climate and environment for economic development. http://www.ainc-inac.gc.ca/ecd/ep/ceo/index-eng.asp

INAC; LARGE ENERGY PROJECTS: INAC will support energy efficiency and renewable energy projects, with active Aboriginal and northern community involvement, which lead to concrete, quantifiable and verifiable GHG

and Criteria Air Contaminants (CAC) emissions reductions. The program's funding cycle finishes in the fall and is started again in April of every year. Note: program funding is currently suspended, but may resume in the future. http://www.ainc-inac.gc.ca/enr/clc/pra/lpfc-eng.asp

INAC; SMALL ENERGY PROJECTS: INAC has numerous links that hold information for small energy developments in: community energy planning, wind, hydro, solar (thermal and PV) and district heating. http://www.ainc-inac.gc.ca/enr/clc/cen/htd-eng.asp

NATURAL RESOURCES CANADA; COMMERCIAL BUILDING INCENTIVE PROGRAM: Natural Resources Canada's Office of Energy Efficiency (OEE) offers the ecoENERGY Retrofit Incentive for Buildings, the commercial/institutional component of the ecoENERGY Retrofit Financial Incentives for existing homes, buildings and industrial processes. http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/index.cfm?attr=20

NATURAL RESOURCES CANADA; CLEAN ENERGY FUND: The Government of Canada has committed that Canada's total GHG emissions be reduced by 17 percent from 2005 levels by 2020, and that 90 percent of Canada's electricity be provided by non-emitting sources such as hydro, nuclear, clean coal and wind power by 2020. The Clean Energy Fund provides nearly $795 million over five years to advance Canadian leadership in clean technology. http://www.nrcan-rncan.gc.ca/eneene/science/ceffep-eng.php

NATURAL RESOURCES CANADA; ECOENERGY FOR RENEWABLE HEAT: Incentives are offered to the industrial/commercial/institutional sector to install active energy-efficient solar, air and/or water heating systems. The ecoENERGY for Renewable Heat program runs from April 1, 2007 to March 31, 2011. http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/index-eng.cfm

NATURAL RESOURCES CANADA; ECOENERGY FOR RENEWABLE POWER: EcoENERGY for Renewable Power will invest $1.48 billion to increase Canada's supply of clean electricity from renewable sources such as wind, biomass, low-impact hydro, geothermal, solar photovoltaic and ocean energy. Applications are accepted until March 31, 2011. http://ecoaction.gc.ca/ecoenergy-ecoenergie/power-electricite/index-eng.cfm

ENVIRONMENT CANADA; ECOACTION COMMUNITY FUNDING PROGRAM: Since 1995, Environment Canada's EcoAction Community Funding Program has provided financial support to community-based, non-profit organizations for projects that have measurable, positive impacts on the environment. http://www.ec.gc.ca/EcoAction/default.asp?lang=En&n=FA475FEB-1

SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA: The $550M SD Tech Fund™ is aimed at supporting the late-stage development and pre-commercial demonstration of clean technology solutions. The fund is currently not accepting further applications, but is working with the Government of Canada to secure additional funding. http://www.sdtc.ca/index.php?page=sdtech-funding-timelines&hl=en_CA

FEDERATION OF CANADIAN MUNICIPALITIES; GREEN MUNICIPAL FUND (GMF): The GMF is a unique program that supports municipal initiatives across Canada by offering below-market loans to directly support municipal initiatives, while GMF education and training resources help municipal governments share expertise and strengthen their ability to set and surpass their sustainable goals. This opportunity is particularly relevant for

equity partnership models. http://gmf.fcm.ca/Home/

WESTERN ECONOMIC DIVERSIFICATION CANADA (WD): The WD's Western Diversification Program (WDP) is the main program through which strategic investments in initiatives that enhance and strengthen the economy of western Canada take place. WDP is increasingly used to collaborate with others and is designed to respond to economic priorities. http://www.wd.gc.ca/eng/301.asp

INDEPENDENT FUNDING ORGANIZATIONS

BC FIRST NATIONS EQUITY FUND: The New Relationship Trust (NRT), All Nations Trust Company (ANTCO) and Nuu-chah-nulth Economic Development Corporation (NEDC) have joined forces to create the BC First Nations Equity Fund limited partnership. The Fund will offer competitively priced equity loans to BC First Nations so they may participate as owners/partners in commercially viable green energy projects. Note: funding sources are listed as of January 2011 and may change on a year-to-year basis. http://www.nationtalk.ca/modules/news/article.php?storyid=30650

FOUNDATION AND NON-PROFIT FUNDING ORGANIZATIONS

TD FRIENDS OF THE ENVIRONMENT FOUNDATION (TDFEF): TDFEF supplies environment funding for community projects, focused on four areas: (1) Protecting and preserving the Canadian Environment, (2) Assisting young Canadians in understanding and participating in Environmental activities, (3) Supporting urban renewal such as environmental projects to rejuvenate smaller or at-risk neighborhoods and 'main streets', and (4) Enhancing cooperation among Environmental organizations. http://www.fef.td.com/funding.jsp#areas

VANCITY COMMUNITY FOUNDATION (VCF) GRANT PROGRAM: VCF invests in affordable housing, community asset building and social enterprise projects that use community economic development strategies to support economic and social inclusion. Grants ($500 to $20,000) are awarded quarterly to charities in VanCity's service area. https://www.vancity.com/AboutUs/OurBusiness/Subsidiaries/VancityCommunityFoundation/FundingLendingGuidelines/

VANCOUVER FOUNDATION: The Vancouver Foundation (VF) funds a wide variety of programs and projects in a variety of areas. Under its Grants and Community Initiatives Program, VF funds projects related to the environment. A specific goal is to support the development and delivery of training programs for First Nations and other communities who are or will become involved in the sustainable management of natural resources. http://www.vancouverfoundation.bc.ca/grants/environment.htm

FRASER BASIN COUNCIL: Along with the Province of British Columbia (Ministry of Energy), SolarBC, T'Souke First Nation and Xeni Gwet'in First Nation, the Fraser Basin Council (through its Community Action on Energy and Emissions Program and Remote Community Implementation Program) have partnered to establish a Solar Community Mentorship Initiative. It is intended to address the needs of remote and First Nations communities in BC for tools and guidance in planning, implementing and training within solar renewable energy projects. http://fraserbasin.bc.ca/programs/caee_rci_eligibility.html

APPENDIX 7: INFORMATION RESOURCES[46]

GOVERNMENT OF BRITISH COLUMBIA

FRONTCOUNTER BC[47]: The Provincial agency offers independent power production proponents 'one - stop' assistance and advice on getting proposed projects approved. It is the BC government's 'single window service' for citizens and businesses seeking natural resource authorizations and permits for Crown resources. N.A. Toll Free: 1-877-855-3222 http://www.frontcounterbc.gov.bc.ca

PROVINCIAL INDEPENDENT POWER PRODUCERS (IPP) OFFICE: The IPP office enhances the effectiveness of ministries and agencies by coordinating the IPP portfolio province-wide in support of the BC Energy Plan (2007), greenhouse gas reduction goals and optimizing government resources. Contact the Surrey IPP Office[48] for information.

BC MINISTRY OF ENVIRONMENT: The BC. Ministry of Environment (http://www.gov.bc.ca/env) has three divisions with a direct interest in independent power production:

1. The Water Stewardship Division (WSD) is responsible for the Water Act and oversees the issuance of water licenses and approvals. http://www.env.gov.bc.ca/wsd
2. The Environmental Stewardship Division (ESD) is responsible for the maintenance and restoration of the natural diversity of provincial ecosystems and fish and wildlife species and their habitat. http:// www.env.gov.bc.ca/esd
3. The Environmental Protection Division (EPD) is responsible for the Environmental Management Act. The EPD works to prevent pollution and promote and restore environmental quality. http://www.env.gov.bc.ca/epd

ENVIRONMENTAL ASSESSMENT OFFICE (EAO): The EAO is a neutral central Provincial agency that oversees major project reviews - ensuring that projects comply with the Environmental Assessment Act. Major projects are reviewed for potentially adverse environmental, economic, social, health and heritage effects that may occur during the lifecycle of proposed projects. http://www.eao.gov.bc.ca

BC MINISTRY OF FORESTS AND RANGE (MFR): MFR is responsible for managing the province's forests and rangelands. Its legislative jurisdiction includes the Forest Act, Range Act, and Forest and Range Practices Act where the ministry can issue approvals that allow proponents to cut, destroy and remove crown timber. http://www.gov.bc.ca/for

BC MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE: The ministry is responsible to build, maintain and operate the Provincial highway system to ensure safe and efficient operation for the benefit of the general public. Under the Transportation Act or the Industrial Roads Act, the ministry grants approvals required to temporarily or permanently use, impact or connect to highways, secondary roads or public rights-of-way. No work, construction or activity is allowed before a valid permit has been obtained. http://www.gov.bc.ca/tran

[46] Source: Independent Power Production in BC. An Inter-agency Guidebook for Proponents. BC Ministry of Agriculture and Lands (2008). http://www.agf.gov.bc.ca/clad/IPP_guidebook.pdf | [47] FrontCounter BC is s. It provides services on behalf of 13 provincial natural resource ministries and agencies. In addition FrontCounter BC is the independent power producers' one-stop information centre. | [48] Surrey FrontCounter BC: Suite 200, 10428 (604) 586-4434

BC MINISTRY OF ENERGY: The ministry is tasked with managing the responsible development of BC's energy industry, supporting a climate to organize a thriving, safe, environmentally responsible and competitive energy sector. It is through these initiatives that the Ministry contributes to the economic growth and development of communities throughout BC. http://www.gov.bc.ca/empr

The ministry, in partnership with BC Hydro and the First Nations Energy Council, also published 'Your Energy Savings Kit', which is intended to reduce both demand and costs for household energy. http://www.empr.gov.bc.ca/EAED/Documents/Energy%20Saving%20Kit%20Booklet.pdf

GOVERNMENT OF CANADA

CANADIAN ENVIRONMENTAL TECHNOLOGY ENHANCEMENT CORPORATION (CETAC WEST): CETAC-WEST is a private sector, not-for-profit corporation committed to helping small and medium-sized enterprises (SME's) engaged in the development and commercialization of new environmental technologies. http://www.cetacwest.com/index.html

DEPARTMENT OF FISHERIES AND OCEANS CANADA (DFO): DFO is responsible for proper management, conservation, and protection of fish and fish habitat while also administering and enforcing the Fisheries Act (Environment Canada administers the pollution sections of the Act). DFO has additional federal responsibilities under the Species at Risk Act (SARA) and Canadian Environmental Assessment Act (CEAA). http://www.dfo-mpo.gc.ca/oceans-habitat

NATURAL RESOURCES CANADA (NRCAN): NRCan is an economic-science based department with a mandate to develop, implement and deliver policies, programs, and science and technology for the sustainable development and responsible use of Canada's natural resources including energy, forests, and minerals and metals. It develops policies and programs that enhance the contribution of the natural resources sector to the economy and improve the quality of life of all Canadians. http://www.nrcan.gc.ca

TRANSPORT CANADA (TC): Transport Canada is responsible for developing and administering policies, regulations and services for the best transportation system for Canada and Canadians — one that is safe and secure, efficient, affordable, integrated and environmentally friendly. It is recommended to consult TC as independent power production projects may affect transportation systems in the air and/or on water. http://www.tc.gc.ca

INDEPENDENT ORGANIZATIONS

CLEAN ENERGY BC (FORMERLY IPPBC): Clean Energy BC represents power suppliers, power retailers and their supporting industries. Its mandate is to develop a viable independent power industry in BC that serves the public interest by providing cost-effective electricity through the efficient and environmentally responsible development of the Province's energy resources. http://www.ippbc.com

FIRST POWER CANADA: First Power is a joint project of Taylor Munro Energy Systems (TMES) and Centre for Integral Economics (CIE) designed to empower First Nations to gain access to and ownership of renewable

energy. Their work concentrates on solar thermal applications with an emphasis on remote First Nations and/or high impact demonstration projects. http://www.firstpowercanada.ca

BC FIRST NATIONS ENERGY AND MINING COUNCIL: The Council has developed a strategic plan to provide a framework for creating and implementing effective approaches to the management and development of the energy and mineral sectors in BC. Environmental sustainability and socio-economic benefits viewed equally in management and development decisions. http://fnbc.info/fnemc

COMMUNITY ENERGY ASSOCIATION/PROVINCE OF BRITISH COLUMBIA: Funded by the Province of British Columbia, t his introductory guide for rural BC communities is a collaborative project of the RuralBC Secretariat, Ministry of Community and Rural Development, and the Community Energy Association. http://www.ruralbc.gov.bc.ca/library/Clean_Energy_for_a_Green_Economy.pd