Electrical Energy Generation and Strategic Land Use Planning: Applications for Haida Gwaii

by

Ian Benoit

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Name:	**Ian Benoit**
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Title	***Electrical Energy Generation and Strategic Land Use Planning: Applications for Haida Gwaii***
Examining Committee:	**Chair:** Nancy Olewiler Director, School of Public Policy, SFU

Douglas McArthur
Senior Supervisor
Professor

J. Rhys Kesselman
Supervisor
Professor

Maureen Maloney
Internal Examiner
Professor

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Abstract

This study evaluates multiple collaborative land use planning processes aimed at engaging stakeholders in developing management objectives for clean electrical energy supply generation in the Haida Gwaii Land Use Planning Area. A survey methodology designed to qualitatively assess stakeholders' satisfaction with land use planning processes and outcomes in British Columbia was applied in Haida Gwaii. The study uses the results to estimate stakeholder approval of alternative processes in order to identify the most acceptable approach to produce new management objectives aimed at promoting clean energy project development. Potential management objectives directing such resource developments are evaluated with an assessment of technical attributes of specific energy projects. These technical attributes examined are, output potential, cost efficiency, ecological impact, and socio-economic impact. The study concludes by recommending a collaborative planning process involving a comprehensive stakeholder driven land use planning forum, overseen by the Haida Gwaii Management Council. The study further recommends targeted outputs of clean energy generated from small hydroelectricity installations and onshore wind turbines as potential management objectives to be considered in the proposed planning process.

Keywords: Land Use Planning; Haida Gwaii; Energy; Electricity; Hydroelectricity

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Table of Contents

List of Tables

List of Figures

List of Acronyms

Acronym	Definition
CEP	Community Energy Plan
CHN	Council of the Haida Nation
HGMC	Haida Gwaii Management Council
MOD	Management Objective Development
SLUA	Strategic Land Use Agreement

Glossary

Term	Definition goes here, see example and notes below
Collaborative Planning	Inclusive, interest-based negation, usually with the objective of achieving consensus and reducing conflict
Community Energy Plan	A collaboratively designed plan expressing a communities' values pertaining to energy use and energy demand satisfaction
Haida	An indigenous resident of Haida Gwaii
Land Use Plan	A strategic level policy regulating land use in an efficient and ethical way
Land Use Planning Area	The total land mass the subject of a land use plan
Management Objective	A goal pertaining to a resource value that is the subject of a land use plan
Non-integrated Area	An area serviced by BC Hydro and Power Authority that has not been integrated in the main provincial power grid
Operating Zone	A Resource Management Zone permitting resource development
Protected Area	A Resource Management Zone where resource development is restricted for the purpose of ecological or cultural preservation
Resource Management Zone	A section of a land use planning area where specific values, objectives and priorities are designated
Resource Value	A resource or an economic or cultural value associated with a resource

Executive Summary

Haida Gwaii is an archipelago approximately 80 km off of the West coast of British Columbia. There are approximately 5000 permanent residents, about half of which are Haida First Nations. There are three incorporated municipalities on Haida Gwaii, and two First Nations reserves. The Haida are political organized as a central government called the Council of the Haida Nation (CHN).

The CHN is a significant actor in strategic resource management and land use planning on Haida Gwaii. It is a signatory party to the Haida Gwaii Strategic Land Use Agreement (SLUA). The SLUA establishes resource values, land use management objectives, and resource management zones for Haida Gwaii. Implementation, monitoring, and amendment of the SLUA is the responsibility of the Haida Gwaii Management Council (HGMC) in accordance with the BC Haida National Reconciliation Protocol. This body is composed equally by representatives of BC and the CHN and is empowered to make strategic level decisions about resource management on Haida Gwaii.

The SLUA is silent on electrical energy resource development, despite development of a clean energy resources being included as an objective of an independently produced Community Energy Plan. (CEP). The absence of these terms compromises the likelihood that the HGMC will assign energy resources a strategic value when making land and resource use decisions. This report evaluates the opportunities to develop clean electrical energy resources on Haida Gwaii, and proposes a process to amend the SLUA to accommodate management objectives directing the development of the most optimal energy resources.

Haida Gwaii is a non-integrated area, meaning that electrical energy has to be generated on site. Currently the demand for electricity is satisfied by two diesel generating systems (DGS) and one small hydroelectric installation. The CEP has established reduced dependence on DGS as an energy objective for Haida Gwaii.

Two categories of policy options are analysed using two separate methodologies. These categories are (1) Resource Development Options, and (2) Management Objective

Development (MOD) Options. Resource Development Options are specific sites within the land use area where a potential for clean energy generation exists given a particular technology. The technologies explored by this report are small hydroelectric installations, and wind energy installations. Other forms of clean energy such as solar, biomass, and geothermal generation are screened out due to feasibility and availability problems. MOD Options refer to processes by which the SLUA might be amended to accommodate the recommended changes.

Analysis of Resource Development Options is conducted by a comparative technical attribute assessment. Specific sites and technologies are assessed based on their potential output of electrical energy, their associated cost efficiency gains, and their potential for carbon dioxide abatement. Four small hydroelectricity sites are evaluated; wind is evaluated without reference to specific sites, but in a general capacity. On average small hydro sites are measured to have higher yields, greater efficiency gains, and higher levels of carbon dioxide abatement than wind, although all sources and technologies were measured to be superior to the status quo in these regards.

Three MOD options are analysed in the subsequent section. MOD Option 1 is a collaborative planning process consistent with what academic literature has described as a best-practices approach to land and resource use planning. MOD Option 2 is a technocratic process by which the HGMC may make amendments to the SLUA with minimal to no public or stakeholder consultation. MOD Option 3 is a mixed-method approach that utilizes some aspects of the collaborative planning process in MOD Option 1, but reduces the duration and intensity of stakeholder involvement.

The MOD Options are analysed using survey data collected in a previously conducted study on Haida Gwaii. The survey assessed local opinions about land use planning processes using 14 criteria. Criteria are matched with features of the MOD Options. Criteria are fulfilled when survey questions associated with each criterion meet a 50% agreement rate.

MOD process Options 1 and 3 both receive optimum scores in this analysis. The major trade-off between these options is effectiveness and budgetary impact. Option 2 is discouraged due to reduced measures of effectiveness and equity. Option 3 is favoured

over Option 1 due to the high marginal costs associated with the surplus effectiveness score. This report concludes by recommending MOD Option 3 for the purposes of developing management objectives directing the development of small hydroelectric and wind energy installations, with the prioritization of small hydro.

Chapter 1. Introduction

Purpose

The purpose of this study is to assess the development of potential renewable energy projects on Haida Gwaii for the purposes of satisfying the objectives set out in the Haida Gwaii Community Energy Plan. This study will further evaluate and recommend a process for amending the Haida Gwaii Strategic Land Use Agreement to include management objectives directing the development of these resources.

Background

Physical Description of Haida Gwaii

Haida Gwaii is an archipelago consisting of over 150 islands, spanning over 250 km. It is situated approximately 80 km off the West Coast of British Columbia. It has a varied geography and a mild climate permitting extensive biodiversity.

The islands have been inhabited by the Haida First Nations People for over 10,000 years. European contact was first made by Juan Perez in 1774. As was the case with many First Nations, the Haida population was seriously diminished by the spread of introduced diseases, particularly smallpox. Throughout the proceeding centuries, Haida Gwaii was colonized for the purpose of developing the timber industry. This industry experienced dramatic decline during the 1980s and 1990s, and today employs 30% of the local workforce, with the rest being distributed amongst government jobs (30%), tourism (13%) and fisheries (7%)(Astofooroff, 2008).

The current population of Haida Gwaii is approximately 5000 people distributed amongst five communities and two First Nations Reserves. Most residents live on Graham Island

(the largest Island on the Northern side) in the municipalities of Queen Charlotte, Massett, Port Clements, and the un-incorporated community of Tlell. Moresby Island holds the un-incorporated community of Sandspit, with approximately 200 permanent residents.

Politics and Governance of Haida Gwaii

Governance of Haida Gwaii, and the management of lands and resources is conducted by multiple authorities and jurisdictions. Each municipality is governed and serviced by a local government. The un-incorporated communities have representatives who sit on the Skeena-Queen Charlotte Regional District Management Board. The Naikun Provincial Park encompasses almost 70,000 hectares of Graham Island (Province of BC, 2014).The Gwaii Haanas National Park Reserve and Haida Heritage Site contains 138 islands in the South Moresby area and is co-managed by the Government of Canada and the Council of the Haida Nation (Parks Canada, 2014). Gwaii Haanas is managed by the Archipelago Management Board (AMB) consisting of three members representing the Government of Canada, and three members representing the Council of the Haida Nation (CHN). All decisions are made by consensus.

The CHN is the elected National Government of the Haida First Nations people, established in 1974 to exercise the sovereignty of the Haida (Astofooroff, 2008). The CHN adopted a Constitution in 2003. The organization develops policy on behalf of its constituents, and represents the Haida in negotiations with Canada and BC. The CHN consists of twelve members elected by Haida citizens to serve for three year terms. The Haida communities of Skidegate and Old Massett are represented by four members each. A four member Executive Committee is elected two of whom are elected specifically to fill the roles of President and Vice President. A total of two members of the CHN are elected to represent Haida citizens living in Prince Rupert, BC and Vancouver, BC. Policies developed by the CHN must be adopted by a Haida town hall meeting called the “House of Assembly,” where all Haidas are welcome to attend and vote.

Strategic Land and Resource Use Planning on Haida Gwaii

Land Use Planning represents a historic departure in BC resource management policy away from what researchers have described as the “technocratic” approach towards a “collaborative” approach (Frame et al, 2004, Morton et al, 2011, Astofooroff, 2008). The technocratic approach is characterized by strategic land use decisions being made by government officials informed by technical and scientific assessments. A collaborative planning approach empowers regional land users and stakeholders to take part in this process by allowing them to define resource values, resource management zones, and management objectives.

This transition was initiated by the Province, primarily as a response to dramatic conflicts pertaining to land use and resource management across BC during the 1980s and 1990s. The CHN initially rejected the province-wide Land Use Planning process as a resource management method. They felt that the social and political circumstances on Haida Gwaii were too complex, and too unique for a Provincial wide approach to be appropriate in the specific area. Particularly, the CHN did not feel that the standard process reflected the Haidas’ locally recognized role in regional governance (Astofooroff, 2008).

BC agreed to negotiate a specially designed strategy to implement collaborative land use planning on Haida Gwaii, with the CHN as an equal partner. Both parties agreed to separate and parallel protocols on Land Use Planning and Interim Measures. The common key features of these protocols were that each party agreed to work with the other to engage in Land Use Planning, share resources (for data collection, research, and analysis), respect the principles of ecosystem based management, and proceed with a “government to government” relationship.

BC and the Haida Nation then proceeded with a two-tier collaborative planning process to develop the terms of a Strategic Land Use Plan, particularly land use management objectives. The first tier involved a Community Planning Forum (CPF) with 15 local

stakeholders; tasked with producing a recommendations report. Following from a consensus decision of the CPF, the recommendations were presented to a table comprised of representatives of BC and the CHN representing the second tier (Astofooroff, 2008 Morton et al, 2011). This table negotiated final approval of the Haida Gwaii Strategic Land Use Agreement (SLUA).

The SLUA establishes Land Use Management Zones and Management Objectives. The Zones are (1) New Protected Areas, (2) Operating Zone, and (3) Special Value Areas. New Protected Areas are identified for ecological and cultural conservation. The Operating Zone is identified as the area where resource development may occur, in accordance with the principles of EBM. Special Value Zones are identified for 100% forest retention for the purposes of conserving the habitats of goshawk, great blue heron and the saw-whet owl (SLUA, 2007).

There are seven classes of management objectives. Each class references a specific resource value. The management objective describes specific actions pertaining to that resource value. In addition, there are measures assigned to each objective to evaluate success, as well as a target measure. For example, the resource value of “Culturally Modified Trees” (CMTs), is assigned the objective of “identify and protect CMTs,” the measure being the number of CMTs protected, with a target of 100%. The resource values enumerated by the SLUA, and assigned objectives are:

- Haida traditional forest resources and traditional heritage features
- Monumental Cedar
- Western Yew, Western Red Cedar, and Western Yellow Cedar
- Culturally Modified Trees (CMTs)
- Aquatic Habitats
- Biodiversity
- Wildlife Habit

BC Haida Nation Reconciliation Protocol (Kunst’aa Guu – Kunst’aayah)

The Reconciliation Protocol establishes the composition, roles, responsibilities and decision making process of the Haida Gwaii Management Council (HGMC). The HGMC

is composed of equal representatives of the BC and the CHN. Both parties are responsible for appointing two representatives to the HGMC, as well as jointly appointing a chairperson. The HGMC is responsible for monitoring and implementing the SLUA and making amendments to this document as needed. All decisions are made by consensus, excluding the chairperson.

Any proposed amendment to the Strategic Land Use Agreement (SLUA), including identification of additional resource values and management objectives, has to be reviewed and approved by the HGMC. The HGMC may engage in additional community engagement and collaborative planning approaches to identify and evaluate these amendments.

Provision of Electrical Energy on Haida Gwaii

There are two separate electrical energy generation and distribution systems that supply the communities of Haida Gwaii. They are referred to as the Masset and the Sandspit systems. The Masset system services the communities of Masset and Old Massett and terminates at Port Clements. It is powered by a diesel generating station (DGS) with seven modules and a total generating capacity of 11.4 MW (CEP, 2008). The distribution system consists of two circuits, one serving over 1000 customers in Masset, and another serving 330 customers in Port Clements (ibid). Together these circuits consist of 188 km of power line.

The Sandspit system draws electrical energy from a second DGS as well as a small hydro IPP at Mitchell Inlet. It serves the communities of Sandspit, Queen Charlotte, Skidegate, and terminates at Tlell. It is separated from the Masset system by approximately 10 km (CEP, 2008). The small hydroelectric system satisfies approximately 2/3 of the demand in these communities. It has a total generating capacity of 5.7 MW.

The standby power for the Sandspit system is generated from a DGS with two modules, both of which were manufactured over 50 years ago and as such are no longer economical to operate or maintain (CEP, 2008). It cannot be run unattended as it poses an environmental risk of fuel and glycol spills. It has a generating capacity of 800 kW.

There are two circuits in the Sandspit distribution system, one serving 300 customers in Sandspit, the other serving 1200 customers in Queen Charlotte, Skidegate, and Tlell. Together these circuits consist of 106 km of power line.

Projected Demand for Electrical Energy on Haida Gwaii

The current annual consumption is approximately 46,000 MWh/year and is forecast to expand to 52,000 MWh/year by 2027 (CEP, 2008). This forecast is produced by BC Hydro based on recent trends of electricity usage on both systems, the assumption that per account user rates for Haida Gwaii are similar to the Northern Region of the integrated system, and estimated population growth provided by BC Statistics. BC Hydro expects that the existing DGS and small hydro system will be able to satisfy this increase in demand (ibid).

The Haida Gwaii Community Energy Plan and Community Energy Values

In 2007 the CHN and BC Hydro commissioned the Sheltair Group to conduct a CEP for Haida Gwaii. The purpose of this exercise was to identify issues surrounding supply and consumption of electricity on Haida Gwaii, and produce recommendations reflective of the residents expressed values and goals.

The development of the CEP involved a technical assessment, and a community consultation component. The technical assessment analysed data to make recommendations for demand-side conservation methods, and possible supply options. The consultation process involved a working group consisting of local municipal authorities, BC Hydro, the CHN, and the Haida Hereditary Chiefs. The wider public was also encouraged to provide input through a series of public meetings, informal coffee sessions, a website, and a 1-800 telephone number.

The technical analysis did not go as far as to recommend supply options, however it did recommend that BC Hydro conduct further assessments of small hydro, wind, and biomass electrical generation.

The community consultation component identified the following objectives:

1. CO_2 Abatement
2. Mitigate Impacts on Local Food Harvesting
3. Production of Jobs
4. Ensure affordable Unit Energy Costs
5. Increase the Local Dependence on Renewable Sources of Energy
6. Mitigate Visual and Sound Impacts

The objectives (1), (3), (4), and (5) can all be achieved by the development of renewable energy technologies in areas proximate to either of the existing distribution networks. Concurrently, demand management initiatives, and increasing efficiencies in consumption can be used to accomplish these objectives.

Policy Problem

Through technical assessment and community engagement the Haida Gwaii CEP has established “decreasing dependence on DGS electricity” and “development of small-hydro, wind, and biomass” as energy objectives. Resource management on Haida Gwaii is the responsibly of the Haida Gwaii Management Council (HGMC).The HGMC implements the Strategic Land Use Agreement (SLUA). If development of these resources is not included as a management objective in the SLUA, the HGMC will not assign them a strategic value, and their development will be less likely. This may result in possible failure to achieve the objectives of the CEP, prolonged dependence on DGS, and lost opportunities for cost efficiency gains, and CO_2 abatement.

Literature on Land Use Planning Evaluation and Electricity on Haida Gwaii

Using Collaborative Land Use Planning for Fair and Effective Resource Management

This section describes research on collaborative land use planning in British Columbia in order to understand the benefits and limitations of this process. It also identifies a ‘best practices’ approach to collaborative planning. If collaborative land use planning is

to be used to develop clean energy resource management objectives on Haida Gwaii for inclusion in the SLUA, it ought to be done in accordance with a recognized best practices approach. 14 process criteria have been developed and applied in the evaluation of multiple collaborative land use planning processes in BC, including the SLUA.

Because of the relationship between BC and the CHN formalized by the Reconciliation Protocol, development of a collaborative land use planning process on Haida Gwaii will need to be especially sensitive to the position and authority of the Haida. This section proceeds to review literature aimed at identifying the most appropriate ways to engage in collaborative planning with aboriginal populations.

Collaborative planning is a method of land use planning adopted by BC during the 1990s in order to resolve resource conflicts across BC and bring investment certainty to regions across the province (Integrated Land and Management Bureau, 2014) . As indicated, it is a departure from the “technocratic” approach to resource management that relied exclusively on technical and scientific data without involving the input of local stakeholders. The key characteristics of collaborative planning are:

- higher level collaboration and involvement
- independent facilitation
- seeking consensus
- respect for all participants
- discussion based on interests, not predetermined positions (Frame et al, 2004)

The general process for collaborative land use planning is to have stakeholders organized into a working group where they develop terms of reference, identify their goals and objectives, and conduct an analysis of regional resource data. The working group is responsible for allocating land to resource zones, and conducting a multiple account analysis of likely development scenarios. The final decisions of the working group are made by consensus.

The primary benefit of collaborative planning is its propensity to solve conflicts through a process that encourages the development of solutions that meet mutual interests (Morton et al, 2011,Frame et al, 2004, Astofooroff, 2008). Moreover, these solutions are likely to be of a higher quality because they represent a broad array of knowledge and experiences. Collaborative planning is more likely to benefit the society at large than bureaucratic and ministerial decision making because it is performed by affected communities (ibid). The plans are easier to implement and are more durable because they are less likely to generate opposition, and the participants are usually sensitive to implementation concerns. Overall, the process builds social and political capital through cooperation and the sharing of knowledge.

The limitations and complications of collaborative planning are:

- ideological differences
- institutional cultures
- lack of flexibility in procedures
- difficulties in locating legitimate facilitators
- trust (or lack thereof) between stakeholders
- power imbalances
- negotiations skills imbalances
- non participation
- poorly organized stakeholders
- time and money limitations
- participant “burnout”
- transfer of personnel; reduced continuity
- participants not motivated to reach agreement
- weak accountability of stakeholders to wider community (Frame et al, 2004)

In order to best realize the benefits of collaborative planning as an approach to land use planning, while mitigating the above frustrating factors, Frame et al recommend that the process fulfill the following criteria:

1. Purpose and Incentives
2. Inclusive Representation
3. Voluntary Participation
4. Self- Design
5. Clear Ground Rules
6. Equal Opportunity and Resources
7. Principled Negotiation and Respect
8. Accountability
9. Flexibility, Creativity, Adaptability
10. High Quality Information
11. Time Limits
12. Implementation and Monitoring
13. Effective Process Management
14. Independent Facilitation (Frame et al, 2004)

Thus, this study identifies a 'best-practices' collaborative planning approach to a process that fulfills these above criteria. See Table 2.2-2.15 for a more detailed description of these criteria as well as fulfillment conditions.

This process needs to be constructed further to accommodate the significance of the CHN's political and legal position on Haida Gwaii. Morton et al (2011) set out the two-tiered collaborative planning model that is needed. This process distinguishes between First Nations involvement, and general stakeholder consultation by separating these processes into different "tiers."

Morton et al's description of the first tier is consistent with the above "best practices" approach to collaborative planning involving the working group. This tier performs the necessary analysis and negotiation and makes recommendations to the second tier.

In the second tier, BC engages in face to face negotiations with relevant First Nations authorities and representatives to review and finalize the plan recommended by the first tier. In doing so, BC is better positioned to respect the government-to-government

relationship with First Nations. Moreover, it alleviates a number of the other factors that otherwise disadvantage First Nations in this process, which the authors describe as:

- dominant stakeholders setting the terms of communications
- super-imposition of supposed interest (of First Nations)
- excessive compromise of First Nations priorities when seeking consensus from multiple stakeholders
- implied First Nations consent to “stakeholder” characterization (Morton et al, 2011)

Thus, options for land use planning processes on Haida Gwaii should (a) satisfy the criteria developed by Frame et al (2004) and (b) incorporate a separate, second tier into the process, enabling government to government negotiation between BC and the CHN.

This general process is supported by literature evaluating land use planning in BC. In addition, this study finds that this process is consistent with Haida principles of resource stewardship. These principles are enumerated in an essay written by Jones et al (2010). These values are:

Yahguudang – “Respect”

Yahguudang is a action-based value applicable to all living things. It is suggestive of the interconnectedness of all life. As such, the Haida believe in taking only what is needed from the Earth. In addition, yahguudang is a social value having implications for planning processes

Giidtll’ juus – “The world is as sharp as a knife”

This value is the most closely associated with what western culture understands to be “sustainability.” What it suggests is that balance should guide the interaction of people with the natural world. In its application to resource management, the term “balance” is applicable to resource values, and the necessity of resource development that does not compromise the status of other values. As the name suggests, this balance is sensitive and therefore requires careful attention to ensure its maintenance. Activities that upset the balance should be avoided where possible.

Isda ad diigiiisdaa – “Giving and receiving”

This value is what western culture refers to as “reciprocity.” The Haida value gift giving as a tool of diplomacy, and a signifier of friendship and willingness to work together. In the Haida culture, reciprocation for a gift given is more than just expected. It is recognized as the fulfillment of cyclical and interconnected relationships between people. This is a value that the Haida extend to the natural world. When life and resources are harvested for use by the Haida, they give thanks to them for the sacrifice.

Gina K’aadang.ngagiiuutl’ k’anguudang – “Seeking wise council”

The Haida understand knowledge and wisdom to be holistic values. In essence, all life is a source of wisdom and worthy of recognition and consideration. In decision making, political or otherwise, the Haida value consulting and receiving input from the widest variety of sources and people. Community engagement is of the utmost importance on matters concerning resource management and land use. This principle is consistent with place-based management, as the people who are part of the ecosystem are understood to have the best knowledge regarding its stewardship. In addition, the Haida hold the elders of their communities in high esteem due to their wisdom accrued through a lifetime of interacting with the natural world.

‘LaaguugaKanhlIns – “Responsibility”

This value refers to the responsibility of today’s generations to pass the culture of the Haida onto future generations. The Haida see this as vital both to their social and ecological sustainability. Haida culture is traditionally oral, and their history and laws are transmitted to younger generations often in the form of stories in addition to artwork. Ownership of these stories is subject to complex social constraints. There are some that belong exclusively to a specific clan, as well, some can only be transmitted by a specific member of the community like an elder or a chief.

See table 3.10 for a chart illustrating the consistency of Frame et al’s process criteria and the five stated Haida values.

Evaluating Land Use Planning on Haida Gwaii

Astofooroff (2008) conducted a survey on Haida Gwaii to determine how well collaborative land use planning has fulfilled Frame et al's criteria. For each criterion, one or more questions were developed to measure fulfillment. The questions asked participants to respond to a statement using a 'likert' scale (strongly agree, agree, disagree, or strongly disagree). If the majority of participants responded with "agree" or "strongly agree," to a set of questions the associated criterion was determined to be fulfilled. In the case of negatively phrased questions, this calculation was reversed.

The survey was distributed to 15 members of the Community Planning Forum. 11 completed the survey. This study yields favourable results for collaborative land use planning processes on Haida Gwaii. 12 of the 14 criteria were fulfilled. The two that were not met were "time limits" and "implementation and monitoring." Participants likely felt that the time limits were too prohibitive for the planning forum to reach a meaningful consensus (Astofooroff, 2008). Additionally, they had little confidence that the SLUA would be implemented effectively (Ibid). These represent shortfalls of collaborative land use planning as a resource management strategy for Haida Gwaii.

Open ended responses also indicated that participants felt that the Haida dominated the process. This might be a consequence of the 2-tier, government-to-government phase (Astoffooroff, 2008). Interestingly, 77% reported being satisfied with the level of First Nations involvement, and felt that the Haidas' participation was both necessary and beneficial.

Reaching a Consensus on Energy Supply Development

The development of the Community Energy Plan represents the most concerted efforts to understand residents' energy objectives, as well as the availability of supply alternatives and development feasibility.

As previously discussed, the CEP was developed through intensive stakeholder consultation on Haida Gwaii. Through this consultation, the following objectives were identified for electrical energy use:

1. CO_2 Abatement
2. Mitigate Impacts on Local Food Harvesting
3. Production of Jobs
4. Ensure affordable Unit Energy Costs
5. Increase the Local Dependence on Renewable Sources of Energy
6. Mitigate Visual and Sound Impacts (CEP, 2008).

The CEP feasibility assessment evaluated renewable sources of energy such as small hydro, wind, biomass, geothermal, landfill gas, tidal, and solar generated. Those sources fall outside the parameters of the Land Use Area and are beyond the scope of this study. Small hydro and wind were found to be feasible and locally available for utility scale development.

Small hydroelectric installations generate a maximum of 50 MW from small, steep creeks (CEP, 2008). BC Hydro has identified four potential sites for these installations (BC Hydro, 2000). Hydroelectricity is dependent on climate factors such as annual rainfall and seasonality. As such, it is not sufficiently reliable to be supplied without a firm backup like DGS. Hence small hydro installations have the potential to offset some DGS generated electricity, but not eliminate dependence. These projects can have negative effects on streams, such as dewatering effects, upstream blockages, habitat alteration, and entrainment of fish passages (CEP, 2008). Careful assessment needs to be conducted to gauge the magnitude of these impacts, especially where salmon are affected, due to their cultural significance.

Wind energy generation involves the installations of turbines to capture the kinetic energy of the wind. The CEP took measures of wind speeds at three sites, and conditionally deemed them to be feasible. It noted that year round measurements would need to be taken to assess the impacts of seasonality. Wind energy is also an intermittent source, so like small hydro, installations would need to be supported by a firm source. Wind turbine installations may have impacts on wildlife migration, and have significant visual effects on the landscape.

Biomass was found to be feasible, but due to the uncertain volume and distribution of wood waste, the CEP could not verify its availability.

Recognizing a 'Best-Practices' Approach to Management Objective Development

Required Process

Mutual agreement by the signatory parties (CHN and BC as represented by the Minister of Agriculture and Lands) is required for amendment of management objectives according to Attachment 'B,' Section 4 of the SLUA. The Reconciliation Protocol further clarifies this process in Schedule B. The Haida Gwaii Management Council (of which the CHN and representatives of the BC is composed) can recommend amendments to the respective parties, who must then adopt these amendments by their respective legislative mechanisms. All recommendations of the HGMC must be made by consensus, excluding the Chair, in accordance with Scheudle 'B,' Section 2.4 of the Reconciliation Protocol.

Under the terms of these two agreements, there is no requirement for collaborative planning, or stakeholder consultation. The authorities of the signatory parties can make HGMC recommended amendments without further discussion or collaboration.

Best-Practices Process

Land Use Planning as an application of collaborative planning has been extensively evaluated in BC. As such, some conclusions have been agreed upon by researchers who study resource development and land use planning in the Province. This section provides some justification for the construction of management objective development options by drawing general recommendations out of this literature.

A best-practices model defined by Morton et al (2011) is characterized by a "two-tiered" collaborative planning process. Tier 1 refers to a general stakeholder planning and negotiations process where recommended management objectives are developed. The collaborative planning process undertaken by the Haida Gwaii community planning forum represents an example of this first tier. The community planning forum phase should be designed and conducted to fulfill the criteria presented by Frame et al (2004).

Tier 2 refers to a subsequent process where the Tier 1 recommendations are reviewed in a government to government negotiations process between Provincial Government authorities and affected First Nations.

The negotiations of the Haida Gwaii Management Council might be considered an application of Tier 2. Membership consists of equal representative of the BC Government and the Haida Nation. The initial development of the Haida Gwaii Strategic Land Use Agreement could be understood to be constant with the Two-Tiered collaborative planning process described by Morton el al (2011). As such, a collaborative land use planning process designed to inform a decision of the HGMC might be considered an application of the two-tiered collaborative approach.

The principles of two-tiered collaborative planning are also advantageous to the Haida to allow for consistency with their cultural values, mainly because this system directs BC to engage with them as equal partners in a government to government negotiations. It is consistent with the values of Yahguudang (Respect) and Isda ad diigii isdaa (Giving and receiving) (Jones et al 2010). Moreover, the interviews yielded results suggesting that the Haida are generally satisfied with this style of collaborative planning, and are optimistic about future applications. The process was described as “completely relevant given the Haida claim to the land,” moreover, the best solution to land use conflicts was identified as one where the “Haida and the non-Haida work together.”

Options for a land use planning processes aimed at establishing energy resource management objectives should be reflective of this best practices approach. Specifically, processes ought to incorporate a stakeholder driven community planning forum into a two tier model that permits government to government negotiations between First Nations and the Province.

Chapter 2. Methodology and Approach

This report evaluates two categories of policy options: (1) energy resource development options, and (2) options for establishing energy resource management objectives. Energy resource development options refer to sources of electrical energy, the development of which could be included as management objectives in the SLUA for the purposes of satisfying the CEP objectives. These options are evaluated by a comparative technical assessment respecting and incorporating the CEP objectives. Because the role of identifying management objectives ultimately falls upon the agents and authorities discussed in the assessment of management objective development options, these resource development options should be interpreted as material for consideration by those agents and authorities.

Management objective development options can be interpreted as a “road-maps” for an SLUA amendment procedure. These options are evaluated using the responses to the survey and the interviews. Each option has a number of features relating to the survey criteria. Criteria are measured by agreement rates with the survey statement questions. In order for an option to meet a criterion, it needs to (1) have a least one feature matching the criterion, and (2) the agreement threshold for that criterion has to be met by the survey responses.

Methodology 1: Evaluating Energy Resource Development Options

Technical Attribute Assessment

The development of specific energy resource values that might be considered as management objectives are especially limited by local availability. The technical analysis begins by identifying which of these resources is actually present within the existing land

use planning area. Following this identification, each potential management objective associated with a specific resource is evaluated against three main technical attributes. These attributes are (1) effectiveness, (2) cost of installation, (3) cost of generation, and (4) ecological impacts. Each attribute has one or more associated criteria that are discussed in detail below. All criteria are weighted equally.

The CEP technical assessment identifies the energy resources available on Haida Gwaii, namely small hydro and wind. This study evaluates development of these two resources using the above stated criteria. The methods of evaluation differ slightly depending on the resource. The table below is an illustrated summary of this methodology:

Table 2.1. Resource Development Analysis Matrix

Option	Objective	Criteria	Measure
Resource Development Option: Development of source/installation	Effectiveness	Output Potential	kWh/site
		Demand Satisfaction	%
	Cost Efficiency	Capital Investment (mean)	$/site
		Investment Period	years
		Cost of Generation (mean) ($/kWh)	$/kWh
		Potential Cost Offset	$/site
	Ecological Impacts	Potential CO_2 Offset	Kt/site
		Habitat Alteration (Sm. Hydro)	Fish Flow Factor

1. Effectiveness

An electrical energy resource is evaluated for effectiveness in accordance with potential output in MWh. Similarly, potential outputs are measured in accordance with their capacity to satisfy projected demands for electrical energy. BC Hydro has projected a demand for electrical energy to reach 52,000 MWh/year by 2027 (CEP, 2007). This report considers this to be a reasonable time frame to allow for the development of these resources leading to the satisfaction of this demand. Resources measured to have the highest potential output will be determined to the most effective.

Potential energy output for specific small hydro sites is taken from BC-Hydro's calculation published in "Inventory of Undeveloped Opportunities at Potential Micro Hydro Sites in British Columbia," (2000). This study offers a comparison between sites. For wind energy, average output between sites is estimated based on an assumed turbine model (Wind Energy Foundation, 2014) and wind speeds published in the CEP. This study compares this output with those calculated for specific hydro sites, and the average output of hydro sites.

Finally, this study calculates the potential portion of the 2027 forecast demand that each resource and installation can satisfy.

2. Cost of installation

Development of each specific resource value is associated with various financial costs to bring the resource to utility. These refer mainly to technical surveys materials, construction, and labour. In some cases, these costs include infrastructure, namely storage and grid connection. For each resource these costs have been aggregated as a lump sum for each of the potential sites. In the case of wind energy, this cost is taken to be the per-unit cost of a wind turbine. Specific resources measured to have the lowest capital costs are determined to best satisfy this criterion.

BC Hydro's inventory (2000) supplies the costs of installation of small hydro by site. This study offers a comparison between sites and between the average, per turbine cost of developing wind energy. The cost of wind turbine installation is estimated in accordance with an assumed model (Windustry, 2014).

Displacement of DGS with both small hydro and wind electrical energy yields cost-efficiency gains because the per-unit output of energy from alternative sources is less expensive than DGS output (see proceeding section "Cost of Generation"). This study calculates an investment period by determining the length of time for the cost-efficiency gains to equal the cost of installation.

3. Cost of Generation

Cost of Generation is understood to be the rate of expenditure per KWh generated. Specific resources measured to have the lowest rate of expenditure per KWh generated are determined to be the most cost-efficient.

Cost efficiency gains are the difference between the cost of generating a volume of electrical energy from alternative sources and the cost of generating an equivalent volume from DGS. The cost to satisfy the projected demand for electrical energy of 2027 by diesel generation has been calculated to be $10,300,000/year. This value is likely deflated as it may not reflect future changes to the price of fuel. Moreover, in the calculation of cost-efficiency gains, there is assumed to be a cost free transition between energy sources once the new sources are operational.

The per kWh cost of generating energy from small hydro sites is supplied by BC Hydro's inventory (2000). Average costs of wind generation is supplied by the CEP. This study offers a comparison of these values.

4. Ecological Impacts

This assessment measures both positive and negative impacts of developing clean energy technologies. For all sources and installations, the primary ecological benefit is the potential offset of carbon-dioxide emissions. Where new installations generate a lower volume of emissions than the existing diesel fuel cells, the difference is calculated. Again, this is assuming an effective replacement of the existing energy supply with electrical energy generated from new installations. Generation of 1 kWh of electrical energy from diesel fuel produces 0.45 kg of CO_2 (US Energy Information Administration, 2014). Where development of a specific resource yields a greater CO_2 offset, this resource is determined to better satisfy this criterion.

The most notable ecological impact of small hydro installation is the impact on fish habitats. BC Hydro's inventory supplies a "Fish-flow-factor" designed to quantify the

density of fish in a given stream. This study offers a comparison. Sites with higher densities of fish represent more sever ecological repercussions.

The ecological impacts of on-shore wind turbine installations remain unconfirmed at this time (Christidis, 2012, CEP, 2008).

Methodology 2: Evaluating Management Objective Development Processes

Management objective development processes are evaluated using data collected by a survey administered on Haida Gwaii by Astofooroff (2008), and interview responses collected by this study. This section will discuss the collection and utilization of these resources for the purpose of analysing management objective development processes.

Analysis of Astofooroff's Survey

There are 6 societal objectives indicative of a successful land use planning process. These objectives are (1) effectiveness, (2) development, (3) stakeholder (3rd Party) acceptance, (4) equity, (5) budgetary impact, and (6) consistency with Haida values. This section lays out a set of criteria indicative of fulfillment of these objectives, measures of those criteria, and the data sources drawn upon to obtain those measures.

The first four societal objectives correspond to the criteria established by Frame et al (2004). See Table 3.8 for an illustration of this correspondence.

Effectiveness refers to the likelihood that management objectives will be produced through the collaborative planning process. Development refers to the likelihood that the management objectives will be implemented. Stakeholder acceptance means whether or not the parties affected by changes to the Land Use Agreement will be willing to accommodate those changes and remain in compliance with the Agreement. The principle of equity means that all parties are treated the same, and are empowered to participate sufficiently to represent their respective interests. The following table displays the societal objectives, and associate criteria and measures. See Tables 2.2 – 2.15 for a more detailed description of these criteria.

To obtain measures for these criteria, this study uses survey responses collected by Astofooroff (2008). Astofooroff's study measured each criterion with a number of statement questions. All of the questions prompted the participant to respond to a statement with either "strongly agree," "agree," "disagree," or "strongly disagree." Where the majority of respondants either "agreed" or "strongly agreed" with the statements associated with a criterion, that criterion was deemed to be met.

This study assumes that the respondents of Astofooroff's survey agreed or disagreed with the statements because of the presence (or lack thereof) of a particular feature of the land use planning process. Thus fulfillment of Frame et al's criteria is also dependant on these features. This study matches a set of features of land use planning processes with Frame et al's criteria. Table 3.9 illustrates how the criteria are matched to features. Table 3.10 illustrates how Frame et al's criteria correspond to Haida Values.

This study evaluates three management objective development options. Each option has a set of differing features. In order for an option to meet a criterion, the process needs to exhibit at least one feature associated with that criterion. Additionally, the responses to Astofooroff's survey must confirm that that criterion has been met.

There are some societal objectives not associated with Frame et al,'s criteria, or measured by Astofooroff's survey. These are "budgetary impact," and "consistency with Haida Values." Table 4 illustrates how the criteria reflect Haida Values. These criteria are respectively measured by the cost of facilitation, and the presence of a government-to-government negotiation phase. The measure for the cost of facilitation is estimated based on the cost of a professional facilitator for planning sessions, and the length of time permitted for planning in the process.

Management objective development options are given a cumulative score and ranked in accordance with this score. The highest rank indicates the option meeting the most criteria.

Interviews

Interviews with individuals who were either participants in the land use planning processes, or have been responsible for monitoring, implementation or compliance with the SLUA have been conducted to gain a deeper, more nuanced understanding of how the plans satisfy the criteria. In particular these interviews aimed to address the following concerns:

- How and why is the development of the SLUA perceived as a success by Haida Gwaii residents?
- Was the collaborative planning process thought to be fair and inclusive?
- How do residents feel about Haida Gwaii's electrical energy supply?
- Do residents feel that the SLUA can address problems surrounding local development of electrical energy?
- Do residents feel that it is appropriate and feasible for the SLUA to contain management objectives directing the development of electrical energy?
- Do residents feel that the SLUA accurately articulates local values?
- Do residents feel that the SLUA is compatible with First Nations rights and values?

This section will state the target population of these interviews, the recruitment process, and the execution of the interviews.

The participants of the study were representatives of municipal or regional governments, local energy project proponents, and First Nations Government (principally the CHN) in the land use planning area. Only participants who had knowledge pertaining to the development of the SLUA were selected. The participants needed to currently reside on Haida Gwaii.

Given the restrictive inclusion criteria, only nine (9) possible participants were identified. The participants were contacted by telephone and/or email and informed about the details of the study, as well as their potential contribution. Participants willing to participate agreed to a time and location at which they could be interviewed personally

by the researcher. Out of the nine participants contacted three (3) agreed to participate, (3) refused to participate, citing either a lack of personal knowledge about the subject matter, or a reluctance to discuss sensitive local topics, and (3) did not respond to attempts to contact.

The participants who agreed to be interviewed were representative of the three stated authorities/organizations. A town councillor of the Municipality of Queen Charlotte was selected to represent local/regional governments. A private energy resource developer was selected to represent local industry. This participant has recently submitted an expression of interest to BC Hydro to develop a biomass electrical energy generation facility on Haida Gwaii. Finally, a mapping technician employed by the Secretariat of the Haida Nation was selected to represent First Nations Government. This participant additionally identified as a Haida himself.

All of the interviews were conducted in person, with the researcher taking handwritten notes. The interviews were designed to be semi-structured to allow for the discussion to deviate to relevant topics as they presented themselves. The researcher maintained a list of questions to guide the discussion where necessary. For a list of the interview questions, see Appendix B.

For the purposes of this study, the results of the interviews are considered to be relevant background information.

Results

Report of Astofoooff's Survey Results

Each criterion has one to six statement questions measuring its fulfillment. Astofooroff calculated the portion of respondents who agreed or strongly agreed with each question. These numbers are expressed as percentages. For each criterion an average rate of agreement with the statements was calculated. Astofooroff deemed the criterion to be fulfilled. This section will report on these results and discuss the implications they have for collaborative land use planning on Haida Gwaii.

Each chart names the process criteria and provides a description of it. The lower columns report on the percentage rate of agreement with the survey statement questions.

Table 2.2. Purpose and Incentives

Criterion	Description						
1. Purpose & Incentives	The participants developing the Land Use Plan should have an understanding about why they are performing the exercise. They recognize that there is an end benefit that is desirable to themselves, their constituents and fellow stakeholders. Moreover, they should feel that collaborative planning is the best way to resolve existing resource conflicts for this criterion to be satisfied.						
Response Measures							
Question #	1(a)	1(b)	1(c)	1(d)	1(e)	1(f)	Mean
Score (%)	100	100	100	62	77	85	87

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

All of the responses to Astofooroff's survey met the threshold of 50% agreement, with three statements receiving 100% agreement. The responses to these three statements suggest that the participants were confident in the collaborative planning process as an optimum strategy to develop a land use plan. They understood their goals and objectives, and were well aware of the multiple divergences of values among the other participants.

The Astofooroff survey statement with the lowest level of agreement (62%) was "the participants collectively identified and agreed upon clear goals and objectives." They may have felt that some parties did not have a sufficient opportunity to participate in the development of goals and objectives, or that the goals and objectives decided upon were not clear enough to be universally understood. So while the survey participants may have felt that they understood they own reasons for becoming involved in the process, they were less confident in the agreed upon collective objectives.

This criterion is fulfilled with an average agreement rate of 87%

Table 2.3. Self Design

Criterion	Description			
2. Inclusive Representation	This criterion is fulfilled when all participants with an interest become involved in the planning process. This includes First Nations interests. No party should dominate the process or have more power than any other the other stakeholder participants.			
Response Measures				
Question #	2(a)	2(b)	2(c)	Mean
Score (%)	72	92	77	80

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

All of the responses to Astofooroff's survey met the agreement threshold. The average agreement rate is 80%. The participants were reasonably confident that the representation of all local interest was sufficient. The highest level of agreement (92%) was with regard to adequate representation of government agencies. The participants agreed that all relevant government authorities were involved.

Some local stakeholders have raised concerns in open-ended responses to Astofooroff's survey about the CHN's preponderance in the planning process. This might be reflected by the slightly lower satisfaction with First Nations involvement (77%). However, this score is not egregiously low suggesting that a majority of participants recognize the unique rights of the Haida.

This criterion is fulfilled with an average agreement rate of 80%.

Table 2.4 Voluntary Participation

Criterion	Description		
3. Voluntary Participation	Participants should participate because they want to, and as such, become committed to the process. This ensures that the best efforts are made by participants to both represent their constituents, and proceed to develop a plan that is in the collective interest.		
Response Measures			
Question #	3(a)	3(b)	Mean
Score (%)	100	46	73

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was a very large discrepancy between the Astofooroff survey participants' feelings about their own commitment to the process relative to the commitment of others. 100% of the respondents to her survey agreed that they were fully committed to the process, while only 46% agreed that their counterparts were. It is reasonable to expect some over-reported agreement with the former statement. Nonetheless, there is a clear divergence of respondents' perceptions of others' intentions. Astofooroff, suggests that some of the participants may have been content to let the collaborative planning exercise fail, and simply allow the Haida to negotiate the agreement with BC (Astofooroffs, 2008). This is consistent with feelings that the Haida dominated the process.

This criterion is fulfilled with an average agreement rate of 73%.

Table 2.5. Self Design

Criterion	Description		
4. Self Design	Participants should work together to design the process in which discussions pertaining to the development of the Land Use Plan follows. This includes design and maintenance of a terms or reference for the land use plan working group. Adjustments and modifications to the process should be able to be made by the participants as they become necessary. It is important to note for the purposes of this study that it is assumed that the participants will have an opportunity to review the recommendations herein' and be granted discretion in the manner of proceeding.		
Response Measures			
Question #	4(a)	4(b)	Mean
Score (%)	70	31	51

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

This criterion was met only by a very small margin indicating that while the respondents to Astofooroff's survey did not necessarily disagree with the statements, their agreement was not particularly strong. The participants' feelings of personal efficacy to influence the planning process, on an on-going basis was very low, with only 31% agreement. A reasonably strong majority of 70% agreed that they were involved in the design of the process, at least initially. However, there is a perception that as time went on, participants' opportunities to influence the process diminished.

This criterion is fulfilled with an average agreement rate of 51%.

Table 2.6. Clear Ground Rules

Criterion	Description				
5. Clear Ground Rules	This criterion references a comprehensive, widely understood procedural framework guiding the planning process. With relation to "#4 Self-Design," this suggests the working group design a comprehensive terms of reference. Clear ground rules allow development of the plan to progress unencumbered by uncertainty and internal conflict.				
Response Measures					
Question #	5(a)	5(b)	5(c)	Mean	
Score (%)	62	62	69	64	

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

Altogether agreement for the statements in Astofooroff's survey associated with this criterion was moderate with a range of agreement between 62% and 69%. There was moderate agreement that the roles of participants and particularly first nations were clearly defined by the rules of the process. The "ground rules" themselves were moderately agreed to be "clearly defined" at 69%.

This criterion is fulfilled with an average agreement rate of 64%.

Table 2.7. Equality of Opportunity and Resources

Criterion	Description					
6. Equal Opportunities & Resources	This criterion is satisfied when all relevant parties and stakeholders are able to participate in collaborative planning in a meaningful way. No party should be removed from the process, or in any way disadvantaged. Similarly, no party should be able to unfairly dominate the process. Ensuring equal opportunity may require additional efforts depending on the nature of the stakeholders involved. For example, training and/or funding might be necessary where a stakeholder group is, for whatever reason, poor in knowledge or resources.					
Response Measures						
Question #	6(a)	6(b)	6(c)	6(d)	6(e)	Mean
Score (%)	92	77	62	31	38	60

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was moderate agreement that equality of opportunity and resources was achieved. Respondents to Astofooroff's survey strongly believed that they themselves received the necessary training and resources to effectively participate (92%). Additionally there was strong agreement that the respondents were given the necessary funding (77%).

Nonetheless, there was much less agreement with Astofooroff's statement questions pertaining to power imbalances, and all interests having equal influence. Only 31% agreed that all interests had equal influence, and 38% agreed that the process reduced power imbalances. So while the respondents to her survey appreciated that efforts were made to ensure equality of opportunity and resources, they generally did not feel as though those efforts were effective.

It is important to note as well that despite this inadequacy, there was moderately strong agreement that respondents' participation made a difference in the process (62%).

This criterion is fulfilled with an average agreement rate of 60%.

Table 2.8. Principle Negotiation and Respect

Criterion	Description					
7. Principled Negotiation and Respect	This criterion refers to the assurance that collaborative planning participants operate in accordance with mutual respect and trust. Planning should be done with open communication as well as a recognition and understanding about differing perspectives.					
Response Measures						
Question #	7(a)	7(b)	7(c)	7(d)	7(e)	Mean
Score (%)	92	46	42	46	54	56

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was generally low agreement that participants of the planning process demonstrated a clear understanding of differing viewpoints (46%) and that the process generated trust (46%). An explanation of these feelings might be that participants also felt that the process was hindered by poor negotiation and communication skills. Nonetheless, there was strong agreement amongst Astofooroff's participants that the

process encouraged open communication about the participations interests (92%). This suggests that the respondents to her survey might have more confidence in the process itself than the people involved.

This criterion is fulfilled with an average agreement rate of 56%.

Table 2.9. Accountability

Criterion	Description						
8. Accountability	The criterion of accountability suggests that the process and the participants should be accountable to the broader public and constituents. Ultimately, the participants represent a population subject to the Land Use Agreement. Perceptions of misrepresentation can frustrate efforts to reduce conflict through collaborative planning. It can also have negative impacts on compliance and implementation. It is important that the participants are sensitive to their responsibilities as representatives, and that there is regular communication of plan processes and decisions with the public.						
Response Measures							
Question #	8(a)	8(b)	8(c)	8(d)	8(e)	8(f)	Mean
Score (%)	69	73	77	69	46	54	65

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

Overall there was moderately strong agreement among Astrofooroff's participants that the process and participants were accountable to the wider public. The participants felt that they themselves were accountable (73%), and that others were as well (69%). Only 46% agreed that there was an effective strategy to communicate with the public. It might be the case that participants felt as though the onus fell on them as individuals to maintain transparent communication with their constituents.

This criterion is fulfilled with an average agreement rate of 65%.

Table 2.10. Flexible, Creative and Adaptive

Criterion	Description		
9. Flexible, Creative & Adaptive	The planning process should be adaptive to changing circumstances. This means that while clear ground rules need to be in place, there needs to be sufficient flexibility to allow for unforeseen situations, and changes affecting the social and environmental landscape. Additionally, it is important that the process be assessed as time goes on, especially in cases where planning lasts longer than anticipated.		
Response Measures			
Question #	9(a)	9(b)	Mean
Score (%)	85	62	74

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was agreement that the process was able to change when necessary. 85% agreed that it was flexible enough to adapt to new information and changing circumstances. 62% agreed that they had the opportunity to periodically assess the process and make adjustments.

This criterion is fulfilled with an average agreement rate of 74%.

Table 2.11. High Quality Information

Criterion	Description						
10. High Quality Information	This criterion is referring to the material presented to the participants to inform their decision making. In addition to being sound and scientifically accurate, the information should permit multiple accounts of analysis and be thoroughly reflective of multiple resource values and land use options.						
Response Measures							
Question #	10(a)	10(b)	10(c)	10(d)	10(e)	10(f)	Mean
Score (%)	46	54	25	54	92	92	61

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was varying levels of agreement depending on the types and sources of information made available to the participants. Astofforoff's statement that the information was high-quality failed to meet the 50% threshold of agreement at 46%.

Nonetheless, the respondents to her survey were slightly more confident in the usefulness of the information for the purposes of decision making (54%).

Concurrently, the respondents expressed strong approval of the multiple accounts method for evaluating options, as well as overlay of multiple resources values for spatial analysis. Both statements received 92% approval. The participants were more confident with the analytical methodologies, rather than the data presented to them. This may have been the result of the limited studies and tests drawn upon.

An important point to note is that the participants felt quite strongly that the provincially established guide of 12% protected areas was a hindrance to reaching consensus. Only 25% felt that this was a useful stipulation.

This criterion is fulfilled with an average agreement rate of 61%.

Table 2.12. Time Limits

Criterion	Description			
11. Time Limits	This criterion is satisfied when the participants feel as though they have had sufficient time to effectively analyze the data, engage in deliberations, and come to a consensus decision. The duration of time is dependent on many factors such as the size of the land use area, the availability and diversity of resource values and interests, and the level of conflict or disagreement.			
Response Measures				
Question #	11(a)	11(b)	11(c)	Mean
Score (%)	46	62	38	49

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

The participants in Astofooroff's survey did not feel that the time given to collaborate was sufficient. Only 38% agreed that the time allotted was realistic. Some did feel that the time limit was helpful in moving the process forward (62%). However, the general feeling was that achieving meaningful consensus would take longer than the time allowed for this exercise.

This criterion is not fulfilled with an average agreement rate of 49%.

Table 2.13. Implementation and Monitoring

Criterion	Description		
12. Implementation & Monitoring	Participants should feel that through the establishment of the plan, all of the interested parties are committed to its implementation. The plan itself should contain expressions of implementation protocols and monitoring recommendations.		
Response Measures			
Question #	12(a)	12(b)	Mean
Score (%)	15	23	19

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

The respondents to Astofooroff's survey were not satisfied with the plans and outlook for implementation and monitoring. Only 15% agreed that the table developed a clear strategy for plan implementation. Only 23% felt that the participants shared a strong commitment to implementation. Astofooroffs suggests that the reason for this might be that the participants were not satisfied with the details of this section of the agreement, or that the consensus met on this matter was forced and not meaningful (Astofooroffs 2008)

This criterion is not fulfilled with an average agreement rate of 19%.

Table 2.14. Effective Process Management

Criterion	Description				
13. Effective Process Management	The overall process should be managed by a competent authority, and in a neutral manner. This includes all staff members, and government agencies. The participants should be able to trust the process managers and feel confident that they are operating in accordance with principles of neutrality and transparency.				
Response Measures					
Question #	13(a)	13(b)	13(c)	13(d)	Mean
Score (%)	54	62	62	77	64

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was moderate agreement that the process was managed effectively. The respondents to Astoforooff's survey were moderately confident that the agency and its

staff were neutral and unbiased (62%). 77% felt that the staff were sufficiently skilled. 54% agreed that the structure of the process was sufficient to make progress.

This criterion is fulfilled with an average agreement rate of 64%.

Table 2.15. Independent Facilitation

Criterion	Description		
14. Independent Facilitation	As with criterion #13, discussions need to be facilitated by a neutral party that is well trained and skilled at directing and maintaining constructive dialogue between multiple interested parties.		
Response Measures			
Question #	14(a)	14(b)	Mean
Score (%)	50	58	54

Astofooroff, N. (2008) "Evaluating Collaborative Planning: A Case Study of the Haida Gwaii Land and Resource Management Plan," *Masters of Resource Management Research Project*, Simon Fraser University, Report No. 462

There was moderate agreement that the facilitator improved the process effectiveness (50%) and that they acted in an unbiased manner (58%).

This criterion is fulfilled with an average agreement rate of 54%

Interview Results

The responses highlight seven (7) themes pertaining to Land Use Planning on Haida Gwaii and regional energy development. This section will discuss these themes as well as what the responses might mean for policy development in this area.

1. Successes in initial collaborative planning process

One of the most important outcomes of a collaborative planning process is that the participants and constituents feel as though the process yielded successful results (Frame et al, 2004, Morton et al, 2011, Astofooroff, 2008). This is important for providing investment certainty, reducing future conflict, and ensuring implementation and compliance.

All of the participants agreed that the initial process was, for the most part, successful. It is recognized as an appropriate and useful process, yet all of the participants were aware of some limitations. One participant said:

> *It is messy. It is unproductive, but there really is no better alternative.*

Another said:

> *It is completely relevant because of the situation on Haida Gwaii; because of the Haida claim to the land. It is the best solution [because] it allows the Haida and the non-Haida to work together*

And,

> *Collaborative planning is absolutely necessary to maintain economic and environmental sustainability. This makes it hugely relevant to Haida Gwaii. The process is tailor made for places like this*

Nonetheless, the participants all tempered their comments of approval with feelings about how the process and outcome were limited or deficient. The lack of management objectives pertaining to energy resource development was a common theme. Some of the comments were:

> *We never thought about energy in the Land Use Planning Process [...] the focus was more on timber extraction.*

> *Energy Interests did not participate directly in the Land Use Planning Process. Nonetheless, it does in fact make sense to deal with energy resource issues in this forum. At the time, the scope just might have been just too broad to accommodate [energy resource values].*

And,

> *We never considered the social aspect. At the time, we were just looking for guarantees.*

So, while the participants understood the process to be an effective and fair exercise with favourable outcomes, they all expressed some understanding about the shortfalls, particularly the remaining uncertainties regarding electrical energy development.

2. Fairness and inclusiveness in the initial collaborative planning process

Perceptions of fairness and inclusiveness is also essential in ensuring compliance and implementation, and especially in reducing future conflict. The legitimacy of a regional land use plan is closely related to feelings of respectful approval amongst the regional constituents. The participants' comments suggested that this criterion has been fulfilled.

When asked about stakeholder and First Nations involvement the participants made these comments:

> *The process was fair and successful. We did incorporate Haida, environmental, and operational values […] I am satisfied with the Haida involvement. The technical and management teams were collaborative. The process was agreed upon by the Haidas.*

And,

> *Everyone interested was involved. Everyone on-Island was included and satisfied with the process and consented to the final document. The only people who may have been in disagreement were project proponents from off-Island.*

The general consensus among the participants was that the process was fair, and that their respective stakeholders had appropriated opportunities to be included in the process.

3. Participants' recognition and understanding of current energy problems

There was divergence of opinions about the nature of Haida Gwaii's energy problems. Only one specifically cited dependence on diesel generated electricity as a chief concern, moreover, he continued to describe it as a necessity saying:

> *There will always need to be a rolling reserve of diesel when a non-firm energy (i.e. wind) is utilized.*

When asked about the greatest energy concern, another participant cited the cost saying:

> *Burning diesel is a problem. But, the cost to produce [energy] is very high. Manufacturing is not realistic.*

One participant even believed that the concerns about diesel generated electricity have been overstated. He said that:

> *Diesel fuel [burned to generate electrical energy] amounts to less than 10% of the overall CO_2 emissions. In this regard, I think that we are fairly good, and comparable to other industrial areas … Our bigger concern should be the carbon dioxide in the atmosphere produced from decomposing waste wood.*

These responses suggest that energy development on Haida Gwaii is a multifaceted problem that is understood from a number of divergent viewpoints. This illustrates the importance of collaborative planning, but also suggests that there may be some difficulty in achieving a consensus decision on a Land Use Planning Order pertaining specifically to energy.

4. Possibility to formalize energy priorities in the SLUA

The participants were prompted to answer questions regarding the appropriateness and feasibility of participating in Land Use Planning exercises designed to address local and regional energy supply issues. The exercises were described to be similar in kind to the ones employed to develop the existing Haida Gwaii Strategic Land Use Agreement. Generally, there were feelings that this would be a fair and logical approach to resolve energy supply issues. Concurrently, there were persistent concerns about the efficacy of this exercise. Moreover, there were also some feelings that this level of consultation was redundant given previous efforts, namely the development of a Community Energy Plan.

When asked specifically about developing energy value management objectives, each participant cited different concerns. The project proponents said:

> *The only way to get that kind of change would be through government to government negotiations [between the Province and the CHN]. The [Land Use Plan] couldn't be any worse, but probably wouldn't be much better either. The public would like to have an energy plan. But private [energy] developers will just see this as making the regulatory process more murky.*

The SHN employee said:

> *The approach is good. It's not a bad idea. It [energy resource management] is just very sensitive. For now, the individual, case-by-case approach is better. Making changes would require higher level planning. There is too much uncertainty for a blanket statement. We need to establish our long-term energy goals first.*

And the municipal councillor said:

> *There was a broad spectrum of interest in the development of the SLUA. More focus might have helped [include energy resource values]. However, efforts have been made to have public discussions about energy, by Sheltair, by CHN. I'm just not sure if there is appetite for more discussion right now.*

So both the councillor and the proponent cited some stakeholder hesitation in engaging in these processes. The SHN employee was the most adverse to the exercise. When asked about allowing the HGMC to amend the Haida Gwaii Strategic Land Use Agreement without the use of collaborative planning (which would significantly reduce stakeholder involvement and public consultation)

The municipal councillor said:

> *Allowing the Haida Gwaii Management Council to make these changes would be a more practical option. Consultation should still occur – although it might be difficult to stimulate interest given the previous efforts; there has been consultation ... If the decision is passed by the HGMC the decision will go to the signatory parties. The CHN will bring the matter to the House of Assembly. If the House adopts those changes, then I think that would indicate achievement of a social license.*

The project proponent said:

> *I would be in favour, if the CHN was in concurrence. I think the Haida Gwaii Management Council does have the social licence to make these changes. They would probably choose to talk to some people though. The initial process was big. Six months long. The information is already gathered. If we open this up, it should be on a smaller scale; we are only dealing with one issue.*

And, consistent with his earlier comments, the SHN employee said:

> *The Solutions Table doesn't have the qualifications or expertise to recommend [to the HGMC] these changes. It could be done, but for something this large it would need to involve more people.*

So, with the exception of the SHN employee, there was support for a streamlined option, provided that public consultation be performed, at least at some level. The SHN employee appears to be in favour of maintaining the status quo, where energy projects are considered on an ad-hoc basis without any hard qualifying criteria.

5. Components of an energy management objective

The participants were prompted to provide input about the feasibility and appropriateness of developing three different components of a management objective: identification of a specific resource value available for development, identification of potential development sites, and targets for energy output.

On the matter of specific resources, the participants said:

> *Biomass is well supported by the CHN. Some people want tidal, but at present, there is no proven viable technology. For some of these proponents, the importance of this deficiency is underappreciated. They continue to advocate for tidal energy projects. The South grid is already supported by hydroelectricity. With wind power, storage is a big technical issue. Additionally, there needs to be a rolling reserve of diesel when a non-firm energy is utilized.*

And:

> *Certainly, biomass is one. There is an opportunity for hydro – the only good ones [sites] are on Moresby [Island], but it is expensive to get to communities. Biomass uses waste products that would otherwise be considered a pollutant. It helps the forest industry. It is labour intensive, with low capital costs. This would mean local jobs. The cost of transmission is low. It is really the only one that makes sense. Run of River will never be feasible. The salmon are too important. We can't use geo-thermal.*

And:

> *The CHN or political leaders would have to identify this [specific energy resource values]. I have no experience in this, but all resources are important.*

There is some common understanding about the technical feasibility and availability of energy resources. Additionally, there is some confidence that political authorities could be trusted to identify these in policy. Based on these responses, there must be some confidence that management objectives could include specific energy resource values.

On the matter of resource development sites, all participants agreed that this was a possibility. They recognized that the existing Land Use Agreement specified an operating zone to which industrial development has been limited. No one indicated that this zone was insufficient to accommodate energy developments.

The municipal councillor provided a thorough response that was consistent with all others, saying:

> *Feasibility is an issue. Protected areas need to be considered (for example, what is untouchable?) We have to consider all the various values. But it is possible that we could do this.*

On the matter of development targets all participants except for the SHN employee felt that they were necessary. He felt that it was too presumptuous to assume that we could set targets given what is known at this time. The others however, felt that without targets and incentives implementation of the management objectives might not occur. They said:

> *With targets you need penalties for when you fail to meet them, otherwise they are ineffective. There is a possibility that the cost of failure might make people squeamish about setting targets like this.*

And:

> *Yes we should [set targets]. We need incentive; carrot and stick. Major damage is being done by waste wood. We are already being penalized by the Province for not meeting BC's targets. This is making the municipalities anxious. Anything that improves carbon neutrality will please the villages.*

Setting targets for development is something that could get reasonable attention through collaborative planning.

6. The SLUA's compatibility with local values

The participants were asked if they felt that the Land Use Agreement has been effective in articulating their values. Overall the feeling was that the Agreement contained a fair and accurate articulation, however, there were concerns about the respect given to them, especially by industry. For example, one participant responded saying:

> *[The values] are all there. If they [industry] cares is a different question. They may not respect it. We know that the Province did not get what they were looking for. They wanted to harvest more timber. We knew that we were going to run out of trees.*

There is a recognition that the stakeholders residing in the planning area are more committed to a sustainable approach to resource management, and are more sensitive to development of resources. This is one of the primary reasons BC adopted collaborative planning as an approach to Land Use and Resource Management. Hence these statements reflect a successful application of collaborative planning as a means to promote regional values. They also suggest a slightly confrontational attitude towards "outside interests." Another participant responded saying:

> *On-Island [forestry] developers have Forest Stewardship Council certification – so we consider this satisfactory*

This suggests that local industry has made efforts consistent with the values of the Land Use Agreement. Hence, the values may be clear and well-articulated, however, the same participant also described the wording of the Land Use Agreement to be "confusing."

7. Compatibility with First Nations rights and values

The participants were prompted to comment on the Land Use Agreement and planning processes applicability with Haida values. The thoughts here were almost categorically positive. One participant said:

> *It provided the Haida with a degree of ownership [...] We did incorporate Haida, environmental and operational values [...] I am satisfied. The Process was agreed upon by the Haidas. It was respectful to the Haida claim to the land.*

There was only one instance where a participant suggested that the process may have produced a balance of power in favour of the Haida. This had to do with the 2-tiered negotiated nature of the planning process. This concerns the process by which the CHN was allowed to grant final approval of the Agreement, while local non-Haida residents entrusted that authority to the Provincial Government on their behalf.

Interview Conclusions

1. The Haida Gwaii Strategic Land Use Agreement and the process by which it was designed was fair and effective. This is a reasonable approach to resolving resource management conflicts, and would be looked upon favourably by regional stakeholders as method to address energy conflicts.

2. Concerns about energy supply on Haida Gwaii are varied and complex. An open and holistic approach should be taken to identify all of the implications with development of this resource.

3. Establishing Energy Resource Management Objectives is possible. There are however, potential challenges such as:

    - Abandoning a favoured ad-hoc approach to energy resource management
    - Replicating redundant and tired energy supply consultations, and preferences for a streamlined approach
    - Issues surrounding compliance and implementation
    - Intractable positions regarding specific resource values

4. There needs to be efforts to educate proponents and stakeholders about the practical and technical feasibility of each specific energy resource.

5. Principles of Ecosystem Based Management need to be maintained.

Policy Options

This section lays out (1) clean energy resource development options, and (2) options for establishing energy resource management objectives. Resource development options refer to specific energy resources that have the potential to, in part, satisfy CEP objectives. These developments could reduce local dependence on DGS, and reduce the emissions of the existing power supply system. Management objective development options describe the processes by which development of these resources could be established as management objectives in the SLUA.

Energy Resource Development Options

Resource Development Options refer to management objectives that this study hopes to incorporate into the SLUA through a proposed collaborative planning process. Management objectives pertain to a specific resource value. In the case of this study, these resource values are small hydroelectricity, and wind energy. A management objective contains a specific action pertaining to a resource value, and a target indicating accomplishment of the objective.

This section endeavours to enumerate all potential options for resource development without prejudice to a full technical analysis being conducted in the subsequent section. However, there are a number of limiting factors that must first be discussed before this selection can be made. These limitations necessarily remove specific resource values from this analysis.

The first limiting factor is the parameters of a land use plan and the land use planning area. While residents have expresses preferences for the development of energy resources such as wave energy, tidal energy and off-shore wind energy (CEP, 2008), all of these resources are only available in areas outside the land use planning area. Due to this limiting factor, these resources are considered to be outside the scope of this analysis, and therefore are excluded.

Also limiting the scope of this analysis is the absence of a local supply, or uncertain volume of local supply of the specific energy resource. The first source this factor

eliminates is solar generated electricity. Solar energy refers to sunlight converted to electrical energy by solid-state semi-conductor diodes called photovoltaic cells. Effective use of this technology requires that it be installed at sites sufficiently insolated, taking into account seasonal variation. On Haida Gwaii, direct sunlight averages approximately three to four hours per day (CEP, 2008). With average estimated costs of generation of solar electricity in BC being $1.26 - $1.40 (CEP, 2008), and given the reduced volume of available sunlight, solar energy does not have a supply feasible for considered in this study.

Also uncertain in supply is biomass. This is a very popular option on Haida Gwaii due to the high volumes of solid wood waste produced as a bi-product of the forest extraction industry. Anecdotal evidence, as illustrated in the interviews, gives rise to suspicions that, should forest harvesting continue at current rates, a viable biomass electrical energy generation industry exists in the region. These claims are in part supported by technical surveys, although the viability of the supply remains unconfirmed. The most common suggested application of wood waste as a bio-fuel involves the use of residues of saw-mills. However, saw-mill processing does not occur on Haida Gwaii, and as such, the waste materials available are in the form of large blocks that would require further chipping, which is energy intensive and expensive as a stand-alone process, not integrated as part of a pulp or saw mill (CEP, 2008). Local fuel stocks alone would only support 20 MW of generating capacity, much less than the minimum 200 MW required for a wood residue plant to be economically installed and operated in Western Canada (ibid). For these reasons, this study cannot endeavour to accurately assess the overall feasibility of developing biomass on Haida Gwaii.

Another potential energy supply source that needs to be removed from this analysis due to uncertainty of supply is geothermal generation. This refers to the process by which heat from the Earth's crust is captured to generate utility-scale electrical energy. The costs for exploration are considerable, and while there are suspicions regarding the availability of this resource on Haida Gwaii (primarily around a number of Hot Springs existing within a National Park), there is far too much uncertainly at this time to include development of this resource as a management objective.

Supplies of natural gas are absent, and volumes of coal are unconfirmed. Furthermore, management objectives aimed at development of these resources would likely be deemed to be in contrast to the principles of ecosystem based management; the respect of which must be maintained when producing amendments to the SLUA in accordance with Attachment 'B' Section 4.

Resource Development Option 1 - Management Objective: Development of Small Hydro Electrical Energy Generation

Small Hydro refers to hydroelectric projects generating less than 50 MW. Regulatory processes in BC are well established to permit BC Hydro and Independent Power Providers to develop these installations across BC. These installations typically occur on small steep creeks with slopes of at least 10%. The reliability of the output of these installations is variable, and depends on weather patterns and seasonality. As such, this resource will never be able to completely replace a dependable source, such as diesel fuel generation. It can only effectively satisfy a portion of the demand.

There is already one such facility operating on Haida Gwaii. It has a generating capacity of 5.7 MW and supplies about 80% of the demand on the southern system (CEP, 2007). BC Hydro has identified a number of potential small hydro sites in the operating zone (BC Hydro, 2000). These will be discussed in further detail in the analysis section under the criteria heading of local availability.

Resource Development Option 2 – Management Objective: Development of Onshore Wind Electrical Energy Generation

Wind energy refers to the use of standing turbines to convert kinetic energy of surface winds to electrical energy. The technology has been applied world-wide in several jurisdictions. Output is dependent on the physical specifications of the turbines as well as the volume and speed of the wind. Onshore turbines typically generate 1.5 – 3.0 MW. Output is intermittent based on the variable availability of the wind. Similar to Option 1, wind generated electrical energy can only be expected to offset a percentage of a dependable energy source and can only act as a supplement.

Three onshore locations have been identified as potential sites for wind turbine installations.

Management Objective Development (MOD) Options

Management objective development (MOD) options are step-by-step plans for implementing a collaborative planning processes aimed at amending the SLUA to include management objectives directing the development of clean energy resources.

The MOD options presented in this section are processes constructed in accordance with 'best practices' approaches identified through the literature review. Additionally they are sensitive to the amending formula established in the SLUA.

MOD Option 1 – CFP Integrated Energy Planning Protocol

This option applies best-practices as determined by earlier evaluation of collaborative planning in BC. It has three phases, each phase containing multiple stages of progress that will cumulatively produce stakeholder identified land use management objectives to be adopted by the Haida Gwaii Management Council. This option is designed to be an application of best-practices in collaborative planning. Amongst all options it represents the highest level of consultation and stakeholder involvement. It is the most effective, equitable, politically feasible, option. Conversely, it is the lengthiest process, most challenging to implement, and most expensive.

Phase 1.A - Process Initiation involves all necessary preparations to begin a collaborative planning process such as the one described by Morton et al (2011). All the data to be considered by the Community Planning Form needs to be amalgamated here and prepared in a format accessible to all relevant stakeholders. Stakeholders need to be identified, recruited to participate, and given the necessary training to participate effectively. At this point a competent facilitator also needs to be identified to guide the collaborative planning process as it proceeds.

Phase 2.A – Community Planning Forum Formation represents the most substantial stage of this process. This is where the collaborative planning sessions of the

Community Planning Forum are performed. These involve a series of facilitated negotiations where the stakeholder participants are presented with the technical data collected in Phase 1.A. Their discussions are guided towards the formation of a recommended management objectives. Each management objective should pertain to the development of a specific energy resource value within the SLUA Operating Zone.

The structural content of these negotiations is left purposefully general. This is because, in the interests of meeting the objective of stakeholder driven negotiations, the terms of reference for the Community Planning Forum ought to be developed by this body.

A crucial component necessary to ensure CPF accountability to the wider community is regular public engagement. Meetings should be open for the public to view, and to request information when needed.

All management objectives as well as associated indicators and targets are recommended to the Haida Gwaii Management Council by consent decision of the CPF. This is reflected in Phase 2.B – Community Planning Forum Amendment Recommendations. At this point in time, Morton et al's (2011) First Tier of collaborative planning is deemed to be complete.

Phase 3 – HGMC Final Decision represents the implementation of Section 4.0 – 4.1 (a – c) of the HGSLUA and Schedule B of the BC Haida Nation Reconciliation Protocol. The HGMC reviews the recommendations of the CPF and adopts them by mutual consensus. The HGMC may make revisions to be reviewed and commented upon by the CPF. After adoption by the HGMC, the amendments proceed for approval by the signatory parties of the BC Haida Nation Reconciliation Protocol.

MOD Option 1 is displayed as a flowchart in Appendix A1.

MOD Option 2 – HGMC Streamlined Protocol

The Haida Gwaii Management Council exercises its authority to integrate energy resource value management objectives into the SLUA with minimum collaboration and

stakeholder involvement. The HGMC remains in compliance with Section 4.0 – 4.1 (a – c) of the HGSLUA and Schedule B of the BC Haida Nation Reconciliation Protocol,.

The responsibilities of the CPF carried out in Phase 2 of MOD Option 1 are assumed by the HGMC, and the CPF is never formed. Phase 1.A of MOD Option 2 involves the same technical information gathering and aggregation. In this process, the task of analysing the data and negotiating the terms of management objectives is performed by the HGMC.

Phase 1.B mirrors Phase 2.B of MOD Option 1. Phase 2 mirrors Phase 3 of MOD Option 1.

MOD Option 2 is displayed as a flowchart in Appendix A2.

MOD Option 3 – HGMC Community Consultation Protocol

MOD Option 3 is a process that draws upon the strengths of MOD Option 1 and 2. As with MOD Option 2, the responsibility of developing management objectives falls upon the Haida Gwaii Management Council. In place of the Community Planning Forum described in Option 1, public hearings of the affected communities are organized so that residents and stakeholders can provide input to the HGMC. The primary difference between Option 3 and Option 1 is that Option 1 empowers affected parties to play a role in designing the management objectives. Option 3 offers only consultation.

Following production of draft energy resource value management objectives in Phase 1.A, those amendments are published and made available for public consumption. In Phase 2.A, the HGMC is then required to organize Public Hearings in the affected communities of Haida Gwaii. Information sessions are held in order to promote public understanding of the process and the implications of the draft management objectives. Members of the public are then permitted to present statements to the HGMC. For maximum inclusion, public participants should be permitted to issue statements in a format of their choosing (written or oral). The HGMC must then take the statements into consideration when finalizing the draft management objectives in Phase 2.B.

Phase 3 of Option 3 mirrors Phase 3 of Option 1.

MOD Option 3 is displayed as a flowchart in Appendix A3.

Chapter 3. Analysis of Options

Analysis of Resource Development Options

As determined in the enumeration of potential resource development options, management objectivities directing the development of small hydro and wind are deemed to be sufficiently available within the operating zone to be considered in this analysis. This section evaluates these resource development options in accordance with their individual merits. The purpose of this section is to inform decision makers in a collaborative planning process about the most optimal resource management objectives aimed at realizing the energy values enumerated in the CEP, particularly “increasing dependence on renewable sources,” “carbon dioxide abatement,” and “ensuring affordable user energy costs.” (CEP 2008).

This section evaluates the technical attributes of small hydroelectric and wind electrical energy. The attributes are associated with the following objectives:

- Effectiveness in terms of energy output
- Cost efficiency in terms of installation investment and cost of generation
- Ecological impacts in terms of carbon-dioxide abatement and other environmental factors depending on the nature of the technology

The proceeding sections will evaluate all of the energy sources and options under the headings of each of the objectives. There are four potential sites for small hydro installations. Each is individually assessed to determine the optimal site. The chart below illustrates an overview of each site, displaying geographic location, cost of installation, potential output, and per-unit cost of output:

Table 3.1. Inventory of Small Hydro Sites

Stream Name	Lat/Long	Power (kW)	Cost ($1000)	Transm. Dist. (km)	Capacity Factor	Energy (GWh)	Fish Flow Factor	'Green Energy' (GWh)	Cost ($/kWh)
Haans Cr.	5315/13153	700	4,645	4	65%	4.0	0.90	3.6	0.122
Sachs Cr.	5312/13158	900	2,419	5	65%	5.1	0.90	4.6	0.049
Tlell R	5322/13200	500	5,598	14	65%	2.8	0.90	2.6	0.205
Unnamed Cr	5410/12956	500	2,342	0.5	70%	3.1	0.90	2.8	0.080

Sigma Engineering, (2000), "Inventory of Undeveloped Opportunities at Potential Micro-Hydro Sites in BC" Prepared for BC Hydro and Power Authority

Because there is no year-round data on wind speeds at any of the potential sites for wind energy development, attributes of this resource are generalized across all sites. .For the purposes of comparison, the assumed area utilized for wind turbine installation is the area required to generate a yield equivalent to output of the average small hydro site. This amounts to approximately 3 km^2 (Meyers & Meneveau, 2012).

Each source and site is then ranked depending on how well they fulfil the stated objectives in comparison to the other options. Higher ranks indicate greater fulfillment. Table 2.1 illustrates this scheme.

Effectiveness

Effectiveness refers to the volume of electrical energy that can potentially be generated by each installation. These measurements have been published in BC Hydro's inventory, and in the CEP. This study offers a comparison, as well as a percentage of demand.

Small Hydro

Development of the resource must generate usable electrical energy. Additionally, it must have the potential to measurably offset local dependence on diesel generated electrical energy. Output is measured as 'green energy' generated in MWh. 'Green energy' refers to the total energy available at the site adjusted for mitigation measures to reduce the impact of the installation on salmon. These efforts cost a varying level of

efficiency in output depending on the density of salmon in the stream. BC hydro has estimated the impacts of these inefficiencies using the 'fish-flow-factor.' This is a ratio indicating the mean annual energy available in the stream allowing for fish flow requirements in accordance with BC Hydro's criteria for Green-Micro-Hydro Generation (BC Hydro,2000). Green energy is calculated by divining potential energy by the fish-flow-factor. All potential sites on Haida Gwaii, have a fish flow factor of 0.90, hence the cost to efficacy is that output is reduced by 10% at each site.

BC Hydro has projected growth of demand for electrical energy on Haida Gwaii to reach 52,000 MWh annually by 2027 (CEP, 2008). This study uses this projected figure as the measure of future demand. Potential energy output for specific small hydro sites is taken from BC-Hydro's calculation published in "Inventory of Undeveloped Opportunities at Potential Micro Hydro Sties in British Columbia," (2000). This study offers a comparison between sites.

For ease of interpretation, average green energy output has been calculated across all of the potential sites. The average site in the land use operating area has the potential to generate 3.4 million kWh of green electrical energy. In terms of future demand satisfaction, each site can, on average, satisfy 7.63% of the total demand for electrical energy on Haida Gwaii.

Onshore Wind Energy

Wind energy refers to the use of turbines to convert the kinetic energy of surface winds to electrical energy. Onshore turbines typically generate 1.5 to 3.0 MW of power (CEP, 2008). Sites require a minimum of 4.5 m/s of wind speed in order for the installation to be feasible. Three such sites have been identified on Haida Gwaii:

Table 3.2. Potential Wind Energy Sites

Location	Latitude/Longitude
Masset (near the airport)	54.004 N, 132.101 W
Sandspit (near the airport)	53.178 N, 131.837 W
Tlell	53.602 N, 131.936 W

The Sheltair Group, (2008) Haida Gwaii Community Energy Plan, prepared for HC Hydro and Power Authority and the Council of the Haida Nation

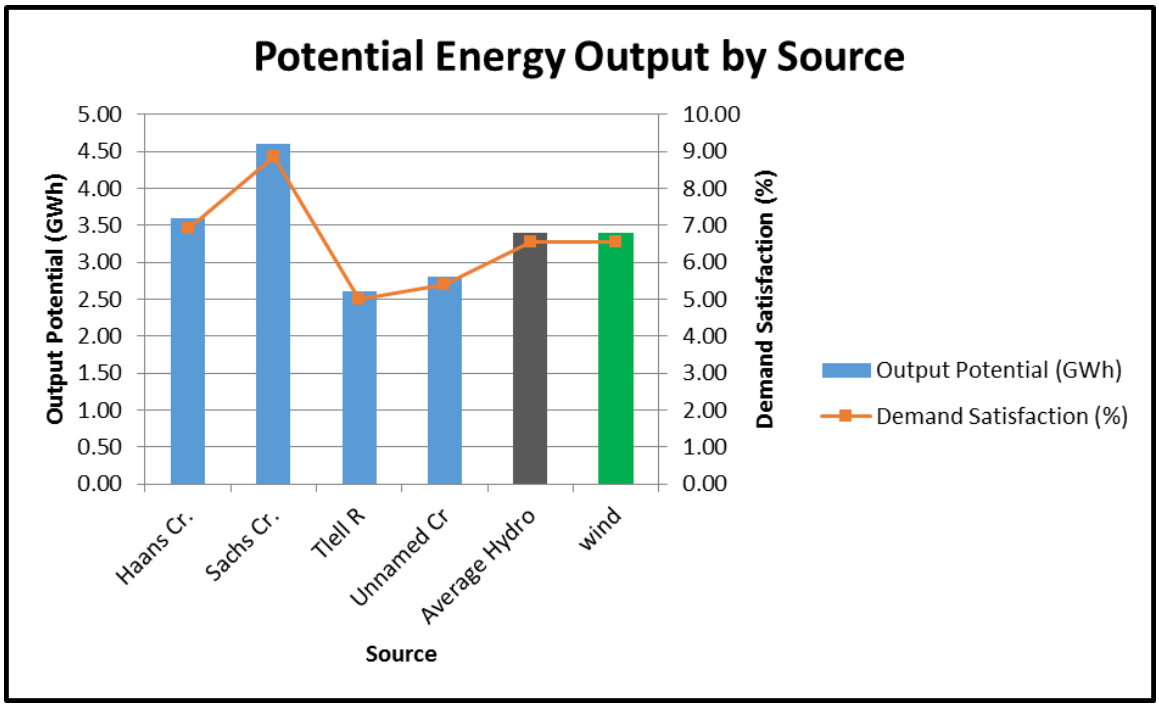
No specific data to differentiate sites has been collected other than estimated annual wind speeds. Thus this analysis will only consider this option in aggregate, without analysing specific sites, as was applied in the case of small hydroelectricity.

The output of wind turbine installations varies according to several factors such as wind speed, altitude, turbine model, and site area. This analysis takes the average estimated wind speed across the three sites, and assumes it remains constant. The area available for wind turbine installations can be deeply contentious. As such, this analysis considers the smallest possible unit (1 km2) of development (and output), and takes expansion to be variable depending on exogenous social factors. According to Meyers and Meneveau (2011), optimal distance between turbines is 15 rotary diameters, or ~1km. Wind installations will yield an output of 1.1 GWh/km2, which will satisfy 2.76% of the projected demand for 2027 (windenergyfoundation.com, CEP, 2008).

Comparing the benefits and implications of small hydroelectricity and wind generation can be challenging. This is due to the varying physical nature of the resources and technical features of the installations. Where small hydro projects have a maximum estimated potential output, the maximum output for wind energy is dependent on the amount of land allocated for development. For the purposes of comparison, this study focuses on the minimum quantity of turbines required to generate wind energy equivalent to the output of the average small hydro project. A single turbine will generate an output of 34%. Thus, three turbines covering 3 km^2 would be required for equivalent output.

The bar chart below displays the energy output of each site on the primary vertical axis, with the percent demand satisfaction on the secondary vertical axis.

Figure 3.1. Potential Energy Output by Source



Sigma Engineering, 2000, CEP, 2008

Cost Efficiency

Cost-efficiency is determined by both the cost of installation of energy projects, as well as the projected cost to generate and maintain electrical output. Both values have been supplied by BC Hydro's inventory and the CEP. This study offers a comparison, as well as a calculation of efficiency gains from displacement of DGS. Given these efficiency gains, this study also calculates an investment period by calculating the time required for the efficiency gains to match the cost of installation.

Small Hydro

Hydroelectric installations have the potential to offset some of the local dependence on diesel generated electrical energy. At the time of development of the CEP in 2007, the cost of diesel generated electricity was calculated to be $0.26/kWh. This cost has likely risen substantially over the past decade. However, in the interest of maintaining conservative estimates of the cost efficiencies associated with hydroelectric

development, this figure will be used in this study's calculations. In doing so, this analysis takes precautions not to overstate the benefits of any resource development options.

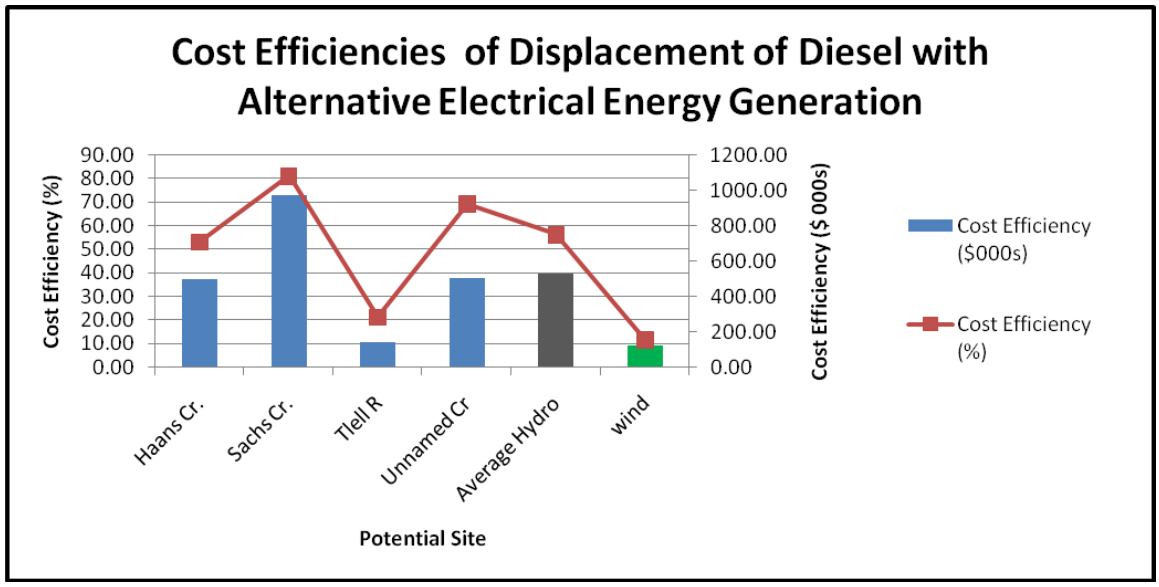
The costs of installation range from $ 2.4 million to $2.6 million with an average cost of $3.7 million (BC Hydro, 2000). These sites are expected to have additional costs to maintain output ranging from $0.049 - $0.122 per kWh, with an average cost of $0.114/kWh (Ibid). To measure cost efficiency, the cost of maintaining each installation at maximum output was calculated and subtracted from the cost of generating an equivalent volume of electrical energy from diesel fuel. The average cost of offset per site is $528,600 or 56.15%. The investment period has been calculated by determining the number years required for the cost efficiency gains to match the cost of installation.

Onshore Wind Energy

Cost Efficiency, as with hydroelectricity options has been measured in terms of capital investment and per unit cost of generation. The installation of a single wind turbine costs between a range of 1.3 million – 2.2 million, for an average cost of $1.75 million (CEP, 2008). These costs are likely subject to economies of scale when several turbines are installed at one site. However, in the case of this study this impact is judged to be minimal due to the low levels of available terrain.

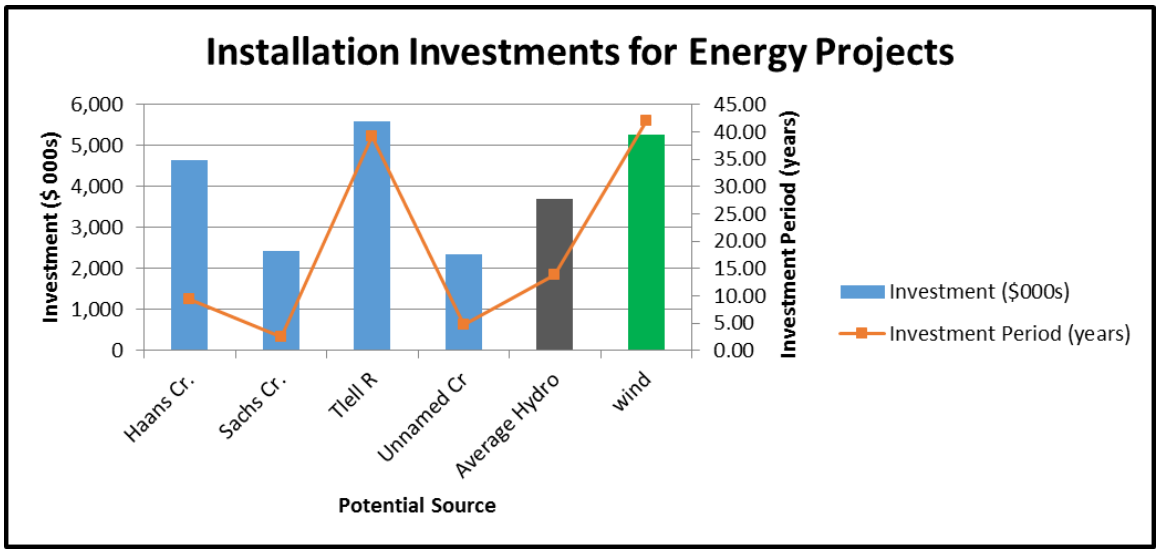
The cost of generation ranges from $0.20/KWh - $0.26/KWh, with an average of $0.23 KWh, or $253,000/$km^2$. This makes wind energy the least cost efficient option, yielding a lower cost efficiency than even the least favourable hydroelectric site. Similarly, the capital costs are significant, costing 1.4 times more than the average small hydro project to generate an equivalent output. Given the low cost efficiency, it would take over 40 years to recoup these costs.

Figure 3.2. Cost Efficiencies of Displacement of Diesel with Alternative Energy Generation



Sigma Engineering, 2000, CEP, 2008

Figure 3.3. Installation Investments for Energy Projects



Sigma Engineering, 2000, CEP, 2008

Ecological Impacts

Ecological impacts refers to both positive and negative influences energy projects have on the surrounding environment and atmosphere. The primary ecological benefit of a

clean energy project is the potential it might have to offset DGS generated electricity and the associated CO_2 emissions.

Small Hydro

Small hydroelectricity has both positive and negative ecological implications. The primary ecological benefit of offsetting diesel generated electrical energy with hydroelectricity is the abatement of greenhouse gasses, namely carbon dioxide. Generating 1 kWh of energy from diesel fuel produces approximately 0.45 kg of CO_2 (US Energy Information Administration, 2014). The potential abatement of CO_2 for each site was calculated as the total emissions produced by diesel electricity in order to generate an equivalent output. This study has assumed zero emissions produced from hydroelectricity. The average abatement of CO_2 is 1.53 Kt or 6.54 %.

Small hydro installations also have the potential to damage fish habitats. Preferred sites often have natural physical barriers to fish access, such as a waterfall. All of the sites examined in this study have a fish-flow-factor of 0.90. It is uncommon for this ratio to have a more ideal value (amongst those sites surveyed by BC Hydro) (BC Hydro, 2000). Nonetheless, the Haida ascribe very significant cultural importance to the salmon fishery. It might be necessary to conduct further investigation into the potential impacts on salmon bearing streams.

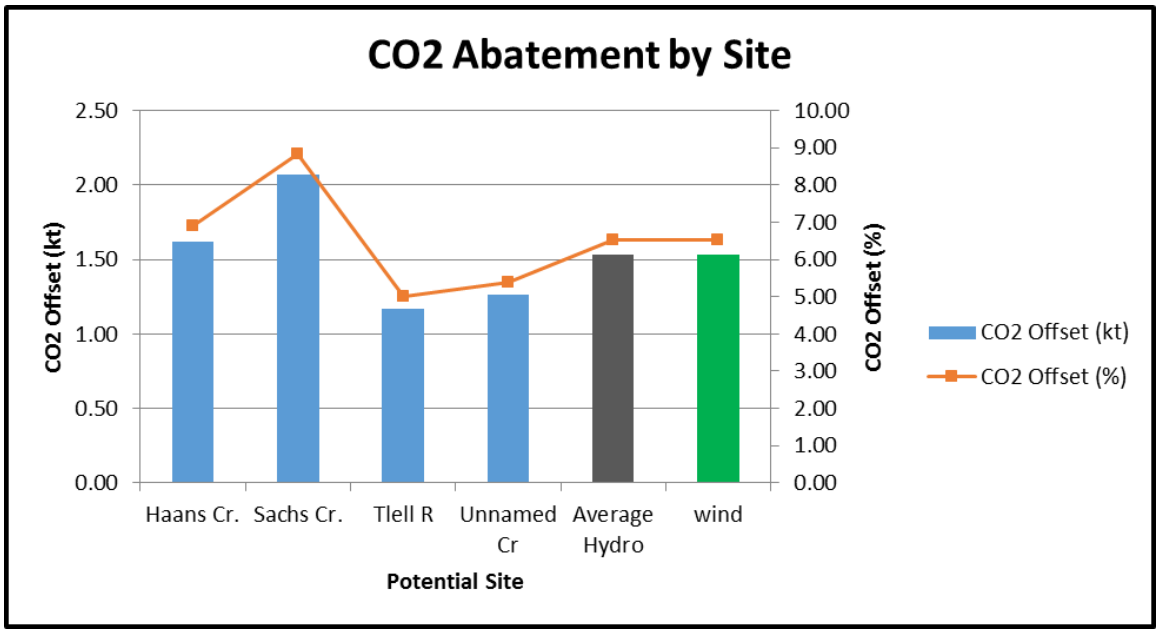
Onshore Wind

As both hydroelectricity and wind generated electricity produce zero emissions, wind energy has the potential to offset equivalent carbon dioxide emissions as hydro, assuming equivalent outputs of energy.

Wind turbines are suspected to impact wildlife migration. Additionally they also have significant impacts on the visual landscape. This is especially noteworthy given that the proposed sites are proximate to residential areas.

The following bar chart illustrates potential CO_2 abatement by source and site in terms of Kt and as a percentage.

Figure 3.4. CO_2 Abatement by Site



Sigma Engineering, 2000, CEP, 2008

Cumulative Analysis

The following charts summarize the analysis of resource development options. It begins with the specific sites for hydroelectric generation, and finishes with the wind energy. installations. All criteria are weighted equally. Each criterion is given a rank relative to the other options. The ranks are not absolute. Superior options are assigned a high rank (5 being the highest, 1 being the lowest). An overall rank is then assigned to each option.

Table 3.3. Analysis of Resource Development Options (1-a)

Option	Objective	Criteria	Measure	Rank
Resource Development Option 1- a: Haans Creek Small Hydroelectric Installation	Effectiveness	Output Potential (GWh)	3.6	4
		Demand Satisfaction (%)	6.92	
	Cost Efficiency	Capital Investment ($ 1000s)	4645.00	3
		Investment Period (years)	9.35	
		Cost of Generation ($/kWh)	0.12	4
		Potential Cost Offset ($ 1000s)	496.80 (53.08%)	
	Ecological Impacts	Potential CO_2 Offset (kt)	1.62 (6.92%)	4
		Fish-Flow-Factor	0.90	
Final Score (_/5)				4

Table 3.4. Analysis of Resource Development Options (1-b)

Option	Objective	Criteria	Measure	Rank
Resource Development Option 1- b: Sachs Creek Small Hydroelectric Installation	Effectiveness	Output Potential (GWh)	4.60	5
		Demand Satisfaction (%)	8.85	
	Cost Efficiency	Capital Investment ($ 1000s)	2419.00	5
		Investment Period (years)	2.49	
		Cost of Generation ($/kWh)	0.05	5
		Potential Cost Offset ($ 1000s)	970.60 (81.15%)	
	Ecological Impacts	Potential CO_2 Offset (kt)	2.07 (8.85%)	5
		Fish-Flow-Factor	0.90	
Final Score (_/5)				5

Table 3.5. Analysis of Resource Development Options (1-c)

Option	Objective	Criteria	Measure	Rank
Resource Development Option 1- c: Tlell River Small Hydroelectric Installation	Effectiveness	Output Potential (GWh)	2.60	1
		Demand Satisfaction (%)	5.00	
	Cost Efficiency	Capital Investment ($ 1000s)	5598.00	2
		Investment Period (years)	39.14	
		Cost of Generation ($/kWh)	0.21	2
		Potential Cost Offset ($ 1000s)	143.00 (21.15%)	
	Ecological Impacts	Potential CO_2 Offset (kt)	2.07 (1.06%)	1
		Fish-Flow-Factor	0.90	
Final Score (_5)				1

Table 3.6. Analysis of Resource Development Options (1-d)

Option	Objective	Criteria	Measure	Rank
Resource Development Option 1- d: Unnamed Creek Small Hydroelectric Installation	Effectiveness	Output Potential (GWh)	2.80	2
		Demand Satisfaction (%)	5.38	
	Cost Efficiency	Capital Investment ($ 1000s)	2342.00	4
		Investment Period (years)	4.65	
		Cost of Generation ($/kWh)	0.08	3
		Potential Cost Offset ($ 1000s)	504.00 (69.23%)	
	Ecological Impacts	Potential CO_2 Offset (kt)	2.07 (3.73%)	2
		Fish-Flow-Factor	0.90	
Final Score (_/5)				3

Table 3.7. Analysis of Resource Development Options (2)

Option	Objective	Criteria	Measure	Rank
Resource Development Option 2: Onshore Wind Turbine Installations (per 3km^2)	Effectiveness	Output Potential (GWh)	3.40	3
		Demand Satisfaction (%)	6.54	
	Cost Efficiency	Capital Investment ($ 1000s)	5250.00	1
		Investment Period (years)	42	
		Cost of Generation ($/kWh)	0.23	1
		Potential Cost Offset ($ 1000s)	125.00 (69.23%)	
	Ecological Impacts	Potential CO_2 Offset (kt)	1.53 (6.54%)	3
Final Score (_/5)				2

Analysis of Management Objective Development (MOD) Options

Management Objective Development (MOD) options are analysed in accordance with six societal objectives. “Effectiveness,” “development,” “stakeholder acceptance,” and “equity” correspond to criteria established by Frame et al (2004), and measured by the responses from Astofooroff’s (2008) survey. The objective “budgetary impact,” corresponds with the criterion “cost of facilitation” and measured by the estimated cost of hiring a professional facilitator for the planning sessions. The objective of “consistency with Haida values” is fulfilled by the presence of a government to government negotiations phase in the planning process.

The Table 3.8 illustrates how societal objectives corresponding to criteria and how those criteria are measured. Table 3.9 illustrates how the criteria correspond to land use planning features. Table 3.10 illustrates how the criteria correspond to Haida Values.

Table 3.8. MOD Criteria Matrix

Objective	Criteria	Measure
Effectiveness	Purpose and Incentives	Survey Questions: 1(a) – 1(f)
	Self-Design	Survey Questions: 4(a) – 4(b)
	Clear Ground Rules	Survey Questions: 5(a) – 5(c)
	Flexible, Creative, Adaptive	Survey Questions: 9(a) – 9(b)
	High Quality Information	Survey Questions: 10(a) – 10(f)
	Time Limits	Survey Questions: 11(a) – 11(c)
	Effective Process Management	Survey Questions: 13(a) – 13(d)
	Independent Facilitation	Survey Questions: 14(a) – 14(b)
Development	Implementation and Monitoring	Survey Questions: 12(a) – 12(b)
Stakeholder Acceptance	Voluntary Participation	Survey Questions: 3(a) – 3(b)
	Accountability	Survey Questions: 8(a) – 8(f)
Equity	Inclusive Representation	Survey Questions: 2(a) – 2(c)
	Equal Opportunities and Resources	Survey Questions: 6(a) – 6(e)
	Principled Negotiation and Respect	Survey Questions: 7(a) – 7(e)
Budgetary Impact	Cost of Facilitating Collaborative Planning	Total Cost of Hiring a Facilitator
Consistency with Haida Values	Presence of a government-to-government negotiation stage	Does the process include HGMC review (yes/no)?

Table 3.9. MOD Criteria and Applicable Features

Criteria	Feature
Purpose and Incentives	HGMC Preliminary Information Analysis
	Community Planning Forum
Inclusive Representation	Stakeholder Identification
Voluntary Participation	Community Planning Forum
Self Design	CPF Terms of Reference
Clear Ground Rules	HGMC Preliminary Information Analysis
	CPF Terms of Reference
Equal Opportunities and Resources	Participant Training or Training Organization
	Information Sessions
Principled Negotiation and Respect	HGMC Preliminary Information Analysis
	Community Planning Forum
	Public Hearings
	Consensus Decision Making
Accountability	Information Sessions
	Community Engagement
	Publication of Revisions
	Signatory Party Approval
	Consensus Decision Making
Flexible, Creative, Adaptive	CPF Terms of Reference
	Routine Process Review
High Quality Information	Information Analysis
	BC – Haida Nations Integrated Operations and Departmental Technicians Report
	Information Sessions
Time Limits	HGMC Preliminary Information Analysis
	Community Planning Forum
	Public Hearings
Implementation and Monitoring	Amendment Recommendations (Management Objectives and Targets)
Effective Process Management	Facilitator Identification
	Facilitator Guidance and Moderation
Independent Facilitation	Facilitator Identification
	Facilitator Guidance and Moderation

Table 3.10. Haida Values Corresponding to Frame (2004) Criteria

Haida Value	Criteria (Frame et al, 2004)
Yahguudang - Respect	Inclusive Representation
	Equal Opportunity and Representation
	Principled Negotiation and Respect
Gii tll'juus - "The world is as sharp as a knife"	Self Design
	Clear Ground Rules
	Time Limits
Gina waadluxan gud ad kwaagiida "everything depends on everything else"	Flexibility, Creativity, Adaptability
Isda ad diigii isda – "Giving and Receiving"	Accountability
Gina k'aadang.nga gii uu tl'k'anguudang - "seeking wise counsel"	High Quality Information
	Effective Process Management
	Independent Facilitation
'Laa guu ga kangllns – "responsibility"	Purpose and Incentives
	Voluntary Participation
	Implementation and Monitoring

MOD Option 1: CFP Integrated Planning Protocol

The first MOD Option analyzed is the CFP Integrate Planning Protocol. This is the process where recommended management objectives are developed by a stakeholder planning forum and presented to the HGMC for revision and final authorization. For a complete illustration of this process, see Appendix A1.

The table below summarizes the analysis. The first column states the relevant option name. The second column states the societal objective. The third column states the criteria pertaining to the associated societal objective. The fourth column displays a score for each objective. All objective and criteria are weighted equally.

Table 3.11. Analysis of MOD Options (1)

Option	Objective	Criteria	Score
MOD Option 1: CFP Integrated Energy Planning Protocol	Effectiveness	Frame Effectiveness Criteria	7/8 (87.5%)
	Development	Frame Development Criteria	0/1 (0%)
	3rd Party Acceptance	Frame Acceptance Criteria	2/2 (100%)
	Equity	Frame Equity Criteria	3/3 (100%)
	Budgetary Impact	Cost of facilitation	$19,000 – $27,000
	Consistency with Haida Values	Government to Government negotiations	✓

Effectiveness

Effectiveness refers to the likelihood that energy resource management objectives will be successfully integrated into the SLUA. This option scores highest (87.5%) for effectiveness amongst all MOD options. This is likely because this option makes the most effort to engage interested and affected parties in the development of these objectives. The CPF is empowered to collaboratively provide meaningful input based on individual stakeholder interests. The one criterion where this option failed was “time limits.” The respondents to the survey felt that this process did not provide sufficient time for negotiation given the complex multitude of resource values, and the potential for conflict in the region. All options are subject to this shortfall, suggesting that land use planning might persistently be limited as such, unless more time is committed to the process.

Development

Survey respondents have persistently negative thoughts about land use planning’s ability to actually produce real results. The “implementation and monitoring criterion” failed by all measures. So, while residents of Haida Gwaii accept the appropriateness of the collaborative planning approach, they remain remarkably cynical about the feasibility and likelihood of resource development pursuant to the SLUA. Further research should be conducted to further investigate these values. Moreover, specific attention should be paid to strategies in place for implementation and monitoring of management objectives. This might help determine empirical reasons for failures to implement.

Stakeholder Acceptance

Stakeholder acceptance receives a perfect score (100%). This reflects the respondents' feelings that collaborative land use planning is the only fair and feasible way to address resource conflicts in the region. This option provides stakeholders with enhanced opportunities to engage with the decision-making process surrounding management objective development.

Equity

Equity also receives a perfect score (100%). Respondents are generally satisfied that through collaborative planning, no affected party is denied equitable opportunities to engage with the decision-making process. A crucial measure of this criterion is that disadvantaged parties (often lacking in land use planning processes) be provided the training and resources necessary to participate effectively. This is a factor that ought to be respected in the case of Haida Gwaii, where there are extremely variable levels of skills between a wide dispersion of stakeholders.

Budgetary Impact

Budgetary impact refers to the expense to the signatory parties (BC and CHN) required to finance the MOD option relative to the other options. With all MOD options the primary cost involves the procuring a facilitator collaborative planning negotiations. This study assumes that participants will not receive honoraria, and that the collection of most physical and technical data has already been conducted, or can be conducted by existing staff.

Facilitators range in cost depending on reputation and experience. This study accepts a range of costs from $140.00 - $200.00 per hour (Fulop, 2014). The total expenditure depends on the number of facilitated meetings required to implement the MOD option. In the case of this Option 1, 17 eight-hour meetings would need to occur (the number of meetings conducted by the CPF during the initial development of the SLUA) (Astofooroff, 2006). The cost of facilitating these meetings may cost between $19,000.00 and $27,000.00. This is the highest cost of all the MOD options.

Consistency of Haida Values

The BC Haida Nation Reconciliation Protocol and the SLUA both establish the requirement of HGMC approval of amendments to management objectives. This means that regardless of which collaborative planning approach is taken, government to government negotiations will need to be conducted, with consensus decision-making amongst governments being mandatory. Assuming the Haida appointments to the HGMC by the CHN are a reflection of the interests of the Haida Nation, we can deem this process to be respectful of Haida values. Given this assumption, all MOD options have been deemed to be consistent with Haida values.

It is important to note that, the Haida representatives on the HGCM will not approve management objectives without the consent of the Haida Nation House of Assembly, the legislative authority of the CHN. The House of Assembly is an annual town hall meeting where all citizens of the nation are authorized to vote on policy and legislation. With this additional procedure outside of the formalized process, this study is confident that the wider Haida community will have the opportunity to participate in the decision-making process in accordance with legal mechanisms of their own design.

MOD Option 2: HGMC Streamlined Protocol

Option 2 is the process where there HGMC develops and adopts the energy resource management objectives without recommendations from a CPF. It minimizes stakeholder involvement for the benefit of easy and inexpensive implementation. For a complete illustration of this process, see Appendix A2.

Table 3.12. Analysis of MOD Options (2)

Option	Objective	Criteria	Score
MOD Option 2: HGMC Streamlined Protocol	Effectiveness	Frame Effectiveness Criteria	3/8 (37.5%)
	Development	Frame Development Criteria	0/1 (0%)
	3rd Party Acceptance	Frame Acceptance Criteria	2/2 (100%)
	Equity	Frame Equity Criteria	1/3 (33.33%)
	Budgetary Impact	Cost of facilitation	Minor
	Consistency with Haida Values	Government to Government negotiations	✓

Effectiveness

This option scores lowest out of all the MOD options for effectiveness (37.5%). The literature refers to this process as the "technocratic process" (Frame, 2004 Astofooroff, 2006, Morton, 2011). It has been widely criticized in the past for inadequately incorporating the interests of stakeholders, and those affected by the resulting decisions. Similarly, there is general agreement that the parties closely associated with the land use area are both most knowledgeable about the relevant resource values, as well as the most invested in a sound resource management strategy. The results of the survey suggest that the residents of Haida Gwaii hold feelings consistent with these arguments. By not organizing the CPF, or making concerted efforts to include regional residents input into the decision making process, significant phases that would have satisfied criteria associated with the effectiveness objective are eliminated.

Development

No MOD option satisfies the objective of development.

Stakeholder Acceptance

Regardless of the failure to consult stakeholders in a collaborative planning process, the survey results suggest that this process option still satisfies the criteria of "accountability"

and “voluntary participation.” This is because the HGMC is thought to be accountable to their constituents, and those authorities are personally invested in a consensus-based decision making process for the benefit of the wider community. Additionally, some participation will still be required though the Haida Nation’s House of Assembly process. Some of the interviews suggest that stakeholders might be experiencing fatigue with discussions regarding land use and energy development. Depending on the public’s confidence with the HGMC, and the pervasiveness of fatigue with collaborative planning, interpreting this score should be interpreted with caution.

Equity

This option falls short of a successful measure of equity (33.33%). A significant number of stakeholder groups are effectively removed from the decision making process. No efforts are made to ensure that interests are equally and effectively communicated from all sectors in the land use planning area. It satisfies the criteria of “principled negotiation and respect” due to the consensus decision making process conducted by the HGMC.

Budgetary Impact

Without a collaborative planning process procuring a facilitator becomes unnecessary. Other expenses are expected to be minor. This option has the lowest cost of all MOD policy options.

Consistency with Haida Value

This option includes consensus decision making among signatory parties of the BC Haida Nation Reconciliation Protocol, as well as CHN approval. It is deemed consistent with Haida values.

MOD Option 3: HGMC Community Consultation Protocol

MOD Option 3 involves an amendment process that is driven by the HGMC, but incorporates a community hearings phase in order to enhance the option’s consultative

rigor. It is in essence a compromise between MOD Options 1 and 2. For a complete illustration of this process, see Appendix A3.

Table 3.13. Analysis of MOD Options (3)

Option	Objective	Criteria	Score
MOD Option 3: HGMC Community Consultation Protocol	Effectiveness	Frame Effectiveness Criteria	5/8 (62.5%)
	Development	Frame Development Criteria	0/1 (0%)
	3rd Party Acceptance	Frame Acceptance Criteria	2/2 (100%)
	Equity	Frame Equity Criteria	3/3 (100%)
	Budgetary Impact	Cost of facilitation	$3,000 - $5,000
	Consistency with Haida Values	Government to Government negotiations	✓

Effectiveness:

The objective of effectiveness receives a satisfactory score of 62.5%. The presence of facilitated public meetings improves the effectiveness score relative to MOD option 2 by permitting the option to satisfy the criteria of "effective process management" and "independent facilitation." When the process can be controlled by an impartial independent party the respondents feel more confident in the appropriateness and likelihood of success of collaborative planning processes. No self-designed terms of reference are written for the hearings. Moreover, there is less opportunity for flexible and creative discussion. This is why this option's effectiveness is diminished relative to option 1. Generally, it is still very limited in engagement due to the lack of a CPF. The quality of recommendations for management objectives drawn from stakeholder groups will likely be diminished.

Development:

No MOD option satisfies the objective of development.

Stakeholder Acceptance:

Stakeholder acceptance receives a perfect score (100%). As with option 2, stakeholders will likely be satisfied, subject to the level of confidence in the HGMC, and the CHN. Concurrently, the presence of public hearings will likely improve the receptiveness of the HGMC to stakeholder input.

Equity

Equity receives a perfect score of (100%). Public hearings give a chance for all stakeholders to equally participate in the decision making process in an equal capacity. This can be best ensured by having information sessions to inform the public prior to the public sessions, and offering to receive statements in a variety of mediums.

Budgetary Impact

This option involves facilitated public hearings, estimated to take three eight hour days. This is a significant reduction from the 17 sessions described in option 1. In terms of expense, this option is deemed to be less expensive than option 1, but more than option 2.

Consistency with Haida Value

This option includes consensus decision making among signatory parties of the BC Haida Nation Reconciliation Protocol, as well as CHN approval. It is deemed consistent with Haida values.

Cumulative Analysis

The chart below summarizes the cumulative analyses of all the MOD options. For each objective, each option is assigned a rank relative to the alternative options. The ranks are A, B, and C, with A being the optimal rank. Each criterion is assigned an overall rank based on its cumulative level of accomplishment of the objectives. Where equivalent scores are reported, equivalent ranks are assigned.

Table 3.14. MOD Options Cumulative Analysis Matrix

Objective	Criteria	MOD Option	Score	Rank
Effectiveness	Frame Effectiveness Criteria	MOD Option 1`	7/8 (87.5%)	A
		MOD Option 2	3/8 (37.5%)	C
		MOD Option 3	5/8 (62.5%)	B
Development	Frame Development Criteria	MOD Option 1`	0/1 (0%)	C
		MOD Option 2	0/1 (0%)	C
		MOD Option 3	0/1 (0%)	C
3rd Party Acceptance	Frame Acceptance Criteria	MOD Option 1`	2/2 (100%)	A
		MOD Option 2	2/2 (100%)	A
		MOD Option 3	2/2 (100%)	A
Equity	Frame Equity Criteria	MOD Option 1`	3/3 (100%)	A
		MOD Option 2	1/3 (33.33%)	B
		MOD Option 3	3/3 (100%)	A
Budgetary Impact	Cost of Facilitation	MOD Option 1`	$19,000-$27,000	C
		MOD Option 2	Minor	A
		MOD Option 3	$3,000-$5,000	B
Consistency with Haida Values	Government to Government negotiations	MOD Option 1`	✓	A
		MOD Option 2	✓	A
		MOD Option 3	✓	A
FINAL		**MOD Option 1`**		**A**
		MOD Option 2		**C**
		MOD Option 3		**A**

Conclusions

Resource Development Conclusions

All of the small hydroelectricity sites, with the exception of Option 1(c): Tlell River outperformed wind energy development. The best hydro site, by all measures is Option 1(b): Sachs Creek. This site boasts the highest levels of potential output, coupled by low costs of installation and maintenance. It could satisfy 8.85% of the 2027 projected demand thereby offsetting DGS generations costs of over $900,000, and reducing carbon-dioxide emissions by over 2 Kt (8%). Given these savings, the cost of installation could be recouped in less than three years.

The least attractive small hydroelectricity site was Option 1(c): Tlell River. Potential output was reported at 2.6 GWh, the lowest output reported and 24% below average. It also had the highest costs of installation and maintenance, making it the least cost effective option with an investment period of 39 years, 29 years longer than average.

The major caveat remaining for small hydro development is that all of the steams assessed in this study are, to some degree, fish bearing. This study recommends that further impact assessments be made to determine if, or how, impacts to fish can be mitigated in development of this resource.

Relative to average small hydro sites on Haida Gwaii, wind energy is less favourable. The output calculated by this study was taken to be dependent on the area utilized for development. 3 km^2 of land is required for wind turbines to yield outputs equivalent to the average small hydro site. This is considerable due to the small land space available on Haida Gwaii, and the proximity of the proposed sites to residential areas (the communities of Sandspit, Masset and Tlell). Moreover, wind energy is not particularly cost efficient relative to small hydro yielding savings 76% lower than the average small hydro site.

Management Objective Development Conclusions

The most visibly attractive management objective development option was Option 1: Integrated Planning Protocol. It scored 7/8 for effectiveness, 2/2 for third party acceptance and 3/3 for equity. According to the literature on BC collaborative land use planning, these fulfillments indicate a high probability of success for this process (Morton et al, 2011, Frame et al, 2004, Astofooroff, 2008). The primary negative trade-off for this process is that it is the most expensive, and requires the longest, most intense stakeholder consultation. Some consideration should be made regarding this complication, especially considering that participants might be experiencing “stakeholder fatigue” and thereby be less interested in engaging in this process (Frame et al, 2004). The possibility of this occurring might also be confirmed by the low response rate for interviews in this study.

There is little evidence to suggest that Management Objective Development Option 2: HGMC Streamlined Process should be implemented. This option failed the tests for effectiveness and equity. This is due to the reduced opportunities to engage local land users, and the centralization of the decision making. While this option would be inexpensive and simple to implement, it falls short of developing a plan that achieves high levels of buy-in amongst local land users.

Management Objective Option 3: HGMC Community Consultation almost equals Option 1 in effectiveness, scoring 5/8, and matches the scores for equity and stakeholder acceptance, while reducing costs by as much as 80%. While this option does substantially reduce the quality of stakeholder involvement, this study finds that this compromise might be acceptable due to scope of planning being limited to energy resources.

It is important to note that none of the management objective development options satisfied the objective of development. This is because Astofooroff's survey yielded very sceptical feelings about the efficacy of collaborative land use planning in terms of implementing management objectives. People on Haida Gwaii favour land use planning as a fair and necessary process, but do not expect it to yield concrete results. This is a factor that ought to be researched further to determine whether implementation problems are actually occurring, or if these feelings are a social or cultural factor.

Recommendations

All of the Resource Development Options represent an opportunity to supply electrical energy on Haida Gwaii that is emission free and cost effective relative to the status quo. While all of the sites and technologies are superior options to the diesel generation systems, the potential small hydroelectric sites received better scores in the analysis than wind generated electricity. This report cannot eliminate development of wind energy as a viable supply source. However, it does recommend prioritization of small hydroelectric generation.

There is a trade-off between effectiveness and budgetary expense in the evaluation of Management Objective Development Options 1 and 3, with Option 1 being more effective, but more expensive. Given the measures applied for effectiveness, Option 1 is 2/8 points (20%) more effective than Opting 3. This increase in effectiveness comes at the cost of between $16,000 and $22,000 due to the increased length of the professional facilitator's contract.

The five effectiveness points scored by Management Objective Development Option 3 are associated with costs of $600-$1000 each. The two additional effectiveness points scored by Option 1 are associated with costs of $8000-$11,000 each. These additional effectiveness points are approximately 12 times more expensive to achieve than the five scored by Option 3. For this reason, this report deems the two surplus effectiveness points scored by Option 1 to be an unnecessary expense. Thus Management Objective Development Option 3 is recommended.

This report recommends Management Objective Development Option 3: HGMC Community Consultation for the purposes of developing management objectives directing the development of small hydroelectric and wind energy installations, with the prioritization of small hydro.

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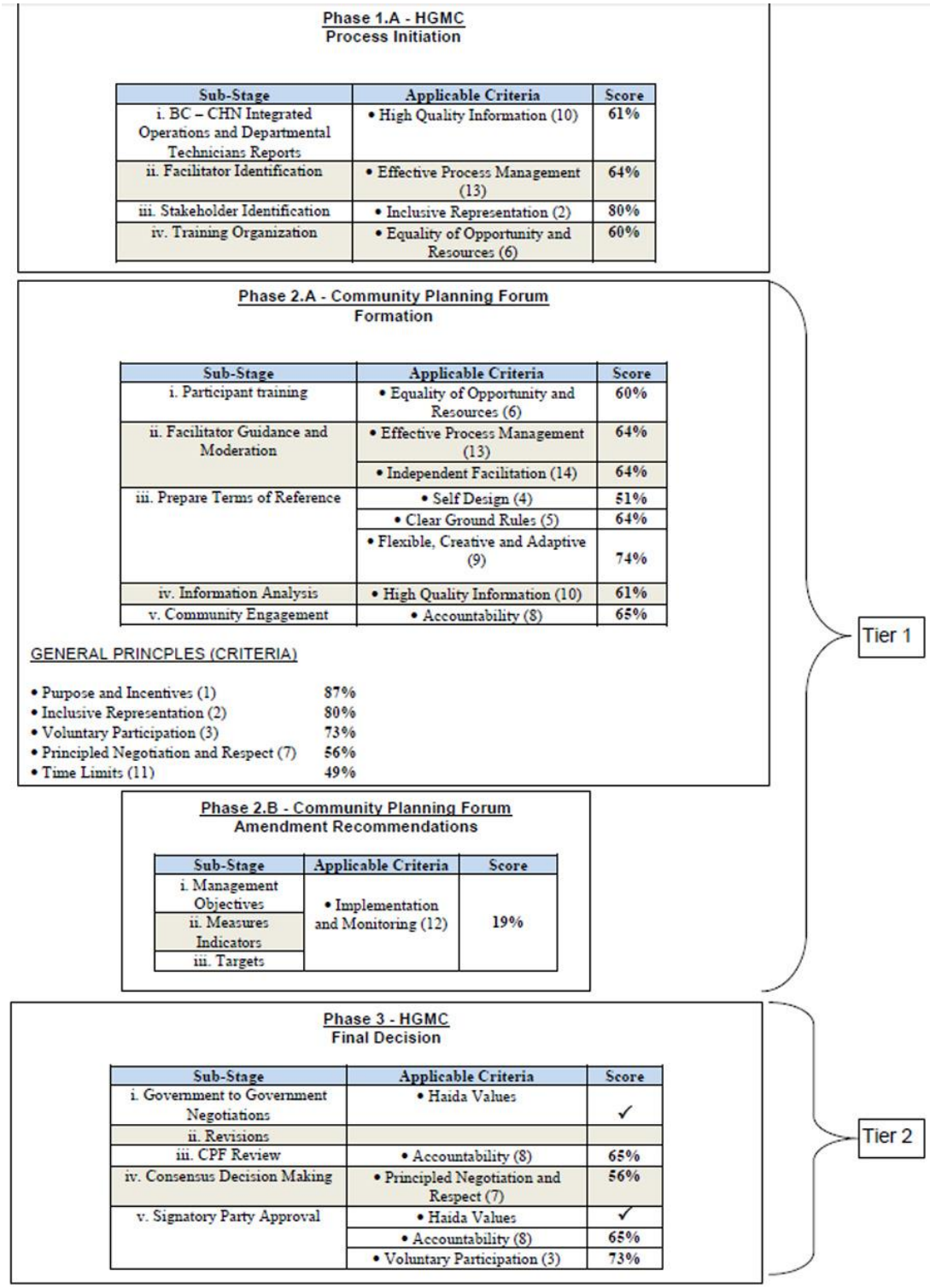
Appendix A1. MOD Option 1: Integrated Planning Protocol



Appendix A2. MOD Option 2: HGMC Streamlined Protocol

Phase 1.A - HGMC
Information Analysis

Sub-Stage	Applicable Criteria	Score
i. BC – CHN Integrated Operations and Departmental Technicians Reports	• High Quality Information (10)	61%
ii. Information Analysis	• High Quality Information (10)	61%
iii. Government to Government Negotiations	• Principled Negotiation and Respect (7)	56%

GENERAL PRINCPLES (CRITERIA)

• Purpose and Incentives (1)	87%
• Principled Negotiation and Respect (7)	56%
• Time Limits (11)	49%
• Clear Ground Rules (5)	64%

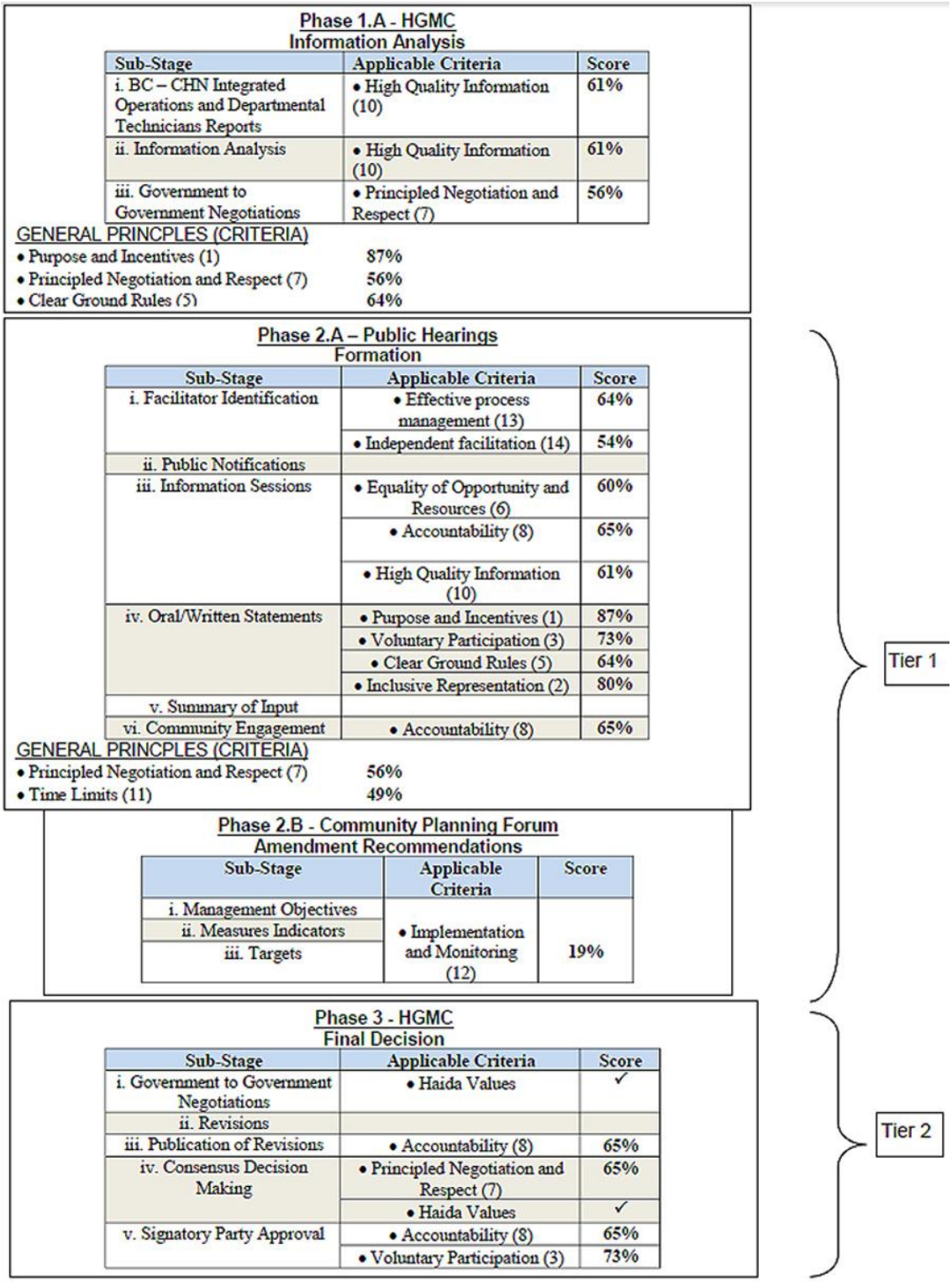
Phase 1.B - HGMC
Draft Amendments

Sub-Stage	Applicable Criteria	Score
i. Management Objectives	• Implementation and Monitoring (12)	19%
ii. Measures Indicators		
iii. Targets		

Phase 2 - HGMC
Final Decision

Sub-Stage	Applicable Criteria	Score
i. Government to Government Negotiations	• Haida Values	✓
ii. Revisions		
iii. Consensus decision making	• Principled Negotiation and Respect (7)	56%
	• Haida Values	✓
	• Accountability (8)	65%
iv. Signatory Party Approval	• Voluntary Participation (3)	73%

Appendix A3. MOD Option 3: Community Consultation Protocol



Phase 1.A - HGMC
Information Analysis

Sub-Stage	Applicable Criteria	Score
i. BC – CHN Integrated Operations and Departmental Technicians Reports	• High Quality Information (10)	61%
ii. Information Analysis	• High Quality Information (10)	61%
iii. Government to Government Negotiations	• Principled Negotiation and Respect (7)	56%

GENERAL PRINCPLES (CRITERIA)

• Purpose and Incentives (1)	87%
• Principled Negotiation and Respect (7)	56%
• Clear Ground Rules (5)	64%

Phase 2.A – Public Hearings
Formation

Sub-Stage	Applicable Criteria	Score
i. Facilitator Identification	• Effective process management (13)	64%
	• Independent facilitation (14)	54%
ii. Public Notifications		
iii. Information Sessions	• Equality of Opportunity and Resources (6)	60%
	• Accountability (8)	65%
	• High Quality Information (10)	61%
iv. Oral/Written Statements	• Purpose and Incentives (1)	87%
	• Voluntary Participation (3)	73%
	• Clear Ground Rules (5)	64%
	• Inclusive Representation (2)	80%
v. Summary of Input		
vi. Community Engagement	• Accountability (8)	65%

GENERAL PRINCPLES (CRITERIA)

• Principled Negotiation and Respect (7)	56%
• Time Limits (11)	49%

Phase 2.B - Community Planning Forum
Amendment Recommendations

Sub-Stage	Applicable Criteria	Score
i. Management Objectives	• Implementation and Monitoring (12)	19%
ii. Measures Indicators		
iii. Targets		

Phase 3 - HGMC
Final Decision

Sub-Stage	Applicable Criteria	Score
i. Government to Government Negotiations	• Haida Values	✓
ii. Revisions		
iii. Publication of Revisions	• Accountability (8)	65%
iv. Consensus Decision Making	• Principled Negotiation and Respect (7)	65%
	• Haida Values	✓
v. Signatory Party Approval	• Accountability (8)	65%
	• Voluntary Participation (3)	73%

Tier 1

Tier 2

Appendix B. Interview Questions

1. Do you think that collaborative land use planning is an effective tool for resource management?

2. What about its relevance to Haida Gwaii?

3. In the development of the plan, are you satisfied with the level of involvement of local stakeholders?

4. Do you feel that through the establishment of the plan, resource developers on Haida Gwaii have a good understanding of our values here?

5. What do you think are the most significant energy supply issues on Haida Gwaii?

6. Other land use plans in BC address energy supply issues. Do you think there is an opportunity of for the Haida Gwaii Strategic Land Use Agreement to do this?

7. Do you think the land use plan could identify specific energy resources that could be developed on Haida Gwaii?

8. Do you think the land use plan could identify specific locations within the operating zone where these projects could occur?

9. Do you think we could set targets for clean energy generation?

10. Do you think that there is an opportunity to reduce conflicts surrounding energy supply uses through land use planning?

11. Would you be in favour of re-opening discussion on the land use plan to address energy supply concerns? If so, would you consider a processes similar to the initial one? What would you change?