DRAFT

SOUTHEAST ALASKA INTEGRATED RESOURCE PLAN

Volume 1 - Executive Summary

B&V PROJECT NO. 172744

PREPARED FOR

Alaska Energy Authority

DECEMBER 2011

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- Alaska Power and Telephone
- City of Sitka Electric
- Gustavus Electric
- Inside Passage Electric Cooperative
- Ketchikan Public Utilities
- Metlakatla Power & Light
- Petersburg Municipal Power & Light
- Wrangell Municipal Light & Power
- Southeast Alaska Power Agency
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- Robert Venables, Southeast Conference

Purpose and Limitations of the IRP

PURPOSE AND LIMITATIONS OF THE SOUTHEAST ALASKA IRP

- The development of this Southeast Alaska IRP is not the same as the development of a State Energy Plan; nor does it set State policy. Setting energy-related policies is the role of the Governor and State Legislature. With regard to energy policy making, the Southeast Alaska IRP does provide a foundation of information and analysis that can be used by policy makers to develop important policies.

  However, the existence of the State's Energy Policy and or the potential development of other related policies could directly impact the specific resources chosen for the region's future. As such, the Southeast Alaska will need to be readdressed as future energy-related policies are enacted.
- This IRP, consistent with all integrated resource plans, should be viewed as a "directional" plan. In this sense, the Southeast Alaska IRP identifies alternative resource paths that the region can take to meet the future energy needs of the region's citizens and businesses; in other words, it identifies the types of resources that should be developed in the future. These paths are summarized through the Preferred Resource Lists shown in this plan for each of eight subregions in Southeast Alaska. The granularity of the analysis underlying this IRP, and the quality and inclusiveness of available information on potential projects as discussed elsewhere, is not sufficient to identify the optimal combination of specific resources that should be developed.
- The capital costs and operating assumptions used in this study for alternative demand-side management/energy efficiency (DSM/EE), generation and transmission resources do not consider the actual owner or developer of these resources. In other words, we assumed the same form of financing for all resource options. Ownership could be in the form of individual utilities, a regional entity, or an independent power producer (IPP). Depending upon specific circumstances, ownership and development by IPPs may be the least-cost alternative.
- As with all integrated resource plans, the Southeast Alaska IRP should be periodically updated (e.g., every three to five years) to identify changes that should be made to the Preferred Resource Lists to reflect changing circumstances (e.g., resolution of uncertainties), improved cost and performance of emerging technologies (e.g., tidal), and other developments.

Acronym List

AATP	Southeast Alaska Transportation Plan
AC	Alternating Current
ACEEE	American Council for an Energy Efficient Economy
ACS	American Community Survey
AEA	Alaska Energy Authority
AEL&P	Alaska Electric Light & Power
AEO 2010	Annual Energy Outlook 2010
AHFC	Alaska Housing Finance Corporation
AN	Audible Noise
ANGDA	Alaska Natural Gas Development Authority
AP&T	Alaska Power & Telephone
APC	Alaska Pulp Company
ARRA	American Recovery and Reinvestment Act
ASD	Alaska Ship & Drydock
AVEC	Alaska Village Electric Cooperative, Inc.
AWG	Advisory Work Group
BC	British Columbia
BESS	Battery Energy Storage System
BPA	Bonneville Power Administration
CAISO	California Independent System Operator
CDP	Census-Designated Place
CI	Compression Ignition
CL	Corona Losses
CNPV	Cumulative Net Present Value
CO_2	Carbon Dioxide
COD	Commercial Operation Date
COP	Coefficient of Performance
CORAC	Composite Refiner Acquisition Cost of Crude Oil
CSC	Source Converters
CWIP	Construction-Work-In-Progress
DC	Direct Current
DNR	Department of Natural Resources

DOL&WD	Department of Labor and Workforce Development
DOT	Department of Transportation
DOTPF	Department of Transportation and Public Facilities
DR	Demand Response
DSM/EE	Demand-Side Management/Energy Efficiency
EEI	Edison Electric Institute
EEIRR	Energy Efficiency Interest Rate Reduction Program
EIA	Energy Information Administration's
EIS	Environmental Impact Statement
EMS	Emergency Medical Service
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EPS	Electric Power Systems, Inc
FDPPA	Four Dam Pool Power Agency
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FS	Forest Service
FSA	Farm Services Agency
GE	General Electric Co.
GIS	Geographic Information System
GSHP	Ground-Source Heat Pump
HDD	Heating Degree Day
HDR	Hdr Alaska Inc.
HERP	Home Energy Rebate Program
HEV	Hybrid Electric Vehicles
HS	High-Speed
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IFA	Inter-Island Ferry Authority
IPEC	Inside Passage Electric Cooperative
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
ISER	Institute of Social and Economic Research

JEDC	Juneau Economic Development Council
kcmil	Thousand Circular Mils
KMC-GC	Kennecott Mining Company - Greens Creek Mine
KPU	Ketchikan Public Utilities
kV	Kilovolt
kW	Kilowatt
KWETICO	Kwaan Electric Transmission Intertie Cooperative, Inc.
LUD	Land Use Designation
M&E	Measurement and Evaluation
MIC	Metlakatla Indian Community
mmbf	Million Board Feet
MMBtu	Million British Thermal Units
MP&L	Metlakatla Power & Light
MS	Medium-Speed
MSRP	Manufacturer's Suggested Retail Price
MVA	Megawatt-Ampere
MW	Megawatt
N_2	Nitrogen
NEL	Net Energy For Load
NIMBY	Not In My Back Yard
NPV	Net Present Value
NRC	Nuclear Regulatory Commission
NREL	National Renewable Energy Laboratory
O&M	Operation and Maintenance
O_3	Ozone
OATT	Open Access Transmission Tariff
OEM	Original Equipment Manufacturers
PCE	Power Cost Equalization
PCS	Power-Conditioning System
PHEV	Plug-In Hybrid Electric Vehicle
PMPL	Petersburg Municipal Power and Light
PNW	Pacific Northwest
PSA	Power Sales Agreement
PWM	Pulse-Width Modulation

R&R	Repair and Replacement
RD	Rural Development
REAP	Renewable Energy Alaska Project
REGF	Renewable Energy Grant Fund
RI	Radio Interference
RICE	Reciprocating Internal Combustion Engine
RIM	Ratepayer Impact Measure
RIRP	Railbelt IRP
rms	Roof Mean Square
ROD	Record of Decision
ROR	Run-of-River
RPS	Renewables Portfolio Standard
RurAL CAP	Rural Alaska Community Action Program, Inc.
SCADA	Supervisory Control and Data Acquisition
SE	Southern Energy
SEAPA	Southeast Alaska Power Agency
STATCOM	Static Synchronous Compensator
STI	Swan-Tyee Intertie
TRC	Total Resource Cost
ULC	Upper Lynn Canal
UMTRI	Transportation Research Institute At The University of Michigan
USDA	US Department of Agriculture
USFS	United States Forest Service
VAC	Volts Alternating Current
VEEP	Village Energy Efficiency Program
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VSC	Voltage Source Converters
WEC	Wave Energy Conversion
WECC	Western Electricity Coordinating Council
WEST	Wave Energy/Sequestration Technology
WGA	Governor’s Association
WMLP	Wrangell Municipal Light & Power

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1.0 Executive Summary

A directive from the Alaska Legislature designated the Alaska Energy Authority (AEA) as the lead agency to develop an Integrated Resource Plan (IRP) for the Southeast region, which includes over 30 communities. AEA retained Black & Veatch to examine the current status of energy resources in the region and explore the options for minimizing future power supply and space heating costs, while maintaining or improving current levels of power supply reliability. Black & Veatch was assisted by HDR Alaska, Inc., in the evaluation of potential hydro projects.

The purpose of this section is to provide a summary of the results of the IRP study. In completing this study, Black & Veatch has reviewed and built upon the results of the significant analysis and planning work completed, over the years within the region, of specific generation and transmission initiatives, including the Southeast Intertie Plan that has envisioned tying all of the communities of the region into a single transmission network.

Our goal has been to develop a detailed and cohesive plan that will be of use for all people of Southeast Alaska. This plan is the result of our effort. It is a large and complex document, which likely will be used in different ways by different people. There are specific sections, listed below, that develop different aspects of energy planning that are building blocks for the cohesive plan.

- **Volume 1 - Executive Summary**
  - **Section 1.0 - Executive Summary**
- **Volume 2 - Technical Report**
  - **Section 2.0 - Project Overview and Approach**--Provides an overview of Black & Veatch's approach to the completion of this study.
  - **Section 3.0 – Situational Assessment**--Summarizes the various energy-related drivers and issues facing Southeast Alaska.
  - **Section 4.0 – Description of Existing System and Committed Resources**--Provides detailed information on each community, along with information on the region's existing generation and transmission resources, including the Committed Resources identified by the Advisory Work Group.
  - **Section 5.0 – Fuel Price Projections**--Summarizes the fuel price projections used in this study.
  - **Section 6.0 – Economic Parameters**--Identifies the economic parameters used in this study.
  - **Section 7.0 – Reliability Criteria**--Summarizes the reliability criteria used in modeling the Southeast region's electric utility systems.
  - **Section 8.0 – Load Forecasts**--Summarizes the three load forecasts that were developed for each community.
  - **Section 9.0 – Financing Alternatives**--Discusses alternative financial structures that could be used to finance future resource additions.
  - **Section 10.0 – Potential Hydroelectric Projects**--Summarizes Black & Veatch's evaluation of potential hydroelectric projects.
  - **Section 11.0 – Other Generating Unit Alternatives**--Provides information on other generation technologies considered in the study.

- **Section 12.0 – Transmission Interconnection Alternatives**-- Summarizes Black & Veatch's evaluation of potential transmission interconnections.
- **Section 13.0 – Demand-Side Options**-- Summarizes Black & Veatch's evaluation of energy efficiency and conservation measures.
- **Section 14.0 – Weatherization**--Provides information on the region's existing weatherization programs.
- **Section 15.0 – Space Heating Conversion**-- Summarizes Black & Veatch's evaluation of alternative space heating technology alternatives.
- **Section 16.0 – Initial Analysis of Issues**--Provides a detailed assessment of the energy-related issues facing the region.
- **Section 17.0 – Regional Expansion Plan Development**--Provides Black & Veatch's electric and space heating resource recommendations for each of the eight subregions considered.
- **Section 18.0 – Financial Assessment**--Provides Black & Veatch's recommendations related to financing the recommended resources.
- **Section 19.0 – Implementation Risks and Issues**--Summarizes the different implementation risks and issues for each alternative resource technology.
- **Section 20.0 – Conclusions and Recommendations**--Provides Black & Veatch's detailed conclusions and recommendations resulting from this study.
- **Section 21.0 – Near-Term Regional Implementation Action Plan (2012-2014)**--Provides Black & Veatch's recommended near-term implementation plan.

Volume 3 – Appendices

- **Appendix A – Fuel Forecasts**--Provides detailed information on the fuel price projections.
- **Appendix B – Financial Models**--Provides example financial pro formas based upon the financing alternatives discussed in Section 9.
- **Appendix C – Comprehensive Potential Hydro Project List**--Provides the detailed list of all potential hydro projects that were identified and considered in this study.
- **Appendix D – Advisory Work Group Resolution**--Provides the resolution passed by the Advisory Work Group establishing the list of Committed Resources, which are discussed later in this section.
- **Appendix E – Description of Strategist®**--Provides a description of the Strategist® optimal generation expansion model used to evaluate the various alternatives and scenarios.

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1.1 KEY FINDINGS

The key findings from this study include the following:

- **Historical Crossroad**--The current situation facing the Southeast region includes a number of issues that place the region at a historical crossroad regarding the mix of generation, demand-side management/energy efficiency (DSM/EE), end-use conversions, transmission, and transportation resources that it will rely on to economically and reliably meet future electric and heating needs.
- **Subregional Differences Require Solutions for Each Subregion**--Southeast Alaska has significant hydroelectric power resources, and many parts of the region enjoy the affordable and plentiful electricity from specific hydroelectric power projects that have been developed over the last century. Other subregions do not have this economic benefit and are forced to walk down the path of diesel fuel dependency. This has created a gap or chasm between communities, where stable and "well-to-do" communities exist near struggling communities and a notable absence of private sector economic activity are the norm. As a result of these subregional differences, Black & Veatch developed Preferred Resource Lists for each subregion as part of this study. These Preferred Resource Lists, which are summarized later is this section and discussed in more detail in Section 17.0, include a portfolio of resources that have been identified according to the specific circumstances faced by each subregion.
- **External Energy Drivers**-- Diesel fuel has evolved as the heating fuel and non-hydroelectric power generation fuel of choice over the last five decades. It was always perceived as being a stable priced fuel, which was easy to transport and use. The recent unprecedented increase in diesel prices has made the search for alternative fuels for heating, and development of economic renewable energy sources, a key part of energy planning for Southeast Alaska. These considerations are the foundation for this regional IRP.
- **Inflexible Business Structure**-- A joint action agency, Southeast Alaska Power Agency (SEAPA), operates as a nonjurisdictional generation and transmission entity serving southern Southeast Alaska. SEAPA, by contract, is obligated and required to provide its services only to the three communities of Petersburg, Wrangell, and Ketchikan. This system has no open access rules which would allow for interconnections with other utility systems. Under the terms of power sales agreements, the SEAPA system is not economically dispatched. Construction of new State-funded capital projects may require these structures to be changed, so that the benefits from State funds could be equitably distributed.
- **Shortage of Storage Hydroelectric**--The Southeast region as a whole is currently short of hydro storage capacity. As a result, potential hydroelectric projects with storage capabilities are more valuable, particularly from a system integration perspective (i.e., matching of generation capability with electric demands in connected load centers) than potential run-of-the-river hydro projects.
- **Space Heating Conversions**--The "achilles heel" of the current hydro system is the recent trend towards conversion of oil space heating to electric space heating in those communities with access to low-cost hydroelectric. The relationship of the cost of fuel oil to the stable price of hydroelectric-based electricity has created a unique situation where, for hydroelectric rich subregions, it is economically advantageous for people individually to switch from heating with fuel oil to resistance electric heating. While this may seem a reasonable economic action for a resident to take to lower overall utility costs, it is and has

been shown to be detrimental at a community- and utility-wide level. There is clear evidence that widespread conversions of energy supply for heating has eaten into reserve hydroelectric power capacity and energy supplies, such that nearly all of the hydro rich subregions need to supplant hydro power production with diesel-fired generation.

- **Lack of Information on Potential Hydro Projects**--One significant impediment to the completion of this IRP was the wide variety in the quality and inclusiveness of information available to evaluate specific hydro projects. As a result of this wide variation in data quality across the spectrum of potential hydro projects in the Southeast region, it is impossible at this time to conduct a true "apples-to-apples" comparison of hydro projects. In a similar manner, it is impossible at this time to complete a definitive comparison of the economics of potential hydro projects to other resources (e.g., biomass, other renewable technologies, and DSM/EE).

- **Need for Balanced Portfolio of Resources**--The uncertainties facing the region and the limitations on the quality and inclusiveness of information on potential hydro projects drive home the need for the region to 1) develop multiple options, 2) move towards a more balanced and diversified portfolio of resources, and 3) maintain flexibility with regard to the selection of resource options over time as the uncertainties above become more resolved. Black & Veatch concludes that a diversified, balanced solution represents the most appropriate way for the region to move forward. In short, Southeast Alaska will not be able to merely build more hydroelectric power and transmission projects to chart its future. It must embrace a coordinated action plan that includes DSM/EE, which are actions consumers and businesses must take, and development of hydro power projects in areas that now suffer extremely high and economically stifling utility rates. The solution set must involve electricity supply, heating energy supply, and considerations of electric vehicles for transportation.

> ***"There is no 'silver bullet' for the Southeast.....it is more like 'silver buckshot.'"***
> Advisory Work Group Member

- **Phased Approach to the Future**--Black & Veatch believes that it is important for the region to think about the future in two phases with regard to long-term resource decisions:
  - **Phase 1** - the next 5 years (2012-2016)
  - **Phase 2** - beyond the next 5 years (2017 and beyond)

  In **Phase 1**, the regional emphasis should be on adding the Committed Resources (which are discussed in Section 1.11 and Section 4.0) and aggressively pursuing the implementation of DSM/EE and biomass space heating conversion programs.

  In parallel, the region should continue reconnaissance and feasibility studies of all potential hydro projects listed in the Refined Screened Potential Hydro Project List (see Table 10-4 in Section 10.0). These reconnaissance and feasibility studies should be completed consistent with the AEA-directed process and standards.

  Finally, as part of Phase 1, this IRP should be updated in 2014-2015 to make the longer-term resource selections that would be implemented in Phase 2. By updating the Southeast Alaska IRP in 2014 or 2015, the region will have: 1) better project-specific information to make a definitive selection among specific alternative hydro and other renewable projects, and 2) actual experience with the implementation of DSM/EE and biomass conversion programs to better determine the level to which the region, and individual subregions, can rely on these programs over the long term.

In **Phase 2**, the region would develop hydroelectric and other renewable projects, as well continue to implement DSM/EE and biomass conversion programs as appropriate, based upon the results of the updated Southeast Alaska IRP.

- **Economic Realities of Southeast Intertie Concept**-- The vision of interconnecting all of the Southeast communities into a backbone transmission system has been discussed by many Southeast Alaskans for several decades. This initiative is in direct response to the reality of Southeast Alaska that hydroelectric resources are beyond the economic reach of a number of the Southeast communities. While the intent of this initiative has been to provide affordable hydropower-based energy to all communities, Black & Veatch finds that implementation of the backbone is not economic, and other energy solutions are recommended for specific communities. Two selected transmission line projects that have been a part of the initiative (Kake to Petersburg Intertie and the Metlakatla Intertie) are included in the list of Committed Resources. The remainder of the connections will include long submarine cables and very high construction costs that are not justified by the expected power flows. In short, even if the projects are fully funded by the State of Alaska, expected maintenance and operations costs will exceed significantly the benefits of many of the potential regional interconnections. The results of the initial economic evaluation of the transmission interconnections indicates that none of the interconnections evaluated have estimated transmission costs that are lower than the projected diesel costs.
- **AK-BC Intertie**--One specific resource addition considered in this study was the development of the AK-BC Intertie, which would connect the Southeast region to the BC Hydro transmission network, allowing for the import or export of power to or from British Columbia and the lower 48 states. Black & Veatch conducted a screening analysis of the AK-BC Intertie and concluded that it was not a viable project given current conditions.
- **Role of Technology Innovation**—Black & Veatch's recommendations offer a multi-faceted energy future, but it is clear that this IRP cannot yield equality in cost of and availability of energy throughout the region. In particular, remote communities are facing a future of continuing higher rates for energy. Expected electrical rates in Kake, Angoon, and Ketchikan will remain distinctly different, and this will likely be one key player in the economic future of the communities. Certainly, Kake and Angoon, and the utilities that serve them, do not have the advantages of utilities, such as Ketchikan Public Utilities, of size and paid for energy infrastructure that is owned by SEAPA that has been significantly subsidized by past State-funded energy projects. Possible future solutions to this equality issue may reside in focused technology advances in small-scale power supply. Governmental organizations such as the AEA Emerging Energy Technology Fund and the Alaska Center for Energy can play an important role in seeking lower cost energy conversions.

- **Aggressive Pursuit of DSM/EE and Biomass Conversion Programs**--Based upon the results of this study, the region should significantly increase the implementation of DSM/EE programs. However, to achieve these projected savings, the region will need to approach this effort as a top priority and address a number of important delivery issues, including: 1) how best to leverage existing Alaska Housing Finance Corporation (AHFC), AEA, and RurAL CAP programs, 2) whether additional DSM/EE programs should be developed on a regional basis and implemented in close coordination with local utilities versus requiring each utility to develop their own DSM/EE-related staff and skills, 3) establishing Southeast region-specific costs for higher efficient appliances and equipment, and 4) the financing of the up-front DSM/EE program development costs as well as ongoing incentives to residential and commercial customers to install more efficient appliances and equipment.

  Also, the region should pursue policies and programs to encourage the conversion of space heating to biomass. One particularly promising resource option to accomplish this goal is the regional adoption of wood pellet technology. Again, to achieve the very significant savings related to space heating conversions to biomass identified in this study, the region will need to be serious in its approach to this potential and address the same type of delivery issues as discussed above for DSM/EE programs.

- **Load Uncertainties due to Economic Development Efforts and Potential Mines**--Another risk facing the region is the potential for large load increases resulting from economic development efforts (e.g., the development of one or more mines, ore or fish processing plants, etc.). Although the High Scenario Load Forecasts, discussed in Section 8.0, were developed to illustrate the potential for significantly higher load growth than shown in the Reference Scenario Load Forecasts, they may not adequately capture the impact of a large mine load increase (or any other large, discrete increase) because of the potential size of mine loads and the fact that, if developed, the impact of a new mine would be site-specific.

- **Need for Continued State Financial Assistance and Proposed AEA Decision Framework and Policy**--It will be critical for the State to continue to provide financial assistance to enable the region to lower costs and meet its electric and heating needs going forward. To ensure that State monies provide public benefit, the AEA is proposing a decision framework and policy requiring developers of each potential project to develop a standard set of information, at an appropriate level and quality of detail, prior to any decisions being made about which projects should be developed. This decision framework and related information standards are intended to yield a minimum threshold of information, thereby providing the foundation of decisions regarding the next increment of hydro projects. They are also intended to identify any fatal flaws that would prohibit a proposed project from being developed. Black & Veatch believes that this type of decision framework and information standards should be adopted to effectively address the issues associated with the quality and inclusiveness of information available on specific projects, and enable the region to make more fact-based decisions regarding which hydro projects should be developed.

> ***"I would like to see the AEA play a much stronger role in leading the way to less reliance on carbon-based fuels."***
>
> Southeast Alaska Resident

- **Encourage Private Development of Resources**-- To make private development of projects in the region more feasible, a standard power sales agreement (PSA) should be developed to: 1) facilitate the provision of State financial assistance, and 2) provide independent power producers (IPPs) an equal opportunity to submit qualified proposals to develop specific projects. Additionally, consideration should be given to the development of an open access policy for the region's transmission network, based on the Federal Energy Regulatory Commission (FERC) Open Access Transmission Tariff (OATT), which governs the planning and operation of the transmission grids in the lower 48 states.

> ***"Public-private partnerships are crucial to developing energy infrastructure in Alaska."***
> Former Mayor, Rural Community

1.2 PROJECT OVERVIEW AND APPROACH

The IRP study process for the Southeast Alaska region consisted of four key stages: data collection, optimal generation expansion and integrated DSM/EE and transmission expansion planning, consideration of space heating and transportation requirements, and report writing and documentation. Throughout this process, data related to alternative demand-side, supply-side, and transmission resource options were compiled, reviewed, screened, and modeled, where appropriate, using Ventyx's Strategist® optimal generation expansion model. Model inputs and assumptions consider possible sensitivity cases and considerations unique to each community and their serving utilities to derive an expansion plan for the Southeast region.

One of the AEA's directives to Black & Veatch was to proactively solicit input from a broad cross-section of the Southeast region's stakeholders. Elements of the stakeholder involvement process are summarized in Figure 1-1.

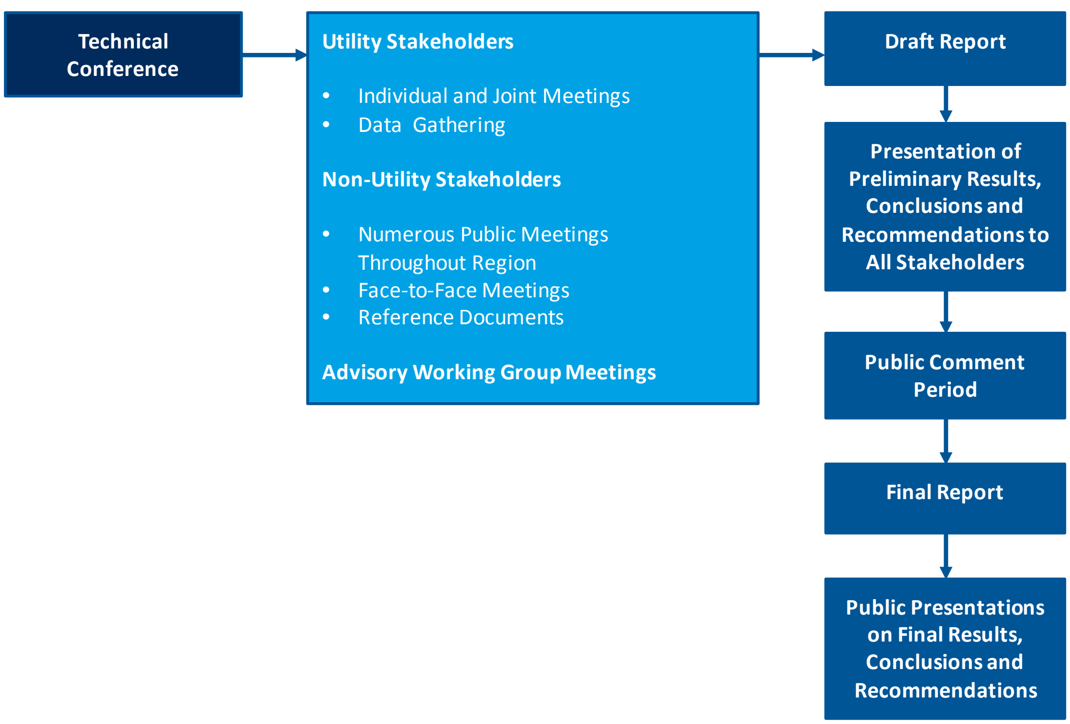


Figure 1-1 Elements of Stakeholder Involvement Process

As part of the stakeholder involvement process, the AEA assembled an Advisory Work Group (AWG), which provided input on a number of project-related issues, including the following:

- Project objectives, scope, and approach.
- General and project-specific input assumptions.
- Potential projects to be treated as Committed Resources.
- Preliminary results, conclusions, and recommendations.
- Draft report.

1.3 ISSUES FACING THE REGION

The Southeast region faces a number of challenging energy-related drivers and issues including those listed in Table 1-1. Each of these drivers and issues is discussed in more detail in Section 3 and Section 16.

Table 1-1 External Drivers and Regional Issues Facing Southeast Alaska

EXTERNAL DRIVERS	REGIONAL ISSUES

• Federal and State energy policy legislation
• Fossil fuel prices and availability
• Land use regulations
	• Uniqueness of Southeast Alaska
	• Subregional Differences
	  o Cost of electricity
	  o Conversion to electric space heating
	  o Rapidly declining excess hydroelectricity
	  o Declining population in communities
	  o Declining economies in communities
	• High cost of space heating
	• Difficulty in developing new hydroelectricity and transmission interconnection projects
	• Low levels of weatherization and energy efficiency
	• Availability and cost of capital
	• Risk management issues

"After the business is closed for the day, I go upstairs to relax and read by the light of the street lamp. I cannot afford to keep the lights on for pleasure."

Yakutat Business Owner

"Because of the high energy costs, we had to lay off our employee. My husband and I have to do all the work ourselves."

Hoonah Restaurant Owner

"The key energy-related issues and uncertainties in the Southeast are manifold including threats stemming from high energy costs to rural communities, resulting in outmigration of residents."

Commercial Fisherman

"We are surrounded by forests, but we can't touch them."

Southeast Business Owner

1.4 EXISTING UTILITY SYSTEMS

Southeast Alaska is characterized by numerous islands, marine passages, mountains, and evergreen forests in a wet, relatively temperate climate. The combination of high precipitation levels and the mountainous terrain provides significant opportunity for hydroelectric generation. The mountainous, island environment, however, has limited the development of roads and other infrastructure systems, including electric transmission lines, generally to relatively confined areas surrounding the region's cities, towns, and villages. Consequently, although significant hydroelectric power is available in some locations, the lack of power transmission facilities prevents its distribution to the region as a whole.

The existing transmission system in Southeast Alaska is very limited; however, the electric systems in a few communities are currently interconnected. To date, the Southeast Alaska power system has developed to utilize hydroelectric resources on a subregional or isolated community basis. Within the subregions, some transmission lines are currently planned to be constructed in the near future to further distribute power from relatively small hydroelectric projects. For the purposes of analyzing the transmission system in Southeast Alaska, subregions were identified as shown on Figure 1-2.

As part of its deliberations, the Southeast Alaska IRP AWG passed a resolution directing Black & Veatch to consider the following generation and transmission projects as "Committed Resources" for purposes of this study:

- Blue Lake Expansion Hydro (Sitka)
- Gartina Falls Hydro (Hoonah)
- Reynolds Creek Hydro (Prince of Wales)
- Thayer Creek Hydro (Angoon)
- Whitman Lake Hydro (Ketchikan)
- Kake – Petersburg Intertie
- Ketchikan – Metlakatla Intertie

From an analytical and modeling perspective, the designation of these projects as Committed Resources means that they are treated as existing units.

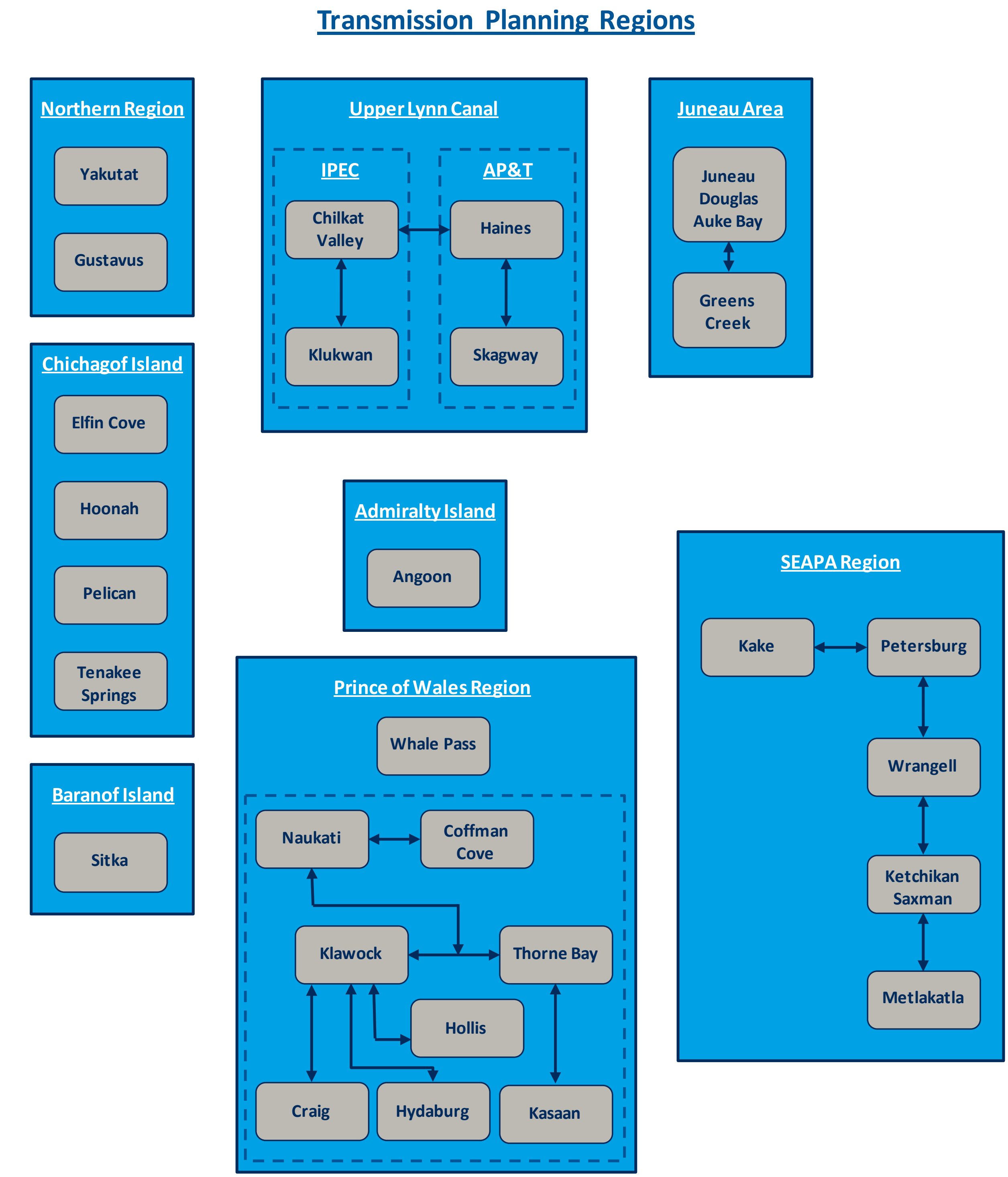


Figure 1-2 Transmission Systems Considered in the IRP

1.5 EVALUATION OF POTENTIAL HYDRO PROJECTS

The approach used by Black & Veatch to evaluate the potential hydro projects in the region is summarized on Figure 1-3 and described in detail in Section 10.0.

The screening process started with the development of a comprehensive list of potential hydro projects in the region. Black & Veatch, and its subcontractor HDR Alaska Inc. (HDR), developed this Comprehensive Potential Hydro Project List, and it contains the projects that Black & Veatch/HDR become aware of from numerous sources. One of the main sources of potential projects was the 1947 Water Powers of Southeast Alaska Report prepared by the Federal Power Commission. This report contained 200 hydro projects some of which have already been constructed. Where more than one source of information was available, data from the additional sources were also included in the screening process. Some data were conflicting, and some became more refined and, potentially, more accurate as projects developed. In all, nearly 300 projects are included in the Comprehensive Potential Hydro Project List.

The next step of the process was to conduct a high-level evaluation of the Comprehensive Potential Hydro Project List, which yielded a list of potential projects that could supply future power needs, subregion by subregion. The criteria for screening, listed below, are a practical set of gates that projects must pass through to be considered a potential generation resource. Screening narrows the potential projects to be considered and is structured so all reasonable projects can be considered as generation resources; typically, acceptable projects are currently under development or have had a significant level of development work conducted for them. This list is referred to as the Refined Screened Potential Hydro Project List:

- Committed Resources – Projects where the decision to develop them has already been made.
- Projects which would otherwise be viable resource candidates, but are deemed to have significant environmental and land use issues, are identified and set aside for potential consideration later in the planning.
- Projects that are being developed to specifically serve loads for potential new mines being developed and, therefore, not generally intended to be interconnected in any meaningful fashion to the utility grid system.
- Projects which are primarily being developed to export power from Alaska.
- Projects which may be suitable for development to serve the utility systems of the Southeast Alaska communities.

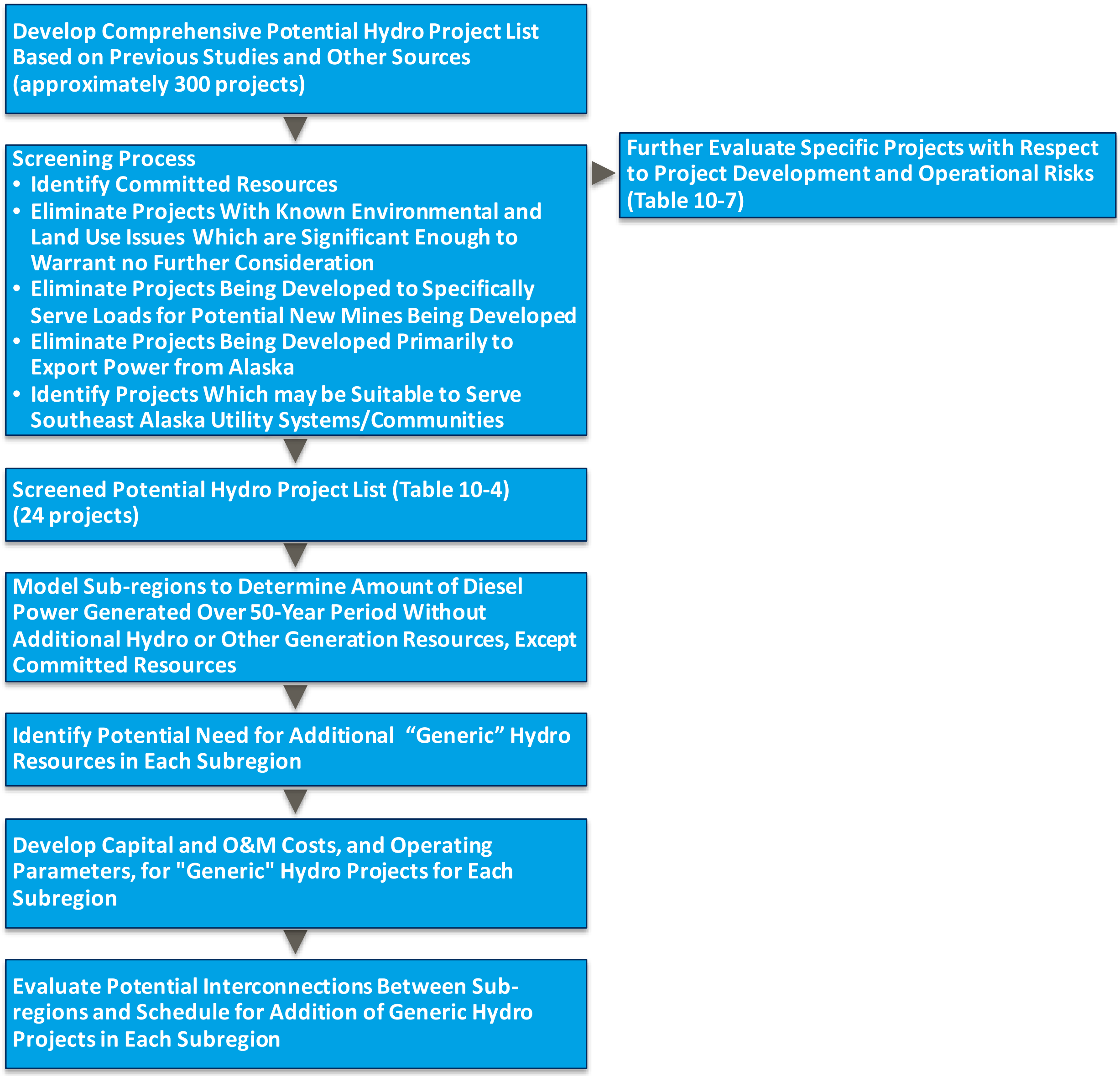


Figure 1-3 Hydro Project Evaluation Process

The Refined Screened Potential Hydro Project List is shown in the Table 1-2.

One significant impediment to the completion of the SEIRP was the wide variety in the quality and inclusiveness of information available to evaluate specific hydro projects, including:

- Realistic commercial operation dates (CODs).
- Capital costs.
- Storage capacity, if any, and monthly energy output.
- Environmental, permitting, and licensing issues.
- Business structure and agreements, including ownership structure, project development capabilities, and power sale and interconnection agreements.

As a result of this wide variation in data quality across the spectrum of potential hydro projects in the Southeast region, it is impossible to conduct a true "apples-to-apples" comparison of projects. To get all projects to a comparable level of data quality requires a significant amount of further study, and this effort is outside of the scope of this study; consequently, it is impossible at this time to make a definitive selection of which hydro projects should be developed within each subregion to meet future electric requirements.

As a result, generic hydro projects were developed for use in modeling expansion plans in Strategist® to evaluate: 1) the proper sizing and timing of additional hydro projects that could be added to each subregion, and 2) transmission interconnections and other alternative generation and demand-side projects. The generic projects were developed for use in the modeling to avoid having to model with the specific projects identified in Table 10-2 with their attendant issues of the quality and inclusiveness of cost and performance estimates. The generic projects developed for each subregion are shown in Table 10-5. It should be noted that these generic hydro projects are <u>not</u> based on actual projects that are available within each subregion. They represent a more idealistic view of the type of hydro projects that would best match the capacity and storage needs of each subregion.

As a final step in the hydro project evaluation, Black & Veatch and HDR assessed the types of project development and operational risks related to each project on the Refined Screened Potential Hydro Project List in Table 1-2. The relative rankings for each risk factor are shown in Table 10-7, located in Section 10.0.

Table 1-2 Refined Screened Potential Hydro Project List

PROJECT NAME	LOCATION	CATEGORY	CAPACITY (MW)	CAPITAL COST ($ MILLIONS)	CAPITAL COST $/KW	ANNUAL ENERGY (MWH)
SEAPA						
Anita - Kunk Lake	Wrangell	Storage	8.60	90.54-135.82	10,528-15,793	28,100
Cascade Creek	Petersburg	Storage	70.00	146.35-219.53	2,091-3,136	202,300
Connell Lake	Ketchikan	Storage	1.70	5.40-10.80	3,176-6,353	10,600
Lake Shelokum	Wrangell	Storage	10.00	39.00-91.00	3,900-9,100	40,000
Mahoney Lake	Ketchikan	Storage	9.60	34.50-51.76	3,594-5,392	46,066
Orchard Lake	Meyers Chuck	Storage	10.00	34.20-79.80	3,420-7,980	56,000
Ruth Lake	Petersburg	Storage	20.00	84.54-126.82	4,227-6,341	70,700
Scenery Creek	Petersburg	Storage	30.00	128.98-193.48	4,299-6,449	128,700
Sunrise Lake	Wrangell	Storage	4.00	16.64-24.96	4,160-6,240	13,500
Thoms Lake	Wrangell	Storage	7.50	110.11-135.17	14,681-18,023	24,200
Triangle Lake	Metlakatla	Storage	3.50	12.63-18.95	3,609-5,414	13,100
Tyee New Dam Construction	Wrangell	Storage	1.40	36.60-85.4	26,143-61,000	9,100
Tyee New Third Turbine	Wrangell	Storage	10.00	13.20-30.80	1,320-3,080	-
Virginia Lake	Wrangell	Storage	12.00	103.21-154.81	8,601-12,901	43,800
Baranoff Island						
Takatz Lake	Sitka	Storage	27.70	117.04-175.56	4,225-6,338	106,900
Chichagof Island						
Crooked Creek and Jim's Lake	Elfin Cove	Storage/Run-of-River	0.16	1.48-2.22	9,250-13,875	666
Indian River	Tenakee Springs	Run-of-river	0.25	2.02-3.02	8,080-12,080	916
Water Supply Creek	Hoonah	Run-of-river	0.40	5.49-8.23	13,725-20,575	1,480

PROJECT NAME	LOCATION	CATEGORY	CAPACITY (MW)	CAPITAL COST		ANNUAL ENERGY (MWH)
				($ MILLIONS)	$/KW	
Juneau Area						
Lake Dorothy Expansion	Juneau	Storage	28.00	71.40-166.60	2,550-5,950	96,000
Sweetheart Lake	Juneau	Storage	30.00	82.82-124.08	2,761-4,136	136,000
Upper Lynn Canal						
Connelly Lake	Haines	Storage	12.00	36.80-55.20	3,067-4,600	39,762
Schubee Lake	Skagway	Storage	4.90	36.00-54.00	7,347-11,020	25,000
Walker Lake	Chilkat Valley	Run-of-river	1.00	6.08-9.12	6,080-9,120	2,750
West Creek	Skagway	Storage	25.00	112.00-168.00	4,480-6,720	76,600

Note: This table is provided for general information purposes. The information shown in this table was gathered from multiple sources, and the quality and inclusiveness of this information varies significantly across the projects shown. Black & Veatch and HDR have completed a high-level review of this available information and show a range of capital costs for each project to reflect the uncertainties associated with the available information. As a result of the wide variation in the quality and inclusiveness of project-specific information, the AEA believes that this information should not be used, in its current form, to make any investment decisions.

1.6 EVALUATION OF POTENTIAL TRANSMISSION INTERCONNECTIONS

As discussed in Section 12.0, the AEA directed Black & Veatch to consider transmission from the perspective of a "public benefit investment" as part of its evaluation of potential transmission segments. As a result of this directive, Black & Veatch analyzed the economics of potential transmission investments in two ways. First, Black & Veatch, examined the best information available (modified where appropriate based upon Black & Veatch's transmission construction and operating experience) regarding the capital and operations and maintenance (O&M) costs of specific transmission segments (including segments that would transfer power within a subregion as well as between subregions). An economic screening was then conducted to compare the annual capital carrying costs and O&M expenses of transmission segments to the value of the diesel power displaced. None of those transmission segments passed the economic screening of having lower transmission costs on a $/MWh basis than diesel generation. This approach did not include the effect of any State financial assistance.

Additionally, Black & Veatch evaluated the economics of potential transmission segments assuming: 1) that the State provided financial assistance in the form of a grant equal to 100 percent of the construction capital costs, and 2) that the local utility would be responsible for covering the annual O&M expenses, as well as an annual contribution to a repair and replacement (R&R) fund to ensure adequate monies for future major repairs and replacement investments to keep the transmission system in good shape for decades.

There have been many studies regarding transmission in the Southeast region. Many of these studies focused on individual projects. Three studies, however, focused more on the entire transmission system:

- Southeast Alaska Transmission Intertie Study, Harza Engineering Company, 1987.
- Southeast Alaska Electrical Intertie System Plan, Acres International Corporation, January 1998.
- Southeast Alaska Intertie Study Phases 1 and 2, D. Hittle & Associates, December 2003.

Many of these studies had addenda that updated and focused on specific aspects of the region. Of these studies, the D. Hittle study is the most recent and most well known. The D. Hittle study focused primarily on the transmission system. The IRP significantly differs from the D. Hittle transmission study in that the IRP focuses on integrated solutions for communities in the Southeast with equal emphasis on generation, transmission, conservation and energy efficiency as well as space heating. This integrated approach provides more robust solutions to meeting the communities' energy requirements.

Building upon the D. Hittle study, Black & Veatch evaluated the following transmission interties. The numbering and nomenclature used in the D. Hittle study is used to maintain continuity with previous studies. SEI-1 is now called SEI-1A Hawks Inlet – Hoonah, since part of the original SEI-1 transmission line has been constructed. SEI-2 and SEI-3 are Committed Resources and discussed above. SEI-5 and SEI-6 North-South, is a combination of two interconnections evaluated together as single interconnection which was not evaluated in a combined fashion in the D. Hittle study. SEI-9 is an interconnection that was not evaluated in the D. Hittle study.

- SEI-1A: Hawks Inlet - Hoonah
- SEI-2: Kake - Petersburg
- SEI-3: Ketchikan - Metlakatla
- SEI-4: Ketchikan – Prince of Wales
- SEI-5: Kake – Sitka
- SEI-6: Hawks Inlet – Angoon – Sitka
- SEI-6 Alternate: Hoonah – Tenakee Springs – Angoon – Sitka
- SEI -5 and SEI-6: North - South
- SEI-7: Hoonah – Gustavus
- SEI- 8: Juneau – Haines
- SEI-9: Pelican - Hoonah

Table 1-3 provides the results of the initial economic evaluation of proposed transmission interconnections, and Table 1-4 presents the results of the public benefit evaluation.

Table 1-3 Results of Transmission Interconnection Economic Evaluation

INTERCONNECTION		MILES	2011 CAPITAL COST ($ MILLION)	2011 ANNUAL O&M AND R&R COSTS	ANNUAL AVERAGE TRANSFER OVER INTERCONNECTION (NOTE 1) (MWH)	2011 TRANSMISSION INTERCONNECTION COST (NOTE 2) ($/MWH)
SEI-1A	Hawks Inlet - Hoonah	28.5	101.7	350,000	2,802	2,891
SEI-4	Ketchikan - Prince of Wales	35.2	99.7	293,000	9,094	797
SEI-5	Kake - Sitka	55	199.1	432,000	31,521	495
SEI-6	Hawks Inlet - Angoon - Sitka	102	143.1	471,000	11,104	1,025
SEI-6 Alternate	Hoonah - Tenakee Springs - Angoon - Sitka	106	147.2	497,000	7,290	1,607
SEI-5 and SEI-6	North - South	137	310.2	789,000	93,180	262
SEI-7	Hoonah - Gustavus	29	116.5	350,000	0	--
SEI-8	Juneau - Haines	85.3	243.8	319,000	4,844	3,902
SEI-9	Pelican - Hoonah	55	63.6	288,000	632	8,125
2011 Diesel Generation Cost						255

Note 1: The annual average transfer over the interconnection is determined by taking the sum of the annual flows for each segment of each interconnection as modeled in Strategist® for the 50-year planning period and dividing the sum by 50.

Note 2: The annual transmission interconnection cost does not include any cost for generating the electricity that would be transmitted over each transmission interconnection.

Table 1-4 Results of Transmission Interconnection Public Benefit Evaluation

INTERCONNECTION		MILES	2011 CAPITAL COST ($ MILLION) (A)	2011 CUMULATIVE PRESENT WORTH COST FOR ISOLATED SUBREGIONS ($ MILLION) (B)	2011 CUMULATIVE PRESENT WORTH COST FOR INTERCONNECTED SUBREGIONS ($ MILLION) (C)	2011 CUMULATIVE PRESENT WORTH COST SAVINGS DUE TO INTERCONNECTION ($ MILLION) (D) = (B) – (C)	2011 CUMULATIVE PRESENT WORTH COST FOR INTERCONNECTION O&M AND R&R ($ MILLION) (E)	2011 NET CUMULATIVE PRESENT WORTH SAVINGS ($ MILLION) (F) = (D) – (E)	BENEFIT-COST RATIO (G) = (F)/(A)
SEI-1A	Hawks Inlet - Hoonah	28.5	101.7	286.1	277.9	8.2	13.1	-4.9	--
SEI-4	Ketchikan - Prince of Wales	35.2	99.7	307.6	282.5	25.1	11.4	13.7	0.14
SEI-5	Kake - Sitka	55	199.1	386.1	341.6	44.5	15.5	29.0	0.15
SEI-6	Hawks Inlet - Angoon - Sitka	102	143.1	339.8	290.1	49.7	16.5	33.2	0.23
SEI-6 Alternate	Hoonah - Tenakee Springs - Angoon - Sitka	106	147.2	182.8	128.2	54.6	17.6	37.0	0.25
SEI-5 and SEI-6	North - South	137	310.2	654.0	522.9	131.1	32.0	99.1	0.32
SEI-7	Hoonah - Gustavus	29	116.5	115.1	110.5	4.6	13.1	-8.5	--
SEI-8	Juneau - Haines	85.3	243.8	278.8	239.5	39.3	13.8	25.5	0.10
SEI-9	Pelican - Hoonah	55	63.6	51.9	46.7	5.2	10.1	-4.9	--

1.7 SUMMARY OF DSM/EE PROGRAM SCREENING

Section 13.0 provides a description of the process used by Black & Veatch to evaluate potential DSM/EE measures. The list of measures considered, and the related input assumptions, are summarized in Tables 13-1 and 13-2, located in Section 13.0. Also, included in Sections 13.0 and 16.0 are descriptions of the existing DSM/EE programs available in the Southeast region.

> ***"Funding is the main hurdle to energy efficiency and demand-side management. The State should offer matching grants to electric utilities and/or communities to make public buildings more energy efficient."***
>
> Southeast Alaska Retiree

For the measures relevant to the Southeast region, Black & Veatch completed a cost-effectiveness screening using the following three industry-standard DSM/EE cost-effectiveness tests: the Total Resource Cost (TRC) Test, Ratepayer Impact Measure (RIM) Test, and Participant Test. Furthermore, Black & Veatch conducted the standard cost-effectiveness tests for three categories of communities, including high-cost utilities (those communities who are dependent upon high-cost diesel generation), mid-cost utilities (those communities who have access to some low cost hydro generation but have higher costs due to economies of scale), and low-cost utilities (those communities who have sufficient low-cost hydro generation to meet almost all of their electric demand).

For the cost-effectiveness screening, Black & Veatch established the criterion that a DSM/EE measure had to pass all three of the standard DSM/EE cost-effectiveness tests. This criterion is both conservative and restrictive: conservative in that this requirement helps ensure that the specific DSM/EE measures will prove to be cost-effective, and restrictive in that more measures would have passed the cost-effectiveness screen if Black & Veatch had not required a measure to pass all three cost-effectiveness tests. Black & Veatch believes that this is the most appropriate approach given the limited end-use and vendor DSM/EE-related information available at this time and the region's limited experience with these types of programs. However, it should be noted that additional measures could be implemented if utility decision makers and regional policy makers choose to apply a less conservative standard. One point of note is that many measures did not pass the RIM test for the high-cost utilities. This is because those utilities also have high non-fuel costs and therefore will suffer significant lost revenue due to DSM/EE programs. This issue will need addressing if utility decision makers and regional policy makers choose to apply a less conservative standard.

> ***"Demand-side management, conservation and energy efficiency are necessary components to sustainable economic and energy policies."***
>
> Southeast Stakeholder

The results of the DSM/EE cost-effectiveness screening for the high-cost utilities, mid-cost utilities, and low-cost utilities are shown on Figure 13-1 through Figure 13-3, located in Section 13.0.

Those measures that passed all three standard cost-effectiveness tests were then grouped into DSM/EE programs and used in the development of the Low Scenario Load Forecasts, as discussed in Section 8.0 and Section 17.0.

1.8 SPACE HEATING CONVERSION

Space heating costs represent a major portion of residential, commercial, and industrial energy expenditures in Southeast Alaska. Historically, most space heating used fuel oil. When oil prices increased significantly in 2008 and again in 2010 and 2011, many customers in areas with low-cost hydroelectric generation areas converted to electric heat. This conversion significantly increased electric loads, consuming excess hydro generation resources and, in some cases, resulting in the operation of diesel generation when water levels of the hydro projects dropped to unacceptable levels. The significant increase in electric loads also often strained other parts of the utility system, including transformer capacity. In most instances the increase in electric loads occurred very rapidly.

Biomass space heating is analyzed in Section 16.0. The technology for all three forms of biomass is well established, although the infrastructure for production and delivery for pellets and chips need to be developed in the Southeast. There are a number of favorable aspects relative to the social/political characteristics of biomass. The concept of using a local renewable resource that creates local jobs is well received. The ease and convenience of use varies considerably with the form of biomass. One of the big social/political benefits of oil and electric space heating is the convenience of use. Pellet space heating can provide a similar level of convenience via continuous feed from a hopper and minimal operating maintenance. On the other hand, cord wood space heating requires much more effort and attention for burning the wood and for removing ash. Wood chips are in between the effort required for pellets and cord wood.

Based on the analysis of the use of pellets for space heating in the Southeast, Black & Veatch has conducted an evaluation of the cost and impact of a proposed plan for a major conversion to pellets for space heating in the Southeast.

For the first step of the evaluation, Black & Veatch estimated the oil space heating load for each of the subregions in the Southeast through the 50 year evaluation period. The oil space heating load was based on information used for the electric load forecasts described in Section 8.0 and the space heating requirements contained in the *Alaska Energy Pathway*. Figures 15-11 through 15-18, located in Section 15.0, present the estimated oil space heating load in annual gallons per year of fuel oil for each region.

The economic evaluation of the savings from the pellet conversion program is presented in Table 15-2, located in Section 15.0. Table 15-2 is based on the medium heating oil projections in Section 5.0 and assumes a pellet cost of $300 per ton escalating at the general escalation rate of 3 percent as presented in Section 6.0. The costs for the pellet space heating equipment are those presented in Subsection 15.4.4 and are escalated at 3 percent annually. Specific costs for pellet mill development or transportation or distribution system infrastructure are not included, the $300 pellet price used is the delivered price for pellets in Southeast Alaska, and those production and infrastructure costs are captured in the delivered costs. The actual program may want to provide assistance in these areas to hasten the local development of the industry. Table 15-3 presents the estimated capital cost for the pellet space heating equipment. The proposed pellet conversion program would save an estimated $2.1 billion in cumulative present worth costs for space heating for the region over the 50 year period and would require a total capital investment of $532 million for the pellet space heating equipment.

Table 1-5 shows the 50 year savings from the proposed pellet space heating conversion program. While there is uncertainty in the magnitude of these savings and costs, the magnitude of savings is sufficiently large that it can be concluded that the region would incur significant savings for space heating with a significant program for conversion to biomass for space heating.

It should also be noted that changes in utility rate structures can also be used to discourage electric space heating conversions.

Table 1-5 Savings from Pellet Conversion Program (Cumulative Present Worth Costs $'000)

REGION	EXISTING OIL SPACE HEATING COSTS (A)	OIL COSTS (B)	PELLET COSTS (C)	COST OF PELLET SPACE HEATING EQUIPMENT (D)	TOTAL PELLET PROGRAM COSTS (E)=(B)+(C) + (D)	SAVINGS (F)=(A)-(E)
SEAPA	977,320	258,011	238,441	61,875	558,327	418,993
Admiralty Island	22,334	6,830	4,717	1,195	12,742	9,592
Baranof Island	460,426	121,745	98,280	23,655	243,680	216,746
Chichagof Island	58,459	13,753	11,950	2,806	28,509	29,950
Juneau	2,120,883	541,759	490,307	111,314	1,143,380	977,503
Northern	147,786	39,089	23,925	6,849	69,863	77,923
Prince of Whales	366,725	94,304	77,469	14,916	186,689	180,036
Upper Lynn Canal	347,271	90,274	67,919	16,287	174,480	172,791
Total Southeast Region	**4,501,204**	**1,165,765**	**1,013,008**	**238,897**	**2,417,670**	**2,083,534**

1.9 REGIONAL EXPANSION PLAN DEVELOPMENT

The Southeast Alaska IRP is built upon a number of input assumptions, including the following: drivers and issues; economic and financial factors; load forecasts (i.e., High, Reference and Low Scenario Load Forecasts); forecasts of fuel prices including emissions allowance costs; existing generation and transmission resources; and reliability criteria. Each of these categories of input assumptions is discussed in Section 3.0 through Section 8.0.

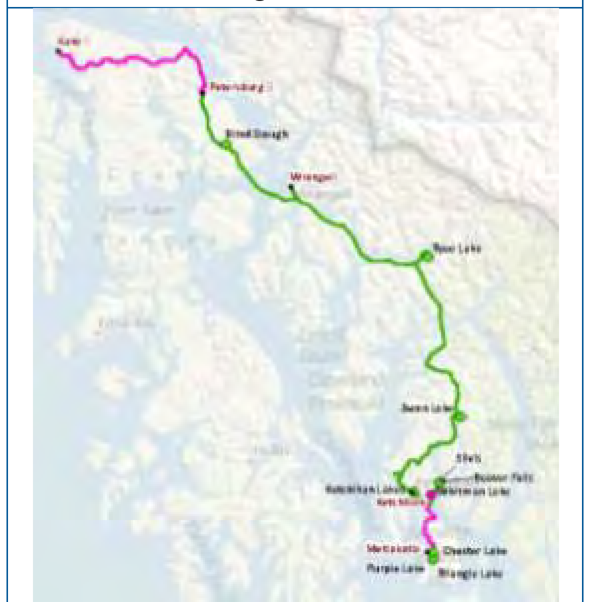
Additionally, future resources were considered, including hydroelectric generation, other generation resources (including conventional and renewable resources), DSM/EE, and transmission, along with the types of screening that were conducted for each category to determine which resources should be included in the detailed economic modeling. These alternative resources are discussed in detail in Section 10.0 through Section 15.0.

In addition to the detailed economic modeling, Black & Veatch considered the environmental impacts and risks associated with each resource category to develop a Preferred Resource List for each subregion.

Each of the subregions shown on Figure 1-2 was modeled using the Strategist® optimal generation expansion program. Strategist® evaluates all combinations of potential generating units to develop an expansion plan that has the least cumulative present worth cost over the planning period. The expansion plans for each of the three load forecasts (High, Reference, and Low Scenarios) are presented for each subregion in Tables 17-9 through 17-11, located in Section 17.0, and summarized in Figures 1-4 through 1-11.

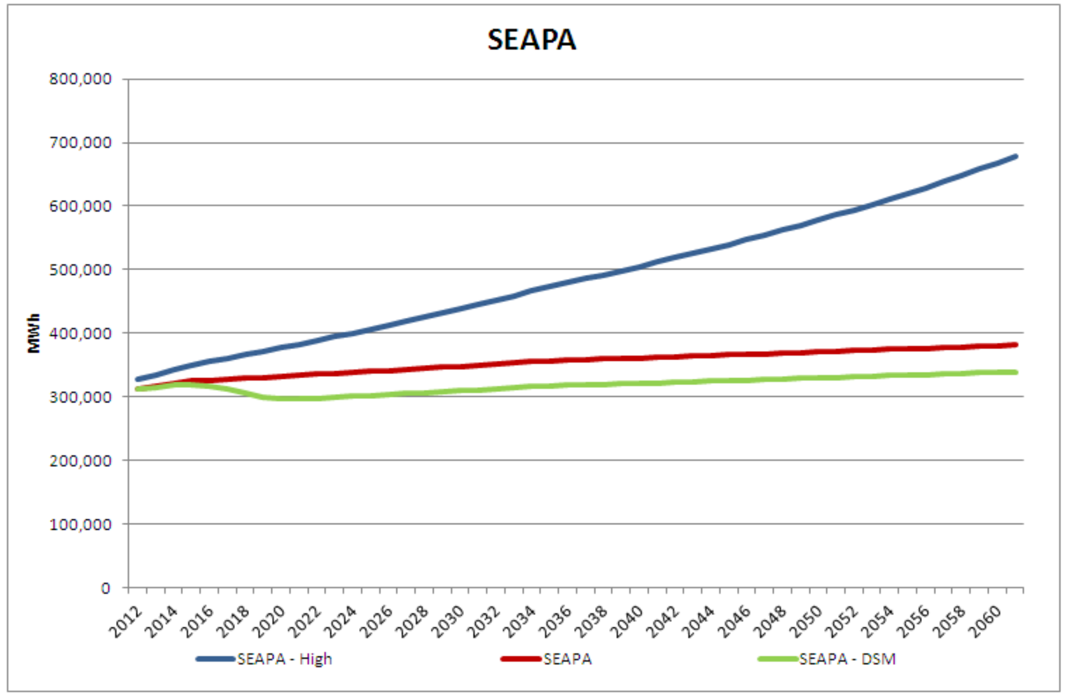
Summary of Results

Subregion: SEAPA

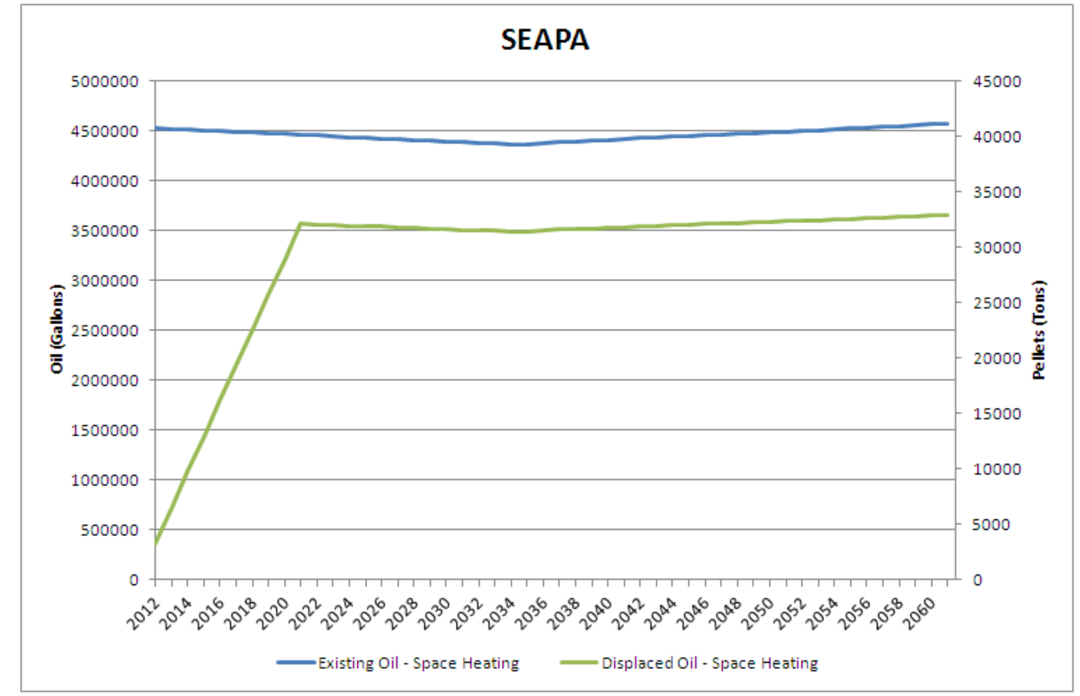


Kake
Petersburg
Wrangell
Ketchikan/Saxman
Metlakatla

Electric Load Forecast

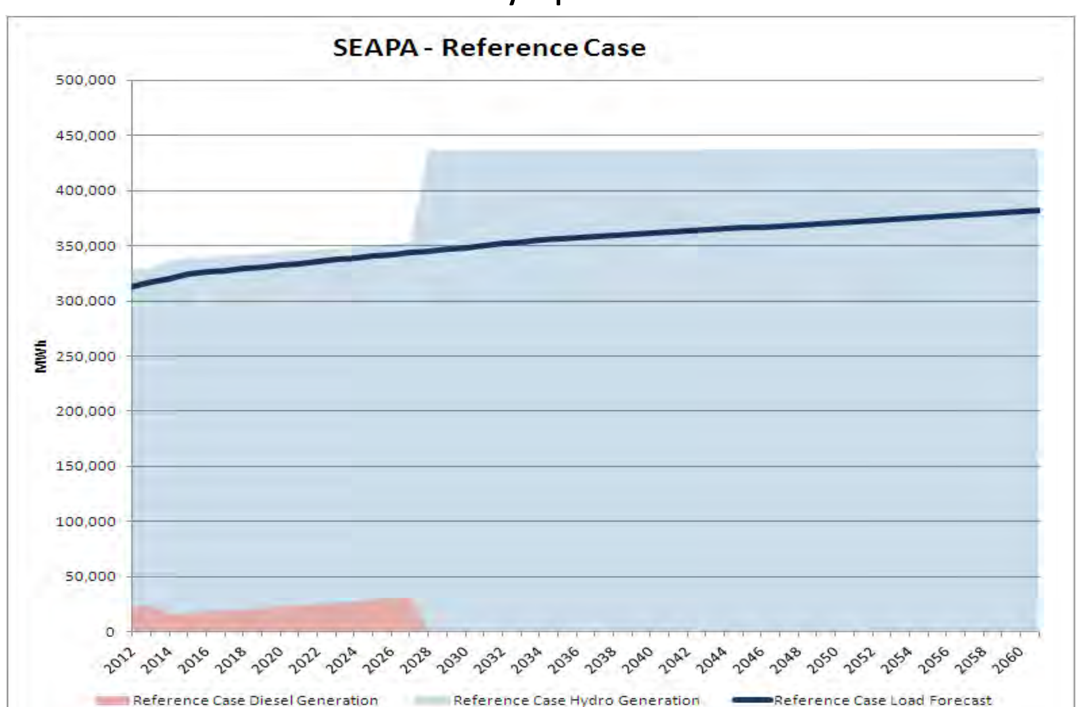


Space Heating



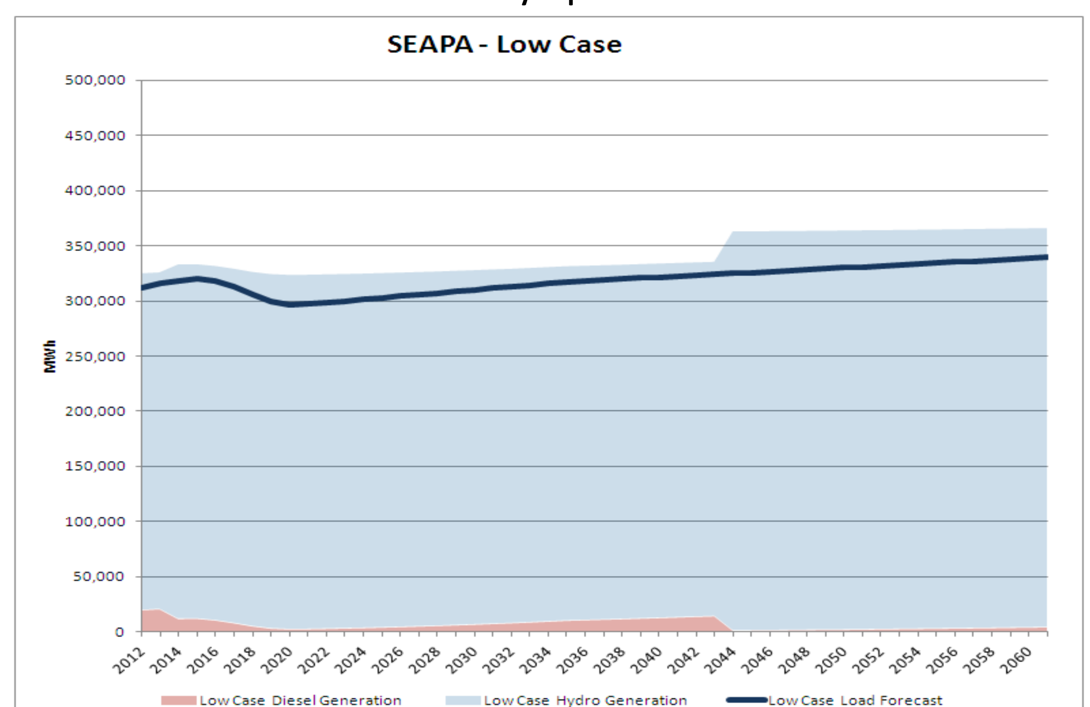
Cumulative Present Worth Cost ($ 000s) - Oil Only:	977,320
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	558,327

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	288,797

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	234,723

Expansion Plan Alternatives:

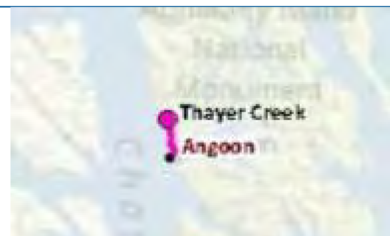
SEAPA

- Committed Resource – Transmission
- Committed Resource – Hydro
- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating
- Wind – Project Development

Figure 1-4 Subregion Summary – SEAPA

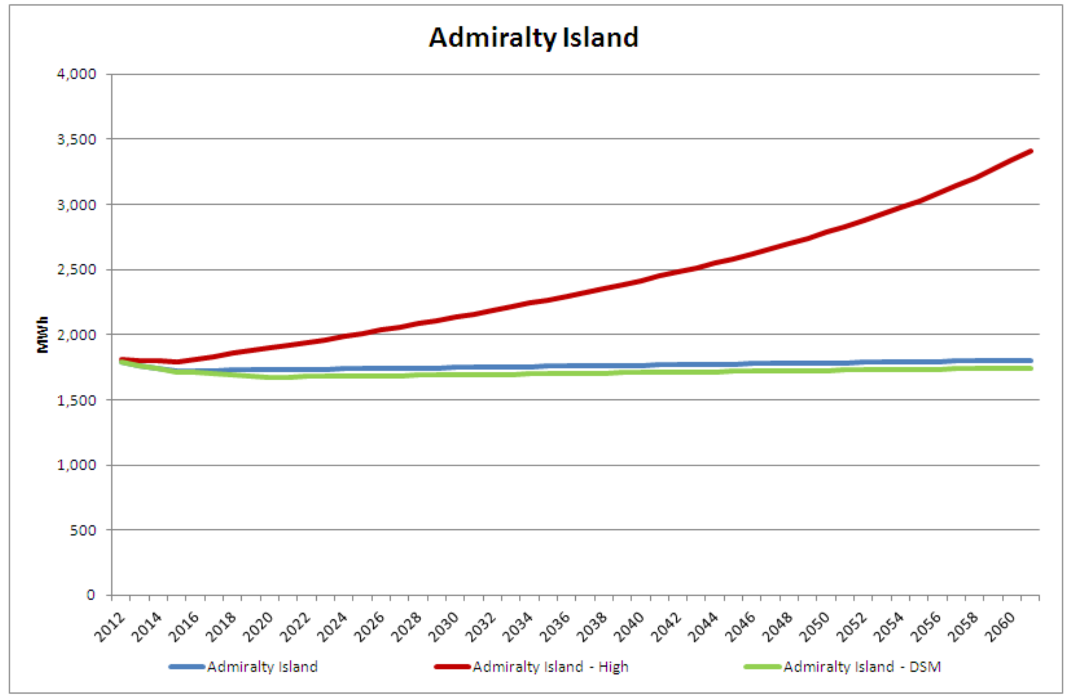
Summary of Results

Subregion: Admiralty Island

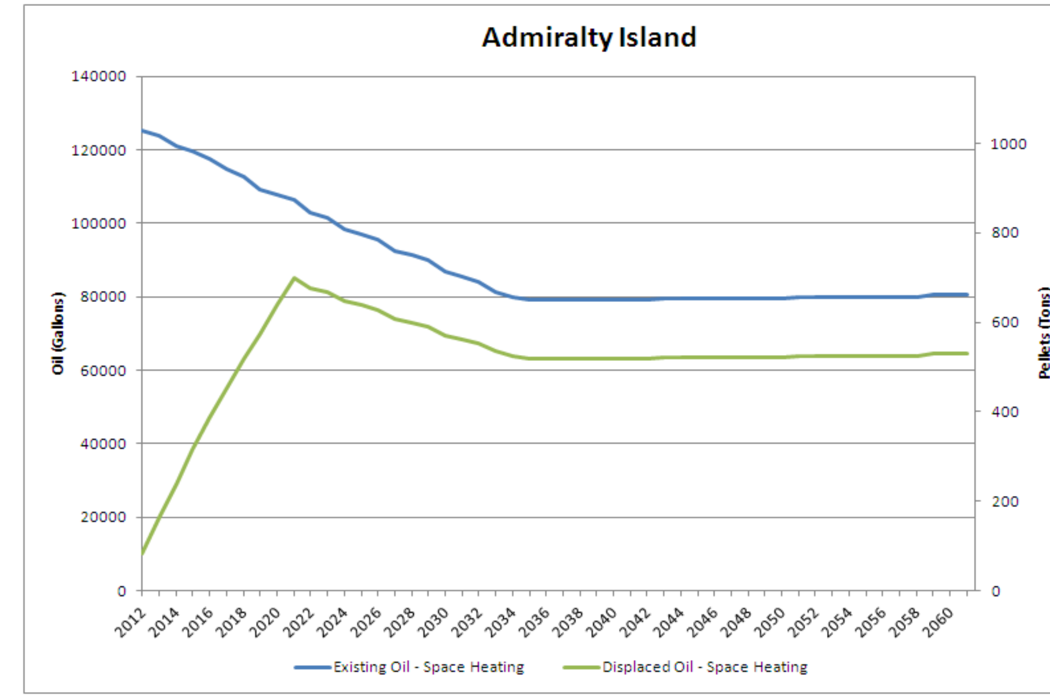


Angoon

Electric Load Forecast

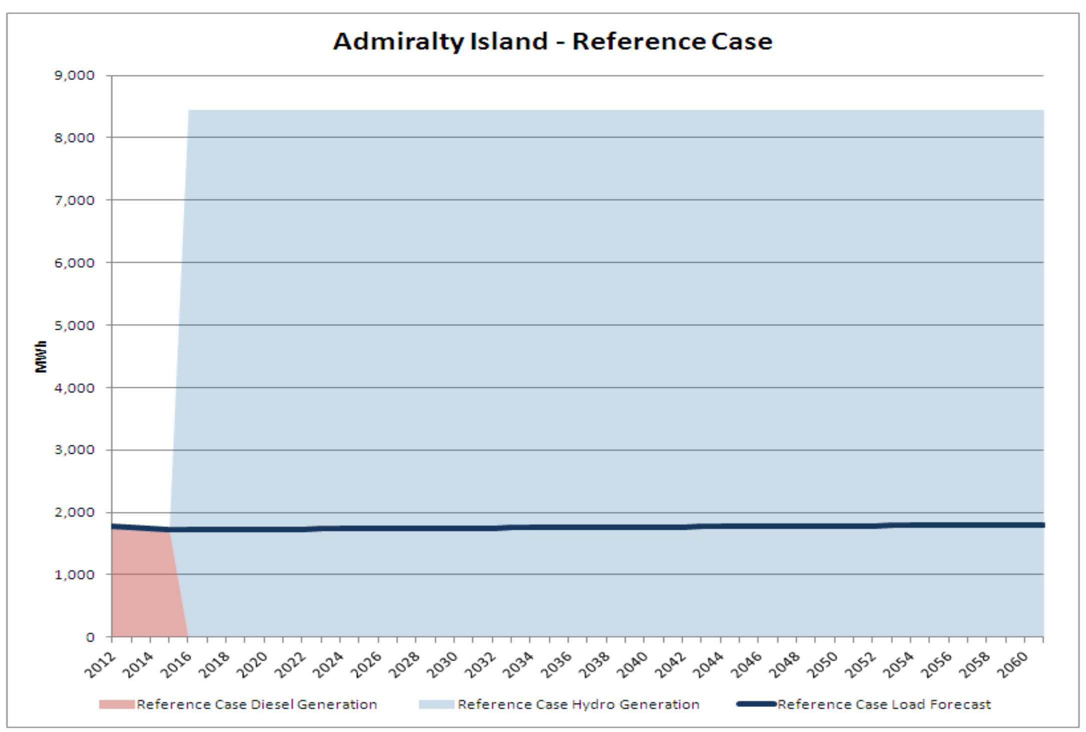


Space Heating



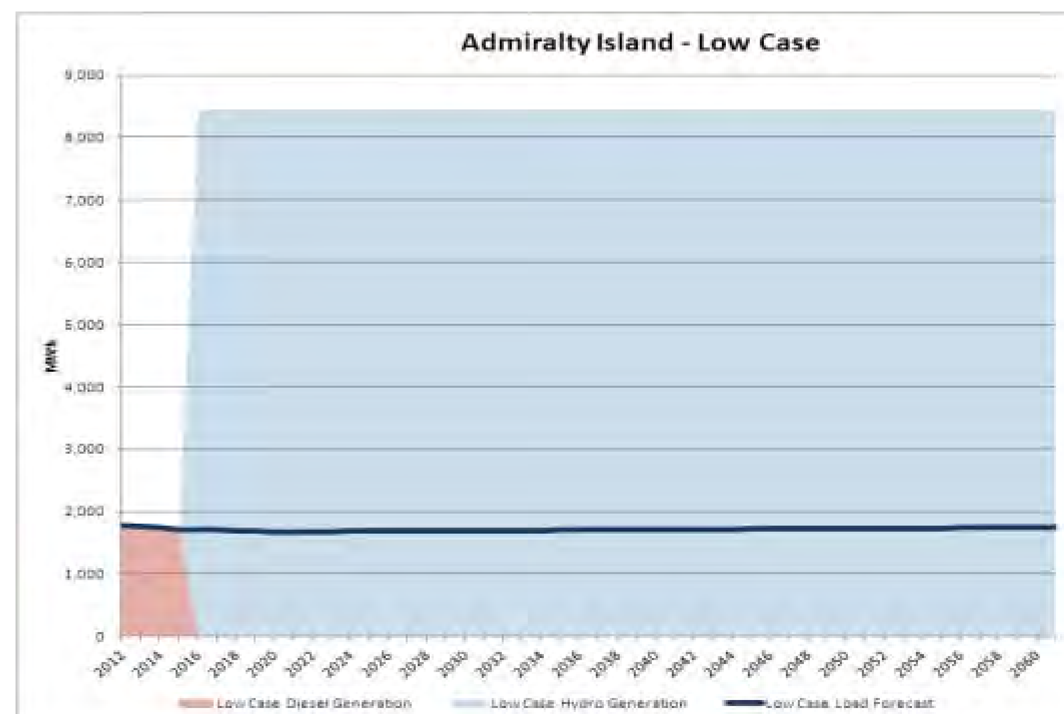
Cumulative Present Worth Cost ($ 000s) - Oil Only:	22,334
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	12,742

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	8,022

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	8,044

Expansion Plan Alternatives:

Admiralty Island

- Committed Resource – Hydro
- Diesel
- DSM/EE
- Biomass Space Heating
- Wind – Project Development(1)
- Tidal – Technology Development(1)

(1)May not be necessary if the Thayer Creek Hydro Project is successful.

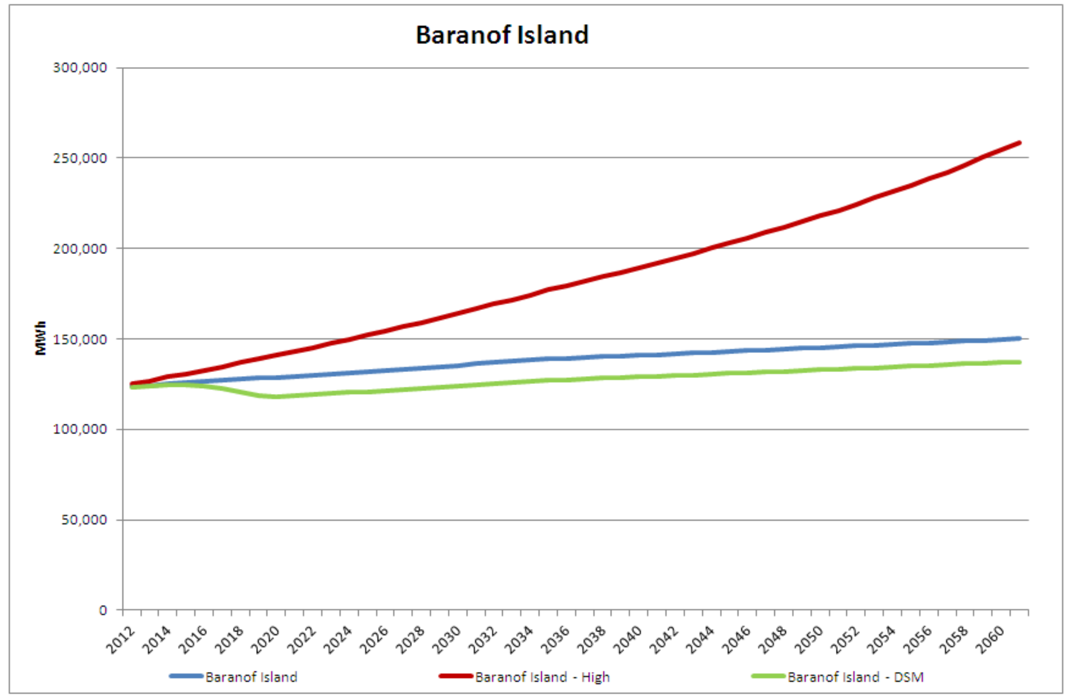
Figure 1-5 Subregion Summary – Admiralty Island

Summary of Results

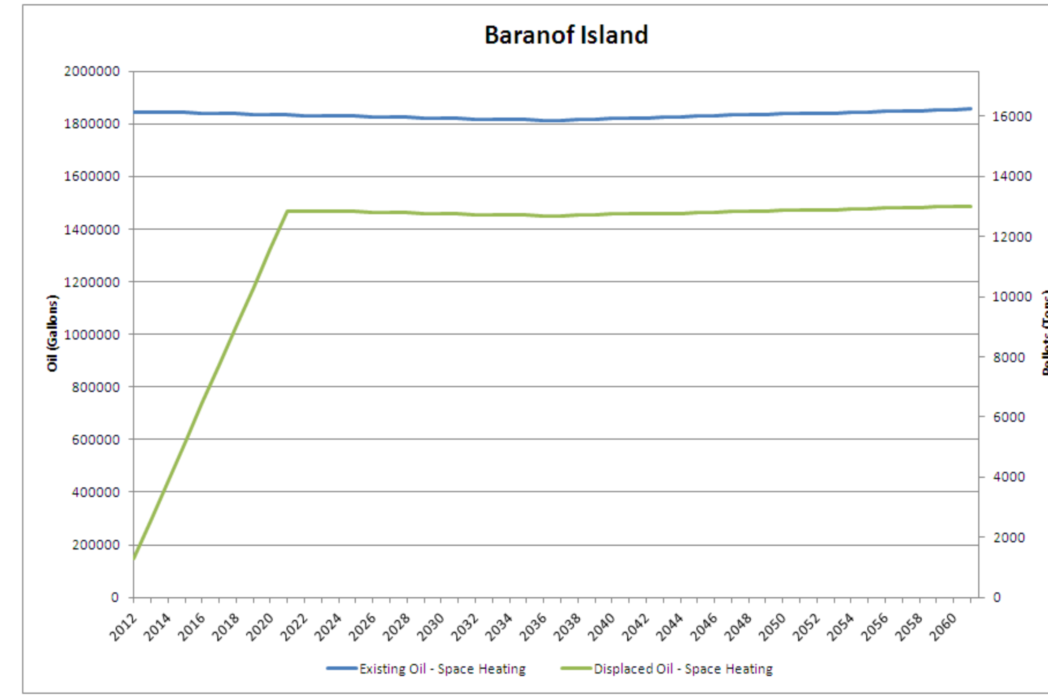
Subregion: Baranof Island

Sitka

Electric Load Forecast



Space Heating

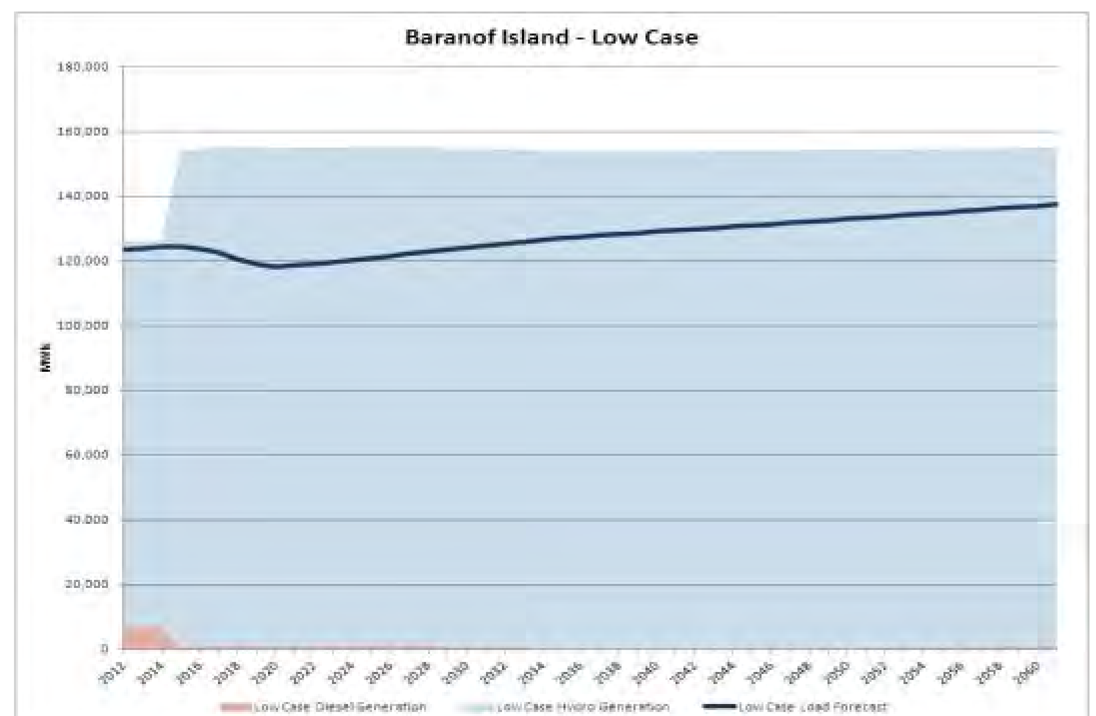


Cumulative Present Worth Cost ($ 000s) - Oil Only:	460,426
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	243,680

Electric Utility Expansion Plan

Cumulative Present Worth Cost ($ 000s):	97,345

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	95,872

Expansion Plan Alternatives:

Baranof Island

- Committed Resource – Hydro
- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating

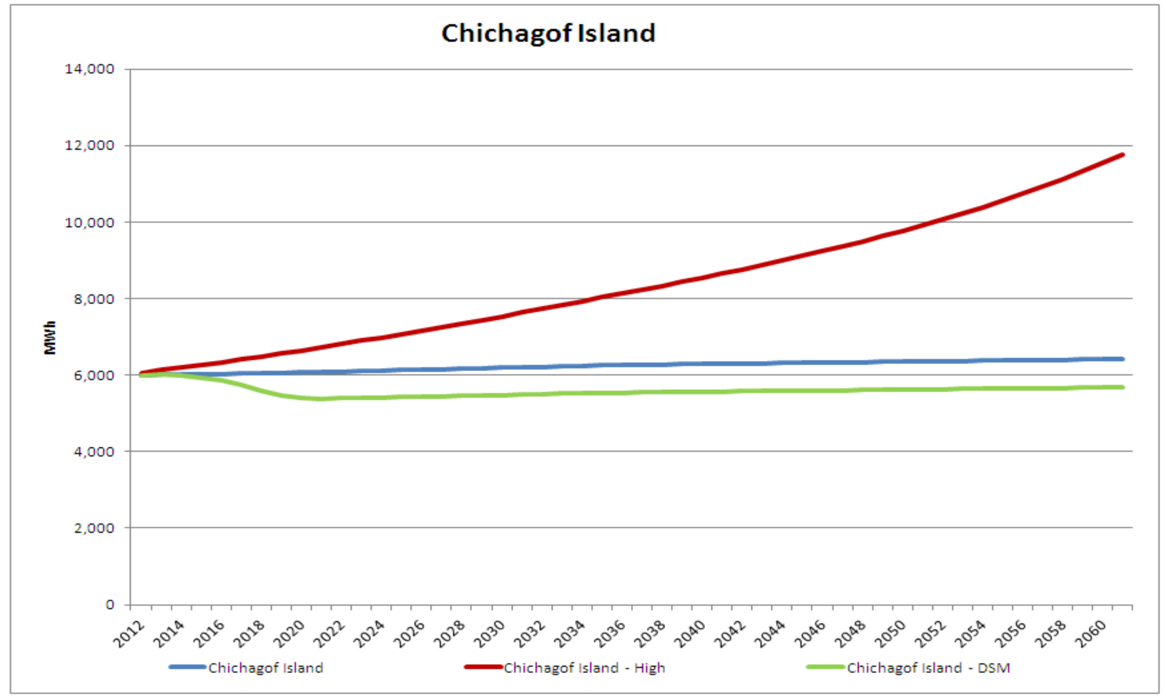
Figure 1-6 Subregion Summary – Baranof Island

Summary of Results

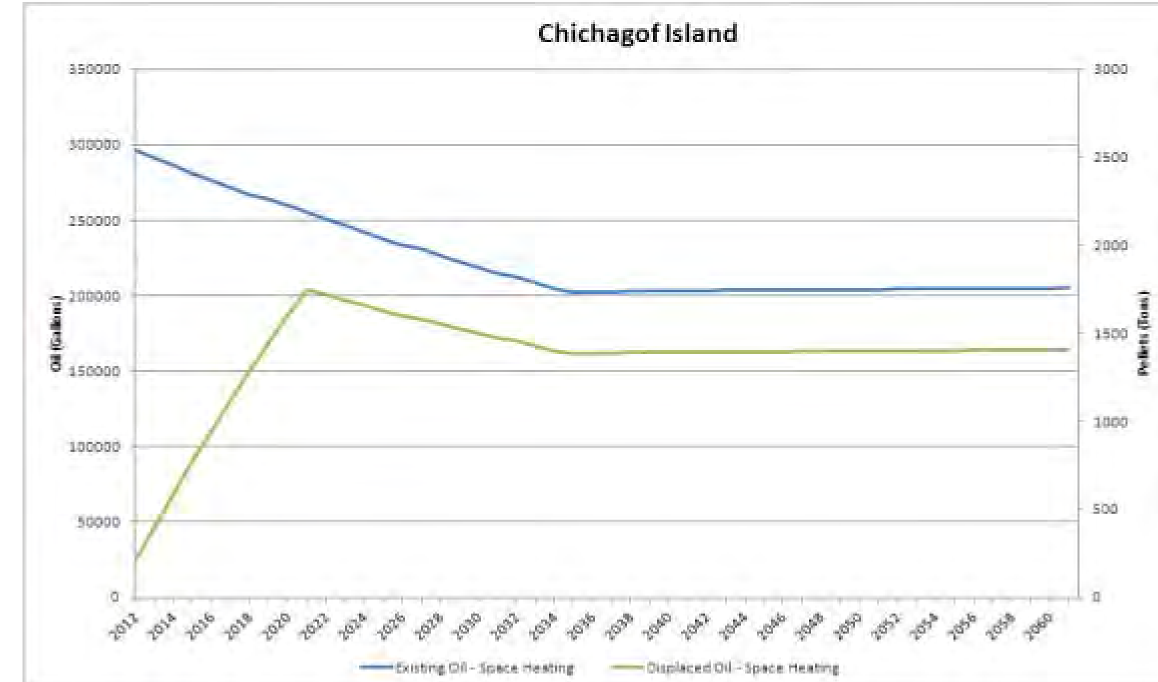
Subregion: Chichagof Island

Elfin Cove Hoonah Pelican Tenakee Springs

Electric Load Forecast

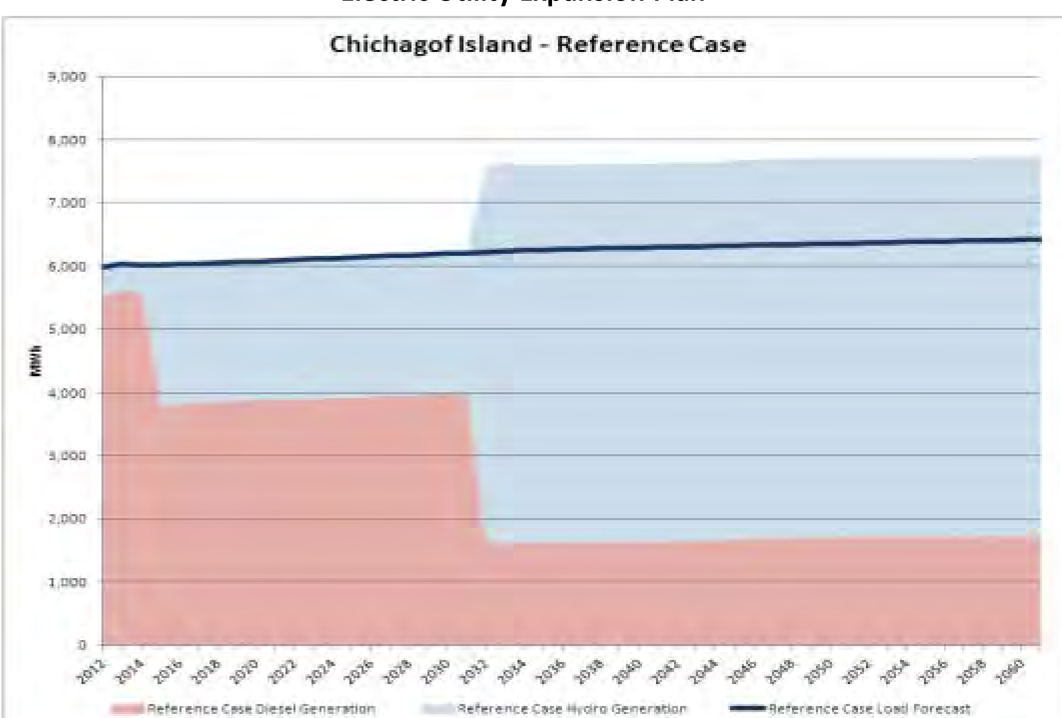


Space Heating



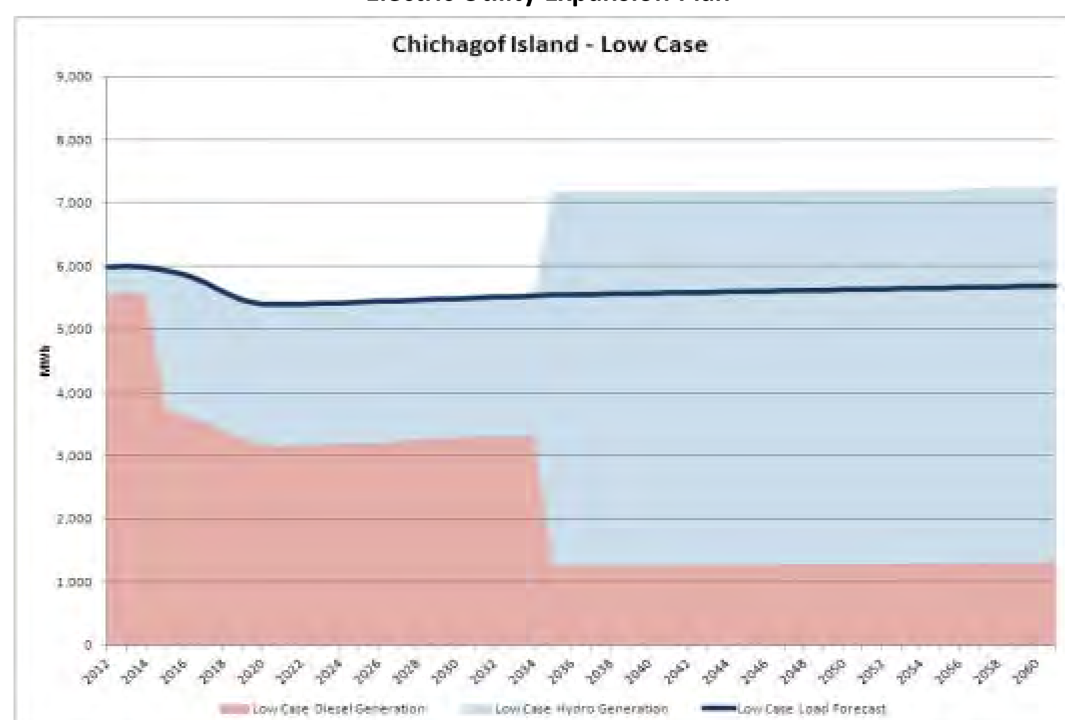
Cumulative Present Worth Cost ($ 000s) - Oil Only:	58,459
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	28,509

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	53,291

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	46,568

Expansion Plan Alternatives:

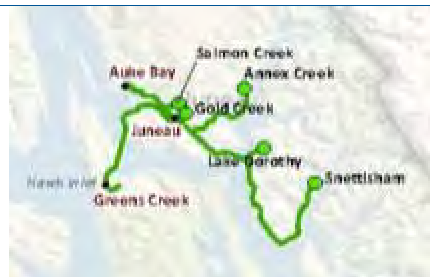
Chichagof Island

- Committed Resource – Hydro
- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating
- Geothermal – Project Development
- Tidal – Technology Development

Figure 1-7 Subregion Summary – Chichagof Island

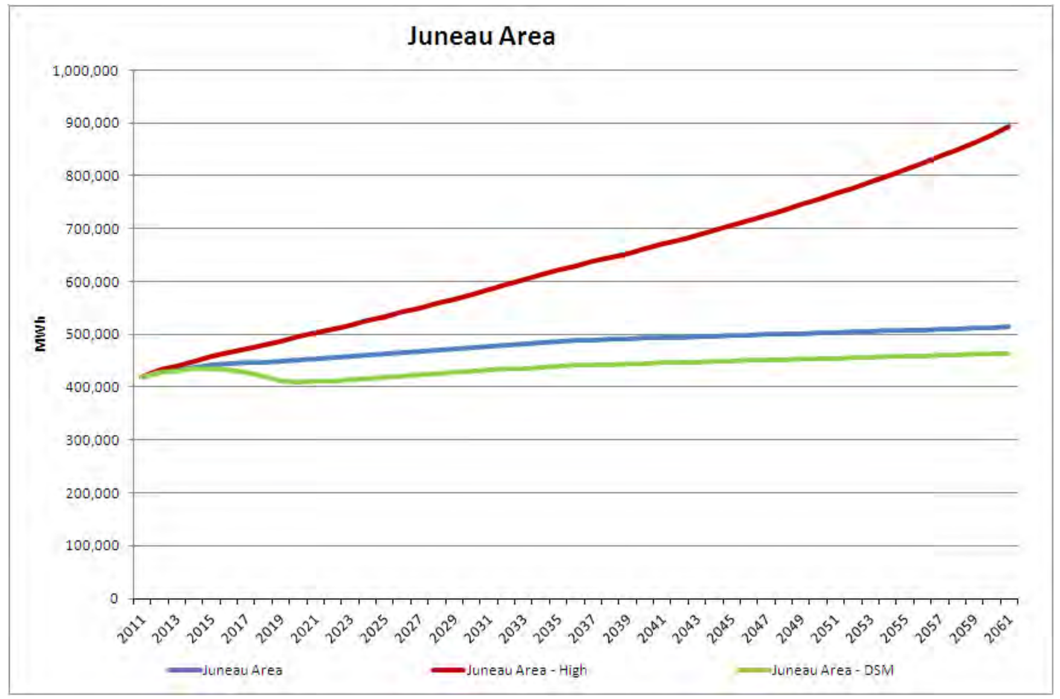
Summary of Results

Subregion: Juneau Area

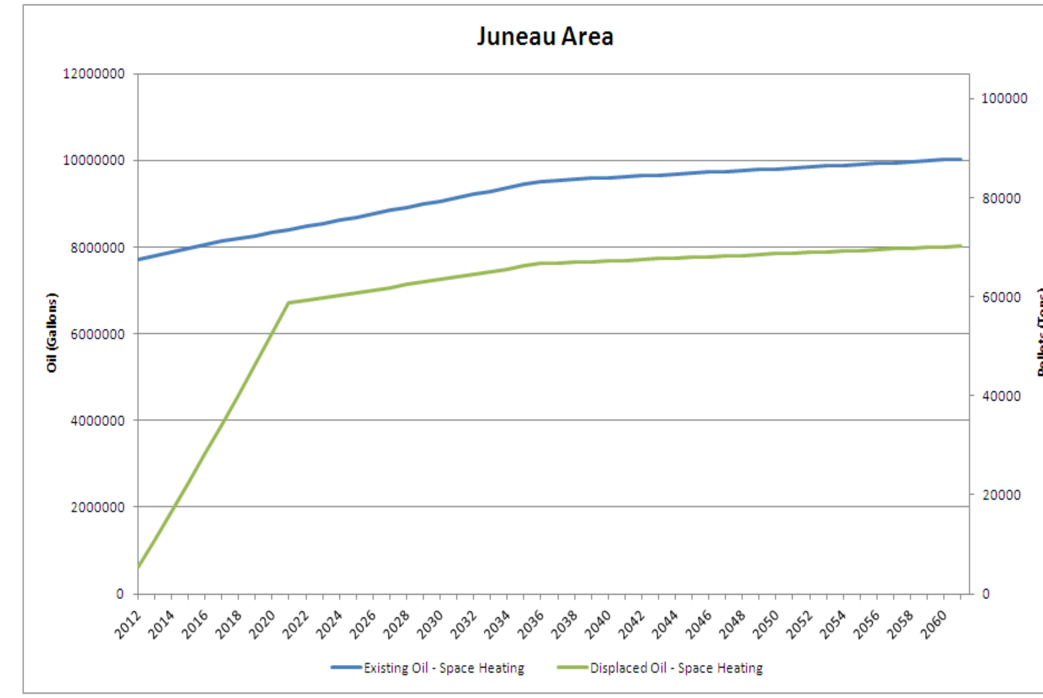


Juneau
Greens Creek

Electric Load Forecast



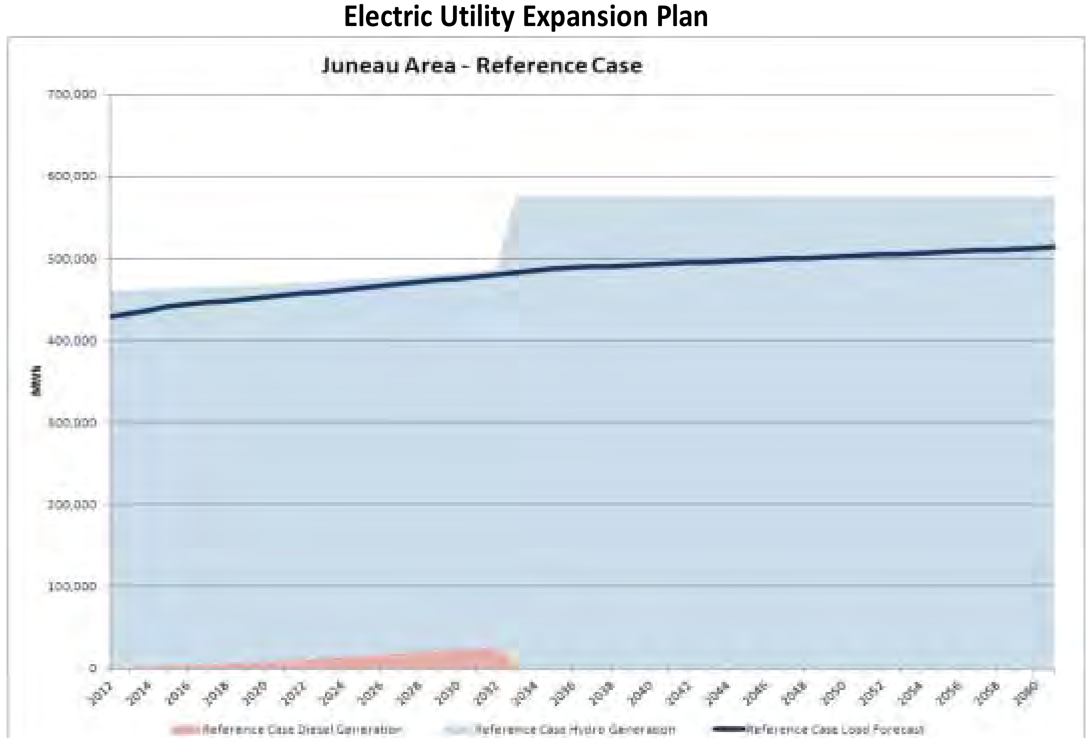
Space Heating



Cumulative Present Worth Cost ($ 000s) - Oil Only:	2,120,883
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	1,143,380

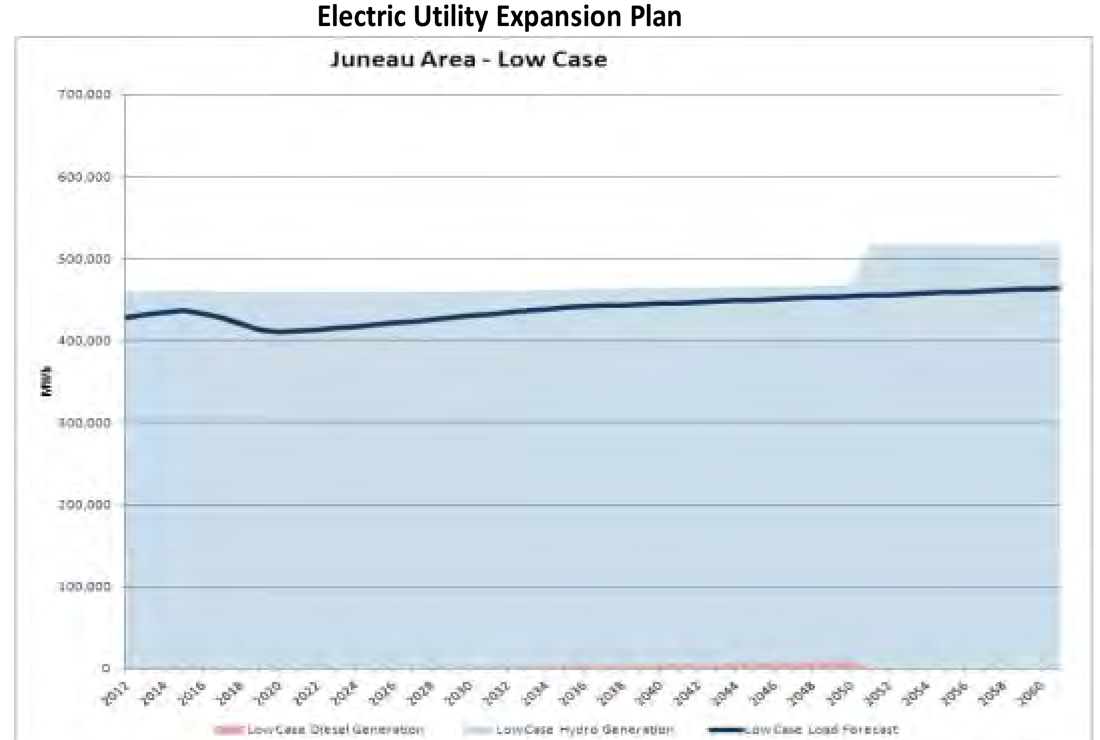
Summary of Results

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	234,265

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	185,556

Expansion Plan Alternatives:

Juneau Area

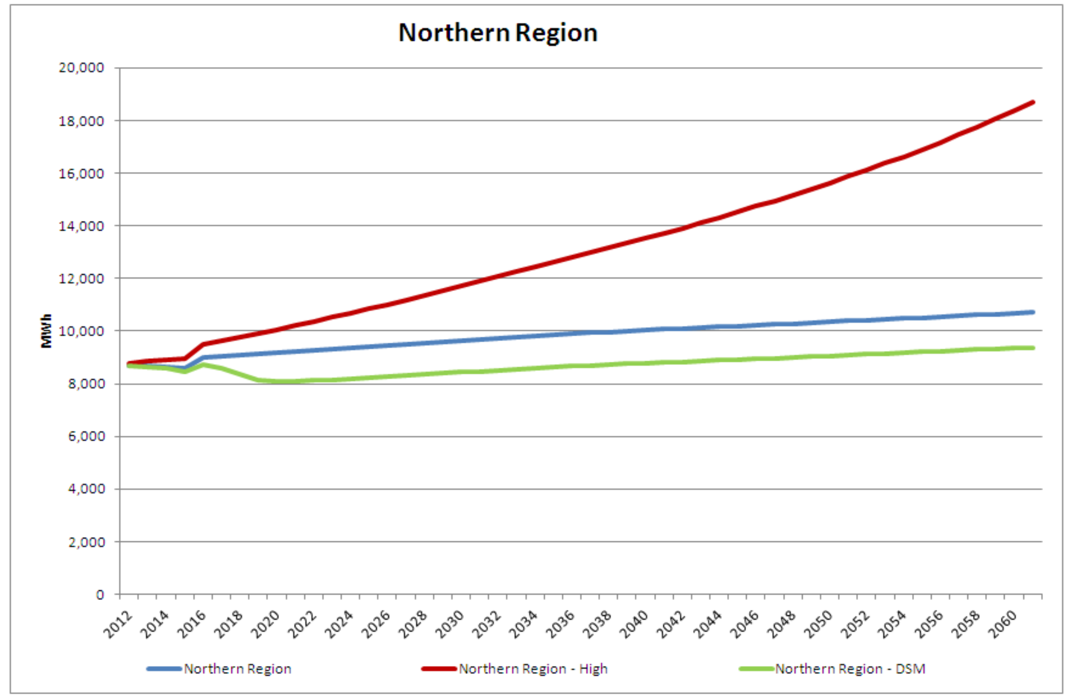
- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating
- Tidal – Technology Development
- Biomass Generation – Technology Development

Figure 1-8 Subregion Summary – Juneau Area

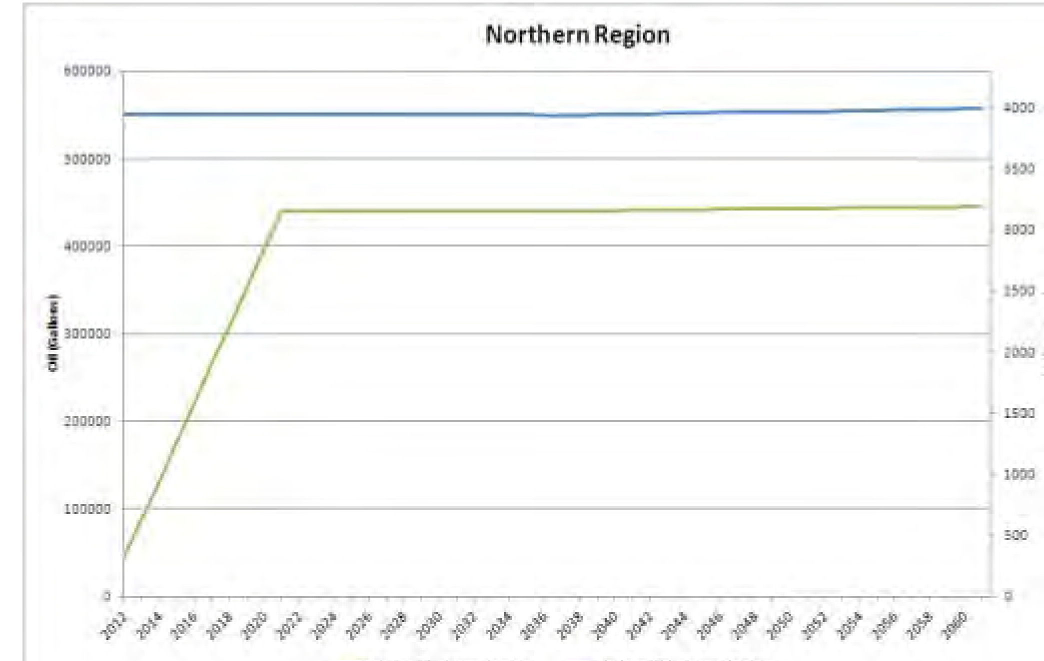
Summary of Results

Subregion: Northern Region

Yakutat
Gustavus

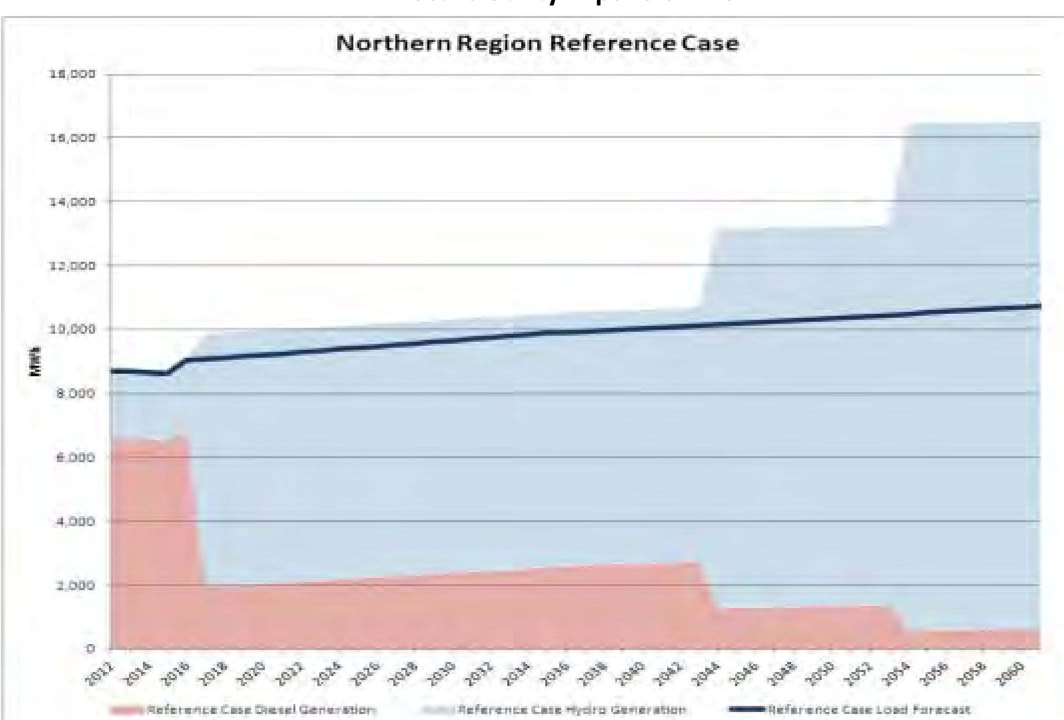


Space Heating



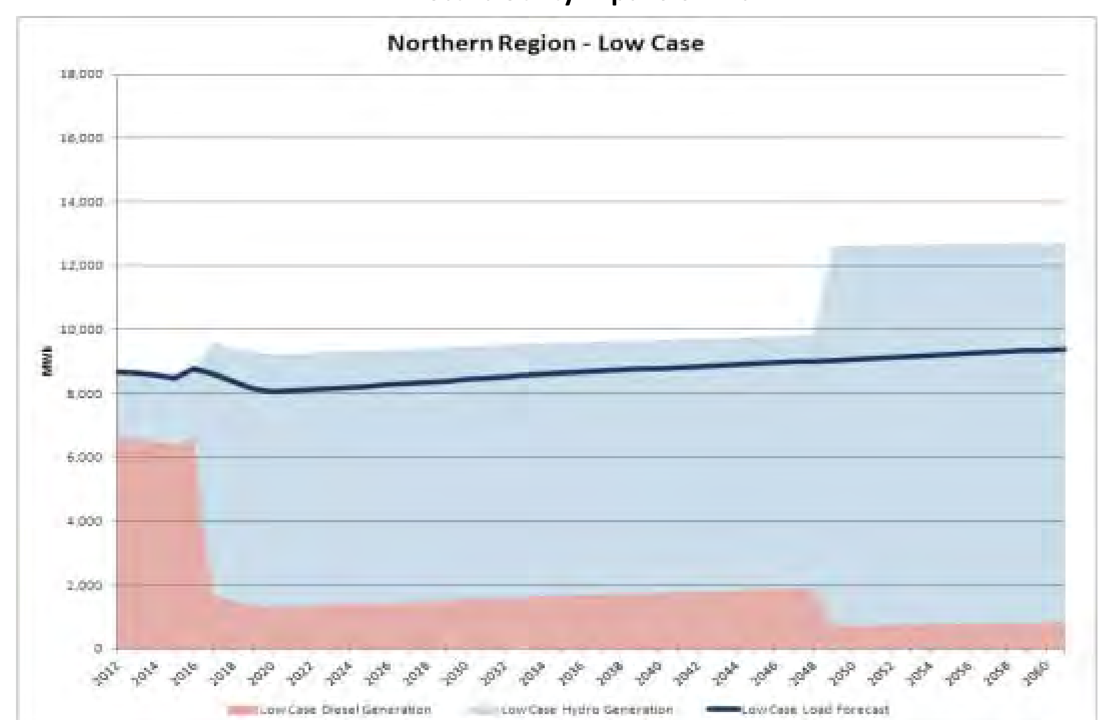
Cumulative Present Worth Cost ($ 000s) - Oil Only:	147,786
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	69,863

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	63,256

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	55,825

Expansion Plan Alternatives:

Northern Region

- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating
- Wind – Project Development
- Tidal – Technology Development
- Biomass Generation – Technology Development

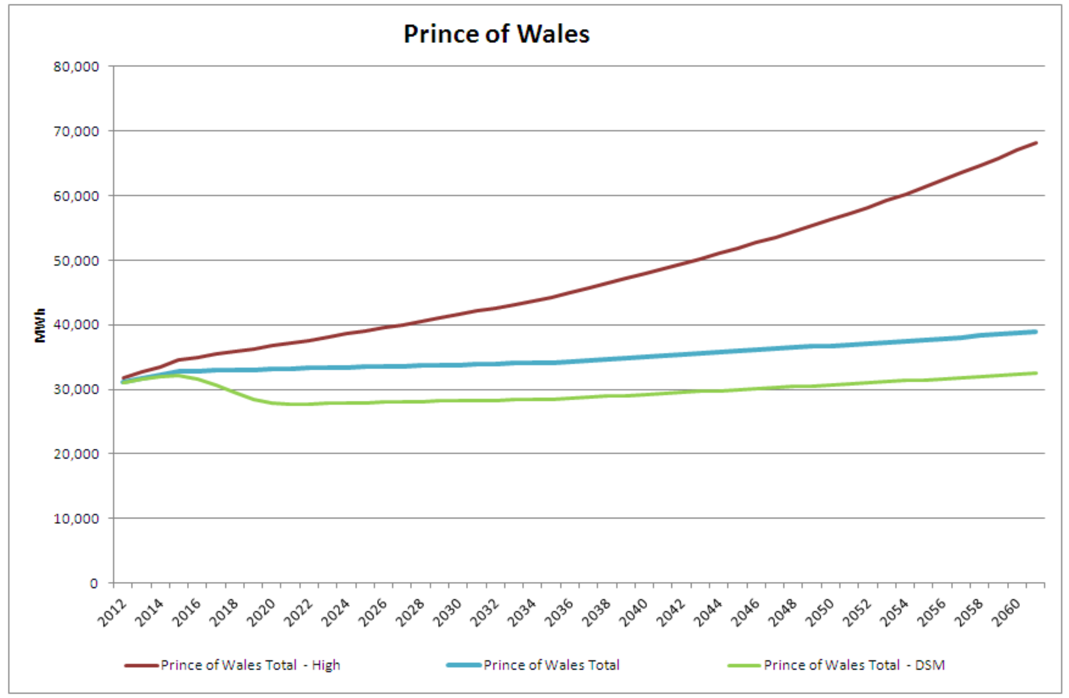
Figure 1-9 Subregion Summary – Northern

Summary of Results

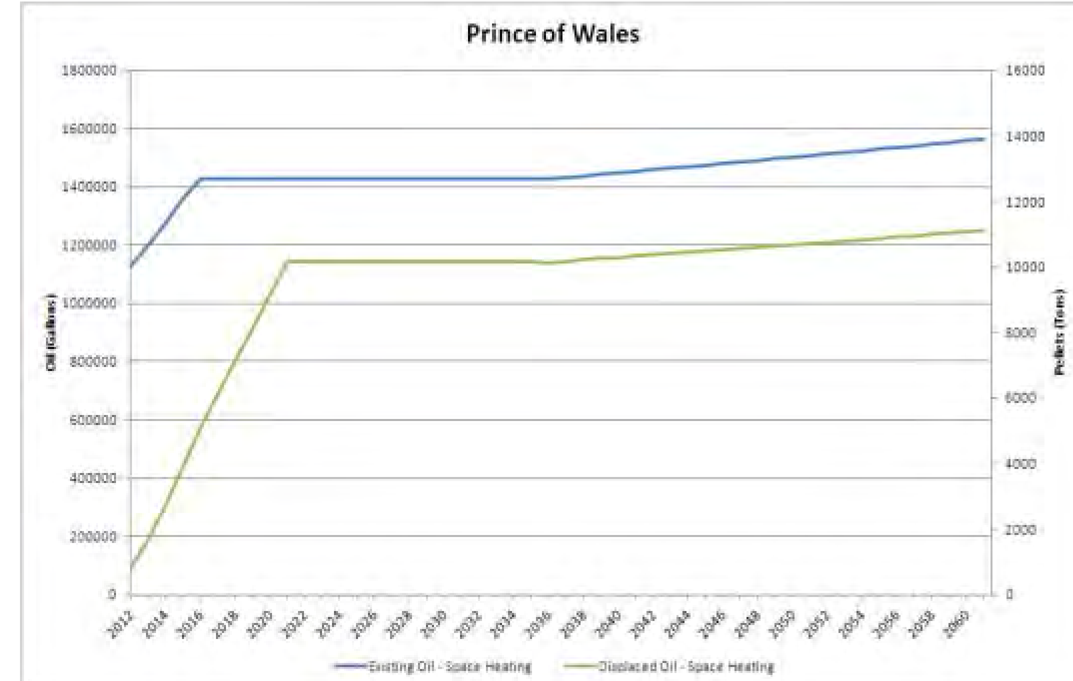
Subregion: Prince of Wales

Naukati Whale Pass Coffman Cove Klawock Thorne Bay Hollis Craig Hydaburg Kasaan

Electric Load Forecast

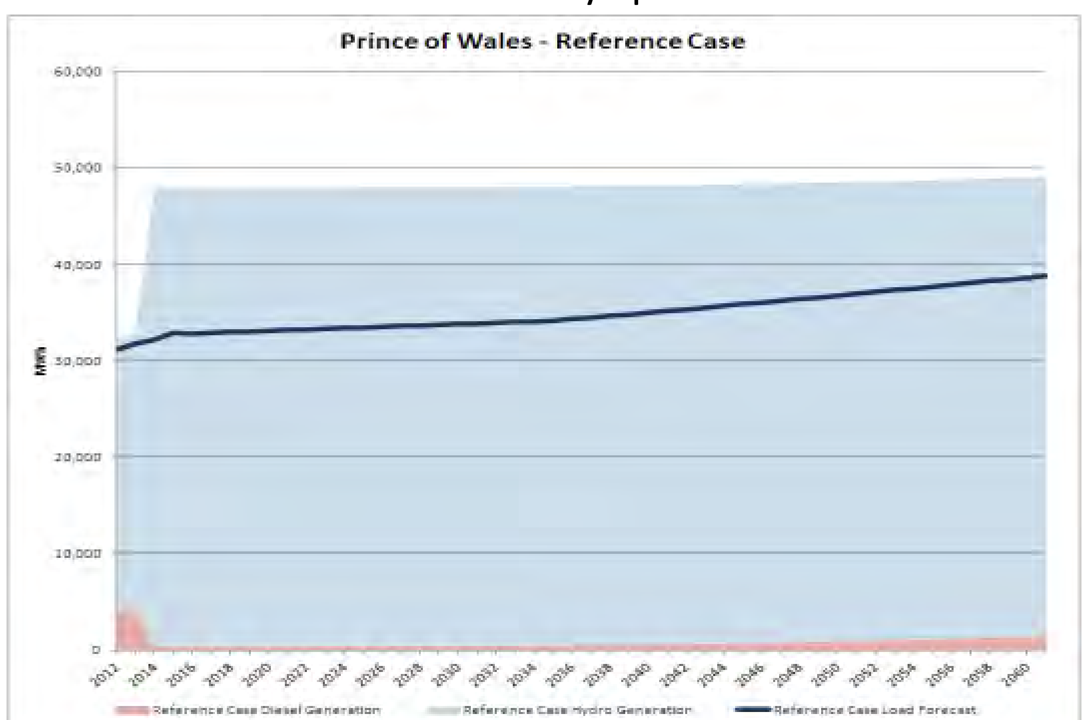


Space Heating



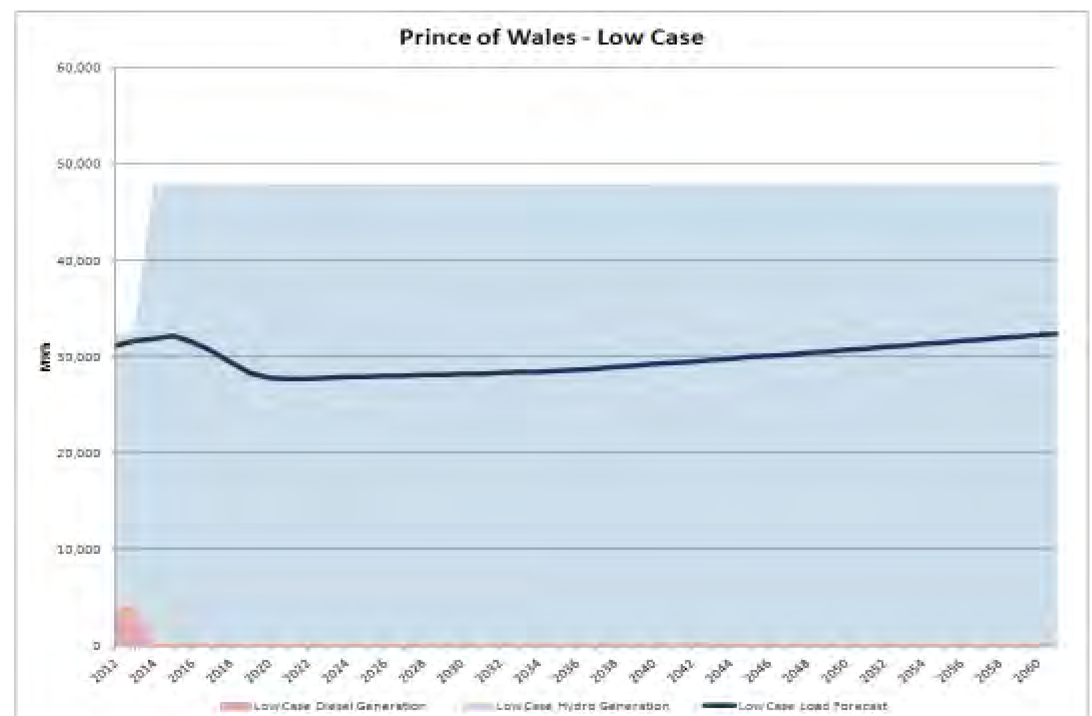
Cumulative Present Worth Cost ($ 000s) - Oil Only:	366,725
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	186,689

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	24,094

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	20,781

Expansion Plan Alternatives:

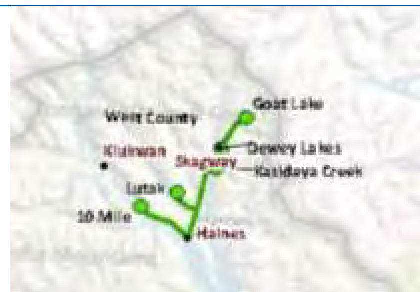
Prince of Wales

- Committed Resource – Hydro
- Diesel
- DSM/EE
- Biomass Space Heating

Figure 1-10 Subregion Summary – Prince of Wales

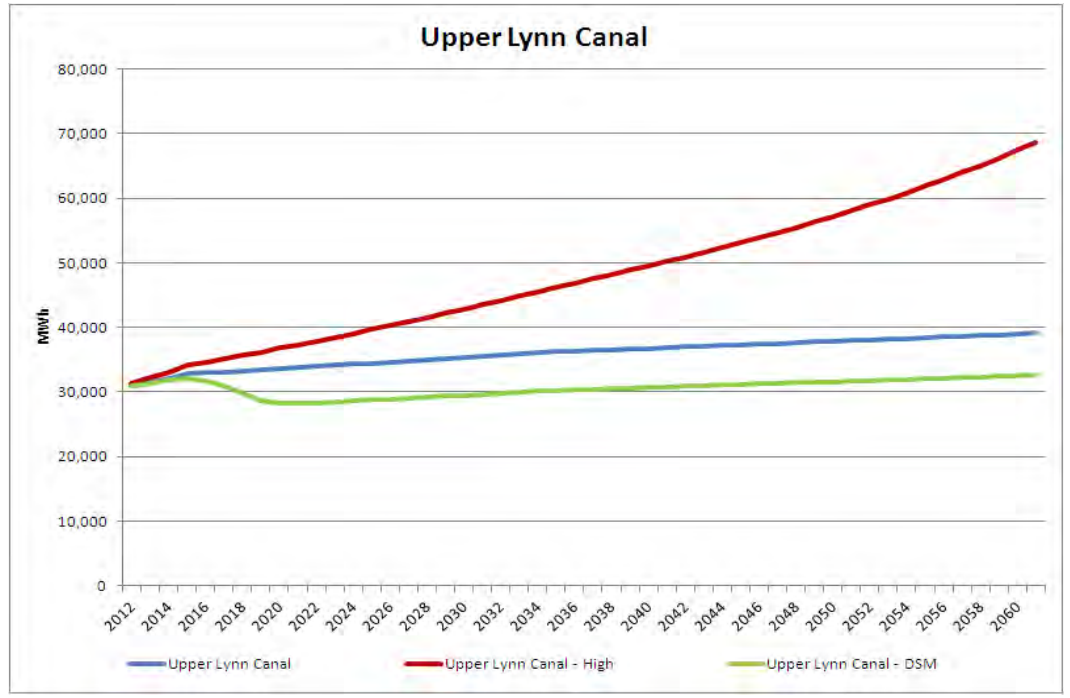
Summary of Results

Subregion: Upper Lynn Canal

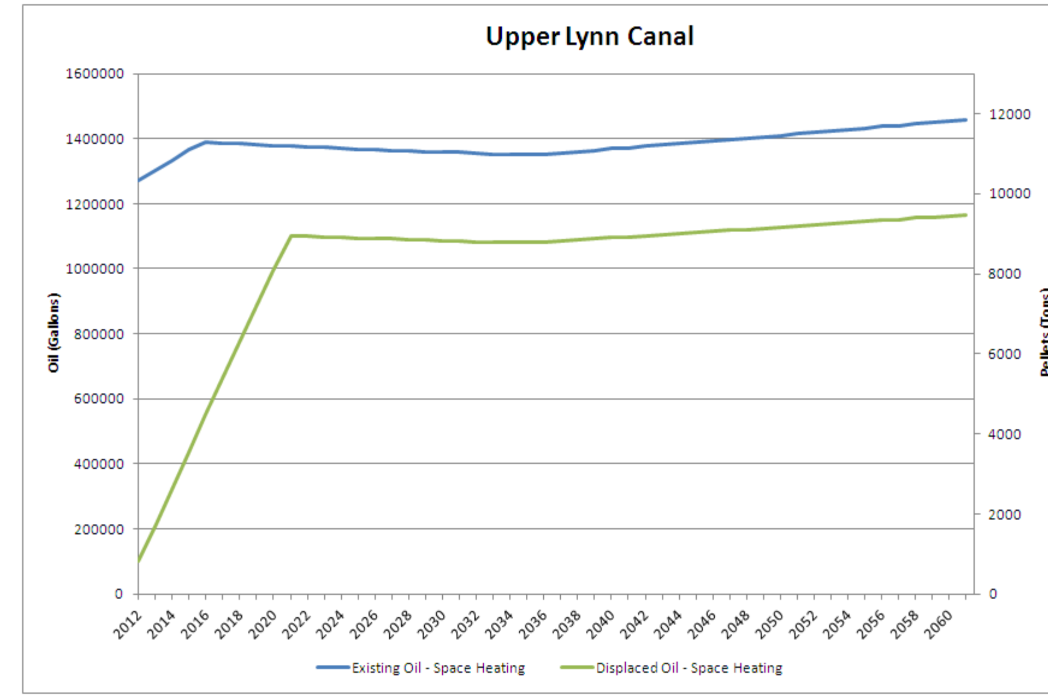


Chilkat Valley
Klukwan
Haines
Skagway

Electric Load Forecast

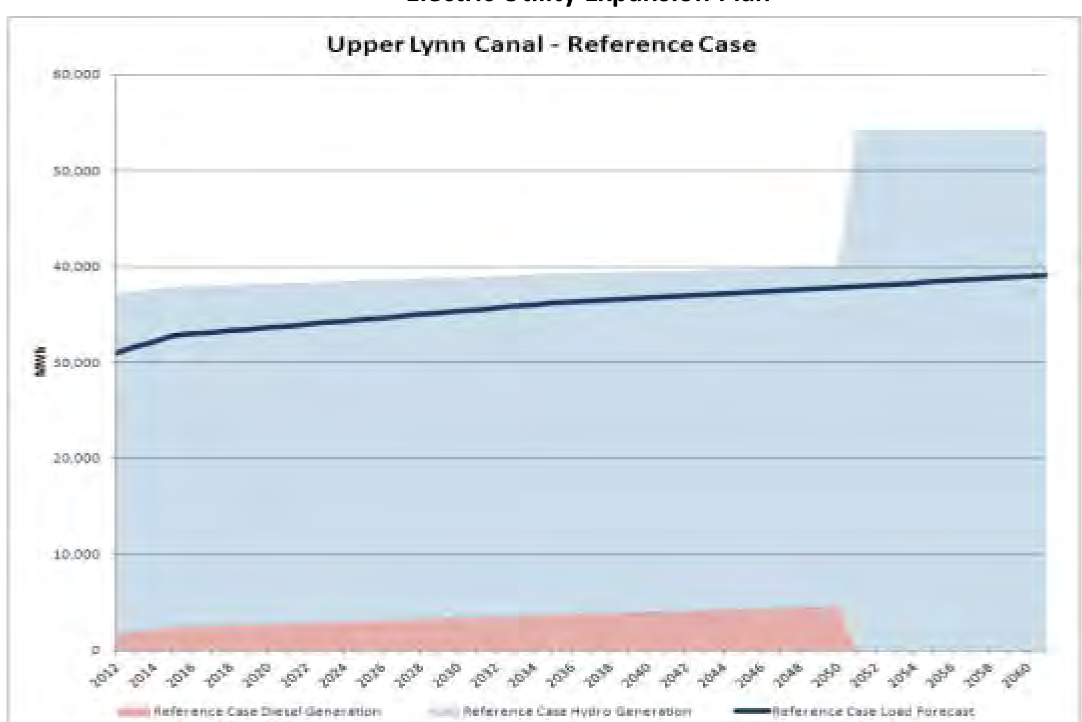


Space Heating



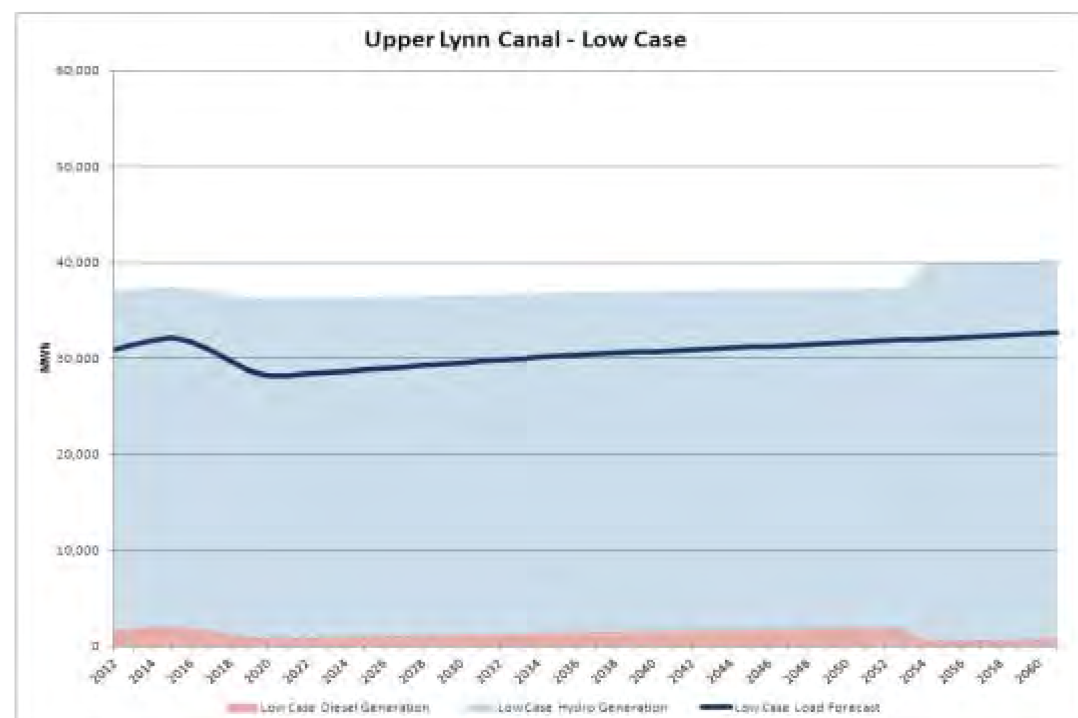
Cumulative Present Worth Cost ($ 000s) - Oil Only:	347,271
Cumulative Present Worth Cost ($ 000s) - Biomass & Oil:	174,480

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s):	44,538

Electric Utility Expansion Plan



Cumulative Present Worth Cost ($ 000s) - Including DSM:	27,678

Expansion Plan Alternatives:

Upper Lynn Canal

- Generic Hydro
- Diesel
- DSM/EE
- Biomass Space Heating

Figure 1-11 Subregion Summary – Upper Lynn Canal

1.10 IMPLEMENTATION RISKS AND ISSUES

In Section 19.0, Black & Veatch identifies and discusses a number of general issues and risks that relate to the implementation of this Southeast Alaska IRP. These general issues and risks are grouped into the following categories:

> ***"Continued regulatory burdens placed on utilities for diesel generation emissions by the EPA are a major risk for the future of utilities and communities."***
>
> Rural Utility Manager

- **Resource Potential Risk -** the risk associated with the total energy and capacity that could be economically developed for each resource option; this risk is particularly important for certain renewable technologies such as wind and geothermal.
- **Project Development and Operational Risks -** the risks and issues associated with the development of specific projects, including regulatory and permitting issues, the potential for construction cost overruns, actual operational performance relative to planned performance, and so forth. This category also includes non-completion risks once a project gets started, the risk that adverse operating conditions (e.g., earthquake) will severely damage or impair the facilities and result in a shorter useful life than expected, and project delay risks. These risks are particularly important for hydroelectric projects.
- **Fuel Supply Risks -** The risks and issues associated with the adequacy and pricing of required fuel supplies, including diesel and biomass.
- **Environmental Risks -** The risks of environmental-related operational concerns and the potential for future changes in environmental regulations; these risks could significantly impact each of the resources contained in the Preferred Resource Lists.
- **Transmission Constraint Risks -** The risk related to the impaired ability to move power from a specific generation resource to a load center such as during a transmission line outage caused by an avalanche.
- **Financing Risks** – The risk that a regional entity or individual utility will not be able to obtain the financing required for specific resource options under reasonable and affordable terms and conditions.
- **Regulatory/Legislative Risks** – The risk that regulatory and legislative issues could affect the economic feasibility or operations of specific resource options.
- **Price Stability Risks** – The risk that wholesale power costs will increase significantly as a result of changes in fuel prices and other factors (e.g., carbon dioxide [CO_2] emissions allowance costs).

In addition, Black & Veatch identified the primary issues and risks associated with the development of the following resource options:

- DSM/EE.
- Generation resources, including fuel oil, hydro, biomass, wind, geothermal, solid waste tidal/wave, coal and modular nuclear.
- Transmission resources.

The results of this assessment are shown in Table 1-6.

Table 1-6 Resource-Specific Risks and Issues - Summary

RESOURCE	RELATIVE MAGNITUDE OF RISK/ISSUE							
	RESOURCE POTENTIAL RISKS	PROJECT DEVELOPMENT AND OPERATIONAL RISKS	FUEL SUPPLY RISKS	ENVIRONMENTAL RISKS	TRANSMISSION CONSTRAINT RISKS	FINANCING RISKS	REGULATORY/ LEGISLATIVE RISKS	PRICE STABILITY RISKS
DSM/EE	Moderate	Limited	N/A	N/A	N/A	Limited - Moderate	Moderate	Limited
Generation Resources								
Fuel Oil	Limited	Limited	Significant	Moderate	Limited	Limited	Moderate	Significant
Hydro	Limited - Moderate	Moderate	N/A	Moderate	Moderate	Limited - Moderate	Limited	Limited
Biomass	Limited - Moderate	Limited	Moderate	Limited	N/A	Limited-Moderate	Limited	Limited-Moderate
Wind	Moderate	Moderate	N/A	Limited	Significant	Limited - Moderate	Limited	Limited - Moderate
Geothermal	Significant	Limited - Moderate	N/A	Limited - Moderate	Moderate – Significant	Limited – Moderate	Limited	Limited
Solid Waste	Significant	Moderate-Significant	N/A	Significant	Moderate	Limited – Moderate	Limited-Moderate	Moderate
Tidal/Wave	Limited	Significant	N/A	Significant	Moderate - Significant	Moderate – Significant	Moderate - Significant	Limited - Moderate
Coal	Significant	Moderate-Significant	Moderate	Significant	Significant	Significant	Significant	Moderate
Modular Nuclear	Limited	Significant	Moderate	Significant	Moderate	Significant	Significant	Moderate
Transmission	Limited	Significant	N/A	Moderate	N/A	Significant	Moderate - Significant	N/A

1.11 CONCLUSIONS

The primary conclusions from the Southeast Alaska IRP study are grouped into three categories and summarized below. These conclusions are discussed in more detail in Section 20.0.

- General.
- Analysis and Results.
- Moving Forward.

Conclusions – General

1. The current situation facing the Southeast region includes a number of issues that place the region at a historical crossroad regarding the mix of generation, DSM/EE, end-use conversions, transmission, and transportation resources that it will rely on to economically and reliably meet the future electric and heating needs of the region's citizens and businesses.

2. The key factors that drive the results of Black & Veatch's analysis include the following:

   - Limitations in the quality and inclusiveness of capital cost and operating information on specific hydroelectric projects from previous studies and other sources provided to Black & Veatch during the course of this study.
   - The inclusion of the Committed Resources as the next set of resources to be developed within the region.
   - Future load forecasts which are driven by projected population trends, economic forecasts, and recent electric heat conversions.
   - The future availability and price of diesel.
   - The uncertainties and risks that exist for all DSM/EE, generation, and transmission resource options available to the region.
   - Potential future CO_2 emissions allowance prices, which would impact all fossil fuels, which may or may not result from proposed federal legislation.
   - The region's existing transmission network, which is limited in terms of 1) the number of communities connected to the network, 2) the ability to transfer power between areas within the region, and 3) the resulting limited amount of dispatchable resources that can be integrated into the region's transmission grid and, thus, can be economically dispatched to minimize total electric costs on a regional basis.
   - The ability of the region to raise the required financing and mitigate the rate impacts of constructing new resource alternatives.

3. Another key driver is the fact that the Southeast region as a whole is currently short of hydroelectric storage capacity. As a result, potential hydroelectric projects with storage capabilities are more valuable, particularly from a system integration (i.e., matching of generation capability with electric demands in connected load centers) or utilization perspective, than potential run-of-the-river hydroelectric projects; more specifically, low-altitude, large storage hydro projects are of the greatest value.

4. The "achilles heel" of the current hydro system is the recent trend toward conversion of fuel oil space heating to electric space heating in those communities with access to low-cost hydroelectric. While this trend is resulting in significant savings for those residential and commercial customers that convert, it is leading to a rapid decline in the "excess" hydro capacity in the region. In this context, "excess" refers to capacity and annual generation relative to loads. As a result of the limited storage capability of the region, spilling of water (i.e., water flowing over dams without generating electricity) occurs on a regular basis in certain months of the year (i.e., spring and fall) when electric loads are low and water flows are high due to the limited storage capability.

5. There are a number of region-specific uncertainties that underlie the completion of this study related to loads, resources and State financial assistance. These uncertainties are described in more detail in Section 20.

   These uncertainties drive home the need for the region to 1) develop multiple options, 2) move towards a more balanced portfolio of resources (i.e., the solution to the region's energy challenges is not as simple as adding more hydro and some transmission), and 3) maintain flexibility with regard to the selection of resource options over time as the uncertainties above become more resolved.

> ***"There are significant economic opportunities to improve energy security for Southeast through weatherization and switching from fossil fuels to renewable clean energy. Alaska should be leading the way."***
>
> Southeast Alaska Resident

CALL TO ACTION

The energy challenges facing the Southeast region are not new and they have been studied, debated, and acted upon over the years. There have been numerous studies that have been completed in the past, including project feasibility studies and regional transmission studies. These studies have served an important role and the results of these studies, to varying degrees, have been reviewed as part of this effort to develop a Southeast Alaska IRP. Additionally, ongoing efforts like the Southeast Conference energy programs and the USFS-funded Juneau Economic Development Council's Renewable Energy Cluster provide important forums to help move the region forward in meeting its energy challenges. As the various quotes from regional consumers and business representatives that are contained in the Executive Summary of this report demonstrate, the need is great, the problem is regional in nature, and regional solutions are required. The objective of this Southeast Alaska IRP is to help put some "stakes in the ground," better enabling the region to move forward in meeting its energy challenges.

Conclusions – Analysis and Results

6. As noted earlier, the key assumptions used in Black & Veatch's analysis are discussed in detail in the sections that are contained in Volume 2 of this report.

7. To complete this study, Black & Veatch grouped the region's communities into eight subregions, as shown on Figure 1-2. This approach was taken due to the limited reach of the region's transmission network and the disparity of energy costs throughout the region, which require solutions be developed at the subregional level. Many of the analyses (e.g., load and fuel forecasts) were completed at the community level. These analyses provided the foundation for the development of specific Preferred Resource Lists for each subregion, as discussed in Section 17.0, which were then combined to result in the overall Southeast Alaska IRP.

8. As previously stated, there is a wide variety in the quality and inclusiveness of information available to evaluate specific hydroelectric projects. As a result, it is impossible to conduct a true "apples-to-apples" comparison of hydroelectric projects. In a similar manner, it is impossible to complete a definitive comparison of the economics of potential hydro projects to other resources (e.g., biomass, other renewable technologies, and DSM/EE). To get all projects to a comparable level of data quality requires a significant amount of further study, and this effort is outside of the scope of this study; consequently, it is impossible at this time to make a definitive selection of which specific resources (e.g., hydro, other renewable technologies, or DSM/EE) should be developed within each subregion to meet future electric requirements.

9. Despite the discussion above regarding the inability to complete a definitive comparison of all potential resources and projects, the reality remains that the region must do something to address its energy challenges. To provide guidance despite the uncertainties, Black & Veatch evaluated two "Integrated Cases" to develop a balanced strategy for the region, and each subregion, to move forward with now and provide the basis for making longer-term resource decisions in the years ahead. The two Integrated Cases analyzed were:

   - **Optimal Hydro/Transmission Case** – This case is based on the generic hydroelectric projects discussed in Section 10.0 and the potential transmission segments discussed in Section 12.0. This case compares the economics, on a subregion basis, of adding Committed Resources, additional generic hydro projects, and potential transmission interconnections between subregions to the costs associated with the subregions continuing to rely on existing generation resources, Committed Resources, and the burning of diesel to meet electric load requirements. In essence, this is an "electric supply side only" case with continued reliance upon fuel oil for space heating.
   - **Optimal DSM/EE, Biomass and Other Renewables Case** – this case shows the economic impact of adding Committed Resources, DSM/EE, and biomass for space heating in each subregion, compared to the costs associated with the subregions continuing to rely on existing generation resources along with more limited generic hydro additions, Committed Resources, and the burning of diesel to meet electric load requirements.

   These Integrated Cases are compared to status quo case on which the region continues to rely on diesel for electric generation and space heating.

As noted above, this approach does not provide "definitive" results, in terms of a direct comparison of actual projects; the approach was required due to the aforementioned issues regarding the quality and inclusiveness of information currently available on potential hydro projects and other alternative resources. This approach, however, does provide "illustrative" results, from which conclusions can be drawn regarding the most appropriate way for the region to move forward in achieving the objective of developing a balanced portfolio of supply-side and demand-side resources.

10. Black & Veatch computed the total capital costs and cumulative net present value (CNPV) costs, over the 50-year planning horizon for each of these two Integrated Cases, compared to the Status Quo Case (which includes only existing generation and transmission resources and Committed Resources). These regional results are shown in Table 1-7.

Table 1-7 Results of Integrated Cases – Regional Summary

INTEGRATED CASE	TOTAL CAPITAL COSTS ($'000,000)	TOTAL CUMULATIVE NET PRESENT VALUE (CNPV) COST ($'000,000)	TOTAL CUMULATIVE NET PRESENT VALUE (CNPV) SAVINGS RELATIVE TO STATUS QUO CASE ($'000,000)
Optimal Hydro/Transmission Case	1,407	5,313	340
Optimal DSM/EE, Biomass, and Other Renewables Case	2,030	3,093	2,561
Status Quo Case	770	5,654	--

The subregional results are shown in Tables 20-2 and 20-3, located in Section 20.0. Table 1-8 provides three tables which summarize the results of these integrated cases as follows:

- 50-Year CNPV Savings – Optimal Hydro/Transmission Case relative to the Status Quo Case.
- 50-Year CNPV Savings – Optimal DSM/EE, Biomass and Other Renewables Case relative to the Status Quo Case.
- 50-Year CNPV Savings – Optimal DSM/EE, Biomass and Other Renewables Case relative to the Optimal Hydro/Transmission Case.

Table 1-8 shows that the cost associated with a greater reliance on hydroelectric power, DSM/EE, and renewable resources (including biomass) is less than the continued heavy reliance on diesel, based upon the base case diesel price forecast that was used in this analysis.

Based on these results, Black & Veatch concludes that an integrated, balanced solution represents the most appropriate way for the region to move forward. Table 1-8 clearly shows that a balanced portfolio of resources (essentially a combination of the Optimal Hydro/Transmission Case and Optimal DSM/EE, Biomass and Other Renewables Case) is more cost-effective than a "build only hydro and transmission" solution, and the Status Quo Case.

Table 1-8 Results of Integrated Cases – Subregional Savings

OPTIMAL HYDRO/TRANSMISSION CASE - SAVINGS RELATIVE TO STATUS QUO CASE – 2012-2061						
	Total Cumulative Net Present Value (CNPV) Savings ($'000)					
	Utility System Costs		Oil Space Heating Plus Biomass Costs		Total	
	$	%	$	%	$	%
SEAPA	167,356	37%	0	0%	167,356	12%
Admiralty Island	0	0%	0	0%	0	0%
Baranof Island	198	0%	0	0%	198	0%
Chichagof Island	7,934	13%	0	0%	7,934	7%
Juneau	136,408	37%	0	0%	136,408	5%
Northern	26,239	29%	0	0%	26,239	11%
Prince of Whales	0	0%	0	0%	0	0%
Upper Lynn Canal	2,065	4%	0	0%	2,065	1%
Total Southeast Region	**340,200**	**30%**	**0**	**0%**	**340,200**	**6%**

OPTIMAL DSM/EE, BIOMASS AND OTHER RENEWABLES CASE - SAVINGS RELATIVE TO STATUS QUO CASE – 2012-2061						
	Total Cumulative Net Present Value (CNPV) Savings ($'000)					
	Utility System Plus DSM Costs[(1)]		Oil Space Heating Plus Biomass Costs		Total	
	$	%	$	%	$	%
SEAPA	221,430	49%	418,993	43%	640,423	45%
Admiralty Island	(22)	0%	9,592	43%	9,570	32%
Baranof Island	1,671	2%	216,746	47%	218,417	39%
Chichagof Island	13,218	22%	29,950	51%	43,168	37%
Juneau	185,117	50%	977,503	46%	1,162,620	47%
Northern	33,670	38%	77,923	53%	111,593	47%
Prince of Whales	3,313	14%	180,036	49%	183,349	47%
Upper Lynn Canal	18,925	41%	172,791	50%	191,716	49%
Total Southeast Region	**477,322**	41%	**2,083,534**	46%	**2,560,856**	45%
[(1)]Includes savings from generic hydro projects.						

OPTIMAL DSM/EE, BIOMASS AND OTHER RENEWABLES CASE - SAVINGS RELATIVE TO OPTIMAL HYDRO/TRANSMISSION CASE – 2012-2061						
	Total Cumulative Net Present Value (CNPV) Savings ($'000)					
	Utility System Plus DSM Costs		**Oil Space Heating Plus Biomass Costs**		**Total**	
	$	**%**	**$**	**%**	**$**	**%**
SEAPA	54,074	19%	418,993	43%	473,067	37%
Admiralty Island	(22)	0%	9,592	43%	9,570	32%
Baranof Island	1,473	2%	216,746	47%	218,219	39%
Chichagof Island	5,284	10%	29,950	51%	35,234	32%
Juneau	48,709	21%	977,503	46%	1,026,212	44%
Northern	7,431	12%	77,923	53%	85,354	40%
Prince of Whales	3,313	14%	180,036	49%	183,349	47%
Upper Lynn Canal	16,860	38%	172,791	50%	189,651	48%
Total Southeast Region	**137,122**	**17%**	**2,083,534**	**46%**	**2,220,656**	**42%**

11. The region's limited size directly affects the ability to justify the expansion of the region's transmission network, based on fundamental economics. Simply stated, regional loads are insufficient to result in sufficient flows of electricity over an expanded transmission network to justify the capital and operating costs. This was previously discussed in Section 1.6.

12. One specific resource addition considered in this study was the development of the AK-BC Intertie, which would connect the Southeast region to the BC Hydro transmission network, allowing for the import or export of power to or from British Columbia and the lower-48 states. As discussed in Section 12.0, Black & Veatch conducted a screening analysis of the AK-BC Intertie and concluded that it was not a viable resource under the current conditions. However, given the 50 year time horizon for this study and the volatility of North American power market dynamics and other factors that affect the economic viability of the AK-BC Intertie, it is impossible to conclude with absolute certainty that the AK-BC Intertie would not, under any set of conditions, become a viable project. Therefore, it is appropriate to consider the various set of conditions under which the AK-BC Intertie might become economical. The following is a list of such conditions:

    - The expected monthly profile of electric sales (or purchases) and whether those sales (or purchases) would be under the terms of a long-term firm contract or on the spot market is clearly defined.
    - Prices in potential export markets in North America (principally BC, PNW and/or the Southwestern region of the United States) increase significantly due to capacity and energy shortages, continued increases in applicable RPSs, and/or increased environmental regulations that cause existing generation facilities to be retired or prohibit planned facilities from being built.
    - For potential import, costs for new generation will have to increase substantially over the costs for potential hydroelectric projects capable of meeting Southeast Alaska's energy requirements. This could be the result of large project cost increases, or significant load increases that exceed the availability of lower cost regional hydroelectric projects, or regulatory and or legislative prohibitions to the development of Southeast resources.

13. In addition to comparing the total capital costs and CNPV costs, over the 50 year planning horizon for each of the two Integrated Cases (i.e., the Optimal Hydro/Transmission Case and Optimal DSM/EE, Biomass and Other Renewables Case), Black & Veatch evaluated how long the next hydro project could be delayed as a result of the aggressive implementation of DSM/EE and biomass conversion programs. These results are shown in Figures 20-2 through 20-9, located in Section 20.0.

HIGHEST VALUE USE OF HYDRO AND THE FUTURE ROLE OF BIOMASS

As has been discussed previously in this report, communities with access to low-cost hydroelectric power have seen a recent increase in the number of conversions to electric space heating. While these conversions have resulted in significant savings for those residential and commercial customers who have made the conversions, they have led to a significant reduction in the amount of hydroelectric capacity available to meet future electric demands. As a result, without the development of new hydroelectric or other generation projects or restrictions on future conversions to electric space heating, all customers in these communities will pay higher rates for electricity as a result of higher future use of diesel for electric generation, and communities will be denied new economic development opportunities.

This reality raises the question, what is the highest value use of current and future hydroelectric power? An important element of this question is the alternative energy sources that can be used to meet specific end-uses. For example, in the case of lighting, there is no practical alternative to electricity that provides the same level of quality of life. However, in the case of space heating, there are alternatives such as biomass, including the use of wood pellets, and heat pumps.

Given the fact that the region's transmission network is very limited in terms of the number of communities connected, and the size of loads within the region adversely affect the direct economics of additional transmission segments, hydroelectric power within the region will remain a limited resource. Therefore, the region should carefully consider the best use of this limited resource.

Biomass is a particularly good option given the local and abundant nature of this solution, and the relative economics and availability of supplies within the region, both as a short-term solution for the region as well as a long-term solution for certain communities. Our analysis also shows that biomass is economical in most cases even if it is shipped in from the lower 48 states. As discussed elsewhere, one supply chain-related challenge that should be addressed for wood biomass to be utilized to its optimal level is the development of one or more pellet manufacturing facilities within the region and securing long-term fiber supplies. This will provide a more secure fuel supply, lower costs, and produce jobs within the region.

Conclusions – Moving Forward

14. Given the previous discussion, Black & Veatch believes that it is important for the region to think about the future in two phases with regard to long-term resource decisions, as shown in Table 1-9 and discussed below:

- **Phase 1** - the next five years (2012-2016)
- **Phase 2** - beyond the next five years (2017 and beyond)

Table 1-9 General Strategy for Adding Regional Resources

RESOURCES	PHASE 1 (2012-2016)	PHASE 2 (2017 AND BEYOND)
Committed Resources	√	
DSM/EE Programs	√	√
Biomass Conversion Programs	√	√
Next Increment of Hydro and Other Renewable Projects		√

In **Phase 1**, the regional emphasis should be on adding the Committed Resources, and aggressively pursuing the implementation of DSM/EE and biomass space heating conversion programs.

In parallel, the region should complete reconnaissance and feasibility studies of all potential hydro projects listed in the Refined Screened Potential Hydro Project List (see Table 1-2). These reconnaissance and feasibility studies should be completed consistent with the AEA-directed process and standards.

Finally, as part of Phase 1, this IRP should be updated in the 2014-2015 time frame to make the longer-term resource selections that would be implemented in Phase 2. By updating the Southeast Alaska IRP in 2014 or 2015, the region will have 1) better project-specific information to make a definitive selection among specific alternative hydro and other renewable projects, and 2) actual experience with the implementation of DSM/EE and biomass conversion programs to better determine the level to which the region, and individual subregions, can rely on these programs over the long term.

In **Phase 2**, the region would develop the hydro and other renewable projects, as well as continue to implement DSM/EE and biomass conversion programs as appropriate, based on the results of the updated Southeast Alaska IRP.

15. This two-phase approach is appropriate given the following challenges that exist with each resource type:

- **Hydro Projects –** The need to improve the quality and inclusiveness of project-specific estimates regarding capital costs, operating costs, annual and monthly energy output, ability to utilize annual and monthly energy outputs in nearby load centers, and so forth.

- **DSM/EE Programs –** Issues related to DSM/EE programs include the following:
  - The total market potential for these programs (which will be addressed in large part by the AEA's current Energy End Use Data Collection Project).
  - The ability of the region, and subregions, to implement a comprehensive and aggressive set of DSM/EE programs.
  - Determining the most effective way to leverage existing DSM/EE programs in the region (including the existing AHFC, AEA, and RurAL CAP programs discussed in Section 10.0).
  - Determining the most effective way to deliver these programs (e.g., each utility developing its own DSM/EE programs, a regional entity that would develop and deliver these programs in close coordination with local utilities, and/or development of public-private partnerships to deliver these programs).
  - Actual response of residential and commercial customers to the DSM/EE programs offered.
- **Biomass Conversion Program –** Issues related to a regional biomass conversion programs include the following:
  - Future price of oil which will impact the level of conversions from diesel space heating that will occur.
  - The total market potential for biomass conversion in each subregion.
  - The ability of the region, and subregions, to implement an aggressive biomass conversion program.
  - Determining the most effective way to leverage existing biomass conversion programs in the region (e.g., biomass programs being implemented by the Coast Guard, USFS, and Sealaska).
  - Similar to the DSM/EE discussion above, there is a need to determine the most effective way to deliver these programs (e.g., individual utilities, a regional entity, and/or public-private partnerships).
  - Actual receptiveness of residential and commercial customers.
- **Transmission Projects –** while none of the proposed transmission interconnections considered were selected for inclusion in the region's expansion plan (other than the transmission Committed Resources), the State may decide to move forward with one or more of these interconnections for noneconomic reasons.

It is Black & Veatch's opinion that the long-term definitive selection of specific potential projects cannot be made until 1) these challenges are addressed, 2) better information is available regarding the capital and operating costs of specific projects, and 3) experience is gained with regard to the implementation of DSM/EE and biomass conversion programs. Again, the level of these uncertainties drive home the need for the region to: 1) develop multiple options, 2) move toward a more balanced portfolio of resources (i.e., the solution to the region's energy challenges is not as simple as adding more hydro and some transmission), and 3) maintain flexibility with regard to the selection of resource options over time as the uncertainties above become resolved.

16. The Preferred Resource Lists that were developed for each subregion as part of this study, which are discussed in more detail in Section 17.0 and Section 21.0, include a portfolio of resources that have been identified based on the specific circumstances faced by each subregion. If implemented, the Southeast Alaska IRP will lead to the following:

- The development of a more diverse resource mix resulting from a regional planning process.

- Allow for moving forward with certain resources now (including the Committed Resources, DSM/EE, and biomass programs), while developing better fact-based information to make long-term resource decisions.
- A reduction in the overall costs for electricity and heating.
- Greater reliance on DSM/EE and renewable resources, including hydroelectric power and biomass, and a lower dependence on diesel.
- A somewhat more expansive transmission network as a result of the completion of the transmission Committed Resources.
- A stronger foundation upon which to base future economic development efforts.

17. Included in the Preferred Resource Lists are seven Committed Resources, which are described in Table 1-10. As discussed earlier in this report, these hydroelectric and transmission projects were identified by the AWG (adopted through a resolution) as projects that should be developed because of the economic benefits that they would provide to the region. As stated in the AWG resolution, these "projects have been under development for many years, have completed or nearly completed exhaustive FERC licensing or similar process, and have broad public support." From a modeling perspective, consistent with this AWG directive, Black & Veatch treated these projects as existing resources.

    While these Committed Resources are included in the Preferred Resource Lists, it is important to note that significant work is still required to bring these projects to reality. For example, several of the hydroelectric projects on this Committed Resource list require additional engineering and design work, as well as additional environmental and permitting work, before they can move to construction. For the transmission projects on the Committed Resource list, not only is additional engineering and design, environmental and permitting work, required but operational agreements with SEAPA must also be developed, as well as construction funding acquired.

18. As stated above, the region should significantly increase the implementation of DSM/EE programs consistent with the State's target of 15 percent increase in energy efficiency by 2020, building upon the current programs offered by the AHFC, AEA, and RurAL CAP. These programs will lower total energy requirements, thereby reducing the draw on hydro resources in those communities with access to hydro power and lowering costs and/or improve the quality of living in all communities. However, to achieve these projected savings, the region will need to address a number of important delivery issues: 1) how best to leverage existing AHFC, AEA, and RurAL CAP programs, 2) whether additional DSM/EE programs should be developed on a regional basis and implemented in close coordination with local utilities versus requiring each utility to develop its own DSM/EE-related staff and skills, 3) establishing region-specific costs for higher efficient appliances and equipment, and 4) the financing of the up-front DSM/EE program development costs, as well as ongoing incentives to residential and commercial customers to install more efficient appliances and equipment.

Table 1-10 Committed Resources

PROJECT	DISCUSSION	TOTAL CAPITAL COST ($ MILLION)	REMAINING CAPITAL COST ($ MILLION)
Blue Lake Expansion Hydro (Sitka, City of Sitka Electric)	Expansion will increase the capacity of the existing Blue Lake Hydro Project by an estimated 8 MW and increase the average annual energy from the project by approximately 34,500 MWh.	$96.5	$47.5
Gartina Falls Hydro (Hoonah, IPEC)	New run-of-river project near Hoonah that will provide an estimated 0.44 MW of capacity and approximately 1,800 MWh of average annual energy.	$6.3	$5.5
Reynolds Creek Hydro (Hydaberg, Haida Energy and AP&T)	New storage project located that will provide an estimated 5 MW of capacity and approximately 19,300 MWh of average annual energy.	$28.6	$8.1
Thayer Creek Hydro (Angoon, Kootznoowoo, Inc.)	New run-of-river project that will provide an estimated 1 MW of capacity and approximately 8,400 MWh of average annual energy.	$15.2	$13.0
Whitman Lake Hydro (Ketchikan, KPU)	New storage project at an existing lake located that will provide an estimated 4.6 MW of capacity and approximately 15,900 MWh of average annual energy.	$25.8	$13.4
Kake – Petersburg Intertie (Kwaan Electric Transmission Intertie Cooperative)	New 69 kV overhead and submarine cable transmission line connecting Kake and Petersburg.	$53.8	$48.3
Ketchikan – Metlakatla Intertie (Metlakatla Indian Community)	New 34.5 kV overhead and submarine cable transmission line connecting Ketchikan and Metlakatla.	$12.7	$8.2
	Totals	**$238.9**	**$144.0**

19. Also, as stated above, the region should also pursue policies and programs that reduce the number of residential and commercial customers converting to electric space heating. One particularly promising resource option to accomplish this goal is the regional adoption of wood pellet technology for space heating. Additionally, rate structures could be modified (e.g., increased rates for higher consumption levels) to discourage electric space heating conversions. Similar to DSM/EE programs, this resource option would provide benefits to all subregions. Additionally, the region should address a number of important delivery issues: 1) how best to leverage current programs underway within the region to encourage the adoption of wood pellet technologies, 2) whether additional wood pellet programs should be developed on a regional basis and implemented in close coordination with local utilities versus relying solely on private parties and or each utility to develop their own wood pellet-related staff and skills, 3) establishing region-specific customer educational and contractor certification programs, and 4) the financing of the up-front wood pellet conversion costs.

20. There are a number of risks and uncertainties regardless of the resource options chosen, including the following categories, which are discussed in Section 1.10 and Section 19.0 along with their potential implications.

- Resource Potential Risk
- Project Development and Operational Risks
- Fuel Supply Risks
- Environmental Risks
- Transmission Constraint Risks
- Financing Risks
- Regulatory/Legislative Risks
- Price Stability Risks

In some cases, these risks and uncertainties might completely eliminate a particular resource option. Due to these risks and uncertainties, it will be important for the region to maintain flexibility so that changes to the Preferred Resource Plan can be made, as necessary, as these resource-specific risks and uncertainties become clearer or get resolved.

21. Another risk facing the region is the potential for large load increases resulting from economic development efforts (e.g., the development of one or more mines). Although the High Scenario Load Forecasts, discussed in Section 8.0, were developed to illustrate the potential for significantly higher load growth than shown in the Reference Scenario Load Forecasts, they may not adequately capture the impact of a large mine load increase (or any other large, discrete increase) because of the potential size of mine loads and the fact that, if developed, the impact of a new mine would be site specific. Due to the speculative nature of these potential load increases, it is impossible in this study to identify how these potential loads would be served. Most proposed mines are in remote locations and far removed from potential grid access. It is likely that hydro resources in proximity to the mines could be developed to displace diesel-generated power.

22. Given the size of the Southeast region and the financial capabilities of the region's utilities, it will be critical for the State to continue to provide financial assistance to enable the region to lower costs and meet its electric and heating needs going forward. Black & Veatch's recommendations regarding the capital projects, and other supporting studies and actions, which should be considered for State assistance are discussed in Section 21.0. Furthermore, Section 18.0 provides the results of Black & Veatch's evaluation of alternative options for State financial assistance.

23. Integrated resource plans are typically updated on a periodic basis, most typically every 3 to 5 years to reflect changes that occur over time, as well as other alternative resources and projects that are identified. Given the uncertainties that exist in the Southeast, coupled with the limited development work that has occurred with regard to many of the resources contained in the Preferred Resource Lists, it will be important to update the Southeast Alaska IRP on a periodic basis.

RELATIONSHIP BETWEEN THE SOUTHEAST ALASKA IRP AND THE *"ALASKA ENERGY PATHWAY"*

In July 2010, the AEA published *"Alaska Energy Pathway – Toward Energy Independence."* This report, which was the result of extensive consultations between the AEA and communities throughout Alaska, was developed to provide direction and focus to the goal that all Alaskans should have access to affordable power. This report was part of the AEA's effort to develop a long-term energy strategy for the State of Alaska. The first step in that effort was the 2009 publication of *"Alaska Energy – A First Step Toward Energy Independence,"* which contained information on available energy technologies and a database of community energy resources.

Alaska Energy Pathway laid out an overall direction for the State, including aggressive targets for energy efficiency and conservation as well as renewable energy development; recommendations which have been adopted, with certain modifications, by the State Legislature and Governor. For areas of the State outside of the Railbelt Region, the report focused on the use of locally available resources whenever possible to meet energy needs for heat and electricity. An assessment of possible options for each community was completed, yielding a potential pathway for each community. This resulted in a recommended community resource development strategy that would involve the deployment of renewable resources, including hydroelectric power, where economically feasible, but also the continued use of diesel as a major fuel source for both electricity and heating.

There are many similarities between the Southeast Alaska IRP and the *Alaska Energy Pathway*, including the underlying objectives and resources considered. In that sense, this IRP is a logical next step on the journey to developing community plans to lower energy costs. The Southeast Alaska IRP, however, differs from the *Alaska Energy Pathway* in several important ways. First, the analysis completed as part of this IRP (e.g., projected heating and electric load forecasts, the costs of available resources including generation and transmission, etc.) was at a more granular level of detail. Second, the analytical approach was different in that it was more detailed and considered the interaction between alternative resources in more detail. Finally, the level of involvement of regional stakeholders throughout the development of this IRP was greater.

As a result, the results of this IRP, including the Preferred Resource Lists for each subregion, represent a more comprehensive and tailored set of near-term and long-term solutions for addressing the region's energy challenges. In that sense, the Southeast Alaska IRP builds upon the *Alaska Energy Pathway* and provides a more detailed pathway for the Southeast region.

1.12 RECOMMENDATIONS

This subsection summarizes the overall recommendations arising from this study are grouped in two categories and summarized below. These recommendations are discussed in more detail in Section 20.

- Recommendations – Capital Projects
- Recommendations – Other

Recommendations – Capital Projects

The following general actions should be taken to ensure the timely implementation of the Southeast Alaska IRP:

1. As stated in Subsection 1.12, Black & Veatch believes that the region should move forward with regard to long-term resource decisions, as follows:
    - **Phase 1** - the next 5 years (2012-2016)
    - **Phase 2** - beyond the next 5 years (2017 and beyond)
2. The State should work closely with the region's utilities and other community stakeholders to confirm the recommended Preferred Resource Lists for the region as a whole, and for each subregion, resulting from this study.
3. Black & Veatch believes that the region-wide Preferred Resource List, provided in Table 1-11, should be the starting point for the selection of resources to be developed to meet the region's future energy requirements. This table is based on the subregion Preferred Resource Lists discussed in Section 17.0.

Table 1-11 Region-wide Preferred Resource List

SUBREGION	RESOURCE	ESTIMATED CAPITAL COSTS ($'000,000)	PROJECTED COMMERCIAL OPERATION DATE (COD)
PHASE 1: COMMITTED RESOURCES 2012-2016			
SEAPA	Kake-Petersburg Interconnection Ketchikan-Metlakatla Interconnection Whitman Lake Hydro Diesel DSM/EE Biomass	48.6 8.2(1) 13.4(1) 51.1 3.1 139.4	2015 2013 2014 2012-2016 2012-2016 2012-2016
Admiralty Island	Thayer Creek Project DSM/EE Biomass	13.0(1) 0.0(3) 0.8	2016 2012-2016 2012-2016
Baranof Island	Blue Lake Hydro Diesel DSM/EE Biomass	47.5 20.2 0.9 14.1	2015 2012-2016 2012-2016 2012-2016
Chichagof Island	Gartina Falls Hydro Diesel DSM/EE Biomass	5.5 0.3 0.0 1.9	2015 2012-2016 2012-2016 2012-2016
Juneau	Diesel DSM/EE Biomass	20.2 3.6 63.3	2012-2016 2012-2016 2012-2016
Northern	Diesel DSM/EE Biomass	2.8 0.0 4.1	2012-2016 2012-2016 2012-2016

SUBREGION	RESOURCE	ESTIMATED CAPITAL COSTS ($'000,000)	PROJECTED COMMERCIAL OPERATION DATE (COD)
Prince of Wales	Reynolds Creek Hydro	5.5[2]	2014
	DSM/EE	0.0[3]	2012-2016
	Biomass	8.9	2012-2016
Upper Lynn Canal	DSM/EE	0.2	2012-2016
	Biomass	9.7	2012-2016
PHASE 2: RESOURCES 2017-2061			
SEAPA	Hydro – Storage (10 MW)	193.1	2044
	Diesel	202.8	2017-2061
	DSM/EE	102.1	2017-2061
	Biomass	166.0	2017-2021
Admiralty Island	Diesel	1.7	2017-2061
	DSM/EE	0.1	2017-2061
	Biomass	0.7	2017-2021
Baranof Island	Diesel	83.4	2017-2061
	DSM/EE	31.4	2017-2061
	Biomass	16.1	2017-2021
Chichagof	Hydro – Run of River (1 MW)	21.7	2035
	Diesel	6.4	2017-2061
	DSM/EE	0.8	2017-2061
	Biomass	1.6	2017-2021
Juneau	Hydro – Storage (10 MW)	237.5	2051
	Diesel	216.6	2017-2061
	DSM/EE	124.5	2017-2061
	Biomass	79.5	2017-2021

SUBREGION	RESOURCE	ESTIMATED CAPITAL COSTS ($'000,000)	PROJECTED COMMERCIAL OPERATION DATE (COD)
Northern	Hydro – Storage (1 MW) Hydro – Run of River (1 MW) Diesel DSM/EE Biomass	18.6 32.8 23.3 1.3 4.7	2017 2049 2017-2061 2017-2061 2017-2021
Prince of Wales	Diesel DSM/EE Biomass	16.6 66.4 10.2	2017-2061 2017-2061 2017-2021
Upper Lynn Canal	Hydro – Storage (1 MW) Diesel DSM/EE Biomass	55.4 19.8 5.4 11.1	2054 2017-2061 2017-2061 2017-2021

(1)Additional funds required to complete project not considering any pending grant requests.
(2)Additional funds required to complete project.
(3)Cost is zero due to rounding. Actual cost is 0.002.

Recommendations - Other

Other actions, related to the implementation of this IRP, that should be undertaken include:

4. The State and the region should develop a public outreach program to inform the general public regarding the Southeast Alaska IRP and the Preferred Resource Lists, including the costs and benefits of developing the projects included. Additionally, the benefits of DSM/EE and biomass conversions should be included as part of this public outreach program.

5. The State Legislature should make decisions regarding the level and form of State financial assistance that will be provided to assist the region's utilities in developing the generation resources and transmission projects identified in the Preferred Resource List.

6. The AEA proposes a decision framework and policy requiring developers of each potential project to develop a standard set of information, at an appropriate level and quality of detail, before any decisions are made about which projects should be developed. The AEA proposes that this policy would apply to all projects for which the State will be providing financial assistance, and it recommends that it also apply to cases where the project proponents decide not to seek State financial assistance so that the permitting agencies can compare the benefits consistently between all projects. This decision framework and related information standards are intended to yield a minimum threshold of information, thereby providing the foundation of decisions regarding the next increment of hydro projects. They are also intended to identify any fatal flaws that would prohibit a proposed project from being developed.

   Black & Veatch believes that this type of decision framework and information standards should be adopted, as they will effectively address the issues associated with the quality and inclusiveness of information available on specific projects and enable the region to make more fact-based decisions regarding which hydro projects should be developed.

> ***"While new energy infrastructure is important and necessary, the State needs to oversee development to assure a safe and sane approach with the good of its residents in mind."***
>
> Rural Community Council

7. The State Legislature should appropriate funds for the initial stages of the development of a regional DSM/EE program to supplement current programs offered by the AHFC, AEA, and RurAL CAP. This appropriation should be directed at the required elements of a comprehensive DSM/EE program, which are described in Section 20.0.

   It should be noted that the Southeast region can learn from the lessons of others with regard to the development and execution of a comprehensive DSM/EE program. Many regions of the country, as well as other countries, have been delivering DSM/EE programs for a number of years; some utilities have been implementing DSM/EE programs for 30 years. Consequently, there are many "lessons learned," and the region should do everything it can to take advantage of this experience.

8. The State Legislature should appropriate funds for the initial stages of the development of a regional biomass conversion program to supplement current programs offered in the region. This appropriation should be directed at the required elements of a comprehensive biomass conversion program, which are described in Section 20.

Again, it should be noted that the Southeast region can learn from the lessons of others with regard to the development of biomass space heating programs, especially those programs that have been implemented in Europe.

9. Evaluate the potential benefits and costs of forming a regional entity, or utilizing an existing entity, to develop and deliver DSM/EE programs, in close coordination with the region's utilities, to residential and commercial customers throughout the Southeast region. Black & Veatch does not believe that the region will be successful in developing an aggressive DSM/EE program if each utility has to develop 1) its own DSM/EE program, including hiring the appropriate staff, 2) detailed DSM/EE program plans, 3) a set of qualified vendors, and 4) an education and marketing campaign.

10. Evaluate the potential benefits and costs of forming a regional entity, or utilize an existing entity, to accelerate the development of a biomass conversion program.

11. Consistent with the need to improve the quality and inclusiveness of available information on potential hydro projects, the State Legislature should appropriate funds to assist hydro project proposers complete high-level reconnaissance studies. These relatively low-cost reconnaissance studies would provide the necessary information to determine whether a proposed hydro project should move forward to the preparation of a FERC license application.

12. For those proposed hydro projects that meet the needs identified as the next increment of hydro and have completed reconnaissance studies that show they are sufficiently viable to move to the FERC license process, the State Legislature should appropriate funds to assist project proposers prepare the FERC license application. The FERC licensing process is a multi-year and multi-million dollar process that could prohibit the development of some feasible projects without State financial assistance.

13. Complete a regional technical and economic market potential assessment, including the identification of the most attractive sites, for all non-hydro renewable resources included in the Preferred Resource List.

14. Similar to many proposed hydro projects, there is a need to improve the quality and inclusiveness of available information on potential non-hydro renewable projects. As a result, the State Legislature should appropriate funds to assist non-hydro renewable project proposers complete high-level reconnaissance studies. These reconnaissance studies would provide the necessary information to determine whether a proposed renewable project should move forward to the next step of the development process.

15. Further development of tidal and wave power should be encouraged due to its resource potential in the Southeast region. Although this technology is not now commercially available, in Black & Veatch's opinion it has the potential to become economic within the planning horizon. In fact, the Southeast region could become a research, development, and demonstration center for the development of tidal and wave technologies.

16. Develop a standard PSA to: 1) facilitate the provision of State financial assistance, and 2) provide IPPs an equal opportunity to submit qualified proposals to develop specific projects.

17. Consider the development of an open access policy for the region's transmission network, based on the FERC's Open Access Transmission Tariff (OATT), which governs the planning and operation of the transmission grids in the lower-48 states.

18. Consistent with previous comments, this IRP should be updated in the 2014-2015 time frame to make the longer-term resource selections that would be implemented in Phase 2. By updating the Southeast Alaska IRP in 2014 or 2015, the region will have: 1) better project-specific information to make a definitive selection among specific alternative hydro and other renewable projects, and 2) actual experience with the implementation of DSM/EE and biomass conversion programs to better determine the level to which the region, and individual subregions, can rely on these programs over the long term.

19. The regional utilities, perhaps with the assistance of the AEA, should evaluate the benefits of developing tariff structures that better reflect actual costs, particularly with regard to the additional long-term costs that will be incurred as a result of electric space heating conversions. As part of this effort, workshops should be held to focus on the issue that the last block in tariffs need to better reflect incremental costs. Additionally, cost-of-service studies should be completed for each utility facing the impact of electric space heating conversions to determine what rates should be for higher consumption.

20. To the extent that electric space heating conversions continue to increase a utility's electric load, those utilities should evaluate the benefits of developing weather normalized load forecasts. These activities should be as part of this effort: 1) hold workshops to focus on the need for, and approaches to, weather normalized load forecasting methodologies, 2) develop a standard weather normalized load forecasting methodology, and 3) develop short-term weather normalized load forecasts for each relevant utility.

21. The State and the region's utilities should work closely with resource agencies to identify changes that can be made to streamline State and Federal regulatory and permitting processes related to the resources contained in the Preferred Resource List.

22. Federal legislative and regulatory activities, including those related to emissions regulations, should be monitored closely and influenced to the degree possible.

1.13 NEAR-TERM REGIONAL IMPLEMENTATION ACTION PLAN (2012-2014)

This section provides Black & Veatch's recommended near-term implementation plan, covering the period from 2012 to 2014. Black & Veatch's recommended actions, which are consistent with the Preferred Resource Lists presented in Section 17.0 and the recommendations resulting from this study that are discussed in detailed in Section 20.0, are grouped into the following categories:

- Capital Projects – SEAPA Subregion.
- Capital Projects – Other Subregions.
- Regional Supporting Studies and Other Actions.

The near-term implementation plans shown in the following tables serve two objectives. First, they identify the steps that should be taken during the next 3 years regardless of the alternative resource plan that is chosen as the preferred resource plan. Second, they are intended to maintain flexibility as the uncertainties and risks associated with each alternative resource become clearer or resolved.

1.13.1 Capital Projects – SEAPA Subregion

Table 1-12 Near-Term Implementation Action Plan – Capital Projects – SEAPA Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIME FRAME**	**ESTIMATED COST**
Committed Resources • Kake-Petersburg Transmission Intertie (SEI-2) o Estimated total cost - $53,780,000 o Previous grants - $5,490,000 o Remaining project cost - $48,290,000 • Ketchikan-Metlakatla Transmission Intertie (SEI-3) o Estimated total cost - $12,725,200 o Previous grants - $4,500,000 o Remaining project cost - $8,225,200 • Whitman Lake Hydroelectric o Estimated total cost - $25,830,000 o Previous grants - $12,420,000 o Remaining project cost - $13,400,000	2013-2015 2012-2013 2012-2014	$48,290,000 $8,225,200 $13,400,000
Replacement of Existing Diesel Generation Facilities	2012	$39,685,000
DSM/EE Programs	2012 2013 2014	$69,100 $169,900 $395,300
Biomass Conversion Program	2012 2013 2014	$25,201,800 $26,393,100 $27,875,700
SEAPA Subregion Total (2012-2014)		**$189,705,100**

1.13.2 Capital Projects – Other Subregions

1.13.2.1 Admiralty Island Subregion

Table 1-13 Near-Term Implementation Action Plan – Capital Projects – Admiralty Island Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIMEFRAME**	**ESTIMATED COST**
Committed Resources • Thayer Creek Hydroelectric o Estimated total cost - $15,201,100 o Previous grants - $2,156,100 o Remaining project cost - $13,045,000	2012-2016	$13,045,000
DSM/EE Programs	2012 2013 2014	$100 $100 $300
Biomass Conversion Program	2012 2013 2014	$144,000 $108,600 $249,500
Admiralty Island Subregion Total (2012-2014)		**$13,547,600**

1.13.2.2 Baranof Island Subregion

Table 1-14 Near-Term Implementation Action Plan – Capital Projects – Baranof Island Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIME FRAME**	**ESTIMATED COST**
Committed Resources • Blue Lake Expansion Hydro o Estimated total cost - $96,500,000 o Previous State funding - $49,000,000 o Previous bond net proceeds - $20,000,000 o Remaining project cost - $27,500,000	2012-2015	$27,500,000
Replacement of Existing Diesel Generation Facilities	2012	$20,220,000
DSM/EE Programs	2012 2013 2014	$20,800 $50,800 $118,100
Biomass Conversion Program	2012 2013 2014	$2,663,700 $2,664,400 $2,825,900
Baranof Island Subregion Total (2012-2014)		**$56,063,700**

1.13.2.3 Chichagof Island Subregion

Table 1-15 Near-Term Implementation Action Plan – Capital Projects – Chichagof Island Subregion

CAPITAL PROJECTS		
DESCRIPTION	TIME FRAME	ESTIMATED COST
Committed Resources • Gartina Falls Hydroelectric o Estimated total cost - $6,330,000 o Previous grants - $850,000 o Remaining project cost - $5,480,000	2012-2015	$5,480,000
Replacement of Existing Diesel Generation Facilities	2012	$303,500
DSM/EE Programs	2012 2013 2014	$600 $1,400 $3,100
Biomass Conversion Program	2012 2013 2014	$313,700 $417,000 $327,400
Chichagof Island Subregion Total (2012-2014)		$6,846,700

1.13.2.4 Juneau Area Subregion

Table 1-16 Near-Term Implementation Action Plan – Capital Projects – Juneau Area Subregion

CAPITAL PROJECTS		
DESCRIPTION	TIME FRAME	ESTIMATED COST
Replacement of Existing Diesel Generation Facilities	2012	$20,220,000
DSM/EE Programs	2012 2013 2014	$82,200 $201,500 $468,800
Biomass Conversion Program	2012 2013 2014	$11,379,500 $12,016,400 $12,675,700
Juneau Area Subregion Total (2012-2014)		**$57,044,100**

1.13.2.5 Northern Subregion

Table 1-17 Near-Term Implementation Action Plan – Capital Projects – Northern Region Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIME FRAME**	**ESTIMATED COST**
Replacement of Existing Diesel Generation Facilities	2014	$2,790,200
DSM/EE Programs	2012 2013 2014	$900 $2,100 $4,700
Biomass Conversion Program	2012 2013 2014	$780,700 $749,200 $828,200
Northern Region Subregion Total (2012-2014)		**$5,156,000**

1.13.2.6 Prince of Wales Subregion

Table 1-18 Near-Term Implementation Action Plan – Capital Projects – Prince of Wales Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIME FRAME**	**ESTIMATED COST**
Committed Resources • Reynolds Creek Hydroelectric o Estimated total cost - $28,581,500 o Previous grants - $20,520,000 o Remaining project cost - $8,061,500	2012-2014	$8,061,500
DSM/EE Programs	2012 2013 2014	$100 $100 $200
Biomass Conversion Program	2012 2013 2014	$1,339,800 $1,549,600 $1,757,100
Prince of Wales Subregion Total (2012-2014)		**$12,708,400**

1.13.2.7 Upper Lynn Canal Subregion

Table 1-19 Near-Term Implementation Action Plan – Capital Projects – Upper Lynn Canal Subregion

CAPITAL PROJECTS		
DESCRIPTION	**TIME FRAME**	**ESTIMATED COST**
DSM/EE Programs	2012 2013 2014	$3,500 $8,700 $20,500
Biomass Conversion Program	2012 2013 2014	$1,624,700 $1,828,200 $1,839,600
Upper Lynn Canal Subregion Total (2012-2014)		**$5,325,200**

1.13.3 Regional Supporting Studies and Other Actions

Table 1-20 Near-Term Implementation Action Plan – Regional Supporting Studies and Other Actions

DESCRIPTION	TIME FRAME	ESTIMATED COST
General Public Outreach/Education Program	2012	$250,000
Regional DSM/EE Program Start-up Costs	2012-2013	$2,325,000
Regional Biomass Conversion Program Start-up Costs	2012-2013	$2,225,000
Formation of Regional DSM/EE Entity Start-up Costs	2012	$500,000
Formation of Regional Biomass Conversion Entity Start-up Costs	2012	$500,000
Hydro Project-specific High Level Reconnaissance Studies	2012-2013	$2,000,000
Hydro Project-specific FERC License Application Preparation	2012-2014	$10,000,000
Regional Technical/Economic Market Potential Assessment of Non-Hydro Renewable Technologies	2012	$500,000
Other Renewable Project-specific High Level Reconnaissance Studies	2012-2014	$1,000,000
Support Tidal/Wave Technology Development	2012-2014	$1,000,000
Develop Standard Power Sales Agreement	2012	$200,000
Consider Development of Open Access Policy and Related Tariff (including terms and conditions of service)	2012	$250,000

DESCRIPTION	TIME FRAME	ESTIMATED COST
Update Southeast Alaska IRP in 2014	2014	$750,000
Support Development of Tariff Structures That Better Reflect Costs	2012-2013	$1,550,000
Support Development of Weather Normalized Load Forecasts	2013	$375,000
Total		$23,425,000