AVCP Calista Region

Biennial Energy Plan 2008-2010

Nuvista Light and Electric Cooperative, Inc.
A regional wholesale cooperative participated by
Calista Corporation/AVCP/AVCPRHA/YKHC/AVEC/Chaninik Wind Group/MKEC/Kwethluk Power/ Yukon Delta Fisheries Development Association

Introduction

The AVCP CALISTA Regional Biennial Energy Plan is the work and the progress of the AVCP Calista Regional Leadership to:

- ***develop and adopt a long term energy policy for sustainable energy***
- ***work collectively and combine our resources***
- ***identify conventional and non-conventional renewable energy development***
- ***identify strategies for funding and deployments methods***

Regional Leadership

Executive officers, board members, staff of the major regional organizations, local governments, utilities and the business community.

The Leadership is using the Nuvista Light and Electric Cooperative on the Biennial Energy Plan.

The Nuvista Light and Electric Cooperative, Inc. a regional wholesale utility formed by Calista Corporation and currently administered by the Association of Village Council Presidents.

Energy Planning Participants

Sven Paukan, Nuvista Chairman, AVCP Board, Andreafski Tribe
Paul George Guy, Nuvista Vice-Chairman, Calista Board, Kwethluk Power Company and Kwethluk Inc.
Arthur S. Heckman Sr., Nuvista Secretary, Calista Board, Pilot Station Village Corporation
Daniel Waska, Nuvista Treasurer, AVCP Board, Atmautluak Tribe
Moses Owen, Nuvista Board, AVCP Board, Akiak Tribe
Willie Kasayulie, Nuvista Board, Calista Board
Myron Naneng, AVCP President
Ron Hoffman, AVCP Regional Housing Authority CEO
Robert Nick, AVCP Regional Housing Authority Board Chairman
Martin B. Moore, City of Emmonak
William Igkurak, Chaninik Wind Group Chairman
Matthew Nicolai, Calista Corp., President & CEO
Andrew Guy, Calista Corp., General Counsel
Doug Nicholson, Donlin Creek, LLC, General Manager
Brent Petrie, Alaska Village Electric Cooperative, VP
Ernie Baumgartner, Middle Kuskokwim Electric Cooperative, CEO
Gene Peltola, Yukon Kuskokwim Health Corporation, CEO

Task Force and Committees

Western Alaska Fuel Task Force
Chair - Meera Kohler, AVEC
Elaine Brown, Northstar Gas
Greg McIntyre, YKHC
Ivan M. Ivan, Akiak TC
Willie Kasayulie, Calista Corporation
Deborah Vo, Yukon Delta Fisheries Development Association
Allen Joseph, AVCP Regional Housing

Legislative Committee
Chair- Michelle Sparck, AVCP
Elaine Brown, North Star Gas
Rep. Bob Herron
Allen Joseph, AVCP Regional Housing Authority
Meera Kohler, AVEC
Mary Nelson, Donlin Creek LLC Biennial Energy Plan

Renewable Energy Committee
Chair - John Sargent, City of Bethel
William Igkurak, Chaninik Wind Group
Brent Petrie, AVEC

Goals and Deployment Objectives

Energy Security and Economic Stability

- ***Develop integrated energy solutions that meet local energy requirements and economic development needs***

Energy Parity and Stability

- ***Establish statewide energy cost parity to make home heating affordable and equitable***

Energy Generation and Transmission

- ***Pursue an All Alaskan Generation and Transmission Utility to save energy dollars and reduce electricity rates across All Alaska***

Integrated Renewable Energy Solutions

- ***Expand Wind Energy Projects along the eastern Bering Sea Coast and the Bethel area***
- ***Determine feasibility for integrated wind/diesel/solar/biomass heating and electric systems with community heat storage system.***
- ***Determine feasibility of Regional Hydroelectric Project (Lake Chikuminuk) to provide region-wide electricity and heat.***
- ***Develop and install Biomass projects: including wood fired boilers, heaters and wood chippers for community facilities and buildings.***

Statewide heating fuel price parity

Introduce statewide heating fuel price parity legislation to cap at $3 per gallon (September 1 through March 31) for all Alaska residents

- ***Formula (delivered fuel cost above $3.00 X total gallons for number of households served) not including O&M, overhead cost, etc.***
- ***Fuel Price Parity set only when price of oil per barrel results in delivered cost of fuel above $3.00 per gallon (note: in 2009 most communities delivered costs are under $3.00 per gallon)***
- ***Formula (delivered cost above $3.00 X total gallons for number of households served) not including O&M, overhead cost, etc.***

All Alaskan G&T Utility to include Rural, Southeast and Railbelt

- ***Takes ownership of G&T Assets across Alaska***
- ***Power costs are pooled and power bought back at postage-stamp rate or a 2 tier rate (utilities then add their costs and sell it to customers)***
- ***Costs range from 5¢ to 50¢ kWh***
- ***Distribution costs range from 3¢ to 20¢ kWh***
- ***PCE currently costs $30 million per year***
- ***Rural school electricity costs $20 million per year***
- ***Other state rural offices pay $20 million per year***

By going to All Alaska G&T the state saves energy money to pay for a significant portion of major project investments thereby driving generation costs down to stabilize rates.

Rural utilities can work together to reduce their delivered costs via shared services and other methods.
End results are rates costing about 25¢ kWh and making PCE unnecessary.

Regions and communities no longer have to compete for investment grants as the AAG&T would build the projects to benefit all Alaskans.

Rural villages will no longer have to struggle with O&M.

The State is currently promoting a Generation and Transmission (commonly known as a G&T) utility for the entire Railbelt. Under that scenario, the existing six utilities will no longer be responsible for developing new G&T projects and possibly will also turn their existing G&T assets over to the new G&T. Power will be generated by the G&T and will be delivered to the existing utilities, generally at a "postage-stamp" rate. The receiving utilities, which will be distribution utilities, will be responsible to deliver the electricity to the end users and will bill the customers.

The AAG&T expands this concept to the entire state. The AAG&T would essentially take ownership of the generation assets throughout the state. To accomplish this, the existing utility essentially "spins-off" its generating plant to the new organization, which would then operate it. All the power costs across the state would be pooled into a single bucket. Each distributing utility would then buy power back from the pool at a postage-stamp rate or, perhaps, a two-tiered rate, and would then add their own costs to that power and sell it to their customers.

- Power generation costs currently range from 5 cents to 50 cents a kWh.
- Distribution costs range from 3 cents to 20 cents a kWh.
- PCE currently costs the State $30 million a year.

- Rural school electricity costs the State $20 million a year.
- Other State rural offices pay electric bills of $20 million a year.

By going to an AAG&T concept, the State could conceivable save enough energy dollars to pay for a significant portion of investment into major projects benefiting the Railbelt, thereby driving the cost of generation down enough to essentially pay for the power cost subsidy necessary to equalize the cost of generated power across the state. The delivered cost across the state will vary because smaller utilities will obviously have higher distribution and administration costs per kWh, but those utilities can work together to reduce those costs through shared services and other measures.

The end result would be electricity costing from about 8.5 cents a kWh to about 25 cents a kWh to every Alaskan. PCE would no longer be needed and the endowment could be put to its best use as an investment in a major project like Susitna. Regions and communities would no longer have to compete for investment grants as the AAG&T would build the projects that will deliver the maximum benefit to **all** Alaskans. Rural villages would no longer have to struggle to operate and maintain complex generation systems and instead would all support the best investments for the State since they would all benefit directly from every dollar invested in generation assets.

Goals and Deployment Objectives (cont.)

Consolidate local individual utilities into Regional Cooperative Utilities

- ***Bethel and nearby 12 villages***
- ***Coastal and Tundra villages***

Sub-regional inter-ties

- ***Pursue sub-regional inter-ties and distribution systems beginning with an inter-tie to connect the villages of Alakanuk and Emmonak; and the villages of St. Mary's, Mountain Village and Pilot Station.***

Bulk Fuel – Western Alaska Fuel Task Force

1. ***Reduce fuel consumption in 2009 by 10%***
   a. ***Determine fuel users, consumption, and storage capacity of each community (utility, schools, village corporations, local organizations, tribal council)***
   b. ***Link villages/users together under cooperative purchase agreements***
2. ***Seek changes to State and Federal Fuel Programs***
3. ***Conduct Education Outreach***

AVCP Calista Region's Energy Supply and Demand

Fuel Price and Electricity

Prices for residential heating oil, regular gasoline increased well over 100% since 2007 in many of the regions villages (prices without taxes). The AVCP Calista region's prices have followed national trends and will continue to be linked to world oil prices. Delivered prices in spring 2008 rose to $8.00 gallon for home heating fuel throughout the region.

Electric utility rates are higher as 2009 begins, between 53¢ and 65¢ per kWh, and electric bills have been averaging around $342 to $360 per month in villages of the region. Usage has been anywhere around 530kWh to 750kWh per household. Increases in the electric rates have been reflective of higher delivered fuel costs in recent years and the PCE program has been significant in every community in helping to make electricity affordable to families in the region.

Fuel costs have been going up between $6.00 and $8.00 per gallon. Recently in the village of Emmonak fuel had to be flown in at a cost near $10.00 per gallon when local storage runs out. Energy costs take up a significant portion of family disposable income, which in recent months is estimated 60% to 70% due to price hikes.

Any further increases in fuel costs and electric rates will have the effect of making fuel and electricity unaffordable. Recent studies that were conducted in the region (Nuvista Light and Power 2002 and 2004 Energy Studies) have shown that lower income residents devote higher amounts of their disposable income to energy and use less.

Unemployment rates are currently between 16.6 and 22.8 for the Bethel and Wade Hampton Census districts respectively. However, the jobless rate is even more significant and relevant indicator of the economic condition in the region. The rate is 38.5% and 43.3% for the Bethel and Wade Hampton census districts. Total income in 2007 for the Bethel census district was $431.4 million and $124.8 million which provided a median income of $45,200 and average monthly income about $2,700 for the Bethel

census district; and $36,600 median income and $1,750 average monthly for the Wade Hampton census district.

2008 Kuskokwim Salmon Fishery

A total of 494,108 salmon was harvested in 2008 in the Kuskokwim area by 462 permit holders for an estimated ex-vessel value of $1,487,111. This provides an exvessel value of $3,219 per permit holder. (2008 ADF&G Kuskokwim River Salmon Fishery Report)

2008 Yukon Commercial Fishery Summary

A total 312,513 salmon were commercially harvested in the Lower Yukon in 2008. A total of 444 permit holders fished in the Lower Yukon area for a total of $1,363,746 in ex-vessel earnings from the 2008 commercial fishery. This provides an exvessel value of $3,071 per permit holder. (ADF&G 2008 Annual Yukon Salmon Fishery Report)

Both higher fuel costs and increases to electric rates also have the effect of making other local goods and services unaffordable. This has been demonstrated since the fall of 2008 with the onset of winter and freezing temperatures. Because of low income and higher energy costs, there were numerous families in the region that were unable to afford fuel, electricity and food items from the local store. This humanitarian crisis surfaced in numerous news media and generated food drives and donations to villages in the Yukon delta.

This is an indicator that populations throughout the region are vulnerable, local economies are fragile and susceptible to further fuel and price and electric rate increases.

Fuel Price and Use

Prices for residential heating oil, regular gasoline increased well over 100% since 2007 in many of the regions villages (prices without taxes). The AVCP Calista region's prices have followed national trends and will continue to be linked to world oil prices. Delivered prices in spring 2008 rose to $8.00 gallon for home heating fuel throughout the region.

The news media reported earlier in 2008 the fuel bill for the Alaska Village Electric Cooperative, which serves 53 small villages in the west of the state, went up to $26 million from $14 million in 2007.

Village residents are already paying electric bills of $300 a month and will look to rates increasing to an unaffordable one-third to one-half from fuel increases. With average household incomes of only $17,500 many families are unable to maintain their livelihood and support their families.

Fuel costs by village (Tundra Drums Newspaper 1/3/08)

The price of gasoline and heating oil in the Yukon-Kuskokwim Delta is sometimes twice that of prices in Anchorage and Fairbanks. Villages are ranked by the cost of heating oil, from highest to lowest.

Village	Vendor	Gasoline	Heating oil
Akiachak	Akiachak Fuel Sales Inc.	$5.55	$5.44
Akiak	Stephan Ivan and Sons Store	$5.00	$4.60
Alakanuk	Alakanuk Native Store	$5.83	$5.04
Aniak	Crowley Maritime Corp.	$4.62	$4.28
Atmautluak	Atmautluak Ltd. Store	$4.93	$4.81
Bethel	Northstar Gas	$4.84	$4.55
Chefornak	Chefarnmute Inc. Yupiak Store	$5.46	$4.44
Chevak	Chevak Co. Store	$5.35	$5.15
Chuathbaluk	City of Chuathbaluk	$5.10	$5.15
Crooked Creek	Thomas Trading Post	$5.95	$5.85
Eek	Iqfijouaq Co. Inc.	$5.11	$5.15
Emmonak	Emmonak Corp.	$5.91	$4.85
Gambell	Gambell Native Store	$6.02	$4.89
Goodnews Bay	Mumtram Pikkai Inc.	$5.25	$4.12
Grayling	HYL Fuel	$5.50	$4.50
Holy Cross	Holy Cross Oil Co.	$5.30	$4.55
Hooper Bay	Crowley Maritime Corp.	$5.32	$5.05
Kasigluk	Kasigluk Inc.	$5.45	$5.40
Kipnuk	Kugkaktlik Ltd.	$5.51	$4.60
Kongiganak	Qemirtalek Store	$4.48	$4.45
Kotlik	Kotlik Yup'ik Enterprises	$5.95	$5.11
Kwethluk	Kwethluk Sports Store	$5.16	$4.96
Kwigillingok	Kwik Inc.	$5.35	$4.85
Marshall	Marshall Enterprises	$4.83	$4.88
McGrath	Crowley Maritime Corp.	$5.73	$4.92
Mekoryuk	NIMA Store	$5.42	$4.82
Mountain Village	Azachorok Fuel Co.	$5.01	$4.81
Napaskiak	Napaskiak Tribal Council	$5.08	$5.15
Newtok	Newtok Traditional Council	$4.99	$4.90
Nunapitchuk	Nunapitchuk Ltd. general store	$5.40	$5.35
Pilot Station	Pilot Station Inc. Native Store	$6.08	$5.98
Quinhagak	Qanirtuuq Inc.	$5.40	$4.87
Russian Mission	Russian Mission Native Corp.	$5.52	$4.75
Savoonga	Savoonga Native Store	$5.76	$4.83
St. Marys	Crowley Maritime Corp.	$4.85	$4.86
Togiak	Togiak Fuel Distributors LLC	$4.21	$3.68
Toksook Bay	Nunakaviak Yup'ik Corp.	$5.89	$5.24
Tuluksak	Tuluksak Native Store	$4.93	$4.32
Tuntutuliak	Qinarmiut Corp. Store	$5.00	$5.15
Tununak	Tununrmiut Rinit Corp.	$4.75	$4.56
Upper Kalskag	City of Upper Kalskag	$5.15	$5.00

For comparison:
Anchorage Various $3.06 $3.20
Fairbanks Various $3.07 $3.18

SOURCE: Telephone survey by The Tundra Drums

Fuel Prices as of May 12, 2009

Villages		Stove oil per gallon	with tax	Fuel	with tax
Akiachak		7.06	7.41	6.59	6.91
Akiak		6.45	no tax	6.25	no tax
Alakanuk		7.25	7.54	6.74	7.03
Atmautluak		5.69	5.86	5.75	5.92
Chefornak		7.90.	8.06	7.55	7.70.
Chevak		5.95	no tax	6.00.	no tax
Eek		6.62	6.75	6.29	6.42
Emmonak		7.60.	7.83	7.04	7.25
Goodnews Bay		6.14	6.32	6.71	6.91
Kasigluk		5.69	5.92	5.74	5.97
Kipnuk		7.71	7.94	7.13	7.34
Kongiganak		6.50.	no tax	5.90.	no tax
Kotlik	Cash	7.85	8.85	7.55	8.55
Kotlik	Charge	7.79	8.85	7.61	8.55
Kwethluk		8.10.	no tax	5.86	no tax
Kwigillingok		6.70.			
Marshall		7.25	7.54	6.98	7.26
Mekoryuk		6.08	6.32	5.49	5.71
Mtn. Village		6.82	7.02	6.31	6.50.
Napakiak		6.40.	6.59	5.75	5.92
Napaskiak					
Newtok		6.47	no tax	6.30.	6.42
Nightmute		7.93	no tax	7.74	no tax
Nunam Iqua		7.35	no tax	7.20.	no tax
Nunapitchuk		5.69	5.86	5.74	5.91
Oscarville					
Pilot Station		7.13	7.42	6.55	6.81
Platinum		5.45	no tax	5.75	no tax
Quinhagak		7.02	7.23	6.22	6.41
Scammon Bay		6.90.	7.07	6.79	6.93
Toksook Bay		7.86	no tax	7.98	8.13
Tuluksak		6.79	6.99	6.39	6.58
Tuntutuliak		6.86	no tax	6.60.	no tax
Tununak		6.14	no tax	5.43	no tax
Hooper Bay		7.37	no tax	7.16	no tax
St. Mary's		6.67	no tax	6.41	no tax

Electricity

Utility	Community	Pop 06/30/07	Total Fuel Used (gallons)	Total Cost of Fuel/Gallon	Avg Price of Fuel/Gallon	Total Diesel Generated kWhs
Akiachak Native Community Electric Co.	Akiachak	644	181,453	$ 596,325.38	$ 3.29	1,800,172
Akiak, City of	Akiak	378	90,305	$ 272,651.20	$ 3.02	
AVEC	Alakanuk	678	132,087	$ 248,342.41	$ 1.88	1,757,214
AVEC	Chevak	916	180,785	$ 345,846.13	$ 1.91	2,287,638
AVEC	Eek	291	56,570	$ 108,336.85	$ 1.92	775,087
AVEC	Emmonak	740	202,893	$ 385,988.38	$ 1.90	2,884,529
AVEC	Goodnews Bay	238	54,725	$ 105,155.68	$ 1.92	686,347
AVEC	Hooper Bay	1,133	207,586	$ 389,582.77	$ 1.88	922,360
AVEC	Kasigluk	534	162,151	$ 310,947.73	$ 1.92	2,235,444
AVEC	Lower Kalskag	252	-	$ -	***	
AVEC	Marshall	370	86,539	$ 164,360.37	$ 1.90	1,203,402
AVEC	Mekoryuk	192	68,559	$ 128,585.15	$ 1.88	962,073
AVEC	Mountain Village	786	176,569	$ 330,378.50	$ 1.87	2,615,914
AVEC	Nightmute	234	45,085	$ 84,482.52	$ 1.87	588,666
AVEC	Nunapitchuk	516	-	$ -	***	
AVEC	Pilot Station	565	128,455	$ 241,443.70	$ 1.88	1,701,354
AVEC	Pitkas Point	103	-	$ -	***	
AVEC	Quinhagak	642	134,072	$ 259,790.18	$ 1.94	1,802,038
AVEC	Russian Mission	329	59,709	$ 111,665.65	$ 1.87	815,679

AVEC	Scammon Bay	509	121,579	$ 296,144.96	$ 2.44	1,635,960
AVEC	St. Mary's, Andreafsky	715	215,077	$ 408,856.64	$ 1.90	3,196,819
AVEC	Toksook Bay	596	139,588	$ 267,737.43	$ 1.92	2,552,597
AVEC	Tunanak	328	-	$ -	***	
AVEC	Upper Kalsag	276	91,301	$ 172,331.09	$ 1.89	1,255,023
Aniak Light & Power Company	Aniak	528	195,889	$ 540,199.25	$ 2.76	2,569,600
Atmautluak Joint Utilities	Atmautluak	304	53,931	$ 173,703.84	$ 3.22	33,269
Bethel Utilities Corp.	Bethel/Oscarville	6,019	3,084,531	$ 11,632,705.15	$ 3.77	42,140,800
Kipnuk Light Plant	Kipnuk	688	142,565	$ 451,036.54	$ 3.16	1,427,939
Kotlik Electric Services	Kotlik	609	151,270	$ 486,744.88	$ 3.22	1,763,129
Kwethluk, Inc.	Kwethluk	695	100,363	$ 285,573.91	$ 2.85	1,438,119
Kwig Power Company	Kwigilligok	361	70,347	$ 189,187.38	$ 2.69	1,065,250
Lime Village Electric Utility	Lime Village	28	9,721	$ 51,666.35	$ 5.31	101,016
MKEC	Chuathbaluk	93	25,565	$ 81,655.43	$ 3.19	258,721
MKEC	Crooked Creek	145	23,876	$ 76,182.40	$ 3.19	274,824
MKEC	Red Devil	36	15,424	$ 49,270.05	$ 3.19	151,124
MKEC	Sleetmute	92	27,655	$ 87,272.92	$ 3.16	286,831
MKEC	Stony River (11)	42	15,078	$ 47,499.46	$ 3.15	143,427
Napakiak Ircinraq Power Company		373	-	$ -	***	

Napaskiak Electric Utility		428	74,098	$ 235,252.27	$ 3.17	934,527
Naterkaq Light Plant	Chefornak	457	73,122	$ 264,217.17	$ 3.61	904,180
Nunam Iqua Electric Company		158	51,717	$ 154,223.89	$ 2.98	699,396
Platinum, City of		38	20,570	$ 76,508.11	$ 3.72	199,072
Puvurnaq Power Company	Kongiganak	427	77,820	$ 229,133.10	$ 2.94	951,274
Tuluksak Traditional Power Utility		466	75,738	$ 228,234.80	$ 3.01	869,717
Tuntutuliak Community Service Assoc.	Tuntutuliak (7)	399	43,963	$ 100,930.75	$ 2.30	542,072
Unqusrag Power Company	Newtok	315	39,791	$ 60,148.68	$ 1.51	274,248

(2007 PCE Statistical Report, State of Alaska)

Economic and Community Development Analysis

High costs of living impact on regional income**,** poor salmon runs and competition from international markets on local fishery, high dependency on government grants, high energy costs, fuel shortages combined with high fuel costs, inadequate transportation and energy infrastructure, high unemployment; all of which are symptomatic of basic economic and community problems the region is faced with today. These present very comprehensive challenges requiring initiatives that involve coordination of efforts between the various service organizations with resources to assist in economic development activities in the region.

Average Prices of Fuel and Food Items in the Region

These are some current prices as of 02/25/09

Stove Oil:
$7.00 per gallon (Bulk)
Regular Unleaded Gasoline:
$6.69 per gallon
Propane:
$264.00/100# -25 gal. bottle
Telephone Service (Basic): $34.43/mo
Housing Payment/Rent: $290.00 to $683.00

Average Ticket from Village to Bethel Round Trip: $410.86
Average Ticket from Village to Anchorage Round Trip:
$556.36
Basic Cellular Service:
1200/min $55.00/avg. Monthly
Snow-machine 550-800cc $8,200.00
Outboard Motor 100-115hp $10,713.00

SELECTED FOOD ITEMS (ON SALE IN LOCAL STORE)

10lb of Potatoes:
$10.99

Apples:
$2.86/lb

Bath Tissue:
$34.56/24 pkl

1 Doz. Grade A Eggs:
$4.36

1 Lb. Coffee:
$10.28

1 lb. Butter
$5.00

10 lb. Flour:
$15.43

Beef Steak:
$13.44/lb

Ground Beef:
$5.11/lb

Gallon of Milk:
$9.26

White Bread:
$4.12

Sales Tax: 2%

2008 Kuskokwim Salmon Fishery

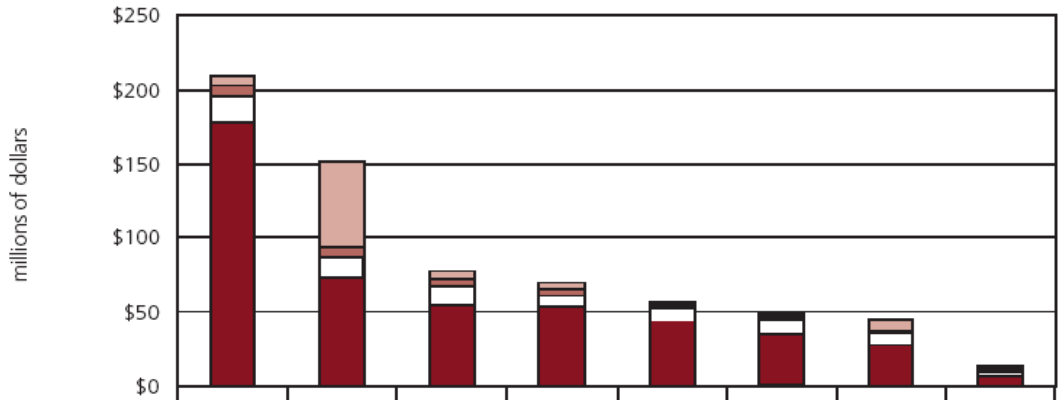
A total of 494,108 salmon was harvested in 2008 in the Kuskokwim area by 462 permit holders for an estimated ex-vessel value of $1,487,111. (2008 ADF&G Kuskokwim River Salmon Fishery Report)

2008 Yukon Commercial Fishery Summary

A total 312,513 salmon were commercially harvested in the Lower Yukon in 2008. A total of 444 permit holders fished in the Lower Yukon area for a total of $1,363,746 in ex-vessel earnings from the 2008 commercial fishery. (ADF&G 2008 Annual Yukon Salmon Fishery Report)

Grants in the Bethel Region

Figure 5-3. Federal Money in Remote Rural Census Areas, 2000



	Bethel	Yukon Koyukuk	Nome	Northwest Arctic	Wade Hampton	Dillingham	North Slope	Lake and Peninsula
Procurement	$5.28	$57.73	$4.15	$3.79	$1.80	$2.91	$8.85	$0.64
Wages	$8.32	$7.24	$6.17	$3.98	$2.08	$2.91	$1.73	$1.51
Transfers	$18.67	$13.70	$12.35	$8.60	$10.15	$8.26	$7.23	$3.83
Grants	$176.69	$72.48	$54.59	$52.30	$42.09	$35.25	$27.39	$6.22

Source: ISER, Status of Alaska Natives Report, 2004, page 5-13; [Consolidated Federal Funds Report]

As the center for goods, services and government the Bethel census area is heavily dependent upon government grants. The graph above demonstrates how much the Bethel census area weighs in compared to other regions of Alaska when it comes to government grants. The region is susceptible to policy changes in government that impact the level of government grant funding.

Fossil Fuel Resources

Petroleum *Supply*

The AVCP Calista region has a few identified potential fossil fuel resource exploration targets and imports 100 percent of its petroleum. There are no refineries that exist in the region and distances from large bulk fuel facilities are far from villages making transportation of fuel an issue.

Fuel Shipping

Transporting the fuel from West Coast USA/Canada or Cook Inlet to Bethel and points along the Kuskokwim River requires the following steps: (1) line-haul barge transportation from the supply source across open ocean and up the Kuskokwim River to Bethel, (2) off-load and temporary storage at Bethel, and (3) transfer of fuel to smaller river barges and delivery to Kuskokwim area villages. The shallow nature of the Kuskokwim River above Aniak (between Bethel and Crooked Creek) provides the greatest challenge, both physically and financially, to delivering fuel to middle Kuskokwim River villages.

Both Yukon Fuel Company and Crowley Marine each operate tank farms in Bethel. Fuel for mid and lower Yukon villages is barged down river from Nenana to fuel storage facilities in villages along the Yukon River by Yutana Barge lines. Early spring often means air shipment by Everts Air Cargo or by other air cargo freighter to villages in the region when villages run out of fuel.

Disruptions in the supply and distribution chain of fuel throughout the system can create a severe and prolonged shortage of fuel and price volatility. Added surcharges when fuel often has to be delivered by air cargo, creates a additional hardship on village residents.

Fuel is delivered from the months of June to September with approximately 150 days of barge delivery. Bulk fuel storage for Bethel is shown as follows:

<u>Tank Owners / Total Capacity</u>
Yukon Fuel Co. 9.4 million gal
Crowley Marine 5.6 million gal
Airport 120,500 gal
Bethel Utilities Corporation 51,000 gal
U.S. Federal Aviation Administration 44,000 gal

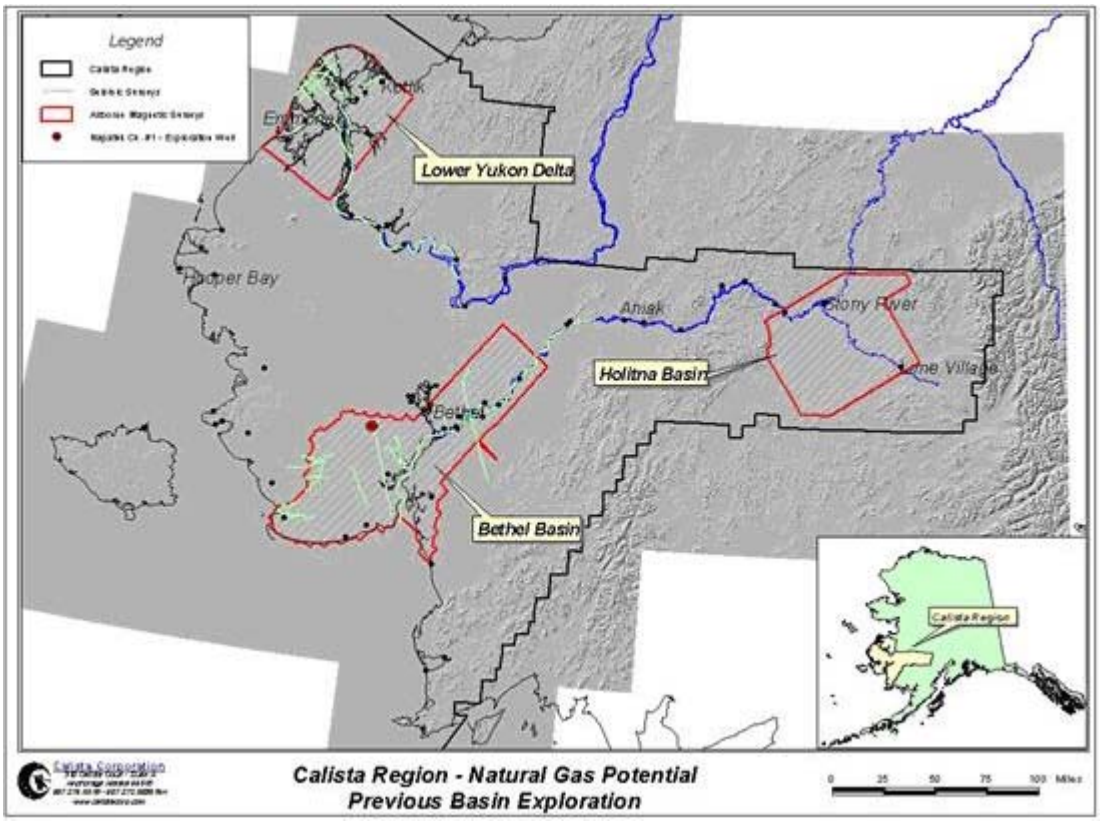
Natural Gas *Supply*

Natural Gas and Oil Exploration / Venture Activities

(Calista Corporation - AVCP 2004 Economic Summit)

Aeromagnetic surveys in the region conducted by the State of Alaska Division of Geological & Geophysical Surveys for conventional hydrocarbon resources focused on three geographic areas: The Bethel Basin, the Lower Yukon Delta, and the Holitna Basin. According to geologists the potential for conventional petroleum resources is nonexistent. The source rock studies done to date have been mostly negative in this regard. However, there has been no drilling conducted to provide information about subsurface conditions to make definitive results on the potential for shallow gas. And in each basin the potential for shallow gas within the Tertiary section has not been fully explored. As technology improves for developing small shallow gas resources then it is possible to re-examine these areas for exploration.

The Bethel Basin is a Cenozoic non-marine basin, roughly outlined by a 5800 square mile airborne magnetic survey area flown by the state in 1994-1996. The regions lone exploration well is the Napatuk Creek #1 drilled by Pan American in 1961 to a very dry depth of 14,890 feet. The main target was a very subtle low gravity area, which turns out to be on the flank of the basin. 2-D seismic data collected for Shell Oil in the early seventies outlined an elongate structural basin to the south (ed. near the village of Kipnuk). The Yukon Delta is a large modern deltaic complex underlain by non-marine Tertiary sandstone and shale, unconformably overlying a thick, complexly deformed flysch. The delta is on the edge of Norton Basin in Norton Sound. 2D seismic coverage by Amoco in the early eighties identified an antiformal closure (ed. at the mouth of the Yukon River) that was apparently slated to be drilled. The Holitna Basin is a Cenozoic non-marine tectonic basin in the lowland draining the Alaska Range to the east and the Kuskokwim Mountains to the west. It is adjacent to the Denali Farewell fault zone, a regionally dominant right-lateral fault system. It has many similarities to other interior basins like the Minchumina Basin further east. It is characterized by a prominent, but small, -40mgal gravity low. Note that it is also about 45 miles from Donlin Creek. The Holitna is rimmed by Paleozoic basinal and platform carbonates; Triassic carbonates and marine siliciclastics.



Propane

(LPG – Liquid Petroleum Gas)

Households and Utilities

Propane is presently used in most villages in the region, primarily for cooking, and some water heating, and to a lesser extent space heating. Total Household and Utility Propane Demand in Bethel are approximately as follows:

ISO Container Barge (Gallons)
Bethel 378,000 household and 7,761,000 utility

Renewable Energy Resources

Wind, hydroelectricity projects, biomass (wood and organic solid waste), and to some degree solar energy along with alternative fuels can provide the AVCP Calista region with energy sustainability, independence and rural community development. The recently completed Alaska Energy Authority Energy guide demonstrates the potential generation capability for renewable energy based upon location to potential hydroelectric power and wind class and other available renewable energy sources.

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Wind

There is abundant wind energy resource available in the AVCP Calista region. The 2002 Nuvista study evaluated wind generation in those villages where there is sufficient wind resources to justify installation of wind turbines. The study assumed wind generation would be considered in areas where the Wind Power Class is 4/5 or greater as designated in the Wind Energy Resource Atlas of the United States.

Wind Power Class

7	6	5	4
Sheldon's Point	Emmonak	Kotlik	Mt. Village
Scammon Bay	Alakanuk	Nunapitchuk	St. Mary's
Hooper Bay	Tuntutuliak	Kasigluk	
Chevak		Atmautluak	
Newtok		Eek	
Tununak			
Toksook Bay			
Nightmute			
Chefornak			
Kipnuk			
Kongiganak			
Kwigillingok			
Quinhagak			
Goodnews Bay			
Platinum			
Mekoryuk			

It is assumed that a maximum allowable wind penetration of 50% would not be unreasonable. A maximum wind penetration of 50% would require a total installed wind turbine capacity of 935 kW. Using this information, in conjunction with wind power density in Watts/meter2 for each wind power class, it is possible to develop an approximate relationship involving installed wind turbine capacity, annual energy generated and wind power class. This relationship is summarized in the following table.

(Assumes 50% Wind Penetration)

Wind Power Class	Percent of Total Energy Generated from Wind	Kilowatts Generated per Installed KW
4/5	6.5	1505
5/6	8	1912
6/7	16.5	3824
7	23.7	5481

The data can be used to estimate the total installed capacity and the total annual kWhs generated by wind turbines if the wind power class and annual village energy requirements are specified. For example, if a village's annual energy requirement is 4,000,000 kWhs and it is located in wind power class 7 area, the total percent of the village's annual energy requirements generated by wind turbines is 23.7% x 4,000,000 or 948,000 kWhs annually. Installed wind turbine capacity is calculated by dividing 948,000 kWhs by 5481 kWh/KW, which results in a total installed wind turbine capacity of 173 kW.

There are two wind generation projects developed and managed by the Alaska Village Electric Cooperative. These are located in the communities of Toksook Bay on Nelson Island on the Eastern Bering Sea Coast, and Kasigluk which is 20 miles west of Bethel.

Toksook Bay (Alaska Village Electric Cooperative)
Three 100 kW Northern Power Systems Northwind 100 turbines were installed in 2006. This wind-diesel system also supplies power to nearby Tununak and Nightmute. This system is estimated to displace 52,000 gallons of diesel fuel per year. (AEA)

Kasigluk (Alaska Village Electric Cooperative)
Three 100 kW Northern Power Systems Northwind 100 turbines were installed in the summer of 2006. This wind-diesel system also supplies power to nearby Nunapitchuk and Old Kasigluk. This system is estimated to displace 52,000 gallons of diesel fuel per year. (AEA)

In recent years local utilities have become more interested in co-generation capabilities based upon the wind energy potential demonstrated by these projects. Four villages of the lower Kuskokwim River Bay area joined together under an organization called the Chaninik Wind Group whose aim is to develop wind generation capacity of the four villages in that area and reduce their dependence on fossil fuel generated electricity and heating. They are currently engaged in developing a wind development project to determine the feasibility of a subregional wind farm project to serve the four villages and will also determine the wind resource availability for expansion and possible build-out to other parts of the region. The Chaninik Wind Group received a $4.8 milion state grant in 2008 to pursue these efforts.

Regional Hydroelectric Power

It has been estimated from previous studies conducted involving a potential Kuskokwim region Hydroelectric project that approximately 16 to 30 megawatts of power and roughly 130 million kwh of energy may be available for Bethel and the 12 villages from Tuluksak to Quinhagak located along the Kuskokwim River. This project has the potential of replacing diesel as the primary source of energy in this region. Reconnaissance studies conducted for the Alaska Power Authority of this project demonstrated energy costs of 18¢ per kwh as opposed to 30¢ per kwh for continued diesel generation with a medium interest rate of 7%. In today's dollars that could equate to approximately 23¢ per kwh as opposed to 38¢ per kwh based upon conservative estimates of inflation costs. 2007 PCE reports indicate costs of 40¢ per kwh to 60¢ per kwh without PCE adjustments for continued diesel power generation demonstrating greater potential savings per household. Additional savings to the state in the form of reduced PCE requirements provide added cost saving benefit to the state over the long term. Hydroelectric power in the Kuskokwim Region is a viable first alternative compared to wind and other renewable energy options. Wind energy systems installed in the region have proven to be expensive and can only provide a portion savings in diesel fuel costs. Diesel fuel costs are expected to remain high for the foreseeable future and the consistency of lower energy costs provided by a full capacity regional hydroelectric system offers a significant advantage over the long term for the region. This fact has been demonstrated by other successful regional hydroelectric projects constructed in Alaska during the past 30 years for other communities. Even more importantly, the project may allow communities to switch to partial electric heating and eliminate the use of very expensive heating fuel oil. The economic savings from this project will allow area residents to save more of their disposable income for other economic endeavors.

Hydrokinetic Electric Projects

As technology advances hydrokinetic power projects may offer some communities an alternative solution over wind and biomass. Certain locations at or near the conjunctions of rivers and sloughs where water depths and currents create year-round ice-free or minimal ice flows may offer potential sites for hydrokinetic generators without the construction of a dam. This would involve a commercial hydrokinetic turbine, which harnesses the power from moving water. This technology is being tested in other river locations with oversight provided by FERC.

Biomass

Biomass resources are available in the AVCP Calista Region and include wood, plant and to some extent fish waste, other organic matter, or gasses from the decomposition of that matter. Currently there are no biomass fuels utilized for generation of electricity, commercial heat and transportation. Wood fired heaters and stoves are used in many homes throughout the region as a main source of heating. Wood fired steambaths

exist in most every village in the region. Approximately 36% of heating is with wood in the region.

Woody Biomass

A 2006 University of Alaska Cooperative Extension Service study for the Kuskokwim Native Association determined nearly 23 million ft3 commercial stands of spruce and 22.7 million ft3 of non-commercial stands for a total 44.6 million ft3 grow in the Lower Kuskokwim. The study shows that it increases 1.3 percent annually. A similar analysis would be appropriate for the lower Yukon area communities to determine available woody biomass.

The Alaska Energy Authority's Biomass Energy Program provides practical working community scale working examples in other parts of Alaska that are applicable to the region, particularly in the middle Kuskokwim and lower Yukon parts of the region. The City of Craig's Gasification Heater System and wood fired heating systems in the interior Alaska for community facilities provide examples for project deployment. The "Fuel for Schools" program employed in the lower 48 states also provides a working program model for local school districts to plan and develop their own community heating replacement project.

Community or business wood chipper development to supply wood chips for wood fired community heating and home wood fired heating systems offers a viable economical development option for the AVCP Calista Region. There are a variety of low cost equipment and options that are available for community or business development considerations.

Fish Oil and Bio Diesel

The feasibility of producing by-product fish oil from shore-based and floating salmon processors on the Kuskokwim and Lower Yukon from as a byproduct of fish processing plants should be determined. This oil can be utilized as boiler fuel. AEA conducted successful tests of raw fish oil/diesel blends in a 2.2 MW 2-cycle Fairbanks Morse engine generator using 50-50 raw fish oil-diesel blend for power production.

Biodiesel is an engine fuel manufactured from renewable sources, such as vegetable oils, recycled cooking greases or oils, or animal fats. Biodiesel is a U.S. EPA-approved substitute manufactured to established industry standards. Currently AEA is working with University of Alaska Fairbanks ' (UAF's) Arctic Energy Technology Development Laboratory, Alaska Department of Environmental Conservation, and the National Park Service to test performance of biodiesel in generators at UAF and Denali National Park. The team has produced a brochure describing the project.

Municipal Waste

Solid wastes offer potential for providing additional local heating of public facilities. Waste heat energy should be incorporated into each community biomass wood energy project to determine feasibility for combined operations.

"Alaskans generate approximately 650,000 tons of garbage per year. Currently there is no large scale recovery of energy from burning unsorted garbage in Alaska. The Sitka Waste-to-Energy facility operated from 1985 to 2000 and provided heat to nearby Sheldon-Jackson College. Fairbanks Memorial Hospital operated a small onsite heat recovery incinerator from 1989 to 2001…" (Alaska Energy Authority website)

Geothermal

Geothermal resources include high-temperature (100 degrees Celsius or 212 degrees Fahrenheit and higher) for electricity generation, intermediate temperature (100 – 50 degrees C) for industrial, agricultural and municipal applications and low temperature heat pump applications. There is one potential site near Mount Hamilton on Ophir Creek southwest of Aniak, and another small site in the upper Chuilnuk River with the closest village at Stony River. The site on Ophir Creek has potential for producing between 200 and 300 degrees of heat. Water from the Ophir Creek Hot Springs is currently utilized by a local family at a nearby residence.

Solar

Solar energy presents a challenging renewable resource for development in the region. Annual average solar insolation is calculated at 3.5 to 4.0 kWh/m^2/day. There is one active solar power generation system in the region located at Lime Village, where a 106 panel hybrid photovoltaic-diesel-battery system is generating 12 kW. Larger community utility scale solar generation hybrid projects are determined to have high capital costs and low yearly solar output. However, in locations where individual homeowners and facilities are located off the power grid and where relatively electricity needs are lower, solar hybrid systems may prove to be a viable option as shown by the Lime Village example. Solar panels may cost less over time and photovoltaic systems for small power uses would become more economical as fuel prices and cost of fossil-fueled electricity increase.

There are three primary ways in which solar energy is collected: directly for light and heat; by heating water in piped water designed solar panel collectors; and to generate electricity using photovoltaic panels. There are a wide variety of solar energy technologies, each with their own market constraints and costs. Solar energy used directly in homes and facilities for light and heat can help reduce energy needs if buildings are designed properly and effective technologies are employed.

It has been shown that facility and home life-cycle cost can be lower than conventional energy sources if solar is installed when the building is constructed. A determination should be made for new housing and facility construction as to the level of solar energy that can be employed in each construction for lighting and heating. As technologies continue to improve, state incentives need to be developed to promote local investment in solar energy as part of a renewable energy system. Solar photovoltaics (PV) generate electricity directly from sunshine. Solar electric systems have minimal maintenance requirements, have power warrantees in excess of 25 years and in many locations can directly interface with the utility grid. As the world market for solar electric power increases, the manufacturing cost is expected to fall substantially.

Alaska Energy Authority Renewable Energy Grants Round I

AVCP Calista Region Projects Funded in Round I

Project Name	Project_Cost	Grant_Fund_Request
Bethel Wind Power x 4	$3,197,986	$2,598,320
Hooper Bay Wind Farm Construction	$2,220,141	$2,220,141
Kongiganak Wind Farm Construction	$3,200,000	$1,700,000
Kwigillingok Wind Farm Construction	$3,200,000	$1,700,000
Mekoryuk Wind Farm Construction	$3,506,406	$3,155,765
Quinhagak Wind Farm Construction	$4,313,603	$3,882,243
Toksook Bay Wind Farm Expansion Construction	$1,153,056	$1,037,750
TOTALS	**$20,791,192**	**$16,294,219**

AVCP Calista Region Projects not Funded in Round I

Project Name	Project_Cost	Grant_Fund_Request
Bethel Wind Farm Construction (BNC land)	$8,710,000	$6,960,000
Napaimute Solar PV Construction	$123,494	$109,471
Napaskiak Wind Farm Feasibility Study		

AVCP Calista Region Project not Forwarded to State II Review

Project Name	Project_Cost	Grant_Fund_Request
Crooked Creek Renewable Energy Reconnaissance Study	$178,000	$137,543

Alaska Energy Authority Renewable Energy Grants Round II

Project_Name	Project_Cost	Grant_Fund_Request
Akiachak Wind_ANCEC	$600,000	$4,500,000
Akiachak Wind_ANCEC	$600,000	$4,500,000
Akiak Wind		$200,000
Emmonak Wind and Transmission_AVEC	$1,062,818	$10,733,179
Scammon Bay Wind Analysis_AVEC	$6,190	$4,436,800
St. Mary's Wind Analysis_AVEC	$5,500	$6,310,000
Mountain Village Wind_City and Tribe	$11,155	$133,255
Kiseralik_Chikuminuk Hydro_AVCP	$150,000	$400,000
Bethel Wind Power x4_City of Bethel	$599,666	$3,197,986
Crooked Creek Hydro Kinetic		$368,000
High Penetration Wind Diesel Heat_Kipnuk	$1,600,000	$10,188,000
Kotlik Pellet Stove_KYE	$50,000	$626,400
Orutsaramiut Native Council	$771,900	$70,200
Tuntutuliak High Penetration Wind Diesel	$1,600,000	$3,360,000