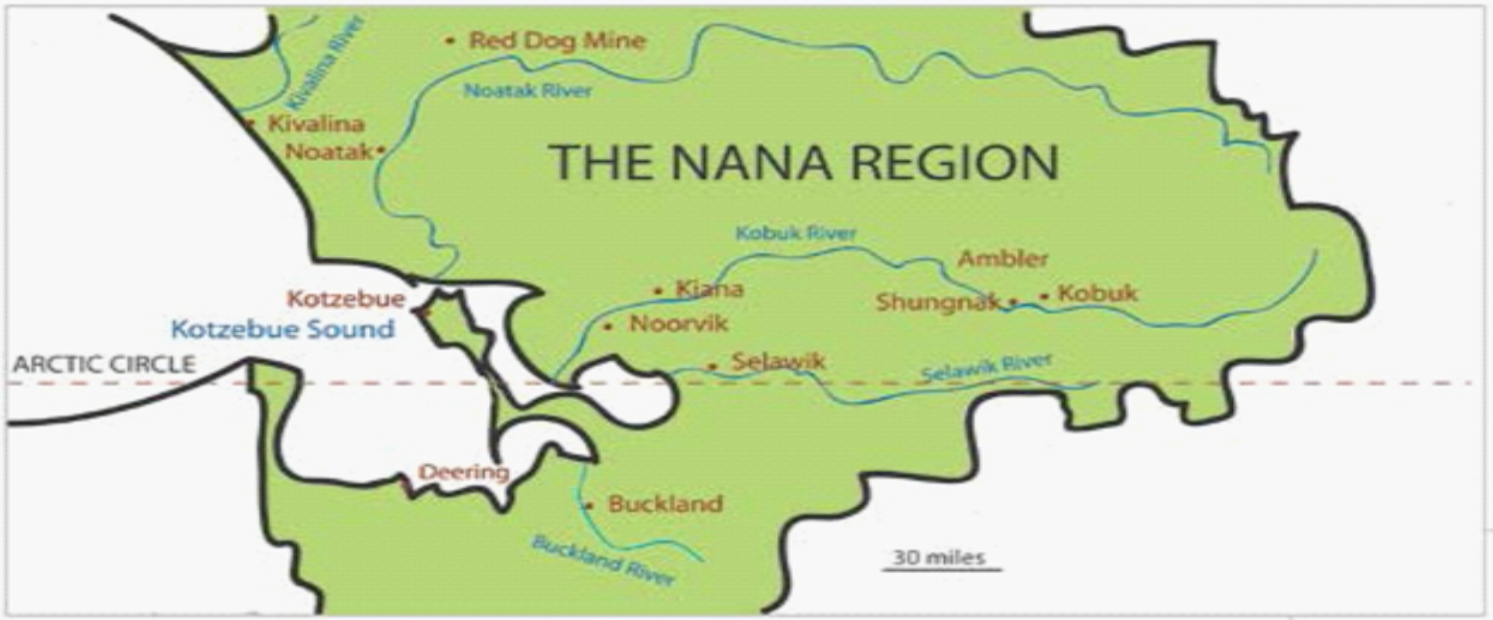
BIA Prov. Conference 2015

Northwest Arctic Sustainable Energy Projects



- **Efficient**
- **Sustainable**
- **Resilient**

&

- **Able to Adapt**


WanderingScapes www.wanderingscapes.com

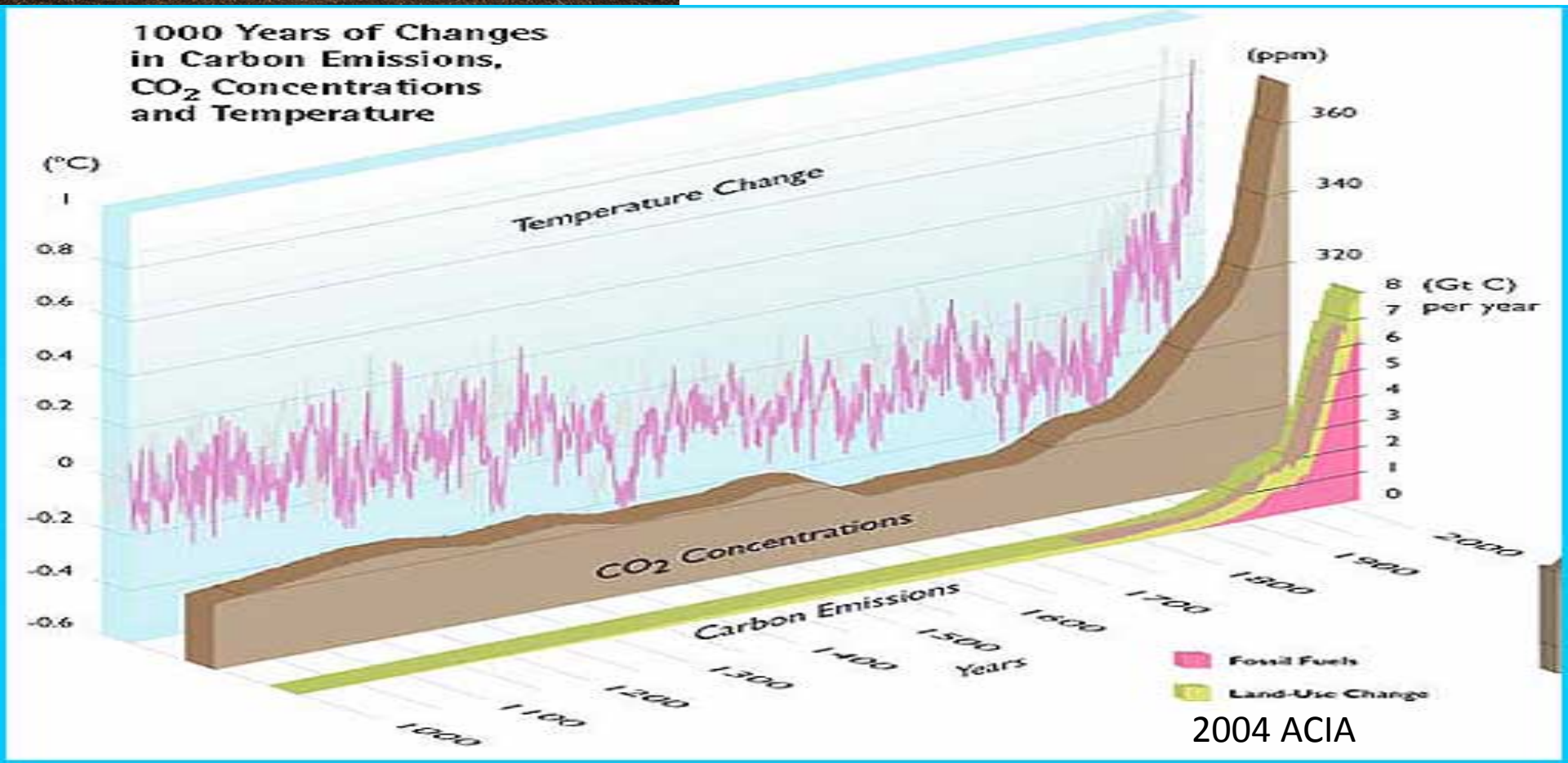
Whaling Crew

Whale or Seal blubber lamp


Energy Efficient
Coordination

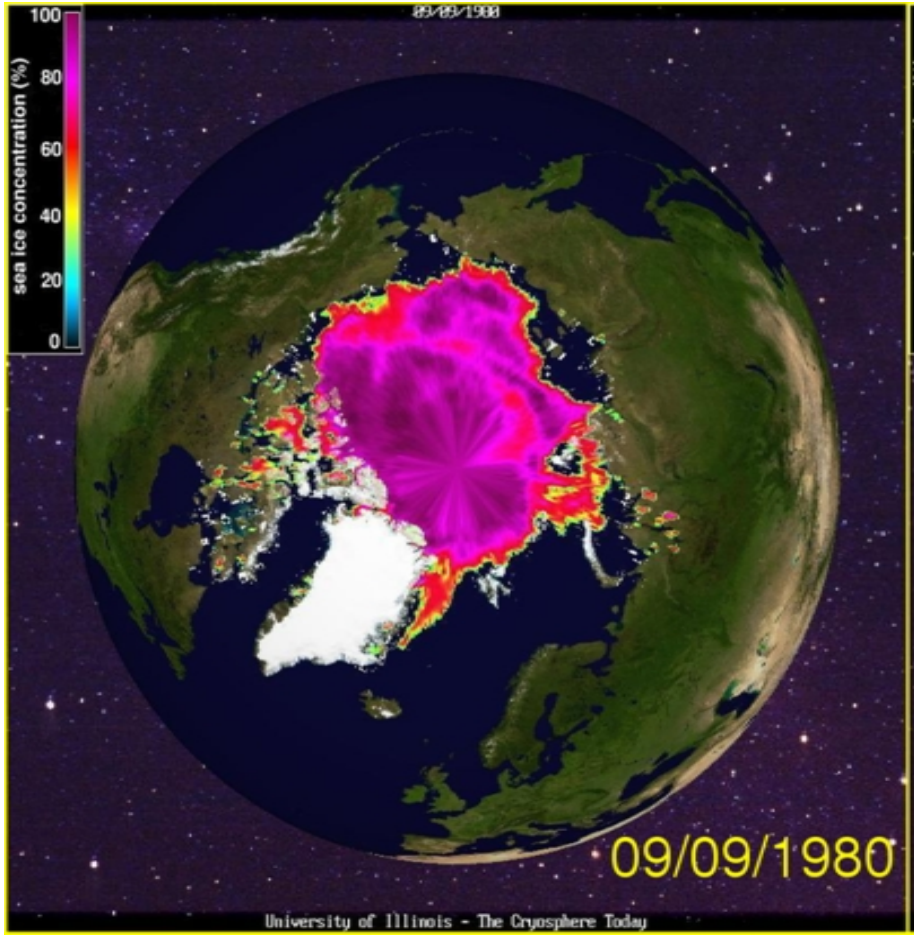
1900 – 1980 Oil for Power

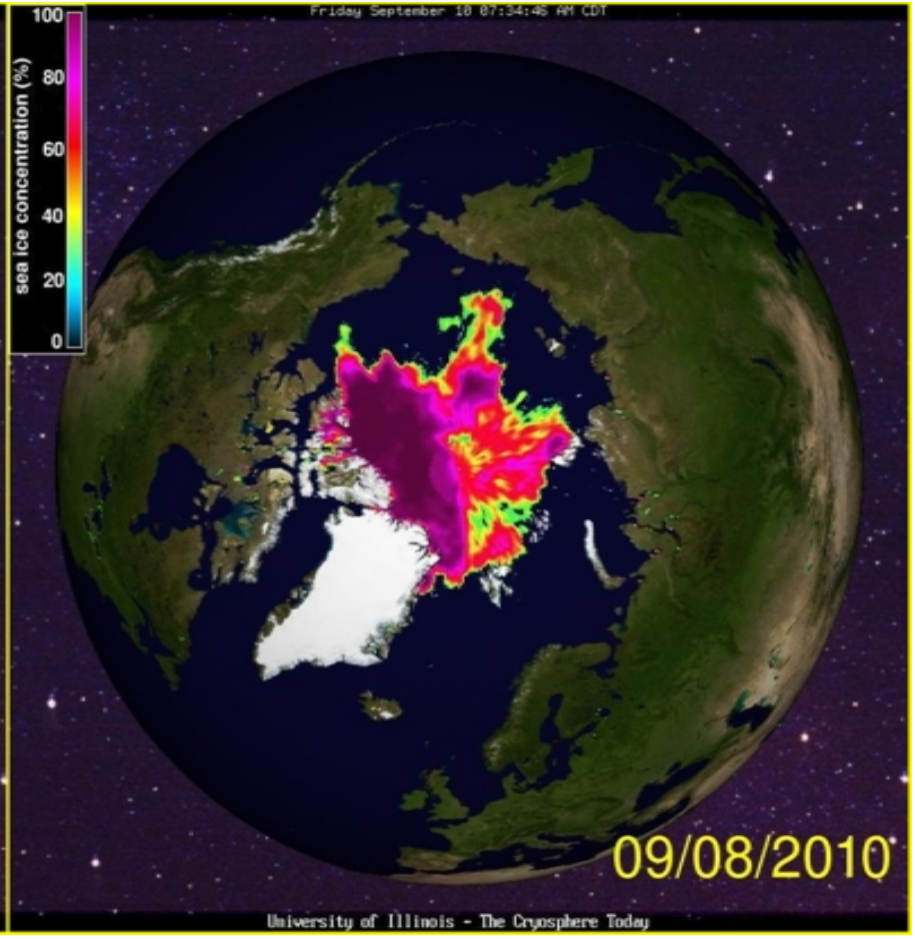
We are releasing energy into our environment that has been buried for millions of years.



2004 ACIA

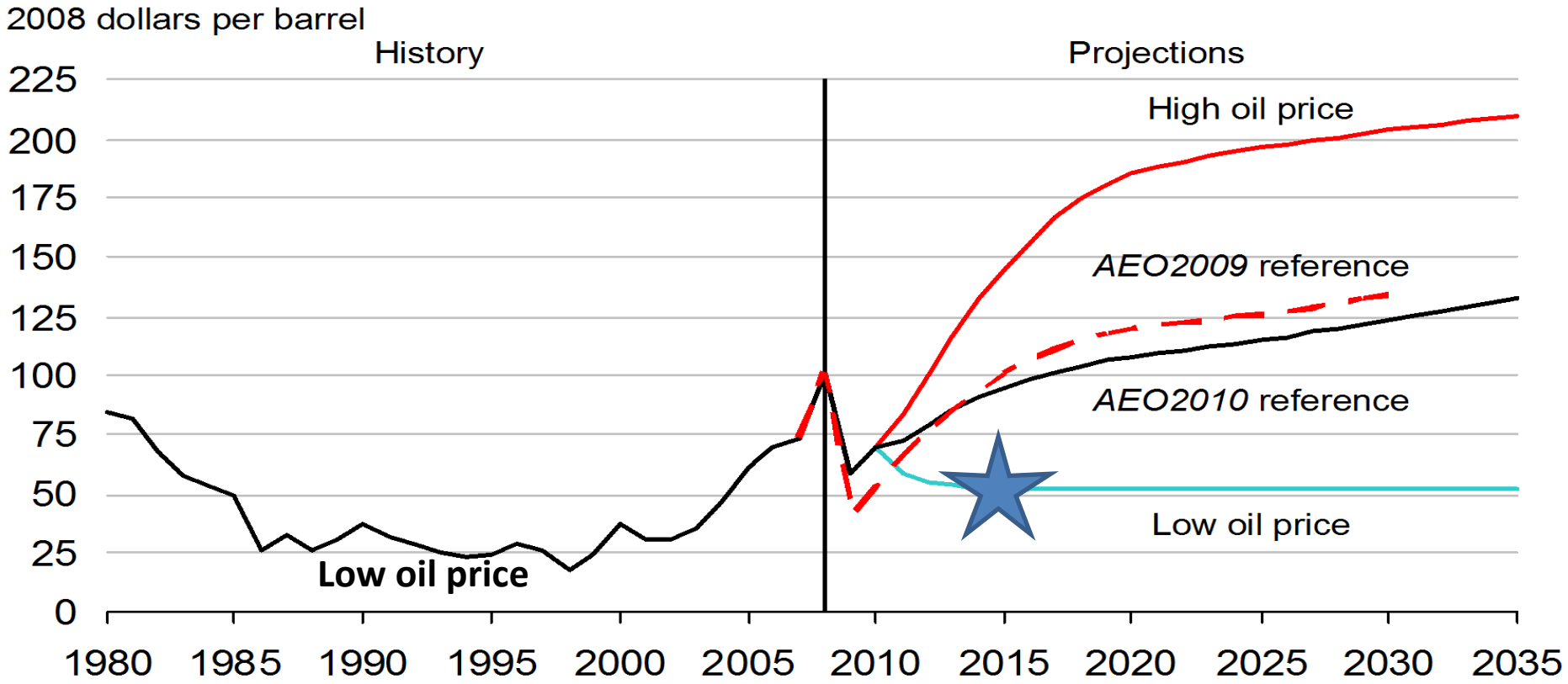
30 years of Ice loss





BRENT CRUDE @ $49.00/BARREL

Oil prices in the reference case rise steadily; the full *AEO2010* will include a wide range of prices



Source: *Annual Energy Outlook 2010*

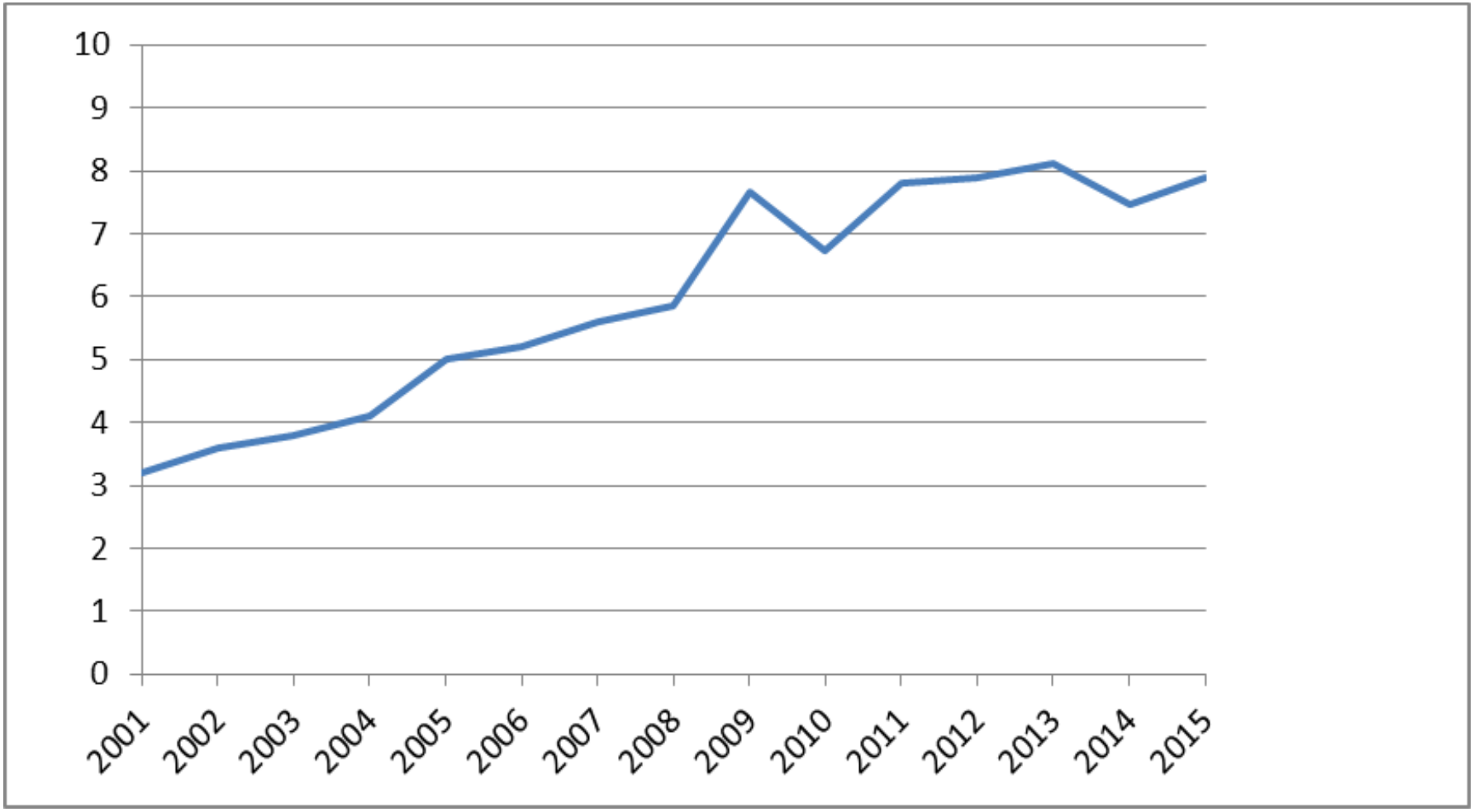
NAB Fuel Prices September 9, 2015

	Gasoline/G	Stove Oil/G	Propane/23G	Kwh (1-500)	KwH (500-700)
Kotzebue	$5.99	$5.65	$198.28	$0.18	$0.45
Ambler	$10.75	$11.00	$285.00	$0.21	$0.61
Kobuk	$10.03	$9.53	$270.00	$0.21	$0.60
Shungnak	$10.50	$9.00	$330.00	$0.21	$0.60
Kiana	$6.50	$6.00	$270.00	$0.20	$0.57
Noorvik	$6.72	$6.23	$278.00	$0.20	$0.57
Selawik	$7.75	$7.50	$264.55	$0.20	$0.52
Buckland	$6.80	$6.80	$271.00	$0.20	$0.48
Deering	$6.75	$6.75	$285.00	$0.32	$0.71
Kivalina	$5.74	$5.85	$285.00	$0.20	$0.56
Noatak	$9.99	$9.99	$311.00	$0.21	$0.75

Source : Retail Outlets (Fuel projects & Stores) in each village

Kotzebue pricing	**Crowley**		**Vitus Marine**	
	$ Drum	**$ Gallon**	**$ Drum**	**$ Gallon**
Stove oil	**299.48**	**5.65**	**285.14**	**5.38 (ULSD sold as stove oil)**
ULSD cost	**326.93**	**6.17**	**285.14**	**5.38**
Gasoline	**317.66**	**5.99**	**302.63**	**5.71**

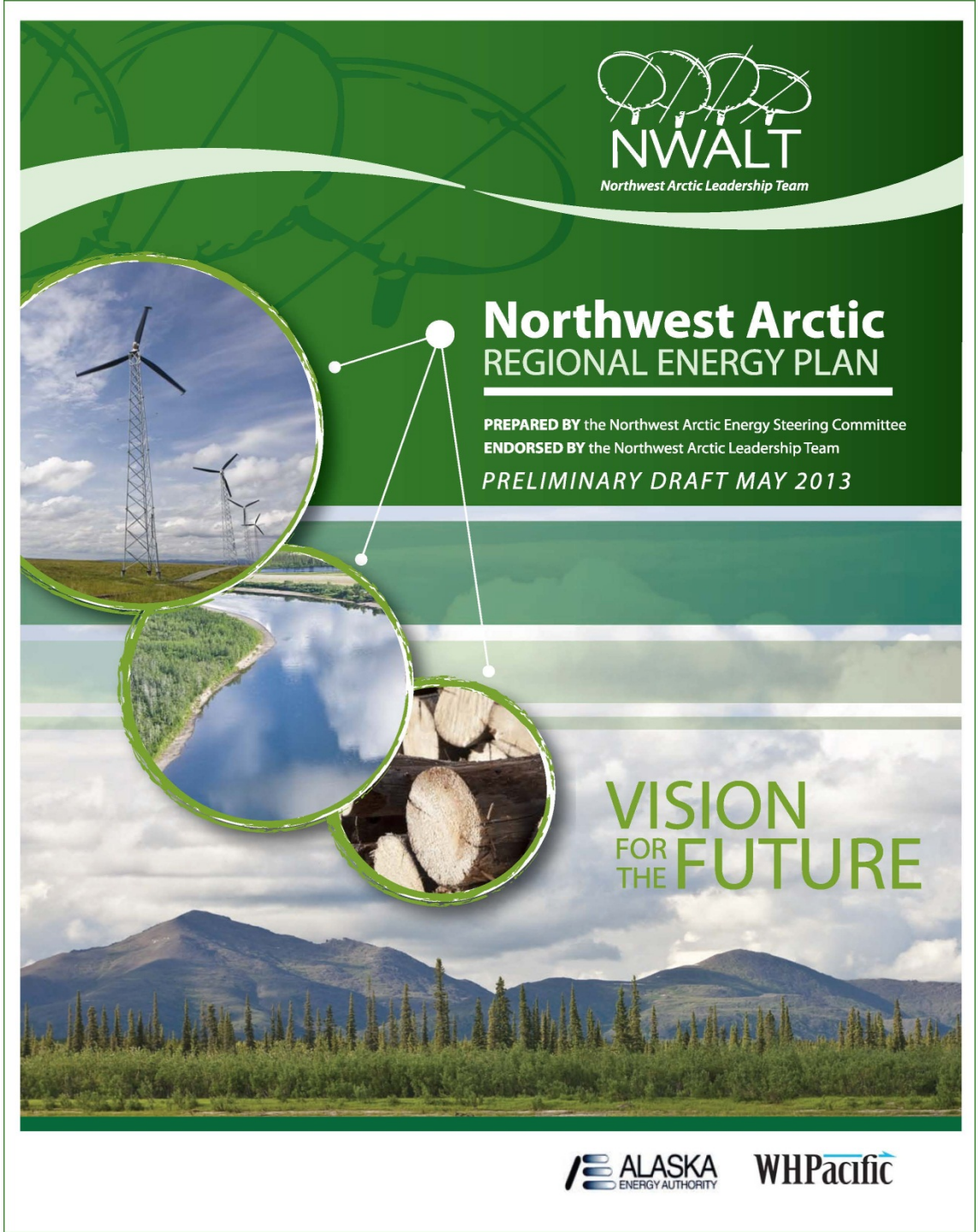
Regional Average Stove oil prices over time
Near 100 % increase 2001-2009



Energy planning

Started in

2008-2009



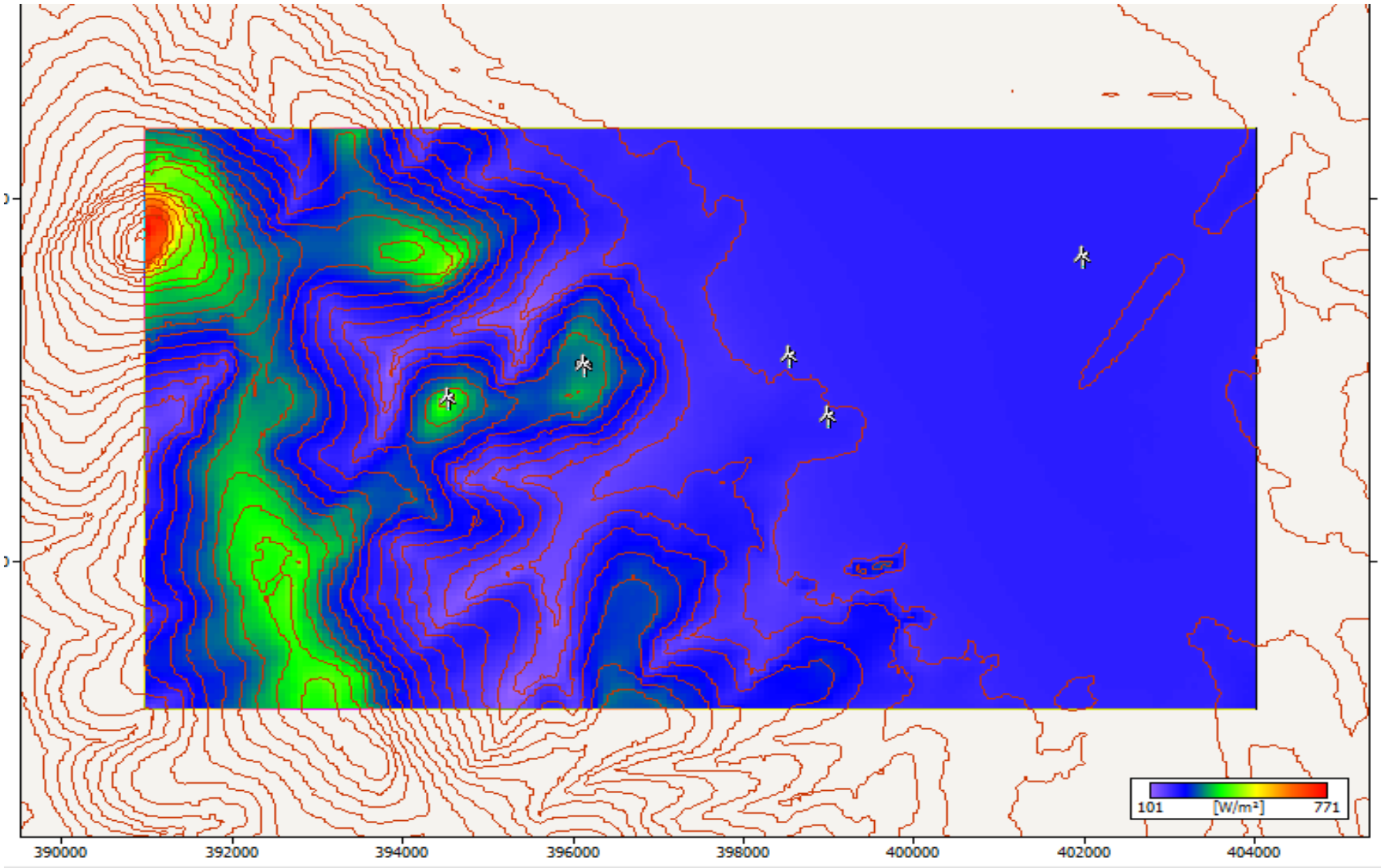
Energy Efficiency projects

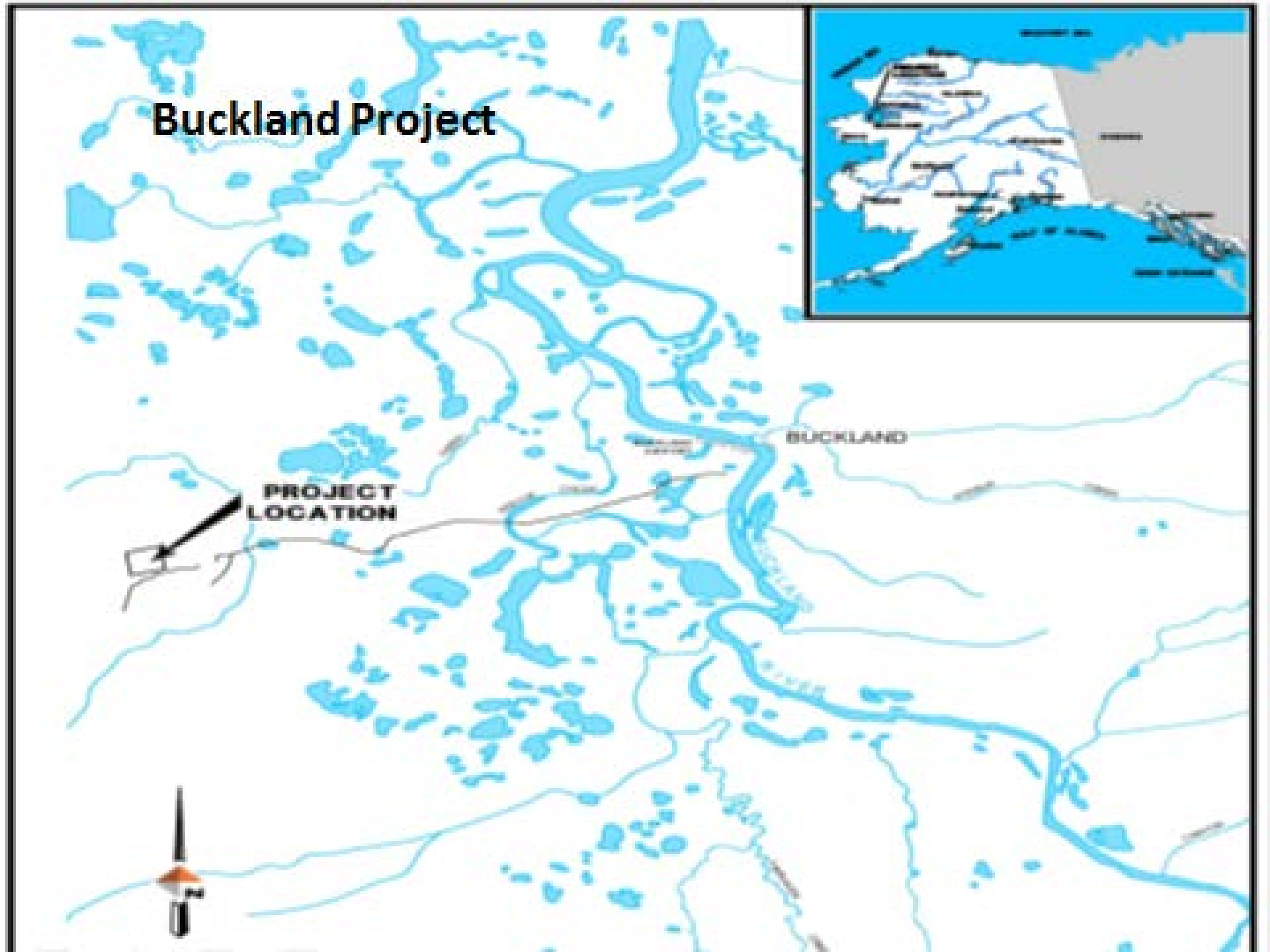
Rural Alaska Community Action Program, Inc.'s

Energy Wise Program

Buckland, Deering & Noorvik Wind Diesel Project 2009-2015

Relative Wind strength




Buckland Project
BUCKLAND
PROJECT
LOCATION
N

Turbine specifics

- 2pc. Northern Power 100 ARCTIC -24
- Design Class Class S (air density 1.34 kg/m^3, average annual wind below 8.3 m/s, 50-yr peak gust below 56 m/s)
- Design Life 20 years
- Hub Height 37 m (121 ft)
- Rotor Diameter 24 m (79 ft)
- Rated Electrical Power 100 kW, 3 Phase, 480 VAC, 60 Hz
- Cut-In Wind Speed 3.5 m/s (7.8 mph)
- Gearbox Type No gearbox (direct drive)
- Generator Type Permanent magnet, passively cooled
- Apparent Noise Level 55 dBA at 30 meters (98 ft)

Estimated Savings for Buckland

Two Northern Power 100-24-Artic

Hub height 37m

Wind Energy recoverable 466,826 Kwh

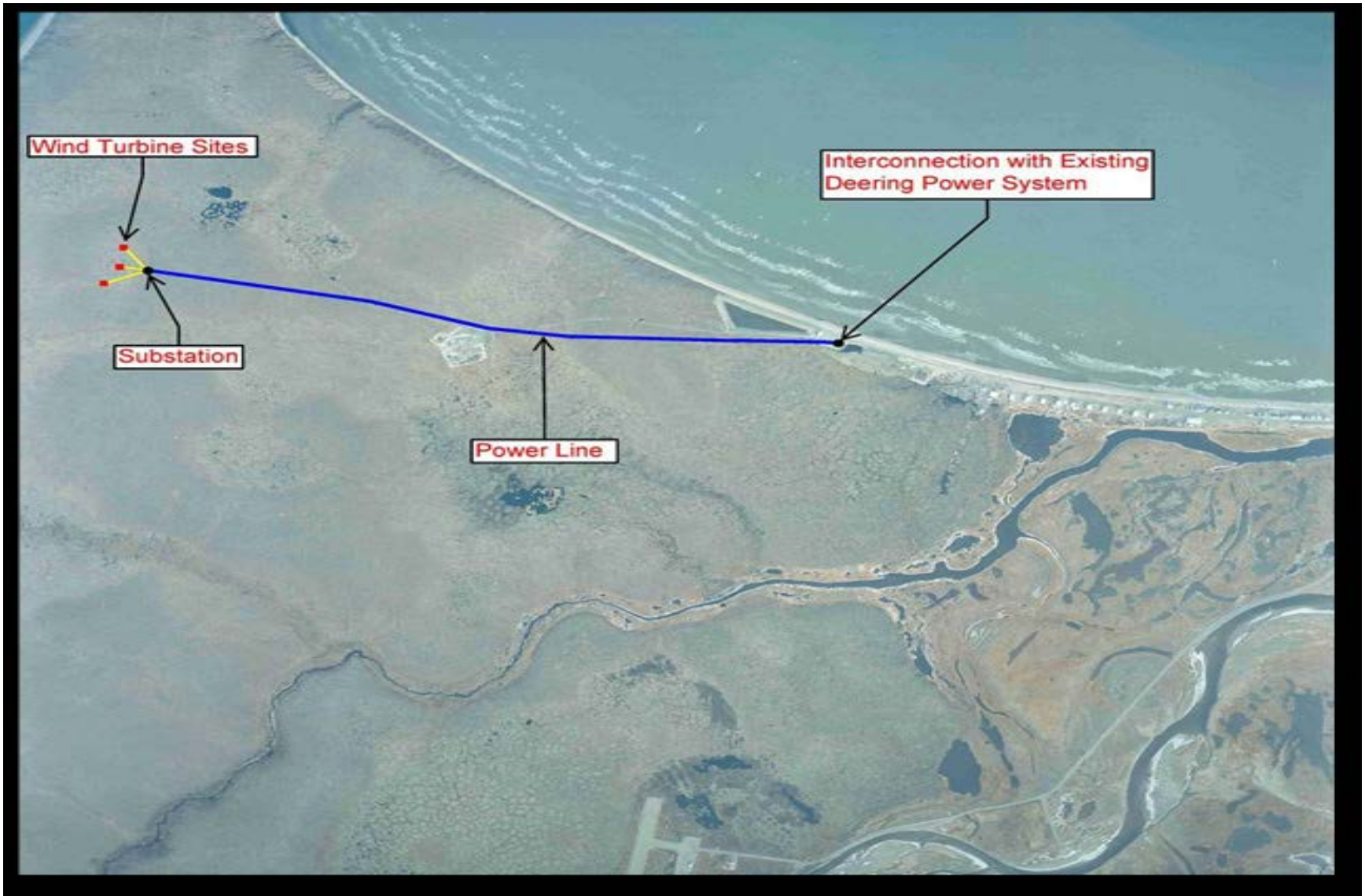
Diesel and heating fuel displaced 25,751 Gallons

Savings per year in $ 117,682.00

Construction summer-fall of 2014

STG inc. is the Contractor.

Deering Wind Site



Estimated Savings for Deering

One Northern Power 100-24-Artic

Hub height 23m

Wind Energy recoverable 209,696 Kwh

Diesel and heating fuel displaced 17,485 Gallons

Savings per year in $ 79,950.00

Construction planned for winter 2014-2015

From our Energy Planning
2 points stood out

- That the most important thing in a healthy community, is a functional, sustainable and affordable Water and Sewer system.

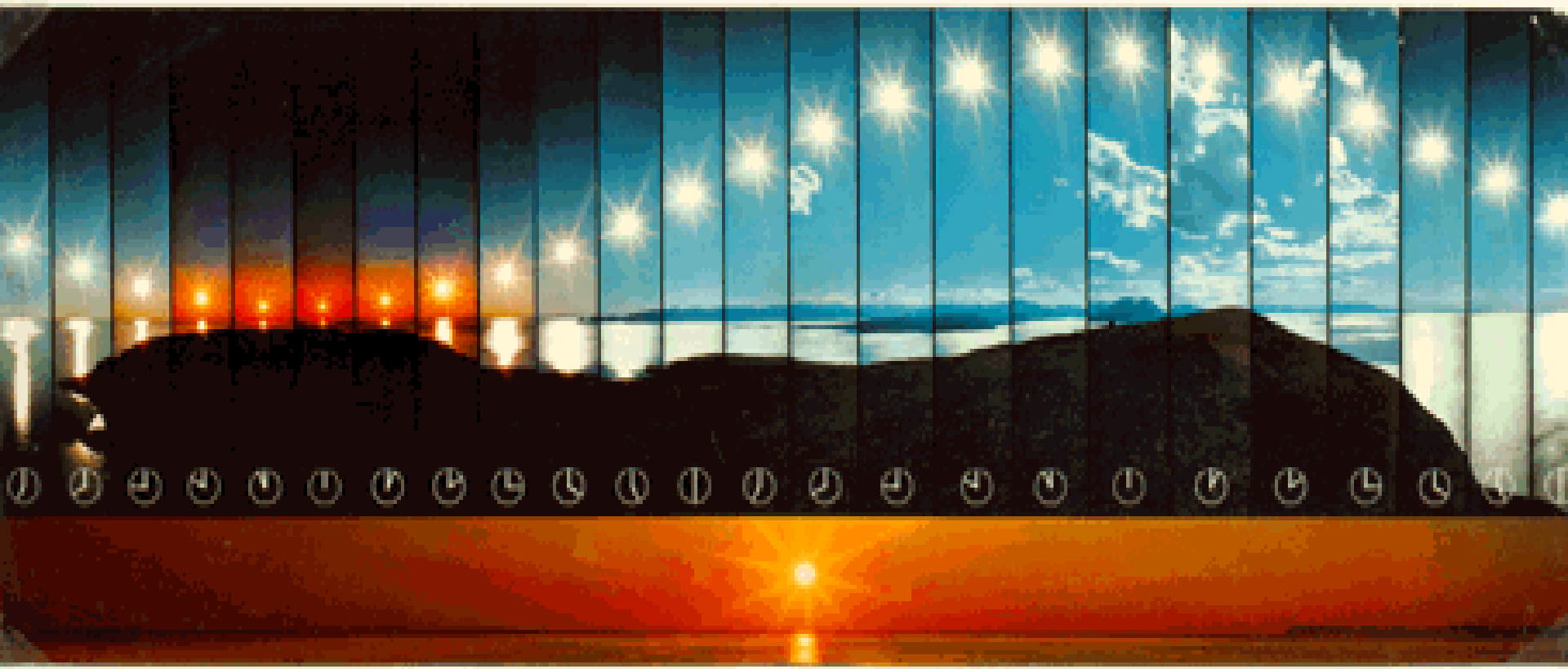
- Also recognized was; that the local “governments” needs to be sustainable and needs to be Energy efficient.

Cost of Water/sewer/month

• Kotzebue	$ 150.00	
• Ambler	$ 175.00	
• Kobuk	$ 200.00	
• Shungnak	$ 140.00	
• Kiana	$ 140.00	
• Selawik	$ 250.00	
• Noorvik	$ 150.00	
• Buckland	$ 175.00	Partial system
• Deering	$ 80.00	Washeteria
• Noatak	$ 138.00	
• Kivalina	$ 1.50 for 33 G	Washeteria

Arctic circle sun at Kotzebue summer solstice

The Households are using the Water/Sewer System primarily during the day



2012 NAB Synergy project

- Borough population: 7,810
- Electricity for village water / sewer plants
- Launched in Ambler, replicating across borough
- 10,000 kWh/year from 10 kW array
- Peak production April-June
- Long sunlight hours in summer + 30% reflection from snow-covered ground in spring
- 12.8 year payback

Photos: Northwest Arctic Borough

Powering water treatment facilities with renewable energy

Goals.

The Synergy projects goals are :

- **To offset as much electricity as possible without reversing the electric meter.**
  (No Net metering is available)

- **Create as broad as possible power curve, to make smaller impact on generators and also match Community usage.**

Project Scope

- **To install a 10 Kw Fixed solar-PV array on or adjacent to each Water-sewer plant to off-set energy usage.**
- **Yearly electricity offset per array 9,360 Kwh @ an average of $ 0.70/Kwh gives $ 6,552.00/plant**
- **Yearly Savings for the Region (12 plants)**

  $ 78,624.00
- **Project lifetime 25 years, Cost $ 75,000.00/plant**
- **Pay back 11.5 Years**
- **Diesel Fuel not needed over 25 Years 208,000 Gallons**

Ambler 45 Deg Solar PV array 8.4 kw

2 DC strings.

- **Sharp 240w modules**
- **2pc 8 panels**
- **2pc 9 panels**
- **10 Kw inverter**

Status

NORM

Power Right Now

0.0
kW

Energy Generation

TODAY	LIFETIME
38.0 kWh	13.0 MWh

Yahoo! Weather
near Ambler, AK United States

14 °F
Fair

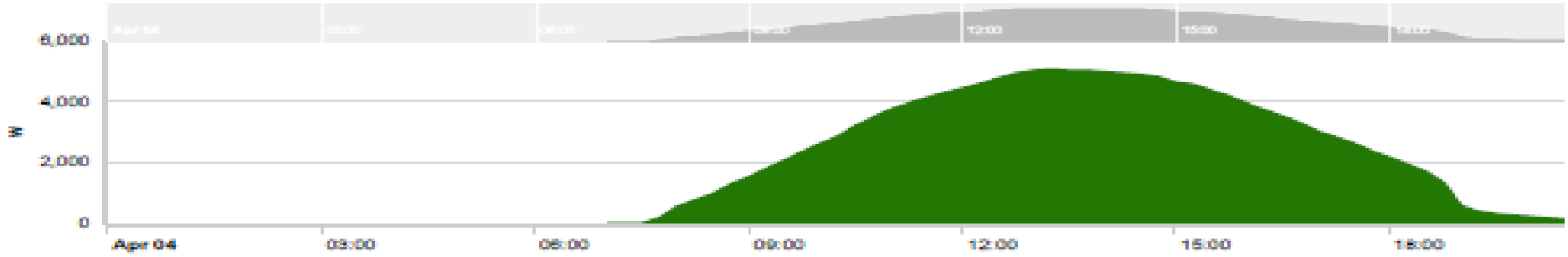
Atmosphere
Humidity: 68%
Pressure: 2.50 '
Visibility: 10.00 mi

Wind
Speed: 10.00 MPH
Direction: 20

Power

1D | 7D | 30D | 12M | WTD | MTD | YTD

Apr 04, 2015 - Apr 04, 2015



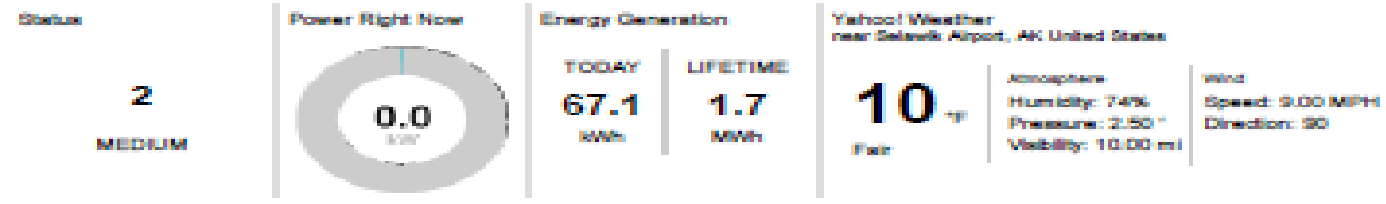
Solar PV array
Selawik and Deering

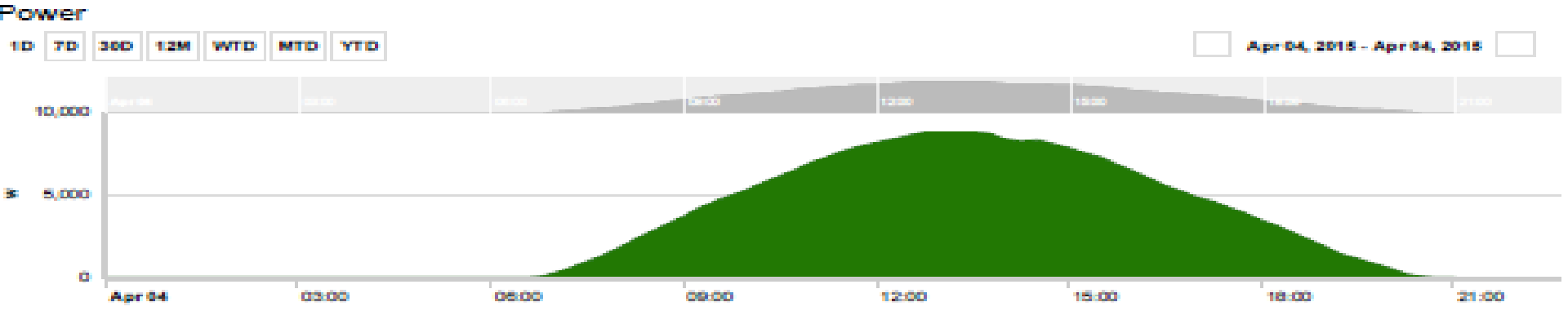
90 deg configuratiom

180 deg configuration

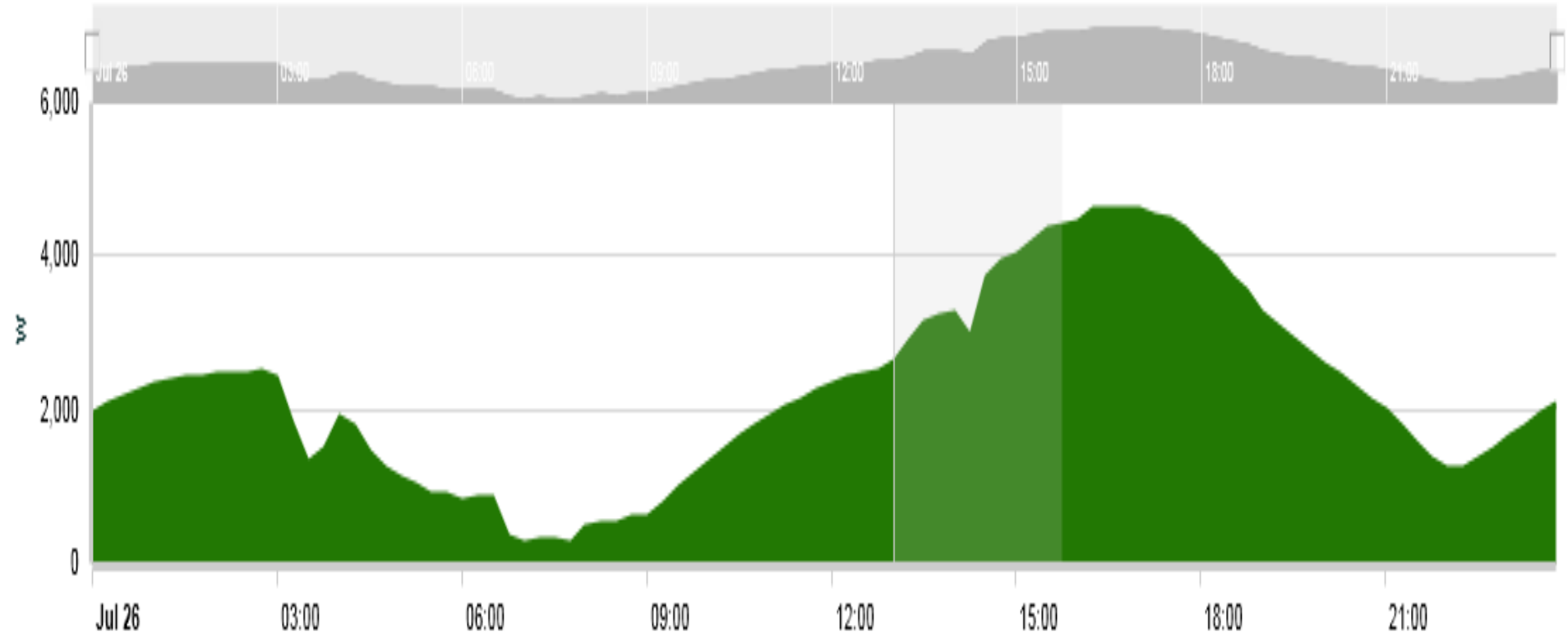
Selawik 90 Deg. Solar Array 9.72 Kw

Individual ABB
Micro inverters
Solar world 270w
36 Modules





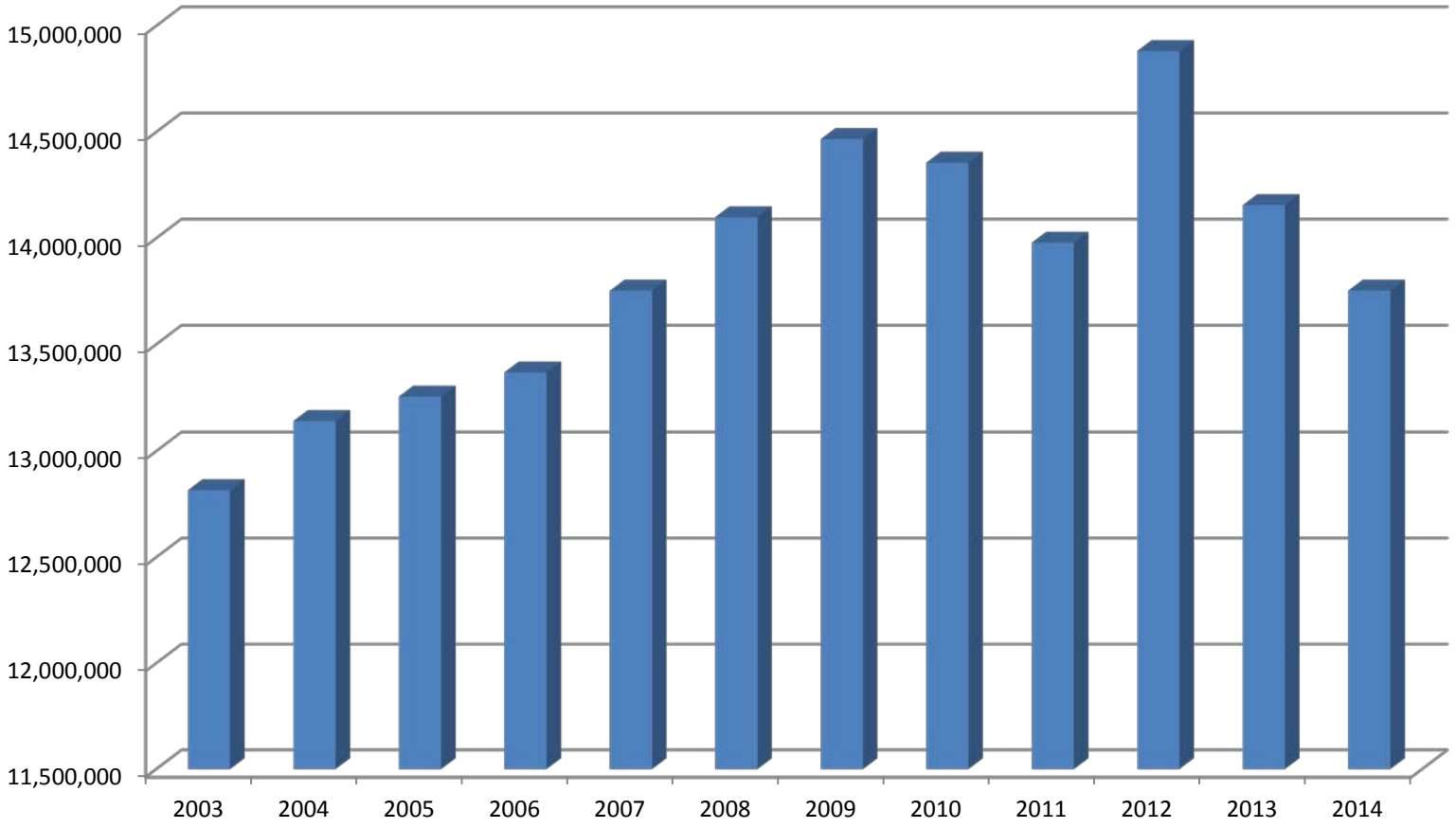
Continuous Solar input from Noatak Array



Synergy project performance as of Sep. 2015

Community	installed	installed size Kw	production MWh Since comm	Current $/Kwh retail	Value $	CO 2 offse lb	Disel offset Gallon	Cost $	Cost/watt installed	Average Performance Kwh/day
										9/17/2015
Ambler	3/1/2013	8.4	16.8	0.67	$11,256.00	49,412	1244.44	75,000	8.928571	18.06451613
Ambler IRA	3/1/2013	2.2	5.8	0.67	$3,886.00	17,059	429.63	25,000	11.36364	6.23655914
Kobuk	3/1/2013	7.38	10.12	0.73	$7,387.60	29,765	749.63	75,000	10.1626	10.88172043
Shungnak	10/1/2013	7.5	9.5	0.73	$6,935.00	27,941	703.70	75,000	10	13.26815642
Noorvik	10/1/2013	12	12.8	0.55	$7,040.00	37,647	948.15	75,000	6.25	17.87709497
Noatak	11/1/2013	11.27	14.9	0.78	$11,622.00	43,824	1103.70	75,000	6.654836	21.75182482
Deering	11/1/2013	11.55	16.5	0.71	$11,715.00	48,529	1222.22	75,000	6.493506	24.08759124
Kotzebue-1	10/15/2014	10.53	3.27	0.45	$1,471.50	9,618	242.22	83,000	7.882241	9.703264095
Kotzebue-2	11/10/2014	10.53	2.54	0.45	$1,143.00	7,471	188.15	83,000	7.882241	8.167202572
Selawik	11/20/2014	9.72	8.1	0.51	$4,131.00	23,824	600.00	83,000	8.539095	26.910299
Kiana	8/13/2015	10.53	2.6	0.56	$1,456.00	7,647	192.59	83,000	7.882241	74.28571429
Buckland		10.53		0.47	$0.00	0	0.00	83,000	7.882241	0
Kivalina		10.53		0.55	$0.00	0	0.00	83,000	7.882241	0
Total		122.67	102.93		$68,043.10	302,735	7624.44	973,000	8.292573	231.2339431

Electric usage Region wide



Goals

- **Continue to work with the Regional plan,**
- **It is the “vision” for the future.**
- **Make sure the document gets updated periodically as it is a “dynamic” living document and needs to be able to “Adapt” to changes..**

Challenges

- Sustainability of a project
- Sustainability of the Community infrastructure
- Getting all Stakeholders to agree on what to develop.
- Finding ways to fund the projects.

Adaptability & Lessons learned

- Make a sustained effort, and realize that change comes slowly, with understanding of new ways of operation.
- Realize that the Energy plan is “dynamic”, and needs to be revised, as new Energy sources or thinking comes along. It will hopefully **never** be completed.
- As you get projects up and running use them for education and Community participation.

Energy Policy

- **What is needed is a “clear” Vision for the future, from the people, for the people.**

- **Do we develop Energy resources for short time profits ?**
- **Or do we develop Energy resources that can sustain the Planet for the foreseeable future and create a “cleaner” environment for our Children ?**

Energy Policy

The Policy also needs to be;

- **Sustainable/Resilient**
- **Comprehensive**
- **Able to Adapt to changing times**


Eric Lefranc/Solentnews

- *It is not the strongest of the species that survives,*
- *nor the most intelligent that survives.*
- *It is the one that* ***adapt*** *to change that survives.*

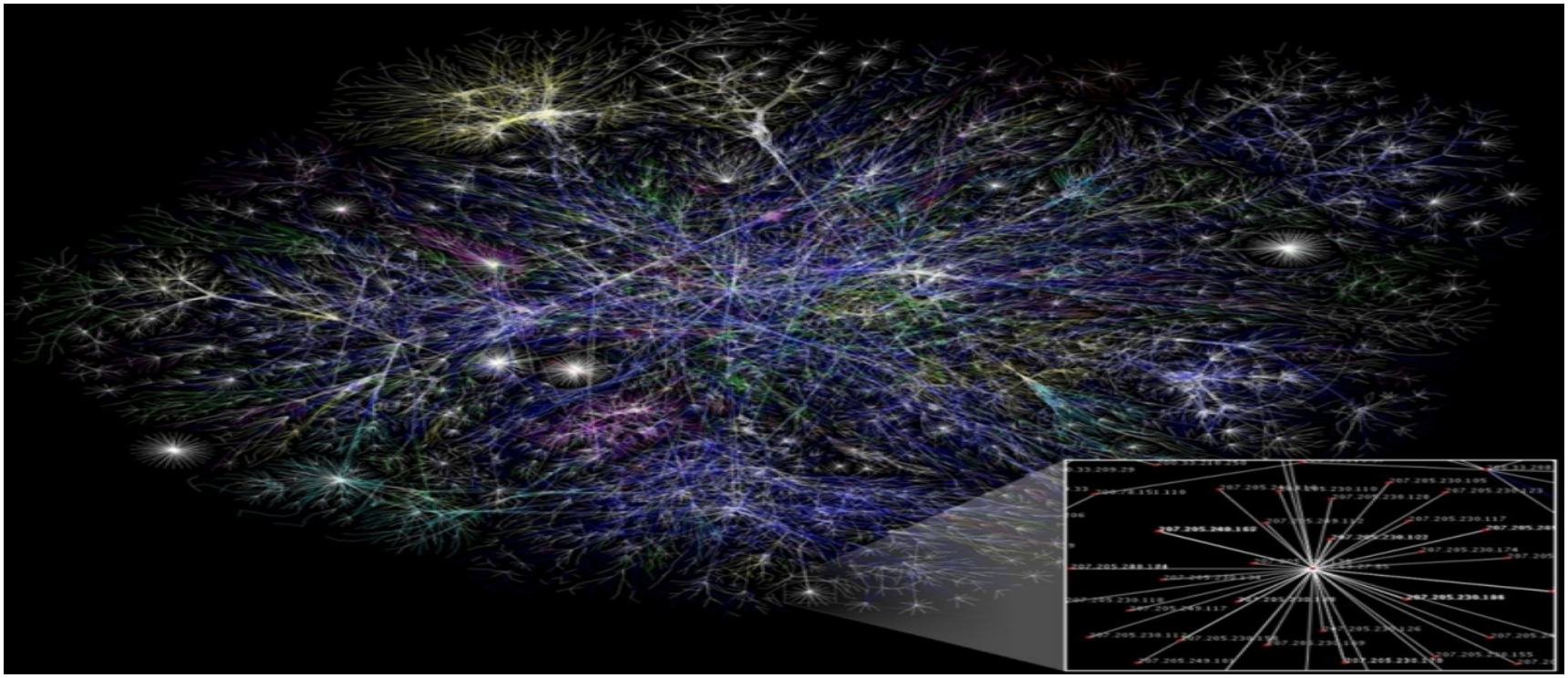
Darwin

We are still all in the same boat using our Energy to go somewhere….

We just need to go in the same direction

Where do we go next
Maybe Heatpumps

Let’s Network



Thank you, Questions ?

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