

# Interior Issues Council Cost-of-Energy Taskforce

- Fairbanks pulling together and asking the tough questions to find an energy solution.
- Partnering with: FEDCO, utility, industry, environmental community, University of Alaska – Fairbanks, CCHRC, government
- Finding common ground in a diverse group.

# Energy Taskforce Process

- Recharge Existing Taskforce and add new impassioned members
- Identify Issues to be addressed
- Form workgroups
- Create Business Plan

# IIC Energy Taskforce Members

Chair: Steven Haagensohn

Frank Abegg

Henry Cole

Ryan Colgan

John Davies

Jim Dodson

Mark Elliot

Hugh Fate

Lori Fickus

Jack Hebert

Dave Hoffman

Gwen Holdman

Sue Hull

Bernie Karl

Kate Lamal

Carol Lewis

Eric Lidji

Karl Monetti

Paul Morgan

Mike Musick

Paul Parks

Lena Perkins

Cassie Pinkel

William Sackinger

Rick Solie

Jomo Stewart

David Van Den Berg

Jeff Werner

Dan Wells

Dan White

# Issues to be Resolved

<b>Issue</b>	
PM2.5	Particulate matter under 2.5 microns
Municipal Waste	Paper, plastics, tires, wood and metals
Cost of Energy	Our original goal: “Reduce the cost of energy”
Sustainability	Fuel for the 100 year plus timeframe
Global Warming	CO2 reduction
Green Energy	Helping ourselves and others meet an RPS
Economic Development	Local jobs, economic diversification and growth
Wildfire Mitigation	Fire buffers around populated areas
Compatible Products	Use FT fuels in existing infrastructure
Fuel Supply	Fuel that is vertically integrated, economic, long-term stable priced and sustainable

# Looming Energy Issues

<b>Scenario</b>	<b>Issue</b>
TAPS	Pipeline could shut down by 2014 – low volume
Anchorage Gas Supply	Anchorage could run out of gas by 2011
Bullet Line	Line not built till 2011
Natural Gas Pipeline	Line not built till 2017-2022
Kenai gas supply	No additional gas found
Aging Generation	1,000 MW to be replaced in next 10 years
Cost of crude oil	Crushing the economy throughout Alaska
Joint Utility Planning	Multiple directions and goals

# Workgroups

<b>ALTERNATIVE</b>	<b>Chair</b>
Waste-to-Energy	Ryan Colgen
Biomass	Gwen Holdmann
Gasification	Dave Hoffman
Fischer-Tropsch	Paul Park
Hydroelectric	John Davies
Geothermal	Dan White
Distributed Generation	Jack Hebert
Conservation/ Efficiencies	Rich Seifert
Modeling	Henry Cole

# Strategic Business Planning

<b>Business Plan Components</b>	<b>Status</b>
Executive Summary	Need one page abstract
Marketing Plan	Lower cost of total energy strategy
SWOT Analysis	Completed in draft
Services and Products	Syngas, electricity, FT fuels
Structure and Organization	Non-profit or low profit
Financials	High level to verify lower costs
Contingencies	Alternative uses for Syngas
Exit Strategy	Alternative markets



Units	Measure	Gross BTU's (billions)	efficiency %	Net BTU's (billions)		Net BTU's (Billions)	% of Source
<b>ELECTRIC</b>							
-	gal	PETROLEUM: HAGO	-	30%	-		
73,000	gal	LAGO	14	18%	2	1,086	27%
-	gal	Diesel	-	38%	-		
22,616,683	gal	Naphtha	2,594	48%	1,247		
215,000	tons	COAL: HLP	2,580	27%	707		
146,500	tons	AE	2,051	27%	562	4,638	72%
-	tons	UAF	-	27%	-		
4,100,000	mcf	NATURAL GAS/SynGas: N Anchorage Basin	4,100	36%	1,473		
-	mcf	S North Slope: Frame 7	-	30%	-	1,097	52%
-	mcf	S North Slope: LM6000	-	48%	-		
62,250,000	kwh	HYDROELECTRIC: Bradley Lake	224	95%	212	6,821	54%
-	kwh	Susitna	-	95%	-		
-	kwh	GEOTHERMAL:	-	90%	-		
			11,563		4,204	4204	
<b>SPACE HEATING</b>							
49,000,000	gal	PETROLEUM: Heating Fuel	6,762	85%	5,748		
-	gal	FT Heating Fuel	-	85%	-		
700,000	mcf	NATURAL GAS: Anchorage: LNG	700	85%	595	1,588	40%
-	mcf	North Slope: LNG	-	85%	-		
-	gal	Propane	-	85%	-		
25,000	ton	COAL: AE	350	30%	105	1,215	19%
-	ton	UAF	-	30%	-		
1,000	cord	WOOD:	17		-		
3,600,000	kwh	ELECTRIC:	12	100%	12	479	23%
6,343			7,842		6,460	6460	26%
<b>TRANSPORTATION</b>							
18,000,000	gal	PETROLEUM: Diesel	2,484	43%	1,068		
33,500,000	gal	Gasoline	4,164	25%	1,041		
-	gal	FT Diesel	-	43%	-		
-	gal	FT Gasoline	-	25%	-		
			6,648		2,109	2109	
<b>RESIDENTIAL</b>							
<b>COMMERCIAL</b>							
<b>INDUSTRIAL</b>							
						2,471	20%
						12,574	100%

Cost per unit	Unit	Measure	Total Dollars	Costs per mmmBTU	
\$ 2.10	-	gal			<b>ELECTRIC</b> includes O&M and I&D Capital Cost: \$ 120,000,000 Interest: 6% Life (years): 35 Int. & Depr.: \$ 10,628,571 Ops. & Maint.: \$ -
\$ 2.37	73,000	gal	\$ 173,010	\$ 12,343.91	
\$ 2.37	-	gal	\$ -	\$ -	
\$ 1.96	22,616,683	gal	\$ 44,328,699	\$ 17,088.06	
\$ 23.00	215,000	tons	\$ 4,945,000	\$ 1,916.67	
\$ 20.00	146,500	tons	\$ 2,930,000	\$ 1,428.57	
\$ 30.00	-	tons	\$ -	\$ -	
\$ 6.25	4,100,000	mcf	\$ 25,625,000	\$ 6,250.00	
\$ 6.21	-	mcf	\$ -	\$ -	
\$ 6.21	-	mcf	\$ -	\$ -	
\$ 0.042	62,250,000	kwh	\$ 2,614,500	\$ 11,690.59	
\$ 0.0558	-	kwh	\$ -	\$ -	
\$ 0.0571	-	kwh	\$ -	\$ -	
			\$ 80,616,209		

Cost per unit	Unit	Measure	Total Dollars	Costs per mmmBTU		
\$ 2.71	49,000,000	gal	\$ 132,790,000	\$ 19,637.68	<b>SPACE HEATING</b> Capital Cost: \$ - Interest: 6% Life (years): 35 Int. & Depr.: \$ - Ops. & Maint.: \$ -	
\$ 1.66	-	gal	\$ -	\$ -		
\$ 6.25	700,000	mcf	\$ 4,375,000	\$ 6,250.00		
\$ 7.00	-	mcf	\$ -	\$ -		
\$ 7.00	-	gal	\$ -	\$ -		
\$ 20.00	25,000	ton	\$ 500,000	\$ 1,428.57		
\$ 125.00	1,000	cord	\$ 125,000	\$ 7,183.91		
\$ 0.136	3,600,000	kwh	\$ 489,600	\$ 39,847.64		
			\$ 138,279,600			

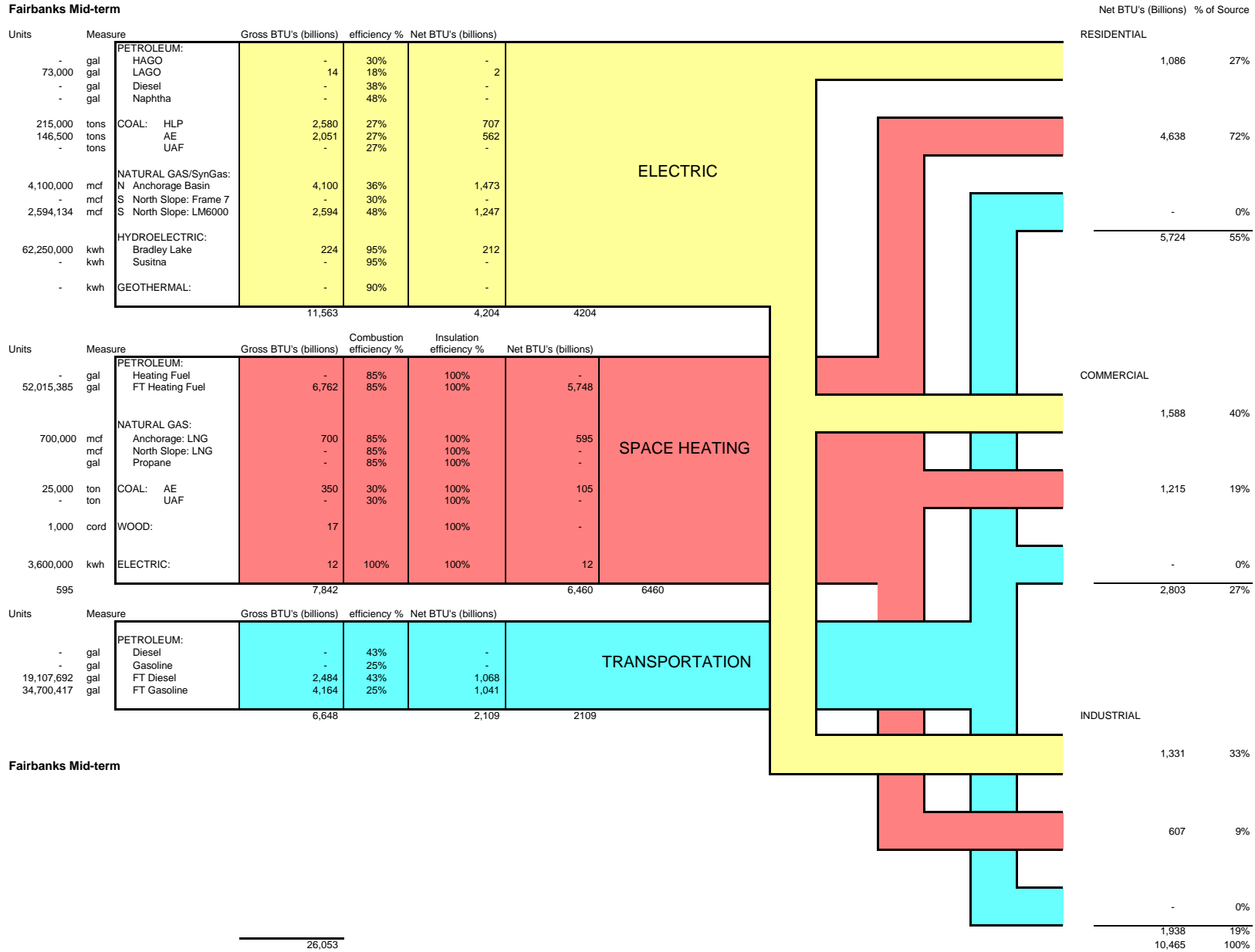
Cost per unit	Unit	Measure	Total Dollars	Costs per mmmBTU	
\$ 3.03	18,000,000	gal	\$ 54,540,000	\$ 21,956.52	<b>TRANSPORTATION</b>
\$ 2.91	33,500,000	gal	\$ 97,451,500	\$ 23,403.06	
\$ 1.86	-	gal	\$ -	\$ -	
\$ 1.80	-	gal	\$ -	\$ -	
			\$ 151,991,500		

\$ 370,887,309

Total Fuel Costs	% of total	35,371 Households	35,371 Households BASE CASE	% change
RESIDENTIAL				
\$ 46,383,040	27%	\$ 1,311	\$ 1,311	0.0%
\$ 99,277,662	72%	\$ 2,807	\$ 2,807	0.0%
\$ 79,062,989	52%	\$ 2,235	\$ 2,235	0.0%
\$ 224,723,691	52%	\$ 6,353	\$ 6,353	0.0%
COMMERCIAL		6,295 business	6,295 business BASE CASE	
\$ 58,393,701	40%	\$ 9,276	\$ 9,276	0.0%
\$ 26,001,292	19%	\$ 4,130	\$ 4,130	0.0%
\$ 34,539,943	23%	\$ 5,487	\$ 5,487	0.0%
\$ 118,934,937	27%	\$ 18,894	\$ 18,894	0.0%
INDUSTRIAL		4 business	4 business BASE CASE	
\$ 39,645,645	33%	\$ 9,911,411.24	\$ 9,911,411.62	0.0%
\$ 13,000,646	9%	\$ 3,250,161.54	\$ 3,250,161.54	0.0%
\$ 38,388,567	25%	\$ 9,597,141.84	\$ 9,597,141.84	0.0%
\$ 91,034,858	21%	\$ 22,758,714.62	\$ 22,758,714.99	0.0%
\$ 434,693,486	100%	Yearly Savings	\$ 5	

Units	Measure	Gross BTU's (billions)	pounds per mmmBTU	Total pounds of CO2		Total pounds of CO2	% of Source		
					<b>ELECTRIC</b>	<b>RESIDENTIAL</b>			
-	gal		159,660	-			508,304,233	27%	
73,000	gal	14	159,660	2,237,765					
-	gal	-	159,660	-					
22,616,683	gal	2,594	159,660	414,179,361					
215,000	tons	2,580	211,910	546,727,800			891,409,954	72%	
146,500	tons	2,051	211,910	434,627,410					
-	tons	-	211,910	-					
4,100,000	mcf	4,100	116,390	477,199,000			640,037,003	61%	
-	mcf	-	101,259	-					
-	mcf	-	101,259	-					
62,250,000	kwh	212	0	-		2,039,751,190	49%		
-	kwh	-	0	-					
-	kwh	-	0	-					
-	kwh	-	0	-					
				11,552	1,874,971,336				
					<b>SPACE HEATING</b>	<b>COMMERCIAL</b>			
49,000,000	gal	6,762	159,660	1,079,620,920			743,600,802	40%	
-	gal	-	159,660	-					
700,000	mcf	700	116,390	81,473,000			233,464,512	19%	
-	mcf	-	116,390	-					
-	gal	-	138,750	-					
25,000	ton	350	211,910	74,168,500			190,890,825	18%	
-	ton	-	211,910	-					
1,000	cord	17	250,000	4,350,000			1,167,956,139	28%	
-	cord	-	250,000	-					
3,600,000	kwh	12	162,313	1,994,302					
				7,842	1,241,606,722				
					<b>TRANSPORTATION</b>	<b>INDUSTRIAL</b>			
18,000,000	gal	2,484	159,660	396,595,440			623,066,302	33%	
33,500,000	gal	4,164	154,910	645,052,986					
-	gal	-	159,660	-					
-	gal	-	154,910	-					
-	gal	-	154,910	-					
				6,648	1,041,648,426				
Excludes:									
Fuel used at the refineries									
Military fuel usage									
Aviation fuel usage.									
				26,041	4,158,226,484	950,519,155	23%		
						4,158,226,484	100%		

**Fairbanks Mid-term**



**Fairbanks Mid-term**

Cost per unit	Unit	Measure	Total Dollars	Costs per mmmBTU	
\$ 2.10	-	gal	\$ -	\$ -	CAPITAL COST: \$ 120,000,000 Interest: 6% Life (years): 35 Int. & Depr.: \$ 10,628,571 Ops. & Maint.: \$ -
\$ 2.37	73,000	gal	\$ 173,010	\$ 12,343.91	
\$ 2.37	-	gal	\$ -	\$ -	
\$ 1.96	-	gal	\$ -	\$ -	
\$ 23.00	215,000	tons	\$ 4,945,000	\$ 1,916.67	<b>ELECTRIC</b> includes O&M and I&D
\$ 20.00	146,500	tons	\$ 2,930,000	\$ 1,428.57	
\$ 30.00	-	tons	\$ -	\$ -	
\$ 6.25	4,100,000	mcf	\$ 25,625,000	\$ 6,250.00	<b>ELECTRIC</b> includes O&M and I&D
\$ 6.25	-	mcf	\$ -	\$ -	
\$ 6.25	2,594,134	mcf	\$ 16,202,407	\$ 6,245.79	
\$ 0.042	62,250,000	kwh	\$ 2,614,500	\$ 11,690.59	<b>ELECTRIC</b> includes O&M and I&D
\$ 0.0558	-	kwh	\$ -	\$ -	
\$ 0.0584	-	kwh	\$ -	\$ -	<b>GEO THERMAL:</b>
			\$ 52,489,917		
Cost per unit	Units	Measure	Total Dollars	Costs per mmmBTU	
\$ 2.71	-	gal	\$ -	\$ -	CAPITAL COST: \$ - Interest: 6% Life (years): 35 Int. & Depr.: \$ - Ops. & Maint.: \$ -
\$ 1.86	52,015,385	gal	\$ 96,639,506	\$ 14,291.56	
\$ 6.25	700,000	mcf	\$ 4,375,000	\$ 6,250.00	<b>SPACE HEATING</b>
\$ 7.00	-	mcf	\$ -	\$ -	
\$ -	-	gal	\$ -	\$ -	
\$ 20.00	25,000	ton	\$ 500,000	\$ 1,428.57	<b>SPACE HEATING</b>
\$ -	-	ton	\$ -	\$ -	
\$ 125.00	1,000	cord	\$ 125,000	\$ 7,183.91	<b>SPACE HEATING</b>
\$ -	-	cord	\$ -	\$ -	
\$ 0.136	3,600,000	kwh	\$ 489,600	\$ 39,847.64	<b>SPACE HEATING</b>
\$ -	-	kwh	\$ -	\$ -	
			\$ 102,129,106		
Cost per unit	Units	Measure	Total Dollars	Costs per mmmBTU	
\$ 3.03	-	gal	\$ -	\$ -	<b>TRANSPORTATION</b>
\$ 2.91	-	gal	\$ -	\$ -	
\$ 2.18	19,107,692	gal	\$ 41,614,687	\$ 16,753.09	
\$ 2.06	34,700,417	gal	\$ 71,410,070	\$ 17,149.19	
			\$ 113,024,757		

**Fairbanks Mid-term**

\$ 267,643,780

Total Fuel Costs	% of total	35,371 Households	35,371 Households BASE CASE	% change
\$ 38,758,010	27%	\$ 1,096	\$ 1,311	-16.4%
\$ 73,323,461	72%	\$ 2,073	\$ 2,807	-26.1%
\$ 58,793,256	52%	\$ 1,662	\$ 2,235	-25.6%
\$ 170,874,726	52%	\$ 4,831	\$ 6,353	-24.0%
\$ 47,239,007	40%	\$ 7,504	\$ 9,276	-19.1%
\$ 19,203,764	19%	\$ 3,051	\$ 4,130	-26.1%
\$ 25,684,783	23%	\$ 4,080	\$ 5,487	-25.6%
\$ 92,127,553	28%	\$ 14,635	\$ 18,894	-22.5%
\$ 30,299,079	33%	\$ 7,574,769.63	\$ 9,911,411.62	-23.6%
\$ 9,601,882	9%	\$ 2,400,470.44	\$ 3,250,161.54	-26.1%
\$ 28,546,718	25%	\$ 7,136,679.50	\$ 9,597,141.84	-25.6%
\$ 68,447,678	21%	\$ 17,111,919.57	\$ 22,758,714.99	-24.8%
\$ 331,449,958	100%	Yearly Savings	\$ 103,243,533	

**Fairbanks Mid-term**

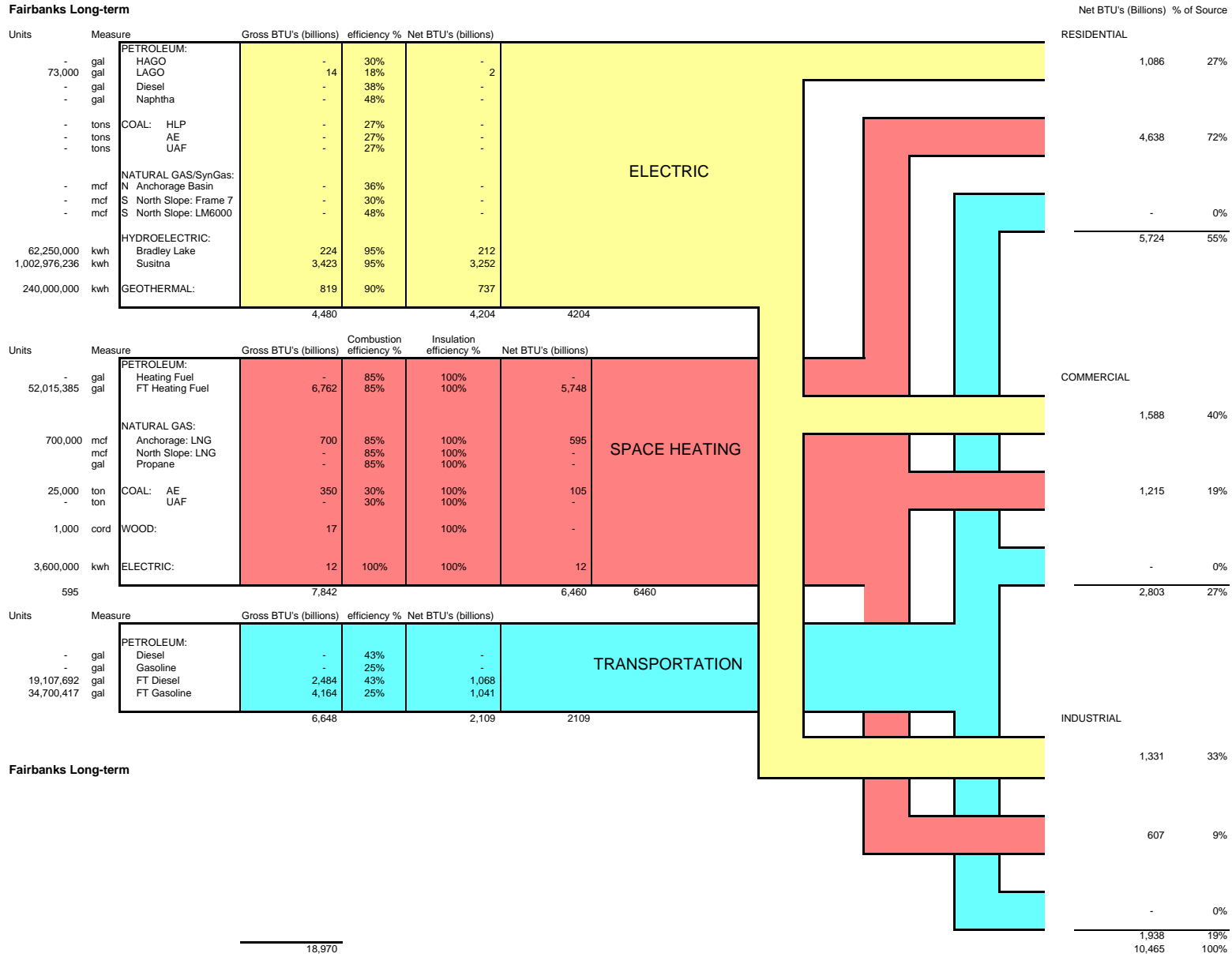
Units	Measure	Gross BTU's (billions)	pounds per mmmBTU	Total pounds of CO2		Total pounds of CO2	% of Source	
<b>RESIDENTIAL</b>								
-	gal	PETROLEUM:			<b>ELECTRIC</b>			
73,000	gal	HAGO	159,660	-			467,232,835	27%
-	gal	LAGO	159,660	2,237,765				
-	gal	Diesel	159,660	-				
-	gal	Naphtha	159,660	-				
215,000	tons	COAL: HLP	2,580	211,910		546,727,800		
146,500	tons	AE	2,051	211,910		434,627,410	938,993,497	72%
-	tons	UAF	-	211,910		-		
4,100,000	mcf	NATURAL GAS/SynGas:						
-	mcf	N Anchorage Basin	4,100	116,390		477,199,000		
-	mcf	S North Slope: Frame 7	-	101,259	-			
2,594,134	mcf	S North Slope: LM6000	2,594	101,259	262,680,142	-	0%	
62,250,000	kwh	HYDROELECTRIC:				1,406,226,332	46%	
-		Bradley Lake	212	0	-			
-		Susitna	-	0	-			
-	kwh	GEOTHERMAL:	-	0	-			
			11,552			1,723,472,118		
<b>COMMERCIAL</b>								
52,015,385	gal	PETROLEUM:			<b>SPACE HEATING</b>			
-		Heating Fuel	-	159,660		-		
-		FT Heating Fuel	7,178	159,660		1,146,059,139	683,517,248	40%
700,000	mcf	NATURAL GAS:						
-	mcf	Anchorage: LNG	700	116,390		81,473,000		
-	mcf	North Slope: LNG	-	116,390		-		
-	gal	Propane	-	138,750		-		
25,000	ton	COAL: AE	350	211,910		74,168,500	245,926,868	19%
-	ton	UAF	-	211,910		-		
1,000	cord	WOOD:	17	250,000		4,350,000		
3,600,000	kwh	ELECTRIC:	12	149,198	1,833,161	-	0%	
595			8,258			1,307,883,800	31%	
<b>INDUSTRIAL</b>								
19,107,692	gal	PETROLEUM:			<b>TRANSPORTATION</b>			
34,700,417	gal	Diesel	-	159,660		-		
-	gal	Gasoline	-	154,910		-		
-	gal	FT Diesel	2,637	159,660		421,001,306		
-	gal	FT Gasoline	4,313	154,910		668,167,391		
			6,950				1,089,168,697	
							572,722,035	33%
							122,963,434	9%
							-	0%
							695,685,469	23%
						3,031,355,918	100%	

Excludes:  
 Fuel used at the refineries  
 Military fuel usage  
 Aviation fuel usage.

26,760

4,120,524,615

**Fairbanks Long-term**



**Fairbanks Long-term**

18,970

**Fairbanks Long-term**

Cost per unit	Unit	Measure	Total Dollars	Costs per mmmBTU	
\$ 2.10	-	gal	\$ -		<b>ELECTRIC</b> includes O&M and I&D Capital Cost: \$ 120,000,000 Interest: 6% Life (years): 35 Int. & Depr.: \$ 10,628,571 Ops. & Maint.: \$ -
\$ 2.37	73,000	gal	\$ 173,010	\$ 12,343.91	
\$ 2.37	-	gal	\$ -		
\$ 1.96	-	gal	\$ -		
\$ 23.00	-	tons	\$ -		<b>ELECTRIC</b> includes O&M and I&D
\$ 20.00	-	tons	\$ -		
\$ 30.00	-	tons	\$ -		
\$ 6.25	-	mcf	\$ -		<b>ELECTRIC</b> includes O&M and I&D
\$ 6.25	-	mcf	\$ -		
\$ 6.25	-	mcf	\$ -		
\$ 0.042	62,250,000	kwh	\$ 2,614,500	\$ 11,690.59	<b>ELECTRIC</b> includes O&M and I&D
\$ 0.0558	#####	kwh	\$ 56,004,025	\$ 16,360.34	
\$ 0.0584	240,000,000	kwh	\$ 14,007,616	\$ 17,100.81	
			\$ 72,799,151		
Cost per unit	Units	Measure	Total Dollars	Costs per mmmBTU	
\$ 2.71	-	gal	\$ -		<b>SPACE HEATING</b>
\$ 1.86	52,015,385	gal	\$ 96,639,506	\$ 14,291.56	
\$ 6.25	700,000	mcf	\$ 4,375,000	\$ 6,250.00	<b>SPACE HEATING</b>
\$ 7.00	-	mcf	\$ -		
\$ 7.00	-	gal	\$ -		
\$ 20.00	25,000	ton	\$ 500,000	\$ 1,428.57	<b>SPACE HEATING</b>
\$ 125.00	1,000	cord	\$ 125,000	\$ 7,183.91	
\$ 0.136	3,600,000	kwh	\$ 489,600	\$ 39,847.64	
	595		\$ 102,129,106		
Cost per unit	Units	Measure	Total Dollars	Costs per mmmBTU	
\$ 3.03	-	gal	\$ -		<b>TRANSPORTATION</b>
\$ 2.91	-	gal	\$ -		
\$ 2.18	19,107,692	gal	\$ 41,614,687	\$ 16,753.09	
\$ 2.06	34,700,417	gal	\$ 71,410,070	\$ 17,149.19	
			\$ 113,024,757		

**Fairbanks Long-term**

\$ 287,953,013

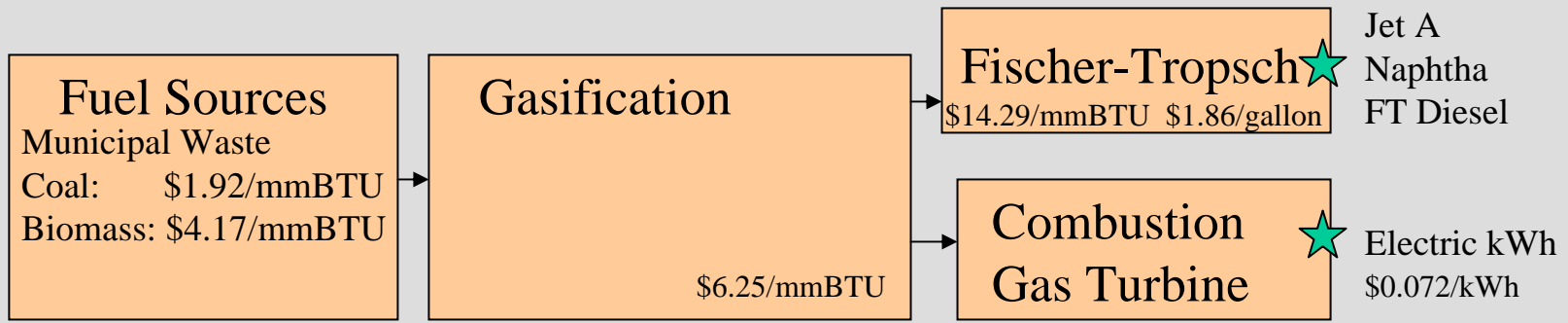
Total Fuel Costs	% of total	35,371 Households	35,371 Households BASE CASE	% change
\$ 44,263,837	27%	\$ 1,251	\$ 1,311	-4.6%
\$ 73,323,461	72%	\$ 2,073	\$ 2,807	-26.1%
\$ 58,793,256	52%	\$ 1,662	\$ 2,235	-25.6%
\$ 176,380,554	50%	\$ 4,987	\$ 6,353	-21.5%
\$ 55,293,510	40%	\$ 8,784	\$ 9,276	-5.3%
\$ 19,203,764	19%	\$ 3,051	\$ 4,130	-26.1%
\$ 25,684,783	23%	\$ 4,080	\$ 5,487	-25.6%
\$ 100,182,056	28%	\$ 15,915	\$ 18,894	-15.8%
\$ 37,047,981	33%	\$ 9,261,995.25	\$ 9,911,411.62	-6.6%
\$ 9,601,882	9%	\$ 2,400,470.44	\$ 3,250,161.54	-26.1%
\$ 28,546,718	25%	\$ 7,136,679.50	\$ 9,597,141.84	-25.6%
\$ 75,196,581	21%	\$ 18,799,145.19	\$ 22,758,714.99	-17.4%
\$ 351,759,191	100%	Yearly Savings	\$ 82,934,300	

**Fairbanks Long-term**

Units	Measure	Gross BTU's (billions)	pounds per mmmBTU	Total pounds of CO2		Total pounds of CO2	% of Source
<b>ELECTRIC</b>							
-	gal	PETROLEUM:					
-	gal	HAGO	-	159,660	-		
73,000	gal	LAGO	14	159,660	2,237,765		
-	gal	Diesel	-	159,660	-		
-	gal	Naphtha	-	159,660	-		
-	tons	COAL:					
-	tons	HLP	-	211,910	-		
-	tons	AE	-	211,910	-		
-	tons	UAF	-	211,910	-		
-		NATURAL GAS/SynGas:					
-	mcf	N Anchorage Basin	-	116,390	-		
-	mcf	S North Slope: Frame 7	-	101,259	-		
-	mcf	S North Slope: LM6000	-	101,259	-		
-		HYDROELECTRIC:					
62,250,000	kwh	Bradley Lake	212	0	-		
1,002,976,236		Susitna	3,423	0	-		
240,000,000	kwh	GEOTHERMAL:	819	0	-		
-			4,469		2,237,765		
<b>SPACE HEATING</b>							
-	gal	PETROLEUM:					
-	gal	Heating Fuel	-	159,660	-		
52,015,385		FT Heating Fuel	7,178	159,660	1,146,059,139		
-		NATURAL GAS:					
700,000	mcf	Anchorage: LNG	700	116,390	81,473,000		
-	mcf	North Slope: LNG	-	116,390	-		
-	gal	Propane	-	138,750	-		
25,000	ton	COAL:					
-	ton	AE	350	211,910	74,168,500		
-	ton	UAF	-	211,910	-		
1,000	cord	WOOD:	17	250,000	4,350,000		
3,600,000	kwh	ELECTRIC:	12	501	6,153		
595			8,258		1,306,056,792		
<b>TRANSPORTATION</b>							
-	gal	PETROLEUM:					
-	gal	Diesel	-	159,660	-		
-	gal	Gasoline	-	154,910	-		
19,107,692	gal	FT Diesel	2,637	159,660	421,001,306		
34,700,417	gal	FT Gasoline	4,313	154,910	668,167,391		
-			6,950		1,089,168,697		
<b>RESIDENTIAL</b>							
						606,658	27%
						937,681,799	72%
						-	0%
						938,288,457	72%
<b>COMMERCIAL</b>							
						887,482	40%
						245,583,328	19%
						-	0%
						246,470,811	19%
<b>INDUSTRIAL</b>							
						743,625	33%
						122,791,664	9%
						-	0%
						123,535,290	9%
						1,308,294,557	100%
			19,677			2,397,463,254	

Excludes:  
 Fuel used at the refineries  
 Military fuel usage  
 Aviation fuel usage.

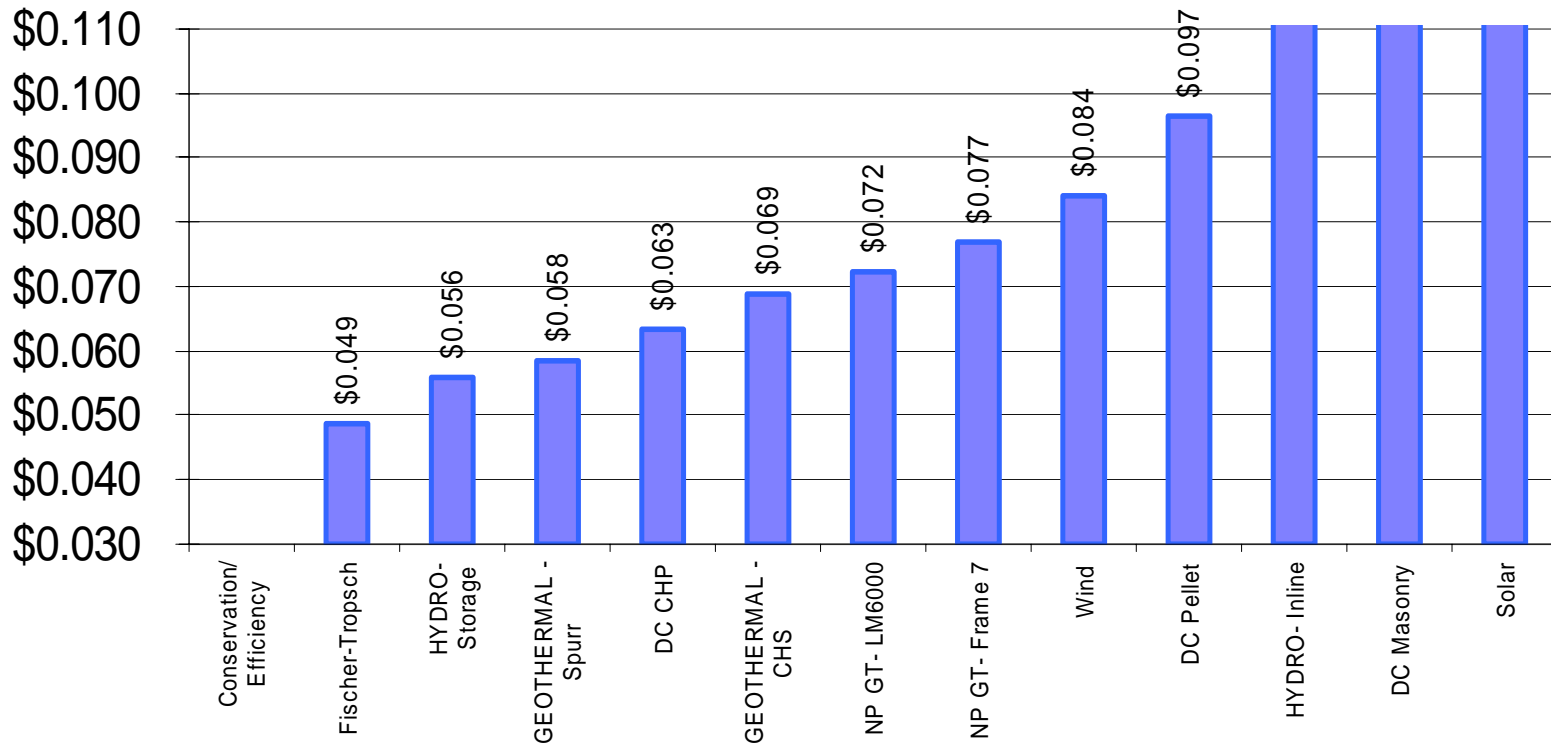
# Financial Model



Natural Gas	\$9.00/mmBTU	
Diesel	\$20.90/mmBTU	
Solar	\$204.25/mmBTU	\$0.6971/kWh
Direct Combustion- CHP	\$18.56/mmBTU	\$0.0633/kWh
Wind	\$24.61/mmBTU	\$0.0840/kWh
Geothermal	\$17.10/mmBTU	\$0.0584/kWh ★
Hydroelectric:	\$16.36/mmBTU	\$0.0558/kWh ★
Conservation/ efficiency improvements	\$( 5.93)/mmBTU	(\$0.0203)/kWh ★

# Options Sorted by Price

## Cost Curve



# Energy Cost Model

Active

Renewable Flow 10-07

	Yearly available volumes per year	Fuel \$ per	Heat content	Total BTU/year	Fuel \$/mmBTU
mmBTU/year					
LANDFILL WASTE	80,300 ton	\$ (25.00) /ton	11,730,000 BTU	941,919	\$ (2.13)
LANDFILL Brush	2,700 ton	\$ (25.00) /ton	10,000,000 BTU	27,000	\$ (2.50)
COAL- Waste	657,000 ton	\$ 15.00 /ton	12,200,000 BTU	8,015,400	\$ 1.23
TIRES	365 ton	\$ 19.70 /ton	28,000,000 BTU	10,220	\$ 0.70
LUMBER WASTE	4,015 ton	\$ 37.04 /ton	13,000,000 BTU	52,195	\$ 2.85
COAL- ROM	1,012,177 ton	\$ 30.00 /ton	15,600,000 BTU	15,789,965	\$ 1.92
BIOMASS- Aspen/Willow	ton	\$ 37.50 /ton	9,000,000 BTU	-	\$ 4.17
BIOMASS- Harveste	200,000 ton	\$ 51.51 /ton	9,000,000 BTU	1,800,000	\$ 5.72
				26,636,699	\$ 1.82
NATURAL GAS	3,172,000 mcf	\$ 9.00 /mcf	1,000,000 BTU	3,172,000	\$ 9.00
#2 DIESEL	gallons	\$ 2.80 /gallon	134,000 BTU	-	\$ 20.90

9,964,500  
FISCHER-TROPSCH 5,000 bb/day  
Net Output 11,687,053.26 mmBTU/yr

0.98 number of units  
4,899 bb/day

8.71 Number of Gasifier units required  
GASIFIER - 1 unit  
Net Output 1,992,900 mmBTU/yr

24,809,699 mmBTU

14,939,060 mmBTU

202,311 acres

2,427,730 mmBTU

Capex	\$ 46,000,000
Debt	30 years
Interest	6.0%
Fuel	\$ 5,178,944 \$ 2.60
I&D	\$ 3,341,850 \$ 1.68
O&M	\$ 3,550,000 \$ 1.78
Margin	\$ 334,185 \$ 0.17
Total	\$ 12,404,979 \$ 6.22
Efficiency	70%

Biomass for FT only (7 year)  
1,244,922 acres

Biomass for Electric only (7 year)  
202,311 acres

Efficiency:Input/Output BTUs  
5967000000  
32019324000  
54%

11,452,000 mmBTU

11687053.26

Capex	\$ 299,000,000
Debt	30 years
Interest	7.0%
Fuel	\$ 94,898,092 \$ 8.12
I&D	\$ 24,095,335 \$ 2.06
O&M	\$ 45,300,000 \$ 3.88
Margin	\$ 2,409,533 \$ 0.21
Total	\$ 166,702,960 \$ 14.26
Efficiency	77%

820 \$ 1.82 /gal FT Naptha

\$ 1.91 /gal FT Jet A

4,280 \$ 1.85 /gal FT Diesel

52,000 kW \$ 0.0487 /kWh

1,505 FT Export \$ -

GAS TURBINE- 1 LM6000  
Net Output 1,766,016 mmBTU/yr

Capex	\$ 120,000,000
Debt	30 years
Interest	6.0%
Fuel	\$ 22,901,500 \$ 12.97
I&D	\$ 8,717,869 \$ 4.94
O&M	\$ 4,800,000 \$ 2.72
Margin	\$ 871,787 \$ 0.49
Total	\$ 37,291,157 \$ 21.12
Efficiency	48%

Interim LM6000 on Syngas \$ 0.0721 /kWh

1,165,310 mmBTU

gas retrofit

GAS TURBINE- 2 Frame 6  
Net Output 2,838,240 mmBTU/yr

Capex	\$ 2,000,000
Debt	30 years
Interest	6.0%
Fuel	\$ 58,889,572 \$ 20.75
I&D	\$ 145,298 \$ 0.05
O&M	\$ 4,800,000 \$ 1.69
Margin	\$ 14,530 \$ 0.01
Total	\$ 63,849,400 \$ 22.50
Efficiency	30%

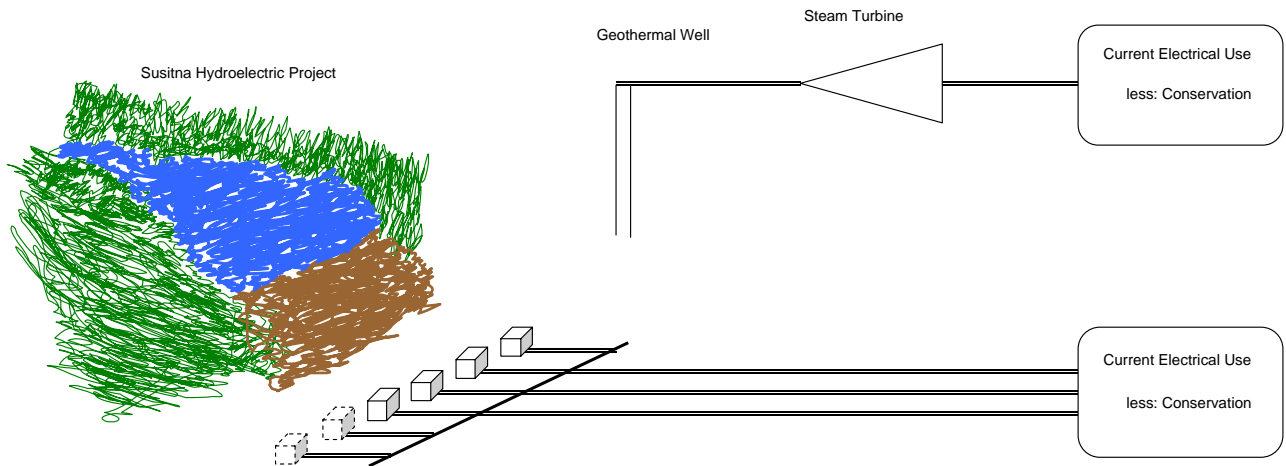
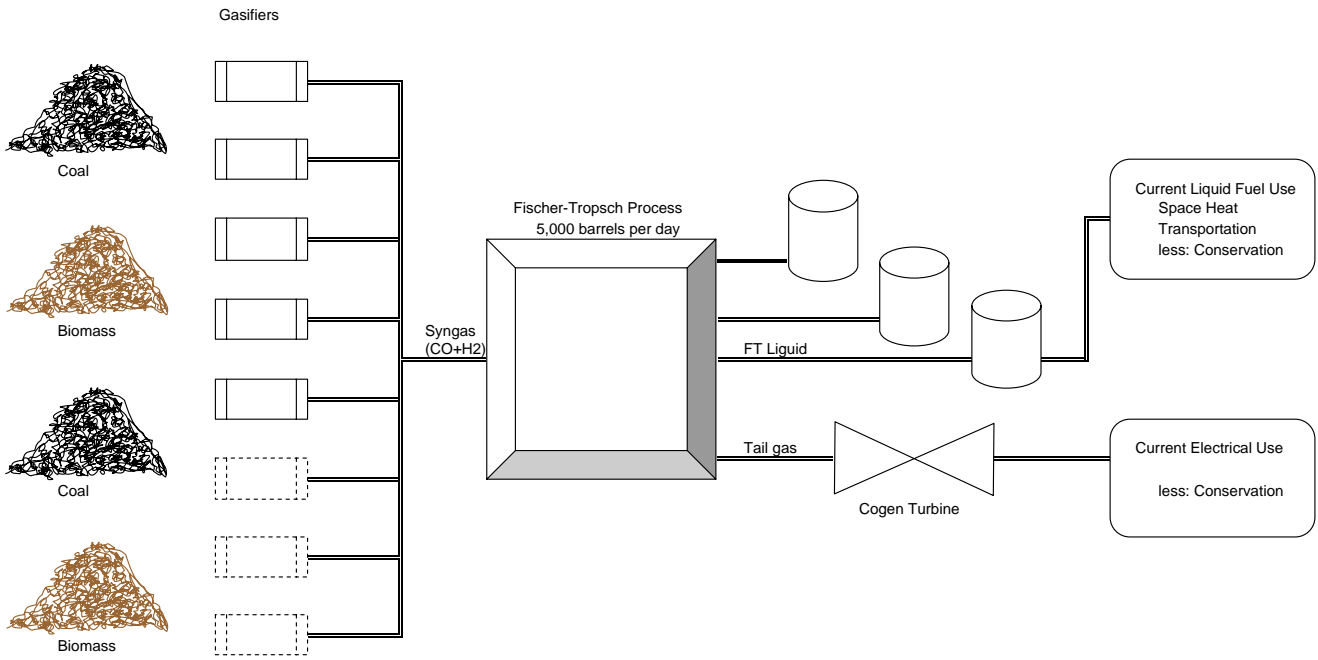
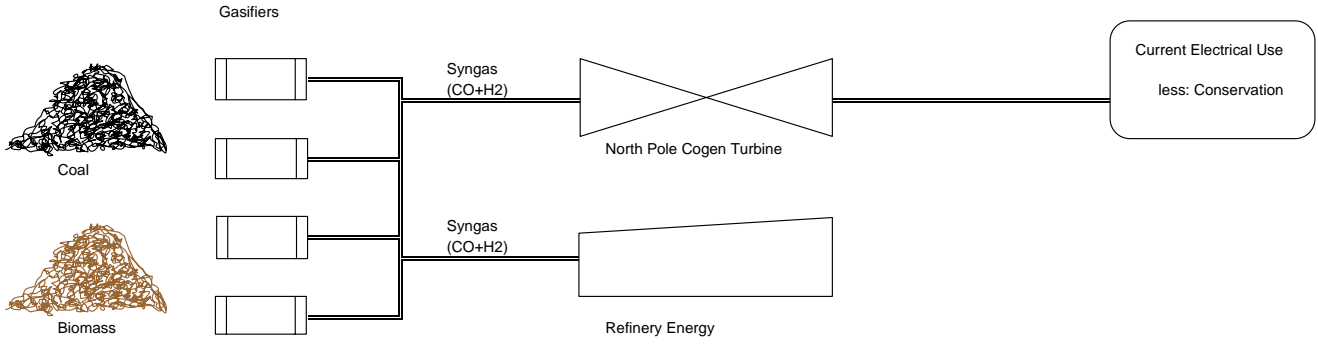
	Capacity Factor	Per Annum \$/mmBTU
Solar 5 kW	15 mmBTU/yr 10%	I&D \$ 3,003 \$ 200.91 O&M \$ 50 \$ 3.34 Total \$ 3,053 \$ 204.25
Direct Combustion Pellet 100,000 BTU/hr	99 mmBTU/yr 90%	Fuel \$ 1,478 \$ 15.00 I&D \$ 944 \$ 9.58 O&M \$ 365 \$ 3.70 Total \$ 1,309 \$ 28.28
Direct Combustion masonry-cord wood 100,000 BTU/hr	99 mmBTU/yr 90%	Fuel \$ 1,684 \$ 17.09 I&D \$ 1,449 \$ 14.71 O&M \$ 456 \$ 4.63 Total \$ 1,905 \$ 36.42
Industrial Direct Combustion CHP 2,000,000 BTU/hr 400 kW	13,403 mmBTU/yr 85%	Fuel \$ 110,547 \$ 4.90 I&D \$ 188,786 \$ 8.37 O&M \$ 119,136 \$ 5.28 Total \$ 307,922 \$ 18.56
Wind 30,000 kW	287,020 mmBTU/yr 32%	Fuel \$ 5,663,576 \$ 19.73 O&M \$ 1,400,000 \$ 4.88 Total \$ 7,063,576 \$ 24.61
GEOTHERMAL - Sp Mt Spurr Model 100,000 kW 20	2,929,992 mmBTU/yr 98%	I&D \$ 28,205,241 \$ 9.63 O&M \$ 21,900,000 \$ 7.47 Total \$ 50,105,241 \$ 17.10
GEOTHERMAL - Ct CHS Model 10,000 kW	284,030 mmBTU/yr 95%	I&D \$ 3,545,802 \$ 12.48 O&M \$ 2,190,000 \$ 7.71 Total \$ 5,735,802 \$ 20.19
HYDRO- Inline 2,000 kW	29,898 mmBTU/yr 50%	I&D \$ 805,864 \$ 26.95 O&M \$ 175,200 \$ 5.86 Total \$ 981,064 \$ 32.81
HYDRO- Storage 600,000 kW 20.0 300.0	17,938,728 mmBTU/yr 100%	I&D \$ 251,435,678 \$ 14.02 O&M \$ 42,048,000 \$ 2.34 Total \$ 293,483,678 \$ 16.36
Conservation/ Efficiency save 500 gallons/year	60 mmBTU/yr 100%	Fuel \$ (1,400) \$ (23.33) I&D \$ 944 \$ 15.73 O&M \$ 100 \$ 1.67 Total \$ (356) \$ (5.93)

Solar	\$ 0.6971 /kWh
Heat DC Pellet	\$ 0.0965 /kWh
Heat DC Masonry	\$ 0.1243 /kWh
Cogen Heat+Electricity DC CHP	\$ 0.0633 /kWh
Wind	\$ 0.0840 /kWh
GEOTHERMAL - Spurr	\$ 0.0584 /kWh
GEOTHERMAL - CHS	\$ 0.0689 /kWh
HYDRO- Inline	\$ 0.1120 /kWh
600 MW Susitna	\$ 0.0558 /kWh
Energy usage reduction	Conservation/ Efficiency \$ (0.0203) /kWh

# Draft Recommendations: Short, Mid, & Long Term

Short-term	Conservation of energy through weatherization and efficiency increases
Mid-term	Gasification for existing Gas Turbines 5,000 bpd Fischer-Tropsch Plant
Long-term	600 MW Susitna Hydro Project + Interties 100 MW Mt. Spurr Geothermal Project

# Fairbanks Energy Plan





# Does this plan achieve our goals?

Issue	
PM2.5	Significantly reduced due to ultra-low sulfur FT fuel
Municipal Waste	Resolved waste-to-energy by gasification
Cost of Energy	Significant reduction
Sustainability	Long-term with coal, sustainable with aspen/willows
Global Warming	Zero from hydro, carbon neutral with aspen/willows
Green Energy	Yes with hydro, geothermal and aspen/willows
Economic Development	Yes, local jobs, economic diversification and growth, increase in disposable income
Wildfire Mitigation	Yes, with strategically harvested aspen/willows
Fuel Supply	Fuel that is vertically integrated, economic, long-term stable-priced and sustainable

# Planning to reduce the impact

<b>Scenario</b>	<b>Results</b>
TAPS	Shutdown would not impact energy costs
Anchorage Gas Supply	No impact to energy costs in Fairbanks
Bullet Line	No impact to energy costs in Fairbanks
Natural Gas Pipeline	No impact to energy costs in Fairbanks
Kenai gas supply	No impact to energy costs in Fairbanks
Aging Generation	Resolved, hydroelectric has a 100+ year life
Cost of crude oil	No impact to energy costs in Fairbanks
Joint Utility Planning	All Railbelt utilities purchase from hydro project
Unified System Operation	Utilities have no issues to disagree on.

# Dreaming together to Power Alaska

- Fuel delivery to rural Alaska
- Return Ballast
- Freight
- People



# Questions ???

## Contact Information:

Fairbanks Economic Development Corporation

301 Cushman Street, Suite 301

Fairbanks, Alaska 99701

U.S.A.

(907) 452-2185

[www.investfairbanks.com](http://www.investfairbanks.com)

# Waste-to-Energy

## STRENGTHS

- Waste to Energy is an accepted technology.
- Large waste stream w/ support for doing something with waste stream other than landfill.
- Stable pricing for up to 5 MW.
- Some portion is carbon neutral.
- Human resources (Henrick Wessel, etc.)

## OPPORTUNITIES

- Landfill lasts longer / does not expand as rapidly.
- Waste will likely increase over time.
- May create jobs.
- Ability to utilize existing infrastructure.
- Large producers of waste may be able to utilize waste in their own facilities (University, City, School District, etc.)
- Landfill mining and reclamation.
- Combine with recycling or other projects which utilize waste stream.
- Most people in this community care about the environment and will encourage these efforts

## WEAKNESSES

- Economies of Scale
- Not separating the waste stream raises the question of how what happens to hazardous materials mixed in with regular waste.

## THREATS

- Questions relating to air quality / emissions need answers.
- Questions relating to what happens when hazardous materials (batteries etc) are combusted need answers.
- Answers to other questions relating to environmental impact.
- May cost more than existing landfill operation.

# Conservation

STRENGTHS	OPPORTUNITIES
<ul style="list-style-type: none"> <li>• Immediate action possible</li> <li>• Technology available</li> <li>• Fairbanks community full of creativity</li> <li>• Fairbanks community has an understanding of conservation</li> <li>• Informed and educated small groups                             <ul style="list-style-type: none"> <li>○ builders</li> </ul> </li> <li>• GVEA promotion</li> <li>• Lower PM 2.5                             <ul style="list-style-type: none"> <li>○ pollution</li> <li>○ gas</li> <li>○ emissions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Retro-fit</li> <li>• Energy Star products</li> <li>• Re-market and re-phrase</li> <li>• Conservation</li> <li>• “green” subdivision on college road</li> <li>• Educate community on “next best steps”</li> <li>• Spawn businesses                             <ul style="list-style-type: none"> <li>○ energy audits</li> <li>○ engineers with understanding</li> <li>○ ARDOR program</li> </ul> </li> <li>• State funding</li> <li>• 5 star appliances (buck for buck)</li> <li>• Before and after audits</li> <li>• Federal Farm Bill grants</li> <li>• AEA/ AIDEA/ AHFC programs                             <ul style="list-style-type: none"> <li>○ financing</li> </ul> </li> <li>• Get politicians to pitch conservation as a positive</li> <li>• Palin promotion                             <ul style="list-style-type: none"> <li>○ florescent lights</li> </ul> </li> <li>• Scalable to demand</li> <li>• Energy Audits</li> </ul> <p>Messages on bills- “You could save \$__ by ...”</p>
WEAKNESSES	THREATS
<ul style="list-style-type: none"> <li>• No architectural school</li> <li>• Knowledgeable community</li> <li>• No codes/mandates for bldg. (UPC)</li> <li>• Hard sell</li> <li>• Not enough contractors                             <ul style="list-style-type: none"> <li>○ skill base for retro fit</li> </ul> </li> <li>• Lack of infrastructure</li> <li>• Traps comm. members might get sucked into without being informed properly</li> <li>• Large shift needed to see difference</li> <li>• Not working in general population</li> </ul>	<ul style="list-style-type: none"> <li>• Low interest loans                             <ul style="list-style-type: none"> <li>○ financing</li> </ul> </li> <li>• Cost vs. Payback</li> <li>• Low cost of energy</li> <li>• Population increase                             <ul style="list-style-type: none"> <li>○ educate more</li> </ul> </li> <li>• Fast growth</li> </ul>

# Gasification

## STRENGTHS

- Abundant local feedstock in Fairbanks
  - coal
  - biomass (willow, lumber waste, paper waste)
  - tires
- Minimal environmental impact; reduce emissions. No sulfur or mercury
- Proven technology w/ coal, oil and NG
- Potential CO2 offset (reduction)
- Use waste stream that is a lower cost fuel source
- Meet various needs of fuel type
- Go GREEN
- Front end to existing plant
- Low onsite construction
- Off market of volatility
- IGCC creates less ash, less CO2 and is more efficient than direct-fired coal combustion
- Combining electrical generation and liquid fuel production provides flexibility for electrical load following
- Continuous or plug type process
- Reduced PM 2.5

## OPPORTUNITIES

- Liquid fuels from SYN gas
- Lower cost, emerging technologies (mcf-\$7.00) utilize biomass
- Get rid of waste
  - all streams
- \$\$\$ from FEDs for CO2 reduction to support
- Better combustion efficiency
- Lower fuel and energy cost
- Utilize non-normal fuels to create gas
- Creation of low sulfur fuels
- Make diesel fuel locally from low sulfur fuels
- Utilize existing infrastructure
  - trucks
  - roads
  - turbines
  - boilers
  - rail transportation system?
- Various types of fuel can be produced to consider utilizing
- Ethanol and methanol
- 30,000(10,000 bbl more realistic) barrels a day (output). Modular technology can start small and expand
- Burn waste coal
- Landfill waste
- Need variable plant size for BA plan; build to fit
- SYN gas from coal (known tech.)
- Reduce CO2
  - global warming
- Create higher value product; can you compete with oil?
- Space to grow
- Portable plant (??)
- Low grade heat (district home heating?)
  - Purchase Syngas from owner of gas plant, avoid capital costs
- TAPS could provide routs for future coal to liquids export

# Gasification Continued

## WEAKNESSES

- Ash
- Multiple materials handling/collecting
- Large real estate needed
- Continuous flow—can it load follow?
- Does it operate at a high enough temp to result with methane and no DiSulfate
- Blended fuel stock
  - don't switch
  - costly
  - maintain sustainability
- Internal
  - volume of feedstock
- Economies of scale
- Catalyst use: high cost
- Proprietary technology
  - consumables
- Weakness in SYN gas (110btu), lower value of SYN gas
- Tapping AK's resources
- Won't affect transportation unless you make fuel out of it.
- Load following capability
- Turbine tripping flare of excess gas

## THREATS

- Coal
- High heat rate
- Energy input = to energy output
- Cost
- Utilize existing infrastructure
  - capital upgrades
  - depends on return
- High cost of conversion/use of infrastructure
- Can't meet feedstock
- PM 2.5 etc. created to gather fuel
  - material handling
- Burning biomass
  - competition
- Plant construction cost
- Permission to utilize certain fuel sources
- CO2 emission
  - coal level
  - scrubbers
- Gas line
- Changing economics: potentially lower cost supply
  - Long lead time for design, procurement, and construction
  - Public perception of using coal and new technology (HCCP)

# Biomass Overall/Gasification

## STRENGTHS

- Plentiful local fuel sources
- Plentiful land
- Sustainable harvest conducive to healthy forests & habitat management
- Carbon neutral
- Successful short rotation crops grown elsewhere in similar climate
- Community development through employment opportunities
- Capture biomass from municipal waste stream
- Power generation facility could be modular to spread out infrastructure costs and match facility with available fuel
- Can successfully be co-fire in existing coal plants
- Would help remove methane produced from dead trees in forests
- Global Warming could make 'silvaculture' easier
- Energy ratios are favorable (14:1)

## OPPORTUNITIES

- Could make use of biomass harvested during power line maintenance
- Fire mitigation and reducing fuel load of burned standing trees could provide near-term fuel source
- Potential for carbon sequestration associated with willow production
- Cost of energy high and climbing
- Fairbanks could export technology/expertise to rural communities, developing industry locally
- Potential for collaboration between UA and industry in addressing challenges
- Opportunity to demonstrate sustainable husbandry
- Re-distribution of farm subsidies
- Potential to engage Usibelli (could willows be grown on their re-vegetation plots?)
- Willows could be used for phytoremediation of urban wastewaters, landfill leachate, industrial wastewaters and sewage sludge
- Develops local economy and potentially raises land values in areas suitable for willow crop production
- Waste heat from biomass power production can spawns other business opportunities (cooling, drying)
- Increased employment (new; revive local farming)
- Specialized equipment might need to be developed which could be done locally and exported to other parts of the state
- Expertise could be exported
- Modular plants could be built located near fuel sources
- Ash byproduct could be used for fertilizer
- There are existing models existing to draw from (Europe, NY)
- New funding sources are available (State, Federal)
- Qualifies for Green Tags sales
- New opportunities for revenue (carbon trading)

## Biomass Overall/Gasification Continued

### WEAKNESSES

- Gathering/transportation of fuels – dispersed resource
- Specialized equipment needed for harvest/collection
- Green biomass has high moisture content – may require drying
- Farm subsidies may discourage biomass crops
- Materials handling – relatively low energy content per pound
- High particulates (potentially)
- May not be economical/profitable
- High infrastructure costs
- Chicken and egg scenario – need power plant and fuel
- Green power can't be purchased at a premium locally

### THREATS

- Land ownership may be an issue – large tracks could be needed
- Single crop biomass farming may be susceptibility to pests
- High particulates (potentially)
- Biomass undercut by other cheap fuel sources such as NG (timing)
- Subsidies that encourage fallow fields
- Corps of Engineers could be resistant to farming if wetlands are involved
- Could hurt Usibelli

# Biomass Extraction

## STRENGTHS

- Could be used in new GVEA turbine in North Pole (19,000 acres in production could meet fuel requirements for turbine)
- Clean
- Renewable
- Carbon neutral

## OPPORTUNITIES

- Could convert Fairbanks vehicles to ethanol
- Potential for 'no' sulfur fuel, range of fuel production
- Need to do demonstrate pilot project
- Military could be customer and source of energy for modular biomass plant
- Now is the right time
- Opportunity to coordinate with other players worldwide
- Funding is available for viable projects
- Re-evaluate currently discounted crops in Alaska for biomass fuel potential rather than feedstock
- Jack Spafford/Dr Posner

## WEAKNESSES

- Alaskan biomass is lower quality in terms of oil content
- Undemonstrated technology
- Byproduct associated with production
- Local ambient temps could pose challenges
- Competing w/ NG (cheaper), economics?

## THREATS

- Need to be aware of biomass 'charlatans' tooting unproven technology
- Cost of labor increases (NG Pipeline?) may change economics

# Geothermal

## STRENGTHS

- Distributed power
- Significant potential in Aleutians
- Non green-house gas producing
- Nearly all of resource undeveloped
- Wide range of opportunity scales
- Much off-the-shelf technology available
- Good cooling resources in Alaska
- Could take advantage of popularity
- Statewide distribution of resource

## OPPORTUNITIES

- Convert geothermal into alternative fuels
- Co-locate with minerals extraction
- Power for refining minerals
  - Red Dog mine ore refining
- Ground source heat pumps
- Volcanoes offer opportunities
- Opportunities for heating (local/district)
- Mt. Spur as a source nearby Beluga
- Geothermal for refrigeration

## WEAKNESSES

- Limited knowledge of resource
- Source not near urban centers,
- Not transportable
- Hazards/volcanoes
- Lack of performance data
- No documented super-sized source
- Issues with transmission of power

## THREATS

- Potential for transience, natural events
- Sustainability
- Potential for depletion
- Public and policy inertia
- Land ownership
- Permitting

## Hydroelectric- Run of River

STRENGTHS (internal)	OPPORTUNITIES (external)
<ul style="list-style-type: none"> <li>•Low to moderate capital required</li> <li>•No fossil fuel</li> <li>•Moderately abundant resource</li> <li>•Source for rural homes/villages</li> <li>•Resource available across Railbelt</li> <li>•Possible ties into grid</li> <li>•Ease of remote construction</li> <li>•Short development time</li> </ul>	<ul style="list-style-type: none"> <li>•Tanana, Yukon, Susitna, Nenana. etc.</li> <li>•Many communities along these rivers</li> <li>•Eagle project funded by Denali Commission</li> <li>•Local industry potential</li> <li>•High cost of fossil fuels</li> <li>•Global warming issue</li> <li>•Possibly portable, or mass produced</li> <li>•New ARRC bridge over the Tanana River</li> <li>•Previously State purchased Harbin turbines</li> </ul>
WEAKNESSES (internal)	THREATS (external)
<ul style="list-style-type: none"> <li>•Limited capacity</li> <li>•Limited season?</li> <li>•Variable output, existing generation must be maintained</li> <li>•Potential for damage by ice/silt/trees</li> <li>•Requires some distribution lines</li> <li>•Possible channel changes (loss of current)</li> </ul>	<ul style="list-style-type: none"> <li>•Fish issues (spawning areas)</li> <li>•Navigation impacts</li> <li>•Flooding</li> </ul>

## Hydroelectric-Storage: Chakachamna

STRENGTHS (internal)	OPPORTUNITIES (external)
<ul style="list-style-type: none"> <li>• Some design and EIS work done (Chris Rose, REAP, Beluga Triangle – hydro, wind, tidal)</li> <li>• Relatively low environmental impact</li> <li>• Abundant power (order of 100s of MW)</li> <li>• Located centrally within the Railbelt</li> </ul>	<ul style="list-style-type: none"> <li>• High cost of fossil fuels</li> <li>• High level of concern about global warming</li> <li>• Good fit with wind systems</li> <li>• Hydrogen production potential</li> </ul>
WEAKNESSES (internal)	THREATS (external)
<ul style="list-style-type: none"> <li>• Cost to connect to grid</li> <li>• Environmental impacts</li> <li>• Large capital needs (\$1 billion)</li> <li>• Long lead time for construction</li> <li>• Potential for lake to fill with silt</li> <li>• Need for EIS</li> </ul>	<ul style="list-style-type: none"> <li>• Negative public opinion about large dams</li> <li>• Seismic, volcanic potential of region</li> <li>• Fish impacts?</li> <li>• Concern over loss of habitat, recreational areas, or historical sites</li> <li>• TDX has applied for the FERC site license</li> </ul>

## Hydroelectric-Storage: Susitna

STRENGTHS (internal)	OPPORTUNITIES (external)
<ul style="list-style-type: none"> <li>• Lots of design and EIS work done</li> <li>• Relatively low environmental impact compared to present alternatives</li> <li>• Abundant power (order of 500s of MW)</li> <li>• Located centrally within the Railbelt</li> <li>• Production of hydrogen possible</li> <li>• Long life time (100 yrs)</li> </ul>	<ul style="list-style-type: none"> <li>• High cost of fossil fuels</li> <li>• High level of concern about global warming</li> <li>• Good fit with wind systems</li> <li>• Creation of recreation areas</li> <li>• Possible benign industry (data center, hydrogen production, etc.)</li> </ul>
WEAKNESSES (internal)	THREATS (external)
<ul style="list-style-type: none"> <li>• Cost to connect to grid</li> <li>• Environmental impacts</li> <li>• Large capital needs (\$5-10 billion)</li> <li>• Long lead time for construction</li> <li>• Potential for lake to fill with silt</li> </ul>	<ul style="list-style-type: none"> <li>• Negative public opinion about large dams</li> <li>• Seismic potential of region</li> <li>• Fish impacts</li> <li>• Concern over loss of habitat, recreational areas, or historical sites</li> <li>• Possible large industry impacts</li> </ul>

## Hydroelectric- Tidal

### STRENGTHS (internal)

- Regular tides, predictable generation
- High capacity
- Located in Railbelt
- Second highest tidal range in world

### OPPORTUNITIES (external)

- Co-locate with wind sites
- Located in Railbelt
- Coastal villages
- Attach to bridges, platforms

### WEAKNESSES (internal)

- Immature technology
- Impact of ice/silt?
- Interconnection costs high
- Slack tide – need two sites?
- High maintenance costs
- Electrical system operating impacts from cyclic generation

### THREATS (external)

- Shipping (low)
- Fish, whale issues
- Seismic design issues

# Distributed Generation

## STRENGTHS

- Produce energy greater than use; Ideal
- Net zero energy use; Practical
- Sustainable building systems and infrastructure
- Environmentally friendly
- Long term cost savings
- Increase disposable income by reducing bills generates greater economic growth in community
- Incremental approach one step at a time, one house at a time. Using a community wide approach

## OPPORTUNITIES

- Turn weaknesses into strengths by education of public:
  - Cost analysis of different energy reduction options available.
  - Easy access to cost analysis information web-sites.
- Reduce cost of energy
- Reduce amount of energy use in homes
- Reduce the detrimental effects of wasted energy on the environment
- Provide positive long term effects from green building
- Reduce reliance on fossil fuels from unstable countries (and underdeveloped wilderness areas).
- Reduce / Eliminate greenhouse gas emissions
- Not add to Global Warming
- Lesson need for new power plants from any source by using energy more efficiently and producing energy cleanly
- Incentives: tax breaks, direct rebates, snap program
- Energy detectives, kilowatts (devices used to show how much energy is being used in total or by a single appliance at any given moment). Could be used to educate public
- Education in schools at all levels on energy production and green building
- Demonstration projects
- National funding for projects
- EPA PM 2.5 reduction
- Change out programs could be used for specific types of appliances or light bulbs
- Local focus in media: newspaper, TV, other press
- Public Service Announcements about energy saving options
- Reality show / energy retrofit one house a month for 1 year
- 30 sec. spots on news, energy tip of the week
- Replace street lights with LEDs.
- Energy tip of the month on GVEA bill - savings per month and savings per year so consumers can see.

## Distributed Generation Continued

### WEAKNESSES

- Initial cost investment is higher
- Lack of public education / awareness / lack of perception of benefits
- Overcoming the desire for the familiar and making a change

### THREATS

- Non tangible
- Lack of commitment on the part of the public and lending institutions that finance buildings

# 2006 Sorted Overall Ranking (Best=0, Worst=90)

Evaluation Matrix Sorted by Ranking	Overall Rank	Energy Service	Success Hurdles	Start-up Date	Capital Needed	Cost Reduction	Monthly Bill	Uncer- tainty	Natural Systems	Alaskan Citizens
Truck North Slope Gas	10	0.0	2	0	0	0	0	3	2	3
Enriched Gas Pipeline*	24	0	6	6	2	0	0	7	2	1
Bullet Gas Pipeline	24	0	5	3	10	0	0	3	2	1
Spur Gas Pipeline**	27	0	9	10	0	0	0	5	2	1
Other AK Gas	28	0	7	8	1	0	0	7	2	3
Conservation	32	8	1	0	1	9	8.6	2	1	2
Wind Power	38	6	2	3	0	9.2	9.7	2	2	4
Coal Bed Methane	39	0	8	6	3	0	0	8	7	7
Coal Power Production	42	5	4	1	2	8.3	9.2	5	5	3
Solar	43	9.9	2	1	0	10	10	4	2	4
Biomass – Combustion	46	9.7	3	3	0	9.7	9.9	3	4	3
Public Transportation	46	9.9	5	2	0	9.2	9.2	7	1	3
Biomass – Extraction	48	9.7	4	4	0	10	9.4	4	4	3
Geothermal	53	9.9	5	4	0	9.8	10	7	2	5
Hydro – Instream	55	9.9	5	5	0	9.8	9.9	8	2	5
Hydro – Storage	55	6	6	6	6	8.8	9.4	6	4	3
Coal Gasification	57	9	8	4	2	9.9	10	8	4	3
Bike Paths & Lanes	58	9.9	8	8	1	9.6	9.7	7	1	4
Nuclear	60	6	9	5	1	8.6	9.3	9	8	5

