Village End Use Energy Efficiency Measures Program

AEA Grant # 2195234 Administered by Alaska Building Science Network

Tuntutuliak Final Report



ABSN Executive Director Scott Anaya and AEA VEUEEM grant Program Manager Rebecca Garrett during lighting site visit.

Community Summary

11 community buildings and 9 teacher housing units received energy efficiency upgrades as follows:

TC Building, Clinic, Public Safety Building, Garage II, New Garage I, TCSA Building, Transient Rental, Washeteria, Small Connex, Main Store, School Building

Retrofits Completed: October - December 2007

Village-Wide Lighting Retrofit Summary:

- Retrofitted 122 light fixtures with electronic ballasts & T8 lamps
- Installed 195 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 26.636 Kilowatts
- Post-retrofit energy use for all lighting: 10.727 Kilowatts
- Energy savings projection: 15.909 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 60%

- Estimated Annual Savings:

kWh Rate (as of 12/3/08):$0.52 Fuel Cost (FY 2007 Ave): $2.30

Hours Per Day/ 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$12,819.50	1999.43	$4,598.68
4 Hours/day	$8,272.68	1290.27	$2,967.62
7 Hours/day	**$14,477.10**	2257.97	$5,193.33
10 Hours/day	$20,681.70	3225.67	$7,419.04

- Total project cost for all measures: $37,775
- Simple Payback (lighting measures only, using 7 hours/day lighting use run-time): 2.61 years
- Total village wide in-kind contribution: $4,223

Additional Energy Efficiency Measures:

- 2 Programmable thermostats installed: 1 in TSCA office building and 1 in teacher housing unit WT 8.
- Coordination and consulting for fuel saving measures for TTC's Alaska State CCED building improvement grants – TTC Community Building and Public Safety Building

Tuntutuliak Traditional Council Owned Buildings



3 buildings owned by the Tuntutuliak Traditional Council received energy efficient lighting upgrades as follows:

TC Building, Clinic, Public Safety Building

- Lighting upgrades completed in: October 2007
- Installed 44 light fixtures with electronic ballasts & T8 lamps
- Installed 18 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 6.078 Kilowatts
- Post-retrofit energy use for all lighting: 3.089 Kilowatts
- Energy savings projection: 2.989 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 49%

- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$2,906.41	453.30	$1,042.60
4 Hours/day	$1,554.28	242.42	$557.56
7 Hours/day	$2,719.99	424.23	$975.73
10 Hours/day	$3,885.70	606.04	$1,393.90

ABSN Field Manager Harry Morgan presents the lighting retrofit training in Tuntutuliak

TC Building

Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	9
2-lamp electronic ballast, (2) 32 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	6
4-lamp fixture 3-lamp ballast (3) 25 watt T8 lamps	9
CFL-23 W	5
CFL-27 W	3

- Pre-retrofit energy use: 3483 watts
- Post-retrofit energy use: 1795 watts
- Energy savings projection: 1688 watts
- Pre-retrofit to post retrofit energy reduction: 48%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
2000 Hours/year (Est.)	$1,755.52	273.80	$629.75
4 Hours/day	$877.76	136.90	$314.87
7 Hours/day	$1,536.08	239.58	$551.03
10 Hours/day	$2,194.40	342.25	$787.19

Notes: All 4-lamp fixtures de-lamped to three 25 watt T-8 lamps each for additional savings.

Additional Measure – TTC Energy Efficiency Building Improvements

Early in the process of coordinating with the Tuntutuliak Traditional Council on these projects, TTC informed us they had grants through Alaska State CCED for making building improvements to two of their buildings. TTC clarified to ABSN that energy efficiency improvements were among their top priorities for utilizing their CCED grants. They identified new windows and heating systems for the Community Building and Public Safety Building. Seeing this as a fuel saving and match funding opportunity for the VEUEEM grant, ABSN coordinated and consulted with TTC to help them move forward in utilizing their building improvement grants to the achieve long-term energy savings.

The windows in the TTC community building were old, double-pane, wood framed and leaky. Several would not close entirely and had moisture trapped between panes – demonstrating compromised thermal breaks. ABSN consulted with TTC to assist them in selecting and ordering low-e, triple-pane windows and trim package for their 3,900 sq ' community building and 544 sq' public safety building. This measure will reduce air leakage and heat loss. ABSN coordinated purchase through a large weatherization supplier to obtain highly competitive materials and shipping prices.

Existing Boiler system in the TTC Community Building

Existing single-pass cast iron boiler

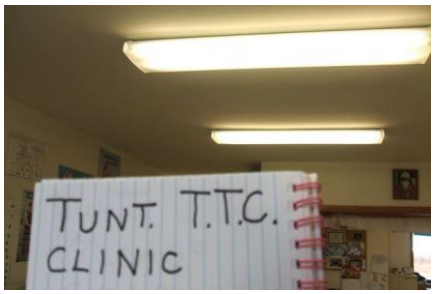
A single thermostat downstairs controls heat for the entire 2-story building, at times leaving the upstairs too cold and the downstairs warm enough to need open windows for cooling.

4 zones (one not pictured) are available for flexible heating control, but only one zone is controlled by the single T-stat.

VEUEEM funds were also used to coordinate a heating retrofit site visit with Tundra Heating of Bethel to assess the TCC building for installing an energy efficient Biasi boiler system. The system offered by Tundra Heating is a redundant system using two Biasi boilers, circulator zone heating instead of zone valves and outdoor temp sensing controls. Each boiler will be able to carry the heating load independently other than the very coldest of the cold days at which time both boilers will kick in to meet heating load. That way the boilers will be sized for the building for maximum efficiency. Biasi boilers reach high 80's for AFUE energy efficiency, which does not give credit for the low-standby losses and outdoor resent controls for these boilers. Biasi boilers employ a three-stage heat exchange system, rather than traditional single-pass, cast iron boilers. These boilers are lower mass and can be direct vented through a wall if workable, to avoid chimney-stack, heat-losses. Also, Biasi boilers can cold-start which means the system does not have to run at operating temperature at all times during all seasons. It only fires when there is a call for heat from a particular zone, and then only creates hot water for the zone that has called for heat. Also, outdoor temperature sensing controls will allow the boiler(s) to lower water temperature during warmer times. All in all, this system will employ some of the best technology and local designer/installer savvy for optimum energy efficiency. We expect the new system will use 30% – 40% less fuel than the existing system and run with fewer maintenance issues.

Materials and labor for these measures will be funded by TTCs building improvement grants, with the measures planned for completion in the spring of '09. Since these measures have yet to be completed, and savings figures are not currently available, no fuel savings figures for these measures appear in reported savings estimates.

Clinic



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	9
4-lamp electronic ballast, (3) 25 watt T8 lamps	4
CFL-14 W	2
CFL-20 W	4
CFL-27 W	3

- Pre-retrofit energy use: 1959 watts
- Post-retrofit energy use: 912 watts
- Energy savings projection: 1047 watts
- Pre-retrofit to post retrofit energy reduction: 53%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1750 Hours/year (Est.)	$952.77	148.60	$341.78
4 Hours/day	$544.44	84.91	$195.30
7 Hours/day	$952.77	148.60	$341.78
10 Hours/day	$1,361.10	212.29	$488.26

Note: All 4-lamp fixtures de-lamped to three 25 watt T-8 lamps each for additional savings.

Public Safety Building

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	4
4-lamp fixture 3-lamp ballast (3) 32 watt T8 lamps	2
CFL-14 W	1

- Pre-retrofit energy use: 636 watts
- Post-retrofit energy use: 382 watts
- Energy savings projection: 254 watts
- Pre-retrofit to post retrofit energy reduction: 40%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1500 Hours/year (Est.)	$198.12	30.90	$71.07
4 Hours/day	$132.08	20.60	$47.38
7 Hours/day	$231.14	36.05	$82.92
10 Hours/day	$330.20	51.50	$118.45

Note: All 4-lamp fixtures de-lamped to three 25 watt T-8 lamps each for additional savings.

Tuntutuliak Community Service Association Owned Buildings

5 buildings owned by the TCSA received energy efficient lighting upgrades as follows:

TCSA Building, Transient Rental, Washeteria, Garage II, New Garage I,

- Lighting upgrades completed in October 2007
- Installed 32 light fixtures with electronic ballasts & T8 lamps
- Installed 42 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 6.523 Kilowatts
- Post-retrofit energy use for all lighting: 2.821 Kilowatts
- Energy savings projection: 3.702 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 57%

- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$2,950.09	460.12	$1,058.27
4 Hours/day	$1,925.04	300.24	$690.56
7 Hours/day	$3,368.82	525.43	$1,208.48
10 Hours/day	$4,812.60	750.61	$1,726.40

TCSA Building

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	6
CFL-14 W	4
CFL-20 W	4
CFL-27 W	3

- Pre-retrofit energy use: 1369 watts
- Post-retrofit energy use: 499 watts
- Energy savings projection: 870 watts
- Pre-retrofit to post retrofit energy reduction: 64%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1800 Hours/year (Est.)	$814.32	127.01	$292.12
4 Hours/day	$452.40	70.56	$162.29
7 Hours/day	$791.70	123.48	$284.00
10 Hours/day	$1,131.00	176.40	$405.72

Transient Rental

Materials Installed	Quantity
CFL-14 W	6
CFL-23 W	5

- Pre-retrofit energy use: 780 watts
- Post-retrofit energy use: 199 watts
- Energy savings projection: 581 watts
- Pre-retrofit to post retrofit energy reduction: 74%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1500 Hours/year (Est.)	$453.18	70.68	$162.57
4 Hours/day	$302.12	47.12	$108.38
7 Hours/day	$528.71	82.46	$189.66
10 Hours/day	$755.30	117.80	$270.94

Washeteria

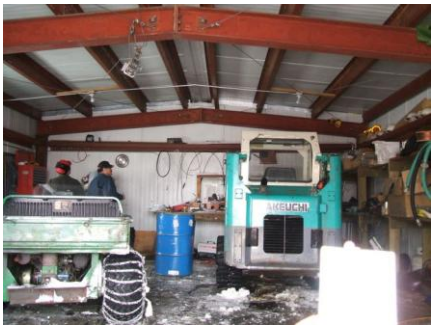
Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	10
2-lamp electronic ballast, (2) 32 watt T8 lamps	10
4-lamp electronic ballast, (3) 32 watt T8 lamps	1
CFL-14 W	12
CFL-27 W	2

- Pre-retrofit energy use: 3079 watts
- Post-retrofit energy use: 1391 watts
- Energy savings projection: 1688 watts
- Pre-retrofit to post retrofit energy reduction: 55%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1500 Hours/year (Est.)	$1,316.64	205.35	$472.31
4 Hours/day	$877.76	136.90	$314.87
7 Hours/day	$1,536.08	239.58	$551.03
10 Hours/day	$2,194.40	342.25	$787.19

Note: Four 4-lamp fixtures reduced to 2-lamp T-8 fixtures while the remaining 4-lamp fixture de-lamped to three T-8 lamps for additional savings.

New Garage



Materials Installed	Quantity
CFL-14 W	1
CFL-20 W	1
CFL-27 W	4

- Pre-retrofit energy use: 520 watts
- Post-retrofit energy use: 142 watts
- Energy savings projection: 378 watts
- Pre-retrofit to post retrofit energy reduction: 73%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1250 Hours/year (Est.)	$245.70	38.32	$88.14
4 Hours/day	$196.56	30.66	$70.51
7 Hours/day	$343.98	53.65	$123.39
10 Hours/day	$491.40	76.64	$176.28

Garage II

ABSN Field Manager Harry Morgan offers advice for retrofitting an 8ft fixture.

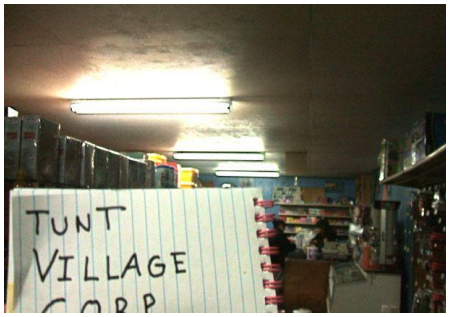
8 ft fixture retrofitted with energy efficient electronic ballast and 59 watt T8 lamps.

Materials Installed	Quantity
8 ft fixture, 2 lamp electronic ballast, (2) 59 watt T8	5

- Pre-retrofit energy use: 775 watts
- Post-retrofit energy use: 590 watts
- Energy savings projection: 185 watts
- Pre-retrofit to post retrofit energy reduction: 24%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1250 Hours/year (Est.)	$120.25	18.76	$43.14
4 Hours/day	$96.20	15.00	$34.51
7 Hours/day	$168.35	26.26	$60.39
10 Hours/day	$240.50	37.51	$86.27

Quinarmiut Corporation Owned Buildings



2 buildings owned by the Quinarmiut Corporation received energy efficient lighting upgrades as follows:

Small Connex, Store

- Lighting upgrades completed in October 2007
- Retrofitted 10 light fixtures with electronic ballasts & T8 lamps
- Installed 9 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 1.445 Kilowatts
- Post-retrofit energy use for all lighting: 0.685 Kilowatts
- Energy savings projection: 0.76 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 53%
- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$807.04	125.87	$289.51
4 Hours/day	$395.20	61.64	$141.77
7 Hours/day	$691.60	107.87	$248.09
10 Hours/day	$988.00	154.10	$354.42

Small Connex

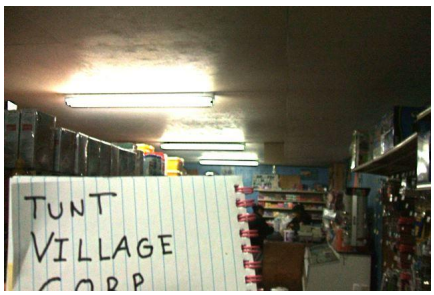
Materials Installed **Quantity**

CFL-23 W 7

- Pre-retrofit energy use: 525 watts
- Post-retrofit energy use: 161 watts
- Energy savings projection: 364 watts
- Pre-retrofit to post retrofit energy reduction: 69%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1000 Hours/year (Est.)	$189.28	29.52	$67.90
4 Hours/day	$189.28	29.52	$67.90
7 Hours/day	$331.24	51.66	$118.82
10 Hours/day	$473.20	73.80	$169.75

Store



Materials Installed **Quantity**

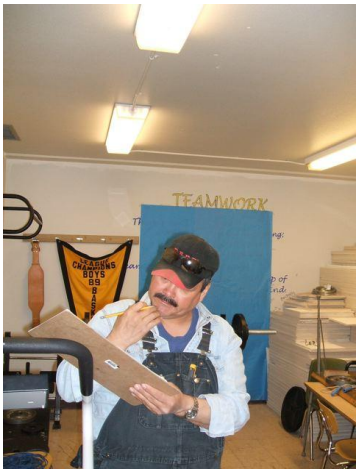
2-lamp electronic ballast, (2) 25 watt T8 lamps 10

CFL-27 W 2

- Pre-retrofit energy use: 920 watts
- Post-retrofit energy use: 524 watts
- Energy savings projection: 396 watts
- Pre-retrofit to post retrofit energy reduction: 43%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
3000 Hours/year (Est.)	$617.76	96.35	$221.61
4 Hours/day	$205.92	32.12	$73.87
7 Hours/day	$360.36	56.20	$129.27
10 Hours/day	$514.80	80.29	$184.67

Lower Kuskokwim School District Owned Buildings



1 school building and 9 teacher housing units owned by the Lower Kuskokwim School District received energy efficient lighting upgrades as follows:

Lewis Angapak Memorial School Main School Building, WT 6, WT 8, WT 10, WT 15, WT 16, WT 18, WT 19, WT 20, WT 21, WT 8

- Lighting upgrades completed in: December 2007
- Retrofitted 36 light fixtures with electronic ballasts & T8 lamps
- Installed 126 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 12.59 Kilowatts
- Post-retrofit energy use for all lighting: 4.132 Kilowatts
- Energy savings projection: 8.458 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 67%

- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$6,155.98	960.13	$2,208.30
4 Hours/day	$4,398.16	685.97	$1,577.73
7 Hours/day	$7,696.78	1200.45	$2,761.03
10 Hours/day	$10,995.4	1714.92	$3,944.32

Main School Building

ABSN Field Manager Harry Morgan looks over the school lighting plan.

Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	7
4-lamp electronic ballast, (4) 25 watt T8 lamps	4
CFL-14 W	2

- Pre-retrofit energy use: 1208 watts
- Post-retrofit energy use: 717 watts
- Energy savings projection: 491 watts
- Pre-retrofit to post retrofit energy reduction: 41%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1800 Hours/year (Est.)	$459.58	71.68	$164.86
4 Hours/day	$255.32	39.82	$91.59
7 Hours/day	$446.81	69.69	$160.28
10 Hours/day	$638.30	99.55	$228.97

Teacher Housing WT 6

Materials Installed	**Quantity**
CFL 3-Way: 12-20-26 W	2
CFL-14 W	5

- Pre-retrofit energy use: 555 watts
- Post-retrofit energy use: 110 watts
- Energy savings projection: 445 watts
- Pre-retrofit to post retrofit energy reduction: 80%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$318.18	49.62	$114.14
4 Hours/day	$231.40	36.09	$83.01
7 Hours/day	$404.95	63.16	$145.27
10 Hours/day	$578.50	90.23	$207.52

Teacher Housing WT 8

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL 3-Way: 12-20-26 W	1
CFL-14 W	2
CFL-20 W	5
CFL-23 W	4

- Pre-retrofit energy use: 1261 watts
- Post-retrofit energy use: 362 watts
- Energy savings projection: 899 watts
- Pre-retrofit to post retrofit energy reduction: 71%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$642.79	100.25	$230.58
4 Hours/day	$467.48	72.91	$167.70
7 Hours/day	$818.09	127.60	$293.47
10 Hours/day	$1,168.70	182.28	$419.24

Note: One 4-lamp fixture reduce to 2-lamps and one 4-lamp fixture de-lamped to three 25 watt T-8 lamps each for additional savings.

Teacher Housing WT 10

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	7
4-lamp electronic ballast, (3) 25 watt T8 lamps	2
CFL-14 W	8

- Pre-retrofit energy use: 1586 watts
- Post-retrofit energy use: 591 watts
- Energy savings projection: 995 watts
- Pre-retrofit to post retrofit energy reduction: 63%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$711.43	110.96	$255.21
4 Hours/day	$517.40	80.70	$185.60
7 Hours/day	$905.45	141.22	$324.81
10 Hours/day	$1,293.50	201.74	$464.01

Note: Six 4-lamp fixtures reduced to 2-lamps and two 4-lamp fixture de-lamped to three 25 watt T-8 lamps each for additional savings.

Teacher Housing WT 15

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL 3-Way: 12-20-26 W	5

- Pre-retrofit energy use: 852 watts
- Post-retrofit energy use: 222 watts
- Energy savings projection: 630 watts
- Pre-retrofit to post retrofit energy reduction: 74%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$450.45	70.26	$161.59
4 Hours/day	$327.60	51.09	$117.52
7 Hours/day	$573.30	89.42	$205.66
10 Hours/day	$819.00	127.74	$293.80

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

Teacher Housing WT 16

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	3
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL-14 W	1
CFL-20 W	11

- Pre-retrofit energy use: 1116 watts
- Post-retrofit energy use: 450 watts
- Energy savings projection: 666 watts
- Pre-retrofit to post retrofit energy reduction: 60%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$476.19	74.27	$170.82
4 Hours/day	$346.32	54.01	$124.23
7 Hours/day	$606.06	94.53	$217.41
10 Hours/day	$865.80	135.04	$310.58

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

Teacher Housing WT 18

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL-14 W	20
CFL-20 W	1

- Pre-retrofit energy use: 1383 watts
- Post-retrofit energy use: 422 watts
- Energy savings projection: 961 watts
- Pre-retrofit to post retrofit energy reduction: 69%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$687.12	107.17	$246.49
4 Hours/day	$499.72	77.94	$179.26
7 Hours/day	$874.51	136.39	$313.71
10 Hours/day	$1,249.30	194.85	$448.15

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

WT 19

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL-14 W	20
CFL-20 W	1

- Pre-retrofit energy use: 1383 watts
- Post-retrofit energy use: 422 watts
- Energy savings projection: 961 watts
- Pre-retrofit to post retrofit energy reduction: 69%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$687.12	107.17	$246.49
4 Hours/day	$499.72	77.94	$179.26
7 Hours/day	$874.51	136.39	$313.71
10 Hours/day	$1,249.30	194.85	$448.15

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

WT 20

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL 3-Way: 12-20-26 W	4
CFL-14 W	14
CFL-20 W	1

- Pre-retrofit energy use: 1623 watts
- Post-retrofit energy use: 418 watts
- Energy savings projection: 1205 watts
- Pre-retrofit to post retrofit energy reduction: 74%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$861.58	134.38	$309.07
4 Hours/day	$626.60	97.73	$224.78
7 Hours/day	$1,096.55	171.03	$393.36
10 Hours/day	$1,566.50	244.32	$561.94

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

WT 21

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL 3-Way: 12-20-26 W	4
CFL-14 W	14
CFL-20 W	1

- Pre-retrofit energy use: 1623 watts
- Post-retrofit energy use: 418 watts
- Energy savings projection: 1205 watts
- Pre-retrofit to post retrofit energy reduction: 74%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
1375 Hours/year (Est.)	$861.58	134.38	$309.07
4 Hours/day	$626.60	97.73	$224.78
7 Hours/day	$1,096.55	171.03	$393.36
10 Hours/day	$1,566.50	244.32	$561.94

Note: One 4-lamp fixture de-lamped to three 25 watt T-8 lamps for additional savings.

Tuntutuliak, In-Kind Contribution Tracking Record - ABSN Energy Efficiency Projects:

In-Kind Item	Dates	Hours Contri-buted	Hourly Wage	Value / Amount	Notes
Staff time for project contact, introduction, and review of intro materials (Number of entities x 1 hour each)	March. 2007	$4.00	$15.00	$ 60.00	list number of entities
Staff time for Attending teleconference (TC/IRA)	3/7/2007	$3.00	$15.00	$ 45.00	list # of staff and wages if possible ($15/hr is an average wage designated for village entity staff).
Staff time for Attending teleconference (Village Corp)	3/7/2007	$1.00	$15.00	$ 15.00	"
Staff time for Attending teleconference (School)	3/7/2007	$2.00	$15.00	$ 30.00	"
Maint. Staff time to accompany Field Manager on building assessments - 1st site visit					list entity and maint staff, add rows as necessary
Maint. Staff time to attend ABSN training					list entity and maint staff, add rows as necessary
Conservative village office administrative percentage of total project cost less ABSN Admin %. Total project cost = $37,775/village - (our admin percentage , (around 12%) Approx: $4,533) = $33,242 x 5.5% = $1,828 (this 5.5% village admin cost estimate is spread across all entities we work with for the course of the grant for completing all energy efficiency measures. These are primarily for cumulative, otherwise unaccounted time expense for village- based project support.	Feb, '07 through			$1,828.00	Each time we call, email, or fax a village entity, someone has to receive the communication, review and/or forward the information, follow-up on requests, etc. Whether it is to set-up a teleconference, verify maintenance staff participation in lighting or boiler trainings, set-up in-kind lodging and transportation, lighting trainings, track a shipment, verify completion of lighting in a given building, ship lamps and ballasts out of the village, request a labor reimbursement agreement, or invoice etc, etc. Village expenses for phone charges, copying and fax costs, office supplies, etc are part of this amount.
Lodging for ABSN Field Managers - 1st assessment site visit	3-29 through 3-30-07			$120.00	
Lodging for ABSN Field Managers - 2nd site visit	10-8 through 10-10-07			$180.00	
Transportation and fuel costs during 2nd Site-visit	10-8 through 10-10-07			$135.00	
Tuntutuliak Traditional Council, Weatherization upgrades coordination work	12-07 through 12-08	35	$22.00	$770.00	Estimated hours and wages: Consulted and coordinated with TTC and Tunt Housing Authority to plan, research and purchase double-pane window replacements for 2-story TTC building. Also same inkind work to plan and initiate coordination of new heating system for TTC building. These measures will be funded by TTC's building improvement grant from Alaska State Dept of Commerce, Community and Economic Development.
LKSD Inkind labor for teacher housing lighting upgrades and installation of 1 programmable T-stat.		52	$20.00	$1,040.00	Assume $20/hr including fringe. Tally sheet estimates 42 hrs - say 45 hrs, to retrofit 36 linear fluorescent fixtures and install 126 cfl bulbs.
	TOTAL			$4,223.00	