Village End Use Energy Efficiency Measures Program

AEA Grant # 2195225 Administered by Alaska Building Science Network

Unalakleet Final Report

Community Summary

22 community buildings and 32 school district housing units received energy efficiency upgrades as follows:

City Office/Radio Station, Water Plant/City Mechanic Shop/Fire Station/ Small Apartment, Office Rental Space, Court House/ Coffee, Library, Midtown Sewer Lift, 6 Mile Water Pump, Sewer Lift Station, Garbage Bailer Building, Tribal Office Building, UNC Office/General Store, Old Store & Office, Igloo Rec Center, UNC 8-Plex, Covenant Church, Covenant Parsonage, Covenant Youth Facility, Assembly of God, Catholic Church, Elementary School, School District Office, Maintenance Trailer,

Retrofits Completed: School facilities: May '09 – April 2010. Village Entity Bldgs: Dec '09-April 2010
ABSN Field Management by: Geoff Butler, Dan Lung and Anna Hilbruner
Trained 16 local maintenance staff who were employed by village entities to complete lighting retrofits

Village-Wide Lighting Retrofit Summary:

- Retrofitted 1,180 light fixtures with electronic ballasts & T8 lamps
- Installed 817 compact fluorescent light bulb
- Installed 23 T5 linear fluorescent fixtures in the School Gym /Lunch Room and Garbage Bailer Building
- Pre-retrofit energy use for all lighting: 196.94 Kilowatts
- Post-retrofit energy use for all lighting: 97.41 Kilowatts
- Energy savings projection: 99.53 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 50.5%

- Estimated Annual Savings:

kWh Rate (FY 2009 AVE): $0.49 Bulk Fuel Cost (FY 2009 Ave): $4.13

Hours Per Day/ 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated Use	$81,003	12154	$50,198
4 Hours/day	$48,988	7350	$30,358
7 Hours/day	**$85,730**	12863	$53,128
10 Hours/day	$122,471	18377	$75,897

- Total project cost for all measures: $89,300
- Simple Payback (lighting measures only, using 7 hours/day lighting use run-time): 1.04 Years
- Total village wide in-kind contribution: $38,905 (Increased grant capacity by 44%.)

City of Unalakleet Owned Buildings

9 buildings owned by the City of Unalakleet received energy efficient lighting upgrades as follows:

City Office/Radio Station, Water Plant/City Mechanic Shop/Fire Station/ Small Apartment, Office Rental Space, Court House/ Coffee, Library, Midtown Sewer Lift, 6 Mile Water Pump, Sewer Lift Station, Garbage Bailer Building

While wattages were calculated separately in the following pages, the Water Plant, City Mechanic Shop, Fire Station and Small Apartment are all in the same building.

- Lighting upgrades completed in: December 2009, except City Bailer Bldg – completed in March, 2010
- Retrofitted 189 light fixtures with electronic ballasts & T8 lamps
- Installed 21 compact fluorescent light bulbs
- Installed 9 T5 linear fluorescent fixtures in the Garbage Bailer Building
- Pre-retrofit energy use for all lighting: 30.937 Kilowatts
- Post-retrofit energy use for all lighting: 14.822 Kilowatts
- Energy savings projection: 16.115 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 52%

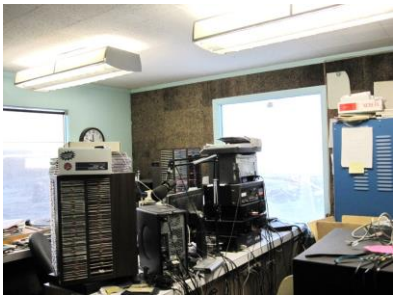
- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$13,185.90	1978.57	$8,171.51
4 Hours/day	$7,931.80	1190.18	$4,915.43
7 Hours/day	$13,880.60	2082.81	$8,602.01
10 Hours/day	$19,829.50	2975.44	$12,288.50

The City of Unalakleet lighting scope was just slightly larger than the village-wide lighting scope average of this grant's 1st four years: 2005 through 2008.

City Office/Radio Station





Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	10
4-lamp electronic ballast, (3) 25 watt T8 lamps	11
CFL-14 W	1
CFL-20 W	4

- Pre-retrofit energy use: 3943 watts
- Post-retrofit energy use: 1379 watts
- Energy savings projection: 2564 watts
- Pre-retrofit to post retrofit energy reduction: 65%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$1,262.00	189.36	$782.08
7 Hours/day	$2,208.50	331.39	$1,368.63
10 Hours/day	$3,155.00	473.41	$1,955.19
2000 Hours/year (Est.)	$2,524.00	378.73	$1,564.15

Note: We reduced 11 fixtures from 4-lamp to 3-lamp fixtures and 10 fixtures from 4-lamp to 2-lamp fixtures.

Water Plant/City Shop/Boiler Building



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	2
3 ft, 2-lamp electronic ballast, (2) 25w T8 Lamps	2
4-lamp electronic ballast, (3) 25 watt T8 lamps	20
4-lamp electronic ballast, (4) 25 watt T8 lamps	21

- Pre-retrofit energy use: 7260 watts
- Post-retrofit energy use: 3594 watts
- Energy savings projection: 3666 watts
- Pre-retrofit to post retrofit energy reduction: 50%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$1,804.41	270.75	$1,118.21
7 Hours/day	$3,157.71	473.82	$1,956.87
10 Hours/day	$4,511.01	676.88	$2,795.53
1900 Hours/year (Est.)	$3,428.37	514.43	$2,124.60

Note: Village maintenance staff reduced 1 fixture from a 4-lamp to a 2-lamp fixture and 20 fixtures from 4-lamp to 3-lamp fixtures in this building.

City Mechanic Shop

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	30
• Pre-retrofit energy use:	5124 watts
• Post-retrofit energy use:	2296 watts
• Energy savings projection:	2828 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
4 Hours/day	$1,391.94	208.86	$862.60
7 Hours/day	$2,435.90	365.51	$1,509.55
10 Hours/day	$3,479.85	522.16	$2,156.51
1200 Hours/year (Est.)	$1,670.33	250.64	$1,035.12

Note: We reduced 30 fixtures from 4-lamp to 3-lamp fixtures in the City Mechanic Shop.

Fire Station

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	4
4-lamp electronic ballast, (3) 25 watt T8 lamps	10
• Pre-retrofit energy use:	2016 watts
• Post-retrofit energy use:	934 watts
• Energy savings projection:	1082 watts
• Pre-retrofit to post retrofit energy reduction:	54%
• Estimated annual savings:	

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$532.56	79.91	$330.03
7 Hours/day	$931.98	139.84	$577.56
10 Hours/day	$1,331.40	199.78	$825.08
1500 Hours/year (Est.)	$798.84	119.87	$495.05

Note: We reduced 10 fixtures from 4-lamp to 3-lamp fixtures in the Fire Hall.

Small Apartment @ City Shop



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	4
CFL-14 W	3
CFL-20 W	1
CFL-23 W	2
CFL-27 W	1
CFL-9 W	3

- Pre-retrofit energy use: 1084 watts
- Post-retrofit energy use: 346 watts
- Energy savings projection: 738 watts
- Pre-retrofit to post retrofit energy reduction: 68%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$363.24	54.51	$225.11
7 Hours/day	$635.68	95.38	$393.94
10 Hours/day	$908.11	136.26	$562.77
1500 Hours/year (Est.)	$544.87	81.76	$337.66

Note: We reduced 2 kitchen fixtures from 4-lamp to 2-lamp fixtures in this apartment.

Office Rental Space



Materials Installed	Quantity
2 ft fixture, 2-lamp electronic ballast, (2) 17 watt T8	2
2-lamp electronic ballast, (2) 25 watt T8 lamps	19
4-lamp electronic ballast, (4) 25 watt T8 lamps	8
CFL-14 W	1

- Pre-retrofit energy use: 2660 watts
- Post-retrofit energy use: 1672 watts
- Energy savings projection: 988 watts
- Pre-retrofit to post retrofit energy reduction: 37%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$486.29	72.97	$301.36
7 Hours/day	$851.01	127.70	$527.38
10 Hours/day	$1,215.73	182.42	$753.40
1800 Hours/year (Est.)	$875.33	131.34	$542.45

Court House/ Coffee Shop



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	19
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
CFL-14 W	4
CFL-27 W	1

- Pre-retrofit energy use: 2169 watts
- Post-retrofit energy use: 1047 watts
- Energy savings projection: 1122 watts
- Pre-retrofit to post retrofit energy reduction: 52%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$552.25	82.87	$342.23
7 Hours/day	$966.43	145.01	$598.91
10 Hours/day	$1,380.62	207.16	$855.59
1600 Hours/year (Est.)	$883.60	132.58	$547.58

Library



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	5
3-lamp electronic ballast, (3) 25 watt T8 lamps	9

- Pre-retrofit energy use: 1932 watts
- Post-retrofit energy use: 896 watts
- Energy savings projection: 1036 watts
- Pre-retrofit to post retrofit energy reduction: 54%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$509.92	76.51	$316.00
7 Hours/day	$892.36	133.90	$553.01
10 Hours/day	$1,274.80	191.29	$790.01
1600 Hours/year (Est.)	$815.87	122.42	$505.60

Note: We reduced 9 fixtures from 4-lamp to 3-lamp fixtures in the Court House / Coffee Shop building.

Midtown Sewer Lift Station

Materials Installed	Quantity
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
• Pre-retrofit energy use:	168 watts
• Post-retrofit energy use:	90 watts
• Energy savings projection:	78 watts
• Pre-retrofit to post retrofit energy reduction:	46%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$38.39	5.76	$23.79
7 Hours/day	$67.19	10.08	$41.64
10 Hours/day	$95.98	14.40	$59.48
200 Hours/year (Est.)	$7.68	1.15	$4.76

6 Mile Water Pump House

Materials Installed	Quantity
2-lamp electronic ballast, (2) 32 watt T8 lamps	2
• Pre-retrofit energy use:	144 watts
• Post-retrofit energy use:	120 watts
• Energy savings projection:	24 watts
• Pre-retrofit to post retrofit energy reduction:	17%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$11.81	1.77	$7.32
7 Hours/day	$20.67	3.10	$12.81
10 Hours/day	$29.53	4.43	$18.30
200 Hours/year (Est.)	$2.36	0.35	$1.46

Sewer Lift Station Near Covenant Church

Materials Installed	**Quantity**
3-lamp electronic ballast, (3) 25 watt T8 lamps	1
• Pre-retrofit energy use:	114 watts
• Post-retrofit energy use:	74 watts
• Energy savings projection:	40 watts
• Pre-retrofit to post retrofit energy reduction:	35%

• Estimated annual savings:

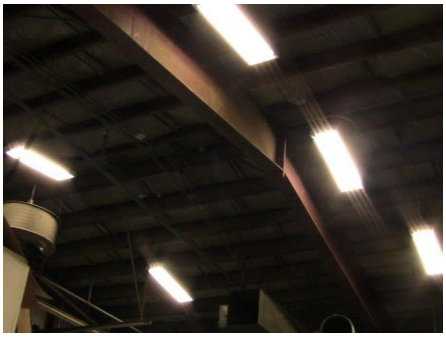
Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$19.69	2.95	$12.20
7 Hours/day	$34.45	5.17	$21.35
10 Hours/day	$49.22	7.39	$30.50
200 Hours/year (Est.)	$3.94	0.59	$2.44

Garbage Bailer Building T8 Retrofits

Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	7
• Pre-retrofit energy use:	588 watts
• Post-retrofit energy use:	322 watts
• Energy savings projection:	266 watts
• Pre-retrofit to post retrofit energy reduction:	45%
• Estimated annual savings:	

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$130.93	19.65	$81.14
7 Hours/day	$229.12	34.38	$141.99
10 Hours/day	$327.31	49.11	$202.84
1700 Hours/year (Est.)	$222.57	33.40	$137.93

Garbage Bailer Building T5 Installations



Former existing HID lighting with very poor color rendering index and long start-up time

New T5 fluorescents with 85 CRI and instant start-up.

Materials Installed	**Quantity**
T5 fixture, electronic ballast, (4) 54 watt T5 HO	9
• Pre-retrofit energy use:	3735 watts
• Post-retrofit energy use:	2052 watts
• Energy savings projection:	1683 watts
• Pre-retrofit to post retrofit energy reduction:	45%
• Estimated annual savings:	

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$828.37	124.30	$513.35
7 Hours/day	$1,449.65	217.52	$898.37
10 Hours/day	$2,070.93	310.75	$1,283.38
1700 Hours/year (Est.)	$1,408.23	211.31	$872.70

Unalakleet - Alaska Building Science Network - T5 Lighting Upgrade Details

These retrofits were completed in March, 2010 - there are still 6 fixtures in addition to the 9 shown below, that are in Unalakleet at the Bailer Bldg to be installed in the outside sorting area that were not in the City budget to cover installation. City Maintenance Manager, Gus (Henry Johnson) knows about this and said in March, 2010 he would look into getting them installed on a separate switch and circuit at a future date.

	Length (feet)	Width (feet)											
City Bailer Bldg	44	51	Ceiling Height (feet)	Type of Existing Fixture	# of Existing Fixtures	Existing Fixture Wattage	**Total Existing Wattage**	Existing Foot-candles	New Foot-Candles	# of New Fixtures	New fixtures	New Fixture Wattage	**Total New Wattage**
"warm side"	dark		see notes	HPS 150 watt		160	**0**	very dark, 10-15 FC	~48		T-5 2 lamps	114	**0**
Color shade of floor	Other School Gym (A)			Multi-Vapor 400 watt	9	415	**3,735**			9	T-5 4 lamps	228	**2052**
Cold side: 15, 400w Multi-vapor fixtures. First 6 are on one switch, next nine (not receiving retrofits) are on another switch.							**0**				T-5 6 lamps	342	**0**
					Total Existing Watts		3,735				Total New Watts		2052

New watts / old watts

Percent Savings Pre to Post Retrofit:	**45.06%**	neg 1 (New watts / Old watts x 100 - 100) / 100

Savings & Payback Calculation for Bailer Building - based on 9 ours of use / day, 250 days / year.:

Assume 1750 hrs / year for 250 days/year of use

Full cost of electricity: **$ 0.49** kWh

Watts of existing lighting: 3,735 watts

New wattage for T5 fixtures: 2,052 watts

Calculation: (Watts) x (hrs/year) / (1000w/kw) x (cost of electricity) = (cost / year)

Existing Cost: $ 3,217

Retrofitted Cost: $ 1,767

Annual Savings: $ $ 1,450

T5 Materials costs	$ 2,987.10
T5 shipping costs	$ 154.10

Material & shipping cost of Gym retrofit: $ 3,141

Simple Payback: Materials cost / annual savings = **2.17** years (for retrofit to pay for itself in materials)

Native Village of Unalakleet Owned Buildings

Maintenance Staff Charlie Doty retrofitting a 2-lamp fixture

"Now that (ABSN) has provided a gateway into the field, Charlie is willing to get trained (as a certified electrician). We sure need certified electricians out here in bush Alaska."

- Sheldon Katchatag, Housing Director for Native Village of Unalakleet: Speaking about intentions to work with Charlie Dotie to help him train to become a certified electrician for the NVU Housing Authority.

1 building owned by the Native Village of Unalakleet received energy efficient lighting upgrades as follows:

Native Village of Unalakleet Office Building

Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	55
4-lamp electronic ballast, (4) 25 watt T8 lamps	4

- Pre-retrofit energy use: 4536 watts
- Post-retrofit energy use: 2890 watts
- Energy savings projection: 1646 watts
- Pre-retrofit to post retrofit energy reduction: 36%

- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$810.16	121.57	$502.07
7 Hours/day	$1,417.78	212.74	$878.62
10 Hours/day	$2,025.40	303.91	$1,255.17
2000 Hours/year (Est.)	$1,620.32	243.13	$1,004.13

Unalakleet Native Corporation Owned Buildings

4 buildings owned by the Unalakleet Native Corporation received energy efficient lighting upgrades as follows:

UNC Office/General Store, Old Store & Office, Igloo Rec Center, 8-Plex

- Lighting upgrades completed in: January 2010
- Retrofitted 132 light fixtures with electronic ballasts & T8 lamps
- Installed 42 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 24.742 Kilowatts
- Post-retrofit energy use for all lighting: 13.255 Kilowatts
- Energy savings projection: 11.487 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 46%
- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$11,234.2	1685.72	$6,962.01
4 Hours/day	$5,653.90	848.38	$3,503.79
7 Hours/day	$9,894.33	1484.66	$6,131.63
10 Hours/day	$14,134.7	2120.94	$8,759.47

Existing older HO fixture lamp holders

Existing older HO fixture wattage test

Retrofitted std 8' fixture lamp holders

Note: The Unalakleet Native Corporation had two buildings primarily lit with 2-lamp 8-foot linear fluorescent fixtures. Of 83 total 8-foot fixtures, 59 had high output lamps and ballasts running at up to 268 watts per fixture. ABSN field manager Dan Lung achieved a substantial wattage reduction in the 8-foot lighting by working with village corp. maintenance staff to retrofit the old HO fixtures with new std T8 lamp holders, T8 lamps and electronic ballasts reducing overall fixture wattage to 118 watts / fixture, and removing 7,788 watts total from all 8-foot lighting.

UNC Office/General Store

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
8 ft fixture, 2 lamp electronic ballast, (2) 59 watt T8	32
CFL-14 W	3
CFL-20 W	1
CFL-27 W	1

- Pre-retrofit energy use: 5676 watts
- Post-retrofit energy use: 4001 watts
- Energy savings projection: 1675 watts
- Pre-retrofit to post retrofit energy reduction: 30%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$824.44	123.71	$510.91
7 Hours/day	$1,442.76	216.49	$894.10
10 Hours/day	$2,061.09	309.27	$1,277.28
2600 Hours/year (Est.)	$2,143.53	321.64	$1,328.37

Old Store & Office Rental Space

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	9
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
8 ft fixture, 2 lamp electronic ballast, (2) 59 watt T8	51
CFL-14 W	3
CFL-20 W	7
CFL-9 W	3

- Pre-retrofit energy use: 14467 watts
- Post-retrofit energy use: 6731 watts
- Energy savings projection: 7736 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
4 Hours/day	$3,807.66	571.34	$2,359.65
7 Hours/day	$6,663.40	999.85	$4,129.39
10 Hours/day	$9,519.15	1428.36	$5,899.13
2000 Hours/year (Est.)	$7,615.32	1142.69	$4,719.30

Igloo Rec Center

Materials Installed	Quantity
2-lamp electronic ballast, (1) 25 watt T8 lamp	4
2-lamp electronic ballast, (2) 25 watt T8 lamps	4
3-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (4) 25 watt T8 lamps	2
4-lamp electronic ballast, (4) 32 watt T8 lamps	6
CFL-20 W	3
CFL-23 W	1

- Pre-retrofit energy use: 1959 watts
- Post-retrofit energy use: 1323 watts
- Energy savings projection: 636 watts
- Pre-retrofit to post retrofit energy reduction: 32%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$313.04	46.97	$193.99
7 Hours/day	$547.82	82.20	$339.49
10 Hours/day	$782.60	117.43	$484.99
1600 Hours/year (Est.)	$500.86	75.16	$310.39

Note: We reduced 1 fixture from a 4-lamp fixture to a 2-lamp fixture with a 3-lamp ballast in this building.

8-Plex

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

- Pre-retrofit energy use: 2640 watts
- Post-retrofit energy use: 1200 watts
- Energy savings projection: 1440 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
4 Hours/day	$708.77	106.35	$439.23
7 Hours/day	$1,240.34	186.12	$768.66
10 Hours/day	$1,771.92	265.88	$1,098.08
1375 Hours/year (Est.)	$974.56	146.23	$603.94

Bering Straits School District Owned Buildings



3 buildings and 32 teacher housing units owned by Bering Straits School District received energy efficient lighting upgrades as follows:

Unalakleet Elementary School, School District Office, Maintenance Trailer, School Gym

1945 Duplex, 1959 Teacher Housing, 3-Plex Teacher Housing, 5-Plex Apartment, Duplex By School, Echols Teacher Housing, FAA Double Wide Trailer, Gerskausky Rental Unit, Middle Blue 4-Plex, North Tan 4-Plex, Old FAA House, South Green 4-Plex, Styles House, Styles Rental Duplex

- Lighting upgrades completed in: April 2010
- Retrofitted 737 light fixtures with electronic ballasts & T8 lamps
- Installed 707 compact fluorescent light bulbs
- Installed 14 T5 linear fluorescent fixtures
- Pre-retrofit energy use for all lighting: 128.398 Kilowatts
- Post-retrofit energy use for all lighting: 62.155 Kilowatts
- Energy savings projection: 66.243 Kilowatts
- Pre-retrofit to post retrofit energy reduction: 52%
- Estimated Annual Savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
Locally Estimated	$52,759.1	7916.57	$32,695.4
4 Hours/day	$32,604.8	4892.39	$20,205.5
7 Hours/day	$57,058.4	8561.69	$35,359.7
10 Hours/day	$81,512.0	12230.98	$50,513.9


BSSD Maintenance Supervisor Ric Ried

BSSD Certified Electrician, Leland Oyoumick

Elementary School



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	131
3-lamp electronic ballast, (3) 25 watt T8 lamps	22
3-lamp fixture, (2) 2-lamp electronic ballasts (3) 25	177
4-lamp electronic ballast, (3) 25 watt T8 lamps	13
4-lamp electronic ballast, (4) 25 watt T8 lamps	2
4-lamp fixture (2) 2-lamp ballasts (4) 25 watt T8	29
CFL-14 W	6
CFL-20 W	12
CFL-23 W	21
CFL-27 W	2

- Pre-retrofit energy use: 41554 watts
- Post-retrofit energy use: 26226 watts
- Energy savings projection: 15328 watts
- Pre-retrofit to post retrofit energy reduction: 37%

- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$7,544.44	1132.05	$4,675.38
7 Hours/day	$13,202.7	1981.09	$8,181.91
10 Hours/day	$18,861.1	2830.13	$11,688.4
1800 Hours/year (Est.)	$13,579.9	2037.70	$8,415.68



Note: With Unalakleet as the headquarters for the Bering Straits School District, the lighting scope for this entity was one of the largest since the beginning of the VEUEEM grants. The District Office with 17,545 square feet and the elementary side of the school including the gym and basement storage with 28,796 square feet, combined for a total of 46,341 building floor square footage, illuminated by more than 730 fluorescent light fixtures.

School District Office Building



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	94
3-lamp electronic ballast, (3) 25 watt T8 lamps	52
4-lamp electronic ballast, (3) 25 watt T8 lamps	2
4-lamp electronic ballast, (4) 25 watt T8 lamps	107
CFL-14 W	3
CFL-20 W	7

- Pre-retrofit energy use: 30360 watts
- Post-retrofit energy use: 18134 watts
- Energy savings projection: 12226 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
4 Hours/day	$6,017.64	902.95	$3,729.20
7 Hours/day	$10,530.8	1580.17	$6,526.10
10 Hours/day	$15,044.0	2257.39	$9,323.00
2000 Hours/year (Est.)	$12,035.2	1805.91	$7,458.40

Note: We reduced 50 fixtures from 4-lamp to 3-lamp fixtures in the BSSD District Office.

Maintenance Trailer

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
CFL 3-Way: 12-20-26 W	1
CFL-14 W	11
CFL-20 W	8
CFL-27 W	4

- Pre-retrofit energy use: 1559 watts
- Post-retrofit energy use: 488 watts
- Energy savings projection: 1071 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
4 Hours/day	$527.15	79.10	$326.68
7 Hours/day	$922.51	138.42	$571.69
10 Hours/day	$1,317.87	197.75	$816.70
500 Hours/year (Est.)	$263.57	39.55	$163.34

Note: We reduced 1 fixture from a 4-lamp to a 2-lamp fixture in the Maintenance Trailer.

School Gym / Lunch Room



Materials Installed	**Quantity**
Dimmable 2-lamp electronic ballasts, single T8 25w	19
T5 fixture, electronic ballast, (3) 54 watt T5 HO	14
• Pre-retrofit energy use:	5084 watts
• Post-retrofit energy use:	3249 watts
• Energy savings projection:	1835 watts
• Pre-retrofit to post retrofit energy reduction:	36%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$903.19	135.52	$559.72
7 Hours/day	$1,580.58	237.17	$979.50
10 Hours/day	$2,257.97	338.81	$1,399.29
1375 Hours/year (Est.)	$1,241.88	186.35	$769.61

ABSN T5 Lighting plans are designed to increase the average light levels throughout the area when all fixtures are switched on - in comparison with former existing light output. Existing switching controls are normally retained - allowing users to choose the appropriate number of light fixtures / rows of light fixtures needed for various use patterns. In many cases school staff will choose not to use all fixtures available, thereby achieving more electrical savings than what is shown above. Considering light quality, ABSN T5 lighting plans employ 54-watt, high output T5 lamps with a color-rendering index (CRI) of 85. Existing light fixtures in rural high ceiling areas typically have a CRI ranging from 30 to 70. With the T5 retrofits, the boost in CRI greatly improves light quality – resulting in objects appearing much closer to their true color as seen under sunlight. This increased light quality can result in less light needed to illuminate a given space. Another advantage appreciated by building owners is the instant-on function of T5 lighting compared with long waiting periods for older HID fixtures to come on. With the waiting period eliminated, building owners have indicated they are more likely to keep lighting off until needed.

Unalakleet - Alaska Building Science Network - T5 Lighting Upgrade Details

These retrofits were completed in (April, 2010).

Old School Lunch Room	Length (feet)	Width (feet)	Ceiling Height (feet)	Type of Existing Fixture	# of Existing Fixtures	Existing Fixture Wattage	**Total Existing Wattage**	Existing Foot-candles	# of New Fixtures	New fixtures	New Fixture Wattage	**Total New Wattage**
Quin's measurements:	55' 5"	32' 10"	13' 10"	HPS 150 watt		160	**0**	14 - 20		T-5 2 lamps	114	**0**
Color shade of walls				HPS 250 watt	14	260	**3,640**		14	T-5 3 lamps	171	**2394**
			Dimmable 2-lamp ballasts, 38, single 34w T12s		19	76	**1,444**			T-5 6 lamps	342	**0**
							0		19	Dimmable 2-lamp ballasts, single 25w	45	**855**
					Total Existing Watts		5,084			Total New Watts		3249

Percent Savings Pre to Post Retrofit:	**36.09%**	neg 1 (New watts / Old watts x 100 - 100) / 100

1750 New watts / old watts

Savings & Payback Calculation for Gym:

Assume 1750 hrs / year for 250 days/year of use

Full cost of electricity: $ 0.49 /kWh

Watts of existing lighting: 5,084

New wattage for T5 fixtures: 3,249

Calculation: (Watts) x (hrs/year) / (1000w/kw) x (cost of electricity) = (cost / year)

Existing Cost: $ 4,379

Retrofitted Cost: $ 2,799

Annual Savings: $ $ 1,581

T5 Materials costs $ 3,546.50

T5 shipping costs $ 141.70

Material & shipping cost of Gym retrofit: $3,688.20

Simple Payback: Materials cost / annual savings = **2.33** years (for retrofit to pay for itself in materials)

1945 Duplex



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
3-lamp electronic ballast, (3) 25 watt T8 lamps	1
CFL-14 W	11
CFL-20 W	12
CFL-23 W	6
CFL-27 W	1
CFL-9 W	3

- Pre-retrofit energy use: 2443 watts
- Post-retrofit energy use: 706 watts
- Energy savings projection: 1737 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
4 Hours/day	$854.95	128.29	$529.82
7 Hours/day	$1,496.16	224.50	$927.19
10 Hours/day	$2,137.38	320.72	$1,324.56
1375 Hours/year (Est.)	$1,175.56	176.39	$728.51

Note: We reduced one fixture from a 4-lamp to a 2-lamp fixture and one fixture from a 4-lamp to a 3-lamp fixture.

1959 Teacher Housing


Materials Installed	Quantity
CFL 3-Way: 12-20-26 W	1
CFL-14 W	11
CFL-20 W	1
CFL-23 W	15
CFL-27 W	3

- Pre-retrofit energy use: 2005 watts
- Post-retrofit energy use: 620 watts
- Energy savings projection: 1385 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
4 Hours/day	$681.70	102.29	$422.46
7 Hours/day	$1,192.97	179.01	$739.30
10 Hours/day	$1,704.24	255.72	$1,056.14
1375 Hours/year (Est.)	$937.33	140.65	$580.88

3-Plex Teacher Housing



Materials Installed	Quantity
CFL-14 W	19
CFL-20 W	8
CFL-23 W	16
CFL-27 W	6

- Pre-retrofit energy use: 4120 watts
- Post-retrofit energy use: 956 watts
- Energy savings projection: 3164 watts
- Pre-retrofit to post retrofit energy reduction: 77%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$1,557.32	233.68	$965.09
7 Hours/day	$2,725.31	408.94	$1,688.91
10 Hours/day	$3,893.30	584.19	$2,412.73
1375 Hours/year (Est.)	$2,141.32	321.31	$1,327.00

5-Plex Apartment



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	6
CFL-14 W	10
CFL-20 W	27
CFL-23 W	19
CFL-27 W	7
CFL-9 W	6

- Pre-retrofit energy use: 5427 watts
- Post-retrofit energy use: 1636 watts
- Energy savings projection: 3791 watts
- Pre-retrofit to post retrofit energy reduction: 70%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$1,865.93	279.99	$1,156.34
7 Hours/day	$3,265.38	489.97	$2,023.59
10 Hours/day	$4,664.83	699.96	$2,890.85
1500 Hours/year (Est.)	$2,798.90	419.98	$1,734.51

Duplex By School



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	2
CFL 3-Way: 12-20-26 W	2
CFL-14 W	4
CFL-20 W	9
CFL-23 W	15
CFL-27 W	3

- Pre-retrofit energy use: 2409 watts
- Post-retrofit energy use: 794 watts
- Energy savings projection: 1615 watts
- 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
4 Hours/day	$794.90	119.28	$492.61
7 Hours/day	$1,391.08	208.73	$862.07
10 Hours/day	$1,987.26	298.19	$1,231.53
1375 Hours/year (Est.)	$1,092.99	164.00	$677.34

Echols Teacher Housing

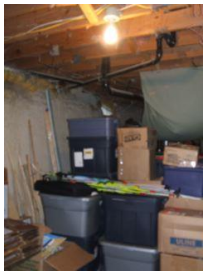

Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
CFL-14 W	12
CFL-20 W	11
CFL-23 W	1
CFL-27 W	1

- Pre-retrofit energy use: 1812 watts
- Post-retrofit energy use: 484 watts
- Energy savings projection: 1328 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
4 Hours/day	$653.64	98.08	$405.07
7 Hours/day	$1,143.87	171.64	$708.87
10 Hours/day	$1,634.10	245.20	$1,012.67
1375 Hours/year (Est.)	$898.76	134.86	$556.97

FAA Double Wide Trailer





Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	2
CFL 3-Way: 12-20-26 W	5
CFL-14 W	4
CFL-20 W	5
CFL-23 W	10
CFL-27 W	6
CFL-9 W	6

- Pre-retrofit energy use: 2719 watts
- Post-retrofit energy use: 794 watts
- Energy savings projection: 1925 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
4 Hours/day	$947.49	142.17	$587.17
7 Hours/day	$1,658.10	248.80	$1,027.54
10 Hours/day	$2,368.71	355.43	$1,467.92
1375 Hours/year (Est.)	$1,302.79	195.49	$807.36

Gerskausky Rental Unit



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (3) 25 watt T8 lamps	2
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
CFL-14 W	3
CFL-20 W	1
CFL-23 W	1
CFL-9 W	4

- Pre-retrofit energy use: 1039 watts
- Post-retrofit energy use: 407 watts
- Energy savings projection: 632 watts
- Pre-retrofit to post retrofit energy reduction: 61%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$311.07	46.68	$192.77
7 Hours/day	$544.37	81.68	$337.35
10 Hours/day	$777.68	116.69	$481.94
1375 Hours/year (Est.)	$427.72	64.18	$265.06

Note: We reduced 2 fixtures from 4-lamp to 3-lamp fixtures in this teacher housing unit.

Middle Blue 4-Plex

Materials Installed	Quantity
CFL-14 W	57
CFL-20 W	35
CFL-23 W	4
CFL-27 W	3
• Pre-retrofit energy use:	7130 watts
• Post-retrofit energy use:	1671 watts
• Energy savings projection:	5459 watts
• Pre-retrofit to post retrofit energy reduction:	77%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$2,686.92	403.18	$1,665.12
7 Hours/day	$4,702.11	705.56	$2,913.95
10 Hours/day	$6,717.30	1007.94	$4,162.79
1500 Hours/year (Est.)	$4,030.38	604.76	$2,497.67

North Tan 4-Plex

Materials Installed	Quantity
CFL-14 W	57
CFL-20 W	35
CFL-23 W	4
CFL-27 W	3
• Pre-retrofit energy use:	7130 watts
• Post-retrofit energy use:	1671 watts
• Energy savings projection:	5459 watts
• Pre-retrofit to post retrofit energy reduction:	77%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$2,686.92	403.18	$1,665.12
7 Hours/day	$4,702.11	705.56	$2,913.95
10 Hours/day	$6,717.30	1007.94	$4,162.79
1500 Hours/year (Est.)	$4,030.38	604.76	$2,497.67

Old FAA House



Materials Installed	Quantity
4-lamp electronic ballast, (4) 25 watt T8 lamps	1
CFL-14 W	7
CFL-20 W	5
CFL-23 W	4
CFL-27 W	2

- Pre-retrofit energy use: 1329 watts
- Post-retrofit energy use: 434 watts
- Energy savings projection: 895 watts
- 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
4 Hours/day	$440.52	66.10	$272.99
7 Hours/day	$770.91	115.68	$477.74
10 Hours/day	$1,101.30	165.25	$682.49
1375 Hours/year (Est.)	$605.71	90.89	$375.37

South Green 4-Plex


Materials Installed	Quantity
CFL-14 W	57
CFL-20 W	35
CFL-23 W	4
CFL-27 W	3

- Pre-retrofit energy use: 7130 watts
- Post-retrofit energy use: 1671 watts
- Energy savings projection: 5459 watts
- Pre-retrofit to post retrofit energy reduction: 77%
- Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$2,686.92	403.18	$1,665.12
7 Hours/day	$4,702.11	705.56	$2,913.95
10 Hours/day	$6,717.30	1007.94	$4,162.79
1500 Hours/year (Est.)	$4,030.38	604.76	$2,497.67

Styles House



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	12
CFL 3-Way: 12-20-26 W	2
CFL-20 W	2
CFL-27 W	1
• Pre-retrofit energy use:	1234 watts
• Post-retrofit energy use:	659 watts
• Energy savings projection:	575 watts
• Pre-retrofit to post retrofit energy reduction:	47%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$283.02	42.47	$175.39
7 Hours/day	$495.28	74.32	$306.93
10 Hours/day	$707.54	106.17	$438.47
1500 Hours/year (Est.)	$424.52	63.70	$263.08

Styles Rental Duplex



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
3-lamp electronic ballast, (3) 25 watt T8 lamps	8
4-lamp electronic ballast, (4) 25 watt T8 lamps	5
CFL 3-Way: 12-20-26 W	1
CFL-14 W	6
CFL-20 W	15
CFL-27 W	1
CFL-9 W	4
• Pre-retrofit energy use:	3914 watts
• Post-retrofit energy use:	1555 watts
• Energy savings projection:	2359 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
4 Hours/day	$1,161.10	174.22	$719.55
7 Hours/day	$2,031.92	304.89	$1,259.21
10 Hours/day	$2,902.75	435.56	$1,798.87
1500 Hours/year (Est.)	$1,741.65	261.34	$1,079.32

Note: We reduced 8 fixtures from 4-lamp to 3-lamp fixtures in this teacher housing dulex.

Church Owned Buildings



5 buildings owned by local community supported Churches received energy efficient lighting upgrades as follows:

Covenant Church, Covenant Parsonage, Covenant Youth Facility, Assembly of God, Catholic Church

• Lighting upgrades for Covenant Church and facilities completed in January 2010. For the Assembly of God Church and Catholic Church, the church managers confirmed they would complete their lighting retrofits with their own labor resources in the Spring of 2010.

• Retrofitted 63 light fixtures with electronic ballasts & T8 lamps
• Installed 47 compact fluorescent light bulbs
• Pre-retrofit energy use for all lighting: 8.327 Kilowatts
• Post-retrofit energy use for all lighting: 4.288 Kilowatts
• Energy savings projection: 4.039 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	$2,203.87	330.69	$1,365.77
4 Hours/day	$1,988.00	298.30	$1,231.98
7 Hours/day	$3,478.99	522.03	$2,155.97
10 Hours/day	$4,969.99	745.75	$3,079.96

Covenant Church



Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	18
3-lamp electronic ballast, (3) 25 watt T8 lamps	5
8' Single Lamp Fixtures 2-lamp shared ballast, (2) 59w T8	12
CFL-23 W	5
• Pre-retrofit energy use:	3244 watts
• Post-retrofit energy use:	2021 watts
• Energy savings projection:	1223 watts
• Pre-retrofit to post retrofit energy reduction:	38%
• Estimated annual savings:	

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$601.96	90.32	$373.04
7 Hours/day	$1,053.43	158.07	$652.82
10 Hours/day	$1,504.90	225.81	$932.61
900 Hours/year (Est.)	$541.76	81.29	$335.74

Covenant Parsonage


Materials Installed	Quantity
2-lamp electronic ballast, (2) 25 watt T8 lamps	5
4-lamp electronic ballast, (3) 25 watt T8 lamps	2
CFL-20 W	15
CFL-9 W	9
• Pre-retrofit energy use:	2045 watts
• Post-retrofit energy use:	761 watts
• Energy savings projection:	1284 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
4 Hours/day	$631.98	94.83	$391.65
7 Hours/day	$1,105.97	165.95	$685.38
10 Hours/day	$1,579.96	237.08	$979.12
1500 Hours/year (Est.)	$947.98	142.25	$587.47

Note: We reduced 1 fixure from a 4-lamp to a 3-lamp fixture in the Parsonage.

Covenant Youth Facility


Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	5
CFL-14 W	6
CFL-23 W	8

- Pre-retrofit energy use: 1255 watts
- Post-retrofit energy use: 498 watts
- Energy savings projection: 757 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
4 Hours/day	$372.60	55.91	$230.90
7 Hours/day	$652.04	97.84	$404.08
10 Hours/day	$931.49	139.77	$577.25
1200 Hours/year (Est.)	$447.11	67.09	$277.08

Assembly of God Church


Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	11
CFL-23 W	3
CFL-27 W	1

- Pre-retrofit energy use: 1027 watts
- Post-retrofit energy use: 602 watts
- Energy savings projection: 425 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
4 Hours/day	$209.19	31.39	$129.63
7 Hours/day	$366.07	54.93	$226.86
10 Hours/day	$522.96	78.47	$324.09
700 Hours/year (Est.)	$146.43	21.97	$90.74

Catholic Church

Materials Installed	**Quantity**
2-lamp electronic ballast, (2) 25 watt T8 lamps	1
4-lamp electronic ballast, (4) 25 watt T8 lamps	4
• Pre-retrofit energy use:	756 watts
• Post-retrofit energy use:	406 watts
• Energy savings projection:	350 watts
• Pre-retrofit to post retrofit energy reduction:	46%

• Estimated annual savings:

Hours Per Day / 250 Days Per Year	Electrical Savings	Comparative Avoided Diesel Use (gal)	Comparative Avoided Diesel Costs
4 Hours/day	$172.27	25.85	$106.76
7 Hours/day	$301.47	45.24	$186.83
10 Hours/day	$430.68	64.62	$266.89
700 Hours/year (Est.)	$120.59	18.09	$74.73

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

In-Kind Item	Dates	Hours	Hourly Wage	Value / Amount	Notes
Staff time for project contact, intro & review of intro materials		4	$ 20	$ 80	(Number of entities x 1 hour each)
Staff time for Attending telecon		1	$ 20	$ 20	TC/IRA
Staff time for Attending telecon		2	$ 20	$ 40	City
Staff time for Attending telecon		2	$ 20	$ 40	Village Corp
Staff time for Attending telecon		8	$ 25	$ 188	School
Maint. Staff time with FM on building assessment - 1st site visit	May 18, 2009	20	$ 25	$ 500	Week of May 18, 2009 Jay Fretag-City =1.5 days, Harold Charles, Jr. UNC =1-(8r) day
Maint. Staff time to attend ABSN lighting and PCB training	Dec '09	36	$ 15	$ 540	8 trainees for 3 hours of Lighting training. 6 trainees for 2 hours of PCB training
Conservative village office administrative percentage of total project cost less ABSN Admin %. Total project cost = $89,300/village - (our admin percentage , (around 12%) Approx: $10,716) = $78,584 x 5.5% = $4,322.12 (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			$ 4,322	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. 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	May 18, 2009	8	$ 50	$ 400	**Geoff/Dan-4 nights UNC (Corp) 14 plex.** Note: Larry Ivanoff prepared receipt
Transport & fuel costs - asses visit	May 18	2	$ 75	$ 113	Jay Fretag-City of Unk=1.5 days City truck.
Lodging for ABSN FMs - 2nd visit	12/7-11/09	15	$ 25	$ 375	Geoff, Dan, Anna BSSD bunks $25/night
Transport & fuel costs 2nd visit	12/7-11/09	5	$ 75	$ 425	Use of Ford 150 truck and fuel, 1 week
City share of payroll contributions	Dec '09			$ 658	Taxes & Workmans Comp from invoices
Overtime Paid by City of Unalakleet	Dec '09			$ 405	Over Time Paid by City of Unalakleet for primary lighting retrofits
City, Kenny Oyoumik - pack and ship backhaul equipment	1/28/2010	3	$ 15	$ 45	260 lbs from NAC 1-29-10, 5 ladders, 5 boxes 25w lamps, 3 boxes supplies,
City Bailer bilding - inkind for electrician's wages	3/10/2010	40	$ 75	$ 3,000	Replace 9 HID fixtures with 4-lamp T5s
Village Corp Inkind for all their 8-foot lighting retrofits	Jan, 2010	80	$ 17	$ 1,360	83 fixtures w/ customization - replacing lamp-holders & rebuilding fixture ends.
School assess & teacher housing upgrades in May w/ leland	May, 2009	8	$ 35	$ 280	1 full day with Leland, and 1.5 days with Quinn
School assessments and teacher housing upgrades in May w/ Quin	May, 2009	12	$ 20	$ 240	1.5 days with Quinn - verified his wage is $18/hr plus at least $2/hr for fringe
School-wide and district office-wide lighting retrofits, all thirty-some teacher housing units including linear and compact fluorescent installations	May '09 through March 2010	736	$ 30	$ 22,080	Estimated 623.5 labor for all this is: I added 18% (112 hrs) add. time to pack and ship the tonage of spent lamps and ballasts. Wage estimate of $30/hr is likely low as Leland did a lot of this work at higher rates & the fringe match from the SD would add another at least 25% to the straight wage.
School T5s and dimmable ballasts in lunch room		75	$ 35	$ 2,625	wage is likely low for Leland.
In-kind labor for Covenant Church, Youth facility and parsonage		36	$ 25	$ 900	Donated by West Coast Construction at $25/hr
labor for Assembly of God Church		10	$ 15	$ 150	Retrofits done by Church staff
In-kind labor for Catholic Church		8	$ 15	$ 120	Retrofits done by Church staff
	TOTAL			$ 38,905	

The capacity of ABSN's scope of work was greatly increased by the response of local communities to work in partnership with ABSN and provide in-kind services of project coordination, paid labor for lighting retrofits, transportation and lodging for ABSN field staff, and other valuable contributions. This allowed ABSN and the community of Unalakleet to deliver 44% more energy savings measures beyond original grant funds.