

Village End Use Energy Efficiency Measures Program '05 – '06
AEA Grant # 2195234 Administered by Alaska Building Science Network

Chefornak Final Report



Community Summary

11 Community buildings and 4 teacher housing units received energy efficiency upgrades August '06 – October '06

City Building, Water Treatment Plant, Community Center, Tribal Council Building, Old Clinic, Community Center, Head Start Building, Fire Station, Police Station, Grocery and Hardware Store, School Building 4 Teacher Housing Units

Village-Wide Lighting Retrofit Summary:

- Retrofitted 149 light fixtures village-wide with electronic ballasts and T8 lamps
- Installed: 35 compact fluorescent light bulbs village-wide
- T5 Light fixtures were installed in the school gym
- Pre-retrofit energy use for all lighting: 27,248 watts
- Post-retrofit energy use for all lighting: 13,974 watts
- Energy savings projection: 13,274 watts (13.27 kW)
- **Pre-retrofit to post retrofit energy reduction: 49 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$6,504	1,081 Gallons	\$2,605
7 Hours	\$11,382	1,892 Gallons	\$4,559
10 Hours	\$16,261	2,702 Gallons	\$6,513

- Total project cost for all measures: \$ 37,250
- Simple mean payback*: 3.27 Years
*(All grant funds, but accounting for lighting savings only)
- Total village wide in-kind contribution: \$ 7,921

Additional Energy Efficiency Measures: (Budget Expense: \$ 5,570)

- Installation of 2 low-mass boilers in old BIA teacher housing bldg. operated by LKSD.
- Low-mass boiler Installation and operations training for 2 LKSD maintenance staff as part of ABSN / LKSD MOA.
- 16 hour energy efficiency boiler training for 1 local maintenance staff – at Bethel regional Boiler training in March, 2006. (Training hours provided in-kind by ABSN.)

Chefnak City Owned Buildings

Energy efficient lighting upgrades were completed in three buildings owned by the City of Chefnak.

City owned Buildings - Lighting Retrofit Summary:

- Lighting upgrades completed in September 2006
- Retrofitted 44 linear fluorescent fixtures with T8 lamps and electronic ballasts
- Installed: 14 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 7,293 watts
- Post-retrofit energy use for all lighting: 3,397 watts
- Energy savings projection: 3,869 watts (3.90 kW)
- **Pre-retrofit to post retrofit energy reduction: 53 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$1,909	317 Gallons	\$765
7 Hours	\$3,341	555 Gallons	\$1,338
10 Hours	\$4,773	793 Gallons	\$1,912

City Building



Materials Installed	2-Lamp Ballasts 25w lamps	2-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
City Building	4	22	0	0	0	1	3

- Pre-retrofit energy use: 4,015 watts
- Post-Retrofit Energy Use: 1,427 watts
- Energy savings projection: 2,588 watts (2.59 Kw)
- **Pre-retrofit to post retrofit energy reduction: 64 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$1,268	211 Gallons	\$508
7 Hours	\$2,219	369 Gallons	\$889
10 Hours	\$3,170	527 Gallons	\$1,270

Water Treatment Plant

Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts 32w lamps	2-Lamp Ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Water Treatment Plant	0	3	0	0	0	0	1

- Pre-retrofit energy use: 592 watts
- Post-Retrofit Energy Use: 385 watts
- Energy savings projection: 207 watts (.21 Kw)
- **Pre-retrofit to post retrofit energy reduction: 35 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$101	17 Gallons	\$41
7 Hours	\$178	29 Gallons	\$71
10 Hours	\$254	42 Gallons	\$102

Community Center



Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts 32w lamps	2-Lamp Ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Community Center	7	8	0	0	0	4	5

- Pre-retrofit energy use: 2,686 watts
- Post-Retrofit Energy Use: 1,585 watts
- Energy savings projection: 1,101 watts (1.10 Kw)
- **Pre-retrofit to post retrofit energy reduction: 41 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$539	90 Gallons	\$216
7 Hours	\$944	157 Gallons	\$378
10 Hours	\$1,349	224 Gallons	\$540

Chefornak Traditional Council Owned Buildings

Energy efficient lighting upgrades were completed in four buildings owned by the Chefornak Traditional Council

Traditional Council owned Buildings - Lighting Retrofit Summary:

- Lighting upgrades completed in September 2006
- Retrofitted 62 linear fluorescent fixtures with T8 lamps and electronic ballasts
- Installed: 20 compact fluorescent light bulbs
- Pre-retrofit energy use for all lighting: 7,555 watts
- Post-retrofit energy use for all lighting: 4,100 watts
- Energy savings projection: 3,455 watts (3.46 kW)
- **Pre-retrofit to post retrofit energy reduction: 46 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$1,693	281 Gallons	\$678
7 Hours	\$2,963	492 Gallons	\$1,187
10 Hours	\$4,232	703 Gallons	\$1,695

Traditional Council Office



Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts (3) 32w lamps	2-Lamp Ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Traditional Council	0	0	5	0	6	0	0

- Pre-retrofit energy use: 770 watts
- Post-Retrofit Energy Use: 313 watts
- Energy savings projection: 457 watts (.46 Kw)
- **Pre-retrofit to post retrofit energy reduction: 59 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$224	37 Gallons	\$90
7 Hours	\$392	65 Gallons	\$157
10 Hours	\$560	93 Gallons	\$224

Old Clinic



Materials Installed	2-Lamp Ballasts 25w lamps	2-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Old Clinic	0	14	0	0	0	3	0

- Pre-retrofit energy use: 2,377 watts
- Post-Retrofit Energy Use: 788 watts
- Energy savings projection: 1,589 watts (1.59 Kw)
- **Pre-retrofit to post retrofit energy reduction: 67 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$779	129 Gallons	\$312
7 Hours	\$1,363	226 Gallons	\$546
10 Hours	\$1,947	323 Gallons	\$780

Notes: Existing lighting in the clinic was more than the relatively low ceilings and small rooms required. 67% savings was achieved by de-lamping and employing a customized lamp and ballast combination. Existing 4-lamp, 34 watt and 40 watt T12 fixtures were changed to 2-lamp fixtures with 3-lamp ballasts and 25w lamps. Three-lamp ballasts running 2 lamps will slightly push the lamps to provide more light than a normal 2-lamp fixture. The 14, 4-lamp fixtures pre to post retrofit went from around 150 watts to 52 watts each.

Traditional Council Community Center



Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts (3) 32w lamps	2-Lamp Ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Community Building	3	6	0	0	0	0	0

- Pre-retrofit energy use: 1,230 watts
- Post-Retrofit Energy Use: 744 watts
- Energy savings projection: 456 watts (.46 Kw)
- **Pre-retrofit to post retrofit energy reduction: 37 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$223	37 Gallons	\$89
7 Hours	\$391	65 Gallons	\$157
10 Hours	\$559	93 Gallons	\$224

Headstart Building



Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts (3) 32w lamps	2-Lamp Ballasts 25w lamps	4-Lamp Ballasts 25w lamps	13w CFL	20w CFL	25w CFL
Headstart Bldg	34	0	0	0	5	6	0

- Pre-retrofit energy use: 3,178 watts
- Post-Retrofit Energy Use: 2,225 watts
- Energy savings projection: 953 watts (.95 Kw)
- **Pre-retrofit to post retrofit energy reduction: 30 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$467	78 Gallons	\$187
7 Hours	\$817	136 Gallons	\$327
10 Hours	\$1,167	194 Gallons	\$468

Chefornak Village Corporation Owned Buildings



Energy efficient lighting upgrades were completed in the Chefarnarmute Inc. owned grocery and hardware store.

Corporation Grocery and Hardware Store - Lighting Retrofit Summary:

- Lighting upgrades completed in September 2006
- Retrofitted 31 linear fluorescent fixtures with T8 lamps and electronic ballasts
- Installed: 1 compact fluorescent light bulbs

Materials Installed	4-Lamp Ballasts (3) 25w lamps	13w CFL	20w CFL	25w CFL
Grocery & Hardware Store	31	0	0	1

- Pre-retrofit energy use for all lighting: 4,440 watts
- Post-retrofit energy use for all lighting: 2,443 watts
- Energy savings projection: 1,997 watts (2.0 kW)
- **Pre-retrofit to post retrofit energy reduction: 45 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$979	163 Gallons	\$392
7 Hours	\$1,712	285 Gallons	\$686
10 Hours	\$2,446	407 Gallons	\$980

Notes: The village corp. store saw great savings and ample light by going to 25 watt lamps and from 4 to 3 lamp / fixtures.

Lower Kuskokwim School District Owned Buildings - Chefornak School

Energy efficient lighting upgrades were completed to the extent possible in the school tool room and 4 teacher housing units owned by LKSD.

School owned Buildings - Lighting Retrofit Summary:

- Lighting upgrades completed in October 2006
- Retrofitted 12 linear fluorescent fixtures with T8 lamps and electronic ballasts
- Pre-retrofit energy use for all lighting: 7,960 watts
- Post-retrofit energy use for all lighting: 4,034 watts
- Energy savings projection: 3,926 watts (3.93 kW)
- **Pre-retrofit to post retrofit energy reduction: 49 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$1,924	320 Gallons	\$770
7 Hours	\$3,367	559 Gallons	\$1,348
10 Hours	\$4,809	799 Gallons	\$1,926

Chefornak School



Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts 32w lamps	2-Lamp Ballasts 25w lamps	2-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Ballasts 25w lamps
Tool Room	0	0	0	3	0	0

- Pre-retrofit energy use: 246 watts
- Post-Retrofit Energy Use: 156 watts
- Energy savings projection: 90 watts (.09 Kw)
- **Pre-retrofit to post retrofit energy reduction: 37 %**

- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$44	7 Gallons	\$18
7 Hours	\$77	13 Gallons	\$31
10 Hours	\$110	18 Gallons	\$44

Teacher Housing

Materials Installed	2-Lamp Ballasts 32w lamps	4-Lamp Ballasts 32w lamps	2-Lamp Ballasts 25w lamps	2-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Fixtures 3-lamp ballasts 25w lamps	4-Lamp Ballasts 25w lamps
Teacher Housing	0	0	2	7	0	0

- Pre-retrofit energy use: 714 watts
- Post-Retrofit Energy Use: 458 watts
- Energy savings projection: 256 watts (.26 Kw)
- **Pre-retrofit to post retrofit energy reduction: 36 %**
- **Estimated Annual Savings:**

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$125	21 Gallons	\$50
7 Hours	\$220	36 Gallons	\$88
10 Hours	\$314	52 Gallons	\$126

Notes: The vast majority of school facilities were already upgraded with T8 lighting. Most of the teacher housing was already furnished with circular fluorescents which are relatively energy efficient. This meant only a few fixtures could be upgraded in LKSD facilities.

High Output T5 Lighting Upgrades for the Gym



Existing 4' HO fluorescent fixtures
in the Chefnak School Gym

Hours Per Day / 250 Days Per Year	Electrical Savings	Avoided Diesel Use	Avoided Diesel Costs
4 Hours	\$1,754	292 Gallons	\$703
7 Hours	\$3,070	510 Gallons	\$1,230
10 Hours	\$4,386	729 Gallons	\$1,756

The Chefnak school gym T5 retrofit was completed in August, 2006. This upgrade resulted in a 51% savings. Fifty-six, 2-lamp High output T12 fluorescent fixtures - each using 125 watts – were replaced with 20, 3-lamp T5 fixtures each using 171 watts.

Alaska Building Science Network - Chefnak T5 Lighting Upgrade Details

These retrofits were completed in August, 2006.

Chefnak	Length (feet)	Width (feet)	Ceiling Height (feet)	# of Existing Fixtures	Existing Fixture Wattage	Total Existing Wattage	Existing Foot-candles	New Foot-Candles	# of New Fixtures	lamps / fixture	New Fixture Wattage	Total New Wattage
Gym	80	50	20	56	125	7000	16	35	20	3	171	3420

Total New wattage for gym = 51 % savings

Savings & Payback Calculation for Gym:

51.14285714

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

Full cost of electricity: \$0.49 /kWh

Watts of existing lighting: 7,000

New wattage for T5 fixtures: 3,420

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

Existing Cost: \$6,003

Retrofitted Cost: \$2,933

Annual Savings:
\$ 3,070

Est material & shipping cost of Gym retrofit: \$5,057.29

Simple Payback: Materials cost / annual savings = **1.647406225** years (for retrofit to pay for itself in materials)

Low-Mass Boiler Replacements for Lower Kuskokwim School District Teacher Housing:



Two new Energy Kinetics EK-2 Low-Mass Boilers like the one pictured will be installed in the LKSD, old BIA teacher housing bldg in Chefornak

After lighting upgrade projects were fully funded, approximately \$12,800 remained in materials and village labor budgets for other energy saving measures. It was determined by ABSN and AEA that reducing heating fuel use would be a good use of remaining funds.

ABSN signed an MOA with LKSD for installation of two, Energy Kinetics EK2 low-mass boilers to be installed in the Chefornak, old BIA teacher housing building. This building of approximately 4,500 square feet is heated by two, old and over-sized cast iron boilers estimated to gross 580,000 BTUs and burn 5.6 gallons of heating fuel per hour of use.

These boiler replacements will happen during the '07 summer recess. The district is contracting with a mechanical contractor experienced with Energy Kinetics boilers based in Bethel, which is the headquarters of LKSD. These two entities will work closely together during the boiler installations to ensure LKSD maintenance staff are trained in the installation, operations and maintenance of the new boiler systems. LKSD will cover transportation, lodging, per diem, shipping and miscellaneous costs. VEUEEM funds will cover materials and most of the contracted labor for these projects. ABSN will be monitoring the installation process and provide AEA with relevant updates.

Although low-mass boilers are not commonly found in rural Alaska applications presently, their potential for fuel savings coupled with steady fuel cost increases may be catalysts in more of these systems being utilized. Rural entities have so far been reluctant to embrace a new heating system that has substantially different parts, technology and maintenance familiarity. With our recent research into low-mass boiler systems we believe the substantial fuel savings potential of the low-mass system will over shadow initial challenges of unfamiliarity. With the low-mass boiler system, providing installation and maintenance specifications of the manufacturer are followed, fuel savings is estimated to be 10% - 30% over the older, existing cast iron boilers.

Low-Mass Boilers – Research Information:

Following is information from our research that led us to pursue installations and training for low-mass boiler systems as energy saving measures for these grants:

The industry standard for rating energy efficiency is the: Annual Fuel Utilization Efficiency (AFUE) rating. This system is decades old and does not account for some of the most important elements effecting energy efficiency of a heating system. AFUE does not measure heat loss and accompanying fuel use due to:

- jacket losses from uninsulated or minimally insulated boilers
- Standby (idle) losses from boilers that always run at operating temperature and never cool to room temperature.
- Room air losses / draft regulator losses and heat-loss up the chimney.

These areas taken together contribute significantly to increased fuel use. These areas of heat (and fuel) losses are why conventional boiler systems burn more fuel than necessary. Low-mass boiler systems were designed to minimize losses in these specific areas.

On Kodiak Island, the U.S. Coast Guard is in the process of finalizing a project to have over 150 EK 2000 low-mass boilers installed in their Kodiak island housing units. They have had a performance-contracting project going for a couple years and have discovered excellent results in replacing conventional cast iron indirect tank systems. According to Energy Kinetics' Vice President, the Coast Guard has described the boiler replacements as the fastest pay-back of all the heating energy retrofits they are monitoring.

These boilers have been around more than 2 decades and have proven themselves in the field. Once the operations and maintenance of these systems is understood, they are not prohibitive to maintain or get parts for.

Recent research findings by the Brookhaven National Laboratory point to significant fuel savings with low-mass boilers over conventional cast iron boilers:

Excerpts from:

The Performance of Integrated Hydronic Heating Systems

*Dr. T. Butcher, Y. Celebi, and G. Wei
Brookhaven National Laboratory, New York*

An 82% AFUE (Annual Fuel Utilization Efficiency) Heat and Hot Water Boiler runs with 61% seasonal efficiency – and the real efficiency is even lower.

An 82% AFUE boiler (with an 80% steady state thermal efficiency) performs with seasonal efficiency of 61%. These results are meticulously calculated by very accurately measuring the amount of energy consumed and the amount of energy delivered to the conditioned space and for domestic hot water. The majority of the reduction in efficiency comes from downtime losses (idle losses) that are not accounted for in the AFUE rating system.¹ The 61% seasonal efficiency is further lowered by draft regulator losses, so the real efficiency is around 55%.

In another example, Dr. Butcher highlights savings of 29.5% when comparing steady state thermal efficiency of 88% versus 80%. In this case, 76% of the savings is achieved by reducing the idle loss from 3% to .15%.

87% AFUE System 2000 outperforms a 93% AFUE condensing boiler.

System 2000 has the highest seasonal efficiency and the lowest idle loss of all systems tested. For example, Dr. Butcher notes that System 2000's "value of .15% here for idle loss represents the best level measured in the lab tests to-date. Here the reduction in annual fuel use is actually lower than with the condensing system and demonstrates the important impact that the idle losses have."² The extremely low idle losses (see yellow graph) indicate that System 2000 is nearly unaffected by oversizing and performs at near peak efficiency in summer, spring, winter and fall.

AFUE	Equipment Type	Steady State Thermal Efficiency	Idle Loss	Oversize Factor	Seasonal Efficiency (Real Efficiency is lower if draft regulator required)
87%	System 2000	86.5%	.15%	3	85.2%
93%	Condensing Boiler with Indirect Tank	92.0%	1.5%	3	79.6%
89%	Boiler with Indirect Tank	88.0%	3%	3	67.1%
82%	Tankless Coil Boiler	80.0%	3%	3	61.0%

Outdoor reset controls These controls can reduce idle losses, but typically will account for savings of less than 6 or 8%.

¹Dr. Thomas Butcher of Brookhaven National Labs May 2, 2006 presentation at the Atlantic Region Energy Expo, "Is there a better method than AFUE?"

²Butcher, T., Celebi, Y, and Wei, G., The Performance of Integrated Hydronic Heating Systems, Proceedings of the Fifth Aachen Oilheat Colloquium, Aachen Germany, Sept. 2006, Olwarme Institute.

Bethel Boiler Training at Yuut Elitnaurviat Learning Center, March 24 & 25, 2006



16 hours of classroom time at the Learning Center Shop



Blue plastic cases are Bacharach flu gas analyzer kits – taken back to villages by maintenance staff



Training on oil burner combustion efficiency

Chefornak maintenance staff: Bernard Mael traveled to Bethel March 24 and 25, 2006 participate in this training. ABSN partnered with Bethel Community Services Association, YKHC's Yuut Elitnaurviat Learning Center and AVCP Housing Authority to provide ABSN's 16-hour boiler training course to 7 rural maintenance staff from VEUEEM grant villages. Charlie Deer's training hours were covered by \$2,100 in matching funds from ABSN. AEA VEUEEM grant funds were used to cover air fare and lodging in Bethel for the following maintenance staff from this grant's villages: **Chefornak:** Bernard Mael, **Kongiganak:** John Phillip, **Kwigillingok:** Benedict White, **Mekoryuk:** Alvin David, **Quinhagak:** Norman Cleveland and Adolph Pleasant. Andrew Lind of Port Heiden (NW-SW Region VEUEEM grant) was also brought to Bethel for this class.



Components of a Bacharach Flu Gas Analyzing Kit used in boiler efficiency training and left with capable maint staff



Smoke-test kit for analyzing flu gases for boiler efficiency



Flu gas analyzer measures levels of unburned carbon in combustion gases

During this training course ABSN's boiler specialist Charlie Deer instructed maintenance staff in the fundamentals of boiler and fuel energy efficiency. Training topics covered: fuel, proper heating system sizing, testing boiler efficiency with a flu gas analyzer kit, cleaning and tuning boilers for energy efficiency, control options and proper control function, burner and nozzle components and function, outdoor temperature boiler controls, programable thermostats, etc.

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

Village entities worked with: Tribe, City, Village Corp, School District.

In-Kind Item	Dates	Hours Contributed	Hourly Wage	Value / Amount	Notes
Staff time for project contact, introduction, and review of intro materials (Number of entities x 1 hour each)		4	\$15.00	\$60.00	Hrs contributed column indicates # of entities we worked with in the village. \$15 / hr is our estimated average wage for local village staff: Tribal Administrators, City Clerks, Facilities Managers, maintenance staff, etc.
Staff time for project contact, introduction, and review of intro materials (Number of entities x 1 hour each)		4	\$15.00	\$60.00	Hrs contributed column indicates # of entities we worked with in the village. \$15 / hr is our estimated average wage for local village staff: Tribal Administrators, City Clerks, Facilities Managers, maintenance staff, etc.
Staff time for Attending teleconference - all entities village-wide		13.5	\$15.00	\$202.50	Hrs contributed column indicates length of telecon multiplied by # of village telecon participants
Office manager time for maintenance worker assistance & supervision		28	\$18.00	\$504.00	In-Kind Items provided by (Chefornak, Inc. From Robert Panruk, 9-13-06) Lighting upgrades done week of 9-4-06
City Maint. Staff - accompany Field Manager on building assessments - 1st site visit		2	\$9.00	\$18.00	
City Maint. Staff - light fixture and ballast research before site visit		6	\$9.00	\$54.00	
Maint. Staff time to attend ABSN training		40	\$9.00	\$360.00	City maintenance staff helped do high school gym lights for training purposes.
Village office administrative percentage of total project cost less ABSN Admin %. Total project cost = \$37,250/village - (our admin percentage, (around 9%) Approx: \$3,352) = \$33,897 x 5% = \$1,694 (this 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 project support.	Jan '05 - Jan '07			\$1,694.00	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 - all site visits				\$300.00	5 nights @60/night
Transportation and fuel costs - all site visits				\$160.00	4-wheeler rental, 4 days @\$40/day
Fuel specific during #1 site visit				\$14.28	3 gallons fuel
School & teacher housing lighting upgrades		8	18	\$144.00	Local maint in-kind labor provided by school district
School T5 Gym lighting upgrades				\$4,303.71	In-kind labor - for LKSD electrician provided by school district, includes airfare and per diem,
Employer expense for Workman's Comp		931	0.05	\$46.55	Generic multiplier: .05 x gross payroll of village labor (indicated in hrs contrib column)
	TOTAL			\$7,921.04	

