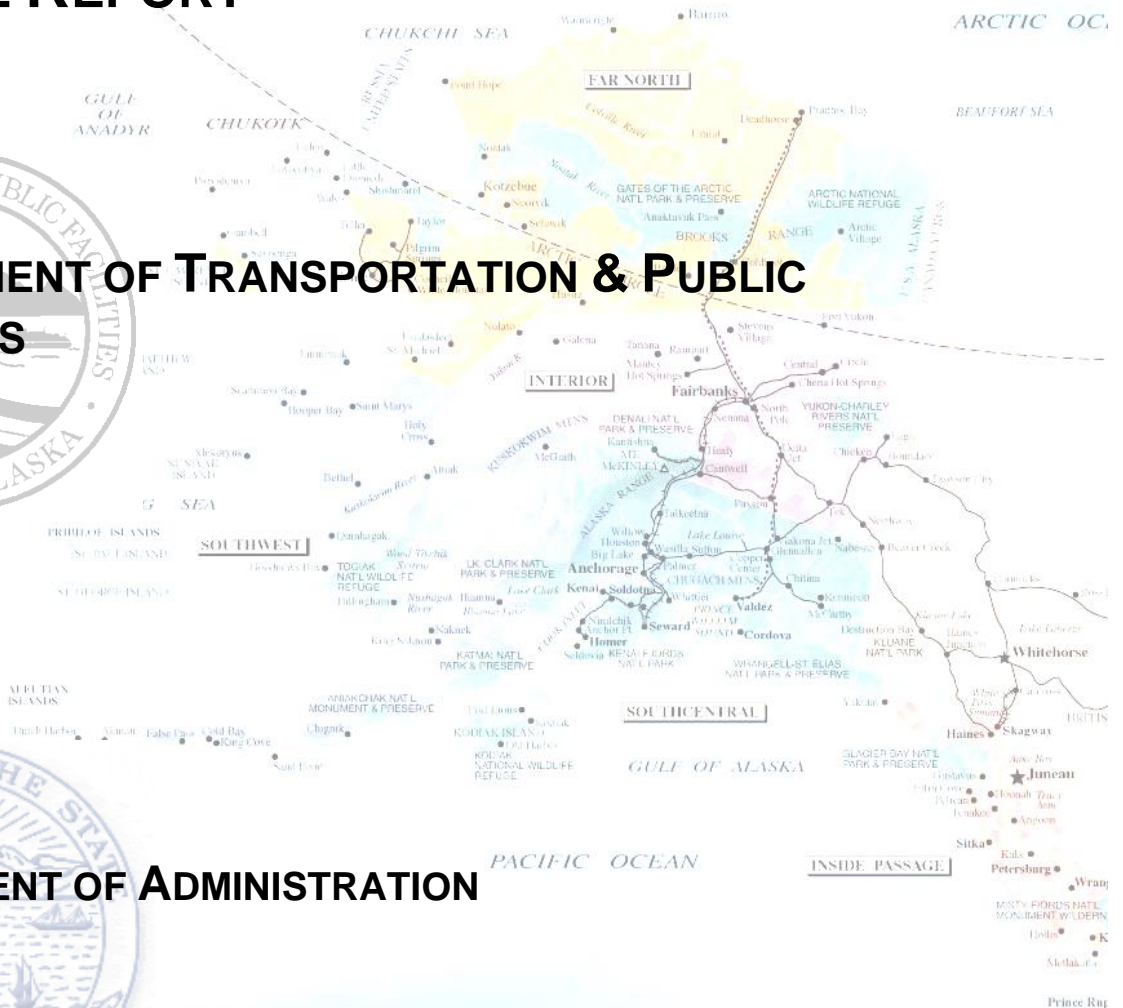


ALASKA SUSTAINABLE ENERGY ACT ANNUAL REPORT

**DEPARTMENT OF TRANSPORTATION & PUBLIC
FACILITIES**

AND

**DEPARTMENT OF ADMINISTRATION**



2013 PROGRESS REPORT
Submitted January 2014



EXECUTIVE SUMMARY

In accordance with AS 44.42.067(d), this FY13 Progress Report is presented to the Alaska State Legislature and details the progress of the State of Alaska Department of Transportation and Public Facilities (DOT&PF) in reducing the state's energy consumption.

AS 44.42.067 (a) requires that the DOT&PF shall work with other state agencies to retrofit 25% of all public facilities that are at least 10,000 square feet, starting with the least energy efficient facilities. By the end of 2013, the DOT&PF has completed energy efficiency projects in 20% of public facilities meeting these criteria and with current and developing projects it is expected to meet the 25% retrofit target by 2016.

The DOT&PF and other state agencies have been working to reduce the state's energy consumption through the use of energy savings performance contracts or other means for many years. To present; through the use of energy savings performance contracts, the state has executed energy savings performance projects in over 40 facilities and has achieved cumulative annual energy cost savings of greater than **\$2.1 Million¹**. The cumulative energy savings is also presented in Table 1 below:

Table 1²
Cumulative Annual Energy Savings through Energy Savings Performance Projects

<u>Energy Type Saved</u>	<u>Cumulative Annual Total</u>	<u>Unit</u>
<i>Electricity</i>	>7,700,000	kWh
<i>Natural Gas</i>	>162,000	CCF
<i>Heating Oil</i>	>227,000	Gallons
<i>CO2 Reduction³</i>	>9,500	Tons

Completed state energy savings performance projects have been accomplished through commercial financing, American Recovery and Reinvestment Act funds and agency deferred maintenance funds. As the DOT&PF develops energy retrofit projects with state agencies, it continues to educate and encourage agencies to utilize the Alaska Housing Finance Corporation (AHFC) Energy Efficiency Revolving Loan Fund Program. Several state projects in current development are anticipated to utilize this program.

The DOT&PF continues to coordinate with the AHFC, The Office of Management and Budget (OMB), and all state agencies on the input of utility and building information into the **Alaska Retrofit Information System (ARIS)**, the web based system used by state agencies to collect and store energy consumption and cost data in order to determine facility energy usage and for prioritization of energy efficiency projects. State agencies are now entering facility utility data into ARIS and ARIS continues to be developed and updated by AHFC.

¹ Adjusted for estimated energy cost escalation/inflation on projects completed in prior years.

² Does not include University of Alaska completed energy savings performance projects.

³ CO2 reduction calculated utilizing EPA Greenhouse Gas Equivalencies Calculator.

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1.0 INTRODUCTION

The State of Alaska Department of Transportation and Public Facilities (DOT&PF), in consultation with the Department of Administration (DOA), present this FY13 progress report to the Alaska State Legislature. Progress in this report includes work completed through 2013.

AS 44.42.067 requires the DOT&PF to retrofit at least 25 percent of all State of Alaska public facilities over 10,000 square feet no later than January 1, 2020. The milestones to accomplishing this include:

- Implementing a standardized method to collect energy consumption and cost data for facilities and generating Energy Use Indexes (AS 37.07.040 (12)).
- Identifying and prioritizing the least energy efficient facilities.
- Determining project scopes for energy retrofit work in those facilities that will meet net cost savings within 15 years.
- Working with the state agencies to arrange funding for the determined energy retrofit projects.
- Contracting with Energy Services Companies to perform energy performance contracts.
- Executing the energy retrofit projects and verifying the energy savings.
- Continuous monitoring of state energy consumption to be compared to levels of past years.

Utility Information for facilities is being entered in the Alaska Housing Finance Corporation (AHFC) Alaska Retrofit Information System. This information is being used to generate energy use indexes for the purposes of determining energy use consumption changes and assisting in prioritizing facility energy efficiency retrofit projects.

State agencies are interested in performing more projects that will result in additional energy savings. The DOT&PF is encouraging and making agencies aware of the AHFC Alaska Energy Efficiency Revolving Loan Fund program as well as developing specific projects intended to utilize the program.

Subsequent sections of this report provide details on the completed work performed in 2013 for energy efficiency focused projects, the utility consumption and expense data through ARIS, and the DOT&PF's coordination with other agencies.

2.0 ENERGY EFFICIENCY RETROFIT PROJECTS

2.1 COMPLETED PROJECTS (2013)

This section details energy efficiency related projects completed by the DOT&PF and other individual agencies in 2013.

2.1.1 ENERGY SAVINGS PERFORMANCE CONTRACT PROJECTS COMPLETED

In 2013, the DOT&PF completed energy savings performance projects at Department of Education and Early Development (DEED), Department of Public Safety (DPS), and Department of Corrections (DOC) facilities. The annual combined savings summary of these projects is presented in Table 2 below and the description of each of the agency's projects follows.

Table 2:
2013 Completed Projects Annual Savings Summary

Electricity (kWh/Yr.)	Heating Fuel Oil (Gal/Yr.)	Annual Cost Savings
51,590	23,181	\$140,475

Department of Education and Early Development

Project: Mt. Edgecumbe High School (MEHS) Upper Campus Heating Upgrades

This was the first part of a phased project at the Mt. Edgecumbe High School Campus to accomplish energy retrofits across all of the campus buildings. Phase 1 involved the upper campus heating system upgrade to replace a failing heating and distribution system. Significant fuel oil savings was achieved through upgrading the existing boilers with high efficiency boilers, improving the heating control system and improving the upper campus heating distribution piping delivery and infrastructure.

Phase 2 of the project, currently in progress, involves further comprehensive energy retrofit upgrades across all of the major Mt. Edgecumbe facilities. The following Table 3 summarizes the completed DEED project.



Picture 1: Mt. Edgecumbe H.S. New Heating Plant

Table 3: DEED-MEHS Energy Savings Performance Project

Project: Mt. Edgecumbe H.S. Upper Campus Heating Upgrades		
Affected Facilities	Location	Energy Retrofits Accomplished
Bldg 289-Upper Heating Plant Bldg 290 -Cafeteria Bldg 292-Boys Dorm Bldg 293-Girls Dorm Bldg 295-Heritage Hall Bldg 297-Ivy Hall	Sitka	-Upper campus heating plant boiler replacements to high efficiency boilers. -New primary buried heating and domestic water distribution piping to replace failing distribution piping to the upper campus facilities. -Direct digital control of the new boiler system.
Reported Annual Energy Savings:	1,218 kWh of electricity 22,037 Gallons of Heating Oil	
Reported Annual Savings:	\$131,178	

Department of Public Safety**Project: Fairbanks Alaska State Trooper Building Energy Upgrades**

This project included major heating and ventilation upgrades to the entire building, direct digital control improvements, lighting upgrades, and the conference room large window upgrade. Significant electricity savings was achieved through the lighting and lighting control upgrades. Table 4 below summarizes the completed DPS project.

Table 4: DPS Energy Savings Performance Project

Project: Fairbanks Alaska State Trooper Building Energy Upgrades		
Affected Facilities	Location	Energy Retrofits Accomplished
Alaska State Trooper Building	Fairbanks	-Lighting upgrades and lighting controls. -HVAC system improvements -Related direct digital control improvements.
Reported Annual Energy Savings:	40,386 kWh of electricity 45 Gallons of Heating Oil	
Reported Annual Savings:	\$7,174	

2.1.2 ENERGY SAVINGS PERFORMANCE CONTRACT PROJECTS IN-PROGRESS & DEVELOPING

Active and developing energy savings performance projects include facilities within the Departments of Education and Early Development, Fish and Game, Corrections, Health and Social Services and DOT&PF-Northern Region. They are summarized in Table 5 below and are in various phases of completion, implementation, construction or development. As projects are developed, their scopes are expected to evolve and as projects are completed, their results reported.



Picture 2: DOT&PF Nelchina Maintenance Station

Table 5: Energy Savings Performance Contract Projects In-Progress

Agency	Affected Facilities	Location	Project Phase, Status or Note
DEED	Mt. Edgecumbe H.S. Campus (includes 8 campus buildings) Bldg 289-Upper Heating Plant Bldg 290 -Cafeteria Bldg 292-Boys Dorm Bldg 293-Girls Dorm Bldg 295-Heritage Hall Bldg 297-Ivy Hall Wide Bldg 1330 – Classroom Bldg 1331 - Gymnasium	Sitka	This project is Phase 2 of the Mt. Edgecumbe High School campus wide energy efficiency upgrades. Implementation phase with construction is currently in-progress. Anticipate completion in 2014.
DF&G	Fairbanks Administration Headquarters Building. SEAL Laboratory Hunter Education Building	Fairbanks	Implementation phase with construction is currently in-progress. Anticipate completion in 2014.
DOC	Spring Creek Correctional Center	Seward	Project is in the investment grade energy audit phase. Anticipate implementation commencing mid-2014. <i>This project is intended to utilize the AHFC Alaska Energy Efficiency Revolving Loan Fund.</i>
	Lemon Creek Correctional Center	Juneau	Selection of the energy savings performance contractor is in process. Anticipate selection by February 2014.
	Ketchikan Correctional Center	Ketchikan	<i>This project is intended to utilize the AHFC Alaska Energy Efficiency Revolving Loan Fund for implementation.</i>
DOT&PF-NR	SREB Building SEF Shop 3-Bay Shop Maintenance Shop Maintenance Shop Airport Maintenance Shop Maintenance Shop Maintenance Shop Maintenance Shop Maintenance Shop SEF Light Duty Shop and Office SEF Motor Room Warm Storage Building Grader Warm Storage Building	St. Marys Chitina Ernestine Gulkana Nelchina Paxson Slana Tazlina Fairbanks	Selection of the energy savings performance contractor is in process. Anticipate selection by February 2014. <i>This project is intended to utilize the AHFC Alaska Energy Efficiency Revolving Loan Fund for implementation.</i>
DHSS	Public Health Lab	Anchorage	Energy savings performance contractor selection in process. Anticipate selection by February 2014. <i>This project is intended to utilize the AHFC Alaska Energy Efficiency Revolving Loan Fund for implementation.</i>

In addition to the above active projects - further projects are being developed for such agencies as the DOC and DOT&PF International Airports.

2.1.3 STATE AGENCY INDIVIDUAL FACILITY ENERGY RETROFIT PROJECTS

Individual facility energy retrofit projects reported by state agencies and completed in 2013 are shown in Table 6 below. Project scope and information was provided by individual agencies.

Table 6: Individual Agency Facility Energy Retrofit Projects Completed

Agency	Affected Facilities	Location	Project Scope Accomplished
DOA/ DGS	Alaska Office Building	Juneau	Replace all boiler isolation valves, circulation pumps, control valves on heat registers, additional isolation valves on each floor, reinsulated boiler room and additional pipe id markers and replace burners. Replace a/c unit, reconfigure HVAC system and insulate duct work.
	Alaska Office Building	Juneau	Exterior site lighting upgrades to - LED lighting
	Alaska Office Building	Juneau	Wood pellet feasibility study.
	Community Building	Juneau	Interior lighting upgrades
	Court Plaza Building	Juneau	Mechanical upgrades including removal of glycol heating system equipment, additional isolation valves for each floor. Boiler replacement.
	Court Plaza Building	Juneau	Replace pneumatic actuators with electronic and new VAV boxes.
	Dimond Courthouse	Juneau	HVAC supply and return fan upgrades.
	Dimond Courthouse	Juneau	Window seal replacement and curtain wall repair (north, east & west) and replace all interior gaskets on all windows.
	State Office Building	Juneau	Install new cooling tower and replacement of galvanized piping located in chiller room, balancing of system and installation of new motor control center.
	State Office Building	Juneau	Upgrade heating P1-P4 elevator lobbies with electric cabinet heaters.
	State Office Building	Juneau	Replace air compressor which operates all pneumatic controls and devices.
	Palmer State Office Building	Palmer	Roof Replacement. Track lighting high efficiency lighting replacement.
	Archives Building	Juneau	Wood pellet feasibility study.
	Governor's House	Juneau	Roof replacement.
DF&G	King Salmon Office and Bunkhouse	King Salmon	Upgrade and improve approximately 10,000 SF of roofing and attic insulation.
	Dillingham Warehouse	Dillingham	Replace metal siding and roofing with new insulated panels. Energy Efficiency upgrade of windows and doors.

	Yakutat Bunkhouse	Yakutat	Upgrade of the hot water heater. Estimate payback – 3-4 years.
	Yakutat Bunkhouse and Office	Yakutat	Retrofit old light fixtures with energy efficient LED lights. Estimated payback – 2-3 years.
	Crystal Lake Spawning Building	Crystal Lake	Replaced the old, un-insulated structure with a new insulated and energy efficient structure.
	Fairbanks Shop	Fairbanks	Upgrades old un-insulated roof and attic with new roofing and insulation.
DOC	Wildwood Correctional Center	Kenai	Replacement of the boiler burners, converting them from high/lo fire sequencing to full modulating sequencing.
	Ketchikan Correctional Center	Ketchikan	Complete roof replacement with added insulation.
	Ketchikan Correctional Center	Ketchikan	Replaced metal halide perimeter lighting with LED lighting.
	Lemon Creek Correctional Center	Juneau	Replaced 2-two stage burners with high efficiency modulating burners.
	Highland Mountain Correctional Center	Eagle River	Replaced 29 doors and 8 large windows with energy efficient doors, door frames, jambs, and windows.
DOT-NR	Cantwell Shop	Cantwell	Convert exterior lighting to LED. Anticipated payback - 3 years.
	Cantwell Shop	Cantwell	Added insulation under building slab.
	Healy Shop	Healy	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Central Shop	Central	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Central Shop	Central	Replaced metal man-door with fiberglass door. Anticipated payback – 8 years.
	Fort Yukon Combined Facility	Fort Yukon	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Peger Road Complex	Peger Road Site, Fairbanks	Convert exterior lighting to LED – SEF Shop, Warm Storage, Maintenance Building, Materials Building. Anticipated payback – 4 years.
	Peger Road Complex	Peger Road Site, Fairbanks	Upgrade to LED interior lighting in some spaces in Warm Storage and Admin Building. Anticipated payback – 4 years.
	Peger Road Complex	Peger Road Site, Fairbanks	Replace exterior windows with fiberglass triple pane. Anticipated payback – 12 years.
	Peger Road SEF Shop	Peger Road Site, Fairbanks	Heavy Duty Bay LED upgrade. Anticipated payback – 4 years.
	Peger Road Admin Building	Peger Road Site, Fairbanks	Replace door seals on Administration Building exterior doors. Anticipated payback – 4 years.
	Peger Road Materials Building	Peger Road Site, Fairbanks	Replaced roof on Materials Building, added insulation.
	Healy Shop	Healy	Replaced metal man-door with fiberglass door. Anticipated payback – 8 years.
	Birch Lake Station	Birch Lake	Hydronic heat conversion, eliminated 2 hot air furnaces. Installed hydronic boiler. Estimated 15% savings on fuel usage.
	Tok Station	Tok	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Tok Station	Tok	Upgraded windows and doors. Anticipated payback – 12 years.
	Delta Courthouse	Delta	Convert exterior lighting to LED. Anticipated payback – 3 years.

	Delta Warm Storage	Delta	Upgraded interior lighting to T-8. Anticipated payback – 7 years.
	Delta Station	Delta	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Eagle Station	Eagle	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Southfork Station	MP 74 Taylor Hwy	Convert exterior lighting to LED. Anticipated payback – 3 years.
	Nome SEF Shop	Nome	Replaced 1960s boiler with modern hydronic unit. Anticipated payback – 20 years.
	Nome Facilities Shop	Nome	Upgrade to LED interior lighting. Anticipated payback – 2 years.
	Nome DOT Complex	Nome	Convert exterior lighting to LED. Anticipated payback – 2 years.
	Nome Airport ARFF Building	Nome	Convert exterior lighting to LED. Anticipated payback – 2 years.
	Gulkana Old Shop	Gulkana Airport	Replaced 1970s boiler with modern hydronic unit. Anticipated payback – 20 years.
	Gulkana Old Shop	Gulkana Airport	Upgraded interior lighting to T-8. Anticipated payback – 7 years.
	Gulkana SREB	Gulkana Airport	Upgraded interior lighting to T-8. Anticipated payback – 7 years.
	Valdez SEF Shop	Valdez	Added 3" urethane spray foam roof insulation. Increased R-value from R-11 to R-33.
	Valdez Facility Shop	Valdez	Upgraded interior lighting to T-5. Anticipated payback – 7 years.
	Thompson Pass	Valdez	Replaced doors and weather proofed the shop and bunkhouse. Anticipated payback – 3 years.
DEED – MEHS	Bldg 1330 – Classroom Bldg 1331 – Gymnasium Bldg 289 – Upper Campus Heating Plant	Sitka	Separated the lower campus from the upper campus heating plant. Built a new lower campus heating Plant with new energy efficient boilers to serve the lower campus Classroom and Gymnasium buildings.

PROJECT PRIORITIZATION

Through the AHFC Alaska Retrofit Information System, utility consumption and cost data information is collected and entered for the facilities by individual agencies. Provided that there is sufficient available data, the state can determine the Energy Use Indexes (EUIs) - the energy use per square foot - of individual facilities. Using this information, the state can examine individual facility EUIs to assist in identifying the least energy efficient facilities.

When developing a project, priority will be given to facilities that are least energy efficient. However individual facility and department needs as well as the geographic locations of the facilities must also be considered.

Because completing the work as cost effectively as possible is essential, when commencing energy efficiency retrofit projects, the DOT&PF intends to group projects by geographic locations to the extent possible. This will assist in expediting project completions, reducing project costs, and maximizing project resources. However, it may mean one group of facilities includes multiple departments and multiple funding sources and that energy retrofits to facilities are not completed in exact order of their baseline EUIs.

3.0 ENERGY CONSUMPTION AND COST DATA ANALYSIS

The Alaska Housing Finance Corporation (AHFC) has developed the Alaska Retrofit Information System (**ARIS**) - the web-based software platform to collect and store energy consumption and expense data for state-owned facilities.

Picture 3: ARIS

The Office of Management and Budget has coordinated with the DOT&PF and AHFC and directed that all state agencies input their respective facility energy consumption and cost information into ARIS. Training for state agencies for this was conducted late 2012.

Individual agencies as well as the University of Alaska are in various stages of entering their respective building energy consumption information into ARIS. Information entered by state agencies and the university remain continually in-progress; however significant information on facility and energy consumption and expense data has been entered by the university and different agencies. The current information available in ARIS represents approximately 50% of the total square footage of all state owned public facilities. A number of state owned smaller, specialized use and residential facilities are not represented in ARIS, including such buildings as sand and cold storage buildings, seasonal residential buildings, shelters, cabins and various others because they have negligible or minimal energy use.

The DOT&PF has analyzed this available data in ARIS, adjusting for potential errors, missing information and accuracy where possible. Analysis of the present available information entered into ARIS for years 2012 and 2013 shows that, on the gross average, there is an overall decrease in the Energy Use Index (energy consumed per square foot), and the Energy Cost Index (cost per square foot). Further information can be found in Appendix A.2.

It is important to note that the analysis is based only on the available information entered into ARIS at present, and that various other factors can affect and influence annual energy consumption including weather, facility need changes and the individual missions of the universities and each agency. More accurate analysis should be possible in the future as state agencies and the university continue entering further information and remaining 2013 data.

4.0 COORDINATION WITH OTHER AGENCIES

The DOT&PF continues to work closely with both the AHFC and the Alaska Energy Authority (AEA); both partners in the efforts to achieve the goals of the Alaska Sustainability Act.

The DOT&PF continues to coordinate with AHFC and all state agencies to input state facility data and utility information into the ARIS site and to coordinate energy retrofit projects at those facilities.

AHFC has created and is administering the Alaska Energy Efficiency Revolving Loan (AEERL) Fund Program. State agencies are being encouraged to utilize the loan program to fund the energy efficiency retrofit projects at their facilities.

AHFC, AEA and the DOT&PF are working together to gather data related to the energy efficiency of facilities throughout the state. AEA is primarily focused on private commercial and residential facilities, but will also be using data that the DOT&PF collects on state-owned facilities.

Both AEA's and AHFC's goal is to collect energy consumption data for public, commercial and residential facilities throughout the state to determine the state's total energy usage. The DOT&PF continues to assist in that effort by supplying the consumption data that the state agencies collect for state-owned facilities.

APPENDIX

A.1: Term Definitions

AkWarm-C©: AHFC data collection software for energy audits.

Alaska Retrofit Information System (ARIS): data collection, management, and information access resource for state agency utility information and AHFC AkWarm-C© files.

Baseline Conditions: the baseline energy consumption and operating conditions for a facility, including the equipment inventory and conditions, occupancy, energy consumption rate, control strategies, etc. in place prior to implementation of EEMs.

Baseline Energy Consumption: for any billing period, the Energy Consumption that would have been incurred by the Facility if the ESCO Services and ESCO Equipment had not been implemented, as calculated by utilizing the data, methodology and variables set forth in the Energy Performance Contract.

Benchmarking: An initial assessment of energy use for a facility to collect data that may be used for a variety of purposes, including prioritizing projects for funding, assessing the building's energy use against available end use indexes (EUI), and developing an Alaska-specific EUI.

Billing Period: the time period as set forth in the Energy Services Proposal (e.g. month, quarter, year) used to calculate Energy Savings for the Facility.

Commissioning: (From ASHRAE Guidance, "The Commissioning Process") a quality-oriented process for achieving, verifying, and documenting that the operation and performance of facilities, systems, and assemblies meets defined objectives and criteria.

Energy Consumption: the amount of energy and power, in the form of electricity, natural gas, oil, propane, or other energy source, consumed in the Facility in any Billing Period, as calculated by utilizing the data, methodology and variables set forth in the Energy Performance Contract. Energy consumption may also include other utilities such as water and wastewater.

Energy Cost Index: the total annual energy cost for all energy sources to operate a building, reported in \$/ft².

Energy Cost Savings: savings in units of consumption (e.g. kWh, kW demand, therms, CCF, gallons, etc.) in a Billing Period times the cost per unit of consumption for the Billing Period, as established in the Energy Performance Contract.

Energy Conservation Measures (ECMs): Policies and procedures intended to reduce a building's energy consumption by modifying human behavior. ECMs are administrative controls, such as training employees to turn lights off in un-used areas, disconnect appliances that are not in use, lower room temperature thermostat set-points, etc.

Energy Efficiency Measure (EEMs): Per [10 CFR 420.2](#), any capital improvement that reduces energy costs in an amount sufficient to recover the total cost of purchasing and installing such measure over an appropriate period of time and maintains or reduces energy consumption from non-renewable sources.

Energy Savings Performance Contract (ESPC): the contracting mechanism between the Facility Owner and the Energy Services Company that implements energy efficiency measures to achieve guaranteed energy savings. Projects can be executed without up-front capital through energy project loan funds, with capital funds, or combinations of loan and capital funds.

Energy Savings: for each form of energy for each Billing Period, the difference between the Baseline Energy Consumption for that Billing Period and the Energy Consumption actually incurred in that Billing Period as set forth in the Energy Performance Contract.

Energy Services Company (ESCO): a contractor that performs the energy audit, design, implementation, and measurement and verification of savings for energy efficiency retrofit projects.

Energy Use Intensity or Energy Use Index (EUI): Energy Use Intensity or Energy Use Index (EUI): a unit of measurement that describes a building's energy use in units of energy consumed by the building per unit area of square footage (BTU/ft²), or BTU/ft²/year. The EUI is used to compare a building's energy use to others of similar size and end use.

The energy consumed is converted into BTUs and divided by the square footage of the building. The EUI can then be used to compare and rank all facilities. The larger the EUI, the more energy consumed per square foot. Different types of facilities will have different EUIs based on their operational function, equipment, space usage and occupancies. For example, a health care or laboratory facility, an office facility, and a parking facility will all have very different EUIs, ranging from highest to lowest respectively.

Typical units for measuring the energy consumption are.

Energy Source	Category	Measured In Units of	
Electrical Consumption	Electricity	Kilowatt-hours	kWh
Electrical Demand	Electricity	Kilowatt	kW
Natural Gas	Heating	Thousand Cubic Feet	ccf
Heating Fuel Oil	Heating	Gallons	gal
Propane	Heating	Gallons	gal

Investment Grade Audit: an energy analysis of a facility to identify cost effective EEMs. The Investment Grade Audit provides detailed engineering investigation and report of a facility's current baseline energy and water consumption, equipment condition, operation, performance, maintenance, potential energy and water efficiency upgrades, life cycle costs, and risks for future performance.

Measurement and Verification (M&V): (From the Efficiency Valuation Organization "Energy Savings Measurement Guide") the process of using measurement to reliably determine actual savings created within an individual facility by an energy management, energy conservation or energy efficiency project or program. As savings cannot be directly measured, the savings can be determined by comparing measured use before and after implementation of a project, making appropriate adjustments for changes in conditions."

A.2: ARIS Energy Consumption & Cost Data

Summary of energy consumption and cost information entered into ARIS for state agencies and the University of Alaska

Data is adjusted, as best as possible, to account for errors, missing information, etc.

Last Updated/Modified: December 2013

AGENCY	YEAR	APPROX. AGENCY TOTAL SQ. FT.	SQ. FT. of FACILITIES ENTERED INTO ARIS	APPROX. PERCENTAGE REPORTED INTO ARIS	TOTAL ENERGY CONSUMPTION [kbtus]	ENERGY USE INDEX EUI [kbtu/S.F.]	EUI CHANGE [%]	TOTAL ENERGY COST	ENERGY COST INDEX ECI [\$/S.F.]	ENERGY COST CHANGE [%]	ENERGY COST INDEX CHANGE [%]	NOTE:
Dept. of Administration		1,523,438										
	2011		1,234,600	81%	105,616,604	85.5		\$ 3,309,270	\$ 2.68			Only Partial 2011 utility data available in ARIS
	2012		1,234,600	81%	110,201,813	89.3		\$ 3,225,634	\$ 2.61			Some outlying data that appeared to be errors not included.
	2013		1,254,779	82%	83,261,008	66.4	-26%	\$ 2,563,949	\$ 2.04	-21%	-22%	Most of 2013 utility data entered into ARIS.
Dept. of Education & Early Development		244,226										
	2011											
	2012		229,678	94%	3,686,273	16.0		\$ 123,999	\$ 0.54			Some agency fuel oil utility data missing.
	2013		229,678	94%	3,044,647	13.3	-17%	\$ 103,492	\$ 0.45	-17%	-17%	Some agency fuel oil utility data missing.
Dept. of Fish & Game		609,282										Substantial number of DNR buildings are remote cabins or shelters and by nature do use utilities.
	2011		145,129	24%	19,938,510	137.4		\$ 593,477				Only Partial 2011 utility data available in ARIS
	2012		288,337	47%	48,477,261	168.1		\$ 1,259,396	\$ 4.37			
	2013		303,337	50%	52,100,998	171.8	2%	\$ 1,333,297	\$ 4.40	6%	1%	
Dept. of Health & Social Services		925,274										
	2011		622,881	67%	62,748,636	100.7		\$ 634,493	\$ 1.02			Only Partial 2011 utility data available in ARIS
	2012		885,739	96%	135,353,364	152.8	52%	\$ 2,784,353	\$ 3.14			Some outlying data that appeared to be errors were not included.
	2013		875,589	95%	111,793,303	127.7	-16%	\$ 2,072,221	\$ 2.37	-26%	-25%	Some outlying data that appeared to be errors were not included. Still some remaining 2013 data to be entered.
Dept. of Corrections		1,310,769										
	2011											
	2012		1,338,254	102%	216,219,364	161.6		\$ 6,492,090	\$ 4.85			Likely a minor discrepancy in square footages
	2013		825,883	63%	34,855,085	42.2	-74%	\$ 1,191,673	\$ 1.44	-82%	-70%	Only partial 2013 utility data available in ARIS.
Dept. of Natural Resources		463,185										Substantial number of DNR buildings are remote cabins, shelters or outhouses and by nature do use utilities.
	2011		127,588	28%	11,504,505	90.2		\$ 223,746	\$ 1.75			Only Partial 2011 utility data available in ARIS
	2012		134,646	29%	12,349,666	91.7		\$ 277,939	\$ 2.06			Only partial 2012 utility data available in ARIS.
	2013		78,151	17%	6,521,898	83.5	-9%	\$ 132,627	\$ 1.70	-52%	-18%	Only partial 2013 utility data available in ARIS.
Dept. of Public Safety		440,000										
	2011			0%								
	2012			0%								
	2013		267,058	61%	2,092,328	7.8		\$ 103,372	\$ 0.39			Only partial 2013 utility data available in ARIS.
Dept. of Environmental Conservation		22,610										
	2009		22,610	100%	17,613,538	779.0		\$ 255,099	\$ 11.28			
	2010		22,610	100%	18,341,145	811.2	4%	\$ 212,654	\$ 9.41	-17%	-17%	
	2011		22,610	100%	20,348,089	900.0	11%	\$ 242,893	\$ 10.74	14%	14%	
	2012		22,610	100%	19,546,745	864.5	-4%	\$ 231,514	\$ 10.24	-5%	-5%	
	2013		22,610	100%	14,291,429	632.1	-27%	\$ 176,430	\$ 7.80	-24%	-24%	Only partial 2013 utility data available in ARIS.
Dept. of Transportation & Public Facilities		7,353,681										Substantial number of DOT/PF buildings are cold storage, sand storage or other and by nature use minimal to no utilities.
	2011		1,602,897	22%	286,106,802	178.5		\$ 5,676,051	\$ 3.54			Most of the energy/utility data availble from DOT&PF in ARIS provided from the
	2012		1,626,337	22%	289,425,832	178.0		\$ 5,023,506	\$ 3.09	-11%	-13%	International Airports.
	2013		1,419,397	19%	221,295,368	155.9		\$ 3,949,508	\$ 2.78	-21%	-10%	

Summary of energy consumption and cost information entered into ARIS for state agencies and the University of Alaska

Data is adjusted, as best as possible, to account for errors, missing information, etc.

Last Updated/Modified: December 2013

AGENCY	YEAR	APPROX. AGENCY TOTAL SQ. FT.	SQ. FT. of FACILITIES ENTERED INTO ARIS	APPROX. PERCENTAGE REPORTED INTO ARIS	TOTAL ENERGY CONSUMPTION [kbtus]	ENERGY USE INDEX EUI [kbtu/S.F.]	EUI CHANGE [%]	TOTAL ENERGY COST	ENERGY COST INDEX ECI [\$/S.F.]	ENERGY COST CHANGE [%]	ENERGY COST INDEX CHANGE [%]	NOTE:
Dept. of Military & Veterans Affairs		738,097										Estimated adjusted square footage. No data available in ARIS.
University of Alaska		6,626,753										
	2009		5,523,179	83%	1,322,202,913	239.4		\$ 16,799,100	\$ 3.04			
	2010		5,539,151	84%	1,041,437,071	188.0		\$ 17,032,320	\$ 3.07	1%	1%	
	2011		5,652,942	85%	1,111,580,618	196.6		\$ 18,223,593	\$ 3.22	7%	5%	
	2012		5,702,449	86%	1,167,459,777	204.7		\$ 18,967,908	\$ 3.33	4%	3%	
	2013		5,916,417	89%	881,834,473	149.0		\$ 15,620,698	\$ 2.64	-18%	-21%	Most Likely still remaining entries for 2013
TOTALS	2011		9,408,647	50%	1,617,843,764	172.0		27,479,030	\$ 2.92			Not all 2011 data entered. This accounts for lower comparitve total energy consumption and cost.
TOTALS	2012		9,836,313	50%	1,713,294,263	174.2		\$ 33,362,833	\$ 3.39	21%	16%	
TOTALS	2013	20,257,315	9,773,502	50%	1,189,795,170	121.7	-30%	\$ 23,297,759	\$ 2.38	-30%	-30%	Not all 2013 data entered into ARIS as of December 2013.

From current available data in ARIS, the 2013 overall EUI is lower than the 2012 overall EUI.

A.3: Energy Savings Performance Projects

Energy Savings Performance Projects Completed Through DOT&PF Statewide Public Facilities

Project No.	Agency	Project Name	Year Completed	Facility(s)	Bldg Sq. Ft.	City	Project Scope	Project Energy Savings									O&M (\$)	Project Total Energy Savings (\$)	Contract Method	Notes
								Elec kW	Elec (kWh)	Elec (\$)	Gas (CCF)	Gas (\$)	Heating Oil (Gal)	Heating Oil (\$)	Water (kGal)	Water (\$)				
CUMULATIVE ENERGY SAVINGS TOTALS=>								7,744,805		162,291		227,235		41,686						
PJ 81136	DFG	Fairbanks Regional Headquarters Energy	in-progress	Regional HQ Bldg, Indoor Shooting, Range, Sealing Laboratory	39,632	Fairbanks	Lighting Upgrades, lighting controls, laboratory u	297	126,316									\$ 46,982	Energy Savings Performance Contract	
PJ 80058	DOC	Dept. of Corrections Facilities (Change Order)	2013	Lemon Creek Correctional Center	85,088	Juneau	DDC Upgrade to Supply Fan (SF-3) system in 'Mod Section' of LCCCC						1,099	\$ 2,660				\$ 2,660	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2013 IGA&ESP.
PJ 81121-A	DEED	MEHS Campus-Wide Energy Upgrades (Ph-2)	in-progress	Bldg 289-Central Heating Plant, Bldg 290-Cafeteria , Bldg 292-Boys Dorm, Bldg 293-Girls Dorm, Bldg 295-	226,431	Sitka	Campus Wide DDC Upgrades, Bldg 1331-Gym Hydronic Heating Piping Replacement, Upper Campus Hydronic Distribution Piping Extension,		153,027	\$ 17,437			39,361	\$ 157,444			60,000	\$ 234,881	Energy Savings Performance Contract	
PJ 81121	DEED	MEHS Upper Campus Heating Upgrades (Ph-1)	2013	Bldg 289-Central Heating Plant, Bldg 290-Cafeteria , Bldg 292-Boys Dorm, Bldg 293-Girls Dorm, Bldg 295-		Sitka	Upper Campus Heating Plant Boiler Replacements, Primary Heating and Domestic Water Distribution Piping Replacments,		1,218	\$ 110			22,037	\$ 86,069			45,000	\$ 131,179	Energy Savings Performance Contract	
PJ 83023-81163	DPS	DPS Fairbanks Alaska State Trooper Bldg Energy Upgrades	2013	Fairbanks State Trooper Building	35,352	Fairbanks	Lighting retrofits including DMV and Dispatch, HVAC upgrades, Conference Room Window Upgrade,		50,372	\$ 7,018			45	\$ 156				\$ 7,174	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2013 IGA&ESP
83080-A	DOT&PF-SR	DOT&PF-Southeast Region Facilities	2012	7-Mile Facility	53,700	Juneau	Heating System Replacement, DDC Upgrade, VFD drives and high efficiency motors		24,157				5,688				\$ 46,135	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2012 M&V Report	
			2012	AMHS Maint Bldg	5,000	Juneau	Lighting Upgrades, Destrat Fan		42,648			(187)								
			2012	Sitka State & City Office	28,138	Sitka	Lighting Upgrades, Lighting Controls		67,127			(934)								
			2012	Ketchikan State Court & Office	36,218	Ketchikan	Boiler Replacements, VFDs, 3-Way Valves		4,979			4,204								
83080-A	DOC	Dept. of Corrections Facilities	2012	Ketchikan Correctional Center	18,092	Ketchikan	Boiler Replacements						5,813				\$ 22,913	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2012 M&V Report	
			2012	Lemon Creek Correctional Laundry	9,066	Juneau	Thermal Fluid Heating System						3,607							
83080-A	DEED	Dept. of Education Facilities	2012	MEHS Gymnasium Bldg	53,826	Sitka	Lighting Upgrades, Lighting Controls		71,041				(1,037)				\$ 8,122	Energy Savings Performance Contract	Energy & cost data from Siemens 2012 M&V Report	
			2012	Sitka SJ Muesum	6,500	Sitka	Lighting Upgrades, Lighting Controls, Demand Controlled Ventilation		35,803											
83080-B: DOTPF-CR	DOT&PF-CR	DOT&PF- Central Region Facilities	2012	Palmer Vehicle Maintenance Shop	12,600	Palmer	Lighting Upgrades, Lighting Controls, Boiler Repla	43	23,790	\$ 2,498	48,846	\$ 40,092				(576)	\$ 55,389	Energy Savings Performance Contract	Energy & cost data from Ameresco 2012 M&V Report	
			2012	Communications Bldg	12,432	Anchorage	Lighting Upgrades, Lighting Controls, Boiler Repla	277	113,188	\$ 11,549	645	\$ 540			1,286					
83080-B: DOL&WD	DOL&WD	AVTEC Facilities	2012	AVTEC First Lake Facility	20,000	Seward	Lighting Upgrades, Lighting Control Upgrades, Bo	384	112,753	\$ 21,079			2,391	\$ 6,189		1,904	\$ 29,172	Energy Savings Performance Contract	Energy & cost data from Ameresco 2012 M&V Report	
83080-B: DF&G	DF&G	DF&G Cordova Facilities	2012	Cordova Administration Bldg	3,920	Cordova	High Eff. Boiler Replacment, Lighting, Upgrades, Lighting controls, DDC Upgrades, instantaneous water heater	45	11,447	\$ 3,285			684	\$ 2,331		254	\$ 9,471	Energy Savings Performance Contract	Energy & cost data from Ameresco 2012 M&V Report	
			2012	Cordova Bunkhouse	3,876	Cordova	High Eff. Boiler Replacment, Lighting, Upgrades, L	21	2,253	\$ 1,045			729	\$ 2,474		82				
83080-B: DNR	DNR	DNR Facilities	2012	Forestry Palmer Admin Bldg	15,678	Palmer	High Eff. Boiler Replacement, Lighting Controls, DDC system improvements, Instantaneous Hot Water Heater		6,047	\$ 574	2,732	\$ 2,296				77	\$ 12,797	Energy Savings Performance Contract	Energy & cost data from Ameresco 2012 M&V Report	
			2012	Forestry Palmer Warehouse Bldg	18,000	Palmer	Lighting upgrades, lighting controls, radiant heat controls, night temperature setback, unified water metering	94	18,712	\$ 2,165	1,540	\$ 1,301			110					
			2012	Forestry Palmer Hanger	15,000	Palmer	Lighting upgrades, lighting controls, radiant heat controls, vehicle door replacement, hanger door seal, instantaneous water heater	104	33,795	\$ 3,775	2,239	\$ 1,795				(318)				
83080-C: DOTPF-NR	DOT&PF-NR	DOT&PF-Northern Region Facilities	2012	Peger Road HQ Bldg	21,900	Fairbanks	Hydronic Heating System, High Eff. Motors, DDC Upgrades, Window Replacement		509,317				(10,989)				\$ 58,580	Energy Savings Performance Contract	Energy & cost data from Siemens 2012 M&V Report	

Energy Savings Performance Projects Completed Through DOT&PF Statewide Public Facilities

Project No.	Agency	Project Name	Year Completed	Facility(s)	Bldg Sq. Ft.	City	Project Scope	Project Energy Savings									O&M (\$)	Project Total Energy Savings (\$)	Contract Method	Notes
								Elec kW	Elec (kWh)	Elec (\$)	Gas (CCF)	Gas (\$)	Heating Oil (Gal)	Heating Oil (\$)	Water (kGal)	Water (\$)				
83080-C: DPS	DPS	DPS Facilities	2012	Coldfoot Hanger	4,053	Coldfoot	Lighting Upgrades, Heating System Upgrade, Building Envelope Upgrades		5,040				1,183					\$ 7,412	Energy Savings Performance Contract	Energy & cost data from Siemens 2012 M&V Report
83080-C: DMVA	DMVA	DMVA Facilities	2012	Anchorage Armory	210,283	JBER	High Eff. Boiler Upgrade				33,359							\$ 27,066	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2012 M&V Report
83080-D: DOA	DOA	DOA Facilities	2012	Atwood Bldg	338,000	Anchorage	DDC Upgrades, Stack Effect Correction				3,333	\$ 3,465						\$ 10,610	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2012 M&V Report
			2012	Community Bldg	22,400	Juneau	DDC Heating System Upgrades,					2,989	\$ 7,145							
83080-E: DHSS	DHSS	DHSS Facilities	2012	Assets Bldg	24,310	Anchorage	High Efficiency Boiler Upgrade				2,844							\$ 8,619	Energy Savings Performance Contract	Energy & cost savings data from Ameresco engineering data
			2012	McLaughlin Youth Center	60,705	Anchorage	Lighting and Lighting Control Upgrades		70,714											
PJ 54552	DOT&PF-CR	Aviation Bldg Boiler Upgrades	2012	DOTPF-CR Aviation Bldg Boilers	62,000	Anchorage	High Efficiency Boiler Upgrade, DDC Panel Upgrades, AHU O/A Damper Improvements				11,045							\$ 7,765	Energy Savings Performance Contract	Energy & cost savings data from Siemens 2012 IGA&ESP
	DOC	State of Alaska: Department of Corrections Energy Savings Performance Project (Phase 2)	2009	Anchorage Correctional Center		Anchorage	Comprehensive	5,856	3,538,268		42,202		58,200		38,763		2,491	\$ 966,253	Energy Savings Performance Contract	Energy & cost savings data from Siemens Year (3) M&V Report submitted 2012
			2009	Hiland Mountain Correctional		Eagle River														
			2009	Spring Creek Correctional		Seward														
			2009	Wildwood Correctional		Kenai														
			2009	Fairbanks Correctional		Fairbanks														
			2009	Lemon Creek Correctional		Juneau														
			2009	Yukon Kuskokwim Correctional		Bethel														
			2009	Anvil Mountain Correctional		Nome														
	DOT&PF/DOA	State of Alaska: Department of Administration / Department of Transportation & Public Facilities Energy Savings Performance Project (Phase 1)	2006	Dimond Courthouse			Comprehensive	437	2,722,793		13,506		92,352	\$ 186,120	2,923		13,034	\$ 557,763	Energy Savings Performance Contract	Energy & cost savings data from Siemens Year (3) M&V report submitted 2009
			2006	Alaska Office Building																
			2006	Court Plaza Building																
			2006	Douglas Island Building																
			2006	State Office Building																
			2006	Aviation Building																
			2006	DOT&PF Annex Building																
			2006	Public Safety Building																

Cumulative Annual Energy Cost Savings from Energy Savings Performance Projects

Applicable Escalation Factors

Energy => 3.50%
Operations & Maintenance => 2.00%

AGENCY / PROJECT	TYPE	Year					
		2009	2011	2012	2013	2014	
DOA/DOTPF (SOA Phase 1)	Energy Operations	\$ 557,763 \$ 13,034	\$ 577,284.71 \$ 13,294.68	\$ 597,489.67 \$ 13,560.57	\$ 618,402 \$ 13,832	\$ 640,045.87 \$ 14,108.42	
							\$ 654,154 Subtotal
DOC (SOA Phase 2)	Energy Operations			\$ 966,253 \$ 2,491	\$ 1,000,072 \$ 2,541	\$ 1,035,074.37 \$ 2,591.64	
							\$ 1,037,666 Subtotal
DOT&PF-SE	Energy Operations			\$46,135.00 \$1,768.00	\$ 47,750 \$ 1,803	\$ 49,420.97 \$ 1,839.43	
							\$51,260.39 Subtotal
DOC	Energy Operations			\$22,913.00 \$	\$ 23,715 -	\$ 24,544.98 -	
							\$24,544.98 Subtotal
DEED - MEHS	Energy Operations			\$8,122.00 \$1,802.00	\$ 8,406 1,838	\$ 8,700.49 \$ 1,874.80	
							\$10,575.29 Subtotal
DF&G	Energy Operations			\$9,135.00 \$336.00	\$ 9,455 343	\$ 9,785.64 \$ 349.57	
							\$10,135.21 Subtotal
DOL-AVTEC	Energy Operations			\$27,268.00 \$1,904.00	\$ 28,222 1,942	\$ 29,210.16 \$ 1,980.92	
							\$31,191.08 Subtotal
DOT-CR	Energy Operations			\$54,679.00 \$710.00	\$ 56,593 724	\$ 58,573.51 \$ 738.68	
							\$59,312.20 Subtotal
DNR	Energy Operations			\$12,016.00 \$781.00	\$ 12,437 797	\$ 12,871.84 \$ 812.55	
							\$13,684.39 Subtotal
DMVA	Energy Operations			\$27,066.00 \$	\$ 28,013 -	\$ 28,994 -	
							\$28,993.78 Subtotal
DPS	Energy Operations			\$7,412.00 \$184.00	\$ 7,671 188	\$ 7,939.92 \$ 191.43	
							\$8,131.35 Subtotal
DOT-NR	Energy Operations			\$58,580.00 \$	\$ 60,630 -	\$ 62,752.36 -	
							\$62,752.36 Subtotal

Cumulative Annual Energy Cost Savings from Energy Savings Performance Projects

Applicable Escalation Factors

Energy => 3.50%
Operations & Maintenance => 2.00%

AGENCY / PROJECT	TYPE	Year					
		2009	2011	2012	2013	2014	
DOA	Energy Operations			\$10,610.00	\$ 10,981	\$ 11,365.70	
					\$ -	\$ -	\$11,365.70 Subtotal
DOT&PF Aviation Bldg Boiler Upgrades	Energy Operations			\$ 7,765	\$ 8,037	\$ 8,318.06	
					\$ -	\$ -	\$ 8,318.06 Subtotal
DPS Fairbanks Alaska State Trooper Bldg	Energy Operations				\$ 7,174	\$ 7,425.09	
						\$ -	\$ 7,425.09 Subtotal
DEED-MEHS Upper Campus Heating Upgrades	Energy Operations				\$ 131,179	\$ 135,770.27	
					\$ 45,000	\$ 45,000.00	\$ 180,770.27 Subtotal
DOC Lemon Creek SF-3 DDC Upgrades					\$ 2,660	\$ 2,753.10	
						\$ -	\$ 2,753.10 Subtotal

\$ 2,130,405 => 2013 Cumulative Annual Energy Cost Savings