# The Alaska Department of Corrections, Unlocking Savings through Energy Performance Contracts

Energy Use – An Owners Perspective

Energy Efficiency NOW Summit

March 4, 2015

# Background

- DOC manages 13 Correctional Facilities throughout AK
- 127 Buildings = 1.8 million square feet
- Energy Sources for heating and domestic hot water = fuel oil and natural gas
- DOC houses sentenced and un-sentenced inmates, community custody to close maximum security classification
- Most Buildings operated 24/7, 365 days of the year
- Mechanical & electrical systems difficult to maintain under maximum to medium security classifications
- Utility Costs are very expensive in remote regions

# Energy Performance Project History

- First "official" energy project initiated in 2007 under the DOT&PF Energy Term
- 8 Institutions were included in this project, located in Juneau, Anchorage, Seward, Kenai, Fairbanks, Nome and Bethel
- Scope of work varied by location
- Siemens Energy & Environmental Solutions selected as the Energy Service Company (ESCO)
- Performance based Design-Build whole system approach
- Construction from June 2007 thru Feb. 2009

## Key Objectives

- **Infrastructure improvements** maintained on a revenue-neutral basis **using cost avoided utility savings**.
- Achieve **energy savings without compromising occupant comfort**
- Facility Improvement Measures (FIMs) had to provide good **return on investment** or other substantial benefit

# Energy Efficiency Measures Selected

- Light Retrofits (T-12 magnetic to T-8 electronic ballast)
- Lighting Controls
- Water Conservation
- Premium Efficiency Motors
- Variable Frequency Drives
- Direct Digital Controls
- Vending Misers
- Heat recovery- Run around glycol coils
- Valve Insulation
- Boiler Burner Replacements
- Constant Air Volume to Variable Air Volume Fan Conversion
- Return/Exhaust Air Conversion to 100% Outside Air Fan

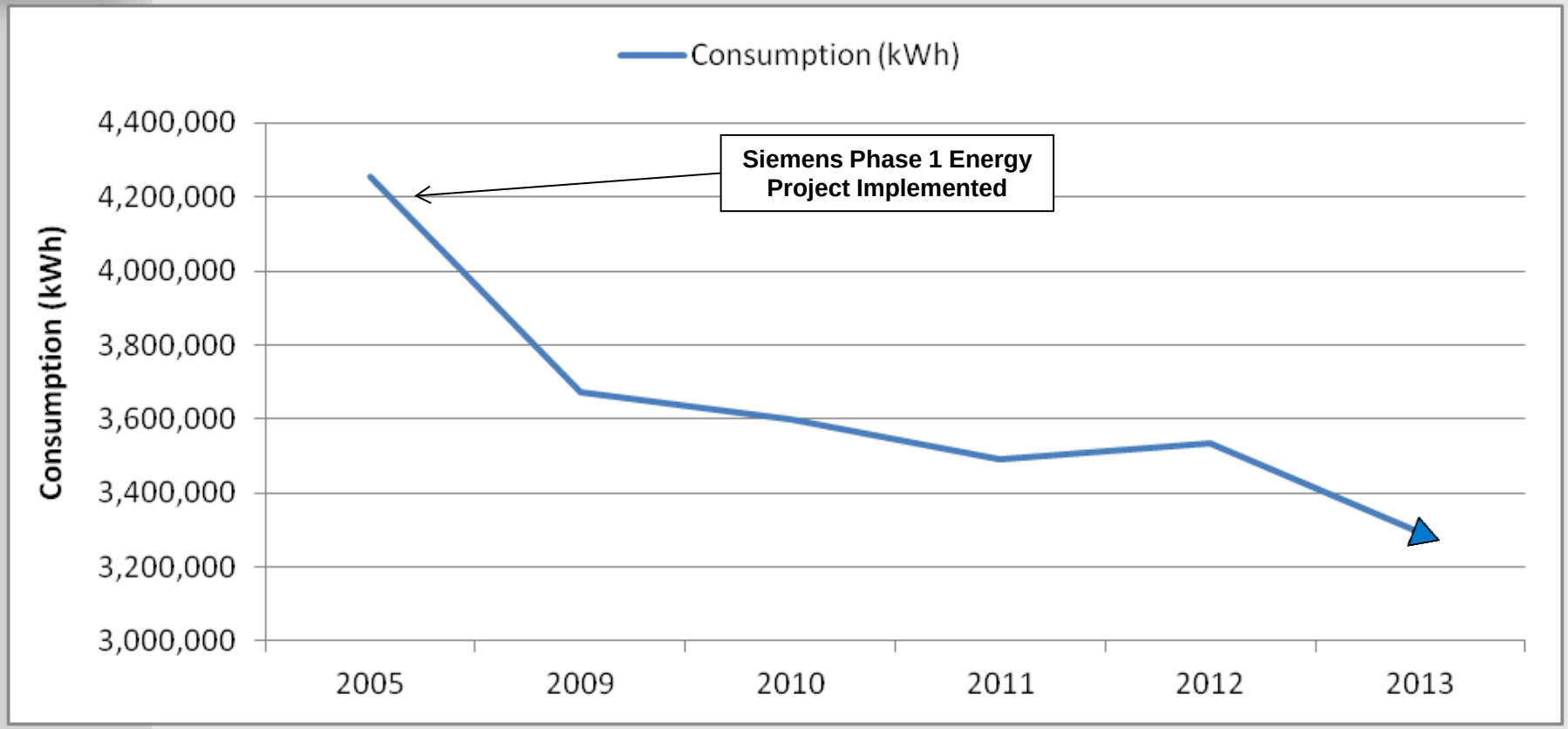
## Project Highlights

- **Project Costs** = $9.7 million, financed over 12 years
- **Performance Guarantee** - 3 years
- **Financial Performance Criteria** – Revenue Neutral based on level-pay structure, total annual payments matched the guaranteed savings + stipulated annual utility cost escalation
- **Warranty** – 1 year on all systems installed, 3 years for lighting
- **Contingency Funds** – allocated for hidden conditions and changes, balance returned to State

**How did the project perform?**

# Spring Creek Correctional Center

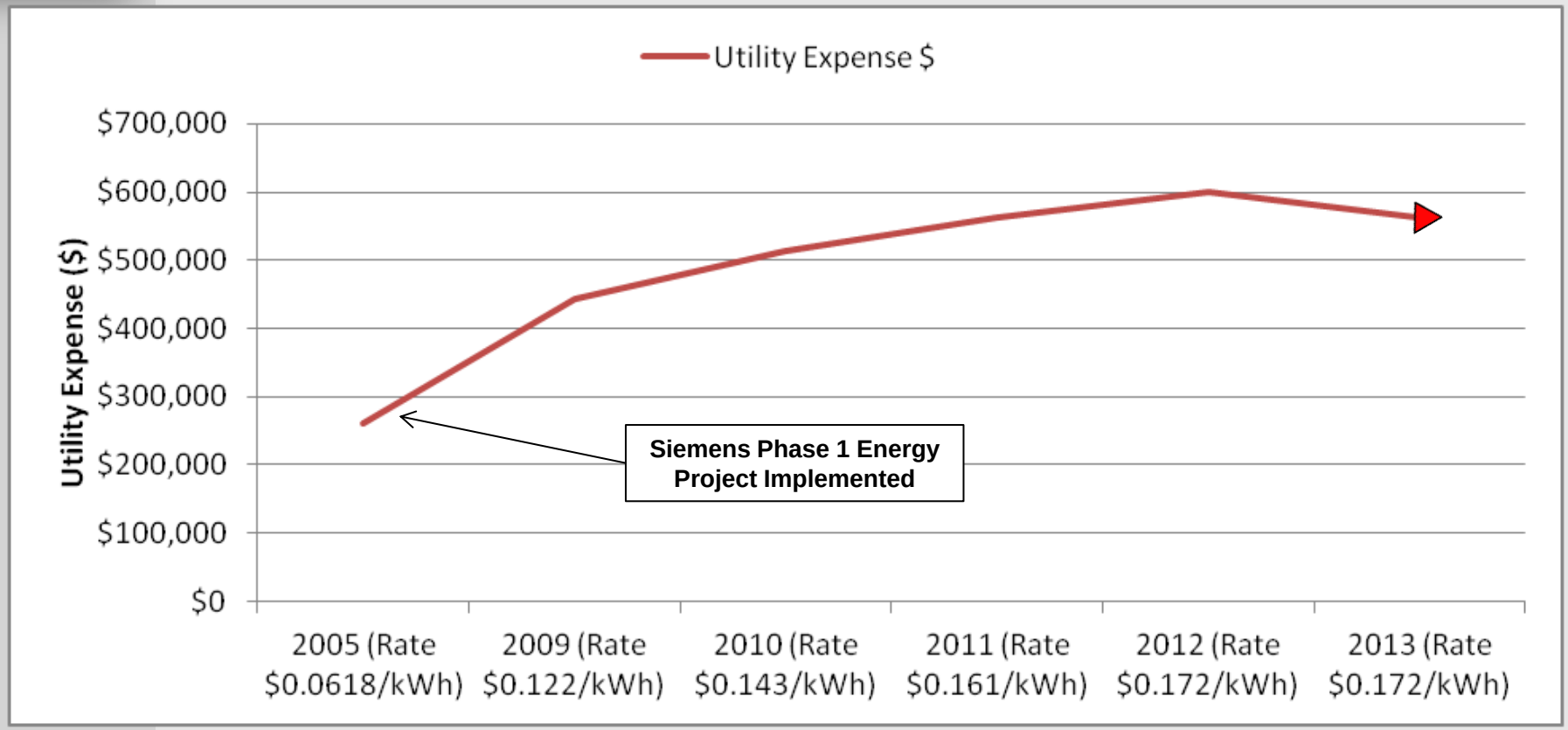
## Annual Electrical Consumption 2005 -2013




- Consumption Decreases from 4,200,000 kWh to 3,300,000 kWh
- 2007-2009 Siemens Implemented $2.5M Phase 1 Energy Performance Contract

# Spring Creek Correctional Center

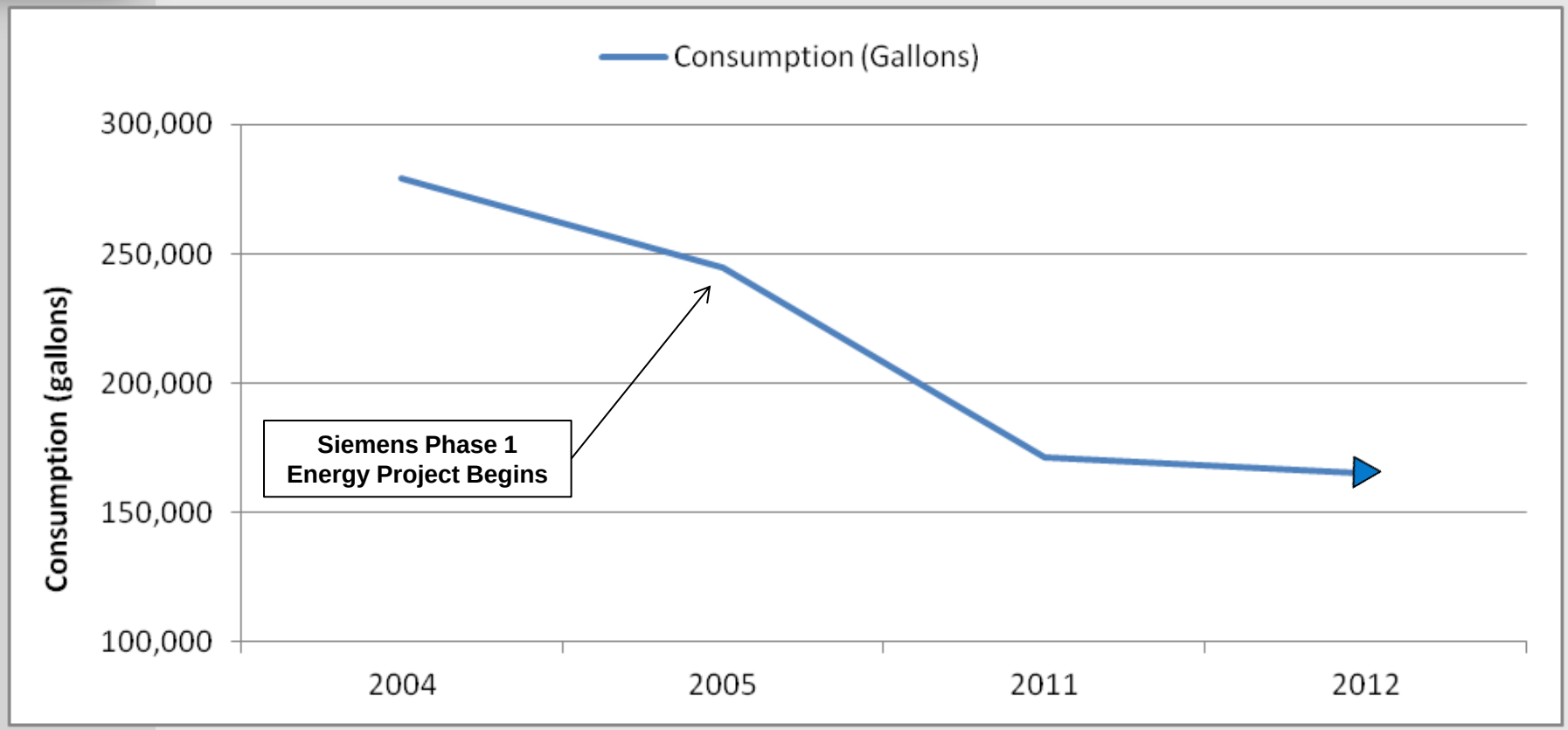
## Annual Electrical Expenses 2005 -2013




- Electrical Rates Increase from $0.06 / kWh to $0.17 / kWh

# Spring Creek Correctional Center

## Annual Fuel Oil Consumption 2004 -2012

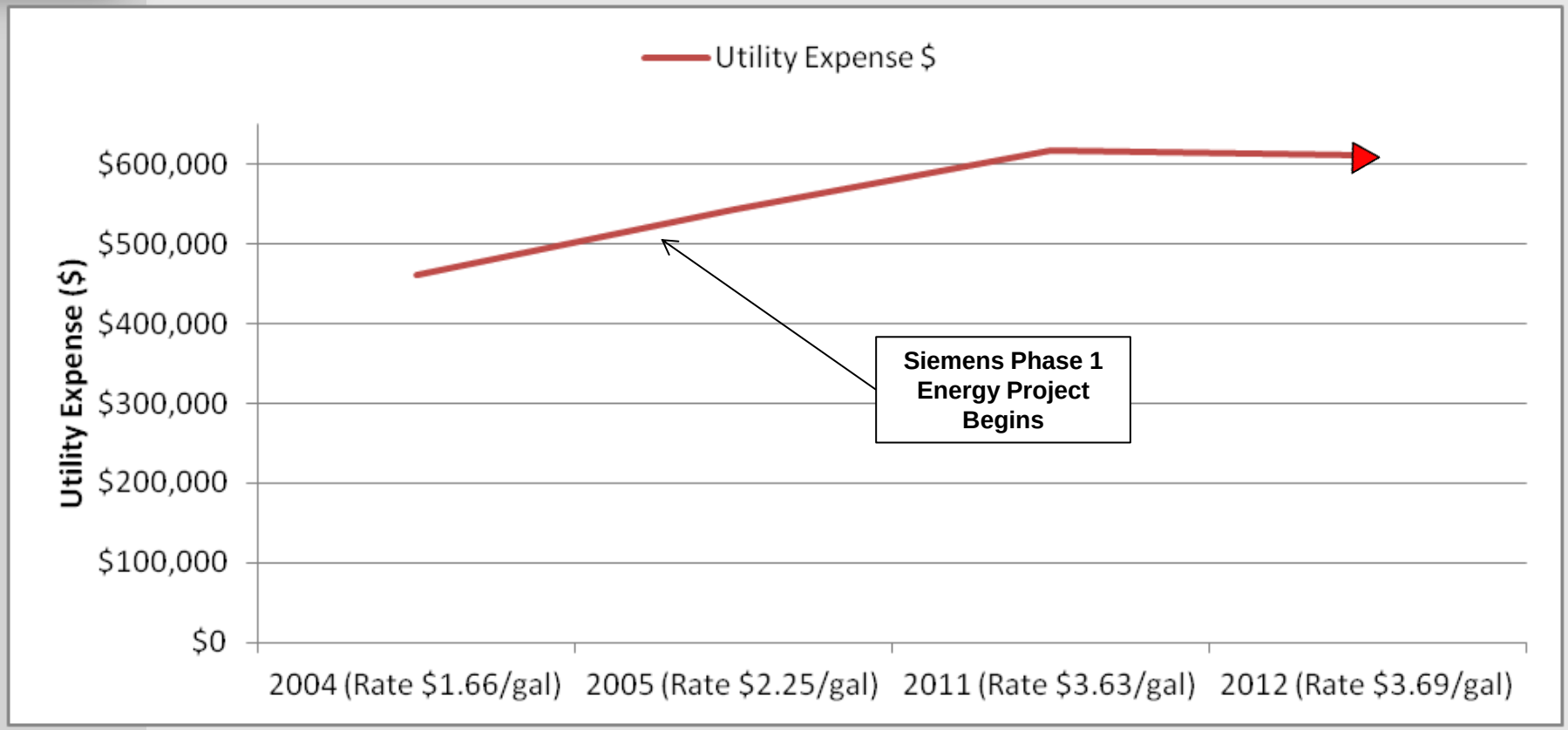



- Consumption Decreases from 280,000 gallons to 165,000 gallons
- 2007-2009 Siemens Implemented $2.5M Phase 1 Energy Performance Contract

# Spring Creek Correctional Center

## Annual Fuel Oil Expenses 2004 -2012

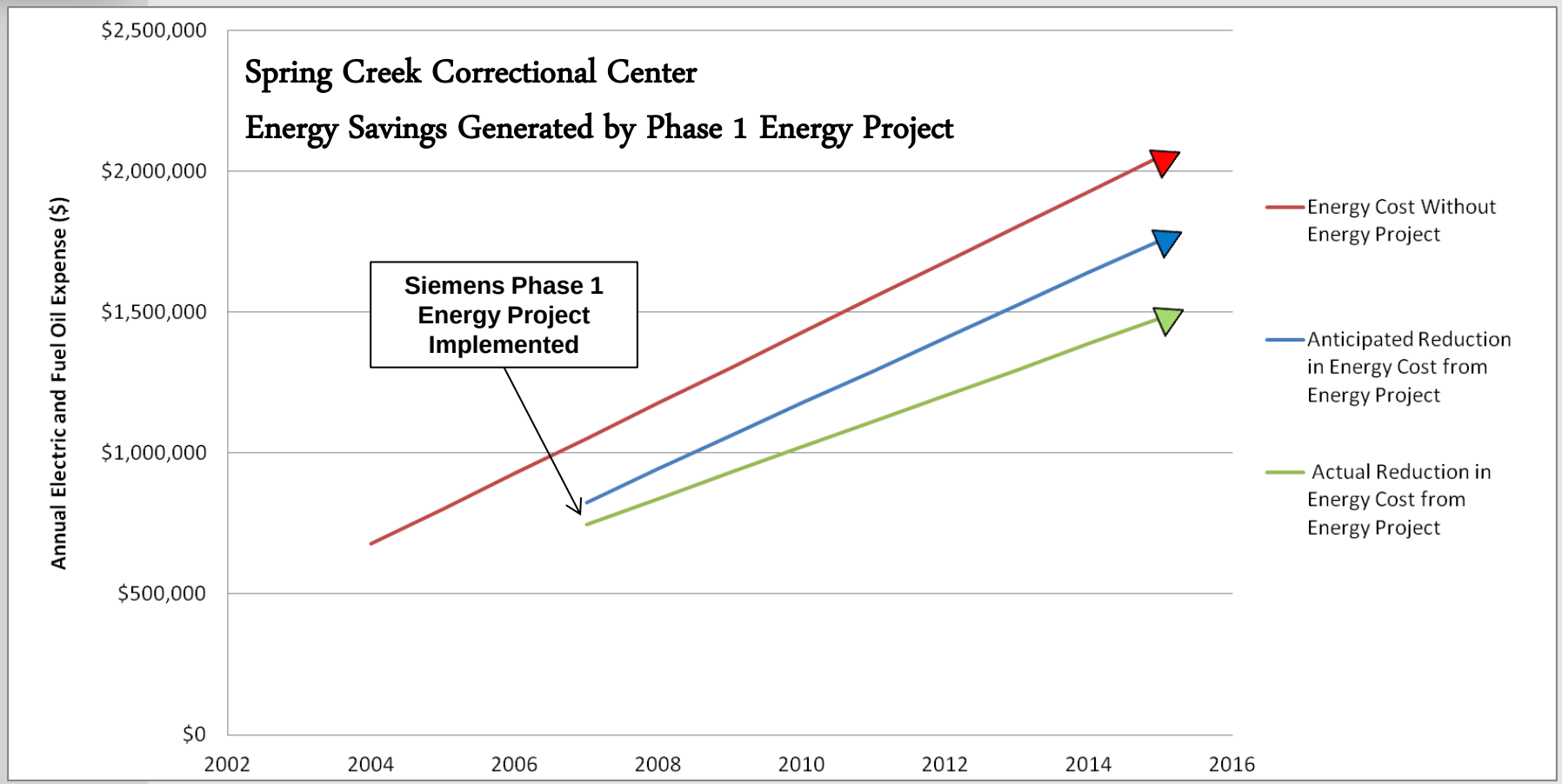
SIEMENS




- Fuel Oil Rates Increase from $1.66 / gallon to $3.69 / gallon

# Spring Creek Correctional Center

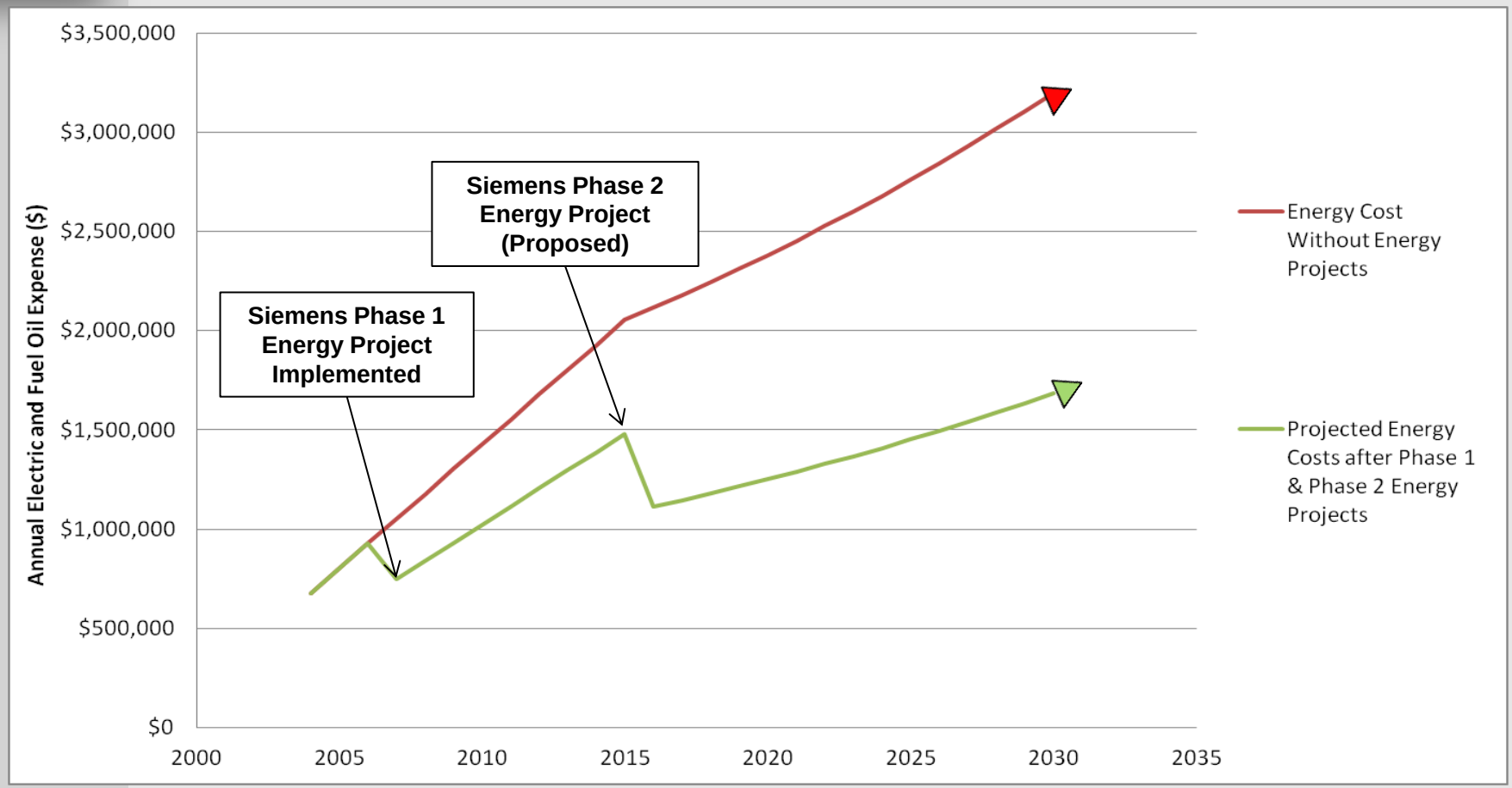
## Energy Savings Generated by Phase 1 Energy Project




- Total Phase 1 Energy Project Savings to Date = $3,900,000
- If Energy Project Had Not Happened, 2014 Energy Costs Would Exceed $2,000,000

# Spring Creek Correctional Center

## Total Energy Savings Generated by Phase 1 & 2 Projects




- Total Phase 2 Energy Project Savings over next 10 years = $ 4,700,000
- Combined Phase 1 & 2 Energy Project Savings over next 10 years = $15,500,000

# Spring Creek Correctional Center

## PH2 Energy Performance Contracting Summary

SIEMENS

| EEM DESCRIPTION | ELECTRIC CONSUMPTION SAVINGS kWh | ELECTRIC CONSUMPTION SAVINGS $ | ELECTRIC DEMAND SAVINGS kW | ELECTRIC DEMAND SAVINGS $ | FUEL OIL CONSUMPTION US Gallons | FUEL OIL CONSUMPTION $ | O&M SAVINGS $ | TOTAL ANNUAL SAVINGS $ |
|---|---|---|---|---|---|---|---|---|
| High Mast Site Lighting and Exterior Building Lighting | 370,586 | $59,607 | 1,918 | $39,876 | - | $0 | $1,222 | $100,705 |
| Interior Lighting Upgrades | 387,187 | $53,156 | 899 | $18,695 | (240) | -$887 | $1,788 | $72,753 |
| Central Boiler Plant Upgrades | 33,266 | $4,029 | - | $0 | 13,557 | $50,158 | $0 | $54,187 |
| Central Plant/DDC Optimization | 157,961 | $19,134 | - | $0 | 8,987 | $33,249 | $0 | $52,383 |
| DDC Optimization | 117,070 | $14,180 | - | $0 | 3,356 | $12,417 | $0 | $26,598 |
| DDC Optimization | 308 | $37 | - | $0 | 14,598 | $54,011 | $0 | $54,049 |

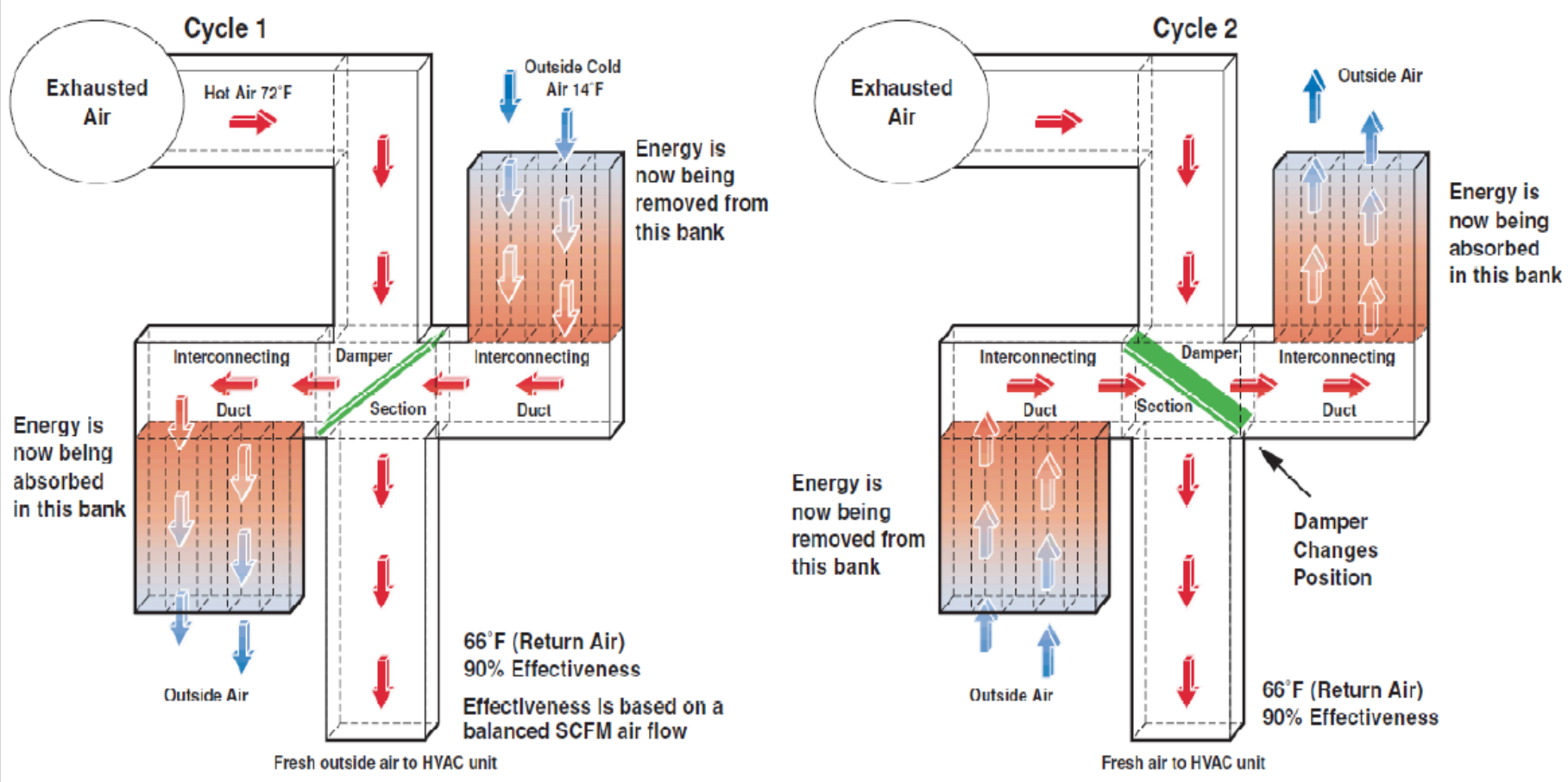
- Total Annual Guaranteed Energy & Operational Savings = $360,674
- Total Energy Project Implementation Cost = $3,142,463
- Annual Energy Savings Guarantee = 3 Years
- Simple Payback = 8.7 years
- Return on Investment (ROI) = 11%
- CO2 Emissions Reduction = 2,475,902 lbs

# Lighting Comparison

# Lighting Comparison

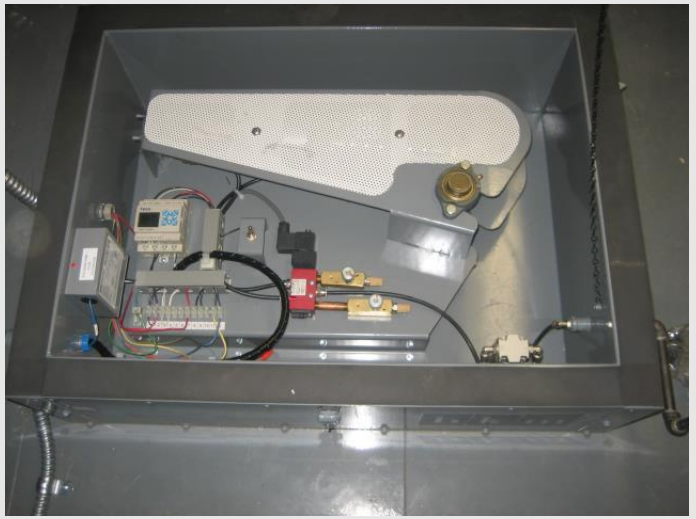
# Vent Icing

# BKM Heat Recovery Schematic

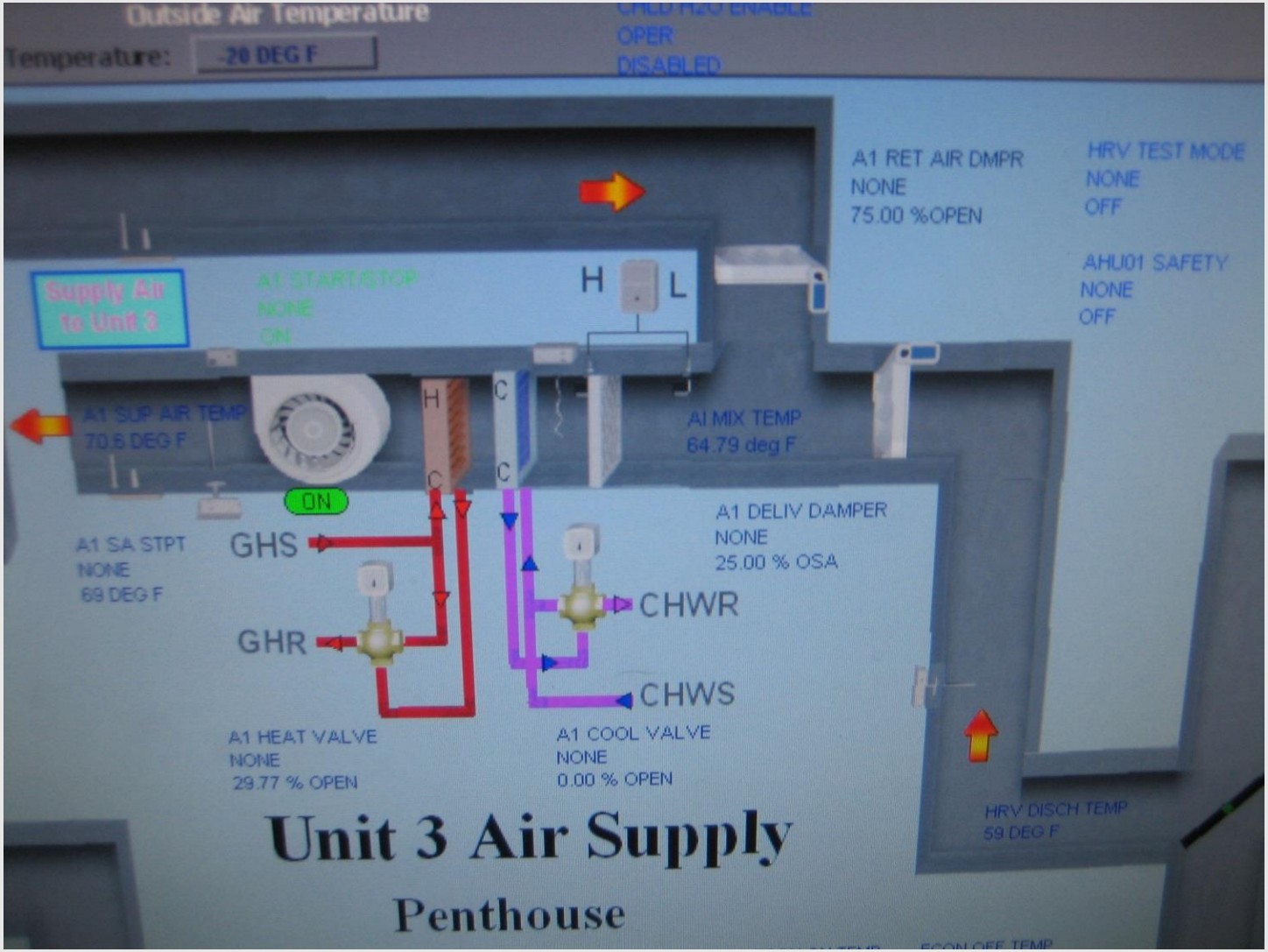


# BKM Heat Recovery





# BKM Monitor


Outside Air Temperature
Temperature:
-20 DEG F
OPER
DISABLED
A1 RET AIR DMPR
NONE
75.00 %OPEN
HRV TEST MODE
NONE
OFF
AHU01 SAFETY
NONE
OFF
Supply Air to Unit 3
A1 START/STOP
NONE
ON
H
L
A1 SUP AIR TEMP
70.6 DEG F
A1 MIX TEMP
64.79 deg F
ON
A1 SA STPT
NONE
69 DEG F
GHS
GHR
CHWR
CHWS
A1 DELIV DAMPER
NONE
25.00 % OSA
A1 HEAT VALVE
NONE
29.77 % OPEN
A1 COOL VALVE
NONE
0.00 % OPEN
HRV DISCH TEMP
59 DEG F
Unit 3 Air Supply
Penthouse

## Conclusion

- With all the money that Clif is saving the AKDOC, he should get a raise☺

# Questions?

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