



**MAINE CONSOLIDATED SCHOOL DISTRICT
BOARD PACKET**

Dr. Mark Williams
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PRESENTED BY:

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Preliminary Energy Audit

Maine Consolidated School District 10 N Spring Valley Rd - Parks, AZ



Facility Facts	
Year Built	1912
Additions Built	Many
Square Footage	27,146
Student Population	144
Grades Served	K - 6
Electric Utility	APS

Existing Conditions

The facility consists of ten main buildings. The site includes a multi-purpose room, which has a kitchen built with in. The HVAC needs of the main facilities are served by gas furnaces that are in good operational condition. The Multi-Purpose Room is heated by 3 large heat strips near the ceiling. The units are controlled by a 7-day programmable thermostats or manual thermostats. There is only one cooling unit which is in the 300 building and it is mounted through a window.

The student bathroom facilities consist of 7 urinals, 16 water closets, 9 paper towel dispensers, and 18 sinks. A few of the urinals have been leaking consistently. The sinks are original twist handle sinks. Water is transported in and stored in an underground tank.

The district also has 25 single Pane windows, which contributes to heat loss through the winter period.

Lighting is a mix of standard T12 lamps and magnetic ballast along with first generation T-8 lamps and electronic ballasts. The gymnasium/MPR uses high intensity discharge lighting system with metal halide lamps. All the interior lighting space is manually controlled.

Recommendations

- Install a Smart Occupant Energy control System on the gas furnaces. This system will use occupancy sensors and schedules to control all gas furnaces. This will be accessible via internet and will provide the district with useful information and setpoints. A networked energy management system tied to all heating units would provide substantial temperature control improvements and ease of schedule changes. Significant energy efficiency improvements would come from temperature adjustment limitation and time of day controls.
- Install 7 waterless urinals in male student bathrooms. These urinals will potentially eliminate the existing water leaks. Waterless urinals will also decrease the potable water usage of the campus.

Preliminary Energy Audit (cont.)...

- Install 18 momentary sinks (.05 GPM) in both male & female student bathrooms. Momentary sinks will limit the use of sink to 5 sec per each push. This will significantly decrease potable water usage of the campus.
- Install solar window film on 25 single Pane windows. This will insulated the windows and provide additional heating through solar heat.
- Install 7.5 kW of Solar Photo-Voltaic arrays on the northwestern corner of the multi-purpose room or on a roof location defined by the district. This will allow the district to produce electricity.
- Install new lamps and ballast (63) and/or new fixtures (154) to replace the existing T12 systems along with the first generation T8 systems with the latest generation of T8 lamps and high efficiency electronic ballast. See the detail lighting information for specific information on individual spaces and fixtures located in the “Supplemental Documentation” section.
- Occupancy sensors will be installed in appropriate rooms to ensure lighting systems are not left on during unoccupied times within the space.
- The metal halide fixtures in the gymnasium and library will be replaced by new high bay fixtures using high light output ballast and T8 lamps. The new fixture is designed to with stand the rigors of a gymnasium fixture. The new “instant on” capability will allow more off time for those fixtures. The lamps will maintain 93% of their lumen output through the course of the life of the lamp as opposed to 70% for the existing fixtures.
- Install PowerSave non-disruptive PC power management software on up to 55 computers, which analyzes CPU, disk, keyboard, mouse, and application activity before taking computer power management actions.

Evaluated, but Not Recommended:

- Install 16 low flow water closets (1.1 GPF) in both male & female student bathrooms. Low Flow water closets will also decrease the potable water usage of the campus.
- Install 9 electric hand dryer units in both male and female student bathrooms. This will decrease the amount of paper towels used by the district.

Executive Summary

Maine Consolidated School District

Capital Improvement Value.....	\$	181,362.00
Utility Rebates.....	\$	26,550.00
Contract Amount	\$	154,812.00
Capital Contribution.....	\$	55,000.00
Net Program Price.....	\$	99,812.00
Annual Energy and Operation Savings	\$	22,106.00
Fifteen Year Program Savings	\$	406,873.00
Fifteen Year Cumulative Positive Cash Flow	\$	273,979.00



**PRELIMINARY FINANCIAL ANALYSIS
7 YEAR MUNICIPAL LEASE**

Maine Consolidated District

FINANCE TERM (YEARS)
FINANCE RATE

7
5.12%

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15	TOTALS
PROGRAM SAVINGS																
ENERGY SAVINGS (3% Escalation)	\$18,835	\$19,400	\$19,982	\$20,581	\$21,199	\$21,835	\$22,490	\$23,164	\$23,859	\$24,575	\$25,312	\$26,072	\$26,854	\$27,659	\$28,489	
OPERATIONAL SAVINGS (2% Escalation)	\$3,271	\$3,337	\$3,403	\$3,471	\$3,541	\$3,612	\$3,684	\$3,757	\$3,833	\$3,909	\$3,987	\$4,067	\$4,149	\$4,231	\$4,316	
TOTAL PROGRAM SAVINGS	\$22,106	\$22,736	\$23,385	\$24,053	\$24,739	\$25,446	\$26,173	\$26,922	\$27,692	\$28,484	\$29,300	\$30,139	\$31,002	\$31,891	\$32,805	\$406,873
PROGRAM COSTS																
CAPITAL IMPROVEMENT VALUE	\$181,362															
UTILITY REBATES	\$26,550															
CONTRACT AMOUNT	\$154,812															
CAPITAL CONTRIBUTION (FROM MCSD)	\$55,000															
FINANCED AMOUNT	\$99,812															
ANNUAL LEASE PAYMENT	\$17,056	\$17,056	\$17,056	\$17,056	\$17,056	\$17,056	\$17,056	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
ANNUAL M & V	\$4,500	\$4,500	\$4,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL PROGRAM COSTS	\$21,556	\$21,556	\$21,556	\$17,056	\$17,056	\$17,056	\$17,056	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$132,895
CUMULATIVE ANNUAL CASH FLOW	\$549	\$1,729	\$3,558	\$10,554	\$18,237	\$26,627	\$35,743	\$62,665	\$90,357	\$118,841	\$148,141	\$178,280	\$209,282	\$241,173	\$273,979	\$273,979

By reducing your energy use it indirectly lowers energy production at the source. A great deal of the energy, which is consumed your facility(s), is produced by power plants burning fossil fuels. The burning of these fuels contributes to environmental contamination.

According to the United States Environmental Protection Agency, and other groups it can be calculated just how much of the pollutants can be reduced or eliminated based on the amount of energy that is saved. This information differs by area based on several conditions. Below are the most recent factors based on the current generating methods and fuels.

Annual kWh saved through project implementation	53,829
Annual therms saved through project implementation	3,095

Type Of Pollution	Health Effect	Environmental Effect	Reduction / kWh	Reduction / Therm	Pollutants Reduced
Greenhouse Gasses (CO2)	Can cause respiratory and other health problems, particularly in children and the elderly.	Climate change on a global scale has been attributed to increased emissions of carbon dioxide (CO2)	1.657 pounds / kWh	12.5 pounds / therm	127,885 lbs (CO2) reduced
Volatile Organic Compounds (VOC)	Ozone (smog) effects, cancer and other serious health problems	Ozone (smog) effects plants life included vegetation damage.	0.000061 pounds / kWh	.0005 pounds / therm	4.8 lbs (VOX) reduced
Nitrogen Oxides (Nox)	Lung damage, respiratory illness, ozone (smog) effects.	Acid rain also causes buildings, statues and monuments to deteriorate.	0.001523 pounds / kWh	.014 pounds / therm	125.3 lbs (NOx) reduced
Carbon Monoxide (CO)	Reduces ability of blood to bring oxygen to body cells and tissues.	One of the six "criteria pollutants" the US EPA tracks related to power production reduces environmental quality	0.00041 pounds / kWh	.0019 pounds / therm	28.0 lbs (CO) reduced
Sulfur Dioxide (SO2)	Respiratory illness, breathing problems, may cause permanent damage to lungs.	Precursor of acid rain, which can damage trees, lakes, and soil; aerosols can reduce visibility.	0.000956 pounds / kWh	.0001 pounds / therm	51.8 lbs (SO2) reduced
Particulates (PM10)	Eye, nose, and throat irritation; lung damage; bronchitis, cancer, early death	Source of haze which reduced visibility. Ashes, smoke, soot and dust can dirty and discolor structures	0.00002 pounds / kWh	.0004 pounds / therm	2.3 lbs (PM10) reduced
Mercury (Hg)	Liver, kidney, and brain damage; neurological and development damage	Accumulates in the food chain.	0.003404 milligrams / kWh	0 or negligible pounds / therm	183.2 Mg of (Hg) reduced

Saving 10,000 kWh is equivalent to the CO2 sequestered from planting 200 tree seedlings and letting them grow 10 years, taking 1.4 cars off the road for a year, or the energy required to power a typical american home for a year. The conversion of one therm	The annual environmental benefit of this project is equivalent to planting and growing for 10 years	2,890	trees / year
	Or removing	20	cars from the road / year
	Or saving enough energy to power	14	typical american homes for a year

Sources: www.cleanerandgreener.org
<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>