

Plumas Unified School District

Heating System Technology Comparison and IAQ Updates

11/18/2020

Process Steps To Date

**LOI
9/28/20**

**Classroom Reopening
Solution First
Requested
09/28/20**

**Mech/Boiler Survey
Phase 1
10/6/20-10/7/20**

**Present to Board
Sanitization Option
for Classroom
Reopening
10/26/20**

PLUMAS UNIFIED SCHOOL DISTRICT
PLUMAS COUNTY OFFICE OF EDUCATION

Process Steps To Date

Heating System Study
10/7/20 - 11/18/20

IAQ Engineering
10/7/20 – 11/18/20

ECM Audits
10/22/20 – 10/23/20

**Present to Board
Heating System
Comparisons**
11/18/20

PLUMAS UNIFIED SCHOOL DISTRICT
PLUMAS COUNTY OFFICE OF EDUCATION

Plumas Unified School District - Quincy High School Heating System Technology Comparison

November 2020

Heating System Technology	Bio Mass	Geothermal	Propane	Variable Refrigerant Flow (VRF)	Comments
Estimated Construction Cost	\$11,800,000	\$12,200,000	\$1,979,600	\$6,806,000	Based upon the cold climate and current staff concerns a VRF System is not a recommendation for the District to consider.
Annual Energy Cost Savings	\$40,800	\$58,749	\$44,895	\$50,864	Energy Savings Based on New Heating System Consumption Versus Existing Fuel Oil Boiler. Existing Fuel Oil Boiler Fuel Cost is \$89,500
Est. Life Operating Cost (Maintenance)	\$1,957,320	\$1,878,980	\$698,850	\$1,575,357	20 yr. life cost based on Annual National Average Maintenance Cost
Simple Payback (yrs.)	289	208	44	134	Simple Payback (Construction Cost / Energy Savings \$)
Energy Savings (MMBtu)	1,070	4,392	2,472	4,054	Base consumption being their current firebox hot water boilers firing #2 fuel oil with no ventilation air load adjustments. The savings noted here are actual units of Energy Savings.
Additional Needs: infrastructure, power, etc.	New Building / Upgrades, More Power	New Building / Upgrades, More Power	None	More power	For Geothermal and VRF solutions, the building is essentially going to be converted to all electric for both heating and cooling. District will need additional power and may involve new service! Biomass boiler system will need more power, new woodchip storage and material handling facility/infrastructure. They will also need a wood chip drying facility. Propane boiler system will only need an exterior propane tank.
Typical Installation Time	11 - 20 Months	11 - 20 Months	8-12 Weeks	12 - 16 Weeks	Based upon past projects plus covid19 equipment ordering delays.
Life Expectancy	20 Years	20 Years (heat pump)	30 Years	25 - 34 Years	Geo Thermal - 25 to 50 year life expectancy for underground infrastructure
Ongoing needs to consider: fuel storage, maintenance routine, etc.	Ash Removal, Chip Drying, Chip Hauling, Chip Storage, Propane Tank Rental, Propane Refills, Heavy Maintenance	Heavy maintenance, Potential tube leaks due local seismic activity	Propane Rental Tank (\$86 per year), Propane refills -500 gallon tank	Filters, Maintenance	Regarding the Geothermal Technology - per the Dept of Natural Resources Guidelines, it makes it extremely difficult due to the fact that is area is at a 76% seismic activity range at 7.0 or more.
Environmental Impact - Number of trees saved	222	910	512	840	Based on EPA's GHG calculator in terms of MT of CO2e emission saved
Impact on School & Safety	High	Med	Low	Low	Bio Mass - Potential for Fly Ash Geothermal - Seismic Considerations

Assumptions:

1. The boiler plant and school operate on a schedule to be implemented in the new sequence of controls while existing boiler plant runs continuously
2. The new systems proposed in this analysis included increased ventilation air to meet standards, existing boiler system does not have or meet code minimum
3. Geothermal and VRF systems are compared with the boiler systems here for heating performance only

Redundancy and Resiliency

- 👍 Look for a solution that creates options
- 👍 Look for a solution that creates thermal consistency
- 👍 Look for a solution that provides security
- 👍 Look for a solution that increases reliability





**The Importance of
Air Conditioning in Schools**

➤ **Potential Solution for ReOpening Schools**

- Phase 1 – Interim Ventilation Solution that will support Phase 2
 - 34 Rooms designated by district officials
 - Immediate Need – Additional 120 classrooms fully operational with Merv 13 filtration.
- Power Concerns with floor units plugging directly into the wall receptacles.
 - Not enough ampacity to support
- Timeline for MERV 13 Filters
- Cost of temporary wall units and what to do with them when not in use (Phase 2)

Interim Ventilation – Presented 10/26/20

➤ Permanent Sanitization Solution

- Replacement Light Fixtures
 - 1:1 Replacement
 - No additional power needed
 - No additional ampacity needed
 - HEPA Filters
 - UV Lighting - Controllable
 - Controllable Fan

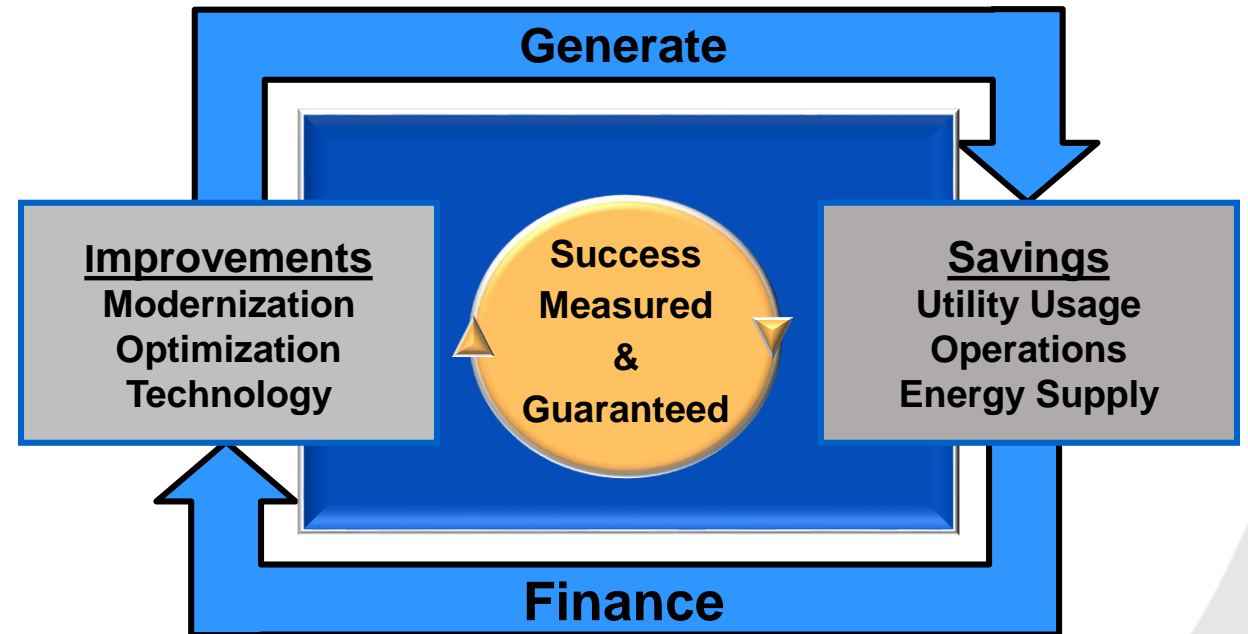


➤ **Ventilation, Filtration, Sanitization = Goal for each classroom**

➤ **The manufacturer is working towards approval from California Air Resources Board - Update**

Benefits of CA 4217

- 👍 Accomplish Facility, Technology & Infrastructure Improvements
- 👍 Reduce Utility and Associated Operational Expenses
- 👍 Low Interest Tax Exempt Financing is Typically Used
- 👍 Savings help Fund Improvements
- 👍 ABM Guarantees the Savings
- 👍 No Change Orders



Possible Funding with CA 4217

*SOLUTIONS ARE FUNDED THROUGH EXISTING
OPERATING BUDGET REDUCTIONS*

Potential Op/Ex Annual Savings	\$110,000 +
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Approximate “Turn-Key” Project Cost	\$6M-\$8M
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\$1.6M +

**Over
15 Years**



Next Steps



➤ Final Design for IAQ

➤ Ventilation

- Establish and model where and how to implement a solution for best ventilation

➤ Environmental Health

- Pre/Post Indoor Air Quality (IAQ) Testing - Ensure best IAQ is in place in accordance with ASHRAE 62.1 and the new Airflow Patterns and Flow Path of Airborne Contaminants standards.

➤ Potential Opportunity for Improvements

- Energy Conservation Measures calculated.



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Collaboration for Best Solutions



Thank You

ABM Building Solutions, LLC.

ABM Team

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