

Mesilla Valey Community of Hope



Solar PV Modifications and Building Electrification

June 26, 2024

**Study Conducted by
Sustainable Engineering LLC**

ENERGY AUDIT EXECUTIVE SUMMARY

This Energy Audit Technical Report was prepared for the Mesilla Valley Community of Hope (MVCH) who serve the homeless and near-homeless population in the City of Las Cruces. The facility houses office space where staff serve clients experiencing homelessness. The facility also houses shower and laundry rooms as well as Camp Hope, a self-governing transitional living community that has restroom facilities with showers and an outdoor kitchen area.

The director's goal is to reduce building utility costs. In addition, we investigate energy saving measures through electrification. Electrification is important because MVCH owns a 63.36 kWdc / 57 kWac solar PV system installed in 2021 with the potential to produce 122,500 kWh per year. The array has yet to benefit the MVCH. A Solar PV Modification report is summarized in Appendix 2 using the electric loads predicted from this audit analysis.

Sustainable Engineering LLC found the following opportunities for energy efficiency.

- Low-Cost Weatherization of Doors
- High Efficiency Heat Pump – HVAC Upgrades
- ENERGY STAR Heat Pump Water Heating
- ENERGY STAR High Efficiency Washers and Dryers

With the implementation of these Energy Efficiency Measures MVCH could save 339,508 kBtu. While electrification increases electricity consumption by 21,946 kWh annually, it also eliminates natural gas consumption of 4,145 therms annually reducing overall utility cost by \$891 per year. With these measures in place, we believe the solar PV system can offset 99 % of the facility's future electricity use further reducing utility cost by \$12,000 annually.

Selecting the highest energy savings and electrification options the facility could reduce their energy use 45.4% though the most long-term economic solution would be to provide solar PV to offset high electricity costs. Even without the full electrification HVAC heat pump option, the facility can save up to 21.6% energy.

This report provides the background, analysis and technical basis for these improvements including the results of an OpenStudio@EnergyPlus building model.¹ A Simple Payback financial analysis was provided in the table below. Sustainable Engineering LLC provides this simple payback table based on web-based comparative costs and previous projects for each of the EEI projects described. The building owner will need to obtain specific quotes for purchase decisions. Also note how the cost of electricity per unit of energy (kBtu) is over 4x greater than the cost of natural gas (NG = \$0.0083/kBtu & Electricity = \$0.0341/kBtu). This makes fuel switching from natural gas to electricity for such items as HVAC equipment and domestic hot water heating look less financially attractive even when it reduces the facility's total energy consumption by 50%. However, electrifying a building allows one to nearly offset their entire electricity bill through a renewable energy system such as solar PV, discussed in more detail below in the Renewable Energy Analysis.

¹ "OpenStudio," Energy.gov, accessed May 24, 2023, <https://www.energy.gov/eere/buildings/articles/openstudio>.

	Estimated Energy Use (Utility Bills)	OpenStudio Model Baseline	High Efficiency Laundry	Heat Pump Hot Water	Air Source Heat Pump	Combined - All Electric
Total Annual Building Energy Use (kBtu)	904,181	748,396	735,178	599,888	570,022	408,891
Heating (kBtu)		237,030	236,916	236,992	58,660	58,831
Cooling (kBtu)		54,471	54,045	54,481	54,471	54,054
Lighting Interior / Exterior (kBtu)		77,550	77,550	77,550	77,550	77,550
Equipment (kBtu)		188,151	175,744	188,151	188,151	175,744
Fans (kBtu)		13,838	13,838	13,838	13,838	13,838
Pumps (kBtu)		0	0	0	0	0
Domestic Water Heating (kBtu)		177,365	177,365	28,871	177,365	28,871
Electricity (kWh)	137,534	97,888	94,128	106,352	115,078	119,834
Electricity (kBtu)	469,285	334,008	321,178	362,888	392,662	408,891
Gas (therms)	4,010	4,145	4,141	2,371	1,774.0	0.0
Gas (kBtu)	434,896	414,390	414,000	237,000	177,360	0
Electricity Peak Demand (kW)		42.04	39	47	42	46
Natural Gas Peak Demand (kBtu/hr)			559,000	456,000	122,000	0
Electricity Savings (kBtu)			12,830	-28,880	-58,654	-74,882
Natural Gas Savings (kBtu)			390	177,390	237,030	414,390
Total Energy Savings (kBtu)			13,220	148,510	178,376	339,508
Energy Savings %			1.8%	19.8%	23.8%	45.4%
Annual Electricity Cost Savings – No SolarPV			\$438	-\$986	-\$2,003	-\$2,557
Annual Gas Cost Savings			\$3	\$1,476	\$1,972	\$3,448
Measure Cost			\$5,400	\$43,295	\$100,000	\$148,695
Simple Payback (yrs)			12.2	88.4	-3258.7	166.9
GHG Emissions CO2-e (metric tons)		59	57.9	47.6	45.4	33.1
GHG Emissions Reduced CO2-e (metric tons)		0	1.1	11.4	13.6	25.9
Notes	CO ₂ -e (metric tons)/kWh	0.000275825				
EPA Calculator Tool	CO ₂ -e (metric tons)/therm	0.007720341				

SOLAR ANALYSIS

This study offers recommendations to the Mesilla Valley Community of Hope to take advantage of the 63 kW DC solar PV system located at the Community of Hope. To date the Community of Hope has not received any financial benefit from the array as it is wired singly to the vacant half of the building formerly occupied by the Casa de Peregrinos. The solar array is serviced by four inverters allowing it to be split in half. Since the Community of Hope intends to occupy vacant half of the building soon, it is our recommendation the array be divided with two inverters supplying each half of the building as described in the Split Solar PV portion of this report. This single change allows 43% savings to both halves of the building when it becomes fully occupied.

The report details the El Paso Electric Small General Service Rate No. 3 describing the demand tariff and ratchet which ties their annual electric bill to the highest demand of 33 kW encountered during the summer months. There is an Alternative Rate available that has non-demand charge but requires the demand to never exceed 15kW. The only reasonable technology to accomplish this is a battery Energy Storage System. Our study shows that a 30kW / 60 kWh Energy Storage System with demand mitigation control working in conjunction with half of the existing solar PV system could reduce the annual electricity billing by 94%. There are other viable power / energy combination systems that will also work with the goal to meet the EPE Alternative Rate requirements.



System	EPE Tariff Rate	Savings	Notes
Existing	Standard SGS	NA	Existing System
Split Solar PV	Standard SGS	39%	Split the Solar PV system
Add ESS	Standard SGS	43%	ESS system operating under the current electricity Rate
Add ESS	Alternative SGS	94%	Target Goal - New Alternative Rate and fully operational ESS.