

ADVANCED ENERGY REBUILD

CASE STUDY Lojowsky Residence

PROJECT NAME	Lojowsky Residence
LOCATION	Redwood Valley
CLIMATE ZONE	02
CONSTRUCTION COMMENCEMENT	2018

PROJECT TEAM

OWNER	MacAdam Lojowsky
HERS RATER	Redwood Energy
ENERGY CONSULTANT	Redwood Energy

PROJECT SUMMARY

This project took advantage of the Advanced Energy Rebuild program to offset the additional costs of implementing aggressive energy efficiency measures. The project chose the All-Electric Home – Flexible Performance Path and demonstrated a modeled compliance of 35.3% better than a standard code compliant home, also improving the energy design rating by 7.

The home reserved a total of \$12,500 in incentives, and showed -762.92 kWh, -0.02 kW and 114 therm savings. The owners installed above-code windows, a high performance attic, highly efficient heat pumps for space conditioning and water heating, energy efficient appliances, and opted for various HERS verified measures to boost their code compliance such as verified SEER/EER, duct sealing.

PROJECT DETAILS

Located in Redwood Valley, California, the property backs up to the Russian river, creating a serene landscape. The home was affected by the October 2017 Northern California wildfires, and is in the process of rebuilding. This home is designed to be all-electric, which means that no natural gas is being supplied to the home. All mechanical equipment and appliances run fully on electricity.



Figure 1. Google street view image of home from June 2012



Figure 2. 3D model image of the proposed home

"The Advanced Energy Rebuild (program) helped our family reach our goal of designing and building the most efficient home possible. Funds from this program helped offset (costs for) upgrades in our HVAC system and water heater that would have been extremely difficult to do otherwise. We are proud to say that our home will reach LEED Gold certification for Homes and the AER (program) helped (us) make that a reality."

- MacAdam Lojowsky, Homeowner



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Energy efficiency translates to better living for you.



Lower Energy Bills
Pay less and save more.



Increased Comfort
Reduced drafts with an improved building shell



Healthier Air
Better air quality and safe temperature levels.

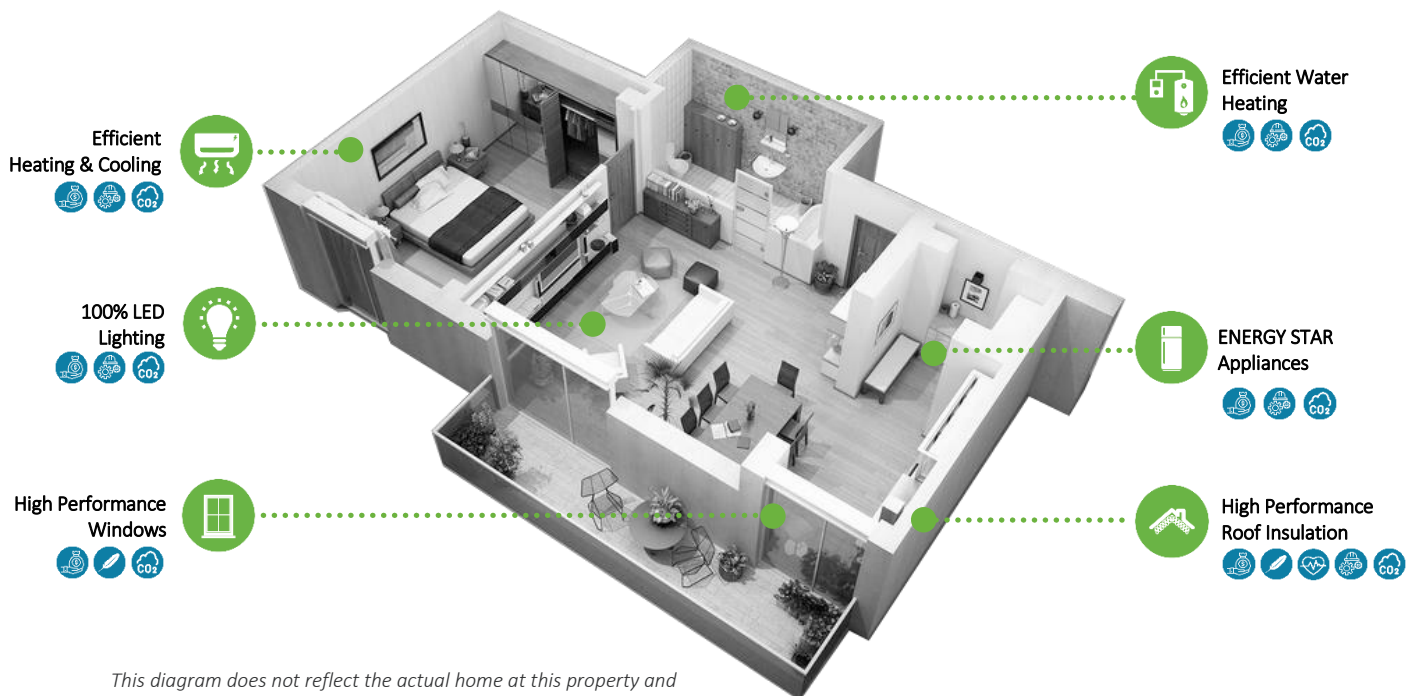


No Nuisances:
Less maintenance, repairs, noise, and odors.



A Better California
Lower your carbon footprint, for a better California.

IMPLEMENTED EFFICIENCY MEASURES



IMPLEMENTED EFFICIENCY MEASURES

Building Envelope



Ceiling: The home is designed to have a high-performance R-38 cathedral ceiling insulation

Walls: In the walls, the owners selected 2x6 framing, with 16" OC, high density batt R-19 insulation.

Fenestration: The owner installed 0.28 U-Factor/ 0.21 SHGC for all windows. The lower U-factor reduces conduction through the glass and the low SHGC ensures lower cooling needs in the home.

Mechanical Systems



Water Heating: The owner installed a NEEA-rated electric heat pump water heater with an energy factor of 3.50. For every unit of electricity delivered to the equipment, the energy output is 3.5 times.

Space Conditioning: The home is equipped with a high-efficiency heat pump HVAC system: 20.5 SEER/ 14.5 EER and 13 HSPF, which caters to both the heating and cooling needs of the home. The HVAC system will be undergoing a suite of HERS verifications for fan watt-draw, proper airflow, verified SEER & EER and refrigerant charge testing, all of which contribute to a higher compliance margin.

Air Distribution: The air distribution in the house is facilitated by an R-8 duct insulation system with all ductwork in conditioned zones, reducing heat gain/loss when transporting conditioned air from the air handler unit to conditioned space. This increases the efficiency of cooling/heating delivered by the HVAC equipment

DETAILED PROJECT SPECIFICATIONS

Envelope	Standard Design (2016 T24)	Proposed Design (2016 T24)
Roof Insulation	R-38	R-38
Wall Insulation	R-19 Cavity + R-5 (U-0.051) Continuous	R-19 Cavity
Window Specs (U-factor/ SHGC)	U-0.32 / S-0.25	U-0.28 / S-0.21
Building Leakage	5 ACH50	5 ACH50
Cool Roof	Low-sloped: Not required	Reflectance - 0.68 / Emittance - 0.87
Radiant Barrier	Yes	No
Mechanical	Standard Design (2016 T24)	Proposed Design (2016 T24)
HVAC Type	Heat Pump	Heat Pump
Cooling Efficiency	SEER 14 / EER 11.7	SEER 20.5 / EER 14.5
Heating Efficiency	HSPF 8.2	HSPF 13
Ducts	R-8, in ventilated attic	R-8, in conditioned zones
Duct leakage	Not verified	Sealed and tested
DHW	Tankless, 0.82 EF (Standard)	Heat Pump Water Heater, NEEA Rated Tier III
Fan power	0.58 W/cfm	0.58 W/cfm
Whole house fan	No	No
Non-Mandatory HERS Measures	Standard Design (2016 T24)	Proposed Design (2016 T24)
Verified Refrigerant Charge	No	Yes
Verified EER	No	Yes
Verified SEER	No	Yes
Quality Insulation Installation (QII)	No	No
Blower Door	No	No
Pipe Insulation (HERS)	No	No