

ADVANCED ENERGY REBUILD

CASE STUDY Shilts Residence

PROJECT DETAILS

PROJECT NAME	Shilts Residence
LOCATION	Paradise
CLIMATE ZONE	11
CONSTRUCTION COMMENCEMENT	October 2019

PROJECT TEAM

OWNER	Gregory Shilts
HERS RATER	DuctTesters
ENERGY CONSULTANT	5 Star Energy

PROJECT SUMMARY

Located in Paradise, California, this home is in the process of rebuilding following the Camp Fire in November 2018. The homeowners worked closely with their BPI trained contractor, Trilogly Construction, to design this home. Both natural gas and electricity will fuel the appliances and equipment in this rebuild. The homeowner pursued the Advanced Energy Home Flexible Performance path with the solar and battery storage bonus. The Advanced Energy Rebuild program incentives helped to offset the additional costs of implementing aggressive energy efficiency measures, which helped to achieve a total modeled compliance of 28.0 percent better than a standard code compliant home and improved the energy design rating (EDR) by 3.9.

The home reserved a total of \$12,500 in incentives with modeled savings of -192.3 kWh, .24 kW and 101.00 therms. The homeowners installed above-code windows, a high-performance attic, a highly efficient ducted mini-split heat pump for space conditioning, a NEEA-rated heat pump water heater, energy efficient appliances, and a balanced IAQ fan with heat recovery to further add to the efficiency of the home. They also installed a 5.5 kW PV system accompanied by a 10.5 kWh battery storage system.

Following their participation in the Advanced Energy Rebuild program, the homeowners shared program information with their contractor, who is now encouraging his clients to rebuild more energy efficient homes to qualify for the incentives.



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



Figure 2. New home under construction

"It has been really different and exciting to be able to design an energy efficient and accessible house from the ground up for me and my family. An interesting fact is that it ended up being less expensive to go with much higher efficient mechanical equipment and have an HRV installed to boot than with my originally proposed equipment."



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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.

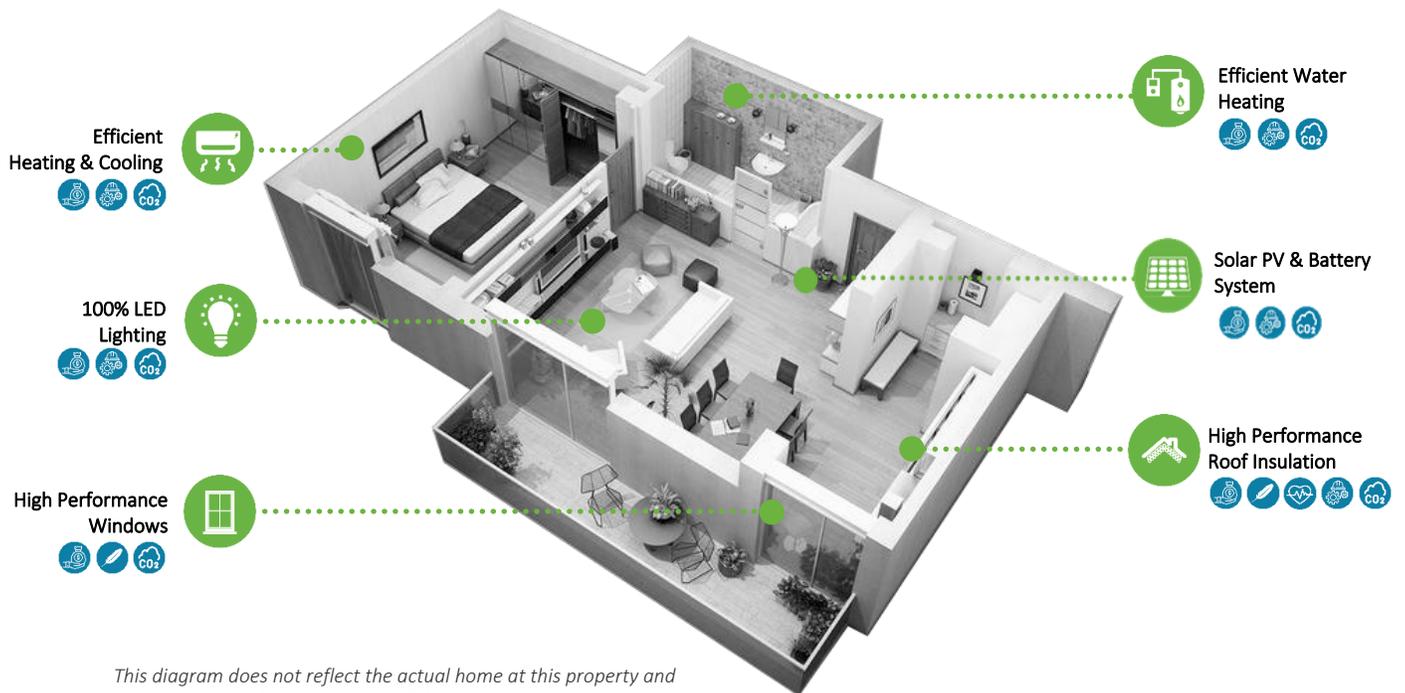


No Nuisances:
Less maintenance, repairs, noise, and odors.



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

IMPLEMENTED EFFICIENCY MEASURES



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Building Envelope



Ceiling: The home is designed to have a high-performance R-38 ceiling insulation with R-13 bellow roof deck insulation

Walls: The owners opted for 2x6 framing, 16" on center, with high density batt R-23 insulation.

Fenestration: The owner installed 0.30 U-Factor/ 0.23 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 a uniform energy factor of 3.2, which has an energy output 3.2 times higher than every unit of electricity delivered to the equipment.

Space Conditioning: The home is equipped with two high-efficiency ducted heat pump HVAC systems: 19 SEER/ 13 EER and 10.9 HSPF, which cater 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, and verified SEER and EER, all of which contribute to a higher compliance margin.

Balanced IAQ Fan: A balanced IAQ fan provides the home with advanced efficient ventilation by pulling air from the outside of the home, filtering that air, and controlling the flow. The balanced IAQ fan installed in this home effectively exchanges heat and supplies fresh air throughout the home. The system installed has a recovery efficiency of 60 percent.

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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-23 Cavity
Window Specs (U-factor/ SHGC)	U-0.32 / S-0.25	U-0.30 / S-0.23
Building Leakage	5 ACH50	5 ACH50
Cool Roof	Low-sloped: Not required	Reflectance - 0.1 Emittance - 0.85
Mechanical	Standard Design (2016 T24)	Proposed Design (2016 T24)
HVAC Type	Heat Pump	Heat Pump
Cooling Efficiency	SEER 14 / EER 11.7	SEER 19 / EER 13
Heating Efficiency	HSPF 8.2	HSPF 10.9
DHW	Tankless, 0.82 EF (Standard)	Heat Pump Water Heater, NEEA Rated Tier III
Fan power	0.58 W/cfm	0.58 W/cfm
Balanced IAQ fan	No	RE 60%
Non-Mandatory HERS Measures	Standard Design (2016 T24)	Proposed Design (2016 T24)
Verified EER	No	Yes
Verified SEER	No	Yes