

Energy Upgrade **COMPLETED** 06/01/2017



energydocshpc@gmail.com

GOALS Comfort, Energy Efficiency

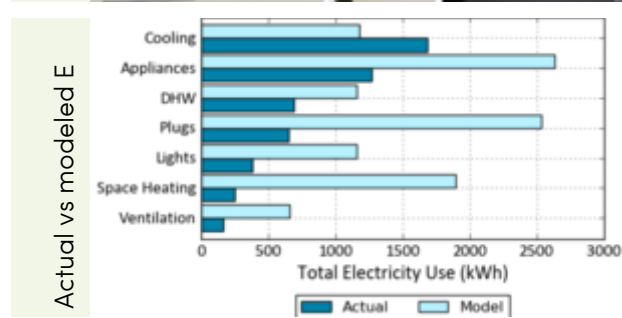
SOLUTIONS Air Seal, Insulation, Ventilation,



E Doc D, Redding, CA 96003



5.3 kW Solar PV



Zero E How close? Within **100%**



2372 ft² CFA
YR Built 2017
SFR detached

Author AjO: Little Role: HP Consultant

★ The existence of a feature does not guarantee optimum performance. Design, install, operations; each are essential.

See details of this project and others @ AjO.earth
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ENERGY COSTS

Annual

Annual Energy Cost \$ 1,750
\$ Saved \$ 2,086
Improvement 119 %
Energy Cost Source Measured
Heating Fuel Type Electric
Total Therms 0 therms
Total kWh 5,089 kWh
Total converted kWh Site 5,089 kWh
Energy Use Intensity 7.32 kBtus/ft²
kWh/Occ 1696
Solar PV Production 8032 kWh
Net kWh with Renewables -2943 kWh
Utility Rate per kWh \$ 0.16
Total (net) Energy Costs \$ -336
\$ Saved \$ 2086
Improvement 119 %
Within % of attaining Zero Energy (approx) 100 %

Water

Type Total
Water Use 110000 gal
Water Savings 30000 gal



RENEWABLE ENERGY

Ownership Owned
Documentation Yes
Solar PV system size 5.32 kW
System PV annual production 8032 kWh
Ann Prod Source Actual
Ann Prod Source Detail Online Monitor
Documentation Yes
Production as % required/year 140 %
Number Panels 19
Grid Integration Grid Tied
Panels - Yr Installed 2017
Inverter Yr Installed 2017
Array Orientation SW
Location Roof
Cost New: Gross \$ 21280
Present Value \$ 17600
Present Value Date 07/22/2018
Present Value Calc Source PVValue.com
Solar Installer Name Energy Docs
Solar Installer Email energydocshpc@gmail.com

Notes

Production is actually 140% of demand (1st yr). Net cost after rebates \$13,264



ENCLOSURE

Air Leakage

CFM50 1800
Air Tightness Improved 90 %
Air Changes/Hour @50 5.06
Tight/Leaky Visual Check Average

Air Seal

Attic Yes
Walls Yes
Floors Yes
Mech System Yes
Elect System Yes
Soil Gasses Yes

Insulation

Attic Flr R Val 38
Attic Flr Type 60
Walls R Val 15
Walls Type Cellulose dense pck
Cellulose dense pck

Insulation Exterior

Walls R Val 4
Walls Type 13
Foundation Perimeter R Val 8
Foundation Perimeter Type XPS
Other 8
Yes Other Yes

Quality Insulation Inspection Walls

Construction Type 2 x 4 Wood
Wall Thickness Advanced Framing/OVE
8 in

Attic 1 Type

Attic 1 Area Vented Attic
1802

Attic 2 Type

Attic 2 Area Other
Continue to page 2

11,208 kWh	-2,943 kWh
\$1,750	\$-336
110K Gal WATER	30K Gal WATER
	126% SAVINGS

Annual Energy Cost \$ 1,750	\$ -336
\$ Saved \$ 2,086	\$ 2,086
Improvement 119 %	119 %
Energy Cost Source Measured	Measured
Heating Fuel Type Electric	Electric
Total Therms 0 therms	0 therms
Total kWh 5,089 kWh	5,089 kWh
Total converted kWh Site 5,089 kWh	5,089 kWh
Energy Use Intensity 7.32 kBtus/ft ²	7.32 kBtus/ft ²
kWh/Occ 1696	1696
Solar PV Production 8032 kWh	8032 kWh
Net kWh with Renewables -2943 kWh	-2943 kWh
Utility Rate per kWh \$ 0.16	\$ 0.16
Total (net) Energy Costs \$ -336	\$ -336
\$ Saved \$ 2086	\$ 2086
Improvement 119 %	119 %
Within % of attaining Zero Energy (approx) 100 %	100 %

Type Total	Total
Water Use 110000 gal	30000 gal
Water Savings 30000 gal	80000 gal

Ownership Owned	Owned
Documentation Yes	Yes
Solar PV system size 5.32 kW	5.32 kW
System PV annual production 8032 kWh	8032 kWh
Ann Prod Source Actual	Actual
Ann Prod Source Detail Online Monitor	Online Monitor
Documentation Yes	Yes
Production as % required/year 140 %	140 %
Number Panels 19	19
Grid Integration Grid Tied	Grid Tied
Panels - Yr Installed 2017	2017
Inverter Yr Installed 2017	2017
Array Orientation SW	SW
Location Roof	Roof
Cost New: Gross \$ 21280	\$ 21280
Present Value \$ 17600	\$ 17600
Present Value Date 07/22/2018	07/22/2018
Present Value Calc Source PVValue.com	PVValue.com
Solar Installer Name Energy Docs	Energy Docs
Solar Installer Email energydocshpc@gmail.com	energydocshpc@gmail.com

CFM50 1800	186
Air Tightness Improved 90 %	90 %
Air Changes/Hour @50 5.06	0.52
Tight/Leaky Visual Check Average	Very tight



Attic Yes	Yes
Walls Yes	Yes
Floors Yes	Yes
Mech System Yes	Yes
Elect System Yes	Yes
Soil Gasses Yes	Yes

Attic Flr R Val 38	60
Attic Flr Type Cellulose dense pck	Cellulose dense pck
Walls R Val 15	16
Walls Type Cellulose dense pck	Cellulose dense pck

Walls R Val 4	13
Walls Type XPS	XPS
Foundation Perimeter R Val 8	8
Foundation Perimeter Type Other	Other
Other Yes	Yes

Construction Type 2 x 4 Wood	Advanced Framing/OVE
Wall Thickness 8 in	8 in

Attic 1 Area Vented Attic	Vented Attic
1802	1802
Other	Other
Continue to page 2	

	Attic 2 Area		570 Slab 2372 Slab perimeter 100 yrs
1st Foundation Type	Foundation Thermal Boundary		
1st Foundation Area	Enclosure	REL	
Notes	Foundation walls exterior insulation type: Rockwool 2" Framing factor 11.7% is superior (less wood) to typical code at 25%	75 yrs	
WEATHER BARRIER			
Cladding	Rain Screen Furring strips Cladding Type		Yes Yes Fiber-cement
Roof 1	Roof Material Radiant Barrier Color		Comp Shingles Yes Dark
Vapor Barrier	Installed Foundation Sealed		Yes Yes
Bulk Water	Drain, site strategies		Yes
Windows	U-Factor Solar HGC Low E Frame # glass layers	.32 .25	.23 .20 Yes PVC/Vinyl Double-pane
 HVAC			
Heating	Manual J Primary heat system Heat Pump type Year Installed Efficiency Size (rated input capacity) Fuel No Combustion Primary Heating Location Fraction Heat Load Heating Mfr REL Htg	Furnace 80 AFUE Natural Gas Unconditioned attic 20 yrs	Yes Heat Pump Mini-Split 2017 4.14 COP 12000 BTU/h Electric Yes Conditioned attic 100 % Fujitsu 25 yrs
Cooling	Manual J Primary System Type Year Installed Fraction Cool Lead Efficiency Capacity Cooling System Mfr REL Cooling	Central Air 14 SEER 20 yrs	Yes Heat Pump 2017 100 % 21.5 SEER 9000 Btu/h Fujitsu 25 yrs
Distribution	Duct Leakage Visual Inspect Duct insul Man D Location % Ducts Located Here		Sealed w/ Mastic R 8 Yes Conditioned space 100 %
Ventilation	Type Whole Bldg vent Exhaust Locations Supply Locations REL Ventilation	Exhaust Kitchen, Bath 20 yrs	HRV Yes Kitchen, Bath, Bath 2, Laundry Liv Rm, Bdrm 25 yrs
HVAC Tests	Total External Static Pressure Rated Input Heating (size) #BTUs per 1000 ft ² CFA Rated Input Cooling (size)	≥ 12,000 BTUs	.2 iwc 12000 BTU/h < 12,000 BTUs 9000 BTU/h
1 Hour Temp Stratification	Max Temp rm/rm		< 3° F
Duct Leakage Test-Out	Total Duct Leakage to Outside Duct Leakage to Outside (%) Targets	6 %	0 CFM 0 % Ideal
Other	Thermostat: Programmable Energy Monitor		Yes Yes
Notes	Ducts are compact design with short runs.		
 WATER			
	Fuel Type	Tank	Electricity Heat Pump - Tank

Year Installed	15 yrs	2017
REL	60 %	25 yrs
Rated Efficiency		3.09 %
Location		conditioned space
Hot Water Distribution		
Type	Trunk & Branch	Trunk & Twig
# Cups to deliver hot	12	3
# Seconds to deliver hot		6
WATER EFFICIENCY		
Efficient Fixtures		
Kitch faucet	≤ 2.0 GPM	≤ 1.5 GPM
Dishwasher		≤ 4.25 GPC
Showers	≤ 2.0 GPM	≤ 1.5 GPM
Toilets	≤ 1.28 GPF	≤ 1.10 GPF
Exterior		
Climate approp. Indscpg		Yes
Irrigation: low-water		Yes
Turf ≤ 25%		Yes
Water Consumption annual		
Water Consumption Total	Estimated 110,000 gal	Estimated 30,000 gal
Water Savings		80,000 gal
Water Savings		73 %
INDOOR AIR QUALITY		
Interior Air is Filtered at		
Interior Air: Filtered		Return
Filter Type		Pleated
Filter Thickness		2 in
Filter Size (inches)		20 X 30
Moisture Control		
Vapor Retarder installed		Yes
Capillary Break installed		Yes
Other Moisture Cntrl Strategies		Yes
Materials		
Low Formaldehyde wood		Yes
Low/No VOC paints/finishes		Yes
Low/No VOC Sealants		Yes
LIGHTING		
≥ 90% Energy Efficient		Yes
Appliances		
Refrigerator Energy Star CEE Tier		4+
Washer Energy Star CEE Tier		4+
Dryer Energy Star CEE Tier		4+
IF SOLD		
Project Budget		
Energy Efficiency		\$ 40358
Total \$		\$ 40358
VALUATION		
Cost Approach:		
Remaining Effective Life		
REL Enclosure	75 yrs	100 yrs
REL Heat	20 yrs	25 yrs
REL Cool	20 yrs	25 yrs
REL Ventilation	20 yrs	25 yrs
REL Water Htr	15 yrs	25 yrs
REL Mech Systems Total	20 yrs	25 yrs
Income Approach: Present Val		
PV Enclosure		\$ 33325
PV Mech Systems		\$ 2250
PV Solar		\$ 17600
Present Value Total		\$ 53175
PV of Energy Savings Inputs		
Solar calcs: PVValue pdf		Yes
Notes		
\$ savings from energy efficiency measured in first year \$980/yr. This amount will increase relatively as energy costs rise.		
GREEN CERT		
3rd Party Inspected		
Status		Passed
Entity		HERS
Date		05/01/2017

Photo Gallery Pg 1



House front



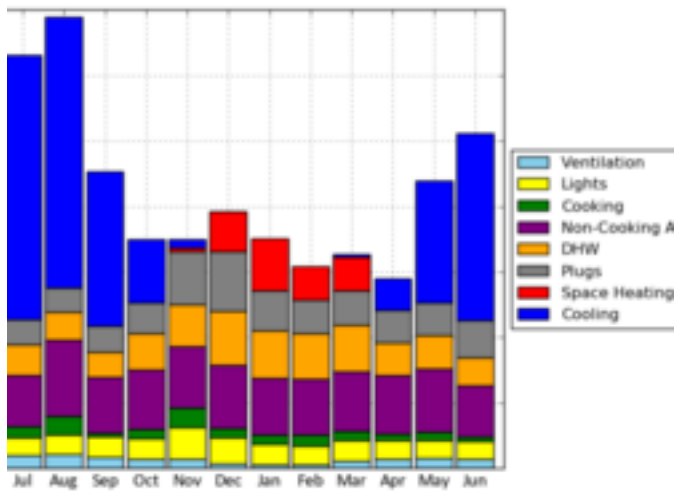
5.3 kW Solar PV



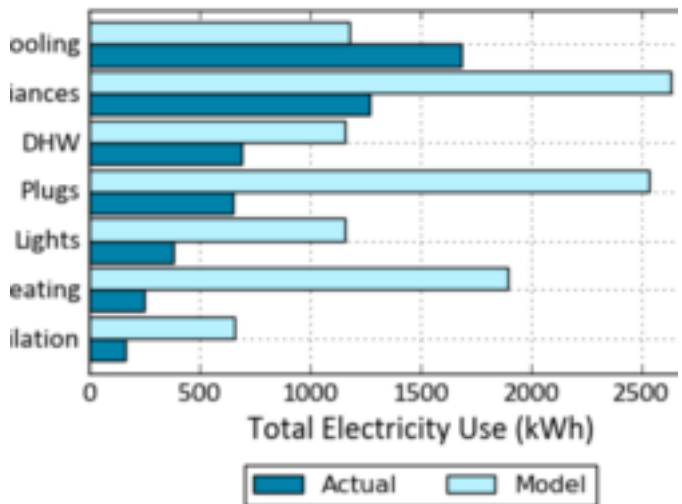
Advanced framing, less wood



Fujitsu 3/4 ton mini-split heat pump: heating & cooling



Monthly energy - end uses. Measured



Actual compared to modeled