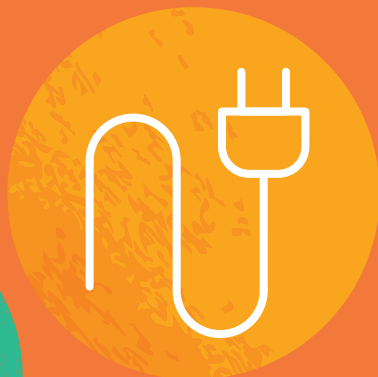
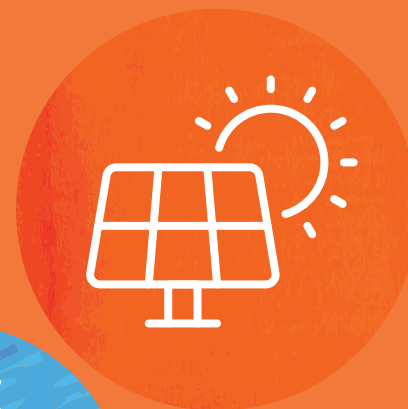


SINGLE-FAMILY HOME DECARBONIZATION CASE STUDY

PESCADERO 1-STORY HOME



OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

FUNDED BY



Updated 3/1/2023

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HOME ASSESSMENT





PESCADERO 1-STORY HOME

 1,150 Square Feet

 2 Occupants


 Built in 1974

 3 Bedrooms

 2 Baths

 Remote Location

The Homeowners are Interested in
Battery
Electric Vehicle Charging
Induction Range
Electric Dryer
Heat Pump Water Heater
Heating/Cooling
Insulation



All recommendations are made to eliminate carbon emissions, increase energy efficiency, and optimize the electric panel.

Panel optimization calls for fitting all the new electric appliances on the panel without having to upgrade the panel and adequately using unused panel space. This is done by careful selection of appliances based on amps and efficiency.

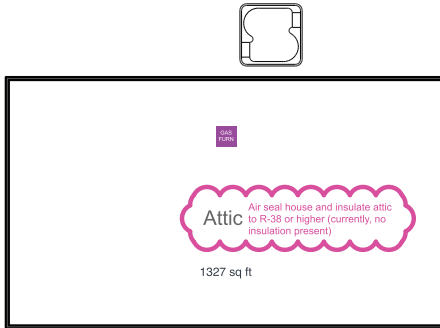


INITIAL HOME ASSESSMENT/INTAKE

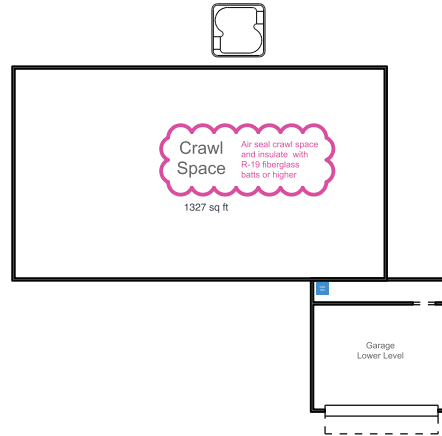
- Wood-burning stove for supplemental heat in winter
- Currently no insulation of any type
- Hot tub in backyard set on high power, where homeowner prefers to keep it
- Home surrounded by dense redwood forest, making solar impractical
- High EV charging demands: one family member's commute = 200 miles/day in a van
- Multi-day Power Outages not Uncommon

FLOOR PLANS WITH UPGRADES*

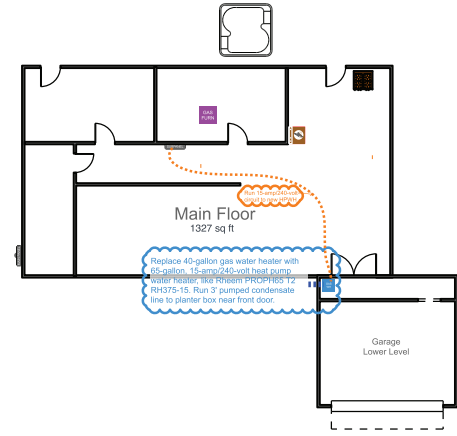
Attic Insulation Work



Floor Insulation Work

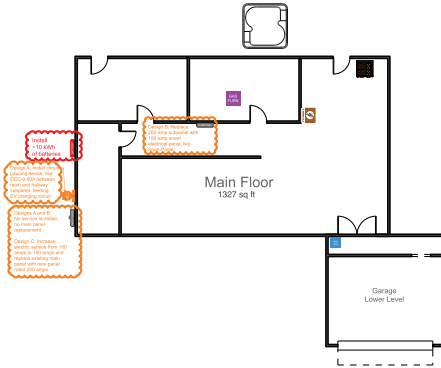


Water Heater Work

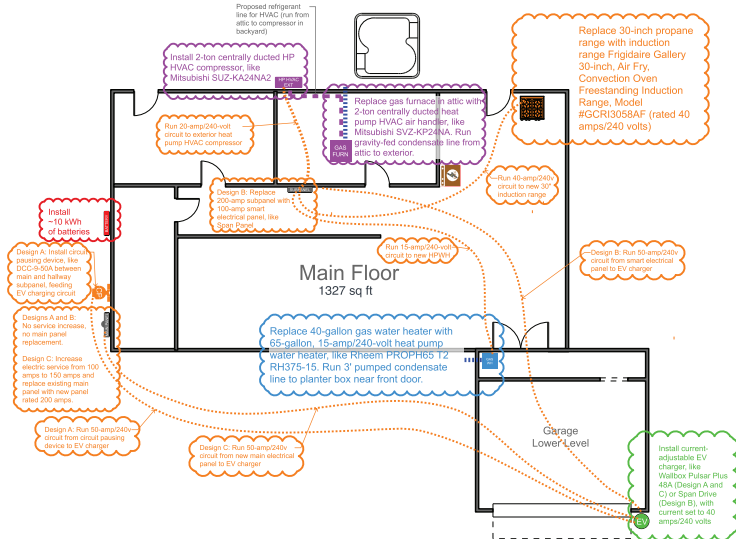


FLOOR PLANS WITH UPGRADES*

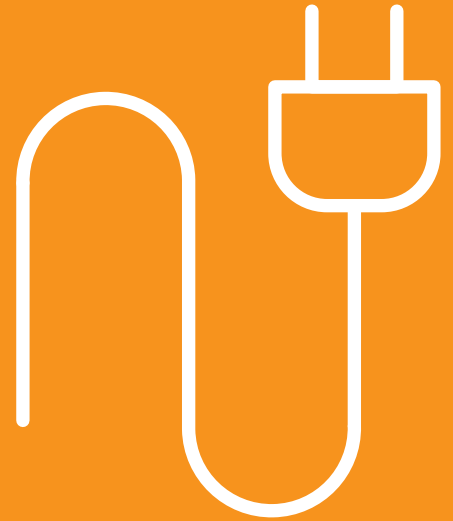
Battery Storage Work



All Electrification Projects



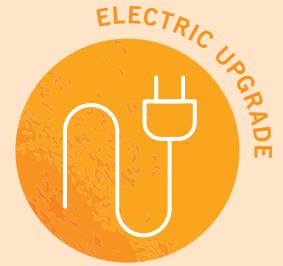
ELECTRICAL UPGRADES



MAIN ELECTRICAL PANEL



Existing
100-amp main
electrical panel



RECOMMENDED

No Change



Lowest Bid

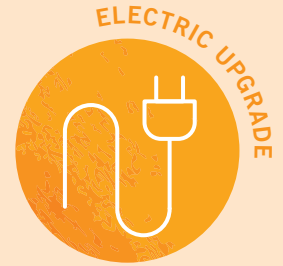
Cost without incentives.....\$0

Cost with incentives\$0

HALLWAY SUBPANEL



Existing
100-amp subpanel



RECOMMENDED

No Change

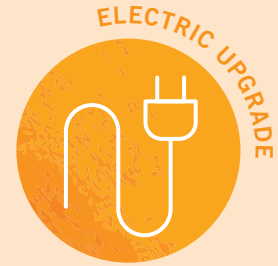
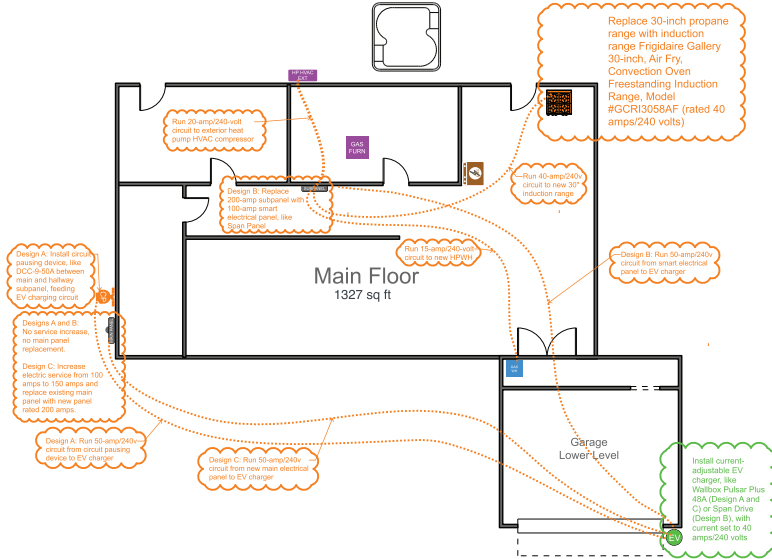


Lowest Bid

Cost without incentives.....\$0

Cost with incentives\$0

WIRING



RECOMMENDED

3 240-volt Circuits to Water Heater, HVAC, Range



Lowest Bid

Cost without incentives.....\$1,951

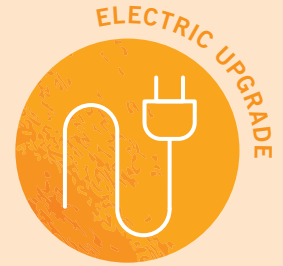
Cost with incentives\$701

EV CHARGING



Recommended


⊗
Existing



RECOMMENDED

EV Charger

Energy Management System

 **Lowest Bid**

Cost without incentives.....\$2,500

Cost with incentives\$2,500

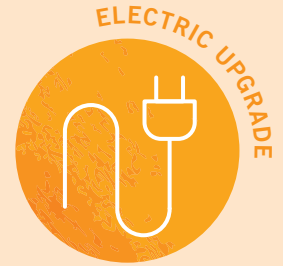
COOKING



Existing
4-burner 30" propane
gas range



Recommended



RECOMMENDED

4-burner 30" Induction Range



Lowest Bid

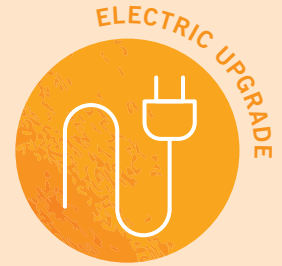
Cost without incentives.....\$1,099

Cost with incentives\$0

CLOTHES DRYING



Existing
7.5 cu ft electric
resistance dryer



RECOMMENDED

No Change



Lowest Bid

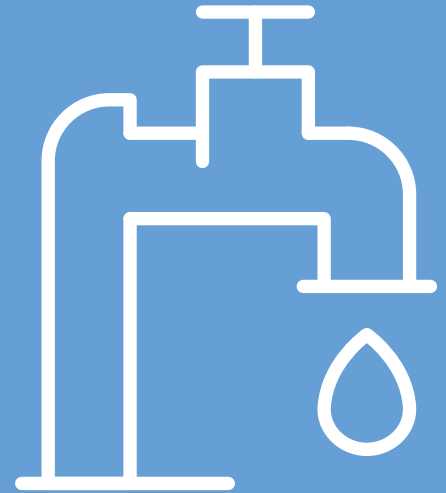
Cost without incentives.....\$0

Cost with incentives\$0

CONTRACTOR QUOTES

Existing Condition	Proposed Electrification	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
100-amp main electrical panel and 100-amp hallway subpanel	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
No 240-volt circuits to water heater, HVAC, range	3 240-volt circuits to water heater, HVAC, range	\$0	\$1,951	\$701	\$1,951	\$701	\$5,100	\$3,850	\$5,474	\$4,224
No at-home fueling for 1 gas car: 12k miles/year and 1 gas van 40k miles/year	EV charger and energy management system	\$0	\$2,500	\$2,500	\$2,500	\$2,500	\$2,650	\$2,650	\$6,165	\$6,165
4-burner 30" propane gas range	4-burner 30" induction range	\$980	\$1,099	\$0	\$1,099	\$0	\$1,099	\$0	\$1,099	\$0
7.5 cu ft electric resistance dryer	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total		\$980	\$5,550	\$3,201	\$5,550	\$3,201	\$8,849	\$6,500	\$12,738	\$10,389

PLUMBING UPGRADE



WATER HEATER



Existing
40-gallon propane
gas water heater



Recommended



RECOMMENDED

65-gallon Heat Pump Water Heater

Why

Uses 1/3 the energy of a gas water heater



Lowest Bid

Cost without incentives.....\$4,953

Cost with incentives\$55

CONTRACTOR QUOTES

Existing Condition	Proposed Electrification	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
40-gallon propane gas water heater	65-gallon heat pump water heater	\$2,701	\$4,000	\$0	\$4,953	\$55	\$7,649	\$2,751	\$8,325	\$3,427
Total		\$2,701	\$4,000	\$0	\$4,953	\$55	\$7,649	\$2,751	\$8,325	\$3,427

HVAC UPGRADE



SPACE HEATING/COOLING



Recommended



Existing

80% efficient centrally ducted propane gas furnace with MERV-13 filter

RECOMMENDED

24,000 BTU Centrally Ducted Heat Pump HVAC System with MERV 13 Filter



Lowest Bid

Cost without incentives.....\$11,370

Cost with incentives\$1,834

CONTRACTOR QUOTES

Existing Condition	Proposed Electrification	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
80% efficient centrally ducted propane gas furnace with MERV 13 filter	24,000 BTU centrally ducted heat pump HVAC system with MERV 13 filter	\$4,808	\$5,000	\$0	\$11,370	\$1,834	\$14,950	\$5,414	\$15,066	\$5,530
Total		\$4,808	\$5,000	\$0	\$11,370	\$1,834	\$14,950	\$5,414	\$15,066	\$5,530

INSULATION UPGRADES



BUILDING SHELL IMPROVEMENTS



Existing
Attic,
no insulation



Existing
Ductwork,
good insulation



RECOMMENDED

Attic: Air Seal, R38 Insulation
Ductwork: No Change



Lowest Bid

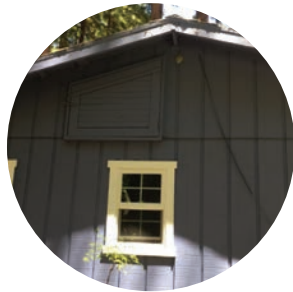
Cost without incentives.....\$2,506

Cost with incentives\$977

BUILDING SHELL IMPROVEMENTS



Existing
Floor,
no insulation



Existing
Walls,
no insulation



RECOMMENDED

Floors: Air Seal, R19 Insulation

Walls: Air Seal, R11 Insulation



Lowest Bid

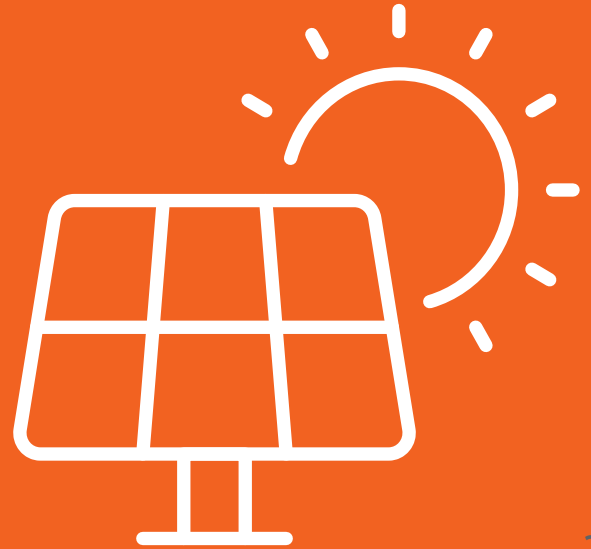
Cost without incentives.....\$4,742


Cost with incentives\$2,200

CONTRACTOR QUOTES

Existing Condition	Proposed Electrification	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
Insulation: attic – none	Insulation: attic – R38	\$0	\$970	\$492	\$2,506	\$977	\$2,550	\$1,021	\$3,185	\$1,656
Ductwork: good condition	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Insulation: floor – none	Insulation: floor – R19	\$0	\$1,366	\$770	\$2,160	\$1,493	\$2,515	\$1,848	\$2,654	\$1,987
Insulation: walls – none	Insulation: walls – R11	\$0	\$2,582	\$707	\$2,582	\$707	\$2,582	\$707	\$6,836	\$4,961
Total		\$0	\$4,918	\$1,969	\$7,248	\$3,177	\$7,647	\$3,576	\$12,675	\$8,604

OPTIONAL SOLAR & BATTERY UPGRADES





Decarbonizing a home does not require adding solar or batteries, since the electricity in San Mateo County is 100% carbon emissions free.

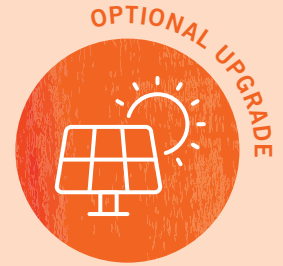
Instead, solar panels can make electrification more affordable and batteries provide resiliency during power outages.



SOLAR & BATTERY



Existing



RECOMMENDED

Solar System: No Change, Too Shady 10 kWh Battery System



Lowest Bid Battery

Cost without incentives.....\$12,359

Cost with incentives\$8,651

COST SUMMARY

ELECTRIFICATION COSTS

Subtotals of Upgrade by Trade	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
Electrical	\$980	\$5,550	\$3,201	\$5,550	\$3,201	\$8,849	\$6,500	\$12,738	\$10,389
Plumbing	\$2,701	\$4,000	\$0	\$4,953	\$55	\$7,649	\$2,751	\$8,325	\$3,427
HVAC	\$4,808	\$5,000	\$0	\$11,370	\$1,834	\$14,950	\$5,414	\$15,066	\$5,530
Insulation	\$0	\$4,918	\$1,969	\$7,248	\$3,177	\$7,647	\$3,576	\$12,675	\$8,604
Total	\$8,489	\$19,468	\$5,170	\$29,121	\$8,267	\$39,095	\$18,241	\$48,804	\$27,950

OPTIONAL SOLAR & BATTERY INVESTMENT*

Existing Condition	Proposed Electrification	Replace Existing (gas)	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
Rooftop solar PV: none	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Home battery: none	Home battery: 10 kWh	\$0	\$12,359	\$8,651	\$12,359	\$8,651	\$18,500	\$12,950	\$19,075	\$13,353
Total		\$0	\$12,359	\$8,651	\$12,359	\$8,651	\$18,500	\$12,950	\$19,075	\$13,353

For more information about incentives, please visit www.smcsustainability.org/energy-water/decarbonizing-homes/incentives

*Solar and batteries are not required for home and vehicle electrification. Peninsula Clean Energy already provides carbon-free electricity for its customers. Solar and batteries are an investment opportunity for any home to save on the electric bill and to increase electricity resilience.

CONTACT

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WWW.SMCSUSTAINABILITY.ORG



OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

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