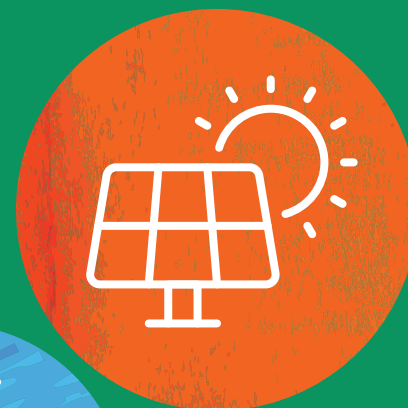


SINGLE-FAMILY HOME DECARBONIZATION CASE STUDY

SAN MATEO 1-STORY HOME



OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

FUNDED BY



Updated 3/1/2023.2

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HOME ASSESSMENT





SAN MATEO 1-STORY HOME

 1,110 Square Feet


 2 Occupants

 Built in 1940

 2 Bedrooms

 1 Bath

The Homeowners are Interested in
Electric Vehicle Charging
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

Home already has solar

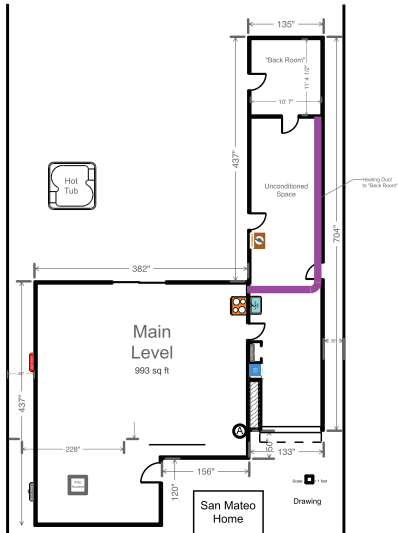
Home already has back up battery

Ducts need work

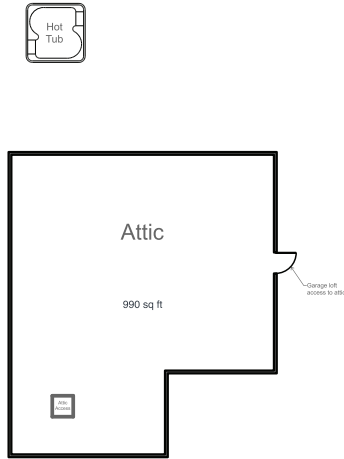
Poor attic insulation

FLOOR PLANS WITHOUT UPGRADES

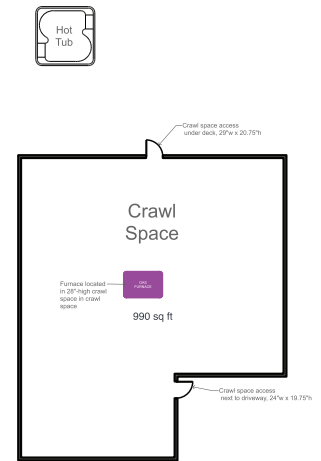
Current Condition Main Level



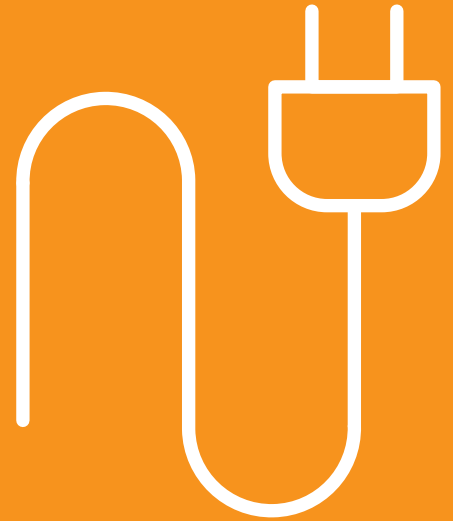
Current Condition Attic



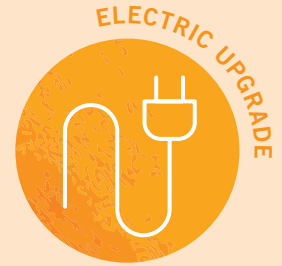
Current Condition Crawl Space



ELECTRICAL UPGRADE



MAIN ELECTRICAL PANEL



Recommended



Existing
125-amp main
electrical panel

RECOMMENDED

125-amp Electrical Panel



Lowest Bid

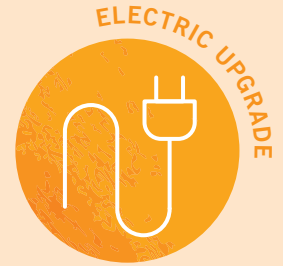
Cost without incentives.....\$0

Cost with incentives\$0

GARAGE SUBPANEL



Existing
100-amp subpanel



RECOMMENDED

100-amp Subpanel



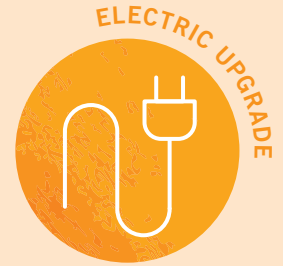
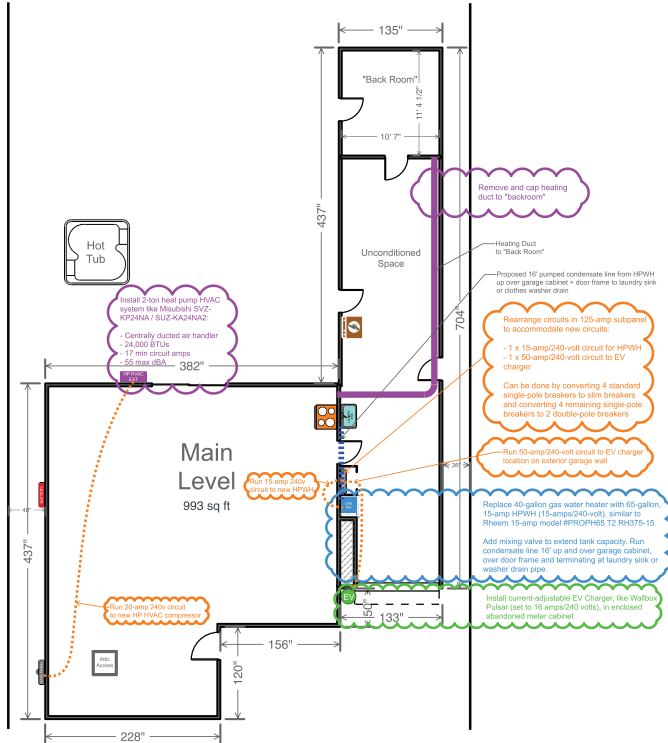
Lowest Bid

Cost without incentives*\$0

Cost with incentives\$0

*Cost included with main panel work

WIRING



RECOMMENDED

2 240-volt Circuits to Water Heater, HVAC



Lowest Bid

Cost without incentives.....\$2,240

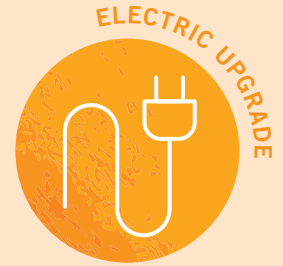
Cost with incentives\$990

EV CHARGING



Recommended


Existing



RECOMMENDED

EV Charger

Energy Management System



Lowest Bid

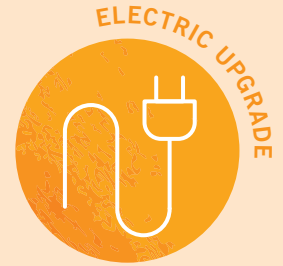
Cost without incentives.....\$1,940

Cost with incentives\$1,940

COOKING



Existing
4-burner 30" electric
resistance range



RECOMMENDED

No Change



Lowest Bid

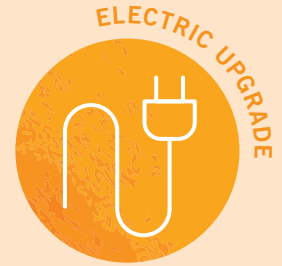
Cost without incentives.....\$0

Cost with incentives\$0

CLOTHES DRYING



Existing
7.5 cu ft electric
resistance dryer



RECOMMENDED

No Change



Lowest Bid

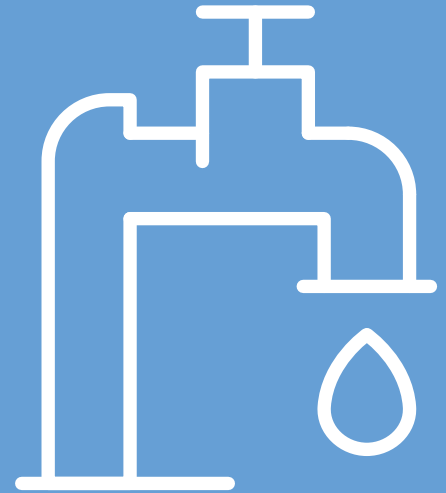
Cost without incentives.....\$0

Cost with incentives\$0

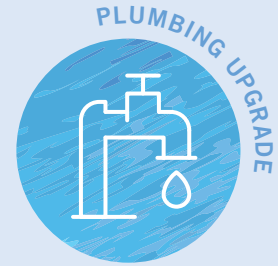
CONTRACTOR QUOTES

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
125-amp main electrical panel and 100-amp garage subpanel	125-amp main electrical panel and 100-amp garage subpanel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,350	\$14,350
No 240-volt circuits to water heater, HVAC	2 240-volt circuits to water heater, HVAC	\$0	\$2,240	\$990	\$2,240	\$990	\$3,933	\$2,683	\$4,017	\$2,767
No at-home fueling for 2 gas cars: 12k miles/year	At-home fueling for 2 EVs: 12k miles/year	\$0	\$1,940	\$1,940	\$1,940	\$1,940	\$2,078	\$2,078	\$2,917	\$2,917
4-burner 30" electric resistance range	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7.5 cu ft electric resistance dryer	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total		\$0	\$4,180	\$2,930	\$4,180	\$2,930	\$6,011	\$4,761	\$21,284	\$20,034

PLUMBING UPGRADE



WATER HEATER



Existing
40-gallon 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.....\$5,353

Cost with incentives\$335

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 gas water heater	65-gallon heat pump water heater	\$2,754	\$3,342	\$0	\$5,353	\$335	\$6,307	\$1,289	\$7,899	\$2,881
Total		\$2,754	\$3,342	\$0	\$5,353	\$335	\$6,307	\$1,289	\$7,899	\$2,881

HVAC UPGRADE



SPACE HEATING/COOLING



Recommended

RECOMMENDED

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

Why

Uses 1/3 the energy of a gas furnace



Lowest Bid

Cost without incentives.....\$13,650

Cost with incentives\$3,430



Existing

80% efficient centrally ducted gas furnace

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 gas furnace	24,000 BTU centrally ducted heat pump HVAC system with MERV 13 filter	\$7,708	\$5,761	\$0	\$13,650	\$3,430	\$16,475	\$6,255	\$19,849	\$9,629
Total		\$7,708	\$5,761	\$0	\$13,650	\$3,430	\$16,475	\$6,255	\$19,849	\$9,629

INSULATION UPGRADES



BUILDING SHELL IMPROVEMENTS



Existing
Attic,
some insulation

Existing
Ductwork,
good condition



RECOMMENDED

Attic: Air Seal, R38 Insulation

**Ductwork: Seal and Insulate
or Replace**



Lowest Bid

Cost without incentives.....\$6,550

Cost with incentives\$3,831

BUILDING SHELL IMPROVEMENTS



Existing
Floor,
no insulation

Existing
Walls,
no insulation



RECOMMENDED

Floors: Air Seal, R19

Walls: Air Seal, R11



Lowest Bid

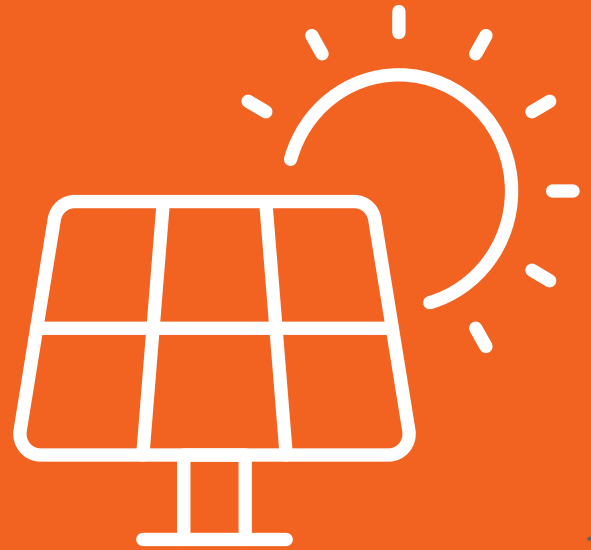
Cost without incentives.....\$4,063


Cost with incentives\$1,596

CONTRACTOR QUOTES

Existing Condition	Proposed Electrification	Replace Existing (gas)	Replace Existing (gas) With Incentives	DIY	DIY With Incentives	Low Bid (gas)	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
Insulation: attic – some	Insulation: attic – R38	\$0	\$0	\$782	\$361	\$1,850	\$531	\$2,228	\$909	\$2,843	\$1,524
Ductwork: good condition	Ductwork: sealed and insulated as needed	\$4,700	\$3,300	\$4,700	\$4,100	\$4,700	\$3,300	\$4,700	\$3,300	\$4,700	\$3,300
Insulation: floor – none	Insulation: floor – R19	\$0	\$0	\$1,076	\$567	\$1,650	\$983	\$1,797	\$1,130	\$1,876	\$1,209
Insulation: walls – none	Insulation: walls – R11	\$0	\$0	\$2,413	\$613	\$2,413	\$613	\$2,413	\$613	\$5,279	\$3,479
Total		\$4,700	\$3,300	\$8,971	\$5,641	\$10,613	\$5,427	\$11,138	\$5,952	\$14,698	\$9,512

OPTIONAL SOLAR & BATTERY UPGRADES



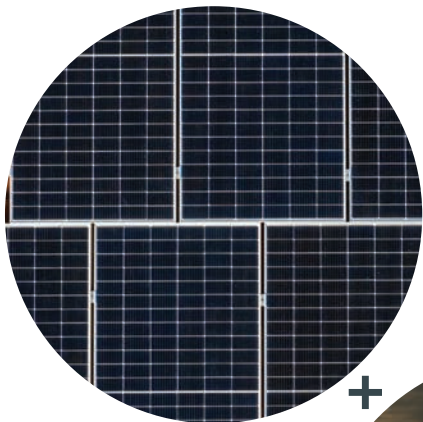


Decarbonizing a home does not require adding solar or batteries, since the electricity in San Mateo County is 100% carbon emissions free.

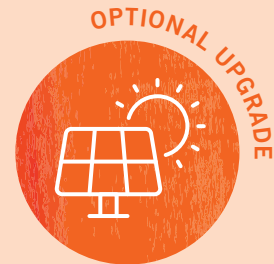
Instead, solar panels can make electrification more affordable and batteries provide resiliency during power outages.



SOLAR & BATTERY



Existing



RECOMMENDED

No Change



Lowest Bid Solar

Cost without incentives.....\$0

Cost with incentives\$0

Lowest Bid Battery

Cost without incentives.....\$0

Cost with incentives\$0

COST SUMMARY

ELECTRIFICATION COSTS

Subtotals of Upgrade by Trade	Replace Existing (gas)	Replace Existing (gas) With Incentives	DIY	DIY With Incentives	Low Bid	Low Bid With Incentives	Mid Bid	Mid Bid With Incentives	High Bid	High Bid With Incentives
Electrical	\$0	\$0	\$4,180	\$2,930	\$4,180	\$2,930	\$6,011	\$4,761	\$21,284	\$20,034
Plumbing	\$2,754	\$2,754	\$3,342	\$0	\$5,353	\$335	\$6,307	\$1,289	\$7,899	\$2,881
HVAC	\$7,708	\$7,708	\$5,761	\$0	\$13,650	\$3,430	\$16,475	\$6,255	\$19,849	\$9,629
Insulation	\$4,700	\$3,300	\$8,971	\$5,641	\$10,613	\$5,427	\$11,138	\$5,952	\$14,698	\$9,512
Total	\$15,162	\$13,762	\$22,254	\$8,571	\$33,796	\$12,122	\$39,931	\$18,257	\$63,730	\$42,056

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: ~3 kW	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Home battery: 13 kWh	No Change	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

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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OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

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