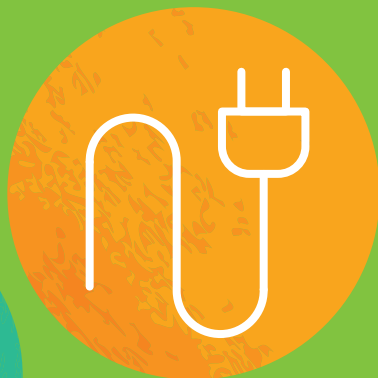
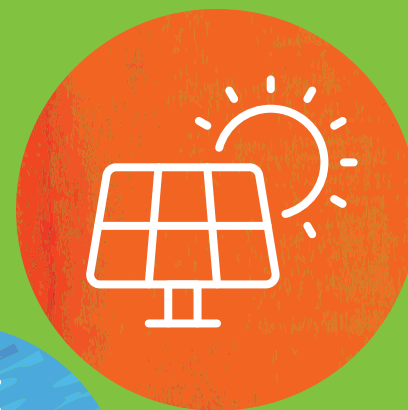


SINGLE-FAMILY HOME DECARBONIZATION CASE STUDY

BRISBANE 2-STORY HOME



OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

FUNDED BY



Updated 3/1/2023

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HOME ASSESSMENT





BRISBANE 2-STORY HOME

 1,500 Square Feet

 2 Occupants

 Built in 1934

 3 Bedrooms

 2 Baths

 Narrow Hillside Lot

The Homeowners are Interested in

Solar/Battery

Electric Vehicle Charging


Induction Cooktop/Electric Wall Oven

Heat Pump 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.

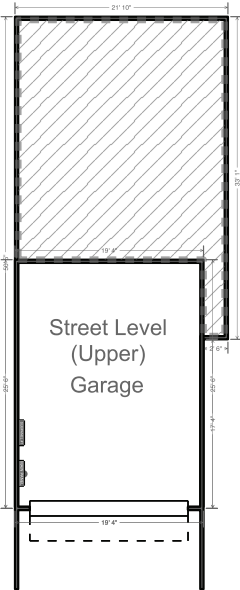


INITIAL HOME ASSESSMENT/INTAKE

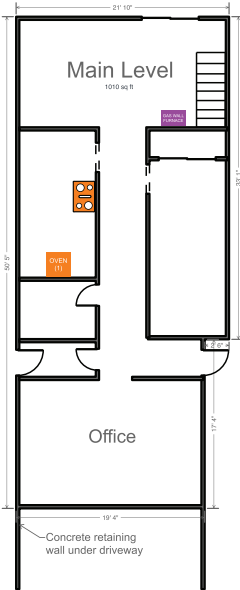
- Roof has good solar exposure
- All major appliances are currently gas
- Unable to enter the home due to concerns about COVID, so the process was modified
- Single gas wall heater in home not functional
- Attic not currently insulated

FLOOR PLANS WITHOUT UPGRADES

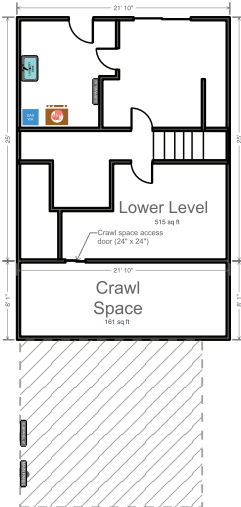
Current Condition
Street Level



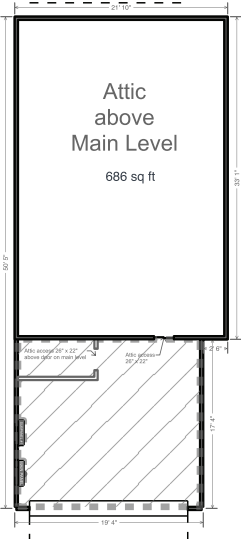
Current Condition
Main Level



Current Condition
Lower Level

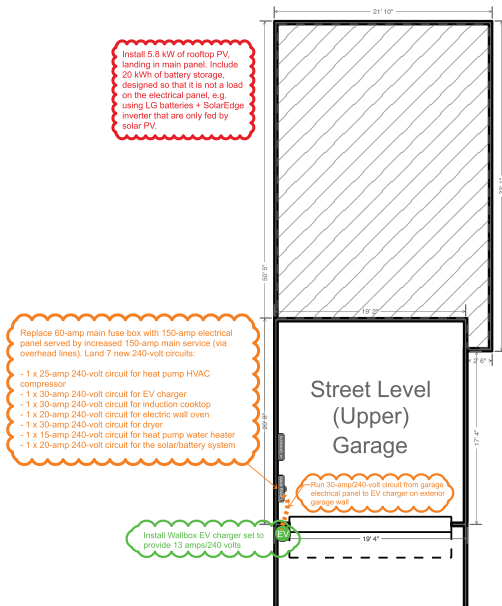


Current Condition
Attic

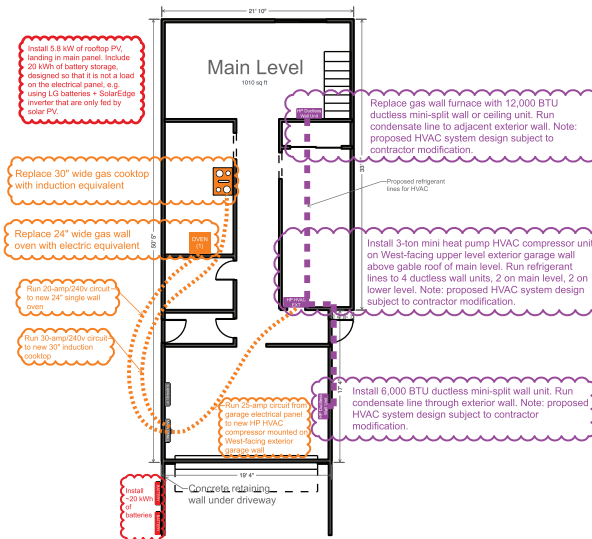


FLOOR PLANS WITH UPGRADES*

All Electrification Work Street Level



All Electrification Work Main Level

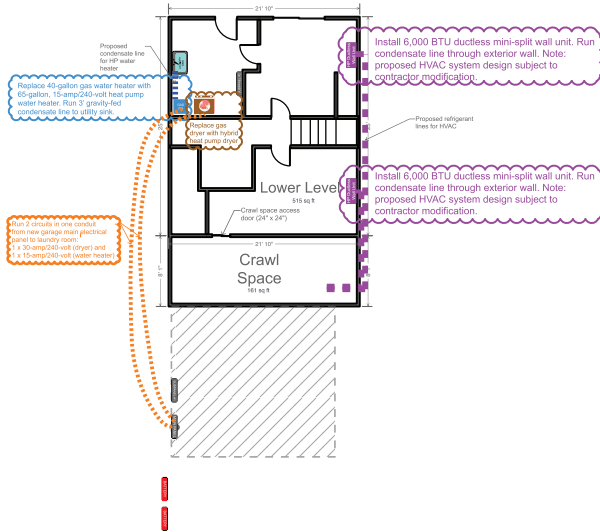


*Information for contractors

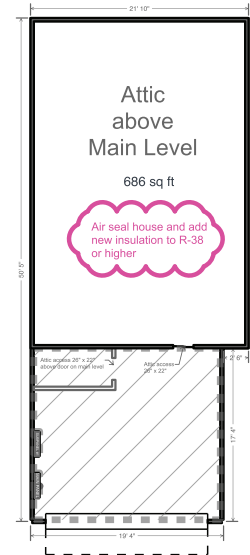


FLOOR PLANS WITH UPGRADES*

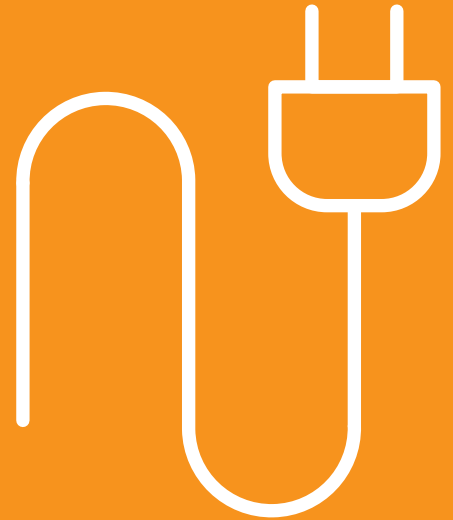
All Electrification Work Lower Level



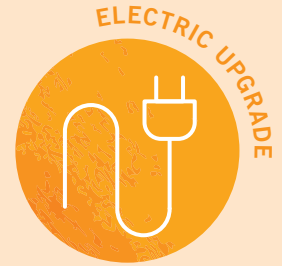
All Electrification Work Attic



ELECTRICAL UPGRADES



MAIN ELECTRICAL PANEL



Recommended



Existing
60-amp main fuse box

RECOMMENDED

150-amp Service Line

150-amp Electrical Panel



Lowest Bid

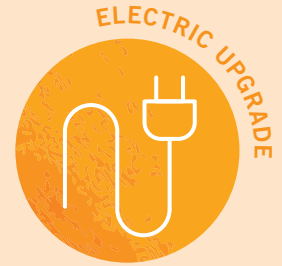
Cost without incentives.....\$3,092

Cost with incentives\$0

LAUNDRY ROOM SUBPANEL



Existing
60-amp electrical
subpanel



RECOMMENDED

No Change

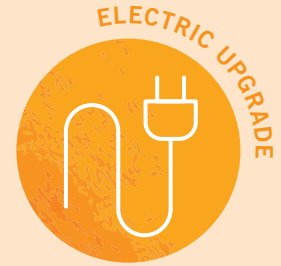
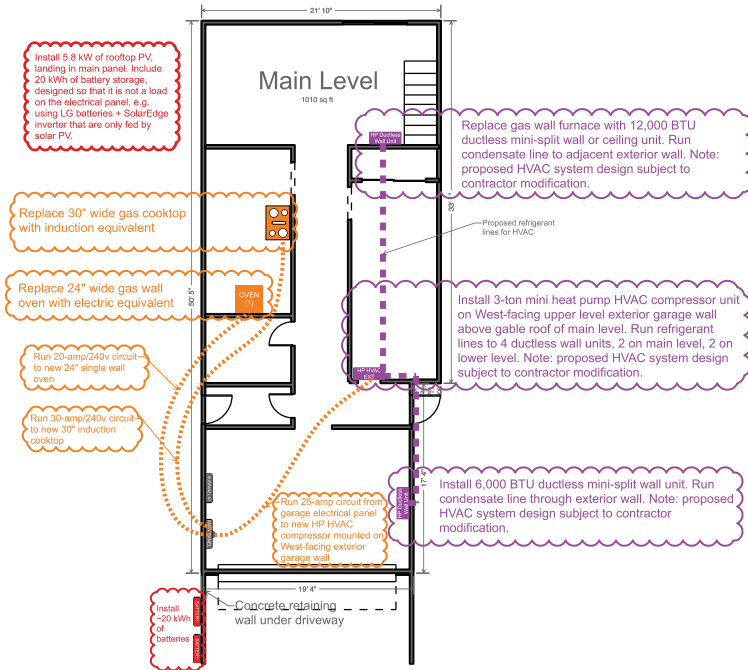


Lowest Bid

Cost without incentives.....\$0

Cost with incentives\$0

WIRING



RECOMMENDED

5 240-volt Circuits to Water Heater, HVAC, Cooktop, Wall Oven, Dryer



Lowest Bid

Cost without incentives.....\$2,730

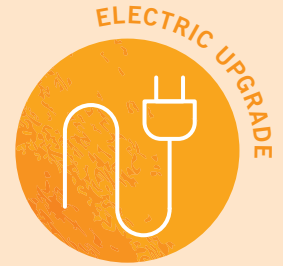
Cost with incentives\$1,480

EV CHARGING



Recommended


⊗
Existing



RECOMMENDED

EV Charger

Energy Management System

 **Lowest Bid**

Cost without incentives.....\$1,900

Cost with incentives\$1,900

COOKING

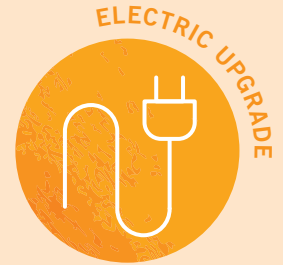


Recommended



Existing

4-burner 30" gas cooktop
24" gas wall oven



RECOMMENDED

4-Burner 30" Induction Cooktop
24" Electric Wall Oven

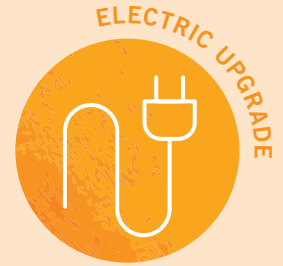


Lowest Bid

Cost without incentives.....\$3,000

Cost with incentives\$1,830

CLOTHES DRYING



Recommended

RECOMMENDED

7.4 cu ft Hybrid Heat Pump Dryer



Lowest Bid

Cost without incentives.....\$1,394

Cost with incentives\$674



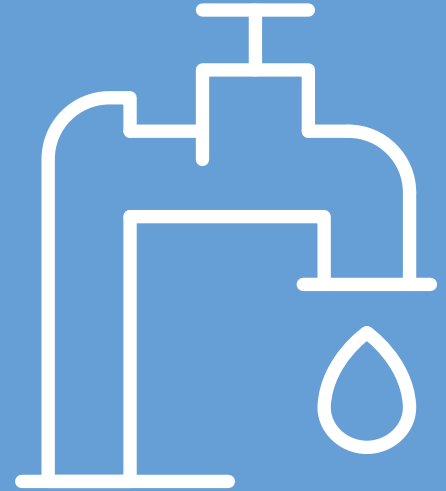
Existing

7.4 cu ft gas dryer

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
60-amp main fuse box and 60-amp laundry room electrical subpanel	150-amp electric service line, 150-amp main electrical panel, and 60-amp laundry room electrical subpanel	\$0	\$3,092	\$0	\$3,092	\$0	\$7,270	\$4,178	\$11,985	\$8,893
No 240-volt circuits to water heater, HVAC, cooktop, wall oven, dryer	5 new 240-volt circuits to water heater, HVAC, cooktop, wall oven, dryer	\$0	\$2,730	\$1,480	\$2,730	\$1,480	\$6,950	\$5,700	\$9,280	\$8,030
No at-home fueling for 2 gas cars: 12k miles/year	EV charger and energy management system	\$0	\$1,900	\$1,900	\$1,900	\$1,900	\$1,940	\$1,940	\$1,954	\$1,954
4-burner 30" gas cooktop and 24" gas wall oven	4-burner 30" induction cooktop and 24" electric wall oven	\$3,096	\$3,326	\$2,156	\$3,000	\$1,830	\$3,326	\$2,156	\$8,224	\$7,054
7.4 cu ft gas dryer	7.4 cu ft hybrid heat pump dryer	\$1,079	\$1,394	\$674	\$1,394	\$674	\$1,394	\$674	\$1,394	\$674
Total		\$4,175	\$12,442	\$6,210	\$12,116	\$5,884	\$20,880	\$14,648	\$32,837	\$26,605

PLUMBING UPGRADE



WATER HEATER



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



Recommended



Existing
40-gallon gas
water heater

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	\$3,038	\$3,810	\$0	\$4,953	\$55	\$7,152	\$2,254	\$8,070	\$3,172
Total		\$3,038	\$3,810	\$0	\$4,953	\$55	\$7,152	\$2,254	\$8,070	\$3,172

HVAC UPGRADE



SPACE HEATING/COOLING



Recommended



Existing

Broken gas wall furnace and portable electric heaters

RECOMMENDED

36,000 BTU Pump HVAC System with 4 Ductless Wall Units



Lowest Bid

Cost without incentives.....\$16,882

Cost with incentives\$6,132

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
Broken gas wall furnace and portable electric heaters	36,000 BTU pump HVAC system with 4 ductless wall units	\$2,672	\$7,800	\$0	\$16,882	\$6,132	\$18,348	\$7,598	\$27,680	\$16,930
Total		\$2,672	\$7,800	\$0	\$16,882	\$6,132	\$18,348	\$7,598	\$27,680	\$16,930

INSULATION UPGRADES



BUILDING SHELL IMPROVEMENTS



Existing
Attic,
no insulation

Existing
Duckwork,
none



RECOMMENDED

Attic: Air Seal, R38 Insulation
Duckwork: No Change



Lowest Bid

Cost without incentives.....\$1,200

Cost with incentives\$0

BUILDING SHELL IMPROVEMENTS



Existing Floor,
no insulation



Existing Walls,
no insulation



RECOMMENDED

Crawlspace No Change: Minimal Raised Floor Area

Walls No Change: Hard to Insulate with Tube Wiring



Lowest Bid

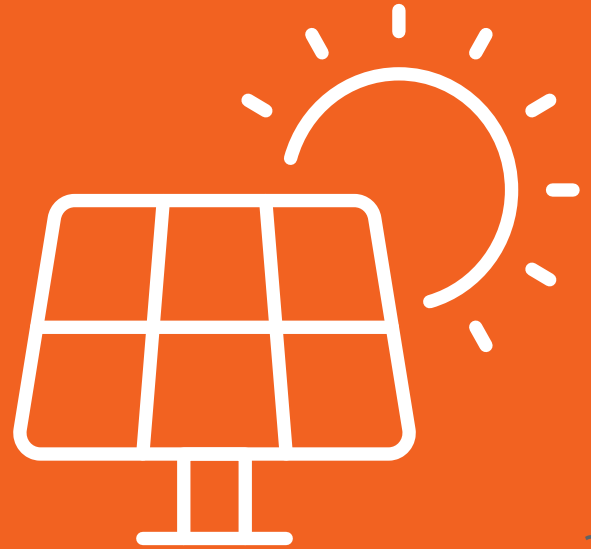
Cost without incentives.....\$0


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
Insulation: attic – none	Insulation: attic – R38	\$0	\$781	\$6	\$1,200	\$0	\$1,518	\$318	\$1,805	\$605
Ductwork: none	Ductwork: none	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Insulation: floor – none	Insulation: floor – none	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Insulation: walls – none	Insulation: walls – none	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total		\$0	\$781	\$6	\$1,200	\$0	\$1,518	\$318	\$1,805	\$605

OPTIONAL SOLAR & BATTERY UPGRADES



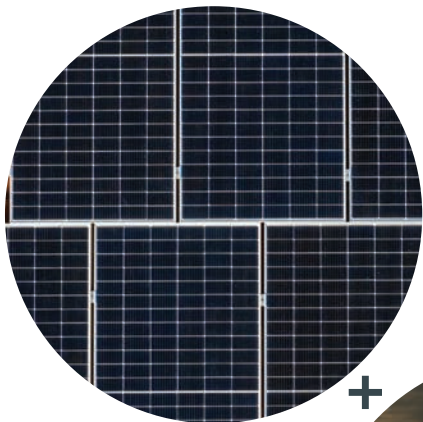


Decarbonizing a home does not require adding solar or batteries, since the electricity in San Mateo County is 100% carbon emissions free.

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



SOLAR & BATTERY



Recommended



Existing



RECOMMENDED

5.8 kW Solar System

10 kWh Battery System



Lowest Bid Solar

Cost without incentives\$13,833

Cost with incentives\$9,683

Lowest Bid Battery

Cost without incentives\$12,000

Cost with incentives\$8,400

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	\$4,175	\$12,442	\$6,210	\$12,116	\$5,884	\$20,880	\$14,648	\$32,837	\$26,605
Plumbing	\$3,038	\$3,810	\$0	\$4,953	\$55	\$7,152	\$2,254	\$8,070	\$3,172
HVAC	\$2,672	\$7,800	\$0	\$16,882	\$6,132	\$18,348	\$7,598	\$27,680	\$16,930
Insulation	\$0	\$781	\$6	\$1,200	\$0	\$1,518	\$318	\$1,805	\$605
Total	\$9,885	\$24,833	\$6,216	\$35,151	\$12,071	\$47,898	\$24,818	\$70,392	\$47,312

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	Rooftop solar PV: 5.8 kW	\$0	\$13,833	\$9,683	\$13,833	\$9,683	\$20,875	\$14,613	\$26,384	\$18,469
Home battery: none	Home battery: 10 kWh	\$0	\$12,000	\$8,400	\$12,000	\$8,400	\$14,675	\$10,272	\$18,978	\$13,285
Total		\$0	\$25,833	\$18,083	\$25,833	\$18,083	\$35,550	\$24,885	\$45,362	\$31,754

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

ALERO MOJU
AMOJU@SMCGOV.ORG

WWW.SMCSUSTAINABILITY.ORG



OFFICE OF
SUSTAINABILITY
COUNTY OF SAN MATEO

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