

FOSSIL FREE HOMES



A GUIDE TO THE ALL-ELECTRIC, LOW-CARBON, CLEAN HOME

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Ever wondered if you could eliminate fossil fuel use in your home?

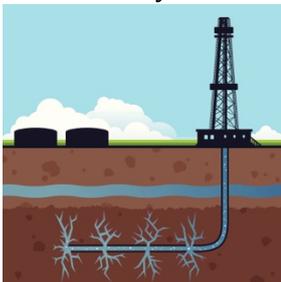
This guide can help you replace natural gas heating, water heating and appliances to go low- or zero-carbon in your home, and you don't necessarily need solar panels to do it. Natural gas used to be much cleaner and cheaper than electricity, but now our power is transitioning away from dirty fossil fuels like coal and gas to an increasing share of renewables and clean power sources. Alternatives to natural gas are becoming more popular, as climate-conscious people try to reduce their fossil fuel use, avoid natural gas produced by "fracking" and all the risks that come with it, and limit the safety hazards of gas leaks like the major incident in Aliso Canyon outside of Los Angeles and the pipeline explosion in San Bruno.¹



A natural gas pipeline in Colorado. Credit: Kevin Moloney, NYT. <http://bit.ly/22JNeDb>

Fortunately, there are many affordable choices for alternatives to natural gas in homes that are widely available and compatible in most homes with some advance planning.

Natural gas is the most common source of home heating and water heating in the Bay Area. Although the term "natural gas" sounds environmentally friendly, it's still a fossil fuel with significant impacts. Compared to coal, natural gas releases less CO₂, yet its main component, methane, is a greenhouse gas (GHG) with 84 times the short-term warming power of CO₂.² Currently the government and oil industry have few regulations for methane leaks during the natural gas production process, thus it's impossible to know exactly how much natural gas is adding to the carbon footprint. However, it was determined that a four-month methane leak at the Aliso Canyon natural gas storage facility in Los Angeles released 96,000 tons of methane, which has the same environmental impact as burning nearly one billion gallons of gasoline.¹ It also equates to about 8 million tons of CO₂ — 8.6% of California's annual GHG inventory for industry.³



Hydraulic fracturing, or "fracking," is the high-pressure injection of more than a million gallons of water, chemicals, and sand into underground wells in order to extract natural gas. Hazardous waste from the process can sit in open pits, where chemicals evaporate into the air and sink into groundwater. Residents of communities with extensive fracking, such as those in Parachute, Colorado, have reported headaches, respiratory infections, neurological impairment, nausea, and skin rashes.⁴

*A fossil free home is a healthy home, one that helps the environment, the community, and the health of those living in it. **Plan ahead for your furnace, water heater and gas appliances by having an electrician prepare your home with the necessary electrical panel upgrades, conduits and outlets needed to go Fossil Fuel Free.***



1. "Alison Canyon leak sheds light on national problem." Environmental Defense Fund. <http://bit.ly/1Q11rrj>

2. Information on natural gas by National Academies of Science: <http://bit.ly/1QhYsrr>

3. California Greenhouse Gas Inventory. California Environmental Protection Agency. <http://bit.ly/2sZaLTp>

4. "Health Problems Emerge Near Natural Gas Fields." Scientific American. In extreme cases, cancer and miscarriages have been reported as well. <http://bit.ly/22JNeDb>

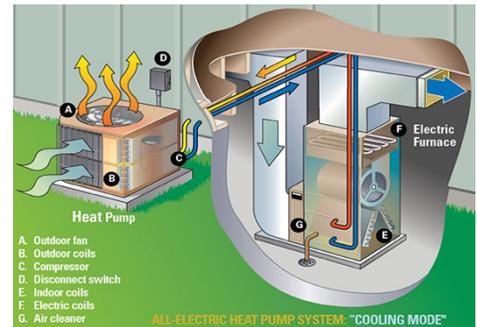
ALTERNATIVES

FURNACES

- AIR SOURCE HEAT PUMP *COST: \$3,000 - \$8,000*

Air-source heat pumps use electricity to transfer heat, much like a refrigerator. They do not combust fuel to generate heat. This alternative distributes heat by moving air through ducts. It also works for air-conditioning, not just heating.^{5, 6}

- DUCTLESS MINI-SPLITS *COST: \$2,000 - \$5,000*

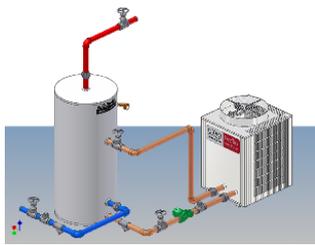


Source: KCP&L

These smaller heat pumps provide both heating and cooling to a few rooms. Although the installation costs can be higher, they can be cost-effective where there is no existing ductwork.

WATER HEATING

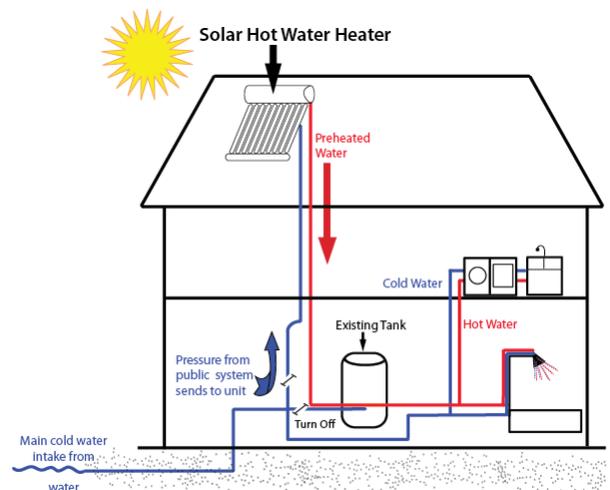
- ELECTRIC HEAT PUMP WATER HEATER *COST \$1,000— \$2,000*



This water heating system looks like a normal tank water heater, and works in a similar way to a refrigerator in reverse, by taking heat from its surrounding air and using it to warm water. Most models have built in backup electric resistance elements to ensure ample heating during very cold weather. Replacing your gas water heater with this alternative could save \$360/year and prevent 18 metric tons of GHG emissions over its lifetime.

- SOLAR WATER HEATER
COST — \$4,000 to \$10,000 before rebates and incentives

Substituting with a solar water heater could save you \$140/year and 1.2 tons CO₂/year. The batch (passive) system doesn't require electricity to operate and has a short return on investment. There's also the active system, known as "flat plate."



APPLIANCES

- Electric clothes dryers, ovens, and stoves are all available in many models and styles comparable to natural gas appliances in cost and performance. These electric models can reduce significant carbon emissions.
- Switching to electric appliances usually requires a 240 volt outlet.
- Check for appliances with the highest Energy Star ratings, which are typically much more efficient than standard models.



If you don't own your home, ask your landlord whether alternative electric or solar heating, water heating and appliances are an option. Some landlords are open to co-investment where landlord and tenant split the cost of a higher efficiency appliance.

5. coolcalifornia.org / energy.gov

6. "Heat Pumps / AC." GreenAndSave. http://www.greenandsave.com/heating/furnaces/heat_pumps_ac.html

THINGS TO LOOK OUT FOR

- When installing a new heat pump or electric appliance, check for the Energy Star label and try to select the most energy efficient model.
- Heat pumps are rated by a heating season performance factor (HSPF) and a seasonal energy efficiency ratio (SEER) for cooling. In warmer climates the SEER rating is more important, whereas for colder climates the HSPF rating is more important. Consider selecting a unit with demand-defrost control for lower energy use.
- Consider that the fans and compressors in heat pumps make noise. Look for a unit with a quieter rating of 55 decibels or less.
- Heat Pumps installed indoors require extra space around them, between 750 to 1,000 cubic ft., for the best efficiency, though they can work in tighter spaces with louvered doors to facilitate air flow. Condos and other tight spaces may require split-system heat pumps with outdoor compressors.
- A garage, basement or outside location works best for heat pumps, since they will cool and dehumidify the surrounding space. However other locations can also be suitable.
- Heat Pumps typically have a 30 A circuit and a 240V electrical conduit, which any electrician can install. But, for some homes, electric master panels may need an upgrade.
- Oversize your heat pump water heater by 50% relative to a standard water heater for the best efficiency. This will minimize the use of electric resistance mode.
- To save money on operational costs, get onto a time-of-use rate, and program your water heater to run at the cheapest off-peak times.
- Choose an experienced contractor, check references, and solicit multiple quotes.



INCENTIVES & REBATES

- Energy Upgrade California offers a \$500 rebate for heat pump water heaters. Visit <http://myenergy.energyupgradeca.org/myplan/rebates>.
- The City of Palo Alto just launched the Heat Pump Water Heater Pilot, which will offer rebates up to \$1,500. Apply at <http://bit.ly/1PXBquH>
- The federal government allows for a 30% deduction of solar water heater costs off your federal taxes through an ITC (investment tax credit). If you do not owe taxes this year, the federal solar tax credit rolls over to next year.
- The federal tax credits of \$300 for Heat Pump Water Heaters and air source Heat Pump Heaters are effective through December 31, 2016. See: http://www.energystar.gov/about/federal_tax_credits/water_heaters_non_solar
- Rebates of up to \$4,366 for solar water heaters with Pacific Gas & Company. Contractors can be found on their website: <http://bit.ly/1SjSbOq>
- In addition to home equity loans, **Property Assessed Clean Energy (PACE) loans** allow homeowners to finance many energy upgrades, including efficient heaters. See: <http://green.smcgov.org/pace-financing>

RESOURCES

- The Menlo Spark Green Renovations guide contains detailed information about energy efficient systems and products. <http://bit.ly/1TFkds6>
- For more information about heat pumps, see
 - U.S. Department of Energy (DOE), <http://energy.gov/energysaver/articles/heat-pump-systems>
 - U.S. Environmental Protection Agency (EPA), <http://www.energystar.gov/products/certified-products/detail/high-efficiency-electric-storage-water-heaters>
<https://www.energystar.gov/products/certified-products/detail/heat-pumps-air-source>
 - City of Palo Alto Heat Pump Water Heater Program:
http://www.cityofpaloalto.org/gov/depts/utl/residents/resrebate/smartenergy/heat_pump_water_heaters/heat_pump_water_heater_pilot_program.asp

Some popular heat pump models that are readily available:*

- Whole house **Ducted Heat Pump Heater and Air Conditioner:**
<http://www.carrier.com/homecomfort/en/us/products/heat-pumps/25vna0/>
 - **Ductless Mini-split** (heater and air conditioner): http://www.fujitsugeneral.com/hfi_feat_sm.htm
 - **Heat Pump Water Heater:** <http://www.geappliances.com/ge/heat-pump-hot-water-heater/water-heater-reseller.htm>.
- Additional models** listed here: <http://www.cityofpaloalto.org/civicax/filebank/documents/51480>

**For informational purposes only; Menlo Spark does not endorse brands or products.*

LOCAL CONTRACTORS

Local Contractors specializing in heat pumps:*

Ducted heat pumps heaters & ductless mini-splits:

- **Alternative HVAC Solutions**, provides multiple heating solutions including heat pumps, mini-splits and radiant tiles; 104 Constitution Dr. Suite 1, Menlo Park, 650-322-4328; <http://alternativehvacs.com/>
- **Sandium Heat & Cooling**, carries an efficient Carrier Greenspeed model plus HPWHs; 1045 North 10th St. San Jose, 408-894-9072; <http://sandium.com/>
- **Residential Heating and Air Conditioning, Inc.**, 65 Cristich Lane, Campbell, 408-377-4073; <http://www.residentialheating-ac.com>
- **DG Heating & Air Conditioning**, 2288 Cherry Ave, San Jose, 408-201-9411; <http://www.dgheatingandair.com>
- **Bayside Heating & Air Conditioning**, heat pumps and mini-splits, 720 South Amphlett Blvd, San Mateo, 650-299-9070; <http://www.baysideinc.com>
- **Calvey Heating and Air**, installing roughly 100 Fujitsu mini-splits per year, Mountain View, 650-265-2202; <http://www.calveyheatingandair.com/>
- **Advanced Home Energy**, full service covering audits, solar, heating & cooling, weatherization, and more; based in Richmond; <http://advancedhomenergy.com/>
- **Hussey Bros., Inc.**, 903 George St, Santa Clara, 408-733-6360; <http://www.husseybros.com/products/split-system.htm>
- **Air Perfection Heating & Air Conditioning**, 850 S. Van Ness Ave, San Francisco, 415-590-2934; <http://www.coolingandheatingsanfrancisco.com>

Heat Pump Water Heaters:

- **Cobalt Construction**, 105 Serra Way Ste. 196, Milpitas, 408-500-6396
- **Hansen A G Plumbing**, 1046 Tehama Ave Menlo Park, 650-323-4138
- **Valley Heating**, Cooling and Electrical, 1171 N. 4th St., San Jose, 408-294-6290
- **Supreme Air Systems**, 80 Gilman Avenue Ste. 1, Campbell, 408-376-0406
- **Sandium Heat & Cooling**, 1045 North 10th St., San Jose, 408-894-9072

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