

Heat Pumps and Health

How Heat Pumps Work

Heat pumps work by expanding and contracting fluid to move heat into or out of your home. This means heat pumps can both **heat** and **cool** your home. Heat pumps use outside coils to exchange heat with the air, water, or ground. Air source is the easiest to install but ground source is the most efficient.¹

NOTE:

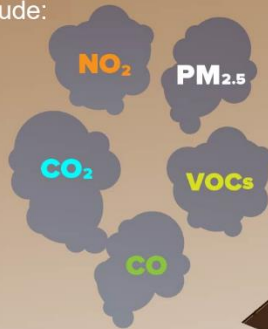
Induction stoves are very efficient and another way to keep pollution out of your home.

Why Gas is a Bad Option

Natural Gas is a major contributor to climate change, and fracking for gas causes serious environmental and health problems.⁶

Gas furnaces, stoves and water heaters create dangerous combustion chemicals. Improper installation or damage to furnace and water heater chimneys can vent these chemicals directly into your home. Gas stoves often have no external ventilation.

These include:



These chemicals are associated with or shown to cause numerous problems in people, including: asthma, decreased lung function, nausea, nerve damage, cancer, fatigue, headaches, dizziness, heart attacks, and stroke.^{7,8,9,10,11}

Heat pumps do not burn gas in your home. They use electricity, and are very energy efficient which saves you money.²

Heat Pumps can operate in very cold temperatures (suitable for the North East US).³

Heat Pumps can also be installed to heat/cool your entire home, or small modular units can be used for just certain rooms.

NOTE:
Gas stoves release dangerous indoor pollutants, increasing asthma up to 42%.¹²

The Truth About Heat Pumps:

1. **"Heat pumps are too expensive."** Upfront costs can be higher in existing homes, but this is not always the case for new homes. Also heat pumps cost about 50% less to heat your home.²

2. **"Pennsylvania is too cold."** Modern heat pumps are far more efficient than decades ago. Many air source heat pumps can produce heat down to 5°F and some can keep working down to -7°F. Air source heat pumps are used in Canada. Ground and water source heat pumps can operate at even colder outdoor temperatures by utilizing more stable ground/water temps.^{1,3}

3. **"Heat Pumps need air ducts."** Heat pumps can use air ducts, but they don't need them. Heat pumps can also use existing water radiators, or mini-splits. Mini-splits are modular and can be an easy way to add heating/cooling to drafty rooms or home additions not well served by existing systems.⁴

4. **"A heat pump uses electricity from the grid and that's just as dirty as burning gas in my house."** There used to be some truth to this. But the US electric grid is cleaner than ever and moving in that direction fast.⁵



Physicians for Social Responsibility PENNSYLVANIA

Physicians, Nurses, and Other Health Care Professionals
Addressing the Greatest Threats to Public Health

Notes:

- <https://energysavingtrust.org.uk/blog/air-source-heat-pumps-vs-ground-source-heat-pumps>
- <https://www.wbur.org/hereandnow/2019/08/29/heat-pumps-environmentally-efficient>
- Some air source heat pump models can produce heat down to temperatures of -7°F , however all heat pumps do lose efficiency as the temperature goes below freezing. Heat pumps often utilize auxiliary heating but properly designed systems only use this additional system on the coldest days of the year. Sources:
 - <https://energysavingtrust.org.uk/renewable-energy/heat/air-source-heat-pumps>
 - <https://www.nordicghp.com/2015/12/air-source-heats-pump-cold-climates>
- All heat pumps require an indoor unit and an outdoor unit. The indoor unit can be set up to blow warm/cool air into ducts, or warm radiator lines. However, if these are not available, lines from the outdoor unit can be run to one or more indoor units called mini-splits. These mini-splits circulate the fluid warmed by the heat pump outside and blow the indoor air over them.
- Pennsylvania residents can select their electric supplier and choose 100% renewable energy.** Go to <https://www.papowerswitch.com/> to find your best renewable option.
In 2005 coal accounted for 50% of US electricity production, but by 2019 its share had fallen to just 27%. During the same period, renewable energy saw huge growth. From 2005 to 2019 **Solar energy grew from just 0.01% to 2%, and wind energy increased from 0.4% to 7%**. Natural gas has also seen growth in this period but not at nearly the same rate. Source: <https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php>
- PSR: "Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction), Sixth Edition"**
<https://www.psr.org/wp-content/uploads/2019/06/compendium-6.pdf>
- NO_2 (Nitrogen Dioxide): Decreases lung function, especially in children and the elderly. Causes development of asthma and asthma attacks. Outdoors it creates ozone and fine particle pollution. Sources:
 - <https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects>
 - <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/nitrogen-dioxide.html>
 - <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/ozone.html>
- VOCs (Volatile Organic Compounds): Can cause breathing problems, nausea, and damage to the nervous system. Some VOCs can cause cancer. At ground level they create ozone and fine particle pollution. Sources:
 - <https://toxtown.nlm.nih.gov/chemicals-and-contaminants/volatile-organic-compounds-vocs>
 - <https://www.lung.org/our-initiatives/healthy-air/indoor/indoor-air-pollutants/>
- CO (Carbon Monoxide): Causes fatigue and impaired brain function. At high concentrations it can cause headaches, dizziness, nausea, and even death. Source: https://www.epa.gov/indoor-air-quality-iaq/carbon-monoxides-impact-indoor-air-quality#Health_Effects
- $\text{PM}_{2.5}$ (Fine Particulates): These can pass through the lungs and into the bloodstream. They can cause asthma, breathing problems, heart attacks, and strokes. Sources:
 - <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>
 - <https://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/particle-pollution.html>
- CO_2 (Carbon Dioxide): Is a greenhouse gas that causes climate change and is associated with health effects. Sources:
 - <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>
 - <https://www.cdc.gov/climateandhealth/effects/default.htm>
- In many older homes, gas stoves are not vented to the outdoors so the pollution from an open gas flame remains inside. Even in homes with vents, this is often vented at street level. **A meta-analysis of 42 studies found children in homes with gas stoves had a 42% increased risk of asthma. Another study showed that without proper ventilation NO_2 levels could far exceed acceptable outdoor levels.** Sources:
 - <https://heetma.org/wp-content/uploads/2019/04/Gas-cooking-can-harm-children-4-15-19-clean-.pdf>
 - <https://www.sciencedirect.com/science/article/abs/pii/S036013231730255X>
 - http://bit.ly/meta_analysis_gas_cooking_asthma