

# Heat Pumps: Zero-Emission Heating Devices

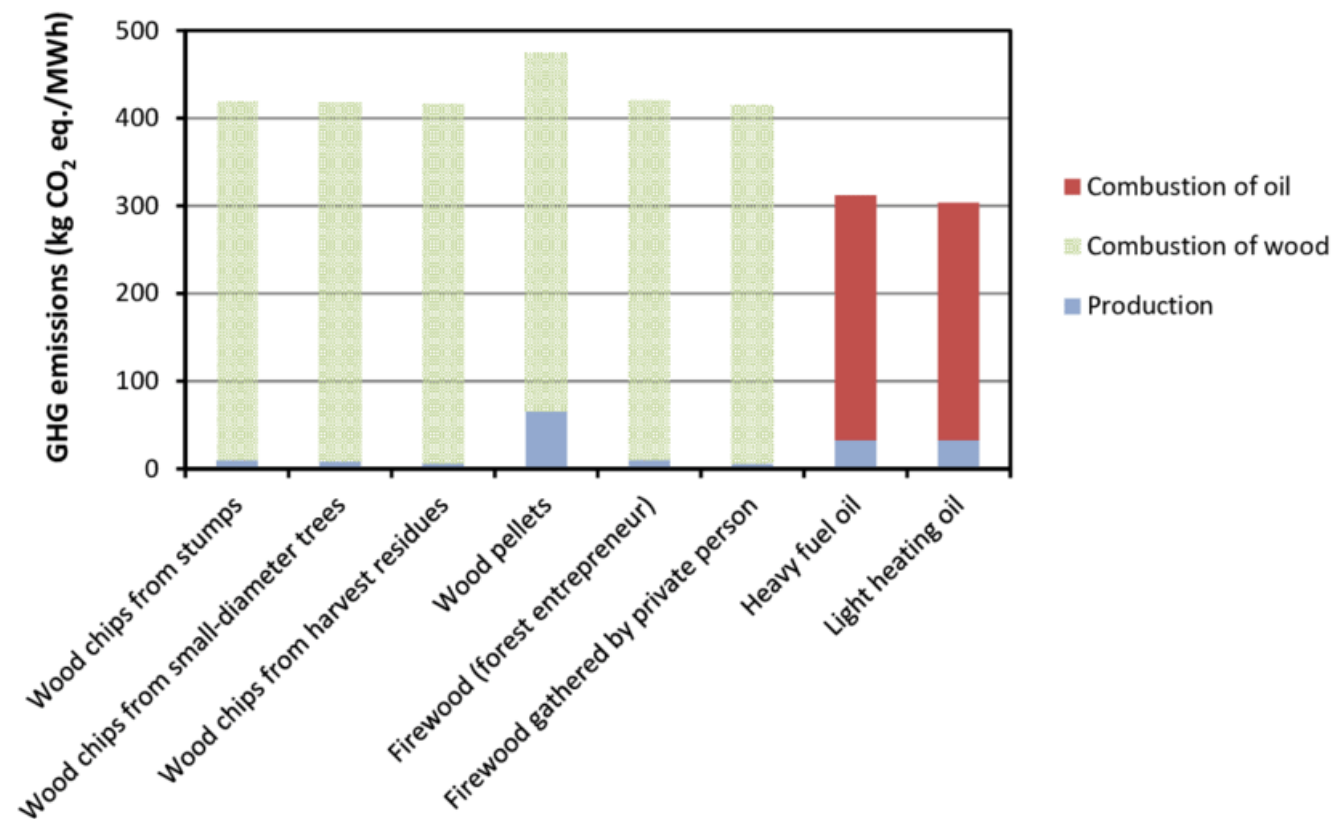
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# Climate Impacts of Wood Smoke

- Misconception: Biomass-combustion is a clean, sustainable, and natural energy
- Major emissions: **black carbon**, biogenic CO<sub>2</sub>, CO, PM
- Seasonality impacts
- [CARB Woodsmoke Reduction Program](#) has 98,208 MTCO<sub>2</sub>e GHG emission reductions
- Stove efficiency and type of wood matters



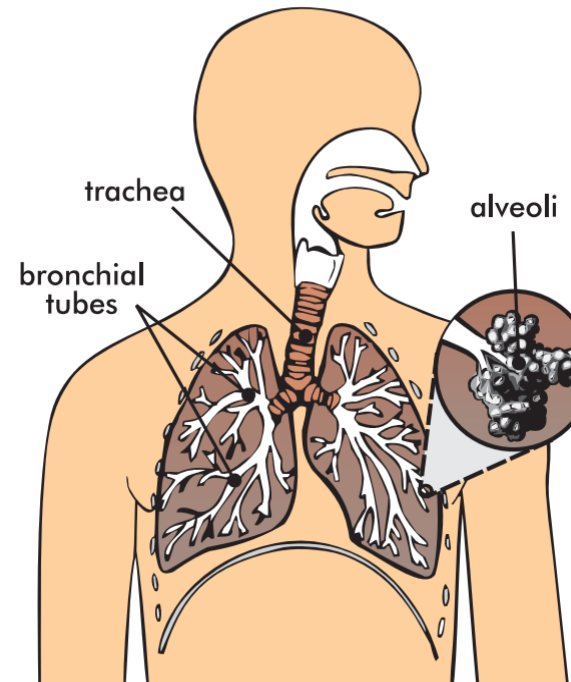
# Health Impacts of Wood Smoke

- People spend up to 90% of their time indoors; indoor air quality matters
- PM<sub>2.5</sub> is of particular concern due to penetration into the lungs and bloodstream
- EldersAIR study found PM<sub>2.5</sub> from combustion of solid fuels to be linked to respiratory disease
  - [Seven other studies](#) found similar outcomes
- Concerns over:
  - Cytotoxicity
  - Placental damage
  - Vascular membrane injury
  - Pulmonary edema
  - DNA mutagenicity
  - Asthma

Pollutant	Emission Range, lb/cord†
Particulates	3-93
SO <sub>x</sub>	0.5-1.5
NO <sub>x</sub>	0.7-2.6
Hydrocarbons	1-146
Carbon monoxide	300-1,220
Polycyclic organic materials	0.6-1.22
Formaldehyde	0.3-1.0
Acetaldehyde	0.1-0.3
Phenols	0.3-8
Acetic acid	5-48

\*Adapted from Duncan et al.<sup>2</sup>  
†The factor used to convert 1 lb per ton was 1.65 lb per cord.

Pierson WE, Koenig JQ, Bardana EJ Jr: Potential adverse health effects of wood smoke. *West J Med* 1989 Sep; 151:339-342

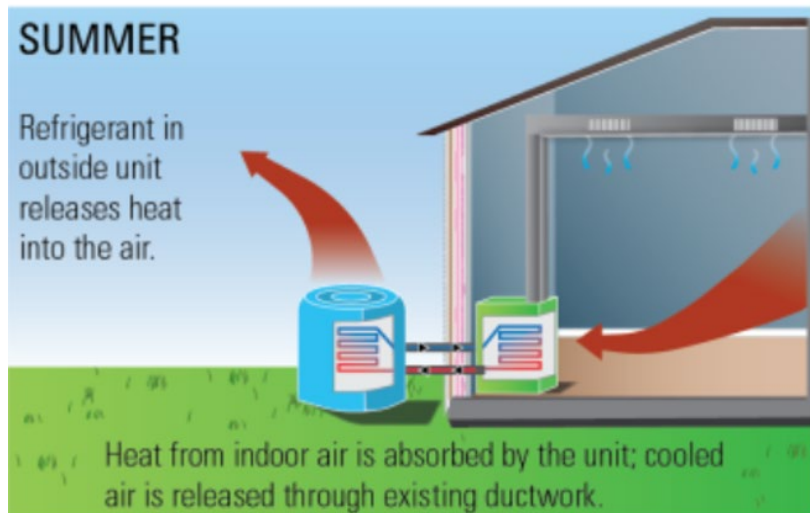
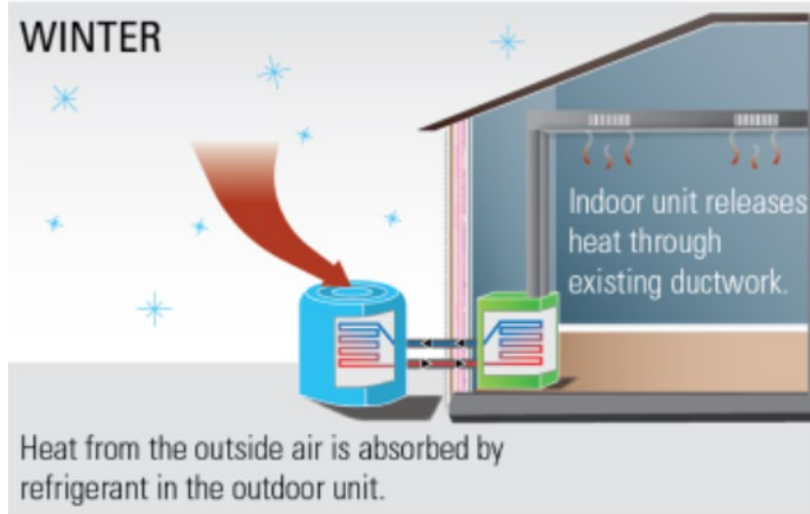


# Modern Air Source Heat Pump Technology

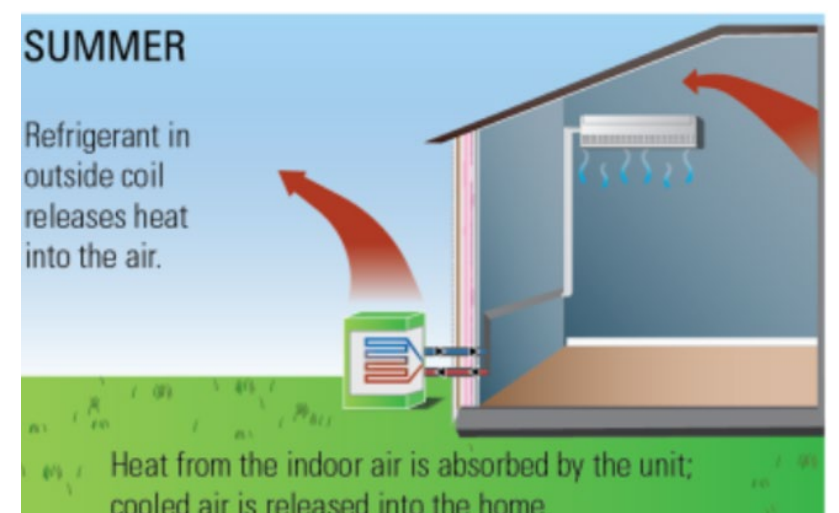
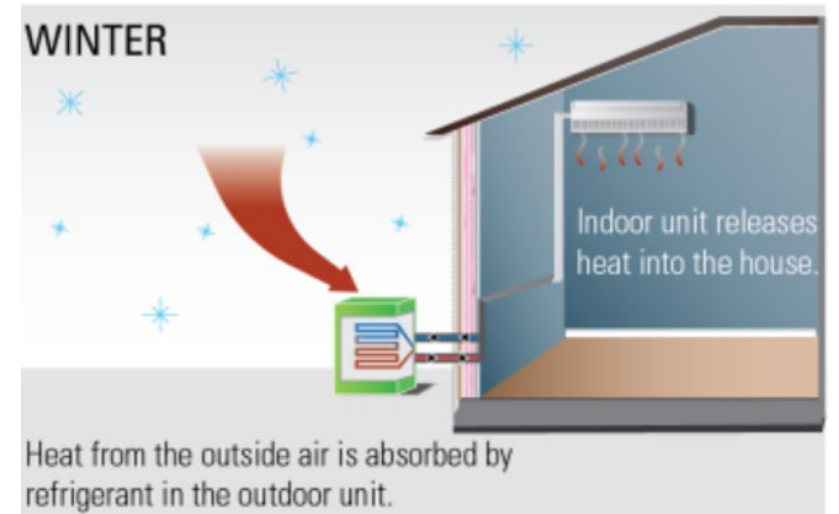
- **Variable speed compressor:** allows the heat pump to moderate their speeds, instead of a traditional heating and cooling systems that turns off/on to reach a particular temperature. Results in better energy efficiency, and longer-lasting comfortable indoor temperatures
- **Variable speed fans:** keeps air flow at a comfortable speed, can increase energy efficiency.
- **Cold-Weather Refrigerants:** Found in Cold Climate Heat Pumps. Can work in low ambient temperatures and draw more heat energy from cold air.
- **Heating season performance factor (HSPF):** ratio of the total space heating provided during a heating season to the total electrical energy consumed by the heat pump during that same heating season
- **Seasonal Energy Efficiency Ratio (SEER):** ratio of the heat removed during the cooling season to the total electrical energy used during that same cooling season

# Types of Air Source Heat Pumps (ASHPs)

## Ducted ASHP



## Ductless ASHP



# Types of Air Source Heat Pumps

- Ducted
  - Can replace existing central AC units
  - Existing ductwork may need work before it can be used
- Ductless aka "mini-splits"
  - Wall mounted
  - Ceiling mounted
  - Floor mounted
  - Can have individually controlled zones



# Benefits of Heat Pumps



Heating AND Cooling



Zero-Emissions



No wood processing



Simple operation  
and maintenance

## Testimonials from Oakridge Air's Home Heating Upgrades Program

- "We like it because it's quiet and it helps heat what the woodstove won't, and we also like that it cools."
- "Everything went great for installation and set up. It was SO nice to have the back up heat source and the Air Conditioner was amazing to have."
- "Happy that the electric bill hasn't gone up much."





# Additional Considerations

- **Home efficiency:** Insufficient insulation and air leaks can lead to energy waste
- **Proper heat pump sizing and placement:** Oversized heat pumps can lead to increased cycling, thus inefficient heating/cooling. Under-sizing can lead to insufficient heating/cooling needs. Placement affects airflow, thus comfort and consistency of temperatures.
- **Operation and maintenance:** Optimize the longevity and performance of the device
- **ENERGY STAR Air Source Heat Pumps:**
  - Ducted: <https://www.energystar.gov/productfinder/product/certified-central-heat-pumps/results>
  - Ductless (Mini-split): <https://www.energystar.gov/productfinder/product/certified-mini-split-heat-pumps/results>

# Funding Opportunities

## EPA Community Change Grants (\$2 Billion)

- Fund community-driven pollution and climate resiliency solutions.
- **Apps due November 21, 2024**, at 8:59 PM Pacific Time
- Applications will be accepted, reviewed and awarded on a rolling basis.
- Applicants must either be a partnership of two community-based nonprofit organizations (CBOs) or a partnership between a CBO and a federally recognized Tribe, local government or institution of higher education.
- Technical Assistance
  - Broad-based pre-award and post-award available for those preparing a Community Change Grant application.
  - Submit an on-line TA Request Form: <https://www.epa.gov/inflation-reduction-act/community-change-grants-technical-assistance>
  - Call to make a TA Request or ask questions: 1 (800) 540-8123
  - Email: [EJ\\_TechAssist@epa.gov](mailto:EJ_TechAssist@epa.gov)

# Funding Opportunities

## EPA Community Change Grants (Continued)

Track I applications: \$10M - \$20M each award. Must address these requirements, as further described in those in Section I.G and Section IV.B. of the NOFO:

### Climate Action

- Green Infrastructure & Nature-Based Solutions
- Mobility & Transportation Options
- Energy-Efficient, Healthy and Resilient Housing & Buildings
- Microgrid Installation
- Community Resilience Hubs
- Brownfield Redevelopment
- Waste Reduction & Management
- Workforce Development

### Pollution Reduction

- Indoor Air Quality & Community Health
- Outdoor Air Quality & Community Health
- Clean Water Infrastructure
- Hazardous Waste Management

### Plans

- Community Engagement and Collaborative Governance Plan
- Community Strength Plan

### Additional Requirements

- Readiness Approach
- Compliance Plan

Note: Projects must be place-based and include a Project Area Map, as described in Appendix A

# Funding Opportunities

## [EPA Climate Pollution Reduction Grant Program](#) - Implementation Phase Grants for Tribes and Territories - \$300 million

- Apps due **May 1, 2024**, at 8:59 PM Pacific Time
- Focused on GHG emissions reductions
- Applications for grants under this NOFO must seek funding to implement measures that are included in a PCAP developed with funding from a CPRG planning grant. Implementation grant applications can be submitted not just by the lead organization that received CPRG planning grant funds (“lead organization”), but also by tribes, territorial municipalities, and tribal and territorial agencies that did not directly receive planning grant funds but that seek funding to implement one or more measures included in an applicable PCAP.
- Example measures: Electrification of residential buildings, implement energy-efficiency measures, incentive programs for the purchase of energy-efficient appliances

# Funding Opportunities

## EPA [Thriving Communities Grantmakers Subgrants](#)

- Grantmakers are expected to begin opening competitions and awarding subgrants by summer 2024.
- Grantmakers are to alleviate much of the burden that the federal grants process places on the subrecipients.
- Tribal governments (both federally recognized and state-recognized) and intertribal consortia, and Native American Organizations will be eligible to apply for subgrants distributed by the [Grantmakers](#)
- 3 Tiers of Subgrants
  - Tier One will consist of grants for \$150,000 for assessment
  - Tier Two will consist of grants for \$250,000 for planning
  - Tier Three will consist of grants for \$350,000 for project development/implementation. More details about the phases can be found on pages 10-12 [here](#)

# Funding Opportunities

## US DOE [Home Energy Rebates](#)

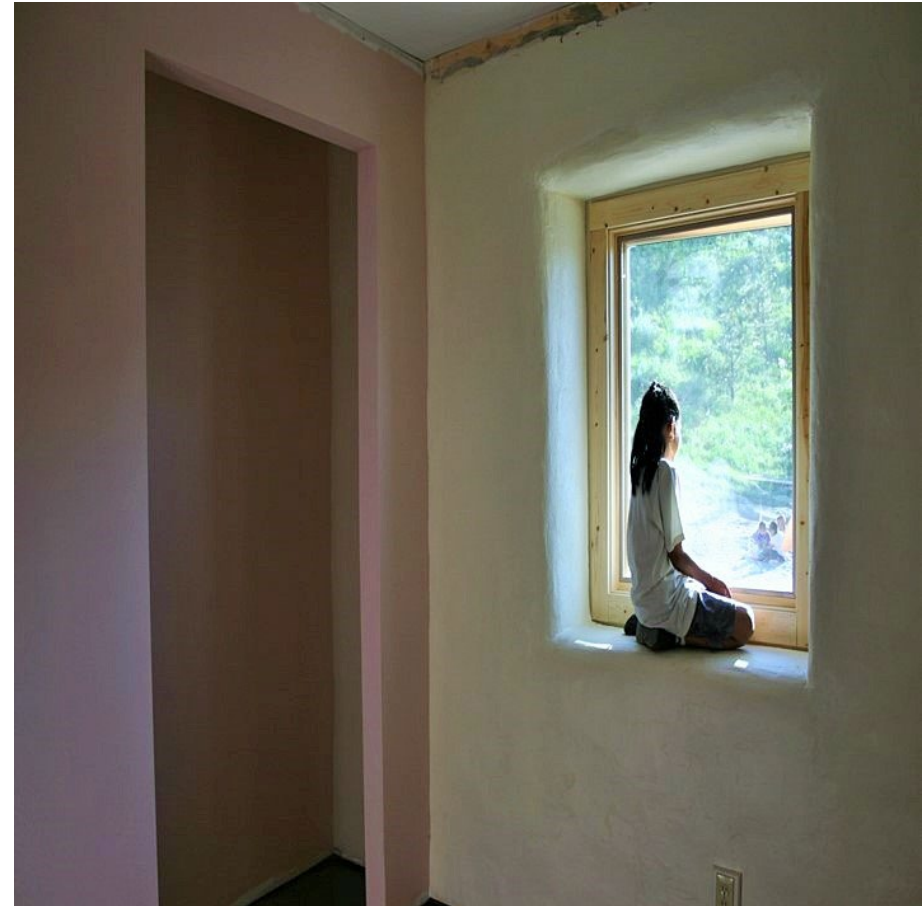
- Focused on low-income consumers, communities will be able to electrify home appliances and perform energy efficient retrofits.
- **The Home Efficiency Rebates (HOMES) program** will provide performance-based rebates for whole-house energy saving retrofits. The amount of the rebate varies by the amount of energy savings.
- **High-Efficiency Electric Home Rebate (HEEHRA) program** will provide point-of-sale rebates for qualified electrification projects in low-income and historically underserved households. e.g., EnergyStar heat pumps, insulation and wiring
- Rebate allocations to states: <https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate>
- State rebate program websites
  - CA: <https://www.energy.ca.gov/programs-and-topics/programs/inflation-reduction-act-residential-energy-rebate-programs-california>
  - AZ: <https://resilient.az.gov/resiliency-programs/energy-programs/energy-affordability/efficiency-rebates>
  - NV: [https://energy.nv.gov/Resources/Federal\\_Funding\\_Opportunities/IRA-Rebates/](https://energy.nv.gov/Resources/Federal_Funding_Opportunities/IRA-Rebates/)
  - HI: <https://hawaiienergy.com/education/federal-funding/>

# Funding Opportunities

- DOE [Energy Efficiency and Conservation Block Grant \(EECBG\)](#) Formula Grants
  - Tribal Allocations: [Check here](#)
  - Submit application for grant or voucher by **April 30, 2024**
- [DOE Tribal Home Electrification and Appliance Rebates \(HEAR\) Program](#)
  - Tribal Allocations: [Check here](#)
  - [Applications](#) must be submitted by, and are reviewed on a rolling basis until, **May 31, 2025**
  - Eligible for rebate:
    - Electric heat pumps for space heating and cooling
    - home electric circuit panel
    - Insulation, Air Sealing, and Ventilation
    - Electric Wiring



- Founded in 1994
- Mission: Red Feather partners with indigenous communities to develop and implement lasting and impactful housing solutions.
- Program Areas
  - Education
  - Case Management
  - Home Repairs





# Legacy Of Coal



# Heating Risks



# Heating Demonstration Sites



# Mini Split Heat Pumps



- Energy Efficient
- Cost Effective
- Low Maintenance
- Improves Indoor Air Quality

# Community Input: Heat Pumps



# On-Line Educational Resources



Carbon Monoxide and Smoke Alarms  
62 views • 2 years ago



Loretta Talas movie  
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Wood Stove Inspections  
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Wood Stove Connector Pipe  
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# DIY Healthy Heating



# Trades Scholarships



- Licensing and Bonding
- College, Trade school, and Certificate Course
- Tools and Equipment



# PROFESSIONAL WEATHERIZATION



- \* Substantially weatherized over 150 Hopi & Navajo homes in last 4 years
- \* Provide full-time employment to tribal professionals



# New Heating Stoves



# Thank you for attending!

Questions?

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