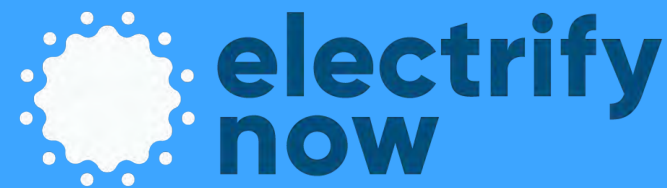


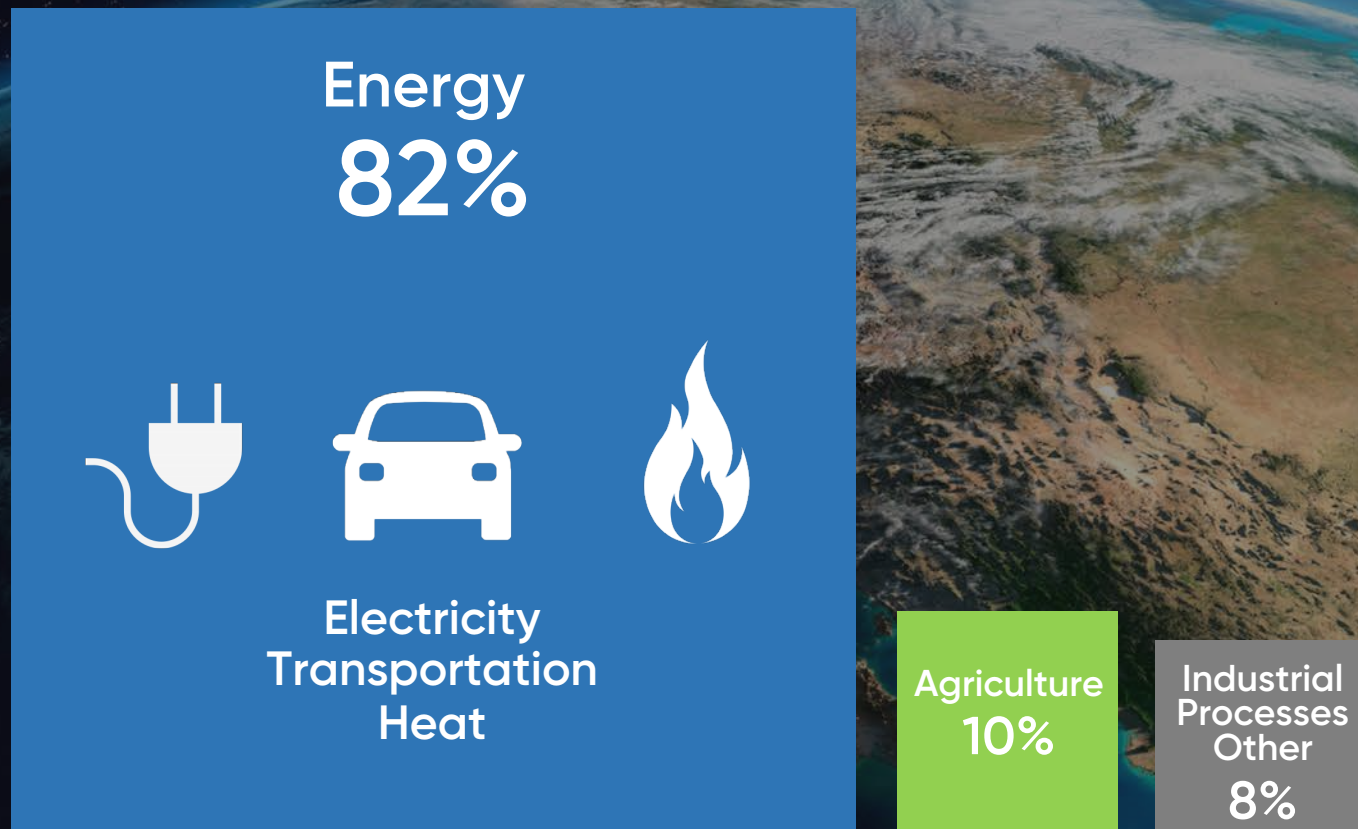


The Benefits of Electrification

Brian Stewart



Global carbon emissions



U.S. SOURCES OF GREENHOUSE GAS EMISSIONS
US EPA Greenhouse Gas Inventory 2019

Household carbon emissions

Energy
60%



Electricity
Transportation
Heat

Stuff we buy
26%

Food
14%



Electricity

Coal & Natural Gas



Transportation

Gasoline / Diesel



Heat

Natural Gas, Propane

Bad News

We have to stop burning fossil fuels

Good News

Wind and solar are now the lowest cost sources of new energy

Solar \$355

Wind \$135

Gas Peaker \$124 - 159
Nuclear \$118-192

Coal \$66-152

Gas CC \$41-62

Solar \$30-41
Wind \$26-50

2009 \$/MWh

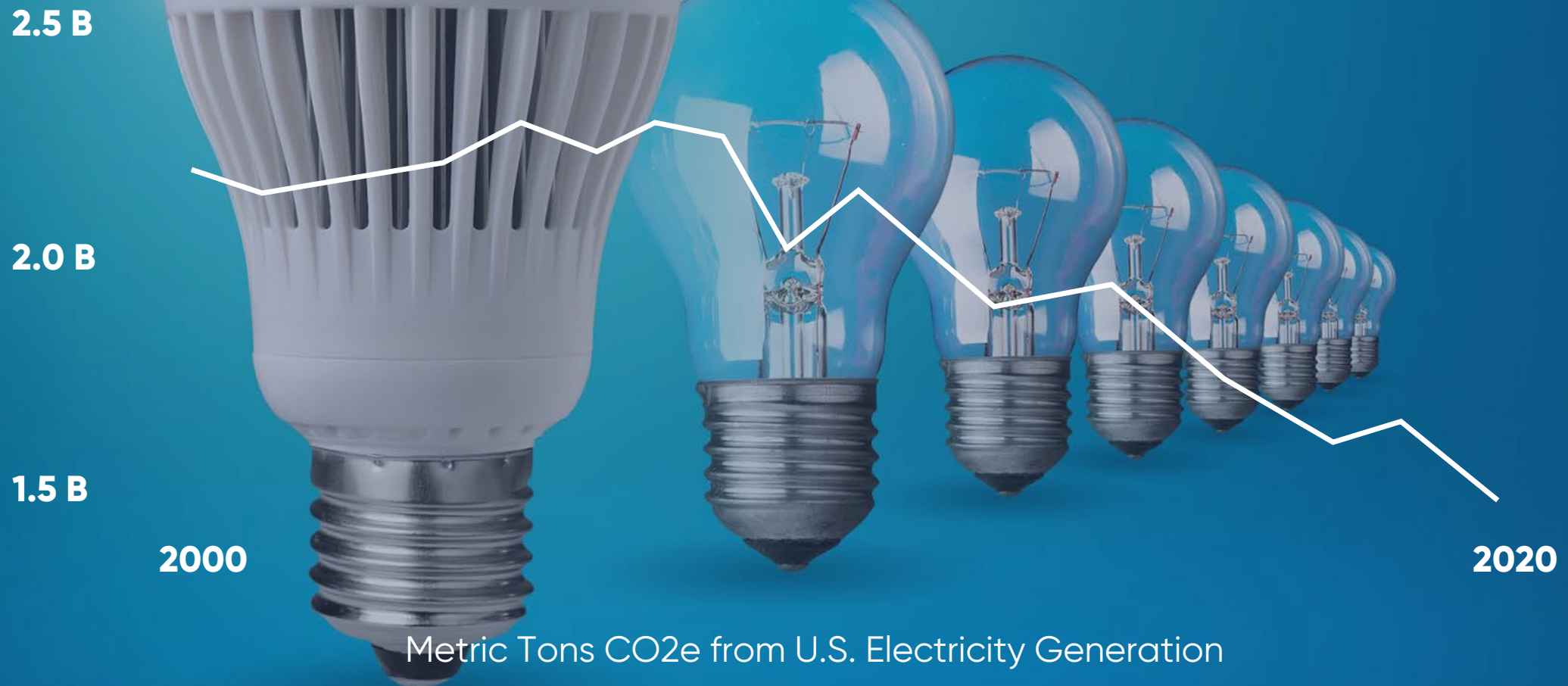
2021 \$/MWh

Levelized Cost of Energy – Unsubsidized Analysis from Lazard – Dec 2021



Electric Appliances have become dramatically more efficient – 3 to 10X

Electricity gets cleaner every year



Electrify Everything

A sustainable future where the wind and sun powers **ALL** our primary energy needs





cleaner **Air**
cleaner **Water**
stronger **Economy**

The stark reality:

Every single thing that burns fossil fuels must be replaced with a clean energy alternative before 2050

Thousands
of coal and gas
power plants



Millions
of cars
and trucks



Millions
of gas furnaces
and water heaters



We have potent solutions:
Ready to scale, cost effective, eliminate carbon



Wind
Solar



Electric
Vehicles



Electric
Heat Pumps

Renewable Energy




Electrification





Electricity
3-5 Tons/yr



Gas Car
4-8 Tons/yr



Efficiency
Strategies
-20%



Gas Furnace
4-8 Tons/yr



Gas WH
1-3 Tons/yr



Electricity
3-5 Tons/yr

100% Renewable
0 Tons/yr

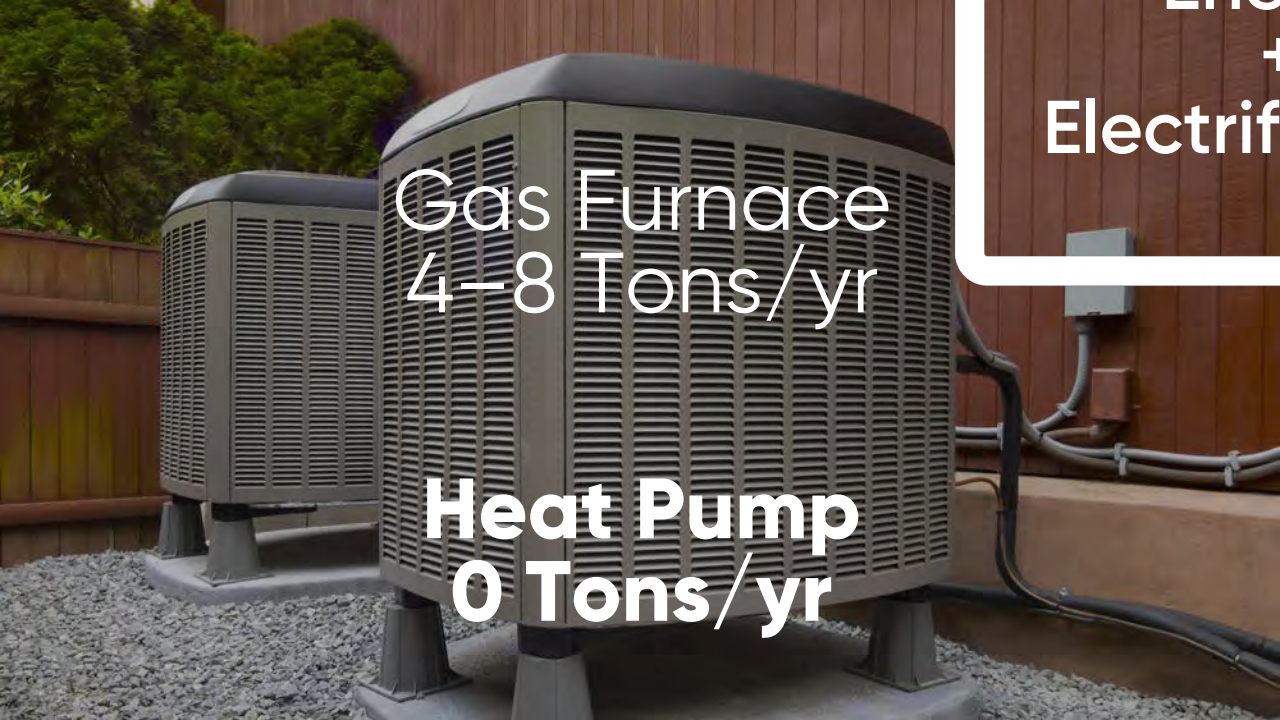


Gas Car
4-8 Tons/yr

EV
0 Tons/yr



Renewable
Energy
+
Electrification



Gas Furnace
4-8 Tons/yr

Heat Pump
0 Tons/yr



Gas WH
1-3 Tons/yr

Heat Pump
0 Tons/yr



Typical
Home

20-30 Tons CO₂/yr

\$4,000/yr



Renewable Energy
+ Electrification

0 Tons CO₂/yr

\$3,000/yr

A close-up photograph of a person's hands counting a large stack of US dollar bills. The hands are positioned at the top and right sides of the frame, with fingers running through the stack. The bills are fanned out, showing various denominations including \$100, \$20, and \$10 bills. The background is dark, making the light-colored currency stand out. The overall image has a slightly desaturated, high-contrast aesthetic.

Renewable Energy + Electrification

Live in a home that is safer and more comfortable

Spend your energy dollars on the solution rather than the problem.

electrify!



1. Clean up your electric supply



2. Electrify your home



3. Electrify your ride



4. Electrify Everyone



**electrify
now**

1. Clean up your electric supply



25% of US Carbon Emissions come from generating electricity

Oregon electricity comes from coal, gas, wind, solar and hydro

**Pacific
Power**
5-7
Tons/year

**Portland
General Electric**
3-5
Tons/year

**Consumer
Power**
0.4-0.7
Tons/year

**Ashland
Electric**
0.2-0.4
Tons/year

Oregon is headed to 100% Clean Energy by 2040

We can all get 100% clean energy right now



Power your life with zero emissions energy
Help finance new clean energy generation



**Green Power
plans**

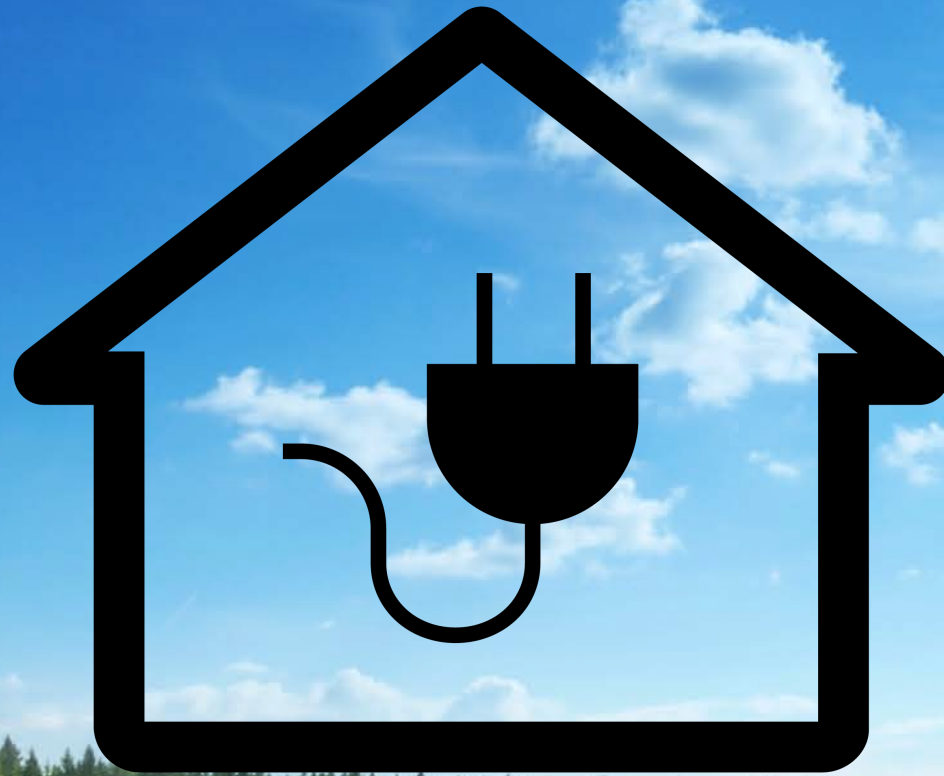


**Rooftop
Solar**



**Community
Solar**

2. Electrify your home



A photograph of an industrial facility, likely a refinery or chemical plant, featuring large pipes and structures. A prominent vertical pipe on the left side is emitting a large, bright orange and yellow flame that extends horizontally to the right. The background is a clear, bright blue sky. The overall scene suggests industrial combustion or a controlled burn.

Methane Gas – Not the clean fuel advertised

Burning natural gas for heat produces over 25% of US emissions.

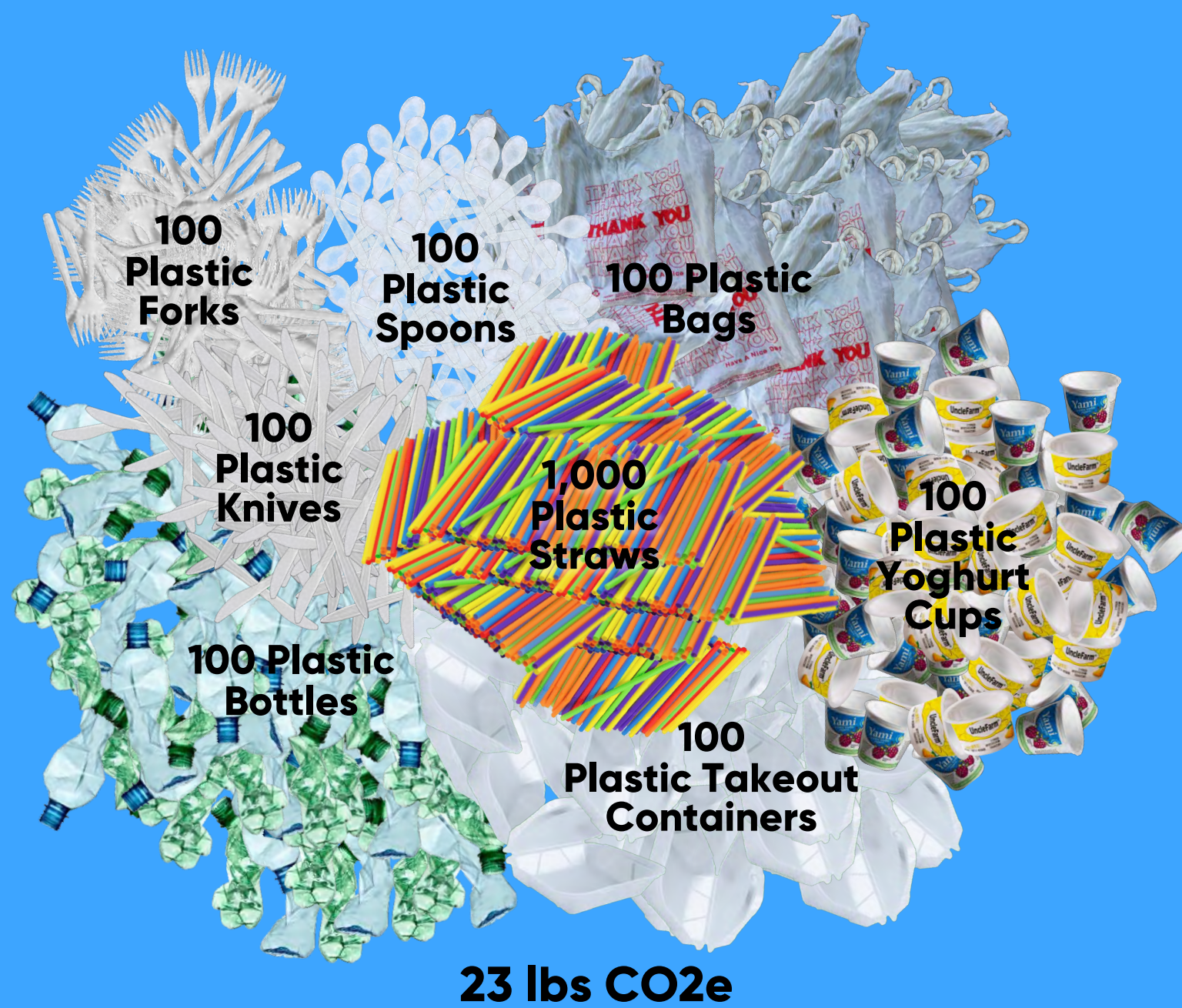
Major source of indoor and outdoor air pollution



**Gas Furnace:
4-8 TONS CO₂e/yr**



**Gas Water Heater:
1-3 TONS CO₂e/yr**



**100
Plastic
Forks**

**100
Plastic
Spoons**

**100 Plastic
Bags**

**100
Plastic
Knives**

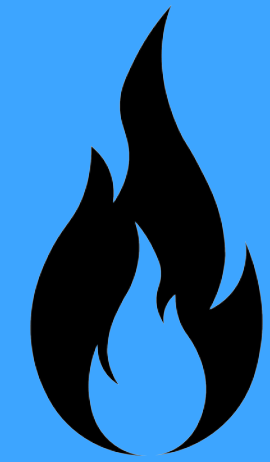
**1,000
Plastic
Straws**

**100
Plastic
Yoghurt
Cups**

**100 Plastic
Bottles**

**100
Plastic Takeout
Containers**

23 lbs CO2e



**1 Day of
Heating with
Natural Gas
44 lbs CO2e**



**1
Gallon of Gas
25 lbs CO2e**

From: product weights from manufacturers, plastics carbon intensity from US EPA, fuel carbon intensity from Oregon DEQ – extraction, distribution and combustion, Average Oregon Residential Gas Consumption from EIA

Filling up.....





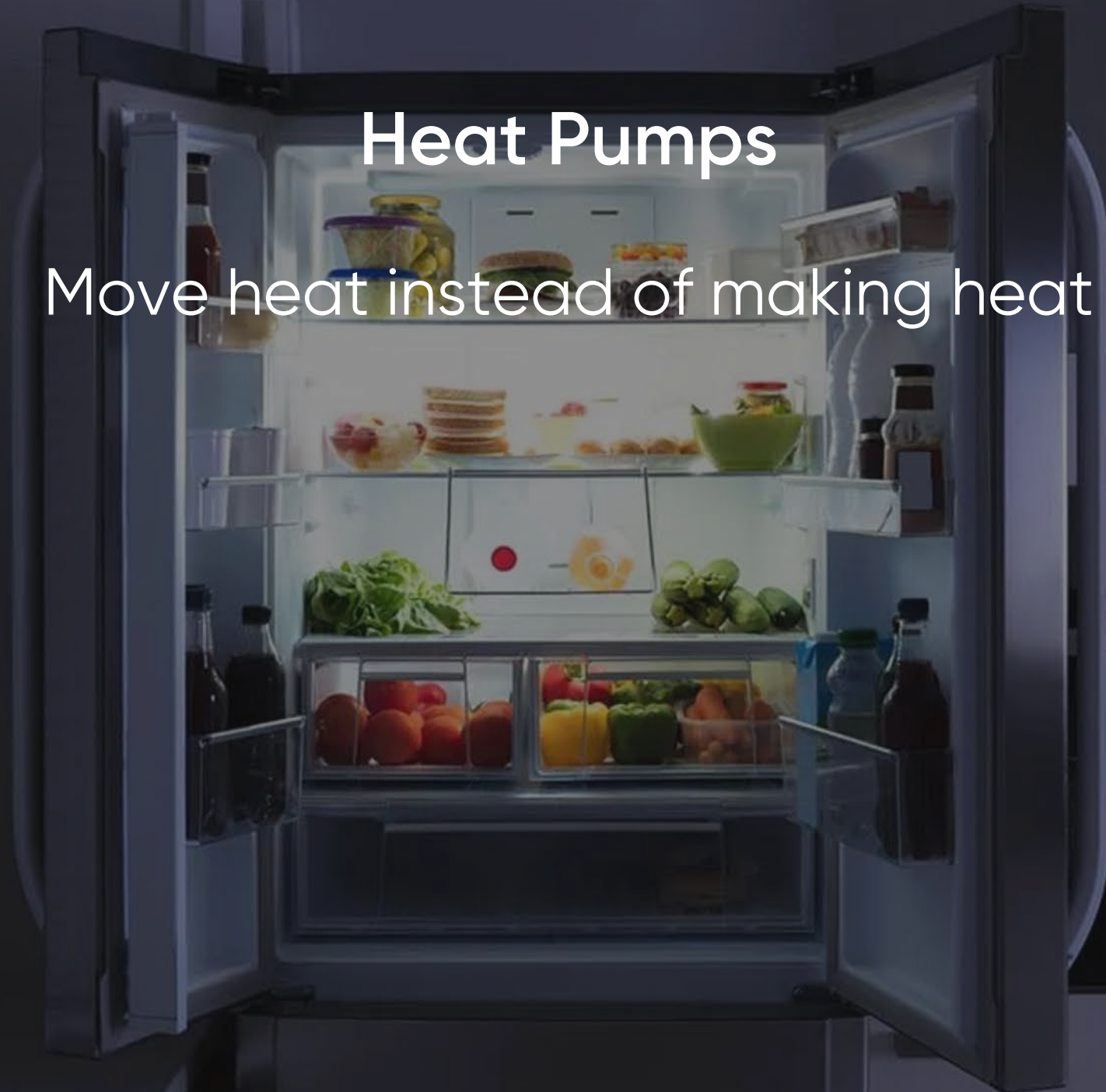
**Zero Emissions
Space Heating**



**Zero Emissions
Water Heating**

Heat Pumps

Move heat instead of making heat



Heat Pumps

Makes ice even when
your kitchen is hot





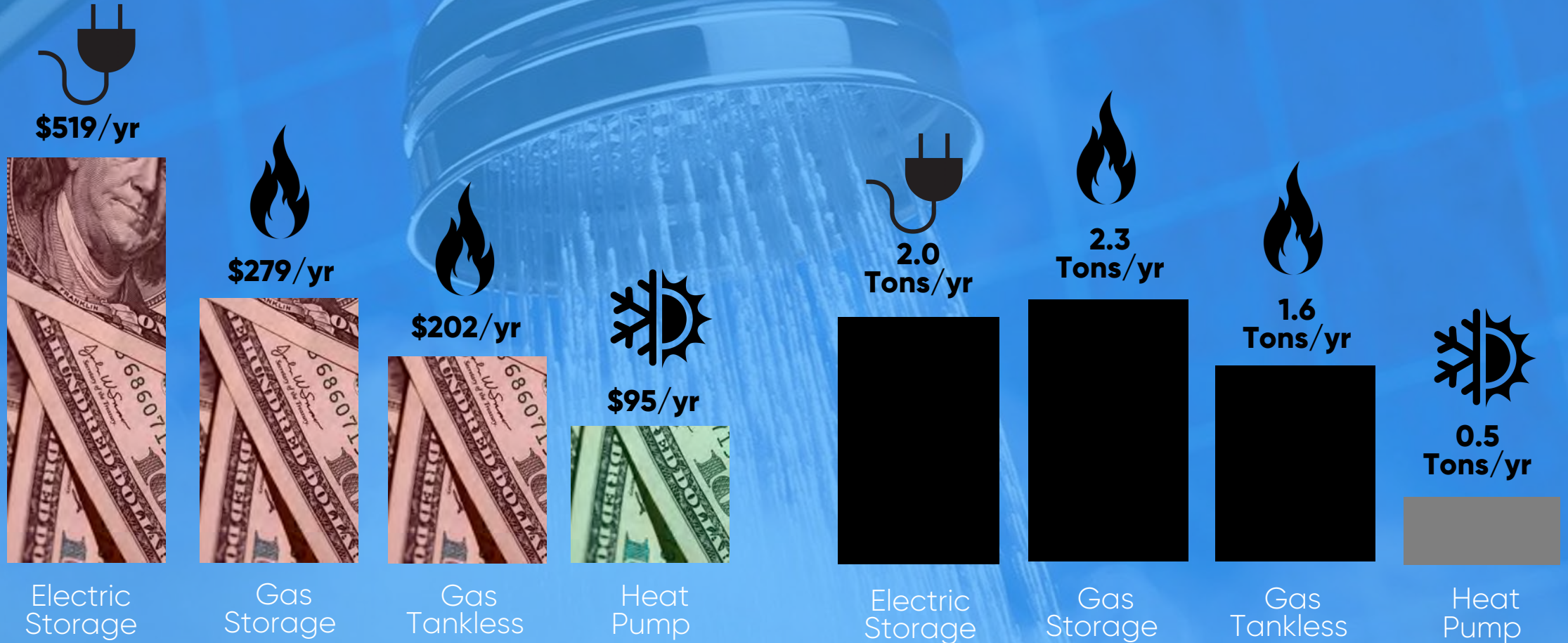
Heat Pump Water Heater

Lowest cost, lowest carbon hot water

- Ambient air is pulled into unit and heat is absorbed by the the refrigerant
- Compressor increases the temperature of the refrigerant
- Hot refrigerant is pumped through the condenser coil to heat the water
- 3X more energy efficient than other systems
- Best in basement or garage

More Showers for the Money

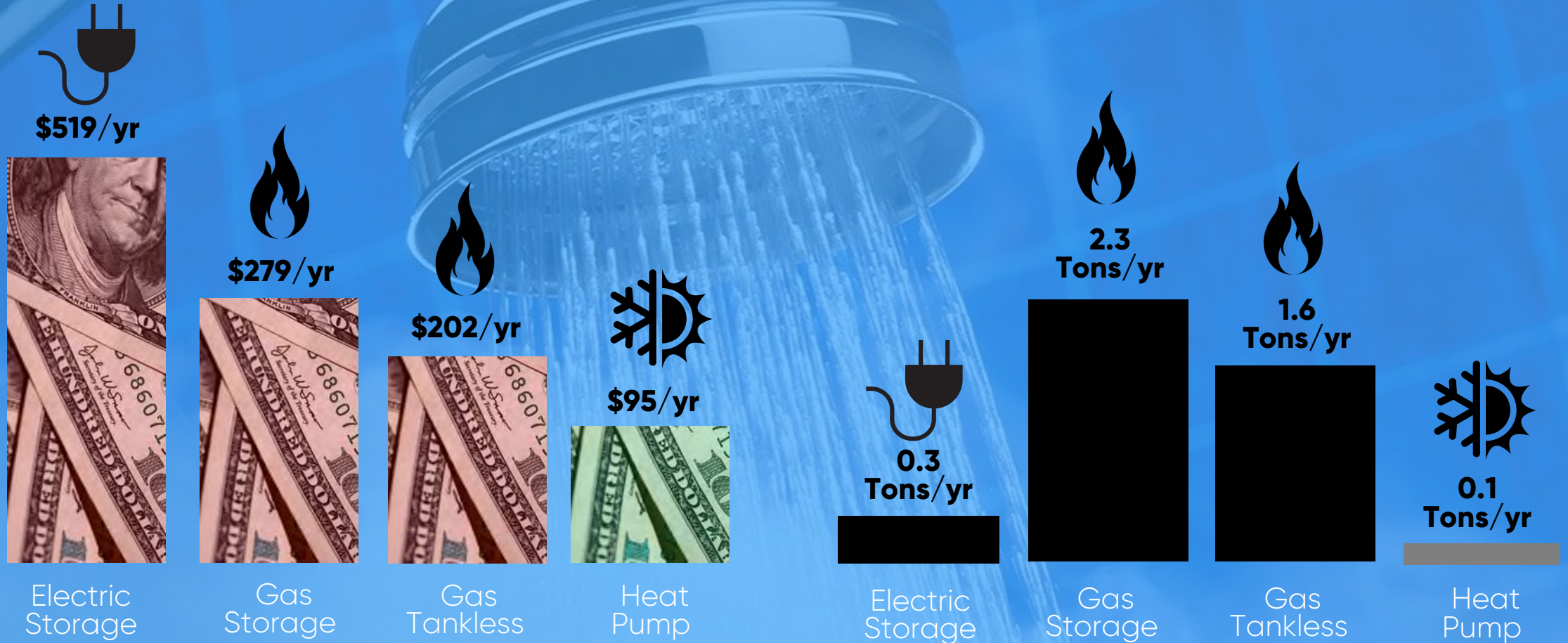
Pacific Power



From Energy Guide Labels for energy consumption, 2022 Oregon energy prices and carbon intensity from DEQ Fuel Pathways

More Showers for the Money

Consumer Power



From Energy Guide Labels for energy consumption, 2022 Oregon energy prices and carbon intensity from DEQ Fuel Pathways

More Showers for the Money

Renewable Electricity



\$519/yr



Electric Storage



\$279/yr



Gas Storage



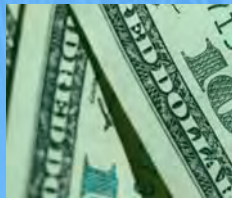
\$202/yr



Gas Tankless



\$95/yr



Heat Pump



0 Tons/yr

Electric Storage



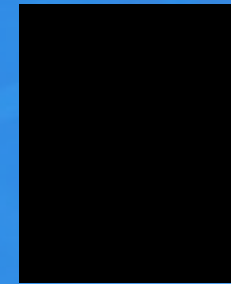
2.3 Tons/yr



Gas Storage



1.6 Tons/yr



Gas Tankless



0 Tons/yr

Heat Pump

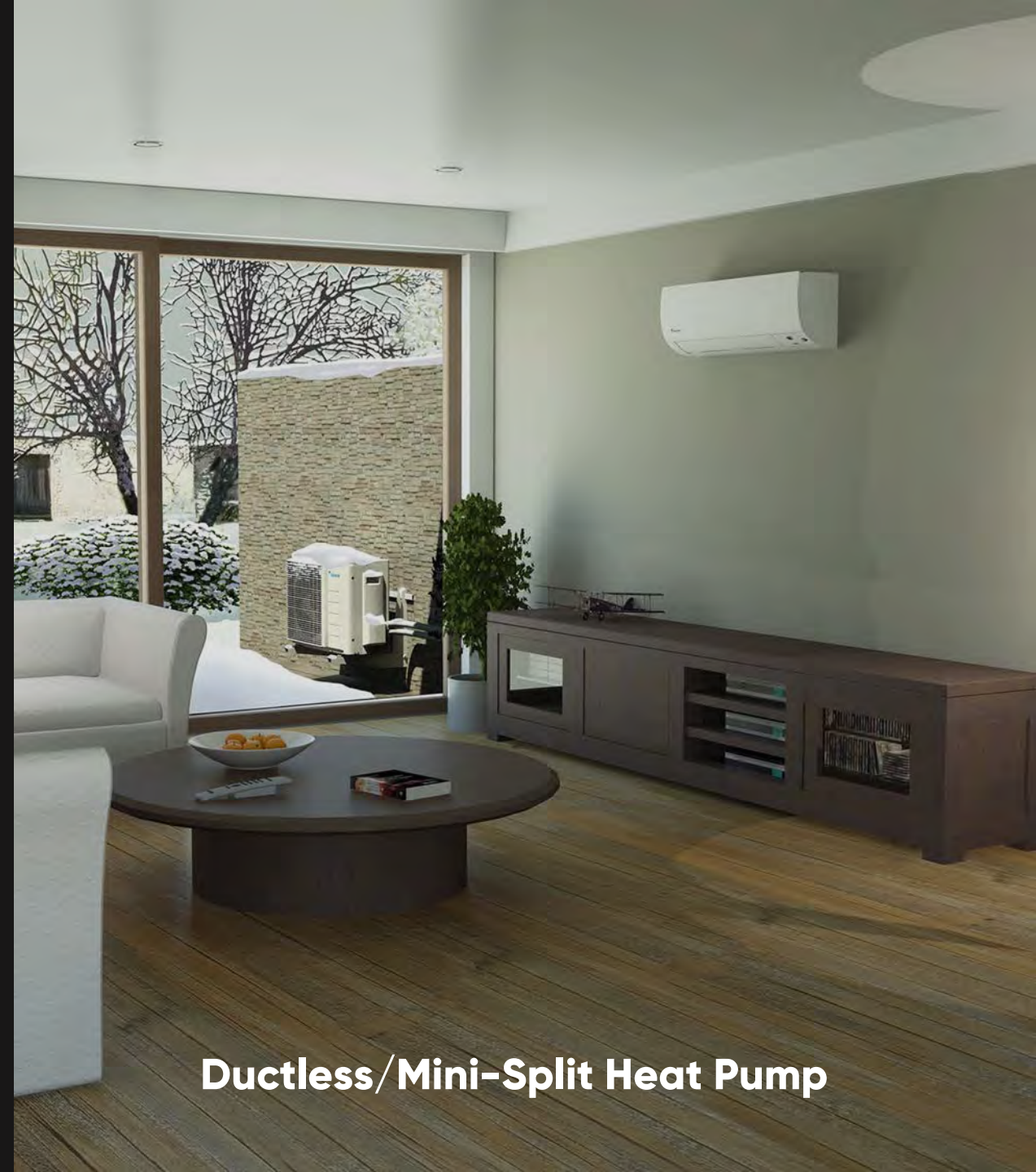
Heat Pump Space Heating/AC

More comfort and cleaner air





Ducted/Central Heat Pump



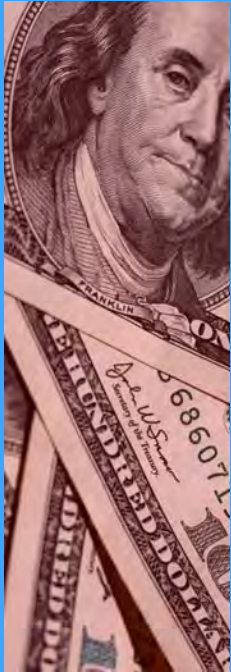
Ductless/Mini-Split Heat Pump

More warmth for the money

Heat pumps can lower utility bills



\$55



Oil
Furnace
**\$1,700 -
\$2,800/yr**



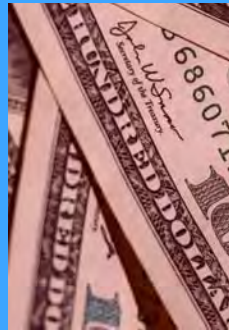
\$32



Electric
Baseboard
**\$965 -
\$1,600/yr**



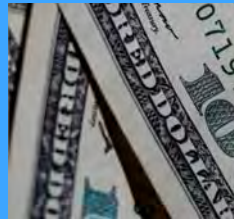
\$22



Older Gas
Furnace
**\$650 -
\$1,100/yr**



\$14



Best Gas
Furnace
**\$420 -
\$700/yr**



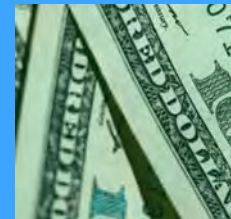
\$14



Best Gas
Furnace+HP
**\$415 -
\$690/yr**



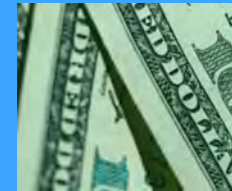
\$14



Variable
Speed HP
**\$410 -
\$690/yr**



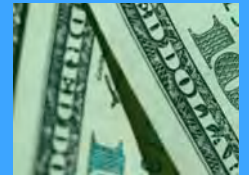
\$11



Cold
Climate HP
**\$335 -
\$555 /yr**



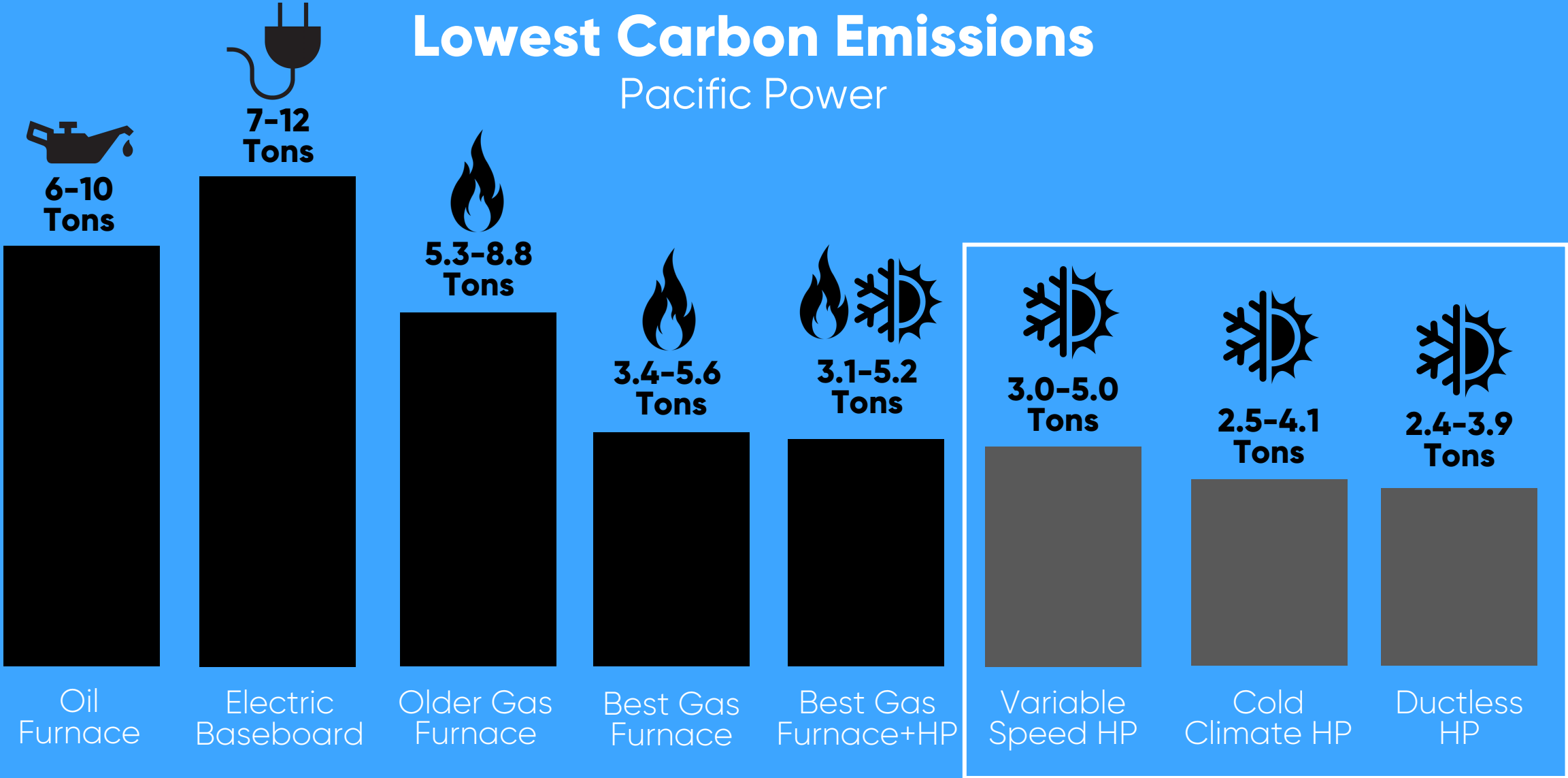
\$11



Ductless
HP
**\$320 -
\$535/yr**

Lowest Carbon Emissions

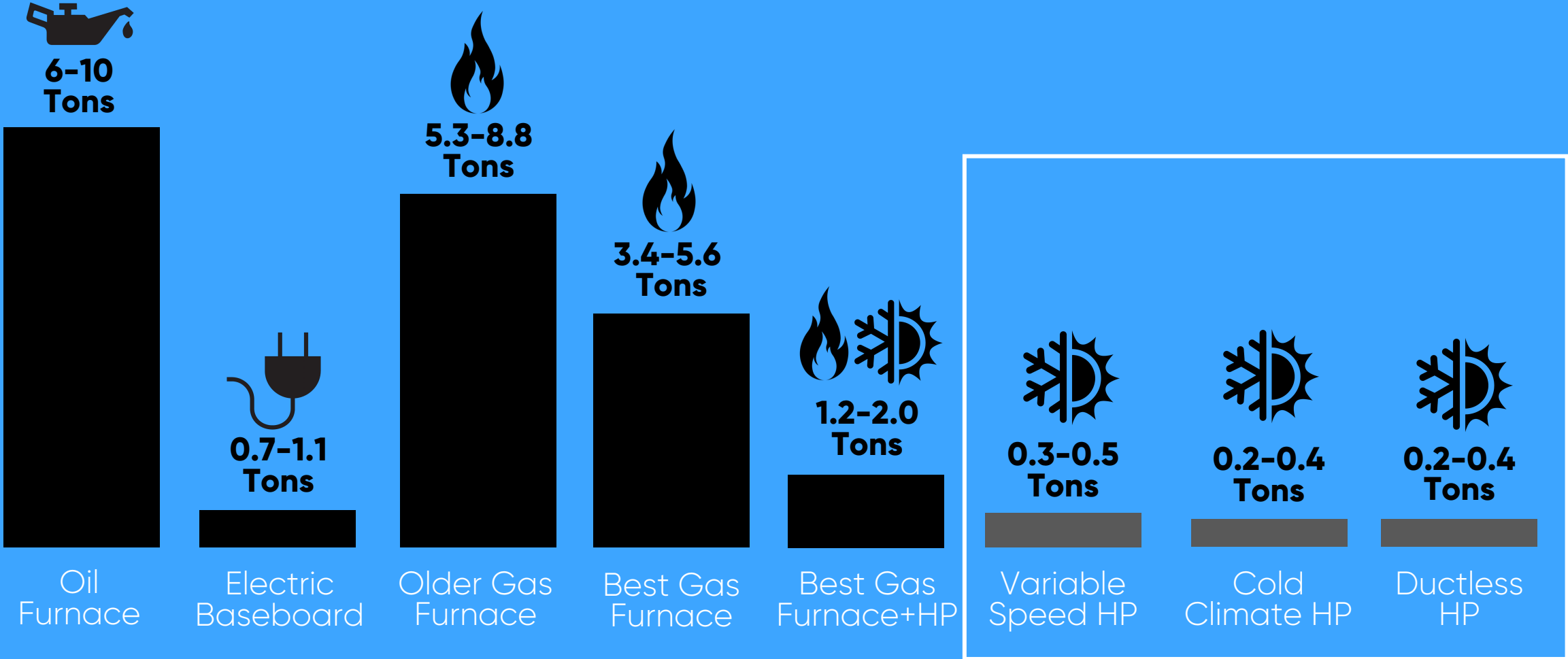
Pacific Power



Typical Oregon heating load of 30 – 50MMBTU, DEQ Fuel Pathways values for carbon intensity of fuels for Oregon utilities statewide average

Lowest Carbon Emissions

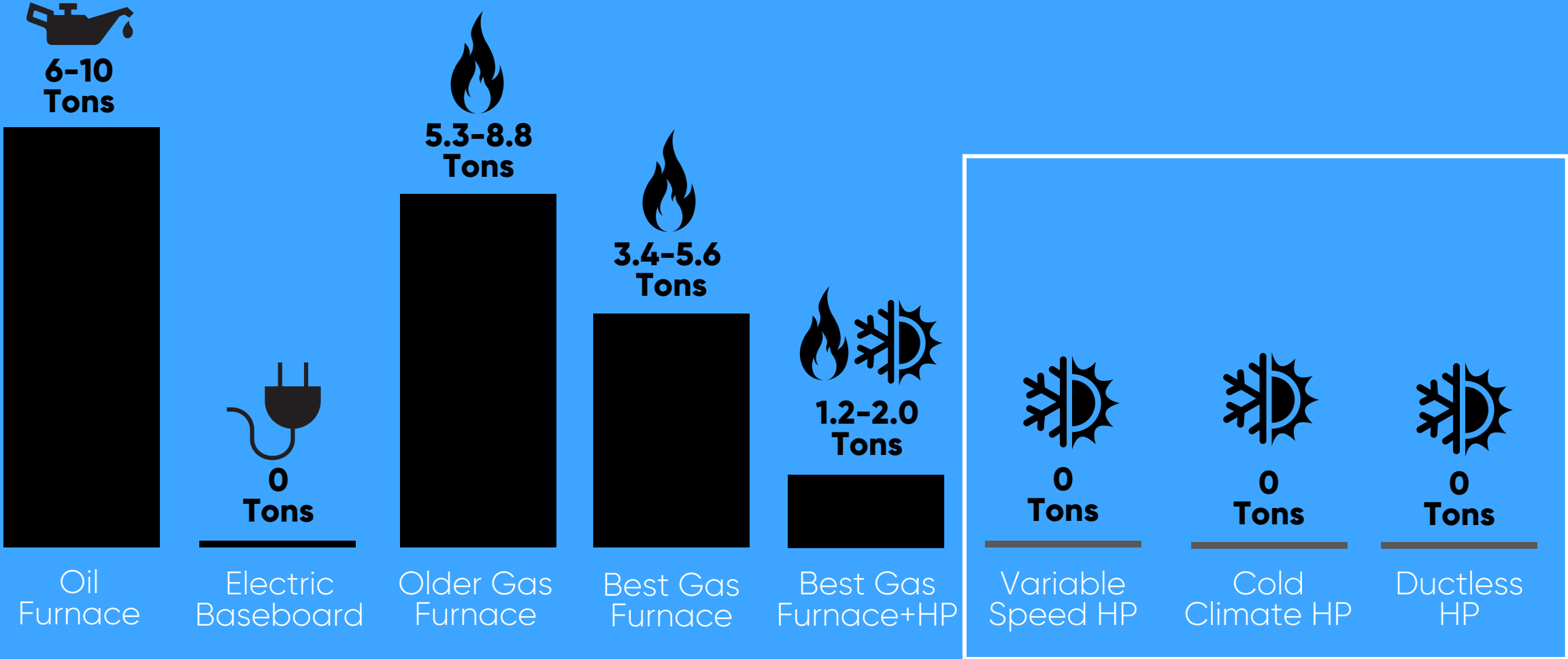
Consumer Power



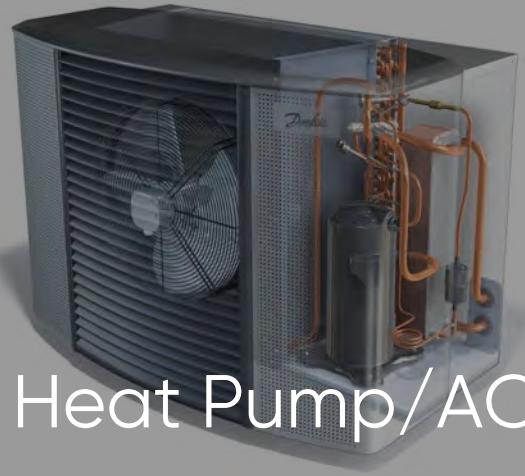
Typical Oregon heating load of 30 – 50MMBTU, DEQ Fuel Pathways values for carbon intensity of fuels for Oregon utilities statewide average

Lowest Carbon Emissions

Renewable Electricity



Typical Oregon heating load of 30 – 50MMBTU, DEQ Fuel Pathways values for carbon intensity of fuels for Oregon utilities statewide average



Heat Pump/AC

Electric Heat Pumps - no compromise comfort
ZERO EMISSIONS

Avoid 5-11 Tons CO₂/year



Heat Pump
Water Heater



Superior Indoor Air Quality



Methane Gas

- CO and NO2 emissions are linked to higher risk of asthma, especially in children
- Peak indoor air pollution can reach levels that would be illegal outdoors
- Leak Methane even when not in use

Induction

- Better control and faster heating
- Much easier to clean
- Safer – cool to the touch
- ZERO CO and NO2 emissions
- Less than 1/10th the carbon emissions

from: Health Effects from Gas Stove Pollution, RMI, Physicians for Social Responsibility, Sierra Club, Mothers Out Front, May 2020
DEQ Fuel Pathways values for carbon intensity of fuels in Ashland



Ditch the Gas

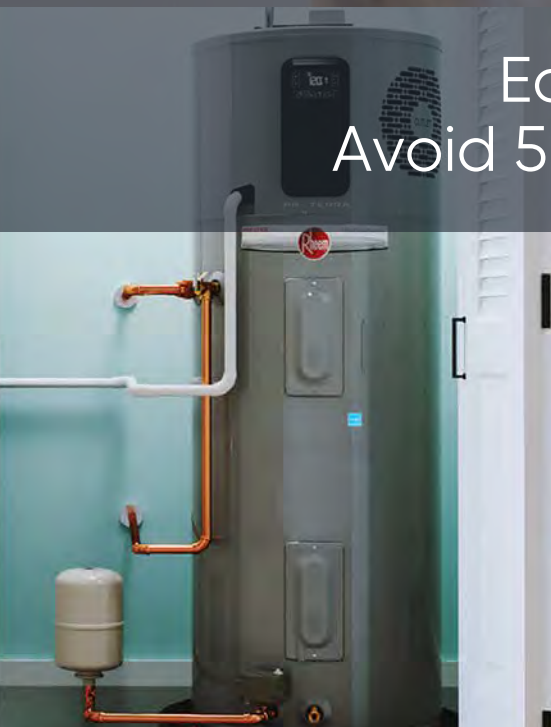
Better performance and comfort

Superior air quality

Lower operating expenses

Easier cleaning and maintenance

Avoid 5–11 Tons of carbon emissions per year



3. Electrify your ride

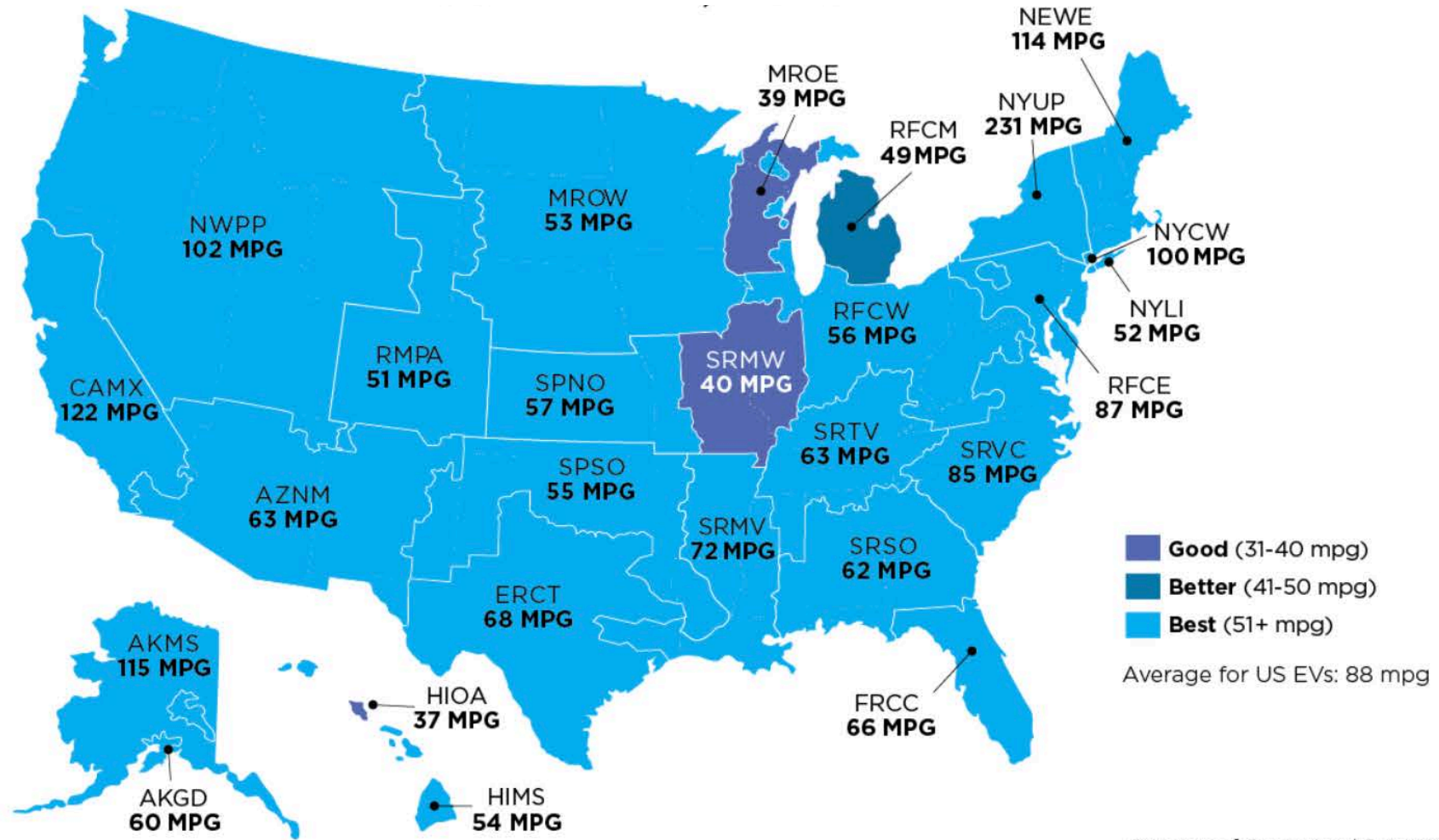




Nearly 30% of US carbon emissions come from transportation – mostly from cars

4 – 8 TONS of carbon emissions per year/car

US Average EV equivalent MPG – 88 MPG



© Union of Concerned Scientists

EV's are more energy efficient – more miles for the money

Hyundai Kona



55
miles


Hyundai Kona EV



338
miles

from manufacturers mileage estimates, gas at \$4.64/gal, and electricity at \$0.11/kWh,

EV's are cheaper than you think!

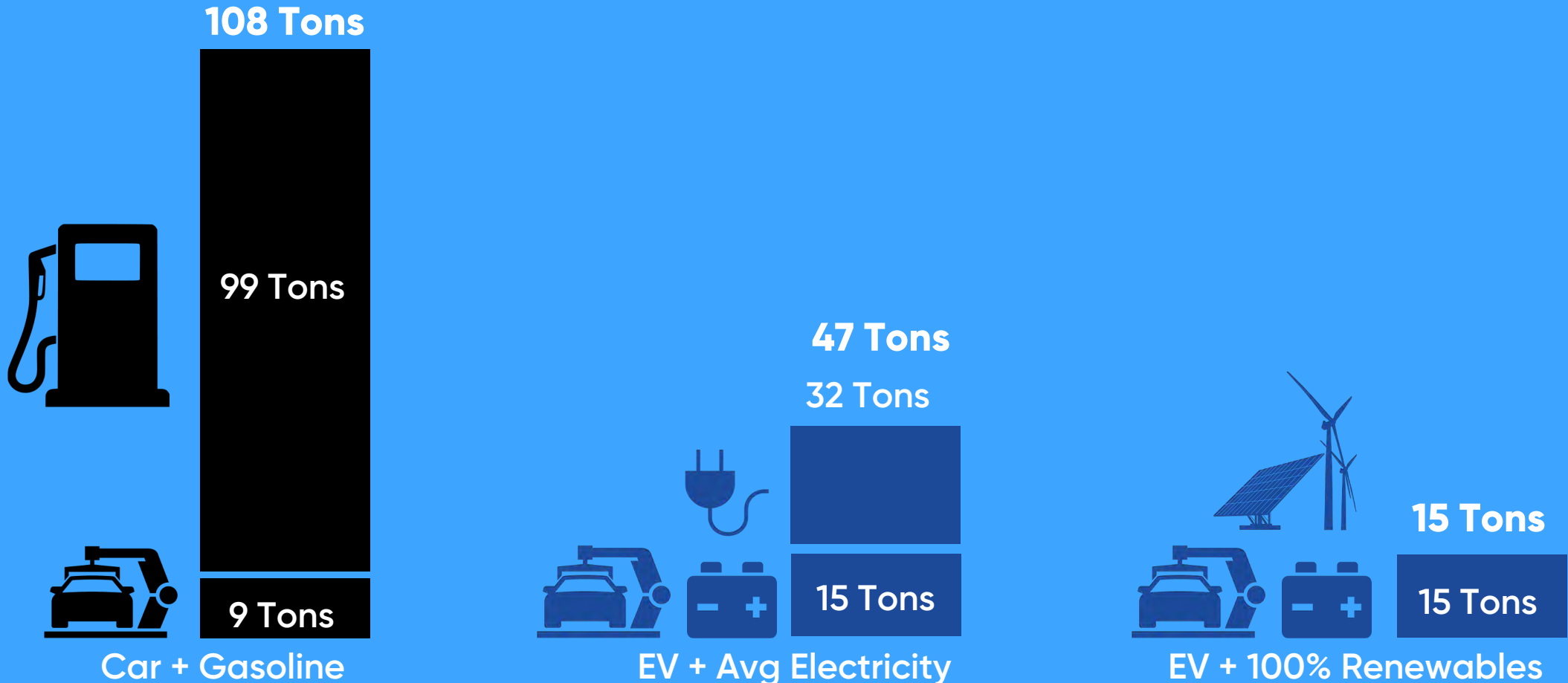


	Kona	Kona EV
List Price	\$24,745	\$35,245
Fed Tax Credit		-\$7,500
State Tax Credit		-\$2,500
	<hr/>	<hr/>
	\$24,745	\$25,245
5 yr fuel cost	\$9,280	\$1,544
5 yr maintenance	\$2,000	\$880
Total 5 yr Cost	<hr/> \$36,025	<hr/> \$27,669

from manufacturers website, mileage estimates, gas at \$3.70/gal, and electricity at \$0.154/kWh, and Consumer Reports 5 year maintenance cost estimates

What about the manufacturing the batteries?

A full sized EV will produce far fewer lifecycle emissions than a gas car



from Union of Concerned Scientists for full sized cars, BEV with range of 265 miles, 15 year operating life, Oregon Avg Electricity



Electricity
3-5 Tons

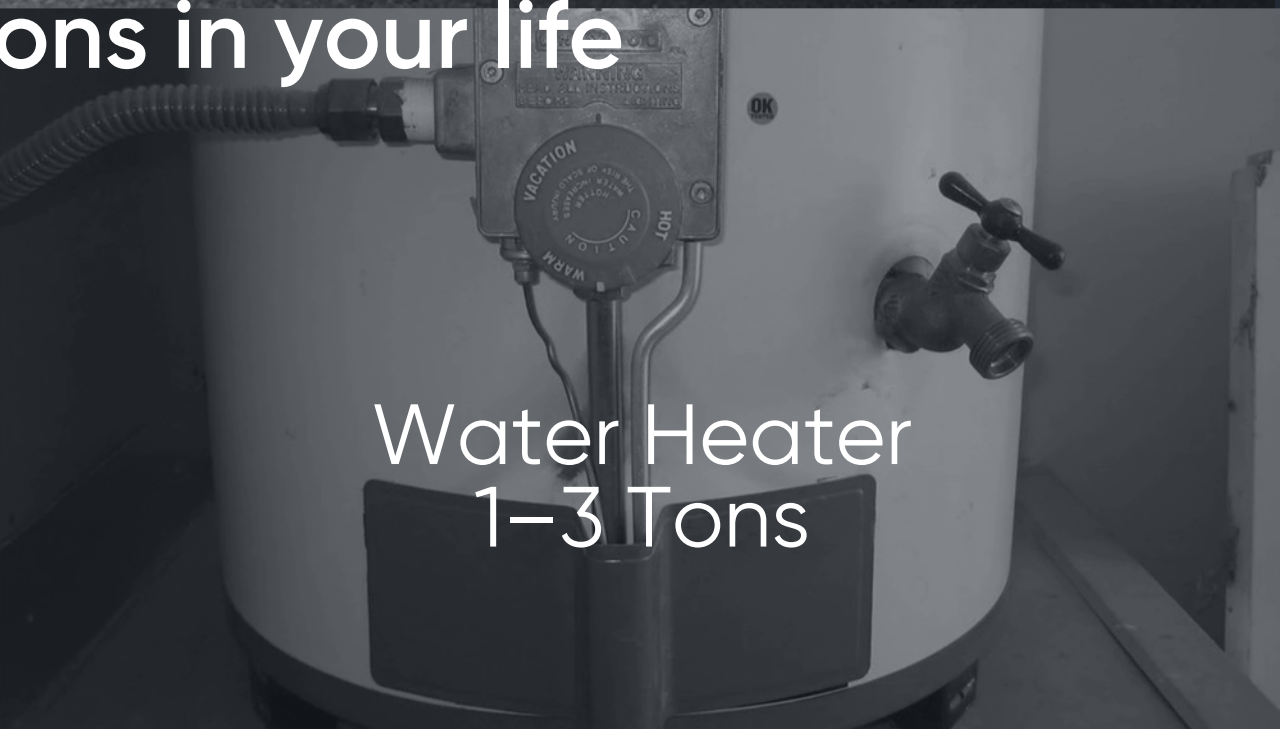


Car
4-8 Tons

4 Largest sources of carbon emissions in your life



Furnace
4-8 Tons



Water Heater
1-3 Tons



1. Clean up your electric supply
2. Electrify your home
3. Electrify your ride
4. Electrify Everyone

electrifynow.net



Can Electrification Change the World?

Electrification and renewable energy are the most powerful and lowest cost tools to eliminate carbon emissions. But it is easy to overlook the other

induction stove buying guide



Its better and safer, but which one?

It would be hard to miss all the media attention on the dangers of gas cooking and advantages of induction, so if you are thinking about making the switch in your home, here are some resources to help you find the right solution.

[Electric Kitchens](#) is a website devoted to the advantages of going electric - they have great info and FAQs and rebate information if you live in California. Yale Appliances provides a great [buyers guide](#) as well as reliability data based on their own sales and service. [Consumer Reports](#) are very thorough and unbiased and cover the entry level offerings very well. (but you have to be a

electric power tool discounts



Exchange your gas tools for a discount on electric tools

PGE is sponsoring [outdoor power tool exchanges](#) this month in several locations in the Portland metro area. By registering for these events, you can bring a gas tool to be recycled and pick up a replacement electric tool at a substantial discount. You will get 15 - 20% off of the industry leading [EQO Power Tools](#), and get your dangerous air polluting gas tools recycled for free. It's a great way to start the summer with clean, maintenance free outdoor landscaping - this could be a great early father's day present too!

[Register now for a tool exchange and electric tool discount!](#)




The Dangers of Cooking with Gas



Central Heat Pumps



Home Backup Power



Heat Pump Water Heaters

