ENERGY SOLUTIONS CENTER

Track: Residential Natural Gas

Unit # 5: Indoor Appliances

Eric Burgis, Energy Solutions Center

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Presentation Outline

Indoor Residential Appliances

- Cooking
- Clothes Dryer
- Hearth Products

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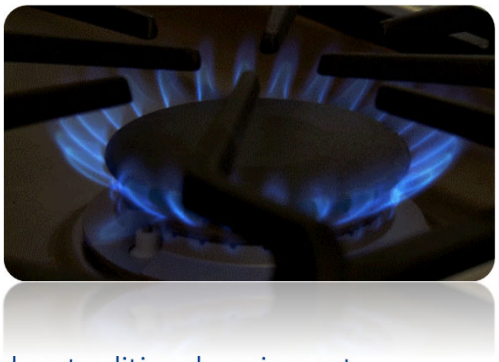
Cooking

Cooking

- Traditional Appliances
  - Range
  - Cooktop
  - Wall Oven
- High End Appliances
  - Commercial Equipment for the Home
  - Offer other features and benefits not found on traditional equipment



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Traditional Cooking Appliances

Range

Cooktop

Wall Oven

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Cooking with Gas

- 88% of professional chefs prefer to cook with gas*
  - Consistent, even heating
  - Faster cook times
  - Better cooking results
  - Better efficiency
  - Able to "see" the blue flame

*Source: Fryett Consulting Group – for GFEN Consortium

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Range

- Wide range of sizes, colors, styles and features
- Simple apartment size to commercial models used in high end residential
- Often the focal point of the kitchen

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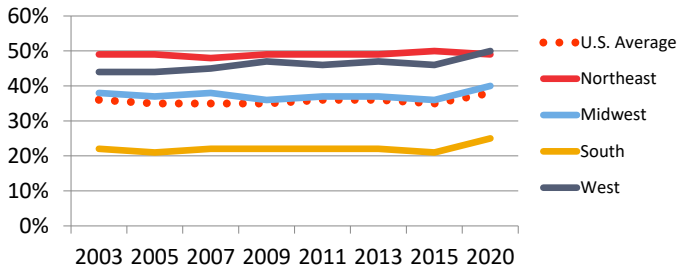
Range Market Penetration

(Represents the % of homes that have a gas cooking of all homes that have cooking equipment)

63% of homes that have natural gas have gas cooking.

Overall gas cooking market increased from 35% in 2015 to 38% in 2020.



Gas Range	2003	2005	2007	2009	2011	2013	2015	2020
US Average	36%	35%	35%	35%	36%	36%	35%	**38%**
Northeast	49%	49%	48%	49%	49%	49%	50%	49%
Midwest	38%	37%	38%	36%	37%	37%	36%	40%
South	22%	21%	22%	22%	22%	22%	21%	25%
West	44%	44%	45%	47%	46%	47%	46%	50%

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Source: American Gas Association, *Residential Natural Gas Market Survey*, March 2017
2020 Residential Energy Consumption Survey, released March 2023

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Cooktop & Rangetop

- Cooktop – supported by the counter on all four sides with controls on the top.
- Rangetop – supported by counter on 3 sides and cabinet on the front with controls on the front.
- 4 - 6 Burners
  - 3,400 – 22,000 Btuh burners
- 24”, 30”, 36” & 48” (.6, .76, .9 & 1.2 meter) widths
  - Wider units may have griddle
- Some manufacturers offer downdraft ventilation

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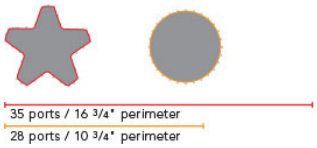
Thermador StarBurner

- Has more flame ports than a round burner
- Provides equal flame distribution for even cooking
- Extra Low feature provides a wide range of temperature control allowing cooks to maintain a very low temperature
- The raised pedestal burner and porcelain maintop are a perfect integration for easy cleanup.



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Wall Oven

- Single
  - Standard & convection bake with broiler
- Double
  - 2 singles with choice of door configuration
- Hybrid
  - Double oven: One Gas, One Electric
  - Gas oven with Electric Convection
  - Microwave-wall oven combo

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Wall Oven

- Configurations
  - Single
  - Double
  - Hybrid

Gas oven & broiler on top
Electric oven & broiler on bottom

Microwave-wall oven combo

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Wall Oven

- ~200°F – 500°F (93.3°C - 260°C)
- ~30,000 Btuh per oven
- Convection fans provide more uniform heating

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Non-Traditional Cooking

Indoor Grill

Down draft ventilation

Pizza Oven

Flat Top Grill

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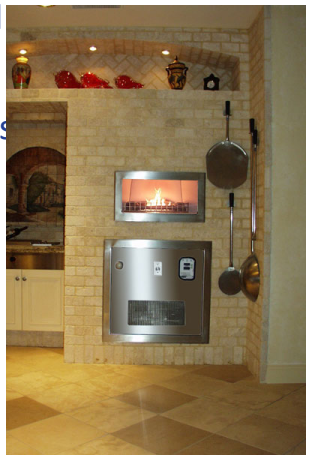
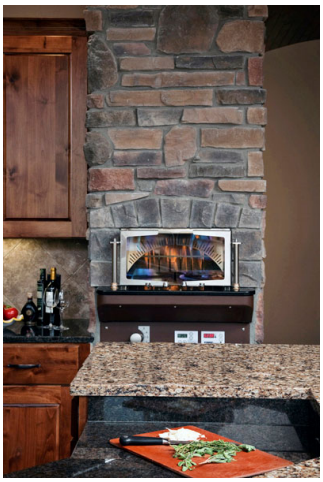
Pizza Oven

- Authentic Italian cooking
- Some models combine gas and wood
- Various sized cooking chambers
- 50,000 Btuh and up





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Flat Top Griddle/Grill

- 30” (.76 m) commercial grade grill
- Inner burner – 13,000 Btuh
- Outer burner – 24,000 Btuh
- Variable temperature from 225°F to 625°F (107 to 329°C)

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Indoor Grill

- Usually a component of a range or cooktop
- Some come with downdraft ventilation

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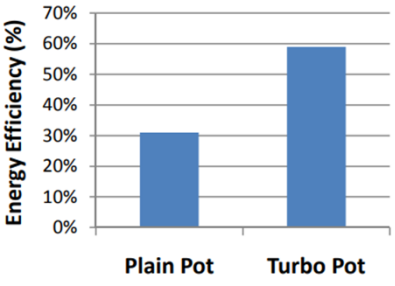
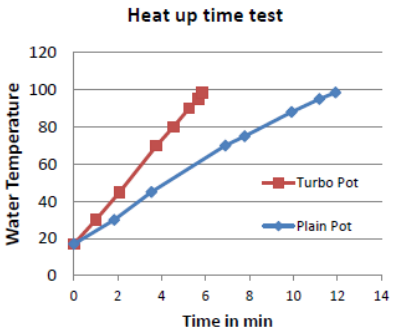
Turbo Pot® Cookware from Eneron

- Various sizes of fry pans, sauce pans and stock pots
- Quick heat up
- Even heating
- Saves on gas bill



*Independently tested by PG&E



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Eneron Fry Pan

- Fry Pan
  - Quick heat up and recovery
  - Even heating
  - Long lasting non-stick coating
  - Save on gas bill
  - 8” & 10” (203 & 254 mm) Aluminum
  - Ceramic non-stick & natural finish

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High End Kitchens – Retro Comeback

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Non-Traditional Cooking

Commercial Grade Appliances

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Commercial Grade Appliances

- Designed and warranted for commercial installations
- Higher output burners
  - Potential gas line sizing issues if replacement of older standard equipment
- Ranges don't have a simmer setting or broiler
- Don't have electronic ignition, use standing pilot
- May not fit into a kitchen retrofit as they tend to be larger in size
- May nullify your homeowner's insurance

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Pro-style Appliances

- Appliances that look commercial but are designed for residential installation
- Built for zero clearance
- Higher output than standard appliances but lower than commercial
- More expensive than standard appliances

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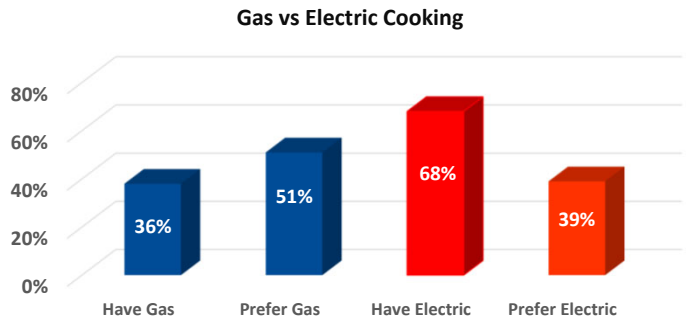
Consumer Preference

National Consumer Preference Study

More want gas than have gas



Approx 43% of the people that have electric cooking really don't like it.

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Figures for have gas are from EIA's 2020 Residential Energy Consumption Survey, released Mar 2023
Figures for prefer gas are from NAHB's What Homebuyers Really Want, 2021 Edition

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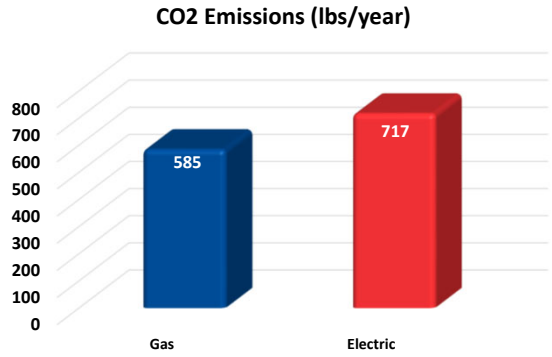
Cooking Usage and Emissions

	Energy Use	Cost	Average cost
Natural Gas	5 MMBTU/Yr	$47/Year	$9.30/MMBTU
Electric	792 KWH/Yr	$104/Year	$.13/KWH



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Data from ESC's Residential Energy & Emissions Carbon Calculator for average fossil sources of energy

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Gas Dryers

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Advantages of a Natural Gas Dryer

- Dry your clothes more quickly
- Cost less to operate than electric models.
- Produce less static cling.
- Dissipate heat quickly when the dryer stops, reducing the amount of wrinkling
- More efficient moisture removal - dryer senses heat and moisture throughout the cycle and turns off when clothes are dry
  - Saves energy
  - Reduces the risk of shrinkage

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Dryer Energy Star Standards

- Effective - January 1, 2015
- Definitions:
  - Combined Energy Factor (CEF): Combined Energy Factor (CEF) is a measure of energy efficiency that reflects the energy use of the clothes dryer - the higher the CEF, the more energy efficient the clothes dryers.
    - The clothes dryer test load weight in pounds divided by the sum of the per cycle standby and off mode energy consumption and either the total per-cycle electric dryer energy consumption or the total per-cycle gas dryer energy consumption expressed in kilowatt hours (kWh)
  - Basic Model: Units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

ENERGY STAR

ESC Data from Energy Star website

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Dryer Energy Star Standards

The ENERGY STAR criteria for clothes dryers were established on May 19, 2014. The ENERGY STAR criteria will require that products meet the following efficiency and cycle time requirements:

Efficiency Requirements	
Product type	**Combined Energy Factor (lbs/kWh)**
Vented Gas	3.48
Ventless or Vented Electric, Standard (4.4 cu-ft or greater capacity)	3.93
Ventless or Vented Electric, Compact (120V) (less than 4.4 cu-ft capacity)	3.80
Vented Electric, Compact (240V) (less than 4.4 cu-ft capacity)	3.45
Ventless Electric, Compact (240V) (less than 4.4 cu-ft capacity)	2.68

Cycle Time Requirement	
Maximum Test Cycle Time	80 minutes

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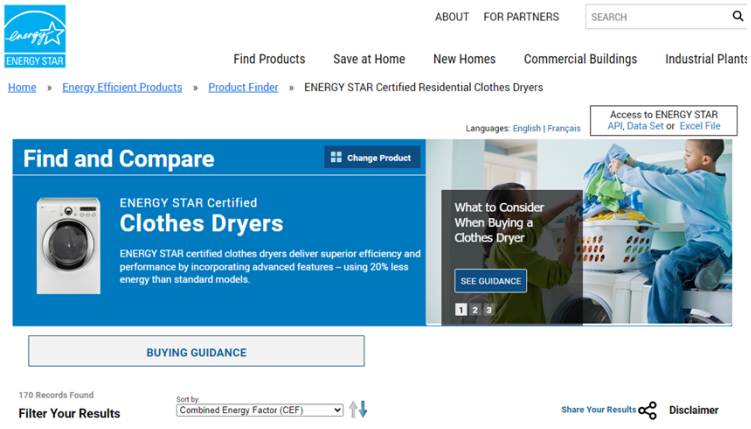
Energy Star Dryers Product Finder

More than 170 Gas Dryers are Energy Star certified. Most have CEF of ~3.49.



https://www.energystar.gov/productfinder/product/certified-clothes-dryers

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Increasing Dryer Functionality and Performance

ENERGY STAR certified clothes dryers incorporate the following advanced features:

- **Sensors to Detect When Clothes Are Dry** - ENERGY STAR clothes dryers save energy by using automatic termination to help detect when your clothes are dry. This feature also prevents wear and tear on your clothes from over-drying.
- **Low Heat Setting** - ENERGY STAR clothes dryers use lower temperatures than standard clothes dryers, generally.
- **Delayed Start** – Delay start gives you the option of setting the dryer to begin according to your schedule. In some cases, delaying the start of the dryer could save energy costs if your utility offers time of use (TOU) pricing.
- **Steam Cycles** - Many ENERGY STAR dryers also include convenient features, such as a steam cycle that can help save time on ironing clothes by preventing wrinkles.

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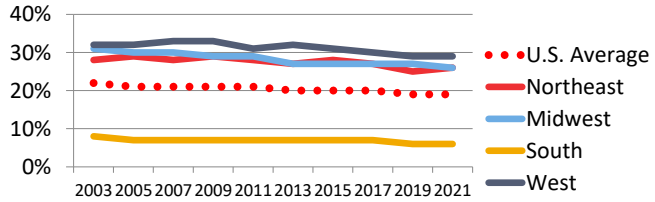
Dryer Market Penetration

(Represents the % of homes that have a dryer on piped gas of all homes that have a dryer)

Only 19% of homes that have natural gas have a gas dryer.
The gas dryer market decreased 6% from 2013 – 2021.



Gas Dryers	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021
U.S. Average	22%	21%	21%	21%	20%	16%	20%	20%	19%	19%
Northeast	28%	29%	28%	29%	28%	27%	28%	27%	25%	26%
Midwest	31%	30%	30%	29%	29%	27%	27%	27%	27%	26%
South	8%	7%	7%	7%	7%	7%	7%	7%	6%	6%
West	32%	32%	33%	33%	31%	32%	31%	30%	29%	29%

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Source: American Gas Association, *Residential Natural Gas Market Survey*, Jan 2023

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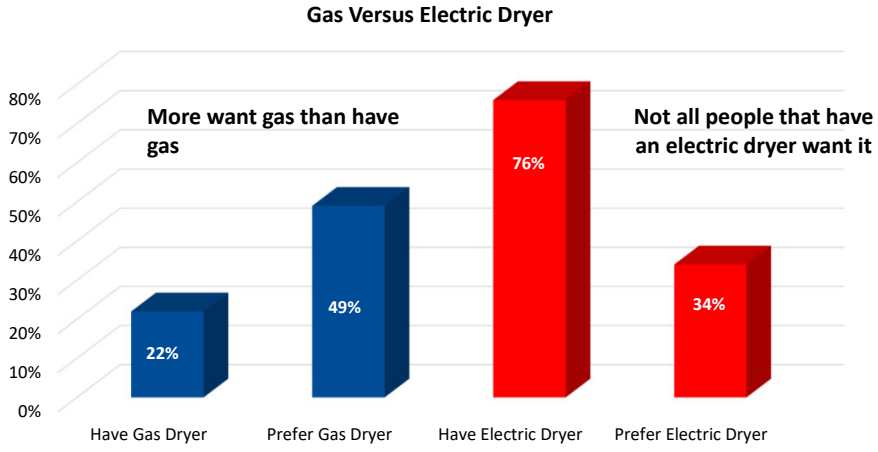
Consumer Preference - Dryers

(Results from a national consumer preference study)



New Homeowner Energy Preference Survey - Woodland O'Brien & Scott

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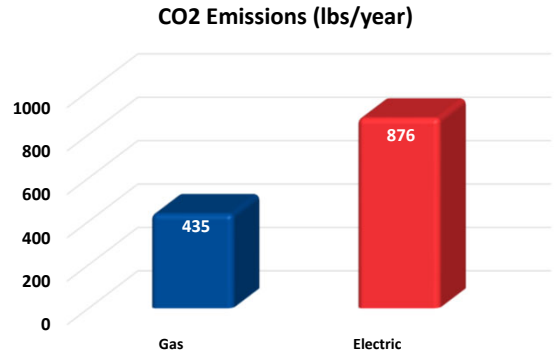
Dryer Usage and Emissions

	Energy Use	Cost	Average cost
Natural Gas	3.7 MMBTU/Yr	$35/Year	$9.30/MMBTU
Electric	967 KWH/Yr	$127/Year	$.13/KWH



Data from ESC's Residential Energy & Emissions Carbon Calculator for all sources of energy. Assumes 8 loads of laundry per week.

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Electric Hybrid Dryer

- A combination of conventional heating elements and a heat pump system
- Recovers heat from the hot, moist air that is normally exhausted and lost to the outside
- Uses the recovered heat to preheat incoming air
- Manufacturer claims it will be 50% more efficient than standard model
- Also called a heat pump dryer

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Electric Standard Vs Heat Pump Dryer

Standard

See more images

Whirlpool - 7.4 Cu. Ft. Stackable Electric Dryer with Quick Dry - White

Model: WED4720RW
SKU: 6585508
(6)

$679.99
~~$899.99~~

Add to Cart

Heat Pump

See more images

Whirlpool - 7.4 Cu. Ft. Stackable Electric Dryer with Wrinkle Shield Option - White

Model: OBX WHD560CHW
SKU: 6581128
Not yet reviewed

$1,394.99

Unavailable Nearby

Cost Premium for Heat Pump Dryer = $715.

Save 50% of ~$127/year electric = $63.50

Payback ~ 11 years

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https://www.bestbuy.com

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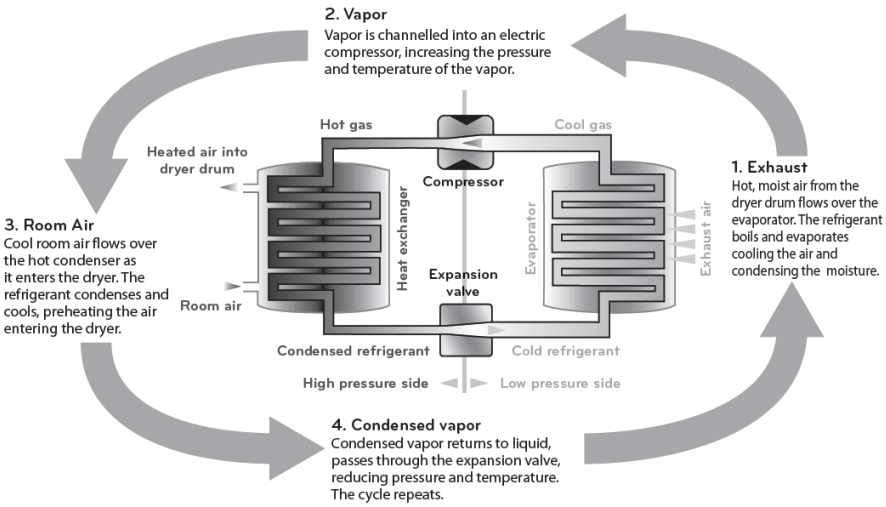
Electric Hybrid Dryer



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Pros and Cons of Electric Heat Pump Dryers

- **Pros**
  - Ventless
  - Gentle on fabric
  - Up to 28% more efficient
  - Since there are no vents, there is no lint build up
- **Cons**
  - Longer drying time
  - Mold risk
  - Maintenance – lint can get trapped in filters and coils
  - Price – can cost twice as much as a conventional dryer

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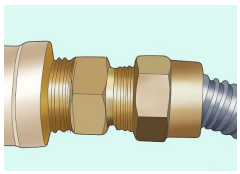
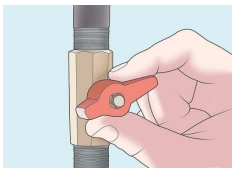
Common Dryer Misconception

My dryer must be electric if it has a plug!

A gas dryer has <u>both</u> gas and electric hook-ups


An electric dryer has only an electric hook-up

3 or 4 prong 220V

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Hearth Products

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Types of Indoor Hearth Products

- Natural Gas Fireplaces
  - Standard
  - Wall Mounted
  - Room Divider
  - Art Deco
  - Fireplace-Heater
- Fire Bowl
- Log Sets
- Free Standing Stoves

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Hearth Products

- Approx. 7% of all U.S. homes have a secondary wood heating source. (8.83 million homes)
  - ~ 35% are heating stoves
  - ~ 64% are fireplaces (5.6 million)
    - An existing wood fireplace may be a good opportunity to convert to gas.
- Free standing stoves are good for basements, 3 season rooms, or other un-heated spaces.

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EIA's Residential Energy Consumption Survey 2020

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Feature & Benefits

- Many styles, sizes, shapes, colors, options and configurations
- No storage, ash removal or bugs related to wood
- Easy on and off
- Variable heat output
- Many can be operated during power help warm space
- Low cost of operation

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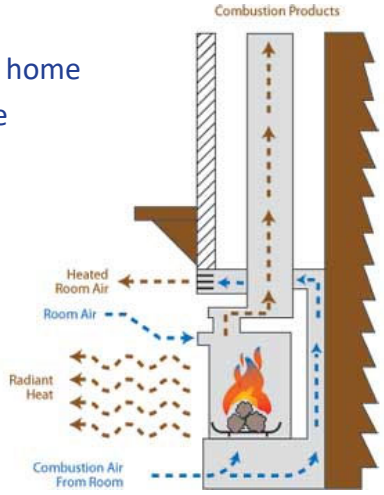
Venting

- Natural Draft
  - Appliance takes in combustion air from inside the home
  - Products of combustion vented outside the home



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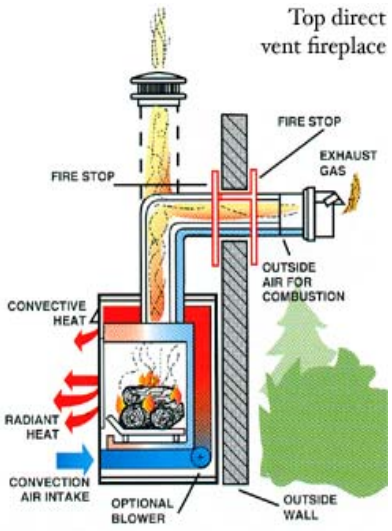
Venting

- Direct Vent
  - Appliances draw combustion air from the outdoors
  - Products of combustion exhausted to the outdoors
  - Eliminates need for a standard chimney
  - A glass panel is critical to keeping the combustion system sealed
  - Direct-vent piping can go out the wall directly in back of the unit or terminate vertically above the roof
  - The majority of gas fireplace sales are direct vent units



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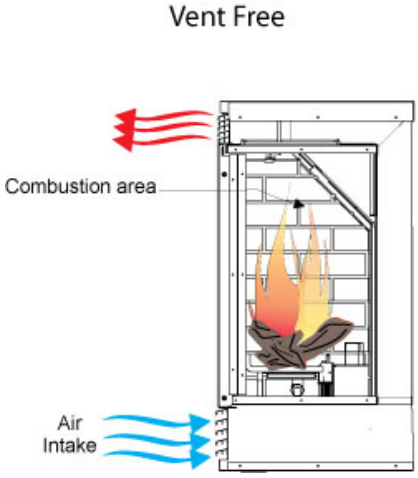
Venting

- Unvented or Vent Free
  - Draws combustion air from inside the home
  - Designed to burn so efficiently that it eliminates the need for venting
  - Not permitted in Canada



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Fireplace / Hearth

- Free Standing Stoves help heat normally unheated areas such as a basement
- Fireplaces add ambiance and warmth to a family or living room

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Standard/ Traditional Gas Fireplace

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Standard/ Traditional Gas Fireplace

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Wall Mounted Gas Fireplace

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Bookshelf Gas Fireplace

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Room Divider Fireplace

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Art Deco Fireplaces

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Its What's Inside that makes it Unique

- Glass
- Ceramics
  - Logs
  - Shapes
- Metal

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Fireplace - Heater

- Heat is extracted from the firebox and distributed throughout the house through ductwork

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Fire Bowls

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Mixing Fire and Water



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Log Sets

- Standard
  - Vented vent Free
- Large Sizes
- Unconventional
  - Bonfire
  - Stones
  - Many others




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Log Sets

- Many Manufacturers – see ESC Equipment Manufacturers Directory: https://www.energysolutionscenter.org/manufacturer/
- Options:
  - Vented (functional chimney or flue)
  - Vent free (check codes)
  - Widths from 12” to 96” + custom sized sets
  - Outputs from 20,000 Btuh
  - “Wood” types – Oak, Driftwood, Birch, etc.
  - Push button ignition, remote control or wall switch

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Free Standing Stoves
Vented and Vent Free

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Free Standing Stoves

- Help heat normally unheated areas such as a basement
- Many Manufacturers
- Many styles & sizes
- Some models have blowers

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Safety

- Hot glass and frame take up to 1 hour to cool
- Use a barrier (gate) or screen around stove or fireplace with children
- Put remote control out of reach

ESC Video Vault found under Resources

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Learn more about Hearth Products

- ESC website - www.energysolutionscenter.org
  - Guide To Gas Solutions > Residential Appliances > Indoor Fireplace, Log Sets, Freestanding Stoves
  - Equipment Manufacturers Directory
- Hearth, Patio and Barbeque Association -www.hpba.org

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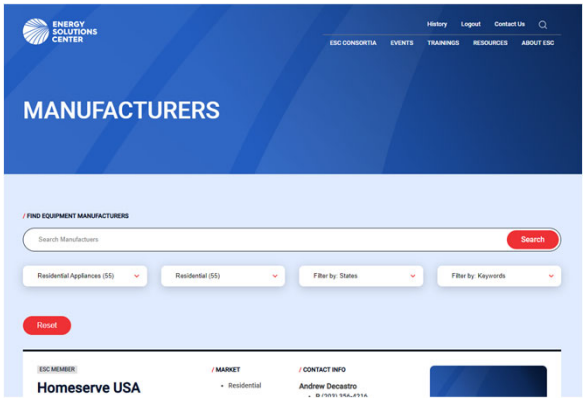
Learn More

https://www.energysolutionscenter.org/manufacturer/

Equipment Manufacturers Directory



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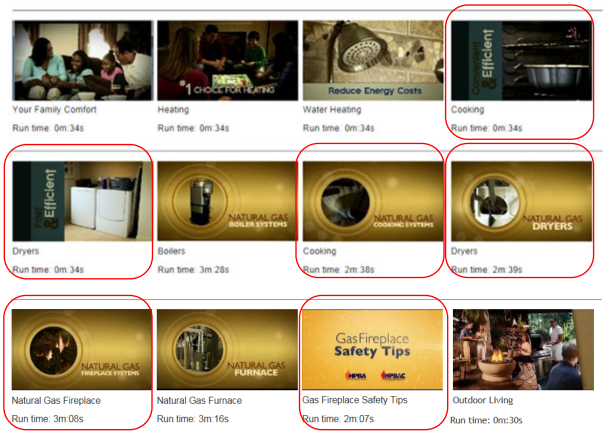

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Thank You

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