



## Track: Residential Natural Gas

### Unit # 1: Opportunities for Residential Natural Gas Load Growth & Retention

Can you name 20+ potential burner tips for the home?

Eric Burgis, Energy Solutions Center

## Standard Residential Appliances



Heater  
Water Heater  
Range  
Clothes Dryer  
Gas Fireplace



# Heating

## Residential Gas Technologies



## Heating - Traditional

### ■ **Furnace**

- Forced warm air system that uses duct work to distribute warm air to the home
- Standard or Condensing
- Add-On Heat Pump



## Heating - Traditional

### ■ **Boilers**

- Hot Water or Steam Boilers
- Heat through radiators or radiant floor heating
- Variations Include:
  - Sectional
  - Condensing
  - Wall Hung
  - Combination Boiler/Water Heater
- Not many boilers in new construction



## Steam & Hot Water Heating Systems

- Use heat exchangers to transfer heat to the space
  - Radiator – Radiates heat to space
  - Fan Coil System – Forces air through steam or water coil



Cast Iron



Baseboard Style



In Ceiling Fan Coil System



## Radiant Floor Heating

- Uses a boiler to run hot water solution through PEX tubing



*“I wonder if this stuff can work outside”*



## Snow / Ice Melting



*“Yes it can!”*



## Heating Non-Standard

### Space Heaters

Blue Flame



IR



Plain



Note that many of these products are vent free.  
They are allowed in the U.S., but not Canada.



## Heating Non-Standard

### Wall Furnace

- 8,000 – 60,000 Btuh
- Can heat one or more rooms



## Heating Non-Standard

### Floor Furnace

- 30,000 – 75,000 Btu/hr
- Fits between 16" joists

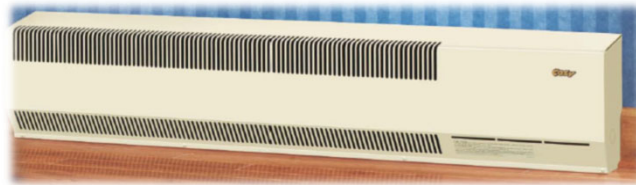




## Heating Non-Standard

### Direct Vent Gas Baseboard

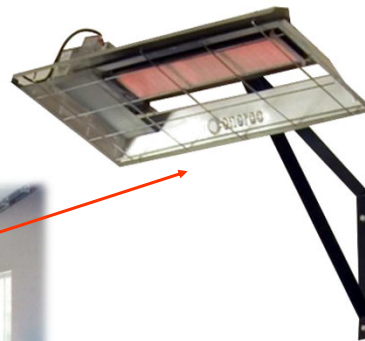
- 5,000 – 9,000 BTU/Hr
- Mounts on outside wall



## Heating Non-Standard

### Garage Heater

- 25,000 BTU/Hr



## Heating Non-Standard

### Gas Heat Pump

- Currently available 80,000 BTU/Hr
- 140% AFUE lowers gas use and emissions
- Comfortable down to -40°F/C without back-up



## Water Heating



## Water Heating - Traditional

Atmospheric



Direct Vent



High Efficiency



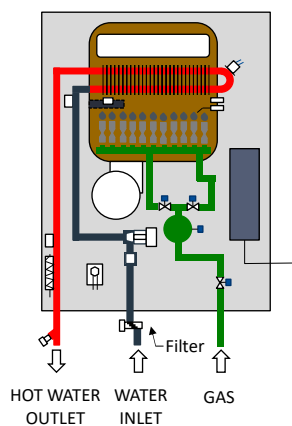
## Water Heating Non-Standard

### Tankless

- Standard
- Condensing



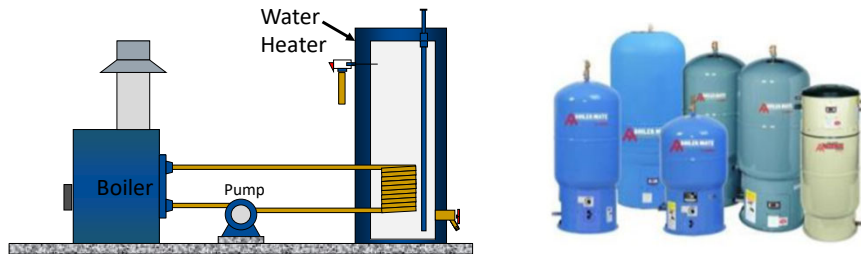
(Internal View)



## Water Heating Non-Standard

### Indirect Water Heater

- Heat source provides heat to coil in indirect water heater to heat up and store hot water



## Water Heating Non-Standard

### Solar Water Heater

- With H.E. Gas back-up system





**Cooking**

**Traditional Appliances**

- Range
- Cook Tops
- Wall Oven

**High End Appliances**

**Non-Traditional Appliances**





## Traditional Cooking Appliances

Wall Oven



Cook Top



Range



## High End Kitchens – Retro Comeback



## Non Traditional Cooking



Pizza Oven



Indoor Grill

Flat Top Grill



Down draft ventilation



Dual Fuel



## Non-Traditional Cooking

### Commercial Grade Kitchen Appliances



# Miscellaneous Gas Appliances

## Dryers





## 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



## Types of Indoor Hearth Products

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



## Standard Gas Fireplace



## Wall Mounted or Bookshelf Gas Fireplace



## Room Divider Fireplace



## Art Deco Fireplaces



## Its What's Inside That Makes It Unique

- Glass
- Ceramics
  - Logs
  - Shapes
- Metal



## Fireplace - Heater



Ductwork



## Fire Bowls



## Log Sets



### Standard Log Set

- Vented
  - Vent Free
- Large Log Set



6' Long 220,000 BTU Log Set



## Free Standing Stoves Vented and Vent Free



**Cooling**



## Residential Air Conditioning

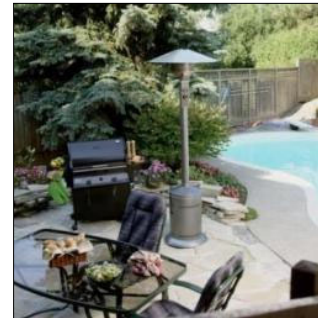
- Generally, units are 5 Tons+
  - Absorption
  - Absorption Heat Pump
    - Absorption based Geo-Thermal
  - Engine Driven Heat Pump
- Offer Zone-ability



## Outdoor Living

## Outdoor Living

- Creating an outdoor room extends the home's living space
- Work towards getting builders to include a stub and possibly a convenience outlet
- Appliances to consider:
  - Fire Pits and Fire places
  - Lights & Tiki Torches
  - Patio Heaters
  - Pool Heaters
  - Fire and Water
  - Grills
- Convenience Outlets



## Outdoor Fireplaces



## Fire Pits – All Shapes and Sizes



## Fire Pits – a Wide Range of Choices and Sizes



From a few hundred dollars ...

... to well over \$10K



48" ring can be up to 1 MMBTU



## Ambiance Lights & Tiki Torches

### Gas Lights – Mantle Type



## Gas Light - Open Flame



## Gas Light - Mounting Options



Post



Wall Mount



Ceiling





## Tiki Torches



## Additional Outdoor Living Products



## Patio Heaters



## Pool / Spa Heater



## Mixing Fire and Water



## Standard Gas Grills and Grill Islands



## Natural Gas Grills Go High-Tech



## Natural Gas Grills Go High-Tech



## Outdoor Kitchens



## Gas Convenience Outlets Makes Installation or Redesign 'Plug & Play'



MB Sturgis



Burnaby Mfg.



Have you ever  
considered offering an  
outdoor gas  
convenience package  
or upgrade?

This sets the stage for  
a future outdoor room





## ...of Course, CSST Piping Keeps Costs Down



	Pipe Length (ft)	No. Of Elbows
A From gas meter to manifold	16	3

	Appliances	Capacity (BTU/h)	Pipe Length (ft)	No. Of Elbows	Vertical Length (ft)
1	Fireplace	25,000	22	4	0
2	Range	70,000	13	4	0
3	Furnace	70,000	12	3	0
4	Water Heater	45,000	10	2	0
5	Dryer	22,000	20	5	10
6	BBQ	50,000	20	6	0
7	Other	-	0	0	0

Rates	Plumber	48.75\$/h
	Apprentice	39.00\$/h

	Material Cost (\$)	Labor Cost (\$)	Total Cost (\$)
Schedule 40	713	2,648	3,360
Copper	842	2,051	2,892
CSST	1,045	1,112	2,157
Hybrid	978	1,488	2,467



Costs from ESC's CSST Cost calculator.

## Back-up Power & Micro CHP Options

## Back-up Generators



## Residential Fuel Cells

- Provides homes with primary power or uninterrupted power supply options
- Uses existing residential natural gas infrastructure
- Can accept up to 20% blended hydrogen
- Solid oxide fuel cell technology (SOFC) equals higher efficiency, quieter operation and lower emissions





## Micro CHP

### North American MicroCHP Manufacturers



Marathon

Marathon Engine Systems - ecopower 1.2 - 4.4 kW(e) ICE. Part of Axiom Energy



Yanmar

Yanmar—10kW(e) ICE unit and 5kW(e) ICE .



And Yes, it is True...

## You Can Purchase an Incinerating Toilet!



<https://cinderellaeco.com/en-us>

## Thank You

■ Consider taking the on-line test while course material is fresh in your mind



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