

Dimplex **Green**

*Defining the consumer, commercial and environmental benefits of Dimplex electric fireplaces, the **green** alternative in hearth products.*



 **Dimplex**[®]

North America Limited

The unique design attributes of Dimplex electric fireplaces provide a multitude of benefits to builders, homeowners and the environment. Many of these characteristics uniquely meet the criteria set out by various groups and organizations promoting the practice of Green construction techniques and sustainable development practices in North America. This document details how Dimplex electric fireplaces meet these criteria and go further to help create and maintain buildings that are clean, healthy and safe for their occupants and neighbors.

Criteria

Increase energy efficiency during construction, renovation or occupancy

- No standing pilot Page 5
- Flame-only option..... Page 8
- 100% efficient..... Page 9

Contributes to a safe, healthy indoor environment

- No particulates from combustion Page 4
- No carbon monoxide Page 4
- No moisture/mold Page 5
- Purifire® Air Treatment System..... Page 5
- Glass remains safe to touch Page 7
- No gas leaks Page 7

Reduce environment impact

- Carbon dioxide reductions Page 2
- No neighborhood pollution Page 3

Thermal comfort

- Zone heating..... Page 6
- Flame without heat Page 8
- Supplemental heat..... Page 8

Increase ventilation effectiveness

- No air exchange..... Page 6

Low-emitting materials

- No emissions Page 4

Preserves natural resources

- No consumption of wood..... Page 3
- No consumption of fossil fuels Page 3

Improved durability and reduced maintenance

- Very low annual maintenance requirement Page 9

Reduced construction time and material cost

- No venting/chimney Page 10
- No additional gas lines Page 10

Lowers operating and maintenance costs

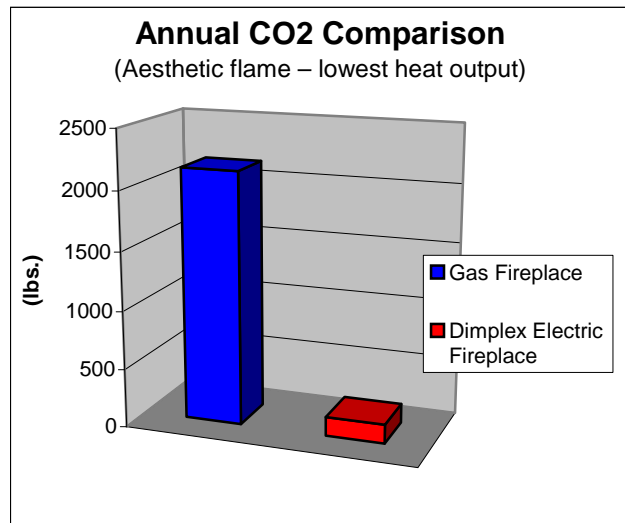
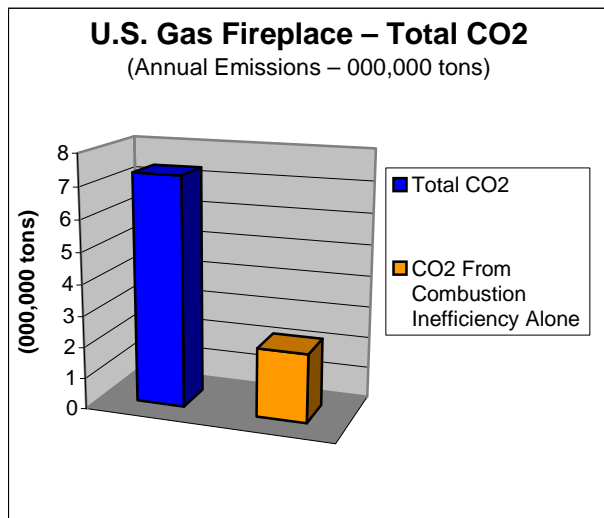
- Periodic light bulb replacement Page 9
- No cleaning..... Page 10
- No ‘wear-out’ parts Page 10

Environmental Impact

Carbon Footprint

Dimplex Electric Fireplaces produce less CO₂ than gas fireplaces, especially when used for aesthetic flame.

Gas fireplaces were responsible for producing 7,312,500 tons of carbon dioxide in the year 2000 (American Gas Foundation). Unlike electric, no gas fireplace is 100% efficient meaning that up to 50 percent or more of the energy (heat), along with the pollution, is lost into the atmosphere. Based on an average direct vent gas fireplace efficiency of 70%, approximately 2,193,750 tons of the total carbon dioxide produced results from combustion inefficiency (EIA – Natural Gas Issues and Trends 1998). In other words, this carbon dioxide is wasted into the atmosphere without benefit of heat to the home.



In many cases, homeowners want to enjoy the beauty and romance of a fireplace without the heat. Modern, well-insulated homes quite often require no supplemental heat, and in most cases, small rooms simply cannot absorb the high BTU output of a gas fireplace. Households in warmer climates also require little or no supplemental heat for a majority of the year. In addition, multi-unit housing often benefits from greater thermal mass, reducing overall heating requirements and minimizing the need for supplemental heating (Green Building Design & Construction Guidelines, April 1999). This is an important consideration for developers/builders who want to offer fireplaces without the wasted energy and cost often associated with non-electric fireplaces.

Dimplex electric fireplaces provide users the option to enjoy the flame without the heat. Not only is this practical but it dramatically reduces emissions of carbon dioxide and other pollutants into the atmosphere. An average direct vent gas fireplace produces 2,150.46 pounds of carbon dioxide annually.* *Based on unit with standing pilot (500 BTU/hour – 24 hours/day) consuming 28,000 BTU/hour when in use, 5 hours per day, 100 days per year.* By comparison, a Dimplex electric fireplace using flame only, produces 164 pounds of carbon dioxide annually (as a result of electricity generation).** *Based on 818.4 BTU/hour, 5 hours per day, 100 days per year.*

*According to the Environmental Protection Agency, natural gas emits 11.7 lbs of CO₂ per therm (or per 100,000 BTU)

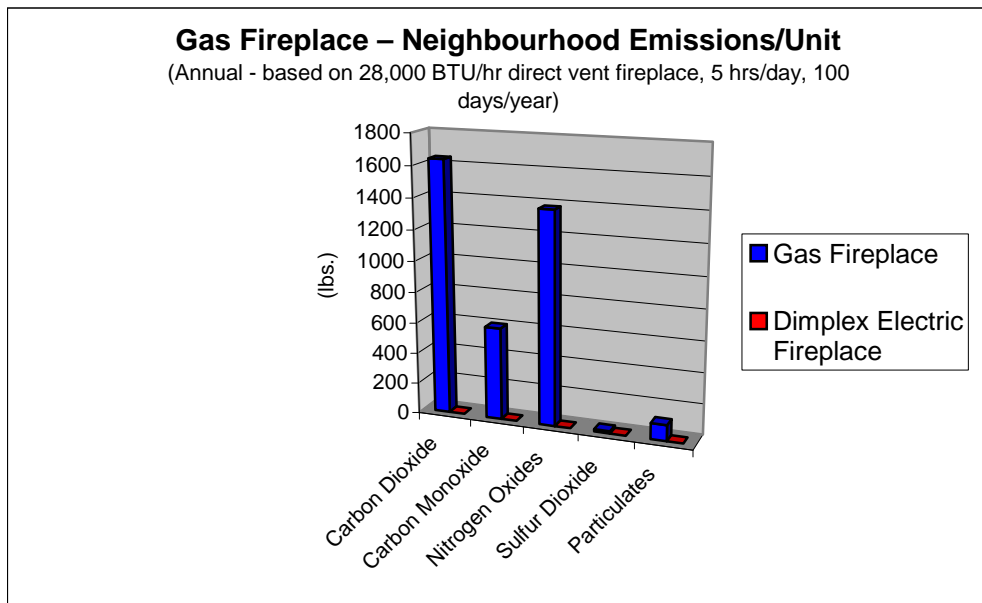
** According to the Environmental Protection Agency, the production of an average mix of electricity emits 1.37 lbs of CO₂ per kilowatt-hour.

Neighborhood Air

Dimplex Electric Fireplaces generate zero local emissions where it can affect children, the elderly, and those with respiratory conditions.

Similar to smog-forming tailpipe pollution from cars, emissions from gas and wood fireplaces are released directly into residential neighborhood atmospheres where air quality is most important. Because electric fireplaces operate without combustion, no particulates or other by-products are released into neighborhood air.

Since houses "breathe" there is always infiltration of outside air into the house; therefore, it is not possible for homeowners to isolate themselves from high outdoor particulate levels. In addition, the most dangerous particles are too small to be smelled (Burning Issues, A project of Clean Air Revival Inc, 1992).



Natural Resources

Dimplex Electric Fireplaces reduce consumption of wood and fossil fuels.

Electricity is generated from a variety of sources including fossil fuels, nuclear, and a variety of renewable sources like hydro, wind, solar, geothermal and biomass. The result is an aggregate of both clean, renewable sources and non-renewable, polluting sources. As of 2007, 28% of all electrical generation came from clean, non-fossil fuel generation (Energy Information Administration). That represents a 28% reduction of fossil fuel consumption for an electric fireplace compared to a gas fireplace that derives 100% of its energy from fossil fuels.

Gas fireplaces accounted for 125 trillion BTU of gas consumption in the United States for the year 2000 (American Gas Foundation).

Wood burning stoves and fireplaces consumed almost 20 million cords in 1999. One cord - a volume equal to a stack of logs 4'x4'x8' - can be used to make between 1,000 to 2,000 pounds of paper, depending on grade of paper and type of pulp. For newspapers, a cord of wood is equal to 2,700 copies of an average 36 page daily newspaper. A "rule of thumb" is that an acre of land may yield an average of 10-15 cords of wood when harvested at maturity (Wisconsin Paper Council). Therefore, in 1999 wood burning stoves and fireplaces consumed approximately 2 million acres of mature forest in the United States alone.

In 2006 pellet appliances consumed 1,285,470 tons of pellets in the U.S. (Pellet Fuel Institute, 2007). Wood pellets are mostly produced from sawdust and wood shavings, compressed under high pressure. One ton of pellets is equivalent to approximately 1.5 cords of firewood (U.S. Department of Energy, 2008). Therefore, in 2006 pellet appliances consumed approximately 1,928,205 cords of wood.

Indoor Air Quality

Combustion Emissions

Dimplex Electric Fireplaces contribute no particulates or emissions to the indoor environment.

The Environmental Protection Agency (EPA) lists poor indoor air quality as the fourth largest environmental threat to the United States.

Combustion of fossil fuels and wood produce a variety of pollutants that can adversely affect indoor air quality. Homeowners must be vigilant to assure an adequate draft is maintained and venting is kept clean and free of obstructions to ensure that potentially harmful toxins do not back-up into the house.

Wood smoke is of particular danger as it contains over 200 chemicals and compound groups. The emissions are almost entirely in the inhalable size range. (Environmental Impact of Residential Wood Combustion Emissions and Its Implications, John A. Cooper, APCA Journal, Vol.30 No.8, August 1980). The EPA estimates that the lifetime cancer risk from wood stove smoke is twelve times greater than that from an equal volume of second hand tobacco smoke. (The Health Effects of Wood Smoke, Washington State Department of Ecology)

By-Products of Fireplace Fuels

By-Product	Side Effect
Electricity	
None	None
Gas (Partial List)	
Carbon Dioxide	Respiratory stimulant
Nitric Oxide	Pulmonary irritants
Nitrogen Dioxide	Pulmonary irritants
Carbon Monoxide	Bloodstream poison
Formaldehyde	Carcinogen
Water Vapor	Mold

By-Product	Side Effect
Wood (Partial List)	
Chlorinated Dioxin	Carcinogen
Carbon Monoxide	Bloodstream poison
Methane	Asphyxiant
Volatile Organic Compounds	Carcinogen
Nitrogen Oxides	Pulmonary irritants
Polycyclic Aromatic Hydrocarbons	Carcinogen
Fine Particulate Matter	Respiratory irritant

(Indoor Environment Notebook, Ball State University; Health Canada)

Carbon Monoxide

Dimplex Electric Fireplaces produce no carbon monoxide because there is no combustion or ventilation to become blocked.

Carbon monoxide (CO) is a flammable, colorless, odorless, tasteless toxic gas produced during incomplete combustion of fuel - Natural Gas, Oil, Coal, Wood, Kerosene, etc. During normal combustion, each atom of carbon in the burning fuel joins with two atoms of oxygen - forming a harmless gas called carbon dioxide. When there is a lack of oxygen to ensure complete combustion of the fuel, each atom of carbon links up with only one atom of oxygen - forming carbon monoxide gas.

Carbon Monoxide is the leading cause of accidental poisoning deaths in America, according to the Journal of the American Medical Association (JAMA). "CO poisoning from the use of fuel burning appliances kills at least 200 people each year and sends more than 5,000 to hospital emergency rooms for treatment," according to Chairman Ann Brown of the Consumer Product Safety Commission.

Moisture/Mold

Unlike combustion fireplaces, Dimplex Electric Fireplaces contribute no moisture to the indoor environment.

In addition to potentially harmful emissions, gas logs and some gas fireplaces can cause moisture problems that can lead to mold, another serious indoor air problem. "All gas logs have the capability of producing huge amounts of water vapor. 1.5 gallons of water is produced for every 100,000 BTUs of gas burned. This massive amount of water can condense on cold chimney flue walls and drip into your fireplace. In the case of vent free logs, this water vapor can condense on windows and other cold surfaces. Should you install these in a newer air-tight home, you may create severe moisture problems in your attic and in exterior wall cavities." (Tim Carter, Gas Logs - Vented and Vent-Free Sets, Ask The Builder, April 1996)

By breaking the building envelope for chimneys or venting and supply lines, gas fireplaces also create additional opportunity for water and water vapor to penetrate the building. This represents a potential contributor to mold growth and is avoided with electric fireplaces that require no venting or supply lines.

Purifire

Dimplex electric fireplaces equipped with the Purifire® Air Treatment System improve indoor air quality.

The quality of the air in a home has a significant impact on the health and well being of the occupants. Dimplex electric fireplaces equipped with the Purifire Air Treatment System help improve air quality by removing mold spores, dust mites, pet dander, pollen and other particulates from the indoor environment. Purifire filters allergens as small as one micron, exceeding MERV 10 (Minimum Efficiency Reporting Value) rating. Purifire circulates and cleans the air of an average-size room (12' x 14') up to four times an hour. The cost of operation is only ½ cent per hour, based on average national residential rates. The standard 10" x 20" filter can be washed or replaced about once a year.

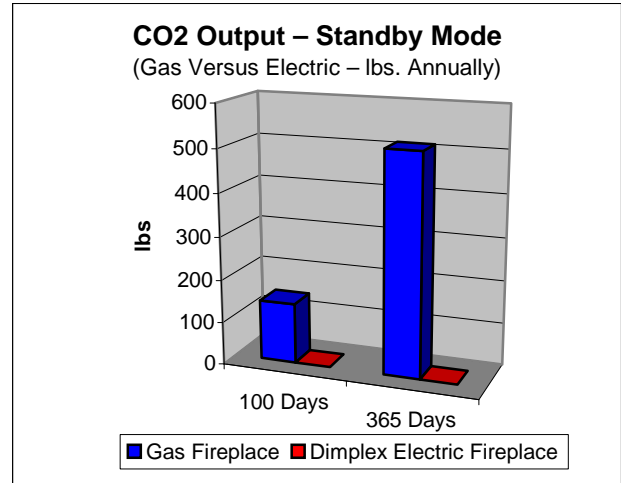
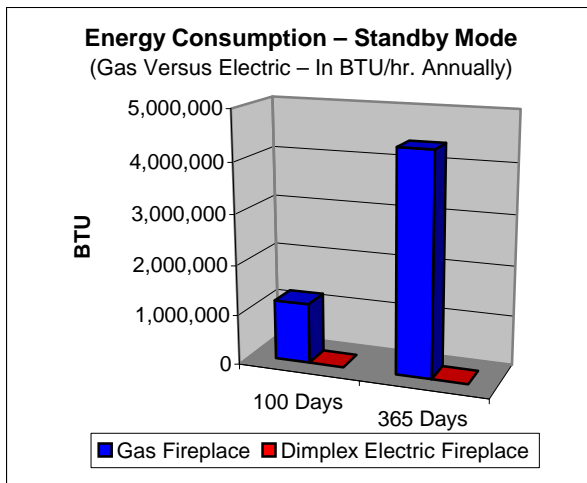
Energy Efficiency

Standing Pilot

Dimplex Electric Fireplaces eliminate the need for a standing pilot and therefore do not consume energy when not in use.

A standing pilot is a flame that is constantly burning; or standing. Its purpose is to provide a source of ignition for the main burner(s). The advantages of the standing pilot are simplicity and reliability, however, the down side is that they continue to use energy and generate emissions even when the fireplace is not in full operation. A gas fireplace in standby mode can consume up to 4.38 million BTU of natural gas per year (*Based on 500 BTU/hr standing pilot, 24 hours per day, 365 days per year*) and thus produce up to 512 pounds of carbon dioxide per year (The Environmental Protection Agency states that natural gas emits 11.7 lbs of CO₂ per therm). While some homeowners will turn the pilot off during warmer months or periods of extended inactivity, others will leave it on continuously. In fact, there is an incentive to leave the pilot on year-round as many manufacturers recommend servicing to remove dust and lint if the standing pilot is left off for extended periods of time.

While electronic ignition is available on some gas fireplaces, they are typically more expensive and will not operate in a power outage.



Heat Loss Through Stack Effect

Dimplex Electric Fireplaces preserve the building envelope – not an exit point for heated/cooled air, or an entry point for nuisance animals and pests.

Houses lose heat up the chimney due to the "stack effect". The stack effect is the movement of air due to convection currents within your house's building envelope. Heated air leaks out any exit it can find, and when heated air is drawn out of your home, cold outside air is drawn in to make up for it. The fireplace accelerates the normal stack effect. The greater the difference between the outside and indoor air temperature, the greater the air movement due to the stack effect. For example, if the outdoor air temperature is 15 degrees F (-10 degrees C) and the indoor temperature is 68 degrees F (+20 degrees C), the stack effect of the fireplace chimney would be the same as a 300 CFM bathroom fan running continuously.

House designers allow for an extra 3,400 BTU/hr (1 kW/hr) of additional heating for each fireplace added to a home. For homes heated with natural gas, at an average cost of \$13.49 per Mcf, that amounts to approximately \$400 extra per year in home energy costs. (According to the EIA, the US 2008 7-month average consumer price of natural gas was \$13.49/Mcf)

Zone Heating

Dimplex Electric Fireplaces make efficient zone heating possible by providing adequate heat without overheating.

Dimplex electric fireplaces produce up to 5,000 BTU/hour, enough to provide supplemental heat for up to 400 square feet.

Gas fireplaces on the other hand typically produce 30,000 BTU/hour or more, while the average gas furnace generates only 90,000 BTU to heat the entire home. This high output can result in overheating of average sized rooms, uncomfortable occupants, and wasted energy.

By using only the required amount of energy, Dimplex electric fireplaces allow homeowners to warm the areas that experience the most occupancy (i.e. family room) and reduce the primary heating system temperature for the remainder of the home. Turning the thermostat back 10°F to 15°F for 8 hours can

save about 5% to 15% a year on the heating bill - a savings of as much as 1% for each degree if the setback period is at least eight hours (U.S. Department of Energy. "Thermostats and Control Systems". A consumer's Guide to Energy Efficiency and Renewable Energy. 2008).

Safety

Operating Temperatures

Dimplex Electric Fireplaces present no safety risk from high temperature glass surfaces or open flame.

"An investigation of the surface temperature of the front glass panel of gas fireplaces was undertaken to clarify the risks posed by these units. Surface temperature measurements of the glass panel of 3 common gas fireplace models were obtained using a thermocouple probe. Glass temperatures reached a temperature of 200°C within 6.5 minutes of ignition, climbing to 245°C after 14 minutes after ignition. Glass temperature continued to rise, but it could not be monitored because the adhesive used to secure the thermocouple probe melted. Glass temperatures of 50°C were recorded 30 minutes after the unit was shut off. The temperatures of the glass panel of gas fireplaces are sufficient to cause cutaneous burns within seconds of contact both while the fireplace is in-use and up to one half hour after it has been turned off. Current industry safety standards are not directed at the prevention of contact burns." (The Gas Fireplace: A new Burn Hazard in the Home, L. Becker, BSc (Eng), MD and R. Carotto, MD, FRCS Kingston, Ontario, Canada)

"Gas fireplaces are a popular alternative to traditional wood burning fireplaces and with their increased presence, it is likely that over time burns will occur more frequently. Between 1995 and early 2003 there were 150 cases reported at 15 hospitals across the country." (Protect children from gas fireplaces and other burn hazards this winter, urges Safe Kids Canada, Hospital For Sick Kids, January 2004)

Gas Leaks

Dimplex Electric Fireplaces present no opportunity for gas leaks caused by mechanical failure, improper installation, or natural disaster.

The relative simplicity of installing a Dimplex electric fireplace, without the need for gas connections, chimneys or venting, eliminates any potential hazards associated with these operations. While the likelihood of these dangers is small, the consequences and liability are not. Broken gas lines caused the massive fires that broke out in the Marina district of San Francisco during the earthquake in 1989. Measures have been taken since then to prevent this from happening again, but electric fireplaces eliminate the potential altogether.

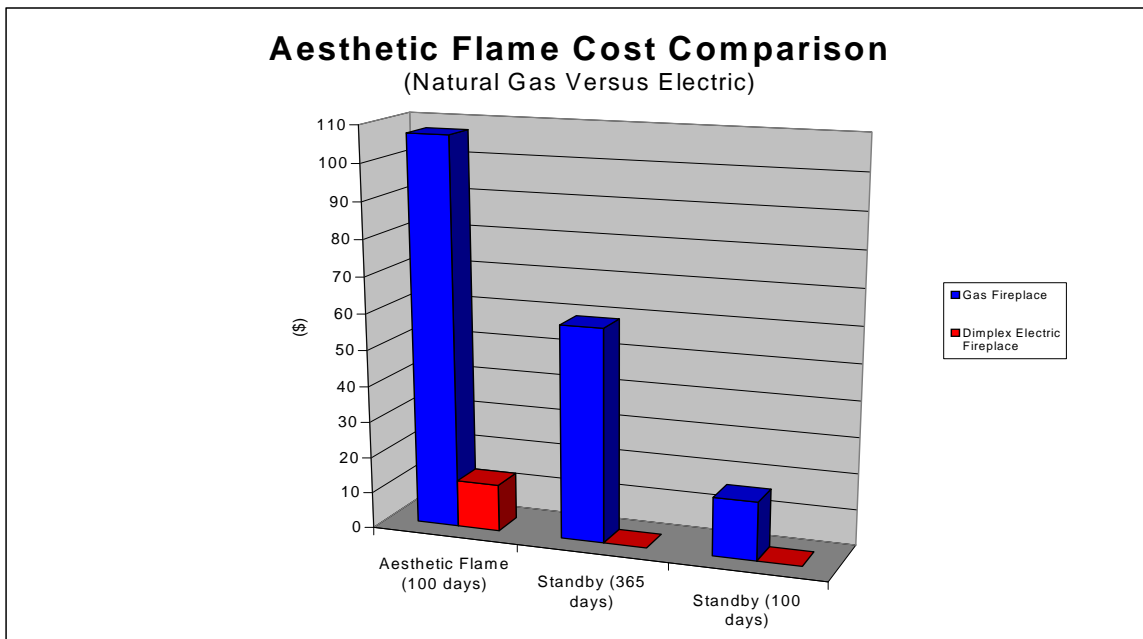
Economics

Flame Only

Dimplex Electric Fireplaces offer the aesthetic appeal of a fire without the costs associated with heat production.

Because they have the option, many consumers choose to enjoy the ambiance of the flame year-round without the heat. This option is only available with electric fireplaces. Gas fireplace owners are left with the choice of an attractive flame that requires higher input (quite often resulting in excessive heat output) or lower input that provides adequate heat but a less impressive flame. By giving consumers the option to enjoy the realistic, full flame with or without the heat, Dimplex Electric Fireplaces are not only energy efficient, but economical to operate.

It costs less to operate the flame only on a Dimplex Electric Fireplace (5 hours per day, 100 day per year) than it does to operate the standing pilot on a gas fireplace for the same number of days (assuming the standing pilot is shut off for the remaining 265 days) – in many cases the standing pilot is left on year-round, more than doubling the operating cost.

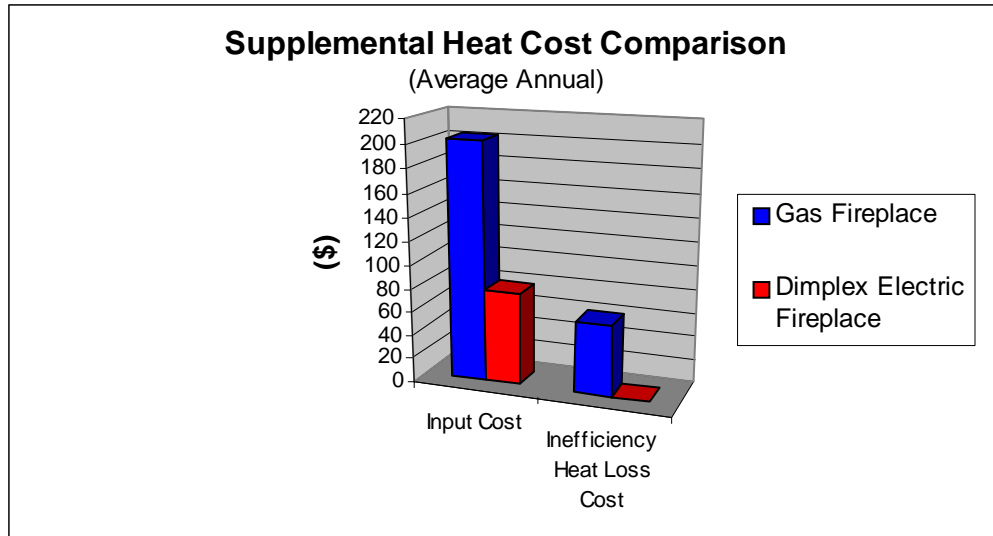


Supplemental Heat

Dimplex Electric Fireplaces are ideal for supplemental heat by providing adequate, controllable output.

Gas fireplaces can interfere with effective overall heating depending on their proximity to the homes central thermostat. Fireplaces are typically a focal point in a high traffic area such as a family room, where the central heating thermostat is also usually located. The high heat output generated by gas fireplaces (even on the low setting) can dramatically affect thermostat readings and effectively shut off the heat to the rest of the house. Furthermore, few individual rooms require, or can absorb, the high heat output of a gas fireplace and can overheat the room making it uncomfortable to enjoy the flame.

Dimplex Electric Fireplaces on the other hand, provide even, thermostat controlled supplemental heating to rooms up to 400 square feet. This is more than adequate for most family rooms and since they provide only the amount of heat required they are more cost effective than gas.



Calculations:

Gas

A 28,000 BTU/hr gas fireplace consumes 14,950,000 BTU annually
 28,000 BTU/hr × 5 hrs/day × 100 days/year = 14,000,000 BTU annually
 Standing pilot 500 BTU/hr × 19 hrs/day × 100 days/year = 950,000 BTU annually
Input cost = 14.95 million BTU × \$13.49/million BTU* = **\$201.68**
 Based on 70% fireplace efficiency, the heat loss cost is **\$60.50**

* According to the EIA, the US 2008 7-month average consumer price of natural gas was \$13.49/Mcf

Electric

A 1440W Dimplex electric fireplace uses 4910.4 BTU/hr or 2,455,200 BTU annually
 4910.4 BTU/hr × 5 hrs/day × 100 days/year = 2,455,200 BTU/year
Input cost = 2.455 million BTU × \$31.70/million BTU* = **\$77.82**
\$0 heat loss (100% efficiency)

* According to the EIA, the US 2008 6-month average retail price of electricity was \$0.1083/kWh.

Efficiency

Dimplex Electric Fireplaces convert 100% of their input energy to heat.

In the supplemental heat comparison from the previous section we see that Dimplex Electric Fireplaces are 100% efficient and therefore do not waste heat, nor the money it costs to generate that heat.

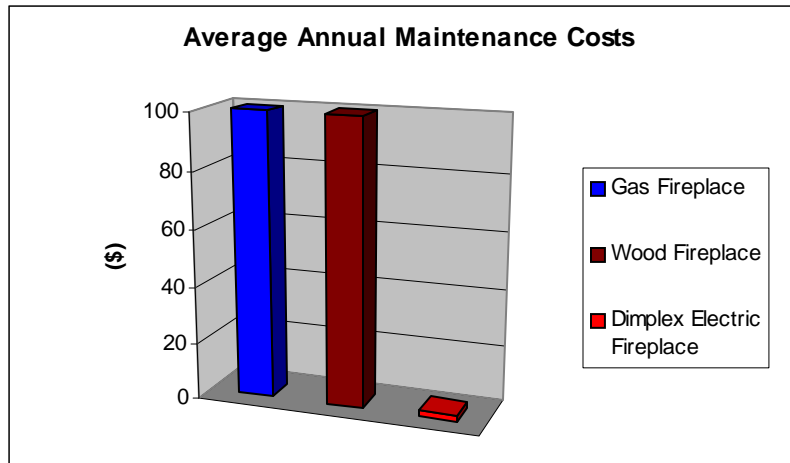
Maintenance Costs

Dimplex Electric Fireplaces require little maintenance compared to gas or wood.

Over its lifetime, a typical Dimplex electric fireplace typically only requires the occasional light bulb change. The bulb is a standard 60-watt chandelier (or torpedo) style, available at virtually any hardware, grocery, general merchandise, or home improvement store.

Costs associated with maintaining gas and wood fireplaces will be somewhat similar over the years. A modern wood stove probably should be cleaned every 4 cords of wood burned or so. This cleaning can be a DIY job or can cost approximately \$100 or more for a professional chimney sweep.

Most gas fireplace manufacturers recommend consumers have their fireplace checked annually by a professional before the start of the heating season. In addition, mechanical parts such as thermocouples can also fail, typically requiring a maintenance call. Consumers can therefore expect to pay approximately \$100 annually for their service check-up, plus the cost of periodic maintenance and required parts.



Installation Costs

Dimplex Electric Fireplaces are simple and inexpensive to install.

Most Dimplex plug-in electric fireplaces require no installation, venting or connections other than simply plugging them into a standard 120V. The basic installation of a Dimplex built-in electric fireplace only requires the unit to be framed, using traditional construction, and connected to an electrical supply. In some instances where the supply is 240 volt, using an electrician may be preferable depending on the users comfort and experience.

Installation of gas and wood fireplaces can be very complicated and expensive, requiring professional contractors, permits, and inspections. Gas fireplace installation (excluding the cost of venting) can range from \$500 to \$1,000 and up for the basic installation, not including the cost of any decorative components.

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