

OptiFlame[®]

revolutionary electric fireplaces
for the professional builder

The **green** alternative in hearth products.
Information on the consumer, commercial and
environmental benefits of electric fireplaces.



Dimplex[®]

North America Limited

Green Building / Sustainability

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 7
- Flame-only optionPage 9
- 100% efficientPage 12

Contributes to a safe, healthy indoor environment

- No particulates from combustion.....Page 5
- No carbon monoxide.....Page 6
- No moisture/mold.....Page 6
- Glass remains safe to touchPage 9
- No gas leaks.....Page 9

Reduce environment impact

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

Thermal comfort

- Zone heating.....Page 8
- Flame without heat.....Page 10
- Supplemental heat.....Page 10

Increase ventilation effectiveness

- No air exchangePage 7

Low-emitting materials

- No emissions.....Page 5

Preserves natural resources

- No consumption of wood.....Page 4
- No consumption of fossil fuelsPage 4

Improved durability and reduced maintenance

- Very low annual maintenance requirement.....Page 12

Reduced construction time and material cost

- No venting/chimney.....Page 13
- No additional gas lines.....Page 13

Lowers operating and maintenance costs

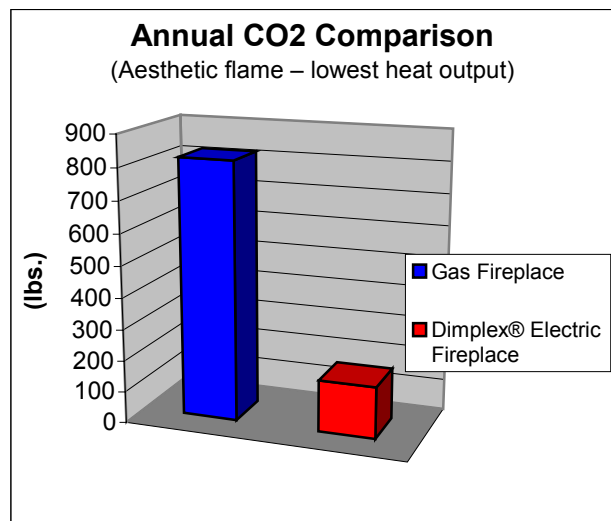
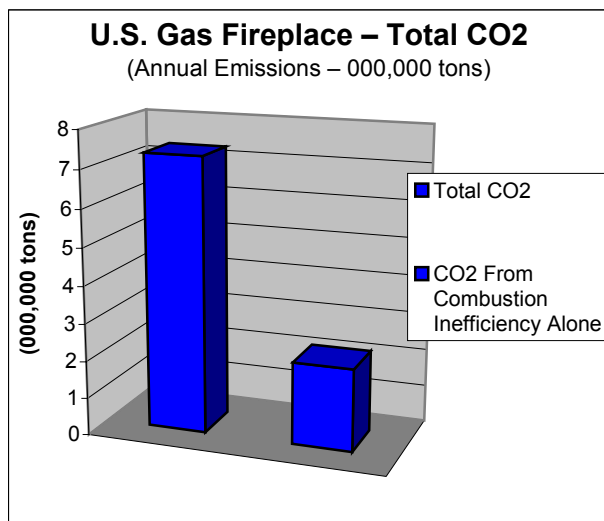
- Periodic light bulb replacement.....Page 12
- No cleaning.....Page 12
- No ‘wear-out’ parts.....Page 12

Environmental Impact

Carbon Dioxide

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). Based on an average direct vent gas fireplace efficiency of 70%, approximately 2,193,750 tons of the total carbon dioxide produced result 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.



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. 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. Even at minimum output, each average direct vent gas fireplace produces 819 pounds of carbon dioxide annually. *Based on unit with standing pilot (500 BTU/hour – 24 hours/day) consuming 14,000 BTU/hour when in use (low heat), 5 hours per day, 100 days per year).* By comparison, a Dimplex® electric fireplace using flame only, produces

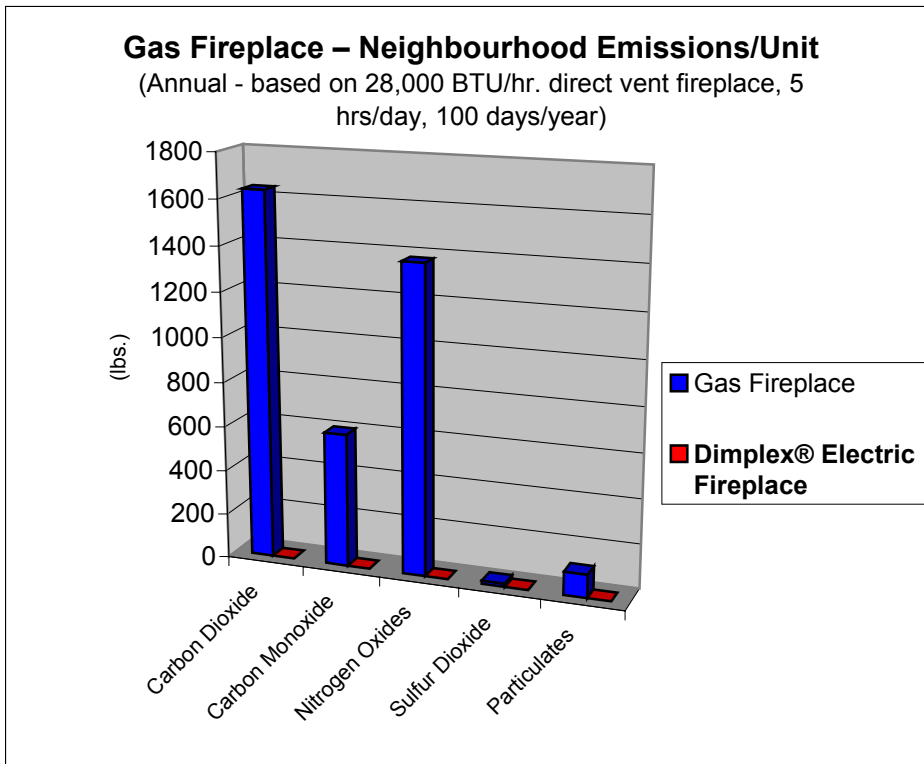
164 pounds of carbon dioxide (as a result of electricity generation) *based on 2,890 BTU/hour, 5 hours per day, 100 days per year*. In addition, it contributes **zero** carbon dioxide or pollutants to the neighborhood air, meaning cleaner air where it matters most.

Neighborhood Air

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

Emissions from gas and wood fireplaces are released directly into residential neighborhood atmospheres where air quality is most important. Because electric fireplace operate without combustion, no particulates or other by-products are released into neighborhood air.

Since houses "breathe" there is always seepage of outside air into the house; therefore, it is not possible for homeowners to isolate themselves from high exterior particulate levels. In addition, the most dangerous particles are too small to be smelled (Burning Issues).



Natural Resources

Dimplex® Electric Fireplaces reduce consumption of wood and fossil fuels.

Electricity is generated from a variety of sources including fossil fuels, nuclear, hydro, and a variety of smaller sources like wind, solar, geothermal and biomass. The result is an aggregate of both clean, renewable sources and non-renewable, polluting sources. As of 1999, 30% of all electrical generation came from clean, non-fossil fuel generation (U.S. Department of Energy). That represents a 30% reduction of fossil fuels 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 30 million cords in 1996. 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. As a rough conversion, there are about 500 board feet of lumber in a typical cord of wood and a typically 1,800 square foot house uses 10,000 board feet of lumber. The cord of wood is with the bark on it, and the bark accounts for 10 to 20 percent of the volume of the wood. 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 1996 wood burning stoves and fireplaces consumed 2 million acres of mature forest in the United States alone.

Indoor Air Quality

Combustion Emissions

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

The Environmental Protection Agency 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
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 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 any 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.

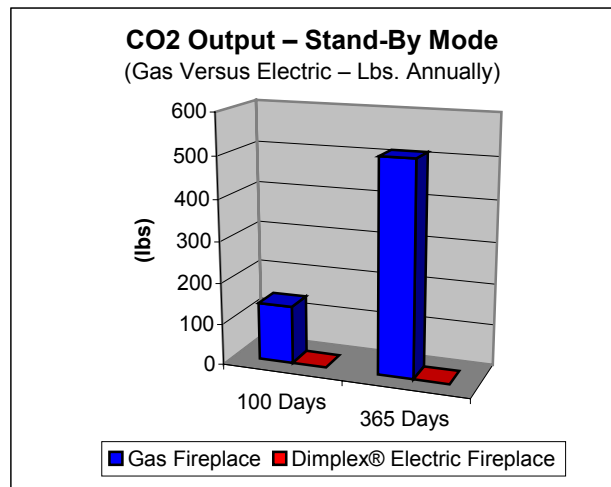
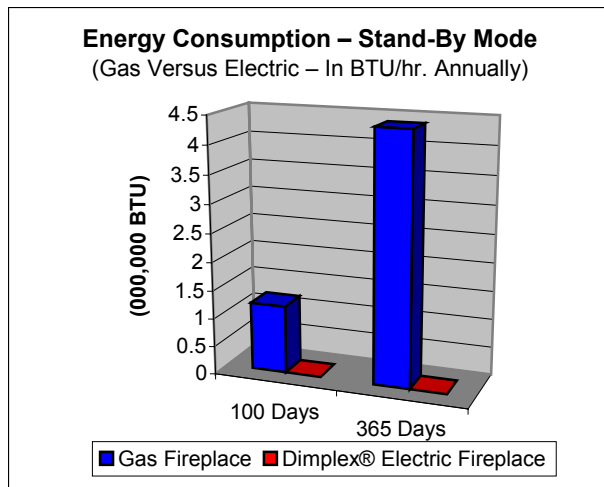
Energy Efficiency

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. 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 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, with an average cost per therm of \$0.92, that amounts to approximately \$350 extra per year in home energy costs.

Zone Heating

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

Dimplex® built-in electric fireplaces produce up to 10,000 BTU/hour, enough to provide primary heat for up to 300 square feet, or the size of an average family rec. room. In applications where the fireplace is required only for supplemental heat, it provides adequate heat for up to 800 square feet.

Gas fireplaces on the other hand typically produce 30,000 BTU/hour or more, while the average home requires 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® built-in 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° to 15° 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 eight hours long.

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.

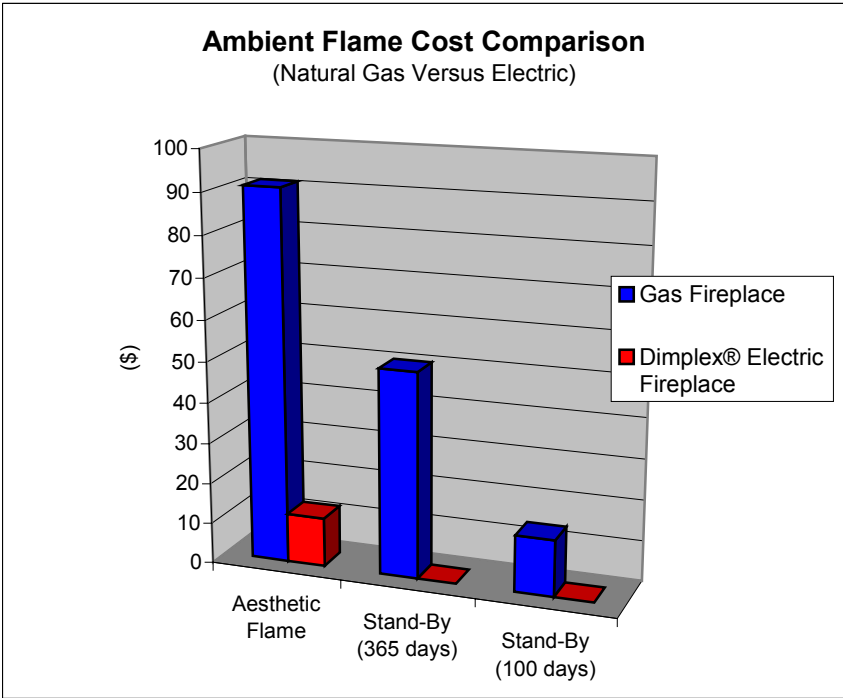
The relative simplicity of installing a Dimplex® electric fireplace, without the need for gas connections, chimneys or venting, eliminates any potential hazards associated with these operations. While the likelihood of these dangers is small, the consequences and liability are not. Broken gas lines caused 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, more than doubling).

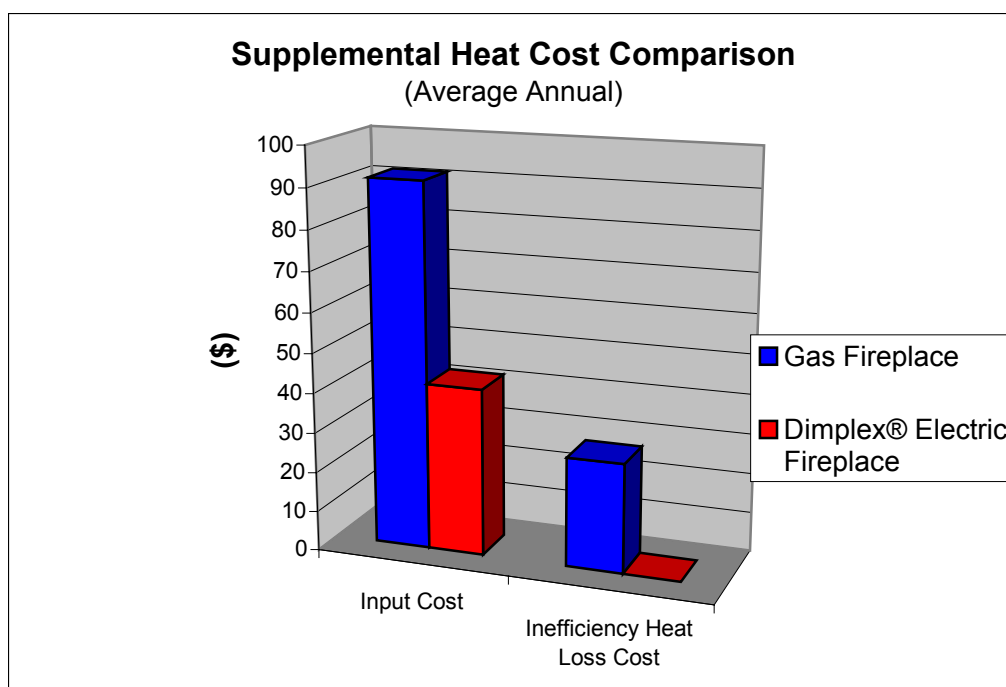
Supplemental Heat

Dimplex® Electric Fireplaces are ideal for supplemental heating 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 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 from 400 to 800 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

28,000 BTU/hr fireplace set to low (14,000 BTU/hr)
 14,000 BTU/hr x 5 hrs/day x 100 days/year = 7,950,000 BTU annual
 \$11.50/million BTU (based on \$0.92/therm)
 = **\$91.43 (input cost)**
\$27.43 combustion heat loss (based on 70% fireplace efficiency)

Electric

4,937 BTU/hr fireplace with thermostat cycling @ 50% (2,469 BTU/hr)
 2,469 BTU/hr x 5 hrs/day x 100 days/year = 1,234,250 BTU annual
 \$29.30/million BTU (based on \$0.10/kWh)
 = **\$36.16 (input cost)**
\$0 heat loss (100% efficiency)

Efficiency

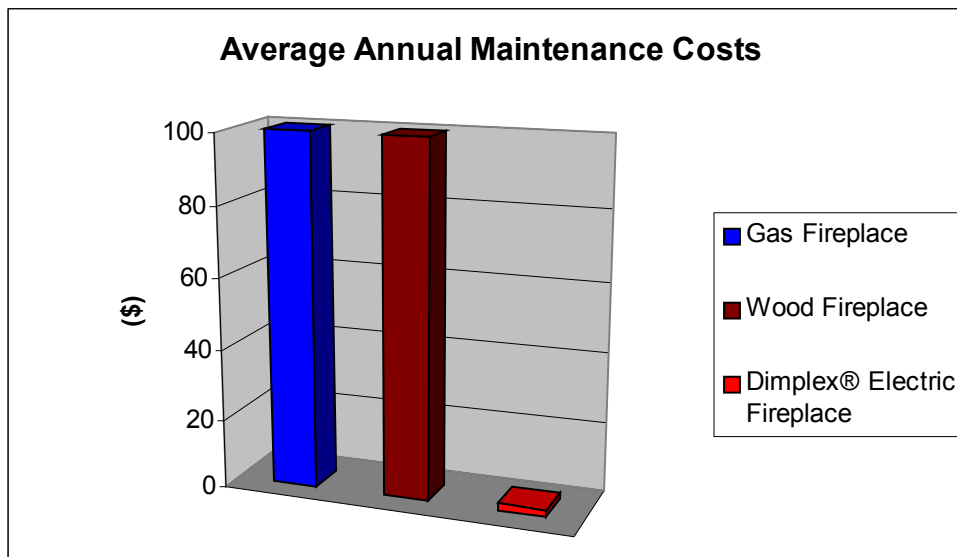
Dimplex® *Electric Fireplaces convert 100% of the input energy to heat.*

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 from \$55 to \$100 or more (if a fireplace insert has to be removed from the fireplace.)

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 between \$50-100 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.

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, however, no permits or inspections are required.

Dimplex® plug-in electric fireplaces require no installation, venting or connections other than simply plugging them into a standard 120V.

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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