Attachments to Proposed Changes

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SustainableSolutions CORPORATION

Life Cycle Installation and Maintenance Data
12/17/10

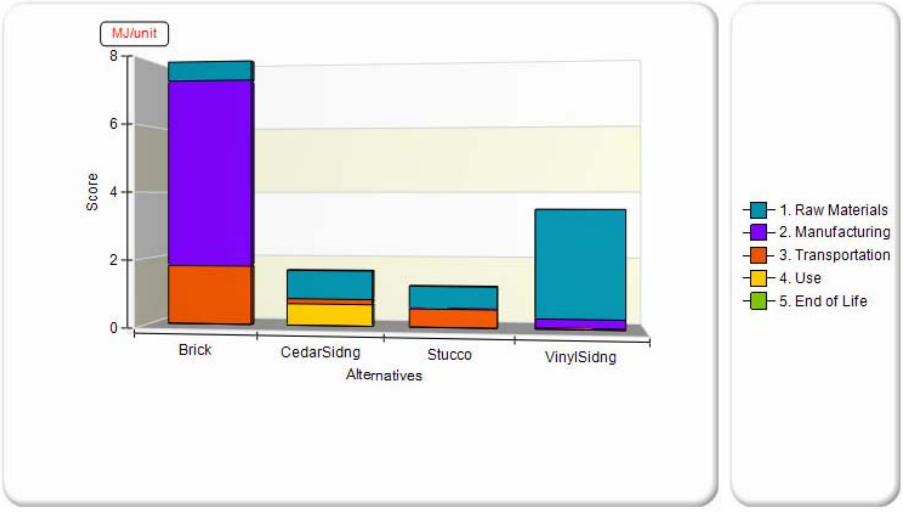
Executive Summary

In addition to the environmental impacts associated with the production of building materials, the installation and maintenance of these products can also have a significant impact on the environment. Many materials require adhesives, finishes, stains and other materials as a part of their installation or regular maintenance over the course of the product life. Often there are alternative products that serve the same purpose that do not require additional materials for installation or maintenance. These materials offer a clear environmental benefit over those requiring installation and maintenance materials.

Life Cycle Assessment (LCA) provides a comprehensive view of the environmental aspects of a product and an accurate picture of the environmental costs and benefits of product selection. The graph below shows the results of a comparison of the life cycle impacts of several cladding products using the Building for Economic and Environmental Sustainability (BEES) LCA tool. Cedar Siding's use phase (installation and maintenance, illustrated in yellow below) requirements include one coat of primer and two coats of stain at installation and two coats of stain every ten years, while the other cladding products require little or no maintenance. The graph demonstrates the environmental impacts associated with the installation and maintenance of the selected products and supports the conclusion that choosing products with minimal installation and maintenance requirements reduces the environmental impacts associated with building construction. Further such graphs and examples are provided throughout the report.

In addition to the environmental benefits of materials with minimal maintenance requirements, there are also economic benefits. The reduction in maintenance costs can be a significant benefit to all building owners, and is of particular importance to residents of affordable housing and first-time homebuyers. Thus, a product that requires minimal maintenance produces both environmental and economic benefits.

BEES Environmental Impact: Fossil Fuel Depletion



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The NGBS and Passive House

Building the Best Green Standard

Inclusion of Passive House design and energy performance with the NAHB's National Green Building Standard/ ICC 700-2008 is not only desirable for all parties involved, but essential. Energy is at the heart of green building. Passive House is the logical endpoint for energy-conscious construction. Including the Passive House standards in the NGBS would create the best green building standard possible.

Following are notes regarding key areas where Passive House methodology can be recognized within NGBS.

Performance/ Site Testing

NGBS Performance Path does not yet require site testing; it is optional. This is different from LEED-Homes Performance Path, which requires Energy Star-equivalent site testing. [Site testing would include a blower-door test, duct pressurization test for HVAC ducts outside the thermal envelope, verification of proper insulation install., etc.]. While this feature of the NGBS may seem like "flexibility", or helpful to some builders compared to LEED-Homes, attaining the highest "Emerald" level in NGBS should require inspections similar to what Passive House requires.

"Emerald" Level Energy Efficiency Requires 120 Points

NGBS Energy Efficiency (Chapter 7) requires 120 points to allow for Emerald Level scoring. Within the Performance Path section 702, Sub-Section 702.2 (4) provides for the granting of 120 points when energy efficiency of the building exceeds the ICC IECC by 60 percent.

Using the HERS scale, an Energy Star home would score an 85, or 15% better than baseline. Tim Eian states in his "Close to Zero" presentation to AIA that a Passive House would score a 15 on the HERS scale. These scores indicate that a Passive House would represent better than an 82% improvement in energy consumption compared to an Energy Star home.

It's interesting to note that the 2009 edition of the IECC totally exempts "very low energy buildings" which consume < 3.4 Btu/h-ft^2. A Passive House, by definition, has a Specific Primary Energy Demand of less than 38,039 Btu/h-ft^2/year. This contemplates source energy, which if electric & coal sourced (conversion factor 3.3) yields 11,527 Btu/h-ft^2/year of site consumption. This is a limit of 31.58 Btu/h-ft^2 daily, or 1.315 Btu/ft^2 each hour. Therefore, the Passive House metric exceeds 2009 IECC definition of a "very low energy building" by better than 61%.

Note that the Passive House definition of "Treated Floor Area" is more stringent than simple calculation of area square footage, in keeping with the German Floor Area Ordinance. *This makes the Passive House energy performance the more remarkable.*

"Emerald" Level Energy Efficiency = Passive House

NGBS Energy Efficiency (Chapter 7) allows for an "Alternative Bronze Level" for compliance. Any building that qualifies as an Energy Star Qualified Home or equivalent achieves the Bronze Level for Energy Efficiency, Chapter 7. This is described in Practice # 701.1.3.

Therefore, it should be relatively simple to mirror this for Passive House adoption. Suggested language could read: "Any building that is certified by the Passive House Institute/ Passive House Institute U.S. achieves the Emerald Level for Energy Efficiency, Chapter 7." A practice would be added for this, such as # 701.2.1.

Here, the word "certified" is preferable to the phrase "qualifies as . . . or equivalent". For PHIUS, the "certification" requirement encourages designers/ builders/ owners to take the Passive House building process to its logical conclusion: certification. For the NAHB Research Center Certification Program, the Passive House Certificate makes compliance very easy to determine and document; no time needs to be spent by NGBS Program verifiers, or NAHB Research Center staff, to compare and contrast competing energy performance results, some of which will be reported in IP values, some in SI; some of which will be reported based on the German Treated Floor Area, some in unadjusted square footage numbers.

Clarity of language, and speed of verification / certification by the NAHB Research Center, are both critical elements to the continued growth and success of the NGBS. The speed of certification under the NGBS is a major selling point in its favor, when compared to LEED-Homes.

Integrated Design Benefits

The NAHB staff, including NAHB Research Center staff, may not be familiar with the integrated design approach of Passive House. They may/ may not know of the specific performance metrics required for PH Certification, but they probably are not aware of the level of detail involved in Passive House planning and energy modelling, such as:

- Highly-detailed UA (U factor for thermal envelope) calculations, which include
  - Thermal bridging calculations (in THERM) where such bridges are present
  - UW calculations (U factor window) which include not only glass and frame, but also spacer thermal coefficient, installation thermal coefficient; doors with glass are modeled as windows
- Solar gain calculations which include wall orientations (N,S,E,W), angle of incidence/inclination for fenestration, highly-detailed shading calculations for fenestration, even a discount factor for "dirty" windows
- Thermal mass within the thermal envelope
- Ventilation air energy recovery efficiency requirement
- Ventilation system design, including fresh air CFMs, duct design, air distribution, Coanda effect, etc.
- DHW / Service Hot Water energy efficiency, including distribution heat loss calculations
- Site vs. Source energy calculations; inclusion of site, renewable energy generation; CO_2 awareness

Ventilation: The PH ERV/HRV Impact on IAQ

Chapter 9 of the NGBS concerns Indoor Environmental Quality/ IAQ. Reliance in PH methodology on a superior ERV/ HRV for continual fresh air supply should be recognized by the NGBS here. To encourage Passive House building, it may be wise for the NGBS to assign an "automatic" point total in Chapter 9 for Passive House homes, since they would comply with some many provisions in the NGBS already. Items of high relevance in Chapter 9 include:

- Attached garages (901.3) are separated from living space(thermal envelope) in airtight manner
- Continual supply of fresh air off-sets:
    - Off-gassing of wood products (901.4)
    - Off-gassing of flooring products (901.5 & 6)
    - Off-gassing of wall coverings (901.7)
    - Architectural coatings, site applied finishes: VOC concerns (901.8 – 901.9)
    - Off-gassing of cabinetry (901.10)
    - Off-gassing of insulation (901.11)
- Qualifies as pollution control, as in:
    - Spot ventilation in baths & kitchens (902.1.1-3)
- Satisfies "Building Ventilation System" criteria:
    - Continuous operation, either as ERV or HRV (902.2.1)
    - Ventilation airflows tested at building commissioning (902.2.2)
    - MERV filtration of 8 or better (902.2.3)
        - e.g. *Ultimate Air Recouperator provides MERV 12 filtration*
    - Radon control (902.3)
        - Continual fresh-air supply + airtight construction = superb radon mitigation

ENERGY STAR®
Program Requirements for Residential Windows, Doors, and Skylights – Version 5.0

Partner Commitments

Eligible Organizations:
Manufacturers (and private labelers) of Residential Windows, Doors, and Skylights;
Manufacturers of Residential Window, Door, and Skylight Components

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Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing and marketing of ENERGY STAR qualified windows, doors, and skylights. The ENERGY STAR PARTNER must adhere to the following program requirements:

- Comply with the current ENERGY STAR Eligibility Criteria defining the requirements that must be met for use of the ENERGY STAR on windows, doors, and skylights and specifying the National Fenestration Rating Council (NFRC) certification requirement for windows, doors, and skylights. The U.S. Department of Energy (DOE) may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market or voluntarily supplied by PARTNER at DOE's request;

- Comply with current ENERGY STAR Identity Guidelines, ENERGY STAR Marks, Maps, and Messaging: Simplified Marketing Guidelines for Partners, and other guidelines specific to the program area. These guidelines describe how the ENERGY STAR name, marks, and labels may be used. PARTNER is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors are also in compliance;

- Offer at least one ENERGY STAR qualified model of a window, door, or skylight or manufacture components that are used in the construction of qualified windows, doors, or skylights before activating this agreement. Windows, doors, or skylights must appear under the PARTNER's name in the National Fenestration Rating Council's (NFRC) Certified Product Directory (CPD);

- Provide clear and consistent labeling of ENERGY STAR qualified windows, doors, and skylights and display units for these products. When PARTNER labels the product, it must meet the specification in effect at that time. The ENERGY STAR for Windows, Doors, and Skylights Product Qualification Label must be clearly displayed on ALL qualified windows, doors, and skylights. ALL display units for qualified products must display the ENERGY STAR for Windows, Doors, and Skylights Display Unit Label. Labeling qualified products and display units is not optional. Components may not carry an ENERGY STAR label or logo. The appropriate ENERGY STAR mark must be clearly displayed on the manufacturer's Internet site and in product literature (e.g., catalogues, user manuals, spec sheets, etc.) where information about ENERGY STAR qualified models is displayed;

- Provide a Qualified Product Information form (QPI). Once PARTNER submits its QPI form, PARTNER's company name will be featured in the product search for ENERGY STAR qualified windows, doors, and skylights on the ENERGY STAR Web site. PARTNER is responsible for submitting a new QPI form at least once per year. TDD manufacturer partners must also submit a copy of the NFRC Certification Authorization Report documenting the computer simulated U-factor ratings for their qualified products. Component manufacturers do not need to provide QPI forms;

- Notify DOE of a change in the designated responsible party or contacts for windows, doors, and skylights within 30 days and update all contact and organization information at least once per year.

Performance for Special Distinction

In order to receive additional recognition and/or support from DOE for its efforts within the Partnership, the ENERGY STAR PARTNER may consider the following voluntary measures and should keep DOE informed on the progress of these efforts:

- May provide to DOE or its contractor for ENERGY STAR for Windows, Doors, and Skylights, on an annual basis, unit shipment data to assist in determining the market penetration of ENERGY STAR qualified windows, doors, and skylights. Specifically, PARTNER may submit the total number of ENERGY STAR qualified units shipped and the total number of units shipped to U.S. destinations broken down by product category (window, door, skylight) and state or regions specified by DOE.

  The data for each calendar year may be submitted to DOE or its contractor, in electronic format, no later than March 31 of the following year and may be provided directly by PARTNER or through a third party. Data submitted to the DOE contractor for ENERGY STAR for Windows, Doors, and Skylights will be aggregated before it is transferred to DOE. The data will be used by DOE only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), DOE will argue that the data is exempt. Any information used will be masked by DOE so as to protect the confidentiality of PARTNER.

- Consider energy efficiency improvements in company facilities and pursue to benchmark their buildings through the ENERGY STAR Buildings program;

- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to DOE for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes;

- Ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;

- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified product models;

- Feature the ENERGY STAR mark(s) on PARTNER web site and in other promotional materials. If information concerning ENERGY STAR is provided on PARTNER web site, DOE may provide links where appropriate to PARTNER web site;

- Provide a simple plan to DOE outlining specific measures PARTNER plans to undertake beyond the program requirements listed above. By doing so, DOE may be able to coordinate, communicate, and/or promote PARTNER's activities, provide a DOE representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones for which PARTNER would like DOE to be aware. For example, activities may include:

  (1) Increase the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines;

  (2) Demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year;

  (3) Provide information to users (via the web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and

  (4) Build awareness of the ENERGY STAR Partnership and brand identity by collaborating with DOE on one print advertorial and one live press event;

- Provide quarterly, written updates to DOE as to the efforts undertaken by PARTNER to increase availability of ENERGY STAR qualified products and to promote awareness of ENERGY STAR and its message.

ENERGY STAR® Eligibility Criteria for

Residential Windows, Doors, and Skylights

Below are the product criteria for ENERGY STAR qualified residential windows, doors, and skylights. A product must meet all of the identified criteria to be labeled as ENERGY STAR qualified by its manufacturer.

1) Definitions:
   a) Window: An assembled unit consisting of a frame/sash component holding one or more pieces of glazing functioning to admit light and/or air into an enclosure and designed for a vertical installation in an external wall of a residential building.
   b) Door: A sliding or swinging entry door system designed for and installed in a vertical wall separating conditioned and unconditioned space in a residential building. ENERGY STAR recognizes three categories of doors:
      i) Opaque: A door with no glazing.
      ii) ≤ ½-lite: A door with ≤ 29.8 percent glazing (based on NFRC 100-2004 or the most recent procedure available from NFRC). Includes ¼- and ½-lite doors.
      iii) > ½-lite: A door with > 29.8 percent glazing (based on NFRC 100-2004 or the most recent procedure available from NFRC). Includes ¾-lite and fully glazed doors.
   c) Skylight: A window designed for sloped or horizontal application in the roof of a residential building, the primary purpose of which is to provide daylighting and/or ventilation. May be fixed or operable. Skylights have their own set of ENERGY STAR criteria. Tubular Daylighting Devices are included under the skylight criteria.
   d) Sliding Entry Door: A door that contains one or more manually operated panels that slide horizontally within a common frame. Sliding doors are included under the door criteria and definition.
   e) Swinging Entry Door: A door system having, at a minimum, a hinge attachment of any type between a leaf and jamb, mullion, or edge of another leaf or having a single, fixed vertical axis about which the leaf rotates between open and closed positions. Swinging entry doors are included under the door criteria and definition.
   f) Tubular Daylighting Device (TDD) or tubular skylight: A non-operable device primarily designed to transmit daylight from a roof surface of a residential building to an interior ceiling surface via a tubular conduit. The device consists of an exterior glazed weathering surface, a light transmitting tube with a reflective inside surface and an interior sealing device, such as a translucent ceiling panel. TDDs are included under the skylight criteria.
   g) Dynamic Glazing Product: Any fenestration product that has the fully reversible ability to change its performance properties, including U-factor, SHGC, or Visual Transmittance. This includes, but is not limited to, shading systems between the glazing layers and chromogenic glazing.
      i) Switch-able Glazing Product: An electrochromic glass system that can be tinted or untinted in response to an electronic control signal or environmental change.
      ii) Internal Shading System: A fenestration product that includes blinds or shades positioned between glass panes that can open or close.
   h) Window, door, and skylight components: Components used by an ENERGY STAR partner in the construction of an ENERGY STAR qualified window, door, or skylight including, but not limited to, coated glass, frame profiles, and warm-edge spacers.
   i) Residential Building: A structure used primarily for living and sleeping that is zoned as residential and/or subject to residential building codes. For the purposes of ENERGY STAR, "residential building" refers to buildings that are three stories or less in height.
   j) Insulating Glass (IG) Unit: A preassembled unit, comprising lites of glass, which are sealed at the edges and separated by dehydrated space(s). The unit is used in glazed fenestration products.
   k) Private labeler: A company that has joined the NFRC private labeler program in order to market under its own name windows, doors, or skylights manufactured by a different company.
   l) U-Factor: The heat transfer per time per area and per degree of temperature difference. The U-factor multiplied by the interior-exterior temperature difference and by the projected fenestration product area yields the total heat transfer through the fenestration product due to conduction, convection, and long wave infra-red radiation. Expressed here in units of Btu/h·ft^2·ºF.

m) Solar Heat Gain Coefficient (SHGC): The ratio of the solar heat gain entering the space through the fenestration product to the incident solar radiation. Expressed as a value between 0 and 1.
n) National Fenestration Rating Council (NFRC): NFRC provides product and energy performance data for windows, doors and skylights.
o) NFRC 2004 Procedures: Product testing and simulation procedures officially released by NFRC in 2004.
p) ENERGY STAR Climate Zone: See ENERGY STAR Climate Zone Map on page 5. A complete list of ENERGY STAR Climate Zones by state and county or, where applicable, zip code will be available from DOE or its contractor.

2) Eligible Products: Windows, doors, skylights, and dynamic glazing products (while in the minimum tinted state for switch-able glazing products or the full "OPEN" position for internal shading systems) for residential applications that appear in the NFRC CPD, meet the definitions specified above, and meet the testing, certification, and ENERGY STAR criteria specified on the next page.

3) Testing and Certification Criteria: The performance of windows, doors, and skylights must be independently tested and certified in accordance with National Fenestration Rating Council (NFRC) procedures for U-Factor (NFRC 100) and Solar Heat Gain Coefficient (NFRC 200). All products containing insulating glass (IG) units must have them certified according to NFRC procedures when such procedures are established. TDDs must meet the skylight U-factor criteria using U-factor ratings certified under the NFRC computer simulation procedure.

4) Effective Date: The effective date of this version of the Program Requirements, Version 5.0, is January 4, 2010, and supersedes all previous versions.

5) Future Criteria Revisions: ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Keeping with current policy, industry/stakeholder discussions determine revisions to the criteria.

6) ENERGY STAR Criteria: To qualify for ENERGY STAR, products must have NFRC certified U-Factor and, where applicable, Solar Heat Gain Coefficient (SHGC) ratings at levels which meet or exceed the minimum qualification criteria specified in the table on the following page. Windows and skylights must meet the criteria for a given ENERGY STAR Climate Zone. Window, door, and skylight products must be rated under the NFRC 2004 procedures or the most recent procedures available from NFRC.

   Equivalent Energy Performance: Allows windows and sliding doors with energy performance equivalent to the prescriptive criteria to qualify in the Northern climate zones. Equivalent performance criteria are not applicable to the North-Central, South-Central, or Southern climate zones or to swinging entry doors or skylights.

ENERGY STAR® Qualification Criteria for Residential Windows, Doors, and Skylights

Windows

Climate Zone	U-Factor[1]	SHGC[2]	
Northern	≤ 0.30	Any	Prescriptive
	=0.31	≥ 0.35	Equivalent Energy Performance
	=0.32	≥ 0.40	
North-Central	≤ 0.32	≤ 0.40	
South-Central	≤ 0.35	≤ 0.30	
Southern	≤ 0.60	≤ 0.27	

[1] Btu/h.ft^2.˚F

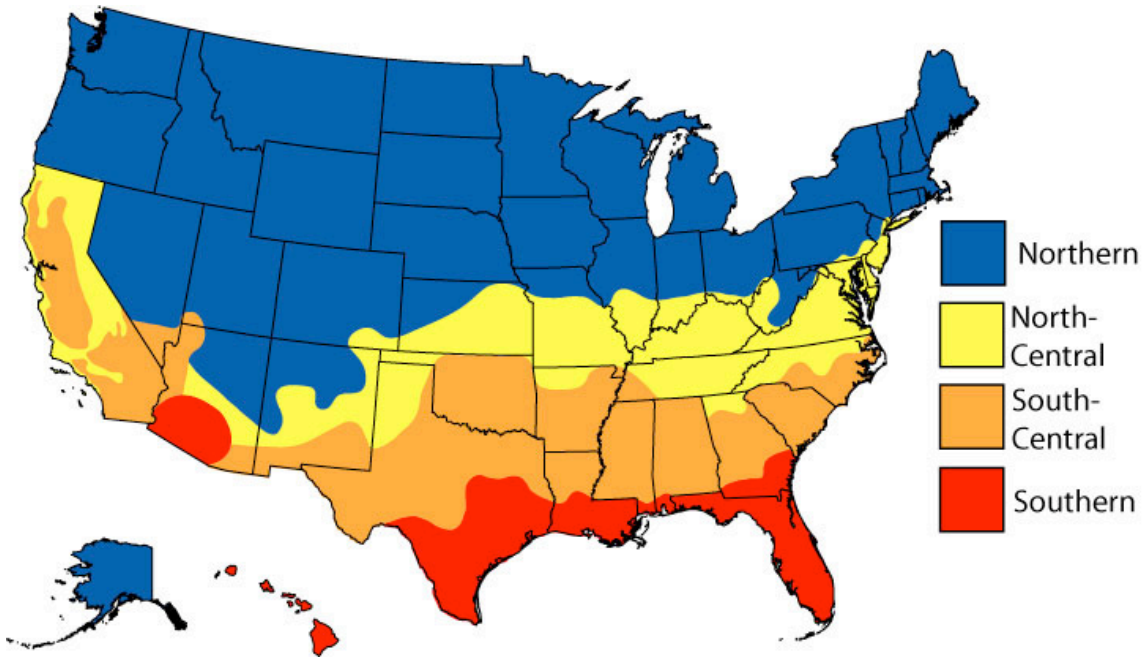
[2] Fraction of incident solar radiation

Doors

Glazing Level	U-Factor[1]	SHGC[2]
Opaque	≤ 0.21	No Rating
≤ ½-Lite	≤ 0.27	≤ 0.30
> ½-Lite	≤ 0.32	≤ 0.30

Skylights

Climate Zone	U-Factor[1]	SHGC[2]
Northern	≤ 0.55	Any
North-Central	≤ 0.55	≤ 0.40
South-Central	≤ 0.57	≤ 0.30
Southern	≤ 0.70	≤ 0.30



Frame/Foundation Change for Low Rise Residential

For more than 100 years the template for low rise residential construction has been PLATFORM FRAMING. Platform framing is a building system dating back to the 19th century and still used today for most low rise commercial and residential construction. This system is intrinsically flawed and restrictive to innovation and is mostly responsible for the fragmentation endemic to residential construction. Basic elements of this system are shown in figure 1. The assembly order for walls in platform framing is such that services hardware and insulation can be added only after an open sided wall is installed, thus restricting innovative approaches. Additionally, please note the vulnerability for unwanted air infiltration. Seismic activity and distortions of the wooden components in the frame/foundation connection from temperature and humidity variations cause openings to develop around the building perimeter to allow unwanted air infiltration. Engineering design considerations to correct this basic flaw have never been addressed. For "net zero energy" to succeed, it is imperative that a flexible insulating gasket becomes part of this junction. Attaching a wooden component directly to a concrete foundation is simply bad engineering. Good engineering always requires an appropriate interface when dealing with dissimilar materials.

Consider instead a revised system illustrated in figures 2 and 3. Modifying the frame/foundation connection, not only stop all unwanted air infiltration it also leads to **true panelized construction**. By adopting this simplified connection, all envelope components including walls, roof and floor are factory produced and delivered to the job site for assembly by a trained work crew. Sprinkler plumbing, insulation and other service hardware are all pre-installed before delivery. Inter-connection of the various utilities imbedded in the panels is done after the envelope is complete and the assembly crew is gone (See figure 3)

Advantages include:

1. Simplifies and strengthens the load path between the roof and foundation
2. Provides a convenient electric wiring chase for all wiring. In addition to basic wiring, modern homes require high speed internet cables to connect the home to the outside world. This also includes wiring for heating control, surveillance cameras, computers, printers, music and home theater systems.
3. The closed cell, insecticide laced insulating gasket shown in the frame/foundation connection also provides an insect barrier.
4. Forms the basis for true panelized construction where all envelope components are factory produced in a factory controlled environment and assembled on the job site by a trained work crew.
5. Insulation: Study after study has shown cellulose insulation to be a far better than fiberglass. "On site" builders continue to use fiberglass for convenience.
6. Energy conservation. The new frame/foundation connection stops all unwanted air infiltration in the frame/foundation connection.

7. Moisture control: Controlling air infiltration also controls damaging moisture accumulation.
8. Load bearing strength. In this new configuration, loading is transferred away from framing studs to the panel skins. This reduces framing lumber requirements and increases load strength.
9. Quality. All components for this structure are factory produced in a controlled environment before they are delivered to the job site for assembly.
10. Resale value. Quality design and low energy usage will enhance the resale value of structures using this design.
11. Lower insurance rates. Time will show that these structures are less vulnerable to damage from natural forces.
12. Home comfort. This construction method results in reduced noise levels, and provides for homogeneous temperature distribution.
13. Blower door test. With proper fenestration management, this structure will comfortably pass all blower door tests throughout its' lifetime

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TRUE PANELIZED CONSTRUCTION

PLATFORM FRAMING

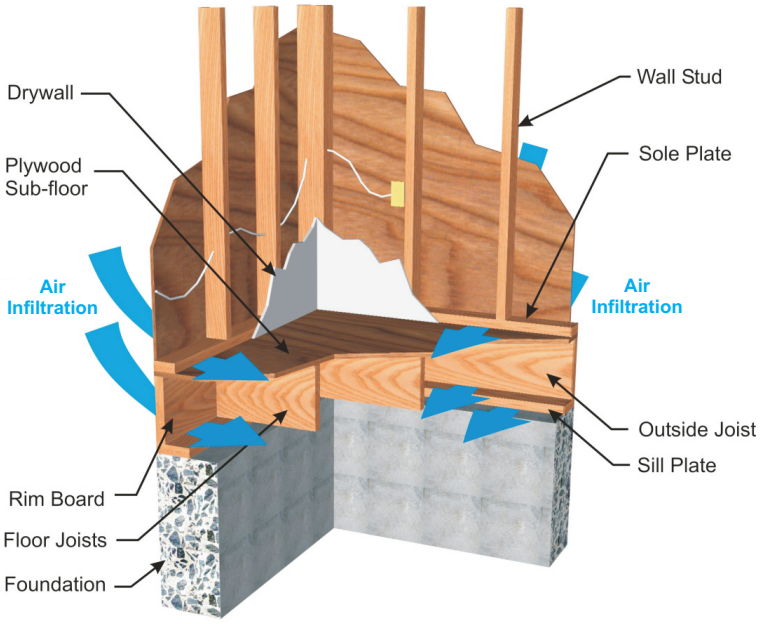


Figure 1

PRE-FABRICATED WALL PANEL SYSTEM

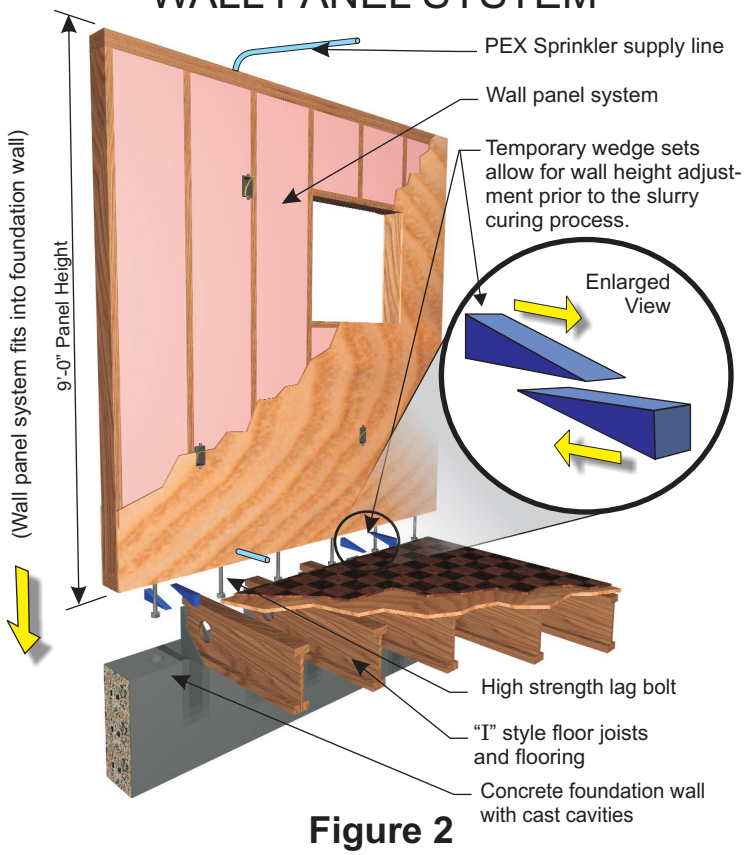
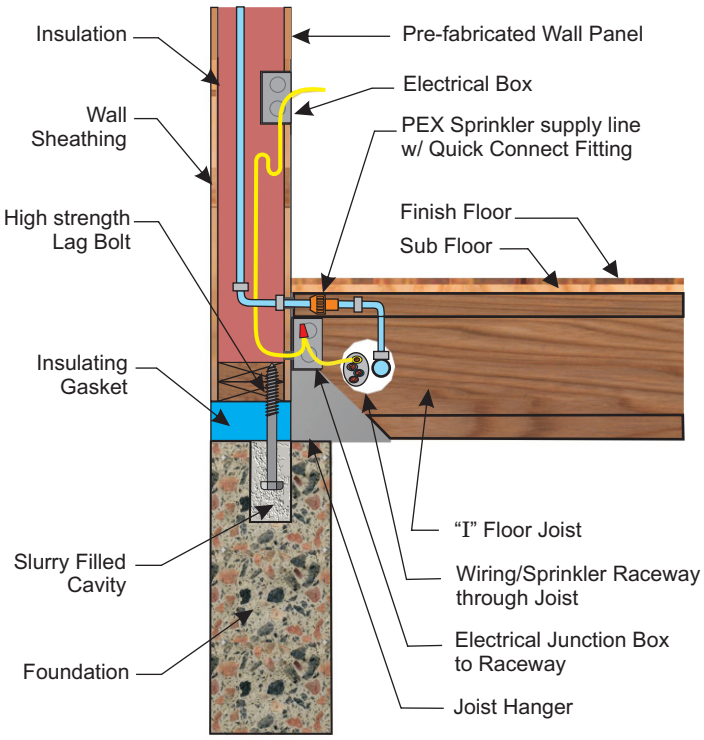


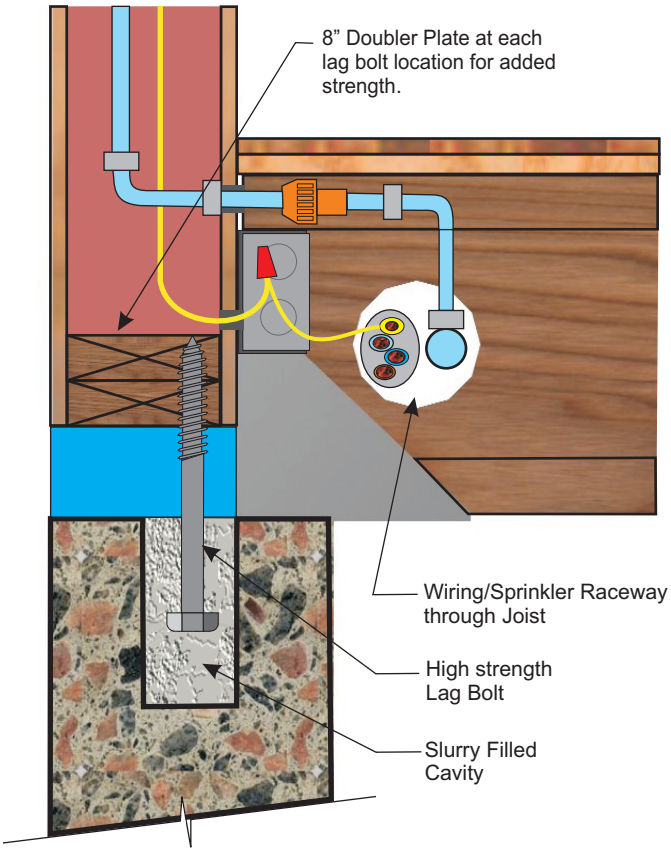
Figure 2

WALL PANEL SYSTEM SECTION



Cross Section

Figure 3



Enlarged Detail

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.

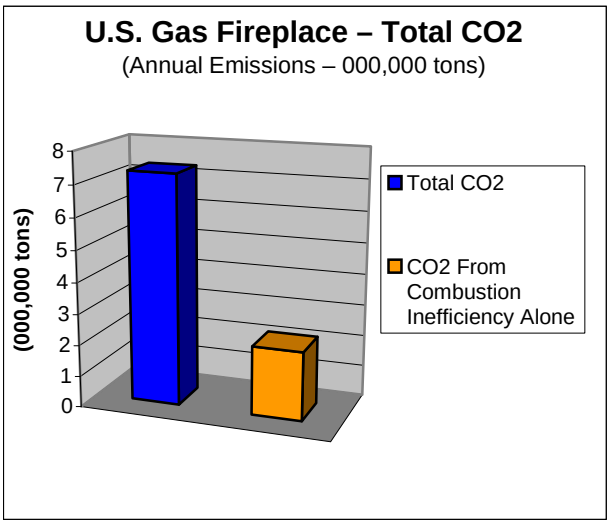
Criteria

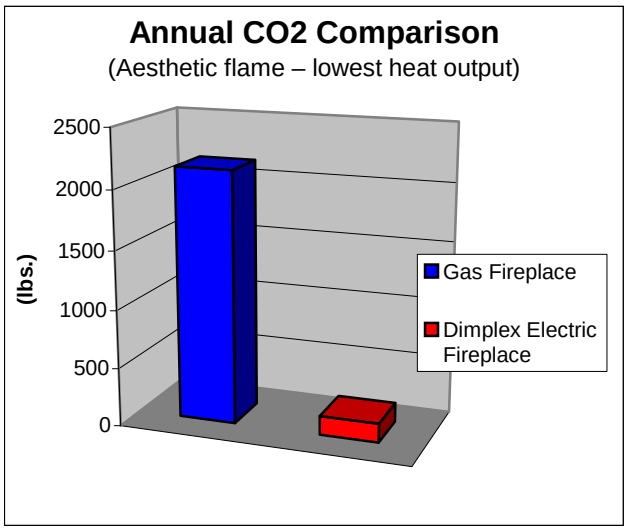
Environmental Impact

Carbon Footprint

Dimplex Electric Fireplaces produce less CO_2 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).*

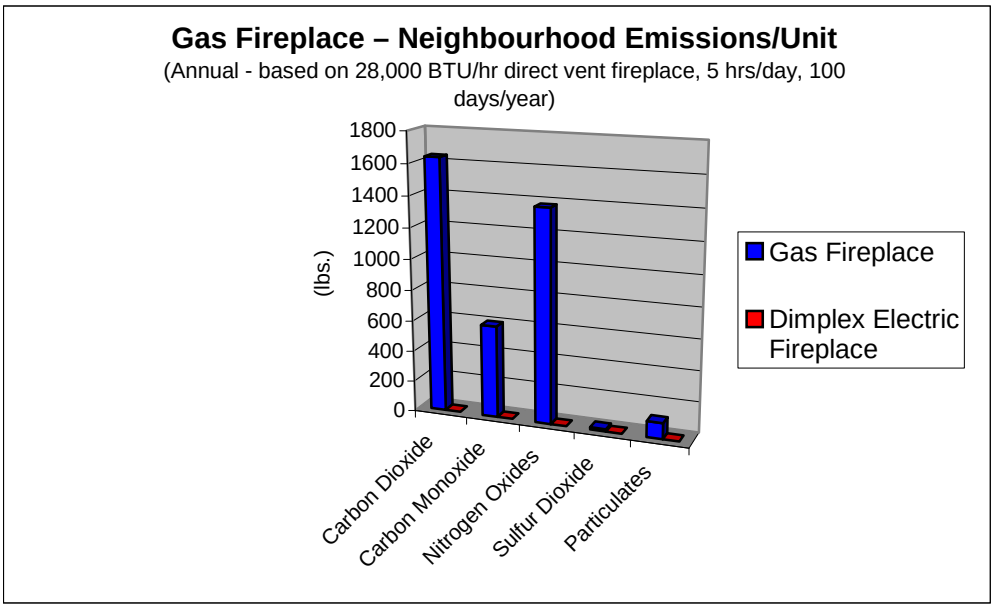
*According to the Environmental Protection Agency, natural gas emits 11.7 lbs of CO_2 per therm (or per 100,000 BTU)
** According to the Environmental Protection Agency, the production of an average mix of electricity emits 1.37 lbs of CO_2 per kilowatt-hour.

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.

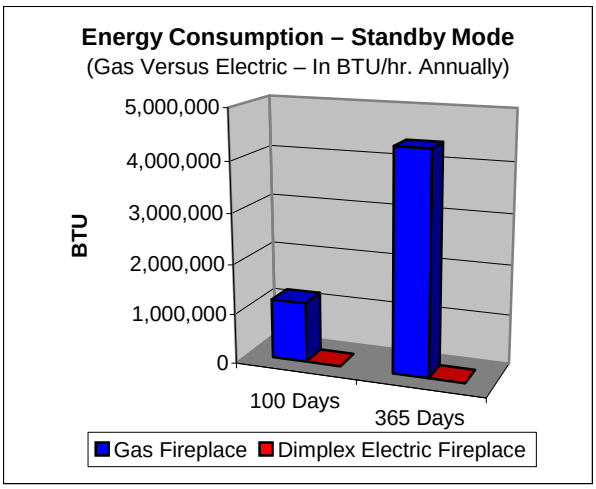
Energy Efficiency

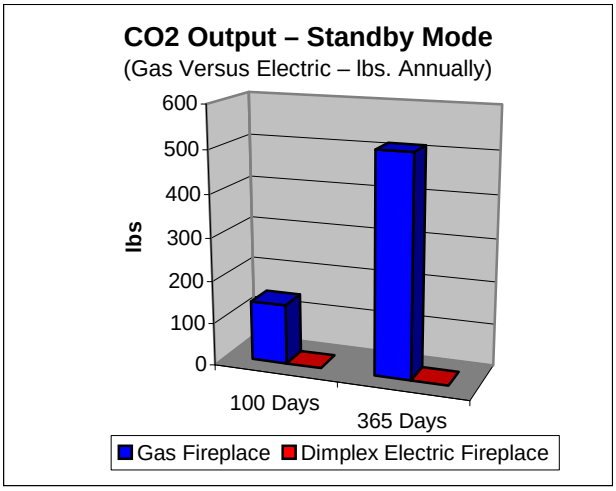
Standing Pilot

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 CO_2 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.

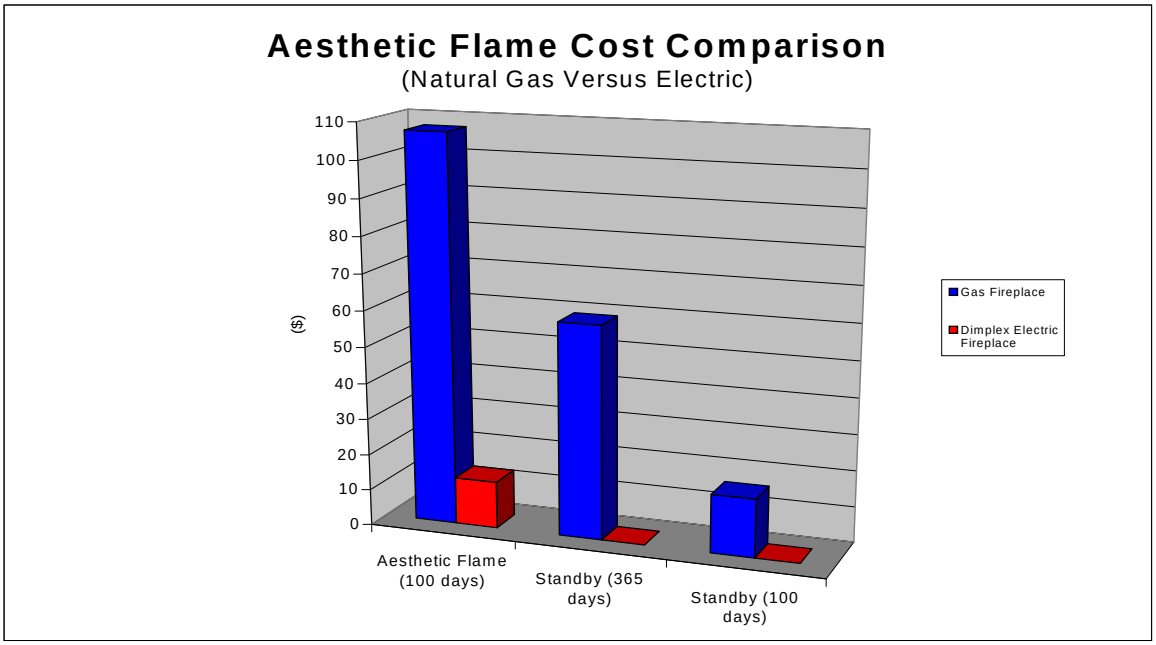
Economics

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.

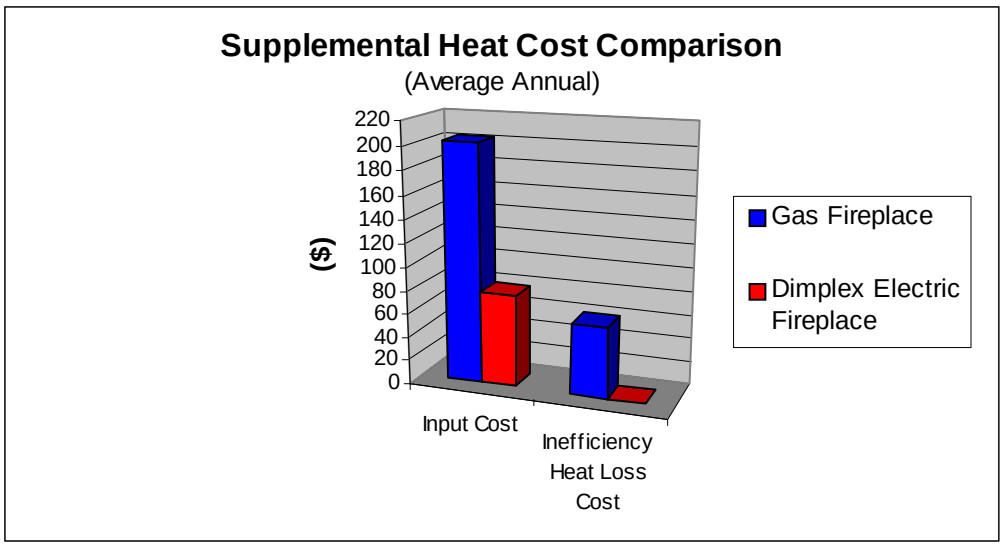


Supplemental Heat

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.

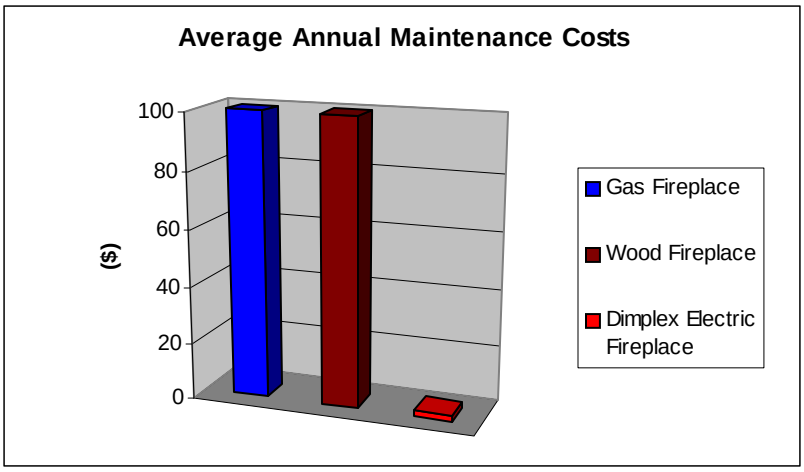
Maintenance Costs

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.

This report has been printed on paper which contains 100% post consumer fiber which is certified by credible, thorough environmental agencies.

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KCMA Environmental Stewardship Program ESP 04-11

Effective Date 01/01/2011

Points must be earned out of all five categories.

I. AIR QUALITY:

Mandatory Requirement for particleboard, MDF and hardwood plywood. If an participant is manufacturing or consuming any or all of these products, they must be claimed and meet the requirements outlined in items A, B, and C. If the applicant is using non-compliant product, the option of just not claiming the points is no longer available. Such consumption will need to be collected and reported as non-complying material and included in the computation to determine 80% compliant product.

A.	Annual manufacture or purchase of Particleboard products (panels, components, etc.) meets the applicable formaldehyde emission level of CARB Compwood ATCM and ANSI A208.1-2009: 80% or greater [1]	10
B.	Annual manufacture or purchase of MDF products (panels, components, etc.) meets the applicable formaldehyde emission level of CARB Compwood ATCM and ANSI A208.2-2009: 80% or greater [1]	10
C.	Annual manufacture or purchase of Plywood products (panels, components, etc.) meets the applicable formaldehyde emission lever of CARB Compwood ATCM and ANSI/HPVA HP-1-2009: 80% or greater [1]	10
D.	75% of finished products are finished in the U.S. or Canada and finishes used emit no greater HAPS than allowed by the Wood Finishing MACT, 40 CFR 63.800 Subpart JJ.	10

[1] Requires 3rd party certification

Maximum Allowable Points to Carry Forward from this Section **30**

II. PRODUCT RESOURCE MANAGEMENT:

A.	Annual manufacture or purchase of Particleboard meets the CPA EPP 3-08 Specification for recycled/recovered fiber content: 80% or greater	10
B.	Annual manufacture or purchase of MDF meets the CPA EPP 3-08 Specification for recycled/recovered fiber content: 80% or greater	10
C.	Manufacturer or subset of manufacturer has received Chain of Custody (COC) certification through a recognized sustainable forestry program with at least one product line offering COC certified product or as an order option. Initial year - 10 points. Subsequent years - 5 points.	variable

II.	**PRODUCT RESOURCE MANAGEMENT:** (continued)	
D.	Annual manufacture or purchase of hardwood and softwood lumber are certified through a recognized sustainable forestry program (See KCMA Sustainable Forestry Statement). 100% = 20 points; 90% = 18; 80% = 16; 70% =14; 60% =12; 50% = 10; 40% = 8; 30% = 6; 20% = 4; 10% = 2 points.	variable
E.	Annual manufacture or purchase of hardwood plywood and softwood plywood are certified through a recognized sustainable forestry program (See KCMA Sustainable Forestry Statement): 100% = 20 points; 90% = 18; 80% = 16; 70% = 14; 60% = 12; 50% = 10; 40% = 8; 30% =6; 20% =4; 10% = 2 points.	variable
F.	Manufacturer utilizes a written training plan on an annual basis to educate their hardwood suppliers of their purchasing preference for certified hardwood lumber.	5
	Maximum Allowable Points to Carry Forward from this Section	**30**
III.	**PROCESS RESOURCE MANAGEMENT:**	
A.	Manufacturer has a comprehensive recycling program for process wastes in at least three of the following product categories: Cardboard, Paper, Plastic, Wood, Solvents, Metal.	10
B.	Manufacturer has a program for tracking and reducing process wastes with documented goals and reports (state specific programs)	10
C.	Manufacturer uses internal or external process by-products to generate alternate energy services, e.g. electricity, steam or other.	5
D.	Manufacturer has a documented energy conservation program.	5
	Maximum Allowable Points to Carry Forward from this Section	**20**
IV.	**ENVIRONMENTAL STEWARDSHIP:**	
A.	(Mandatory Requirement) Manufacturer has a firm commitment to environmental quality as evidenced by a written policy statement.	5
B.	Manufacturer has an Environmental Management System (EMS) in place:	
	i. Not certified by third party	5
	ii. Certified by third party	15

IV.	**ENVIRONMENTAL STEWARDSHIP:** (continued)	
C.	Manufacturer reviews environmental practices and policies of its key vendors and contractors:	5
D.	Manufacturer has a documented program which promotes the use of renewable/recycled materials or products:	5
	Maximum Allowable Points to Carry Forward from this Section	**15**
V.	**COMMUNITY RELATIONS:**	
A.	Manufacturer demonstrates community involvement and leadership through service or charitable organizations (Habitat for Humanity, Food Banks, Emergency Response Agencies, hospitals and similar organizations)	5
B.	Manufacturer has had no major non-compliance citations from any Federal, state or local environmental regulatory agency in the previous 12 months.	5
	Maximum Allowable Points to Carry Forward from this Section	**10**

ADDITIONAL REQUIREMENTS:

ESP participants agree to report to KCMA within 60 days of any local, state or federal citation in excess of $50,000 per violation explaining the circumstances of the citation and violation. Upon final determination by the regulator that the violation was willful, grossly negligent or reckless, the ESP Committee (subject to KCMA Board approval) may terminate for a period of no less than 12 months, the ESP participant's participation in the ESP Program. The ESP participant shall have the right to a review hearing regarding such termination by a third party arbitrator following ANSI arbitration procedures. The cost of such arbitration will be borne by the ESP participant.

Summary of Points

Category	Available Points	Maximum Allowed Points
I. Air Quality	40	30
II. Product Resource Management	75	30
III. Process Resource Management	30	20
IV. Environmental Stewardship	30	15
V. Community Relations	10	10
Total Available	185	105
Required Point Total		**80**

COMPOSITE PANEL ASSOCIATION

ENVIRONMENTALLY PREFERABLE PRODUCT SPECIFICATION CPA 3-08

Approved by CPA Board of Directors
October 23, 2007

Effective Date April 1, 2008

CPA GRADEMARK CERTIFICATION PROGRAM
ENVIRONMENTALLY PREFERABLE PRODUCT
SPECIFICATION CPA 3-08; APRIL 1, 2008

BACKGROUND

Environmentally preferable product, as defined by Federal Executive Order 13101, are "products and services (that) have a lesser or reduced effect on human health and the environment when compared to other products and services that serve the same purpose". Furthermore, various states have adopted policies promoting sustainability to "reduce adverse impacts on natural habitats and species". The Composite Panel Association (CPA) adopted this voluntary Environmentally Preferable Product Specification (EPPS) to promote the fulfillment of these goals. CPA will certify products to this EPPS within its ANSI accredited third party Grademark Certification Program.

PURPOSE

This EPPS has been developed to provide assurance that products conforming to it have been independently certified to meet certain environmentally preferable characteristics, including fiber usage and formaldehyde emissions. Certification to these criteria assures the consumer that these products exhibit enhanced environmentally friendly characteristics.

SCOPE

This EPPS applies to all grades of particleboard, medium density fiberboard (MDF) and hardboard that have been engineered and produced for all applications. This EPPS defines particleboard, MDF and hardboard, classifies all acceptable fiber types used in the production of particleboard, MDF and hardboard , and establishes maximum formaldehyde emission limits.

DEFINITIONS

Particleboard

> "A generic term for a composite panel primarily composed of cellulosic materials (usually wood), generally in a form of discrete pieces or particles, as distinguished from fibers, bonded together with a bonding system, and which may contain additives." Reference: ANSI A208.1–1999.

Medium Density Fiberboard

"A composite panel products composed primarily of cellulosic fibers and a bonding system cured under heat and pressure. MDF density is typically between 500 kg/m^3 (31 lbs/ft^3) and 1000 kg/m^3 (62 lbs/ft^3)." Reference: ANSI A208.2–2002.

Hardboard

"Hardboard is a panel manufactured primarily from inter-felted lignocellulosic fibers which are consolidated under heat and pressure in a hot press to a density of 500 kg/m^3 (31 lbs/ft^3) or greater. Others materials may be added to improve certain properties, such as stiffness, hardness, finishing properties, resistance to abrasion and moisture, as well as to increase strength, durability, and utility." Reference: ANSI A135.4-2004, ANSI A135.5-2004, ANSI A135.6-2006.

FIBER CLASSIFICATION

This EPPS recognizes the environmental benefits of utilizing the variety of fiber source opportunities available today, which include both wood based and non-wood based cellulose fiber, and follows the U.S. Government guidelines on the classification of raw materials used in the manufacturing sector. Specifically, the Federal Trade Commission (FTC) has defined recycled materials as follows:

"Materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer). To the extent the source of recycled content includes pre-consumer material, the manufacturer or advertiser must have substantiation for concluding that the pre-consumer material would otherwise have entered the solid waste stream. In asserting a recycled content claim, distinctions may be made between pre-consumer and post-consumer materials. Where such distinctions are asserted, any express or implied claim about the specific pre-consumer or post-consumer content of a product or package must be substantiated." Reference: Federal Register 16 CFR Part 260.

Further, the U.S. Environmental Protection Agency (EPA) defines recovered materials as follows:

"Waste materials and by-products which have been recovered or diverted from solid waste, but does not include those materials and

by-products generated from, and commonly reused within, an original manufacturing process." Reference: 42 U.S.C. 6903 (19).

Based on these definitions, the following fiber classifications represent the acceptable fiber types covered by this EPPS used in the manufacture of composite panel products:

Recycled Fiber

Pre-Consumer Recycled includes fiber generated as a waste from manufacturing and converting processes such as scrap, trimmings and cuttings that have been diverted from the solid waste stream following the manufacturing and converting process. This material must have undergone processing before becoming a waste to be included in this category. Examples of this category include planer shavings, plytrim, sawdust, fines, chips and bagasse.

Post-Consumer Recycled includes fiber from products that have completed their life as a consumer item and have been diverted or recovered from the solid waste stream after having been used and/or disposed of by the consumer following their intended use. Examples of this category include used pallets, recycled furniture and cabinet waste, construction waste and demolition waste.

Recovered Fiber

Fiber in this category has been recovered as a by-product of an agricultural crop or public/private tree maintenance program where the fiber generated is used on a secondary basis not related to the original agricultural or ornamental function. For definitional purposes, this fiber has been sub-categorized as wood and non-wood.

Wood Fiber is generated from the removal of woody biomass from both urban and non-urban sources as part of a management prescription, maintenance or hazard tree program, pre-commercial thinning or salvage operation where the removal of such fiber does not adversely affect soil nutrient or structure. Examples of this category include fruit tree pruning's, park tree removal, logging slash and culled timber.

Non-Wood Fiber is generated as a by-product of an agricultural crop where the cellulose is other than woody biomass. Removal of this fiber must not adversely affect soil nutrients or structure. Examples of

this category include straw from wheat, rice, barley or other cereal/grain operations.

Fiber omitted from this specification is fiber generated from the harvest of commercial timber for the sole purpose of converting that timber into chips, shavings or sawdust to then be used in the manufacture of composite panel products. Commercial timber is defined as timber that can be used to produce lumber or plywood. This restriction only applies to the main bole of the tree and does not include the slash or other recoverable by-product resulting from timber harvesting.

FIBER REQUIREMENT

100% of the fiber used in products certified, as conforming to this EPPS, must be either recycled fiber, recovered fiber or a combination of both, as described in this EPPS.

FORMALDEHYDE EMISSIONS REQUIREMENT

The formaldehyde emission requirements for this specification have been approved by the CPA Board of Directors and may change from time to time. The effective date for compliance to this new emission requirement is April 1, 2008. The emission levels are considered preferable because they reflect a lower level compared to the ANSI A208.1-1999 Table A and ANSI A208.2-2002 standards.

Unfinished Particleboard. Formaldehyde emissions from unfinished particleboard must be less than or equal to 0.18 ppm using the Large Chamber Test Method (ASTM E1333). Particleboard products will be evaluated at the typical loading rate for particleboard of 0.13 ft^2/ft^3. Particleboard that uses a bonding system other than Urea Formaldehyde, may qualify for "Exempted" status under section 6.3 of the EPP Grademark Manual. One exception to this requirement is for Grade LD of ANSI A208.1-1999 (Door Core) products. Grade LD is allowed a loading ratio of 0.04 ft^2/ft^3 as per section 3.4 of ANSI A208.1-1999.

Unfinished MDF. Formaldehyde emissions from unfinished MDF must be less than or equal to 0.21 ppm using the Large Chamber Test Method (ASTM E1333). MDF products will be evaluated at the typical loading rate for MDF of 0.08 ft^2/ft^3. Special arrangements will be made for MDF manufacturers who wish to have the MDF tested at the higher loading ratio of 0.13 ft^2/ft^3. MDF that uses a bonding system other than Urea Formaldehyde, may qualify for "Exempted" status under section 6.3 of the EPP Grademark Manual.

Hardboard. Formaldehyde emissions from unfinished hardboard must be less than or equal to 0.20 ppm using the Large Chamber Test Method (ASTM E1333). There are no specifications in the three relevant hardboard standards (ANSI A135.4, ANSI A135.5, ANSI A135.6) that require or recommend a loading ratio for hardboard products. Hardboard is most similar to MDF and will be tested with the loading ratio of MDF at 0.08 ft^2/ft^3. Hardboard that uses a bonding system other than Urea Formaldehyde, may qualify for "Exempted" status under section 6.3 of the EPP Grademark Manual.

The EPPS CPA 3-08 was approved by the CPA Board of Directors on October 23, 2007, has an effective date of April 1, 2008 and supersedes EPPS version CPA 2-06.