

Environmental Choice^M Program

CERTIFICATION CRITERIA DOCUMENT

CCD-001



Product: Energy Efficient Heating/Cooling Systems for Building(s)

Preamble

Environment Canada's Environmental Choice^M Program is pleased to publish the following national guideline on ***Energy Efficient Heating/Cooling Systems for Building(s)***.

The Environmental Choice^M Program is designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption, and by minimizing the impacts of pollution generated by the production, use and disposal of goods and services available to Canadians.

A growing body of evidence supports the hypothesis that anthropogenic greenhouse gases are having a serious and detrimental impact on the Earth's climate patterns and ecosystems. This extra burden of greenhouse gases, in turn, is largely due to the consumption of fossil fuels for the generation and use of energy. It has been further estimated that up to 40% of all the energy consumed in Canada is used to heat, cool and ventilate buildings.

A number of systems are becoming available in the marketplace that improve the energy efficiency of buildings and industrial facilities. These include district heating systems that capture waste-heat from industrial or on-site power generation to provide heat for surrounding buildings, technologies that use geothermal gradients, systems for re-directing waste heat back into industrial or power generation equipment, and systems that combine conventional equipment with innovative solutions to providing basic heat and/or cooling for a building(s). All such systems have the potential to significantly reduce overall energy consumption and reduce the potential for greenhouse-gas related impacts.

Systems that increase building energy efficiency may also reduce Canadians' dependence on non-renewable energy sources, and/or reduce the amount of potentially toxic or otherwise harmful air emissions such as carbon monoxide, nitrogen oxides, particulate matter and sulfur dioxide.

Based on a review of currently available life cycle information, the product category requirements will produce an environmental benefit through the reduced use of non-renewable resources and reduction of harmful emissions.

Life cycle review is an ongoing process. As information and technology change, product category requirements will be reviewed and possibly amended.

The Minister of the Environment anticipates that manufacturers or importers of ***Energy Efficient Heating/Cooling Systems for Building(s)*** that conform to this guideline will apply to the Environmental Choice^M Program for verification and subsequent authority to label the qualifying products with the

EcoLogo^M.

Notice

Throughout this document, any reference to a standard or guideline means to its latest edition.

The Environmental Choice^M Program (ECP) reserves the right to accept equivalent test data for the test methods specified in this document.

Interpretation

1. In this set of requirements, please note the following definitions:

“CBIP”, means National Resources Canada’s *Commercial Building Incentive Program*, a national Resources Canada program that promotes the incorporation of energy efficiency into commercial/institutional building designs. Program requirements are based in part upon a building’s ability to surpass energy performance standards set by the *Model National Energy Code for Buildings*;

“CBIP reference building” means a theoretical “model” building, to which the energy performance of a CBIP applicant’s building design is compared. For the purposes of this Certification Criteria Document, ECP applicants may have to use CBIP’s “performance path”. This “path” requires using EE4.CBIP software to compare the expected energy performance (and savings) that would be achieved by meeting the *Model National Energy Code for Buildings* to the nominal pattern of energy consumption for a building similar in type, size and climate zone;

“CFC”, or chlorofluorocarbon, means a halogenated hydrocarbon traditionally used as a refrigerant in air-conditioning equipment; the production of these heat-transfer fluids has been phased out by the Montreal Protocol due to significant ozone depletion potentials (ODP), but they may continue to exist in older equipment;

“CO” means carbon monoxide;

“Deep Water Source Cooling”, or DWSC, refers to the renewable use of a large body of naturally cold water as a heat sink for process and comfort space cooling. Water at a constant 40 - 50 °F or less is withdrawn from deep areas within lakes, oceans, aquifers and rivers and is pumped through the primary side of a heat exchanger. The secondary side produces clean chilled water with considerably less energy as required by conventional chiller-based systems;

“district-cooling system” means a configuration of equipment which distribute chilled water or other media to multiple buildings for air conditioning. The cooling (actually heat rejection) is usually provided from a dedicated cooling plant, and may include such technologies as Deep Water Source Cooling (DWSC);

“district-heating system” means a configuration of equipment that captures the waste heat from an industrial or power-generation operation, for the purpose of re-directing this energy (via hot water or steam) for the heating of multiple building within the facility’s immediate environs. Note that this may include domestic water heating, in addition to space heating. The heat can be provided

from a variety of sources, including geothermal, co-generation plants, waste heat from industry and purpose-built heating plants;

“EE4.CBIP” means computer software produced by CBIP to facilitate building energy modelling and comparison to parameters proscribed by the *Model National Energy Code for Buildings*;

“ground loop system” means a configuration of equipment that utilizes geothermal gradients (i.e., the differential between ambient surface temperatures and that of deep soil, groundwater or surface water) to provide heating and cooling of a single industrial, commercial or multi-residential building in a manner that significantly reduces the energy requirement for such tasks;

“HCFC”, or hydrochlorofluorocarbon, means a halogenated hydrocarbon used as an alternative refrigerant to replace chlorofluorocarbons (CFC’s); the latter having been phased out by the Montreal Protocol. While HCFC refrigerants generally have lower ozone depletion potentials (ODP) than CFC’s, they do still affect stratospheric ozone and generally possess significant global warming potentials (GWP), as well; most HCFC’s have been targeted for eventual phase-out by the Montreal Protocol;

“HFC”, or hydrofluorocarbon, means a halogenated hydrocarbon used as an alternative refrigerant to replace chlorofluorocarbons (CFC’s) and/or HCFC’s. While HFC refrigerants generally have minimal ozone depletion potentials (ODP), they generally possess significant global warming potentials (GWP);

“HVAC” means heating, ventilation and cooling, and is a phrase that encompasses all of the air input, handling, conditioning and exhaust systems utilized in most industrial, commercial and multi-residential buildings;

“Model National Energy Code for Buildings” is a document produced by the National Research Council’s *Canadian Commission of Building and Fire Codes*, which provides a set of minimum (climate-adjusted) requirements for energy efficiency for buildings (other than small residential buildings); buildings designed to meet the *Model National Energy Code for Buildings* theoretically achieve energy savings of approximately 25%, in comparison to those designed only to comply with the *National Buildings Code of Canada*;

“NFPA” means National Fire Protection Association;

“NO_x” means nitrogen oxides;

“PPM” means parts per million or milligrams per cubic metre;

“single building heating/cooling system” means a configuration of equipment that facilitates the heating and cooling of a single industrial, commercial or multi-residential building in a manner that significantly reduces the energy requirement for such tasks. For the purposes of this certification criteria document, single building heating/cooling systems may include ground loop systems;

“SO₂” means sulphur dioxide; and

“THC” means total hydrocarbons and refers to emissions resulting from incomplete combustion of hydrocarbon fuels; THC includes all exhaust emissions of methane, ethane, propane, butane, pentane, and higher molecular weight hydrocarbons;

Category Definition

2. This category includes all **Energy Efficient Heating/Cooling Systems for Building(s)** as further defined in the sub-categories in this section. The sub-categories are:
- (a) single-building heating/cooling systems;
 - (b) district-heating systems; and
 - (c) district-cooling systems.

Note: Other sub-categories may be added at a later date. The ECP reserves the right to determine which sub-category will be assigned to a particular applicant.

General Requirements

3. To be authorized to carry the EcoLogo^M, the **Energy Efficient Heating/Cooling Systems for Building(s)** must:
- (a) meet or exceed all applicable governmental and industrial safety and performance standards; and
 - (b) be manufactured and/or provided in such a manner that all steps of the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, by laws and regulations including, for facilities located in Canada, the *Fisheries Act* and the Canadian Environmental Protection Act (CEPA).

Product Specific Requirements

4. To be authorized to carry the EcoLogo^M, the **single-building heating/cooling system** must:
- (a) for at least 95% of all buildings so outfitted by the supplier of **single-building heating/cooling systems** during each calendar year, provide a reduction in the energy consumed (specifically for heating/cooling) of at least 30%, based on total annual fuel heat input, as determined by:
 - (i) comparison to an appropriate CBIP reference building, or
 - (ii) by providing an analysis of the building's comparative energy consumption with and without use of the **single-building heating/cooling system**;
 - (b) consist of more than simple operational modifications, HVAC retrofits and/or building envelope upgrades;
 - (c) utilize equipment that conforms to relevant industry performance standards;

- (d) not require any increase in the quantity of HCFCs or HFCs used in association with cooling the building;
- (e) if utilizing the building's domestic water supply, not impart any contaminants to such water supply;
- (f) if utilizing groundwater or surface waters (e.g., within a ground-source heat pump), not contaminate such water supplies; and
- (g) if utilizing the building's fire-control systems, not hinder proper operation of such systems nor contravene, through its installation or use, any NFPA codes or standards.

5. To be authorized to carry the EcoLogo^M, the **district-heating system** must:

- (a) provide the buildings within the system's area of influence with a reduced average energy consumption of at least 45%, based on total annual fuel heat input, as determined by:
 - (i) comparison (building-by-building) to appropriate CBIP reference buildings, or
 - (ii) by providing an analysis of the collective buildings' comparative energy consumption with and without use of the **district-heating system**;
- (b) for each individual building within the system's area of influence, provide an minimum annual reduced energy consumption of at least 30%, based on total annual fuel heat input, as determined by:
 - (i) comparison to an appropriate CBIP reference building, or
 - (ii) by providing an analysis of the individual building's comparative energy consumption with and without use of the **district-heating system**;
- (c) utilize equipment that conforms to relevant industry performance standards;
- (d) not hinder the performance of any existing HVAC or water-distribution systems that may be incorporated within the **district-heating system**;
- (e) if utilizing the buildings' domestic water supply, not impart any contaminants to such water supply; and
- (f) if utilizing a fossil fuel combusting generator:
 - (i) use natural gas as the fuel source; and
 - (ii) not emit:
 - (a) CO in excess of 375 PPM,
 - (b) NO_x measured as NO₂ in excess of 65 PPM,

- (c) THC in excess of 2250 PPM.

Note that all testing must be performed at operational load. Emissions must be determined from concentration measurements made in the duct or stack (dry basis at 101.3 kPa and 25°C) and then converted to 15% oxygen.

6. To be authorized to carry the EcoLogo^M, the **district-cooling system** must:
 - (a) provide the buildings within the system's area of influence with an average annual reduced energy consumption, dedicated to cooling, of at least 70%, as determined by:
 - (i) comparison (building-by-building) to appropriate CBIP reference buildings, or
 - (ii) by providing an analysis of the collective buildings' comparative energy consumption with and without use of the **district-cooling system**;
 - (b) for each individual building within the system's area of influence, provide a minimum annual reduced energy consumption, dedicated to cooling, of at least 50%, as determined by:
 - (i) comparison to an appropriate CBIP reference building, or
 - (ii) by providing an analysis of the individual building's comparative energy consumption with and without use of the **district-cooling system**;
 - (c) utilize equipment that conforms to relevant industry performance standards;
 - (d) not require any increase in the quantity of HCFCs or HFCs used in association with cooling the buildings;
 - (e) if utilizing the buildings' fire-control systems, not hinder proper operation of such systems nor contravene, through its installation or use, any NFPA codes or standards;
 - (f) if utilizing the buildings' domestic water supply, not impart any contaminants to such water supply; and
 - (g) if utilizing a ground waters or surface waters (e.g., with Deep Water Source Cooling), must not contaminate such water supplies.
7. If installation of the **Energy Efficient Heating/Cooling Systems for Building(s)** in an existing building enables either the modification or complete decommissioning of any equipment containing CFCs, HCFCs or HFCs, the system's supplier must ensure that appropriate arrangements have been made for the capture and disposal/recycling of such heat-transfer fluids.
8. If the **Energy Efficient Heating/Cooling Systems for Building(s)** is used to generate electricity in addition to supplying heating and/or cooling, the EcoLogo must not be used in any association whatsoever with the electricity, whether it is sold back into the power grid or not.

9. All licensed suppliers of the ***Energy Efficient Heating/Cooling Systems for Building(s)*** must notify the Environmental Choice^M Program of any new installations of such systems within one month of the operational date, and must undergo any required verification and certification activities.

Verification

10. To verify a claim that a product meets the criteria listed in this document, the ECP will require access, as is its normal practice, to relevant quality control and production records and the right of access to production facilities on an announced basis.
11. Compliance with requirement 3(b) shall be attested to by a signed statement of the Chief Executive Officer or the equivalent officer of the licensee. The ECP shall be advised in writing immediately by the licensee of any noncompliance, which may occur during the term of the license. On the occurrence of any noncompliance, the license may be suspended or terminated as stipulated in the license agreement.

Conditions for EcoLogo Use

12. The EcoLogo may appear on company literature, and/or on the facility itself, provided that the product meets the requirements in this guideline.
13. A criteria statement must appear with the EcoLogo whenever the EcoLogo is used in association with the **Energy Efficient Heating/Cooling Systems for Building(s)**. The intent of this statement is to provide clarification as to why the product was certified and to indicate constraints to which the certification is limited. This is to ensure no ambiguity over, or misrepresentation of, the reason(s) for certification.

The criteria statement must be specific to the product's sub-category. For sub-category 2(a), the required criteria statement is "Single-building Heating/Cooling System". For sub-category 2(b), the required criteria statement is "District-heating System". For sub-category 2(c), the required criteria statement is "District-cooling System". The licensee may propose other wording for the criteria statement, but any such proposed wording must be approved by the Environmental Choice Program.

14. While the **Energy Efficient Heating/Cooling System for Building(s)** may additionally be able to generate electricity, it is expressly prohibited to use the EcoLogo in any association with the marketing of such generated electricity.
15. All licensees and authorized users must comply with the Environmental Choice Program's Guide to Proper Use of the EcoLogo^M regarding the format and usage of the EcoLogo.
15. Any accompanying advertising must conform with the relevant requirements stipulated in this guideline, the license agreement and the Environmental Choice Program's Guide to Proper Use of the EcoLogo^M.

For additional copies of this guideline or for more information about the Environmental Choice Program, please contact: TerraChoice Environmental Services Inc., 1280 Old Innes Road, Suite 801, Ottawa, Ontario, K1B 5M7 Telephone: (613) 247-1900, Facsimile: (613) 247-2228, Email: ecoinfo@terrachoice.ca