EcoLogo[CM] Program Criteria Review

Certification Discussion Document

CCD-003: Electricity-Renewable Low-Impact
(C) BIOMASS-FUELLED ELECTRICITY

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1 Instructions

EcoLogo[CM] is inviting stakeholders to participate in the review of CCD-003: Electricity-Renewable Low-Impact. This standard is being revised to assure that the current requirements continue to define environmental leadership for renewable low-impact electricity.

Currently, both the scope and the criteria statements found in CCD-003 determine what the EcoLogo[CM] Program considers to be environmental leadership amongst all types of electricity production in North America. During this review, the EcoLogo[CM] Program will re-examine both the scope and the criteria statements. As such, leadership will continue to be defined by first determining what types of electricity can be considered as "renewable low-impact" (i.e. scope), and second what requirements should be established to assure that facilities which produce these types of electricity are following best environmental practices according to the market (i.e. criteria statements).

Stakeholder contributions play a pivotal role in the EcoLogo[CM] standards development process.

To begin your participation and register for the review process:

- Send a request to forums@ecologo.org and specify your name (first and last name), indicating your affiliation, and your wish to participate in the CCD-003: Electricity-Renewable Low-Impact.

While the EcoLogo[CM] Standard Development Forum is the main tool for compiling comments, the EcoLogo[CM] program will also accept comments by e-mail and fax. These comments may also be posted to the online forum and will be viewable by all registered forum participants involved in the discussion.

This stakeholder consultation period will be open for 52 days beginning Nov 18, 2008. Comments must be received by January 9, 2009.

Your time and input in helping us to establish the most stringent environmental standards are very much appreciated. We will send you a reminder as our closing date for comments approaches.

Sincerely,

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2 Introduction

Biomass-fuelled electricity is currently considered in the EcoLogo^{CM} certification criteria document (CCD) for Electricity-Renewable Low-Impact and 17 biomass-fuelled generating facilities amounting to a total capacity of 372 MW have already been third-party certified by the EcoLogo^{CM} Program.

Biomass-fuelled electricity products can sometimes offer considerable environmental benefits by meeting strict requirements for *inter alia* species conservation, soil conservation, water quality, and a reduction in noxious air emissions and carbon dioxide emissions.

The purpose of this section of the Certification Discussion Document is to provide you with broad market information for biomass-powered electricity in Canada and the U.S., and to initiate a discussion to help identify which criteria the EcoLogo^{CM} Program should consider revising to ensure that biomass-fuelled electricity generating facilities continue to represent environmental leadership as "renewable low-impact electricity" generating facilities.

The EcoLogo^{CM} Program is designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption and by minimizing significant life cycle environmental impacts. Life cycle review is an ongoing process and as such, EcoLogo^{CM} CCDs are regularly updated. Products are also re-audited regularly to ensure certified products continue to offer significant environmental benefits.

3 Description

According to the Centre for Energy (2008), there are three main ways to convert biomass into energy:

1) *Thermally—Biomass is burned in a boiler to create high pressure steam which in turn drives a turbine to generate electricity.*

2) *Thermochemically—Biomass reactors heat biomass in a low-oxygen environment to produce a fuel gas, which can then fuel steam generators, combustion turbines, combined cycle technologies or fuel cells.*

3) Biochemically—Adding bacteria, yeasts and enzymes to biomass liquids causes biomass materials to ferment and change into alcohol. This alcohol can than be used as a fuel to generate electricity.

Currently, the biomass products included in CCD-003 include *inter alia* products derived from:

- Wood Wastes
- Agricultural Wastes
- Dedicated Energy Crops
- Liquid Fuels (including *inter alia* ethanol, biodiesel and methanol)
- Clean Organically-Sourced Material Separated from Municipal Solid Waste

4 Market Overview

4.1 Canadian Market

Industry Canada (2008) states that the bioenergy sector is "an up-and-coming segment of the industry, currently numbering only a few facilities". However, according to Climate Change Solutions (2006), biomass accounted for 6% of the Canadian energy market in 2000. Also, they claim that over 60% of the Canadian renewable energy portfolio is from biomass. In this number, they include landfill gas as well which is covered in another CDD.

4.2 American Market

According to the State Energy Conservation Office (n.d.), biomass energy held 47% of the 6% of the renewable energy supply in 2004 in the U.S. Of this, the great majority was derived from wood residues and pulping liquors, urban food and wood and other process residues, and fuelwood. Biofuels and Bioproducts were the smallest contributors to the biomass energy portfolio. According to the Energy Information Administration (EIA), between 2002-2006, the biomass sector for wood waste and derived fuels, and other agricultural by-products has grown by approximately 10%. This growth also includes sludge wastes which are considered in the biogas CDD. The total capacity of these types of biomass electricity industries was of 6933 MW in 2006 in the U.S. On the other hand, the market for biodiesel and ethanol were of 32 and 412 Trillion BTUs in 2006 and grew by 3100% and 129% respectively between 2002 and 2006. The market for municipal solid waste was in decline at 2188 MW in 2006.

5 Other Eco-label Standards

Another Eco Label related to the certification of biomass electricity power is the Naturemade Swiss label. To meet the requirements of this label:

- *Biomass from genetically modified organisms cannot be used.*
- *Energy Crops and other sources of biomass must be grown using renewable sources of power.*
- *Plants using untreated wood must meet a standard guided by the FSC label.*
- *Electricity generating facilities using wood fuel and old wood must have an overall efficiency of at least 60 percent.*
- *The operator of the plant for generating electricity from wood fuel and old wood must declare the origin of the wood fuels, on its own responsibility.*

(Naturemade, 2008)

6 Life Cycle Research Findings

6.1 Life Cycle Definition

Our initial research indicates the life cycle stages of biomass-fuelled electricity sources from which most significant environmental stressors and impacts occur is the use, production and resource extraction stages. At this point, the EcoLogo^{CM} Program leaves the scope and boundaries of the life cycle analysis open for discussion since as stakeholders, you might know of other stressors and impacts not currently addressed in this CDD.

6.2 Summary of Major Environmental Impact Categories and Related Stressors

Below you will find some of the major environmental stressors associated to biomass-fuelled generating facilities as well as specific biomass stressors associated with wood wastes, dedicated energy crops and liquid fuel powered generating facilities.

Stage of the life cycle	Environmental Stressors (numbers in the table refer to specific sections in the document) according to various Life Cycle Stages and Major Impact Categories					
	Energy	Resources	Emissions to			Other
	Renewable/ Nonrenewable	Renewable/ Nonrenewable	Water	Air	Soil	
Resource Extraction		6.3.2.2, 6.3.2.5	6.3.2.4, 6.3.2.5	6.3.4.1	6.3.2.4, 6.3.3.1	6.3.4.1
Production		6.3.2.2, 6.3.2.5	6.3.2.4, 6.3.2.5		6.3.2.4	6.3.2.3, 6.3.5.1
Distribution		6.3.2.2				
Use	6.3.2.6	6.3.2.2, 6.3.2.6		6.3.1.1, 6.3.2.1		6.3.2.1, 6.3.5.1
Disposal		6.3.2.2				

6.3 Discussion Points on Major Environmental Impact Categories and Related Stressors

This section draws attention to the major environmental impact categories and stressors the EcoLogo^{CM} Program intends to address in its revision of CCD-003 for biomass-fuelled electricity. Each section below contains questions pertaining to the environmental impact categories and stressors under investigation.

6.3.1 Current Broad Environmental Impact Categories and Related Stressors under Review for Biomass-Fuelled Electricity

6.3.1.1 Carbon Monoxide (CO), Particulate Matter (PM), Nitrogen Oxides (NOx), and Sulfur Oxides (SOx) Emissions

Currently, CCD-003 stipulates that to meet the criteria, the biomass-fuelled electricity must be generated in such a manner that the total of load points (n.b. load points are a numerical rating system that assigns values according to measured levels of stressors in the environment) assessed for operational air emissions of CO, PM, NOx measured as NO_2 and SOx measured as SO_2 does not exceed 6:

Compound	Load Points					Assigned Load Points
	0	1	2	3	8	
CO	< 2.15 kg/MWh	2.151 - 3.22 kg/MWh	3.221 - 4.30 kg/MWh	4.301 - 5.37 kg/MWh	> 5.371 kg/MWh	
PM	< 0.228 kg/MWh	0.2281 - 0.387	0.3871 - 0.516	0.5161 - 0.645	> 0.6451 kg/MWh	
NOx (as NO_2)	< 0.77 kg/MWh	0.771 - 1.15 kg/MWh	1.151 - 1.52 kg/MWh	1.521 - 1.90 kg/MWh	> 1.901 kg/MWh	
SOx (as SO_2)	< 0.141 kg/MWh	0.1411 - 0.212	0.2121 - 0.282	0.2821 - 0.352	> 0.3521 kg/MWh	
TOTAL LOAD POINTS						

1.Q) Do you think that these load points still represent environmental leadership? If so, why? If not, why not?

6.3.2 New Broad Environmental Impact Categories and Related Stressors for Biomass-Fuelled Electricity

6.3.2.1 Greenhouse Gas Emissions

Zah et al. (2007) have demonstrated that certain biofuels can have a worst greenhouse gas warming potential than certain conventional fossil fuels when the whole life cycle analysis of the energy production is considered. Accoding to Zah's data, one can assume that, within the biomass category, it would be possible to reduce greenhouse gases by roughly 60% compared to the petrol EURO3 reference. This 60% reduction target is also the target value promoted by Greenpeace (Greenpeace International, 2008). Moreover, the Zah et al. (2007) study shows that even though certain types of biomass can reduce greenhouse gas emissions compared to the petrol EURO3 reference, sometimes the overall life cycle environmental impacts can be greater than this reference value when using the environmental impact assessment tools UBP 06 and Eco-Indicator 99. They point that the main culprits leading to negative environmental impacts are: clear-cutting of tropical forests for the purpose of growing energy crops in the tropics, and partially the low crop yields, the intensive fertilizer use and mechanized tilling in the moderate latitudes.

2.Q) Although the Zah et al. study focuses particularly on the impact of biofuels, it is reasonable to belive that biomass power production may have similar environmental impact stressors (i.e. greenhouse gases). Do you agree that this study can be used to define leadership for biomass power production? If so, why? If not, why not?

3.Q) Do you agree that the EcoLogo[CM] Program should propose that the entire life cycle of the production of biomass sources should only come from energy sources that demonstrate a greenhouse gas reduction of at least 60% compared with the fossil fuel reference of petrol, EURO3 which is of approx. 0,18 CO_2 eq [kg/pkm]? If so, why and why? If not, why not?

4.Q) Also, do you think that the EcoLogo[CM] Program should propose that no land with high biodiversity (like old growth forests) value are cleared for the production of biomass-fuelled electricity? If so, how and why? If not, why not? What about if replanting is ensured in certain cases?

5.Q) What do you think to be the solution to ensure that that the entire life cycle of biomass energy production does not become a high emitter of greenhouse gases?

6.Q) Do you think that the EcoLogo[CM] Program should only accept biomass sources that come from high yield crops in moderate climates in the U.S and Canada to maximize their contribution to reducing greenhouse gas emissions?

7.Q) Do you think that the EcoLogo[CM] Program should avoid biomass sources that come from non sustainable agricultural practices (e.g. intensive chemical fertilizer use, mechanized tilling and use of petroleum dependent technology)

6.3.2.2 Resource Conservation

According to Greenpower (2007), to minimize waste and maximize resource conservation, a Waste Management Hierarchy has been developed. This system prioritizes ecologically sustainable waste solutions, based on the maximum conservation of resources in this order of preference:

1. Cleaner production
2. Waste avoidance
3. Waste minimisation
4. Re-use or recycle
5. Waste to energy
6. Landfill

8.Q) Do you think that the EcoLogo[CM] Program should explicitly adopt the Waste Management Hierarchy as a guiding management principle? If so, how and why? If not, why not?

For example, with this principle in mind, the current statement found in CCD-003 that "clean biomass includes wood-wastes and agricultural wastes that are solid residues arising from the harvesting and processing of agricultural crops or forestry products that *might* otherwise be sent to landfill and/or incinerated" would be modified to "wood-wastes and agricultural wastes that are solid residues arising from the harvesting and processing of agricultural crops or forestry products that *would* otherwise be sent to landfill and/or incinerated."

Moreover, this would also mean that the EcoLogo[CM] Program would require that uncontaminated ash arising from biomass power production would have to be used as soil amendment. According to the Oregon Department of Energy (2007), uncontaminated ash can be used as a soil amendment to add minerals and to adjust soil acidity.

This would also put into question the use of clean organically-sourced material separated from municipal solid waste as a low-impact source of energy in lieu of composting facilities.

6.3.2.3 Use of Genetically Modified Organisms

The current CCD-003 does not specifically address genetically modified organisms. However, the Naturemade Swiss Label (2008), as a comparison, does not allow the use of biomass from genetically modified organisms. The current CCD, however, states that:

> *"clean biomass" means organic materials as listed below that have, at no stage in their lifecycle, been treated with organic and/or inorganic substances to change, protect or supplement the physical properties of the materials (including inter alia synthetic chemical pest-control products, fungicides, wood preservatives, paints, varnishes or other surfaces coatings, halogenated compounds and/or compounds containing heavy metals).*

According to Green-E, "genetic engineering remains very controversial. As risk assessments prove, for certain species these genetically modified organisms (GMOs) can spread through nature and interbreed with natural organisms, thereby contaminating non 'GE' environments and future generations in an unforeseeable and uncontrollable way. As long as genetic engineering is such a controversial issue and especially combated by large ENGOs, GMOs need to be excluded from green electricity label schemes."

9.Q) Do you think that the EcoLogo[CM] Program should follow the Naturemade Label and the recommendations of Green-E and explicitly not certify biomass energy coming from genetically modified organisms? If so, why? If not, why not?

6.3.2.4 Following Organic Standards

According to the Organic Trade Association (2008):

> *If all farmers in the U.S. converted to organic production tomorrow, we'd eliminate 500 million pounds of persistent pesticides from entering the environment each year. We'd no longer be dumping 40 billion pounds of synthetic fertilizer on our fields each year. We'd help keep waterways clean. Through cover cropping and other production practices, we'd be taking greenhouse gases out of the air and sequestering more carbon into the soil. Reduced use of pesticides and the increasing biodiversity of organic farms would help restore habitats for beneficial native animals, insects and plants. Universal use of cover crops would dramatically reduce erosion problems.*

10.Q) Do you think that the EcoLogo[CM] Program should only certify biomass energy that comes from a percentage of organically certified sources? If so, what should this percentage be?

11.Q) If you think that the EcoLogo^{CM} Program should require organic certification, which standard should it accept and why? Should it, minimally, accept biomass that follows the Canadian National Organic Production Standard specified in the Organic Products Regulations (SOR/2006-338) which will come into force in December, 2008 (Canadian Organic Growers, 2008) in Canada and the United States Department of Agriculture Standards in the U.S.(USDA, 2008)?

6.3.2.5 Diminishing Risk of Eutrophication

As mentioned previously, Zah et al. (2007) have stated that the intensive use of fertilizers in moderate latitudes is one of the main culprits leading to significant environmental impacts within the biofuels category. The use of chemical fertilizers can lead to eutrophication (Shwartz, 2006). Choosing the right energy crop can lead to lower eutrophication problems (Auer, S., Haulio, M., Lekawska, L., Sonnleitner, M., 2006).

12.Q) Do you think that if the EcoLogo^{CM} Program adopts organic standards, that fertilizer usage would go down and therefore protect waterways from eutrophication?

13.Q) Do you know of other ways to reduce the risk of eutrophication from biomass derivatives? If so, which ones and why?

14.Q) Do you think that certain biomass crops need too much fertilizer compared to others, and therefore should not be EcoLogo^{CM} certified? Which crops should be prioritized in the U.S. and Canada?

6.3.2.6 Efficiency

According to Clean-E (2006), the use of biomass with a low efficiency would be an underutilization of biomass fuel. Therefore, they suggest that the overall efficiency of facilities should be at minimum 60 %. Naturemade (2008) has adopted this standard in its certification guidelines.

15.Q) Do you think that the EcoLogo^{CM} Program should follow the recommendations of Clean-E and Naturemade and certify biomass-fuelled electricity that comes from energy facilities that have an efficiency of 60% or more? If so, why? If not, why not?

6.3.3 Specific Environmental Impact Categories and Related Stressors for Biomass-Fuelled Electricity from Wood Wastes

6.3.3.1 Diminishing Risk of Using Logging Residues

The long-term sustainability of using logging residues for energy is questionable. According to Clean-E (2006), the European Environmental Agency does not allow removal of foliage and roots from forest floors. Also, Clean-E advocates for no removal of needles, foliage and roots. Moreover, they mention that forest residues, like branches and others shall be left at the site as far as possible to maintain soil fertility and to reduce risk of erosion; that measures have to be adapted to site characteristics, and ash quality from conversion processes should be monitored and where possible nutrient-rich ash should be recycled back to the land. As well, Sanborn, Kranabette & Chapman (2000), state that whole-tree harvesting increases potential nutrient removals by 50% or more, compared to bole-only harvesting at certain sites. They also state that the removal of woody residues during harvesting may have limited short-term significance for nutrient budgets, but these materials have many ecological roles that contribute in poorly-understood ways to site productivity. Therefore, they suggest that it would be prudent to minimize unnecessary removal of these materials during forest management.

16.Q) Do you think that the EcoLogo^{CM} Program should ban the use of logging residues such as *inter alia* branches, foliage, and roots for the production of energy to discourage the potential soil degradation of forest floors? If so, why? If not, why not?

17.Q) If you think that a certain percentage of logging residues could be permitted without posing a risk to the sustainability of forest soils, what is that percentage and why?

6.3.4 Specific Environmental Impact Categories and Related Stressors for Biomass-Fuelled Electricity from Dedicated Energy Crops

6.3.4.1 Forest Protection

Both the European Union Commission (Boel, 2008) and Zah et al. (2007) think that lands including forests with high biodiversity and carbon stock value should not be cleared for the production of dedicated energy crops.

18.Q) Do you think that the EcoLogo^{CM} Program should follow the recommendations of both the EU Commission (Boel, 2008) and Zah et al. (2007) and not certify biomass-fuelled electricity derived from dedicated energy crops that have been grown on cleared land that had high biodiversity and carbon value? If so, why and how? If not, why not? If so, how far back should and could the EcoLogo^{CM} Program verify that these types of lands has not been cleared to produce dedicated energy crops? Also, how could the EcoLogo^{CM} Program accurately determine the biodiversity index of these cleared lands?

6.3.4.2 Use of Food Crops

Recently, there has been much controversy about the potential role of biofuels in being one of the causes of rising food prices and subsequent human hunger in certain parts of the world. Some groups like Greenpeace (2008) are calling for the use of biofuels that do not threaten global food security. According to the Food and Agricultural Organizations of the United Nations (1995), a staple food is one that is eaten regularly and in such quantities as to constitute the dominant part of the diet and supply a major proportion of energy and nutrient needs. Of more than 50,000 edible plant species in the world, only a few hundred contribute significantly to food supplies. Just 15 crop plants provide 90 percent of the world's food energy intake, with three rice, maize and wheat - making up two-thirds of this. These three are the staples of over 4 000 million people. Most people live on a diet based on one or more of the following staples: rice, wheat, maize (corn), millet, sorghum, roots and tubers (potatoes, cassava, yams and taro), and animal products such as meat, milk, eggs, cheese and fish.

19.Q) Should the EcoLogo^{CM} Program certify biomass-fuelled electricity generating facilities that derived their energy not from the parts of staple food crops that are edible? If so, why and how? If not, why not? How can this conflict between the use of crops for energy and for food be resolved justly?

6.3.5 Specific Environmental Impact Categories and Related Stressors for Biomass-Fuelled Electricity from Liquid Fuels

6.3.5.1 Methanol Toxicity

20.Q) Does the toxicity of methanol pose a potential significant environmental and health risk when used for the production of electricity?

6.4 General Considerations

21.Q) Do you think that all of the potential significant stressors and impact categories related to biomass power sources are currently being addressed in this CDD? If not, which stressor or impact do you think is missing and why?

7 Performance Testing

22.Q) Do you know of performance tests the EcoLogo^{CM} Program should be aware of for biomass-fuelled electricity?

8 Reference

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