UNDERSTANDING ENVIRONMENTAL PRODUCT DECLARATIONS (EPDs) FOR WOOD
(Current Problems and Future Possibilities)

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September 24, 2013

INTRODUCTION *(Some Basics)*

There is a great deal of confusion and misinformation related to using Life Cycle Assessment (LCA) techniques to create Environmental Product Declarations (EPDs) for wood products. LCAs can differ widely in what they are designed to measure and disregard. Current conventional LCA studies of wood products are seriously flawed because, among other things, they fail to accurately take into consideration the environmental impacts of timber harvesting. This document attempts to clear up some of that confusion and help individuals understand the problems associated with current EPDs for wood.

Using LCA techniques is not new - they have been used by companies for decades to identify inefficiencies in their manufacturing operations and to measure incremental improvements in sustainability. What is new today is the efforts by industry trade groups to use LCA techniques to divert attention away from the problems in their industry. No-where is this more prevalent than in the timber industry.

In simple terms, Life Cycle Assessment is little more than an elaborate yardstick. It attempts to measure the environmental impacts across the entire life cycle of a product. There are generic LCA studies that look at averages for an entire industry's operations and specific LCA studies that look at a specific company's operations. In both cases, without comprehensive Product Category Rules that clearly spell out what must be measured, what can be left out, and how to treat the relevant environmental impacts that have been excluded, LCA studies should be treated with skepticism.

Setting the limits (or System Boundaries) for what an LCA should measure and what it can exclude for any given product is determined by a Product Category Rule (PCR). The current Product Category Rule for North American wood was developed by a Canadian research organization with close ties to the mainstream timber industry and without any input from the environmental community. As a result of this timber industry bias, all current LCA studies of wood products are seriously flawed because, among other things, they fail to accurately take into consideration the environmental impacts of timber harvesting.

All current Environmental Product Declarations (EPDs) for wood products are based on the current Product Category Rule for North American wood. Each EPD is paid for by an organization (called the Declaration Holder) and performed by an organization (called the Program Operator) under rules established by the International Standards Organization (ISO). The EPD is a summary of the results of the LCA study. It also attempts to elaborate on or explain what the results mean, usually in as positive a way as possible.

Q. Using conventional LCA techniques, what's the difference in the environmental impacts reported in an EPD for the two timber harvesting operations shown below?

A. None. The current Product Category Rule for wood does not require site-specific environmental impacts of forestry operations to be measured, nor does it require disclosure of this omission.

WHY CREATE A LIFE CYCLE ASSESSMENT FOR WOOD? *(The Good, the Bad, and the Ugly)*

Mankind has been using trees for many purposes for thousands of years. Living trees provide us with fruits, nuts, medicines, spices, maple syrup, cork, rubber, and other direct benefits. Living trees also provide numerous indirect benefits such as shade, water storage, water purification, carbon capture and storage, habitat for other species, and recreation. On the other hand, cut trees provide us with shelter, wood products, paper, and organic material for cooking and heating. A life cycle assessment for wood only looks at some of the impacts and uses of cut trees, and largely ignores the benefits of living ones.

The Good (and Hope for the Future)

- An LCA for wood is an attempt by the wood industry to measure and quantify some of the impacts of producing and using wood across a product's life cycle, from resource extraction (logging), to manufacturing, to use, to disposal.
- Studying the LCA impacts of a specific company's operations can identify inefficiencies and areas for improvement in a company's total greenhouse gas emissions and other impacts measured by LCA.
- LCA can theoretically measure all relevant environmental impacts of producing and using wood across a product's life cycle, from resource extraction (logging), to manufacturing, to use, to disposal, in a way that is quantitative, scientific, and unbiased.
- Comparing the specific LCA results of two products or materials that perform the same function can theoretically help inform the buyer or design professional on which product or material has a better environmental profile.
- Comparing the specific LCA results of two companies that make the same or similar products can theoretically help inform the buyer or design professional on which company has a better environmental profile.
- Doing life cycle assessments and producing EPDs creates jobs for Program Operators and LCA practitioners.

The Bad (and the Problems)

- Conventional LCA studies do not include the health impacts of manufactured wood products, such as formaldehyde emissions, toxic wood preservatives, or fire retardant additives.
- Conventional LCA studies only report the limited results of five impact categories. They ignore land use-related impacts (such as forest disturbance, stream disturbance, and elimination of wildlife habitat) associated with deforestation and clear cutting, the use of toxic herbicides and pesticides, and the possible health impacts of manufactured wood products in use.
- Conventional LCA studies produce EPDs which can be very misleading if compared, since so many impacts are ignored. Responsible forestry and environmentally-destructive forestry are basically equivalent when compared using the five impact categories which are commonly used.
- Conventional LCA techniques ignore the environmental benefits provided by trees and forests that are the source of that wood.
- Conventional LCA studies report the results as estimated "potential" impacts - not actual impacts.
- Conventional LCA study results are only approximations and are usually based on data from national or regional databases that are industry averages, hence the results can vary greatly in accuracy.
- Industry averages don't tell you where problems are, or who's doing a good job and who's doing a bad job.
- The resulting LCA data is so esoteric that it's impossible for the average individual to understand or evaluate it's meaning.
- Cutting down a tree halts all of the benefits provided by a live tree and begins the process of decomposition and decay, as well as begins other negative processes that the live tree was providing. This is when the tree stops absorbing CO_2 from the atmosphere, and stops sequestering carbon in its roots, trunk, branches and leaves. This is the beginning of the release of all the previously stored carbon in the tree. Other negative processes are also set in motion at this time, such as loss of water uptake by the tree, loss of forest habitat, loss of transpiration (cloud generation), potential loss of topsoil and organic matter, potential pollution of rivers and streams, and a potentially hotter microclimate (the heat island effect). In a sustainably managed

forest, these negative impacts are minimized; in an industrial forestry operation these negative impacts are major.

Faced with the embarrassment of irresponsible logging, the conventional timber industry is touting LCA techniques to mask the problems. Current LCA techniques for wood:

- divert attention away from the problem by creating EPDs that look credible,
- use averaging techniques that treat sustainably managed forests, irresponsibly managed forests, and tree farms alike,
- ignore the fact that only 1/3 of a tree is usable wood, and that 2/3 of the stored carbon is in the roots, soil, branches, and leaves, and
- create carbon accounting scenarios that assume the forest will be replanted, and new trees will eventually sequester carbon at the same rate as cut trees are releasing carbon.

The Ugly (and the Greenwash)

- The primary purpose of current EPDs for wood appears to be to divert attention away from destructive forest management practices which cause disturbance to forests, streams, wetlands, and eliminates habitat for wildlife, all to sell more wood.
- The current LCA system boundaries for wood products do not include the most important and potentially harmful environmental impacts of using wood - forest management practices.
- The data used by LCA practitioners of the environmental impact of logging followed by the replanting of saplings are based on seriously flawed assumptions created by the status-quo timber industry.
- Current EPDs for wood are a classic example of industry greenwashing.

Greenwash: *(n)* Disinformation disseminated by an organization in order to present an environmentally responsible public image. *(Oxford English Dictionary)*

According to TerraChoice, an environmental marketing firm, there are seven "Sins of Greenwashing". In the case of EPDs for wood, several types of greenwash are being employed:

- **Sin of the Hidden Trade-Off:** Wood can be a relatively “energy-efficient” material compared to other building materials like steel and concrete, but to get the wood, you have to cut down trees which provide CO_2 sinks, water storage and filtration, wildlife habitat, global cooling, and other benefits. We cannot destroy forest ecosystems and all the benefits that trees provide in the process of getting the wood. Any honest discussion of wood use must not ignore the source of that wood.
- **Sin of Vagueness:** EPDs contain lots of technical data and assumptions, but the conclusions do not include the biggest impacts, which are how forests are managed and the loss of ecosystem services that trees provide. The industry admits that the impacts that <u>are</u> included are only industry averages with a great deal of variability. The results are practically meaningless.
- **Sin of Irrelevance:** EPDs include Ozone Depletion Potential as one of their five impact categories. This is a measure of CFC equivalents, which are essentially zero. CFCs were banned in the 1990s, and there is no purpose in including this impact indicator in the EPD, other than to make the report look comprehensive.
- **Sin of the Fake Ecolabel:** Although not mentioned in EPDs for wood, the same backers of wood EPDs are also supporters of the Sustainable Forestry Initiative (SFI). SFI created a fake ecolabel in response to the Forest Stewardship Council's (FSC) certification and ecolabel of sustainable forestry operations. The Federal Trade Commission currently has a complaint before it on the legitimacy of SFI's ecolabel. EPDs for wood are another attempt by the status-quo timber industry to divert attention away from their harmful timber harvesting practices.

PROBLEMS COMMON TO ALL CURRENT EPDs for WOOD

Impact Categories Omitted: According to the Product Category Rule for wood, there are only five impact categories that an EPD needs to include. Other impact categories for wood products that are not included, but are just as important, are forest biome disturbance, freshwater biome disturbance, and wildlife habitat disturbance. In certain types of forestry, herbicides like atrazine and 2,4-D are used, which means impact categories can also include those related to hazardous chemical use. Impacts associated with product use are also ignored (i.e. formaldehyde emissions from particle board).

Variable Sales Units: The results for each of the reported Impact Categories is based on a certain quantity of wood sold (a declared unit). The Program Operator, in conjunction with the sponsor who paid for the study, is free to decide what unit of measure these numbers are based on. In one EPD the numbers were based on 1 cubic meter of planed, kiln-dried dimension lumber that had not yet been shipped from the factory; in another EPD the numbers were based on a square meter of installed kiln-dried 1 x 6 wood decking. Sales units do not take into consideration wastage or nominal vs. actual dimensions.

Making Informed Comparisons: EPDs do not necessarily allow for comparison of different products. According to the Product Category Rule for wood, "LCA results … can be used for comparison between different EPDs provided the building products and systems have been assessed on the basis of the same function and reference service life…" However it goes on to say, "The information provided using a declared unit shall not be used for comparison of different products." Since so many impacts are ignored in conventional LCA studies, it is very misleading to compare EPDs based upon them.

P**otential vs. Actual Impacts:** All of the impact categories for wood products are only potential impacts - not actual impacts. The reason for this is that much of the LCA data is collected from generic national or international databases, and not based on actual field measurements. The potential impacts which are considered have no environmental relevance, and provide little or no information about impacts which are actually occurring on the ground.

Industry Averages vs. Location-Specific Results: EPDs use LCA databases that are industry averages that are not specific to any part of the Unites States or Canada. These generalities in data collection and reporting makes the results meaningless for comparison purposes. For example, wood that is milled in Washington state or in upstate New York uses electricity that is over 90% carbon neutral due to its proximity to large hydroelectric dams, whereas wood that is milled in some southeastern parts of the Unites States may use electricity that is 90% from carbon-intensive coal-fired power plants. Using industry-average data hides location-specific variability, and lumps sustainable operations with less sustainable operations.

Boundary Problems: Cradle-to-Grave, Cradle-to-Gate, or Whatever: EPDs for wood products have boundary problems on both ends of the LCA spectrum - the Cradle end, and the Grave end.

- On the "Cradle" end of the spectrum, the tree from which the wood was taken is no longer absorbing or storing CO_2 and water, or providing any of the other functions of a tree. This instantaneous loss of a tree's functionality is difficult to calculate, so LCA studies make various assumptions about replacing a cut mature tree with a new sapling. The current PCR for wood states that the LCA does not include changes in soil carbon during forest [destruction or] growth up through harvest. Ecological impacts and water loss are also not included.
- On the "Grave" end of the spectrum, wood has an enormously variable life span before fully decomposing and releasing the last of its stored carbon into the atmosphere. Over 1/3 of a tree's carbon is in the roots, soil, and leaves and decomposes immediately, some decomposes or is burned as part of milling operations, and some decomposes after the wood is disposed in a landfill. EPDs have difficulty calculating this and often end their Assessment at the "Gate" when a wood product leaves the factory, or they assume a 100 year decomposition cutoff time.

Water Impact Problems: LCA studies do not include the water impacts of cutting down a mature tree. The PCR states that the evapotranspiration caused by forest growth should be excluded. "The process of groundwater and soil moisture absorption through roots and transpiration through leaves is part of the

natural water cycle, and while significant in scale, is generally considered to be in long-term equilibrium in sustainably managed forests."

A prominent UNESCO study calculated that the forest water footprint (water circulated by a tree) to be in the range of 1,000,000 liters of water per cubic meter of wood harvested when one considers the evapotranspiration of water over the life of a tree. This is like taking 2-13 liters of water out of circulation for one sheet of paper!

Although the PCR for wood requires water consumption to be reported, it is not reported because all major Life Cycle Inventory databases only provide data for water withdrawals and not for water consumption.

Time Problems: EPDs claim to be valid for a period of 5 years from the Date of Issue. In addition, the PCR for wood states that data may be used from LCA databases that is up to 10 years old at the time the EPD is issued. As new sustainable power projects like wind and solar enter the marketplace and old carbon-intensive power sources are phased out, the reported LCA results can quickly become obsolete.

PROBLEMS WITH THE FIVE CONVENTIONAL EPD IMPACT CATEGORIES

Global Warming Potential: This category calculates the global warming potential of all greenhouse gasses that are recognized by the 1992 Kyoto Protocol. Substances include CO_2, methane, nitrous oxide, CFCs, HFCs, and SF6. The unit of measure is kg of CO_2 equivalents.

Current LCA techniques do not consider short-lived climate pollutants, like black carbon, which will cause as much as 50% additional global warming between now and the year 2050.

Forests store a large amount of carbon in the soil and in tree roots, branches, and leaves. "Global Warming Potential" does not consider the stored carbon that is lost during harvest. Common LCA techniques assume that all forestry is "carbon neutral" - even deforestation.

Acidification Potential: Calculates the emissions of acids, or substances which can form acids. Substances include ammonia, nitrogen oxides, and sulfur oxides. The unit of measure is H^+ moles equivalents.

In certain regions, like the Northeastern US, these acids fall onto sensitive soils and can cause impacts like dead lakes or forest diebacks. Calculating emissions of acids does not consider whether these substances fall onto sensitive areas.

Eutrophication Potential: Calculates emissions of nitrogen and phosphorus. The unit of measure is kg of N (nitrogen) equivalents.

"Eutrophication Potential" is usually measured using generic national-average databases which are very inaccurate. It reports air and water emissions as equivalent, even though for forestry, runoff into water is by far the more important impact.

Smog Potential: Calculates emissions of VOCs and nitrogen oxides which might form ozone. The unit of measure is kg of ozone equivalents.

"Smog potential" does not consider emissions of "soot", the other part of smog. If breathed, both ozone and soot can cause respiratory and cardiovascular health problems, particularly in young children and the elderly. These emissions are much more important if ozone occurs in regions which are heavily polluted already, which is not reflected in "Smog Potential".

Also, more smog is created from older fossil fuel power plants than from new power plants using renewable power. Common LCA techniques do not consider the variability in smog emissions from the power source feeding the electrical grid.

Ozone Depletion Potential: Calculates potential impact of all substances that contribute to stratospheric ozone depletion. Substances include CFCs, HCFCs, chlorine, and bromine. The unit of measure is kg of CFC-11 equivalents.

This category is irrelevant. There are no CFC emissions associated with wood production, and "Ozone Depletion Potential" is a phantom (non-existent) impact for wood products.

EXPLANATION OF TERMS

Acidification: In LCA, acidification refers to the increase in the acidity of soils and water bodies as a result of acid rain. If acid rain falls onto sensitive regions, damage to plant and animal ecosystems can result, as well as corrosive effects on buildings, monuments, and historical artifacts.

Acid rain is formed from emissions containing acids such as sulphur dioxide and hydrochloric acid. In the U.S., most acid rain is formed from emissions resulting from electricity generation, especially from coal-fired power plants.

Cradle-to-Gate: Cradle-to-gate is an assessment of a *partial* product life cycle from resource extraction (*cradle*) to the factory gate (i.e., before it is transported to the consumer). The use phase and disposal phase of the product are omitted. Cradle-to-gate assessments are sometimes the basis for environmental product declarations (EPDs), termed business-to-business EDPs.

There is no consensus on what should be included in the resource extraction (cradle) phase of an EPD. There is also no consensus on whether the LCA should end at the factory Gate or at the Grave of the product.

The Cradle: The point in the life of a product when the LCA study begins; sometimes called the resource extraction phase; the system boundary where the LCA begins.

The Cradle is a very nebulous concept that is difficult to quantify in conventional LCA studies of wood. There are enormous differences in the impact of different types of forestry operations, from sustainable harvesting in a diverse forest ecosystem, to clearcutting of a diverse forest ecosystem followed by conversion to a tree plantation, to a tree farm operation. Conventional LCA studies ignore these differences and do not attempt to assess the impacts on the forest ecosystem after logging.

LCA studies also make assumptions about replacing a cut mature tree with a new sapling. They specifically exclude from the LCA calculations the fact that approximately 1/3 of the carbon in a tree is in the roots and soil.

Environmental Product Declaration (EPD): An environmental product declaration (EPD) is a standardized way of quantifying the environmental impact of a product or system. Declarations include information on some of the environmental impacts of raw material acquisition, energy use and efficiency, content of materials and chemical substances, emissions to air, soil and water and waste generation.

Only five impact categories are included in current EPDs for wood. The information reported in these five impact categories is incomplete because they do not take into consideration any on-the-ground impacts of how the forest is being managed.

Other equally important impact categories that are not included in the current EPDs for wood, including impacts related to the forest biome, ground water runoff and pollution, herbicide and pesticide use, and product emissions such as formaldehyde.

Eutrophication: Eutrophication is the fertilization of surface waters by nutrients that were previously scarce, leading to a proliferation of aquatic photosynthetic plant life which may then lead to further consequences including foul odor or taste, loss of aquatic life, or production of toxins. Eutrophication is caused by excessive emissions to water of phosphorus (P) and nitrogen (N).

Phosphates and nitrates are fertilizers used in tree farm operations to stimulate tree growth, which can run off into streams and waterways. Likewise phosphates and nitrates might be present if the residue from milling operations were allowed to wash into streams and waterways. A responsibly managed forest operation does not use fertilizer and a responsibly managed lumber mill would not have any runoff of phosphate or nitrate-containing materials into streams and waterways. In a responsibly managed operation, this number should be zero.

The Grave or The Gate: The point in the life of a product (or the system boundary) when the LCA study ends.

The "Grave" for a wood product is when all the wood from a tree has fully decomposed or released all of its carbon into the atmosphere. This is a difficult and problematic point in time for LCA to measure. Wood can last a long time, but unlike metals, wood eventually decomposes and returns its carbon to the atmosphere as CO_2 or methane. The decomposition can happen in years, decades, or centuries. Recognizing this difficulty in putting a time limit on the lifespan of wood and measuring the

impacts, the LCA community has chosen to ignore ("omit") the use phase, disposal phase, and decomposition phase, hence stopping the LCA at the **Gate**.

ISO 14025: International Standards Organization, Document 14025:2006 "Environmental Labels and Declarations, -- Type III Environmental Declarations -- Principles and Procedures."

This is the internationally established rule under which an EPD report is written. A Type III label is a third party environmental declaration based on LCA. This document establishes the principles and specifies the procedures for developing Type III environmental declaration programs and declarations, and requires the use of the ISO 14040 series of standards in the development of these declarations.

If a Program Operator or a Product Category Rule developer fails to follow ISO standards, there is no enforcement mechanism or recourse available, as ISO does not provide anything more than a set of rules.

Life Cycle Assessment (LCA): Life Cycle Assessment, also known as Life Cycle Analysis, is a technique to assess environmental impacts associated with all the stages of a product's life from cradle-to-grave. In the case of wood, a "cradle-to-gate" LCA is sometimes used.

Life Cycle Assessments have four phases: (1) Goal and Scope Definition; (2) Life Cycle Inventory Analysis; (3) Life Cycle Impact Assessment; and (4) Life Cycle Interpretation.

Product Category Rule (PCR): The agreed-upon boundaries that define the limits of what to include and what to exclude from the assessment of a particular Environmental Product Declaration.

The PCR for wood was developed by FP Innovations, a consortium of Canadian timber industry groups, without any input from environmental organizations. The sole purpose of FP Innovations is to maximize the profits of its industry members. FP Innovations is the sole entity responsible for what is included and what is excluded from the wood PCR, and thus what is included and excluded from all EPDs for wood.

Program Operator: The entity that is hired to perform the life cycle assessment and write the environmental product declaration which summarizes the results of their study.

Program Operators may be paid by industry trade groups to perform generic LCA studies on all products or classes of products manufactured by that industry. They may also be paid by a specific company to perform an LCA study on a company's specific product or products.

System Boundary: What is included and what is excluded from the life cycle assessment.

The Program Operator has a great deal of flexibility in defining the boundaries of what they will include or omit from their assessment. These boundaries should be defined in an agreed-upon document called a Product Category Rule (PCR), however in the case of wood, there is no agreed-upon consensus document.

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