

ASTM International Committee E60 on Sustainability Standards

Portland Cement Association
Codes and Standards Department

April 27 – May 1, 2015, Anaheim, CA
Meeting Notes

Next Meeting: October 27 – 29, 2015 - Tampa Marriott Waterside Hotel, Tampa, FL

E60.01.01 Terminology Task Group

No significant activities or issues during this committee week

E60.01.12 Whole Building Life Cycle Assessment (LCA) Task Group

This standard is being revised with the intention of better addressing modifications in other standards such as ASHRAE Standard 189.1. It is intended for use with building codes, standards, and rating systems. Key accomplishments were, that although not binding votes, there was general agreement to:

- Keep basic definitions such as building products unchanged.
- Include plug loads with places further emphasis on operations instead of phases of the LCA. Effort will be required to keep process energy out of the mix. The argument will be that process energy is already accounted for in product EPDs. The term “plug loads” is likely to be replaced with “unregulated loads.”
- The most significant success for this meeting was the ability to keep the product service life at 75 years rather than permitting it to be reduced to 60 years.
- Interior finishes and trim remains the same and is not revised to exclude wood treatments. The arguments best supporting this position were founded on the definitions in the *International Building Code*.
- Many items of concern were not addressed during the meeting. Previous negative comments in this version of the revisions to the standard included:

Negative Comment 1 - Title: Change title to project. There is no reason to limit this LCA practice to buildings, it can also be applicable to transportation and infrastructure projects and sitework. Revise title to read: “*Standard Practice for Life Cycle Assessment of Whole ~~Buildings~~ Projects*”

Negative Comment 2: Introduction: The current introduction is too limiting and too negative, consider replacing with text provided below. The inaccurate unsophisticated approaches might be the only approach acceptable for some, especially smaller projects.

Determination of the sustainability of building and construction materials, components, and systems by using arbitrary and prescriptive criteria for specific material attributes such as recycled content, rapid renewability, or local purchasing does not accurately portray the performance or positive and negative impacts related to achieving sustainability in the built environment.

~~There is growing awareness that the focus in rating systems, codes and standards on specific material attributes, such as recycled content, rapid renewability or local purchasing is too limited in designing and building truly sustainable structures.~~

Negative Comment 3: Clearly identify the features that need to be addressed, see revision to text below:
The sustainability of building materials, components, and systems should be determined by evaluating environmental factors over the specified life of the project. The environmental factors should include:~~The alternative is to shift toward environmental performance measures such as global warming potential, ozone depletion potential, acidification potential, smog potential, eutrophication potential, consumption of water and consumption of virgin raw materials including fossil fuels potential, fossil fuel depletion, and a range of other measures of environmental loading and resource use.~~ Such an approach is commonly referred to as Life Cycle Assessment (LCA) addresses this need and LCA is generally accepted within the environmental research and analysis community as a critical approach for comparing alternative materials, components, systems, and services

Negative Comment 4: Delete text as written and replace with alternative text.
~~As a result, The LCA procedure provided in this standard is intended for use in evaluating the sustainability of building materials, components, systems, and services and determining compliance with is being introduced in codes, standards, and rating systems.~~

Negative Comment 5: As written this language places too high of an emphasis on assemblies which may not reflect overall performance in the building and thereby skew results or otherwise mislead the user. Replace with the following text:
Many building materials, components, systems, and services, unlike many consumer products, perform multiple functions and thereby may uniquely satisfy multiple design criteria. For this reason, evaluations should be determined using whole building or whole project LCA. One example is that fibrous thermal resistance insulation placed within a building assembly may not only provide enhanced thermal performance but may also improve the acoustical performance of the assembly and thus be used to satisfy multiple project requirements. Another example might be concrete structural element which may satisfy the structural and fire protection requirements for the project with additional materials for fire protection. Depending on project requirements the columns may not be required to be finished and may even be integrated into the design of the overall heating, ventilating, and air-conditioning systems to reduce and shift energy demand for building operations. While an LCA analysis of individual materials, components, systems, or services may be appropriate for simple or single function materials, components, systems, or services, they should not be used to evaluate or compare materials, components, systems or services with multiple or complex functionality. ~~at the building assembly (e.g., complete wall assemblies) and whole building levels in order to more holistically address such concerns.~~

Negative Comment 6: Do not list what the standard does not include, list what it does include. See revised text below.

1.3 This practice is intended to address The criteria related to:

- 1.3.1 global warming potential,
- 1.3.2 ozone depletion potential
- 1.3.3 acidification potential
- 1.3.4 smog potential
- 1.3.5 eutrophication potential
- 1.3.6 consumption of water and
- 1.3.7 consumption of virgin raw materials including fossil fuels

1.4 Depending on the scope of any specific project the LCA may be augmented with further analyses conducted using other practices. Such analyses may include: do not deal with the following environmental concerns that are important but are either outside the scope of LCA as currently practiced, have unacceptably high uncertainty

levels, or are in an early stage of development for use in LCA:

- indoor air quality
- social impacts;
- monetary assessments such as life cycle costing;
- risk assessment related to toxic releases; ~~or~~ and
- biodiversity.

Negative Comment 7: Include in-pound units as most building codes and referenced standards adopted and enforced in the United States are in in-pound units. The omission of in-pound could minimize the adoption and enforcement of this practice as a referenced standard.

1.4 The values stated in SI units are to be regarded as standard. In-pound units are provided to facilitate acceptance and determination of compliance with respect to building codes and referenced standards used in some countries. No other units of measurement are included in this standard. Energy shall be expressed in megajoules, MJ, (1000 British thermal units, MBtu) and ~~M~~mass shall be expressed in kilograms, kg, (pound, lb).

Negative Comment 8: Remove buildings and replace with project to reflect expanded use of this practice.

3.3.1 *ancillary product* — A ~~building~~ product that enables another ~~building~~ product to fulfill its purpose in the intended application.

3.3.2 *building* — ~~(1) A shelter comprising a partially or totally enclosed space(s), erected by means of planned forces of forming and combining materials. (2) The act or process of construction. (E631)~~

3.3.3 ~~2~~ *building service life* — The period of time during which the ~~building project~~ performs its essential function.

3.3.3 ~~4~~ *building product* — Goods used during the life cycle of a project building as part of its infrastructure or other construction works.

Negative Comment 9: Move “Upstream and downstream processes are included.” to appropriate section within the practice. This appears to be setting criteria rather than providing a definition.]

3.3.5 *cradle-to-grave* — An assessment of the full product life cycle from extraction of resources ('cradle') through the use phase and to the disposal phase ('grave'). ~~Upstream and downstream processes are included.~~

3.3.8 *life cycle assessment (LCA)* — Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product, component, system or service throughout its life cycle.

Negative Comment 10: Define energy or materials but do not confuse the two one solution might be:]

3.3.11 *non-renewable primary energy resources* — The fossil and mineral energy resources, coal, natural gas, crude oil and uranium, drawn directly from the earth that cannot be replaced once they are consumed.

3.3.13 *process energy* — ~~Building~~ energy loads that are not related to ~~building~~ space conditioning, lighting, service water heating or ventilation for human comfort.

3.3.1.4 *project* — the structure and related sitework as defined in the scope of the analysis.

3.3.16 *reference project building* — A project building design used as a benchmark, or baseline, against which an alternative final design is compared to demonstrate environmental improvement.

3.3.17 *reference service life* — Service life of a ~~building~~ product that is known or expected under a particular set, i.e., a reference set, of in-use conditions and that shall form the basis of estimating the service life under other in-use conditions.

4 ISO Compliance The procedures used for whole project building LCA shall be compliant with ISO 14040, ISO 14044 and ISO 21930.

5 Significance and Use

Comment A: There is no reason to provide qualitative descriptors in this section

5.1 This standard provides criteria that ~~building~~ design teams shall use to ~~accurately and consistently~~ report the environmental impacts associated with a project building design. This standard serves as a template that goes beyond the general principles specified in ISO 14040.

Comment B: The discussion on additional rules is now addressed in the proposed language in the scoping section.

and ISO 14044, but does not address all situations for all projects buildings. ~~NOTE: Additional rules and requirements may be necessary aside from those in this standard.~~

Negative Comment 11: The standard does not perform the actions described, revise accordingly.

~~5.2 This practice standard provides criteria to generate~~ defines verifiable, consistent and, where applicable, comparable technical data or scenarios so that consumers and professionals associated with the project building industry can assess the environmental impacts of whole projects buildings.

~~5.3 The intended users include~~ owners and service providers involved in the design, construction, operation and final disposition of the project and individuals providing or maintaining LCA data. Service providers related to the design, construction, operation and final disposition of the project include but are not limited to, specifiers, planners, developers, architects, engineers, owners, facility managers, financial organizations ~~related to the building industry~~, manufacturers, government personnel agencies including building officials, and other ~~building professionals~~ and service providers involved in the design, construction, operation, and final disposition of the project and materials, components, systems or services. Individuals involved in providing or maintaining LCA data include but are not limited to ~~An additional target audience is the group of owners of life cycle inventory databases, life cycle practitioners, and providers of LCA-based environmental assessment tools.~~

6 Criteria

6.1 Service Life The same ~~building~~-service life shall be assumed for the reference ~~building~~ and for the alternative final design. ~~For buildings and related structures the service life and shall be not less than 60~~ 75 years for the purpose of the whole project building LCA unless otherwise specified. The service life shall be identified in the LCA in a specific code or standard to which the whole building LCA is directed. Product replacement schedules shall reflect the reference service lives for individual products or materials and the consequent number of replacements required over the assumed ~~building~~-service life.

6.2 Life cycle Stages

6.2.1 The entire life cycle of the ~~building~~ shall be taken into account including resource extraction or harvesting, building product manufacturing or processing, all related transportation, on site construction, operations including maintenance and replacement, and demolition and disposal.

Negative comment 12: Clarify the inclusion and/or exclusion of plug and process loads. Suggested language below.

6.2.2 Where energy is used to operate the project, The operations stage may include operating energy use, ~~depending on the code, standard or rating system requirements, Where with plug loads or permitted to be included and process loads are not reported, shall be identified. Where plug and process loads are reported, they shall be reported separately from other energy loads. excluded unless there is a clear and documented relationship to operating energy use.~~

Where a comparison is being made with a reference project building, that project building LCA shall also include comparable plug loads and process loads if such loads are included in the operating energy estimates for the alternative final project building design.

Negative Comment 13: Clarify use after demolition and expand to allow use as fuel for power generation or alternative energy in other processes

6.2.5 The disposal stage shall assign burdens to the building for all materials that are landfilled or incinerated, ~~with a~~ All burdens associated with material reuse or recycling shall be excluded as a charge to the next use after they leave the demolition site gate. All burdens associated with material use as fuel shall be excluded as a charge to the next use after they leave the demolition site gate.

6.3 Study Boundaries

Negative Comment 14: Revise section to keep inclusions together and more specifically list exclusions.

6.3.1 Whole project building LCA shall include the complete structure and related sitework. For buildings this shall include the building envelope; structural elements, inclusive of footings and foundations, and interior

walls, floors ~~and~~ ceilings and all finish materials; and pipe, conduit, ducts, and wiring contained within building elements.

6.3.2 Electrical and mechanical equipment and controls, plumbing and automatic fire sprinkler fixtures, fire detection fixtures and alarm system fixtures, elevators and conveying systems shall not be included in the assessment. ~~Conduit, ductwork, piping and wiring shall be included.~~

Negative Comment 15: All reporting can only be done to the extent that data is available. No reason for this statement. Replace with language that advises that were data is not available it shall be clearly identified.

~~6.3.3 Interior finishes and trim shall be assessed to the extent that data is available, including through the use of a separate life cycle assessment tool, provided that comparable or similar function and performance of interior finishes and trim are included in the reference building used as a benchmark to establish conformance with performance requirements.~~

6.3.4 It shall be clearly identified where ~~s~~Site development is ~~shall~~ not be included.

6.4 Comparison to a Reference Project Building

Negative Comment 16: Criteria are applicable for this practice regardless of use for code compliance.

6.4.1 A reference project building design used as a benchmark ~~to ensure compliance with code or other requirements~~ shall meet specific criteria with regard to size, function, internal conditioning operating energy performance and other criteria determined to be included in the analysis, ~~as may be deemed appropriate by the agency, code or standard specifying such criteria.~~

6.4.2 When an alternative final design is compared to a reference ~~building~~ design, the same LCA tool or software shall be used to complete the LCA for both the reference ~~building~~ and the final alternative designs.

Negative Comment 17: Data sources may be different for different materials or systems. Initial design may not use photovoltaic systems and photovoltaic data may need to come from a separate data source, i.e. the photovoltaic system manufacturer. Revise accordingly.

6.4.3 When an alternative final design is compared to a reference ~~building~~ design, the same data sources for the same materials, components, systems, or services, impact measures and impact measure characterization factors shall be used for both the reference ~~building~~ and the final alternative designs.

Comment C: Consider eliminating the reference to ISO impact parameters and list appropriate parameters in scope.

~~The impact measures and LCI data aggregations shall be those specified in ISO 21930:2007, or a subset of such measures and aggregations as required by the agency, code or standard specifying the compliance requirements~~

Negative Comment 18: Clarify to assure that weighting within specific impact areas is conducted to achieve equivalent values in the report.

6.5 Weighting Weighting shall not be used to generate an single environmental impact number score and each all-individual impact measures shall be reported separately, ~~and LCI data aggregations shall be shown.~~

E60.01.14 Product Communications

Did not meet

E60.01.15 Site Development and Urban Planning

Conflicts with other task group meetings

E60.01.16 Construction Site Waste Material Task Group

This standard is nearing completion. Most negatives have were resolved at the prior meeting and due to job changes leadership had to be re-assigned. Currently there does not appear to be any significant issues remaining to be addressed that would have in impact on impact on the concrete and masonry

industries. Negative comments previously submitted by the PCA Codes and Standards Department include:

1.2 This standard applies to construction and demolition of buildings and other structures. It includes waste construction products and materials as well as waste generated on-site such as construction office waste and food waste

Negative 01: Clarify that it is limited to “waste” construction products and materials

Editorial: Using “such as” does not require the use of “etc.” and “etc. should not be used in a standard.

Negative 02: The construction product and material wastes are also generated on-site so language needs to be reworked:

“It includes all wastes generated on-site including waste construction products and materials, construction product and materials packaging, construction office waste, food waste, and food and beverage packaging waste.”

Negative 03: As described in possible language revision above, incorporate “packaging.”

1.5 This standard does not include the removal of hazardous wastes such as asbestos or lead.

Editorial: This standard addresses more than removal. The preferred language here might be:

“1.5 This standard does not address hazardous materials including asbestos and lead.”

4.1 A significant amount of waste is generated over the course of construction and demolition projects. Implementation of a Construction Waste Management (CWM) plan can reduce the amount of waste that goes into landfills or incineration, excluding waste to energy production facilities. The CWM plan should be designed to re-use materials on site where possible, reduce the amount of waste, and facilitate the recycling or repurposing of materials that cannot be reused.

Negative 04: “A significant amount of waste” is subjective and should not be used in a standard. This might be appropriate for commentary. It is possible to have small projects with no waste on site. Scope includes buildings and other structures. If the project is a concrete sidewalk, it is likely that there will be no waste on site, no need for dumpsters, etc. Simply strike the first sentence of Section 4.1.

Negative 05: “plan” is not “designed to re-use....” Plan is designed to facilitate the re-use...”

4.2 A CWM plan should address materials such as unused construction chemicals, unused finishing materials, scrap structural materials and all other unused or scrap building materials and their packaging. This will also include ancillary items such as but not limited to tools, forms, safety materials/Personal Protective Equipment, food, paper documents, etc; anything that cannot be consumed on the construction site including but not limited to concrete, metals and wood.

Negative 06: This is not a comprehensive list. What happens to construction chemicals that are used but still require disposal after use? They would not fit the category of “unused” construction materials and would thus be exempt for the criteria.

“4.2 A CWM plan should address ~~materials such as unused~~ construction chemicals, ~~unused building materials~~ including finishing materials, and ~~scrap structural materials, and all other unused or scrap building materials and their~~ and packaging. ~~This will also include~~ Ancillary items including such as ~~but not limited to~~ tools, forms, safety materials/Personal Protective Equipment, food, and paper documents, etc; should be addressed in the plan.

Negative 07: The last part of the last sentence in section 4.2 is redundant. If necessary consider revising to address products identified as specific chapters in the IBC to provide justification for the extent of the list:

The plan should address anything that cannot be consumed on the construction site including but not limited to aluminum, automatic fire sprinkler system components, concrete, electrical system components, doors and windows, gypsum and plaster, interior and exterior finishes, masonry, metal, mechanical system components, plastics, plumbing system components, steel, and wood.

4.3 Materials that cannot be recycled or repurposed should be handled in an environmentally responsible manner.

Negative 08: This implies materials that can be recycled or repurposed can be handled in an environmentally irresponsible manner. Revision is required.

4.4 The CWM plan should include a plan for documenting the types and amount of waste generated, and diverted from landfill or incineration.

Negative 09: This section assumes all jurisdictions have landfills or incineration capabilities. In some locations there may still be a “dump” which is not the same as a landfill.

4.5 The end-users of this standard can include contractors, architects, building owners or their representatives, consultants and government agencies, all of whom have an interest in reducing construction site waste.

Editorial: Consider rewording as: “~~The end users of t~~This standard is intended for use by ~~can include~~ contractors, architects, building owners or their representatives, consultants, ~~and~~ government agencies, and others ~~all of whom~~ have an interest in reducing construction site waste.”

E60.01.18 Multi-Attribute Sustainability Task Group

This task group is in the initial stages of developing a new standard Practice for the Development of Multi-Attribute Sustainability Standards for Building Products Work Item WK49400. This was the first meeting of the task group. The goal is to address standards written using a life cycle standpoint, such as minimum levels of cycled content, and/or reclaimed waste. This could be beneficial for concrete and masonry products – such as being indigenous and containing recycled content and using local labor.

- As currently proposed an attribute can be anything related to environmental or social impacts. There is still discussion as to whether the scope should include economic issues along with environmental and social issues.
- There may also be a need for a new standard for reporting multiple purpose products and product minimization. This would need to be championed by the concrete and masonry industry because most other materials service single functions. The proposed standard is intended to address energy resources and emissions related to resource extraction, production, distribution, use and disposal.
- Multi-attribute sustainability standards will likely need to address certification, market differentiation, optimization/opportunity for improvement, product specification in green building. Hiring local people could be an attribute.
- Discussion included a variety of topics, such as “Is global warming social, economic or environmental?” since it has an impact on all issues.
- Are threshold requirements required for multiple performance levels , etc.
- Should the scorecards be disclosed. How does the company meet or exceed the standard, where they need improvement? This is different form an EPD in that:
 - 1) It is a product standard
 - 2) It addresses manufacturing operations associated with a given product
 - 3) It requires that products come from responsible organizations

The impact of the standard appears to be mostly tied to standardization to assure fair marketing of multi-attribute products and does not appear to have a significant impact on national model building and standards but without active participation by the concrete and masonry industries this could easily be written to provide marketing advantages to competitive materials.

E60.01.17 Product Transparency Declarations Task Group

Practice for preparing product transparency declarations for building materials such as health product declarations (HPD) is simply a disclosure of all hazardous or risk materials. This reporting form is to take it further by considering exposure in the building application Ingredients. Key issues that need to be addressed include:

- ✓ Are the ingredients in the state in which they are contained in the product hazardous?
- ✓ Should exposure include both occupants and installers?
- ✓ How should volatile organic compounds (VOC) be treated with regard to content?
- ✓ How should VOC emissions be considered?
- ✓ Should recycled content be considered?

There was general discussion on multiple issues which tended to circle back to volatile organic compounds (VOC).

- Current HPD programs tend to be about product avoidance regardless of exposure or risk. Examples of products being deselected regardless of exposure titanium dioxide, carbon black and crystalline silica.
- The Occupational Safety and Health Administration OSHA has (GHS) and already addresses worker exposure. Proposition 65 in California addresses occupant exposure. This raises the question as to whether additional standardization is needed. The architects and specifiers are independently developing HPDs that completely black list materials with certain ingredients, so the consensus of the group was there is a need for a technically substantiated standard. Heavy metal industries defining list is burdensome.
- Recycled content could be proprietary. Exclusion of recycled content is being considered/
- Should industry average or company average be permitted.
- Should the scope be limited to finished products in exposures during normal occupancy and use.
- Should the scope be limited to intentionally added ingredients - what do you put in. Sometimes things get in that you don't know about. Alternatively some claim all are known even if not intentionally added. It was reported there is an existing standard addressing some of these issues, and language from ASTM F2577 *Standard Guide for Assessment of Materials and Products for Declarable Substances* could be useful.
- Only consider material with an exposure within the materials. Not just installed but during installation. There is a need to explain in the rationale with end-user consumer. Arguments were may be PCA that if the intent is to include installation then there should be consideration of "going back to well head." Life safety and health of manufacturer employees should be equal to that of installers. The strategy is that the metal industry will not want to go back to the well head and installers will be omitted. The preference would be to keep OSHA separate.
- Questions were raised as to what happens during demolition
- To avoid VOC contamination, non absorbent finishes would be needed throughout the building.
- Simply listing all materials not just hazardous is not appropriate. Is it encapsulated? There is nickel in stainless steel, but there is no nickel exposure in normal occupancy and use. The focus should be exposure to occupant with appropriate levels of risk.

- If OSHA required Safety Data Sheets (SDS) are adequate at manufacturing facilities it should also be adequate at the construction site. Some concrete and masonry industry NRMCA representative expressed favor of installation in addition to as installed.
- California has a VOC emissions standards, California 1350, *Standard Method for the testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1 (Emission testing method for California Specification 01350)*.
- Add whether Product Transparency Declaration (PTD) information must be third party certified. Should it be permitted to allow use of third party certification in lieu of listing product ingredients.
- Is a definition of encapsulated required?
- How often should a PTD be re-issued?
- Should the entire ASTM Task Group effort on PTD should be withdrawn because HPD exists. A straw vote, mostly industry representatives, overwhelming indicated there is a need as an alternative to HPDs.
- Green Suite published data on products.
- Clearly there must be task for smaller groups versus trying to tackle this big ugly gorilla. Collaboration sites will be set up.
- It was noted that there is an effort at the American Institute of Architects referred to as AIA Design + Health

E60.80 General Sustainability Standards Subcommittee

No significant issues or activities

E60.90 Executive

No significant issues or activities

E60.91 Strategic Planning

Efforts are underway to assure more effective meetings and to consider the development of processes that will facilitate standards development.

E60.80.06 Sustainability Database Task Group

- The ASTM sustainability standards listing can be found on the ASTM standards page.
- Product Categories Rules (PCR) will be added as a separate tab to the spreadsheet, to add PCRs but to keep them separate from standards.
- This is not a standards development task groups but an ad hoc task group working in a variety of areas and directions. Current activities are mostly at an informational management stage,
- A column is to be added to the spreadsheet tab on standards to indicate the process under which the listed standard was developed, i.e. ASTM, ANSI, or other. This will indicate the type of consensus process used if any and allow differentiation between programs, documents, and standards.