Asphalt Sustainability

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Is it possible to develop "pavement-level" PCRs and EPDs?

In a previous edition of this column, Dr. Mark Buncher discussed materials Environmental Product Declarations (EPDs), laying out the appropriateness of comparing material EPDs. Now we continue the conversation by asking ourselves two questions:

1. What would be the appropriate scope to compare EPDs?

2. Who should oversee the development of an EPD and its Product Category Rules (PCR) beyond cradle to gate?

Product Category Rules provide over-arching rules such as the scope of products/services covered and others to develop construction products and services EPDs. PCRs are developed through a consensus-based effort by involving public agencies and third-party interested groups.

Core rules for EPDs

Section 5.5 of ISO Standard 21930 (2017)[1] is critical for our civil engineering domain stakeholders:

"Comparison of construction products using an EPD shall be carried out in the context of the construction works. Consequently, comparison of the environmental performance of construction products using the EPD shall consider all the relevant information modules over the full life cycle of the products within the construction works. Such a comparison requires scenarios in the construction works context."

Section 5.5 further details that only EPDs that have "*the same functional unit*" shall be comparable.

Terms used in ISO 21930 may be unfamiliar to our typical readers whose domain of expertise is pavements and not life cycle assessment (LCA). Thus, let me decode words such as "*construction products*", "*construction works*", "*full life cycle*", "*scenarios*", "*declared vs functional unit*", and "*information modules*" for the context of a pavement.

"*Construction products*" would include asphalt binder, aggregates, asphalt mixtures and other materials used in pavement construction.

"*Construction works*" would refer to an entire pavement structure consisting of a surface layer, binder course, base, sub-base and subgrade.

"*Full life cycle*" of asphalt binder would include manufacturing of asphalt binder (crude oil extraction, refining, terminal operations), its application in subsequent products and works such as asphalt mixture and asphalt pavement/asphalt shingles through to its disposal (recycling, reusing, or landfilling).

"*Scenarios*" would refer to alternative pavement treatment/maintenance scenarios determined by a state agency.

- An example for "*Declared unit*" is "metric ton" or "Kg" of a product, while an example for "Functional unit" would be "**A** lane-mile of a pavement structure serving **B** amounts of traffic under **C** climatic conditions for **X** years of service life."

- "*Information Module*" would refer to a data entity pertaining to a specific portion of the pavement life cycle. Cradle-to-gate LCA results of asphalt binder would be an example of an information module.

Section 5.5 re-emphasizes the need to consider a "full life cycle" scope to achieve "holistic" pavement sustainability as defined by the Federal Highway Administration[1]. This means considering all four aspects of sustainability (performance, cost, environmental and social impacts) over the full life cycle.

Complexity should not be the reason we do not pursue a methodology.

Responsibility for developing pavement-level PCRs and EPDs

Previous columns detailed the implications of existing federal[3,4] and state level[5,6] "Buy Clean" legislations requiring cradle-to-gate EPDs. Various trade associations are currently working with their memberships to meet these legislative requirements.

Trade associations represent the manufacturers of material and house the relevant body of knowledge regarding the supply chain of that material required to develop cradle-to-gate EPDs. Likewise, the responsibility for developing post-gate pavement level PCRs falls on public agencies who are the owners of the pavement system. Relevant stakeholders for developing pavement-level EPDs would include contractors that build and maintain the roadway infrastructure. Different divisions within a public agency (e.g., material procurement division, design division, pavement management systems division) will have to work together to develop PCRs beyond cradle to gate. Hence, to credibly develop and implement PCRs and EPDs beyond the "gate," two things are necessary:

1. Establishing a transparent knowledge and data transfer between these divisions within a public agency (e.g., establishing an efficient feedback loop between pavement management systems and procurement and design decisions)
2. Accountability and transparent reporting on the performance of a pavement structure for a longer duration.

The tale of complexity

How many times have you heard someone say: "But it's too complex" after you propose a new idea? Complexity should not be the reason we do not pursue a methodology that provides a more complete approach to pavement sustainability.

While the logic for advocating, developing and using just cradle-to-gate EPDs as part of green public procurement may be that of faster implementation, it is important to remember the overall big-picture objective. Comparing EPDs of materials that may have different long-term performance periods can lead to unintended consequences and be detrimental to the big picture of true sustainability.

"Complexity" being used as a reason for not implementing a more holistic methodology is not new to the asphalt pavement industry. The same "it's too complex" logic led to a less-than-complete approach to address cracking in the development of Superpave specifications over 30 years ago. Many have said Superpave fixed the rutting problem but at the expense of cracking. We now are seeing many cracking tests being developed and evaluated as part of the more holistic Balanced Mix Design (BMD) method for designing asphalt mixtures[7].

The challenge

As an industry, we need to challenge ourselves to think beyond the scope of material cradle-to-gate EPDs by exploring a more holistic approach to sustainability that uses pavement-level PCRs and EPDs. This is especially true when using EPDs as part of green public procurement and policy. Not doing so may be easier but will not achieve true sustainability. **A**

References

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