Overview of Review Comments and Responses

Date: February 6, 2017	Project: **NAPA PCR**

REVIEWERS: John Harvey, Joep Meijer (chair) and Christoph Koffler **PCR Review Panel comments on the draft Product Category Rules (PCR) for Preparing an Environmental Product Declaration for: Asphalt Mixtures are divided into the following categories:** 1. Technical comments; 2. General comments; and 3. Editorial comments. **NOTE: With the exception of items noted in the matrix below, the Critical Review Panel is satisfied that other standard requirements (e.g., ISO standards) have been satisfactorily met.**	
1. Technical comments	

#	Page	Section	Comment	Recommendation	Response	Resolved?
T1	3	1	The PCR should be intended for EPDs of any asphalt mixtures sold in the U.S. The term "U.S. company" is not well-defined (=HQ in the US?) and besides the point.	Rephrase to "This product category rule (PCR) is intended to support Environmental Product Declarations (EPDs) of asphalt mixtures sold in the United States of America ("the U.S.")."	Accepted comment as modified. "This product category rule (PCR) is intended to support Environmental Product Declarations (EPDs) of asphalt mixtures produced in the United States of America."	Yes
T2	4	4.a	ISO 14025, section 5.3 states that "In the development of Type III environmental declarations, all relevant environmental aspects of the product throughout its life cycle shall be taken into consideration and become part of the declaration. If the aspects considered to be relevant do not cover all stages of the life cycle then this shall be stated and justified." So unless you justify the irrelevance of the use and EoL phase for the product system under study somewhere in the PCR, it seems that this PCR really aims at developing "information modules" (ISO 14025, section 3.13, section 5.4, and Annex B) for asphalt mixtures rather than Type III EPDs.	Reality has certainly left ISO 14025 in the dust when it come to the life cycle approach in Type III declarations, but I think it would be much better to clearly state that the PCR is intended to develop information modules for asphalt mixtures which can then be used to develop Type III declarations covering the full life cycle. Otherwise the conformance with ISO 14025 may be questioned.	Accepted comment as suggested. Added reference to conform with EN 15804 and added the following language to section 4.a. "This PCR is valid for business-to-business Type III EPDs for asphalt mixtures which consist of information modules from cradle to gate in line with ISO 14025."	Yes
T3	4	4.a	It seems unusual to limit the PCR to asphalt mixtures ***produced*** in the U.S. As a form of product documentation, it is tantamount that all EPDs of asphalt mixtures ***sold*** in the U.S.	Rephrase to "[..] that will provide the basis for determining cradle-to-gate environmental impacts of asphalt mixtures sold in the United States,	This PCR limits to asphalt mixtures produced in the U.S. due to the data sources prescribed.	Yes. Asphalt mixes are not sold across national borders into the US.

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			are based on the same PCR, regardless of where they are produced, correct? See also comment on section 1.	including the federal district and territories."		
T4	4	4.a.iii	EPDs are publicly available information. Limiting their use to certain LCA studies seems odd. not sure what the intent is here.	TBD – maybe rephrase to make the intent clearer	Accepted comment as suggested and clarified text as follows: "Life cycle assessment comparisons of pavement designs may use EPDs produced through this program as a data input. Comparison of life cycle environmental impacts of different pavement designs are only valid if similar system boundaries and secondary data sources for all pavement material inputs."	Yes
T5	5	4.a.iv	It is unclear how this expectation would be established or confirmed. The EPDs should contain enough information that enables the reader to make that assertion.	If not already required, add a requirement about disclosing the relevant product characteristics in the EPD that enable the reader to assess the comparability of function and performance of different mixtures. I am not sure what the difference between a functional and a design performance criterion are. Should be reworded to say that they meet same performance criteria only, or same performance criteria and same specifications to be comparable if want that additional restriction.	Accepted comment as suggested and clarified text as follows: "EPDs in conformance with this program for asphalt mixtures are comparable if the mixtures are expected to meet similar functional and design performance criteria as specified by the customer." RW: *Accepted comment and clarified the text as follows: "EPDs in conformance with this program for asphalt mixtures are comparable if the mixture are expected to meet similar performance criteria as specified by the customer."*	Yes
T6	8	7	The textbox on "Asphalt Production Temperature" states that "no differentiation is made between a "hot" asphalt mixture and a "warm" asphalt mixture; instead, for each asphalt mixture, the plant production temperature will be declared in the EPD". What does "no differentiation is made" mean for the resulting EPDs? Is the energy consumption modeled in the production of the mixtures not based on primary data and will it not differ for hot and warm mixtures?	Please clarify	Accepted comment as suggested and clarified text as follows: "Reducing production temperatures can reduce energy requirements and thus lower the environmental impact of asphalt production. Different plants achieve temperature reductions in different ways; however, the use of RAP and/or polymer-modified asphalts can limit how much temperatures can be reduced. This creates significant variability in the	Yes

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			Or does it simply mean that while the production temperature is disclosed in the EPD, the specific mixture doesn't have to be declared as either a hot or a warm mixture?		actual temperatures at which asphalt mixtures are produced. Furthermore, energy consumption at plants is not recorded separately per mix design. Therefore, the reduced energy consumption of asphalt mixtures using warm-mix technologies currently cannot be isolated from the energy consumption of mixes produced at traditional temperatures. To recognize production efforts to reduce energy consumption, the plant production temperature for each asphalt mixture will be declared in the EPD."	
T7	8	8	ISO 14025 doesn't know the term or concept of a "declared unit". EN 15804 introduced this term to the EPD world. Same for cradle-to-gate EPDs that do not require further justification of why use and EoL were excluded.	I think it would be easier if you didn't claim conformance with ISO 14025, but instead claimed conformance with EN15804 and only referenced ISO 14025. Then the chosen system boundary and the declared unit (instead of a functional unit) would be much less of an issue.	See response for T2.	Yes
T8	8	9.b	A1, A2, A3, etc. are called "modules" in the CEN standards	Change "phases" to "modules" throughout the document	Accepted comment as suggested.	Yes
T9	10	A1-1	The Asphalt Institute is currently evaluating different options to allocate energy consumption across refinery products, but economic allocation is definitely out of the picture because they will not consider the refinery a black box to be allocated in its entirety, but collect data only on the two process steps involved in asphalt production. This means that either the resulting LCI wouldn't comply with the current language in the PCR or the PCR would have to be updated as soon as the AI data becomes available.	TBD. If an update of the PCR once the AI LCI becomes available is not feasible, then the language in the PCR should be revised. It is unusual to try to govern the allocation approach of upstream inventories in a PCR. The PCR should just be limited to prescribing any allocation that may become necessary when producing the asphalt mixture from its ingredients. This would not preclude you from using certain upstream data in your tool, but it makes the tool more flexible to switch to datasets that are not based on economic allocation.	This section has been revised to remove references to data sources as follows. "Data for all these processes will be based on secondary data sources, as prioritized in Section 13.b."	Yes

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T10	10	A1-1	Regardless of the above, the mention of the allocation approach in this section seems odd. There should be a dedicated section on allocation somewhere.	Delete sentence on allocation approach here and (maybe) move to a dedicated section on allocation which should primarily focus on any allocation in foreground processes based on primary data.	Deleted noted sentences. See T9.	Yes
T11	10	A1-1	What Yang did in her Master thesis is plain and simple economic allocation, which is always based on mass output times revenue per mass output. She just made it seem more complicated than it was… ;-p	Rephrase to "Economic allocation is used to allocate the relative impacts of the crude oil refining process across the different co-products (Yang, 2014)."	Sentences were deleted in response to comment T10.	Yes
T12	10	A2	This is also about transportation modes, not just distances. Likewise, it is also about fuels and not just raw materials.	Change to "Transportation modes and distances of raw materials and fuels to the asphalt mixture manufacturing plant are to be based on primary data. However, transportation processes that are [..]".	Accepted comment as modified: "Transportation modes and distances of raw materials to the asphalt mixture plant are considered to be primary data collected in accordance with Section 13.a. However transportation that is part of upstream processes […]"	Yes
T13	10	A2-3	Unclear why you have to assume that the asphalt binder comes from a refinery (instead of a terminal) if it will be based on primary data in any case. Also, this is about transportation distance, so whether it is transported 100 miles from a refinery or 100 miles from a terminal is irrelevant.	Delete sentence	Accepted comment as modified. "Transportation of asphalt binder from the refinery or terminal to the asphalt mixture plant. This will be based on primary data collected for each plant."	Yes
T14	10	A2-2	On page 11, natural gas is only transported from extraction to the asphalt mixture production plant, so this paragraph seems off. Also, it will be close to impossible to model the transportation of natural gas from the actual extraction site to the asphalt mixture plant. We should limit this to Tier 1 transports.	Change to "Transportation of natural gas from natural gas supplier to asphalt mixture manufacturing plant. This will be based on primary data collected for each plant."	According to the metadata, the inventory is from extraction to combustion in industrial boiler, therefore transportation is assumed to be included.	Yes
T15	12	A3-1	Electricity is not listed here even though it says "Energy (fuel and electricity)" at the beginning.	Add electricity; also, are there any asphalt mix plants that produce their own electricity on site?	A3-1 is correct as written. Items a to h are activities that use either fuel or electricity. For example, fuel would be used in the burner used for drying aggregates while electricity would be used in the movement of material and mixing processes.	Yes
T16	12	A3-2.a	If you are asking for the water input into manufacturing, is any of this water leave the	If not all the water that is used is also consumed, add a point d to A3-3	Correct, all water is consumed via evaporation or shipped with the product.	Yes

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			facility as wastewater or is all either evaporated or shipped with the product? If practitioners wanted to use the NAPA datasets to calculate water consumption and no water outputs are reported (see A3-3), then all of the inputs would be considered consumed.	stating "Total amount of water discharged to waste water treatment or to surface water". If any water does go to external treatment, then you would have to add this process to the system boundary and your tool, though, unless it meets your cut-off criteria.		
T17	12	10.a	10.a states that "data gaps may be filled by conservative assumptions with average or generic data". Why have this option if you can instead apply cut-off criteria which will always result in a lower footprint than proxy data, especially if these are based on conservative assumptions? Seems you're trying to accommodate everyone's preferences here, but you may as well delete 10.a in that case.	Make proxy approach mandatory and clarify that this applies to foreground unit processes based on primary data only. Upstream LCIs may use either approach.	This language is in accordance with EN 15804's cutoff rules. Average or generic data does not refer to proxy data and the language was modified as follows to further clarify. "Data gaps may be filled by conservative assumptions with average or generic data from secondary data sources as prescribed in section 13.b."	Yes
T18	12	10.b	I think that you mean 1% of the total energy usage (i.e., fuels, electricity) rather than 1% of the total primary energy usage. A unit process in the foreground system usually doesn't have primary energy as an input. Also, fuels have a mass, too, so they may be excluded here.	If you keep 10.b, change to "In case of insufficient input data or data gaps for a unit process, the cutoff criteria shall be 1% of the total energy inputs (i.e., fuels and electricity based on higher heating value) and 1% of the total mass input (excluding fuels) of that unit process".	Accepted comment as modified to be in accordance with EN 15804 as was recommended in previous comments. Text was clarified as follows "In case of insufficient input data or data gaps for a unit process, the cutoff criteria shall be 1% of the total energy used in the model (i.e., fuels and electricity based on lower heating value) or 1% of the total mass inputs for the model (excluding fuels)."	Yes
T19	12	10.b	Unclear that the 5% also refer to the unit process.	Change to "The total sum of neglected input flows shall not exceed 5% of energy usage and mass inputs of the unit process." Regardless of what EN15804 states, it is still unclear how you would establish 100% of energy use and mass inputs for the "model" in its entirety. If this refers to the elementary flows in the final inventory, then 5% is a very large amount of mass or energy that may potentially be excluded. That's given	Accepted comment as modified to be in accordance with EN 15804 as was recommended in previous comments. Text was clarified as follows "The total sum of data that meets the cutoff criteria shall not exceed 5% of total energy use and 5% of total mass inputs for the model." RW: *Accepted comment and language in document was altered to as follows: "In the case of insufficient input data or data gaps for a unit process, the cutoff criteria shall be 1% of the total energy used in the*	Yes

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				you are able to calculate the 100%; I don't know how you would do this in the presence of data gaps. If it is not based on elementary flows, then what is it based on? Current standard language is not very clear in this regard, so you have the opportunity to do it better then EN15804 by specifying the requirements or exceeding it. So to clarify EN15804, the 100% should be based on the inputs into the foreground processes that make up the "model". That would be a lot clearer than saying X% of the "model". in this statement it says that criteria for cut off are either 1% mass or 1% of energy. It does not state whether the greater or the lesser of these governs. State which governs, or alternatively state that must meet both criteria.	*foreground unit processes (i.e., fuels and electricity based on lower heating values) or 1% of the total mass inputs for the foreground unit processes (excluding fuels) whichever is lesser."* *"Materials that are less than 1% of the total mass inputs for the ground unit processes (excluding fuel)…"*	
T20	13	10.c	How can "impacts" be calculated as a percentage of "energy use and mass"? I think this is a typo. Also, it is unclear whether this threshold is to be met on an individual unit process level or on the level of the cradle-to-gate product system.	Change to "The total sum of neglected impacts for the asphalt mixture shall not exceed 5% in any of the considered impact categories."	This was duplicative and therefore deleted.	Yes
T21	13	10.d	Again, clarify that the 1% applies on a unit process level. Also, how do you know that they will ALWAYS fall below the 1%?	Change to "Materials that may constitute less than 1% of the total mass input into a unit process (excluding fuels) but are considered environmentally relevant include [..]".	Accepted comment as modified to be in accordance with EN 15804 which was recommended by previous comments. Text was clarified as follows "Materials that are less than 1% of the total mass inputs for the model (excluding fuel), but which are considered environmentally relevant, include chemical additives and polymers such as those listed below." Furthermore with current technologies we can confidently assume that these	Yes

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					additives are below 1% of the total mass input modelled. For example, most polymers are added into asphalt at 2–3% of the binder weight. Highly modified binders (HiMA) (which are rarely used) can contain up to 8%. If an asphalt mix had an asphalt content of 6%, then the polymer would only take up 0.18% of the mix for a common binder or 0.48% for a HiMA mixture. GTR is a little different because it is commonly used up to 12%. For the same AC, this would be 0.72% of a mix mass. Asphalt rubber is the only case where this might change. For an asphalt rubber mixture, you can use up to 20% rubber by binder weight with a higher AC content. This might be 8%. In this case, the rubber might be 1.6% of the mass of the mixture; however, this is rare and especially rare for projects that are most likely requesting EPDs (i.e. parking lots). In any case, the use of such materials is required to be clearly stated on the EPD.	
T22	13	11.a.iii	It seems odd to exclude alternative energy technologies only. If a plant had its own natural gas CHP plant, the manufacturing and maintenance of that plant would likewise be excluded.	Rephrase to "Any the manufacturing and maintenance of any equipment used for on-site generation of electricity or heat."	Accepted comment as modified. "Any equipment used for on-site generation of electricity or heat;"	Yes
T23	13	11.a	You technically consider "operations" and "personnel" to be a "materials" by including it in this list. Section a states "Upstream impacts of extraction, production, and manufacturing of any material that is not consumed in the production of the asphalt mixture is considered to be part of the plant infrastructure and is therefore explicitly excluded from the system boundary. These *[materials]* include:"	Rephrase text before the list of excluded items to also apply to operations and personnel or separate the two into a second list ("In addition, the following are excluded from system boundary:").	Clarified bullets for general management, office, and headquarter operations and personnel as follows. "Any materials consumed by the general management, office, and headquarters operations; and Any office materials consumed at the plant or energy consumed by personnel commuting to and from the asphalt mix plant"	Yes

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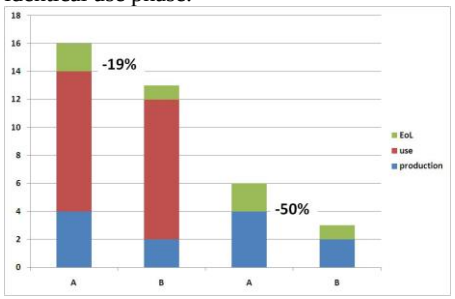
T24	13	11.a	The argument given in the text box is flawed, but unfortunately very common in LCA to this very day. It is not sufficient to argue that everything that is the same between product systems can be excluded from the system boundary because it won't affect the conclusions. While the absolute difference between product systems and the direction of the decision will not be affected, the percent difference will be artificially inflated if the excluded activities would have a significant contribution to the overall result. See below chart for a simple example where the same absolute result leads to vastly different percentage differences by excluding an identical use phase.  	If anything, the argument should be that something is (a) the same for both and (b) not expected to have a relevant contribution to ANY of the considered impact categories (which is quite the audacious assumption). However, in that case you can exclude these things based on relevance alone, so the whole argument about things being the same between product systems is highly questionable in my eyes. It is just something that people hear other people say and they believe it. It's an urban legend of LCA, if you will. Based on the same argument given in the text box about using "similar capital goods to produce the same product", you could then also exclude the raw materials since all asphalt mixture producers use "similar raw materials to produce the same product". Not sure the point was fully understood so I will try one more time. By excluding parts of the product system based on "similarity", you are artificially increasing any percentage differences between asphalt mixtures EPDs that may be calculated by the audience. So the question becomes whether this bias, because that's what it is, is significant or insignificant, which in turn depends on whether the excluded burdens are significant or not compared to what is not excluded. So the exclusion needs to happen based on significance and not based	Point understood, however the point of this EPD program is for asphalt mix producers to communicate the environmental performance of asphalt mixtures to agency engineers and architects who have control over specifying various asphalt mixture requirements in line with accepted LCA practices. That being said, capturing the differences among the environmental footprints of asphalt mixtures is the focus of this program. Any differences in production equipment are captured and recorded in the collection of energy-use data and production data, making evident the impact of those differences in the capital goods. RW: The reviewer's argument is that when the equal and common components between two options (A and B) are discounted, the relative different in "artificially inflated". The above example is appropriate for discussing the exclusion of factors - such as capital goods - that would be equal and common to two mixtures A and B coming from the same plant. If a choice is made between A and B the exclusion of the red bar would not change the direction of the decision, but would definitely place mixture B at a greater disadvantage. While the reviewer considers this "inflation" problematic, this EPD program finds this desirable. The exclusion helps emphasize the difference between the mixtures, allowing decisions-makers to focus on the green bars that are directly within the control of designers, decision-makers and plant managers. The more pertinent argument is that by adding uncertain and	Yes

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				on "similarity" in order to avoid the above potential bias. The current language leaves it open whether or not you just introduced a relevant bias to the comparison of EPD results by the audience. Why does it matter? Because two mixtures may appear to be 20% different in GWP when, in fact, they would only be 2% different if you hadn't excluded things based on similarity. This is not to be taken lightly as it may influence purchasing decision based on incomplete data. I maintain that based on the similarity argument alone, you could also exclude the main raw materials from consideration, which of course wouldn't make any sense.	unverifiable impacts from manufacturing capital goods that are common to both mixtures, and cannot be directly controlled to reduce the impact of the decision-processes, the difference in impacts is being diluted. We believe it to be preferable to avoid dilution of critical differences that can be acted upon (e.g., increasing plant efficiency, or improving mix designs) rather than adding aspects (e.g., capital goods) that cannot be acted upon. RW2: The textbox has been removed.	
T25	14	12	The section would benefit from a distinction between primary and secondary data. I don't think that primary data should be up to 10 years old, correct?	Revise section on data quality requirements to clearly distinguish between primary and secondary data. Or maybe this section is exclusively about background data? Section 13 seems to contain additional requirements for primary data, but 12.g. also mentions primary data. This is slightly confusing.	Accepted comment as suggested. Section 12 has been restructured to state the specific data quality parameters that must be reported on per the ISO standards and the specific data quality requirements per secondary and primary data are included in their respective sections.	Yes
T26	14	12	Unclear whether these data quality aspects should be addressed in the background report or also in the EPD. There is no requirement in ISO 14025 to address data quality in the EPD itself, but that doesn't mean that you can't.	Start section 12 with "The following data quality aspects shall be addressed and documented in the LCA background report that underlies the EPD." Or something to this effect depending on where it should be documented.	Accepted comment as suggested. See response to T25.	Yes
T27	14	12	Points a-c all describe dimensions of representativeness – temporal, technological, geographical. Currently, only point b is called representativeness.	Rename points a-c temporal representativeness, technological representativeness, and geographical representativeness. Or make these three sub-bullets i, ii, ii to (b) Representativeness.	Accepted comment as suggested. See response to T25.	Yes

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T28	14	12.a	"Age" is not well-defined. Data can be distinguished by the age of underlying data sources (multiple), publication date, and reference year. Also, "unchanged" is an absolute that no dataset will ever be able to meet. In addition, you don't need this qualifier if you refer to the reference year as the data provider will have to make the judgment whether a dataset is still significantly representative.	Rephrase to "Age – The reference year of any background data should not be older than 10 years compared to the reference year of the EPD."	Accepted comment as modified. "Secondary data should be published no earlier than 2007 (10 years ago from publish date of this PCR), unless verified that it is unchanged." The period of validity of all EPDs produced under this program expire when the PCR expires. This is to ensure that all EPDs are comparable rather than having an overlapping period where some EPDs follow one PCR and others are still valid following another PCR. This has also been further clarified in the PRC. RW: *Comment accepted. The suggested language has been used.*	Yes, but please note that "verified" implies a verification procedure is in place to perform this task. I don't know of any. Or is this intended to be verified during the general EPD verification? The current language does not make it clear who should verify this when based on which procedural standard. also, publishing and measurement can be very different dates. Need to use the language suggested and remove the word "published".
T29	14	12.c.i	What's "local data"? This is particularly relevant for electricity consumption. Does this allow for utility mixes or is the model limited to emission factors for NERC or eGRID subregions? What about "green electricity" tariffs?	The PCR should set clear rules for how electricity consumption is to be modeled for the asphalt mix plant. I recommend section 7.4 in the ACA PCR: https://www.nsf.org/newsroom_pdf/su_architectural_coatings_pcr.pdf Still unclear as the original question wasn't answered. What the heck does "local data" mean? The utility provider's overall mix? The specific tariff that I am paying for? Or simply the nearest power plant? And why are eGRID subregions considered "proxy data"? Proxy for what? Lastly, the term "local eGRID subregion" completes the confusion. Are eGRID subregions considered local data or regional data? Utility provider mixes and tariff-based fuel mixes have no place in product LCA. Multiple utilities supply power to the same grid (PCA, ISO), and you cannot trace electrons	Accepted comment as modified. Section 12.c.i (now 13.b.ii) is generic geographic rules setting hierarchy of data preferences. Specific electricity consumption requirements are prescribed in the Annex I. RW: The tool that was developed as part of this EPD program uses eGRID subregion based LCIs from USLCI. To keep the program consistent and all EPDs from this program comparable, it was elected by the PCR committee to forgo the use of other datasets. RW2: Language has been changed to the following: "Line power in kWh and zip code to identify energy production mix for the eGRID subregion in which the plan is located as preference. Data pertaining to NERC regions can be used as an alternative." And "Data with energy mixes reflecting the eGRID	Yes

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				back to individual utilities or power plants. So the relationship between utility and plant is contractual only while LCA puts a preference on the physical reality. Here, EPA designed the subregions as virtual subgrids that aim to minimize the import-export problem. You should require the use of grid mixes based on eGRID data for eGRID subregions (prio 1 – GaBi, USLCI) or NERC regions (prio 2 – ecoinvent, USLCI). Utility provider fuel mixes or green power tariffs should not be allowed, specifically because there is no authority in the US currently that guarantees that the same green power isn't sold twice. The European PEF program allows these only if they come with a Certificate of Origin.	subregion data may be used or NERC regions can be used as an alternative."	
T30	14	12.c.ii	Language could be more precise: it is about the data, not the sources, and you are excluding regional or national energy mixes currently.	Rephrase to "Proxy data with modified energy mixes may be used."	Accepted comment as modified "Proxy data with modified energy mixes reflecting the local subregion may be used." RW: Accepted comment with language as follows: "Data with energy mixes reflecting the eGRID grid data may be used." And "Line power in kWh and zip code to indentify energy production mix for the eGRID grid data in which the plant is located. RW2: See T29	Yes
T31.1	14	12.d	The DQI precision in LCA is not about the number of significant issues to be reported. ISO 14044, section 4.2.3.6.2 describes precision as a "measure of the variability of the data values for each data expressed (e.g. variance)".	Since ISO 14025 requires the definition of data quality requirements for precision, you could require the reporting of the coefficient of variation across the reporting period (e.g., across 12 monthly values) for a	This was removed during the restructuring of the data quality section. See response to T25.	Yes

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			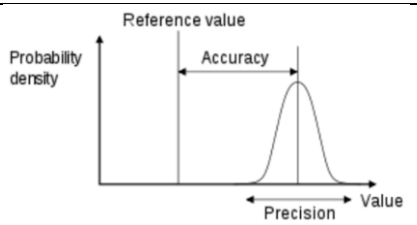	single facility OR across the annual averages of multiple facilities. This only applies to primary data, though. Alternatively, you could resort to a more generic requirement to replace both (d) and (g) like "the EPD (or the background report?) shall contain a qualitative assessment of data precision and uncertainty and its implications on the reported results".		
T31.2	14	12.d	Two significant figures means that 104 kg CO2e would be reported as 100 kg, yet 0.00001234 kg of something would have to be reported as 0.000012 kg. This is always tricky due to the significant differences in magnitude between different impact categories.	You could require scientific notation with two digits after the decimal (1.23E-3), but some people find this hard to read. TBD.	This requirement was deleted as it is not required per ISO standards and is tricky as commenter noted.	Yes
T32	14	12.f	As the system boundary is defined as a "set of criteria specifying which unit processes are part of a product system", this requirement should use the ISO language.	Change to "The LCA shall include data on all unit processes included in the system boundary. The data per unit process shall include all relevant inputs and outputs (see also section X on cut-off criteria)."	This was removed during the restructuring of the data quality section. See response to T25.	Yes
T33	14	12.g	Uncertainty and sensitivity analysis are two distinct analytical methods, so you cannot establish uncertainty through sensitivity analysis.	Rephrase to "the EPD (or the background report?) shall contain a qualitative assessment of data precision and uncertainty and its implications on the reported results."	See response to T31.1	Yes
T34	14	13.a	It is unclear, who this primary data is to be reported to. To the LCA practitioner during data collection, or reported in the LCA background report?	Clarify	Accepted comment as modified. Deleted confusing term "reported to"	Yes
T35	14	13.a.i	As with my comment on the "age" requirement for background data, the 5 years could be more specific.	Change to "Time Period: All data reported must be reflective of plant production over a period of 12 consecutive months, within five years of the reference year of the EPD." The question is whether the reference year of the EPD is automatically the year of publication, or whether I can publish an EPD in 2017 for the	Accepted comment as modified. "All data must be reflective of plant production over a period of 12 consecutive months from no later than 2012 annual production data."	Yes

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				reference year 2014, which means I could use data from 2009 per the 5-year threshold. TBD.		
T36	14	13.a.ii	The statement that "Primary data reported should be based on utility and energy bills" worries me as the utility bill also contains the fuel mix per the tariff. This may be interpreted again in a way that allows the use of utility mixes for electricity consumption, which is a contractual agreement between the company and the utility provider, but does not reflect the physical realities of the grid. On page 18, you seem to mandate the use of a national U.S. average grid mix, which is an okay statistical estimate if you don't know the exact location of a process, but no one actually consumes the U.S. average fuel mix because the continental U.S. has three virtually separate grids called the interconnections (East, West, Texas). While Texas and East are fairly comparable with regard to GWP, the Western interconnection (in GaBi) shows a 25% lower GWP per kWh and even higher differences in other categories. So the locations of the facilities of the declaring company does matter. The use of an U.S. average grid mix also conflicts with the data quality requirements in Section 12 which gives preference to "local" data.	You should require the use of regional (i.e., subnational) grid mixes on the level of the interconnections (East, West, Texas, Alaska, Hawaii) which should also be available in GREET. Even if these are currently based on production rather than consumption mixes, due to the fact that they virtually do not exchange electricity with each other, these are still better estimates than the U.S. average. The question still remains if GREET factors in imports from Canada or not This new language also seems to clearly prioritize eGRID subregions for modeling grid electricity, which seems to be at least confusing when compared to section 13.b.b., which by no means seems to put a preference on eGRID subregions. Also, this requirement excludes the ecoinvent database to be used as only USLCI and GaBi offer grid mixes on the level of eGRID subregions. If you accept my proposal from T29, then this should be modified to read "Line power in kWh and zip code to identify energy production mix for the eGRID subregion or NERC region in which the plant is located"..	See T-30. This is further clarified in the text specifically stating that the total line power used in kWh should be collected. RW: See comment from T29	Yes
T37	14	13.a.iii	What you are describing is benchmarking rather than sensitivity analysis. I am also fairly sure that a statistical "trend" and an "error margin" are not the same. How did you calculate this "error margin" in the underlying LCA? Or is it rather a "coefficient of variance"?	Change to "Bechmarking: The total energy consumption per ton of asphalt mixture (as the sum of the higher heating values of all electricity and fuels) should (or shall?) fall within the range identified in the underlying LCA by Mukherjee (2016). Data	Accepted comment as modified. Benchmarking the total process energy and electricity consumption per ton of asphalt mixture shall be used to assess the accuracy of the primary data collected. Primary data should follow the	Yes

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			Lastly, do you mean total energy consumption (electricity + consumed heat in MJ), total secondary fuel consumption (electricity + fuels in MJ), or maybe just one of the two? Lower heating value or higher? Specify.	reported by plants that do not fall within this range should (or shall?) be checked for reporting errors or explained."	statistical trends identified in the underlying LCA by Mukherjee (2016).	
T38	14	13.a.iv	This could be interpreted to mean that the plant could only report measured or calculated data, but, e.g., no emissions based on emission factors taken from AP-42 or others sources. Is this the intent?	You could add a sentences saying "Where site-specific data is unavailable, generic data may be used, but the sources must be clearly documented."	This is correct. The emission factors are included as part of the US LCI datasets and therefore are not needed to be estimated by other methods such as AP-42.	Yes
T40	14	13.a.v	Unclear what "for which a predetermined scenario has been provided (Items 13 and 14 in the below listing of data to be reported)" refers to.	Clarify	Accepted comment as suggested and fixed the typo in referenced default items.	
T41	15	13.a.vi. b.1	This now requires the use of "the energy production mix for the region in which the plant is located". It is unclear whether this refers to the utility grid mix or the grid mix of the respective interconnection, NERC region, or EGRID region.	The data should specify the ZIP code of the facility and the LCA practitioner should then select the right grid mix datasets based on whether the PCR prescribes interconnections, NERC regions or eGRID subregions to be used. I would recommend interconnections as all other freely available datasets neglect power trade between these regions, which introduces a significant error for some of these.	Accepted comment as modified. Revised text as "Line power in kWh and zip code to identify energy production mix for the eGRID subregion in which the plant is located." RW: See new response to T29.	Yes
T42	15	13.a.vi. b.2 - 4	You ask for solar, wind, and other renewable power in kWh, but it is not clear that you mean onsite production (which I think you do). The question then becomes how you would address any power that is uploaded to the grid rather than consumed on-site. As uploaded electricity is part of the product system "grid mix" and accounted for there, it should not have any relevance for the product system "asphalt mixture" as that would mean double-dipping.	Change to "Solar power produced and consumed on-site in kWh", "Wind power produced and consumed on-site in kWh", and "Other renewable power (specify) produced and consumed on-site in kWh" as well as "Solar power produced on-site and physically uploaded to the grid in kWh", "Wind power produced on-site and physically uploaded to the grid in kWh", and "Other renewable power (specify) produced on-site and physically uploaded to the grid in kWh". You need both to allocate fuel	Accepted comment as suggested.	Yes

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				consumption and emissions between the power consumed on-site and the power that is uploaded to the grid.		
T43	15	13.a.vi.c	Is there absolutely no chance that on-site generators use another fuel than just diesel or unspecific "biofuels"? Also, biogas would also qualify as "biofuel" and would likely not be reported in gallons.	Add additional fuels that are possible and be specific about fuels and units (gases in Nm3, liquids in gallons, solids in mass).	Accepted comment as suggested.	Yes
T44	15	13.a.vi.c-g	If you collect data on fuel consumption, where do the emission factors for the combustion come from? See also comment on 13.a.iv.	Emissions from fuel combustion should be addressed through the appropriate GREET data unless primary data based on measurements is available. The only mandated dataset I see currently is exclusively for natural gas combustion, though.	See T38.	
T45	15	13.a.vi.d & e	Not sure I understand the difference between "primary" and "secondary"	Clarify	Removed the requirement to distinguish between the two different burner types that are at the asphalt plant.	
T46	15	13.a.vi.g	Again, no chance of gasoline being combusted here?	Add gasoline. Table 4 provides a heating value for gasoline, so I can only assume it is missing here.	Accepted comment as suggested.	Yes
T47	15	13.a.vi.h-k	Unit is missing. Pounds? Short tons? Doesn't matter?	Specify?	Accepted comment as suggested. "g) Percent of aggregates (coarse and fine) by weight of total asphalt mixture. h) Percent of asphalt binder by weight of total asphalt mixture. i) Percent of recycled materials (RAP and RAS) by weight of total asphalt mixture. j) Binder additives by weight of total asphalt binder. k) Asphalt mixture additives by weight of the total asphalt mixture."	Yes
T48	16	13.a.vi.l	One-way distances are only appropriate for transports without empty backhauls. These are usually operated by third-party logistics providers where the truck would be on its way to pick up the next freight as close by as possible.	Can you confirm that for these materials, empty backhauls are highly unlikely? It is extremely unlikely that an empty binder truck would haul something back to the terminal, same for aggregate. Although outside asphalt	As the reviewer mentioned, transport of materials are usually operated by third-party logistics providers. It is out of the asphalt mix producer's control and knowledge to where the next pick-up location would be and, as a result, is not included in the system boundaries.	Yes

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				producer's control and knowledge, it should be expected that these trucks will travel back empty. Round trips should be used.	RW: Accepted comment and changed language as follows: "Two-way distances travelled to plant per transportation mode for asphalt binder, aggregate (both virgin and recycled) and any additives, expressed in miles. If producer can prove logistics for a one-way trip, one-way distances are acceptable. Additionally, language in textbox on Page 10 has been changed to reflect this for primary data.	
T48	16	13.a.vi.l	If you know the weight of the transported materials, then why ask for ton-miles rather than just miles?	Asking for miles would eliminate one calculation step for the data provider. Also, you need to know the distance per transportation mode, correct?	Accepted comment as suggested.	Yes
T49	16	13.a.vi.m	If you would want the resulting inventories to be submitted to LCI database like NREL or GaBi so that practitioners can use them, then it is strongly advised to close the water balance and report Water Used (input) as well as Water Discharged vs. Water Evaporated. Whatever the difference should be contained in the asphalt mixture as moisture.	Even though the EPD currently does not require reporting of any water metrics, the inventory should be complete regarding water flows.	Accepted comment as suggested.	Yes
T50	16	13.a.vi.o & p	These are not "scenarios", but default parameter values, and they apply only these two, not to any "parameters that may be difficult to estimate or collect primary data".	"The following estimates (Mukherjee, 2016) shall be used for these two parameters if primary data cannot be collected or estimated otherwise:"	Accepted comment as modified. Pre-determined default values: For parameters that may be difficult to estimate or collect primary data, the following estimates shall be used (Mukherjee, 2016).	Yes
T51	16	13.a.vi.p	Here you also use miles, not ton-miles	-	See response to T48	Yes
T52	16	textbox	The textbox says there are no "hazardous" wastes, but does that mean there are no wastes at all? What about packaging, shipping pallets, etc. pp. Also, does "all material at the plant is completely recycled" mean that it is recycled inside the plant? Or that it is picked up by recyclers? This is related to the question	Clarify whether an asphalt plant is actually a "zero waste" facility by design, or whether non-hazardous wastes like packaging etc. are considered irrelevant, or whether a cut-off approach applies to them where the system boundary stops at the waste.	Accepted comment as suggested. "No waste material is produced, as all materials at the plant are completely recycled on site in the defined system boundaries." It is important to note that the system boundary is based on the asphalt mixture production process. Hence, packaging	Yes

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			whether the PCR will require a cut-off approach, an avoided burden approach, or a mix like in EN15804 to address wastes & recycling.	First, your system boundary is not the "process", but it is "cradle-to-gate" so packaging and therefore packaging waste would be included. Second, the system boundary is the result of inclusions and exclusions based on relevance to the goal of the study, but cannot be a justification for exclusion. Third, available secondary data on upstream inventories will likely not include any packaging, so this "should" is wishful thinking to a certain degree. So under your current system boundary, you should simply exclude packaging and packaging waste treatment due to insignificance. The current language seems convoluted and besides the point. Remove text box.	(possibly for additives) is excluded as it is not a primary data input to the production process. By these boundaries, the upstream secondary inventories of additives should include the impacts of packaging as it is integral to their product delivered. RW: *The textbox has been removed.*	
T53	16	13.b.i & ii	This should at least require that the EPDs were developed for the US or the US & Canada. You can't just prefer *ANY* EPD over freely available public datasets, right?	Change to "Product-specific EPDs for the U.S. or the U.S. and Canada" and "Industry-average EPDs for the U.S. or the U.S. and Canada" Besides the point. You can take European EPDs and convert CML results to TRACI results. The point of the comment was to require EPDs that were developed specifically for the U.S., i.e., for products made or sold in the U.S. Shouldn't that be the necessary requirement for prioritizing these EPDs?	Accepted comment as modified. "Product-specific EPDs with impact categories modeled or able to be modeled by TRACI." RW: Comment accepted. Language has been changed as follows: "Product-specific EPDs for the U.S." and "industry-average EPDs for the U.S."	Yes
T54.1	18	Tables 2a & 2b	As stated before in comments on 13.a.ii and 13.a.vi.b.1, the average grid mix is a good proxy if you don't know where the electricity is being consumed, but no one in the U.S, actually receives this statistical construct since there are separate interconnections.	Recommend to use emission factors for East, West, and Texas interconnections. And Hawaii and Alaska, if necessary. See comments on your replies to T29 and T30.	See response to T30. To avoid confusion and as recommended in comment G1, these tables are now included in Annex I. RW: See new response to T29.	Yes
T54.2	18	Tables 2a	Do the CO2 and CH4 emissions constitute fossil C only, or do these factors include biogenic carbon from biofuels?	Clarify	The emissions factors do include other energy sources such as biogenic carbon	Yes

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					from biofuels. Note biomass is listed in Annex I Table 3a.	
T55	19	14.a	This section grossly misrepresents the hierarchy in ISO. The first option in ISO is actually subdivision, then system expansion, and then allocation.	Revise accordingly	Accepted comment as suggested. "Allocation should be avoided; wherever possible, subdivision or system expansion should be used."	Yes
T56	19	textbox	It is confusing that the title of the text box is "RAP allocation" if you explicitly did NOT apply allocation.	Change to "RAP burden" and add a sentence at the end saying "RAP is therefore treated as a waste material without economic value and does not carry any upstream burden besides the burden of inbound transportation."	This has been removed per comment T57.1	Yes
T57.1	20	14.b	This requirement makes the textbox moot and is somewhat misleading. It is not a necessary requirement fort the cut-off approach that the scrap or waste material is worthless. You could apply the cut-off approach to metal scrap, too, if you wanted to. It is a methodological choice that doesn't require much of a justification beyond, maybe, the strong sustainability vs. weak sustainability brought forward by Frischknecht (2010) if you buy into it (which I don't). Last but not least, for cradle-to-gate LCAs, it is generally advisable to leave any scrap inputs unconnected. Then the resulting LCI can be used for a cut-off as well as an avoided burden approach. This choice is really more relevant in a cradle-to-grave context.	Remove the text box as it does not correspond to the following requirement.	Accepted comment as suggested.	Yes
T57.2	20	14.b.ii.b & c	Also need to include transportation to the plant	Add "and transportation to plant" at the end of b and c	Accepted comment as suggested.	Yes
T58	20	14.c	Yang (2014) uses plain and simple economic allocation. Any allocation is always based on the mass outputs of the co-products, the only question is whether you stop at that point or multiply that mass by, e.g., price per mass, calorific content per mass, etc. Calling this a "combination of mass and economic allocation" implies that you did something	Strike "a combination of mass and" here and anywhere else in the document.	The allocation factor Yang uses is the weighted average economic value for each co-product per the *Mass Yield*.	No, but ok

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			different than "normal" economic allocation, which you didn't.			
T59	20	14.c	This is one of the sections that would have to be revised once the AI LCI becomes available.	I advise against including background data in these methodological requirements. This means you could only switch to newer or better background data if you issued an update of the PCR, which would require a review of the changes by a PCR review panel again. Focus on methological choices for foreground data and require any inventories you want, but simply list those outside of the PCR to avoid having to go through an update procedure any time you want to change a background dataset.	Accepted comment as modified. Clarified that this is a place holder for the time being. "Until a public secondary data source for asphalt binder is published and prescribed on the NAPA EPD Program website, the NREL U.S. LCI Crude oil, at refinery data using a combination of mass yield and economic allocation at the refinery, which is in accordance to the procedure defined by Yang (2014) and outlined in Annex I.."	Yes
T60	20	15.a	LCIA results are to be reported based on the defined functional unit, not on a "per year basis".	Rephrase to "The potential environmental impacts per functional (declared?) unit are to be reported based on the U.S. EPA's TRACI tool, version 2.1." Reference the TRACI 2.1 manual (https://www.pre-sustainability.com/download/TRACI_2_1_User_Manual.pdf)	Accepted comment as suggested.	Yes
T61	20	15.a.i.a	This should specify that this is GWP100 and whether or not biogenic carbon ought to be counted or not (uptake and re-release). TRACI itself doesn't distinguish between fossil and biogenic carbon, but the question is whether GREET does and whether it even includes biogenic carbon at all. Lastly, TRACI is still based on the 2007 IPCC AR4, while AR5 came out in 2013. CO2 will always be characterized as 1, of course, but if there are any other GHG that contribute significantly to the total GWP, requiring IPCC AR5 would be better, i.e., more up-to-date.	Change to "Global warming potential (GWP100), fossil, in kilograms of CO2e". Consider switching to IPCC AR5 for GWP.	Accepted comment as suggested. Switching to IPCC AR5 will be considered for adoption in future versions.	Yes

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T62	21	15.a.i.e	POCP and SFP are two distinct LCIA models. TRACI uses SFP (Smog Formation Potential), while CML and others use POCP	Change to "Smog formation potential (SFP), in kilograms of O3 equivalents."	Accepted comment as suggested	Yes
T63	21	15.a.i.f	Depletion of abiotic resources (fossil), in Unit?	[MJ LHV surplus] – I think ☺	This indicator has been removed in response to comment T 64.	Yes
T64	21	15.a.i.f	Drielsma et al. (2016) recently summarized the methodological issues around mineral depletion in LCA rather well (DOI DOI 10.1007/s11367-015-0991-7). I know for a fact that even the EPA doesn't use this indicator for their LCAs.	I would recommend to remove this indicator, just like you chose to remove toxicity.	Accepted comment as suggested.	Yes
T65	21	15.b.i & ii	Unclear. Are you asking for the primary energy demand or process energy demand or the energy content of the asphalt mixture? If you want the PED, then why are the LHV in Table 4 relevant here?	Revise	This section has been revised to reflect EN15804 energy reporting to address comment T87. "b. The energy reporting in the EPD shall distinguish between energy sources, such as coal, petroleum products, biomass, etc., based upon how they are used. Energy sources shall be reported separately when used as a material component of a product versus used as energy in the product's creation, as follows: Use of renewable primary energy sources as a material, in MJ Use of renewable primary energy sources as energy, in MJ Use of nonrenewable primary energy sources as a material, in MJ Use of nonrenewable primary energy sources for energy, in MJ Lower heating values (Table 1) shall be used to convert to physical units to MJ.	Yes
T66	21	15.b.iii	So here it mentions eGRID subregions for the first time. However, we just finished a project with the EPA and presented the results at the last LCA XVI conference. eGRID subregions without accounting for power trade between these regions can be very far off for individual impact categories. For example, California has a fairly clean grid mix in	As eGRID subregion data including power trade will not become available for a while outside of GaBi, I recommend going back to the level of the interconnections which exchange very little power with each other. Rephrase to "The fuel mix and emission profile will be determined	See response to T65. RW: See response to T29.	Yes

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			eGRID, but imports lots of coal-heavy power from Arizona.	based on the interconnection (East, West, Texas, Hawaii, Alaska) where the plant is located." Do you mean that this has been removed while revising the section in response to T65? It doesn't specify anymore what the boundaries for this are. Should clarify.		
T66	21	15.b.iv & v	I guess this is what you need Table 4 for. These two points should reference the Table.	Add ref to Table 4	See response to T65.	Yes
T67	21	15.b.iv	It is not fully clear that this should be based exclusively on electricity and fuels burned on-site.	Specify	See response to T65.	Yes
T68	21	15.b.v	What does "shall not be included in the total energy used" refer to? The "Total Plant Process Energy" in point iv?	Specify	See response to T65.	Yes
T69a	21	15.b.v	Why does this point only address asphalt binder and no other feedstocks?	This should be about any and all embodied energy in any feedstock	See response to T65.	Yes
T69b	21	15.b.v	You either report total energy or you don't, and you should report it	Remove part of the statement: Total Feedstock Energy: The feedstock energy associated with the liquid asphalt binder will be reported to comply with ISO 14040/44 ~~but shall not be included in the total energy used as the embodied energy is never accessed.~~	See response to T65.	Yes
T70	22	textbox	This is entirely confusing. First of all, whether the "binder gets used as a source of fuel during or after the life of the pavement" is completely irrelevant under a cradle-to-gate system boundary. Second, how do you sequester energy from the "carbon cycle" which is not really about energy? Lastly, you use the example of asphalt binder to justify the separate reporting of any form of feedstock energy, so the argument is flawed.	Remove textbox. I have no idea why you are trying to defend reporting feedstock energy separately from process energy. The one place where everything does get added up is Primary Energy Demand, which includes embodied energy of feedstocks. You cannot change the concept of PED in this PCR or you have to call it something else.	See response to T65.	Yes
T71	22	16.a.ii	What kind of graphic? Anything? Flow chart?	Specify	Accepted comment as modified "an optional graphic of product"	Yes

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T72	22	16.a.iii	Which PO? NAPA or the one where the EPD will be published? Can be a different one.	Change to "Reference to this PCR and the name of the Program Operator under which the declaration will be registered."	Accepted comment as suggested.	Yes
T73	22	16.a.v	A validator validates, but a verifier verifies.	Change to "verifier"	Accepted comment as suggested.	Yes
T74	22	16.a.v	The verifier conforms more than just this.	Change to "confirming that the EPD and the underlying LCA conform to this PCR and the relevant ISO standards ISO 14044 and ISO 14025."	Accepted comment as suggested.	Yes
T75	22	16.a.vi.b	This is a requirement of ISO 14044 for LCA reports; it doesn't have to be in the EPD, but you can require it, of course.	TBD	Thanks for your note.	Yes
T76	22	16a.vi.c	LCA only accounts for what does happen, not for what does not happen. The "avoidance" of further refining does not result in any actual or hypothetical credits; asphalt has a lower burden than other refinery products so the benefit has already been accounted for. In addition, what happens to the asphalt binder during use or EoL is outside of the scope of this PCR.	Again, you cannot change the definition of PED to exclude feedstock energy. Then simply do not report PED at all, period. It is your choice, and you don't have to make these rather questionable claims to justify certain metrics. To me, fossil PED usually correlates strongly with fossil GWP, so the reporting of PED or process energy has little environmental relevance as it is the emissions associated with that energy consumption that cause environmental effects, not the energy consumption itself. Proposal: delete point c, Decide which energy metrics you want to report, you don't HAVE TO report any of them. Joep: I suggest following the FHWA LCa for pavement guidelines which include clear energy categories.	Accepted comment as suggested. See response to T65.	Yes
T76	22	16a.vi	Total Primary Energy and Total Plant Process Energy are not listed here, so does that mean they were not intended to be included in the EPD?	Add all energy metrics to be reported (if any)	Accepted comment as suggested.	

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T77	31	Appendix F	The language equates "transparency" with "costs". This is not correct. As long as data is publicly available, either for free or under license, does not make a difference in terms of transparency. The real reason is that a lot of NAPA members and their clients are from the public sector, so there is this notion that you cannot force anybody to buy software or data. However, I have never seen a fully coherent justification that would point to the official and published source of that requirement. It would be great if this PCR could close that gap. So is it really just the member companies that don't *want* to pay for software and data? I do wonder how they fulfil other, mandatory product standards around product performance without spending a single cent on testing equipment, personnel, or service providers… Is that all free of cost to them? ☺ At the same time, the freely available data is 3 to 13 years old (reference year or publication date?). So you are breaking your own data quality requirements.	I can see the point that the NAPA members don't want to pay for any data, but then the PCR should at least be honest and say so or not address this topic at all. You don't need this whole paragraph at all in my mind. It is your PCR, and if you feel you need to mandate certain data sources, you are free to do so. Otherwise please provide a reference to the respective law, rule, regulation, or executive order that clearly *requires* the data to be free of cost. After 6 years in this country, no one has been able to point me to it yet. It almost seems like an urban myth to me... With regard to breaking your own data quality requirements, you should double-check whether 2003 is the date that this dataset was first published and whether it (and with it the reference year) has been updated ever since. If it hasn't, then you need to adjust your own data quality requirements to match the data your requiring to be used. Anything else would be a double standard.	Appendix F has been removed to Annex I. While there is no federal regulatory directive to use only open data, the strongest voices in the PCR working group in favor of using open data came from representatives of public agencies, the primary customers of our industry. This is in line with OMB's CIO Council's Project Open Data initiative.	Yes
T77	10	Process in Phase A2, No. 3	Not clear what is meant by the assumption that binder will be sourced from a refinery and not from a post-refinery terminal. Does that mean that additional transport to terminal and terminal processes (heating, pumping, etc) are ignored? Or that they will be added if the plant is sourcing from a terminal? From Fig 2 it appears that the terminal is excluded.	Needs to be clarified. In parts of the country it is routine to source from a terminal that is far away from the refinery, and there are impacts associated with this transport and the operation of the terminal. There is no logical reason that terminal operations and transport should be excluded.	Accepted comment as modified. "Transportation of asphalt binder from the refinery or terminal to the asphalt mixture plant. This will be based on primary data collected for each plant."	Yes
T78	6, 7	5.b.xviII and xxii	Clarify observed and measured by whom? All data must have been observed or measured by someone, or else derived from a model. This description does not sufficiently explain the difference.	Clarification. Important that reader of PCR knows how different data source types have been clarified.	Accepted comment as suggested. "Primary data — site-specific data." "Secondary data — data inventories from published sources that are not site-specific."	Yes

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T78	11	Fig 2	What is the Crushing to the right of the quarry processes that is shown as outside the system? If it is real and not a typo, why is it excluded?	Clarification. Diagram is unclear, may be an error.	Modified diagram to fix the typo.	Yes
T79	12	Processes in Phase A3:plant operations	What about water usage for washing aggregates? Also, do "other mobile sources" include belts and conveyors, etc?	Clarification. These items should be named as being in the system.	Accepted comment as modified. "Total amount of water used on the plant for dust control, washing aggregates, and/or foaming."	Yes
T80	12	10a. cut off criteria	Seeming contradiction in statement. Averages by definition are not conservative. State more clearly whether conservative (how is this determined and defined?) or averages will be used.	Clarify. Seeming contradiction in statement. As noted in T17, average data is not conservative. Need to clarify whether average or conservative data are to be used. If average is chosen, then this needs to be stated on the EPD including a statement of the significance of the LCI in relation to the reported LCIA results	See response to T17 RW: The word "average" has been removed.	Yes
T81	12	10.d.	These items will be included once data sources available. Shouldn't a note be required in the EPD stating that these are present but their impacts were not included because of lack of data?	Transparency, per ISO need to note limitations of study, and lack of data for some potentially very impactful materials is an important limitation.	Accepted comment as suggested. Modified text as follows to reference section 16.a.vii. with the required notes on limitations. "As there are data gaps in their publicly available life cycle inventories, these materials will be included in the analysis as soon as reliable and transparent sources become available. These data gaps must be clearly noted on the EPD, as prescribed in section 16.a.vii."	Yes
T82	14	12 d.	No more than two significant figures?	What if have better precision in data? Not clear where this came from. Understand desire to not report more precision than data have.	This has been removed to address comment T31.	Yes
T83	15	13.a.vi.c.	There are other sources of fuel for generators, such as propane, Add propane to list, and add Other to the list.	Missing sources.	Accepted comment as suggested. Added additional sources to list. See response to T43.	Yes
T84	17	Table 1 from PCA	Aggregate for asphalt is somewhat different from aggregate for concrete in that asphalt mixes use all sizes, while concrete washes the aggregate to get rid of the finer particles (often	Make clear the applicability of these aggregate inventories.	Aggregate production, while within the system boundary is dependent on best available upstream data. As correctly pointed out, asphalt plants do not have to	Yes

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			less than the 1 or 0.6 mm sieves). How is this considered? Suggest make adjustments to these inventories, or identify how accounted for differences in gradations used, or why not accounted for.		wash the aggregate. Any energy used for fractionating aggregate gradations at the plant that is not already part of the upstream inventory is being reported within the gross annual energy reporting. Hence this has been accounted for within the current framework.	
T85	19	Table at top of page	Here transportation from the terminal is included. Inconsistent with previous statement (see Comment J above).	Inconsistency in document regarding requirements about terminals.	See response to T77.	Yes
T86	21	15.b.i	Feedstock energy is part of Primary Energy. Clarify that reporting primary energy is without feedstock included because it is reported separately.	Appears to be incorrect accounting of primary energy.	See response to T65.	Yes
T87	21	15.b.i	Do you not want to separate primary energy between renewable and non-renewable?	Provide more detailed information to user. Suggest following the FWHA LCA for pavement guidance.	Accepted comment as suggested. Following FHWA LCA guidance and the EN 15804 standard.	Yes
T88	21	15.b.v.	Here referring to total energy. Was primary energy not used as a material meant? Also refers to embodied energy. The use of language describing energy types in this section appears to be sloppy. Definitions of different types of energy not in glossary or defined in document.	Clarify and be more consistent with names of different types of energy. As currently written could be very confusing to EPD developers and EPD readers. Slide 5 of responses to critical review team comments regarding imprecise and confusing definitions of energy types does not appear to be implemented completely in the current PCR version.	See response to T65.	Yes
T89		Append ix C	Wasn't concrete industry included in stakeholders? There are comments from them.	Incomplete list?	This is a list of commenters we sent notices to. The concrete industry received an email about the PCR most likely through the SPTWG.	Yes
T90	13	10.c	The cut off criteria still somewhat unclear. Is it not possible that a material in asphalt mix can have low mass, low energy but have a very big impact of another type (toxic to humans or water life, etc). Not sure why the words energy and mass are included here. Shouldn't it be that sum of cut-offs should be less than 5% of any of the impact categories required in EPD?	Apparently inconsistent language.	See responses to T17-19.	Yes. This is now OK because it states that the impacts of GTR etc have not been included.

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T91	Whole document	Whole document	Does this EPD include open graded and gap graded mixes? Call that out explicitly.	More clarity regarding types of mixes in scope.	Accepted comment as suggested. Added to 7.a.iii "iii. Asphalt mixtures may be further classified by mix type, such as dense-graded, open-graded friction course, gap-graded, porous, or stone-matrix asphalt mixtures."	Yes
T92	19	16.a.viii	Warm mix additives should be added to this list. Some WMA additives have a fairly large contribution to certain impacts.	Add another clause to this that says "An EPD for an asphalt mixture that uses a warm mix additive must include the following statement: "This mix uses a [name of warm mix additive and type]. The upstream impacts associated with the process of extraction, manufacturing/production, and transportation of the warm mix additive have not been accounted for in this EPD.""" Please notice: this is a new comment. Perhaps the two existing statements, and the call for this third statement can be turned into one statement listing the materials that are not accounted for.	RW: *The EPD template will specifically state what is missing and the potential impacts.*	Yes

2. **General comments**						
#	**Section Ref.**	**Paragraph**	**Comment**	**Recommendation**	**Response**	**Resolved?**
G1	all	all	The PCR would benefit from a clear distinction between requirements for foreground processes based on primary data and requirements that apply to background data for up- and downstream activities. PCR usually focus on foreground processes and mandate less the methodological choices in background data. This does not mean that NAPA can't	I would recommend that the methodological requirements in the PCR focus on the foreground processes based on primary data to allow for easy updates of the annex of required inventories without having to revise larger sections of the PCR whenever better data becomes available that, e.g., follows a different allocation approach.	Accepted comment as suggested. See Annex I	Yes

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			require the use of certain public data because it's the best public available at the current time. That may change soon, though, so it would be easier to update the list of required datasets rather than to revise whole sections of the PCR only to accommodate the use of new background data (e.g., Asphalt Institute).			
G2	all	all	The PCR needs some serious cleaning up in terms of its structure and layout.	Outlining format seemed difficult. Don't use the PCR as an educational tool. Simplify the language so it is strictly technical language. Strive not to go to more than three levels of headings.	Many of the call-out boxes were removed in response to previous comments. Additional sections have been streamlined and modified to improve clarity.	Yes

3. Editorial comments						
#	**Page**	**Section**	**Comment**	**Recommendation**	**Response**	**Resolved?**
E1	4	4.a.iii	You can only comply to laws and regulations. You conform to voluntary standards.	Replace "comply" and "compliance" with "conform" and "conformance" throughout the document.	Accepted comment as suggested.	Yes
E2	7	5.b.xxv	Editorial	"methods that allow asphalt mixtures ~~allowable~~ to be compacted"	Accepted comment as suggested.	Yes
E3	8	9	According to ISO 14025 and 14044, it is "system boundary" (singular)	Replace throughout the document	Accepted comment as suggested.	Yes
E4	10	A2	"the plant" or "the asphalt plant" too unspecific	Change to "asphalt mixture manufacturing plant" or similar throughout the document	Accepted comment as suggested.	Yes
E5	12	A3-2	Should be "water used in the asphalt mixture manufacturing plant"	Change	Accepted comment as suggested.	Yes
E6	15	13.a.vi.b.1	The section numbering and overall structure of the document needs some work. A section 13.a.vi.b.1 is simply odd.	You should use Arabic numerals throughout.	The hierarchy of Arabic numerals, Alphabetic characters, and Roman numerals is a well-accepted method for delineating sections and subsections of a document.	Yes
E7	6	5.b.vii	Reference the method used to calculate ESALs, because there are various approaches (AASHO Road Test, 4th power	Clarification for future comparison of materials against performance metrics.	Different agencies and regions may require different EASL calculation methods and the required method would be stated in the	Yes

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			law, Caltrans, other national or state methods).		mix specifications. This will make transparent the EASL calculation method used.	
E8	6	5.b.vii	Use clearer language than "stabilize the binding structure". Do you mean "to prevent drain-down"? Say plainly what you mean.	Clarification. I have 30 years' experience in the industry and can only guess at what this phrase is trying to say.	Accepted comment as suggested.	Yes
E9	5	5.b and throughout document	Would inclusion of metric units in parentheses be useful for future international harmonization?	Future compatibility.	The PCR is for the U.S. industry, which is rooted in customary units.	Yes
E10	6	5.b.xi	Change "while reducing" to "while allowing reduction" since warm mix is often used as a compaction aid to extend the time for compaction while mixing at normal temperatures.	Doesn't adequately describe use of the additive.	Accepted comment as suggested.	Yes
E11	6	5.b.xvi	Put a comma after loads and another after weight to clarify sentence.	Clarification.	Accepted comment as suggested.	Yes
E12	7	5.b.xxii	Drop the word "are" after the dash to be consistent with other bullets	Clarification	Accepted comment as suggested.	Yes
E13	7	5.b.xxiv	See comment D. Warm mix additives are not necessarily used to reduce temperature of mixing.	Doesn't adequately describe use of the additive.	Accepted comment as suggested.	Yes
E14	7	5.b.xxv	Correct plural/singular contradiction and other problems in "methods that allows asphalt mixtures allowable"	Better reading.	Accepted as modified "methods that allow asphalt mixtures."	Yes
E15	11	Figure 2	Change header on left side to Plant Processes instead of Plant Productions	Incorrect labeling	Comment accepted as suggested. Figure 1 was modified.	Yes
E16	11	Figure 2 Box A3:1e	The word "Move" appears. This most likely is referring to the database/model called Moves, but doesn't really belong in a system boundary diagram.	Clarification	Comment accepted as suggested.	Yes
E17	14	13.a.v.	Don't see items 13 and 14 in the lists below. Was numbering changed?	Unclear, potential error in document.	Corrected reference.	Yes
E18	18	Table 2a	Need some thousands commas. And consideration of significant figures (there are too many figures).	Readability.	Comment accepted.	Yes
E19	19	14a.	Not sure why need to repeat ISO allocation statement generically.	Unneeded commentary.	See modification T55.	Yes

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E20	19	Item about RAP allocation	States that not using economic allocation for items "like RAP". Should it say specifically not being use for RAP? Or are there other materials that are like RAP that will be treated in a similar manner. If yes, then list the materials.	Clarification needed .	This has been removed. RAP is being treated as a waste material following the cutoff methodology.	Yes
E21		Appendix G	Would be good to see the final EPD template.		Section 16 outlines the information included. The template will merely show the layout and presentation of the data.	Yes
E22	11	Figure 2	Include green areas in the key	Currently missing	Comment accepted as suggested.	Yes
E23	16	13.b	The next level below 13.b should have roman numerals not a, b.	Change to 13.b.i instead of 13.b.a	RW: Comment accepted as suggested.	Yes
E24	16	13b	First sentence should correspond to first sentence of 13.a.	Change to "Secondary data shall be in accordance with the following requirements"	RW: Comment accepted as suggested.	Yes

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