EC3 Uncertainty General Methodology

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Foreword

This is a report explaining the process for determining the uncertainty factors applied to EPDs in EC3 when EPDs lack specificity. This is an explanation of our general approach with some category-specific examples; however, this is not an explanation of category-specific factors. Each category where we complete a category-specific analysis will also follow with explanation of the factors developed for that category, in a separate report.

This general methodology builds on the peer-reviewed article by Waldman et al. [1], however, this report itself has not been extensively peer-reviewed, except for a few industry representatives. If you would like to provide feedback, please reach out to us via contact-us@buildingtransparency.org

1 Background

Building materials and products are associated with global warming potential (GWP) impact due to the greenhouse gases emitted in order to produce them. An Environmental Product Declaration (EPD[1]) associated with a product aims to accurately document the GWP impact and other environmental impacts of a product over the 12 months before the EPD was published, based on a life cycle assessment (LCA) of the product. EPDs typically declare a single, deterministic value as an expected value of a given product's impact. However, there can be a high degree of uncertainty and variability if the life cycle inventory (LCI) data[2] used is not 1) technologically, geographically, and temporally representative of the actual product purchased, 2) is not complete, and/or 3) does not consider variation in input data used to compile the inventory. There can be additional differences in the methodology of the underlying LCAs including differences in allocation methods and impact characterization factors.

EC3 helps professionals make informed judgments about material procurement based on EPD-derived embodied carbon data. EC3 aims to help users compare products within the same product or material category while considering performance criteria. EC3 attempts to transparently show professionals the uncertainty and variation behind an EPD's reported embodied carbon impact of the specific material chosen by the professional.

This document describes the method EC3 uses to estimate an EPD's uncertainty in reported GWP impact related to the specificity of the data used in the underlying LCA[3]. Broadly, we evaluate the largest sources of potential variation in GWP for a product category and then assign a *total uncertainty factor* (UF_{total}) based on how specific the EPD data

[1] When we refer to an "EPD" we mean a set of impact declarations. Some EPD documents contain many sets of impact declarations for many products; for this analysis we would consider each set a separate EPD.

[2] LCI data is an inventory of input and output flows for a product system, including inputs of water, energy, and raw material, and releases to air, land, and water. This includes both primary (foreground) and secondary, generic (background) data.

[3] Specificity refers to technological, geographical, and temporal representativeness of the actual product purchased and the variation in input data used to compile the inventory.

is in each of the *uncertainty groups* listed in Table 1. EPD specificity is extracted from the available information in the EPD document[4].

Table 1. Types of Uncertainty in EC3

Uncertainty Group	Description	Examples when this uncertainty factor is applied
Product Uncertainty	Uncertainty in a product EPD's GWP impact due to a single GWP value being provided for more than one product.	- 2mm sheet vs. 4mm sheet covered by same EPD - Concrete mix A and Concrete mix B being covered by the same EPD.
Facility Uncertainty	Uncertainty in an EPD's GWP impact due to a single GWP value being provided, when the product is supplied by multiple plant locations. Alternatively, if an EPD was calculated using LCI data that is not specific to the facility.	- A processed glass product is produced at multiple plants but the EPD provides only one GWP value. - Use of average electricity GWP data representing a broader region where subregional data is available.
Supply Chain uncertainty	Uncertainty in an EPD's GWP impact due to the use of non-specific supply chain LCI data for upstream material impacts.	- Use of generic or average cement LCI data for a concrete EPD (when in fact, the cement comes from a cement plant with unknown efficiency. - Use of generic or average aluminum LCI data for an aluminum molding.
Batch Uncertainty	Uncertainty in an EPD's GWP impact due to batch-to-batch variance in material quantities and energy use (via fuels and electricity) over the 5-year life of the EPD.	-Batch-to-batch variation in cement quantity due to measurement and batching variation.
Manufacturer uncertainty (Industry-wide EPDs only)	If an EPD is for an industry-wide analysis, then the EPD may be for a product with particular performance specifications, but there will be uncertainty due to differences in emissions between manufacturers as well as some product composition variability	- Industry-wide EPD for 2500-3000 psi concrete with 20-29% fly ash replacement - Industry-wide EPD for resilient flooring covering products with slightly different formulations and manufactured using different processes
LCIA method uncertainty	Variation in impact characterization factors across LCIA methods. This uncertainty factor is applied to an EPD only if the EPD's reported method is different from the EC3 user's preferred LCIA method.	- An architect working on a building in the United States uses TRACI 2.1 method for the whole building assessment but sources a European product with an EPD reporting impacts using CML 2.1 method.
Residual uncertainty	Measurement error, rounding errors, sub-cutoff factors, and other factors not covered in the LCA model.	A 3% residual uncertainty is applied to all EPDs, which is arbitrary but aims to capture other potential sources of EPD uncertainty not already captured here

2 The need to quantify uncertainty related to EPDs

The uncertainty methodology described herein is primarily concerned with quantifying and reporting the uncertainty related to the specificity (or non-specificity) of LCI data used to generate EPDs. In general, EPDs provide deterministic values for environmental impacts such as GWP. However, the background LCI data used to calculate a product's GWP impact may not exactly represent its production processes.

The goal of this method is to identify when an EPD has used non-specific LCI inputs related to each of the uncertainty groups listed in Table 1. Subsequently, we calculate and apply an *uncertainty factor* (as a percentage of reported GWP) for each uncertainty group, which represents the difference between the mean and the 80th percentile of GWP impact for the uncertain LCI data belonging to each uncertainty group. The 80th percentile was selected as a

[4] In some cases, the underlying LCA may be more specific than is apparent from the EPD and required by the PCR. In these cases, the EPD owner should work with the LCA practitioner and disclose the additional specificity on the EPD in order to be credited for it. See Table 1 for examples.

conservative value that incentivizes EPD data transparency and specificity, which has been used in other embodied carbon uncertainty literature for encouraging industry emissions disclosure [1].

As an example, for concrete EPDs, if generic or average LCI data for the major mixture ingredients (*i.e.,* cement and aggregate) are being used to calculate a concrete EPD's GWP impact, then this is supply chain uncertainty. Thus, an uncertainty factor representing the 80th percentile GWP impact value for the cement and aggregate markets is applied to this EPD. On the other hand, if a concrete EPD uses cement LCI data specific to its cement and aggregate supply chains (via cement and aggregate EPDs), then the supply chain uncertainty factor would be 0% because the data used represents the actual supply chain of the product. The total uncertainty for an EPD is expressed as a *total uncertainty factor* (UF_{total}), which takes into account the supply chain (UF_S), product (UF_P), facility (UF_F), batch (UF_B), and manufacturer (UF_M) uncertainty factors when applicable to the EPD. In addition, a 3% LCIA method uncertainty (UF_L) is added when the user's and EPD's LCIA methods do not match, and a residual l uncertainty (UF_V) of 3% is added to all EPDs to cover remaining uncertainty from limited precision, measurement error, and remaining uncertainty sources not covered by the methodology used herein.

3 General methodology for calculating uncertainty factors for facility, supply chain and batch uncertainty

Below, the relevant nomenclature for the analysis is defined and we subsequently outline how the uncertainty factors are calculated.

3.1 Nomenclature

q_i - a quantity variable (i.e., a quantity of a flow per unit of product) that is uncertain in the life cycle inventory of a material or product (e.g., the quantity of electricity used to manufacture a unit of material or product).

m_i – a GWP impact variable (e.g., $kgCO_2e$ per unit of a flow) that is uncertain in the life cycle inventory of a material or product (*e.g.,* emissions due to production of a unit of electricity in $kgCO_2e/kWh$)

x_i – the generalized uncertain variable that can represent either a *quantity* (**q_i**) or *GWP impact* (**m_i**) variable. This variable is used for generalization of uncertain variables in subsequent equations.

$q_{i,80th}$ – The quantity of variable q at its 80th percentile value. For instance, $q_{cement,80th}$ could represent the 80th percentile quantity of cement being in a batch of concrete.

$m_{i,80th}$ – The GWP impact of variable m at its 80th percentile value. For instance, $m_{electricity,80th}$ could represent the 80th percentile of North American GWP impact for a unit of electricity based on regional differences in GWP intensity.

$GWP_{prod,median}$ – total GWP value for a functional unit of material or product, where all uncertain variables are at their median values ($x_{i,median}$).

$GWP_{prod}|x_{80th}$– total GWP value for a functional unit of material or product, giventhat the value of a variable x is at its 80th percentile value and all other uncertain variables areat their median value. The vertical bar '|' indicates 'given'.

$GWP_{EPD,median}$ – the median GWP value of the EPDs in EC3 for a given product category

$GWP_{EPD,80th}$ – the 80th percentile GWP value of the EPDs in EC3 for a given product category

$UF_{x,80th}$ – the percent increase in $GWP_{prod,median}$ due to changing the value of x_i from its median value to its 80th percentile value. See Equation 2

uncertainty group – each uncertain variable, x_i, will belong to one of the following uncertainty groups: supply-chain uncertainty (S), facility/plant uncertainty (F), product uncertainty (P), batch uncertainty (B), manufacturer uncertainty (M), and vestigial uncertainty (V)

$UF_{uncertainty\_group,80th}$ – this uncertainty factor (UF) represents the percent increase in $GWP_{prod,median}$ for when variables within a given uncertainty group are at their 80^{th} percentile values

UF_{total} – this uncertainty factor represents the total uncertainty for the material or product by considering all uncertainty groups, shown as a percent increase in $GWP_{prod,median}$.

3.2 LCA Model assumptions

This methodology assumes that the GWP impact of a product (GWP_{prod}) that is determined via LCA can be described as a function of uncertain variables, x_i, that are either *quantity variables, q_i* (related to the quantity of a flow) or *GWP impact variables, m_i,* related to the GWP impact intensity of that flow.

$$GWP_{prod} = f(q_1m_1, q_2m_2, \dots, q_nm_n) \quad \text{Equation 1}$$

As an example, the GWP of a concrete product would be a function of both the quantity of cement (q_{cement}) and the GWP impact of the cement (m_{cement}), both of which can be uncertain. The overall reported GWP of the given product is dependent on both *q* and *m* variables.

3.3 Acquiring LCI Data

The first step in calculating uncertainty factors is to acquire access to LCI data in order to create a proxy model for the material/product category. Possible sources of LCI data include manufacturer's LCAs, Ecoinvent, USLCI, and GaBi. If an existing LCA model is not available, LCI data can be collected from product and industry EPDs, LCAs and published literature. Specific data and sources will be documented in category-specific reports; however, in because of our use of licensed LCA databases whose contents we are not permitted to disclose, and our use of data shared by industry members under non-disclosure agreements, there may be cases where we can share some intermediate statistical information, but not the raw data.

3.4 Determine quantity and impact variables for the most critical contributors to GWP impact

First, a contribution analysis is performed for the product's representative LCA model in order to determine the life cycle flows that most greatly impact its GWP. Material categories are often very different in terms of which uncertainty groups have the most important variables. Furthermore, the importance of an uncertain variable depends on its relative (%) contribution to GWP as well as its variability. Therefore, this method currently applies engineering judgment in determining which uncertain flows to include. These flows are associated with a value for both q_i and m_i (*e.g.,* quantity of cement and the GWP impact per kg of cement). Next, for the list of *q* and *m* variables, determine which uncertainty group from Table 1 that they belong to. For instance, if $m_{electricity}$ is the GWP impact of electricity used in a manufacturing plant, then this variable belongs to the *facility uncertainty group* because the actual GWP impact is dependent on the source of electricity (*i.e*., location) of the manufacturing facility. Another example of identifying the uncertainty group of a variable is the following: if q_{cement} represents the quantity of cement used in a unit of concrete, then this variable belongs to the *batch uncertainty group*, since the quantity of cement used in a concrete mixture will vary slightly from batch to batch. Table 2 provides an example list of q and m variables and their associated uncertainty group for the concrete category (note: this is not the full documentation of the concrete category, but an example of our approach).

Table 2. Categorizing LCI variables into the uncertainty groups for a simplified example of a concrete EPD

Variable name	Units	Quantity or GWP impact variable?	Uncertainty Group
Cement quantity	kg	q	Batch
Cement GWP impact	$kgCO_2e/kg$	m	Supply chain
Electricity used at ready mix plant	kWh	q	Batch
Electricity	$kgCO_2e/kWh$	m	Facility

3.5 Determine median and 80th percentile values for each impact variable

For each m_i variable, the estimated median value for that variable is determined for the market under consideration. This methodology assumes that for a given uncertain variable, there is an underlying distribution of possible values rather than just one possible value. An example of this concept is the uncertainty in emissions impact per kWh of electricity ($m_{electricity}$) in the US market; the associated emissions depend on the generating resources used regionally. To approximate the expected GWP impact of 1 kWh of electricity ($m_{electricity,median}$), we use the US average GWP impact in Ecoinvent 3.5, which is 0.663 kg CO_2e per kWh of electricity. To approximate the 80th percentile GWP impact, we consider the GWP electricity impacts for the regions in the North American Electricity Reliability Council (NERC). As is shown in Table 3, the NERC regions are ordered by GWP impact and then the cumulative percentage of total US generation is calculated (*i.e.,* a cumulative distribution). From this table, we can see that the RFC NERC region contains the 80th percentile of US generation and the GWP impact for the RFC region can be used for ($m_{electricity,80th}$). In other words, at least 80% of the US electricity generation has a GWP impact at or below that of the RFC region.

Table 3. GWP Impact and generation quantities of US electricity

NERC Region	GWP impact (kgCO2e/kWh) [2]	Cumulative percentage of total generation (%) [3]
N/A[5]	0.275	0.0 – 0.0%
NPCC	0.295	0- 5.7%
WECC	0.498	5.7 - 23.6%
FRCC	0.644	23.6 - 29.2%
ASCC	0.658	29.2 - 29.3%
TRE	0.716	29.3 - 39.1%
SERC	0.737	39.1 - 66.4%
RFC	0.742	66.4 - 88.9%
MRO	0.753	88.9 - 99.8%
HICC	0.909	99.8 – 100%

Note, however, that market quantities (*e.g.*, the quantity of electricity generated in each NERC region) for each flow provider are not always available. When this is the case, the analyst may use best judgement for approximating $m_{i,median}$ and $m_{i,80th}$ by determining reasonable "median" and "high" GWP impact values for the market for representing the median and 80th percentiles. For instance, if the electricity generation percentage quantities were not known, we would assume uniform distribution between the high and low GWP impact values, and use the median and 80th percentile of that distribution.

3.6 Determine median and 80th percentile values for each quantity variable

Median and 80th percentile values are also calculated for each *quantity* (q) variable (i.e., $q_{i,median}$ and $q_{i,80th}$). For example, consider that the quantity of cement in a concrete mixture can be deemed an uncertain variable. The uncertainty related to this variable would be batch uncertainty, because it is likely that a batch of concrete will use a slightly different quantity of cement than reported in the mix design. The value for $q_{cement,median}$ can simply be taken as the reported quantity of cement in the mix design. Tolerances related to concrete batching are governed by ASTM C94 [5], which says that the quantity of cement cannot deviate by more than +/- 2%; therefore, 80% of this range is used as the 80th percentile value for cement quantity. Where appropriate, tolerances based on ASTM or other standards can be used to develop values for $q_{i,80th}$ that are related to the batch uncertainty group.

[5] N/A represents generating resources that do not belong to a specific NERC region.

3.7 Determine GWPprod|x_{80th} for each uncertain variable

Once the median and 80th percentile values have been identified for each variable, $GWP_{prod}|x_{80th}$ can be determined *for each variable*; it represents the GWP impact of the product that is calculated when all variables in the LCI except for the variable in question (x) are set to their median value, and the variable in question is set to its 80th percentile value. Thus $GWP_{prod}|x_{80th}$ reflects the importance of the given variable on the overall GWP uncertainty of the product.

3.8 Determine $UF_{x,80th}$ for each uncertain variable

Next, $UF_{x,80th}$ is calculated for each uncertain variable. $UF_{x,80th}$ represents the percent increase from $GWP_{prod,median}$ due to changing each uncertain variable (one at a time) to its 80th percentile value and can be calculated via Equation 2 below. (Thus, there is a $UF_{x,80th}$ value that corresponds to each uncertain variable, regardless of which uncertainty group it belongs to.) Table 4 provides an example of the values of $GWP_{prod}|x_{80th}$ and $UF_{x,80th}$ for a simplified example of a data cable product made of copper, fluorinated ethylene propylene, polyvinyl chloride, and high-density polyethylene that has a $GWP_{prod,median}$ of 0.310 kg CO_2e per meter of cable.

$$UF_{x,80th} = \frac{GWP_{prod}|x_{80th} - GWP_{prod,median}}{GWP_{prod,median}} * 100\% \qquad \text{Equation 2}$$

Table 4. $GWP_{prod}|x_{80th}$ and $UF_{x,80th}$ calculations for an example data cabling product with ten uncertain variables

Variable Name	Type / Unit	Uncertainty Group	High Value (80th%)	Median Value	Unit (per meter cable)	$GWP_{prod}\|x_{80th}$ (kgCO2e/m)	$UF_{x,80th}$ (%)
Copper	Quantity	Batch	0.0184	0.0181	kg copper/ m cable	0.311	0.5
	Impact Intensity	Supply chain	8.3510	6.0124	kg CO2e/kg copper	0.352	13.7
FEP	Quantity	Batch	0.0152	0.0150	kg FEP/m cable	0.310	0.2
	Impact Intensity	Supply chain	2.7450	2.3133	kg CO_2e/kg FEP	0.316	2.1
PVC	Quantity	Batch	0.0125	0.0123	kg PVC/m cable	0.310	0.1
	Impact Intensity	Supply chain	2.5092	2.0646	kg CO_2e/kg PVC	0.315	1.8
HDPE	Quantity	Batch	0.0272	0.0268	kg HDPE/m cable	0.310	0.3
	Impact Intensity	Supply chain	1.9300	1.9288	kg CO_2e/kg HDPE	0.310	0.0
Electricity	Quantity	Batch	0.0533	0.0524	kWh/m cable	0.314	1.3
	Impact Intensity	Facility	0.7421	0.6634	kg CO_2e/kWh	0.314	1.3

3.9 Determine the uncertainty factor for the supply chain, facility, and batch uncertainty groups ($UF_{uncertainty\_group,80th}$)

For the supply chain, facility, and batch uncertainty groups, the individual uncertainty factors, $UF_{x,80th}$, are summed (see Equation 3) to determine the group uncertainty factor ($UF_{uncertainty\_group,80th}$)[6] . Table 5, below, provides an illustrative example demonstrating how the UF for each uncertainty group is calculated.

[6] Note: if there is significant justification that variables are uncorrelated, then the root sum of squares methodology can be used to sum $UF_{x,80th}$ values for a given uncertainty group.

Note that by summing uncertainty factors within uncertainty groups, we are assuming that these uncertain variables have a correlation of 1. This is a conservative assumption in the sense that the group uncertainty factors will be relatively high. In other words, it is assumed that if supply chain information is not provided, the supply chain uncertainty factor considers all supply chain variables to be at their 80th percentile value.

$$UF_{uncertainty\_group,80th} = \sum UF_{x,,80th} \qquad \text{Equation 3}$$

Table 5. Example of supply chain, facility, and batch uncertainty factor calculations

Variable Name	Uncertainty Group	$UF_{x,80th}$ (%)
Copper	Batch	0.5
	Supply chain	13.7
FEP	Batch	0.2
	Supply chain	2.1
PVC	Batch	0.1
	Supply chain	1.8
HDPE	Batch	0.3
	Supply chain	0.0
Electricity	Batch	1.3
	Facility	1.3

Therefore:
$UF_{B,80th}$ = 0.5% + 0.2% + 0.1% + 0.3% + 1.3% = **2.4%**
$UF_{S,80th}$ = 13.7% + 2.1% + 1.8% + 0.0% = **17.6%**
$UF_{F,80th}$ = **1.3%**

4 Method for calculating supply chain uncertainty

Supply chain uncertainty is related to the activities upstream of the manufacturing facility. Since most upstream activities in LCAs are covered by the use of generic LCA datasets, we compare data from multiple sources to understand the variability between the generic data and data describing a broad industry, instead of a specific supplier. Our process consists of collecting equivalent data from multiple LCA databases (e.g. ecoinvent, GaBi, USLCI), literature, or EPDs. In some cases, the LCA databases also provide statistical data which can be used for determining supply chain uncertainty. If an LCA database provides a full LCA model for the production of certain commodities, we also conduct uncertainty analyses by varying parts of the LCA models to represent specific supply chain scenarios.

All supply chain impact intensities are linked with the quantity of a material that is needed to produce the final product. In instances where part of the product formulation includes post-consumer recycled content, which typically has very low upstream impacts compared to virgin materials, we reduce the supply chain uncertainty for that EPD by the amount of the recycled content.

5 Method for calculating product uncertainty

Guidance from ISO 21930 and many PCRs state that EPDs may only report an average GWP to represent multiple products if the products included differ by no more than +/- 10%. Thus, if an EPD is not product-specific (*i.e.,* it has one GWP value covering multiple similar products), then a product uncertainty factor ($UF_{P,80th}$) of 10% is applied.

6 Method for calculating manufacturer uncertainty factors for industry-wide EPDs

There is additional uncertainty associated with EPDs that do not have a specific manufacturer. These EPDs are known as industry-wide EPDs and they report GWP emissions for a product that are not manufacturer-specific and can encompass more broad specifications and performance attributes than that of a single product. In order to approximate an industry-wide uncertainty factor, we use the set of EPDs in EC3 in the given range of the product definition that is provided in the industry-wide EPD. For instance, if a hypothetical industry-wide EPD for data cabling covers Category 5 copper data cabling, then the median and 80th percentile values of Category 5 data cable in the EC3 database are calculated. The percent increase in from the median to the 80th percentile is $UF_{IW,80th}$, as is shown below in Equation 4.

$$UF_{IW,80th} = \frac{GWP_{EPD,80th} - GWP_{EPD,median}}{GWP_{EPDs,median}} * 100\% \qquad \text{Equation 4}$$

7 Method for calculating total uncertainty

$UF_{total,80th}$ for an EPD

7.1 Algorithm for determining UF_{total}

The UF_{total} will be a different percentage for each EPD, depending on the specificity of the data used to calculate the GWP impact and whether the EPD is industry-wide. To calculate UF_{total}, we need to determine whether each group uncertainty factor is applied to the EPD. The algorithm shown in Table 6 can be used to determine which group uncertainty factors apply to the EPD.

Table 6. Algorithm for calculating UF_{total} for an EPD

	True	False
1. EPD is an industry-wide EPD	$UF_M = UFM_{80th}$	$UF_M = 0$
2. EPD is product-specific	$UF_P = 0\%$	$UF_P = UF_{P,80th}$
3. EPD has specific LCI information for s% of the supply chain. (The supply chain contribution must be reported in GWP contribution, not by mass.)[7]	$UF_S = UF_{S,80th} * (1\text{-}s)$	$UF_S = UF_{S,80th}$
4. EPD uses facility-specific data from the manufacturing plant	$UF_F = 0\%$	$UF_F = UF_{F,80th}$
5. EPD is batch-specific, meaning it includes data for the specific batch produced.	$UF_B = 0\%$*	$UF_B = UF_{B,80th}$

*Note, that batch-level uncertainty will be present for most if not all EPDs because of the current standard of publishing EPDs. Most EPDs today are published for a 5-year period based on 12-month data collection.)

[7] If GWP contributions of the supply chain are unknown from the EPD, then UF_S can be recalculated with the uncertainty for the supply-chain specific material removed.

Lastly, a *vestigial uncertainty (UF_V)* of 3% is applied to all EPDs since even EPDs which have uncertainty factors of 0% for the supply chain, facility, manufacturer, product and batch still have a small amount of uncertainty in GWP impact.

Next, the group uncertainty factors that apply to the EPD need to be combined to find $UF_{total,80th}$. This analysis assumes the uncertainty factors for *each group* are based on independent and normal distributions. This assumption allows the rule of normally distributed random variables to be used to determine $UF_{total,80th}$ via the root sum of squares method as shown in Equation 4 [3,4]. This is the method by which standard deviations can be added for uncertain variables. This method is also applicable when the measure of variability is the 80th percentile (or 1.282 standard deviations) as is true in this analysis.

$$UF_{total,80th} = \sqrt{UF_S^2 + UF_F^2 + UF_P^2 + UF_M^2 + UF_B^2 + UF_L^2 + UF_V^2} \quad \text{Equation 5}$$

One potential issue with this method is if the uncertain variables are not well-modeled by a normal distribution. If this occurs then, the estimate for $UF_{total,80th}$ will be an overestimate or underestimate of the true uncertainty, depending on the more representative distribution type. However, the precision error stemming from this simplification is not expected to be significant relative to the estimated uncertainty.

7.2 Example application of $UF_{total,80th}$ for copper cable EPD

Below the example for copper data cable is continued to illustrate how $UF_{total,80th}$ an be determined for a data cable EPD. The example product is called 10Gain XP Category 6A, which is a plenum data cable made by Superior Essex, and it has a reported GWP of 0.349 kg CO_2e per meter of cable. From the description provided in the EPD, it is manufacturer-specific, product-specific, and plant-specific. However, it is not supply chain-specific nor batch-specific.

Accordingly, the group uncertainty factors would be the following:

UF_S = 17.6%

UF_F = 0%

UF_P = 0%

UF_M = 0%

UF_B = 2.4%

UF_V = 3%

Thus, using Equation 5, the total uncertainty factor for this EPD would be 18.0%.

8 Default uncertainty factors

Default uncertainty factors for each category are continuously developed and updated. Please see our Default Uncertainty Factors report for the latest set of factors.

9 References

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