GUIDELINES FOR GLOBAL WARMING POTENTIAL DECLARATION

General rules for environmental impact data statement

INTRODUCTION

This document defines the basic technical and operative instruction to provide properly CO2 emission data for supplies.

1.1 TERMS AND DEFINITIONS

SDGs: Sustainable Development Goals (SDGs) are 17 and they are being adopted by all United Nations Member States in 2015. They provide a shared blueprint for peace and prosperity for people and the planet, now and into the future.

Net Zero: net zero refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. We reach net zero when the amount we add is no more than the amount taken away.

GWP: Global Warming Potential. Global warming potential (GWP) is the heat absorbed by any greenhouse gas in the atmosphere, as a multiple of the heat that would be absorbed by the same mass of carbon dioxide (CO2). GWP is 1 for CO2. For other gases it depends on the gas and the time frame.

Global Procurement Portal: section of the Enel portal dedicated to suppliers which can be viewed at the address http://globalprocurement.enel.com (hereinafter referred to as the Enel Portal).

1.2. LIFE CYCLE STAGES

Life cycle assessment (LCA) is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service.

The assessment breaks down the process in progressive phases according to EN15804 depending on different product cluster as described in the following paragraphs.

1.2.1. Photovoltaic module and/or Wind Turbines

In the following table, it is available a summary of the stages of the Life Cycle:

	Life cycle stages according to EPDItaly PCR	*Life cycle stages according to EN50693*	Life cycle stages according to EN15804	
" CRADLE TO GRAVE"	**Upstream Module**	*Manufacturing Stage ("**CRADLE TO GATE**")*	A1	Raw material supply
			A2	Transport (to the manufacturer)
	Core		A3	Manufacturing
		Distribution Stage	A4	Transport
		Installation Stage	A5	Construction – installation process

		Use Stage	B1	Use
			B2	Maintenance
			B3	Repair
			B4	Replacement
			B5	Refurbishment
			B6	Operational energy use
			B7	Operational water use
		De-installation Stage	C1	De-construction and demolition
		End of Life Stage	C2	Transport (to waste processing)
	Downstream Module		C3	Waste processing
			C4	Disposal
				Voltage drop of electricity distribution to the grid
		Benefits and avoided loads beyond the product system boundary	D	reuse, recovery and/or recycling potentials

Table 1

Therefore, the stages to consider to properly provide CO2 emission data (regardless the certification/document the Supplier will attach) are the following:

Upstream Module --> A1+A2
Core Module --> A3+A4+B1+B2+B3+B4+B5+B6+B7+C1+C2
Dowstream Module --> C3+C4

Cradle To Gate (or "Manufacturing Stage") --> A1+A2+A3
Cradle to Grave --> A1+A2+A3+A4+B1+B2+B3+B4+B5+B6+B7+C1+C2+C3+C4

1.2.2. Electronic and electrical products and systems

EPDItaly Regulations state that the life cycle stages must refer to segmentation in the following three modules:

1. Upstream module which includes all the relevant supply chain processes.
2. Core module which includes all the relevant processes managed by the Organisation proposing the EPD.
3. Downstream module which includes all the relevant processes that take place outside of the Organisation proposing the EPD:
    - product transportation/distribution;
    - product installation (if applicable);
    - use;
    - maintenance;
    - disassembly;

- end-of-life.

Therefore, please, consider the following subdivisions with reference to EN 50693 and EN 15804 to provide CO2 emission data correctly:

<table>
<tr><th colspan="2">MANUFACTURING STAGE</th><th>DISTRIBUTION STAGE</th><th>INSTALLATION STAGE</th><th>USE & Maintenance STAGE</th><th>END-OF-LIFE STAGE

De-installation</th></tr>
<tr><th>UPSTREAM MODULE</th><th>CORE MODULE</th><th colspan="4">DOWNSTREAM MODULE</th></tr>
<tr><td>extraction of raw materials, including waste recycling processes and the production of semi-finished and ancillary products</td><td>manufacturing of the product constituents, including all the stages</td><td colspan="4" rowspan="4">IN ACCORDANCE WITH EN 50693</td></tr>
<tr><td>transportation of raw materials to the manufacturing company</td><td>product assembly</td></tr>
<tr><td></td><td>packaging</td></tr>
<tr><td></td><td>waste recycling processes</td></tr>
</table>

Table 2

Cradle To Gate (or "Manufacturing Stage")	--> Upstream + Core
Cradle to Grave	--> Upstream + Core + Downstream

1.3. GLOBAL WARMING POTENTIAL DECLARATION

Each bidder shall provide the value of the Global Warming Potential (GWP) associated with the offered product, by submitting at least one of the following declarations:

- an Environmental Product Declaration (EPD) according to EPD Italy; or
- a Life Cycle Assessment (LCA); or
- a Product Carbon Footprint (ISO14067); or
- a Self-Declaration for Global Warming Potential.

For more detail, please refer to tender instruction. **In the event of discrepancies or incompatibilities with the tender instruction, the tender documentation and/or Enel communication shall prevail**.

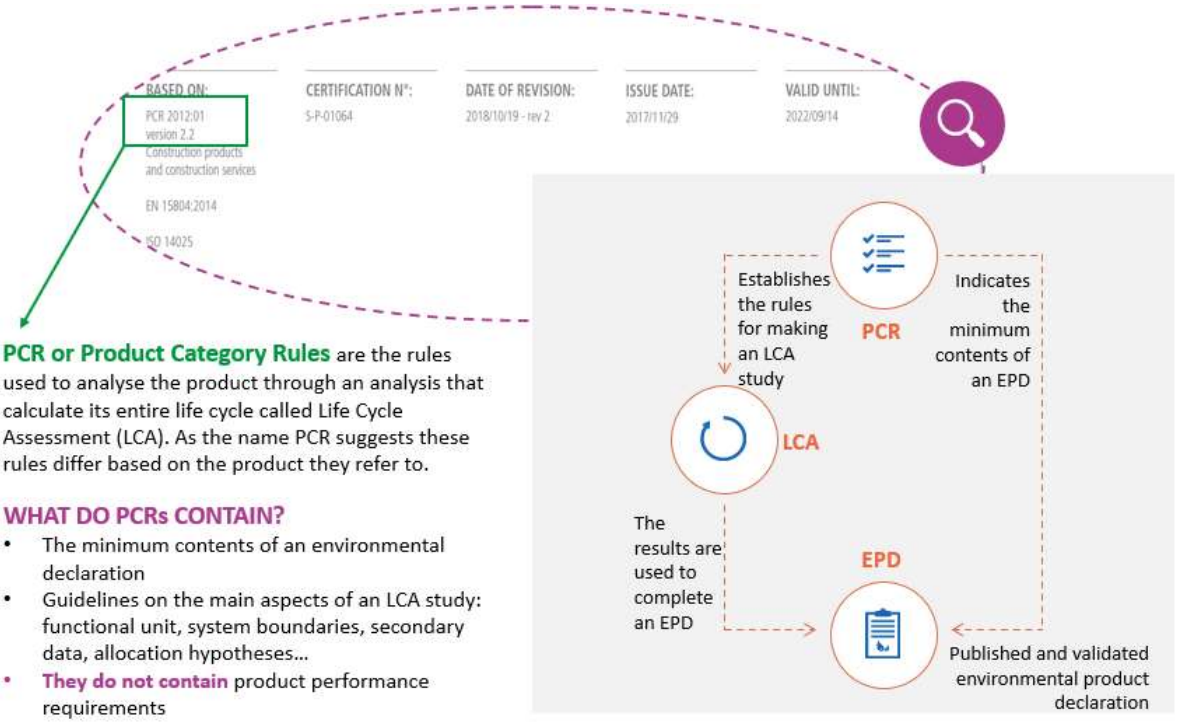
1.3.1. Environmental Product Declaration (EPD)

An Environmental Product Declaration (EPD) is defined by International Organization for Standardization (ISO) 14025 as a Type III declaration that "quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function."

Type III environmental declarations as described in ISO 14025:2006 are primarily intended for use in business-to-business communication, but their use in business-to-consumer communication under certain conditions is not precluded.

The EPD methodology is based also on the Life Cycle Assessment (LCA) tool that follows ISO series 14040.

EPD declaration follows specific PCR (Product Category Rules) as follows detailed.



EPD last **5 years** although every year there should be a maintenance check to verify that the product impact doesn't worsen for more than 10% in comparison with the issue date's result.

In order to provide CO2 emission data, please refer always to the stages listed in paragraph 1.2.

1.3.2. Life Cycle Assessment (LCA)

Life cycle assessment (LCA) is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a product. For instance, in the case of a

manufactured product, environmental impacts are assessed from raw material extraction and processing (cradle), through the product's manufacture, distribution and use, to the recycling or final disposal of the materials composing it (grave).

An LCA study involves a thorough inventory of the energy and materials that are required across the industry value chain of the product in order to calculate the corresponding CO2 emissions. LCA thus assesses cumulative potential environmental impacts.

Widely recognized procedures for conducting LCAs are included in the 14000 series of environmental management standards of the International Organization for Standardization (ISO) in ISO 14040 and ISO 14044. ISO 14040 provides the 'principles and framework' of the Standard, while ISO 14044 provides an outline of the 'requirements and guidelines'.

1.3.3. Product Carbon Footprint (CFP)

A product carbon footprint (CFP) is a means for measuring, managing and communicating greenhouse gas (GHG) emissions related to goods and services following "ISO 14067:2018 - *Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification".* A carbon footprint is based on life cycle assessment (LCA) but focuses on the single issue of global warming.

1.3.4. Self-Declaration for Global Warming

In case the Supplier does not have any certification listed above, The Supplier shall compile a Self-Declaration based on life cycle assessment (LCA) estimation.

The awarding Supplier shall submit to Enel a declaration certified by a third party certifying the C02eq value declared in the technical tender phase within X months from signature date. Enel Procurement will declare the deadline to obtain EPD or equivalent in tender phase.

For more information, please, view the tender documentation. In the event of discrepancies or incompatibilities with the tender instruction, the tender documentation and/or Enel communication shall prevail.

1.4. INSTRUCTIONS FOR ENEL REQUEST

During tender phase, a questionnaire for GWP data will be shared with all tender participants. In those questionnaire Enel could require providing the following main data:

Here the list of the main information required (the list is indicative and it could vary):

- **Functional or Declared Unit** - editable by supplier. It is equal to the reference flow to which the impacts are scaled to. It also defines the Measure unit kg of CO2 equivalent. Here an indicative and not-exhaustive list:
    - Photovoltaic module – 1 kWh of electricity generated as output from the solar PV Plant
    - Storage - 1 kWh stored by a single energy storage module

- Home appliances - product category unit. The GWP has to be calculated on the overall product power capacity
- Lighting - a single luminaire[1] operating during a reference service life set as 40.000 working hours. The GWP has to be calculated on the overall product power capacity
- Wind - 1 kWh of electricity generated as output from the or the wind farm
- Meter - product category unit. The GWP has to be calculated on the overall product power capacity
- Cables – 1km of cable. The GWP has to be calculated on the overall product power capacity
- Transformers - product category unit. The GWP has to be calculated on the overall product power capacity
- Switchboard - product category unit. The GWP has to be calculated on the overall product power capacity
- Switches - product category unit. The GWP has to be calculated on the overall product power capacity
- Insulators - product category unit. The GWP has to be calculated on the overall product power capacity

- **Upstream** - editable by supplier. Below a concrete example of data requested to be exported directly from an EPD:

Indicatore	U.M.	PRODUZIONE		DISTRIBUZIONE	INSTALLAZIONE	FASE D'USO E MANUTENZIONE	FINE VITA	TOTALE
		UPSTREAM	CORE	DOWNSTREAM				
GWP Fossile	kg CO2 eq	1,11E+03	1,34E+02	4,47E-01	5,69E-02	2,34E+03	1,77E-01	3,58E+03
GWP Biogenica	kg CO2 eq	1,10E+00	8,40E+00	2,10E-05	1,48E-01	6,20E+00	1,42E+00	1,73E+01
GWP Uso del suolo	kg CO2 eq	9,11E-01	3,96E-01	4,89E-06	4,66E-06	2,01E+00	3,69E-05	3,32E+00
GWP Totale	kg CO2 eq	1,12E+03	1,43E+02	4,47E-01	2,05E-01	2,34E+03	1,60E+00	3,61E+03
Distruzione dello strato di ozono stratosferico	kg CFC-11 eq	5,09E-05	2,67E-05	8,07E-08	1,74E-09	8,60E-05	1,33E-08	1,64E-04
Acidificazione del terreno e delle falde acquifere	mol H+ eq	4,71E+00	1,56E+00	6,01E-03	8,85E-05	1,91E+01	6,04E-04	2,54E+01
Eutrofizzazione	kg PO4 eq	2,97E-01	1,04E-01	5,27E-04	6,85E-04	4,76E+00	6,36E-03	5,17E+00
Formazione di ossidanti fotochimici	kg NMVOC eq	5,02E+00	9,67E-01	4,16E-03	1,40E-04	7,25E+00	1,07E-03	1,32E+01
Esaurimento delle risorse minerali	kg Sb eq	3,44E-02	8,34E-05	1,44E-08	2,27E-09	9,88E-05	6,24E-09	3,46E-02
Esaurimento delle risorse di energia fossili	MJ	1,11E+04	2,64E+03	6,16E+00	1,52E-01	2,56E+04	1,17E+00	3,93E+04
Consumo idrico	m3 eq	3,34E+02	2,11E+02	-9,05E-04	2,70E-03	5,01E+02	2,95E-03	1,05E+03

- **Core** - editable by supplier. Below a concrete example of data requested to be exported directly from an EPD:

[1] Fuctional Unit has to exclude structural element such as pole for “cradle to gate” GWP measurement

Indicatore	U.M.	PRODUZIONE		DISTRIBUZIONE	INSTALLAZIONE	FASE D'USO E MANUTENZIONE	FINE VITA	TOTALE
		UPSTREAM	CORE	DOWNSTREAM				
GWP Fossile	kg CO2 eq	1,11E+03	1,34E+02	4,47E-01	5,69E-02	2,34E+03	1,77E-01	3,58E+03
GWP Biogenica	kg CO2 eq	1,10E+00	8,40E+00	2,10E-05	1,48E-01	6,20E+00	1,42E+00	1,73E+01
GWP Uso del suolo	kg CO2 eq	9,11E-01	3,96E-01	4,89E-06	4,66E-06	2,01E+00	3,69E-05	3,32E+00
GWP Totale	kg CO2 eq	1,12E+03	1,43E+02	4,47E-01	2,05E-01	2,34E+03	1,60E+00	3,61E+03
Distruzione dello strato di ozono stratosferico	kg CFC-11 eq	5,09E-05	2,67E-05	8,07E-08	1,74E-09	8,60E-05	1,33E-08	1,64E-04
Acidificazione del terreno e delle falde acquifere	mol H+ eq	4,71E+00	1,56E+00	6,01E-03	8,85E-05	1,91E+01	6,04E-04	2,54E+01
Eutrofizzazione	kg PO4 eq	2,97E-01	1,04E-01	5,27E-04	6,85E-04	4,76E+00	6,36E-03	5,17E+00
Formazione di ossidanti fotochimici	kg NMVOC eq	5,02E+00	9,67E-01	4,16E-03	1,40E-04	7,25E+00	1,07E-03	1,32E+01
Esaurimento delle risorse minerali	kg Sb eq	3,44E-02	8,34E-05	1,44E-08	2,27E-09	9,88E-05	6,24E-09	3,46E-02
Esaurimento delle risorse di energia fossili	MJ	1,11E+04	2,64E+03	6,16E+00	1,52E-01	2,56E+04	1,17E+00	3,93E+04
Consumo idrico	m3 eq	3,34E+02	2,11E+02	-9,05E-04	2,70E-03	5,01E+02	2,95E-03	1,05E+03

- "**Total cradle to gate**" - editable by supplier. Indicate the sum of the previous two parameter.
- **Downstream** - editable by supplier. Below a concrete example of data requested to be exported directly from an EPD. In the specific case, indicate in the GWP questionnaire the sum of the highlighted data.

Indicatore	U.M.	PRODUZIONE		DISTRIBUZIONE	INSTALLAZIONE	FASE D'USO E MANUTENZIONE	FINE VITA	TOTALE
		UPSTREAM	CORE	DOWNSTREAM				
GWP Fossile	kg CO2 eq	1,11E+03	1,34E+02	4,47E-01	5,69E-02	2,34E+03	1,77E-01	3,58E+03
GWP Biogenica	kg CO2 eq	1,10E+00	8,40E+00	2,10E-05	1,48E-01	6,20E+00	1,42E+00	1,73E+01
GWP Uso del suolo	kg CO2 eq	9,11E-01	3,96E-01	4,89E-06	4,66E-06	2,01E+00	3,69E-05	3,32E+00
GWP Totale	kg CO2 eq	1,12E+03	1,43E+02	4,47E-01	2,05E-01	2,34E+03	1,60E+00	3,61E+03
Distruzione dello strato di ozono stratosferico	kg CFC-11 eq	5,09E-05	2,67E-05	8,07E-08	1,74E-09	8,60E-05	1,33E-08	1,64E-04
Acidificazione del terreno e delle falde acquifere	mol H+ eq	4,71E+00	1,56E+00	6,01E-03	8,85E-05	1,91E+01	6,04E-04	2,54E+01
Eutrofizzazione	kg PO4 eq	2,97E-01	1,04E-01	5,27E-04	6,85E-04	4,76E+00	6,36E-03	5,17E+00
Formazione di ossidanti fotochimici	kg NMVOC eq	5,02E+00	9,67E-01	4,16E-03	1,40E-04	7,25E+00	1,07E-03	1,32E+01
Esaurimento delle risorse minerali	kg Sb eq	3,44E-02	8,34E-05	1,44E-08	2,27E-09	9,88E-05	6,24E-09	3,46E-02
Esaurimento delle risorse di energia fossili	MJ	1,11E+04	2,64E+03	6,16E+00	1,52E-01	2,56E+04	1,17E+00	3,93E+04
Consumo idrico	m3 eq	3,34E+02	2,11E+02	-9,05E-04	2,70E-03	5,01E+02	2,95E-03	1,05E+03

- "**Total cradle to grave**" - editable by supplier. Indicate the sum of the previous two parameter ("Total cradle to gate" + Downstream).

Enel could also requires additional information such as material code, product class, product specification,… etc.

In case of Self-declaration, The Supplier shall compile the questionnaire based on life cycle assessment (LCA) estimation.

In the event of discrepancies or incompatibilities with the tender instruction, the tender documentation and/or Enel communication shall prevail.

1.5. LINKS

Here a non-exhaustive and indicative list of links and useful tools to refer in order to provide CO2 emission data:

- Tool for LCA measurement according to EPD Italy: https://www.epditaly.it/epd-generate-da-tool
- List of PCR ("Product Category Rules" - The protocol to calculate LCA based on Merchandise Groups) is available here: https://www.epditaly.it/view-pcr.
- international databases (i.e. Ecoinvent) or open data from national institutes (i.e. ISPRA)