

# Extending and Disseminating the Harmonized LCA Methodology for Sustainability Labels

EXPLORING ENVIRONMENTAL PRODUCT DECLARATION (EPD)

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Organized by



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## Sustainability Certificates

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Industry demand for sustainability certification (life cycle assessment based) is increasing in most conventional technologies and construction products.

The certification bases (LCA) of different certificate often overlap significantly. Some examples are:

- **Environmental Product Declaration (EPD)**
- **Ecodesign**
- **EU-Ecolabel**
- **C2C EPEA**

Of these certificates, **EPDs have better market recognition** and are **more holistic in terms of environmental impact categories**. Differences observed for impact assessment method and reporting criteria among all certifications.

EPDs are already widespread or known in other markets as a sustainability certificate based on LCA (e.g., in the context of building certification systems such as DGNB, LEED, BREEAM). EPD's are internationally coordinated, **based on international standards (ISO14025; ISO14040-44)**, as well as the **European DIN EN 15804+A2 when desired**. They are suitable as a proof of environmental claims in public procurement.

**PV technology product category (PCR) available for EPDs** for multiple functionality. There are also multiple published PV technology EPD certificates.

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## Fundamentals of EPD

An EPD is an independently verified summary of the environmental impact of a product throughout its life-cycle, calculated via LCA. It is a Type III Environmental Declaration.

EPD consists of two key documents: **i. Public EPD document** and **ii. Private background report**, also called an LCA report. An EPD is usually valid for five years

EPDs are based on **product category rules (PCR)**. It is a set of rules or *recipe* that defines how the LCA of the given product should be calculated and how the results should be presented.

- Different manufacturers can follow this common recipe (PCR) and ensure that the scope of the EPD and LCA is the same regardless of the manufacturer and developer of the EPD.
- Without PCR, an *objective comparability* between different EPDs for the same product type is difficult and the results can be manipulated to the manufacturers own advantage by making different methodical choices.
- A new PCR shall not be created when there is an existing PCR for that purpose of that product group.



*Environmental label Type III:* Transparent, third party managed, independently audited quantified environmental information for economic actors, e.g., planners, auditors and customers.

*Objective comparability:* Scope and boundaries of the sample may or may not be same.

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## Overview of Currently Available PCRs for PV Technology

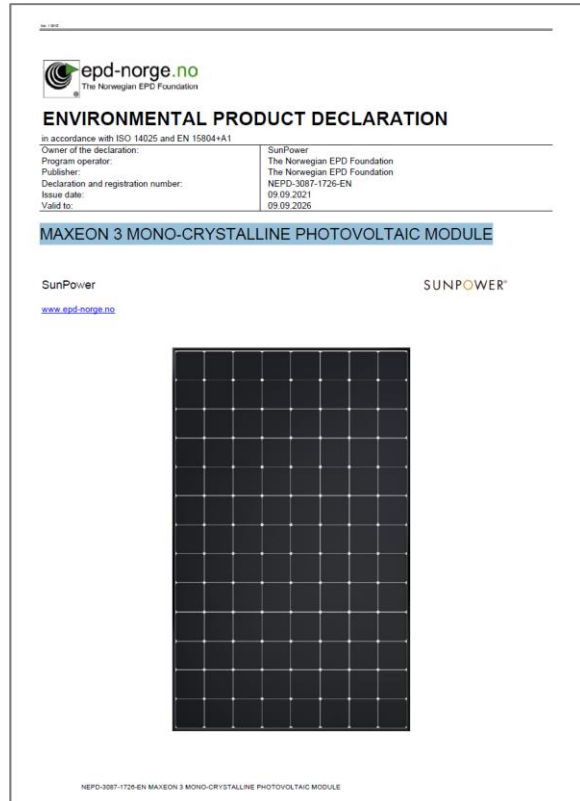
- The International EPD System- PCR 2007:08- *Electricity, steam and hot/cold water generation and distribution.*
- The International EPD System- PCR 2019:14- *Construction products.*
- EPD Italy- PCR 014 – *Electricity produced by photovoltaic modules.*
- The Norwegian EPD Foundation- NPCR Part A for *Construction products and services.*
- The Norwegian EPD Foundation- NPCR Part B for *photovoltaic modules (029-20(20/22))*

Programme	Published EPD Certificates	EPD and Product Owner	Programme Operator	PCR	Functional Unit
The International EPD® System	Jolywood N-type Bifacial Single Glass Photovoltaic Modules	Jolywood (Taizhou) Solar Technology Co., Ltd	EPD International AB	PCR 2007:08 Electricity, steam and hot water generation and distribution (Version 4.0) and EN15804	1 kWh
	Electricity generated in photovoltaic power plant El Romero Solar 196 MW	Acciona Energía, S.A.	EPD International AB	PCR 2007:08 Electricity, steam and hot water generation and distribution (Version 4.11)	1 kWh
	Multi-coloured Glass-Glass Photovoltaic Module for Building Integration	ÜserHuus AG	EPD International AB	EN 15804:2012+A2:2019 PCR 2012:01 Construction products and Construction services (Version 2.3)	1 m <sup>2</sup>
The Norwegian EPD Foundation	Maxeon 3 Mono-crystalline Photovoltaic Module	Sun Power	The Norwegian EPD Foundation	EN 15804:2012+A2:2019 NPCR Part A: Construction products and services, (Version 2.0) NPCR 029:2020 Part B: Photovoltaic modules used in the building and construction industry (Version 1.1)	1 W <sub>p</sub>
	Series 6 Photovoltaic Module	First Solar	The Norwegian EPD Foundation	EN 15804:2012+A2:2019 NPCR Part A: Construction products and services, Version 2.0 NPCR 029:2020 Part B Version 1.1, Photovoltaic modules used in the building and construction industry	1 W <sub>p</sub>
EPD Italy	Trina Solar mono-crystalline silicon PV modules to generate electricity on rooftop and ground solar farms.	Trina Solar Science & Technology (Thailand) Ltd	UL Environment	EN 15804:2012+A2:2019 EPDItaly014: Electricity Produced by Photovoltaic Modules.	1 kWh

Functional units are different based on the functionality of the PV technology but freedom of choice in solar irradiation, background database, impact assessment methods... creates difference in interpretations of results.

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## Objective Comparison of EPDs (1)



**EPD: Maxeon 3 Mono-crystalline Photovoltaic Module**

**Owner: SunPower**

Program Operator: The Norwegian EPD Foundation

**PCR(s):** EN 15804+A1; NPCR Part A for Construction products and services; NPCR Part B for photovoltaic modules(029)

**Database:** Ecoinvent 3.6, ELCD

**LCIA method:** Categories of EN 15804:2012+A1

Climate change kg CO <sub>2</sub> Eq./Wp	
A1-A3	3.4E-01
A4	1.4E-02
A5	8.6E-04
C2	8.0E-04
C3	5.7E-04
C4	6.4E-06
<b>Total</b>	<b>0.36</b>
D	-1.4E-01



**EPD: Series 6 Photovoltaic Module**

**Owner: First Solar**

Program Operator: The Norwegian EPD Foundation

**PCR(s):** EN 15804; NPCR Part A for Construction products and services; NPCR Part B for photovoltaic modules(029)

**Database:** Ecoinvent 3.6

**LCIA method:** Categories of EN 15804:2012+A2:2019

Climate change kg CO <sub>2</sub> Eq./Wp	
A1-A3	2.7E-01
A4	3.8E-02
A5	5.4E-03
B2	1.2E-04
B4	2.7E-03
C1	1.6E-04
C2	4.2E-02
C3	2.0E-02
<b>Total</b>	<b>0.38</b>
D	-9.7E-02

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## Objective Comparison of EPDs (2)

Most PCRs for PV technologies included rules to develop an EPD upto PV module level, i.e., without any switch/cable/inverter-BoS component. However, the use phase of the PV lacks the specification of *solar irradiation*. This opens the gap of some EPD owners calculating energy yield with very high irradiation, resulting lower impacts in their product EPD, while other present higher impacts due to use of lower irradiation location. This reduces the comparability of PV EPDs at a module level.

**OWNER OF THE DECLARATION**




**ENVIRONMENTAL PRODUCT DECLARATION**

TSM-DEG15M.20(II), TSM-DEG15MC.20(II), TSM-DEG17M.20(II), TSM-DEG17MC.20(II)  
TSM-DEG15M.20(II), TSM-DEG15MC.20(II), TSM-DEG17M.20(II), TSM-DEG17MC.20(II)  
TSM-DEG15M.20(II), TSM-DEG15MC.20(II), TSM-DEG17M.20(II), TSM-DEG17MC.20(II)

in compliance with ISO 14025

Program Operator	UL
Publisher	EPDItaly
Dedication Number	4789556470.101.1
Registration Number	MR-EPDITALY0042
Issue Date	10 / 01 / 2020
Valid to	10 / 01 / 2025





Registered under the mutual recognition between EPDItaly and UL  
www.epditaly.it

UL Environment  
 TSM-DEG15M.20(II), TSM-DEG15MC.20(II), TSM-DEG17M.20(II), TSM-DEG17MC.20(II)  
 EPD registration number: MR-EPDITALY0042  
 PCR EPDItaly014

**Nominal solar irradiance: 1,660 kWh/m<sup>2</sup>/year**  
**LCIA Method: Categories of EN 15804+A2:2019 & TRACI**

EPD International AB  
 N-type Bifacial Double Glass Photovoltaic Modules  
 EPD registration number: S-P-02182  
 PCR 2007:08

**Nominal solar irradiance: 1,467 kWh/m<sup>2</sup>/year**  
**LCIA method: Categories of EN 15804**



**Environmental Product Declaration**

In accordance with ISO 14025 and EN 15804

Programme: The International EPD System, www.environmental.org



Programme operator: EPD International AB

EPD registration number: S-P-02182


ECO EPD ref. Nr.: 00001369

Publication date: 2020-11-01

Valid until: 2025-11-01

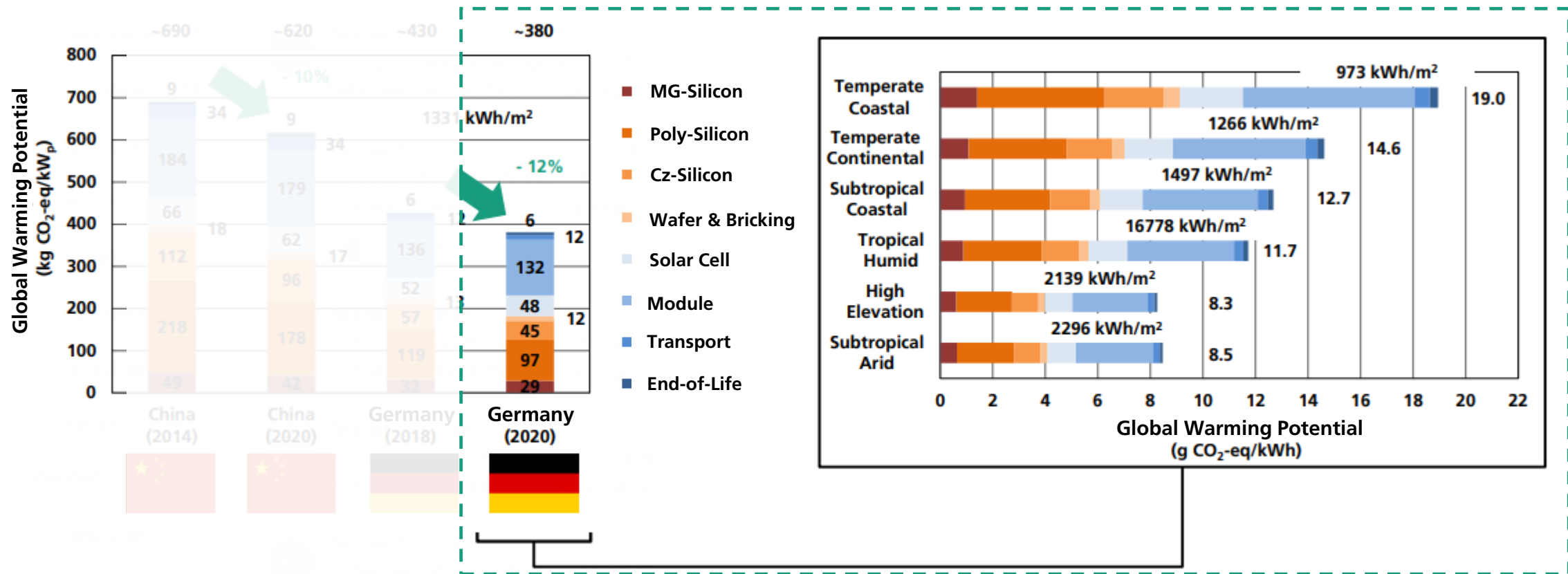
Jolywood



**N-type Bifacial Double Glass Photovoltaic Modules**

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## Implications of Solar Irradiation on GWP of Si-PV Module



Source: Christian Reichel, Abeer Khan, Pamela Molina, Friedrich Lorenz, Dilara Subasi, Sebastian Nold, Dirk Holger Neuhaus. (2023) 'Einfluss des Energiemix und des Energieertrags auf die CO<sub>2</sub> Emissionen von Silizium Photovoltaikmodulen.' 38 PV Symposium, Bad Staffelstein.

# Kontakt

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