

Session 5: Sustainable End- of-life Solutions for Solar Products

Thursday, December 7
17:00 – 18:00

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EUROPE 2023



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7 December, Brussels, Belgium



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Directive 2012/19/EU on waste electrical and electronic equipment (WEEE Directive) State of play & Evaluation

Sustainable Solar Europe 2023

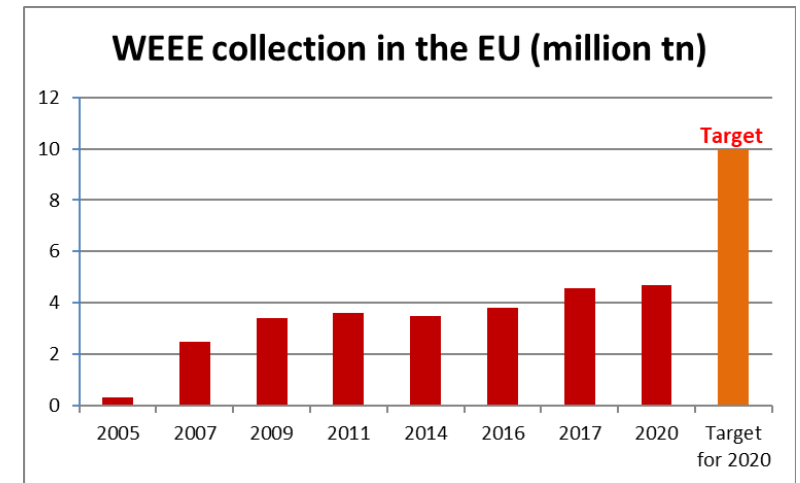
Brussels, 7 December 2023

Maria Banti

DG ENV, Unit B3: From Waste to Resources

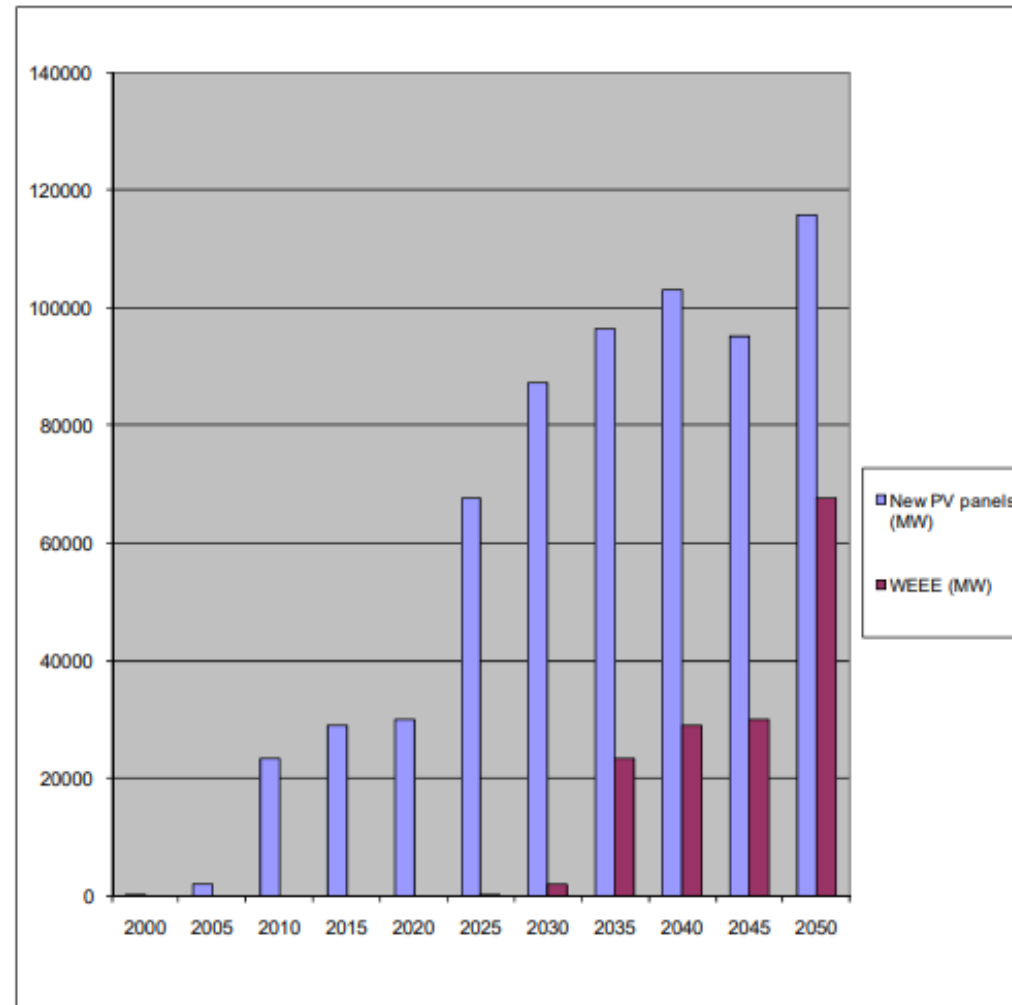
Legislative framework for the management of WEEE in the EU

- The first WEEE Directive 2002/96/EC entered into force in 2003 (20 years of experience)
- The revised WEEE Directive 2012/19/EU entered into force in August 2012
- Photovoltaic panels entered into the scope of the WEEE Directive from 13 August 2012.
- Significant achievements over these 20 years:
 - Increase on WEEE collection from 300 thousand tonnes in 2005 to about 4.9 million tonnes in 2021
 - BUT still a lot to be done as the target was to reach about 10 million tonnes of WEEE collected in 2020.



Challenges in the implementation

- Inclusion of PV panels in scope – impact on collection rate
- WEEE collected and treated through unofficial channels
- Ensuring the proper treatment of WEEE, and a related level playing field
- Online sales, free-riders and authorised representatives
- Exports of second hand EEE – illegal export of waste EEE



Evaluation of the WEEE Directive

❑ Purpose and scope:

- provide evidence on whether the Directive is still fit for purpose, and
- help determine whether a review is needed.

❑ Timeline: Q3 2024

❑ Outcome of consultation activities in relation to PV panels:

- Current classification under category 4 creates issues related to the achievement of the WEEE collection rate
- Methodology to calculate the collection rate based on quantities of EEE put on market is not efficient to take into consideration products with long lifetime
- Exports of PV panels for re-use
- Recycling/ Recovery of PV panels – critical raw materials (germanium, silicon)
- Recycling/ Recovery capacity building
- PV panels are not in scope of the RoHS Directive

Commitments in relation to WEEE

- **Critical Raw Materials Communication** (16.3.2023):
 - **The Commission will** review the WEEE Directive to, inter alia, address CRM-rich equipment in provisions relating to information require.

Commitments in relation to WEEE

- **Targeted amendment of the WEEE Directive (under co-decision)**
 - Purpose: to clarify the timing from when producers of photovoltaic panels and of open-scope EEE have to provide for the financing of the costs for the collection, treatment, recovery and environmentally sound disposal of WEEE.
 - European Parliament and the Council have reached political agreement:
 - Review the WEEE Directive: No later than **31 December 2026**, the Commission shall assess the need for a revision of this Directive and, where appropriate, present a **legislative proposal** in that respect, **accompanied by a thorough socio-economic and environmental impact assessment**.
 - Impact assessment to assess:
 - New EEE category for PV panels and collection targets taking into consideration expected lifetime
 - Adequate collection targets and prevention of WEEE illegal trade
 - Ensure implementation of waste hierarchy
 - Ensure legal certainty – no retroactive effect
 - No disproportionate costs to citizens and consumers
 - Mechanism to ensure producers' compliance

Thank you!

Your WEEE contact at the Commission:

Maria Banti (Maria.BANTI@ec.europa.eu)



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Nicolas Defrenne

General Director,
Soren

7 December, Brussels, Belgium

PV second life

Sustainable Solar Europe

December 7th, 2023

Bruxelles

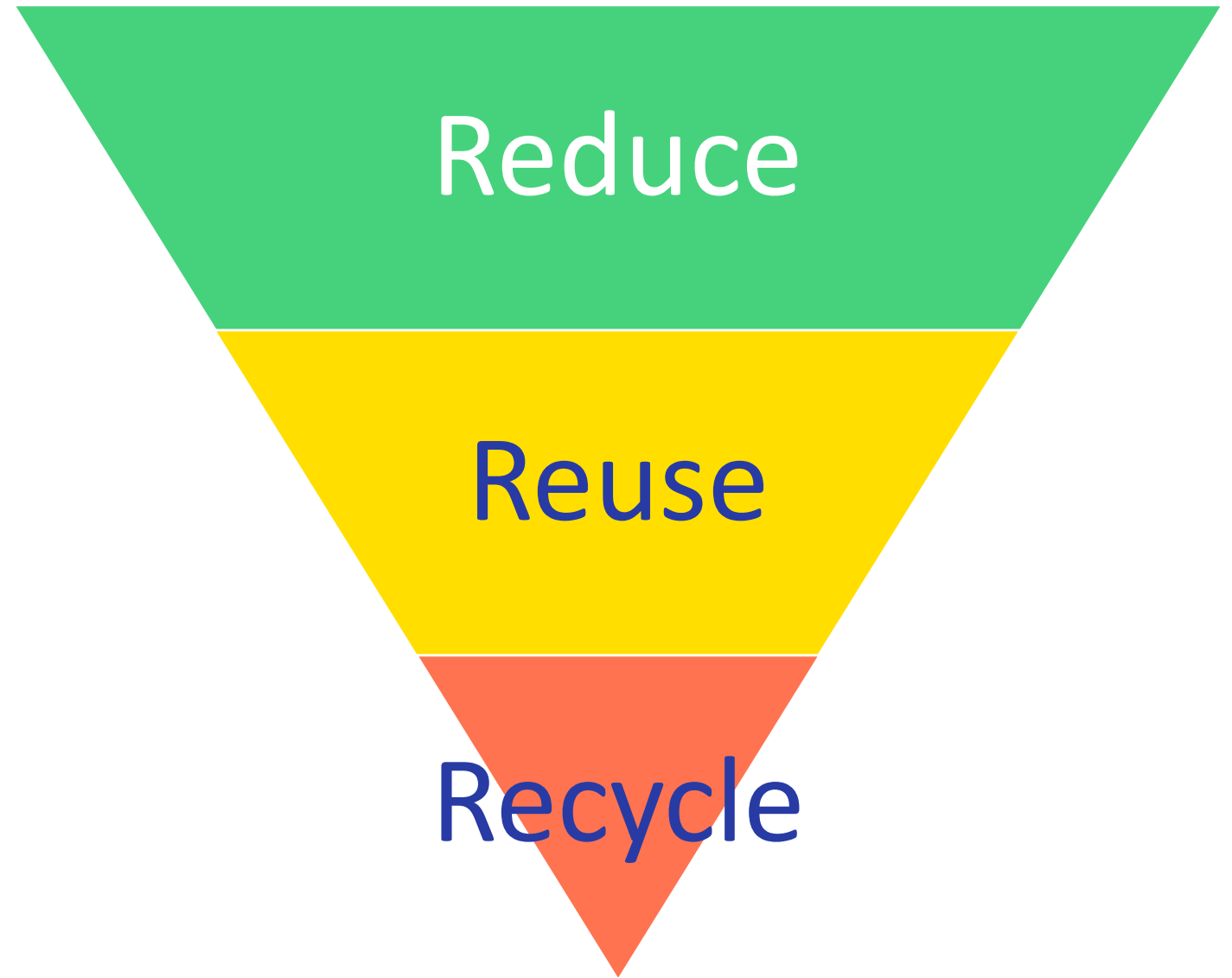
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Reducing consumption of non-renewable resources



Waste hierarchy





Recertification is necessary



Triple warranty for second life



Safety



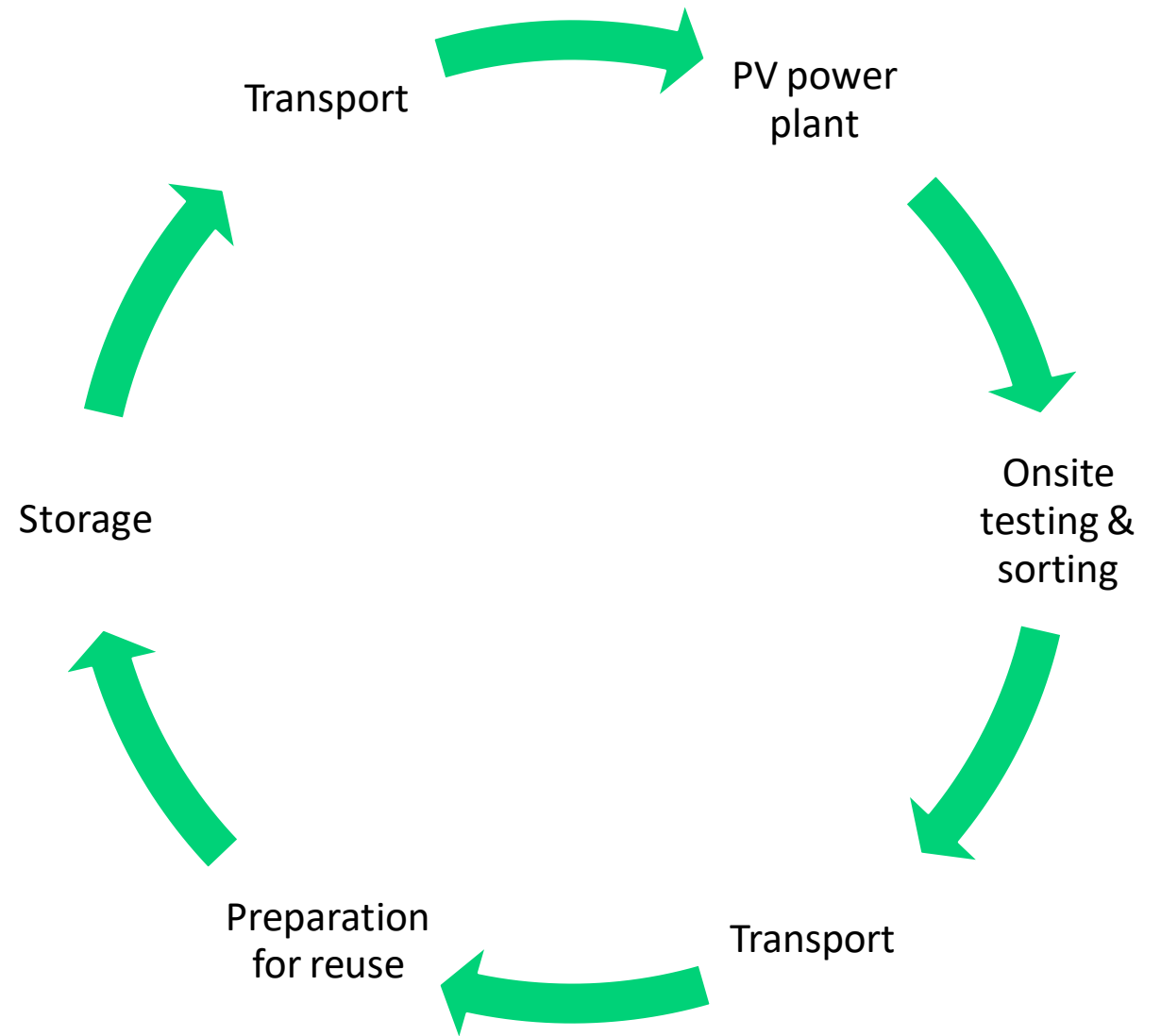
Durability



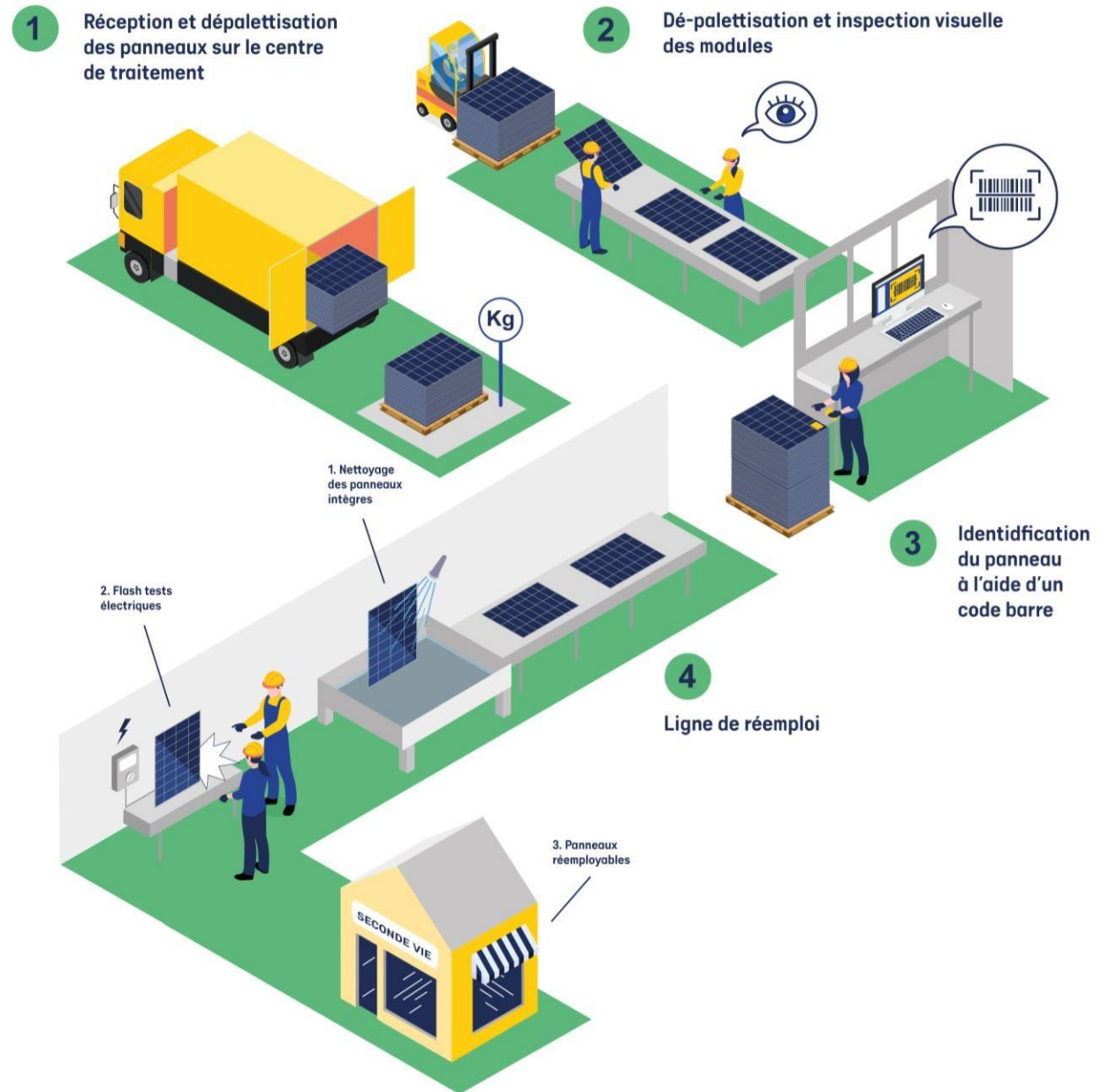
Performance



Organization



Preparation for reuse

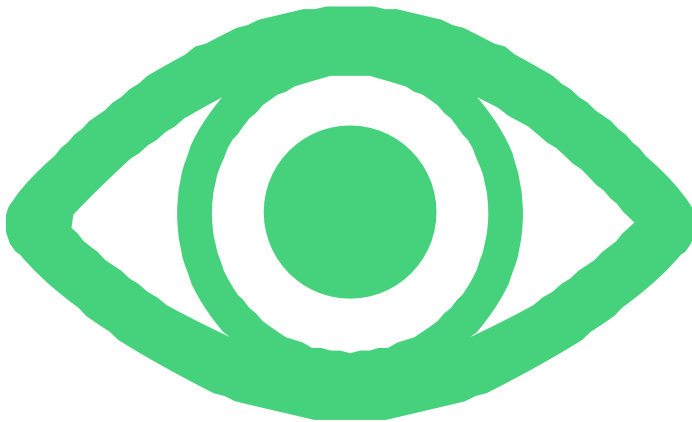




Creation of a label for second life PV in 2024



Visual inspection



Standard: IEC 61215 (minimum illumination 1000 lux)

Quality objective:

- Checklist with minor or major fault classification for each category.
- Visual analysis may depend on the operator responsible for the inspection.

Prerequisites:

- Prior training for all operators
- List of classic defects that are either critical or acceptable (common defect catalog)



Electroluminescence test



No standard (based on IEC 60904-1-13), visual analysis may depend on the operator.

Prerequisite :

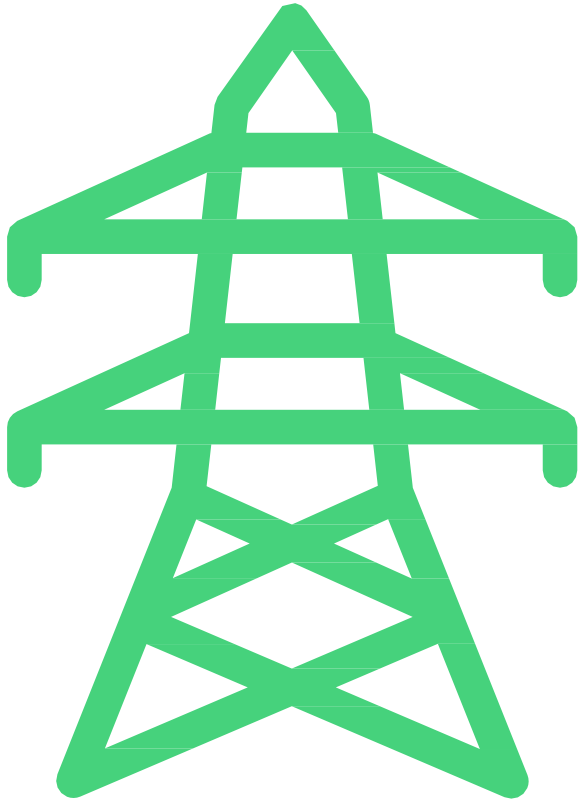
- Operator training.
- Common defect catalog.

Quality objective :

- Per cell: absence of macro cross cracks and absence of dark areas in EL (Electroluminescence).
- Per module: limited number of affected cells.
- Cross-reference with I/V measurement (including FF - Fill Factor).



Power measurement I/V



Standard: IEC 61215 & IEC 60904

Methodology:

- Class A flash testing
- Power sorting within +/- 5%.
- Calibration using a reference module.
- Batch measurement.

Quality objective:

- Less than 2% power loss per year compared to nominal value or less than 20% power loss.
- Fill Factor (FF) \geq 65%.



Isolation test



Standard: IEC 61215. *Test to be performed last.*

Methodology:

Module surface submerged in a tank, except for cable entries or MC4 connections at junction boxes. Voltage applied to the output connectors - which are short-circuited - and increased to the module's maximum voltage (or 500V), applied for a duration of 2 minutes.

Quality objective:

Insulation resistance greater than $40 \text{ M}\Omega \cdot \text{m}^2$ (for modules with a surface area $> 0.1 \text{ m}^2$).

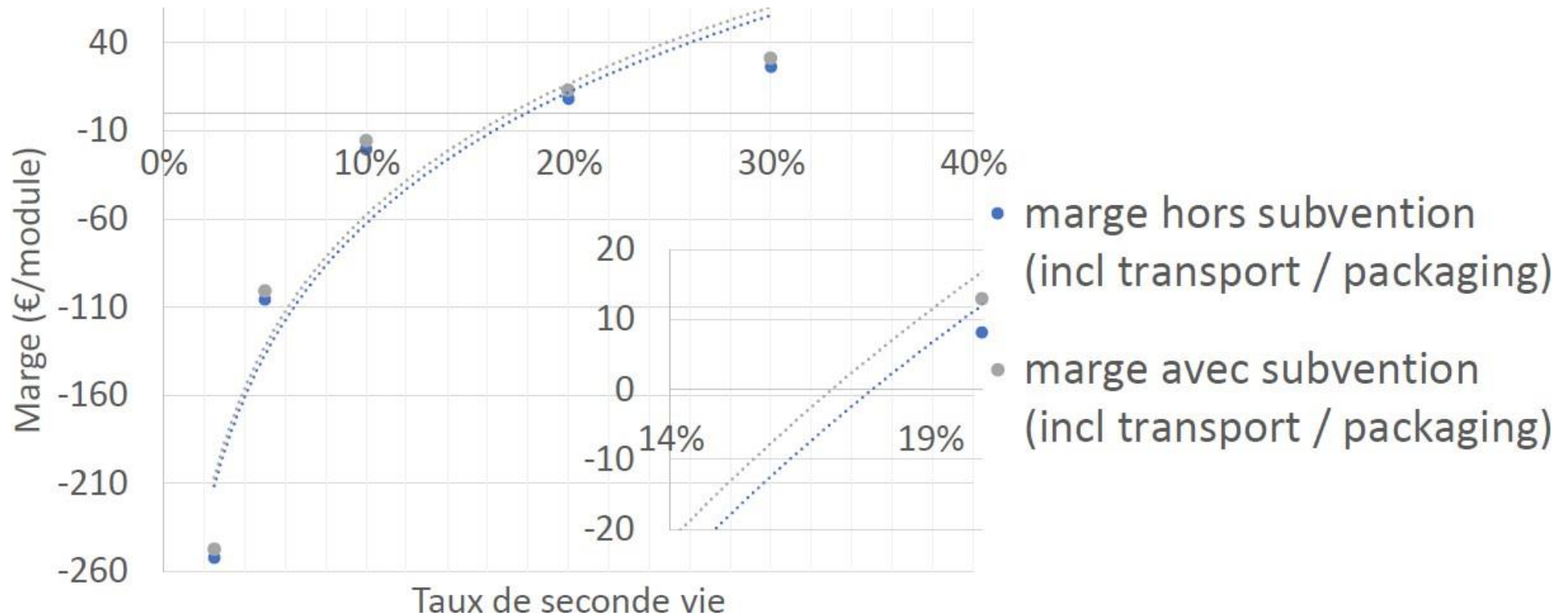


Scoring system & module classes

	Human impact	Economic impact	Environmental impact	Acceptable class
Residential	+++	++	+	A
Schools	+++	++	+	A
ICPE installations	+	++	+++	A
Carports	++	+	+	B
Ground mounted	+	+	++	C
Floating	+	+	+	C



Economic viability if >20% pass





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Kahya Engler

Technical Lead M&A - Strategy,
Sunrock

7 December, Brussels, Belgium



SUNROCK

From End of Life to Closing the Loop

Kahya Engler
Technical Lead M&A and Strategy

SUNROCK



Is End-of-Life a given?

At Sunrock we believe we are part of a clean energy future

The facts of Sunrock's current ownership

+1,500,000 PV panels

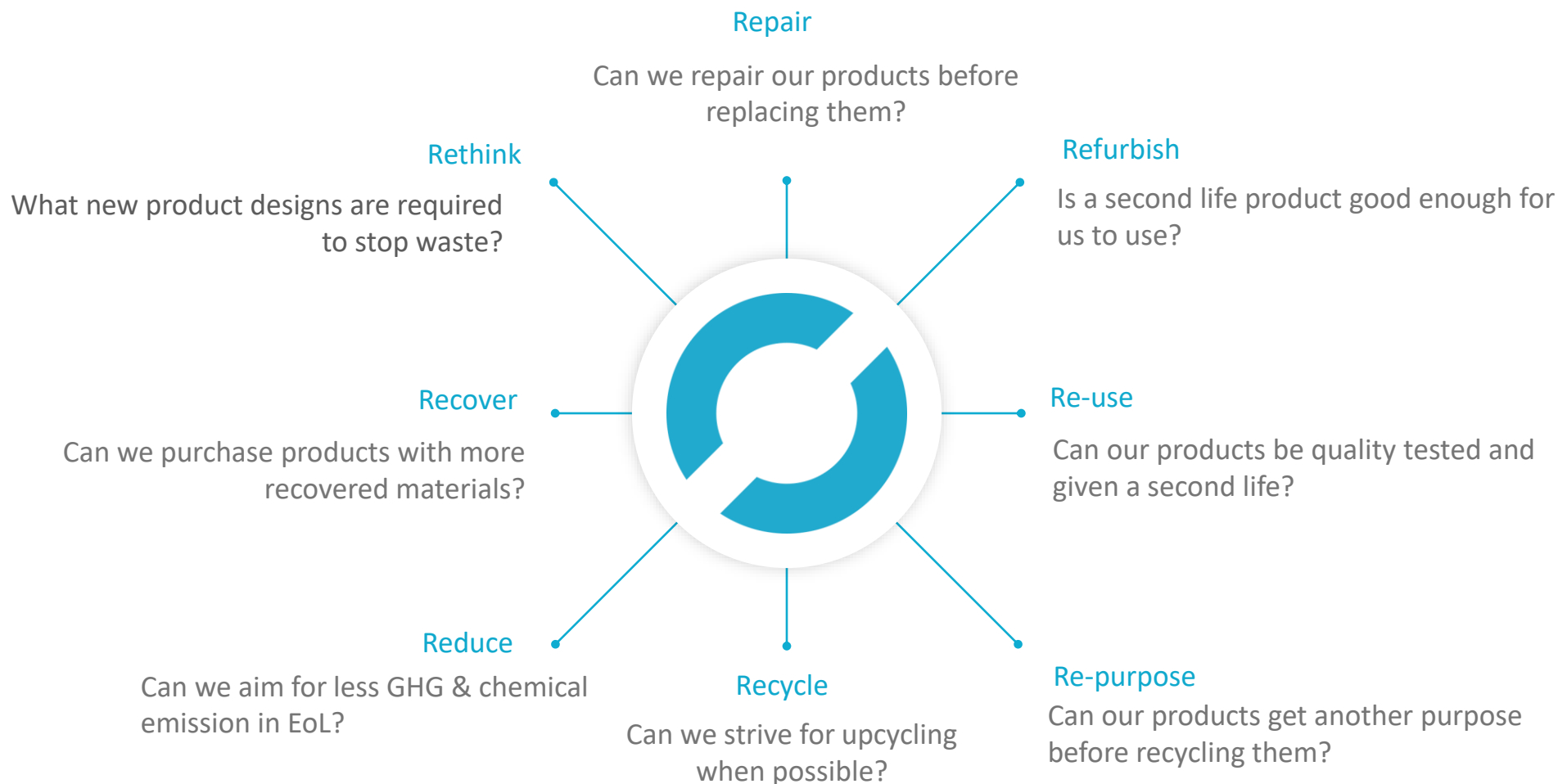
+4000 inverters

+870,000 mounting structure units

Our End-of-Life vision is a path towards circularity

- Bringing **100% back** into the production / use cycle
- Increase kWh output per gram of raw material input
- **30%** EoL materials are reused / upcycled by 2030
- **Zero** EoL materials incinerated / landfilled by 2050







From End-of-Life to Closing-the-Loop

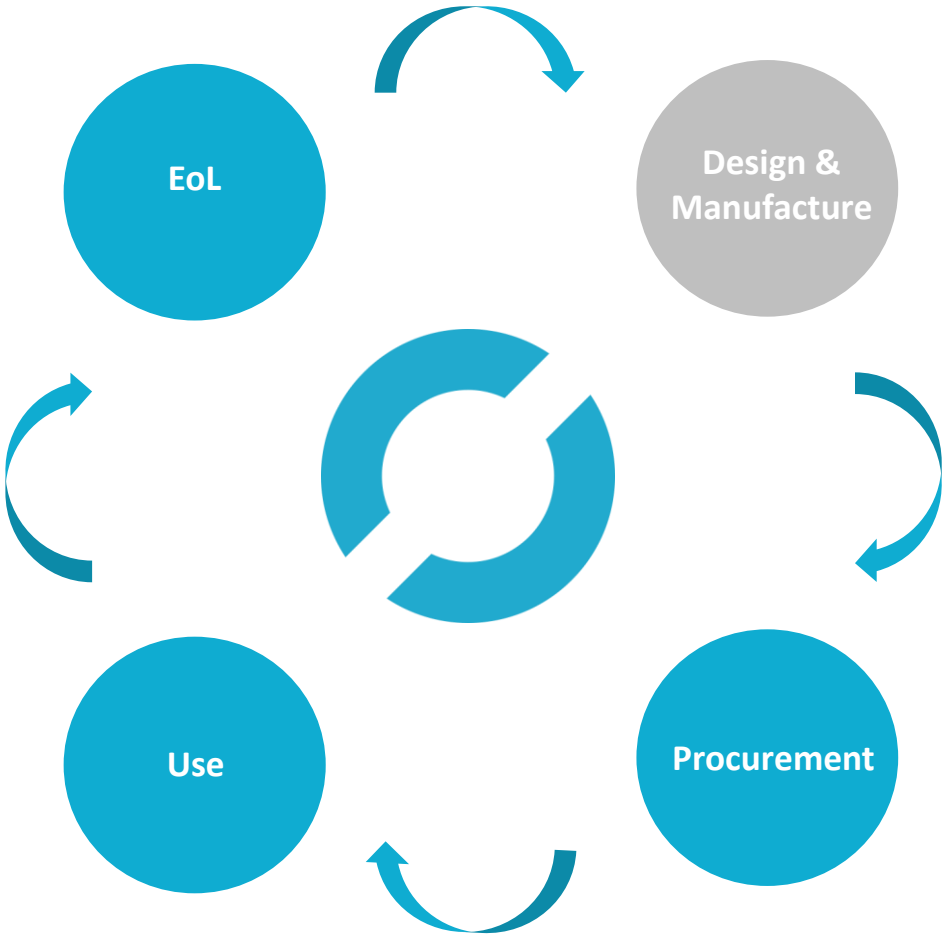
SOLAR RECYCLING IS MANDATORY
ACCORDING TO EU LAW

Take-back and treatment of solar panels, inverters and batteries is mandatory in the EU, leading to high collection, reuse and recycling rates.

85% RECOVERY TARGET

80% PREPARATION FOR REUSE & RECYCLING TARGET

 Solar Best Practices



Moving from vision to action

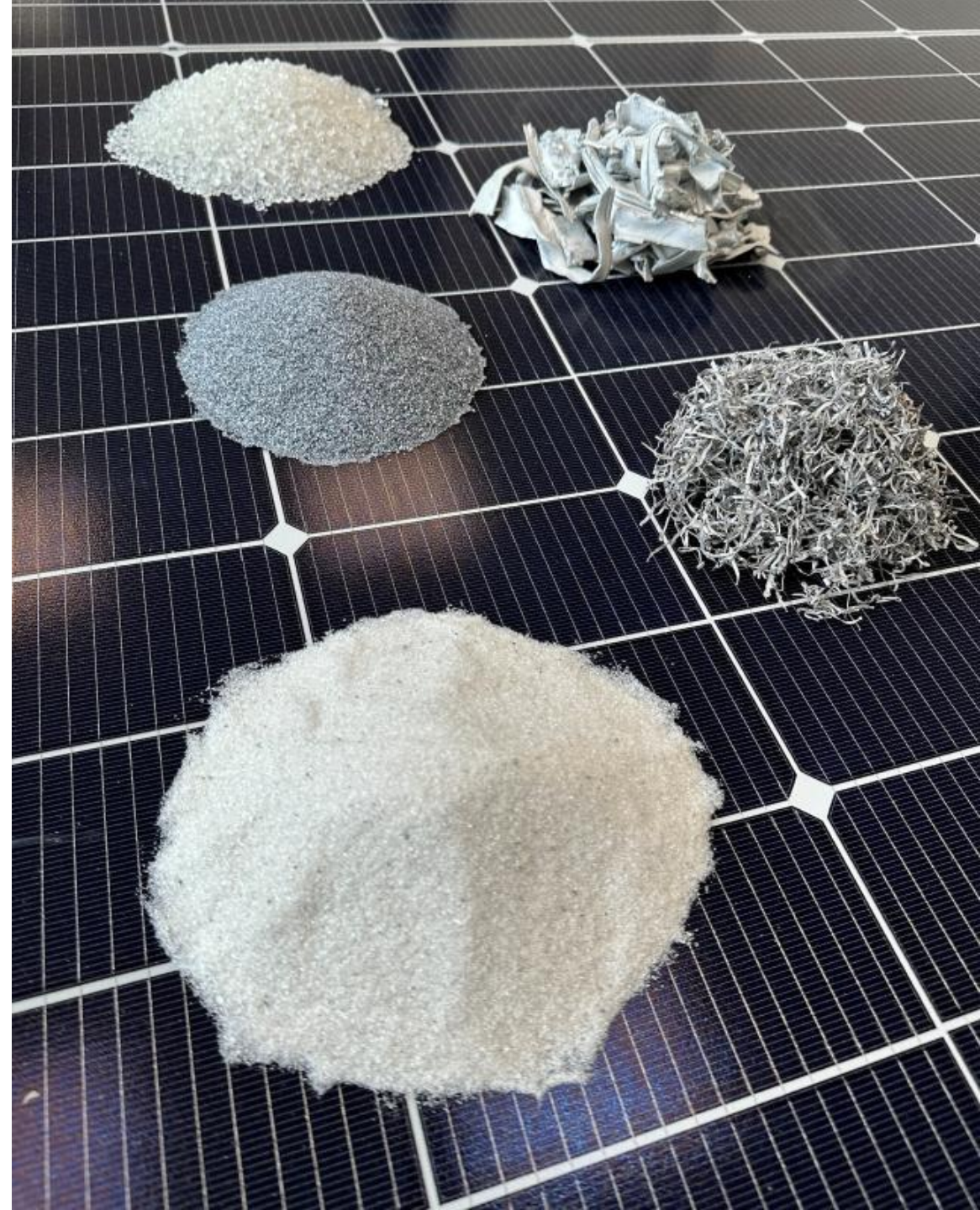
Closing the solar loop

NOW

- ❑ Construction phase - PV breakages – EPC starts recycling process (**WEEE**)
- ❑ Operation / AM phase – using refurbished inverters
- ❑ Contracting with **upcycling and Second Life companies** for damaged or low performance modules

ROADMAP

- Supplier transparency on **raw materials** (Bill of Materials) to understand material impact & recycled content
- **Recycled content** of components in Request for Proposal phase with EPC partners
- Engaging with banks on financing of **cradle-to-cradle** PV modules / inverters / PV plants
- Working with **Solar Power Europe** on the **EoL Best Practice & Eco Design Guide**



SUNROCK Your energy
just got smarter

Thank you



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Closing Ceremony

Thursday, December 7

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A portrait of Dries Acke, a man with brown hair, wearing a dark suit jacket over a light blue shirt. He is looking directly at the camera with a slight smile. The background is white.

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Dries Acke

Policy Director,
SolarPower Europe

7 December, Brussels, Belgium



PHOTO COMPETITION

Solar and nature in harmony

Congratulations Greenvolt Group!



**And the winner
of the Solar
Sustainability
Award is...**