

MINUTES OF THE FIRST STAKEHOLDER MEETING

Project: Development of a recyclability index for photovoltaic products
Date: Meeting date 12.02.2024
To: Participants
Minute taker: Viegand Maagøe

1 Agenda and Participants

This first stakeholder meeting of the project was organized as an online event. The minutes and slides of the meeting are available on the project website <https://www.pv-recyclability-index.eu/>

Agenda points
1. Welcome, Mette Rames (Viegand Maagøe)
2. Background and objectives, Davide Polverini (DG GROW)
3. Questions & answers
4. Study workplan, Felice Alfieri (Viegand Maagøe)
5. Methodology, Nieves Espinosa (University of Murcia), Felice Alfieri (Viegand Maagøe), Jaione Bengoechea (CENER)
6. Questions & answers
7. Next steps, Mette Rames (Viegand Maagøe)
8. AOB, closure

In total, 125 participants from about 90 organisations attended the meeting, covering different categories of stakeholders including PV modules and inverters manufacturers, importers, recyclers, producer responsibility organisations, manufacturers of recycling technologies, Member States, testing organisations, research institutes and NGOs, among others. The list of participating organisations is enclosed in Annex A.

2 Minutes

2.1 Welcome

Mette Rames opened the meeting and welcomed the attendees. She then presented the agenda and the meeting guidelines.

2.2 Background

The background and objectives of the project were presented by Davide Polverini (DG GROW). He introduced the policy framework, the related product policies such as Ecodesign Directive and Energy Labelling Regulation and the relevant measures for PV products (modules and inverters) which are being analysed at present. The draft regulatory acts are under revision and are not available to the public yet. They include circularity aspects and therefore the recyclability index developed in this project could potentially interact with these regulatory acts.

DG GROW pointed to different ways in which the findings of this study could be integrated with the EU legislation. The most likely short-term option for application of the recyclability index could be as an information requirement in the context of the Ecodesign measures on PV products under preparation, with

the full development of the recyclability index in the framework of a standard. Once the Ecodesign regulation is published, EC may request the European standardisation bodies (CEN, CENELEC and ETSI) to develop the method for the definition of the recyclability index as a standard (by a standardisation mandate) and bringing the outcome of this study as a starting/reference method for the development of this standard.

DG GROW also clarified that, in the short-term, it will not be feasible to include the developed recyclability index in the Energy Label. This would require that the method were fully developed before the approval of the Energy Label legal act. Considering that the Energy Labelling measure is expected to be published this year (2024), while the recyclability index, as defined in this project timeline will only be ready by mid-2025 (end of the project), the methodological work from this study is not expected to be ready on time for it to be implemented in the Energy Label.

Another option mentioned by DG GROW (in the mid-term timeline) is to use the output of this study for the inclusion of the recyclability index in the Ecodesign and Energy Label for PV products once they will be reviewed which may be 4-5 years after their implementation.

Polverini also pointed to the similarities to the study performed by the JRC on the reparability of mobile phones and tablets, both in implementation and methodology.

2.3 Q&A session 1

Question: LDB from ECOS (Environmental Coalition on Standards). Will the information about the recyclability be displayed on a label or just become an information requirement within the Ecodesign measures not visible to consumers?

Answer: DP from DG GROW clarified that, due to the mismatch in the development of both the Ecodesign and Energy label measures on one hand, and the recyclability index on the other hand, this information is expected to be included only as information requirement in the Ecodesign. In the case of mobiles phones and tablets, they were developed in parallel and the reparability index entered into the energy label.

Question: VH from EXASUN. Will the expected lifetime be reflected in the index? Maybe with regard to aspects like the energy payback ratio.

Answer: DP clarified that lifetime won't be included as we will be analysing the capability of the PV products for being dismantled and recycled. This topic will be clarified later on in the presentation. Another CINEA project just started, which focuses on the development of a methodology to define the long-term degradation of the PV modules performance. The lifetime aspect will be considered in this other project.

Question: BS from SPF Santé Publique. How are future recycling methods being considered? Could the information about recyclability be included in the product passport?

Answer: DP clarified that the Ecodesign measures for PV products under preparation are based on the existing Ecodesign Directive (2009/125/CE) and the use of the Digital Product Passport (DPP) is premature for this work. The new framework called Ecodesign for Sustainable Products Regulation (ESPR) will introduce a digital product passport, considering the whole products' life cycle. DPP could be considered at the time of the review, when we could have available all the potential approaches of ESPR. Regarding future recycling technologies, we will have to make some assumptions about which recycling technologies will be available.

Question: TS from EXXERGY. Which standard will be created? Conformity assessment standard would be better. Environmental impact index could be considered.

Answer: once the ecodesign regulation is published, the EC could launch the standardisation request to the three EU standardisation bodies. Which conformity assessment procedure should be considered depends on the regulation and not on the standards. Regulation may ask for self-declaration or 3rd party

check. Conformity checks should be based on properties that can be checked on the moment of placing the product on the market. On the environmental impact index, for example,

Question: *AU from UPNA: considering how different they are, are there going to be two separate index for modules and inverters?*

Answer: There will be two separate indexes, based on a common conceptual idea.

Question: *TS from LightingEurope. Will this study serve for other product groups in the future?*

Answer: DG GROW is not aware of other projects developing recyclability indexes for other products. But this study and the experience may serve as example.

Question: *AD from AGC Glass Europe: how will the final output of the study be shown? Will the details of the computation be shared?*

Answer: it will depend on the method. For smartphones, the reparability index (class) is shown in the energy label while the product information sheet contains also the scores for each of the scoring parameters.

2.4 Study Work Plan

Nieves Espinosa presented the study team, work plan, deliverables, and meetings.

2.4.1 Overall timeline:

- **January 2024, start study**
- **12 Feb 2024 10:00-12:00: Online first stakeholder meeting**
 - Presentation of aim and methodology of the study
 - Preliminary considerations on the methodology
 - Input from stakeholders
- **Autumn 2024: Second stakeholder consultation meeting**
 - Presentation and consultation on the draft recyclability scoring methodology
 - Input from stakeholders
- **Spring 2025: Third stakeholder consultation meeting**
 - Presentation and consultation of the results of validation and calibration stage
 - Input from stakeholders
- **June 2025: Publication of final report of the study**

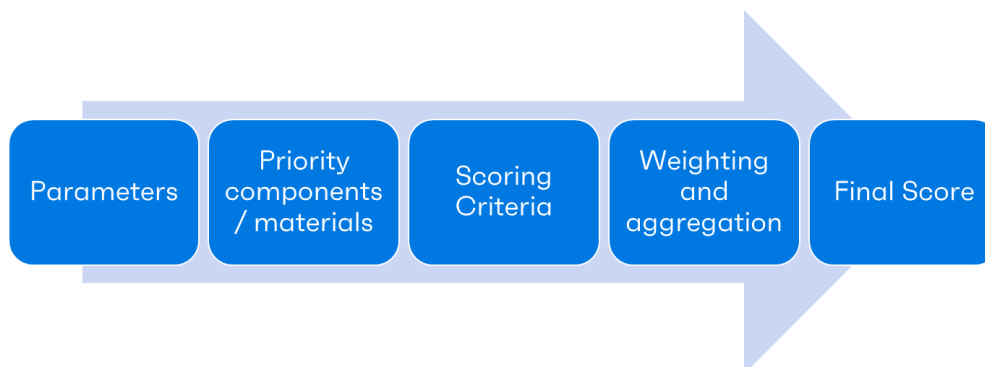
2.4.2 Deliverables:

1. **Interim Report** presenting potential criteria for the scoring system of the products under scope (Draft version available in July 2024)
2. **Final Report** presenting the revised methodology for scoring system and the results of the testing campaign and calibration / validation results (Available in June 2025)

2.5 Methodology

The study approach and methodology were presented by Felice Alfieri (Viegand Maagøe), Nieves Espinosa (University of Murcia) and Jaione Bengoechea (CENER). The main phases of the study are:

- Phase 1: Literature Review and stakeholders consultation;
- Phase 2: Development of the scoring method, including the steps described in the chart below;



- Phase 3: Testing
- Phase 4: Calibration and validation

2.6 Q&A session 2

The second Q&A session was initiated by Mette Rames (Viegand Maagøe). Stakeholders were reminded about the possibility of providing written feedback and inputs to the study team after the meeting, by downloading and filling in the file “Stakeholder comments 1st stakeholder meeting”, found in the Documents section of the study website: <https://www.pv-recyclability-index.eu/documents/>

***Question:** RR from SolarPowerEurope: how are the classes going to be defined? Consider hypothetical products not available right now in the market as it was done for the energy label? Or will the classes be based on existing products?*

Answer: the study team clarified that the scoring criteria should consider the products currently placed on the EU market. The selection of products for the testing part of this study is therefore important. From that selection, the evaluation of how products are distributed in the classes we propose will be assessed, with the intention of the best classes remaining empty as it is the case with the energy label. DP (DG GROW) clarified that this is the very last step of the study, in which the team will present how the different products are positioned with regard to the index, how they are scattered on the basis of the metric. The hypothesis formulated on classes are for the case of a label, but the first approach for the use of this index is just an ecodesign information requirement.

Moreover, the study team clarified that the intention is to test not only modules with large market shares, but include other modules, possibly with a low market share (outliers), but which have a better design with regard to recyclability in order to cover a wide span in terms of scoring.

***Question:** AC from ROSI: In order to make sure the criteria are aligned with the recycling industrial processes, is the study team going to visit or interview PV recyclers?*

Answer: The study team replied that on-site visits are not planned, but they could be considered. Moreover the study team stressed that the intention of the scoring system is not evaluating recycling techniques but the products’ capacity or ability to be dismantled. In this context, the study team considers of high importance to have feedback from different recyclers and different recycling methods.

***Question:** TR from SoliTek: There are some materials, especially in the encapsulation that could be problematic in terms of hazardous elements. How can it be ensured the manufacturers will provide all the correct information regarding material content? Is a methodology going to be implemented to check the manufacturers’ declared values in order to ensure that they are true? Our suggestion is to have third party approval or there are EU projects that are making characterisation and possible checks can be made based on it.*

Answer: in the context of the Ecodesign Directive information requirements can cover several aspects including material composition as for example fluorinated compounds in the backsheet. One of the area of parameters considered in the recyclability index is “material-based parameters”: it is supposed to cover the availability and transparency of the provided information by manufacturers.

Question: *AW from BAM: is the standard which is supposed to be developed under the umbrella of the EN 45555? Is the methodology going to be based on mass-approach?*

Answer: DP (DG GROW) ensured that the EN45555 will be for sure taken into consideration. Nevertheless the inclusion under the EN45555 depends on how it will be developed, since what we will develop may be aligned with the horizontal standard depending on how it is defined. The horizontal standard on recyclability seems to be more generic than the one on reparability (EN45553).

The study team clarified that it is too early to say if we will consider the mass-based approach or other approaches. The first idea is to develop an A to G system, not a scoring system from 0 to 100 on percentage of recycling, for example. Our approach is not intended to have a number on how much will be recycled. We aim at a qualitative assessment on the easiness for recycling.

Question: *BS from SPF commented on products with long lifetime and on the link with the digital product passport. In the long term may be better to have the information digitalised in a QR code, containing score and other information (composition, product digital passport). B class now could become D class in 30 years. It should be possible to have static information to be used in a dynamic way, with not a single score presented but having access to a more detailed information (e.g. on composition). He also mentioned that two approaches are possible: impact-based or mass-based and he suggested that the latter is better to start with. He also claimed that having a score expressed as number or percentage would be better, more useful than having an A to G classification.*

Answer: DP (DG GROW) clarified that the aim of this study is definition of the score and the possible development of a it is out of the scope of this study. Similarly, how to transmit this information over time is not in the scope of this study. However with ecodesign in preparation, we are considering this issue. Once the product is placed in the market, the information remains 30 years in the market. We are considering how to handle this information over 30 years. We are considering options for the long term of information, including availability on website, QR code (to point to a website or to all the information about a product).

Regarding methodology of assessment, the study team is aware of the trade-offs between mass-based (focus on mass which pays more attention on weight but not on environmental relevance of the material) or approach based on importance of the materials for recycling. The study team highlighted the need of inputs from stakeholders on these methodological decisions, including prioritisation.

Question: *JH from ESMC: the legal status, will the output of the study be included in the Ecodesign as information requirement?*

Answer: DP (DG GROW) clarified that the EC will decide how to use the recyclability index method. At this stage, the Commission doesn't see it feasible to have the recyclability index included in the current energy label proposal for PV products, because it would need the method fully defined for that.

Question: *CSR from ROSI: which PV technologies are going to be considered? How are we going to consider the future technologies that will be manufactured in the future?*

Answer: the study team replied that we are starting to define the technologies that will be considered in the study. First, the study team needs to consider technologies available in the market at present preferably models recently placed on the EU market) with an important market share. Secondly, the study needs to consider a wide range of PV technologies to ensure that the recyclability index is well calibrated. Therefore, technologies which currently may not have an important market share may be considered.

Question: *CSR from ROSI: is there a channel to contact the study team?*

Answer: there is an email address available for the study team info@pv-recyclability-index.eu. You can also contact the study team members directly – contact info is found on <https://www.pv-recyclability-index.eu/contact/>.

For technical inputs, a word file will be available for stakeholders to download with various questions for the different topics. They could reply these questions and send the file back to the study team by email.

Question: AS from AGC Glass Europe: the mass-based approach may not be the best one. Thinner glass tends to break more, but should not be penalized in the recyclability index. The IEC 61730 standard tests are not really appropriate according to the European methods/approach. Calculation would be better than testing. To whom will be directed the standardisation request?

Answer: The study team agrees with and recognised the example of the glass. The EC sends the standardisation request to the 3 organizations. We cannot decide which one, that is the EC's decision based on the content of the request.

2.7 Next steps

Mette Rames presented the next steps in the study, mentioning e.g. the following deadlines and dates:

- Written comments and inputs after the meeting are welcomed, deadline 11th March 2024, send comments to info@pv-recyclability-index.eu
- Slides and minutes will be uploaded to: <https://www.pv-recyclability-index.eu/documents/>
- Autumn 2024: Second stakeholder consultation meeting
 - Presentation and consultation on draft Methodology
 - Input from stakeholders

Please register not only for the meeting but also for receiving news / updates at <https://www.pv-recyclability-index.eu/register/>

You will find slides and brief notes of this meeting at the project website. <https://www.pv-recyclability-index.eu/documents/>

2.8 AOB

As there were no further comments from the audience, the meeting was closed at 11:40.

Annex A: List of attendee organisations

3sun	Holosolis
ABAE	Infineon Technoogies AG
ADEME	INNOENERGY
AGC	Leitat
Akuo	LG ELECTRONICS
APPLiA	LightingEurope
Austrian Energy Agency (AEA)	Maxeon Solar
BayWa r.e.	Ministry for environment, climate and energy
Becquerel Institute / ESMC	Ministry for the Ecological Transition
Bee Solar S.r.l.	Ministry of Energy of the Republic of Lithuania
bifa Umweltinstitut GmbH	Norwegian Water Resources and Energy Directorate
Bundesanstalt für Materialforschung und -prüfung (BAMM)	NSG
CARBON	Oxford PV
CEA	PHOTORAMA EU consortium
CENER	PV CYCLE
Centro europeo de reciclaje fotovoltaico	REC Solar EMEA GmbH
CLASP	ROSI
Copeland Europe GmbH	Schuman Associates
DualSun	SMA AG
E&E Solutions Inc.	Solarge International B.V
EC - Joint Research Centre	SolarPower Europe
ECOS	Swedish Energy Agency
EHPA	TECNALIA
Elergone Energia SA	Tenerrdis
enel	Test
Enel Group	TEXXECURE Rating Foundation gGmbH
Energimyndigheten	TÜV NORD China
ENGIE	TÜV Rheinland
Enphase Energy	Universidad Politécnica de Madrid
E-REDES	Universidad Pública de Navarra (UPNA)
Estonian Consumer Protection and Technical Regulatory Authority	Vegro
Eurac Research	Vestas
EuRIC	Vitesco Technologies
Euroalliages	VITRONIC
Eurochambres - The Association of European Chambers of Commerce and Industry	Volkswagen AG
European Commission	Waacker
European Copper Institute	
European Environmental Bureau	
European Heat Pump Association	
European Solar Manufacturing Council	
Exasun	
Exxergy GmbH	
Federal Environmental Agency	
FEICA	
FHNW	
First Solar GmbH	
Fraunhofer Institute for Solar Energy Systems ISE	
French Ministry of Energy	
Fronius International GmbH	
FZ Jülich	
Gamesa Electric	
H.B.Fuller Deutschland GmbH	
Heliatek	
Helmholtz-Zentrum Berlin für Materialien und Energie	