

PRESS RELEASE

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Unlocking the Circular Economy for Plastics: New EU Toolkit for Sustainable Electronics

The European research project INCREASE is setting a new milestone on the path to a truly circular economy: A consortium of universities, research institutions, and industry partners has created a comprehensive playbook and new assessment tool, designed to facilitate the development of recyclable electronic devices and the use of recycled plastics in electronic products.

»Developing Recyclable Electronic Devices: A playbook for design for & from recycling«, authored by Theresa Aigner (Fraunhofer IZM) and Thijs Feenstra (PEZY Group), is set to reveal the reality of circular product development and recommend concrete ideas to get design, material development, and recycling to work better together. The authors take the ‚playbook‘ approach seriously: They compiled practical recommendations across the value chain that show why recyclability is not a matter of a product’s end of life, but of the very first design idea.

A Playbook for Circular Electronics

The book brings together the results of four years of research collaboration across different sectors of industry, and extensive testing to show why visions of circular electronics tended to fail: The reason is not a lack of ambition, but the difficulty in getting all actors fully aligned. In five real-world case studies, stakeholders from the field contribute useful ideas, practical suggestions, and recommendations for the work of designers, engineers, and product developers, covering the entire value chain from product design to recycling. The idea is to incorporate these insights right into the creation of new circular devices without forcing all product developers to become recycling experts themselves. The ebook was published by the Horizon Europe funded INCREASE project. It is publicly available for download here:

<https://increase-project.eu/increase-results/increase-book/>.¹

¹ The book is meant to be used alongside the predecessor PolyCE project’s manual, already published in 2021 as “Design For Recycling. Design From Recycling.” The recommendations for effective plastics recycling were presented to Frans Timmermans, then the EU’s climate commissioner responsible for the green deal and vice president of the EU Commission.

https://www.izm.fraunhofer.de/en/news_events/tech_news/circular-product-development-the-secrets-to-design-for-and-from-recycling.html

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The book was first presented to an eager public of industry specialists on March 26, 2026 at CIC Berlin. In a full day of workshops, the attendees – most of whom were product developers and designers – were given the opportunity to try out the ideas in the playbook in practice. A visit to Open Funk in the MotionLab showcased what circular design could look like.

Theresa Aigner, sustainability and circular economy expert at Fraunhofer IZM and author of the book, emphasized: “We did not attempt to come up with the one-size-fits-all solution. Because every product carries its own constraints, risks, and opportunities. Circular design is therefore not about optimization towards a single ideal, but about making informed, transparent design decisions. With this playbook we hope to motivate and help product developers and designers to get started and build on the learnings we have gathered over the years!”.

A New Yardstick for Product Developers

Along the book the INCREASE consortium has come up with a hands-on tool for circular product design: the Recyclability Assessment Tool (RAT). The RAT can be used for an independent and standardized evaluation of how well an electronics product can be recycled. Developed by Philips and PEZY and tested and improved by industry partners, it helps design and development teams see the critical issues that could decrease their products’ recyclability, such as problematic materials, connections, or surface treatments, early in the development process to find possible alternatives.

To understand the usability in depth on April 9, 2026, Michel Henning (PEZY) and Sharina Ligtelijn (Philips) host a webinar showing how the RAT is used in practice. Product designer and developers wanting to account for recyclability early on in the design process can register [here](#).

Helping the EU Plastics Strategy

The book and the RAT tool together form a new basis for more circular electronic product development in Europe. They and the other contributions and publications of the INCREASE consortium again show how the EU’s plastics strategy benefits when recycling becomes part of the conversation already during a product’s initial design phase and when meaningful manuals and guidelines for product development are widely available.

In December 2025, Jessika Roswall, EU Commissioner for Environment, Water Resilience, and a Competitive Circular Economy emphasized the urgent need for measures by the EU and its member states to promote innovation and support the use of recycled materials when introducing the latest action plan for promoting a more circular economy for plastic products. According to Roswall, the ambitions of the Competitiveness Compass, the Clean Industrial Deal, and the RESourceEU action plan can only be realized with stronger and better coordinated actions. This is where the INCREASE consortium steps in, offering tools that address the issue at the design

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stage. The consortium's playbook and the RAT tool help product developers to make better use of recycled materials and create products that are easier to recycle.²

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On **May 20, 2026** the INCREASE project will celebrate its finalization in Brussels' Hoek 38 venue, an event space and hub for research and development run by FWO (Fonds voor Wetenschappelijk Onderzoek - Vlaanderen). The event will include the official presentation of the »Developing Recyclable Electronic Devices« playbook to an EU representative. The project's results will also be introduced to the public, alongside innovative demonstrators and interactive workshops for the attendees.

This event is intended for recycling industry representatives, product developers, researchers, OEMs, policymakers, and members of the press. Those interested can find more information about the ceremony and how to register for the free informational event [here](#).

Download:

The ebook »Developing Recyclable Electronic Devices« and the »Recyclability Assessment Tool« are available now: <https://increase-project.eu/increase-results/increase-book/>

Text: Steffen Schindler

About INCREASE:

INCREASE aims to promote the production of high-quality secondary plastics from recycled electronics and to facilitate their use in added-value products with innovative and interdisciplinary solutions. By bringing together relevant actors from across the value chain of plastics recycling, holistic solutions can be created in a systemic framework for electrical and electronic devices. With these efforts, INCREASE is contributing to the EU plastics strategy, the first and second circular economy action plans, and the Green Deal with its focus on resource-intensive industries like the electronics and plastics processing sectors.

INCREASE is supported by the Health and Digital Executive Agency HaDEA of the European Commission as part of the Horizon Europe Cluster 4 program. The consortium includes Fraunhofer IZM (as coordinator), Fraunhofer IVV, Vlaamse instelling voor technologisch onderzoek (VITO), Katholieke Universiteit Leuven – KU Leuven, Pezy Group, Plastika Skaza, Vorwerk Elektrowerke GmbH, Neste Oyj, Partners for Innovation, Mirec, Cabka Spain Sociedad Limitada, Universiteit Maastricht, SAP SE, PNO Innovation, Philips Electronics Nederland, Erion Compliance Organization S.c. a r.l., and the ETH Zürich.

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² https://environment.ec.europa.eu/document/download/60277c52-77f0-4860-b6cc-cdaf6665e336_en?filename=COM_2025_805_1_EN_ACT_part1_v3.pdf

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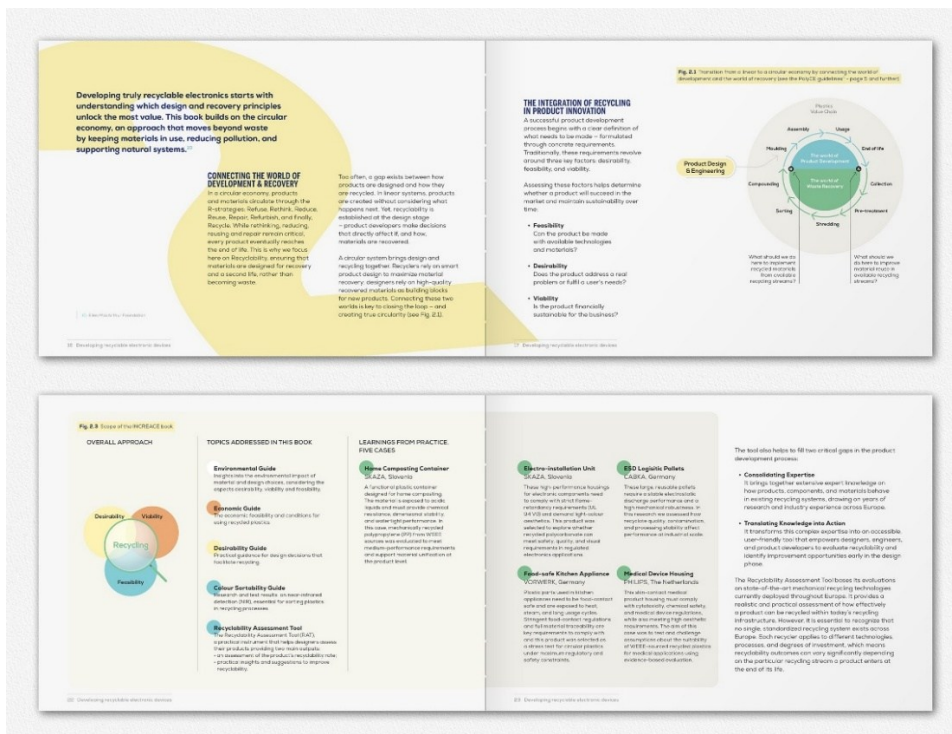
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Authors Thijs Feenstra (PEZY) and Theresa Aigner (Fraunhofer IZM) at the launch event for the Playbook for Circular Electronics in Berlin. © Fraunhofer IZM | Print quality images: www.izm.fraunhofer.de/pics



Playbook “Developing Recyclable Electronic Devices” © INCREASE | Print quality images: www.izm.fraunhofer.de/pics

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Part Properties				Part Connections				Loss Factors				
Bom.Nr	Name	Mass µg/mm³	Material Main Fraction	Plastic Only		Amount	Connection 1 Counterpart	Type	Base material	Additives (in plastic)	Coating (in plastic)	Connections
				↓ Additive	Coating % effect							
1	Cable coupling base	3,615	Plastic	ABS	None	0%	1	5/Clicking	0%	0%	0%	0%
2	Cable coupling cap	3,360	Plastic	PC / ABS	No additives	0%	1		0%	0%	0%	0%
3	Cable coupling foam spacer	2,15	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	1		100%	0%	0%	0%
4	Cable coupling ring	0,11	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	1		100%	0%	0%	0%
5	Exterior cable harness	24,998	Electronic	Cable	No additives	0%	11		70%	0%	0%	0%
6	Wall mounting plate	15,205	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	1		100%	100%	0%	0%
7	Ball joint fill part	2,35	Plastic	PC	Additives (colourant and/or stabilised)	0%	0		0%	0%	0%	0%
8	Metal ball joint	17,4	Metal	NonFerrous	No additives	0%	0		0%	0%	0%	0%
9	Ball joint socket	32,4	Metal	NonFerrous	No additives	0%	0		0%	0%	0%	0%
10	Fixation screw ring	5,605	Plastic	PC	No additives	0%	1	6	0%	0%	0%	0%
11	Rear housing	36,9	Plastic	PC	No additives	0%	5	15	0%	0%	0%	7%
12	Main Housing screws (3x)	0,485	Metal	Ferrous	No additives	0%	0	5	0%	0%	0%	0%
13	Metal interior screws (2x)	0,3	Metal	Ferrous	No additives	0%	0	2	0%	0%	0%	0%
14	Rear shell seal	0,525	Plastic	PC	No additives	0%	1	2	0%	0%	0%	0%
15	Rear metal interior part	19,51	Metal	NonFerrous	No additives	0%	0	2	0%	0%	0%	0%
16	Potting	0,5	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	0	5	0%	0%	0%	0%
17	Cable 6-core multicolor to main PCB	1,46	Electronic	Cable	No additives	0%	0	10	30%	0%	0%	0%
18	Antenna cable (2x)	4,56	Electronic	Cable	No additives	0%	1	15	70%	0%	0%	0%
19	Antenna shell (2x)	6,9	Plastic	ABS	No additives	0%	1	10	0%	0%	0%	0%
20	Antenna cap (2x)	1,7	Plastic	ABS	No additives	0%	0	0	0%	0%	0%	0%
21	Housing interior lid	7,9	Plastic	PC	No additives	0%	1	15	0%	0%	0%	0%
22	Housing interior lid screw	0,3	Metal	Ferrous	No additives	0%	1	15	0%	0%	0%	0%
23	Microphone housing	4,1	Plastic	ABS	No additives	0%	1	24/Adhesive bonding	0%	0%	0%	5%
24	Microphone component	3,5	Electronic	PCBA	No additives	0%	0	0	65%	0%	0%	0%
25	Front housing - alu. painted	97,3	Metal	NonFerrous	No additives	0%	0	0	0%	0%	0%	0%
26	Outer glass window	5,1	NonCombustible	Glass	No additives	0%	0	0	100%	0%	0%	0%
27	Inner glass window + ring	1,9	NonCombustible	Glass	No additives	0%	0	0	100%	0%	0%	0%
28	Window support	2,6	Plastic	PC	No additives	0%	1	20	0%	0%	0%	0%
29	Front shell rubber seal	0,5	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	1	20	100%	0%	0%	0%
30	SD card hatch lid	1,505	Plastic	PC	No additives	0%	1	20	100%	0%	0%	0%
31	SD card hatch lid seal	0,065	Plastic	Any other plastic including foam, rubber, blends, etc.	No additives	0%	1	20	100%	0%	0%	0%
32	SD card hatch lid screws (2x)	0,34	Metal	Ferrous	No additives	0%	0	0	0%	0%	0%	0%
33	Silica gel pack	2,455	Other	Other including organic, hybrid, glass, etc.	No additives	0%	0	0	0%	0%	0%	0%
34	PCBA Lighting	4,005	Electronic	PCBA	No additives	0%	1	20	65%	0%	0%	0%
35	Support for PCBA lighting - alu	1,685	Metal	NonFerrous	No additives	0%	1	20	100%	0%	0%	0%
36	Cable 7-core - PCBA Lighting	1,13	Electronic	Cable	No additives	0%	0	0	70%	0%	0%	0%
37	Screws (2x) - PCBA Lighting	0,2	Metal	Ferrous	No additives	0%	0	0	0%	0%	0%	0%
38	Support screws (2) - PCBA Lighting	0,2	Metal	Ferrous	No additives	0%	0	0	0%	0%	0%	0%

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Output Distribution										
Battery	Metal	Metal (WV)	Target	PCB	Display	Cable	Motor	Custom	Energy Recovery	Landfill
0,4	2,4	174,6	76,0	0,0	0,0	2,5	0,0	0,0	76,3	2,3
0	0	0	3,615	0	0	0	0	0	0	0
0	0	0	1,365	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	2,15	0
0	0	0	0	0	0	0	0	0	0,11	0
0	0	0	0	0	0	22,4955	0	0	22,74545	0
0	0	0	0	0	0	0	0	0	18,205	0
0	0	0	2,355	0	0	0	0	0	0	0
0	0	17,4	0	0	0	0	0	0	0	0
0	0	32,4	0	0	0	0	0	0	0	0
0	0	0	5,605	0	0	0	0	0	0	0
0	0	0	33,81753	0	0	0	0	0	2,482466	0
0	0,485	0	0	0	0	0	0	0	0	0
0	0,3	0	0	0	0	0	0	0	0	0
0	0	0	0,525	0	0	0	0	0	0	0
0	0	19,51	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0,5	0
0	0	0	0	0	0	0,1314	0	0	1,2286	0
0	0	0	0	0	0	0,4304	0	0	4,1406	0
0	0	0	6,8	0	0	0	0	0	0	0
0	0	0	1,7	0	0	0	0	0	0	0
0	0	0	7,9	0	0	0	0	0	0	0
0	0,3	0	0	0	0	0	0	0	0	0
0	0	0	3,895	0	0	0	0	0	3,205	0
0	0	0	0,150063	0	0	0	0	0	3,349938	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	5,1
0	0	0	0	0	0	0	0	0	0	1,9
0	0	0	2,6	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0,5	0
0	0	0	1,595	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0,065	0
0	0,34	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	2,455	0
0	0	0	0	0,174287	0	0	0	0	3,890713	0
0	0	3,685	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0,0999	0	0	1,0101	0
0	0,2	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0,2	0	0	0	0	0	0	0	0	0

Recyclability Report

NOTE: Manual override rates were applied in this assessment. See the FRACTIONS tab


Author(s): Michael Henning
Date: March 26, 2025
WEEK Category: Sample product 1
Original weight: 28560 g
Sum of parts weight: 342 g

Product Recyclability Rate: **75%**

Product Characteristics: 2% Recyclable, 22% Recovery, 75% Landfill

Top 15 Parts Contributing to Non-Recyclability

#	Part name	Nr.	Loss % of total weight
1	Exterior cable harness	5	6,7%
2	Wall mounting plate	6	4,7%
3	PCBA Main	42	3,7%
4	Outer glass window	26	1,5%
5	Antenna cable (2x)	18	1,2%
6	PCBA Lighting	34	1,1%
7	Microphone component	24	1,0%
8	Rear housing	11	0,7%
9	Silica gel pack	33	0,7%
30	Cable coupling foam spacer	3	0,6%
11	Inner glass window + ring	27	0,6%
32	Foams support PCBA Main	41	0,5%
13	Cable 6-core multicolor to m	17	0,4%
14	Cable 7-core - PCBA Lighting	36	0,3%
15	Potting	16	0,1%
-	Other parts combined	1,93	0,6%



Recyclable design planning and assessment tool for design and product development teams.

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