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Fraunhofer Institute for Systems and Innovation Research ISI

Sino-German Expert Workshop on Regulation and Implementation of Standards for Product Energy Efficiency
14 November 2023, hybrid

Status quo of product standards in Germany

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Short biography

Position

Project manager and researcher at Fraunhofer ISI (Germany) in the Energy Efficiency business unit

Work

Energy efficiency (products & enterprises), Circular Economy, Energy Sufficiency

Ecodesign Preparatory Studies, Impact Assessments and Evaluations:

- various products: solid fuel boilers, lifts, batteries, smartphones/tablets...

- as well as the review of the Ecodesign Directive (ESPR)

Focus regions: EU and Africa

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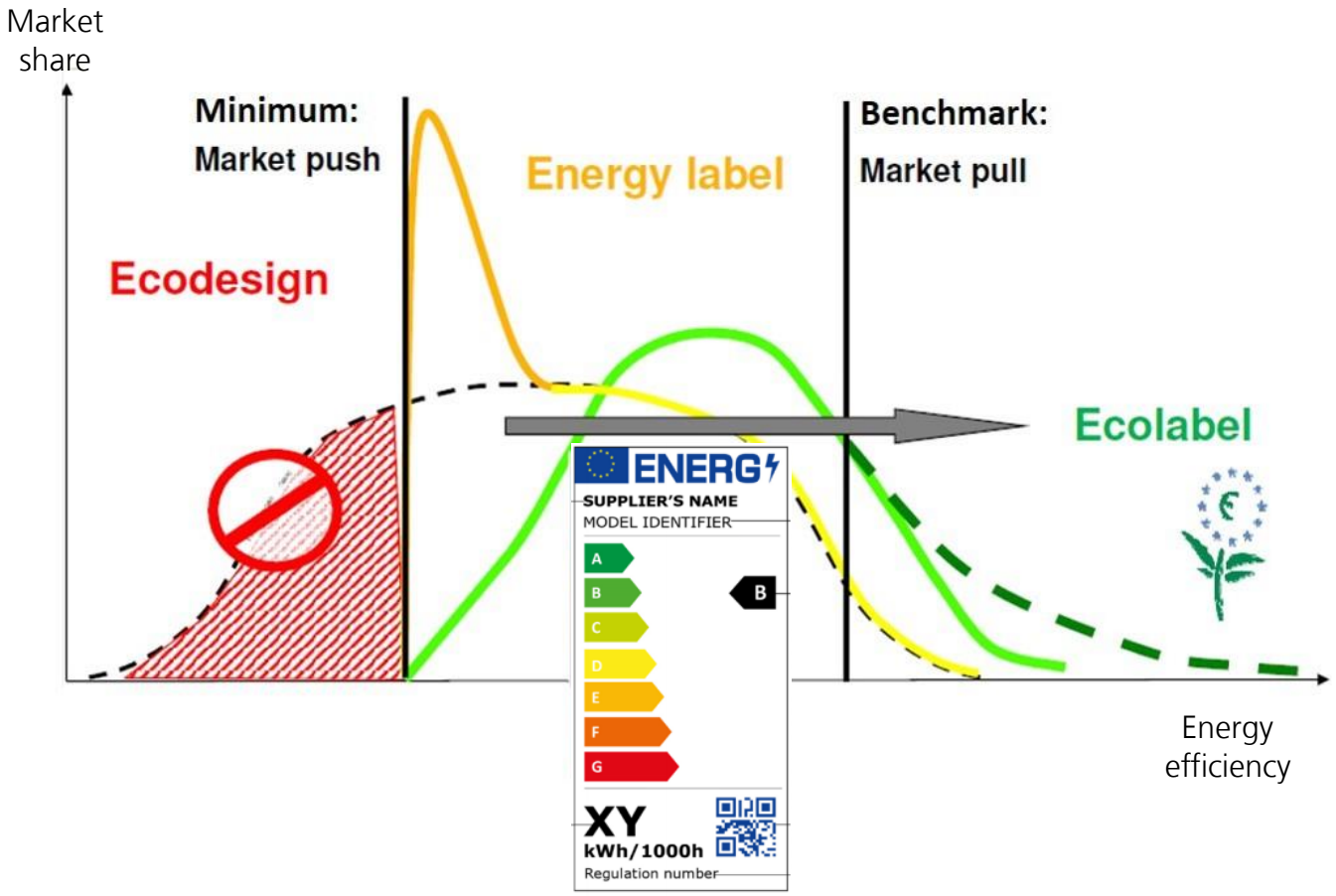
Ecodesign and energy labelling

Framework



https://www.agoria.be/en/Help-I-cannot-see-the-wood-in-the-Ecodesign-regulation

Ecodesign Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products

➔ set minimum product performance and quality

Energy Labelling Regulation (EU) 2017/1369

setting a framework for energy labelling

➔ inform consumers, stimulate demand for efficiency

➔ **For both: product-specific regulations are elaborated by the European Commission**

One of the pillar of the European Energy Efficiency policies:

- Energy savings of 230 Mtoe by 2030
- For consumers: up to €285 saved per year on their household energy bills

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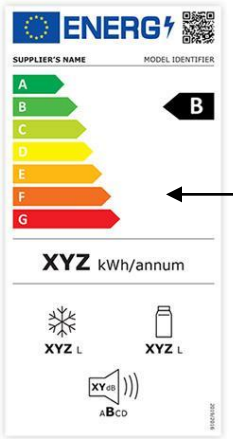
Ecodesign and energy labelling

Hierarchy of technical needs



MEPS

Performance thresholds

Efficiency Metrics

Product categories

Test methodology

Based on Waide Strategic Efficiency Europe

Ecodesign and energy labelling regulations refer to test standards but are in separated documents

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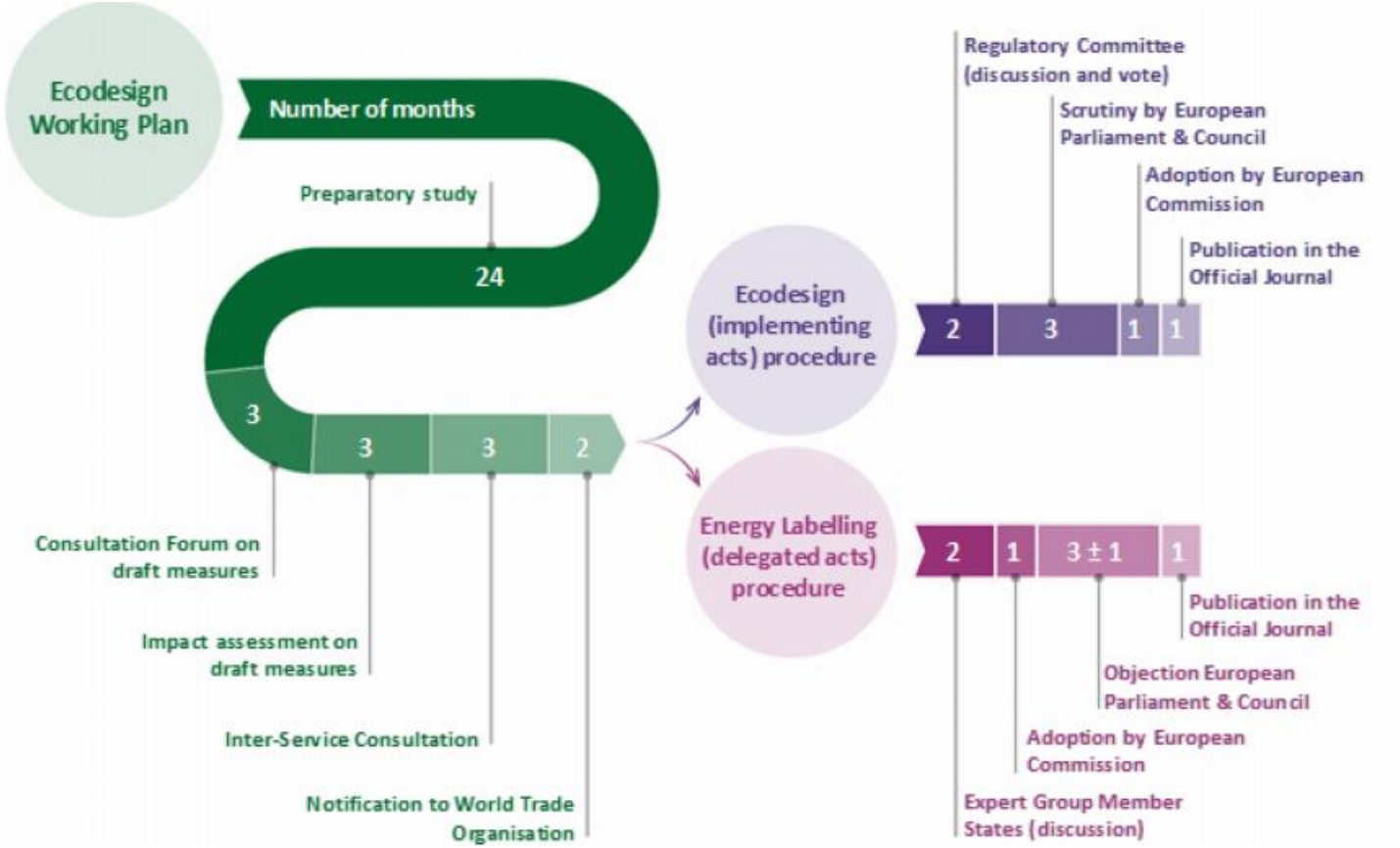
Ecodesign and energy labelling

The process to design and adopt ecodesign and labelling requirements in Europe

Theoretical regulatory process for adopting implementing measures



Source: based on ECA, https://www.eca.europa.eu/Lists/ECADocuments/SR20_01/SR_Ecodesign_and_energy_labels_EN.pdf

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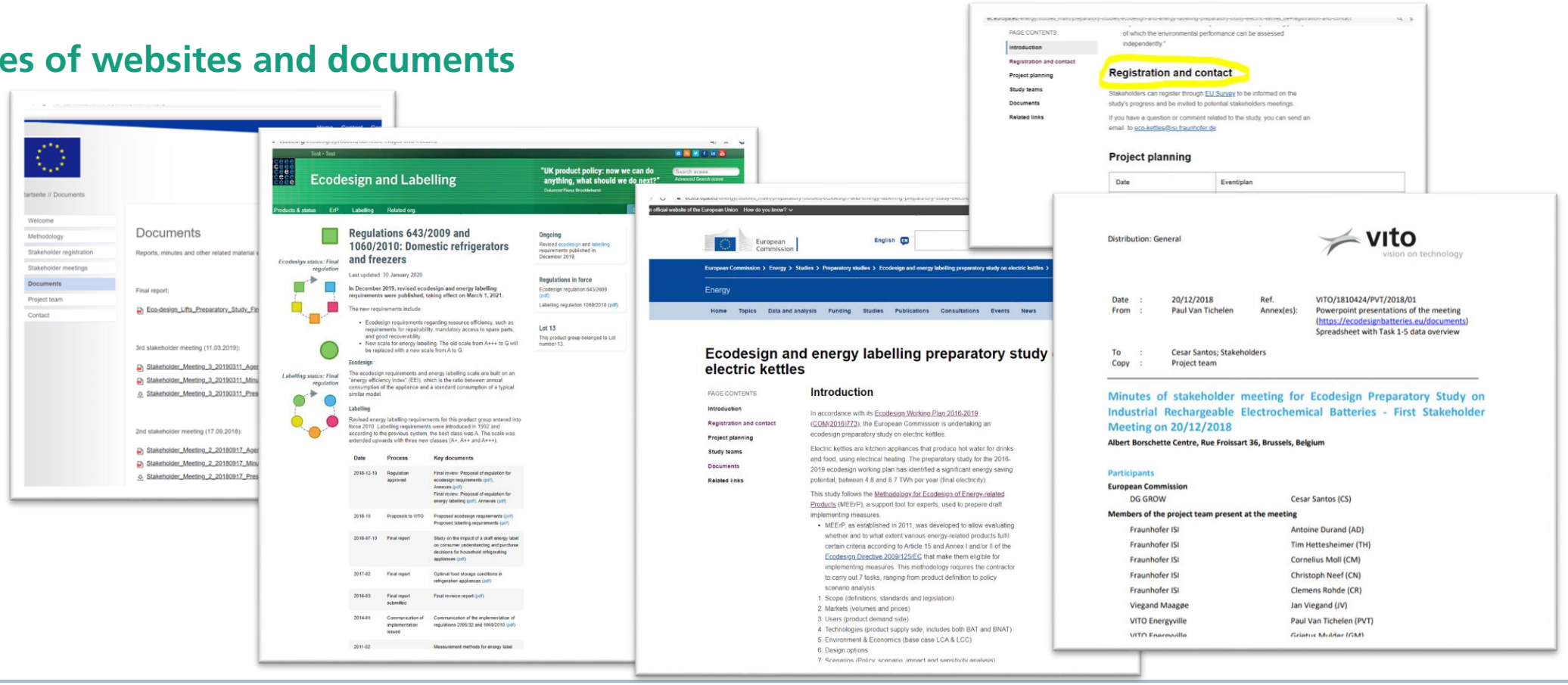
Ecodesign and energy labelling

Transparency, role and involvement of the stakeholders

Stakeholders: Member States, Manufacturers (individual & associations), NGOs, scientists

Examples of websites and documents



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Ecodesign and energy labelling

More than **40 ecodesign and energy labelling regulations** have been adopted since 2005

White goods

- Refrigerating appliances with a direct sales function
- Household refrigerating appliances
- Household dishwashers
- Professional refrigerated storage cabinets
- Domestic ovens and range hoods
- Household washing machines and washer-dryers
- Household tumble driers

Lighting

- Fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps
- Non-directional household lamps
- Directional lamps, light emitting diode lamps and related equipment
- Light sources and separate control gears

Other

- Standby and off mode electric power consumption of electrical and electronic household and office equipment
- Electric motors
- Welding equipment
- Circulators (glandless standalone circulators and glandless circulators integrated in products)
- Small, medium and large power transformers
- Water pumps
- Vacuum cleaners

ICT

- Electronic displays and televisions
- Simple set-top boxes
- Computers and computer servers
- External power supplies (no-load condition electric power consumption and average active efficiency of external power supplies)

Heaters/coolers

- Air conditioners
- Fans driven by motors with an electric input power between 125 W and 500 kW
- Ventilation units
- Air heating products, cooling products, high temperature process chillers and fan coil units
- Local space heaters
- Space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device
- Water heaters, hot water storage tanks and packages of water heater and solar device
- Solid fuel local space heaters
- Solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices

(product groups covered in 2022)

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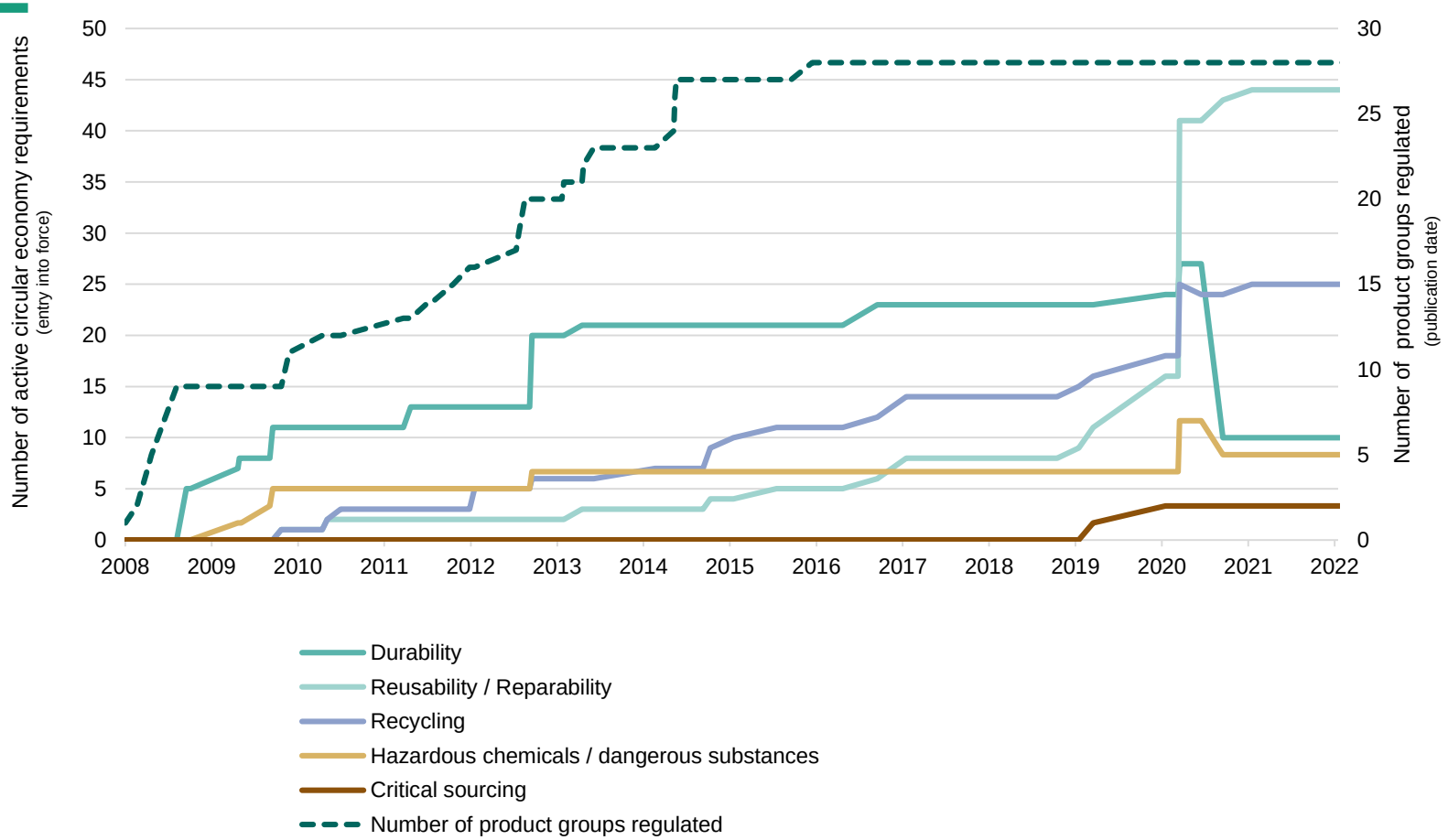
Ecodesign and energy labelling

Trend to Circular Economy requirements



- Strong focus on durability (reduce) in the early ecodesign regulations
- Steady increase of recycling requirements (but mainly informational)
- Sharp increase in 2019, especially for repairability

Barkhausen, R.; Durand, A.; Fick, K. Review and Analysis of Ecodesign Directive Implementing Measures: Product Regulations Shifting from Energy Efficiency towards a Circular Economy. Sustainability 2022, 14, 10318. https://doi.org/10.3390/su141610318

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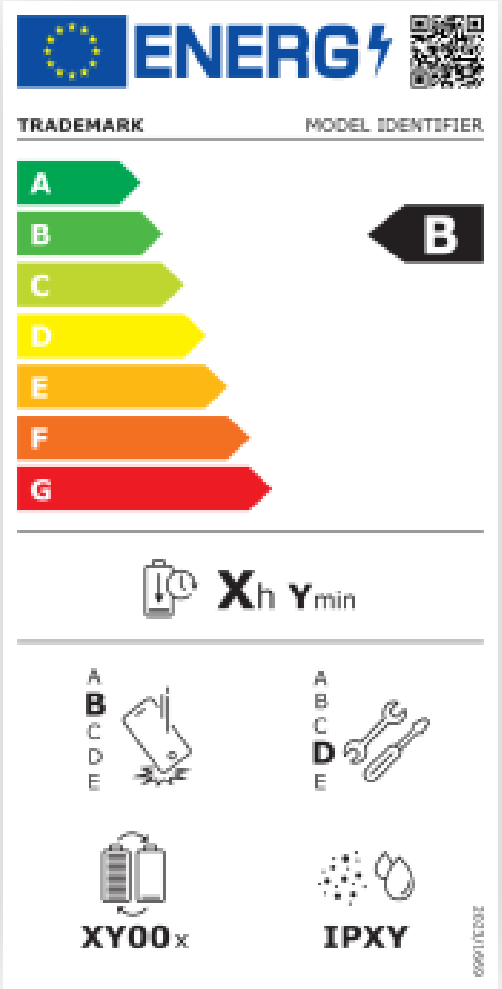
Ecodesign and energy labelling

Smartphones and tablets (2023): durability and repairability

Ecodesign requirements will apply to mobile phones and tablets put on the EU market from 20 June 2025 onwards, including:

- **resistance** to accidental drops or scratches, protection from dust and water
- sufficiently **durable batteries** which can withstand at least 800 cycles of charge and discharge while retaining at least 80% of their initial capacity
- **rules on disassembly and repair**, including obligations for producers to make critical spare parts available within 5-10 working days, and for 7 years after the end of sales of the product model on the EU market
- **availability of operating system upgrades** for longer periods (at least 5 years after the product has been placed on the market)
- non-discriminatory access for professional repairers to any software or firmware needed for the replacement

Ecodesign (EU) 2023/1670: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1670



- energy efficiency classes
- battery endurance
- repeated free fall reliability class
- repairability class
- battery endurance
- ingress protection

Energy labelling (EU) 2023/1669: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1669

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EU battery regulation

Background

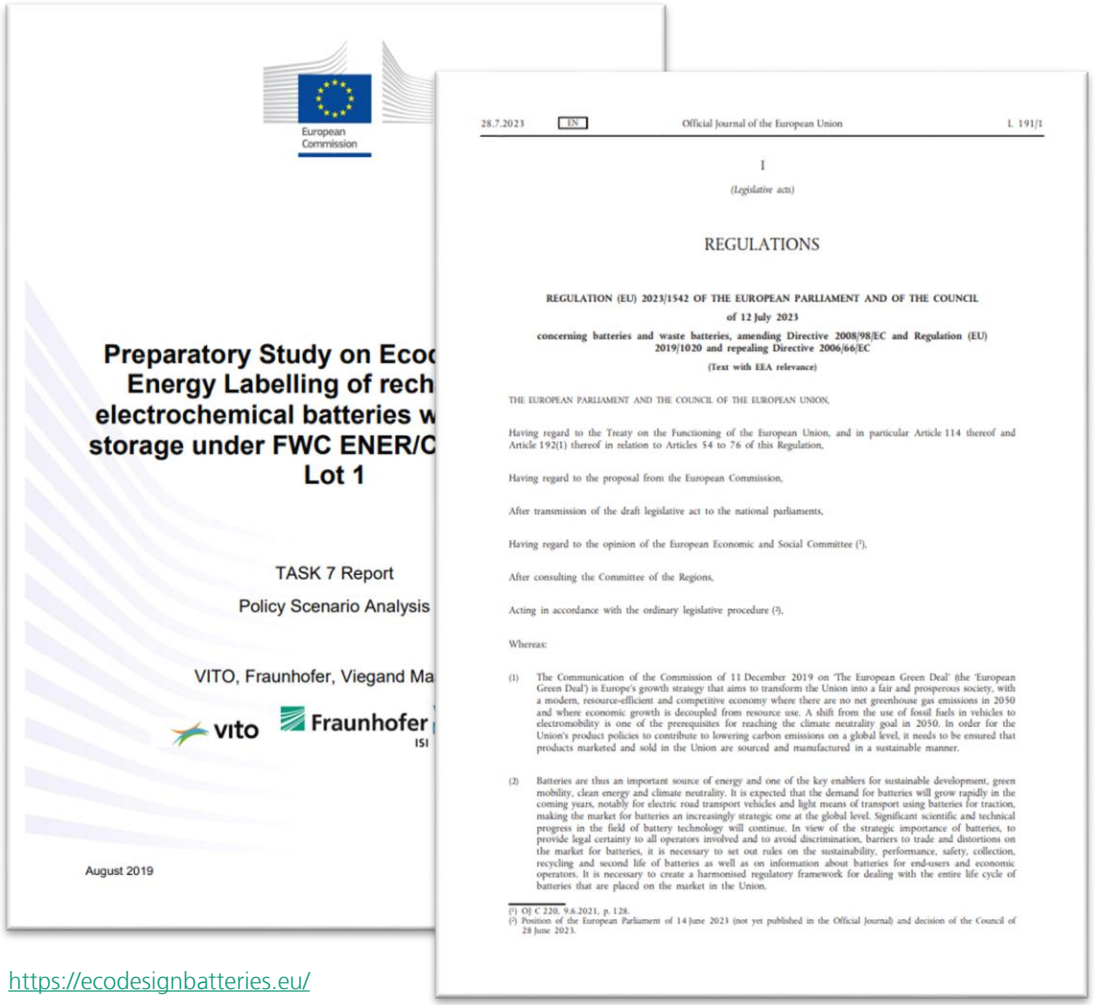
Drivers of policy change:

- EU Goal of **carbon neutrality** (Green Deal)
- **Decarbonisation** of road transport
- **Technological progress** of battery technology
- EU import dependencies on **materials** (Co, Li, Ni, graphite) and technologies
- **Circular economy** as common denominator for environmental coalition and industry coalition

➔ need to review the Battery Directive 2006/66/EC

➔ Regulation (EU) 2023/1542

Scope: all batteries, incl. portable, industrial, EV, light means of transport



https://ecodesignbatteries.eu/

https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1542

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EU battery regulation

Main requirements (focus on EV batteries)

CO_2 footprint:

- 2025: Documentation of the CO_2 footprint of batteries
- 2027: Definition of upper limits for the CO_2 footprint

Labelling and information:

- 2026: Labelling and CE (EU conformity marking)
- 2027: Digital battery passport

End of Life Management: Minimum requirements on

https://thebatterypass.eu/

Recycling efficiency (Battery weight %)

	2025	2030
Lead-acid	75	80
Li-based	65	70
Ni-Cd	80	
Others	50	

Recovery of materials (%)

	2027	2031
Co	90	95
Cu	90	95
Pb	90	95
Li	50	80
Ni	90	95

Recycled content (share, in %)

	2031	2036
Co	16	26
Cu	85	85
Li	6	12
NI	6	15

Supply Chain Management: 2025 Due Diligence requirements for compliance with environmental and social standards

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Ecodesign for Sustainable Products Regulation (ESPR)

History

2005
- Ecodesign Directive 2005/32/EC

  energy using products

2009
- Review: Ecodesign Directive 2009/125/EC

  energy related products

Strong focus on energy efficiency requirements in the use phase...

... but the number of requirements relevant to the circular economy is increasing

2023
- *Battery regulation: Adopted in 2023: (EU) 2023/1542*

  only battery

Holistic approach but not in the ecodesign framework

Draft 30.03.2022
- Ecodesign for Sustainable Products Regulation" (**ESPR**)

  almost any product

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Ecodesign for Sustainable Products Regulation (ESPR)

Making sustainable products the norm !

https://ec.europa.eu/commission/presscorner/api/files/attachment/872167/Sustainable%20products%20Factsheet.pdf.pdf

Broader range of requirements and products covered

- **Scope**: almost all physical products on the EU market (except food and medical devices)
- **Requirements**:
  - Energy and resource efficiency
  - Product **durability, reusability, upgradability and reparability**
  - Presence of substances that hinder the circular economy
  - Use of **recycled material**
  - Reprocessing and **recycling**
  - **Carbon and environmental footprint**
  - Information requirements, including a **digital product passport**

In addition:

- Ban on the destruction of unsold consumer goods
- Green public procurement and
- Incentives for sustainable products

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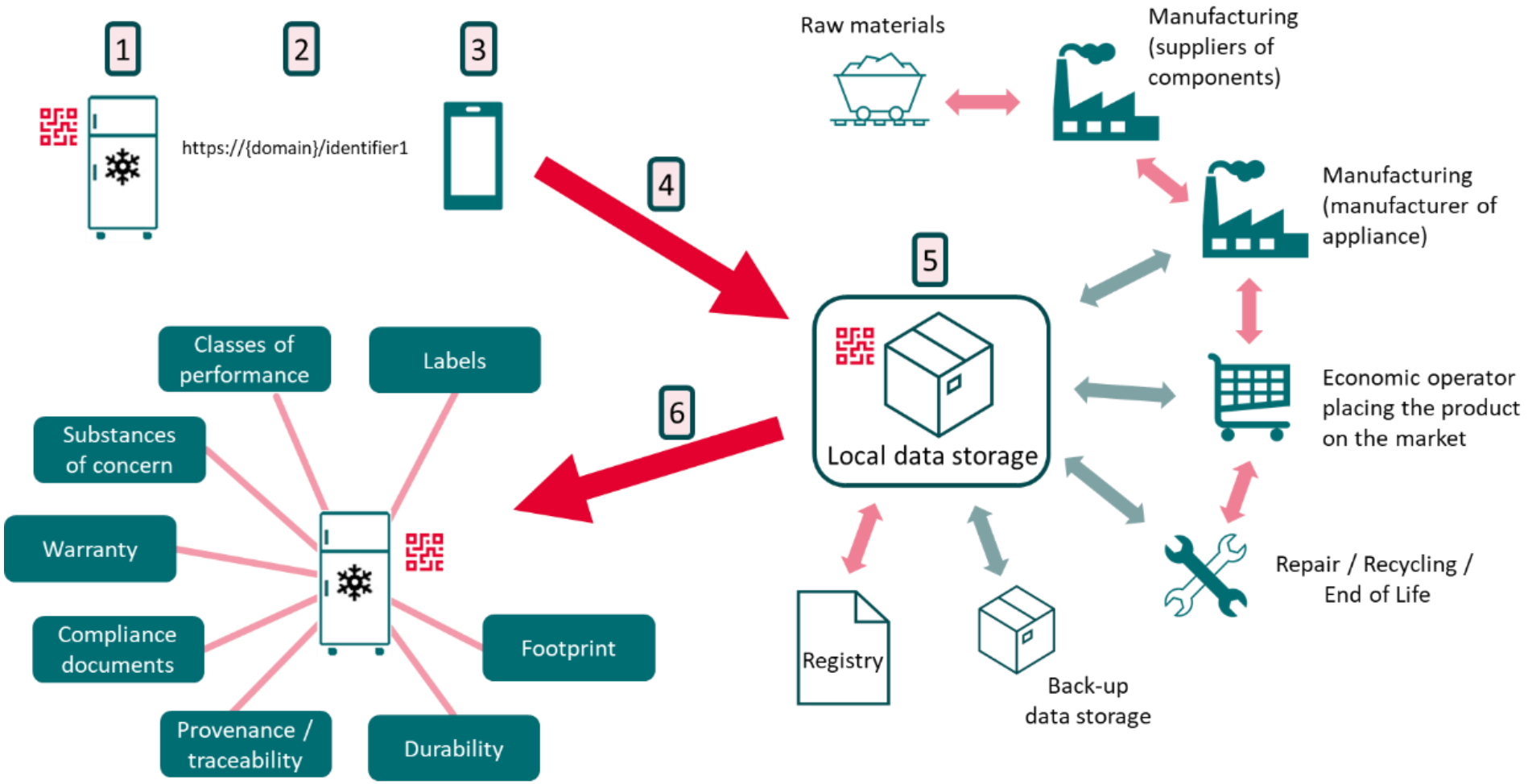
Ecodesign for Sustainable Products Regulation (ESPR)

The Digital Product Passport: Background and operationalisation



Source: A. Durand, T. Goetz, T. Hettesheimer, L. Tholen, S. Hirzel, T. Adisorn (2022): Enhancing evaluations of future energy-related product policies with the Digital Product Passport

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The DPP in the new Batteries Regulation

A blueprint for other policy area

Information captured by the DPP (non exhaustive list):

Information about the battery model:

- Material composition of the battery
- **Carbon footprint information**
- Information on responsible sourcing
- Recycled content information
- Expected battery lifetime
- The labelling requirements
- The EU declaration of conformity
- Initial round trip energy efficiency and at 50% of cycle-life;

Information about the individual battery:

- about the values for **performance and durability** parameters
- Information on the **status** of the battery, defined as [‘original’, ‘repurposed’, ‘reused’], or ‘waste’;
- Information and data as a result of its use, including the number of charging and discharging cycles and negative events, such as accidents, as well as periodically recorded information on the operating environmental conditions, including temperature, and on the state of charge;

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Sustainable products initiative

A holistic package

- **ESPR**

- **Green claims: Proposal for a Directive on substantiation and communication of explicit environmental claims (Green Claims Directive)**
  https://environment.ec.europa.eu/document/download/0514afe4-6b0e-43f0-9154-86972db19495_en

- **Proposal for a Directive on common rules promoting the repair of goods**
  https://commission.europa.eu/document/afb20917-5a6c-4d87-9d89-666b2b775aa1_en

- **EU strategy for sustainable and circular textiles**
  https://environment.ec.europa.eu/publications/textiles-strategy_en

More on the Sustainable products initiative: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013

In addition:

- **Product Environmental Footprint (PEF): LCA methodology, revised in Dec. 2021**
  https://environment.ec.europa.eu/publications/recommendation-use-environmental-footprint-methods_en

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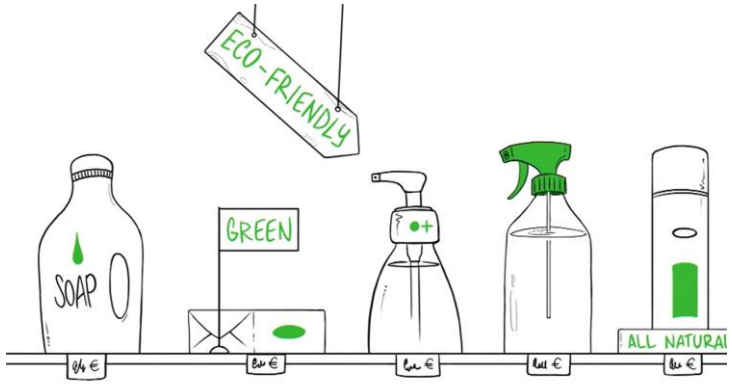
Green Claims Directive Proposal

Current issue



https://environment.ec.europa.eu/topics/circular-economy/green-claims_en

To ensure consumers receive reliable, comparable and verifiable environmental information on products:

- clear criteria on how companies should prove their environmental claims and labels
- requirements for these claims and labels to be checked by an independent and accredited verifier and
- new rules on governance of environmental labelling schemes to ensure they are solid, transparent and reliable

Proposal of the Directive: https://environment.ec.europa.eu/document/download/0514afe4-6b0e-43f0-9154-86972db19495_en

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Conclusions

- **Ecodesign and Energy Label:** successful policy framework in the EU, delivering large energy savings since 20 years
- **Circular Economy** as one of the major drivers for the recent and future product regulations
- **The Battery Regulation as a blueprint for forthcoming product policies in the EU**
- **ESPR (current proposal):**
  - holistic
  - ambitious
  - innovative (DPP)
- **To follow in the coming months and years:**
  - final version of the ESPR regulation and how the product specific delegated acts will be
  - role of digitalization in product policies
  - will this new generation of regulations be also inspiring for other economies (e.g. China)?

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Thanks for your attention

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Useful links

Ecodesign related websites

Main websites of the EC:

- Process and methods: https://ec.europa.eu/growth/industry/sustainability/product-policy-and-ecodesign_en

- Products:
  https://susproc.jrc.ec.europa.eu/product-bureau/product-groups
  and
  https://ec.europa.eu/energy/studies_main_en

- Harmonized standards:
  https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/ecodesign_en

- List of energy efficient products regulations: by product group
  https://energy.ec.europa.eu/topics/energy-efficiency/energy-label-and-ecodesign/list-energy-efficient-products-regulations-product-group_en

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Useful links

EU Regulations

Main EU texts and proposals:

- Energy labelling regulation:
  https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2017.198.01.0001.01.ENG

- Ecodesign Directive 2009/125/EC :
  https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ%3AL%3A2009%3A285%3A0010%3A0035%3Aen%3APDF

- Ecodesign and energy labelling regulations by product: https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-products/list-regulations-product-groups-energy-efficient-products_en?redir=1

- ESPR proposal:
  https://eur-lex.europa.eu/resource.html?uri=cellar:bb8539b7-b1b5-11ec-9d96-01aa75ed71a1.0001.02/DOC_1&format=PDF
  and
  https://eur-lex.europa.eu/resource.html?uri=cellar:bb8539b7-b1b5-11ec-9d96-01aa75ed71a1.0001.02/DOC_2&format=PDF

- Batteries Regulation (EU) 2023/1542:
  https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1542

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Useful links

Publications

- Barkhausen, Robin; Durand, Antoine (2022): Review and analysis of Ecodesign Directive Implementing Measures: product regulations shifting from energy efficiency towards circular economy. Edited by 11th International Conference on Energy Efficiency in Domestic Appliances and Lighting (EEDAL'22)

- Antoine Durand, Thomas Goetz, Tim Hettesheimer, Lena Tholen, Simon Hirzel, Thomas Adisorn (2022): Enhancing evaluations of future energy-related product policies with the Digital Product Passport

- Galatola (2022): Sustainable Products and Digital Product Passports. Keynote from Michele Galatola. Virtual Event, 2022. Available online at https://orgalim.eu/sites/default/files/2022-06/Orgalim%20Policy%20exchange%20on%20SPI%20and%20DPP_%201%20June2022_Presentations.pdf, checked on 7/4/2022.

- Adisorn, Thomas; Tholen, Lena; Götz, Thomas (2021): Towards a Digital Product Passport Fit for Contributing to a Circular Economy. In Energies 14 (8), p. 2289. DOI: 10.3390/en14082289.

- Spherity (2022): Podcast. Product Passport Pioneers - #5 with Michele Galatola, European Commission. https://www.youtube.com/watch?v=ktI21qRh2yA

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Backup slides

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Circular Economy package

Overview of initiative

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Ecodesign for Sustainable Products Regulation (ESPR)

Aims

Making sustainable products the norm !

- **Longer life cycle**
- **Reducing the carbon and environmental footprint of products throughout their life cycle**
- **Ensuring that products are suitable for a climate-neutral circular economy**
- **Preventing waste and increasing material recovery**
- **Minimum use of recycled materials**

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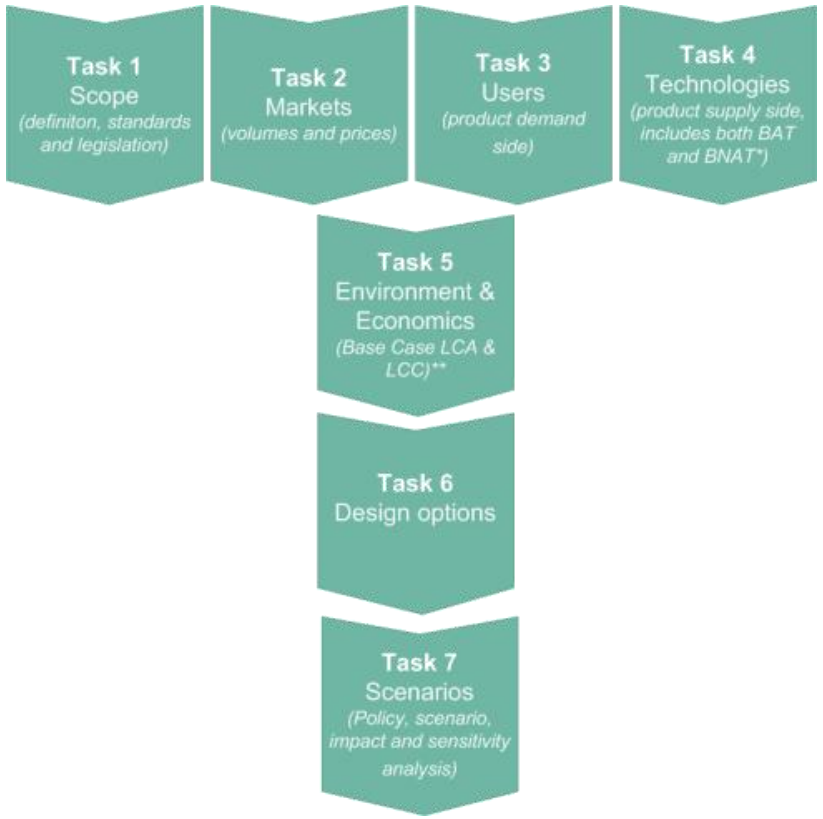
Ecodesign and energy labelling

Methodology for ecodesign of energy-related products (MEErP)



- **Task 1 - Scope** (definitions, standards and legislation, first screening)
- **Task 2 – Markets** (volumes and prices)
- **Task 3 – User** (product demand side)
- **Task 4 - Technologies** (product supply side, includes both Best Available Technology (BAT) and Best Not Yet Available Technology (BNAT)
- **Task 5 – Environment & Economics** (Life Cycle Analysis (LCA) & Life Cycle Costing (LCC) of the Base Cases)
- **Task 6 – Design options** to improve LCA + LCC;
- **Task 7 – Scenarios** (Policy, scenario, impact and sensitivity analysis)

MEErP: https://op.europa.eu/en/publication-detail/-/publication/b7650397-32f1-436c-82c4-df39aef297a3 (currently under review)

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The Digital Product Passport: Background and operationalisation

History and definition

2014	The **European Resource Efficiency Platform** initiated the current demand for a Europe-wide PP
2019 2020	The **European Green Deal** The **Circular Economy Action Plan** Both introduced the idea of a so-called **'electronic'** or **'digital' product passport (PP)** as essential instrument for more product-focused policies → The EU has started a **new area of EU product policies**
2020	DPP has been first introduced in 2020 in **proposal for a new Batteries Regulation**
2022	DPP is an integral part of EU's 2022 ESPR proposal (**Ecodesign for Sustainable Product Regulation**: New Ecodesign Directive)

A DPP can be described as a **structured collection of product related datasets:**

- **with predefined scope and agreed data ownership**
- **with specific access rights for different target groups** (such as consumers, policy makers, recyclers or market surveillance authorities)
- **accessible through a unique identifier** (number or code) present also on the product.

In the EU, it will be most likely a ***decentralised system for data storage*** combined with a lean ***central registry*** by the EU only for selected key parameters

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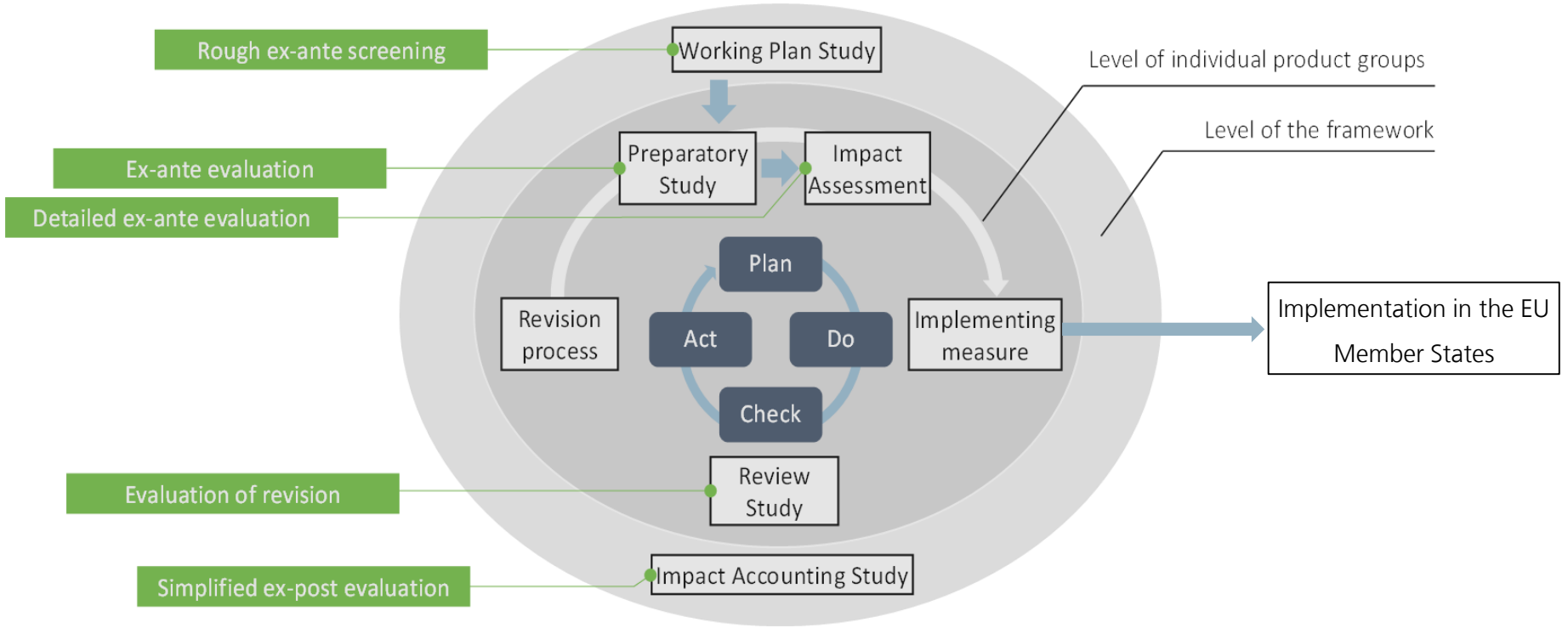
Ecodesign and energy labelling

Policy cycle

Cornerstones of the EU's product policies: **Ecodesign** Directive (2009/125/EC) and **Energy Labelling** Regulation (EU) 2017/1369



Policy cycles in the Ecodesign context. Source: A. Durand, T. Goetz, T. Hettesheimer, L. Tholen, S. Hirzel, T. Adisorn (2022): Enhancing evaluations of future energy-related product policies with the Digital Product Passport

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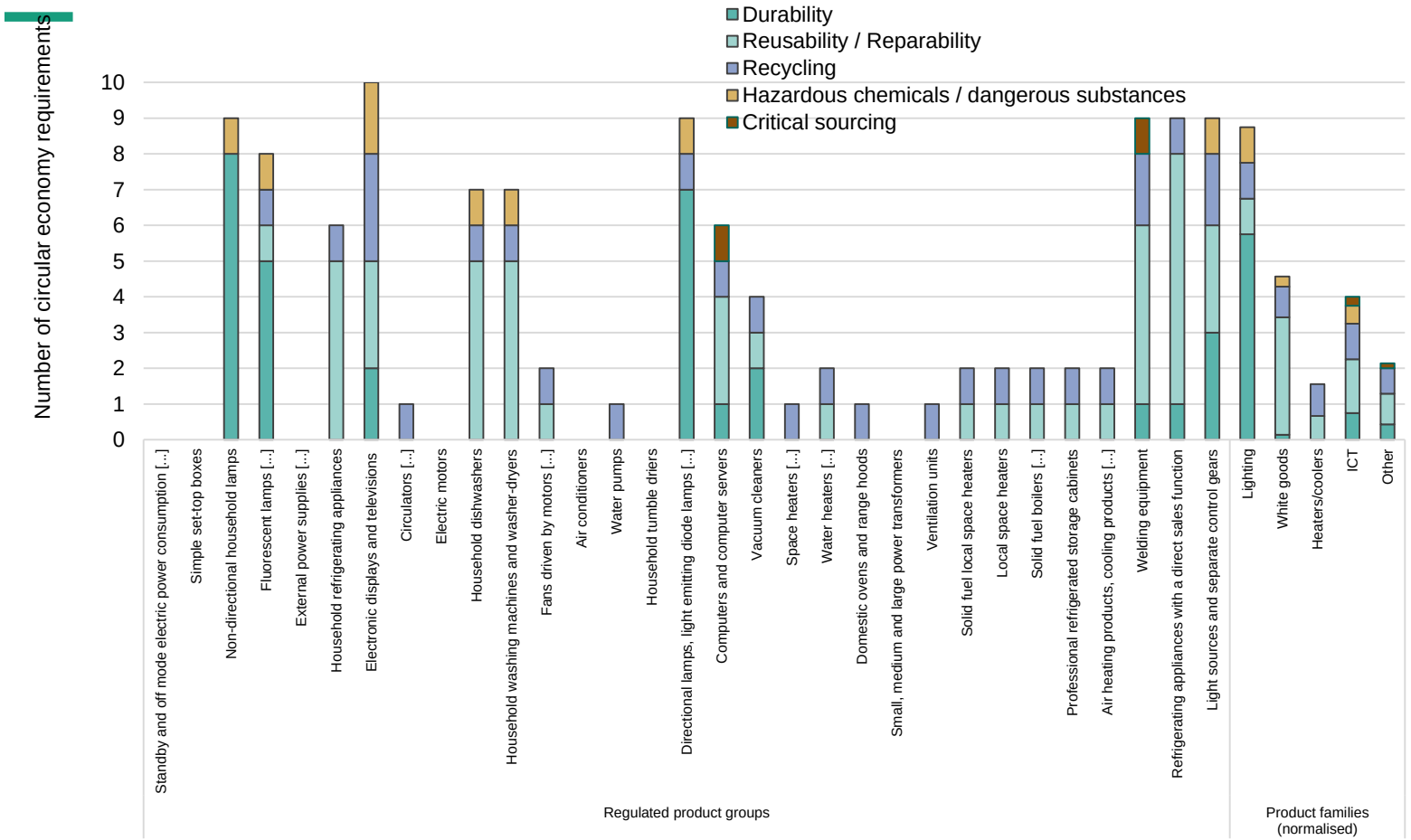
Ecodesign and energy labelling

Trend to Circular Economy requirements



- High share of durability aspects in the lighting regulations
- Focus on reusability/ reparability in the product family white goods
- Requirements on critical sourcing still rare

Barkhausen, R.; Durand, A.; Fick, K. Review and Analysis of Ecodesign Directive Implementing Measures: Product Regulations Shifting from Energy Efficiency towards a Circular Economy. *Sustainability* **2022**, *14*, 10318. https://doi.org/10.3390/su141610318

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The current approach of product regulation

Availability of data and.... need for a Product Passport

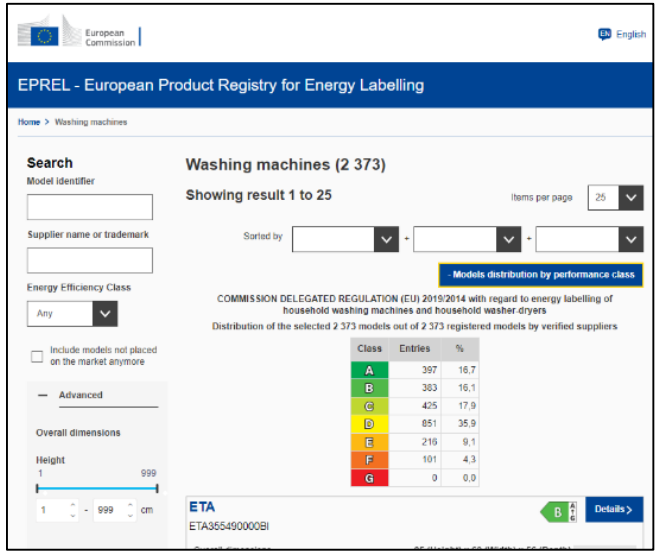
- **Ecodesign**: Data availability is a major problem for policy evaluators as the information should be provided on the product itself
  → There is so far no centralised product database for Ecodesign

- **Energy labelling**: Better situation with the EPREL database (EU Product Registration database for Energy Labelling)
  → Suppliers are obliged, before placing on the market a unit of a new model, to enter in the public and compliance parts of the product database the information for that model
  → no info linked to market volume

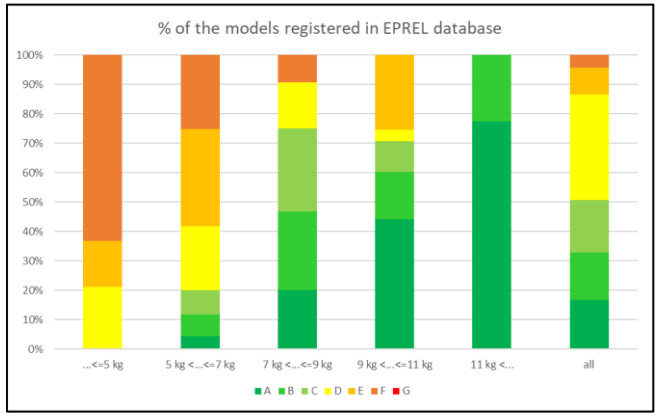
- **Challenges related to data:** lack of information, information is fragmented and not harmonized
  → need to purchase data (e.g. from market institute) to improve the situation

- **Complexity of current regulations and/or framework** (e.g. because of Circular Economy, Better Regulation Guideline) required accordingly more accurate and transparent data

➔ need for an innovative approach



EPREL public website. *Source*: https://eprel.ec.europa.eu/screen/product/washingmachines2019



Share by rated capacity of the models registered in EPREL. *Source*: own calculation, based on the EPREL.

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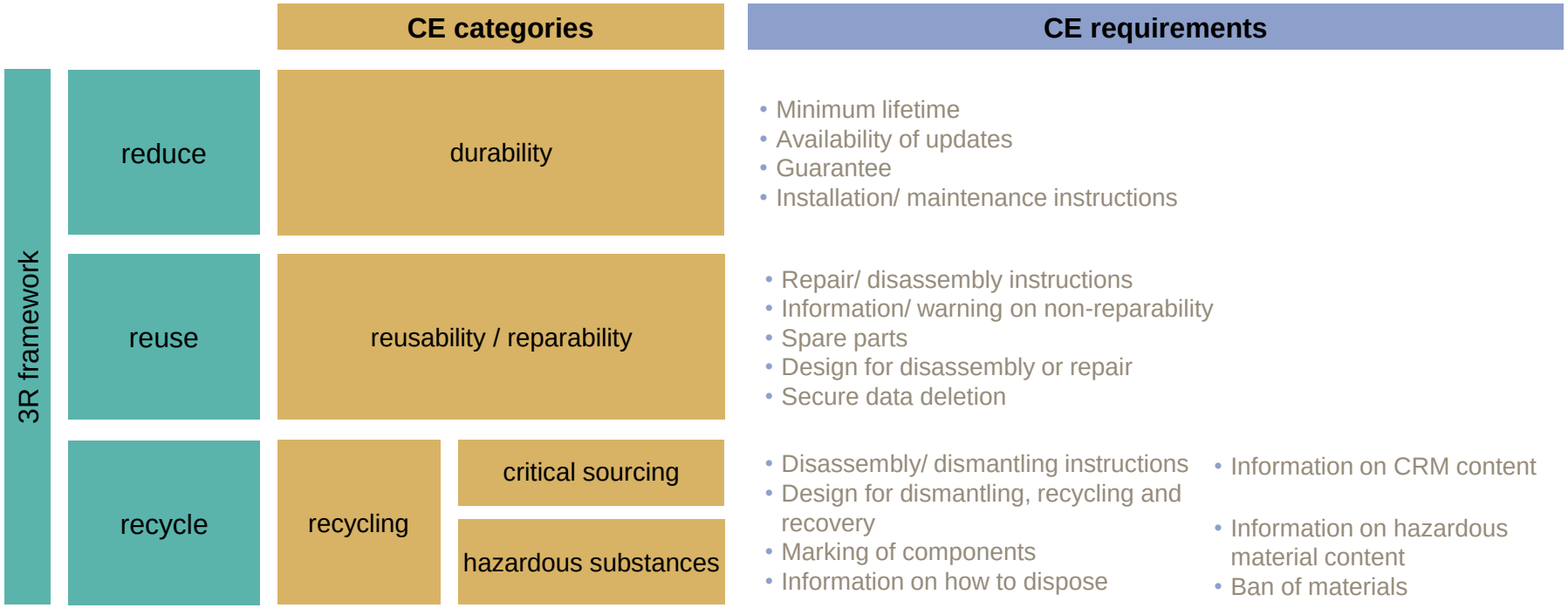
Circular economy: categorisation of requirements



Source: Barkhausen 2022 (basiert auf https://www.mdpi.com/2071-1050/14/16/10318)

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