How can the Ecodesign Directive contribute to Circular Economy objectives?

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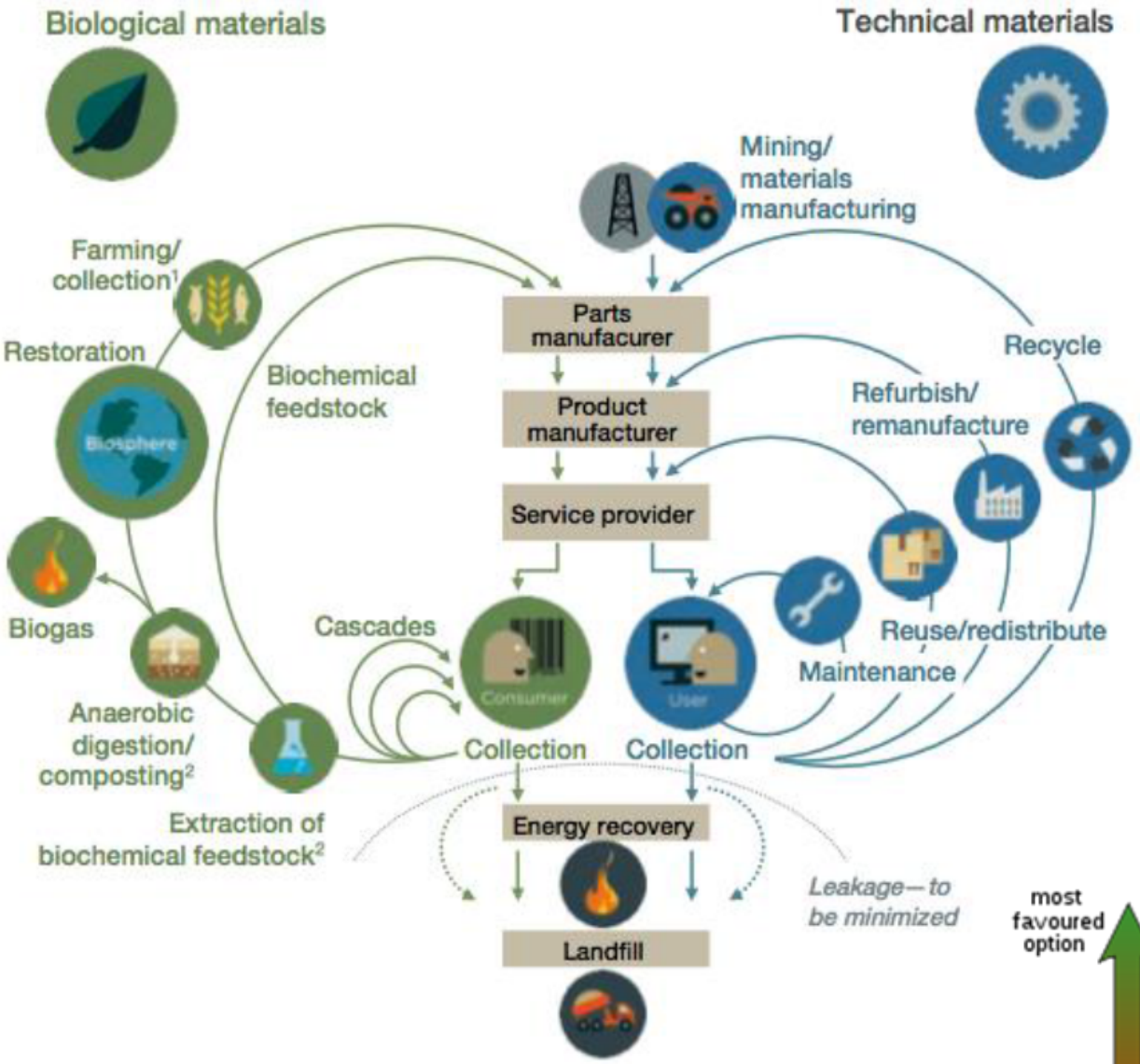
"...times have changed ...the prevailing thinking can no longer be that less government intervention is best for firms. ...the experiment with a deregulated world... has only brought a mixed bag of progress, social tensions and financial weaknesses."

Content

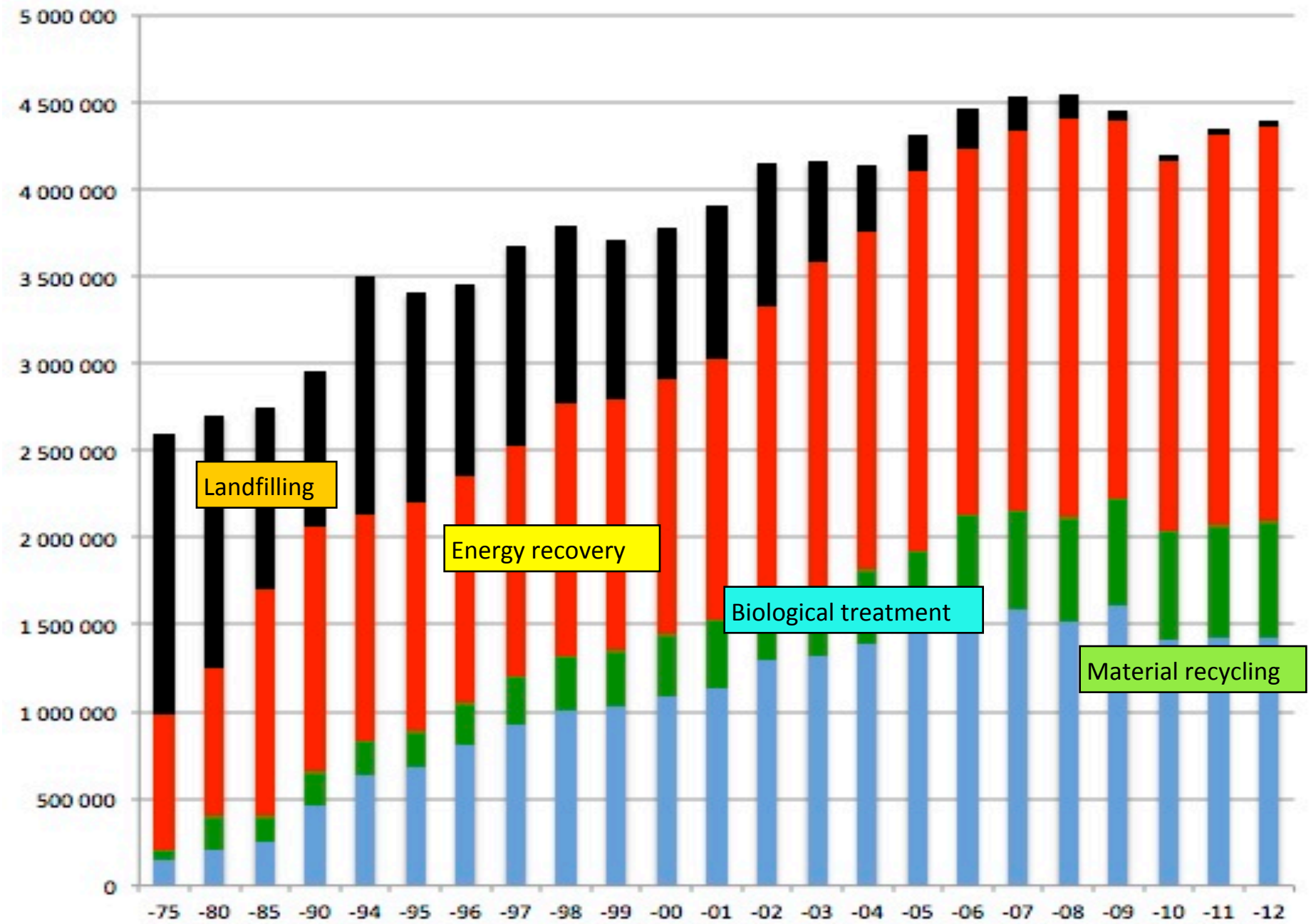
- The Circular Economy and European product policy
- The Ecodesign Directive: main developments
- Potential ecodesign requirements
- Contentious issues



"…an economy that is restorative by design, and which aims to keep products, components and materials at their highest utility and value, at all times"
Ellen MacArthur Foundation

2-3. *The circular economy.*

Ellen MacArthur Foundation (2013a)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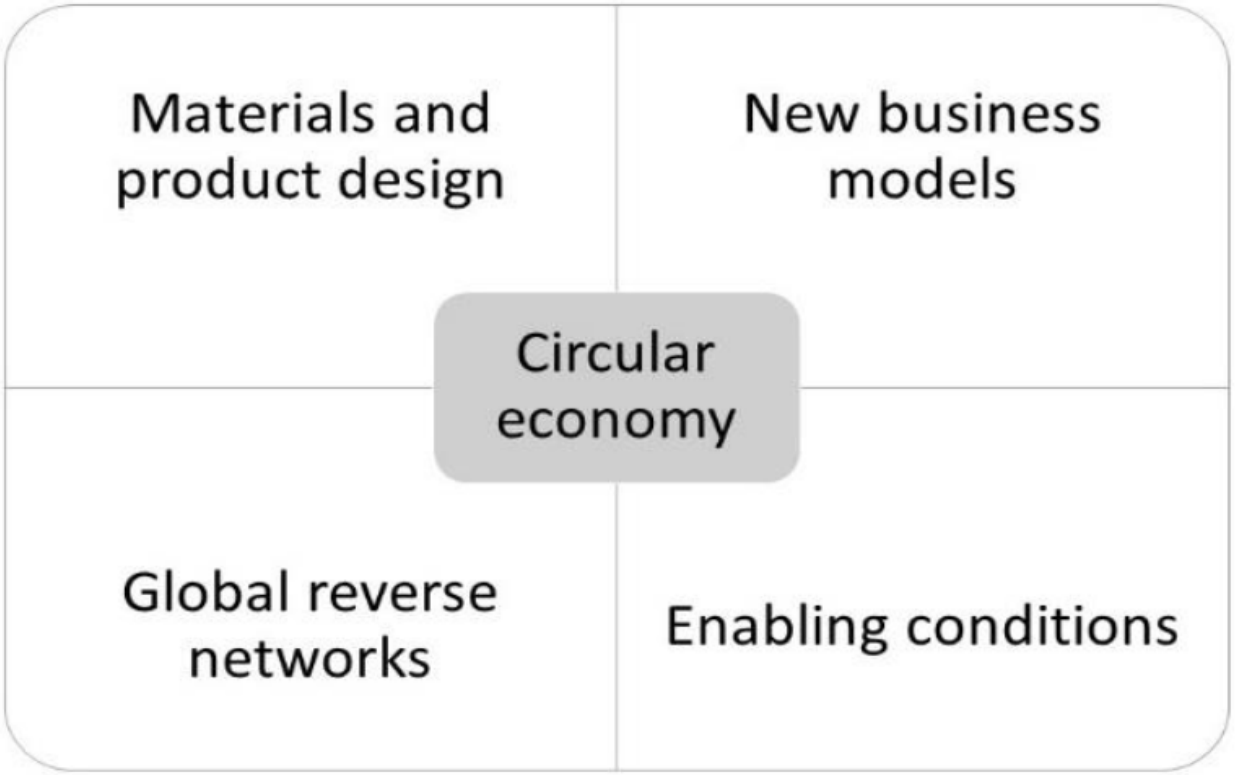
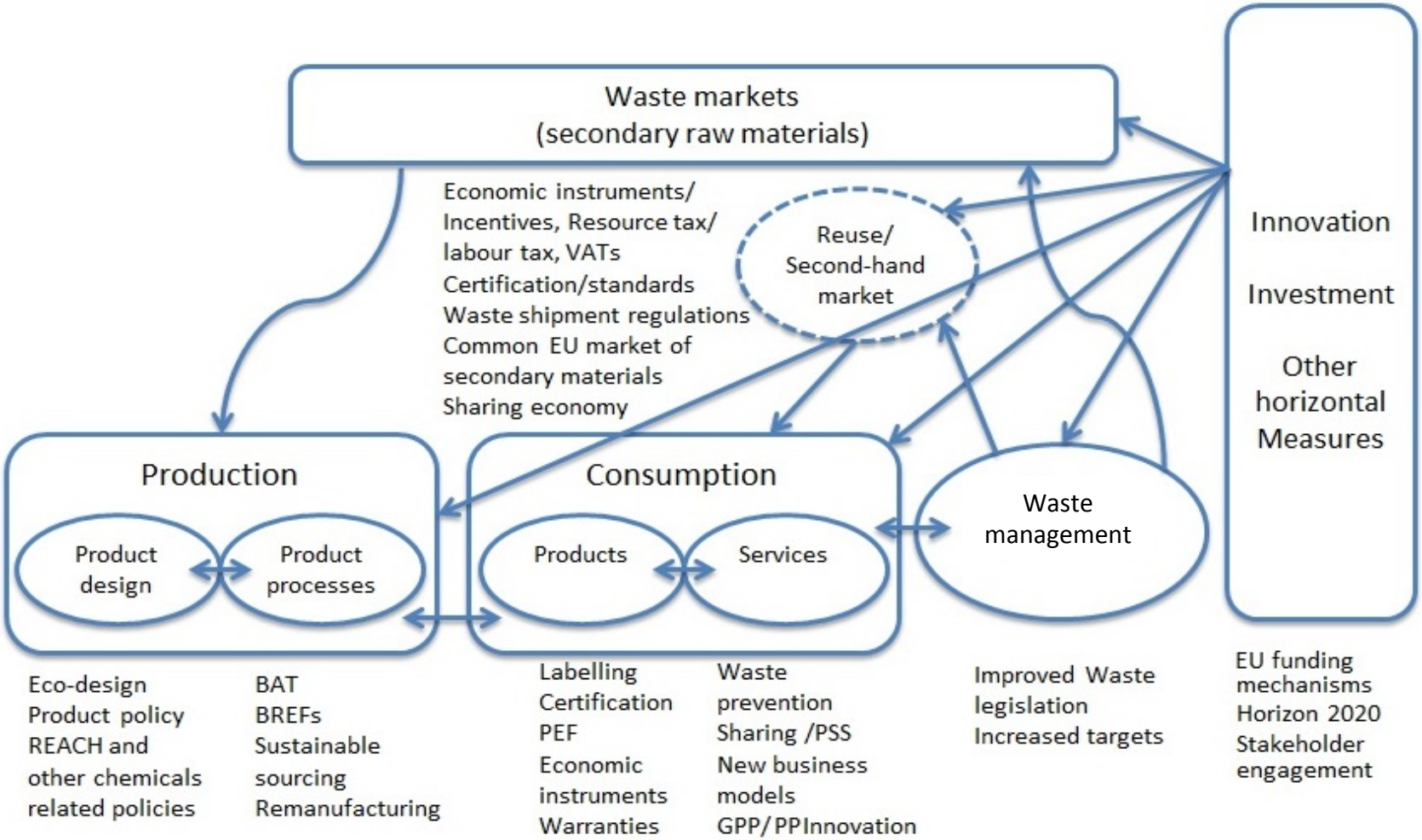
Landfilling
Energy recovery
Biological treatment
Material recycling

The Circular Economy: building blocks



Source: Planing 2015



Policy landscape according to the EU Circular Economy Action Plan. Source: Milios 2016.

Type of environmental aspect	European Union law and policy	Examples of Member State policies
Chemical and material content	Horizontal legislation (e.g. REACH) **Conflict minerals** Sector oriented laws on chemical restrictions (e.g. Packaging, electronics)	Green public procurement criteria for, e.g., chemicals and conflict minerals Eco-labels Taxes on chemicals
Collection and recycling of waste products	General rules and guidelines (e.g., Waste Framework Directive) Sector oriented EPR laws (e.g. WEEE Directive; Waste and Packaging Waste Directive)	Waste related taxes and charges **Infrastructure for re-use and recycling** **Re-use parks/shops for re-used products/repair activities** **Mandatory re-use obligations for white goods (Spain)**
Energy efficiency	Mandatory energy performance standards (MEPS) (set under the Ecodesign Directive) Mandatory energy labelling (set under the Energy Labelling Directive) Voluntary labelling (Energy Star) eco-label	Eco-labels, other labels (TCO etc.) Green public procurement criteria The use of life cycle costing (LCC) in public procurement
Durability, lifetime and reparability	**Direct incentives:** **Mandatory 'lifetime'/'durability' requirements set under the Ecodesign Directive** - ***Vacuum cleaners, lighting products*** **Voluntary ecodesign agreement, imaging equipment** **Indirect incentives:** **Minimum rules on consumer guarantees**	**Direct incentives:** **Criminalizing planned obsolescence (France)** **Indirect incentives:** **Incentivizing the provision of spare parts (France)** **Lower VAT on repair services** **National rules on longer consumer guarantees and/or changed rules for burden of proof is transferred from seller to consumer (several EU Member States)** **Public procurement of remanufactured furniture and computers**

Source: Adapted from Faure and Dalhammar, forthcoming

The Ecodesign Directive & the Circular Economy, examples

- Durability standards, vacuum cleaners
- Durability standards, lighting
- Voluntary agreement on imaging equipment, e.g.
  - Duplex printing
  - Design for recycling
  - Polymer composition

Vacuum cleaners

- the hose, if any, shall be durable so that it is still useable after 40,000 oscillations under strain;

- operational motor lifetime shall be greater than or equal to 500 hours.

Requirements of EU Ecodesign regulations	**Directional and LEDs**	**Non-directional lamps** *(italics for lamps excluding CFL and LEDs)*
lamp survival factor at 6,000 hours	≥ 70% except LEDs ≥ 90% LEDs	≥ 70% *≥ 85 % at 75 % of rated average lifetime and 2000 hour minimum rated lifetime for lamps*
lumen maintenance' at 6,000 hours	≥ 70 CFLs ≥ 80 LEDs	≥ 85 % at 75 % of rated average lifetime
number of switching cycles before failure	≥ 15,000 if rated lamp life ≥ 30,000 hours, otherwise ≥ half the rated lamp life expressed in hours	≥ lamp lifetime expressed in hours ≥ 30 000 if lamp starting time > 0.3 s *≥ four times the rated lamp life expressed in hours*
premature failure rate (maximum number of failure products in %)	≤ 5 % at 1 000 h	≤ 2 % at 400 h *≤ 5 % at 200 h*
'colour rendering' requirements for various applications	≥ 80	≥ 80

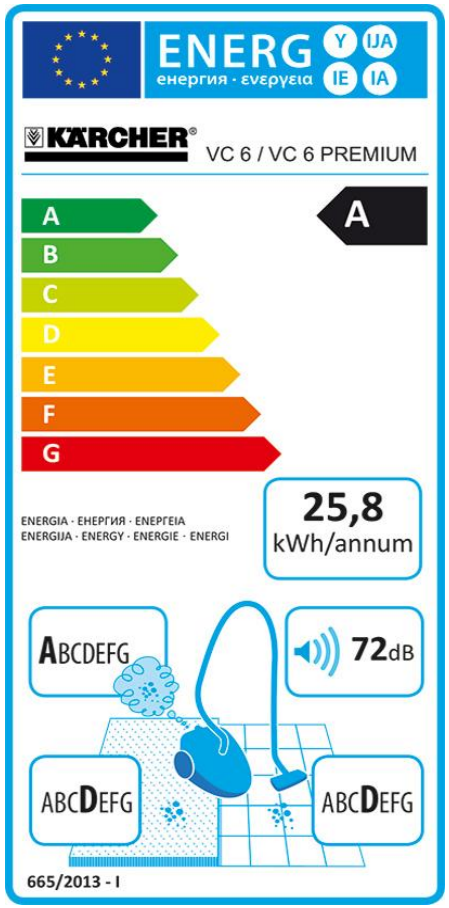
Table 1. Ecodesign requirements for lamps related to durability and quality

"*The Commission will promote the reparability, upgradability, durability, and recyclability of products by developing product requirements relevant to the circular economy in its future work under the Ecodesign Directive*"

[The Commission will] "…*specifically consider . . durability information in future Energy Labelling measures*"

EU Circular Economy Action Plan

Labeling



ENERGY STAR

APPROVED RE-USED ELECTRICALS
PAS 141 2011

DER BLAUE ENGEL
JURY UMWELTZEICHEN

MILJÖMÄRKT

NORDIC COUNTRIES

CERTIFIED
NCERT
»ausgezeichnet«
reparaturfreundlich & langlebig

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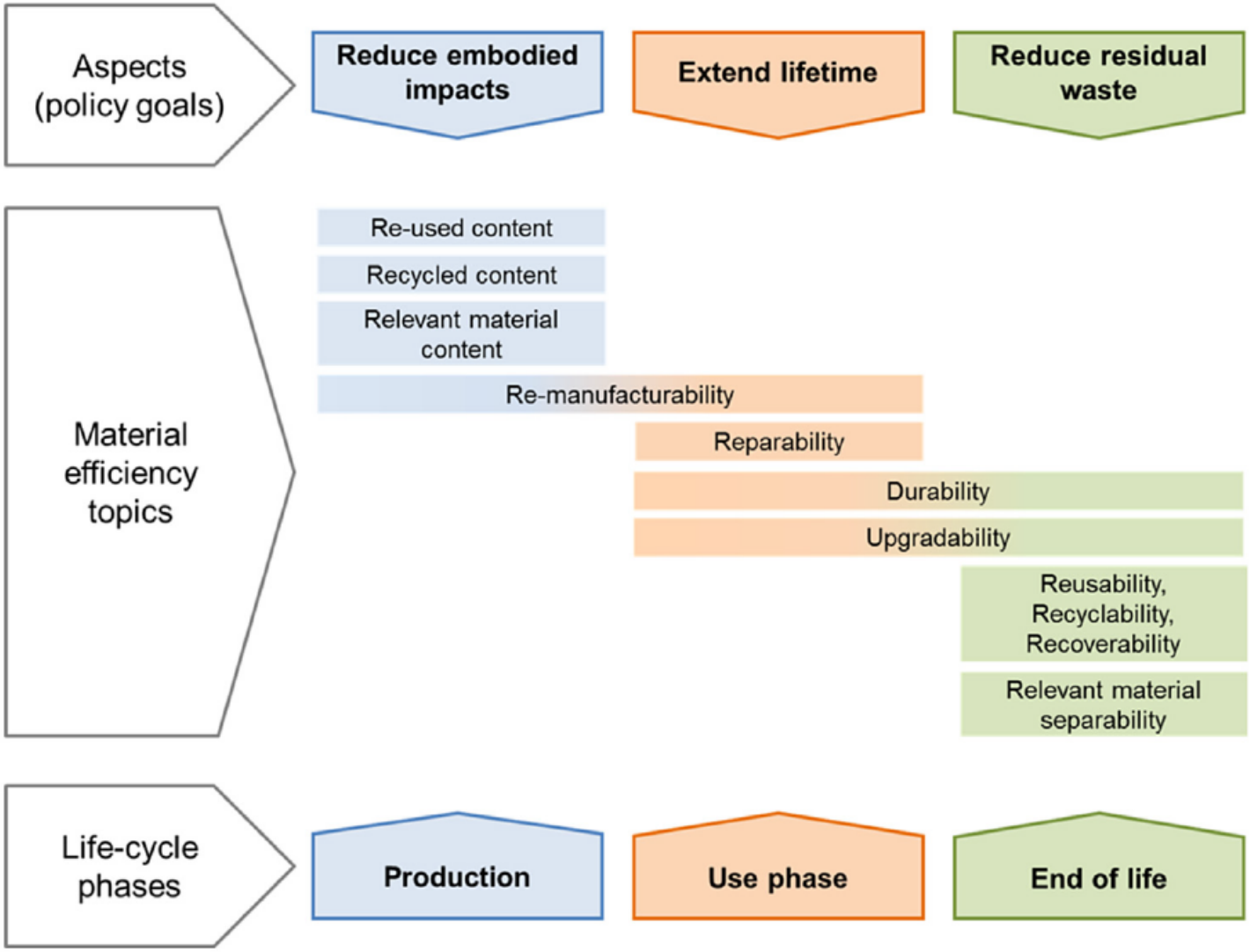
The labeling option

- Assuming we want to implement a mandatory lifetime labeling:
  - Standalone scheme or part of mandatory energy labeling?
  - Indicate lifetime in years/hours/number of uses etc?
  - Use a scale (e.g. A-F) or simply provide a number, or both?
    - Consumers tend to understand scales better than numbers!
  - How address products where durability/lifetime is related to several design properties?
  - What do consumers expect?

Potential mandatory ecodesign standards, examples

- Lifetime/durability/endurance
- Reparability/availability of spare parts
- Modular design
- Ease-of-dissassembly/design for recycling
- Availability of firmware updates to third parties (server re-use)
- Declaration of critical materials

(see e.g Vanegas et al, Journal of Cleaner Production; Polverinin et al. Computers & Security; Tecchio et al, Joint Research Centre; Bundgaard et al., Journal of Cleaner Production)



Source: Tecchio et al, Journal of Cleaner Production

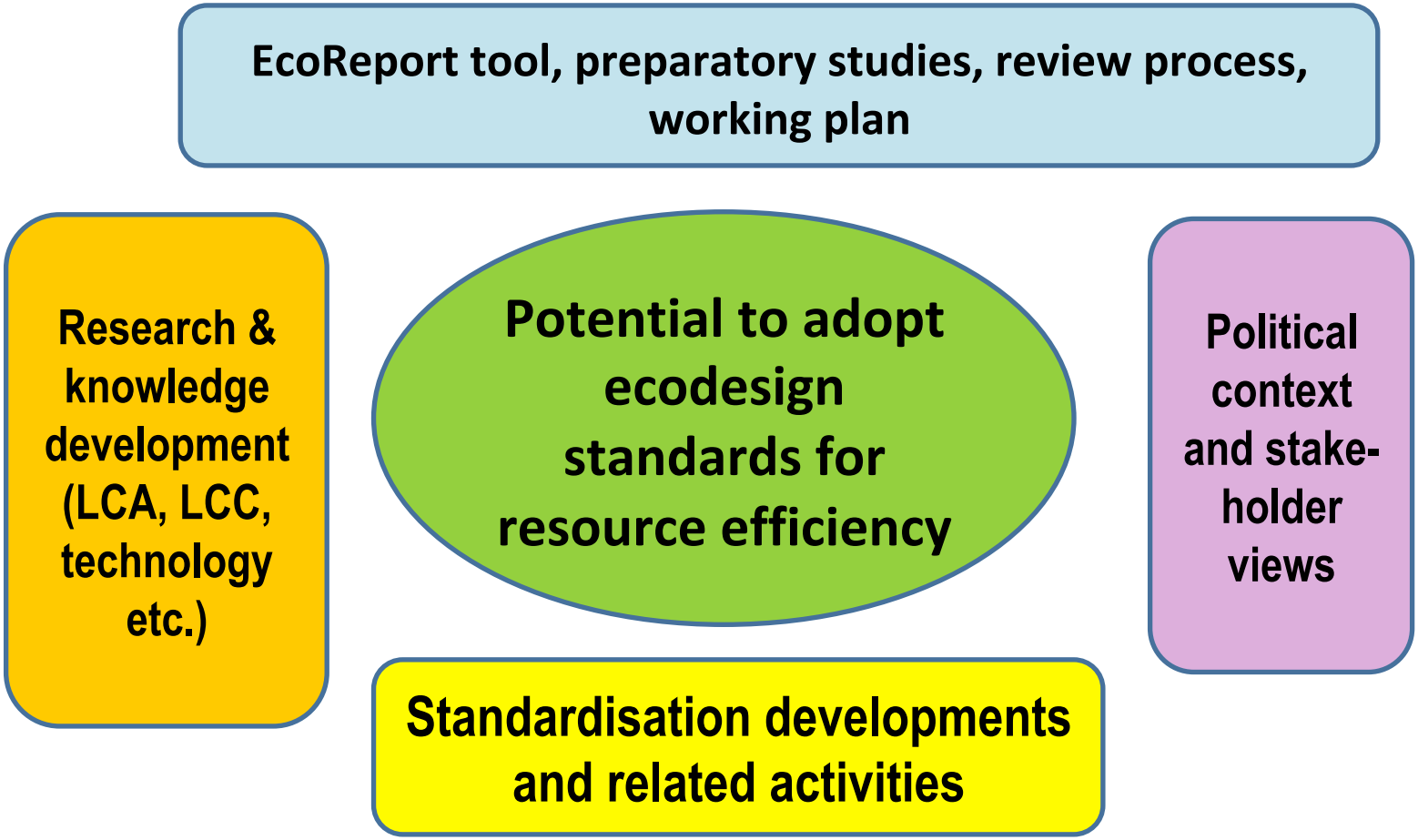
Standardisation required

Table 6
Illustration of the framework for two potential material efficiency requirements for the washing machine product group.

Policy Goal	Material efficiency topic	Potential material efficiency requirements	Metrics [unit]	Tests	Calculation	Reference tables	Reporting/information
Extend the expected lifetime and reduce embodied impacts	Durability	R4. Declaration of expected lifetime	Number of washing cycles [n]	Standardized endurance test (tdb [a]) based on both mechanical resistance and performance measurements according to IEC 60456			Template for reporting to be developed (e.g. a logo compatible with the energy label)
Extend the expected lifetime	Reparability	R5. Minimum disassemblability of key components	Time necessary for disassembly [s]	Measured time during a standardized test (tbd)			Format for dismantling sequence

Legend: when content is underlined, it means that standardization activities have to be started.
[a] To be developed.

Source: Tecchio et al, Journal of Cleaner Production



Cf. Bundgaard et al. (2017). *From energy efficiency towards resource efficiency…* Journal of Cleaner Production

Type of requirement	Description	Main advantages	Main concerns
Durable design/ minimum technical lifetime	Can be implemented by excluding technical solu-tions that lead to early failure, by measured lifetime through various parameters (laboratory tests), by requiring reparability/spare parts availability, & evidence of 'modular design'	Addresses poor design solutions & poor quality Positive for consumers	For new types of products, where energy efficiency improvements are rapid, it may not be optimal to prolong the lifetime. If consumers switch due to 'novelty' we risk over-engineering
Maximum disassembly time	Setting requirements on maximum time allowed for disassembling a product. Standardized methods used to evaluate compliance and/or video as evidence.	Increases cost-effectiveness of future recycling. Provides incentives for 'design for recycling' and disincentives for poor design choices	It is difficult to know now whether manual disassembly will take place in the future Difficult to foresee technical developments in waste treatment and recycling technology
Recycled content mandates **Reuse of components**	Stipulates that new products put on the market must contain a certain percentage of recycled content. This percentage may be raised over time. Stipulated reuse of components	It safeguards demand for recycled material and thus helps market creation It triggers innovation in materials management	For many materials/ products, compliance must be by supplier declaration schemes; this can be costly and difficult to monitor. Concerns on quality of recycled materials; corporations risk non-compliance with REACH and RoHS. Problematic to mandate reuse of components; potential clashes with e.g. health and safety laws
Declaration of substances that are a problem for recycling	Identifies where there are substances of concern when recycling; can be used by recyclers to improve recycling practices.	Increases opportunity of cost-effective recycling. Health and safety benefits.	Sometimes difficult for manufacturer to have this information; dependent upon suppliers. Material tests can be very expensive.
Declaration of substances/ components that may be relevant to recycle	Materials such as rare earth elements may be possible to recycle in a cost-effective way in the future. It is crucial that information on where they are placed in the product is available.	May enable more cost effective recycling in the future.	Potential trade secrets involved for some product groups. Difficult to obtain this information for components from suppliers.
Banning certain design solutions	Ban some designs, such as material mixing and plastic coating around metal parts.	Less material mixing increases likelihood of cost-effective recycling of materials in the future.	May impede innovation and freedom to choose product design in some cases.

Some major issues

- Data gaps, standards
- Potential conflicts between environmental aspects
- Innovation
- Socioeconomic gains not equal to producer gains

- Need for supply chain measures

- Can we apply a preventive approach??? Design now to recycle in 15 years?

Policy choice	Advantages	Disadvantages
Mandatory requirements	Allows policymakers to make the appropriate trade-offs between different functions (e.g. energy use, technological developments, and durability). The complexity of establishing 'durability' for lighting, and the problems of consumers to understand information about durability implies that mandatory requirements can be a good idea cf. to labelling and warranties.	By setting durability standards that goes further than a mere 'baseline', policymakers may interfere with decisions that are best taken by designers, based on customer needs and user patterns. May be better to let customers use labelling to differentiate product lifetime according to their preferences.
Mandatory labelling	**Allows consumers to choose products according to preferences, and provides for competition in the market.** **Less intrusive for producers than mandatory lifetime requirements.**	**Difficult for consumers to understand/ interpret the information.** **Risk of cheating.** **The broad range of products and applications can lead to quite varying lifetimes in practice.**
Voluntary extended warranties	Useful in B2B applications where buyers can interpret technical information and enter into relevant contracts that are suitable for the purpose where the products are used.	Less useful for private buyers as the information is often complex
Mandatory extended warranties	Could be useful for consumers and increase confidence in LED products.	Not so useful in B2B relations.

Source: Luth Richter et al. forthcoming

The Circular Economy

- **Bioeconomy**
  - Industrial ecology (waste heat, waste products)
  - New products and markets (wood based construction and textiles, bio based chemicals etc.), etc.
- **Manufacturing**
  - Remanufacturing, new business models for e.g. transport and lighting, product leasing, sharing etc.
  - industrial ecology (materials, waste heat, markets for by-products etc.),.

Consumer expectations?

- ’Intended lifetime’
- ’Ideal lifetime’
- ’Predicted lifetime’
- ’Average lifetime’

(Cf. Oguchi et al. 2016)

Category	Description	Types of resource efficiency requirements identified
1. Reduction	Initiatives that reduce resource consumption during the entire lifecycle of the product.	Efficient use of consumables, information on the environmentally best use of the product, requirements for the content of critical materials and requirements for the use of resources during use.
2. Maintenance	Initiatives that address improvement of product maintenance.	Maintenance instructions and information requirement for the performance of the product.
3. Reuse and redistribution	Initiatives that enable multiple use-cycles through reuse and redistribution.	Requirements for the durability and lifespan of the product.
4. Remanufacturing and refurbishment	Initiatives that improved a product's remanufacturing and refurbishment potential.	Information requirements for the replacement of component and requirements for dismantability and standardised components.
5. Recyclability	Initiatives that improve the recyclability of the product or materials.	Information requirements relevant for disassembly, recycling and disposal at end-of-life.

Source: Bundgaard et al, Journal of Cleaner Production