Overview Appendix A

Confidential parts (1.1, 2.1, 3) are not included in this document, to protect the data of the smart pillbox company

Bill of Materials (BOM)

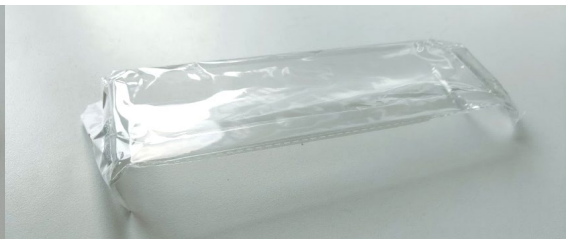
Unit processes

Appendix A1.1 BOM smart pillbox (Confidential)

NOT INCLUDED

Appendix A1.2 BOM 7-day pillbox

	nr	Part name	nr of parts	Material (source: bol.com)	Amount in gram/unit	Kg/parts	Production technique	Location	Notes
	1	7 day pillbox	1	Polypropylene	44	0.0440	Injection molding	China	
	2	Packaging plastic	1	Polyethylene	1	0.0010		China	Packaging film



Appendix A2.1 Unit processes smart pillbox (Confidential)

NOT INCLUDED

Appendix A2.2 Unit processes 7-day pillbox

P1: Production of pillbox						
Economic flows, in:						
Amount	*Unit*	*Product*	*Coming frc*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
0.0440	kg	Market for Polypropylene, granulate		GLO	Ecoinvent		
Economic flows, out:						
Amount	*Unit*	*Product*	*Going to*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
1	unit	7 day pillbox		China			
Environmental flows, in						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*
Environmental flows, out						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*

P2: Packaging of 7 day pillbox						
Economic flows, in:						
Amount	*Unit*	*Product*	*Coming frc*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
0.0010	kg	Packaging film, low density Polyethylene		RoW	Ecoinvent		
1	unit	7 day pillbox					
#VERW!	tkm	Transport, freight, sea, container ship		GLO		Rotterdam	
Economic flows, out:						
Amount	*Unit*	*Product*	*Going to*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
1	unit	Packaged 7 day pillbox		China			
Environmental flows, in						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*
Environmental flows, out						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*

P3: Use of pillbox						
Economic flows, in:						
Amount	*Unit*	*Product*	*Coming frc*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
1	unit	Packaged 7 day pillbox		NL			
-1	unit	Used 7 day pillbox		NL			
-0.0010	kg	treatment of waste polyethylene, municipal incineration		CH	ecoinvent		
Economic flows, out:						
Amount	*Unit*	*Product*	*Going to*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
		Taking medication 2 times a day with conventional 7 day pillbox		NL			
Environmental flows, in						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*
Environmental flows, out						
Amount	*Unit*	*Flow Name*	*Compartments*		*Data sourc*	*Additional*	*Optional calculations*

P4: End of life 7 day pillbox						
Economic flows, in:						
Amount	*Unit*	*Product*	*Coming frc*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
-0.0440	kg	treatment of waste polypropylene, municipal incineration		CH	ecoinvent		
Economic flows, out:						
Amount	*Unit*	*Product*	*Going to*	*Location*	*Data sourc*	*Additional*	*Optional calculations*
1	unit	Used 7 day pillbox		NL			
Environmental flows, in						

Amount	*Unit*	*Flow Name*	*Compartments*	*Data sourc*	*Additional*	*Optional calculations*
Environmental flows, out						
Amount	*Unit*	*Flow Name*	*Compartments*	*Data sourc*	*Additional*	*Optional calculations*

Appendix A3 Transport data (Confidential)

NOT INCLUDED

Overview Appendix C

C1 Impact assesment smart pillbox (mid-point)

C2 Hotspot analysis + sensitivity

C3 Sankey diagram pictures

Appendix C1 Impact assesment smart pillbox (mid-point)

Categorie	Impact	Unit
Agricultural land occupation	1.26E-01	m2 x y
Climate changem, GWP100	1.92E+00	kg CO2 eq
Fossil depletion	5.35E-01	kg oil eq
Freshwater ecotoxicity	5.19E-01	kg 1,4 DB eq
Freshwater eutrophication	8.91E-04	kg P eq
Human toxicity	1.83E+00	kg 1,4 DB eq
Ionising radiation	1.31E-01	kBq U235 eq
Marine ecotoxicity	1.83E+00	kg 1,4 DB eq
Marine eutrophication	4.43E-01	kg N eq
Metal depletion	8.58E-01	kg Fe eq
Ozone depletion	3.08E-07	kg CFC-11 eq
Particulate matter formation	4.44E-03	kg PM10 eq
Photochemical oxidant formation	6.71E-03	kg NMVOC
Terrestrial acidification	9.67E-03	kg SO2 eq
Terrestrial ecotoxicity	8.05E-04	kg 1,4 DB eq
Urban land occupation	1.51E-02	m2 x y
Water depletion	1.45E-02	m3

Appendix C2 **Hotspots smart pillbox**

Impact category/part	Power ada	PCB	Tray	Cable	Top lid	EoL	Battery	Bottom lid	Box	Speaker	Electricity	Other	**Total**
Particulate matter formation	31%	18%	12%	12%	6%	1%	5%	4%	4%	2%	1%	4%	**100%**
Photochemical oxidant formation	34%	14%	14%	7%	7%	1%	3%	5%	3%	3%	2%	7%	**100%**
Ionising radiation	48%	26%	4%	3%	2%	0%	3%	0%	4%	3%	5%	2%	**100%**
Ozone depletion	10%	4%	33%	0%	20%	0%	1%	13%	1%	1%	1%	16%	**100%**
Human toxicity	22%	15%	2%	30%	1%	16%	8%	0%	1%	3%	2%	0%	**100%**
Climate change	26%	14%	16%	2%	8%	15%	2%	6%	3%	2%	4%	2%	**100%**
Water depletion	27%	18%	15%	5%	12%	1%	3%	3%	8%	2%	2%	4%	**100%**
Metal depletion	55%	11%	2%	18%	0%	0%	11%	0%	0%	0%	0%	3%	**100%**
Agricultural land occupation	16%	12%	1%	4%	2%	0%	2%	0%	58%	2%	2%	1%	**100%**
Fossil depletion	29%	15%	20%	2%	9%	0%	2%	8%	4%	0%	4%	7%	**100%**
Freshwater ecotoxicity	11%	8%	0%	17%	0%	56%	4%	0%	0%	2%	1%	1%	**100%**
Freshwater eutrophication	34%	23%	1%	20%	1%	0%	6%	0%	3%	4%	4%	4%	**100%**
Marine ecotoxicity	11%	8%	0%	18%	0%	54%	5%	0%	0%	2%	1%	1%	**100%**
Marine eutrophication	20%	13%	40%	4%	3%	3%	3%	2%	3%	4%	2%	3%	**100%**
Terrestrial acidification	26%	16%	11%	19%	6%	1%	6%	4%	3%	2%	1%	5%	**100%**
Terrestrial ecotoxicity	9%	20%	2%	8%	1%	37%	3%	0%	20%	0%	0%	0%	**100%**
Urban land occupation	22%	19%	9%	23%	2%	1%	8%	0%	6%	4%	2%	4%	**100%**

cut-off 0.001

Sensitivity analyses

Cable

Changes in percentage	Cable uns	Cable, com	Difference	
Particulate matter formation (PM	12%	8%	*-4%*	
Photochemical oxidant formation	7%	5%	*-2%*	
Human toxicity	30%	19%	*-11%*	copper
Metal depletion	18%	10%	*-8%*	

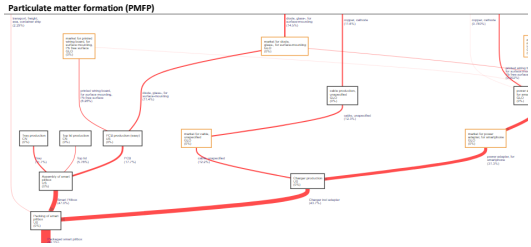
Battery

Changes in percentage	Battery	Battery, sel	Difference	
Ionising radiation	3%	10%	*7%*	higher uranium tailing
Marine eutrophication	3%	6%	*3%*	
Metal depletion	11%	15%	*4%*	
Urban land occupation	8%	13%	*5%*	
Water depletion	3%	25%	*22%*	Cobalt industry, electricity.
Particulate matter formation	5%	7%	*2%*	

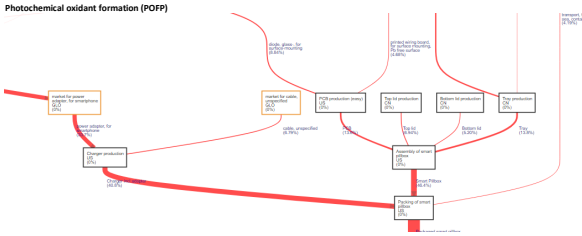
POM - PC or Nylon	Tray			Bottom lid			
Changes in percentage	PC	Nylon	Difference	PC	Nylon	Difference	
Marine eutrophication	40%	46%	*6%*	2%	6%	*4%*	
Photochemical oxidant formation	14%	18%	*4%*	5%	7%	*2%*	
Ozone depletion	33%	2%	*-31%*	13%	0%	*-13%*	upsteam poly carbonate

Appendix C3 **Pictures hotspots**

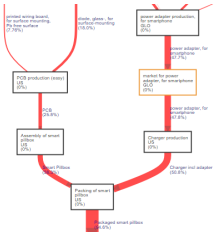
Particulate matter formation (PMFP)



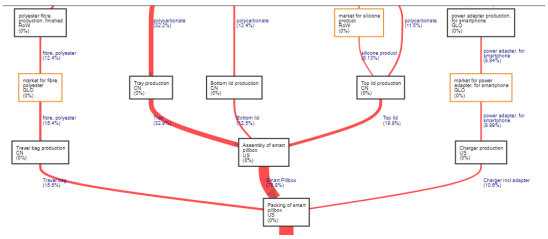
Photochemical oxidant formation (POFP)



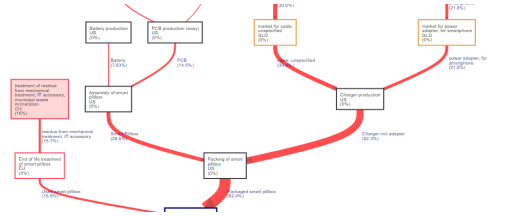
Ionising radiation (IRP_HE)



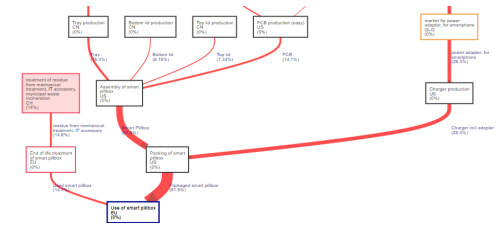
Ozone depletion (ODPinf)



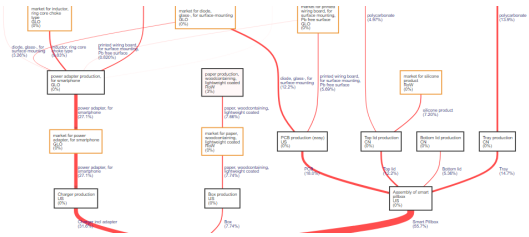
Human toxicity (HTPinf)



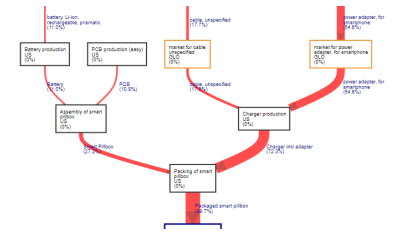
Climate change (GWP100)



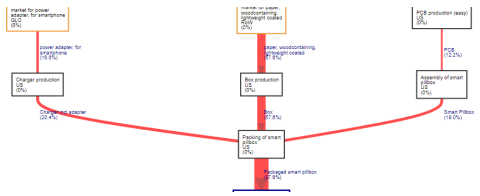
Water depletion (WDP)



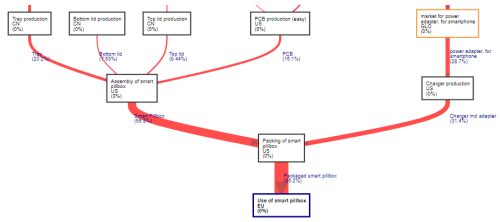
Metal depletion (MDP)



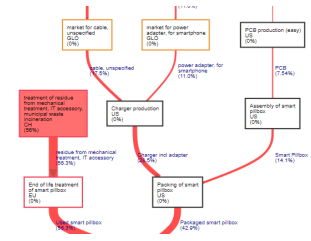
Agricultural land occupation | ALOP



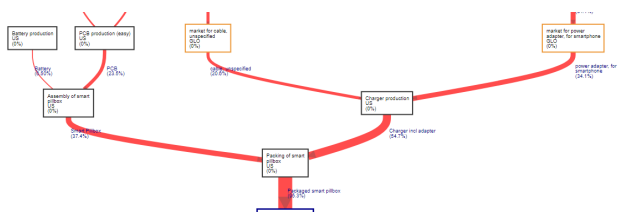
Fossil depletion | FDP



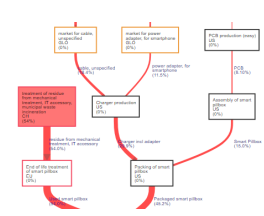
Freshwater ecotoxicity | FETPinf



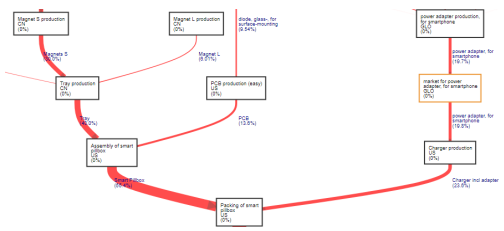
Freshwater eutrophication | FEP



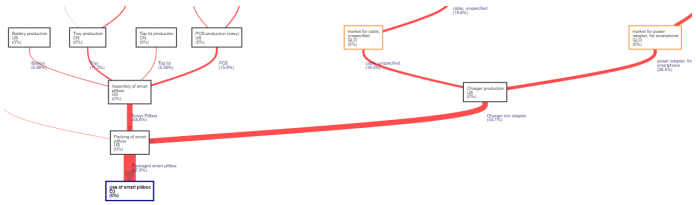
Marine ecotoxicity | METPinf



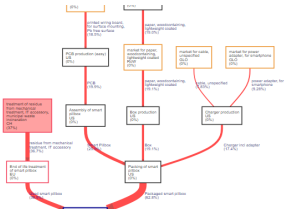
Marine eutrophication | MEP



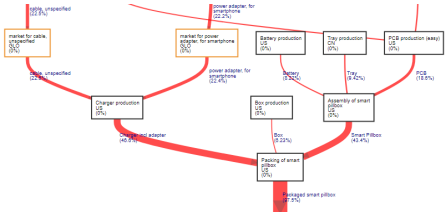
Terrestrial acidification | TAP100



Terrestrial ecotoxicity | TETPinf



Urban land occupation | ULOP



CIRCULAR PRODUCT READINESS

TU Delft 2022

1. STRATEGY & PLANNING

1.1 BUDGET AVAILABILITY FOR CIRCULAR PRODUCT DESIGN

1.1.1 *Has your company made a budget available for circular design?*

☐ Yes	1
☐ This is initiated	0.8
☐ This is planned	0.4
☑ This is not considered	0

1.2 ACCESS TO CIRCULAR DESIGN EXPERTISE

1.2.1 *Does your company have access to circular design expertise?*

This could be circular design expertise internally or from an external party, such as advisors, consultancies, etc.

☑ Yes, we have access to either internal and/ or external expertise	1
☐ We are in the process of acquiring (additional) expertise	0.8
☐ We are planning to acquire additional expertise	0.4
☐ No, we do not have access to circular design expertise	0
☐ N/A	-

1.2.2 *Does your company have channels to exchange product design information with stakeholders, like repair and remanufacturing technicians?*

☑ Yes, we have access to either internal and/ or external expertise	1
☐ We are in the process of acquiring (additional) expertise	0.8
☐ We are planning to acquire additional expertise	0.4
☐ No, we do not have access to circular design expertise	0
☐ N/A	-

1.3 CUSTOMER RESEARCH ATTUNED TO NEEDS IN ALL USE-CYCLES

1.3.1 *To what extent are the needs of customers not only considered in the first use-cycle, but also in the subsequent use-cycles of the product?*

☑ This is the norm	1
☐ This is initiated	0.8
☐ This is planned	0.4
☐ This is not considered	0
☐ N/A	-

1.4 CIRCULAR VALUE PROPOSITION DESIGN

1.4.1 *Does the circular value proposition and its related service and product offer new benefits to customers?*

☐ Yes, there are new benefits to this circular value proposition	1
☐ We are in the process of adding new benefits	0.4
☑ No, there are no new benefits to this circular value proposition	0
☐ N/A	-

1.4.2 *To what extent does value proposition design support high product quality not only in the first use-cycle but also in subsequent use-cycles for the products?*

☑ This is the norm	1
☐ This is initiated	0.8
☐ This is planned	0.4
☐ This is not considered	0

2. HARDWARE & SOFTWARE DESIGN

2.1 MATERIALS

2.1.1 *What fraction of the material value, by cost price, consists of recycled and/ or reused materials calculated over all use-cycles?*

This can be calculated using the following formula: (cost price of recycled and reused materials / cost price of materials in total) x 100%. For products with multiple use-cycles, the average of this fraction over the use-cycles can be calculated.

☐ 0%	*0*
☑ 1 - 19%	*0.4*
☐ 20 - 39 %	*0.6*
☐ 40 - 69%	*0.8*
☐ 70 - 100%	*1*

2.1.2 *What amount of the material value, by cost price, consists of critical materials?*

Critical materials for product designers are defined by Peck et al. (2015) as "elements from the periodic table of elements (metals/ rare earths) that may be at risk of price volatility and supply restrictions, they are often present in small quantities in technology products, substitution usually changes a product's properties and/ or performance." Examples of common critical materials to the EU are the following: Lithium, Beryllium, Magnesium, Scandium, Chromium, Cobalt, Gallium, and Germanium (Bauer et al. 2010).

☐ €0	*1*
☑ €0 - 0.09	*0.8*
☐ €0.1 - 0.19	*0.6*
☐ €0.2 - 0.4	*0.4*
☐ €0.4	*0*

2.1.3 *What amount of the material value, by cost price, consists of conflict materials?*

Conflict minerals refer to raw materials or minerals that come from a particular part of the world where conflict is occurring (i.e. those specifically associated with armed conflict, human rights abuses and corruption) that affect the mining and trading of those materials (Diemer et al. 2021). Examples of common conflict materials include the 3TG: tantalum, tin, tungsten, and gold.

☑ €0	*1*
☐ €0 - 0.09	*0.8*
☐ €0.1 - 0.19	*0.6*
☐ €0.2 - 0.4	*0.4*
☐ €0.4	*0*

2.1.4 *Does the product contain easily separable biodegradable or compostable components?*

☐ The product is fully biodegradable or compostable	*1*
☐ The product contains biodegradable and compostable components that are easy to separate	*1*
☐ The product contains biodegradable and compostable components that are hard to separate	*0*
☑ The product does not contain any biodegradable or compostable components	*-*

2.1.5 *Does the product contain composite materials that are designed to last?*

A composite material is a combination of two materials with different physical and chemical properties. Materials commonly used for composites are polymers, metals and ceramics.

☐ The composite materials used in this product are recyclable	*1*
☑ The product contains composite materials that are easy to separate and designed to last	*0.6*
☐ The product contains composite materials that are easy to separate, but not designed to last	*0.2*
☐ The product contains composite materials that are hard to separate	*0*
☐ No, the product does not contain any composite materials	*-*

2.1.6 *Does the product packaging consist of recyclable, biodegradable, or compostable materials?*

☑ Yes, the packaging is fully recoverable	*1*
☐ The packaging is partly recoverable	*0.8*
☐ This is planned	*0.4*
☐ The packaging is not recoverable	*0*
☐ N/A	*-*

2.2 LONGEVITY

2.2.1 *How does the total lifetime of the product compare to the market average?*

Compare the expected total lifetime of your product to the market average.

☑ Higher than average	*1*
☐ Equal to average	*0.8*
☐ Lower than average	*0*

2.2.2 *After what period of time will the user experience noticeable degradation of the product?*

For example degradation due to (cosmetic) wear, battery life, and corrosion.

☑ From 100% of the expected lifetime	*1*
☐ Between 75-100% of the expected lifetime	*0.8*
☐ Between 50-74% of the expected lifetime	*0.4*
☐ Between 0-49% of the expected lifetime	*0*

2.2.3 *Does the product (information) indicate what components are critical to the duration of either the technical lifetime or the economic lifetime (i.e. relevance to the market)?*

☐ Yes, all key parts are indicated	*1*
☐ Only for a selection of key parts	*0.6*
☐ No key parts are indicated	*0*
☑ N/A	*-*

2.2.4 *Does the product allow for enhancing a product's functionality and/or cosmetic condition throughout its lifetime?*

For example by having a modular or upgradable design.

☑ Yes, for all key parts	*1*
☐ Only for a selection of key parts	*0.8*
☐ This is planned	*0.4*
☐ There are options for enhancement	*0*
☐ N/A	*-*

2.2.5 *Is the product designed to have a timeless aesthetic?*

☑ This is the norm	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

2.3 STANDARDIZATION ACROSS THE PRODUCT PORTFOLIO

2.3.1 *Is Design for Standardization applied throughout the whole product portfolio to support recovery options?*

Design for Standardization aims for standardizing selected parts throughout the product portfolio (e.g. between product generations) over time.

☑ This is the norm	*1*
☐ This is the norm for a sub-set of products	*0.8*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

2.3.2 *Is (backward) compatibility applied throughout the whole product portfolio to support recovery options?*

Part compatibility is based on the interoperability between selected parts for multiple product types, and is dependent on, for example, part dimensions, energy uptake, interfaces, and software versions.

☑ This is the norm	*1*
☐ This is the norm for a sub-set of products	*0.8*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	

2.4 MAINTENANCE & REPAIR

2.4.1 *Is the product designed for ease of maintenance?*

For example, if the product requires regular cleaning, does the design of the product enable this?

☑ This is the norm	*1*
☐ This is the norm for a sub-set of products	*0.8*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

2.4.2 *Does the product come with information, like a manual, on how to take care of it?*

☑ Yes, for all parts that require maintenance	*1*
☐ Only for a selection of parts that require maintenance	*0.6*
☐ No information about how to maintain the product quality is provided	*0*
☐ N/A	*-*

2.4.3 *Does the product come with information, like a manual, on how to diagnose faults in key parts?*

- [x] Yes, for all parts that could require repair — *1*
- [ ] Only for a selection of parts that could require repair — *0.6*
- [ ] No information on fault diagnosis is provided — *0*
- [ ] N/A — *-*

2.4.4 *Does the product come with information, like a manual, on how to repair faults for key components? .*

- [x] Yes, for all parts that could require repair — *1*
- [ ] Only for a selection of parts that could require repair — *0.6*
- [ ] No information on the repair of faults is provided — *0*
- [ ] N/A — *-*

2.4.5 *Does the product have visual or auditory design cues supportive of maintenance and repair?*

- [x] Yes, for all parts that could require maintenance or repair — *1*
- [ ] Only for a selection of parts that could require maintenance or repair — *0.6*
- [ ] No, the product has no design cues for maintenance or repair — *0*
- [ ] N/A — *-*

2.4.6 *Is the safety risk for end-users minimized during self-repair of the product?*

For example by avoiding harmful substances.

- [x] Yes, for all parts that could require repair — *1*
- [ ] Only for a selection of parts that could require repair — *0.6*
- [ ] No, the product is not safe to repair by customers — *0*
- [ ] N/A — *-*

2.5 HARDWARE SUPPORTS SOFTWARE UPDATES

2.5.1 *Does the use of software and software support form a bottleneck for products to live longer than the expected lifetime or for the extension of the product lifetime through re-use or remanufacturing?*

- [x] Software support does not form a bottleneck — *1*
- [ ] Extending software support is initiated — *0.8*
- [ ] Extending software support is planned — *0.4*
- [ ] Software support forms a bottleneck — *0*
- [ ] This product does not use any software — *-*

3. CUSTOMER EXPERIENCE & CARE

3.1 USER AND PRODUCT ON- AND OFFBOARDING

3.1.1 *Are the obligations and responsibilities for access, use, and end-of-life of a product communicated to end-users*?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for on- and offboarding.

- ☐ Yes — *1*
- ☐ No — *0*
- ☑ N/A — *-*

3.1.2 *Is the onboarding process tested with end-users* on clarity and convenience?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for on- and offboarding.

- ☑ Yes, this process is tested and provides clarity and convenience — *1*
- ☐ Only a limited amount of clarity and convenience are provided for onboarding — *0.6*
- ☐ The development of a clear and convenient onboarding process is in development — *0.4*
- ☐ No, clarity and convenience are not maximized for the onboarding process — *0*
- N/A

3.1.3 *Is the end-user* supported in letting go of the product at the end of life, emotionally and/ or practically?*

*For example by supporting them with clearing personal data from the product. *For companies operating in a business to business context, this may not concern the end-user but another party responsible for on- and offboarding.

- ☑ Yes, the customer is supported — *1*
- ☐ Only a limited amount of support is provided — *0.6*
- ☐ No, the customer is not supported — *0*
- ☐ N/A — *-*

3.2 PRODUCT USE-EFFICIENCY PORTFOLIO

3.2.1 *Does the product maximize the use-efficiency of consumables, compared to the market average?*

For example by technologies and innovations that enable energy and water use efficiency. Consumables are goods that are used up while using a product, such as water, energy, ink, paper, and cleaning agents.

- ☑ The use-efficiency is higher than the market average — *1*
- ☐ The use-efficiency is equal to the market average — *0.6*
- ☐ The use-efficiency is lower than the market average — *0*
- ☐ This product does not use consumables — *-*

3.2.2 *Does the product activate end-users to opt for sustainable use options?*

For example by a button for energy or water saving modes.

- ☐ Yes — *1*
- ☐ This is initiated — *0.8*
- ☐ This is planned — *0.4*
- ☑ This is not considered — *0*
- ☐ N/A — *-*

3.2.3 *Does the product require the use of consumables that contain critical or conflict materials?*

For example coffee beans that are obtained from conflict zones.

- ☐ No, the customer can select consumables that are free of critical or conflict materials — *1*
- ☐ Yes, the customer is restricted to a selection of consumables that contain critical or conflict materials — *0*
- ☑ N/A — *-*

3.2.4 *Does the product require the use of consumables that contain contents that can be hazardous to the environment in which they are discarded?*

For example the use of laundry detergents that contain hazardous chemicals

- ☐ No, the customer can select consumables that are free of critical or hazardous contents — *1*
- ☐ Yes, the customer is restricted to a selection of consumables that contain hazardous contents — *0*
- ☑ N/A — *-*

4. PRODUCT SUPPORT SERVICES

4.1 WARRANTY

4.1.1 *Does the product's warranty period last longer than what is legally required?*

☐ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☑ N/A	*-*

4.1.2 *Are products that are returned by the end-user* as part of warranty repaired, refurbished or remanufactured?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for returning products.

☑ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

4.2 PROFESSIONAL SUPPORT SERVICE FOR MAINTENANCE, REPAIR AND UPGRADES

4.2.1 *Does your company, or partnered companies, offer in-warranty maintenance & repair services for the product?*

☑ Yes	*1*
☐ Only for specific defects	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

4.2.2 *Does your company, or partnered companies, offer any paid maintenance & repair support service for the product?*

☐ Yes	*1*
☐ Only for specific defects	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☑ N/A	*-*

4.2.3 *Is the end-user informed about the availability of a professional maintenance and repair service?*

☑ Yes	*1*
☐ No	*0*
☐ N/A	*-*

4.2.4 *Does your company, or partnered companies, offer an upgrade service for your product?*

Examples are upgrading the memory of a laptop and exchanging the armrest of an office chair.

☑ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

4.2.5 *Is the end-user informed about the possibility to upgrade the product?*

☑ Yes	*1*
☐ No	*0*
☐ N/A	*-*

4.3 SPARE PART SUPPLY

4.3.1 *Are the spare parts to support self-repair by end-users affordable?*

☑ Yes	*1*
☐ No	*0*
☐ N/A	*-*

4.3.2 *Does your company produce extra spare parts for recovery, to enable refurbishment or remanufacturing?*

☑ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

4.3.3 *Can end-users* return their used parts, that they have replaced, to your company?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for returning parts.

☑ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

4.3.4 *Are parts that are returned by the end-user* repaired, refurbished or remanufactured?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for returning parts.

☑ Yes	*1*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

5. RECIRCULATION SERVICE

5.1 RECIRCULATION SERVICE

5.1.1 *Does your company have a program to actively retrieve products from the market?*

☐ Yes	*1*
☑ No	*0*
☐ N/A	*-*

5.1.2 *What percentage of the sold products are returned to the company or to partnered companies?*

This includes returned part from buy-back schemes and pay-per service models.

☐ 0%	*0*
☑ 1-9%	*0.4*
☐ 10-19%	*0.6*
☐ 20-49%	*0.8*
☐ 50-100%	*1*

5.1.3 *Are end-users* informed about the product return options?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for returning products.

☑ Yes	*1*
☐ No	*0*
☐ N/A	*-*

5.1.4 *At what point are end-users* informed about the possible return options?*

*For companies operating in a business to business context, this may not concern the end-user but another party responsible for returning products.

☑ During product purchase	*1*
☐ During use, at end-of-use, or at end-of-life of a product	*0.8*
☐ N/A	*-*

5.2 PRODUCT RETRIEVAL

5.2.1 *Does the company provide re-usable packaging for return options?*

For example in case the product requires protection during transport.

☑ Yes	*1*
☐ A non-reusable replacement packaging is provided	*0.8*
☐ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

6. RECOVERABILITY

6.1 DISASSEMBLY

6.1.1 *Does your company list the key parts for disassembly?*

Key parts that should be accessible for repair, upgrades, refurbishment and remanufacturing

✓ Yes, all key parts are listed	1
Only a selection of key parts is listed	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.1.2 *Is product disassembly optimised for time, cost efficiency, simplicity and tool availability?*

For example, by optimizing the joints and connections, minimizing the risk of damage, minimizing tool and equipment complexity, and reducing the number of product components.

✓ Yes, all key parts are listed	1
Only for a selection of key parts	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.2 REFURBISHMENT

6.2.1 *Does your company list what parts make the refurbishment operations feasible and viable?*

✓ Yes, all key parts are listed	1
Only a selection of key parts is listed	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.2.2 *Which fraction of the material value, by cost price, can be refurbished?*

Calculated by dividing the cost price of the materials that can be refurbished by the total cost price of materials

0%	0
1-19%	0.4
20-49%	0.6
50-69%	0.8
✓ 70-100%	1

6.2.3 *Does your company provide refurbishment instructions and protocols to the relevant departments or third parties?*

✓ Yes	1
Only informal instructions are provided	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.2.4 *Does your company have a clear diagnosis procedure for products returning from the market?*

✓ Yes	1
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.3 REMANUFACTURING

6.3.1 *Does your company list what parts make the remanufacturing operations feasible and viable?*

Yes, all key parts are listed	1
Only a selection of key parts is listed	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
✓ N/A	-

6.3.2 *Which fraction of the material value, by cost price, can be remanufactured?*

Calculated by dividing the cost price of the materials that can be remanufactured by the total cost price of materials

0%	0
1-19%	0.4
20-49%	0.6
50-69%	0.8
✓ 70-100%	1

6.3.3 *Does your company provide refurbishment instructions and protocols to the relevant departments or third parties?*

✓ Yes	1
Only informal instructions are provided	0.8
This is initiated	0.8
This is planned	0.4
This is not considered	0
N/A	-

6.3.4 *Does your company have a clear diagnosis procedure for products returning from the market?*

☐ Yes	*1*
☑ This is initiated	*0.8*
☐ This is planned	*0.4*
☐ This is not considered	*0*
☐ N/A	*-*

6.4 RECYCLING

6.4.1 *Which fraction of the material value, by cost price, can be recycled?*

Calculated by the price of materials that can be recycled divided by the total cost price of materials.

☐ 0%	*0*
☐ 1-19%	*0.4*
☐ 20-49%	*0.6*
☐ 50-69%	*0.8*
☐ 70-100%	*1*
☑	

6.4.2 *Does the product fall apart into separate homogeneous or compatible material fragments in the shredding process?*

☐ Yes	*1*
☐ Only for a selection of parts	*0.6*
☐ No	*0*
☑ N/A	*-*

6.4.3 *Are general recycling processes available for the materials in your product?*

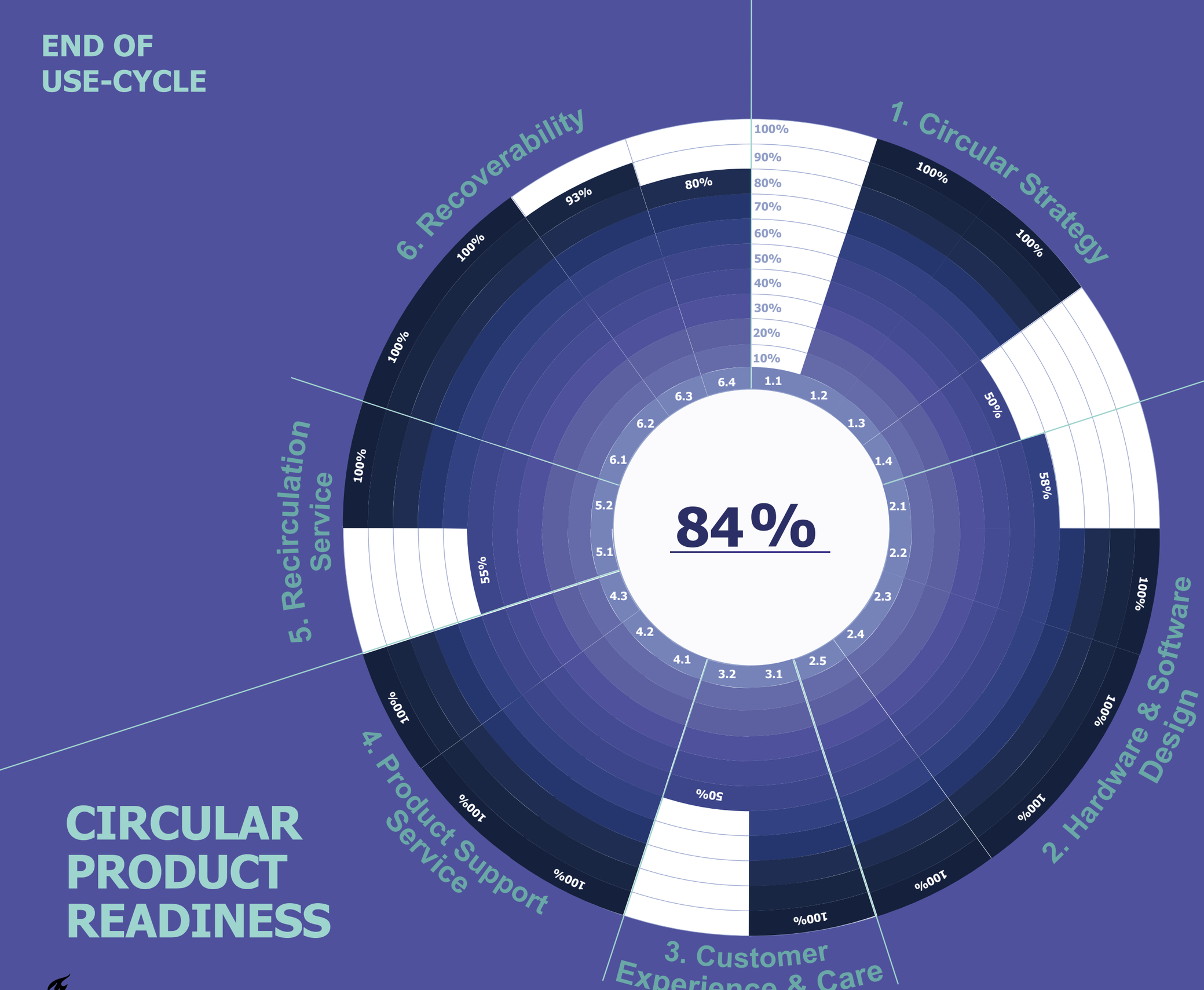
☐ Yes	*1*
☑ Only for a selection of the recyclable materials	*0.6*
☐ No	*0*
☐ N/A	*-*

6.4.4 *Is there an End-of-Use repurposing plan for the materials that are non-recyclable?*

☐ Yes	*1*
☐ Only for a selection of the non-recyclable materials	*0.6*
☐ No	*0*
☑ N/A	*-*

END OF USE-CYCLE

STRATEGY & PLANNING



CIRCULAR PRODUCT READINESS

TU Delft

STRATEGY & PLANNING

1. CIRCULAR STRATEGY
- 1.1 Design budget
- 1.2 Know-how
- 1.3 Customer research
- 1.4 Value proposition

PRODUCTS IN USE

2. HARDWARE & SOFTWARE DESIGN
- 2.1 Materials
- 2.2 Longevity
- 2.3 Standardization
- 2.4 Maintenance & repair
- 2.5 Software support

3. CUSTOMER EXPERIENCE & CARE
- 3.1 On- & off-boarding
- 3.2 Use efficiency

4. PRODUCT SUPPORT SERVICE
- 4.1 Warranty
- 4.2 Professional support
- 4.3 Spare part supply

END OF USE-CYCLE

5. RECIRCULATION SERVICE
- 5.1 Return program
- 5.2 Product retrieval

6. RECOVERABILITY
- 6.1 Disassembly
- 6.2 Refurbishment
- 6.3 Remanufacturing
- 6.4 Recycling

PRODUCTS IN USE

CIRCULAR PRODUCT READINESS

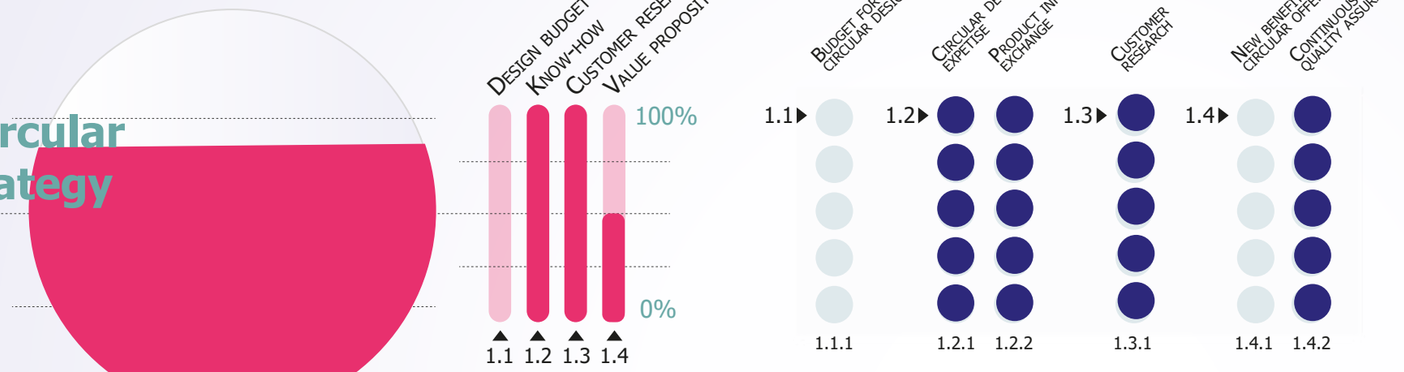
European Commission | Horizon 2020 European Union funding for Research & Innovation

TU Delft

Content development Nina Boorsma, Esra Polat & Prof. Dr. Conny Bakker
Design Nina Boorsma

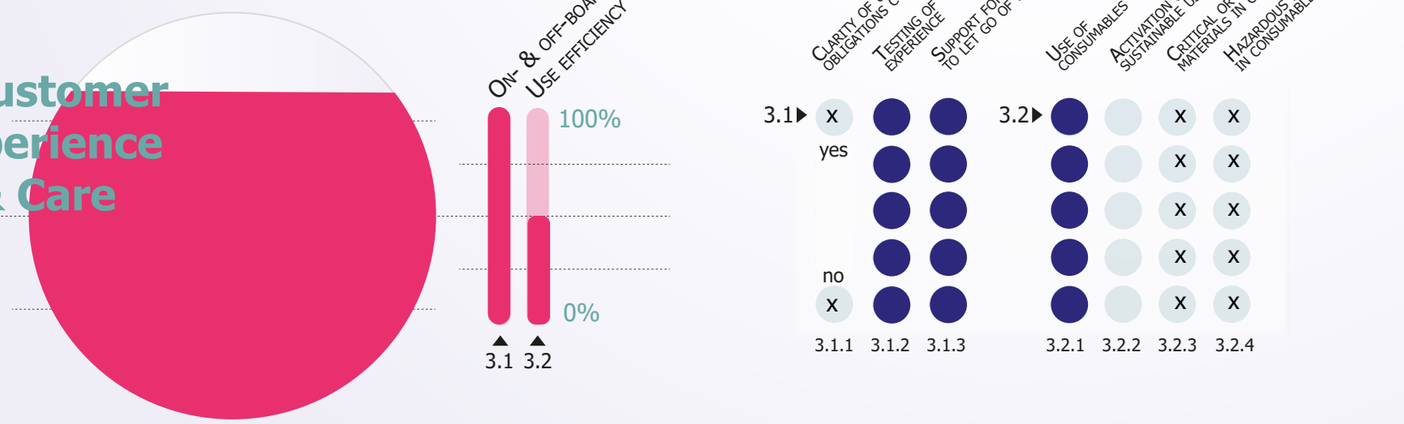
Company | **Product** | **Owner** | **Date**

1. Circular Strategy



2. Hardware & Software Design

3. Customer Experience & Care



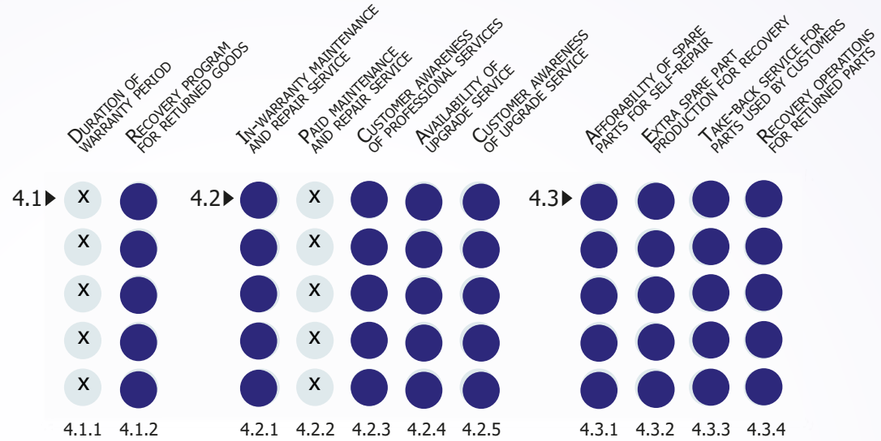
Average score for a theme | Average score for an indicator | 0.2 points | Question is out of scope

CIRCULAR PRODUCT READINESS

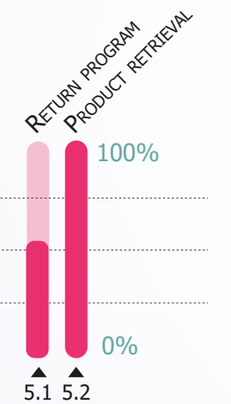
European Commission | Horizon 2020 European Union funding for Research & Innovation

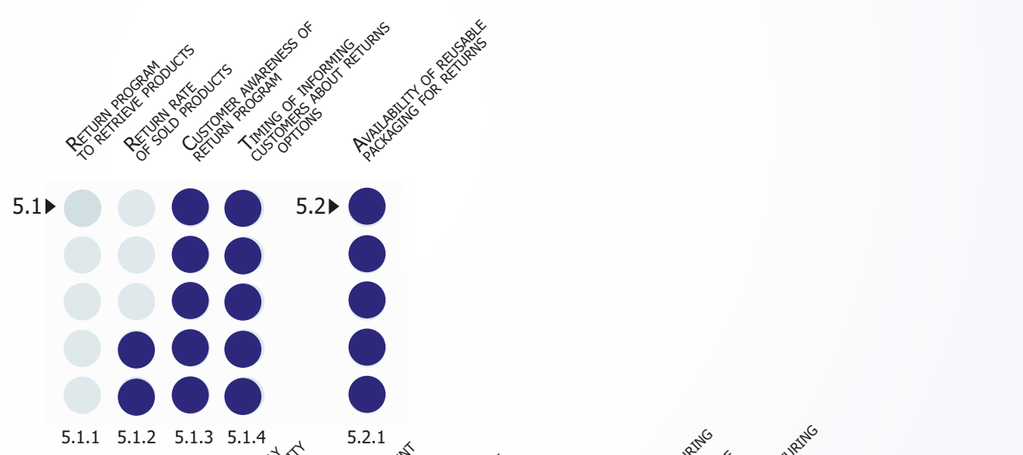
TU Delft

4. Product Support Services

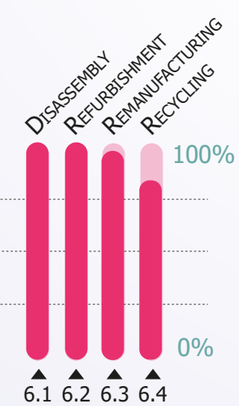


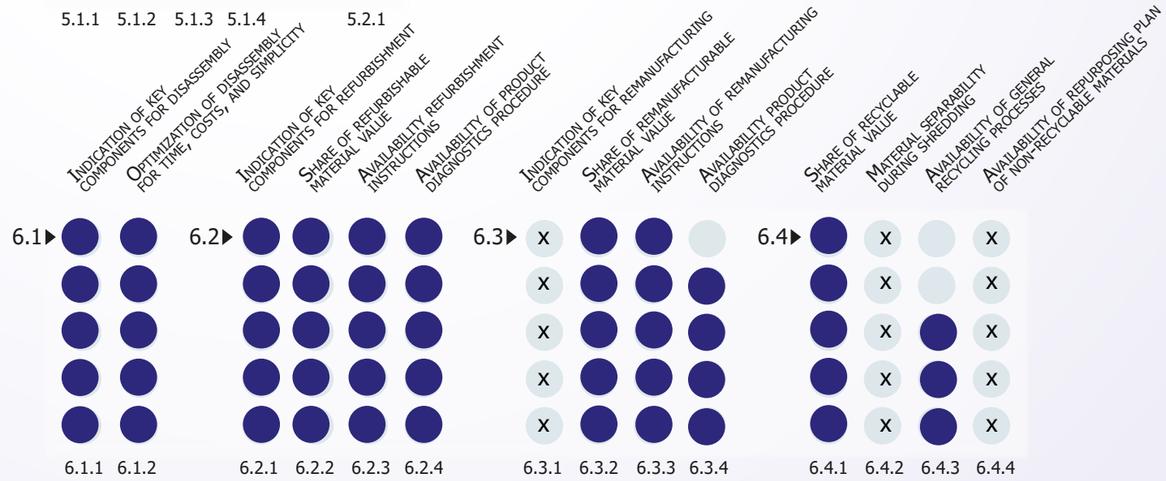
5. Recirculation Service





6. Recoverability



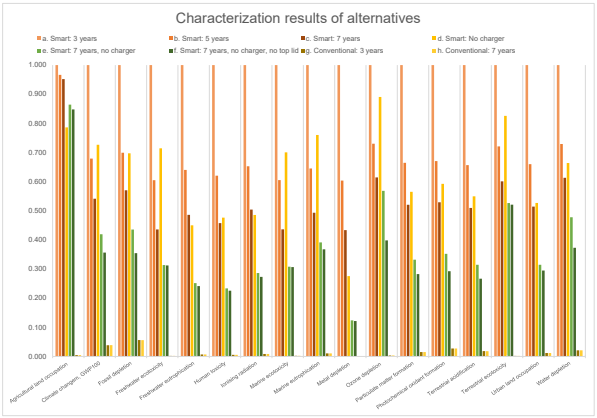


Overview Appendix E

Appendix 1.1 **Impact Midpoint**

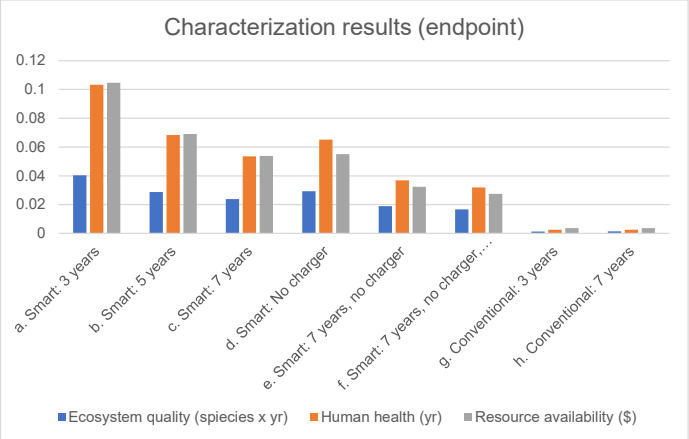
	index	amount	unit	rence pro	name	location	database	agricult	V1.13 | clin	V1.13 | fd	freshw	freshw	V1.13 | hu	ion	V1.13 | mari	V1.13 | mari	V1.13 | mi	natural la	V1.13 | ozo	particula	photochem	terrestr	terrest	V1.13 | urban	V1.13 | water depletion	WDP
0	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox smart normal	0.1264	1.9166	0.5332	0.5190	0.0009	1.8274	0.1316	0.4434	0.0007	0.8580	-0.0001	0.0000	0.0044	0.0067	0.0097	0.0008	0.0151	0.01459		
1	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox: 5 years	0.1221	1.3013	0.3728	0.3140	0.0006	1.1336	0.0859	0.2684	0.0004	0.5179	-0.0001	0.0000	0.0029	0.0045	0.0063	0.0006	0.0100	0.01064		
2	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox: 7 years	0.1203	1.0376	0.3041	0.2262	0.0004	0.8363	0.0663	0.1934	0.0003	0.3721	-0.0001	0.0000	0.0023	0.0035	0.0049	0.0005	0.0078	0.00895		
3	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox: no charger	0.0994	1.3925	0.3718	0.3707	0.0004	0.8708	0.0639	0.3106	0.0005	0.2368	-0.0001	0.0000	0.0025	0.0040	0.0053	0.0007	0.0080	0.00969		
4	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox: 7 years, no charg	0.1092	0.8039	0.2322	0.1628	0.0002	0.4268	0.0377	0.1366	0.0003	0.1063	0.0000	0.0000	0.0015	0.0024	0.0030	0.0004	0.0048	0.00697		
5	Taking medication on time 2 times a d	1	years	Taking me	Use of sm	EU	Pillbox: 7 years, no charg	0.1072	0.6834	0.1891	0.1621	0.0002	0.4125	0.0359	0.1360	0.0002	0.1043	0.0000	0.0000	0.0013	0.0020	0.0026	0.0004	0.0045	0.00544		
	Taking medication 2 times a day with	1	years	Taking me	Use of pill	NL	Pillbox conventional 7 da	0.0006	0.0742	0.0300	0.0010	0.0000	0.0100	0.0011	0.0010	0.0000	0.0008	0.0000	0.0000	0.0001	0.0002	0.0002	0.0000	0.0002	0.00031		
	Taking medication 2 times a day with	1	years	Taking me	Use of pill	NL	Pillbox 7 day: 7 years	0.0006	0.0743	0.0299	0.0010	0.0000	0.0100	0.0011	0.0010	0.0000	0.0008	0.0000	0.0000	0.0001	0.0002	0.0002	0.0000	0.0002	0.00031		
							max	0.1264	1.9166	0.5332	0.5190	8.91E-04	1.8274	0.1316	0.4434	6.72E-04	0.8580	-9.34E-07	3.08E-07	4.43E-03	0.0067	0.0097	8.06E-04	0.0151	0.01459		

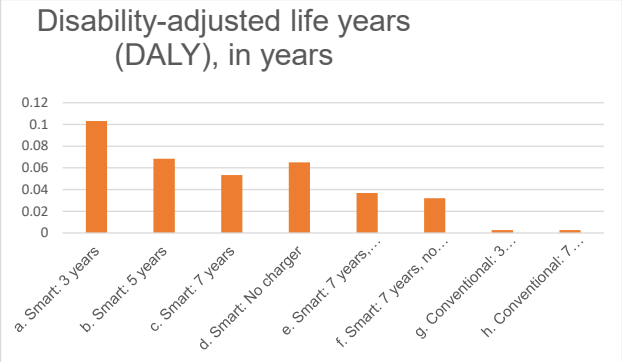
Scenarios	Agricultural land occup	land occup change |	depletion	ecotoxicit	eutrophi	toxicity |	radiation	cotoxicity	trophicat	depletion	depletion |	matter form	oxidant fo	acidificatio	ecotoxicity	id occupatio	depletion |	WDP
	ral land oc	changem,	ssil deplet	water ecot	ter eutro	man toxic	sing radia	ine ecotox	e eutrophi	tal deplet	zone deletic	te matter f	ical oxidan	trial acidifi	strial ecotox	land occupa	ater depletion	
a. Smart: 3 years	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
b. Smart: 5 years	0.966	0.679	0.699	0.605	0.640	0.620	0.653	0.605	0.645	0.604	0.730	0.665	0.670	0.657	0.721	0.660	0.729	
c. Smart: 7 years	0.952	0.541	0.570	0.436	0.486	0.458	0.504	0.436	0.493	0.434	0.614	0.521	0.529	0.510	0.601	0.514	0.613	
d. Smart: No charger	0.786	0.727	0.697	0.714	0.450	0.477	0.486	0.701	0.760	0.276	0.890	0.565	0.593	0.550	0.826	0.527	0.664	
e. Smart: 7 years, no ch	0.864	0.419	0.436	0.314	0.252	0.234	0.286	0.308	0.392	0.124	0.569	0.332	0.352	0.315	0.527	0.315	0.478	
f. Smart: 7 years, no cha	0.848	0.357	0.355	0.312	0.241	0.226	0.273	0.307	0.368	0.122	0.398	0.283	0.293	0.267	0.521	0.295	0.373	
g. Conventional: 3 years	0.005	0.039	0.056	0.002	0.007	0.005	0.009	0.002	0.011	0.001	0.003	0.015	0.027	0.018	0.002	0.012	0.021	
h. Conventional: 7 years	0.005	0.039	0.056	0.002	0.007	0.005	0.009	0.002	0.011	0.001	0.003	0.015	0.027	0.018	0.002	0.012	0.021	



Appendix 1.2 Impact Endpoint

index	amount	unit	reference	name	location	database	ReCiPe Enc	ReCiPe Enc	ReCiPe E	ReCiPe Endpoint (H,A) | total | total
Taking mec	1	years	Taking mec	Use of sma	EU	a. Smart: 3 years	0.040337	0.103202	0.1047	0.2482
Taking mec	1	years	Taking mec	Use of sma	EU	b. Smart: 5 years	0.028749	0.068378	0.0691	0.1662
Taking mec	1	years	Taking mec	Use of sma	EU	c. Smart: 7 years	0.023784	0.053454	0.0538	0.1311
Taking mec	1	years	Taking mec	Use of sma	EU	d. Smart: No charger	0.029349	0.065165	0.0551	0.1496
Taking mec	1	years	Taking mec	Use of sma	EU	e. Smart: 7 years, no charger	0.018936	0.036837	0.0323	0.0881
Taking mec	1	years	Taking mec	Use of sma	EU	f. Smart: 7 years, no charger, no	0.016714	0.031979	0.0275	0.0762
Taking mec	1	years	Taking mec	Use of pillt	NL	g. Conventional: 3 years	0.001342	0.002578	0.0036	0.0075
Taking mec	1	years	Taking mec	Use of pillt	NL	h. Conventional: 7 years	0.001345	0.002582	0.0036	0.0075





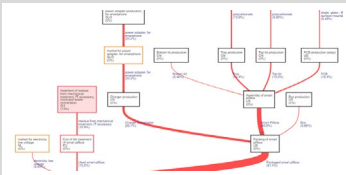
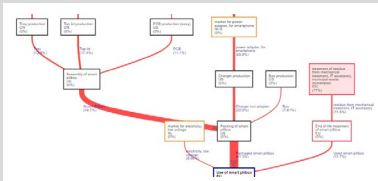
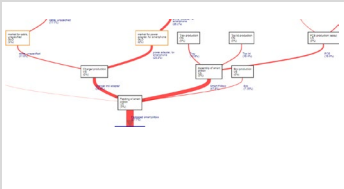
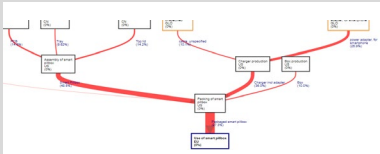
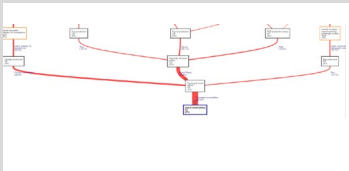
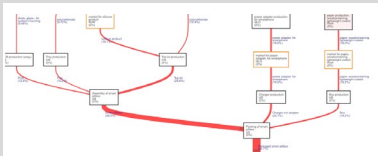
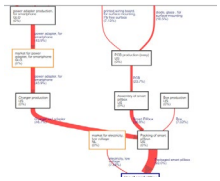
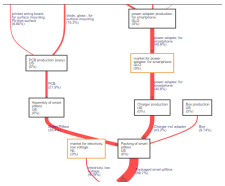
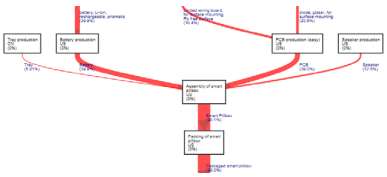
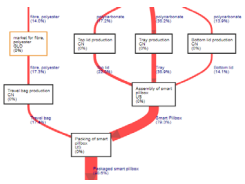
Benefit QALY to DALY

0.37

Benefits of pillboxes

Alternativ	DALY (Da	Benefits (	Benefits -	Overall benefit (QALY)
a. Smart:	0.103	0.37	0.267	0.245
b. Smart:	0.068	0.37	0.302	0.277
c. Smart:	0.053	0.37	0.317	0.291
d. Smart:	0.065	0.37	0.305	0.280
e. Smart:	0.037	0.37	0.333	0.306
f. Smart: 7	0.032	0.37	0.338	0.311
g. Conven	0.003	0.30	0.293	0.270
h. Conven	0.003	0.30	0.293	0.270

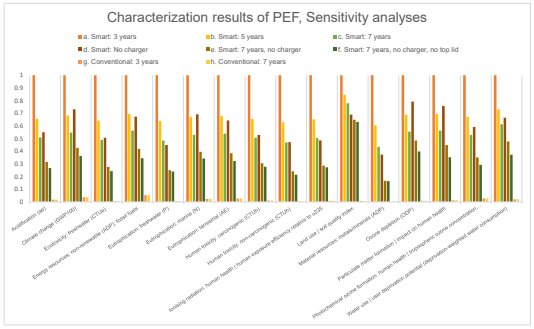
Appendix 2 Hotspot analysis

	Smart: 5 years	Smart: 7 years	Smart: no charger
Climate change			
Particulate matter formation			
Water depletion			
Ionising radiation			
Metal depletion			
Ozone depletion			

Appendix 3.1 **Sensitivity PEF**

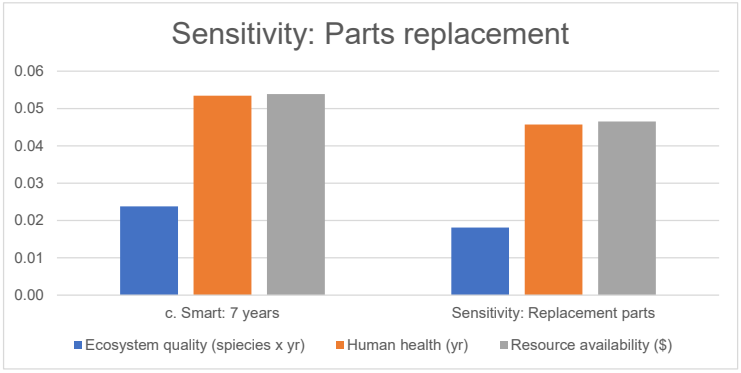
	index	amount	unit	rence pro	name	location	database	ation | ac	nge | glob	biogenic |	: fossil |	gld land use	er | comp	newable |	action of re	action of nu	: terrestri	nogenic |	cinogenic	n health |	land use |	| abiotic	etion | oz	atter form	s: human h	ion potential (deprivation-weighted water consumption)
0	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox smart normal	0.01265	2.02818	2.05E-02	2.00592	1.74E-03	86.3142	21.6532	8.89E-04	2.18E-03	0.02033	1.55E-09	8.57E-08	0.13132	7.10068	1.57E-04	1.45E-07	1.18E-07	0.00669	0.62662
1	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox: 5 years	0.00831	1.38529	0.02052	1.36362	0.00115	55.4633	15.0288	0.00057	0.00146	0.01377	1.01E-09	5.39E-08	0.08574	6.00181	9.51E-05	9.97E-08	8.18E-08	0.00448	0.457
2	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox: 7 years	0.00645	1.10979	0.02052	1.08837	0.0009	42.2418	12.19	0.00043	0.00115	0.01096	7.85E-10	4.03E-08	0.0662	5.53085	6.84E-05	8.04E-08	6.63E-08	0.00354	0.3843
3	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox: no charger	0.00696	1.48354	0.01727	1.46541	8.60E-04	43.7024	14.5848	4.00E-04	0.00151	0.01307	8.18E-10	4.04E-08	0.06379	4.89566	5.88E-05	1.15E-07	8.92E-08	0.00396	0.41612
4	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox: 7 years, no char	0.00399	0.86605	0.01928	0.84624	0.00053	23.8027	9.06609	0.00022	0.00086	0.00782	4.73E-10	2.07E-08	0.0376	4.61075	2.62E-05	7.03E-08	5.29E-08	0.00235	0.29929
	Taking medicatic	1	years	Taking me	Use of sm:	EU	Pillbox: 7 years, no char	0.00338	0.73427	0.01832	0.71545	0.00049	20.971	7.46191	0.00021	0.00075	0.00659	4.30E-10	1.84E-08	0.03588	4.48148	2.58E-05	5.78E-08	4.15E-08	0.00195	0.23379
	Taking medicatic	1	years	Taking me	Use of pilll	NL	Pillbox conventional 7 d	0.00023	0.07665	9.39E-05	0.07654	1.94E-05	0.41081	1.15399	6.16E-06	5.01E-05	0.00054	1.66E-11	3.07E-10	0.00112	0.05706	2.18E-07	1.22E-09	1.55E-09	0.00018	0.01325
	Taking medicatic	1	years	Taking me	Use of pilll	NL	Pillbox 7 day: 7 years	0.00023	0.07683	9.38E-05	0.07671	1.93E-05	0.4103	1.15236	6.15E-06	5.00E-05	0.00054	1.66E-11	3.07E-10	0.00112	0.05698	2.17E-07	1.22E-09	1.54E-09	0.00018	0.01324
							max	0.01265	2.02818	2.05E-02	2.00592	1.74E-03	86.3142	21.6532	8.89E-04	2.18E-03	0.02033	1.55E-09	8.57E-08	0.13132	7.10068	1.57E-04	1.45E-07	1.18E-07	0.00669	0.62662

Smart pillbox	ification	change |				: freshwa	n-renew	ition: fre	cation:	n tion: terr	y: carcin	non-carc	human d	| soil qu	is: metal	depletion	ation | in	health |	l (deprivation-weighted water consumption)
a. Smart: 3 years	1	1	0.99999			1	1	1	1	1	1	1	1	1	1	1	1	1	1
b. Smart: 5 years	0.65696	0.68302	0.99999	0.6798	0.66118	0.64257	0.69407	0.63951	0.67041	0.67752	0.65462	0.62909	0.65288	0.84524	0.60443	0.68799	0.69447	0.67002	0.72931
c. Smart: 7 years	0.50995	0.54718	1	0.54258	0.51598	0.4894	0.56296	0.48501	0.52916	0.53932	0.5066	0.47013	0.50411	0.77892	0.4349	0.55425	0.56355	0.52861	0.61329
d. Smart: No charger	0.55024	0.73146	0.84193	0.73054	0.49292	0.50632	0.67356	0.44928	0.69139	0.64299	0.52776	0.47169	0.48575	0.68946	0.37381	0.79223	0.75748	0.59193	0.66407
e. Smart: 7 years, no c	0.31523	0.42701	0.93998	0.42187	0.30179	0.27577	0.41869	0.25029	0.39571	0.38451	0.30544	0.24125	0.28629	0.64934	0.16676	0.48469	0.44905	0.35136	0.47763
f. Smart: 7 years, no c	0.26715	0.36203	0.89312	0.35667	0.28248	0.24296	0.34461	0.24009	0.34279	0.32397	0.27721	0.21492	0.27323	0.63113	0.16395	0.3985	0.35225	0.29222	0.37309
g. Conventional: 3 yea	0.01834	0.03779	0.00458	0.03816	0.01108	0.00476	0.05329	0.00692	0.02294	0.02659	0.01068	0.00359	0.00855	0.00804	0.00138	0.00843	0.01312	0.02745	0.02115
h. Conventional: 7 yea	0.01832	0.03788	0.00457	0.03824	0.01108	0.00475	0.05322	0.00691	0.02292	0.02656	0.01069	0.00359	0.00853	0.00803	0.00138	0.00842	0.01311	0.02741	0.02112



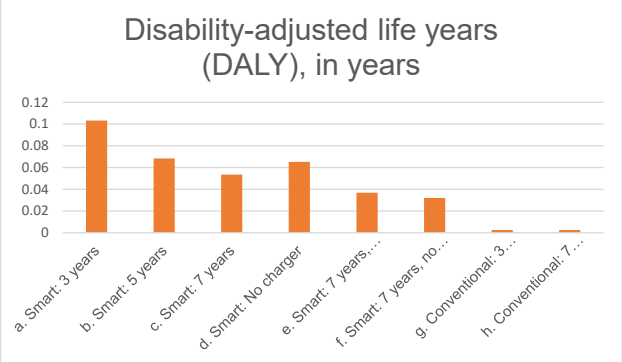
Appendix 3.2 Sensitivity parts replacement

index	amount	unit	reference	name	location	database	ReCiPe En	ReCiPe En	ReCiPe En	ReCiPe Endpoint (H,A) | total | total
Taking me	1	years	Taking me	Use of sma	EU	a. Smart: 3 years	0.04	0.10	0.10	0.25
Taking me	1	years	Taking me	Use of sma	EU	b. Smart: 5 years	0.03	0.07	0.07	0.17
Taking me	1	years	Taking me	Use of sma	EU	c. Smart: 7 years	0.02	0.05	0.05	0.13
Taking me	1	years	Taking me	Use of sma	EU	d. Smart: No charger	0.03	0.07	0.06	0.15
Taking me	1	years	Taking me	Use of sma	EU	e. Smart: 7 years, no charger	0.02	0.04	0.03	0.09
Taking me	1	years	Taking me	Use of sma	EU	f. Smart: 7 years, no charger, no	0.02	0.03	0.03	0.08
Taking me	1	years	Taking me	Use of pillt	NL	g. Conventional: 3 years	0.00	0.00	0.00	0.01
Taking me	1	years	Taking me	Use of pillt	NL	h. Conventional: 7 years	0.00	0.00	0.00	0.01
Taking me	1	years	Taking me	Use of sma	EU	Sensitivity: Replacement parts	0.02	0.05	0.05	0.11



Appendix 3.3 Sensitivity DALY & QALY

index	amount	unit	reference	name	location	database	ReCiPe Enc	ReCiPe Enc	ReCiPe E	ReCiPe Endpoint (H,A) | total | total
Taking mec	1	years	Taking mec	Use of sma	EU	a. Smart: 3 years	0.040337	0.103202	0.1047	0.2482
Taking mec	1	years	Taking mec	Use of sma	EU	b. Smart: 5 years	0.028749	0.068378	0.0691	0.1662
Taking mec	1	years	Taking mec	Use of sma	EU	c. Smart: 7 years	0.023784	0.053454	0.0538	0.1311
Taking mec	1	years	Taking mec	Use of sma	EU	d. Smart: No charger	0.029349	0.065165	0.0551	0.1496
Taking mec	1	years	Taking mec	Use of sma	EU	e. Smart: 7 years, no charger	0.018936	0.036837	0.0323	0.0881
Taking mec	1	years	Taking mec	Use of sma	EU	f. Smart: 7 years, no charger, no	0.016714	0.031979	0.0275	0.0762
Taking mec	1	years	Taking mec	Use of pillb	NL	g. Conventional: 3 years	0.001342	0.002578	0.0036	0.0075
Taking mec	1	years	Taking mec	Use of pillb	NL	h. Conventional: 7 years	0.001345	0.002582	0.0036	0.0075



Benefit QALY to DALY

0.37

Benefits of pillboxes

Alternativ	DALY (Dan	Benefits (D	Benefits - i	Benefits (QALY)
a. Smart:	0.103	0.37	0.267	0.245
b. Smart:	0.068	0.37	0.302	0.277
c. Smart:	0.053	0.37	0.317	0.291
d. Smart:	0.065	0.37	0.305	0.280
e. Smart:	0.037	0.37	0.333	0.306
f. Smart: 7	0.032	0.37	0.338	0.311
g. Conver	0.003	0.30	0.293	0.270
h. Conver	0.003	0.30	0.293	0.270

Sensitivity analyses: QALY difference

Alternativ	DALY (Da	Benefits (	Benefits -	Overall benefit (QALY)
a. Smart:	0.103	0.37	0.267	0.245
b. Smart:	0.068	0.37	0.302	0.277
c. Smart:	0.053	0.37	0.317	0.291
d. Smart:	0.065	0.37	0.305	0.280
e. Smart:	0.037	0.37	0.333	0.306
f. Smart: 7	0.032	0.37	0.338	0.311
g. Conver	0.003	0.37	0.367	0.338
h. Conver	0.003	0.37	0.367	0.338

Sensitivity: benefits only 17% because related to forgetfullness.

Alternativ	DALY (Da	Benefits (	Benefits -	Overall benefit (QALY)
a. Smart:	0.103	0.06	-0.040	-0.037
b. Smart:	0.068	0.06	-0.005	-0.005
c. Smart:	0.053	0.06	0.009	0.009
d. Smart:	0.065	0.06	-0.002	-0.002
e. Smart:	0.037	0.06	0.026	0.024
f. Smart: 7	0.032	0.06	0.031	0.028
g. Conver	0.003	0.05	0.048	0.044
h. Conver	0.003	0.05	0.048	0.044

Sensitivity Break even (QALY-DALY QALY * X = QALY 7-day pillbox

Alternative	Required	Break even with conventional
a. Smart:	0.095	40
b. Smart:	0.063	26
c. Smart:	0.049	21
d. Smart:	0.060	25
e. Smart:	0.034	14
f. Smart: 7	0.029	12
g. Conver	0.002	

h. Conver 0.002

Required QALY to compensate the environmental impact in DALY