VANBERLO

Part of **Accenture**

INNOVATION POWERHOUSE 2 June 2023

Presented by VanBerlo

CONTENT

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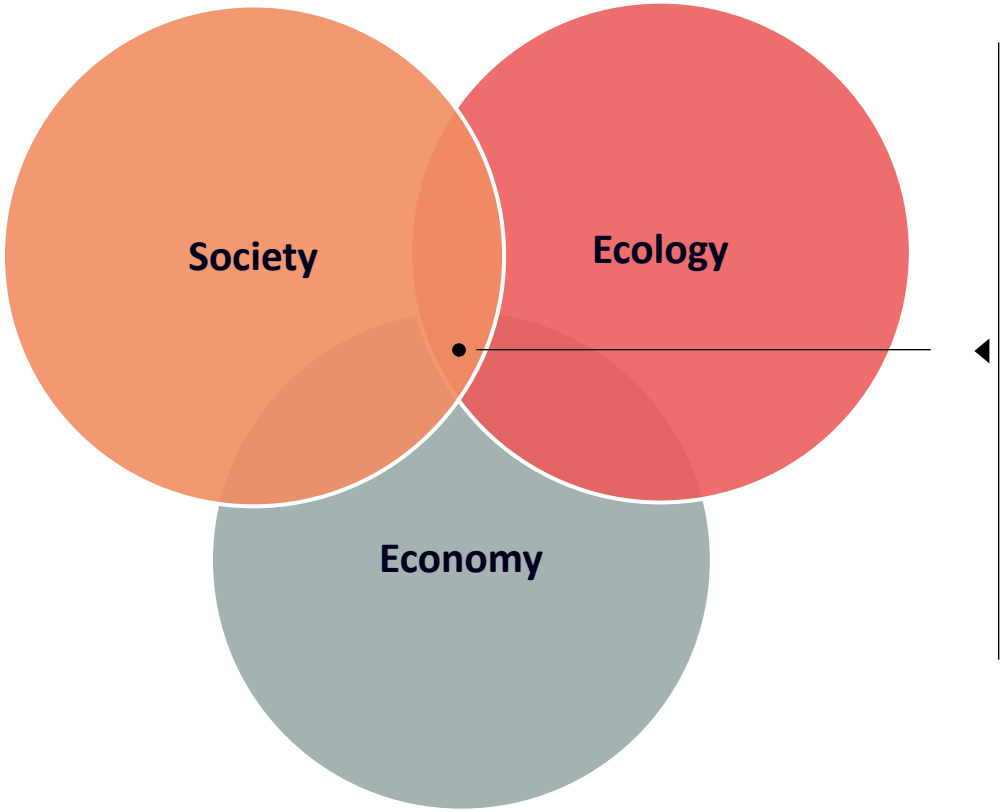
Also referred to as People, Planet, Profit



Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

UN definition of sustainability, Brundtland, 1987

Holistic sustainability.

Going beyond carbon tunnel vision.

Sockholm resilience center: https://www.stockholmresilience.org/research/planetary-boundaries/the-nine-planetary-boundaries.html
SDG: https://unstats.un.org/sdgs/

You can’t have a sustainable product **without a system**

The product system combination makes a product sustainable. The product design empowers the interaction between user and system.

What is a circular economy?

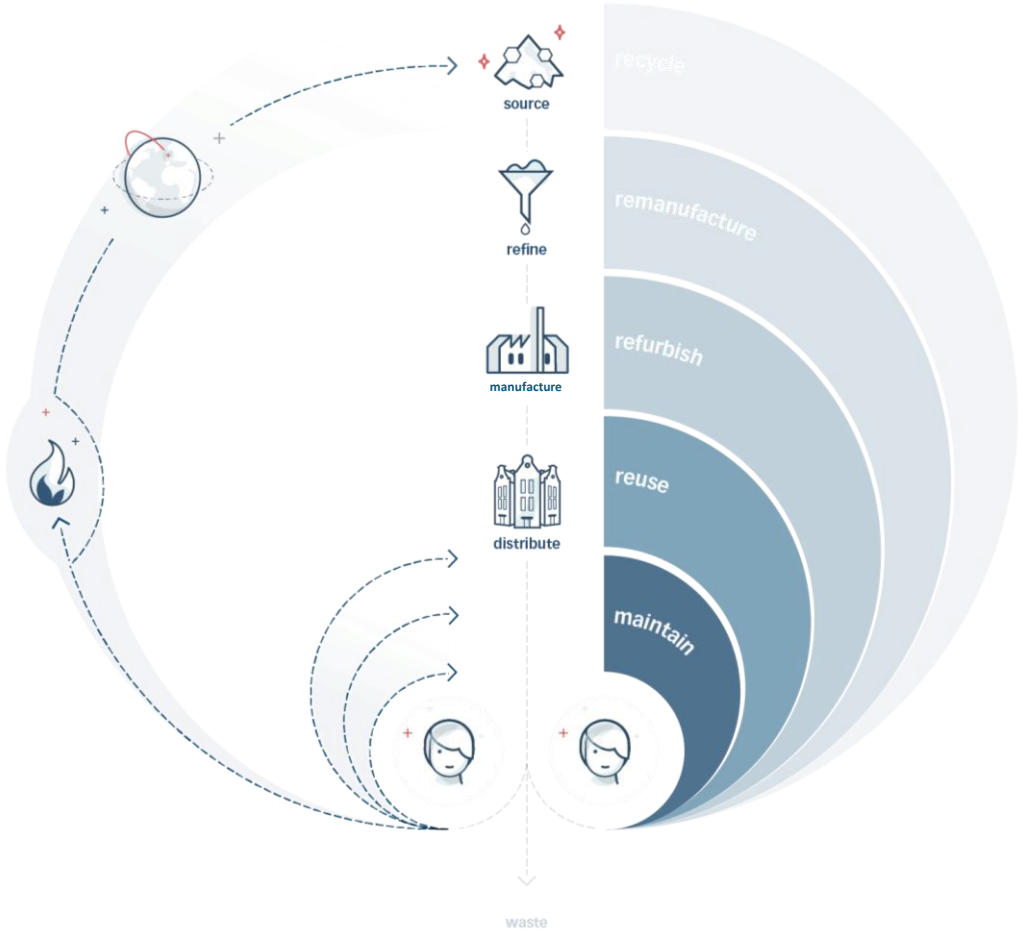
In our current economy, we take materials from the Earth, make products from them, and eventually throw them away as waste – the process is linear. In a circular economy, by contrast, we stop waste being produced in the first place.

The circular economy is based on three principles, driven by design:

- Eliminate waste and pollution
- Circulate products and materials (at their highest value)
- Regenerate nature

It is underpinned by a transition to renewable energy and materials. A circular economy decouples economic activity from the consumption of finite resources. It is a resilient system that is good for business, people and the environment.

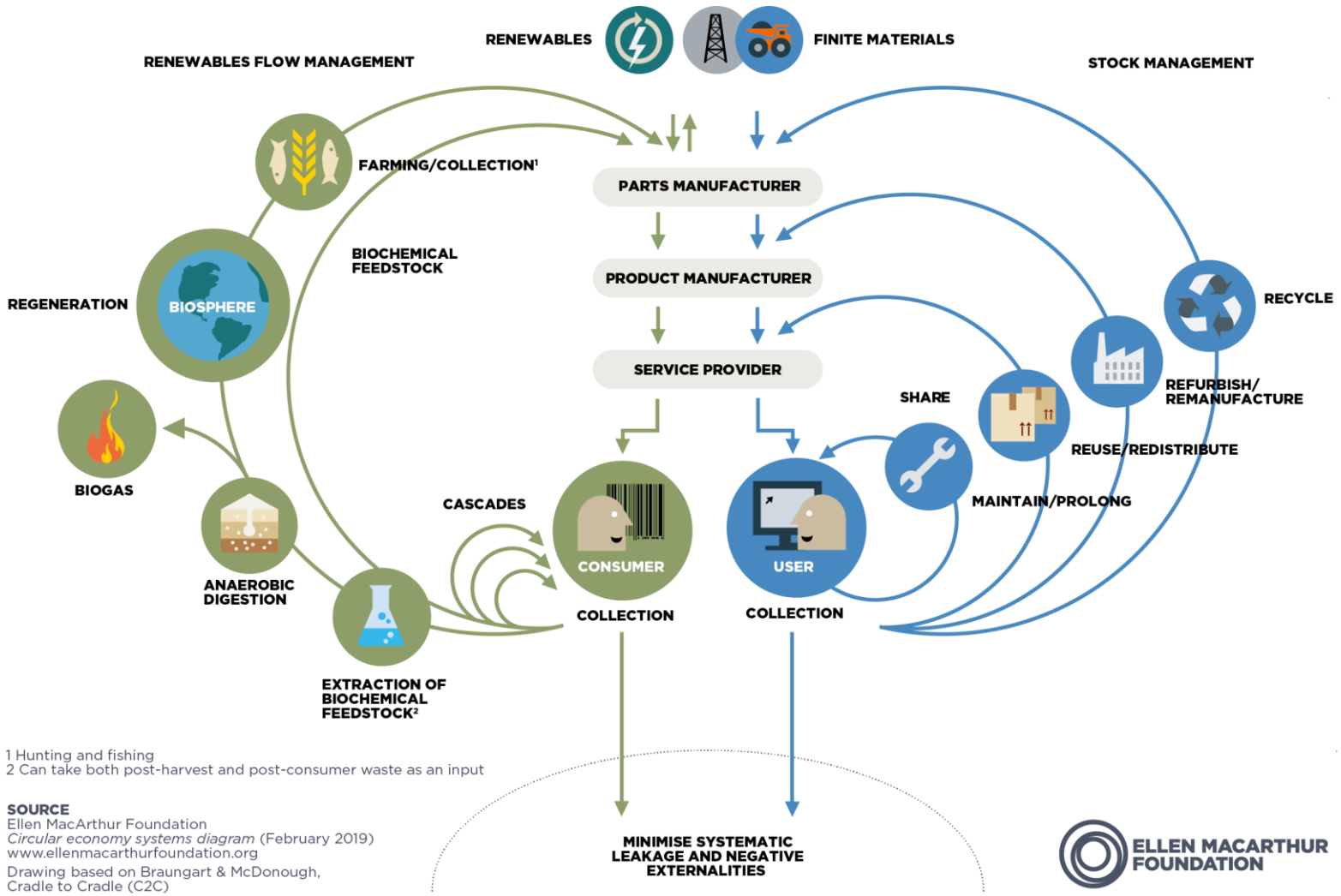
Ellen MacArthur Foundation, 2023



To make what is finite, infinitely available

Based on the Ellen MacArthur butterfly model

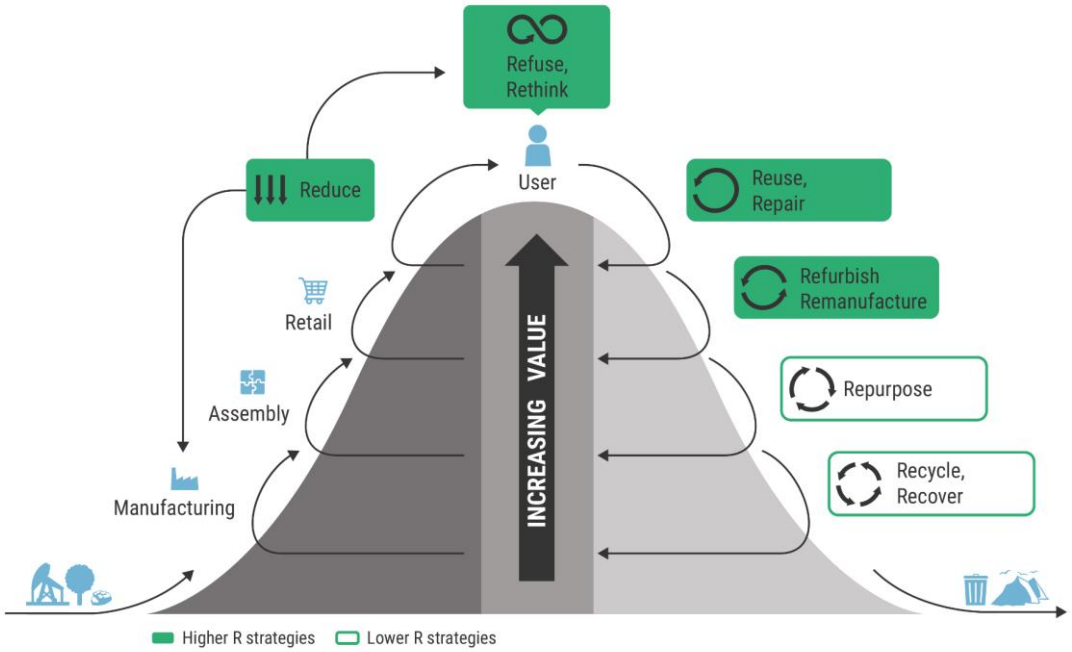
DEFINITION OF CIRCULARITY



1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)

Value-based design



SMARTER PRODUCT USE AND MANUFACTURE

Refuse
Make product redundant by abandoning its function or by offering the same function with a radically different product.

Rethink
Make product use more intensive (e.g. by sharing product).

Reduce
Increase efficiency in product manufacture or use by consuming fewer natural resources and materials.

EXTEND LIFESPAN OF PRODUCTS AND ITS PARTS

Reuse
Reuse by another consumer of discarded product which is still in good condition and fulfils its original function.

Repair
Repair and maintenance of defective product so it can be used with its original function.

Refurbish
Restore an old product and bring it up to date.

Remanufacture
Use parts of discarded product in a new product with the same function.

USEFUL APPLICATION OF MATERIALS

Repurpose
Use discarded product or its parts in a new product with a different function.

Recycle
Process materials to obtain the same (high grade) or lower (low grade) quality.

Recover
Incineration of material with energy recovery.

Increasing circularity

The 9R's

Linear economy → Circular economy

useful application of materials

R9
Recover
Incineration of material with energy recovery

R8
Recycle
Process materials to obtain the same (high grade) or lower (low-grade) quality

R7
Repurpose
Use discarded product or its parts in a new product with a different function.

extend lifespan of product and its parts

R6
Remanufacture
Use parts of a discarded product in a new product with the same function.

R5
Refurbish
Restore an old product and bring it up to date

R4
Repair
Repair and maintenance of defective product so it can be used with its original function

R3
Reuse
Reuse by another consumer of discarded product which is still in good condition and fulfils its original function

smarter product use and manufacturing

R2
Reduce
Increase efficiency in product manufacturing or use by consuming fewer natural resources and materials

R1
Rethink
Make product use more intensive (e.g. by sharing product)

R0
Refuse
Make product redundant by abandoning its function or by offering the same function with a radically different product

Windturbinebladen zijn door de gebruikte composieten **niet te recyclen**, daarom is het belangrijk naar andere R-strategieën te kijken zoals **repurposing**.
Windturbinebladen kunnen een nieuw leven krijgen als onderdeel van een **kinderspeelplaats**.

R9
Recover

Incineration of material with energy recovery

R8
Recycle

Process materials to obtain the same (high grade) or lower (low-grade) quality

R7
Repurpose

Use discarded product or its parts in a new product with a different function.

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Increase efficiency in product manufacturing or use by consuming fewer natural resources and materials

R1
Rethink

Make product use more intensive (e.g. by sharing product)

R0
Refuse

Make product redundant by abandoning its function or by offering the same function with a radically different product

Single use plastics (zoals verpakkingen), zijn **niet geschikt voor strategieën zoals repair, refurbish en remanufacture**. Er bestaat een infrastructuur om deze te **recyclen**, daarnaast wordt er steeds meer gekeken naar **Rethink**, door middel van bijvoorbeeld **hervulbare verpakkingen**.

R9
Recover

Incineration of material with energy recovery

R8
Recycle

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November 25th, 2022

NextGen – A Smart Meter Reference Design

Netbeheer Nederland (NBNL) x VanBerlo (VB) x Umlaut

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Introduction & Recap

NextGen smart meter

Develop a NextGen energy meter, **ready for the energy transition**

designed for **20 years of service**

in more than **8 million** Dutch households

NextGen

Future ready concept supporting consumer upgradeability gateway on eLinux, a replaceable power supply and a reduced footprint.

Research

Field research with stakeholders involved in the smart meter journey

From installers, distribution and testing facilities to recycling partners

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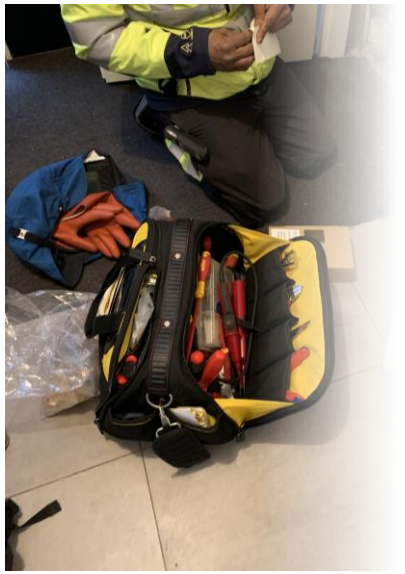
Field research

Observation of workers installing, maintaining and repairing smart meters.

Use of inappropriate tools

High quantities of packaging to deal with

Poor visibility



Need for excessive amount of tools

Field research

Visit warehouse: commissioning, installation process as well as decomissioning and testing.

Great disparity at the end-of-life concerning meters back from the field (missing labels, broken parts etc).

The identification of the causes for disposal is often impossible.

Just testing. Repairing or refurbishing not available.

Testing capacity lower than amount of meters returned.

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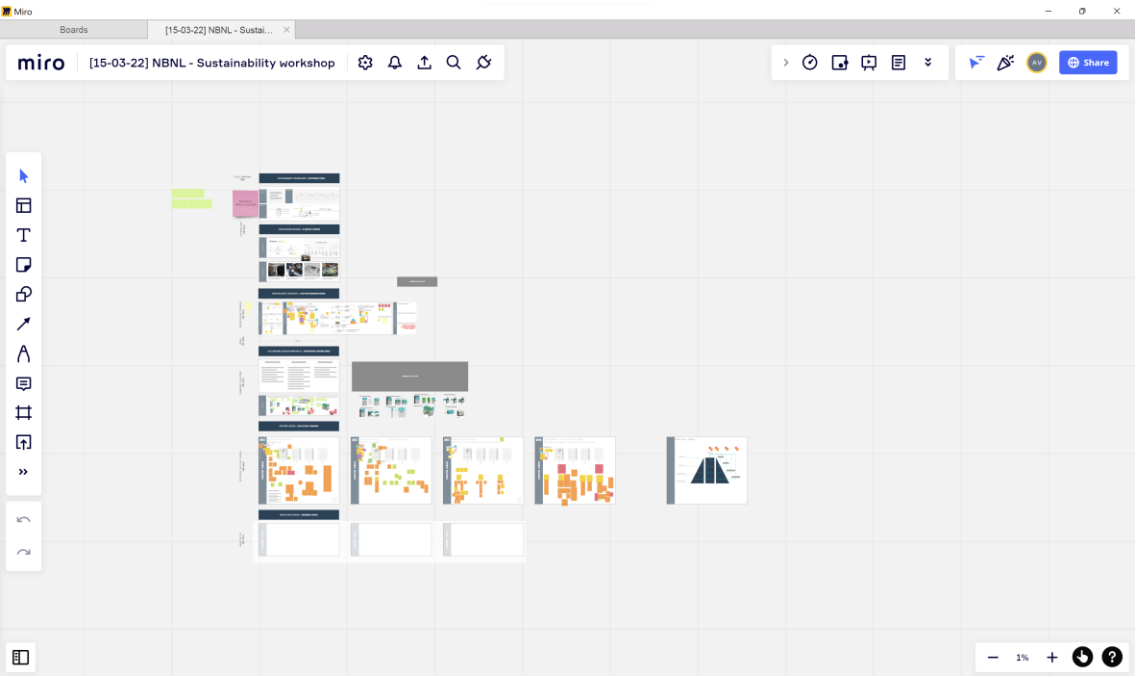
Field research

Recycler visit.. or not?

In-between stakeholder realizing the sorting step, up to 5 additional waste managers are involved in later stages of shredding of the product, battery and material recycling.

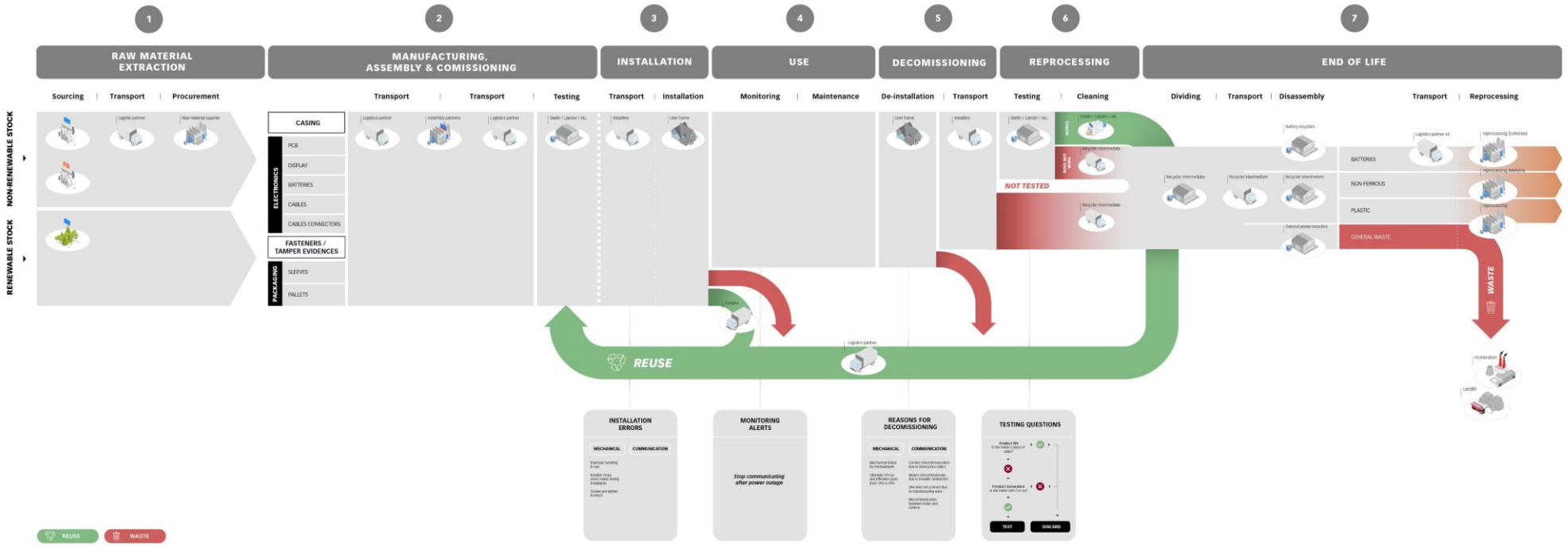


Sustainability intake workshop

Gathering **experts and relevant stakeholders** within Netbeheer NL and grid operators (Liander, Enexis, Stedin, and more) to **gather information** on the tendering process and product journey and **verify** our findings.

System

Product journey map



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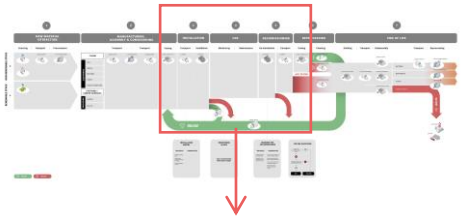
Product journey map

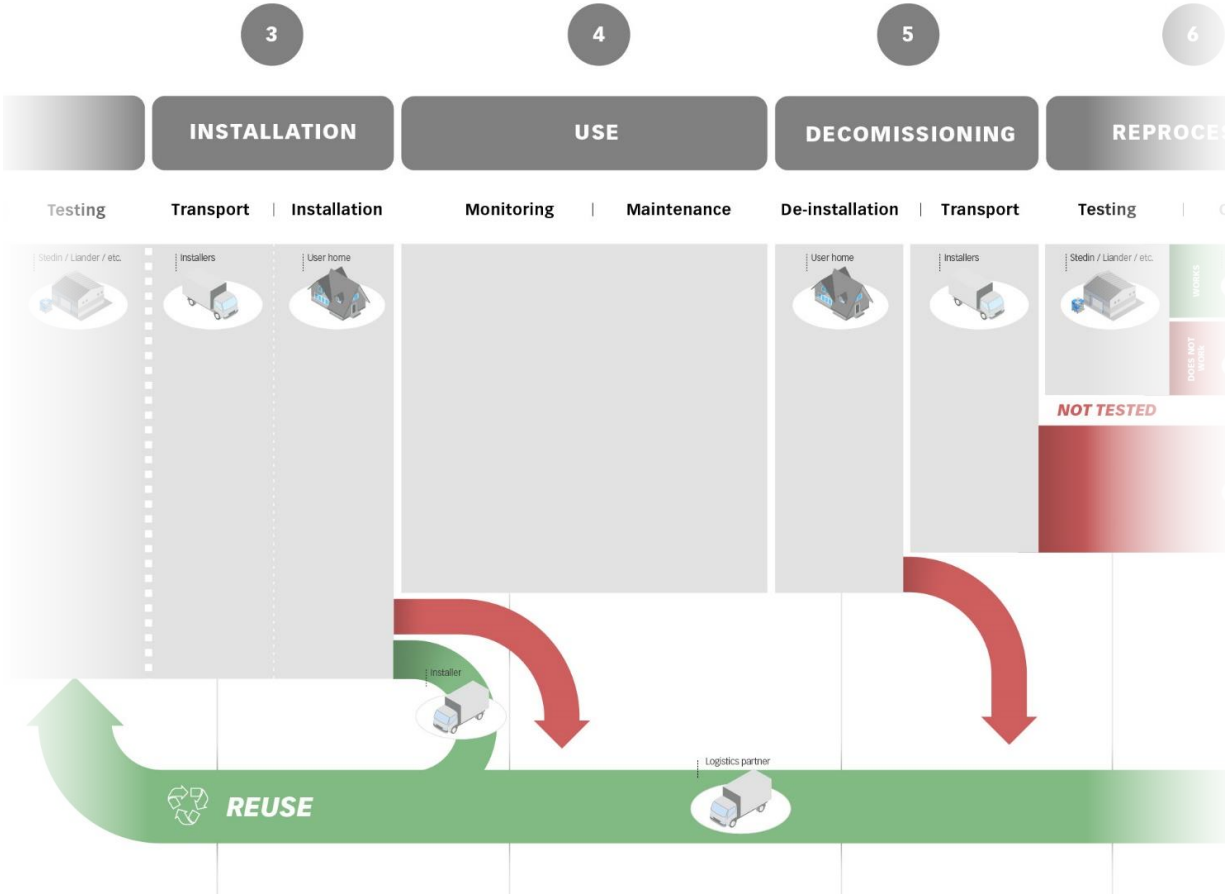


Value recovery loops

- Packaging & Reprocessed meters can be looped back to be re-installed (after succesfully being tested).

value losses

- Mis-treated meters from testing to installation and during decomissioning jeopardize reuse/use.
- Primary packaging is thrown away in some cases when it could be reused.
- Users perceive reused smart meters negatively.
- Early decommissioning



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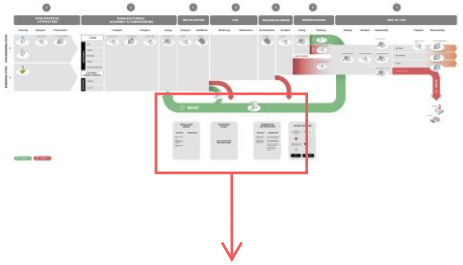
Product journey map



Installation errors

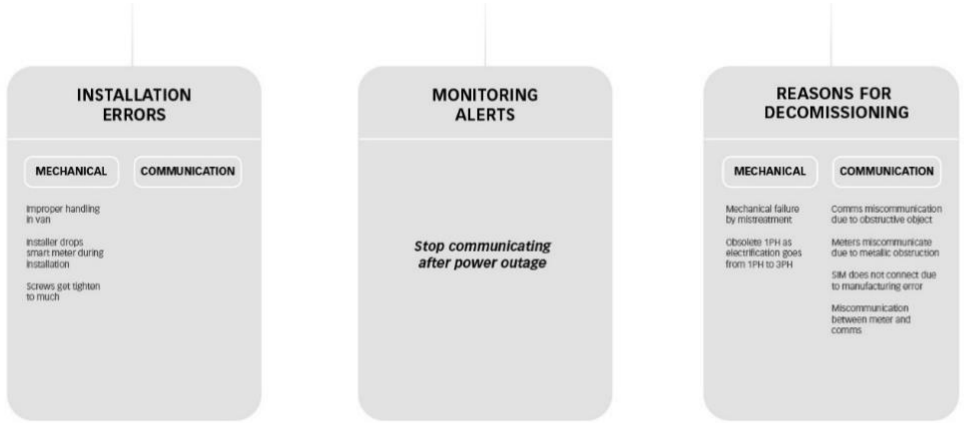
- *Mistreatment during transport*
- *Mis-installation / positioning / configuration*
- *Too big to fit current installation*

Communication issues during lifetime

- *Post power outage*
- *P1 communication*
- *Communication with gas meter*
- *Communication with head-end*

Early decomissioning

- *Software/Technology obsolecence*
- *1 phase to 3 phase household*



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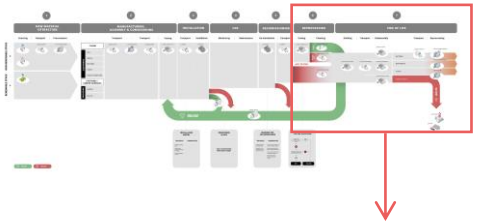
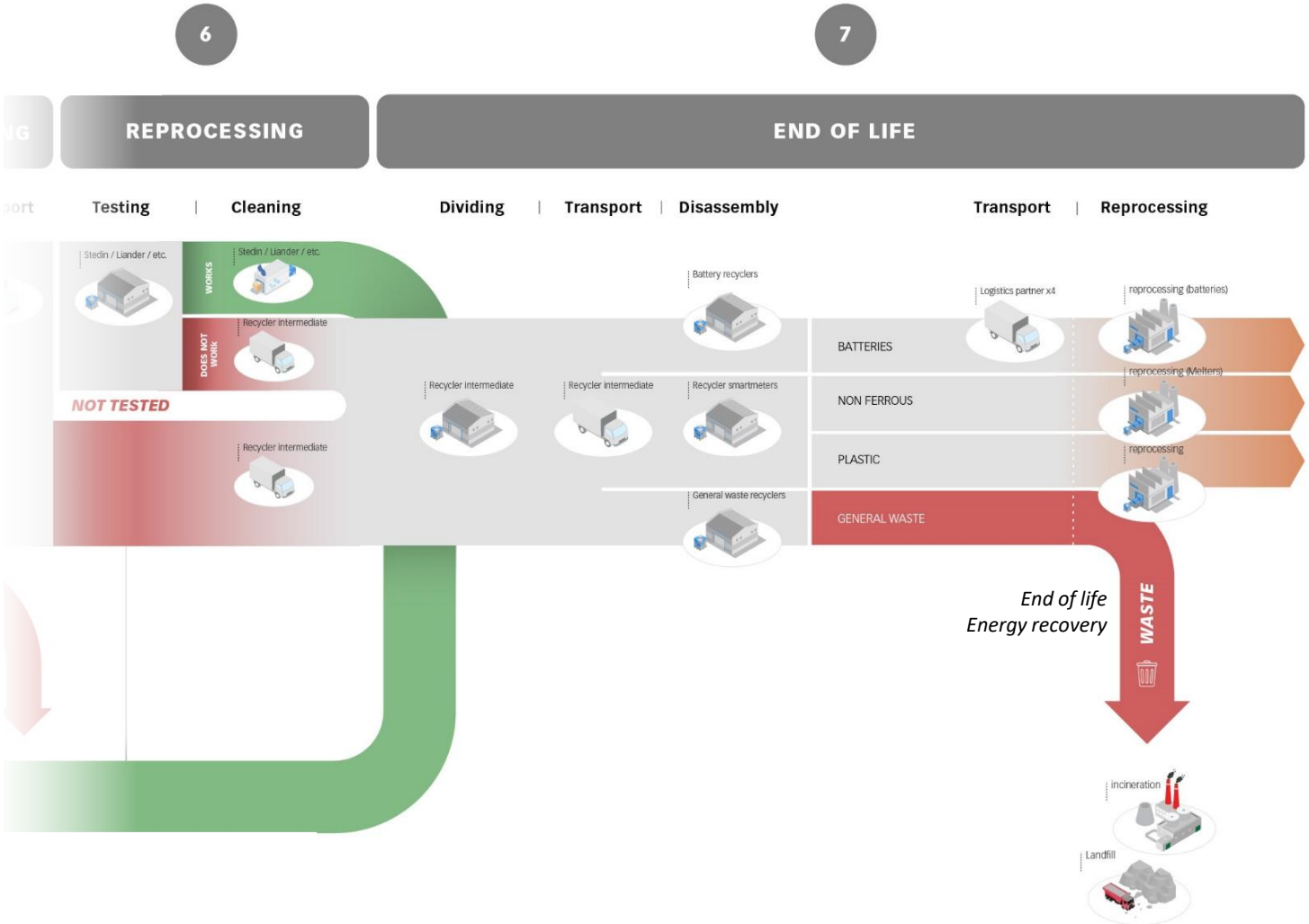
Product journey map



Substantial portion of products are scrapped due to **insufficient testing capacity.**

Suboptimal operations due to lack of information results in the discarding of many still functional smart meters.

End of life consists mostly of **energy recovery processes** and involves **many stakeholders**.



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Clients becoming ambassadors

''Can we use this to speak with our colleagues?''

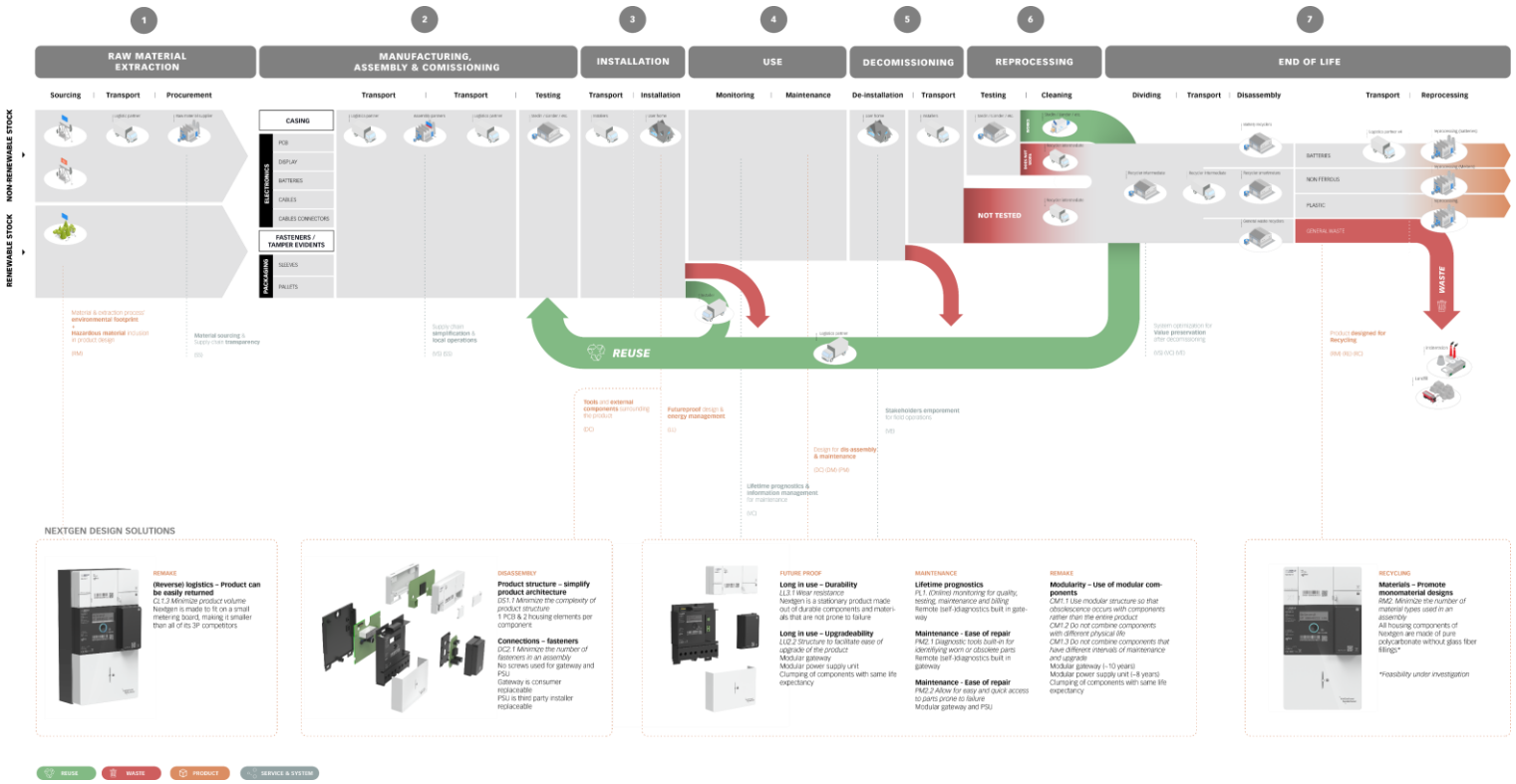
''Can we share this with suppliers?''

''I understand! So good to see it all together''

''I hadn't thought about it this way''

Guidelines & Concept development

Product journey map NEXTGEN DESIGN FEATURES



Product journey map

Opportunities & Guidelines

NextGen design features

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The NextGen concept

Futureproof
Long in use – Durability
Long in use – Upgradeability
Durable, wear resistant
Modular gateway, clumping of components with same life expectancy

Disassembly
Product structure – simplify product architecture
Connections – fasteners
Low complexity
Where possible no screws used

Maintenance
Lifetime prognostics
Maintenance - Ease of repair
Remote (self-)diagnostics
Modular gateway

Remake
(Reverse) logistics – Product can be easily returned
Modularity – Use of modular components
Low product volume
Modular gateway, clumping of components with same life expectancy and upgrade/maintenance frequency

Recycling
Materials – Promote monomaterial designs
Use of non glass-fibre filled PC under investigation

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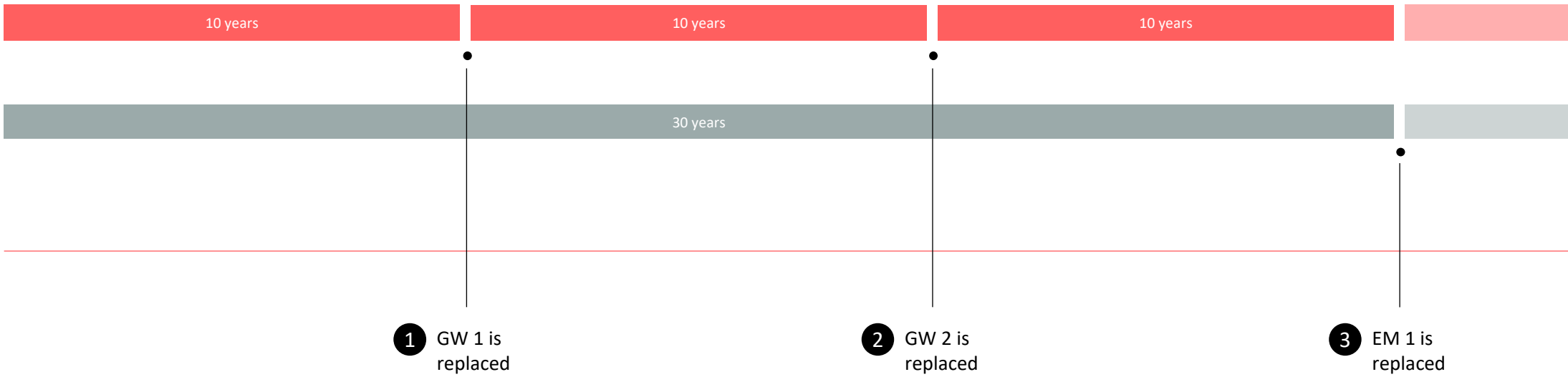
Product lifespan

gateway

e-meter



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Unlocking business value – through product-system design

Smaller footprint

- Less material use, less material costs
- Less weight, less transport costs
- More efficient pallet use, less transport and storage costs
- Not changing metering bord saves time
- Increased installer efficiency

Modular gateway

- At home replacements by consumer
- Freeing up employees to do other tasks, cost of people, cost of transport
- Dedicated waste stream allows for more efficient processing

Remote diagnostics

- Less wasted trips to homes
- Freeing up employees to do other tasks
- More efficient trips to homes
- Administration improvement potential
- Better lifetime prognostics and FMEA, data analysis

Smaller footprint
- Material
- Transport
- Emissions
- Storage
- Time
- Costs

Modular gateway
- People
- Time
- Costs

Remote diagnostics
- Transport
- Emissions
- People
- Administration
- Data
- Time
- Costs

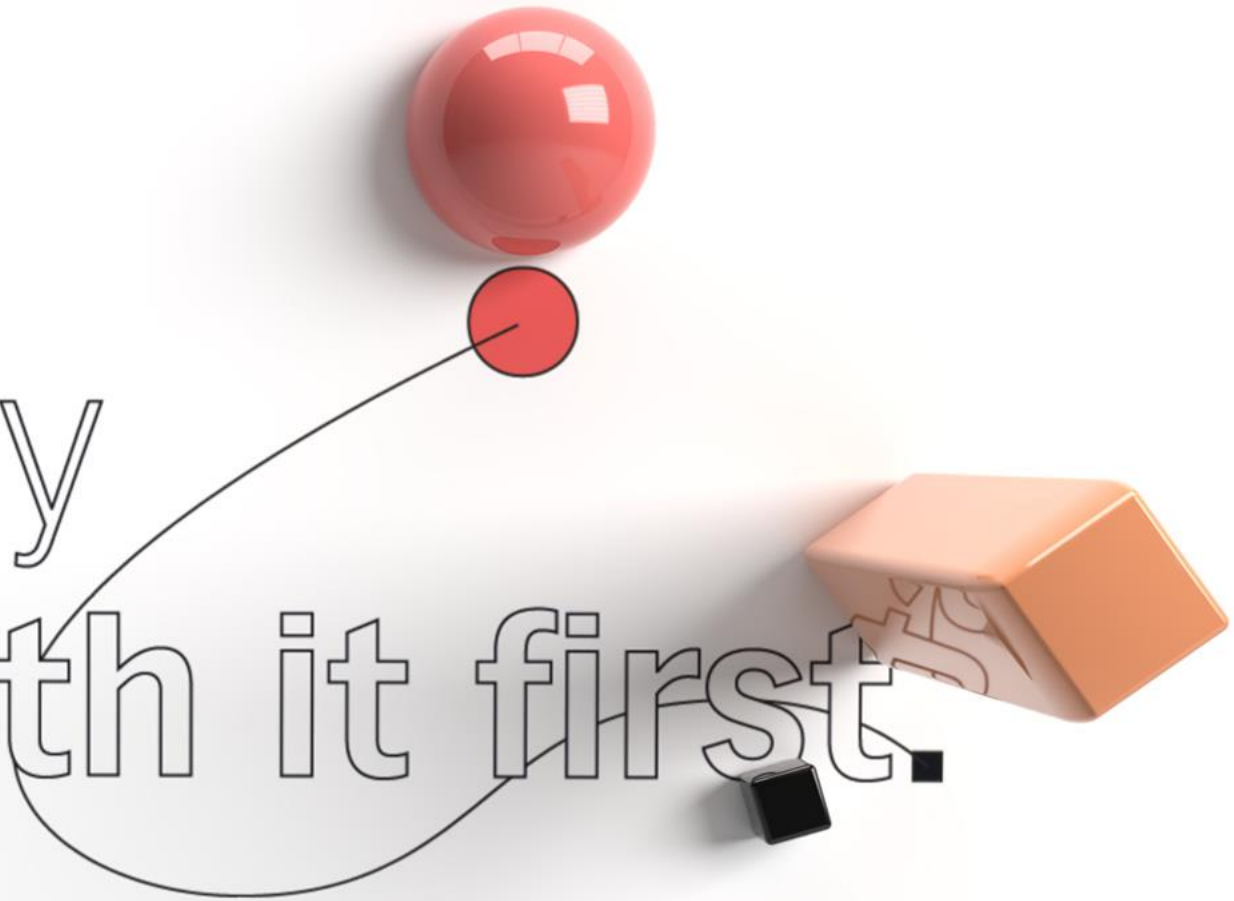
Learnings

- A holistic view of the system reveals valuable information to all stakeholders, e.g. what exactly happens at raw material extraction and EoL is often (purposefully) unknown
- There is no such thing as a sustainable asset on its own, it needs its surrounding system to be sustainable
- Efficient use of energy and materials in the product life saves significant money

And…

- By designing the product before the tender, the client has learned already what is possible and what's not

We shape the future by playing with it first.



www.vanberloagency.nl

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