'23 MANUFUTURE CONFERENCE

PROGRAMME SPEAKERS VENUE & TRAVEL CONTACT REGISTER

MANUFUTURE-EU

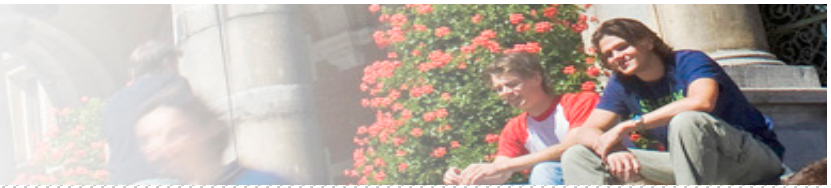
MANUFUTURE CONFERENCE

NOVEMBER
23 AND 24, 2023

DONOSTIA-
SAN SEBASTIÁN

GIPUZKOA SCIENCE AND TECHNOLOGY PARK

Session about Circular Manufacturing & Digitalization



Current European agenda: “Made in Europe” program in “Horizon Europe”

Leadership

Circular

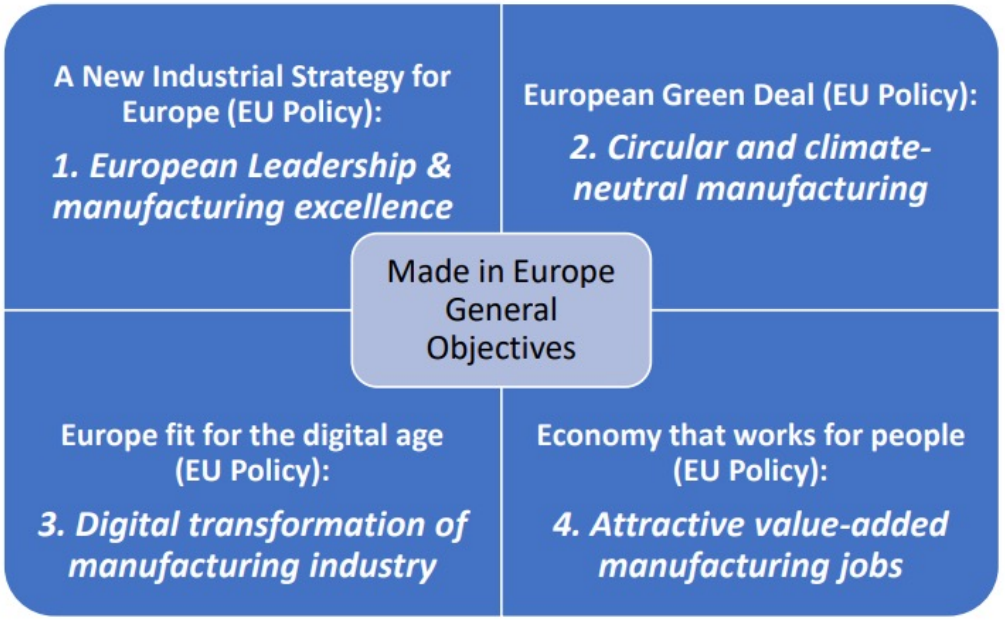


Figure 2: The four General Objectives the Made in Europe Partnership, in line with the EU's political priorities which address manufacturing industries.

Digitalisation

People

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Faculty of Science and Engineering

University of Groningen, the Netherlands

smart industry

The Industrial adoption of a Digital & Circular/sustainable future manufacturing

Jan Post

smart industry

Content of this presentation:

- Who is Jan Post
- Philips Personal Health as a starting point
- Smart Industry and the Circular future Manufacturing
- Conclusions / recommendations

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Holland High Tech
Global Challenges, Smart Solutions

smart industry

Who is Jan Post & Philips Personal Care Drachten

65 years young!
2000 employees
30% commercial R&D expenses
Northern Netherlands
>35 nationalities

Worldwide market leader in electric shaving
Sister factory in China & Indonesia

PHILIPS

j.post@philips.com

- Strategic partnerships Philips Innovation Personal Care
- Roadmap owner Dutch HTSM/Smart Industry and Dutch science agenda Smart Industry
- Professor at the university of Groningen Digital Manufacturing / Fabrication
- Lead AI-Coalition-NNL
- Team member NL-HTSM-CE

NL AI Coalition

rijksuniversiteit groningen

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Philips Personal Health as an example:

- We produce millions of products for consumers every year
- We produce more than a billion metal/plastic/electronic parts
- We are a global company, also for Circularity

- We work/think about the circular economy on:
  - Change in material behavior, how to deal with that
  - Material passports
  - Design for assembly and dis-assembly
  - Zero-defect manufacturing
  - Predictive maintenance (product & process)
  - Internal efficiency (materials, energy, waste etc.)
  - Increasing the product lifespan (design for repair)
  - Recycling
  - Standardization / regulation

- Ambition Dutch Government: in 2050 100% circular, in 2030 50% circular

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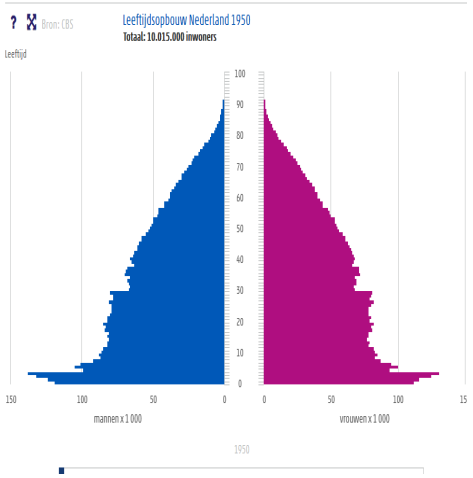
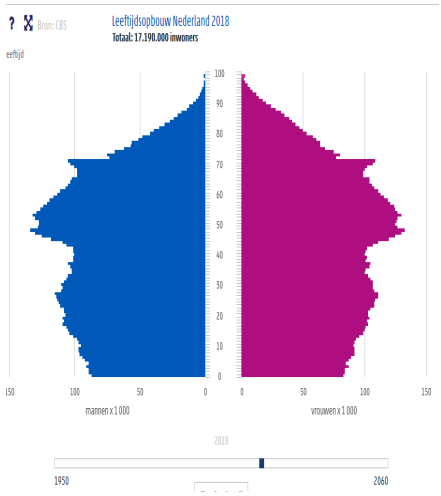
I already learned from Smart-Industry that the Dutch society is changing because of the Demography: "We have to do more with less people in the future"

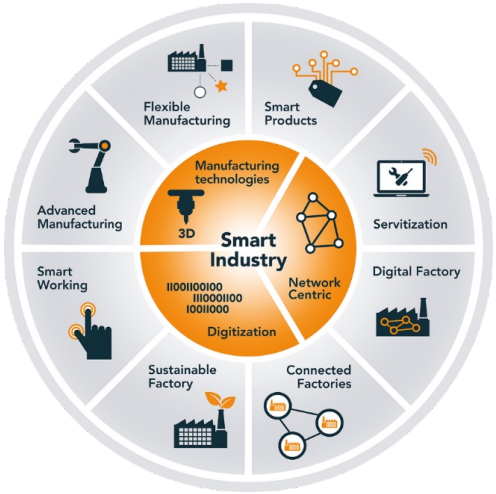
NL: 1950 and 10 M inhabitants



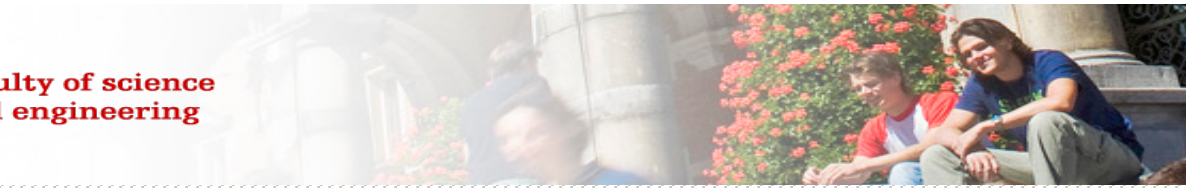
NL: 2018 and 17 M inhabitants



The Dutch Industry 4.0 wheel



https://www.cbs.nl/nl-nl/visualisaties/bevolkingspiramide



Digitalisation as a transition

In industrial production Platforms Experiential knowledge is slowly replaced by Spectators knowledge becuase of Industry 4.0.

People are key for our circular future: We really have to focus on young people and educate them

- Less experienced People
- Less learning by doing
- More Knowledge based innovation
- Learning communities

Abraham Maslow

Experiential knowledge spectators knowledge.

Maslow: Psychology of Science: A Reconnaissance Paperback – 1 Dec. 1969

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smart industry

"BUT THERE IS MORE: HOW TO SURVIVE THIS PERFECT STORM"

OVERCOME THE CURRENT ISSUES / TRANSITIONS:

- **SUSTAINABILITY / CIRCULAR ECONOMY**
- **ENERGY TRANSITION**
- **DIGITALISATION**
- **PEOPLE**
- **INNOVATION**

AND IMPROVE YOUR PRODUCTIVITY IN THE SAME TIME

Back to Philips Personal Health as an example:

- How digital are this subjects?

- Change in material behavior, how to deal with that	Partly digital
- Material / product passports	Digital
- Design for assembly and dis-assembly	Partly digital
- Zero-defect manufacturing	Partly digital
- Predictive maintenance (product & process)	Digital
- Internal efficiency (materials, energy, waste etc.)	Not digital
- Increasing the product lifespan (design for repair)	Partly digital
- Recycling	Partly digital
- Standardization / regulation	Partly digital

smart industry

Challenges I want to address for Circular manufacturing:

- Process & product predictability
  - Digital Twins & interoperability & validation &AI
- Passports (material or product)
  - Digital infrastructure, data sharing, AI
- Design for circular (Product and process)
  - CAE as a part of Industry 4.0
- Standardization /Regulation

Involve the whole value chain:

Example from the Netherlands: “Groeien in Groen staal”

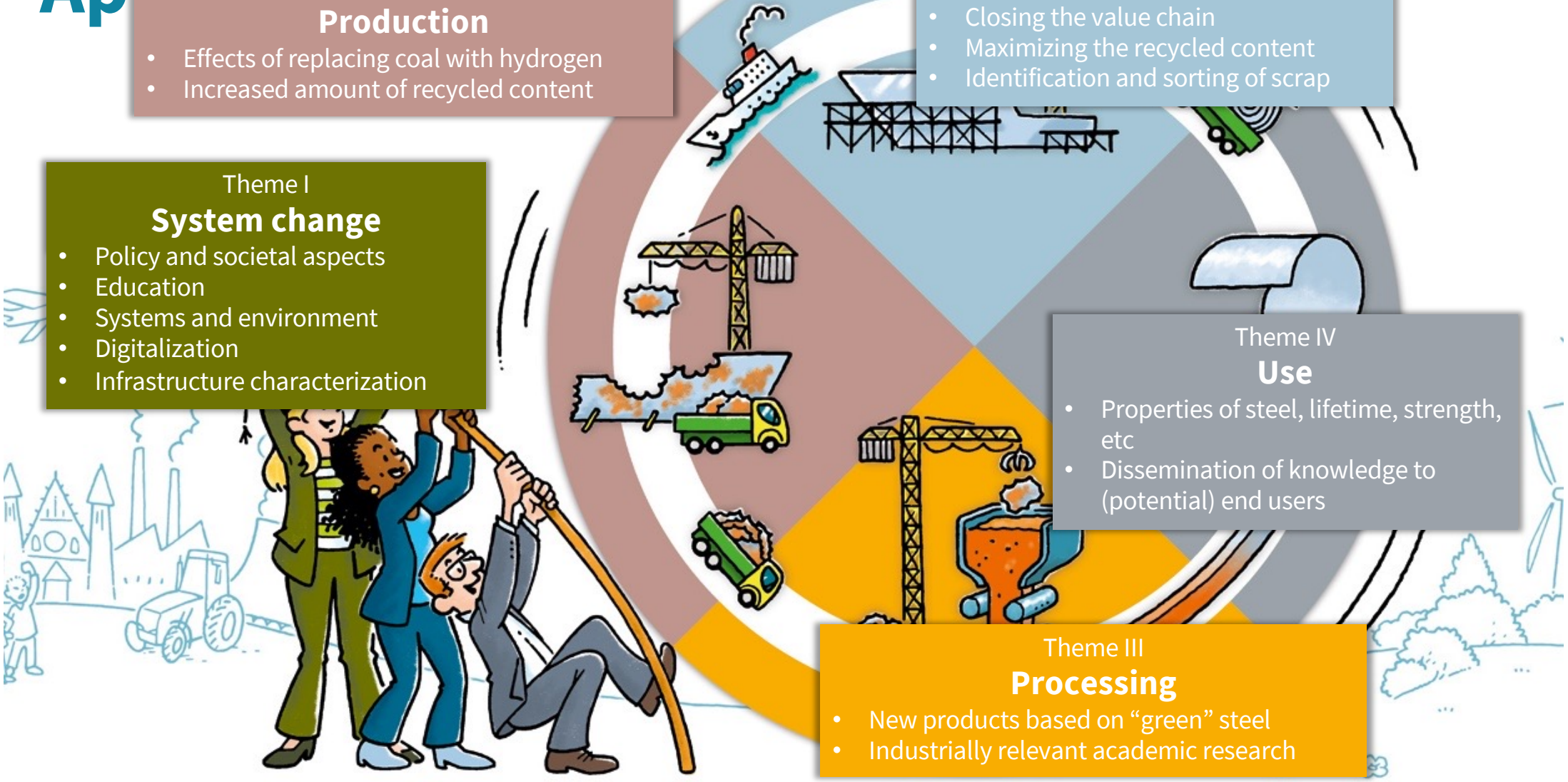
- Focus is on recycling & Carbo footprint
- The whole value chain is included
- Digitalization as an enabling Technology
- People and Education is essential, so in close co-operation with universities and an education program (learning community)

Ap

Theme II
Production
- Effects of replacing coal with hydrogen
- Increased amount of recycled content

Theme V
Recovery
- Closing the value chain
- Maximizing the recycled content
- Identification and sorting of scrap

Theme I
System change
- Policy and societal aspects
- Education
- Systems and environment
- Digitalization
- Infrastructure characterization



Theme IV
Use
- Properties of steel, lifetime, strength, etc
- Dissemination of knowledge to (potential) end users

Theme III
Processing
- New products based on “green” steel
- Industrially relevant academic research

Program information

Program Secretary
Materials innovation institute

Financing
Total investment: **177M€**
NGF subsidy: **124M€**
Private investments: **53M€**

Duration
8 years

Website
groeienmetgroenstaal.nl

Consortium members

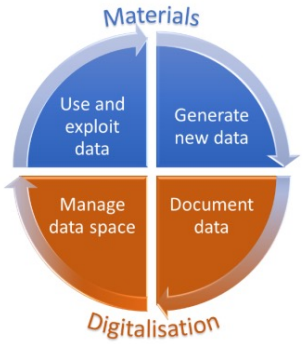
TU Delft, TU/e Eindhoven University of Technology, University of Twente., university of groningen, TNO, NHL Stenden hogeschool, Universiteit Leiden, Universiteit Utrecht, Nova College, avans hogeschool, In Summa, Max-Planck-Institut für Eisenforschung GmbH, BOSCH, TATA STEEL, SKF, bouwen met staal, PHILIPS, VDL, Nederlandse Onttinningsfabriek bv, fnsteel, NEDSCHROEF, VOLVO, ARN Auto Recycling Nederland, KE-works, DILLINGER, EX MENTE, CMT, SGS, SPACEXYZ, Alleima, RESEARCHABLE, DevControl, M2i materials innovation institute

AMi2030

ADVANCED MATERIALS INITIATIVE

STRATEGIC MATERIALS **AGENDA**


1
The main segments of the advanced materials circular value chain
Advanced Materials design development and production
Advanced Materials transformation and integration into components, products and systems
Use Phase
End-of-Life
Digital Technologies for Materials
(AI/ML, data mgt, ontologies, modelling...)
2
Cross-sectorial enablers
Production, processing & characterization technologies
(tools, equipement, instrumentation, automation...)
European policy and regulatory framework
(Regulation and legislation, codes and standards, Innovation and funding)
3
The Materials Innovation Markets
HEALTHCARE
CONSTRUCTION
NEW ENERGIES
TRANSPORT
HOME & PERSONAL CARE
PACKAGING
AGRICULTURE
TEXTILES
ELECTRONICS APPLICANCES



Priorities on materials digitalisation

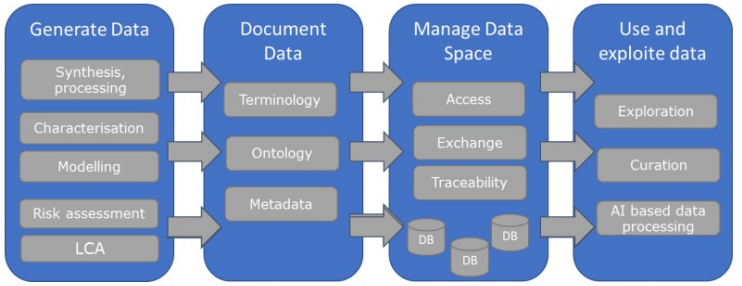


Figure 1: *Efficient pathways for harvesting and exploiting relevant data originating from multiple sources need to be created and managed.*

- Generate data with advanced, harmonised and digitalised techniques
  - Advancing materials characterisation development.
  - Advancing modelling and simulation development.
  - Harmonise and integrate materials multi-technique (e.g. modelling and characterisation) workflows.
  - In-process data collection from e.g. autonomous robotics platforms and fabrication technologies.
- Documentation of data for FAIRness and in support of materials standards
- Common materials data space with trusted management, data access and exchange
- Use and exploit data supported by semantic and AI strategies

Advice, focus on:

- Digitalization will be an important enabling technology
- People and Education will be essential
- Demonstrator projects over the value chain
- Combine Circular manufacturing with increasing productivity
- Make it global on the end

university of groningen

faculty of science and engineering

Any question?

smart industry

www.rug.nl/fse

HOLLAND CIRCULAR HOTSPOT
sharing innovation

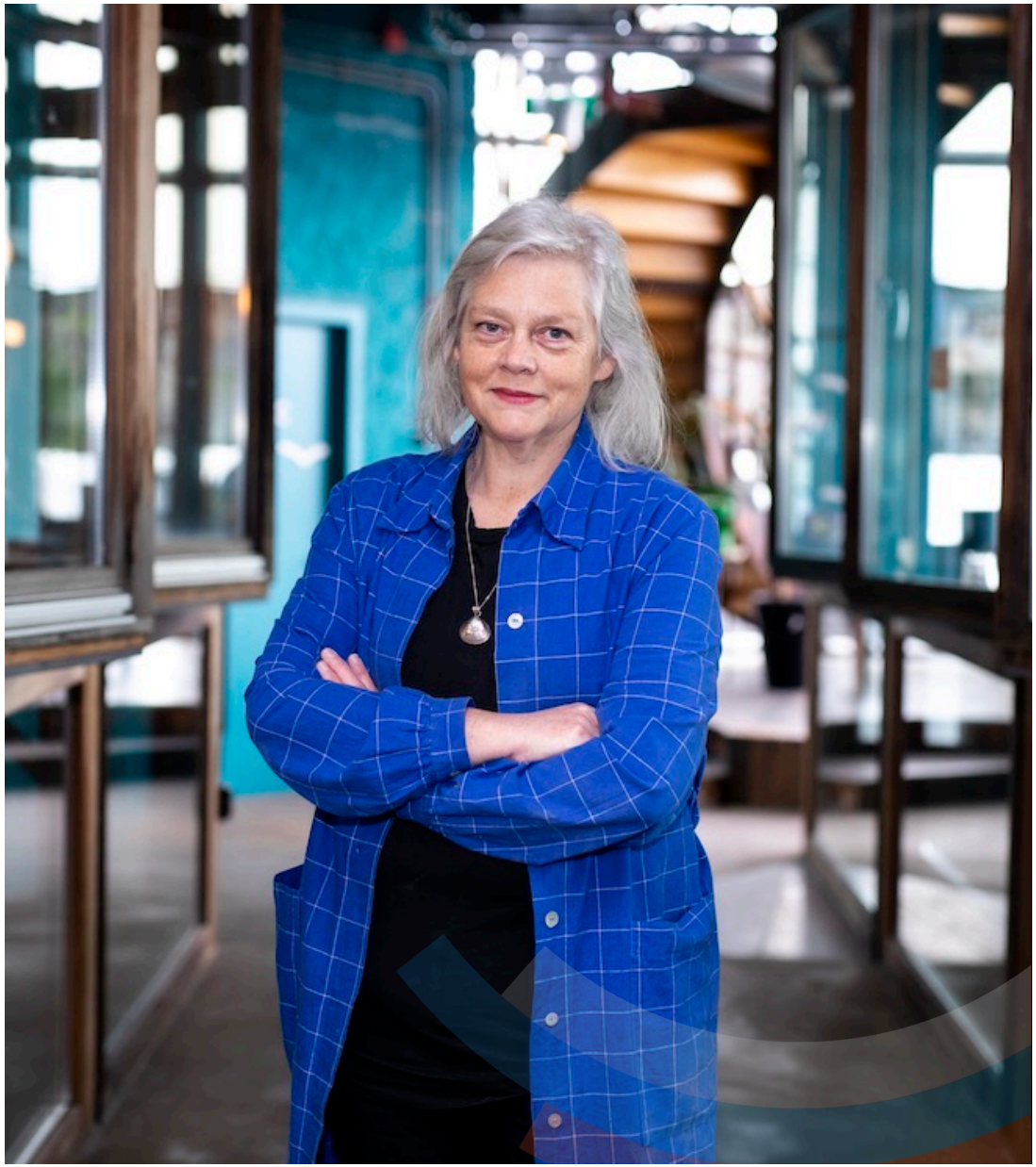
Circular Batteries - Charging the Future

Publication of Holland Circular Hotspot

Diana de Graaf

Projectmanager Verbreding, Circulaire Maakindustrie

Senior Projectmanager HCH



Batteries & Circularity

- Batteries are the foundation of our modern society
- Transition to a climate-neutral society requires a ramp-up in battery capacity and production never seen before.
- Batteries are mined, produced and moved across a truly global supply chain with significant negative impacts on ecosystems and local communities
- This creates a strong momentum for a circular approach

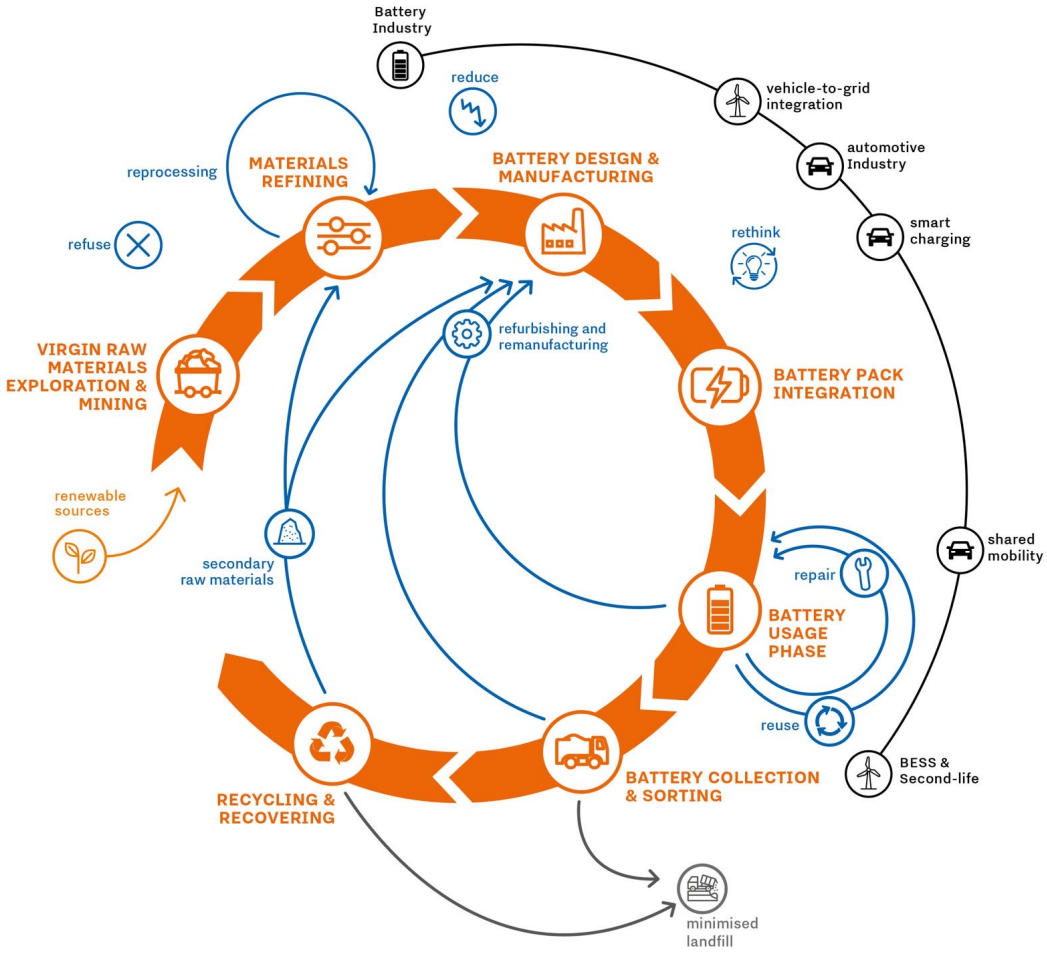
Showcasing the Netherlands

Strategic Partner for Circular Batteries

- 25 Dutch best practices from public & private sectors
- 5 Future Visions from key value chain actors (NL-DE-EU)
- 6 Set of Actions to accelerate the transition

6 Set of Actions for a Circular Battery Value Chain

1. Shift to new consumption and production patterns to achieve true circularity
2. Invest in R&D for alternative battery materials to reduce CRM dependency
3. Incentivise circular design to enable second-life strategies and improve material recovery

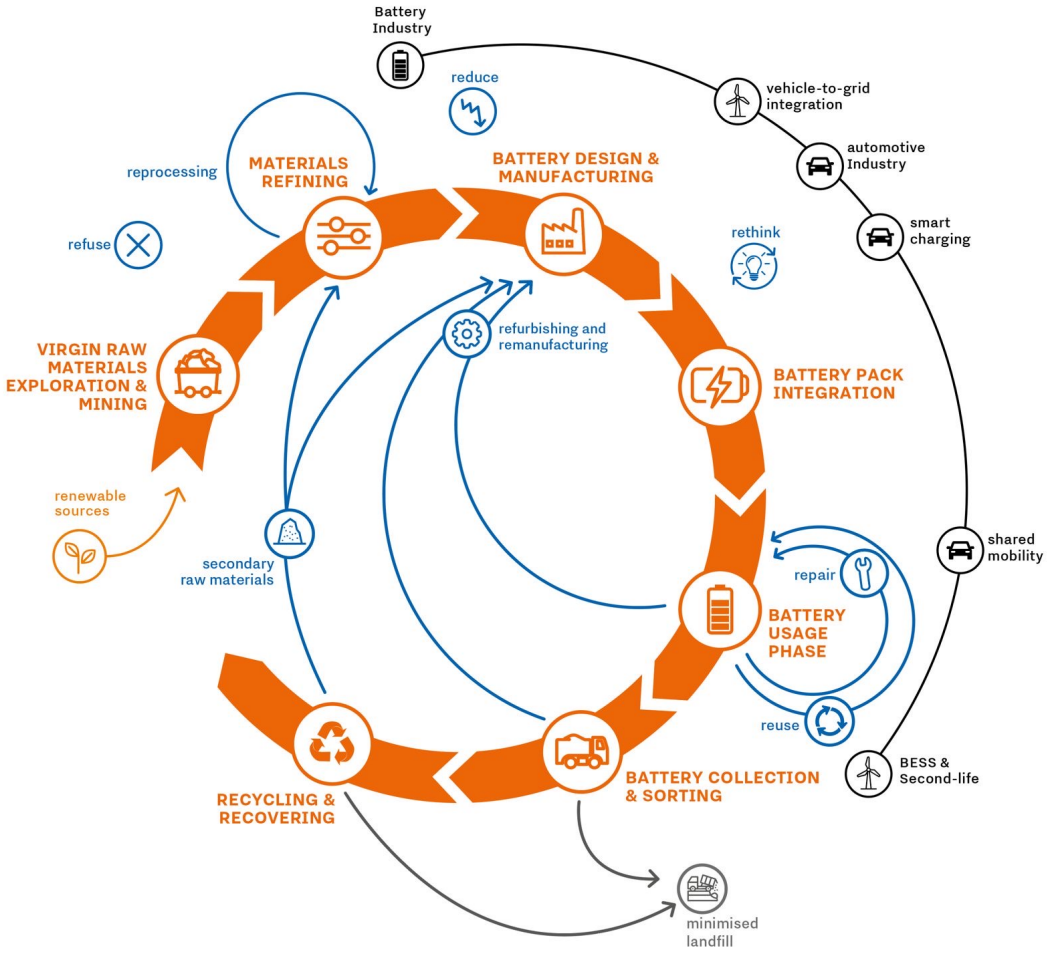


6 Set of Actions for a Circular Battery Value Chain

4. Foster education and reskilling of workers to scale up reuse, repair & recovery

5. Strengthening international cooperation to enable circular battery strategies

6. Increasing EU policy ambition and effectiveness in circular battery



Go to
hollandcircularhotspot.nl/publications/
to download the brochure

HOLLAND CIRCULAR HOTSPOT

sharing innovation

Thank you for joining us today

www.hollandcircularhotspot.nl

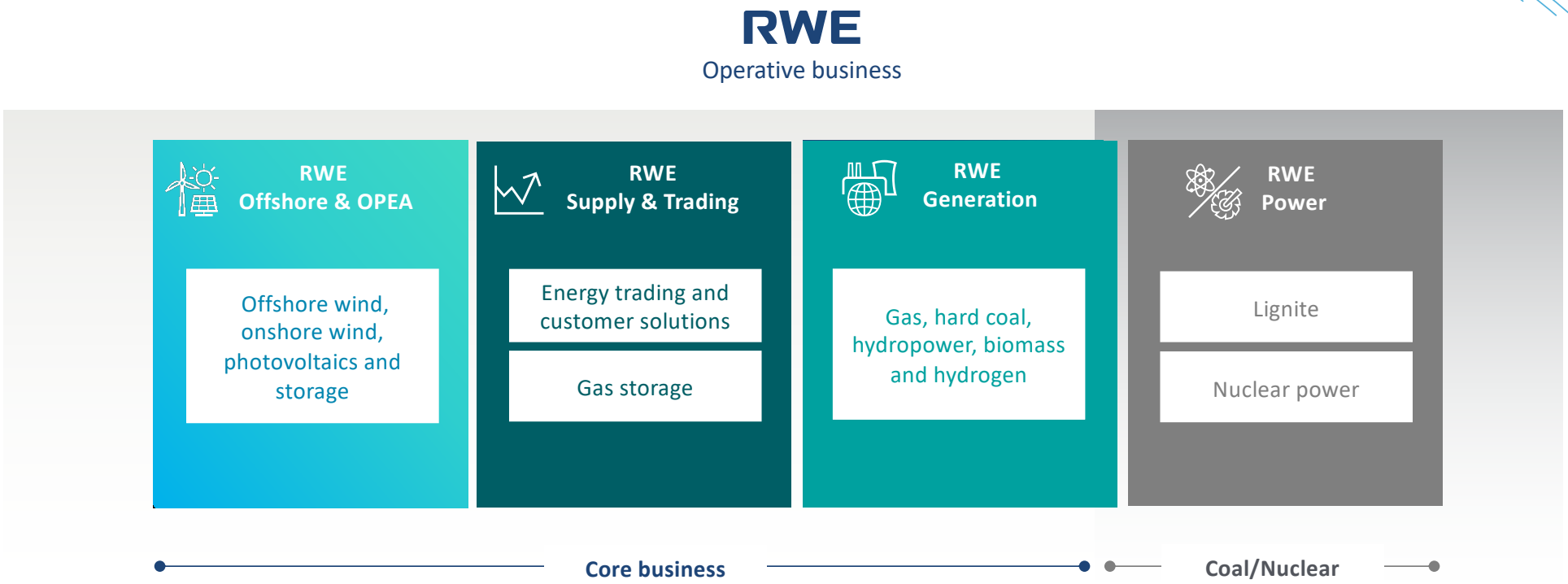
RWE

Circularity in manufacturing

Examples from the wind sector

November 2023 – Daan Bosma – Project Development Offshore Wind RWE

A driving force behind the energy transition – with a powerful organisation



RWE circularity targets

2030 aim:

90% (waste) recovery rate

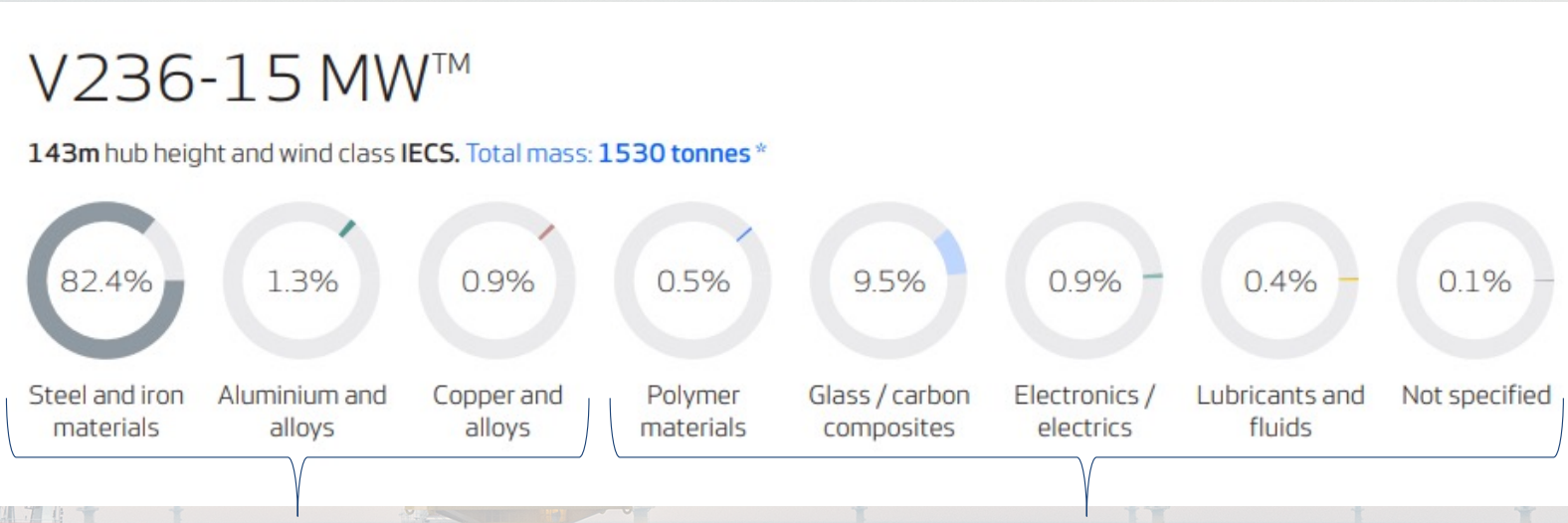
2050 aim:

Ful circularity

* Total installed capacity

Offshore wind

High & low recyclability dependent on material

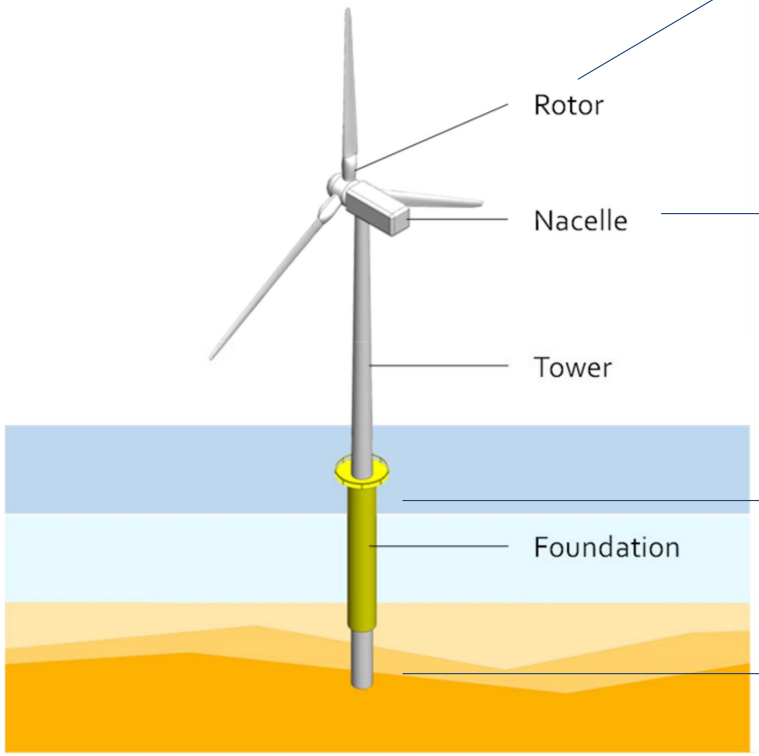


High recyclability

Low(er) recyclability

* Total installed capacity

Modular design by nature

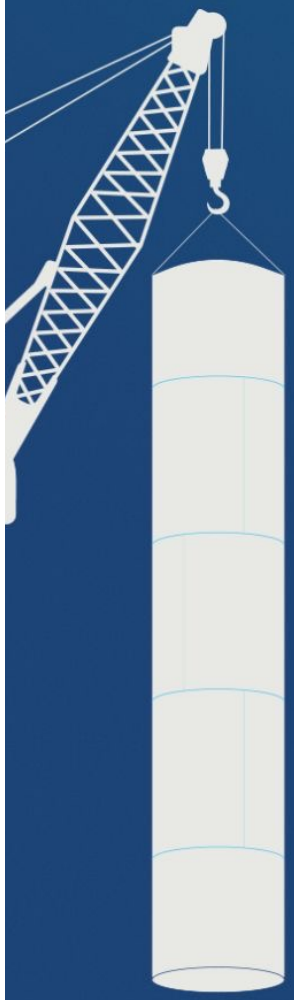


Blades connected with flanges to hub

Tower connected with flanged connection to nacelle

Foundation connected with tower through transition piece or with TP-less design

J-tubes for the pull-in of inter-array cables



RWE will install CO_2-reduced towers at Thor offshore wind farm

What makes Siemens Gamesa's GreenerTower greener?

The steel used in the towers emits a maximum of 0.7 tons of CO_2-equivalent emissions per ton of steel for the steel plate.

This will ensure a CO_2 reduction of at least 63 percent in the tower steel plates compared to conventional steel.

How the CO_2 reductions are achieved:

- Less energy intensive steel manufacturing process
- Increased use of scrap steel in the steel production
- Increased use of renewable energy sources

RWE tests world's first recyclable wind turbine blade at its offshore wind farm Kaskasi

The offshore wind farm Kaskasi (342 MW) is to be constructed in the German North Sea, 35 kilometres north of the island of Heligoland

The turbine blades developed by **Siemens Gamesa** are recyclable thanks to a special resin

Most of the components are already made from recyclable materials

How the recycling process works

1
Decommission after end of life

2
Immerse in mild acidic solution

3
Reclaim separated components

4
Re-use

RWE

Challenges

1

Costs

- Higher costs for secondary materials
- Lack of scale

2

Availability

- Limited availability of secondary materials in market
- Lack of supply chain

3

Quality

- Quality of secondary materials does not always meet internal requirements

RWE

Thank you!

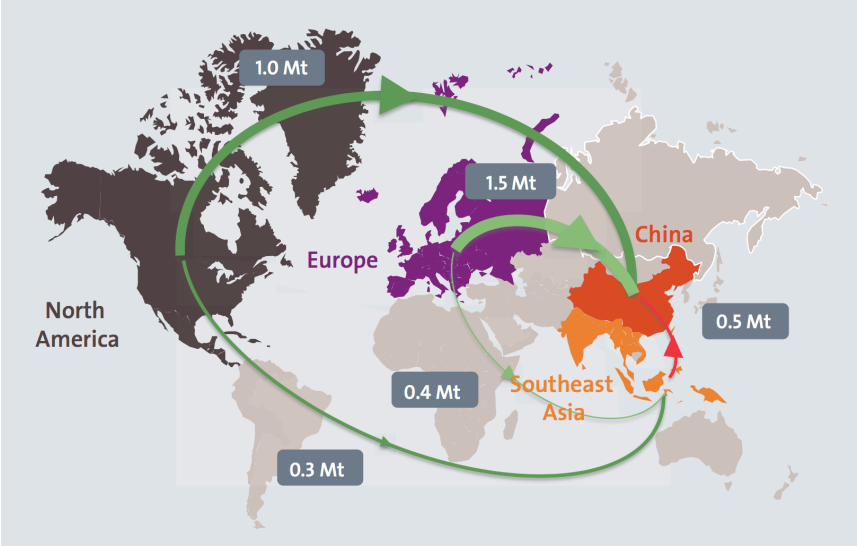
BUTTER BRIDGE

Enabling the low carbon material transition

Steef Steeneken

November 2023

BUTTER BRIDGE



SETTING 2030 BENCHMARKS FOR STRATEGIC RAW MATERIALS

EU EXTRACTION

At least **10%** of the EU's annual consumption for extraction

EU PROCESSING

At least **40%** of the EU's annual consumption for processing

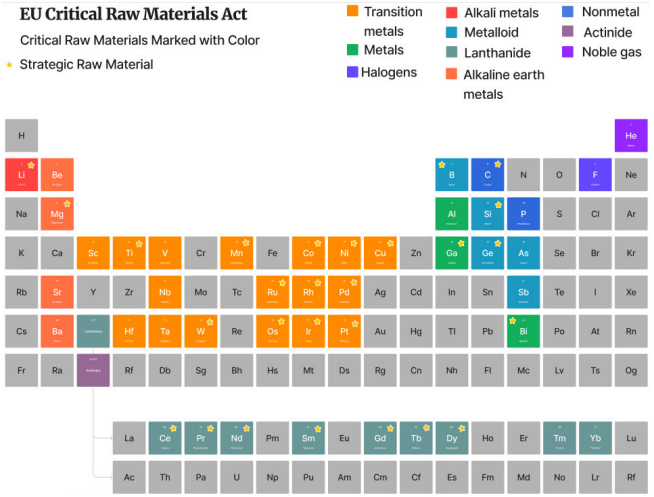
EU RECYCLING

At least **15%** of the EU's annual consumption for recycling

EXTERNAL SOURCES

Not more than **65%** of the EU's annual consumption of **each strategic raw material at any relevant stage of processing** from a single third country

BUTTER BRIDGE



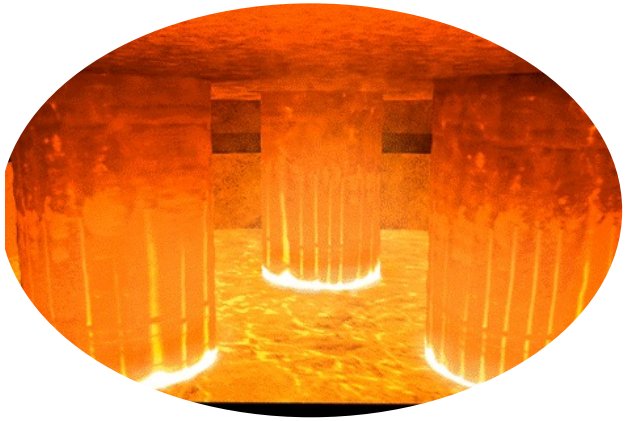
*Maar wat <u>wil</u> en <u>kan</u> **Nederland** doen?*

Visie van Butter Bridge

Grote stijging in gebruik van elektrische ovens

Nieuwe staal proces
Elektrificeren van oa cement en steenwol productie

In Europa verwerken van kritische materialen



Temperatuur 1100 – 2000 °C

Green Metallurgical Innovation Centre

BUTTER BRIDGE

Technologie aantonen

- Proces feasibilities
- De-risken van investeringen
- Aantonen van business cases

Batchgewijs hoogwaardige maar complexe CMR houdende stromen verwerken

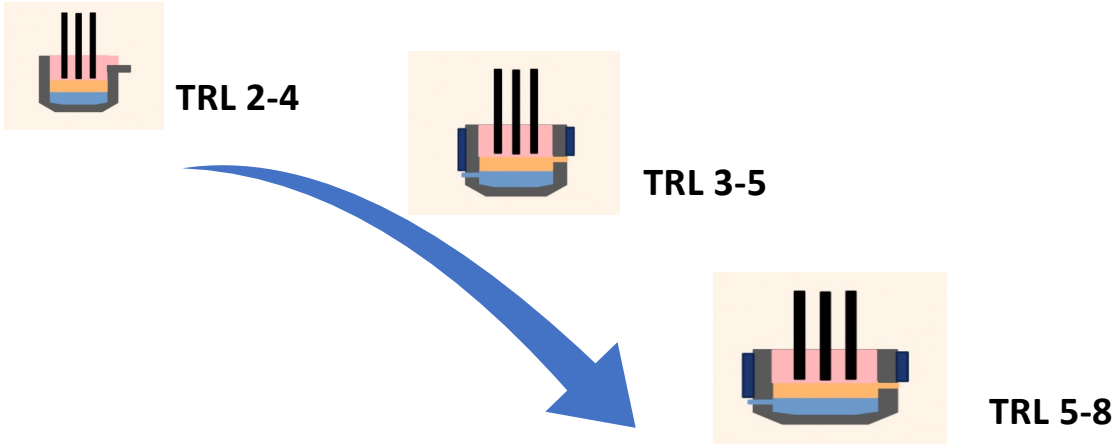
- Katalysatoren
- Vanadium uit slakken
- Batterijen
- Silicium uit zonnepanelen
- Overige residuen

Wat bied Butter Bridge aan

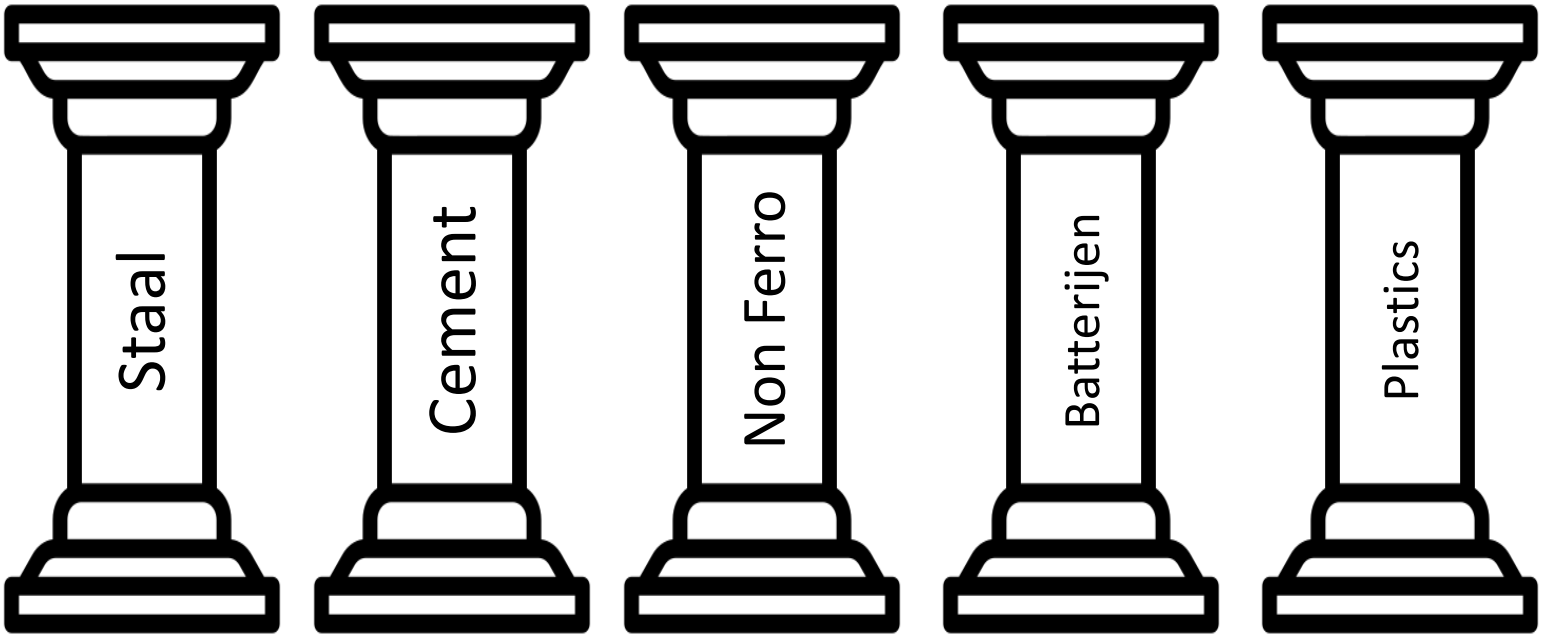
Testfaciliteiten voor geëlektrificeerde hoog temperatuur processen.

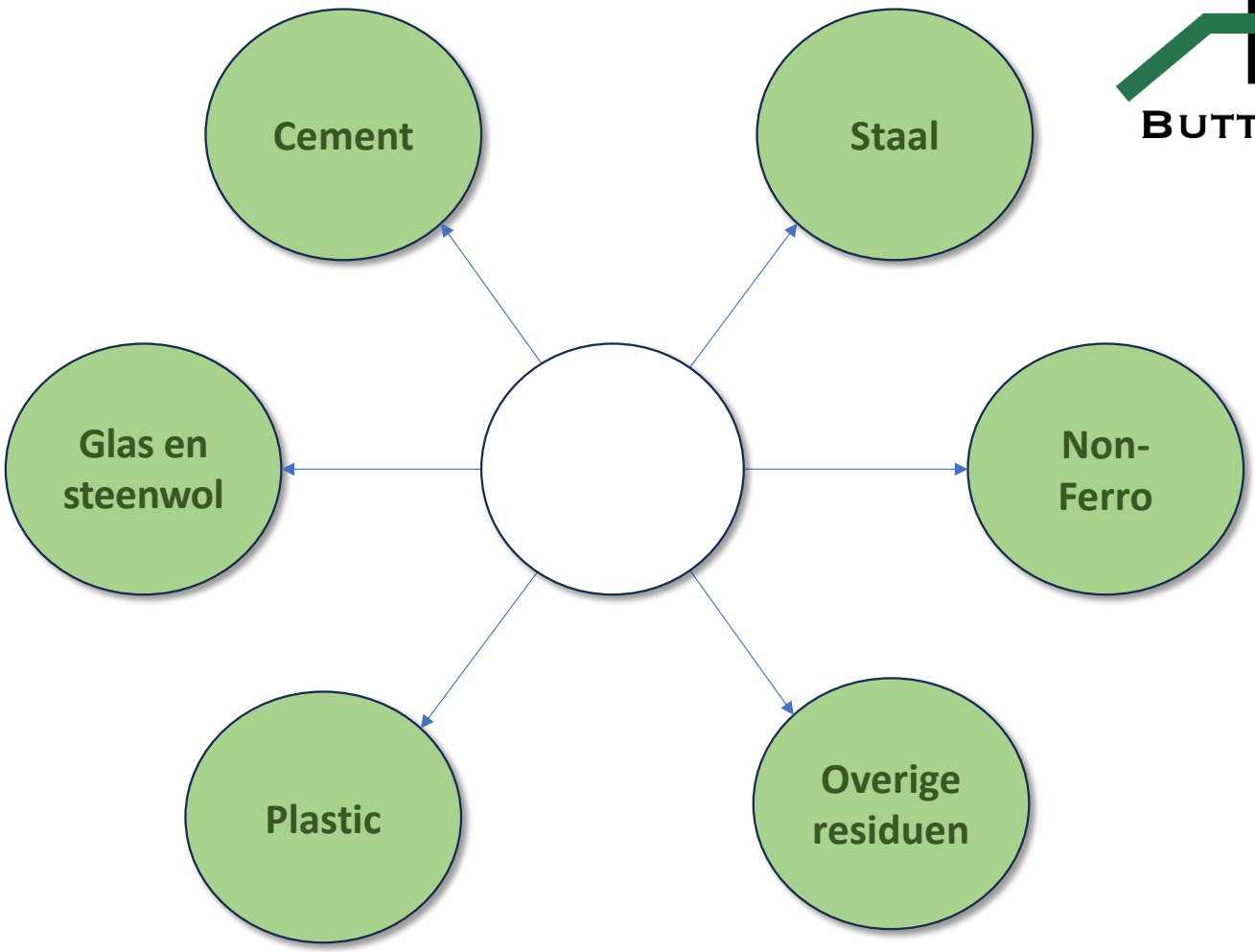
Verschillende formaten ovens om op **verschillende TRL niveaus** testen uit te voeren

Zowel **batch** als **continu** testen



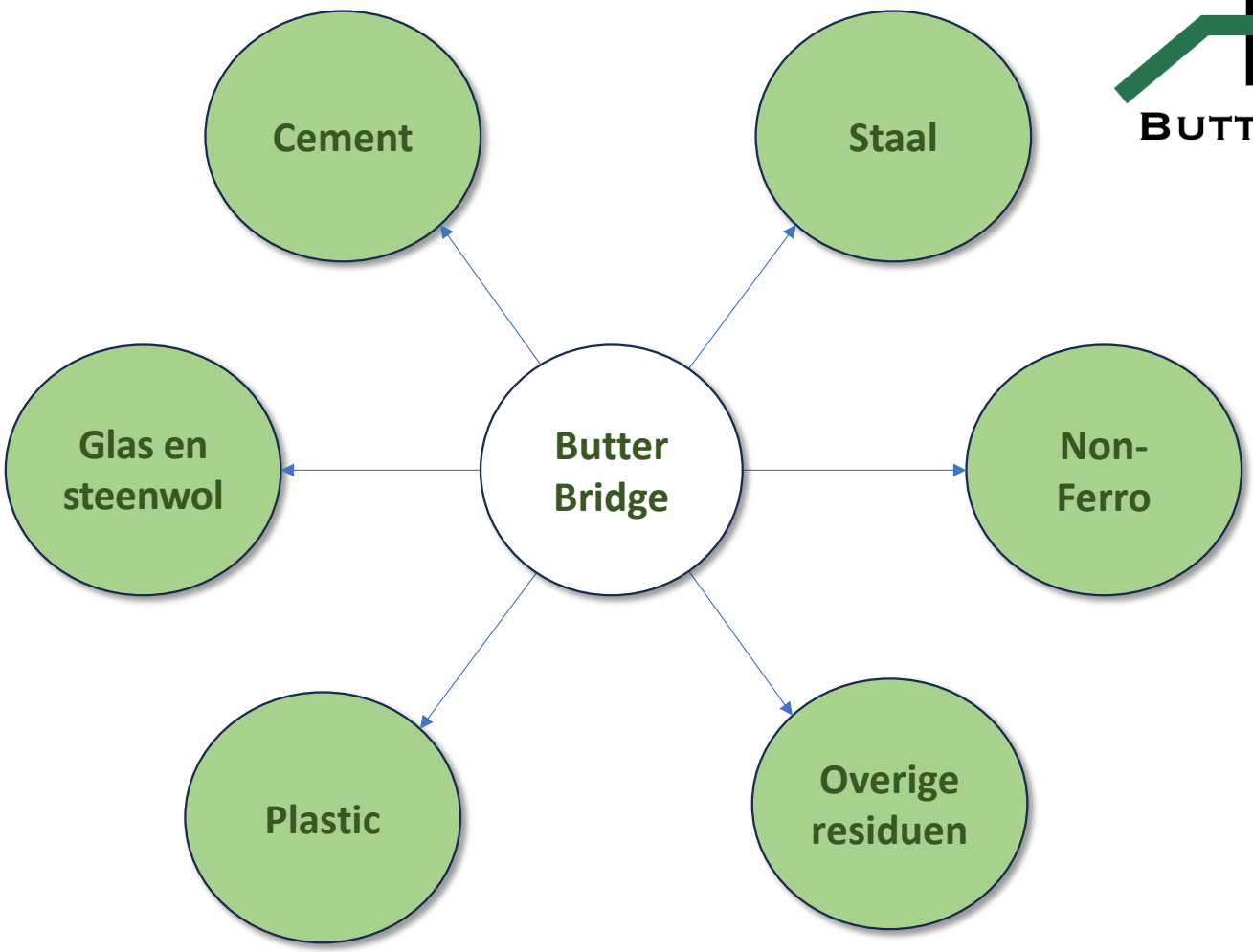
Waarom Butter Bridge





BUTTER BRIDGE

BUTTER BRIDGE



Waar staan we nu

Locatie Chemport Innovation Centre

In gesprek met diverse partijen om LOI's af te ronden voor uitvoeren testen of het verwerken van reststromen

- Leveranciers grondstoffen (ertsen en residuen)
- Cement industrie
- Glas industrie

Op zoek naar financiering