

Elomatic, Mika Patrakka

Koneet ja laitteet yksikön liiketoiminnan kehityspäällikkö

Olen ollut aina kiinnostunut teknologiasta ja suunnittelusta. Ennen kaikkea siitä, miten yritykset voivat tarjota asiakkailleen erinomaista asiakaskokemusta sekä miten luodaan parempaa liiketoimintaa. Päädyin aikoinaan Elomaticille hieman ehkä sattumalta. Olen sattumasta hyvin tyytyväinen

-> tyytyväisyys tulee seuraavista asioista: urakehitys, kehitysmuotoinen organisaatio, arjen ja työelämän yhteen sovittaminen (joustot, välittäminen, etätyöskentely)

Ydinosaamista: Liiketoimintaosaaminen, strategiaprosessit, kestävän kehityksen ja kiertotalouden teemat, palvelumuotoilun sekä tuotekehityksen menetelmät, olen myös aika hyvä kokonaisuuksien hahmottaja ja pidän numeroista, laaja-alainen toimialaosaaminen

Vapaa-aikana mm. pelaan tennistä, opiskelen ja liikun koiran kanssa. Perheeseeni lisäksi kuuluu vaimo ja kolme lasta





Towards sustainable business together with the circular economy

Mika Patrakka,
Lujitemuoviseminaari, 12.10.2023



Mika Patrakka

Business Development Manager,
Machinery & Equipment

Over 10 years of experience in
various design, development and
management roles

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Promoter of sustainable growth



About us



Established in
1970



In private
Finnish ownership



Number of employees
1300



Countries with customers
80 +



Countries with offices
20



Turn over in 2022
102 million €

Our areas of expertise



**Marine &
Offshore Energy**



**Machinery &
Equipment**



**Process &
Energy**



Pharma



**Technology
Solutions**

**Our Purpose: We design solutions that increase
environmental and human wellbeing.**

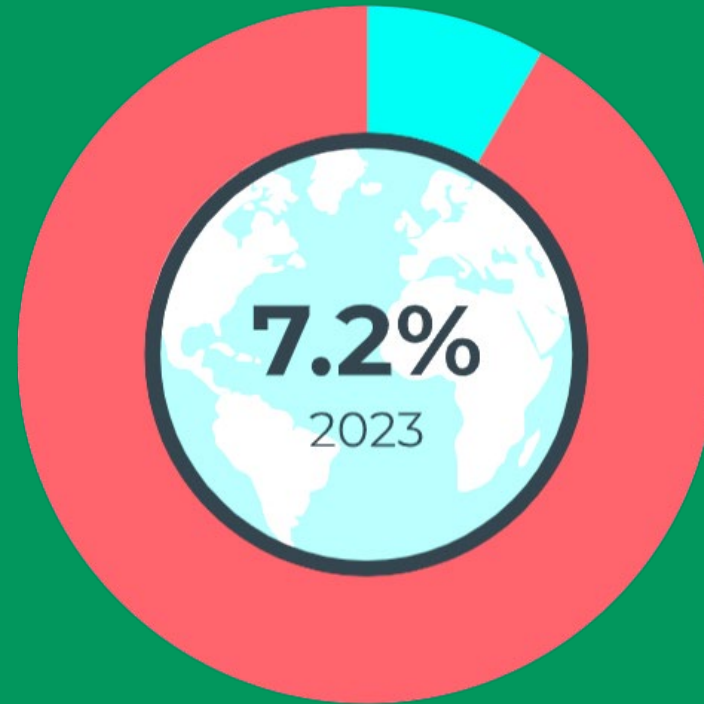
Towards sustainability business together with the circular economy

Growth by
Sustaina-
bility



Circular
Economy





**THE GLOBAL ECONOMY IS NOW ONLY
7.2%¹ (8.6%, 2022^{1a}) CIRCULAR**

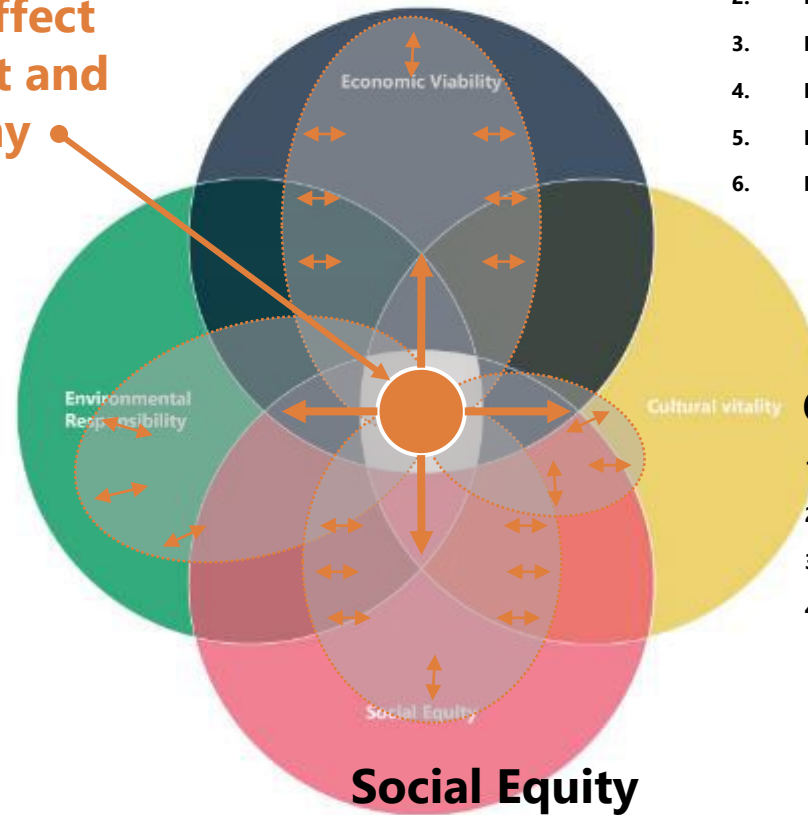
¹Circularity GAP 2023 ^{1a}Circularity GAP 2022

Sustainability and growth?

The paradigm change of planning and business is born here! -> Cause and effect relationship = Impact and regenerative economy

Environmental responsibility

1. Greenhouse gas emissions
2. Energy wisdom and efficiency
3. Waste management
4. Water use
5. Use of materials
6. Renewable and biodegradable materials
7. New environmentally friendly products and services
8. Biodiversity



Social Equity

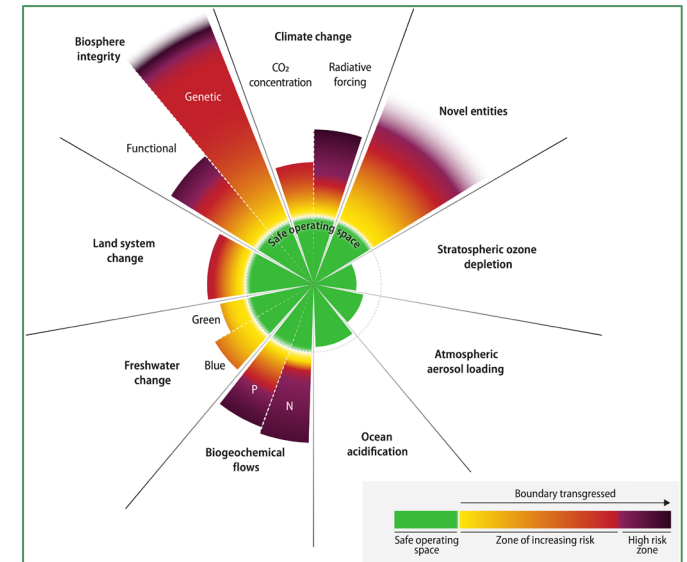
1. Employee well-being
2. Equality and diversity
3. Training and professional development
4. Community impact

Economy Viability

1. Maintaining economic viability
2. Economic efficiency
3. Investments and controlled growth
4. Debt management
5. Ethical financial management
6. Innovation and research

Cultural Vitality

1. Promoting cultural understanding
2. Preservation and respect of cultures
3. Diversity and languages
4. Access to information and non-distortion



<https://www.science.org/doi/10.1126/sciadv.adh2458>



Towards a renewable economy

"One possible scenarios"

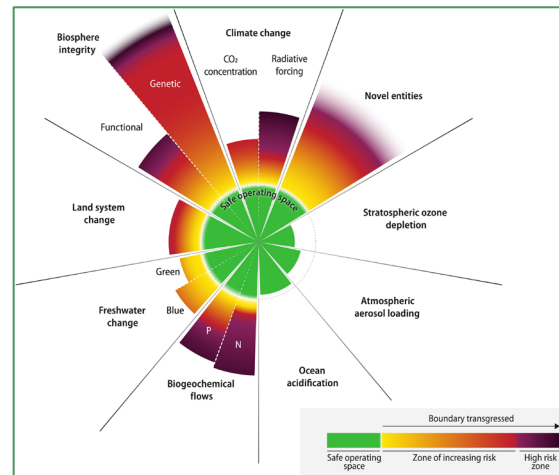
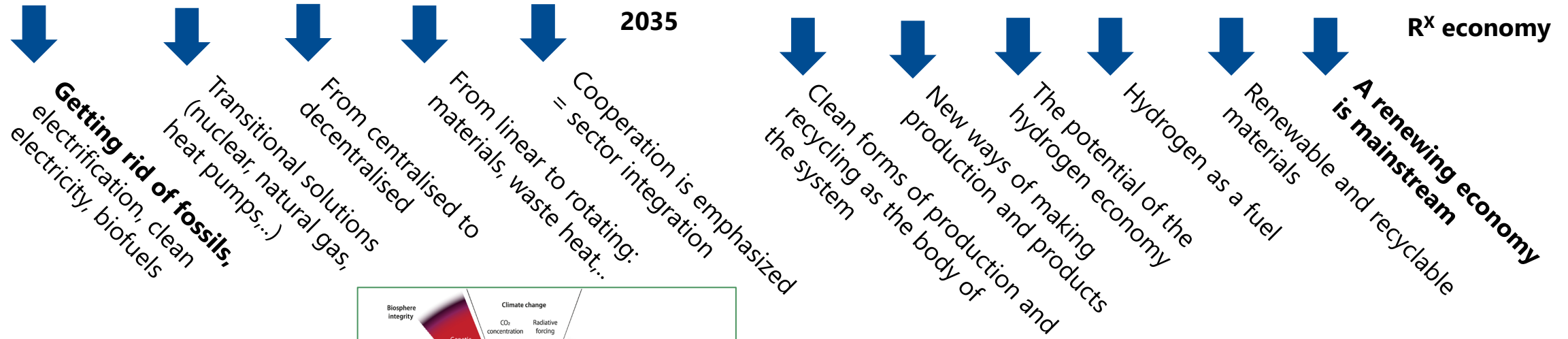
Fossil economy

"Towards carbon neutrality"

"Towards zero emissions"

Hydrogen economy

...2050



<https://www.science.org/doi/10.1126/sciadv.adh2458>



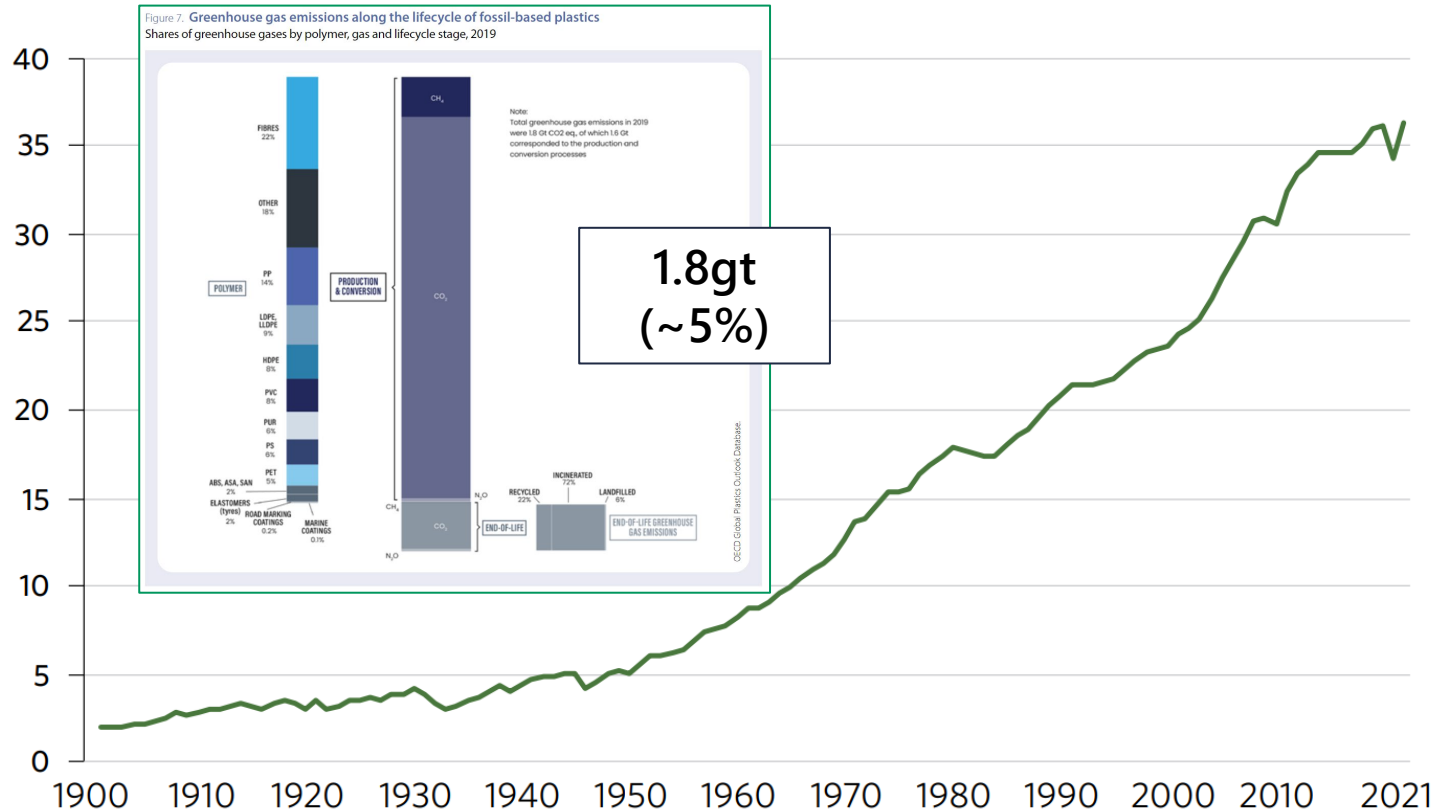
Carbon dioxide emissions from energy combustion and industrial processes

~37Gt

As a result of COVID-19, global carbon dioxide (CO₂) emissions decreased by 5.2% in 2020.

"We have a inspired challenge ahead"

Carbon dioxide emissions from energy combustion and industrial processes, 1900–2021 (gigatons of CO₂)

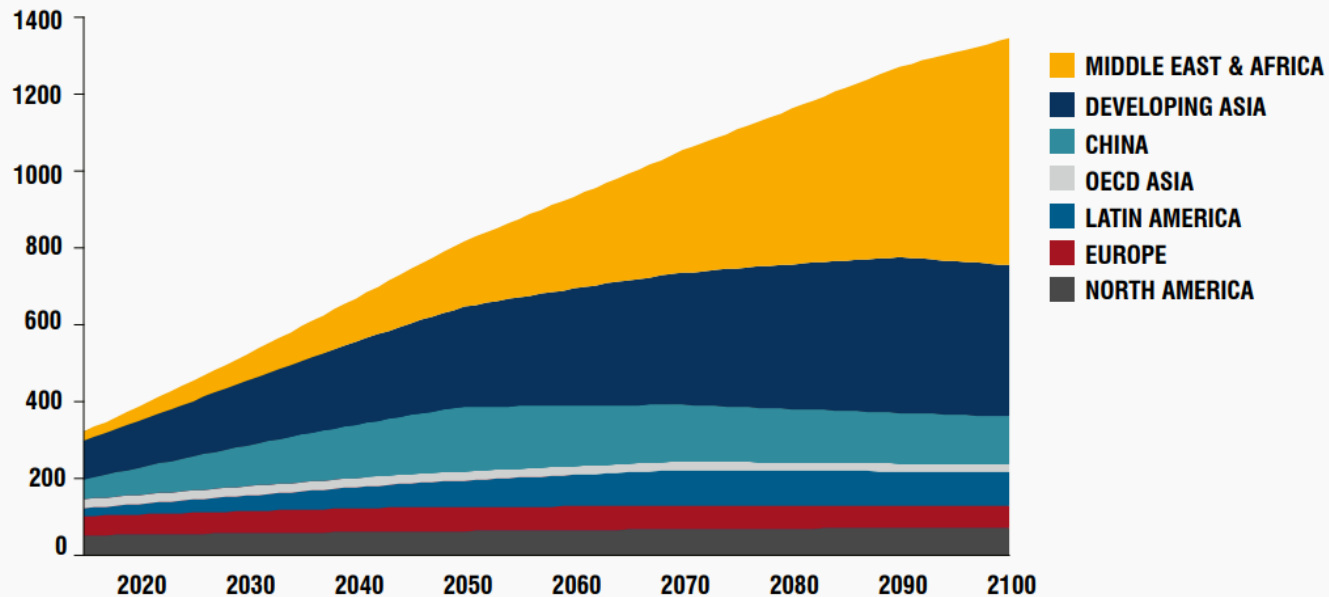


Plastic demand will increase

Exhibit 3.1

PLASTICS DEMAND WILL INCREASE SIGNIFICANTLY

PLASTICS DEMAND BY REGION
Mt PER YEAR, 2015-2100



~400Mt

In 2030,
demand will be
around 400
million tonnes

*"The market is huge
and as an EU we
have huge business
potential to create
clean technology and
new renewable
materials..."*



**Globally, only 9%
of plastic waste is
recycled**

9%

Globally, only 33 million tonnes (Mt), or 9% of the 353 Mt of plastic waste, were recycled in 2019

<https://www.iltalehti.fi/kotimaa/a/cc204b71-7398-4367-bfde-2dbd5f3b2c29>

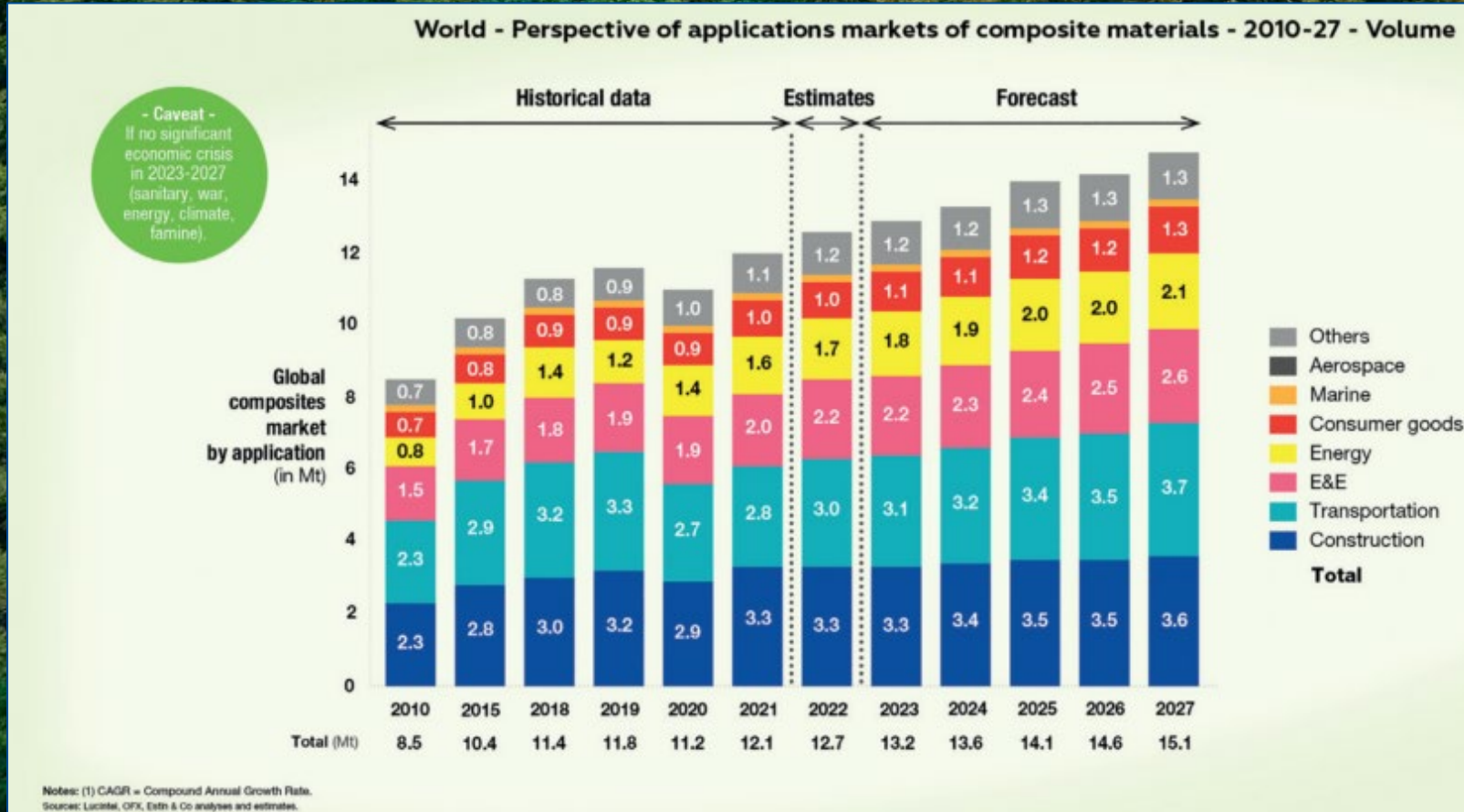
<https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm#:~:text=Nearly%20two%2Dthirds%20of%20plastic,11%25%20from%20clothing%20and%20textiles.>

Composite material demand will increase

219,41 mrd\$

The Composites market industry is projected to grow from USD 113.17 Billion in 2022 to USD 219.41 billion by 2030

"The market is huge and as an we have huge business potential to create clean technology and new renewable materials.."



Europe will generate 683,000 tons of composite waste in 2025

<https://baxcompany.com/insights/the-circular-economy-blueprint-bax-company-partners-with-industry-leaders-to-write-circularity-guide-for-composite-materials/>

2 Mt from 2050 onwards and accumulated waste to 43.4 Mt by 2050

<https://www.sciencedirect.com/science/article/pii/S136403212101114X>

Kuva: <https://www.bloomberg.com/news/features/2020-02-05/wind-turbine-blades-can-t-be-recycled-so-they-re-piling-up-in-landfills#xj4y7vzlg>

100t

The global recycling capacity is under **100,000 tons**

<https://baxcompany.com/insights/the-circular-economy-blueprint-bax-company-partners-with-industry-leaders-to-write-circularity-guide-for-composite-materials/>

Industry plays a big role in the fight against the climate change

20% of all emissions in the area come from the industry.

In addition, only **12%** of the raw materials used by the industry are recycled.

This is why it is seen at the EU level that it is important for the industry to lead the change.

~45 %

of EU-27's greenhouse gas emissions originate from industrial sectors

Sustainable industry The European Green Deal (2019)

https://ec.europa.eu/commission/presscorner/api/files/attachment/859442/Sustainable_industry_en.pdf.pdf

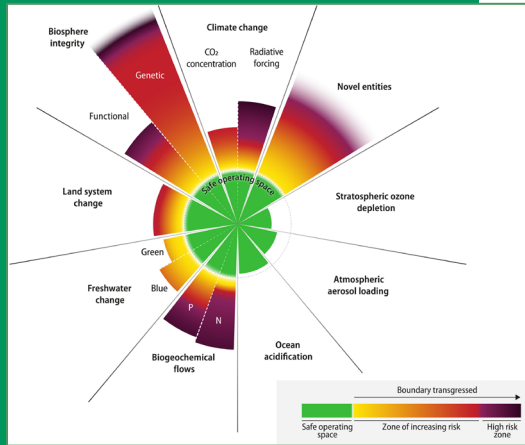
[EU-27: GHG emissions breakdown by sector](#) | Statista

Circular Economy changes the game

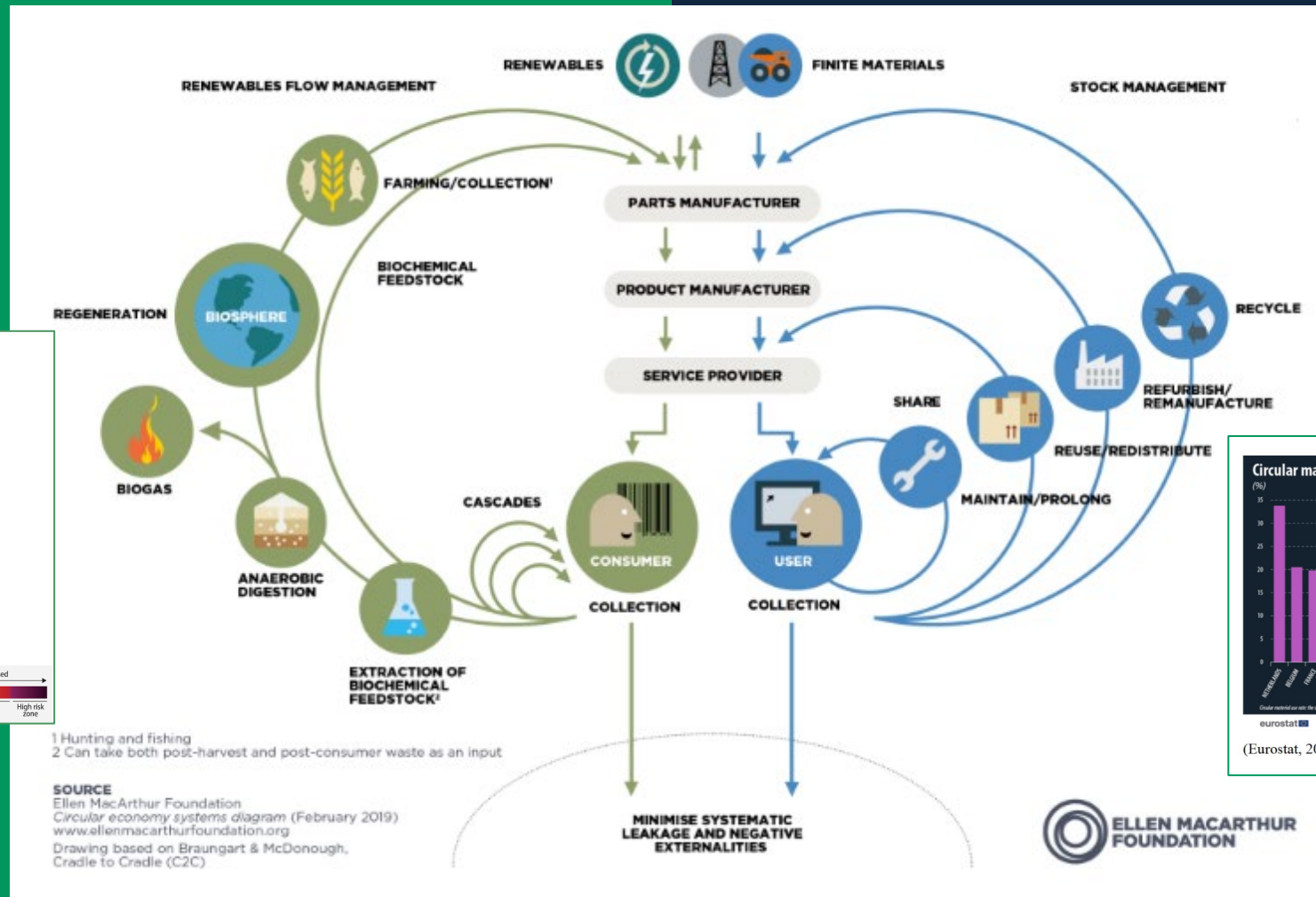
“The circular economy is about keeping a product, system or resource in circulation for as long as possible and foundation of the sustainable and renewable business”

Biological cycle

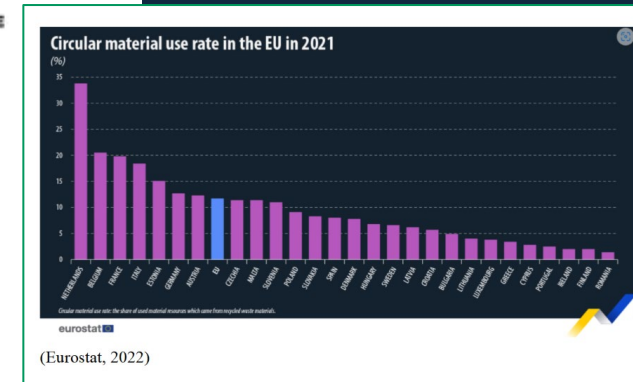
Technical cycle



<https://www.science.org/doi/10.1126/sciadv.adh2458>



Circular material use rate in the EU is 12% (2022)



Linear vs. Circular Economy

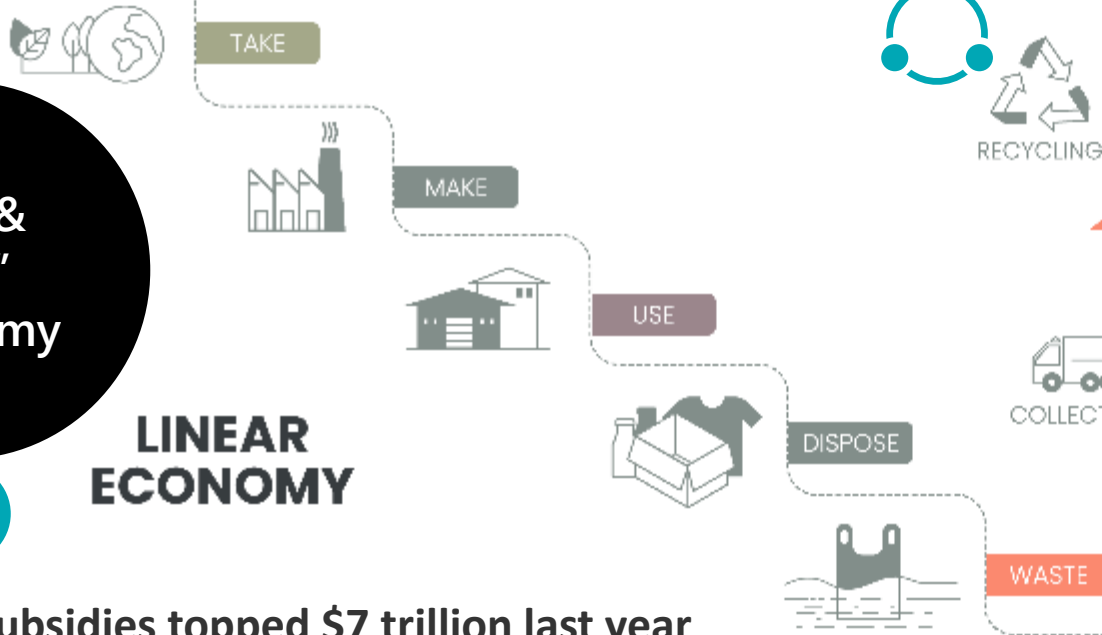
Up to 80% of the environmental impact of products is determined at the design stage

The structure of global economies is the main driver...

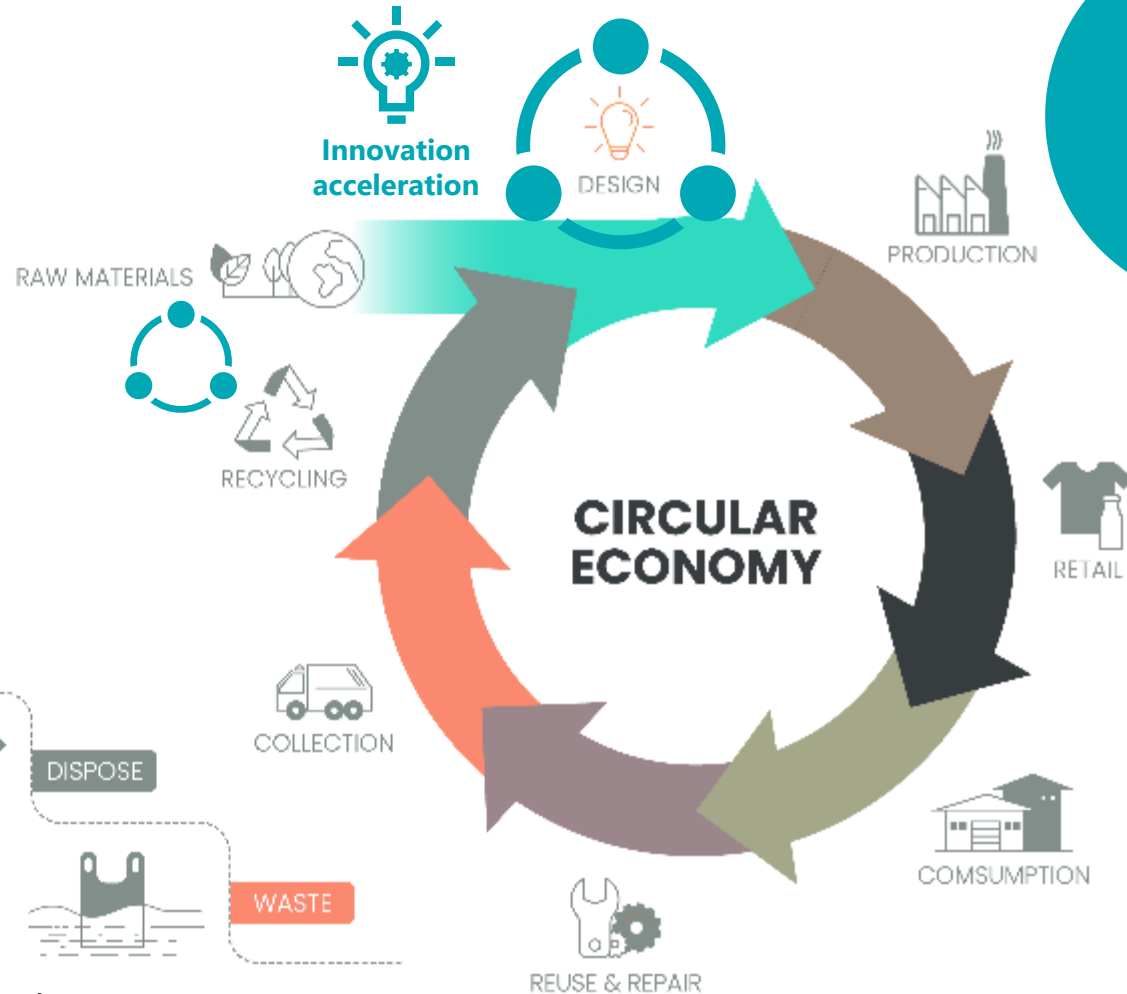
"Oil & Gas" Economy

RwE

LINEAR ECONOMY



Fossil fuel subsidies topped \$7 trillion last year
(Total fossil fuel subsidies, trillions of USD, 2022, IMF)



Renewable Economy

O&G

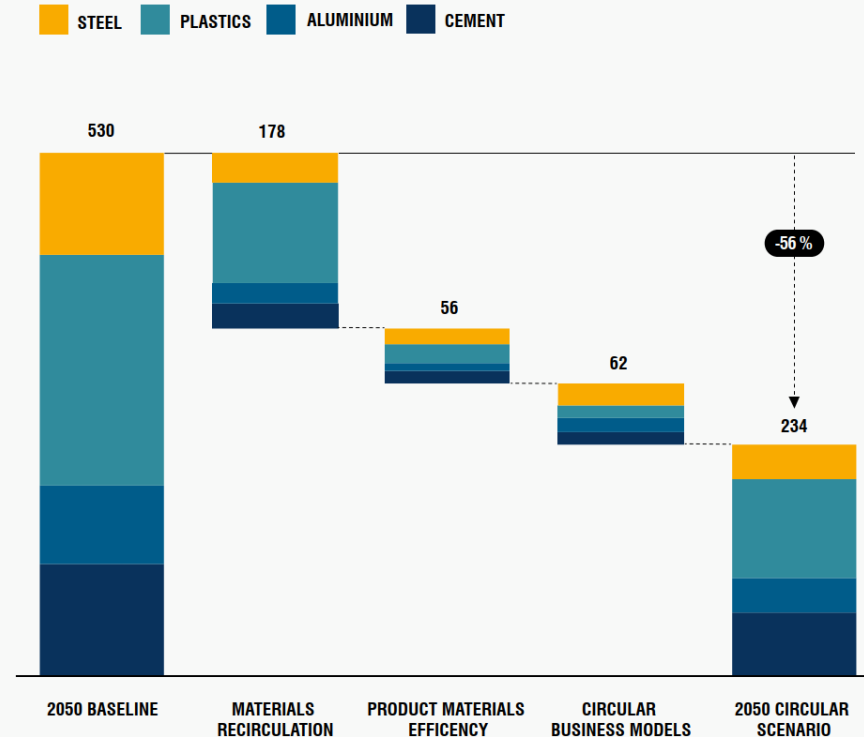
Circular Economy

- The added value of the circular economy by 2030 could be up to €3700 billion.
- It is estimated that the circular economy will create 700,000 new jobs in the EU by 2030.
- Circular economy thinking can increase the value created during a product's life cycle by up to 75%.
- Circular economy business models can increase business revenue up to seven times compared to linear business models.
- The circular economy can reduce a company's environmental footprint by up to 60-85%.

SITRA Kestävää kasvua kiertotalouden liiketoimintamalleista, Accenture – Lacy & Rutqvist (2015): Waste to Wealth: The Circular Economy Advantage;

A more circular economy can cut emissions from heavy industry by 56% by 2050

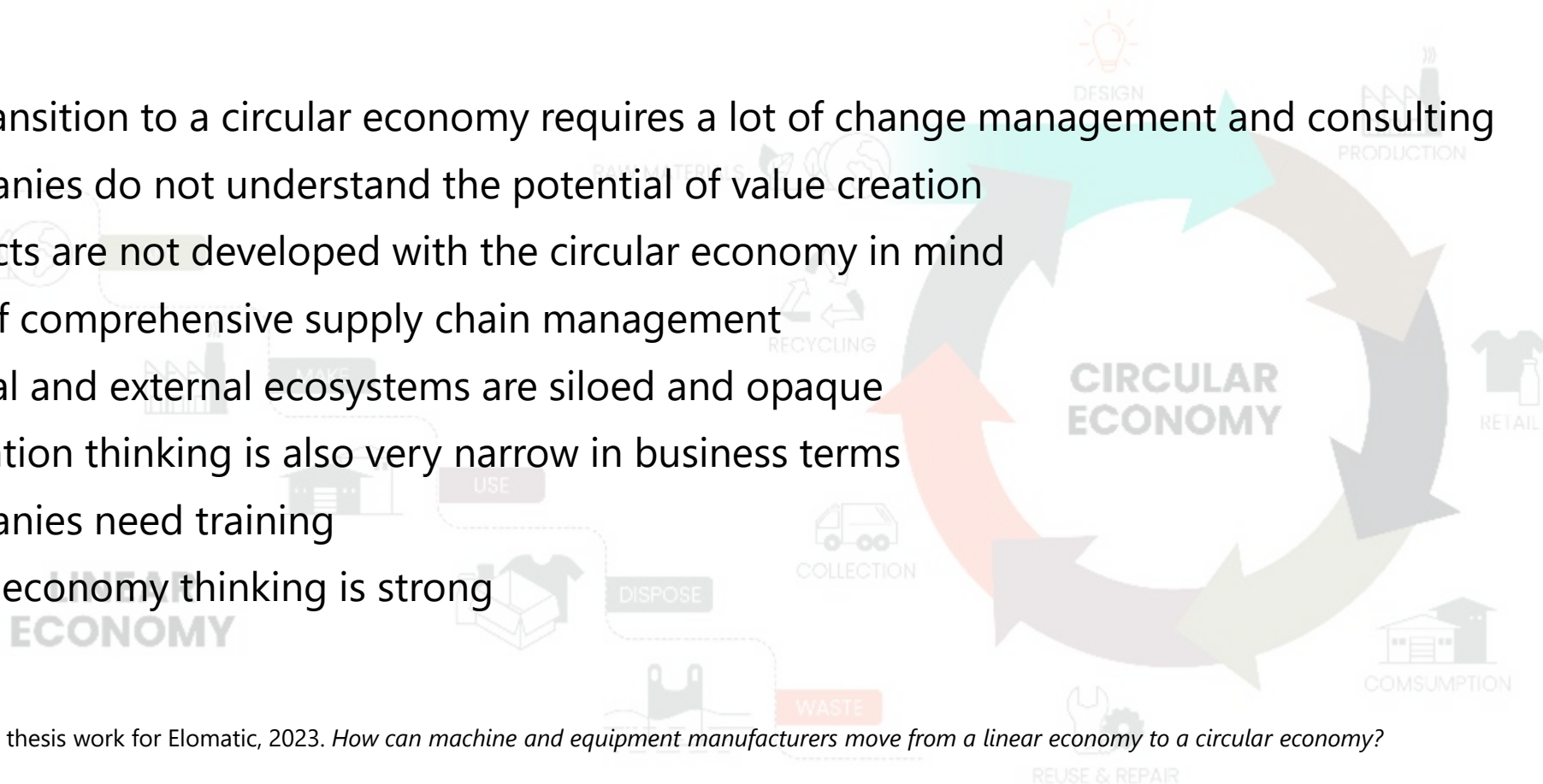
EU EMISSIONS REDUCTIONS POTENTIAL FROM A MORE CIRCULAR ECONOMY, 2050
Mt OF CARBON DIOXIDE PER YEAR



The Circular Economy a Powerful Force for Climate Mitigation
Transformative innovation for prosperous and low-carbon industry (2018)

Challenges of the transition from linear to circular economy

1. The transition to a circular economy requires a lot of change management and consulting
2. Companies do not understand the potential of value creation
3. Products are not developed with the circular economy in mind
4. Lack of comprehensive supply chain management
5. Internal and external ecosystems are siloed and opaque
6. Innovation thinking is also very narrow in business terms
7. Companies need training
8. Linear economy thinking is strong



Hanna Lausmaa, thesis work for Elomatic, 2023. *How can machine and equipment manufacturers move from a linear economy to a circular economy?*

0 i 2 3 b

1

R&D FOR CIRCULAR ECONOMY

- Design thinking
- New Product Introduction
 - Design for X and r-strategy and loops
- SCRUM (if software include)

i

INPUT

- Side streams
- Procurement

DESIGN

2

MANUFACTURING/PRODUCTION

- AM
- Smart manufacturing
- Streams
- Conventional methods
- Resource wisdom
- Logistics

RAW MATERIALS

3

RECYCLING

- Handling process
- Recycling process

b

CIRCULAR ECONOMY

- CLOSING LOOP
- NARROW LOOP
- SLOWING LOOP

DISTRIBUTE / CHANNELS

- Logistics
- Sales

3

USE & CONSUMPTIONS

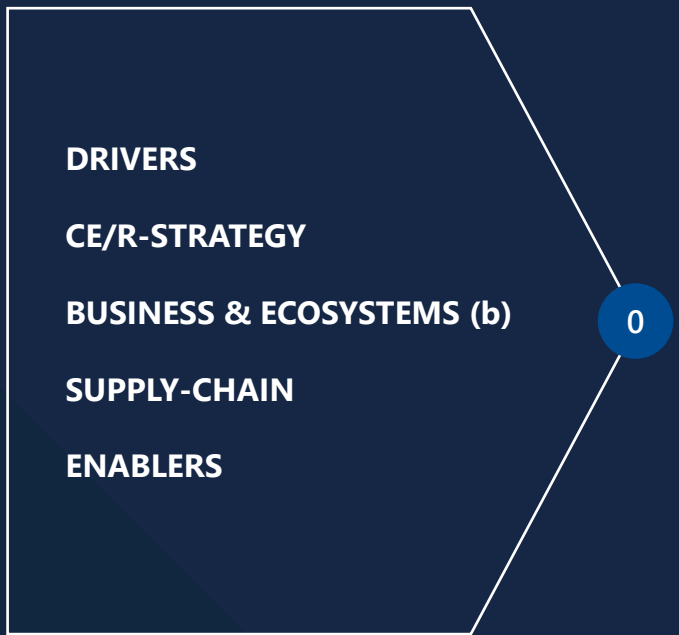
- Needs and user experience
- Life cycle extension by R-Strategy

3

LIFE CYCLE EXTENSIONS

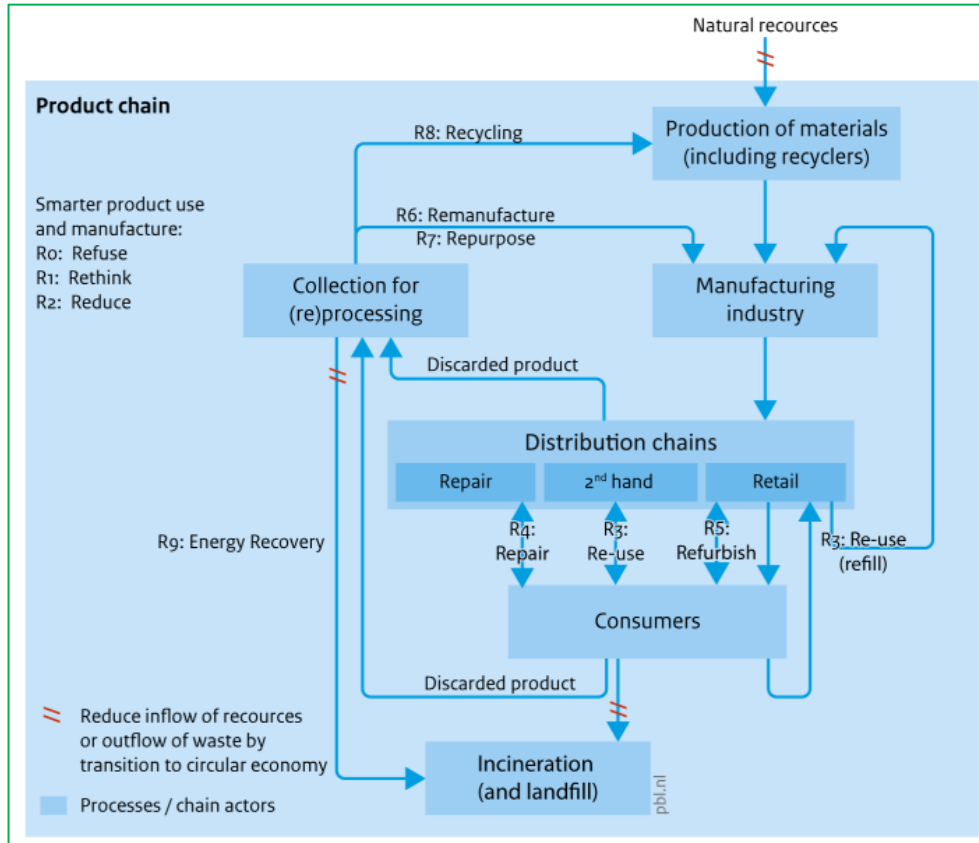
- Needs and user experience
- Life cycle extension by R-Strategy
- Logistics and platforms

- **CLOSING LOOP:** Nothing waste
- **NARROW LOOP:** Fewer resources are used
- **SLOWING LOOP:** Life Cycle Extensions



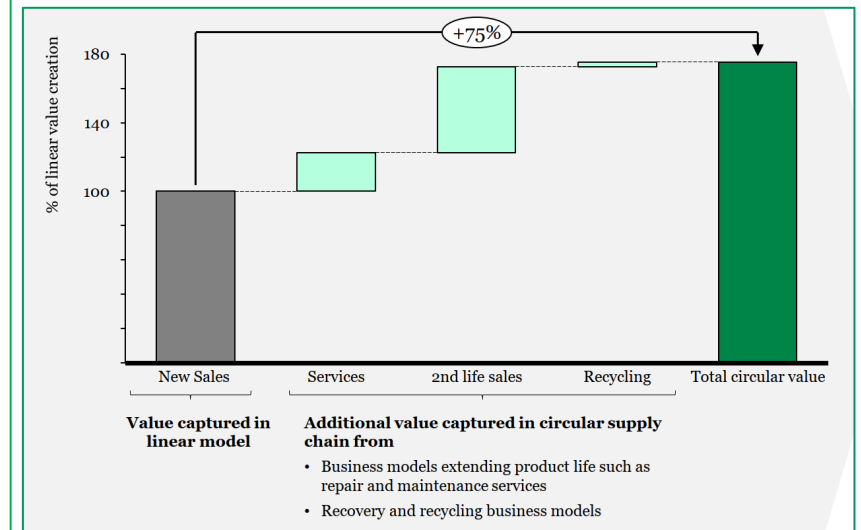
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What is your circular R-X and Circular loops strategy?



Strategies		
Smarter product use and manufacture	R0 Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
	R1 Rethink	Make product use more intensive (e.g. through sharing products, or by putting multi-functional products on the market)
	R2 Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
Extend lifespan of product and its parts	R3 Re-use	Re-use by another consumer of discarded product which is still in good condition and fulfils its original function
	R4 Repair	Repair and maintenance of defective product so it can be used with its original function
	R5 Refurbish	Restore an old product and bring it up to date
	R6 Remanufacture	Use parts of discarded product in a new product with the same function
	R7 Repurpose	Use discarded product or its parts in a new product with a different function
Useful application of materials	R8 Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality
	R9 Recover	Incineration of materials with energy recovery

Where do you capture value?

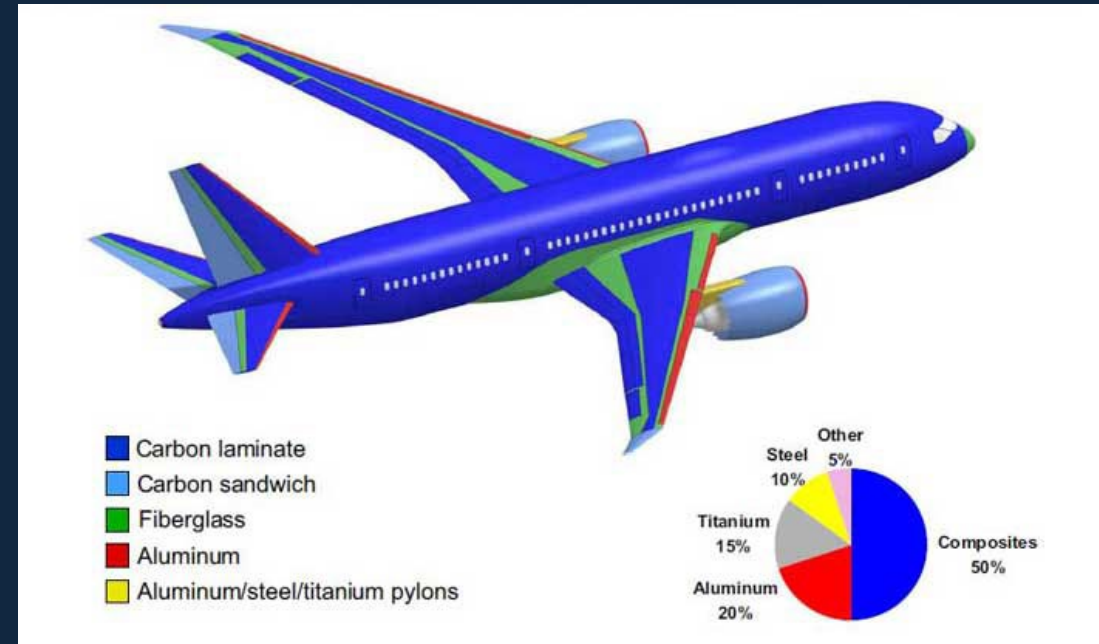


https://www.researchgate.net/publication/319314335_Circular_Economy_Measuring_innovation_in_the_product_chain

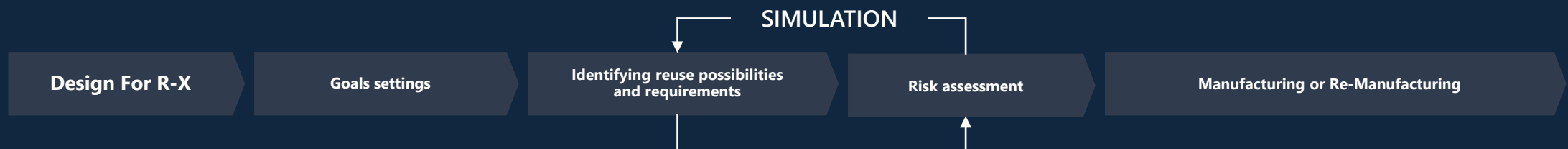
Circular economy business models for the manufacturing industry / Circular Economy Playbook for Finnish SMEs

Design for R-X → repair, reuse, recycle...

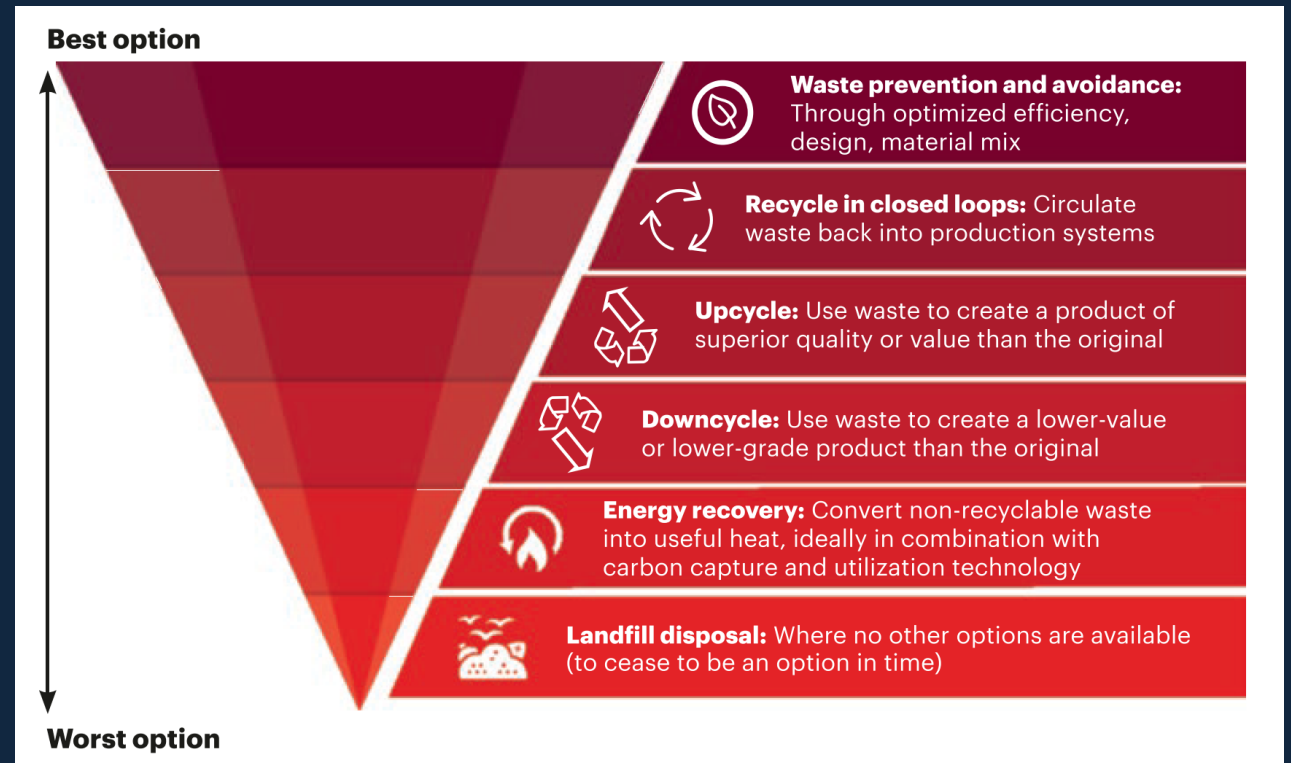
- When designing a new product, it is profitable to set the goal of repairability
- Investing in the design of composite products, areas in structures where recycled or reused material can be applied are identified
- In the design the possibly impaired properties of recycled material are taken into account compared to the requirements
- The risks of recycled materials and repairs are assessed, for example, through strength simulations and tests



The Use of Composites in Boeing 787
 Aircraft Construction <https://vandaair.com/2014/04/14/the-use-of-composites-in-aircraft-construction/>

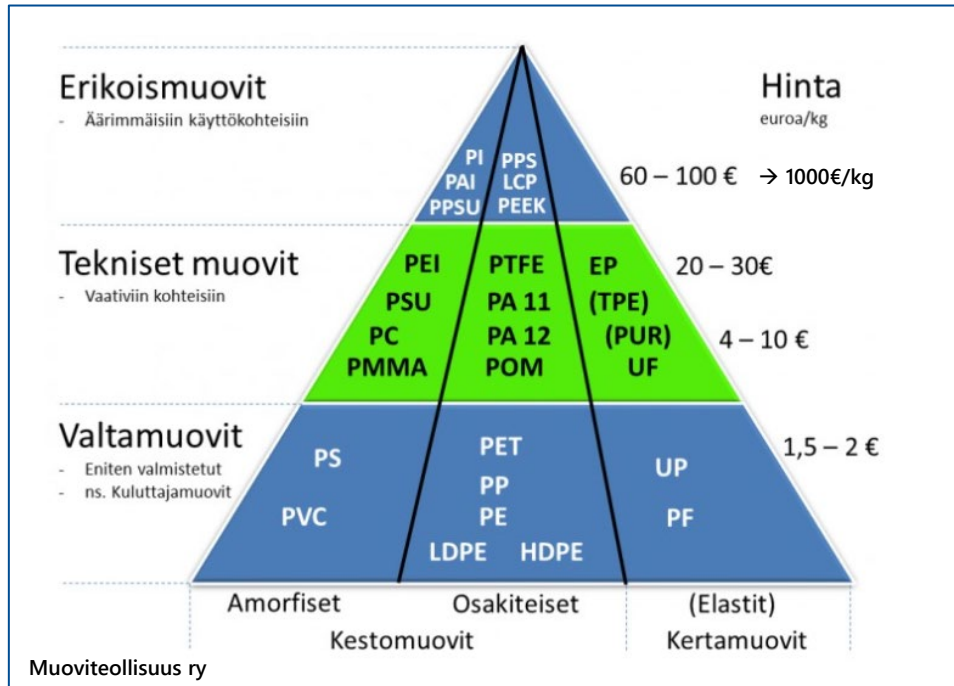


“The material industry is at the crossroads of many business opportunities.



The Circular Economy Handbook, Realizing the Circular Advantage (2020)

Plastics and composites are a top materials



Superior application

- Food packaging (Shelf life)
- Applications requiring strength and lightness, such as aerospace and automotive and transportation anyway need those
- Medical equipment

Key materials part of comprehensive systems

VTT, VTT's trend report 2023 features global megatrends & industry disrupting technologies

- Biomaterials & Biomimicry
- Industrial sidestreams & by-products
- (Organic) waste materials
- Alternative materials (sand, CO2 negative concrete)
- Nanomaterials
- Graphene & 2D materials

NATURAL FIBERS

Published 3/27/2023

Natural fiber composites: Growing to fit sustainability needs

Led by global and industry-wide sustainability goals, commercial interest in flax and hemp fiber-reinforced composites grows into higher-performance, higher-volume applications.

#feature #biomaterials #sustainability



HANNAH MASON 
Technical Editor, CompositesWorld

Three main drivers for use of recycled carbon fiber (rCF)

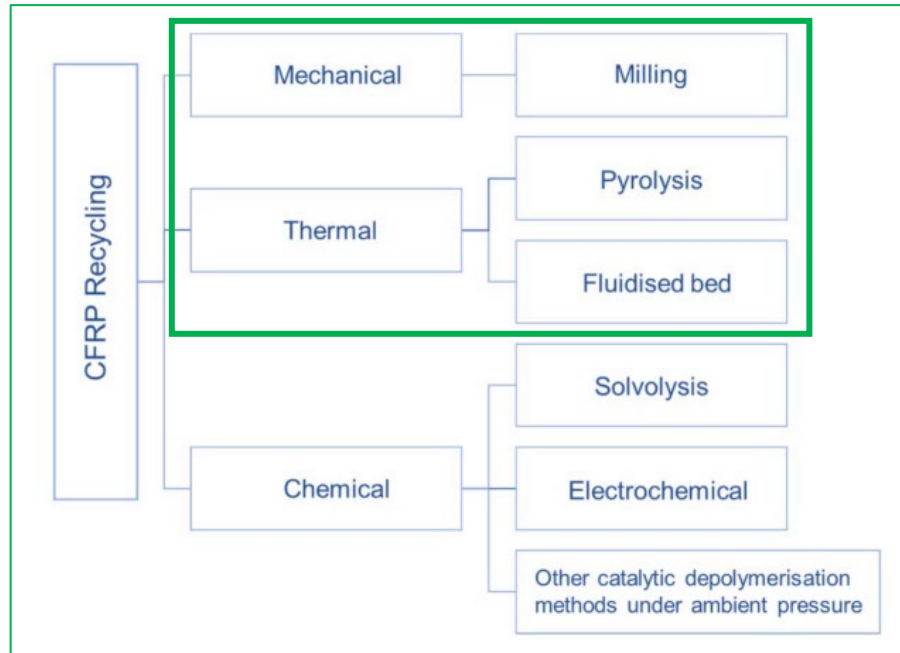
- **Cost competitiveness**
- **Security of supply**
- **Environmental sustainability**



<https://www.compositesworld.com/articles/building-confidence-in-recycled-carbon-fiber>

<https://www.compositesworld.com/articles/natural-fiber-composites-growing-to-fit-sustainability-needs>

Material Lifecycle Extension / ReCycle



Current status of carbon fibre and carbon fibre composites recycling, Composites Part B: Engineering, Volume 193, 2020,

Three main drivers for use of recycled carbon fiber (rCF)

- **Cost competitiveness**
- **Security of supply**
- **Environmental sustainability**

<https://www.compositesworld.com/articles/building-confidence-in-recycled-carbon-fiber>



RECYCLE of CARBON FIBRES

- Cost of recycled CF?
- Quality validation of recycled CF?
- Stress and strain allowables for recycled CFRP?
- May be used for secondary structures and parts with reduced strength values?
- Weight savings when compared to GFRP?

Published 2/28/2019

Building confidence in recycled carbon fiber

Recycled carbon fiber is proving, increasingly, to be a cost-effective, environmentally sustainable composite solution for automotive and other high-volume applications.

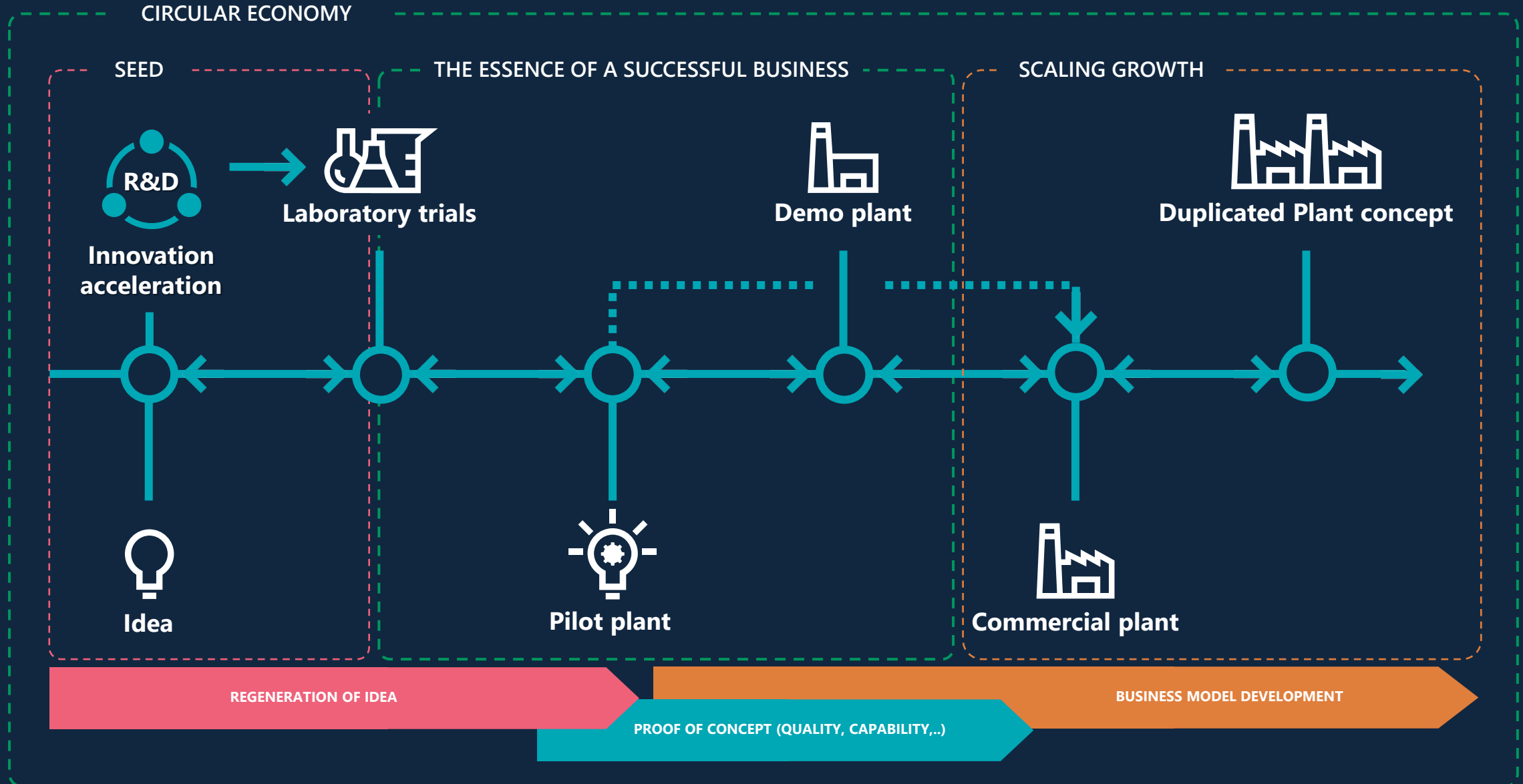
[#sheetmoldingcompound](#) [#outofautoclave](#) [#discontinuousfiber](#)

AMANDA JACOB, CONTRIBUTING WRITER & AMANDA JACOB, CONTRIBUTING WRITER

<https://www.compositesworld.com/articles/sustainable-inline-recycling-of-carbon-fiber>

<https://www.compositesworld.com/articles/the-state-of-recycled-carbon-fiber>

Elomatic Scale-Up Concept





VTT

110 mrd

The global market for plastic films was approximately USD 110 billion in 2021. (VTT)

“

In this project, we had a virtual design team with Elomatic, where we solved the challenges of the community. We thought through the project how to do it in the best possible way, and we looked for the best combination of alternative solutions.

**Ali Harlin,
Research Professor, VTT**

The transparent cellulose film developed by VTT is a more climate-friendly solution instead of plastic. It helps to solve many challenges related to plastic. The development of the solution would not have been successful without Elomatic's expertise.

The project and Elomatic's role

A machine line was needed to manufacture the cellulose-based film developed by VTT, which Elomatic was responsible for implementing as an EPCM project. In addition to mechanical, electrical and automation design, the delivery included tender surveys and supplier comparisons.

The project involved a virtual design team, which solved the challenges of the community. As a result of good cooperation, the start-up of the machine line was successful on the first try. Assembly of the line started in the summer of 2021, and the machine line was successfully started two years after the start of preliminary planning.

Spinnova



I am very proud of our team, our partners for the successful implementation of such a big project so quickly. This is a greenfield plant in all respects, but everything nevertheless went according to plan due to the ingenious idea, careful planning and accurate implementation.

Janne Poranen, CEO, Spinnova

Textile fibre technology company Spinnova has completed the construction of a production line plant to produce textile fibre from cellulose. Elomatic partnered Spinnova starting from the preliminary study and design, to the start-up of the plant.

Elomatic scope included

- Project management
- Preliminary study
- Basic & detail design, device design, plant & process design
- EIA design
- Technical analyses
- Building changes
- Risk evaluations & Procurement

Infinite Fiber Company



It has made a big difference that Elomatic wants to be actively involved in creating something new. It is needed to support sustainable development and solve global challenges. Carbamming is a key part of our process. If we didn't have a world-class partner in it, we wouldn't be able to create value for our own customers.

**Petri Alava, CEO and co-founder,
Infinite Fiber Company**

New fibre from textile waste – Elomatic helps important mission

Infinite Fiber Company's innovation enables the utilization of cotton-containing end-of-life textiles and other cellulose-containing waste streams as new, cotton-like textile fibers. The company has pilot factories in Espoo and Valkeakoski and is planning to build a flagship factory in Veitsiluoto to meet the strong demand for Infinna™ from international clothing brands.

2016 – Co-creation starts

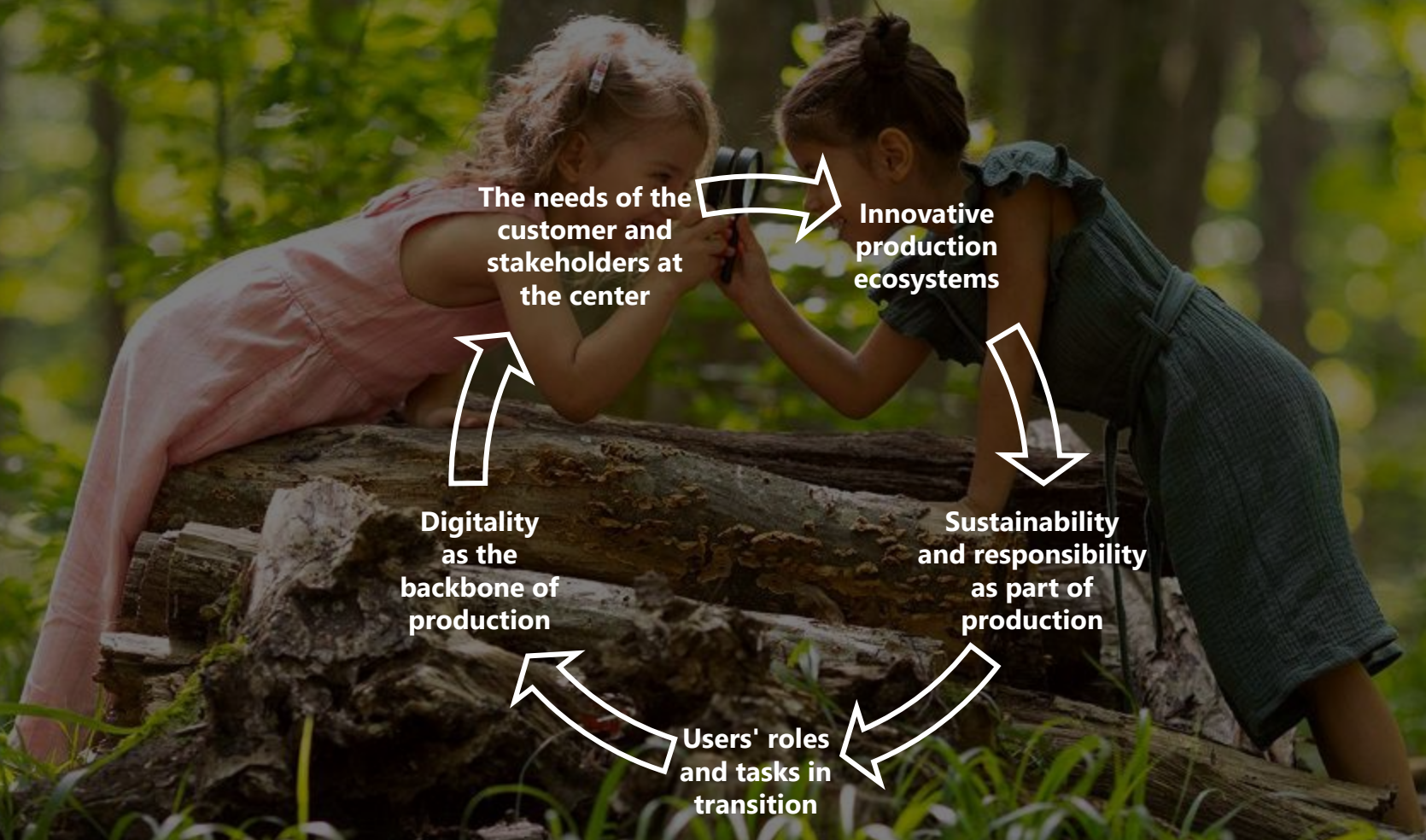
2018 – Pilot plant

2020 – Tervasaari pilot plant starts

2021 – Flagship demo plant CD

2022 – Flagship demo plant BD

How we see the future?



The needs of the customer and stakeholders at the center

Innovative production ecosystems

Digitality as the backbone of production

Sustainability and responsibility as part of production

Users' roles and tasks in transition

10 questions to ponder in your company

1. Is it possible to do business and grow sustainably
 - Idealism or genuine possibilities? What kind of?
2. How does your design consider 80% of the impact of the entire life cycle?
3. Sustainability will soon be the new normal in business. Reporting obligations will soon apply to everyone!
 - The customer/consumer decides who does it best and more reliably! What is the opportunity for your company? Minimum or maximum, pioneer or successor
4. How to make the recycling and reuse of materials work cf. bottle deposit
5. What if the incineration of plastic/material stopped?
6. How are synthesis chains solved taking sustainable development into account?
7. What kind of challenges have your organizations identified in the field of circular economy?
8. Repaired or recycled?
9. What other circular economy R-Strategies do you identify in your organization?
10. What new circular economy business models could emerge in your company? What prevents the emergence of new "NOKIOS"?



ELO
TALK

Building Tomorrow with a Proven Legacy

Uudet jaksot 13.9. alkaen

www.elomatic.com/fi/elotalk/

#EloTalkShow





**When it's time to face the future,
face it with Elomatic.**



Visions of Tomorrow, Engineered Today