資料３

Accelerating Circular economy

Kari Herlevi, Project director
Finnish Innovation Fund Sitra

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Sitra

Erkki Laitila, HS/Lehtikuva 1967

A gift to Finland

The Finnish Parliament established Sitra as a gift celebrating the 50th anniversary of Finland's independence.

The public future-oriented organisation was given the mission to build the successful Finland of tomorrow.

The year was 1967.

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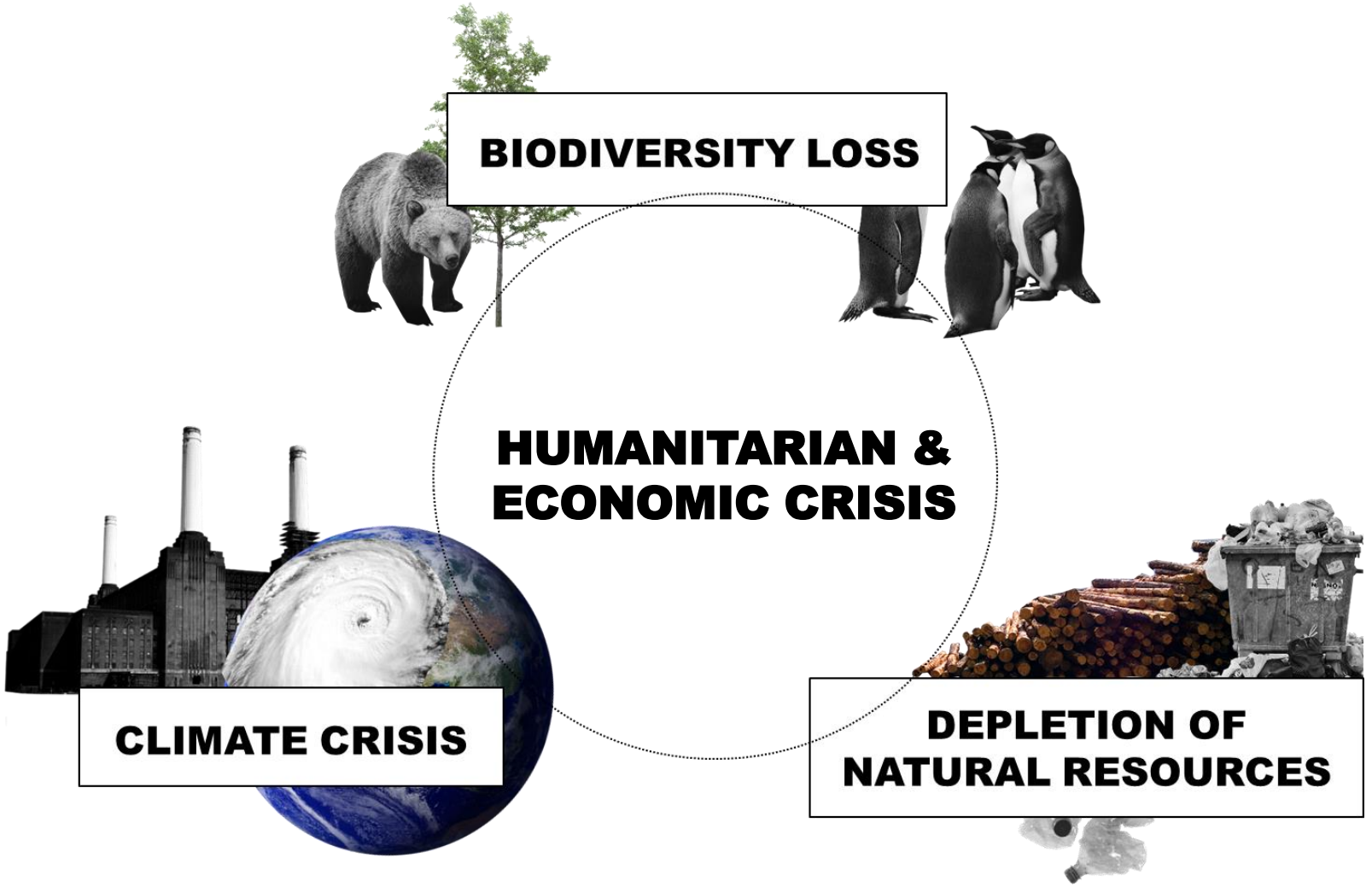
The global sustainability crisis has also led to an economic and humanitarian crisis



Case Finland

We have pioneered studies that capture the potential of a circular economy in tackling climate change and biodiversity loss

Circular solutions in steel, plastics, cement and aluminium can create large savings and reduce CO2 emissions from EU's heavy industry by 56% by 2050.

Sitra etc. 2018: The Circular Economy – A Powerful Force for Climate Mitigation

Tackling Root Causes – A study which demonstrates how the circular economy can tackle biodiversity loss

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3 things about Sitra's and Finland's work to transition to a circular economy

1

In 2016 Finland created **the first national circular economy road map in the world** under the leadership of Sitra. Sitra has helped other countries start their own road map work with a circular economy guide.

2

Study materials and courses for **all levels of education** across Finland with more than 50 educational institutions and organisations, and companies. Pilot projects also in vocational training and lifelong learning.

3

Hands-on company support with playbooks for applying circular business models, e.g. in the technology and chemical industries. See also the list of the most interesting companies in the circular economy in Finland!

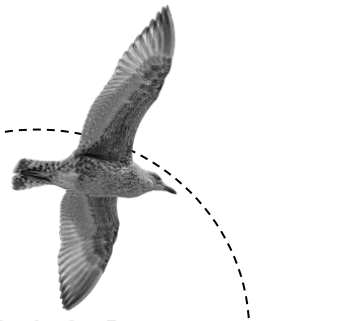
Kick-starting the circular economy transition

Sitra was in the lead!

2014
"The economic potential of CE for Finland in different sectors"

2016

Leading the cycle: Finnish road map to a circular economy 2016-2025



2021

VISION
Finland in 2035: Our economic success is founded on a carbon-neutral circular economy society

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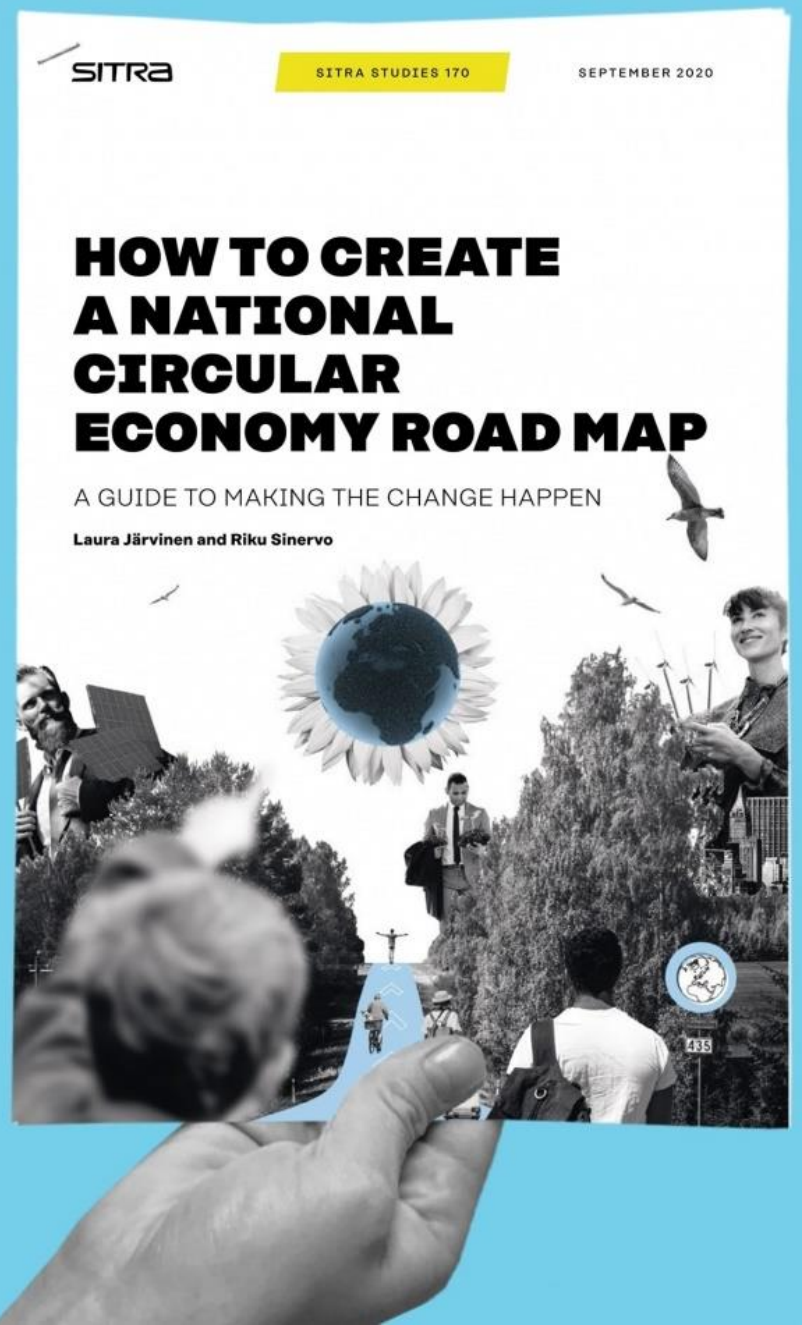

How to create a national circular economy road map?

Based on what we have learned, we put together a guide to help countries **start their journey** towards a circular economy.

The guide features **tools, guidelines and inspiration** for countries that want to move towards or are already taking their first steps towards a circular economy.

The guide can be used as both an inspiration and a guide that walks the reader through each phase of the road map process.

Circular economy on all levels of education

- 2017-2019 Sitra developed and tested the learning materials and courses together with all educational levels.
- Most of the developed courses continued as a permanent part of the institutions' activities.
- Already in 2018 Finnish higher education provided the most circular economy related content in the world
- Next up: vocational schools and lifelong learning!

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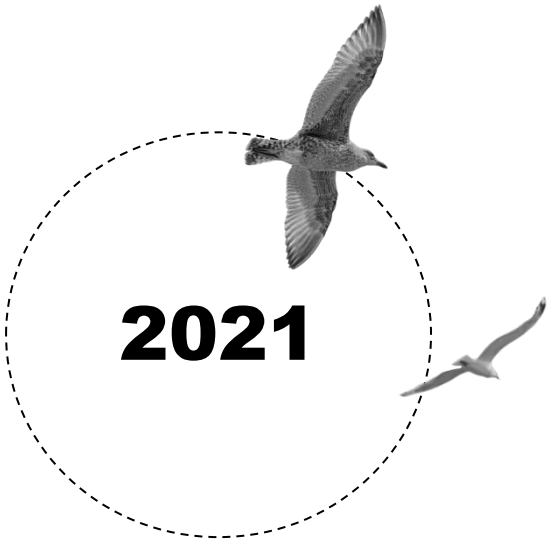
Circular economy as a sustainable foundation of Finland’s economy



Finnish strategic programme to promote a circular economy

The programme was created in collaboration with many societal stakeholders. It outlines **three objectives:**

1. The consumption of non-renewable natural resources will decrease, and the sustainable use of renewable natural resources may increase to the extent that the total consumption of primary raw materials in Finland in 2035 will not exceed what it was in 2015.
2. Resource productivity will double in 2035 compared with 2015.
3. The circular material use rate (CMU) must also be doubled by 2035.

Inside Finland's Plan to End All Waste by 2050

A scene at Fortum Waste Solutions Oy's circular economy facility in Häme, Finland on Dec. 14. In the facility, waste material collected from regular households is converted to clean plastic through Fortum's Eco Refinery—an automated sorting plant Ingmar Björn Nolting for TIME

TEXT BY **LISA ABEND** | PHOTOGRAPHS BY **INGMAR BJÖRN NOLTING** FOR TIME
JANUARY 20, 2022 7:00 AM EST

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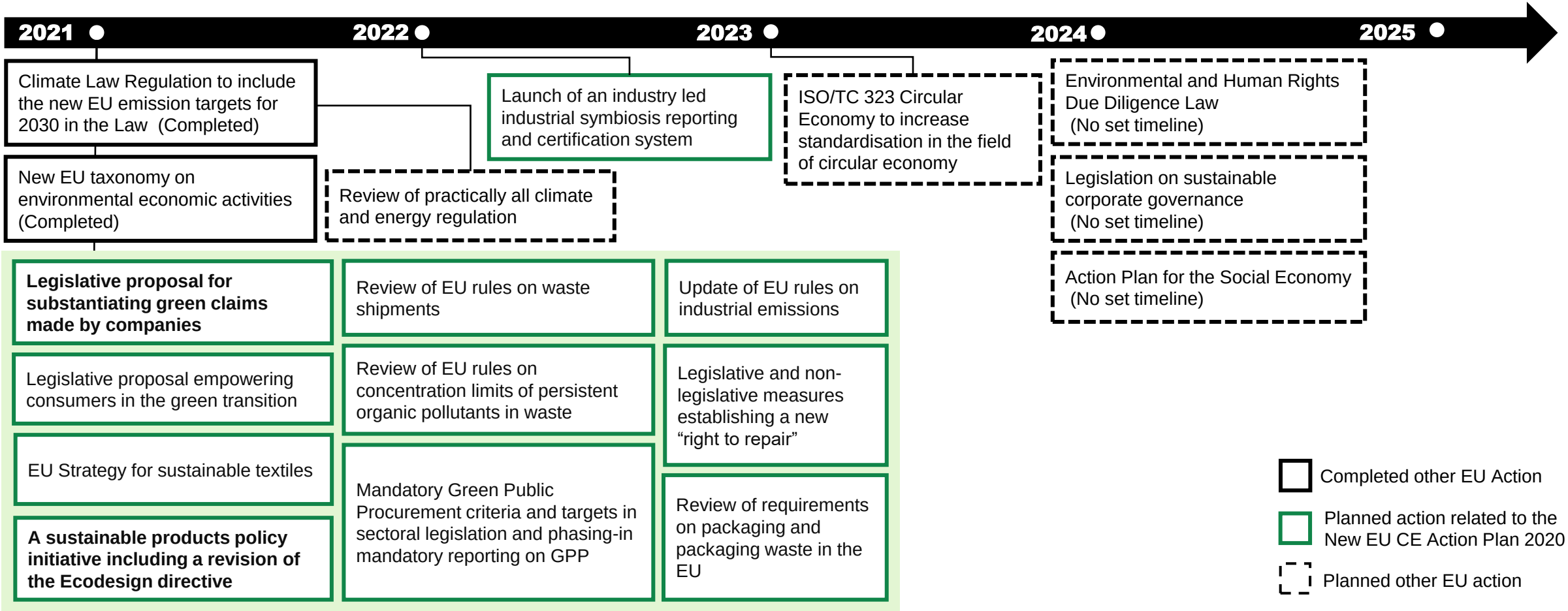
International

Green Deal regulation 2020 - 2025

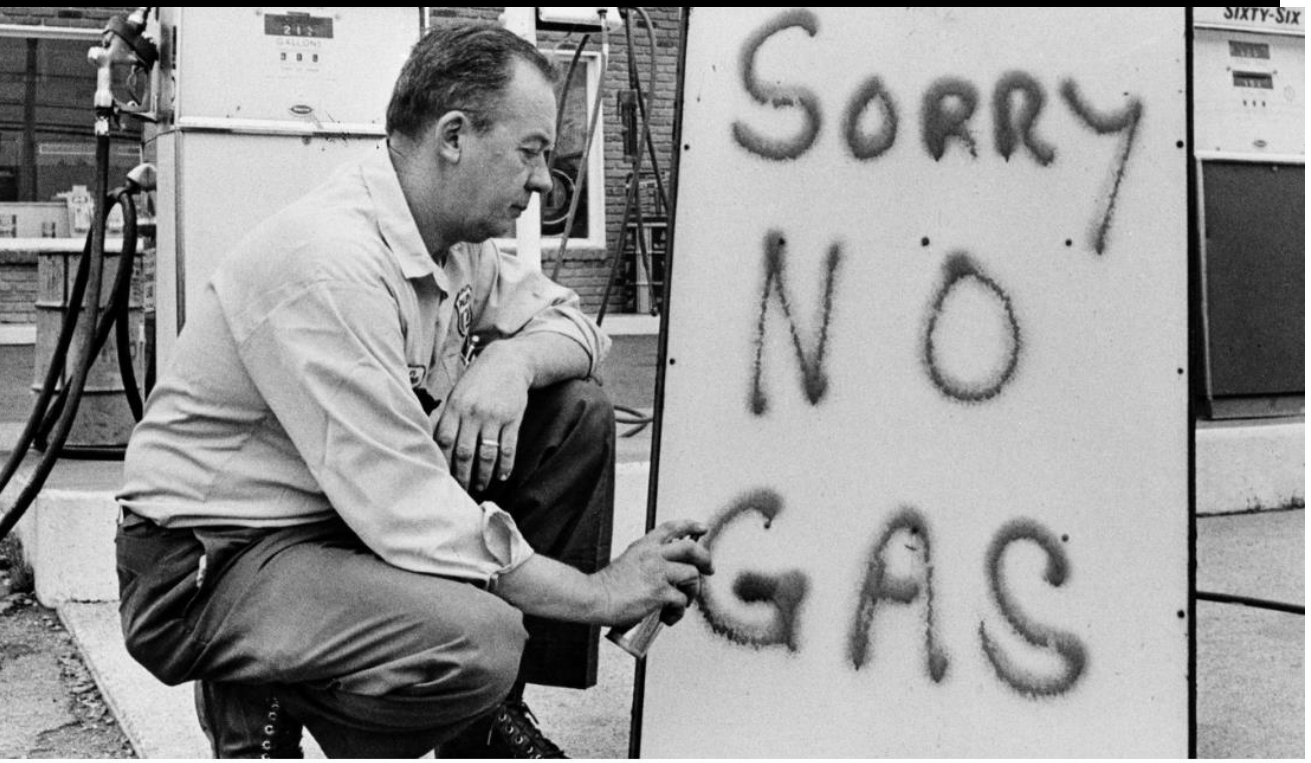
INSIGHT

The direction of regulation is clear – circular economy will be increasingly incorporated into different criteria and rules in the EU in the upcoming years. Factors such as the use of circular-design principles will become an issue of licence-to-operate.



Sources: The European Commission webpages

1973 revealed the world's dependency on oil



Picture source: https://energyfuse.org/princetons-meg-jacobs-1970s-energy-crisis-book-panic-pump/

Sitra working paper: In the brink of an energy crises: what can we learn from the past?

1. Strengthen the foresight and be prepared for all scenarios– will pay back
2. Invest in energy saving and energy efficiency – can provide quick wins
3. Ensure alternative energy production to replace Russian energy – renewable energy, heat pumps are the key
4. Support the long-term energy transition – getting rid of fossils fuels also support energy security

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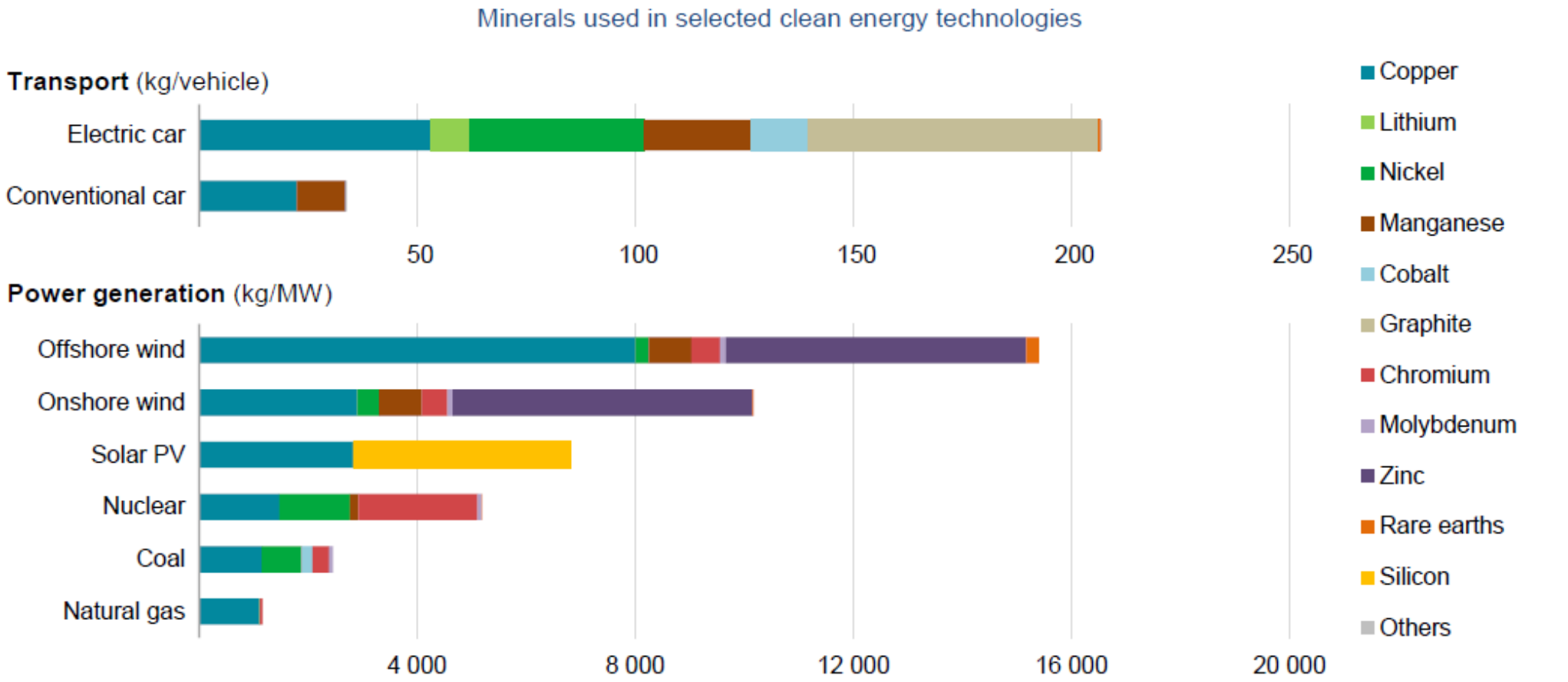
The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals



Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

IEA's six key recommendations for a new, comprehensive approach to mineral security

Ensure adequate investment in diversified sources of new supply

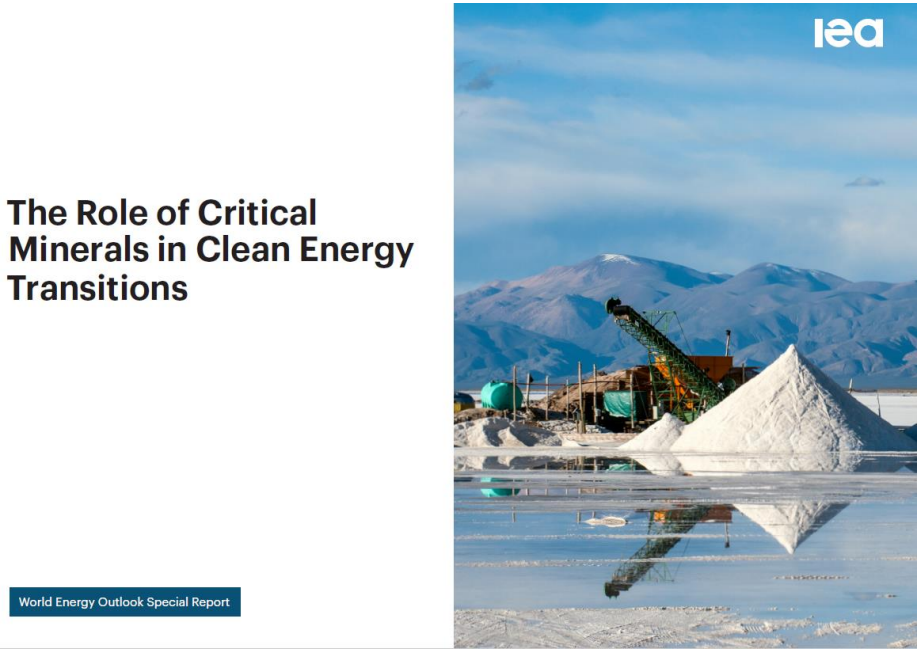
Promote technology innovation at all points along the value chain

Scale up recycling

Enhance supply chain resilience and market transparency

Mainstream higher environmental, social and governance standards

Strengthen international collaboration between producers and consumers



An EU perspective on mineral processing and battery recycling value chains in a circular economy

- Russia's war has accelerated EU's actions to reduce its dependence on fossil fuels and to speeded-up EU's energy transformation
- Shifting away from Russian resources towards renewable energy will increase demand and prices both for base metals and critical raw materials
- the EU is most dependent on China as a supplier of strategic products and raw materials.
- EU seeks to reduce its dependency critical raw materials and securing a stable and strategic supply CRMs by introducing a critical raw materials act early next year.
- Australia is one of the most relevant trade partners with the EU in CRMs (a significant amount of lithium exported to the EU, and EU is currently finalising FTA negotiations with Australia)

With the Critical Raw Materials Act EU tries to find ways to address:

1. The EU's low diversification of supply sources, leading to a high dependency on countries such as China
2. Social, environmental, and human rights impacts of CRM mining operations, currently outsourced to other countries
3. Lack of circularity of CRMs

Business

THERE IS A STRONG BUSINESS CASE FOR CIRCULAR ECONOMY AND THE RIGHT TIME TO START IS NOW

From linear…

…to circular…

…creating opportunities

$4.5 trillion
Global growth potential to 2030

60 - 85%
Reduced environmental footprint

Up to 7x
Higher value in lifecycle revenues vs. new sales

Up to 100%
Reduced exposure to critical raw material

1/3
Of global CEOs already explore circular economy business models

 5

Focus on the change to customer-centricity and data enabled business models

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What’s up in the circular economy?

Traditional corporate social responsibility is no longer enough. The circular economy and sustainability need to be integrated in all business models.

Pioneering companies are setting stricter goals on emissions and circularity than required by regulation.

Both businesses and consumers are requesting data on the sustainability of products and services. This creates new business opportunities.

The Covid-19 pandemic exposed the vulnerability of linear supply-chains. Circular business models can help build resilience.

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Why circular economy?

Circular economy helps the adaptation to the changes in operating environment and builds new value:

1. Climate crisis and biodiversity loss
2. Regulation and policy
3. Client understanding and changing consumer behaviour
4. Technology and data
5. Economic rationale

How does the changing operating environment impact your business?

- License-to-operate: New legislation and clients demands
- More resilient supply chain, savings through operational efficiency
- Differentiation, market share and expanding to new markets

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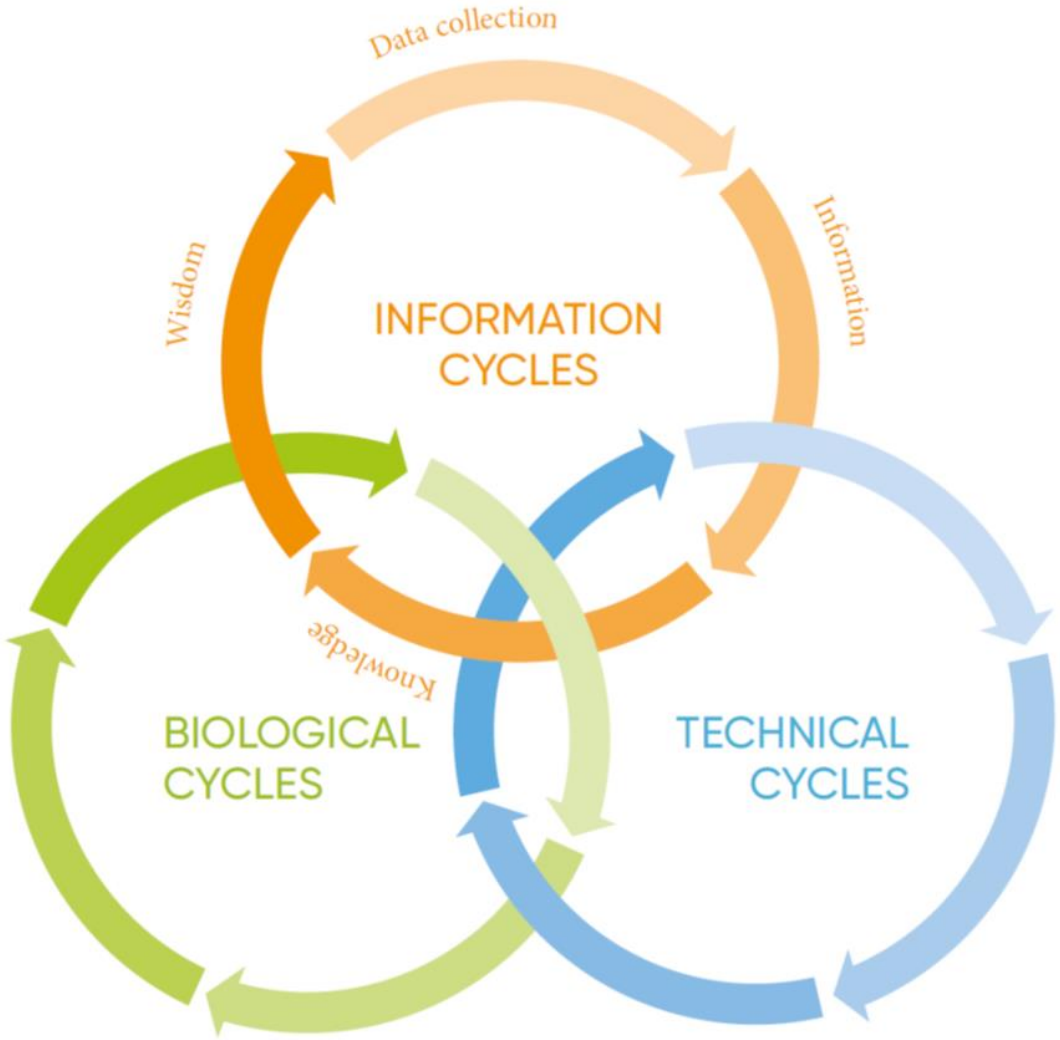
Data as a third dimension of The Circular Economy

The smart use of data and ICT has the potential to change the way value is created and to enable better resource efficiency for societies.

Major Circular Economy solutions are enabled or driven by data and digital platforms. They ensure the availability, reliability, and transparency of the solutions to the relevant actors and stakeholders.

It is essential, therefore, to understand the importance and role of data as well have capabilities to use it.

We need data strategy, management as well capabilities and guidelines to use data in implementing CE strategies and business models.



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New technologies and data are key enablers for the circular business models

TECHNOLOGY	COMMENT
Big data	• Enables analysis of large data sets and data flows to reveal patterns, trends and dependencies • Big data supports the ability to drive descriptive and predictive analysis
IoT	• Enables exchange of data generated in wireless devices with embedded sensors • Supports remote monitoring and diagnostic as the devices interact and can trigger events and alerts
Carbon capture	• Capturing of carbon dioxide from large plants and securely storing it to avoid it from entering the atmosphere
New material	• Advances in material science can help design products and processes that minimize the use and generation of hazardous substances and develop materials with new properties

IDENTIFIED DATA CHALLENGES

Technologies enabling a more efficient data collection and technology enabling alternative materials are seen as the most promising

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Value levers examples in data enabled circular business models

Tier 1 models	Tier 2 models	Value levers	Examples
CIRCULAR INPUTS	Build to last	Reduce production costs	Wärtsilä achieved **45% reduction in production development expenses**, 44% lower cost for ongoing product case and 50% reduction in assembly time using modular engine architecture
		Increase market share	DESSO **increased market share by 8%** and EBIT from 1% to 9,2% in four years by producing carpets that are easy to disassemble by eliminating toxics and number of materials in carpets
	Circular Supplies	Reduce utility costs	Ecovative **reduced energy costs by 75%** compared to industry averages by developed home compostable bio-plastics based on mycelium
SHARING PLATFORMS	Share	Reduce warehouse costs	FLEXE help companies **lower warehousing costs by 20-70%** by providing a sharing service that help optimize usage
PRODUCT USE EXTENSION	Repair & Maintain	Reduce operating expenses	Nokia **reduced OPEX by 20%** by maximising value of aging equipment through modernization of logistics, warehousing and dismantling
	Resell	Participation in new markets	Multiple actors have achieved **up to 50% revenue increase** from selling 2nd hand products
	Remanufacture	Increase gross profits	Caterpillar achieved **50% higher gross profits** from selling remanufacturing products at a 20% discount rate
RECOURCE RECOVERY	Recycle / upcycle	Generate revenue	GM's by-product recycling and reuse initiatives have not only saved money, but also **generated $1 billion in new revenue** for the automaker
	Return	Reduce input material costs	Ford is **cutting about 20% from the cost** of swapping aluminium for steel in F-150 body panels by sorting, cleaning and returning scrap to the same mills that supply it with metal sheet
PRODUCT AS A SERVICE	Product as a Service	Increase revenues	Michelin tyre-as-a-service offering estimated with a **value potential of €3bn in 10 years**

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Most interesting companies in the circular economy in Finland

Sitra has maintained a list of the most interesting companies in the circular economy since 2017. The selected companies represent various industries and the five business models of the circular economy.

1. **Product-life extension**
2. **Product as a service**
3. **Sharing platforms**
4. **Renewability**
5. **Resource efficiency and recycling**

With this list, Sitra wants to encourage Finnish companies to develop smart business in the circular economy.

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Infinited Fiber’s technology allows wasted textiles to be reborn: “You can see and feel the transformation in the textile industry”

”Our technology can use cotton-rich textile waste and other cellulose-based waste streams, such as paper and straw, to create new textile fibre. This enables materials that are already in circulation to be recovered and the amount of generated waste to be reduced.

In the long term, we cannot manufacture the fibre for the needs of the whole textile industry ourselves. Therefore, we sell the technology licence for our patented Infinna manufacturing process to fibre producers. ”

– **Petri Alava,** CEO

PREPARE FOR BARRIERS

Type of Barrier		Challenges
Internal	**Organisational & Cultural**	• Difficulty of **customer-centric innovation and cross-functional collaboration** • Difficulty of **changing old mindsets** of employees • Pressure of **day-to-day priorities** • Lack of skills in **new technologies** • Lack of skills in **solution selling**
External	**Financial**	• Circular business models have **different funding requirements** (e.g. Product as a service requires higher working capital) • Difficulty of **finding financing partners** • Insufficient **understanding of risks** and mitigation strategies
External	**Ecosystem**	• **Complex supply chains** make it difficult to control products after sale, tracking materials and components • Difficulty of finding **suitable partners** need to be identified to fill gaps

Source: Accenture

What skills are needed?

- Skills related to the circularity of materials, from product design to recycling and reuse

- Skills that support the circularity infrastructure, e.g. reverse logistics and material infrastructure management

- Skills on repairing and maintaining goods

- Service skills, e.g. knowledge on digital platforms in sharing economy or second-hand markets

- Creative skills, e.g. design and marketing of circular products and services

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Circular Economy Playbook for the Manufacturing industry
www.circularplaybook.fi

Circular Economy Playbook for the Chemical industry
www.kemianteollisuus.fi/hiilineutraalikemia2045

www.nordicinnovation.org/nordic-circular-economy-playbook

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World Circular Economy Forum

International platform to develop and scale up best practices

2017	2018	2019	2020	2021	2022
Helsinki Finland	Yokohama Japan	Helsinki Finland	Online	The Netherlands	Toronto Canada	Kigali Rwanda

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WCEF is the world's best known neutral global circular economy event and platform for the global circularity movement

14 000
PARTICIPANTS

33%
BUSINESS REPRESENTATIVES

35+
PARTNERS

European Commission
ELLEN MACARTHUR FOUNDATION
FINLAND
WORLD BANK GROUP
ICC INTERNATIONAL CHAMBER OF COMMERCE The world business organization
Nordic Innovation

What?

- Accelerates the global transition towards a circular economy to achieve the UN Sustainable Development Goals.
- Presents the world's best circular economy solutions and gathers the most recognised experts and decision makers in the field.
- Next stop is Africa, as WCEF2022 will be held in Kigali, Rwanda.

The circular economy is a mindset change. The challenge is now to scale up and embed circular in all processes, and make circular thinking the new norm.

Frans van Houten, CEO, Philips

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RISE TO SHINE!