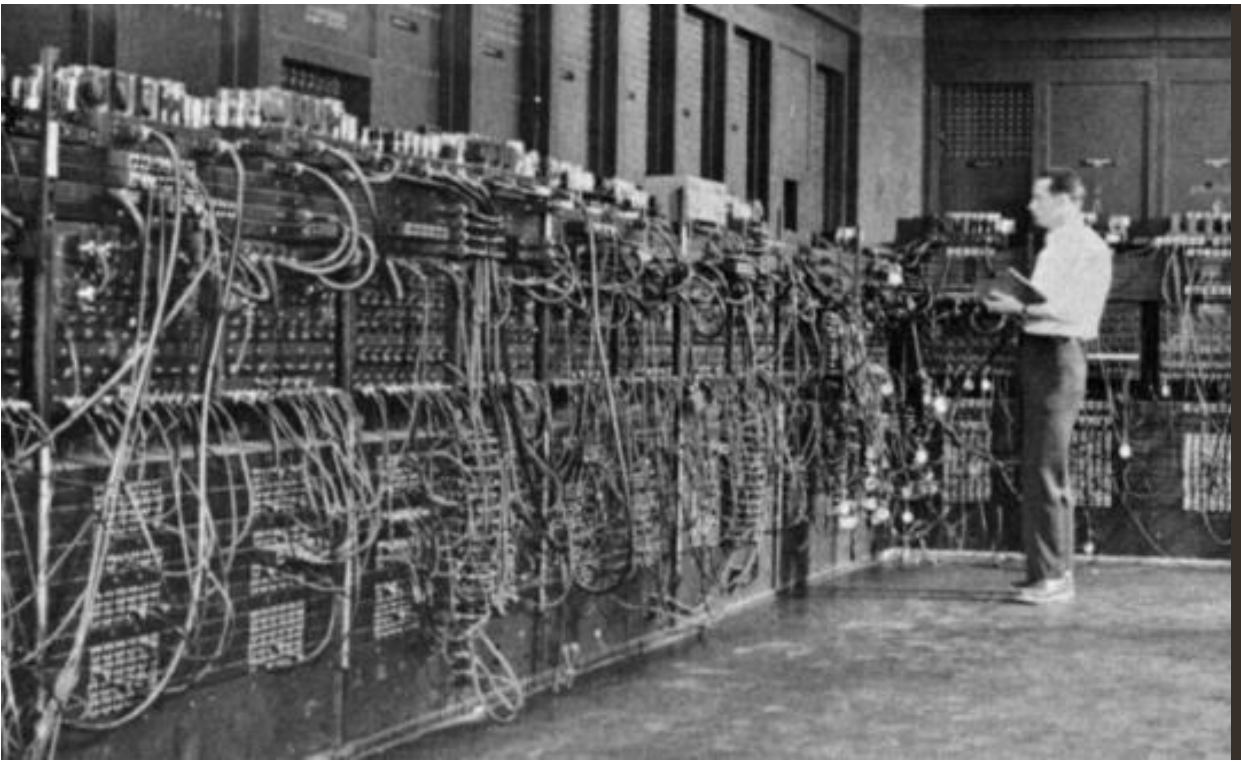
Circular Economy for the Data Centre Industry

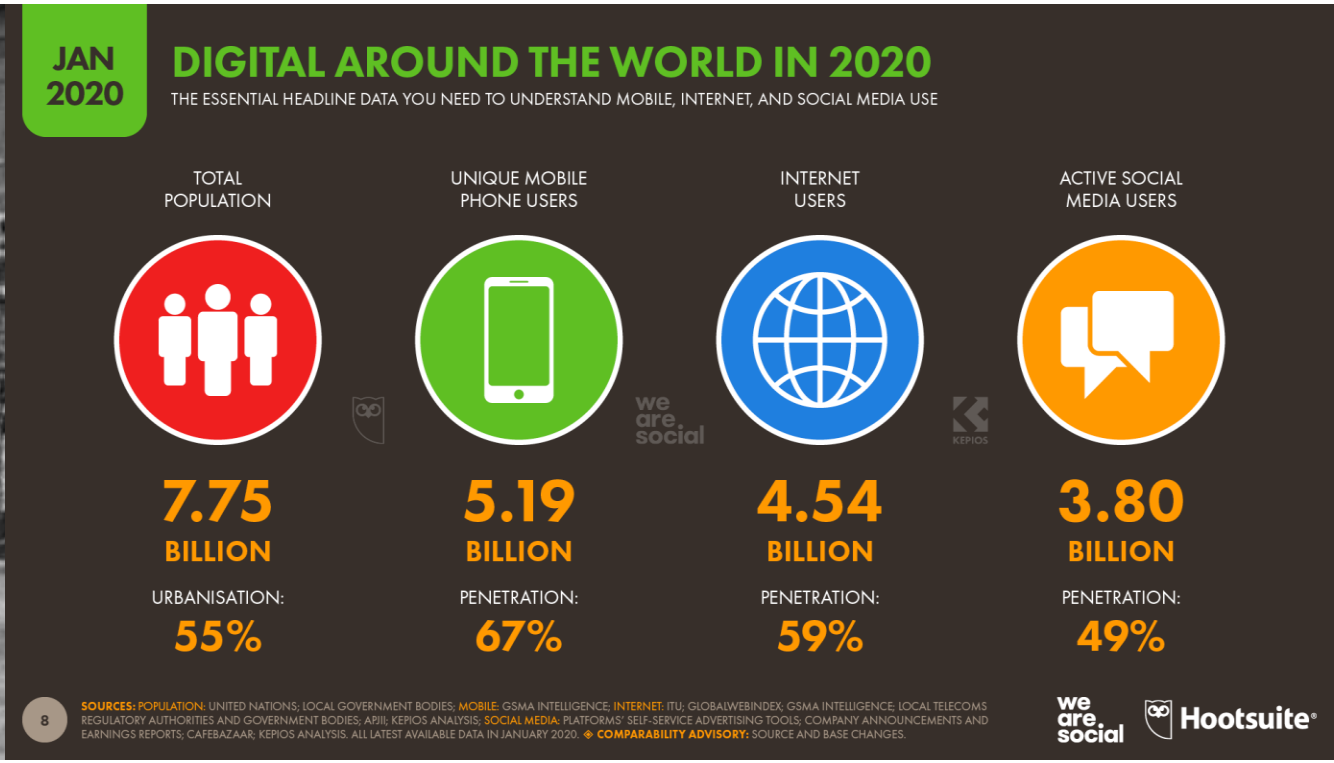
Interreg North-West Europe CEDaCI

Accelerating implementation of the EU Circular Economy Action Plan within data centres

Dr Deborah Andrews
Associate Professor of Design, London South Bank University, UK

Connectivity – data traffic **=** 4.2 trillion gigabytes / yr by 2022



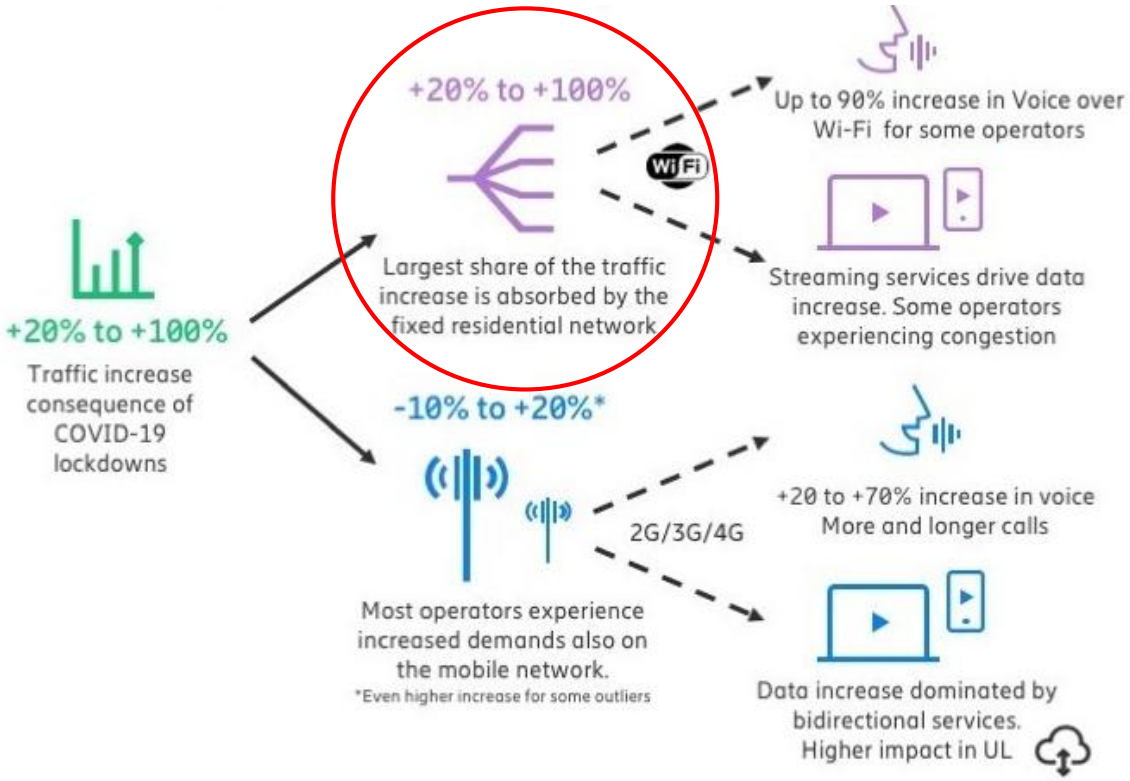


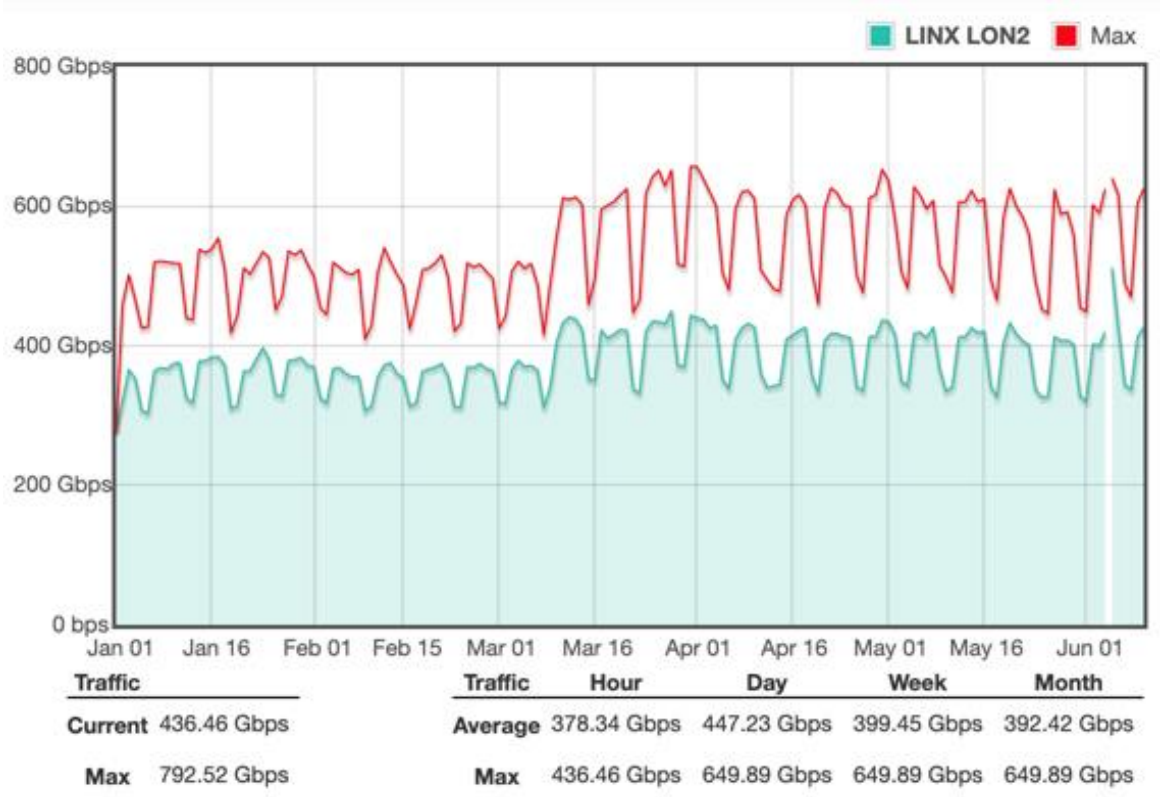
Data Centres

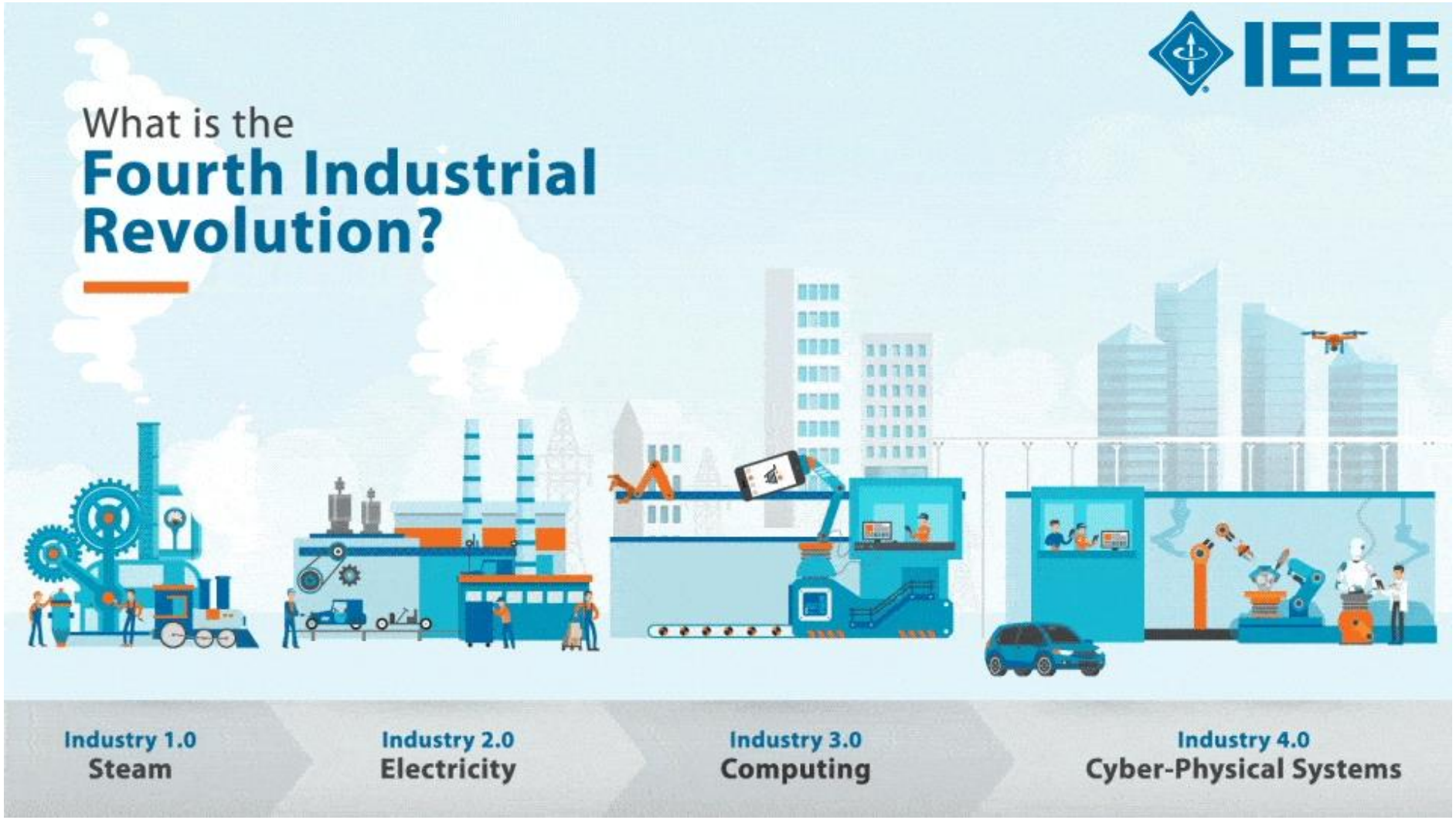
~8m globally / concentration in EU - UK, Germany, France & Netherlands

2010-2020 – $100bn investment in sector

Reliance on DCI - Covid-19 pandemic - the lockdown effect

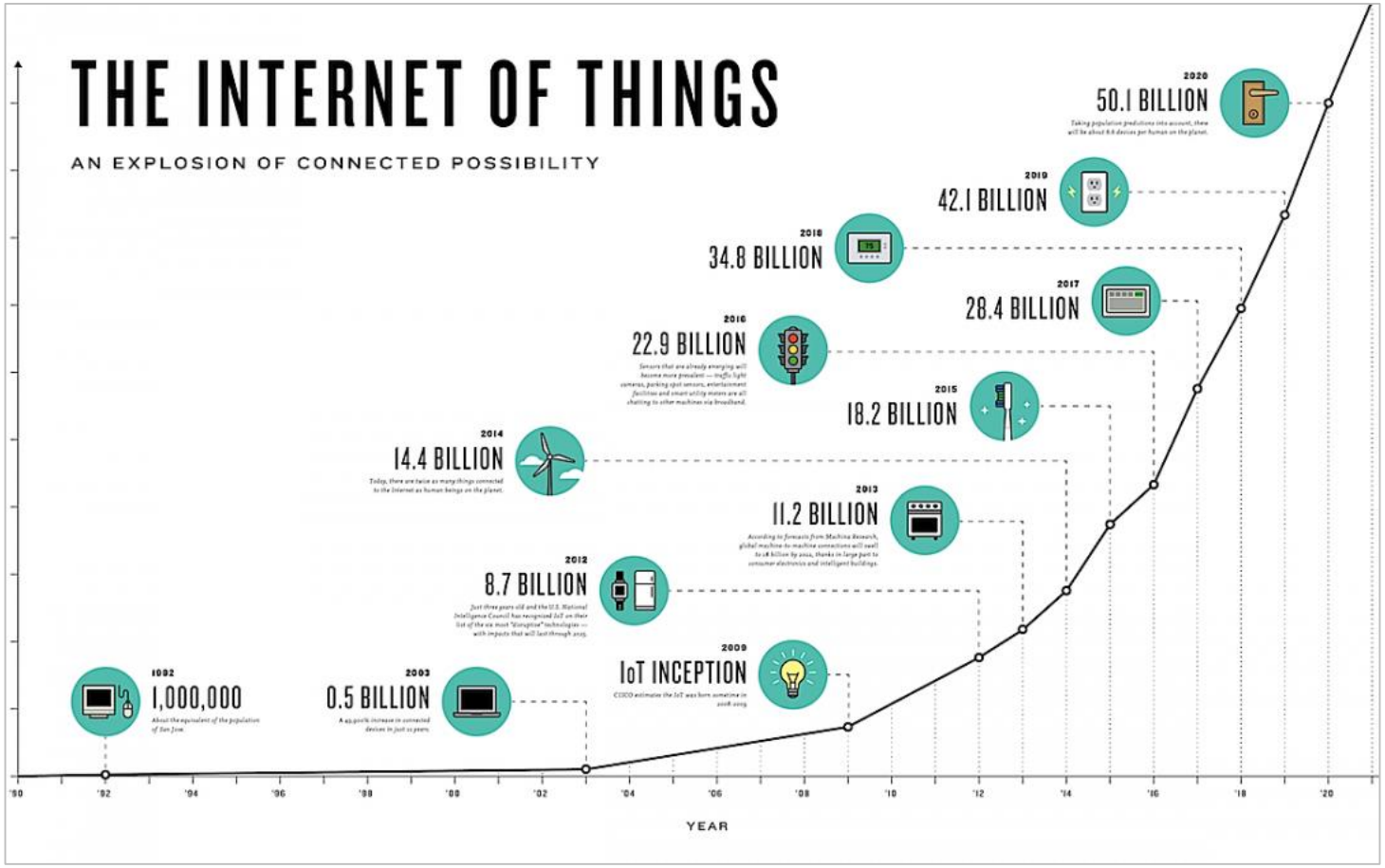






Source: https://innovate.ieee.org/innovation-spotlight-ieee-fueling-fourth-industrial-revolution/

DC growth – 300% in EU by 2025 / 500% global 2030



Source: Weforum.org

Emphasis - 24/7 operation and performance - greatest impact - operational energy

Sectoral energy demand is predicted to reach ~200TWh by 2021 – 1% global energy use

Annual carbon emissions = pre-Covid airline industry

Fewer / larger DCs / increasing use of renewable grid

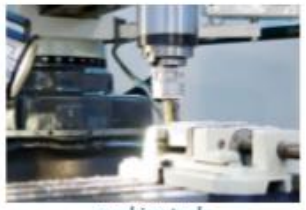
Ecodesign Directive 2009/125/EC

Which products does the Ecodesign Directive cover?

The Ecodesign Directive was extended in 2009 to **all energy-related products** (the use of which has an impact on energy consumption), including:

- **energy-using products (EUPs)**: products which use, generate, transfer or measure energy (e.g. electricity, gas, other fossil fuel), including consumer goods such as boilers, computers, TVs, washing machines, light bulbs and industrial products such as transformers, industrial fans, industrial furnaces.
- **other energy related products (ERPs)**: products which do not necessarily use energy, but have an impact on energy consumption (direct or indirect) and can therefore contribute to saving energy, such as windows, insulation material or bathroom devices (e.g. shower heads, taps). **The Ecodesign Directive does not create binding requirements on products by itself**: product requirements are set in Commission Regulations.


TVs


machine tools


computers

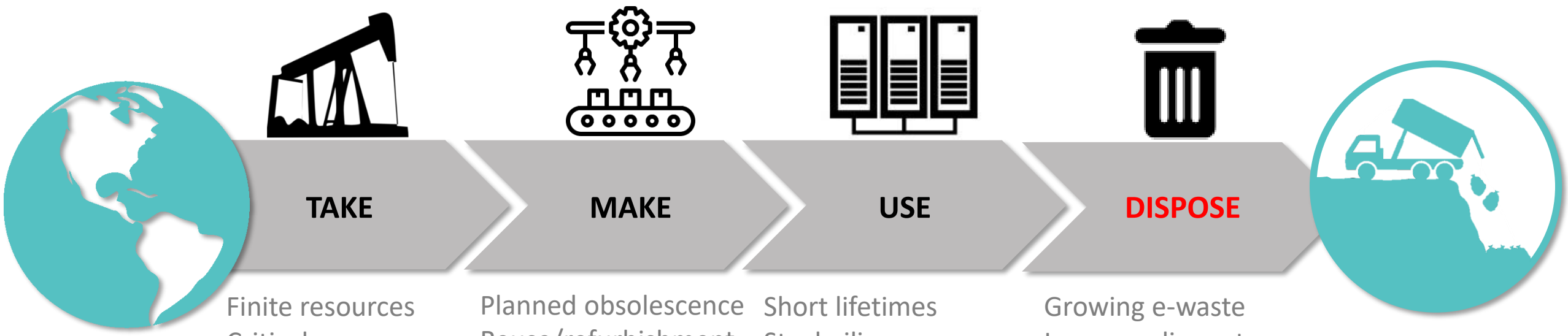

water heaters


refrigerating equipment


air conditioning

6

Linear Economy - model of consumption



Finite resources
Critical
(Nd, Co, Si)

Planned obsolescence
Reuse/refurbishment - difficult by design

Short lifetimes
Stockpiling
Procurement barriers

Growing e-waste
Low recycling rates
Underdeveloped infrastructure

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e-waste

Annual – 2020 ~50 million tonnes – 6kg per person

Business as usual - 2050 – 120 million tonnes

Current value - >$62.5 billion

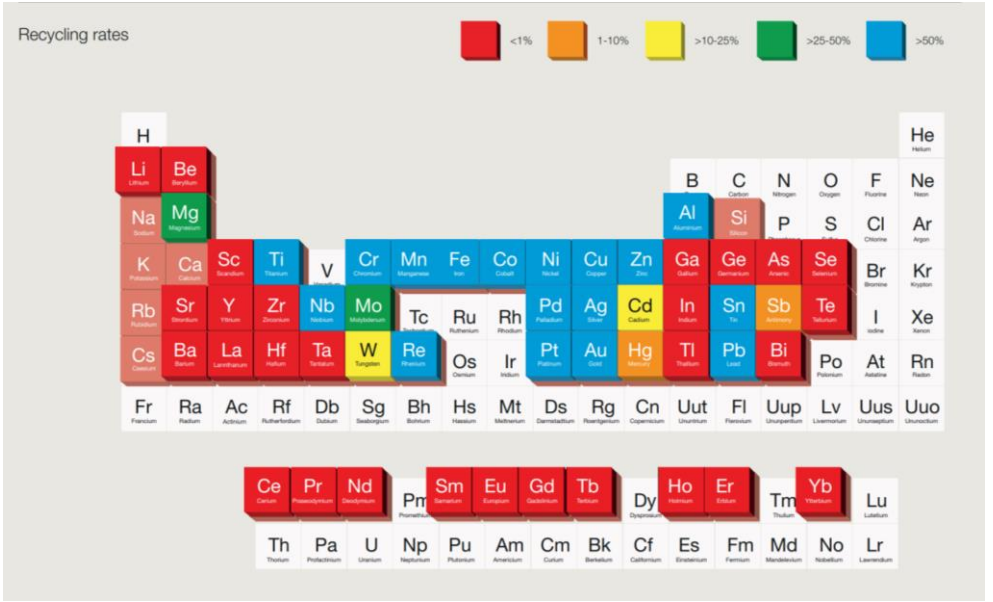
100 x more Au in e-waste than ore

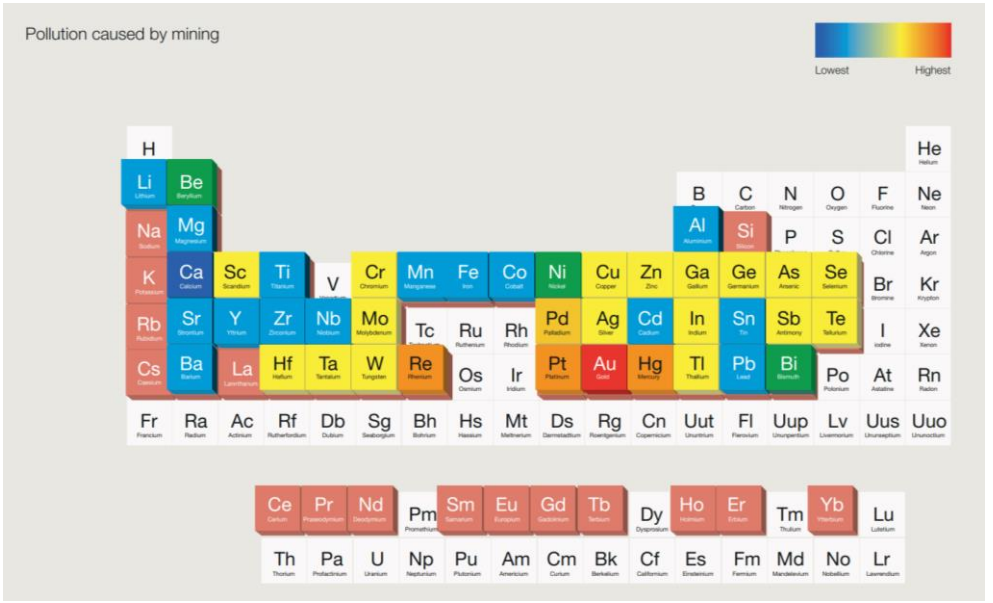
e-waste

Elements found in e-waste

20% global - formal / legitimate recycling
80% informal recycling / landfilled

Emissions to air, water and soil –
Damage environment and health





Source: http://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf

e-waste

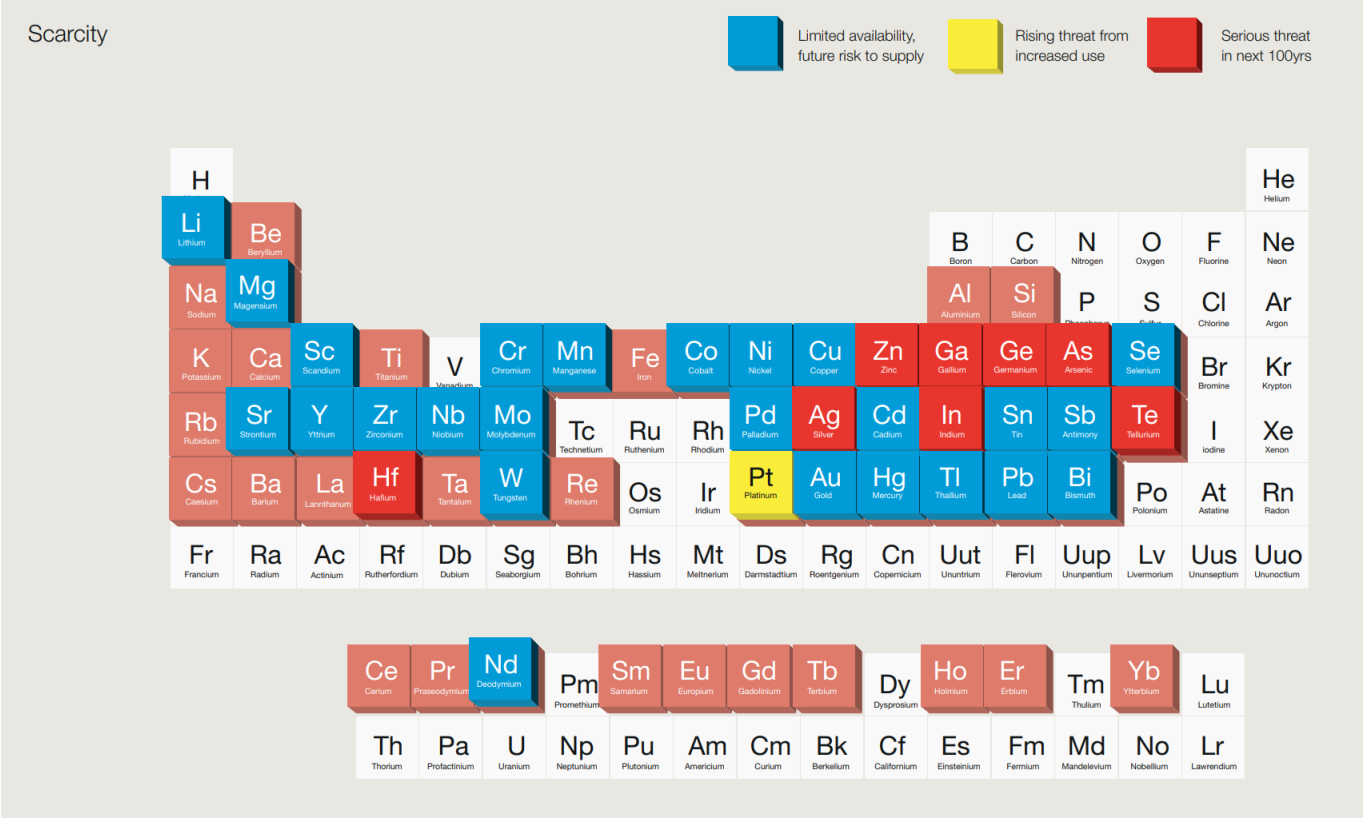
Critical Raw Materials

EU - 14 CRM in 2011

EU - 30 CRM in 2020

10 CRM in DC equipment / servers

CRM 0.2% by mass in servers



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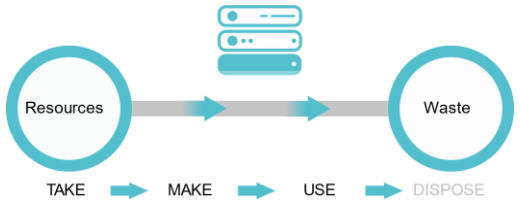
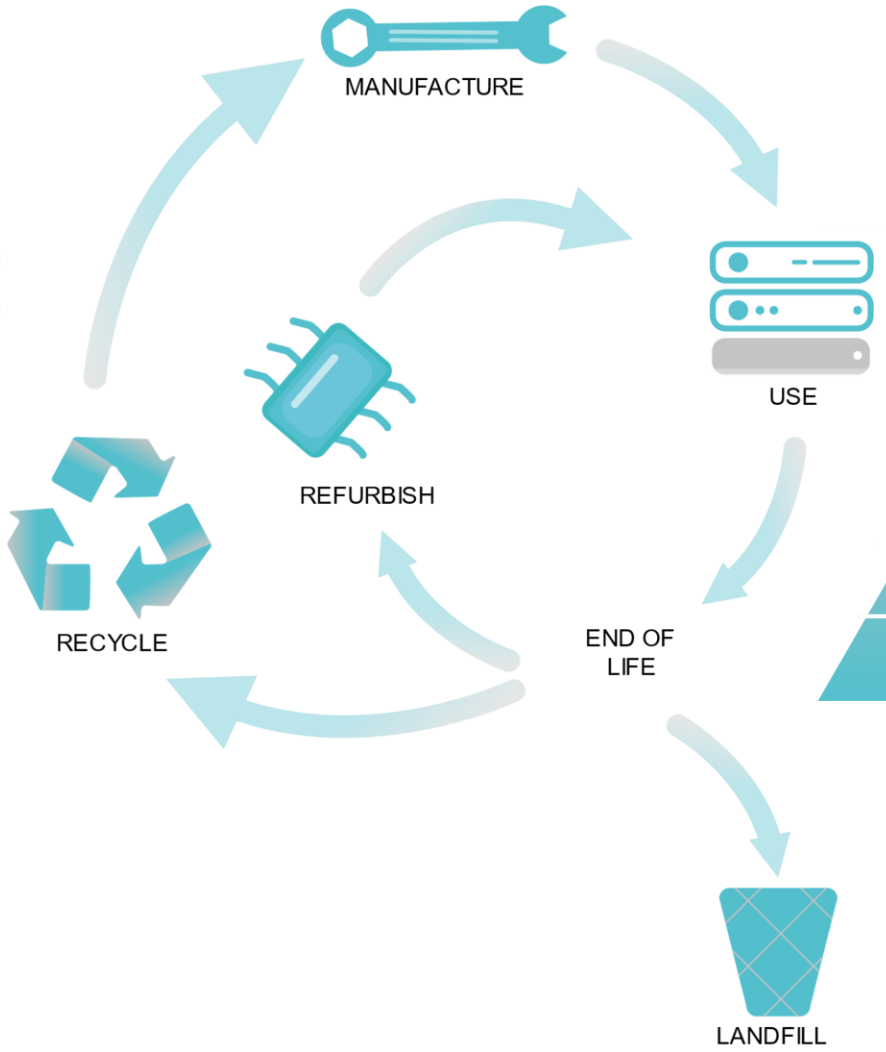
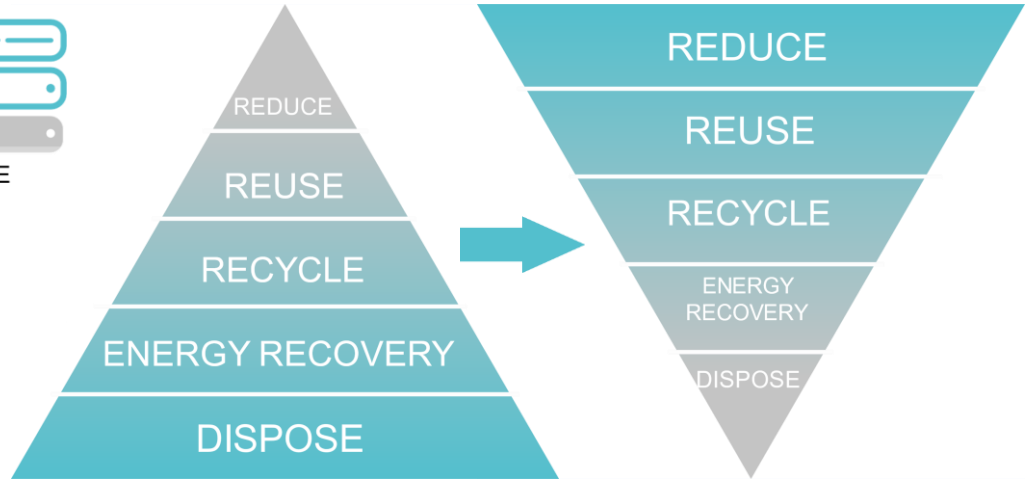
Circular Economy

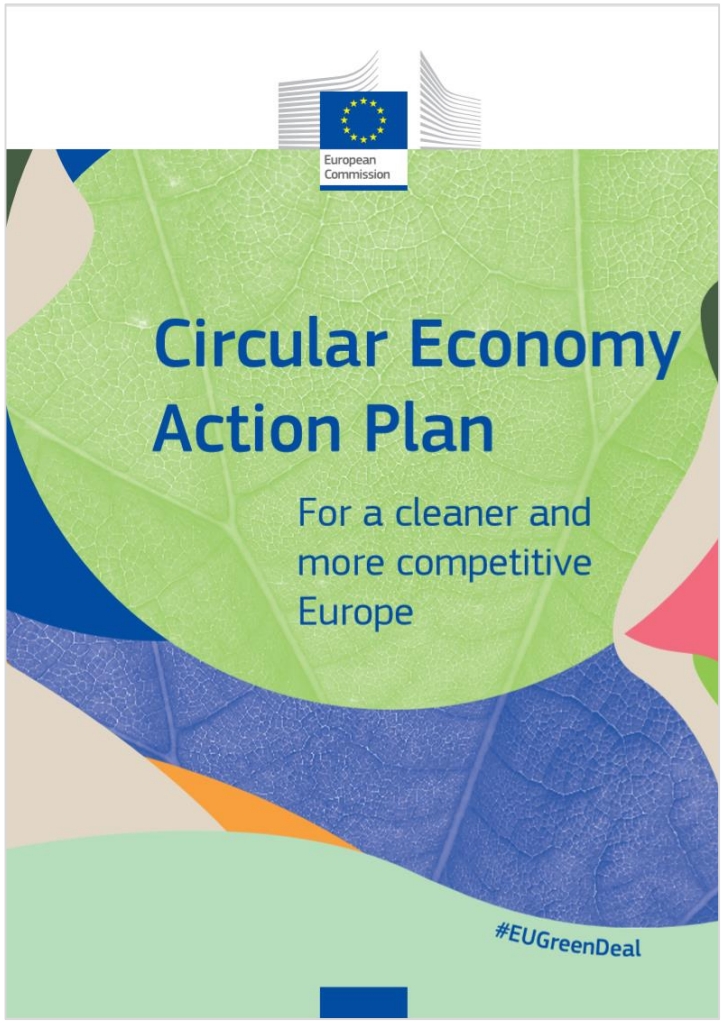
Linear Economy





Waste Management Hierarchy





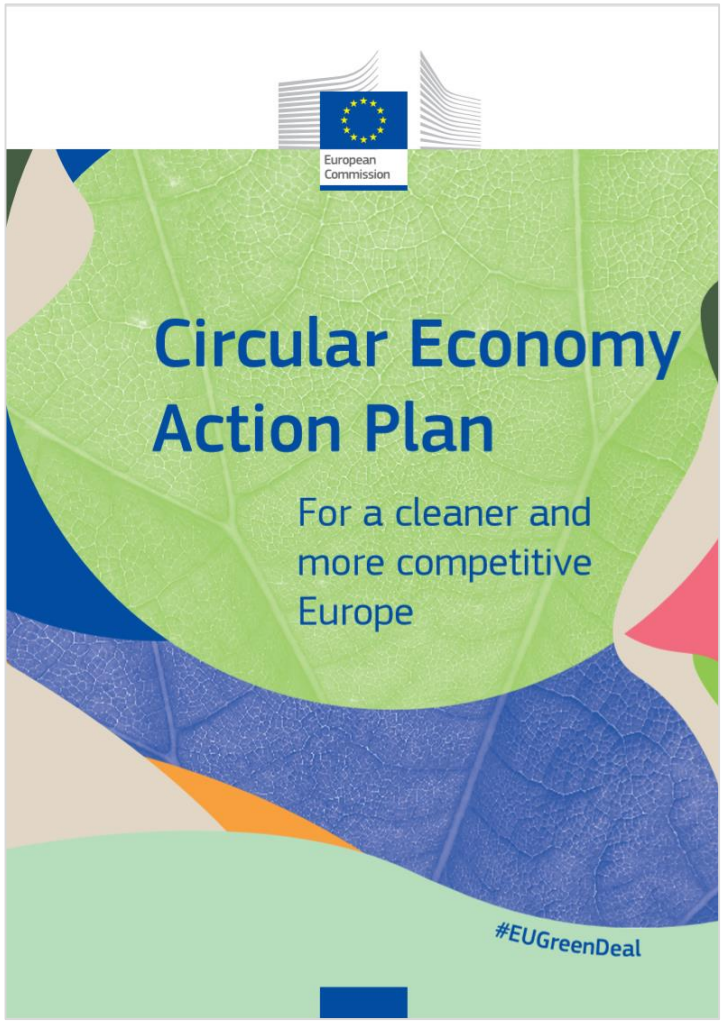
First CE Action Plan – Closing the Loop 2015

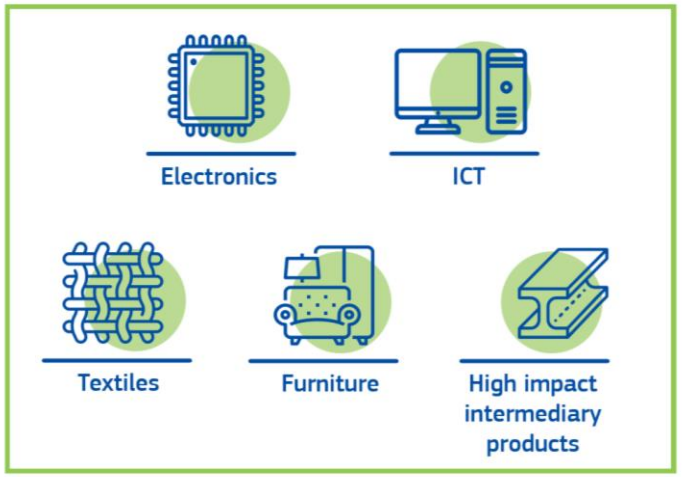
CE Action Plan – 2020

Actions

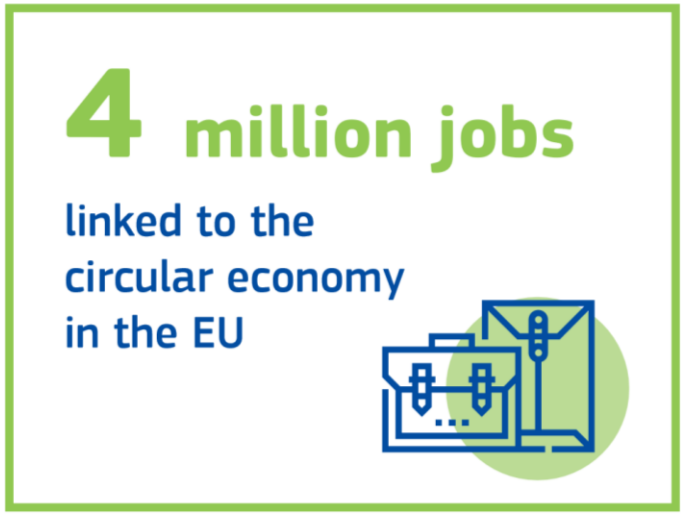
The new Circular Economy Action Plan presents measures to:

- Make sustainable products the norm in the EU;
- Empower consumers and public buyers;
- **Focus on the sectors that use most resources and where the potential for circularity is high such as: electronics and ICT; batteries** and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients;
- Ensure less waste;
- Make circularity work for people, regions and cities,
- Lead global efforts on circular economy.





Priority … product groups in the context of value chains …such as electronics, ICT



2012 – 2018
5% increase in CE linked jobs

KEY ACTIONS	DATE
A SUSTAINABLE PRODUCT POLICY FRAMEWORK	
Legislative proposal for **a sustainable product policy initiative**	2021
Legislative proposal **empowering consumers in the green transition**	2020
Legislative and non-legislative measures establishing a new **"right to repair"**	2021
Legislative proposal on substantiating **green claims**	2020
Mandatory Green Public Procurement (GPP) criteria and targets in sectoral legislation and phasing-in **mandatory reporting on GPP**	as of 2021
Review of the **Industrial Emissions Directive**, including the integration of circular economy practices in upcoming Best Available Techniques reference documents	as of 2021
Launch of an **industry-led industrial symbiosis reporting and certification system**	2022
KEY PRODUCT VALUE CHAINS	
Circular Electronics Initiative, common charger solution, and **reward systems to return old devices**	2020/2021
Review of the Directive on the **restriction of the use of certain hazardous substances in electrical and electronic equipment** and guidance to clarify its links with REACH and Ecode-sign requirements	2021
Proposal for a new **regulatory framework for batteries**	2020
Review of the rules on **end-of-life vehicles**	2021
Review of the rules on proper treatment of **waste oils**	2022
Review to reinforce the **essential requirements for packaging** and **reduce (over)packaging and packaging waste**	2021
Mandatory requirements on **recycled plastic content** and **plastic waste reduction measures** for key products such as packaging, construction materials and vehicles	2021/2022
Restriction of **intentionally added microplastics** and measures on **unintentional release of microplastics**	2021
Policy framework for **bio-based plastics and biodegradable or compostable plastics**	2021
EU Strategy for Textiles	2021
Strategy for a Sustainable Built Environment	2021
Initiative to **substitute single-use packaging, tableware and cutlery by reusable products in food services**	2021

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Public authorities' purchasing power represents

14%

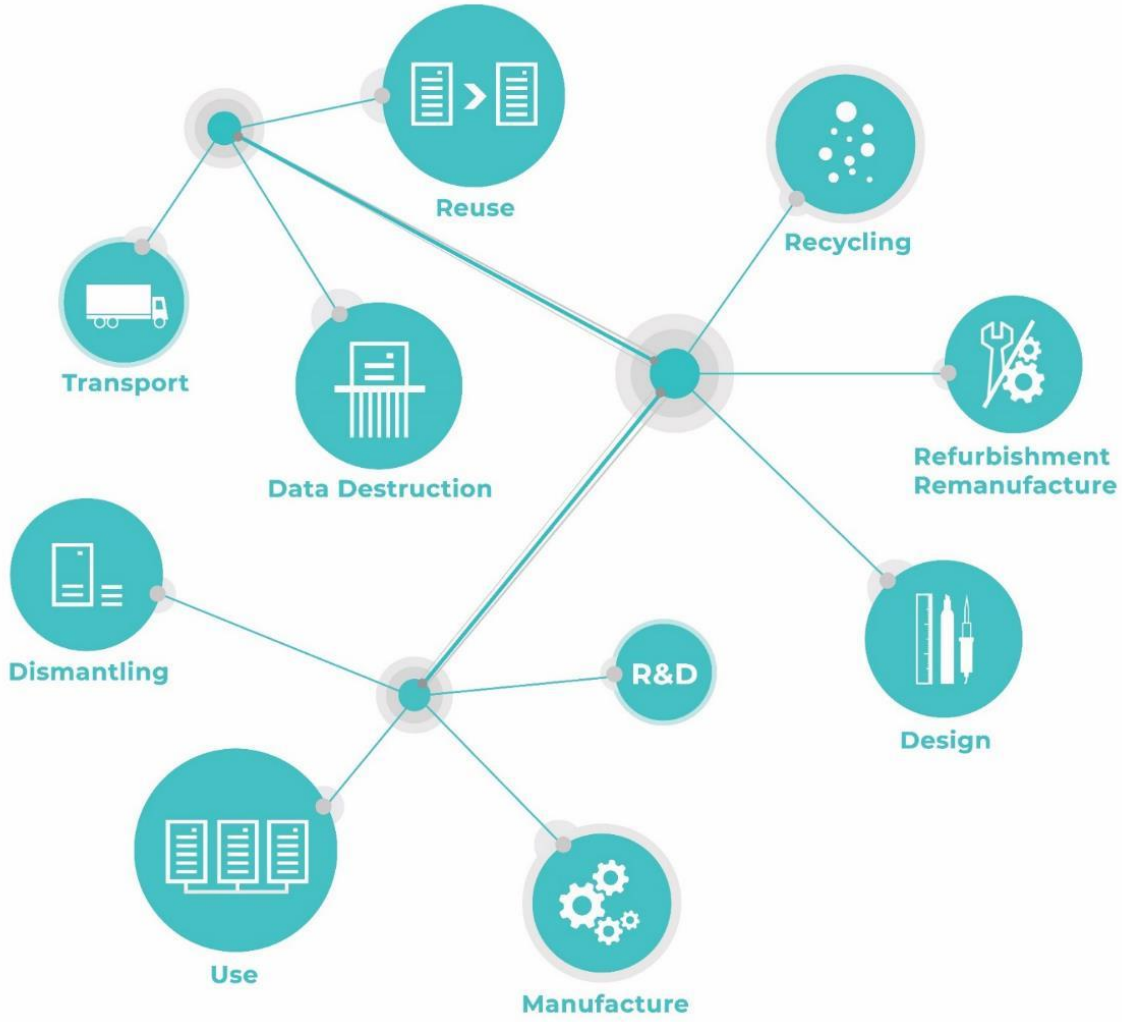
of EU GDP

KEY ACTIONS	DATE
LESS WASTE, MORE VALUE	
Waste reduction targets for specific streams and other measures on **waste prevention**	2022
EU-wide **harmonised model for separate collection of waste and labelling** to facilitate separate collection	2022
Methodologies to track and minimise the presence of substances of concern in recycled materials and articles made thereof	2021
Harmonised information systems for the presence of substances of concern	2021
Scoping the development of further **EU-wide end-of-waste and by-product criteria**	2021
Revision of the rules on **waste shipments**	2021
MAKING THE CIRCULAR ECONOMY WORK FOR PEOPLE, REGIONS AND CITIES	
Supporting the circular economy transition through the **Skills Agenda**, the forthcoming **Action Plan for Social Economy**, the **Pact for Skills** and the **European Social Fund Plus**	as of 2020
Supporting the circular economy transition through **Cohesion policy funds, the Just Transition Mechanism** and **urban initiatives**	as of 2020
CROSSCUTTING ACTIONS	
Improving measurement, modelling and policy tools to capture **synergies between the circular economy and climate change mitigation and adaptation** at EU and national level	as of 2020
Regulatory framework for the **certification of carbon removals**	2023
Reflecting circular economy objectives in the revision of the guidelines on **state aid in the field of environment and energy**	2021
Mainstreaming circular economy objectives in the context of the rules on **non-financial reporting**, and initiatives on **sustainable corporate governance** and on **environmental accounting**	2020/2021
LEADING EFFORTS AT GLOBAL LEVEL	
Leading efforts towards reaching a **global agreement on plastics**	as of 2020
Proposing a **Global Circular Economy Alliance** and initiating discussions on an **international agreement on the management of natural resources**	as of 2021
Mainstreaming circular economy objectives in **free trade agreements**, in other **bilateral, regional and multilateral** processes and agreements, and in **EU external policy funding instruments**	as of 2020
MONITORING THE PROGRESS	
Updating the **Circular Economy Monitoring Framework** to reflect new policy priorities and develop further **indicators on resource use**, including **consumption and material footprints**	2021

Need for sectoral Circular Economy

DCI – comprises many sub-sectors
silo mentality & practice

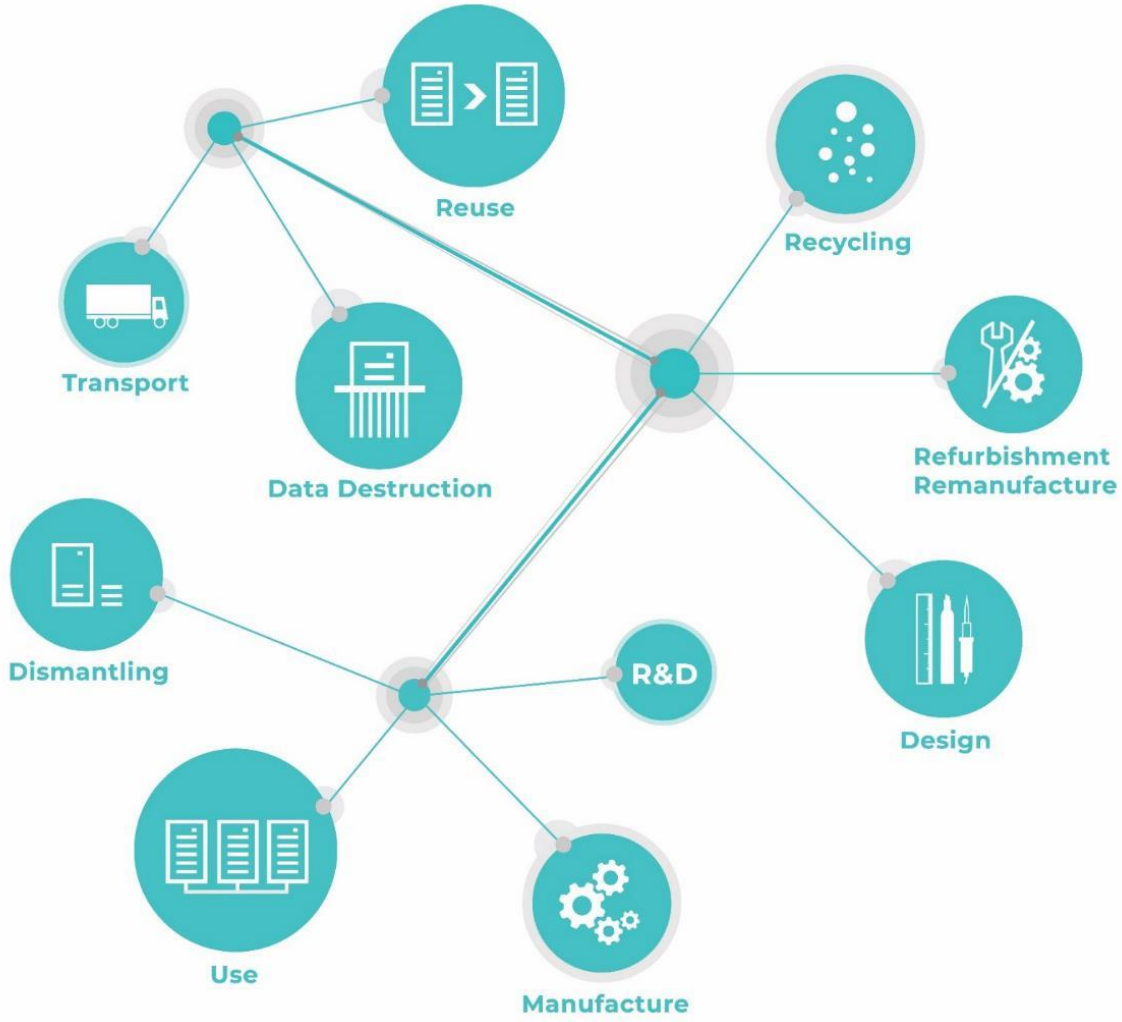
Complexity of challenge demands a
holistic approach



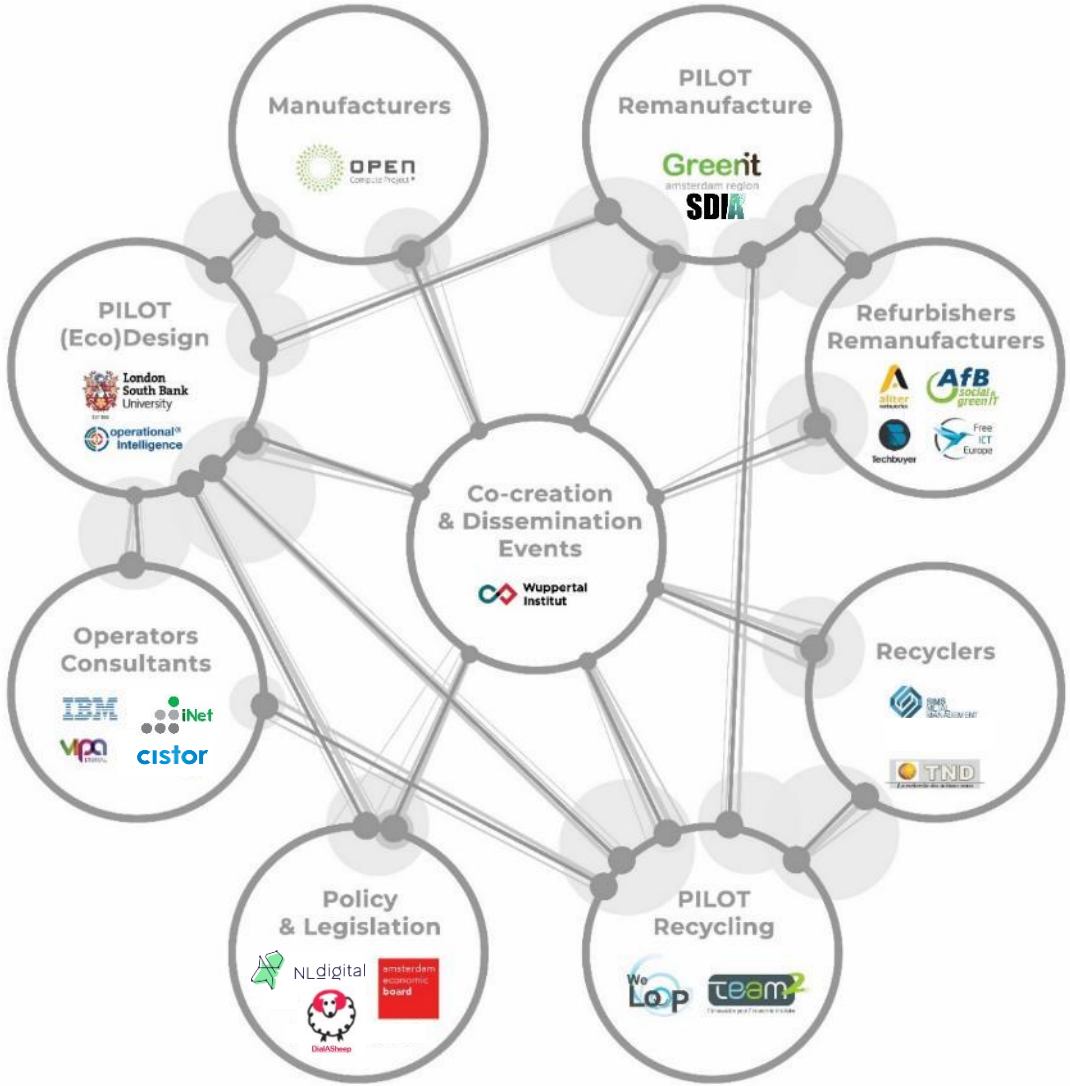
CEDaCI

…. a unique, interdisciplinary, multi-output initiative that uses **whole-life thinking** and **brings together representatives from all DCI sub-sectors** to share knowledge and **accelerate development of a sectoral Circular Economy.**

It will reduce waste and prevent supply chain problems to secure uninterrupted DC operation and service in the future.



Transnational cross-sectoral collaboration



Methodology and Outputs

3 integrated pilots that focus on

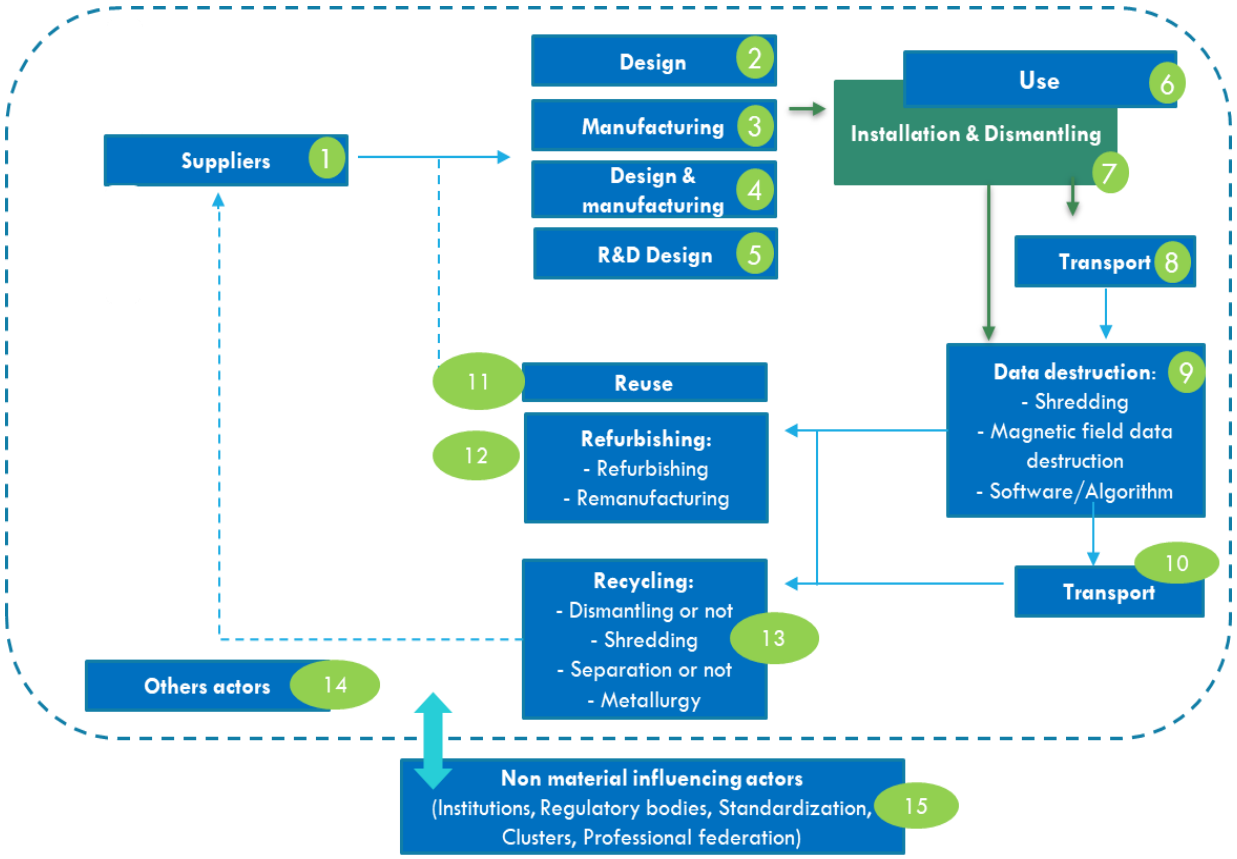
1. Design and manufacture
2. Life extension – second use & refurbishment
3. End-of-life – recycling

OUTPUTS

- LCA methods and database
- CDCC – the Circular Data Centre Compass
- improved refurbishment, recycling and reclamation strategies and business models
- EcoDesign/Design Guidelines for Circular Economy

FEED INTO

- bespoke 1-2-1 technical assistance for 50 SMEs
- advice and guidance for policy-influencers and makers
- a physical and virtual demonstrator
- development of a Circular Economy for the DCI



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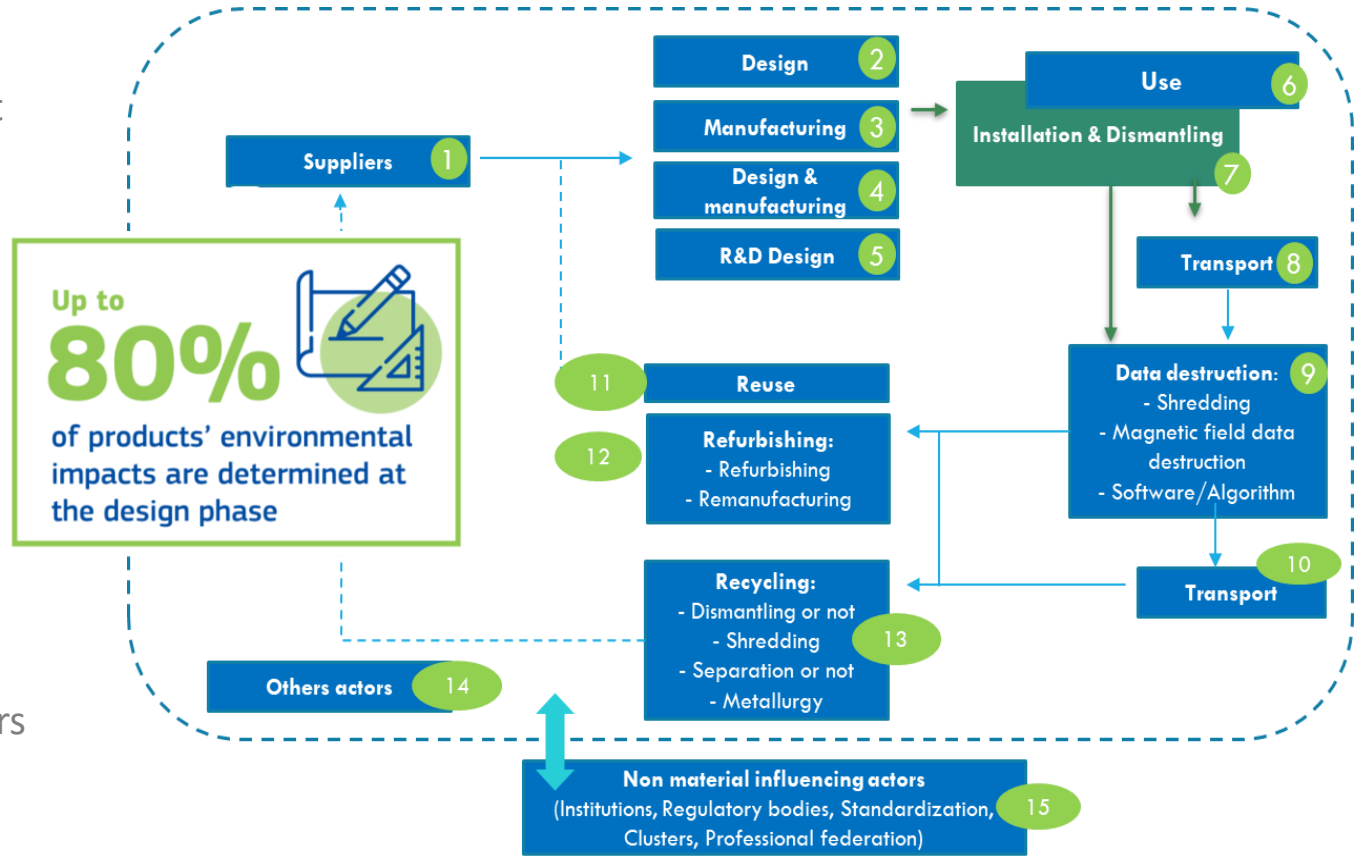

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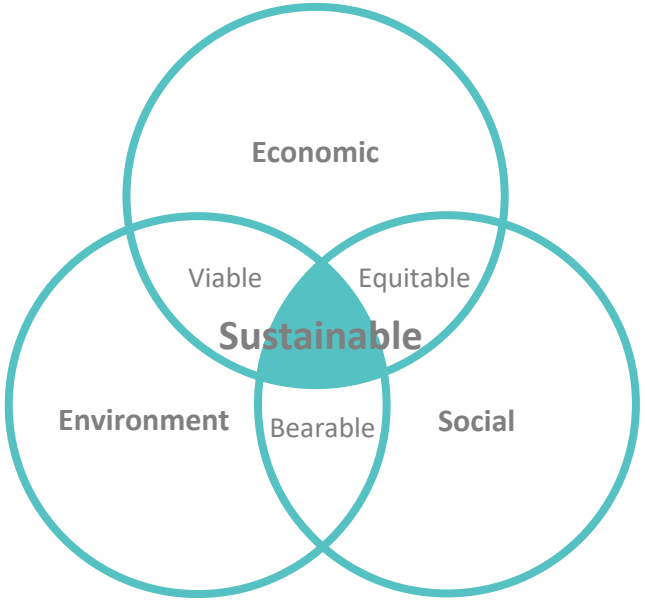
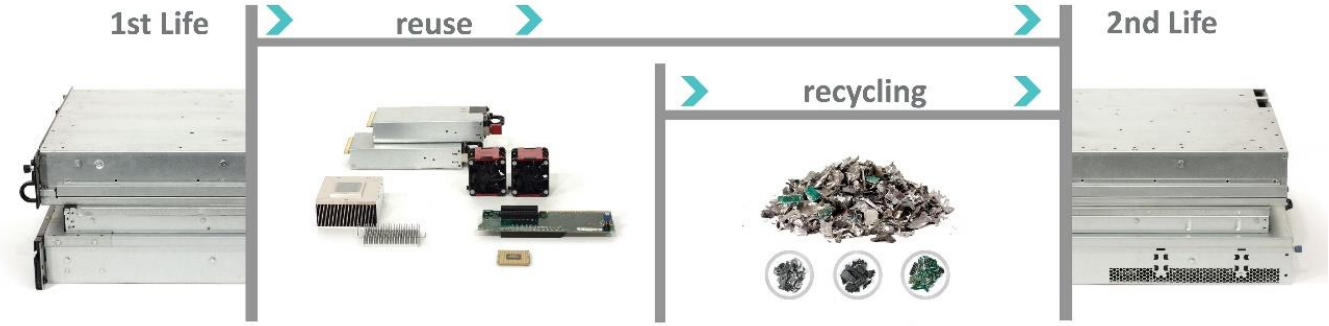
CDCC
Circular Data Centre Compass



Product sustainability and Circularity indicator
Enables business to compare environmental, social and economic impacts of different servers and CRM criticality indicator

Identify preferred Circular business option based on company and/or performance requirements

Free on-line resource



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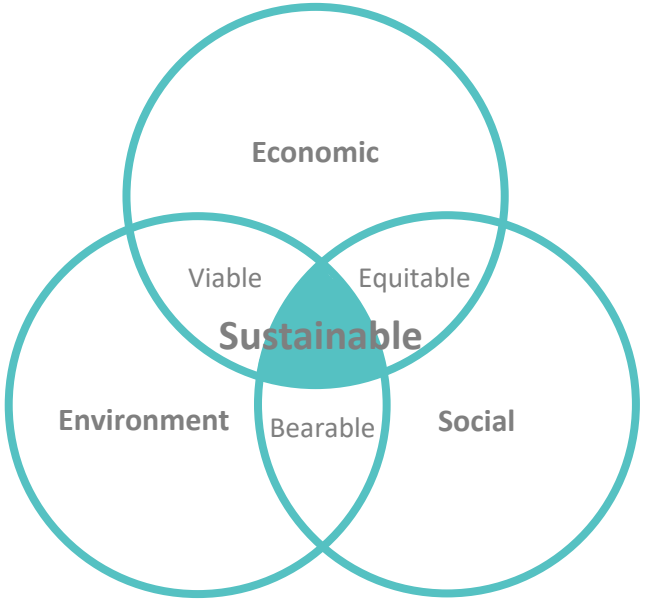

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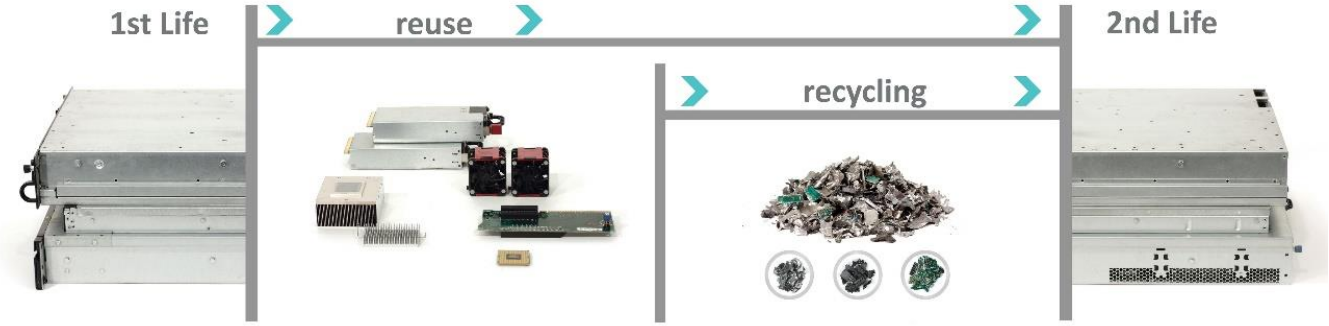

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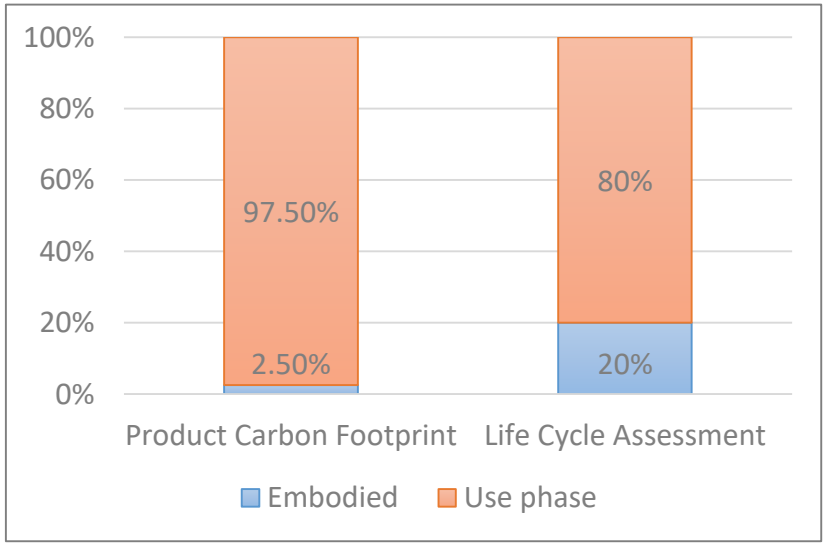
CDCC metrics, validation and reliability



Comparison - Carbon footprint and full Life Cycle Assessment of refrigerated display cabinet

European Commission

PEF

Product Environmental Footprint method

CEDaCI Compass

Increasing collaboration and communication to drive sustainability in the data industry. Co-financed by the European Regional Development Fund, the CEDaCI Project is developing the circularity solutions to decrease the environmental impact of the IT equipment used by the Data Centre Industry.

The Circular Data Centre Compass is designed to guide the Data Centre Industry (DCI) to choose more circular options during the procurement, refurbishment and the disposal of servers and to assess the environmental, social and economic impacts.

How does the CEDaCI Compass work?

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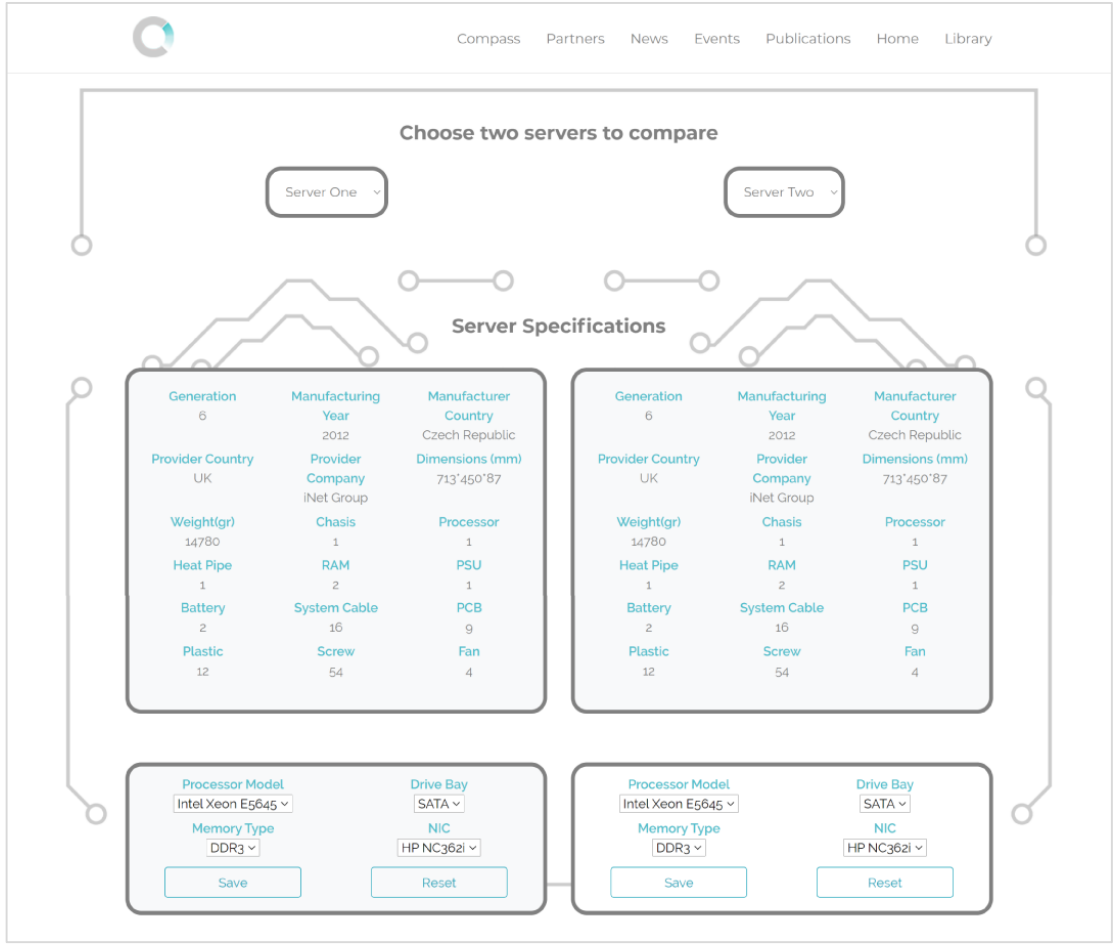
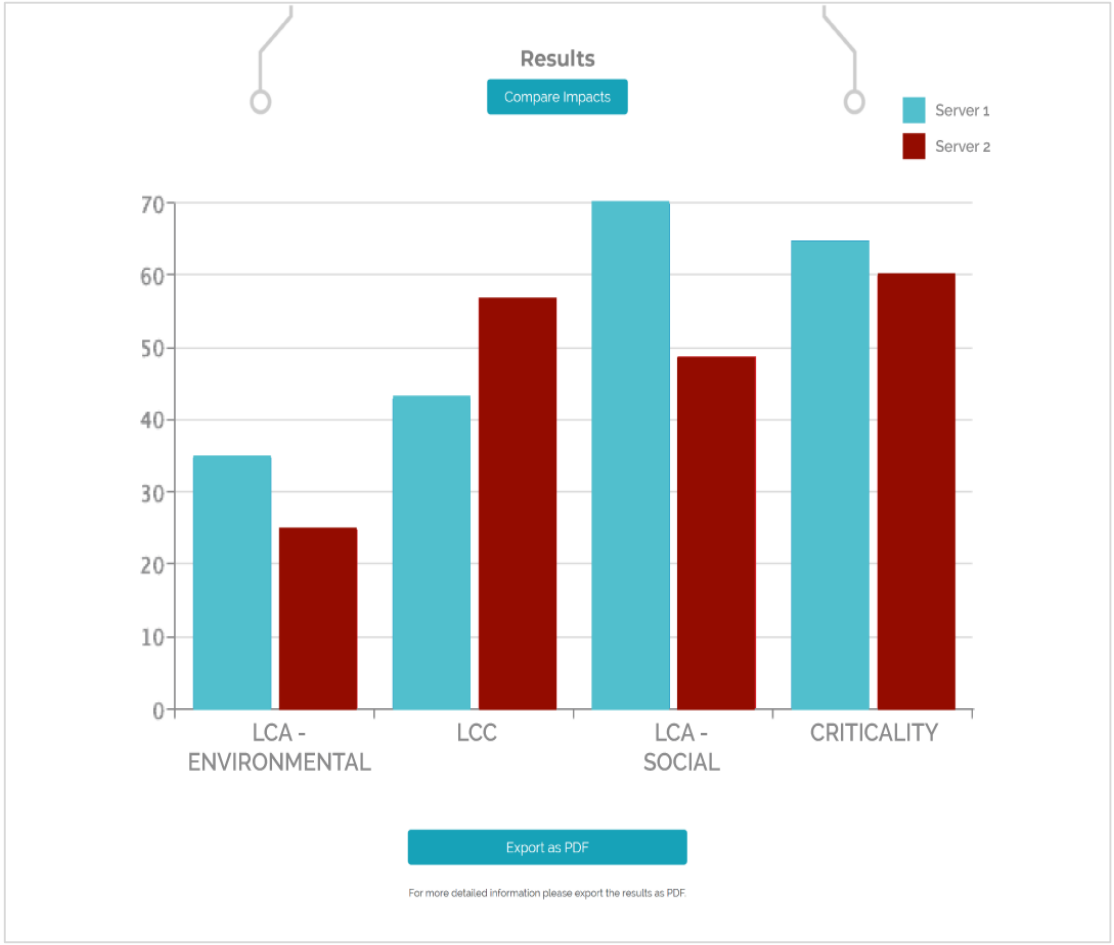
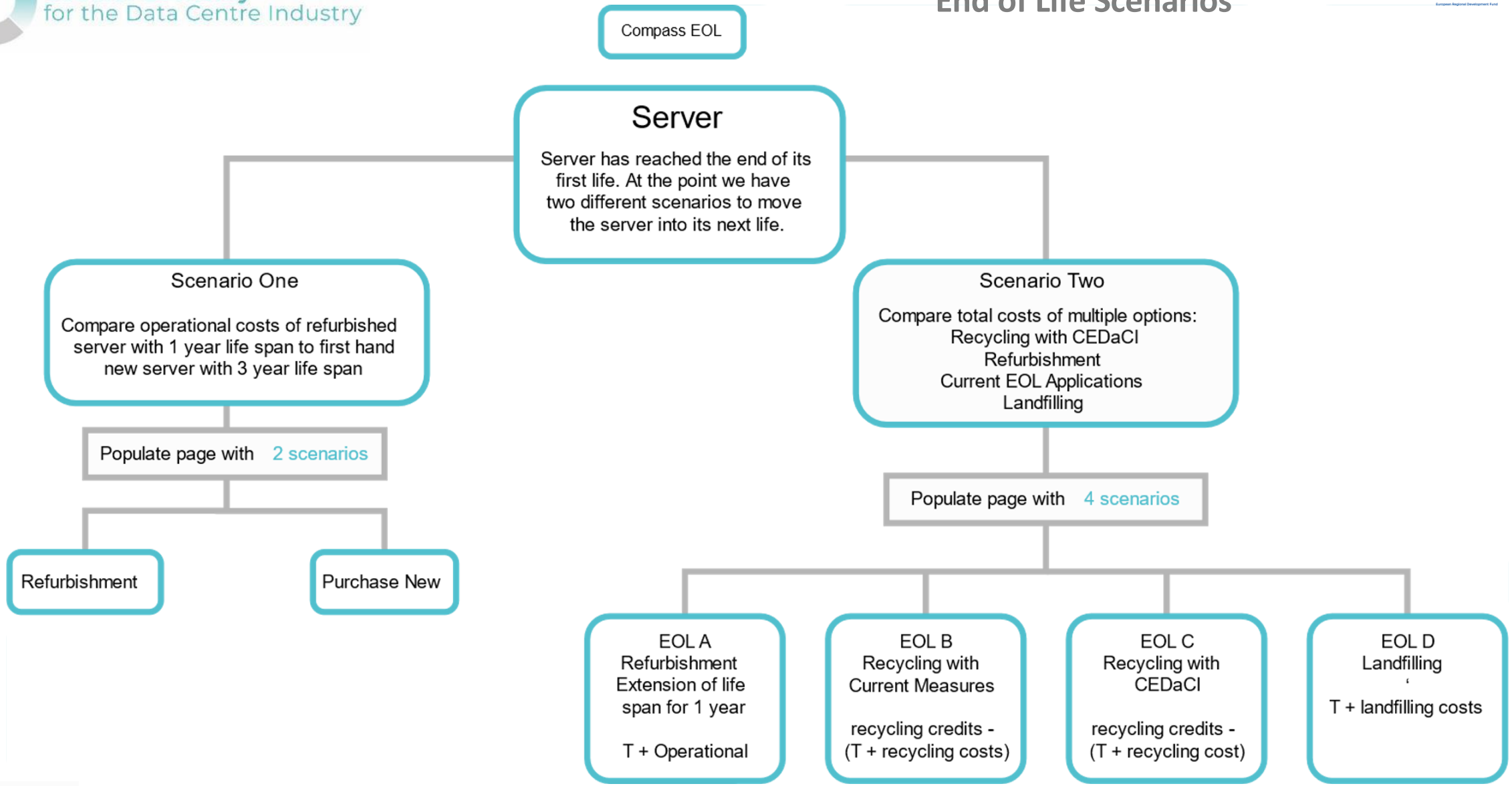
Compare – entry level – tool
current models - refurbish, replace with new, retire, recycle, landfill?





End of Life Scenarios



T = Transportation

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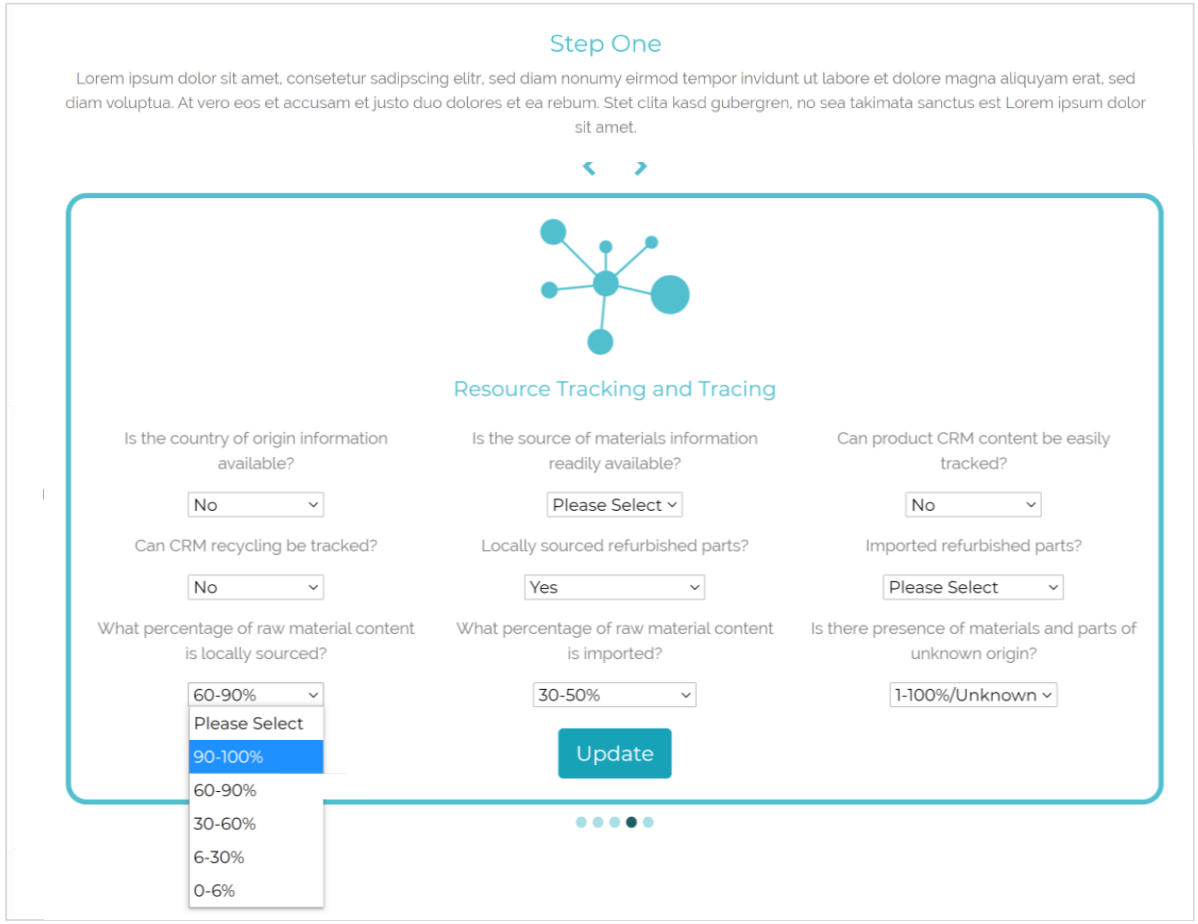
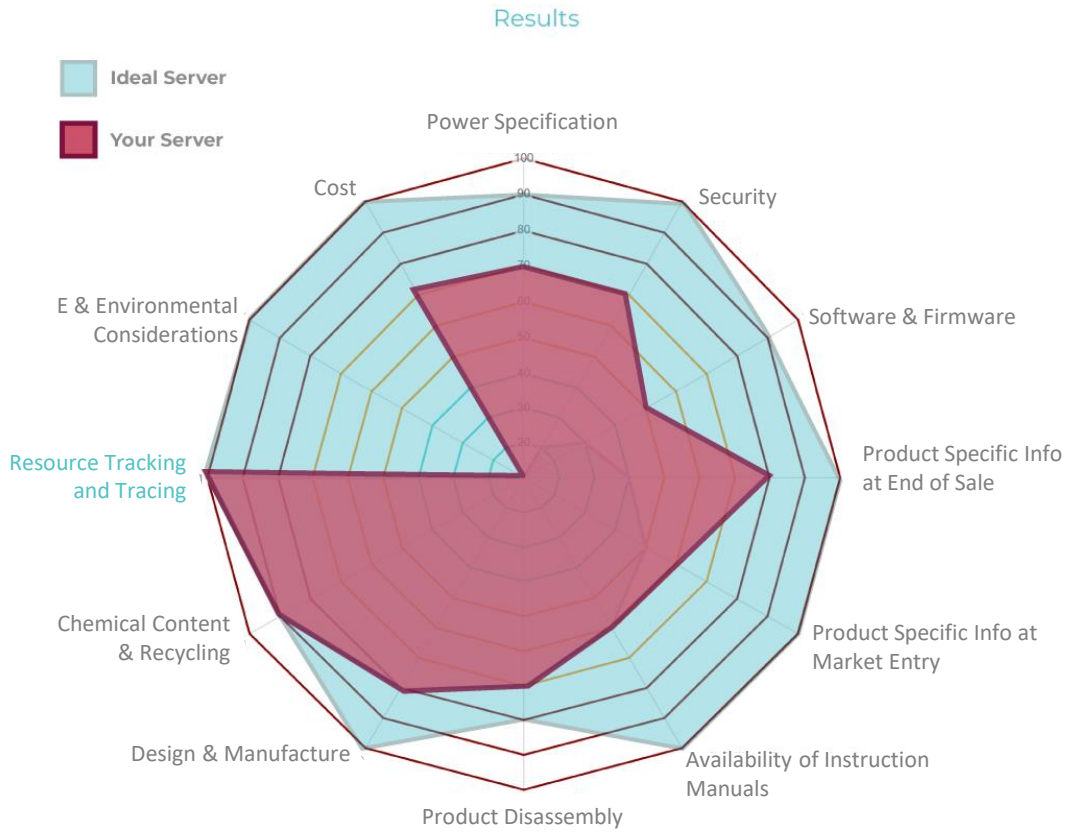
Design Evaluator – professional level
assess Design for Circularity using sector specific Eco-design guidelines





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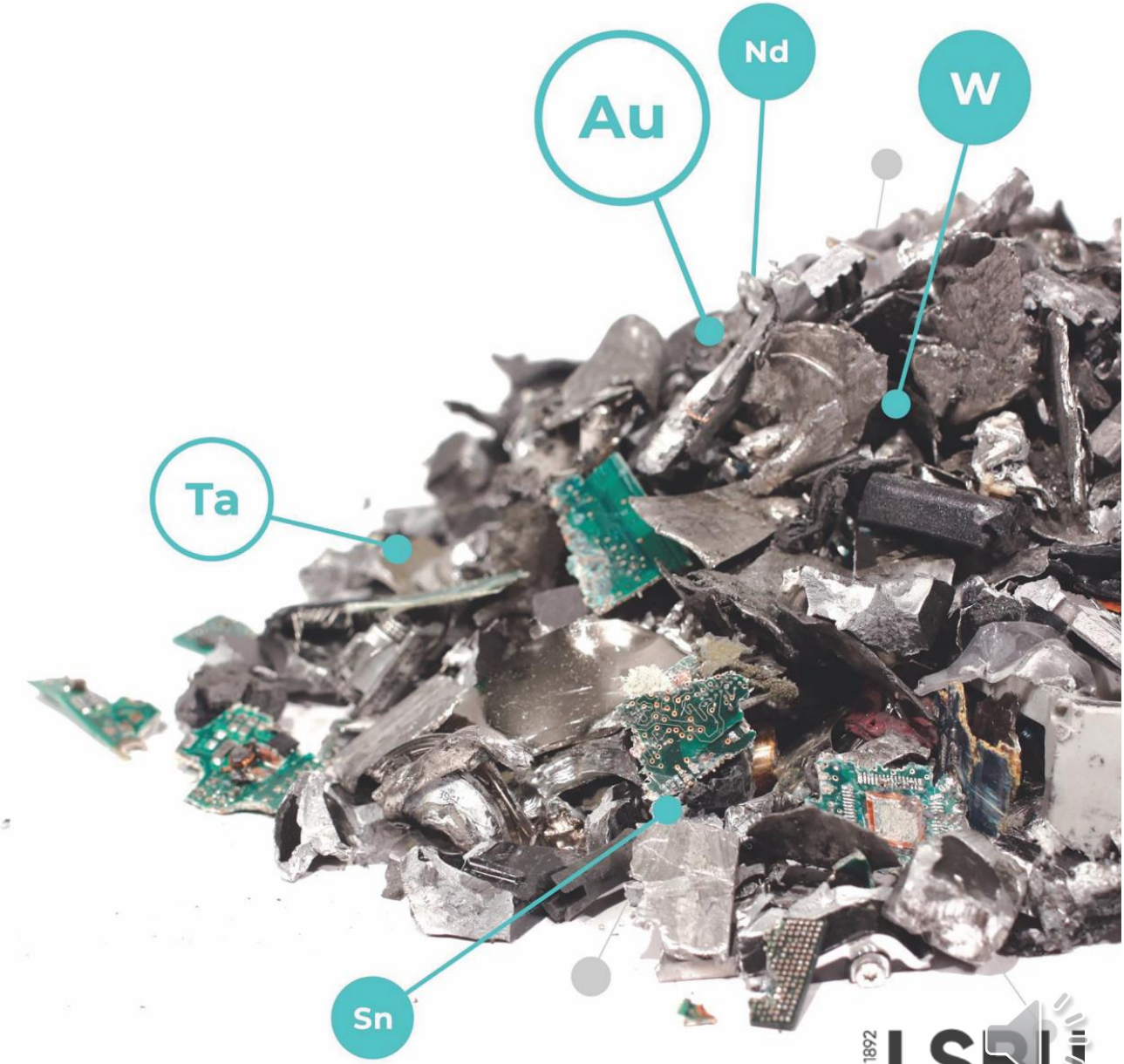
Please join CEDaCI

Network

Working Group members DE



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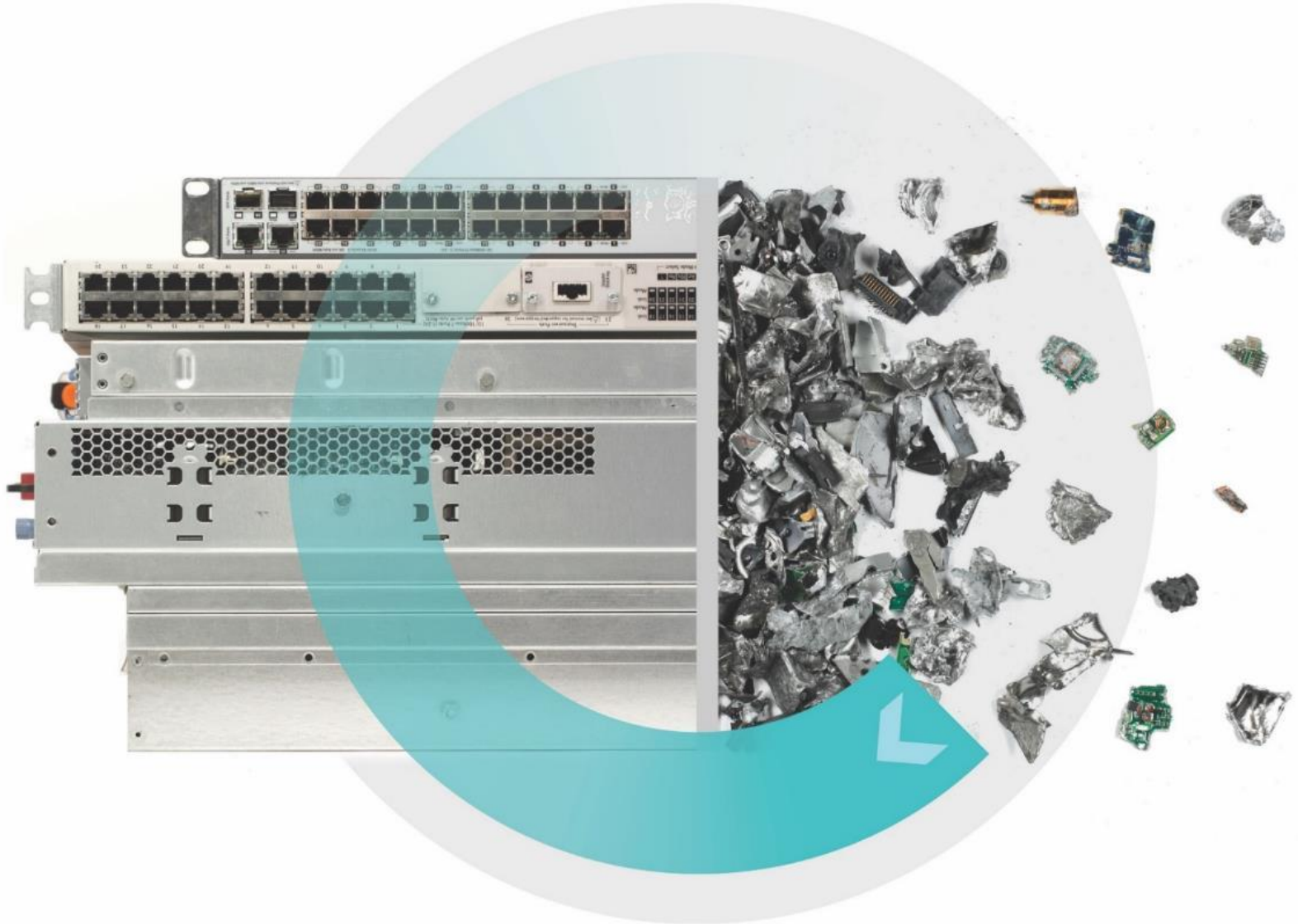
Thank you

Any questions?



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