RGI FACTSHEET | DECEMBER 2024

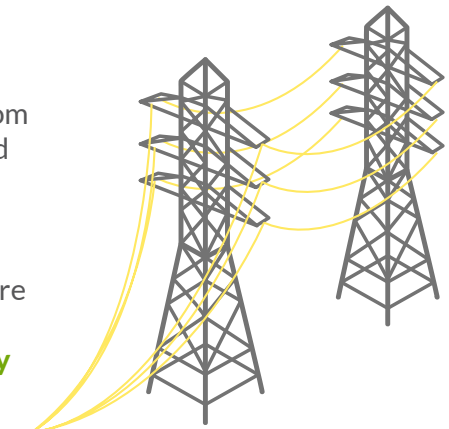
WIRED FOR circularity

BUILDING SUSTAINABLE POWER GRIDS FOR A DECARBONISED FUTURE

The expansion OF EUROPEAN POWER GRIDS...

Grids are the backbone of energy systems, delivering electricity to all – from citizens to industry. Moving towards a decarbonised and renewables-based energy system will require restructuring and expanding electricity grids in Europe and worldwide.

This means **increasing transmission grid capacities**, upgrading infrastructure and building interconnections. These measures will help to manage the variability of renewables, provide flexibility and **increase European security and competitiveness.**



EU TRANSMISSION GRID CAPACITY *TO REACH DECARBONISATION BY 2040*

Historical | base year 2015	2030	2035	2040
274 GW	404GW ↑ 47%	634GW ↑ 131%	668GW ↑ 144%

Source: PAC Scenario Technical Summary, 2024

...WILL REQUIRE SIGNIFICANT resources...

A study based on the Intergovernmental Panel on Climate Change (IPCC)'s Shared Socio-Economic Pathway scenario shows a **rapid growth of material demand** for electricity grid development globally.

Grid technologies and their components will **require critical materials** – to manufacture superconductor cables, semiconductors, converter stations or battery storage systems, materials such as copper, cobalt, lithium and nickel are needed.

...REINFORCING THE NEED FOR sustainable grid deployment

Building the energy infrastructure needed for the energy transition may present significant sustainability challenges.

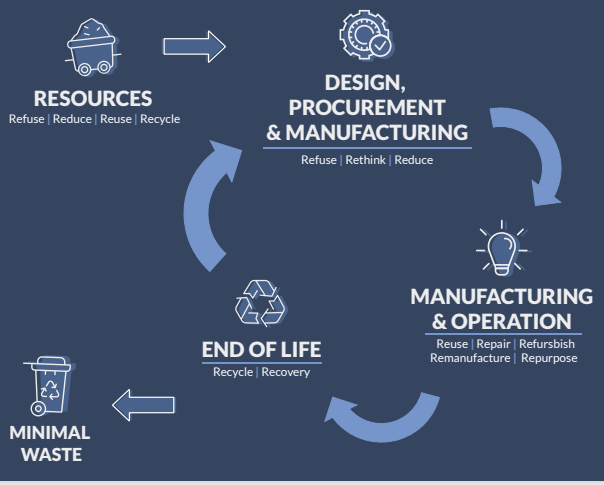
Supply chain constraints can severely impact the implementation and development of grid technologies, leading to delays in electricity grid deployment, increased costs and **slower decarbonisation.**

Resource extraction poses high environmental costs as ore grades are decreasing over time. Ore degradation leads to mining waste increase, posing **risks for downstream communities and ecosystems.**

The high resource demand for the energy transition underscores the need for **responsible resource management throughout the entire lifecycle:** from raw materials extraction, to manufacturing and assembling components, as well as infrastructure operation and end-of-life.

CIRCULARITY OFFERS A SUSTAINABLE WAY FORWARD!

SECURING SUSTAINABLE POWER GRIDS
THE ROLE OF CIRCULARITY



Circularity aims to disrupt the linear production-consumption model by **minimising waste and pollution,** while allowing nature to regenerate.

Products and materials are kept in circulation through processes like reduction, reuse, repairability, recycling, and recovery. For this to be successful, designing components for these processes, and sorting them are crucial steps.

HOW CAN CIRCULARITY ALLEVIATE RESOURCE AND SUPPLY CHAIN PRESSURE?

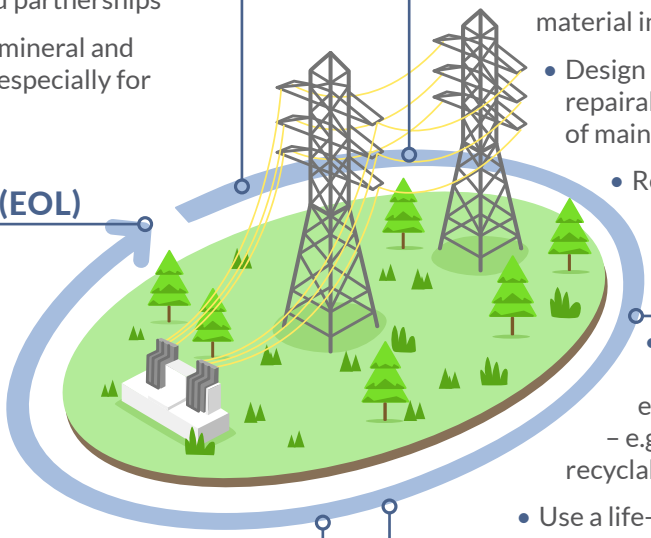
Implementing circularity within electricity grids can reduce dependence on strained supply chains, minimise material demand, and mitigate the **economic, social, and environmental impacts** of resource shortages and disruptions.

RAW MATERIALS

- Promote sustainable sourcing, including CO_2 reduced sourcing and closed-loop strategies
- Engage in on-the-ground corporate sustainability projects and partnerships
- Improve the efficiency of mineral and metallurgical processing, especially for minor metals

DESIGN

- Implement life cycle thinking when designing grid components to optimise resource use and enhance sustainability throughout their entire lifespan
- Promote technological innovation to reduce material intensity
- Design products with emphasis on repairability, availability of spare parts, ease of maintenance, and simple disassembly
- Replace or reduce materials with the highest impact



END-OF-LIFE (EOL)

- Establish partnership agreements with credible recycling companies
- Ensure traceability of EOL components to avoid improper treatment, sorting and downcycling
- Extend EOL of existing infrastructure where possible

PROCUREMENT

- Introduce circularity criteria in procurement to reduce environmental & social footprints – e.g. reusability, repairability, recyclability
- Use a life-cycle approach for procurement decision-making

OPERATION

- Apply predictive maintenance of assets
- Form in-house or close relationships for repair services
- Increase transmission efficiency of existing infrastructure through technological advancements and energy system adjustments

MANUFACTURING

- Use of Material Flow Analysis to identify material hotspots of manufacturing processes
- Implement innovative manufacturing technologies to reduce emissions and enable higher integration rates of secondary resources in industrial processes
- Encourage suppliers to share products' life cycle data to optimise upstream & downstream supply chains

Renewables Grid Initiative

Co-funded by the European Union

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