BEST PRACTICE WEBINAR
RESILIENT & OPTIMISED power grids

WELCOME TO our webinar



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Renewables Grid Initiative
MODERATOR

Renewables Grid Initiative

HITACHI

AGENDA *for today*

INTRODUCTION | Renewables Grid Initiative (RGI)

BEST PRACTICE SHOWCASE | Hitachi Energy

INDUSTRY INSIGHTS | Elia Group

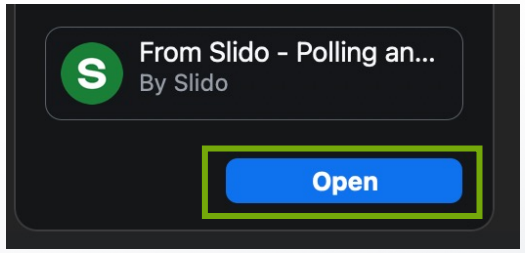
Q&A SESSION

HOUSEKEEPING *guidance*

- This webinar is being recorded
- Microphone off, camera on



- Rename yourself to “Name, Organisation”
- We will use Slido for the Q&A Session. Make sure to write your questions and vote for your favourites!



FOSTERING *discussions*

Renewables Grid Initiative

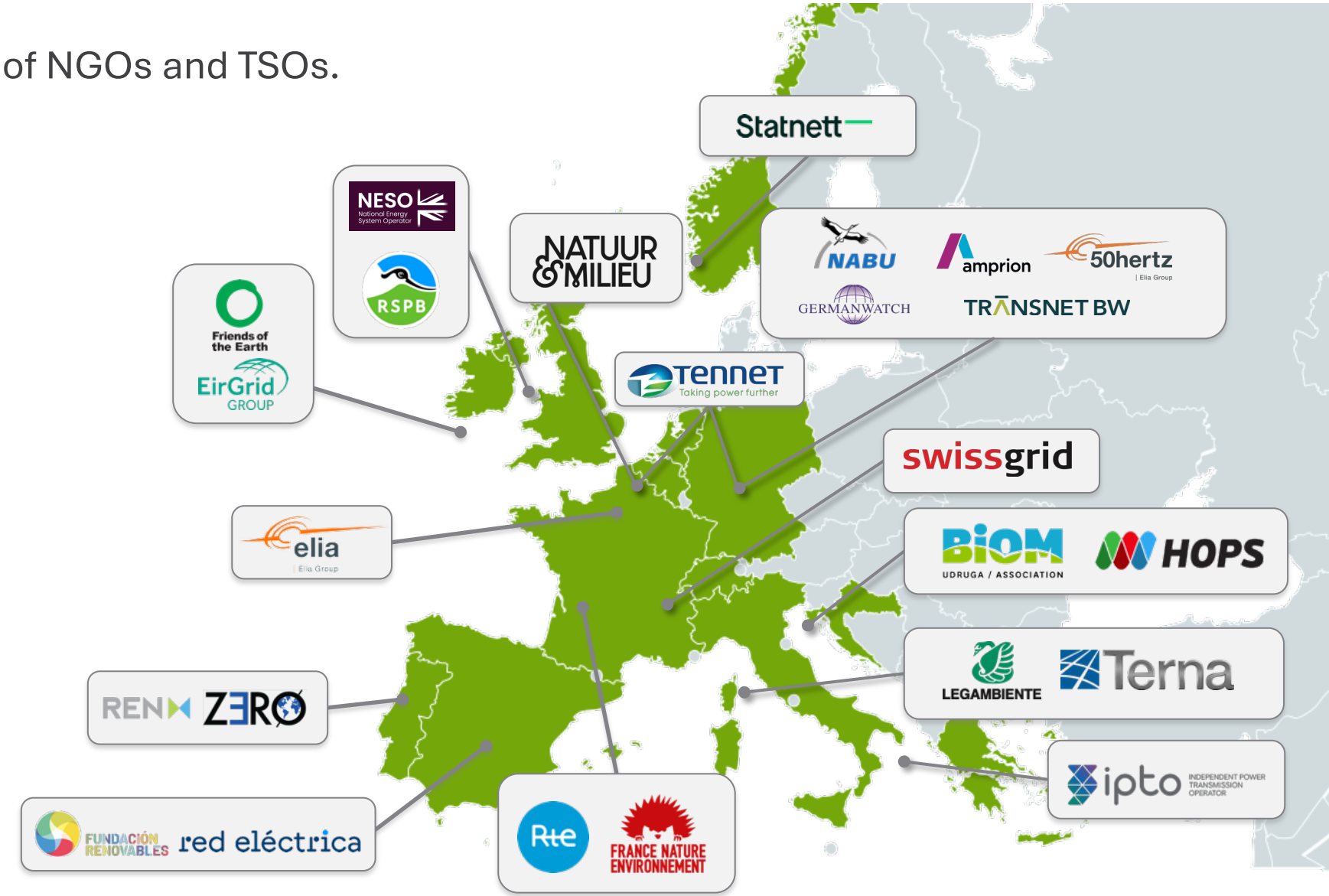
RGI is a unique collaboration of NGOs and TSOs.

EUROPEAN ORGANISATIONS

CAN Europe · WWF · BirdLife International / BirdLife Europe · Bellona Europa · EMBER

SUPPORTING MEMBERS

Europacable – Try life without us · IUCN · T&D europe

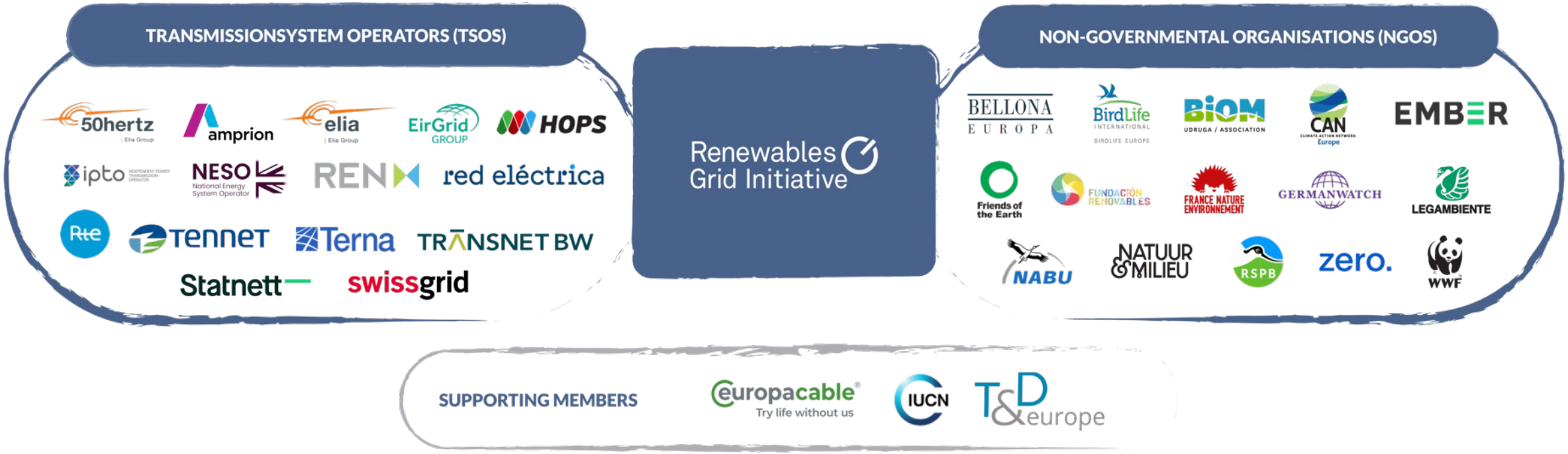


FOSTERING *discussions*

Renewables Grid Initiative

RGI is a unique collaboration of NGOs and TSOs.

We engage in an energy transition ecosystem of actors and promote **fair, transparent, sustainable grid development** to enable the growth of renewables to achieve full decarbonisation in line with the Paris Agreement.



OUR WORK *dimensions*

Renewables Grid Initiative

As a solutions-driven organisation with focus on the electricity infrastructure implementation, we foster knowledge exchange, discussions on the needs of grid infrastructure, and best practices sharing within **three dimensions:**

GRIDS & ENERGY SYSTEMS

We enable discussions on how to **model, plan and implement** decarbonised and optimised clean energy systems, including different voices in the process.

ENERGY & NATURE

We ensure energy systems both onshore and offshore are developed in **coherence with nature and biodiversity**, promoting mitigation, enhancement and restoration measures.

ENERGY & SOCIETY

We include and engage **citizens, civil society and policymakers** on strategies towards full decarbonisation, building capacity on the role of grids within the energy transition.

SHARING Best practices



Renewables Grid Initiative

Collecting and sharing practices

SHARING Best practices

Renewables Grid Initiative

Collecting and sharing practices

Discussing and showcasing practices



SHARING Best practices

Renewables Grid Initiative

Collecting and sharing practices

Discussing and showcasing practices

Promoting and celebrating practices

RGI Grid Awards



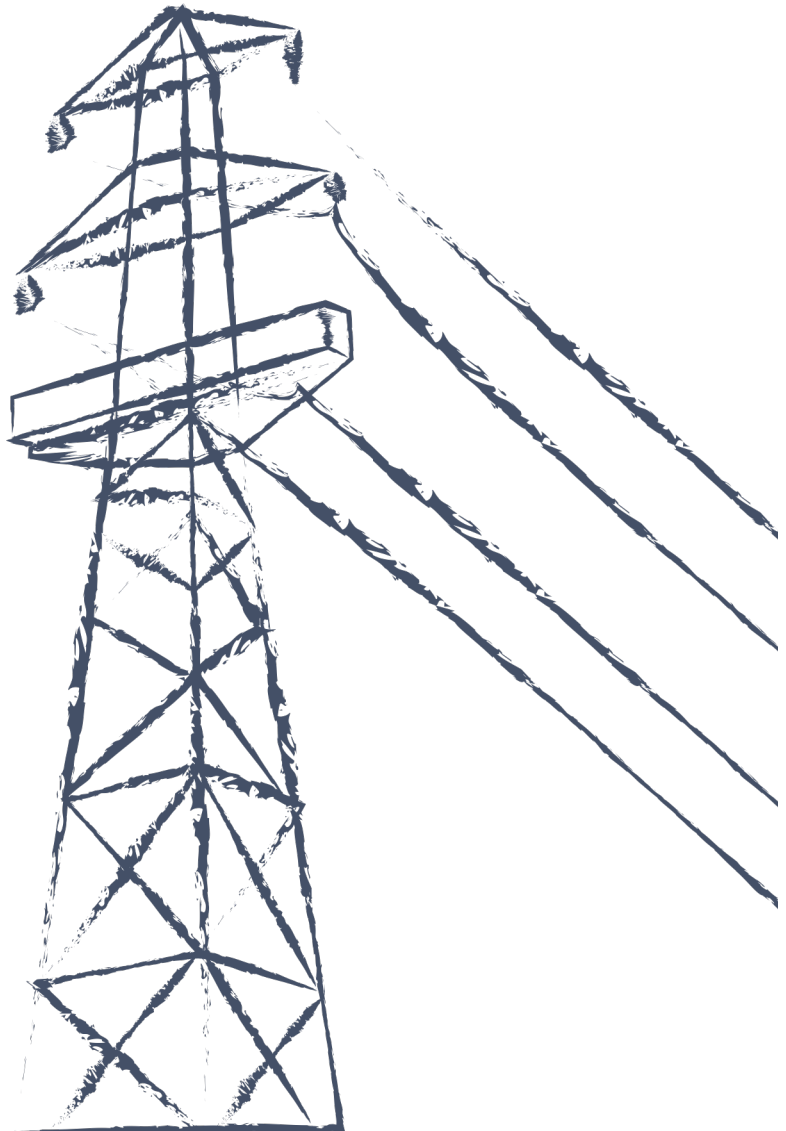
SHARING Best practices

Renewables Grid Initiative



ZOOM-IN

RESILIENT & OPTIMISED *power grids*



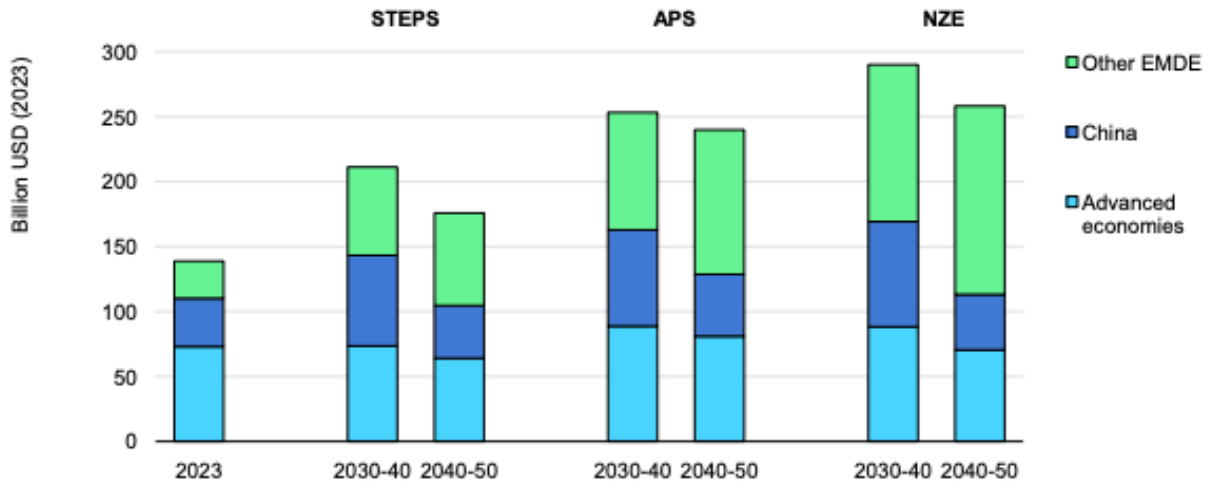
Renewables Grid Initiative

CHALLENGES OF *the energy transition*

Renewables Grid Initiative

As we accelerate the energy transition, **more electricity grids will be needed** to connect renewable energy sources to the communities and industries using them.

Average annual investment in transmission by region and scenario, 2023-2050



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero by 2050 Scenario. Other EMDE = emerging market and developing economies other than China.

IEA, 2025

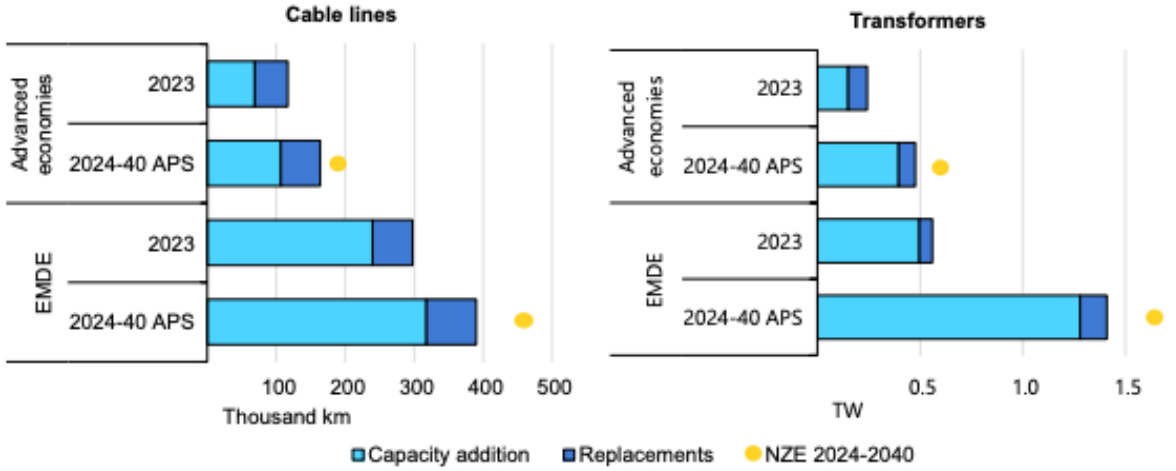
CHALLENGES OF *the energy transition*

Renewables Grid Initiative

As we accelerate the energy transition, **more electricity grids will be needed** to connect renewable energy sources to the communities and industries using them.

However, this also increases the **demand for grid components and equipment** as we accelerate infrastructure deployment.

Average annual capacity additions and replacement per region in the Announced Pledges and Net Zero Emissions by 2050 scenarios, 2023-2040



IEA. CC BY 4.0.

Note: NZE = Net Zero by 2050 Scenario.

IEA, 2025

CHALLENGES OF *the energy transition*

Renewables Grid Initiative

To produce these components, **critical raw materials and manufacturing capacity** will be required.

The energy transition is a materials transition. Our dependence has now shifted from fossil fuels to technologies, manufacturing and materials.

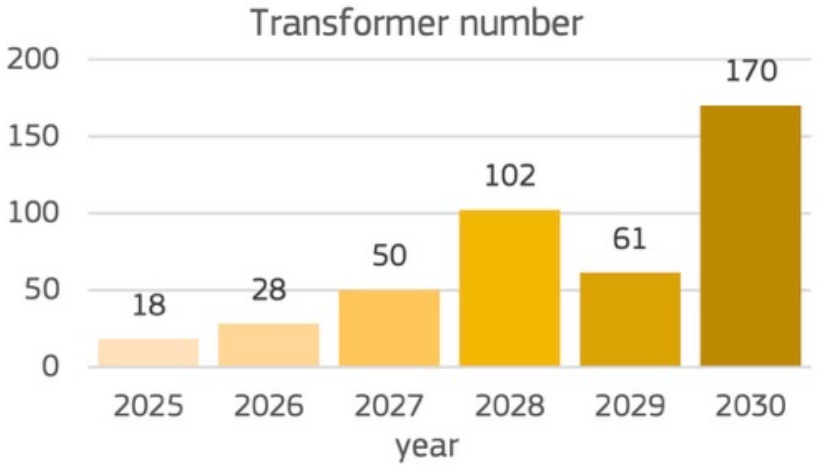


Table 3 – Material intensities in tonnes per transformer for 400/100 kV step-down transformer.

Material	Material intensity [t/transformer]
Steel	180
Silicon steel (core)	130
Unspecified (tank)	50
Copper	45-50
Oil	80

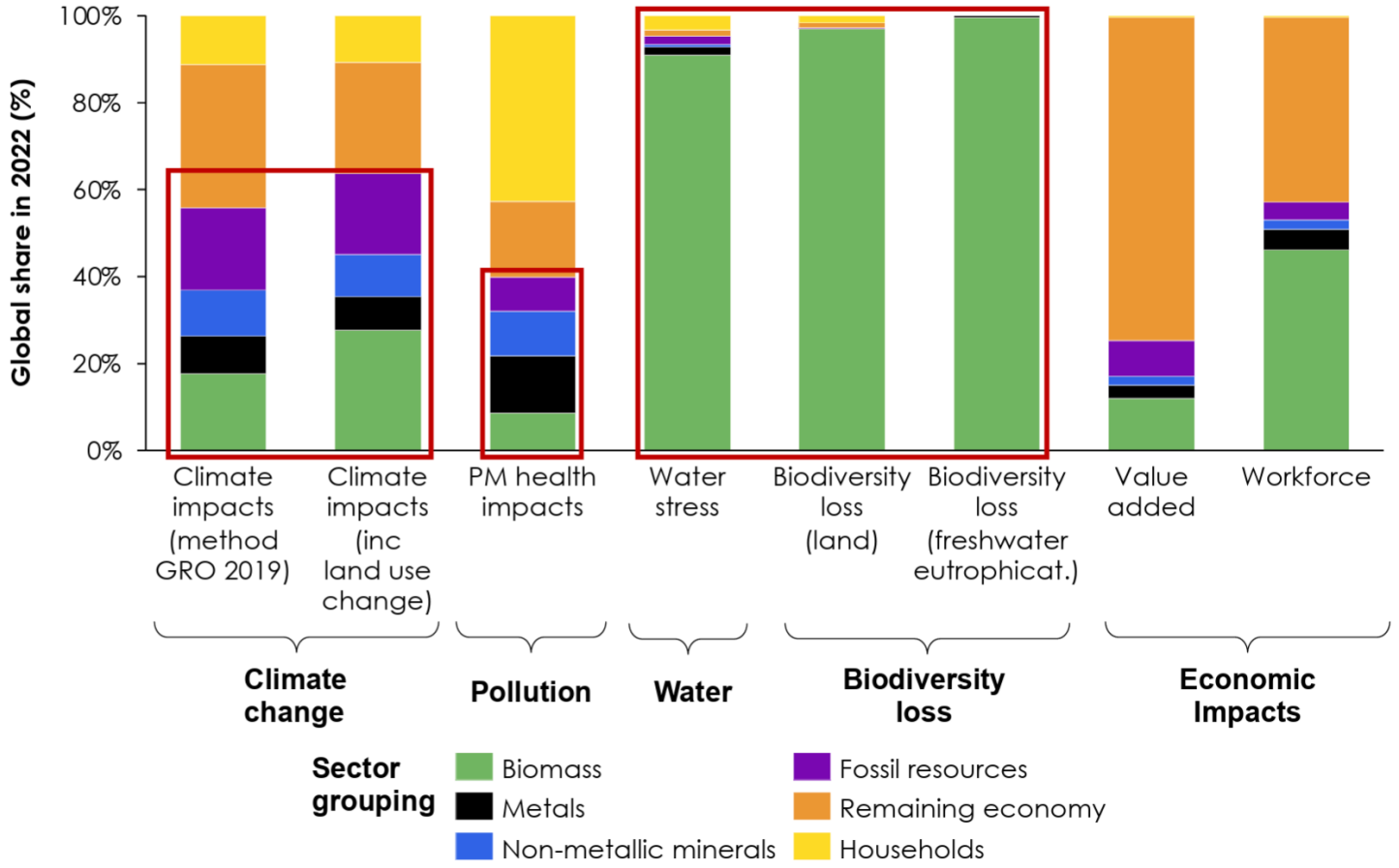
Source: JRC analysis based on [8].

JRC, 2025

CHALLENGES OF *the energy transition*

Renewables Grid Initiative

Material extraction and processing accounts for over 60% of global climate change impacts including land use change.



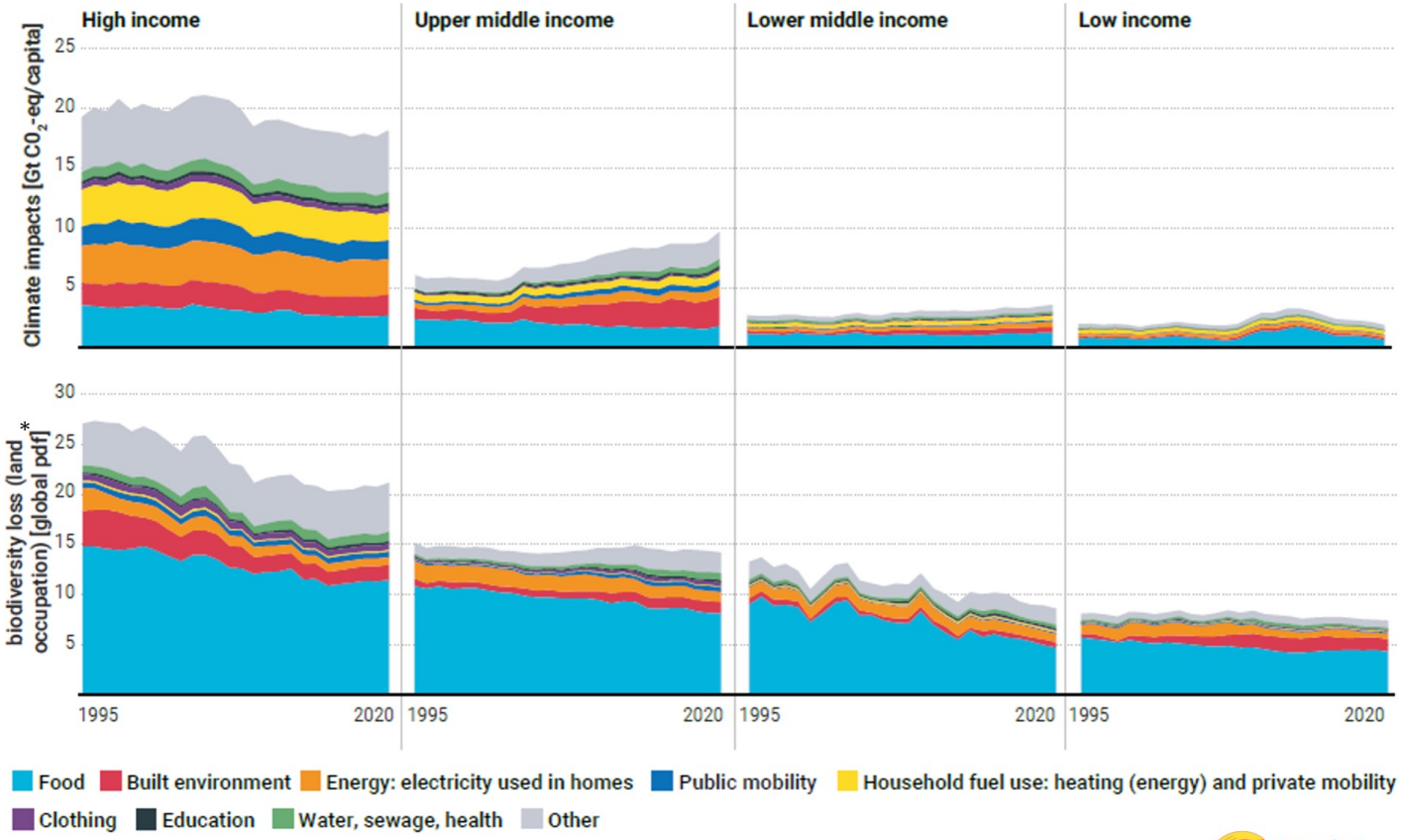
Global Resources Outlook 2024

CHALLENGES OF *the energy transition*

Renewables Grid Initiative

Material extraction and processing accounts for over 60% of global climate change impacts including land use change.

From a socioeconomic perspective, material scarcity can **exacerbate existing inequalities between world regions**, specifically related to material distribution between the Global North and South.



*Global pdf: Global potentially disappeared fraction of species
Source: International Resource Panel, Global Resources Outlook 2024 (https://www.resourcepanel.org/reports/global-resources-outlook-2024)

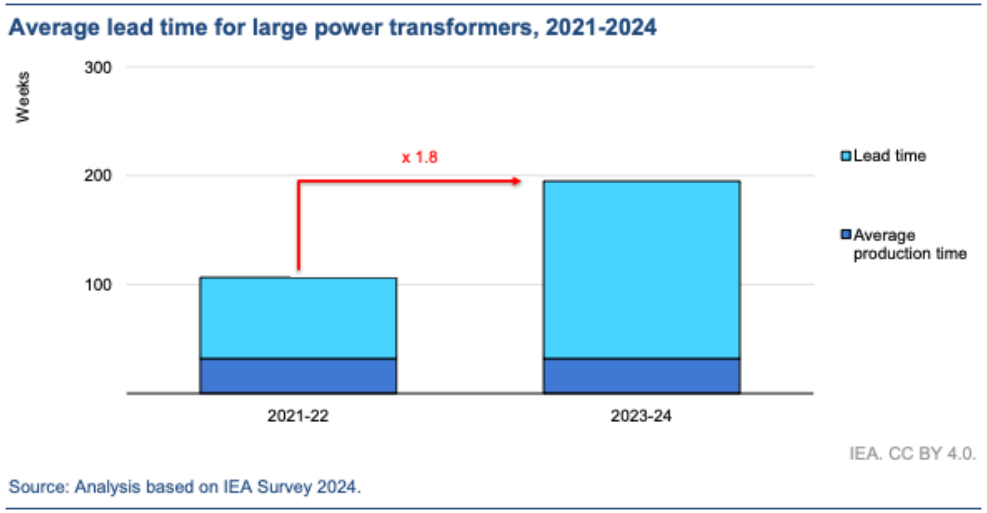
International Resource Panel

[Global Resources Outlook 2024]

CHALLENGES OF *the energy transition*

Renewables Grid Initiative

Transmission components are facing **higher costs and longer lead times.** This delays projects, while also impacting the affordability of the energy transition.



IEA, 2025

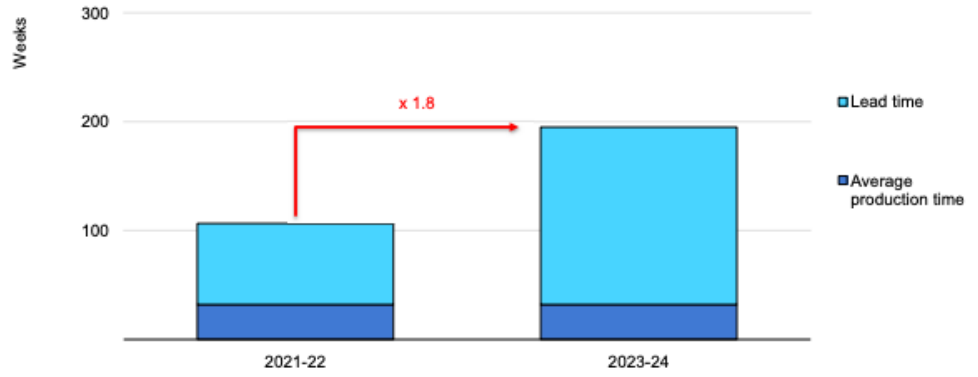
CHALLENGES OF *the energy transition*

Renewables Grid Initiative

Transmission components are facing **higher costs and longer lead times.** This delays projects, while also impacting the affordability of the energy transition.

Globally, since 2021, average transformers **lead times almost doubled**. And **prices increased by around 75% since 2019**.

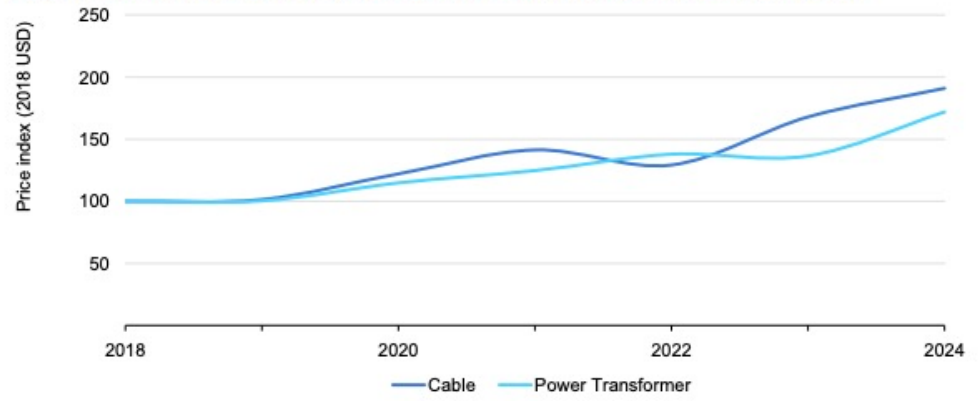
Average lead time for large power transformers, 2021-2024



IEA. CC BY 4.0.

Source: Analysis based on IEA Survey 2024.

Power transformer and cables price index in real terms (2018 USD), 2018-2024



IEA. CC BY 4.0.

Note: Analysis based on cable auctions >320 kV (excluding submarine) and IEA survey for underground cables.
Source: IEA Survey 2024.

IEA, 2025

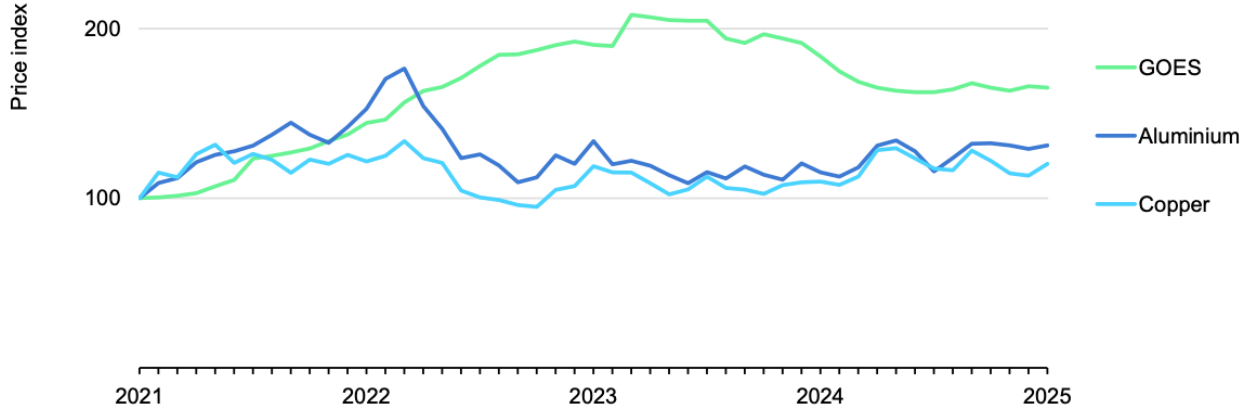
IMPACTS OF *material needs*

Renewables Grid Initiative

High material prices are one of the main causes. For large power transformers, **raw materials account for more than 50% of the total cost.**

Among raw materials, the volatility in the costs of copper, aluminium, and oriented electrical steel (GOES) has contributed to the cost surge in transmission components.

Price index for key materials: GOES, copper and aluminium, 2021-2025



IEA. CC BY 4.0.

Source: IEA analysis based on data from Bloomberg, T&D Europe, Federal Reserve Economic Data.

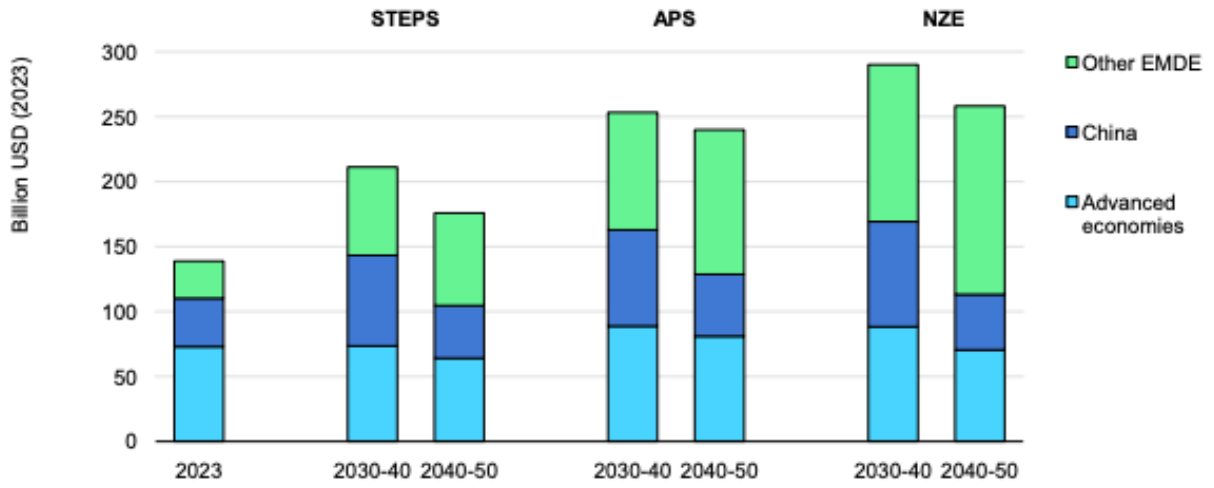
IEA, 2025

IMPACTS OF *material needs*

Renewables Grid Initiative

Strong competition between sectors and technologies, as well as geopolitical competition between world regions, raises even more concerns.

Average annual investment in transmission by region and scenario, 2023-2050



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero by 2050 Scenario. Other EMDE = emerging market and developing economies other than China.

IEA, 2025

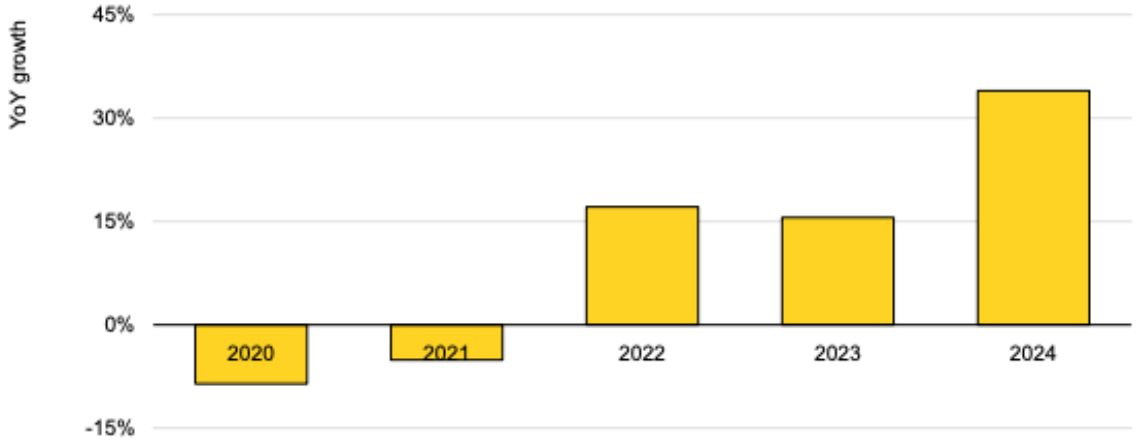
IMPACTS OF *material needs*

Renewables Grid Initiative

Strong competition between sectors and technologies, as well as geopolitical competition between world regions, raises even more concerns.

While the assembly and manufacturing stages for clean technologies are mostly secured in Europe, manufacturers supply for global markets.

Increase in power transformer order backlog in selected manufacturing companies, 2020-2024



IEA. CC BY 4.0.

Note: YoY = year-on-year. Based on order backlogs of Hitachi Energy, Schneider Electric, Siemens Energy, GE Vernova

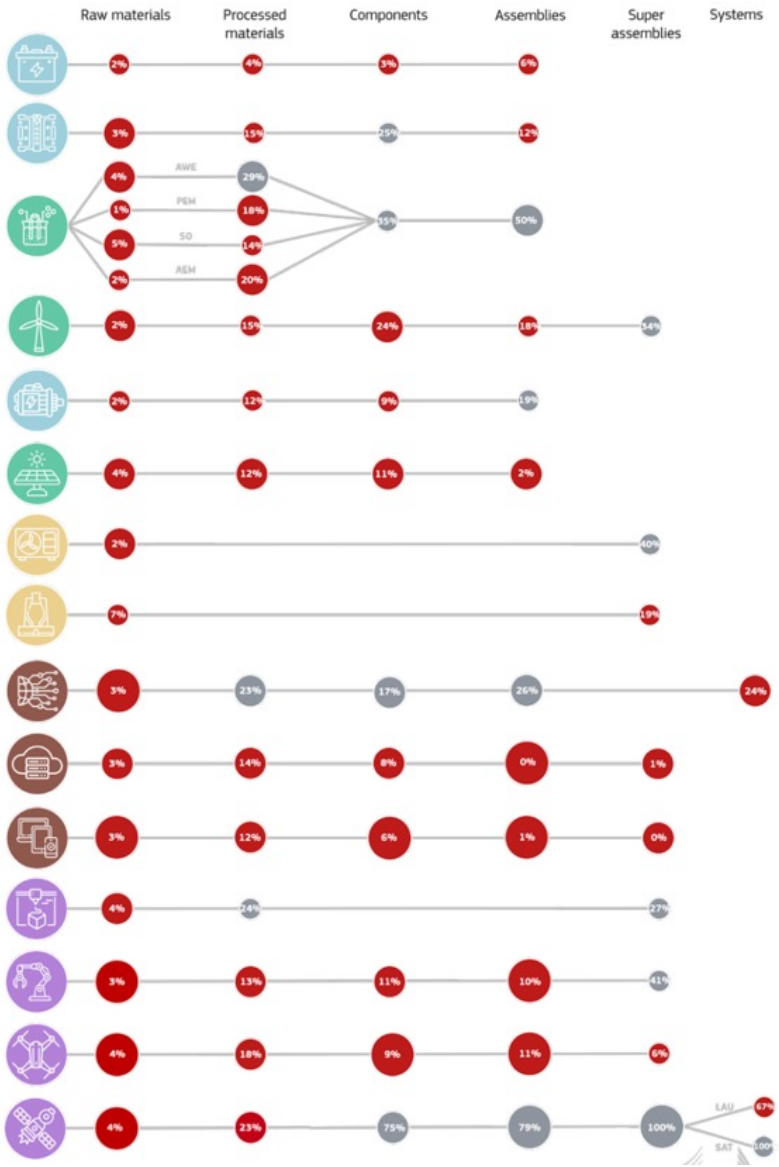
IEA, 2025

IMPACTS OF *material needs*

Renewables Grid Initiative

At the same time, the EU's share in the global production of raw materials has **never been higher than 7%**.

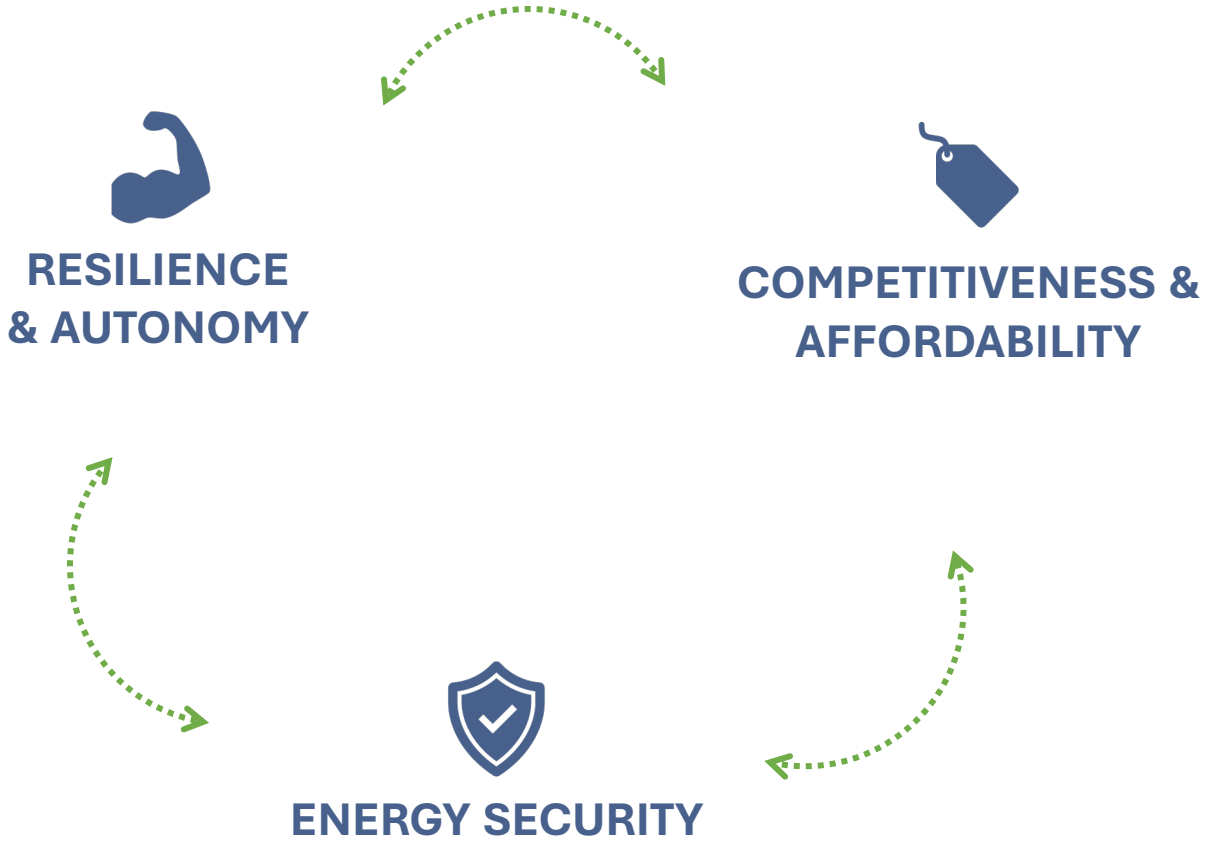
These disparities can lead to **systematic dependences on critical raw materials imports**.



JRC, 2023

IMPACTS OF *material needs*

Renewables Grid Initiative



IMPACTS OF *material needs*

Renewables Grid Initiative



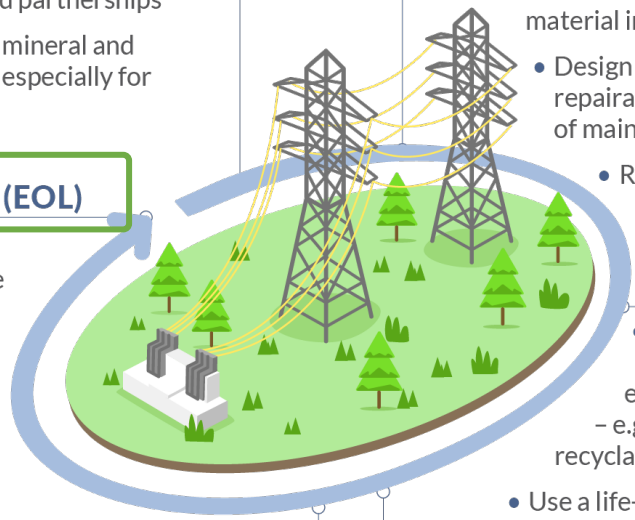
CIRCULARITY AS A PATH TO REDUCE DEPENDENCIES AND INSECURITY, WHILE INCREASING COMPETITIVENESS, RESILIENCE AND AFFORDABILITY

POTENTIAL BENEFITS *of circular approaches*

Renewables Grid Initiative

Implementing measures of **circularity** in energy infrastructure can reduce environmental pressure, increase the security of supply, and provide societal benefits.

Beyond recycling, circular strategies must incorporate resource optimisation, infrastructure efficiency and asset lifetime extension.



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

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

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

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

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

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

CIRCULARITY IN *energy systems*

Renewables Grid Initiative

Bringing stakeholders together, we have discussed possibilities and explored the challenges and possibilities of **incorporating circularity within energy systems and grid supply chains.**

26 June **2024**



Expert Workshop
Closing the Circle

More information

24 October **2024**



Webinar
Wired for Circularity
w/ IRENA, JRC & RTE

More information

December **2024**



Factsheet
Summarising findings

More information

25 September **2025**



Expert Workshop
Powering Security with ICA Europe

More information

06 November **2025**



RGI Statement on the
Circular Economy Act

More information

CIRCULARITY IN *energy systems*

Renewables Grid Initiative



To create awareness on potential solutions and dive deeper into the multiple perspectives within this topic, RGI is organising the **Webinar Series** under our Activity **'Resilient & Optimised Power Grids'**

This is the third session, and more webinars will be held next year – **stay tuned for more info!**

Explore our work on circularity & supply chains

renewables-grid.eu/circularity

BEST PRACTICE WEBINAR

RESILIENT & OPTIMISED power grids

BEST PRACTICE *showcase*



Ghazi Kablouti
Global Portfolio Sustainability Lead (Transformers)
Hitachi Energy

Renewables Grid Initiative

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BEST PRACTICE WEBINAR
RESILIENT & OPTIMISED power grids

INDUSTRY insights



Lara Mertens
Expert - Sustainability
Elia Transmission Belgium

Renewables Grid Initiative

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Questions?
LET'S DISCUSS!

Join at slido.com

Code: #129 0857

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BEST PRACTICE WEBINAR
RESILIENT & OPTIMISED power grids

Thank you & LET'S KEEP IN TOUCH!

Sign up for RGI's newsletter to stay updated
renewables-grid.eu/newsletter

Presentations and recording will be available on our website

Webinar series will continue next year, reach out with your inspiring practices

Renewables Grid Initiative

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