

Expert presentation 5

Systematics for systems



Bruno Cova

We must be honest, realistic
and pragmatic

CET Partnership Annual Conference 2023

Sustainable Supply Chains for the Energy Sector

Understanding the challenge

The urgencies and the role of research and innovation: Systematics for systems

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Advisory Services & Studies

Director

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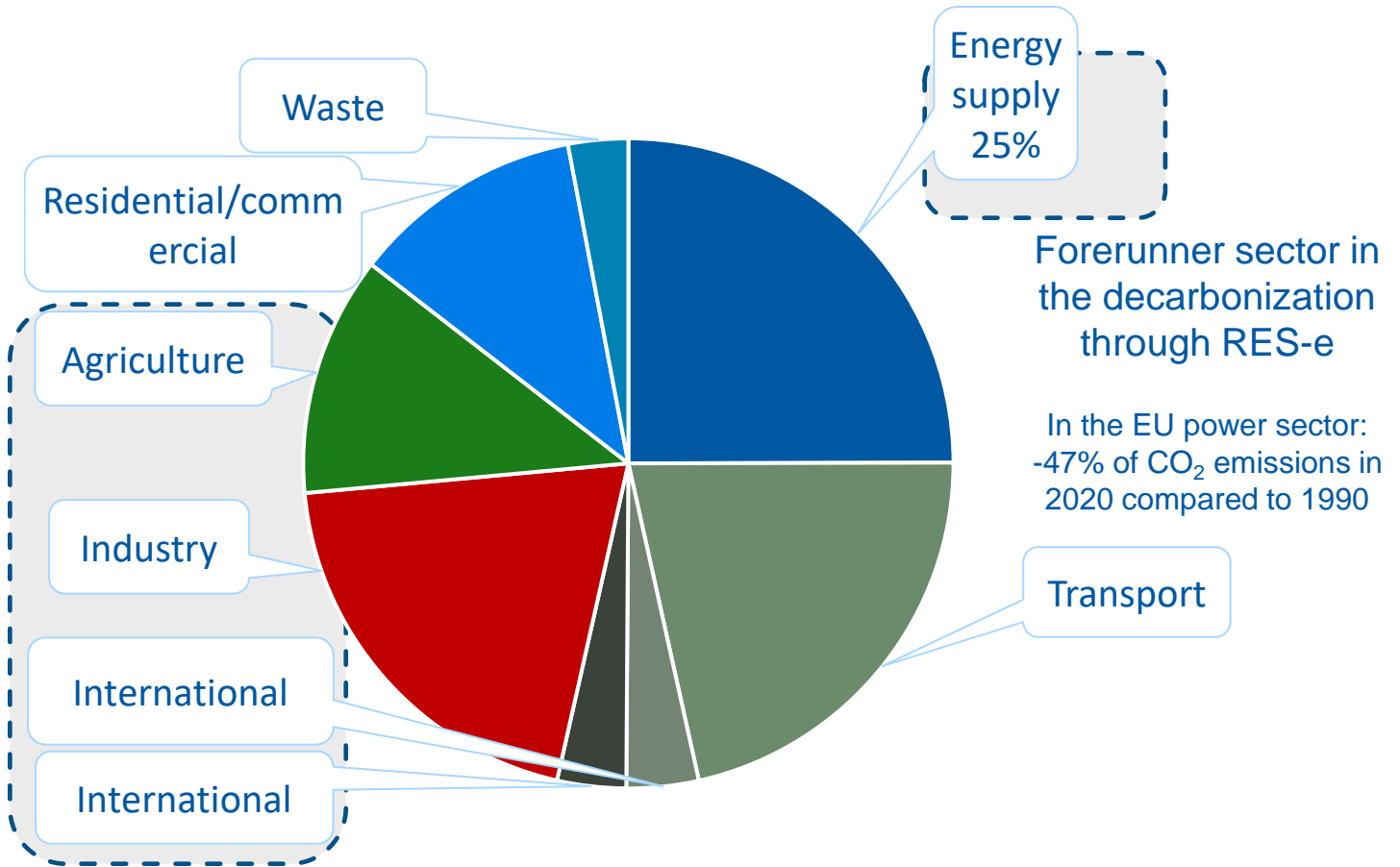
Milan – 24th October 2023

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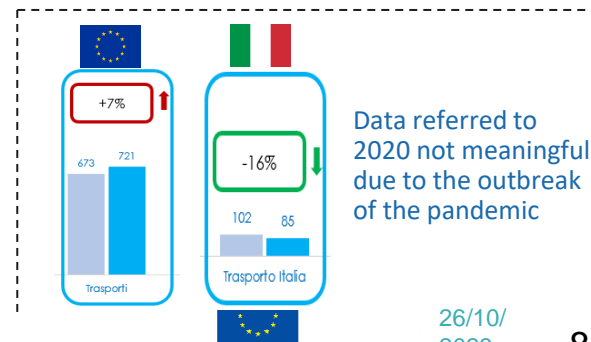
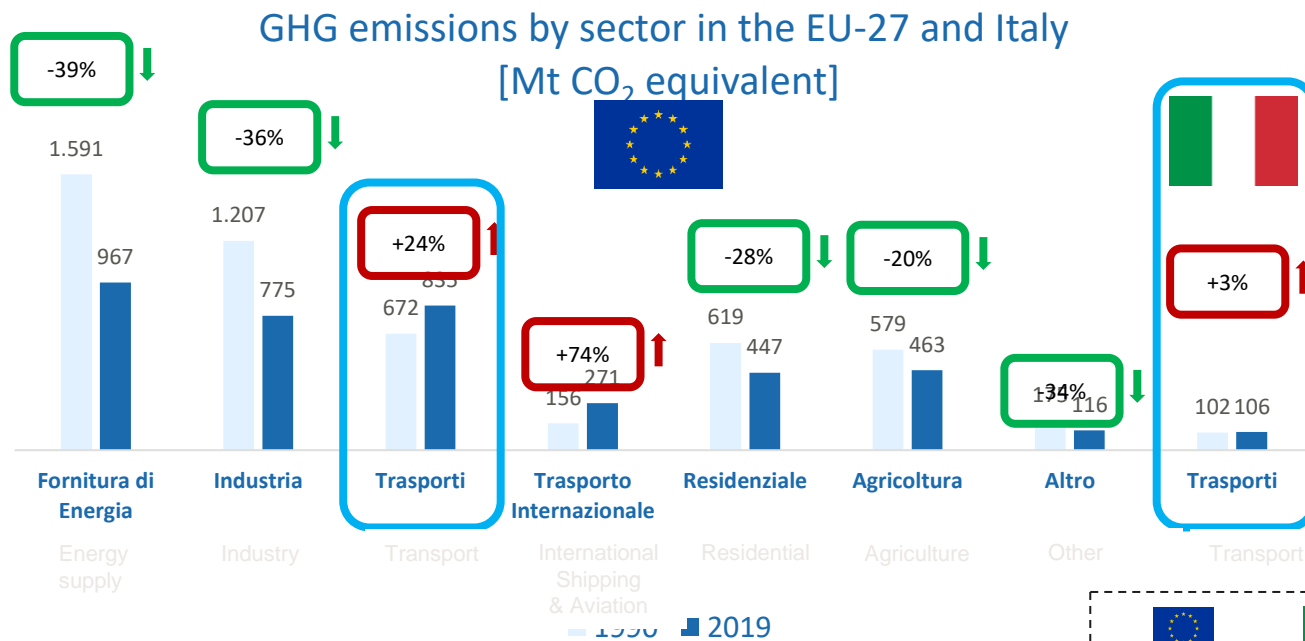
EUROPEAN PARTNERSHIP



GHG emissions in the EU by sector



Decarbonisation in the various sectors: past patterns



- ✓ The various sectors have not had and are still not evolving at the same pace
- ✓ The energy sector is the forerunner having reduced emissions by 39% since 1990, while other sectors are lagging behind
- ✓ Transport has even increased emissions, with a 24% growth in the EU

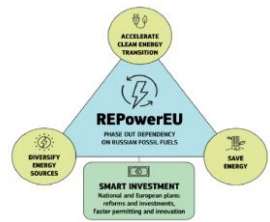
EU: between challenging goals and harsh reality

Despite the ambitious **decarbonization targets...**

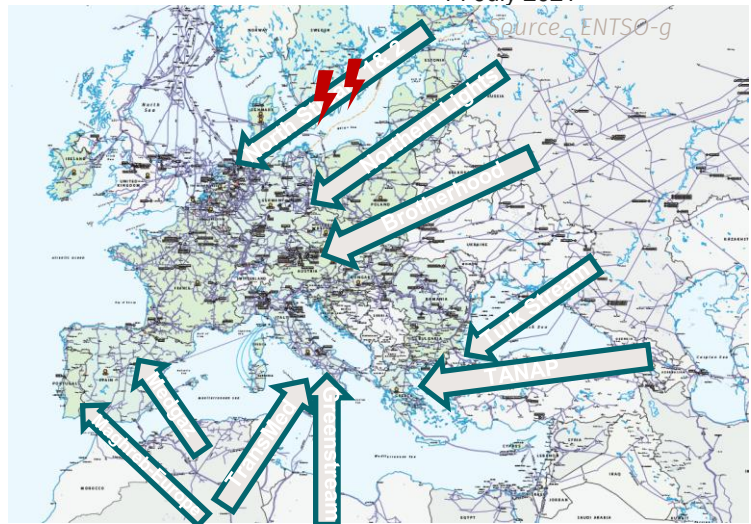


14 July 2021

| 2030 Targets | Fit x 55 | REPowerEU |
|----------------------------|----------|-----------|
| GHG reduction vs 1990 | 55% | |
| %RES on energy consumption | 40% | 45% |



18 May 2022



...the EU economy is **still largely based on fossil fuels**, the largest share of them are imported

EU* imports 56% of its energy, which makes it the largest net energy importer among G20 members

- 96% of crude oil imported
- 83% of NG imported
- ✓ in 17 Member States the dependency on NG imports exceeds 90%

EU energy bill in 2022:
€ 834 billion

Italy

- 93% of crude oil imported*
- 95% of NG imported**

IT energy bill in 2022:
€ 140 billion

The heavy dependence on imported fossil resources makes Europe **highly vulnerable to (possible) external shocks**



The energy transition implies a geopolitical shift for energy sources

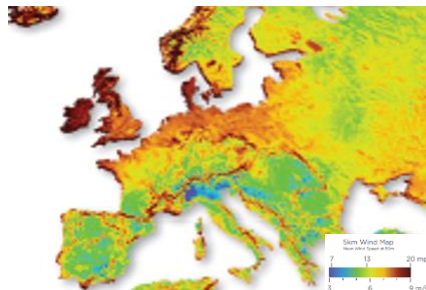
From imported Oil and Gas...

...to exploitation of local RES

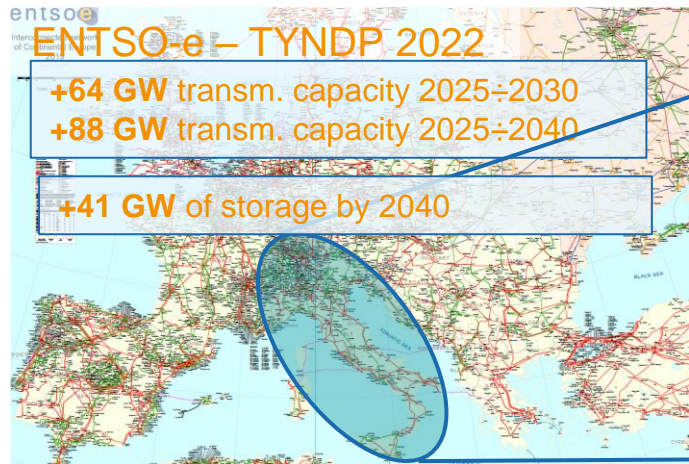
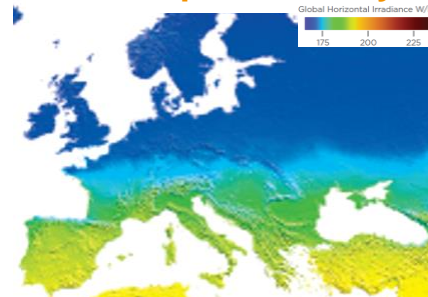


consequent growing effort in transmission capacity

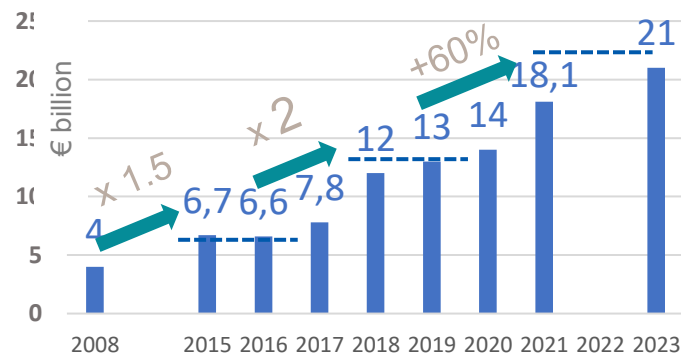
Wind producibility



Solar producibility



10-y 10-year National Development Plan Plan

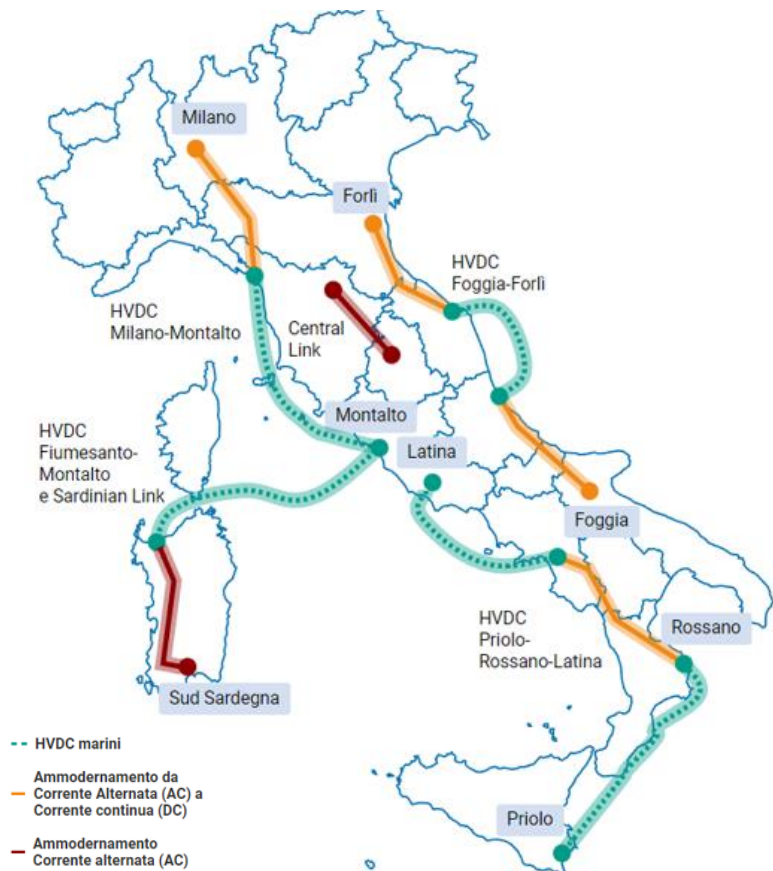


Infrastructural effort largely based on **critical raw materials**, notably **copper** and **bauxite**



Innovative solutions for power transmission: the concept of “Hypergrid”

A vision of the future configuration of the transmission systems foresees a DC network superimposed on the existing AC grid



Source: Terna

Key advances in DC grids in term of system design and configuration:

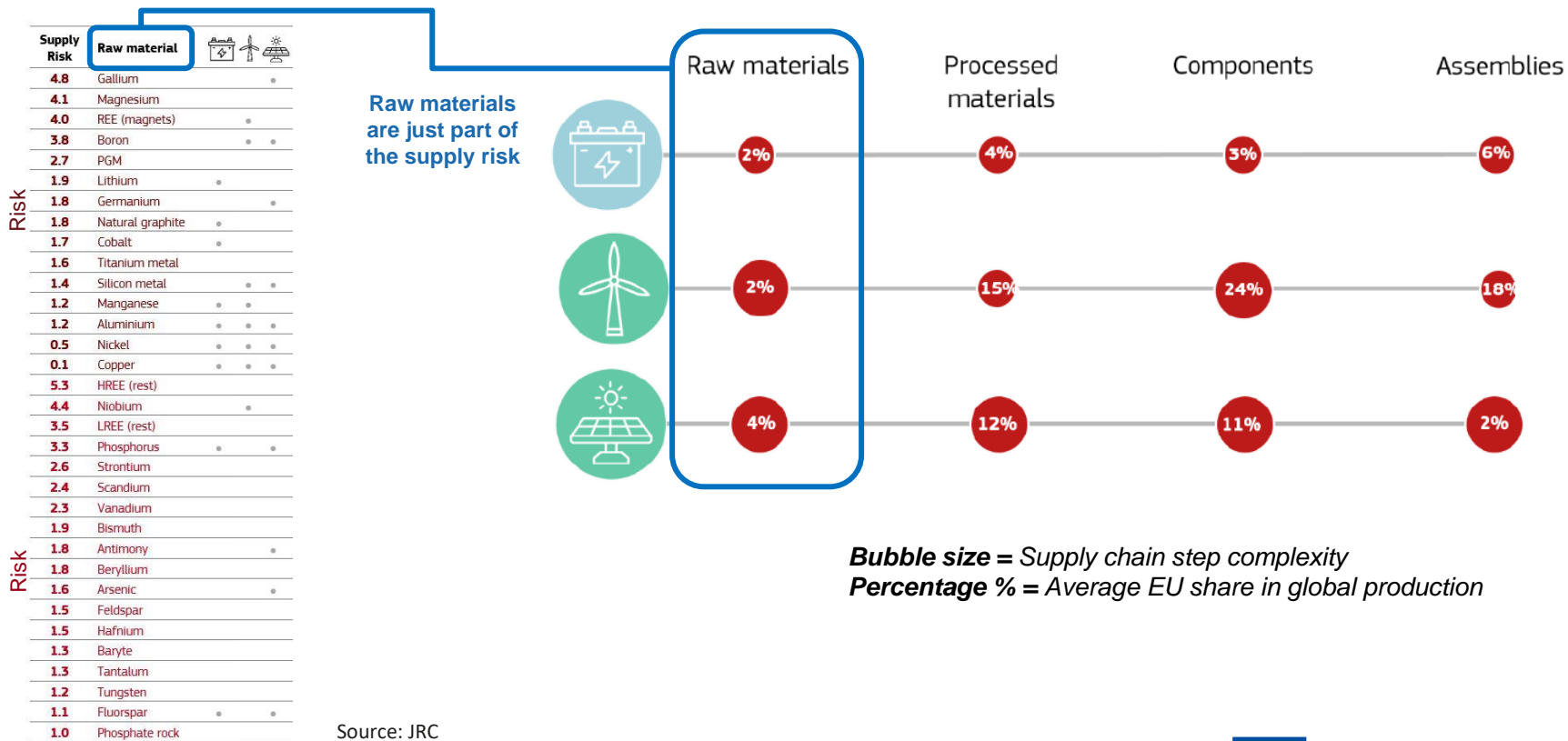
- ✓ Multi-terminal configuration
- ✓ DC grid operation (load flow & power control, telecom, etc.): see example of France-Spain HVDC-VSC link
- ✓ DC fault / DC breakers (sectionalization of faulted zone, limitation of DC fault current, etc.)
- ✓ Protection & Control systems for a multi-terminal grid, with guaranteed interoperability of different systems from different manufacturers
- ✓ Standardization & tests

8 The energy transition entails the adoption of new technologies and materials for green energy conversion and use

Need to ensure energy supply relying on green technologies

Strategic

Critical



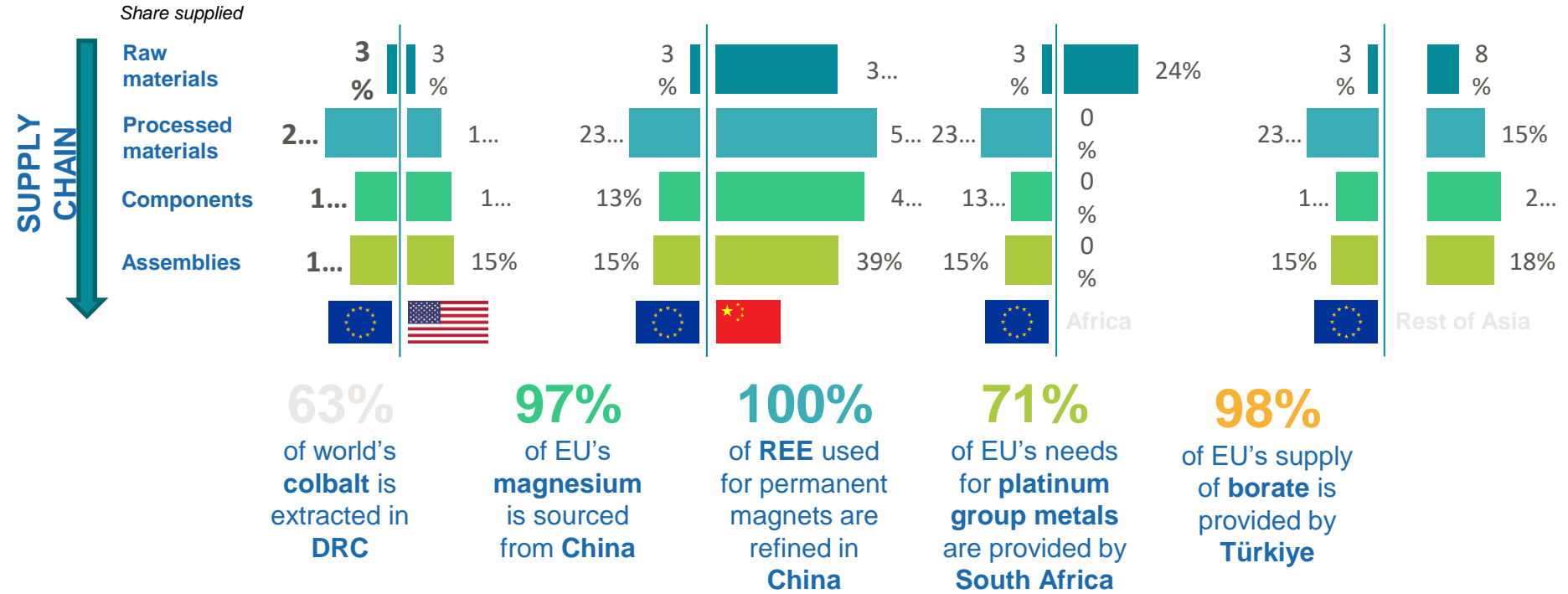
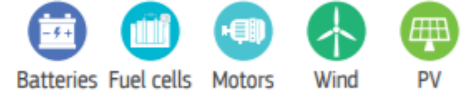
Source: JRC



The energy transition implies a geopolitical shift for energy technologies

Is Europe already vulnerable for the supply chain of green technologies?

Key suppliers for strategic energy technologies – A comparison with EU



Current challenges to move on the energy transition while ensuring energy supply

Reverse the current situation of heavy dependence on import of materials and technological components...

... setting realistic targets and related road maps

- ✓ At least **10%** of the EU's annual consumption for **extraction**,
- ✓ At least **40%** of the EU's annual consumption for **processing**,
- ✓ At least **15%** of the EU's annual consumption for **recycling**,
- ✓ **Not more than 65%** of the Union's annual consumption of each strategic raw material at any relevant stage of processing from a **single third country**

Is the CRM act feasible?



Priority measures for Europe

Recycling

New greener technologies

Sustainable technologies

- ✓ Sustainability indicators for each component of green technologies including conventional equipment
 - ↳ carbon footprint considering the whole supply chain



Timber poles
vs
steel tubular poles





Slido Poll 3

Which of the presented concepts has the biggest potential for resilience in the supply chain?

Replacing critical material (Vanilla Flow)



Optimizing use of existing material (Heat pads for the wall)



Reusing existing infrastructure (Galleries to Calories)



Connected domains (Heatstore for electricity)



Systems of systems (Systematics for systems)



Rising to the challenge: Cooperating in Europe and beyond

Panel discussion

4



Rosalinde van der Vlies

Director for Clean Planet,
European Commission



Tae-Yoon Kim

International Energy Agency



Prof. Dr. Paula Kivimaa

Finnish Environment Institute Skye



Philippe Jacques

Energy Materials Industrial
Research Initiative



Jochen Kreusel

Hitachi Energy, T&D Energy



Luigi Crema

Hydrogen Europe Research



Michael Hübner

Coordinator of CETPartnership

**sustainable
materials**

**technological
sovereignty**

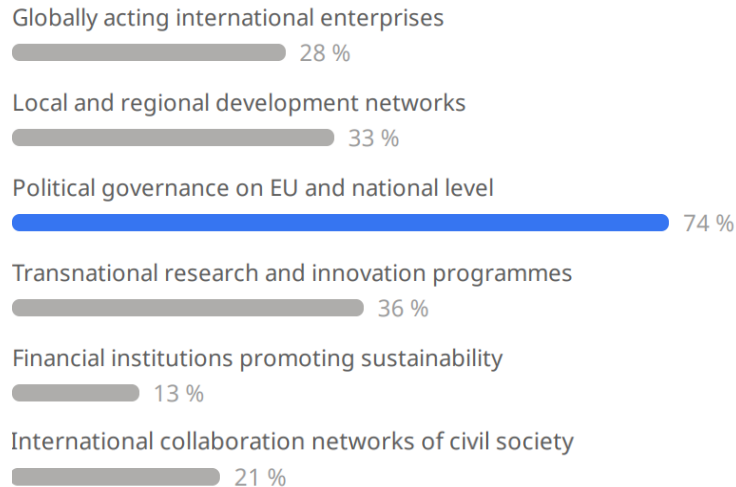
**efficiency &
circularity**

**systemic
approaches**



Slido Poll 4

Who will be important to bring more resilience to the supply chain?



Wrap-up and prospects

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What to expect this afternoon?

End of Policy Conference

13:00 Closing and lunch break

Get ready for the next session!

14:00 Collaborative harvesting: the CETPartnership Knowledge Community & Impact Network

- Presentation of purpose and methods of the Knowledge Community and Impact Network
- Kicking-off the Knowledge Community and Impact network activities in a collaborative way

What to expect tomorrow?

Morning

10:00 RDI Projects in the center

Afternoon

14:00 Joint Call 2023 Q&A session

15:30 Opportunities for matchmaking for the Joint Call 2023

Closing and lunch break

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