

Energy Security and Energy Transition

Alicia Mignone

Senior Energy Expert and ex-Chair of the IEA Committee on
Energy Research and Technology

The 7th AIEE Energy Symposium on Energy Security
14-16 December, 2022

Content

- Notes on Energy Security
- The new Energy Security paradigm
- Does the Energy transformation enhance Energy Security?
- 10 IEA Guidelines for Secure Energy Transitions
- Flexibility – a new watchword for Electricity Security
- Clean Energy Supply Chains
- Final considerations

Notes on Energy Security

Historically, energy security has focused on two goals: national control of supply and surge capacity to cope with disruptions.

Since the Second World War, the great concentration of cheap oil resources in the Middle East heightened the perception of vulnerability for importers. The Arab oil embargo in 1973 caused serious economic damage. This led to the creation of the International Energy Agency in November 1974 with a broad mandate on energy security and energy policy cooperation. This included setting up a collective emergency system to respond effectively to potential disruptions in oil supply.

The IEA's mechanism ensures a stabilizing influence on markets and the global economy. It was activated five times since the Agency's creation. The first was in January 1991, during the First Gulf War. The second was in 2005, after the hurricanes Katrina and Rita damaged oil infrastructure in the Gulf of Mexico. The third was in 2011, during the Libyan crisis. The fourth and the fifth were in 2022, after Russia invaded Ukraine.

While energy security remains a core mission, the IEA has evolved over the years, adapting to the transformation of the global energy system.

Energy security is not just about having uninterrupted access to energy, but also about securing energy supplies at an affordable price

The new Energy Security paradigm

Today, the global energy system is amid a major transition to clean energy. The transition will be based on three main pillars: renewable energy supply, electrification of end use and efficient use of energy.

New vulnerabilities may also emerge.

The increasing role of electricity in final consumption puts a premium on investing in system **flexibility**.

Diverse and resilient clean energy supply chains, including those for **critical minerals and metals**, are essential to avoid costly or delayed energy transitions.

Since the climate is already changing, both existing and new infrastructure will need to factor in climate resilience

Does the Energy Transformation Enhance Energy Security?

When the IEA was born, discussions about Energy Security were largely focused on the supply of fossil fuels. And almost 50 years on, fossil fuels are again at the heart of the current global energy crisis: oil, gas and coal still account for 80% of the global energy mix.

Energy- importing countries would be trading reliance on imported fossil fuels for reliance on the imported equipment and/or minerals needed for renewables.

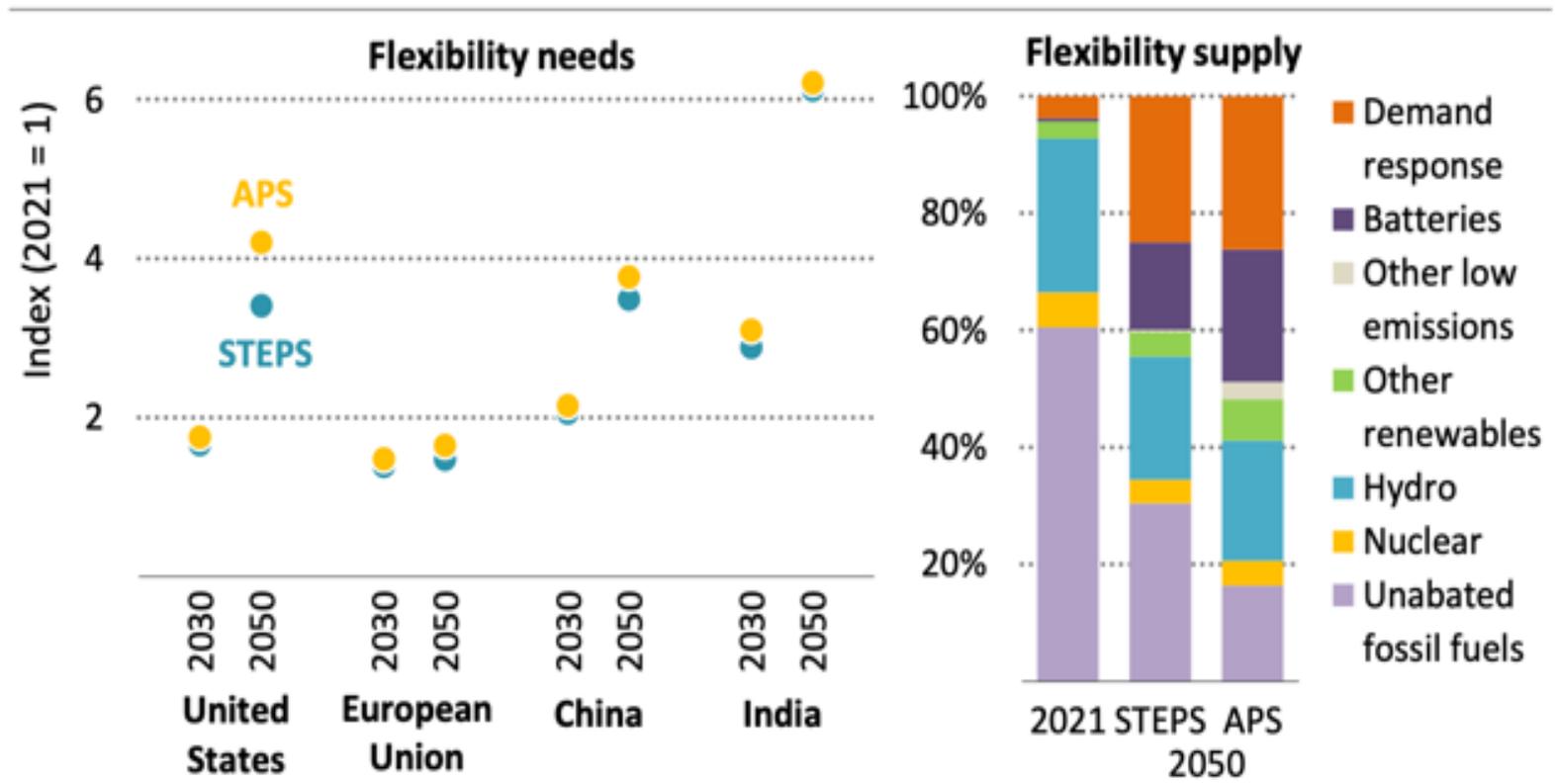
The race to net zero will focus attention on **securing clean energy technology supply chains** and disrupting supply chains will bring new challenges to the energy system.

Critical Raw Materials are at the center of the decarbonization efforts and the electrification of the energy system as we move from a **fossil fuel-intensive to a material-intensive energy system**.

IEA 10 Guidelines for Secure Energy transitions

1. Scaling up clean energy technologies while scaling back of fossil fuels
2. Prioritise energy efficiency
3. Give poor communities a lift into the new energy economy
4. Collaborate to bring down the cost of capital
5. Manage the retirement and reuse of existing infrastructure
6. Tackle the specific risks facing producer economies
- 7. Invest in flexibility**
- 8. Ensure diverse and resilient clean energy supply chains**
9. Foster the climate resilience of energy infrastructure
10. Provide strategic direction and address market failures

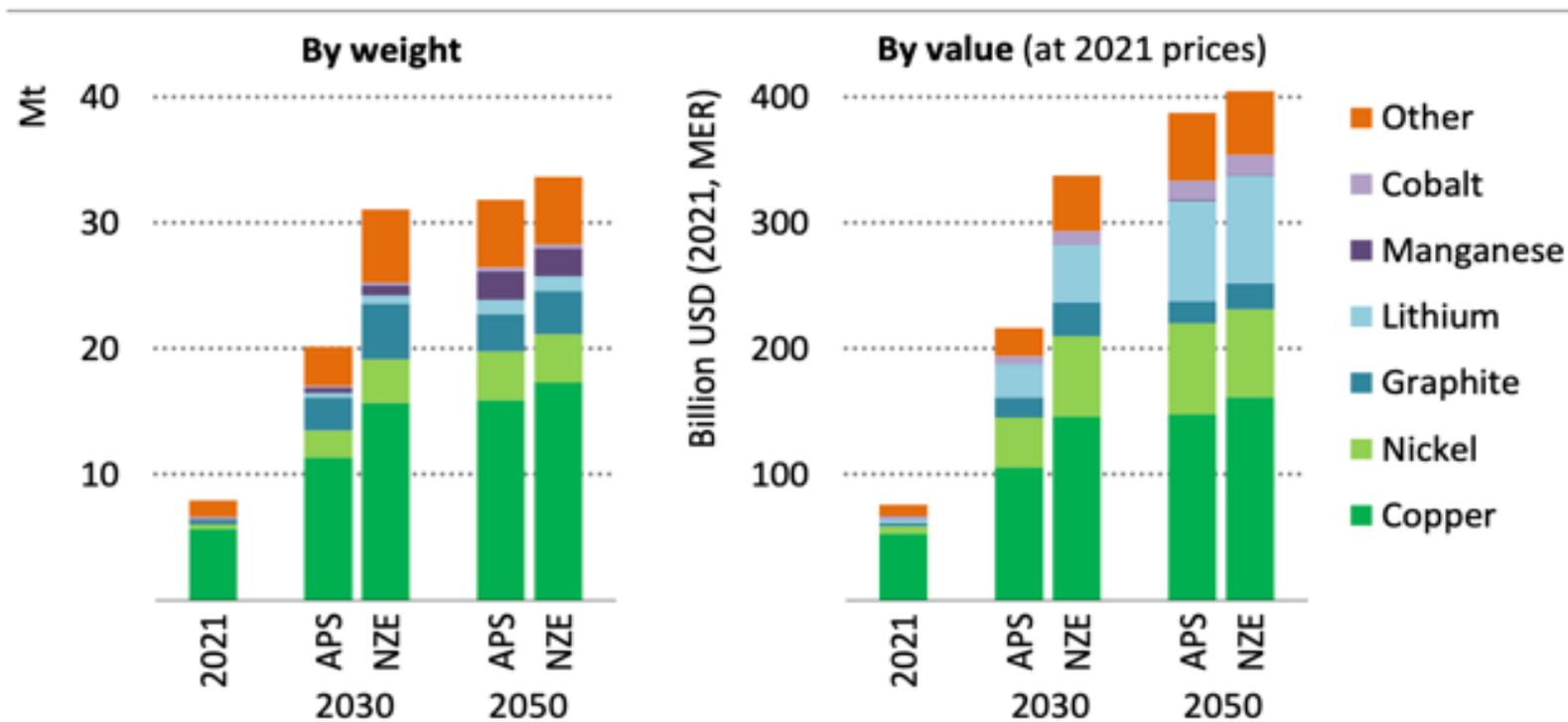
Invest in flexibility – a new watchword for Electricity Security



IEA. CC BY 4.0.

Flexibility needs rise in all scenarios and vary substantially by country; a broad range of technologies and approaches is required to ensure electricity security

Ensure diverse and resilient Clean Energy Supply Chains

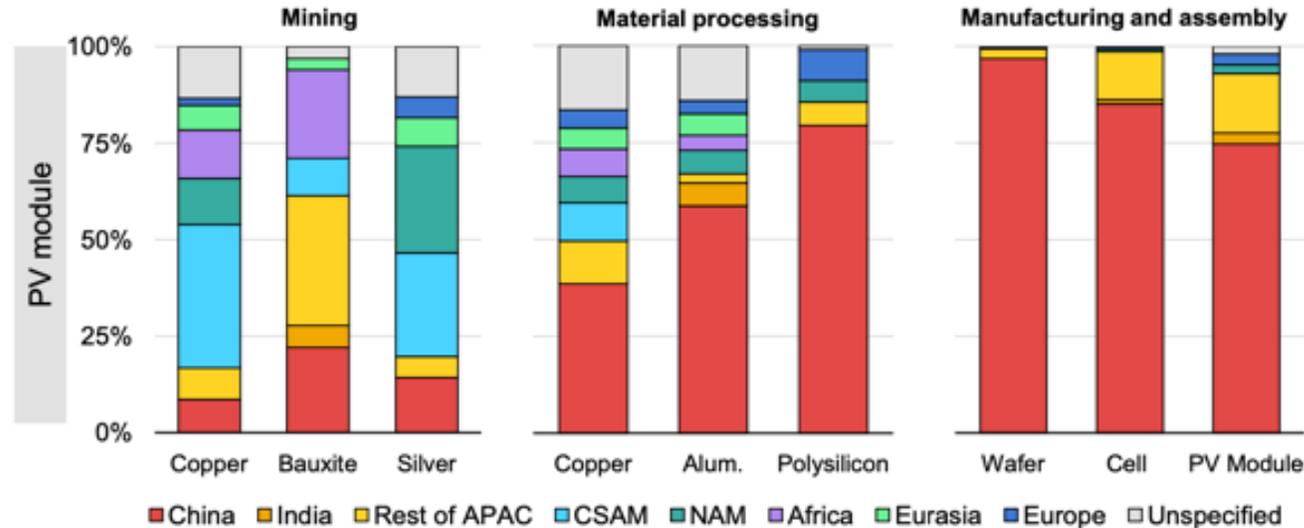
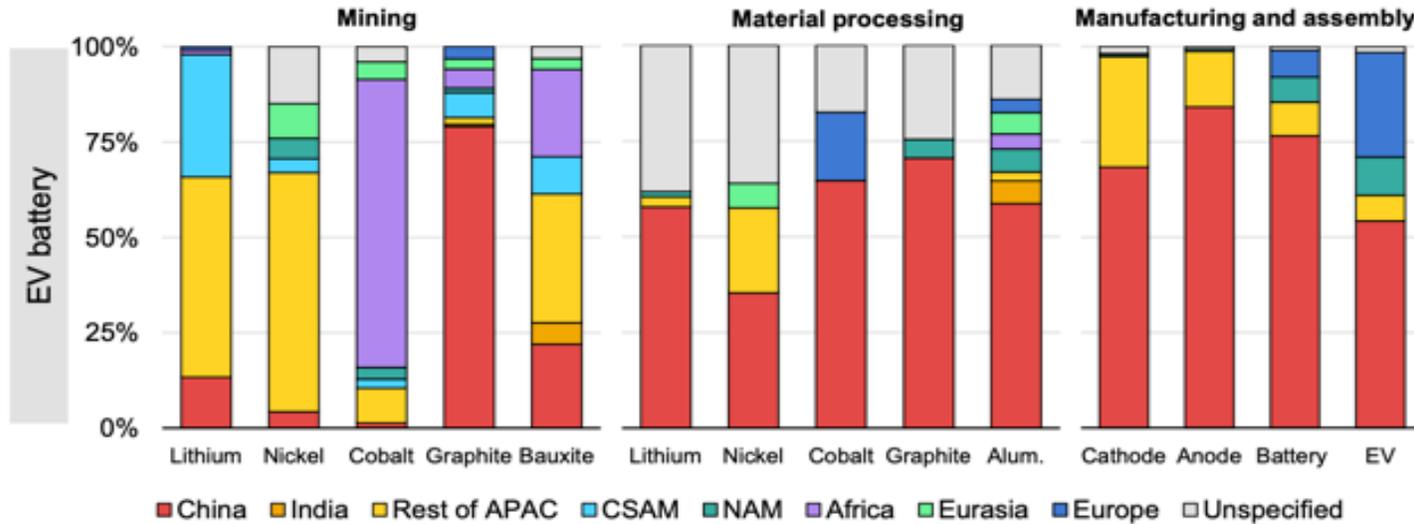


IEA. CC BY 4.0.

Critical mineral demand for clean energy technologies quadruples already by 2050 in the NZE Scenario, with particularly high growth for EV-related minerals

Notes: Mt= million tonnes. 2021 prices are used to calculate the monetary value of critical minerals.

Clean energy supply chains are highly concentrated today



Source: IEA (2022) Global supply chains of EV batteries; IEA (2022) Special Report on Solar PV Global supply chains

Final considerations

- The concept of Energy Security has evolved.
- A new Energy Security Paradigm is needed to maintain reliability and affordability while moving from a **fossil fuel-intensive to a material-intensive energy-system**
- New vulnerabilities emerge from high and volatile critical minerals prices or highly concentrated supply chains
- Secure Energy Transitions through a pragmatic agenda that includes **investing in flexibility and ensuring diverse and resilient clean energy supply chains**