Greening Energy Mix of Aalto by 2030

Team Captain Aalto - Greening Aalto, One ACRE at a time!

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Our Task

1. How can we green the energy usage of Aalto campus by 2030?

2. What are the critical minerals needed for this green energy transition?

3. What are the associated environmental impacts of the mineral needed?

4. How can ACRE use the findings in sustainability initiatives?

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Methodology

1. Analyzed ACRE's power demand for 2030
2. Identified critical minerals
3. Made two power scenarios to study mineral use
4. Compared environmental impacts of mineral use

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Power demand in Aalto Campus in 2021

35,000 MWh

Purchased power
99 %
(GOC)

Produced solar
1 %

GOC wind: Guarantee of Origin certified wind power

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Projected power demand in Aalto Campus in 2030

32,200 MWh

Purchased power
98 %
(PPA)

Produced solar
2 %

PPA: Power purchase agreement

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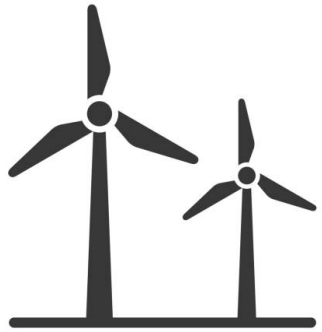
Link between Green Power and Minerals

98 %



Aluminum (Al)

Copper (Cu)

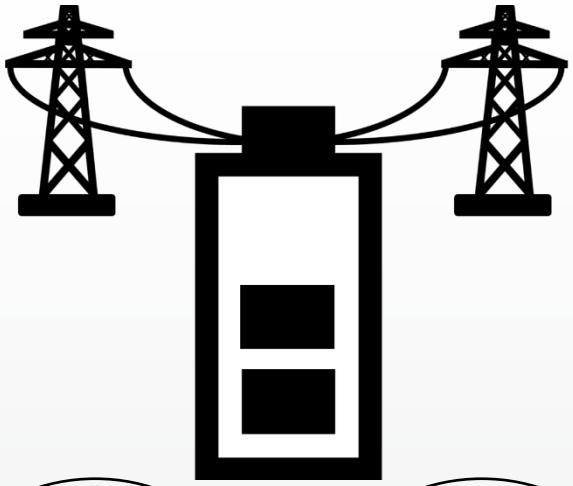
Zinc (Zn)

Rare earths (REE)

2 %

Aluminum (Al)

Copper (Cu)



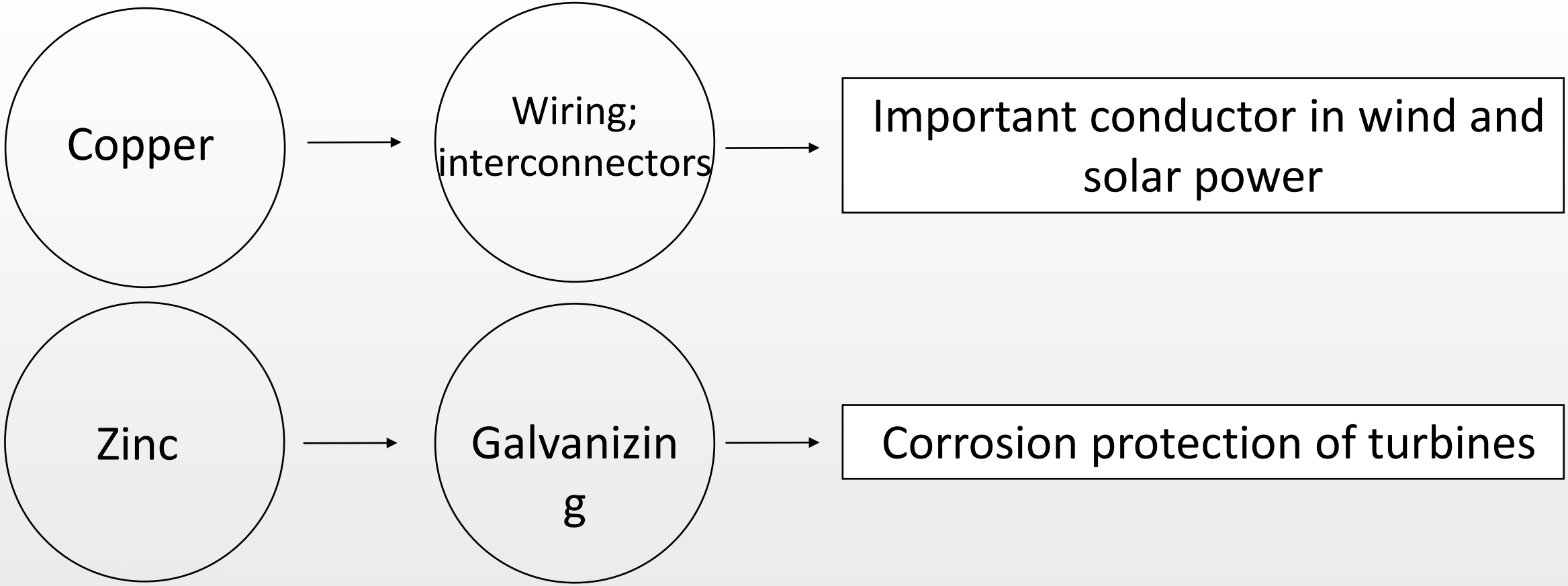
Cobalt (Co)

Nickle (Ni)

Lithium (Li)

Silicon (Si)

Why are these minerals critical?



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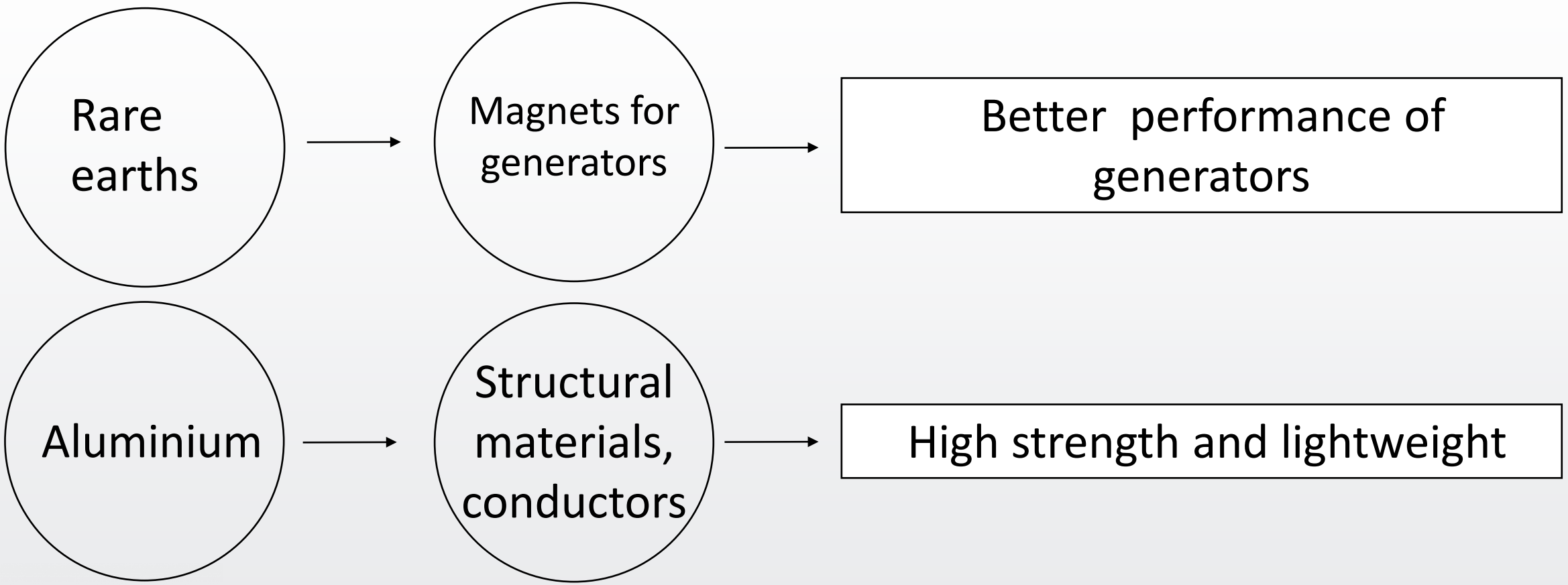
Why are these minerals critical?



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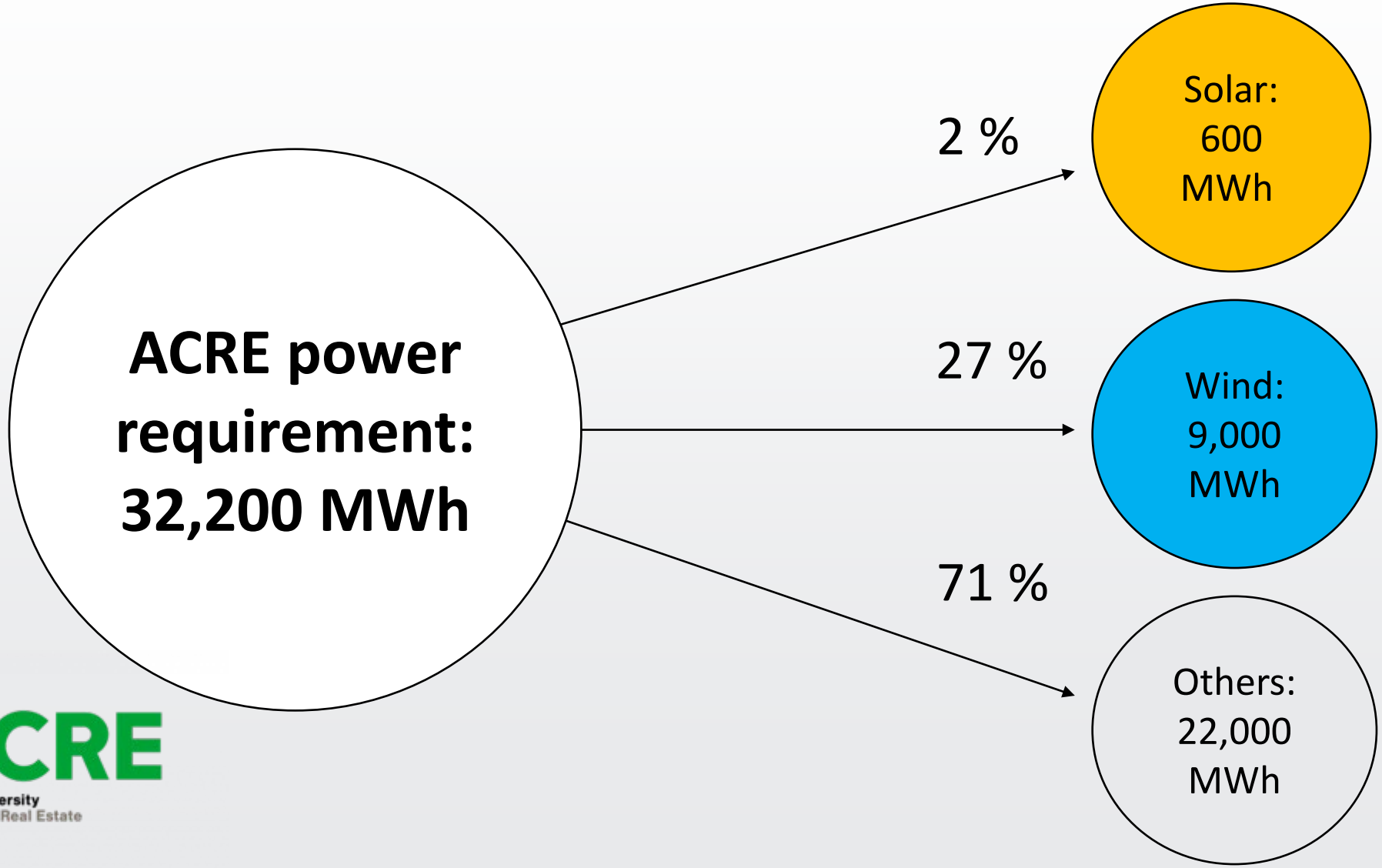
Power Scenario 1: Based on Electricity production mix of Finland in 2030



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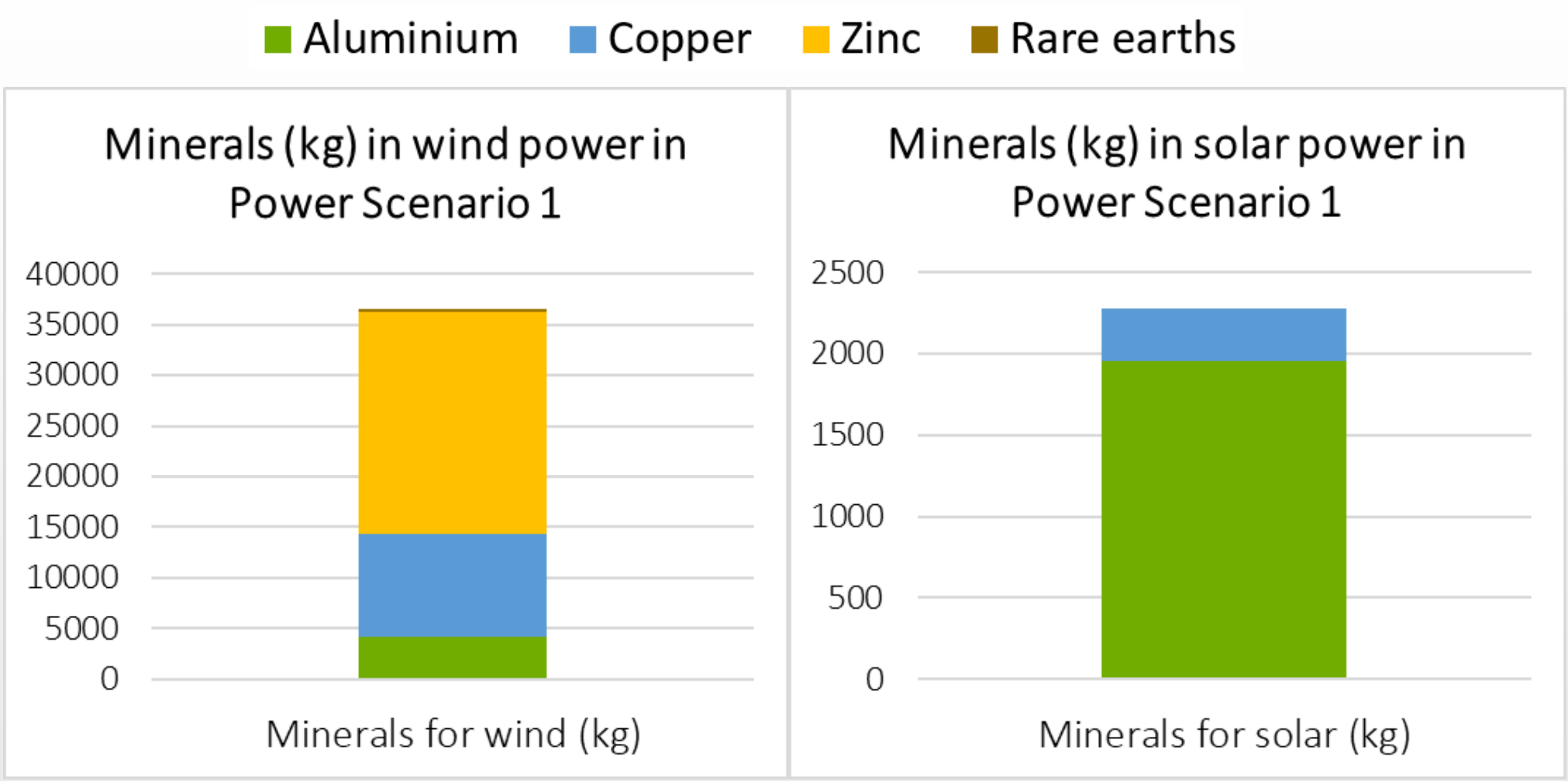
Power Scenario 1: Requirement of Critical Minerals



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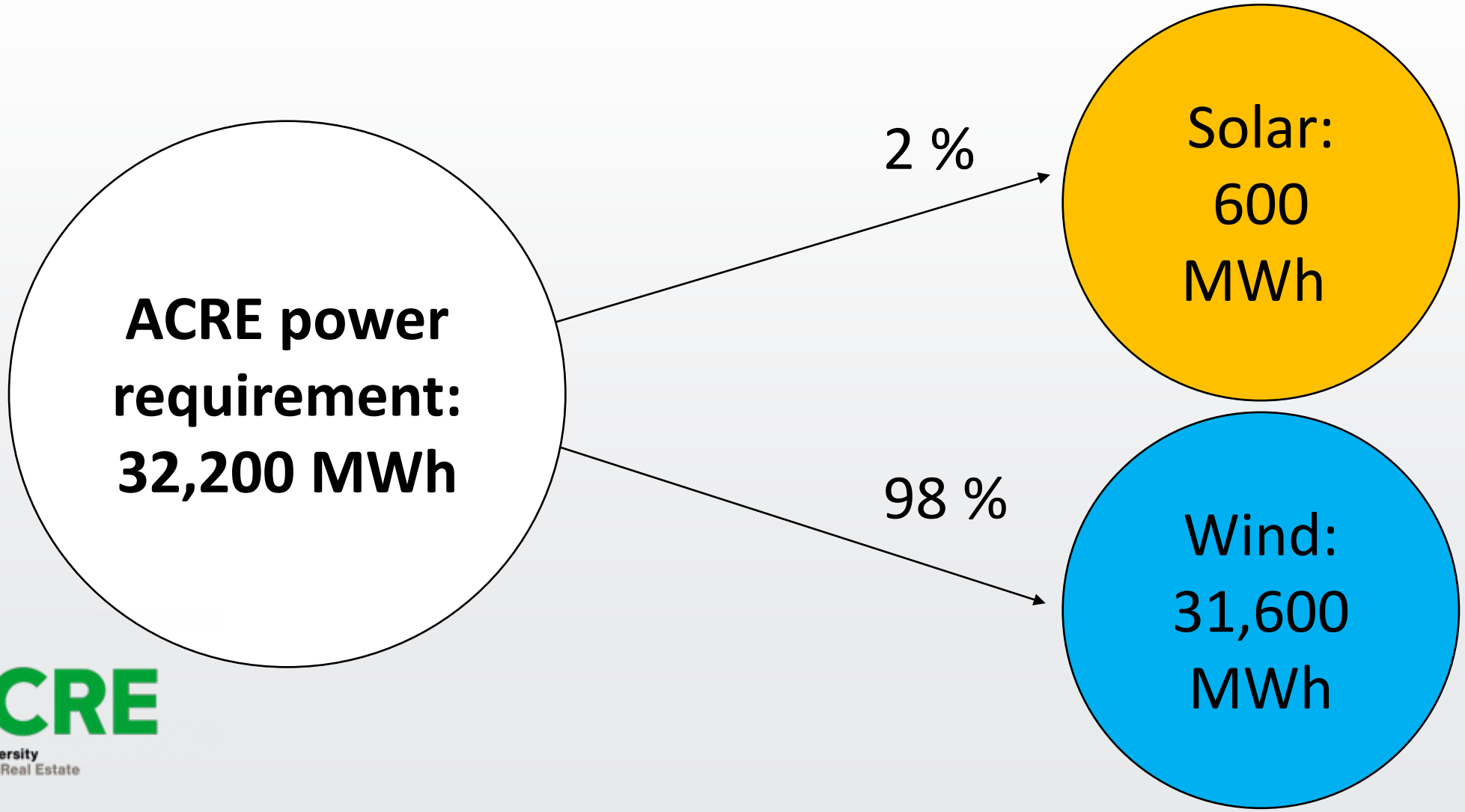
Power Scenario 2: Based on ACRE's Outlook – Only solar and wind power



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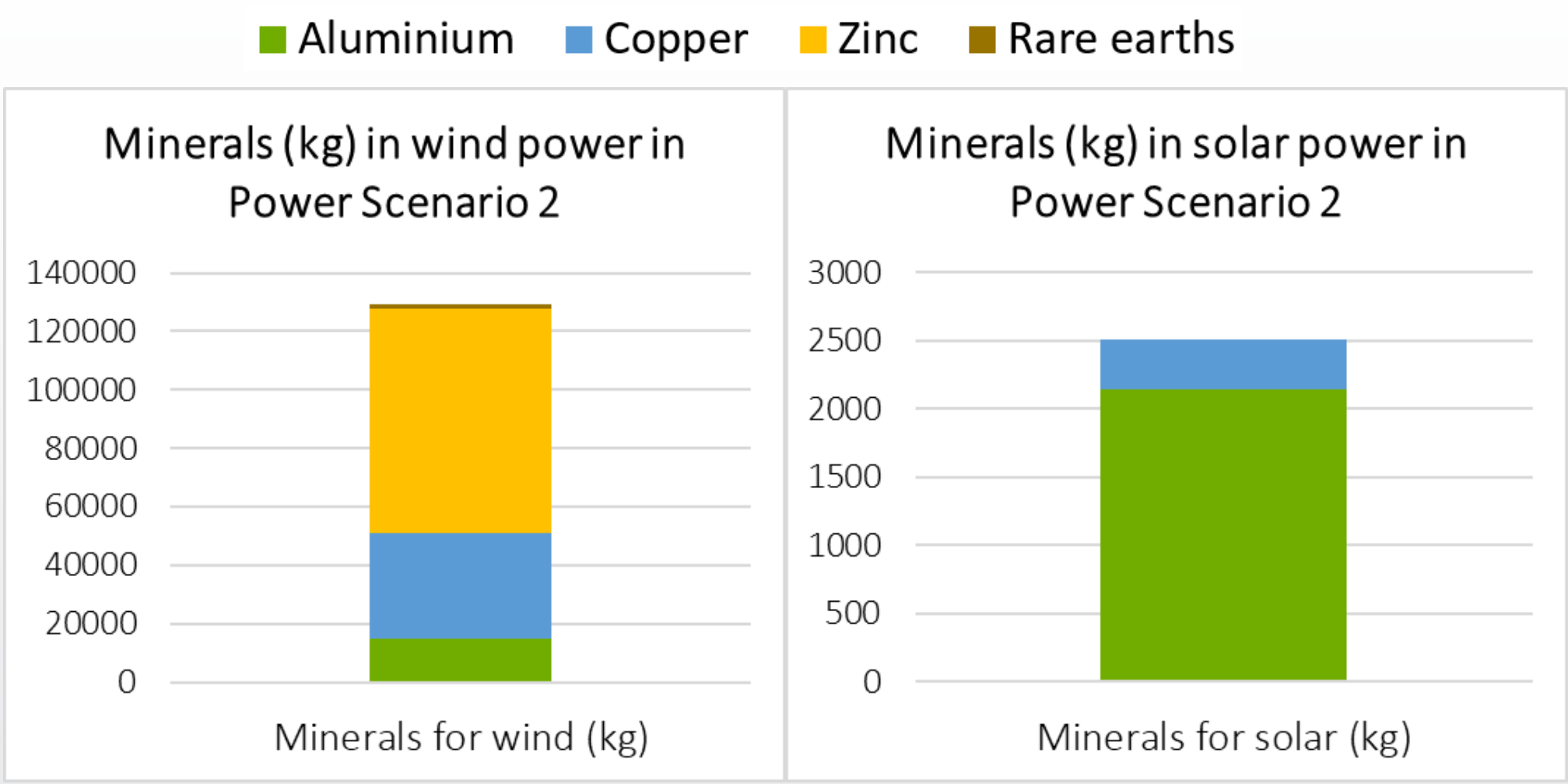
Power Scenario 2: Requirement of Critical Minerals



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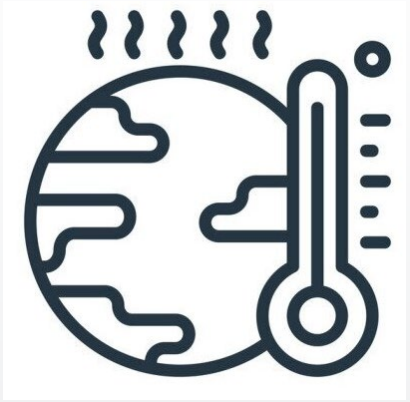
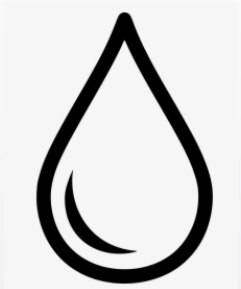
Environmental impact categories

Global warming potential



Water scarcity



Eutrophication

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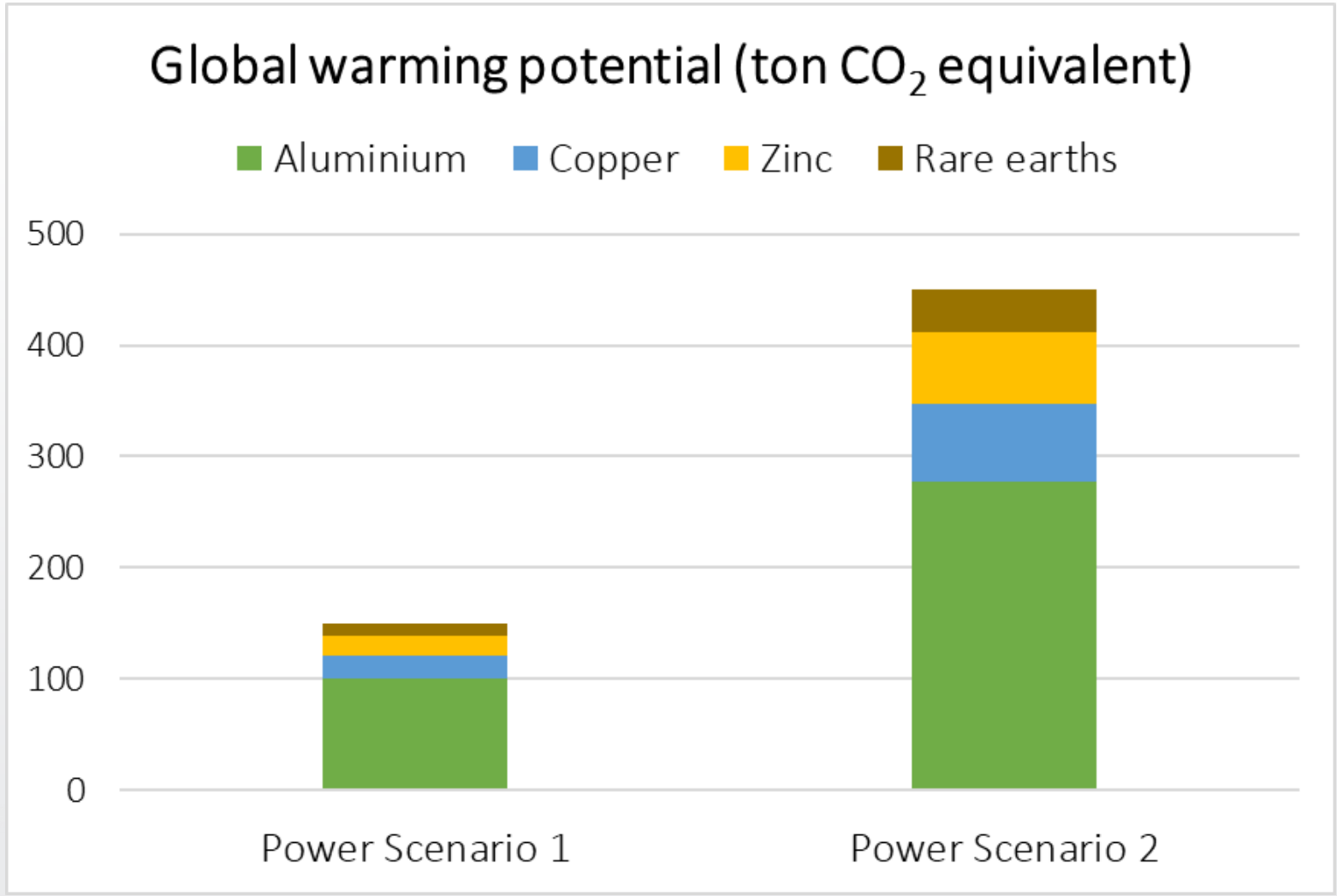

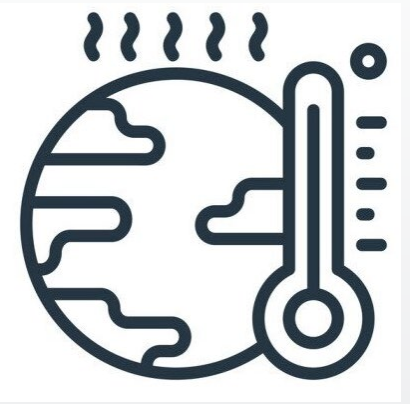

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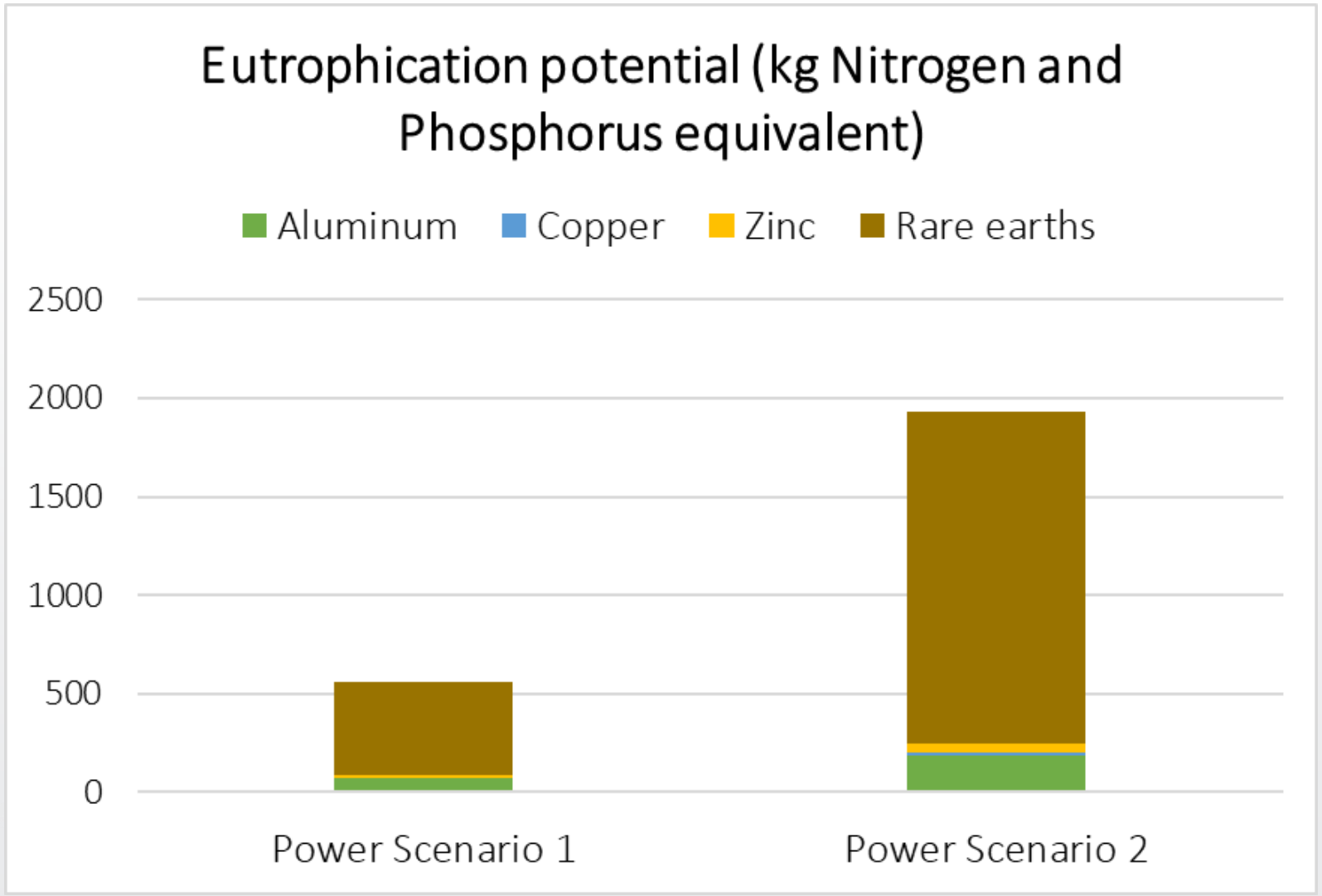

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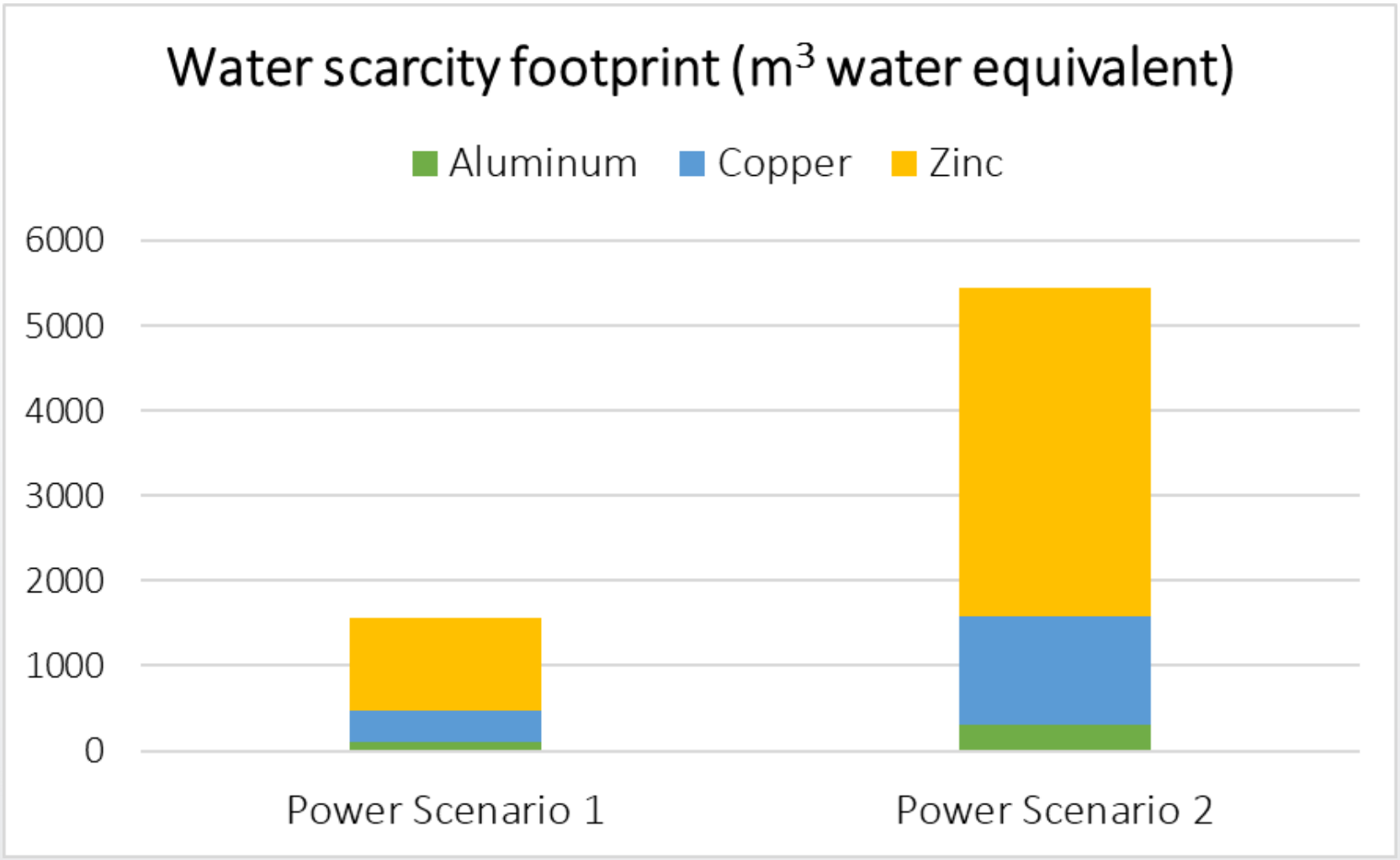

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Putting the pieces together

What have we observed?

Power Scenario 2 has greater intensity of these critical minerals

What does this mean in a larger context?

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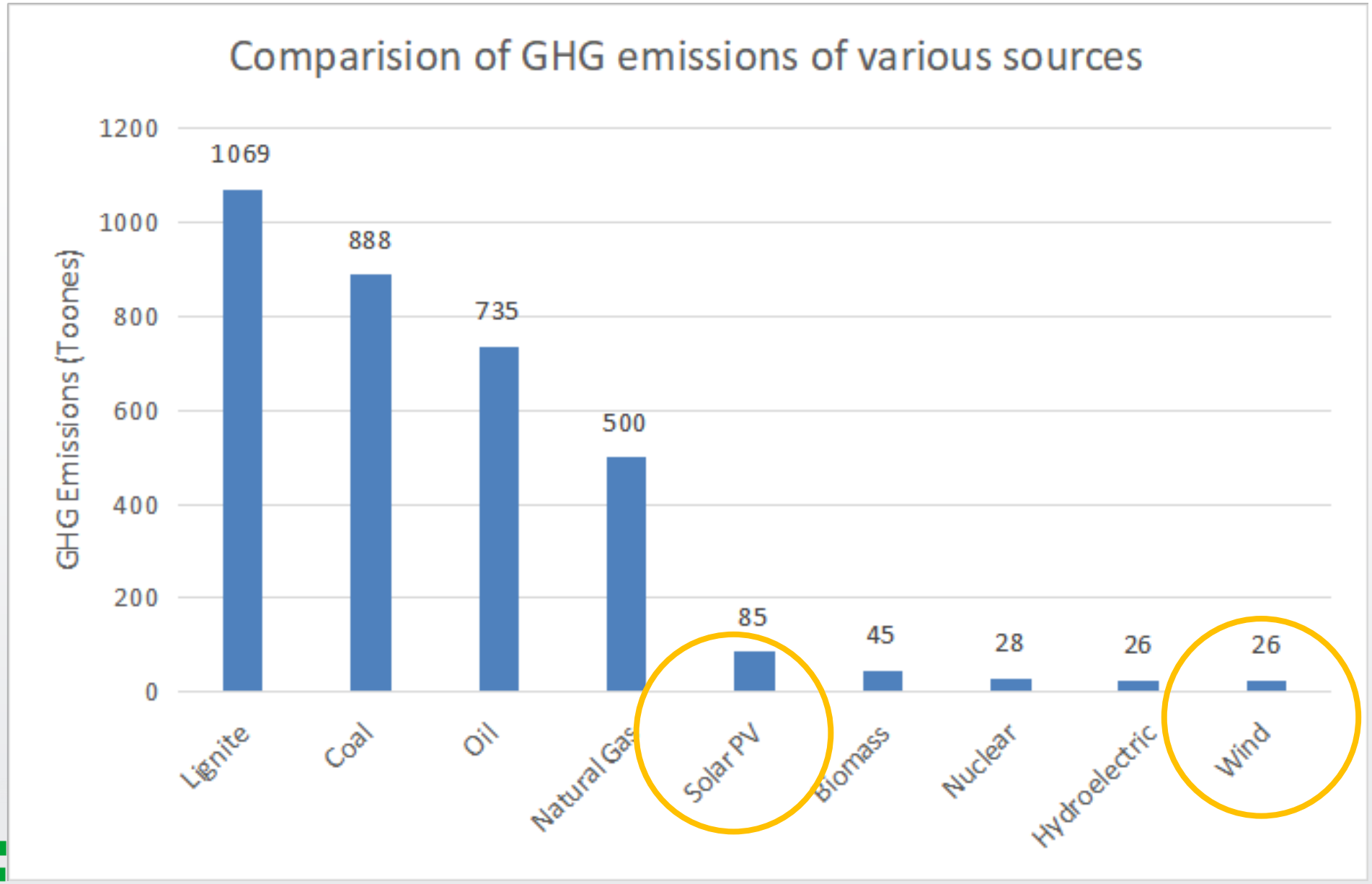

Credit: Dr. John Millar, Aalto University

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Key learnings and recommendations

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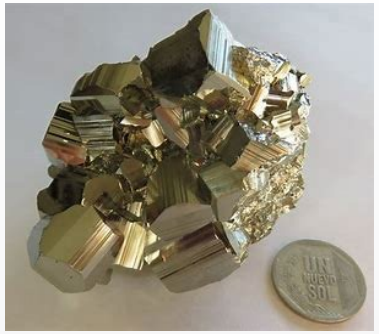
Key learnings



- Green energy production needs critical materials
- Processing of critical minerals have environmental impacts

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Key learnings

- Green energy is essential for a zero-carbon future

- Green energy is imperative for energy security & self-sufficiency of Finland

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Recommendation for ACRE – Sustainability reporting

Mineral demand shall be included in future sustainability reporting by ACRE

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Recommendation for ACRE – PPA with wind power producer(s)

PPA - Power Purchase Agreement

PPA with wind producers

ACRE to perform a cost-benefit analysis of PPAs

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Recommendation for ACRE – On further Research

On mineral intensity (critical & others) of all energy technologies

Include minerals for power storage in future research on mineral intensity of green energy

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Thank you!

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