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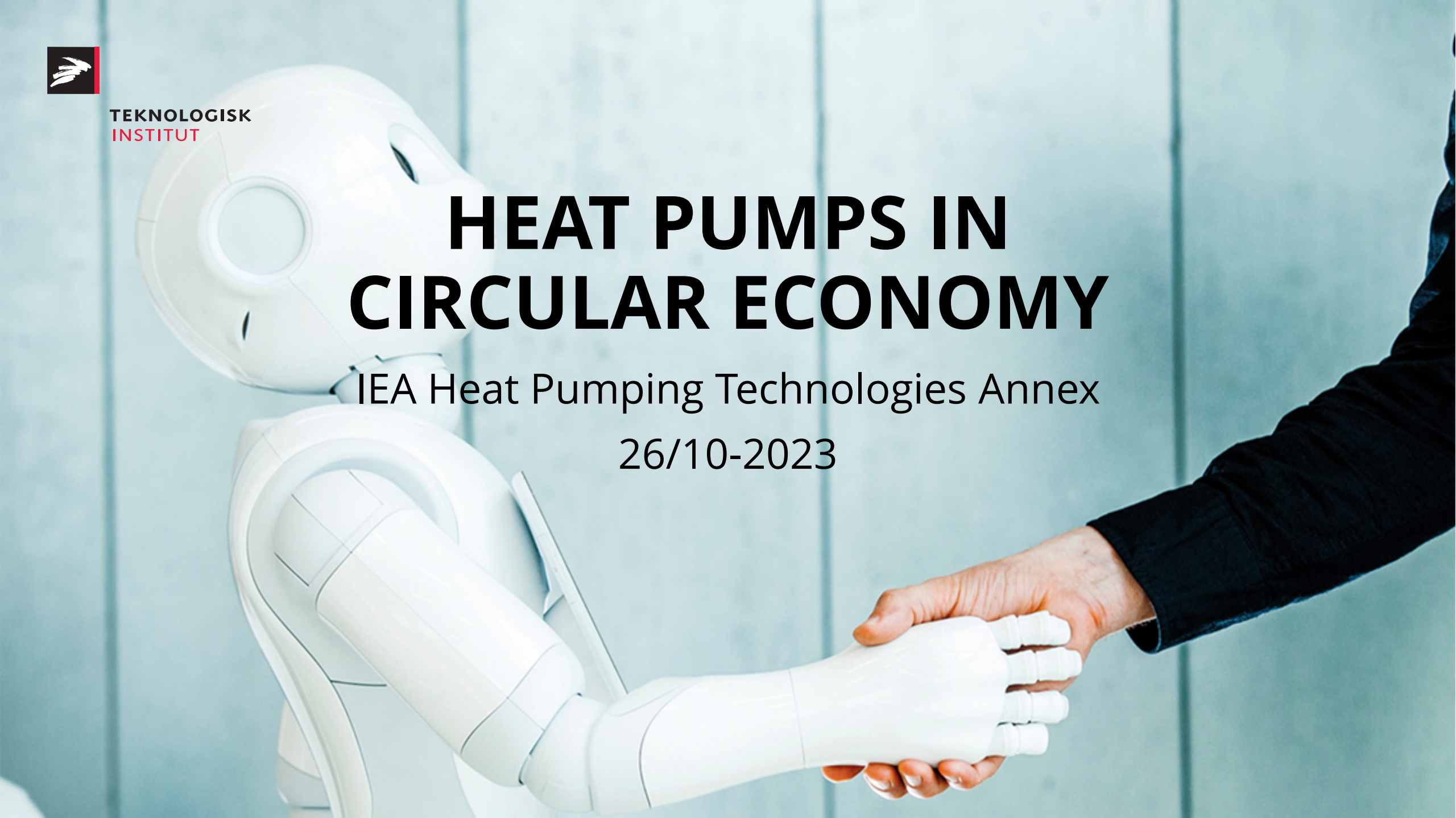
HEAT PUMPS IN CIRCULAR ECONOMY

IEA Heat Pumping Technologies Annex

26/10-2023



AGENDA

- Why is the annex important
- Scope and objective of the annex
- What current trends does the annex address?
- How is the annex organized
- Final remarks

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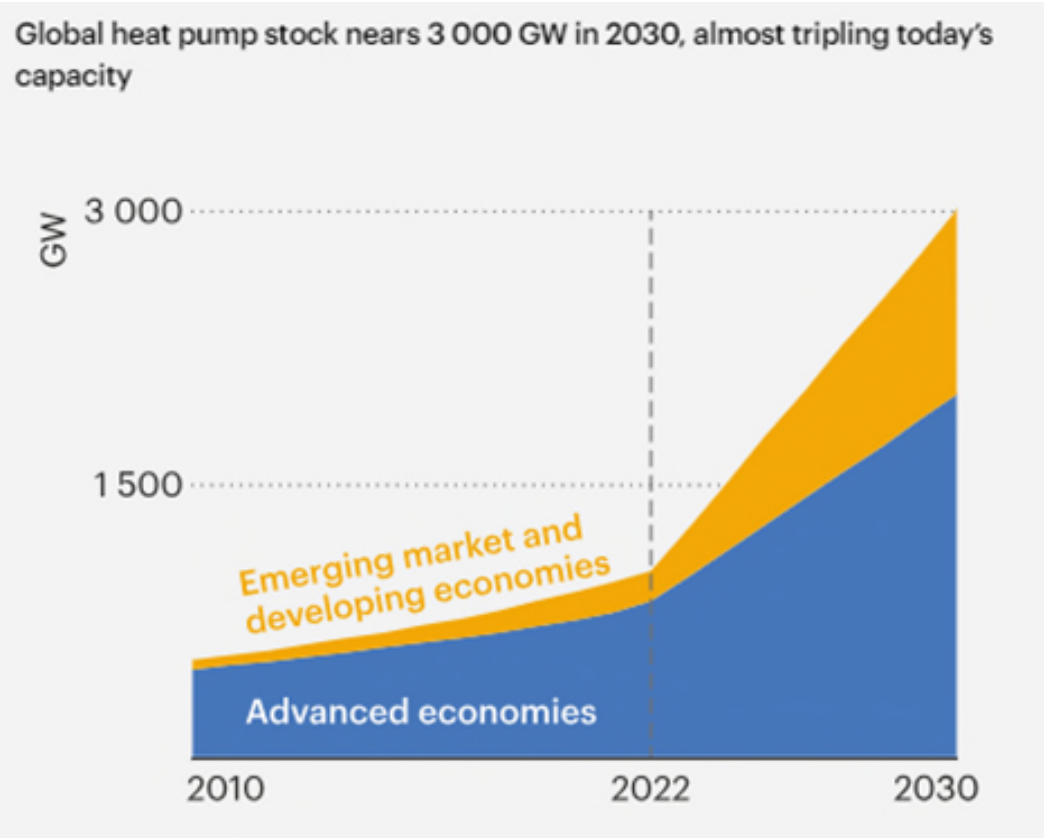
WHY IS THE ANNEX IMPORTANT?

- The Net Zero Roadmap estimates that the global heat pump stock in capacity will triple from 1,000 GW to 3,000 GW.
- The increased deployment of heat pumps will also increase the material footprint and could influence supply chains of materials
- Several large markets for heat pumps have strategies to switch to a circular economy with focus on repairability, reused materials and components, lifetime extension and new business models.
- Increasing focus on limiting the lifecycle carbon footprint of buildings.



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SCOPE AND OBJECTIVES

Scope

- Focus on air-to-air, air-to-water and ground source heat pumps
- Heating capacity (P_design) below 30 kW and for space heating applications.

Objectives

- To provide analysis and share experiences with material efficiency and other circular economy aspects in domestic heat pumps.
- Provide an overview of current national initiatives and improve the understanding of the circular economy framework.

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HOW DOES THE ANNEX MATCH CURRENT TRENDS?

Product regulation

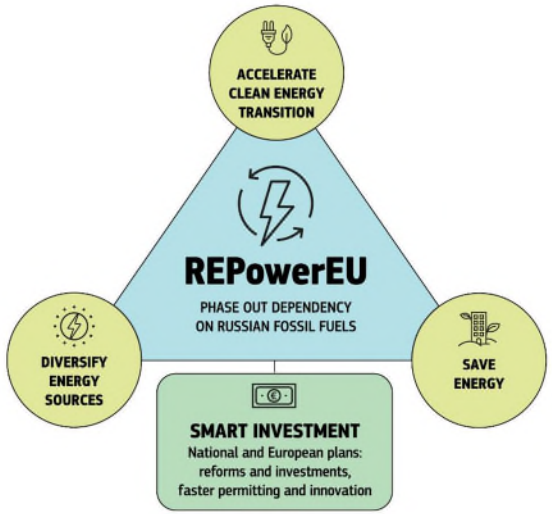
- Material efficiency requirements ecodesign for heat pumps
- Development of a repairability score
- A digital product passport for heat pumps

The building sector

- Environmental product declaration (EPD's) for heat pumps to be used in buildings.

Product design

- Carbon footprint in LCA analysis are becoming a competitive parameter.
- Use of light and/or reused materials/components
- Focus critical raw materials
- Upgradeability in products



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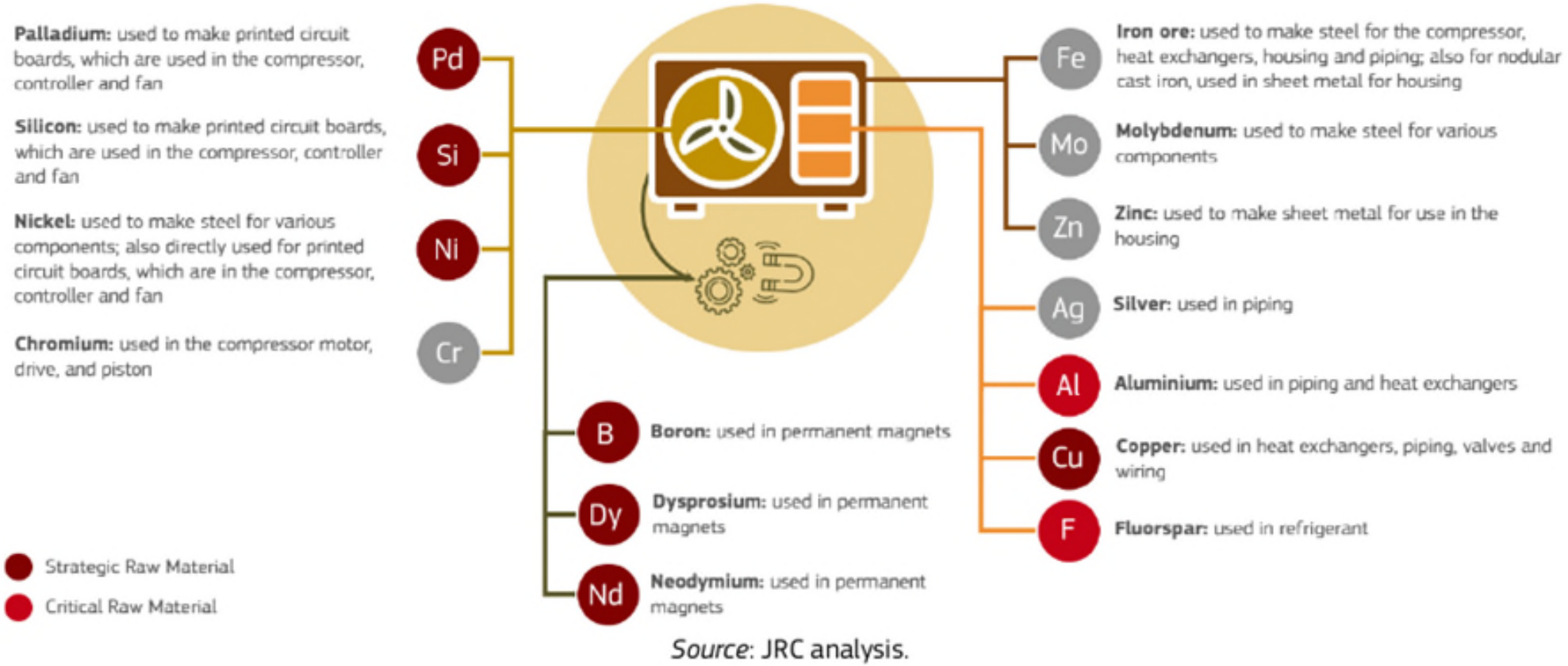
WHAT ARE THE IMPORTANT MATERIALS FOR HEAT PUMPS?

Figure 47. Selection of raw materials used in heat pumps and their function



Source: JRC analysis.

Source: Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU.

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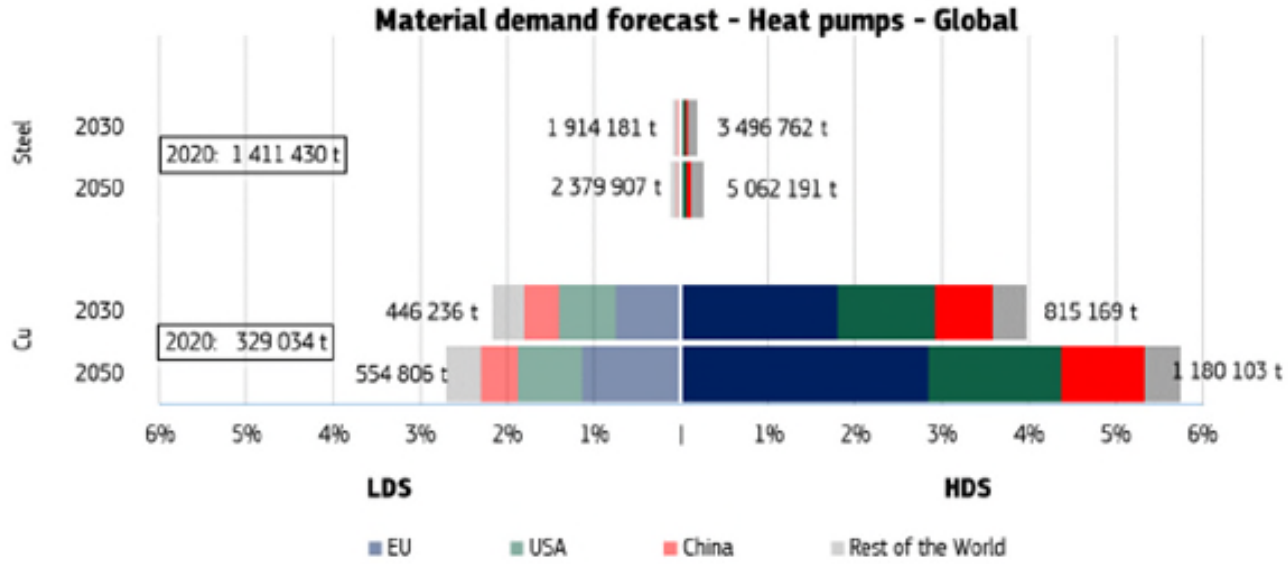
WHY IS THE MATERIAL FOOTPRINT IMPORTANT?

Figure 51. Material demand forecast for heat pumps: global (top) and focus on the EU (bottom)



Source: Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU.

- ***"Residential hydronic heat pumps typically contain more than twice as much aluminium and 15 times more copper and brass*** *than their condensing gas boiler equivalents"* (source: The Future of Heat Pumps IEA report)
- *"Heat pumps* ***are vulnerable to volatility in metal prices and in the supply of semiconductors and permanent magnets … Recycling and substitution will become important strategies as the market scales up****, which it is doing very rapidly."* (source: Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU)

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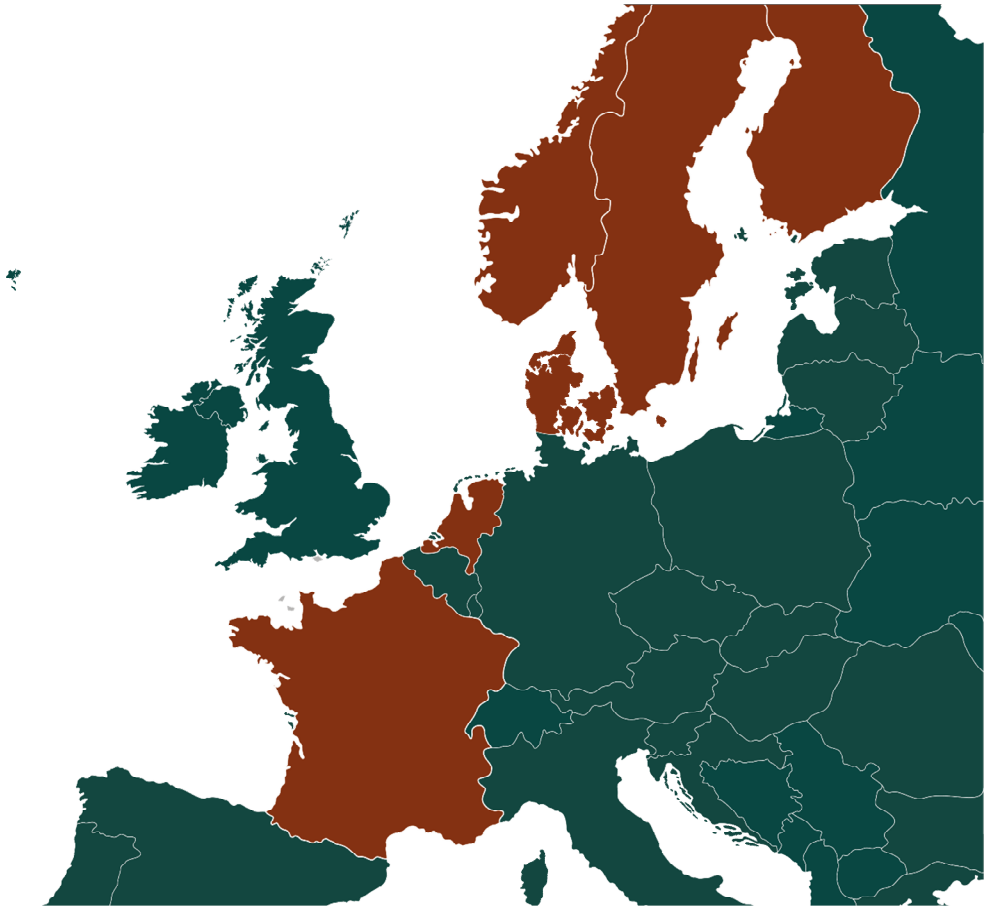
LIFECYCLE CARBON REQUIREMENTS FOR BUILDINGS - EUROPE AS A CASE

- 2012 - Netherlands: (LCA documentation requirements)
- 2018 - Netherlands: (LCA threshold value)
- 2021 - France: (LCA documentation requirements and threshold value)
- 2022 / Jan. - Sweden: (LCA documentation requirements)
- 2022 / End of the year - Norway: (LCA documentation requirements) (expected)
- 2023 / Jan - Denmark: (LCA documentation requirements and threshold value)
- Finland is in progress, official date pending



Red: European countries that have implemented or are in the process of implementing LCA requirements.

Source: Danish Authority of Social Services and Housing, primo 2023

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HOW IS THE ANNEX ORGANIZED?

- Provide an overview of the terminology of material efficiency and circular economy literature study of relevant subjects related to circular economy (Task 1).
- Define the current state-of-the-art for circular economy for domestic heat pumps (Task 2).
- Evaluate the potential for circular economy and potential obstacles for reusing and dismantling (Task 3).
- Develop best-practice tools to achieve an improved material efficiency in domestic heat pumps (Task 4).
- Disseminate the findings with various stakeholders (Task 5).

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FINAL REMARKS

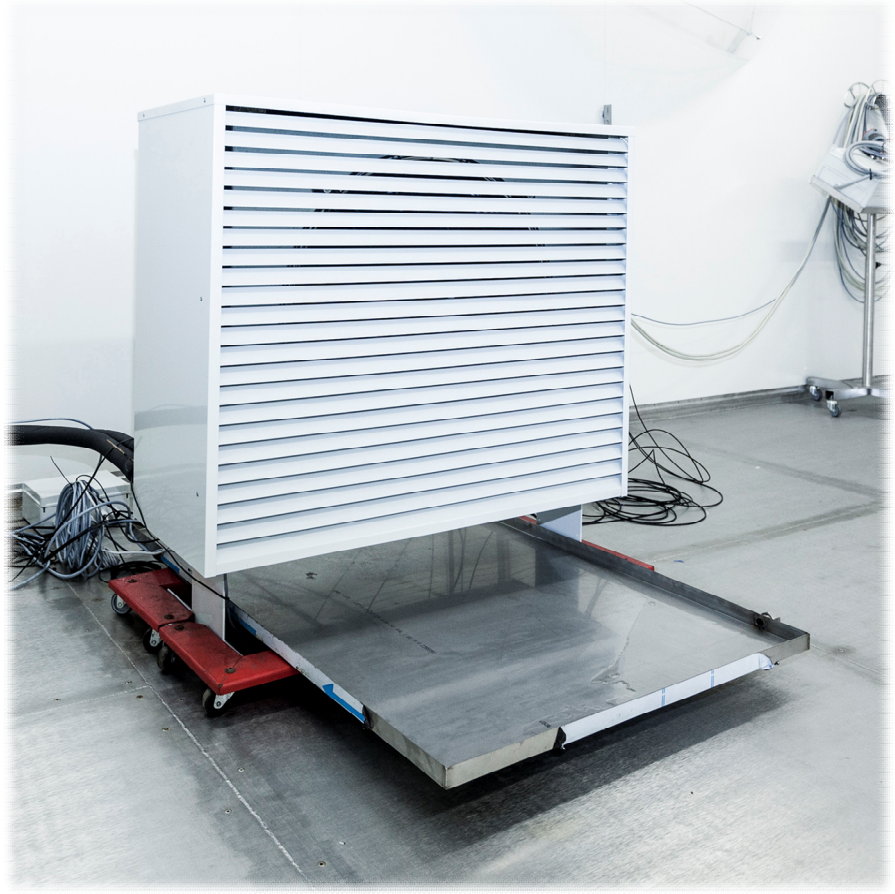
- The scope has been written open terms so that it can be adjusted to make it relevant for the participants.
- Participation is open for 18 months after the legal text is approved.

Current Participants

- Germany
- Denmark (operating agent)
- Several countries have showed interest:
  - Sweden
  - Switzerland
  - France
  - US
  - Austria

Timeline

- The annex is set to start in January 2024.



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Thank you for the attention

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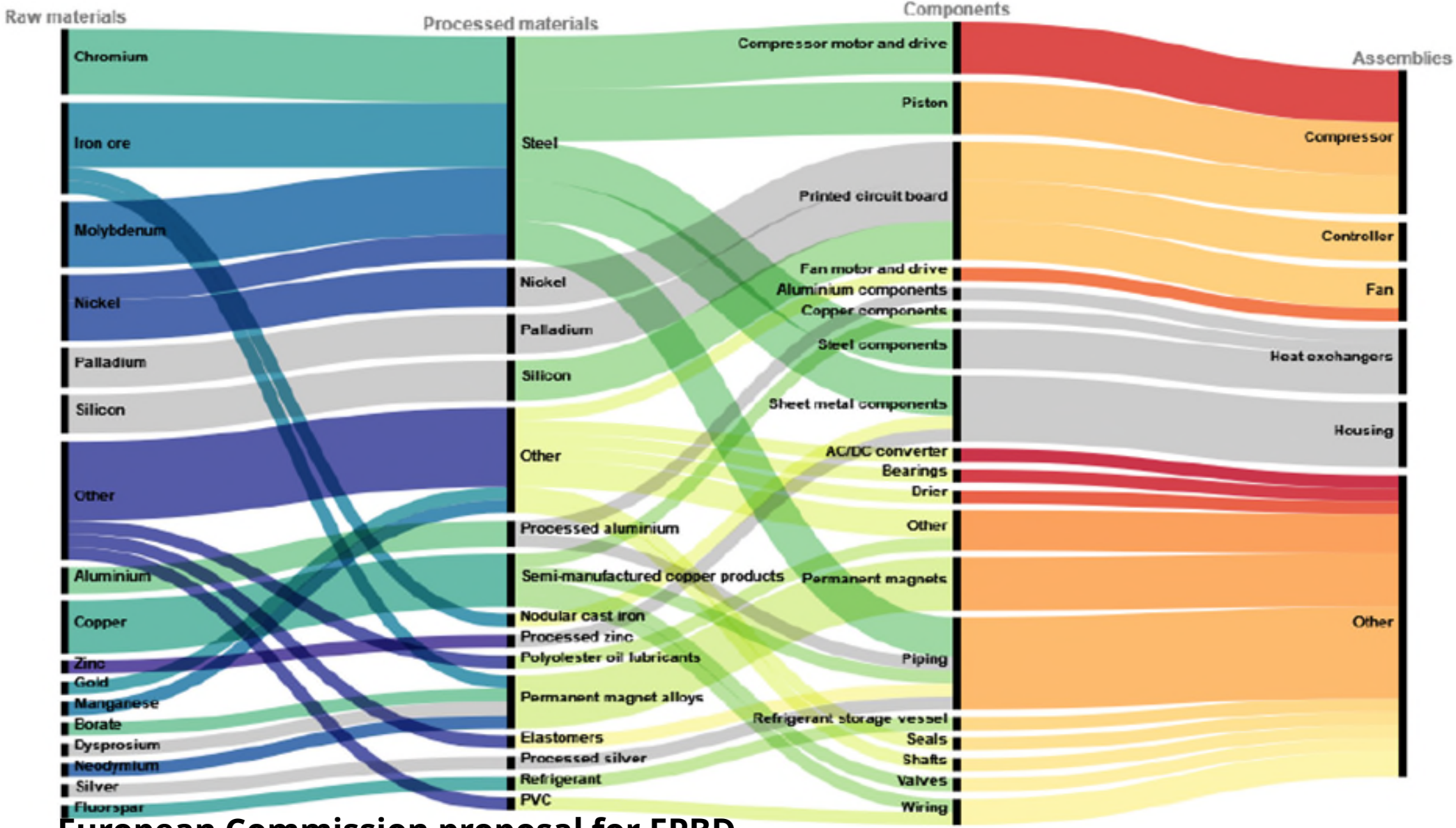

<u>European Commission proposal for EPBD</u>

*"The **EPBD will address carbon emissions over the full lifecycle of a building, through mandatory calculation and disclosure of this information** for new construction, to inform*

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