

Cu

Copper Alliance

The role of motor systems in the energy transition

A white paper under development

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Energy Efficient Motor Driven Systems

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Former white paper published in 2004

Straightforward message:

savings potential
barriers
solutions

Substantial economic and environmental benefits

Substantial copper benefit

→ **Strong correlation between
public and copper interest**



The role of motors in the energy transition

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2018: low hanging fruit has been harvested

Remaining savings potential is scattered among many sub-domains.

Correlation with copper interest not as straightforward as before

Taking one step up:

Motors will play a key role in the energy transition: electrification, flexibility, energy efficiency

Correlation between **Cu interest** and the **entire energy transition**



A first draft paper has been written

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Main chapters

- Motors & electrification
- Increasing the energy efficiency of motor systems
- Motors & the flexibility challenge
- Sustainable material use – motors in the circular economy
- Annex – The estimated increase of motor systems



Key messages

- Better market surveillance
- Removal of exception (IE2) for motors with VSD
- MEPS for sealed units (e.g. compressors)
- Promotion of IE4 for certain motor categories (to be developed)
- Position motor system efficiency in EN 50001 Energy Management

Input gaps

- Sealed units: regulatory state of affairs? E.g. LOT 31, 24, ENTR 6?
- Position motor efficiency as potential outcome in Energy Management Standard: how?

Key messages: regulation

- Set ambitious renewable energy and emission targets for transport
- Set clear definitions for EV motor efficiency (depending on load and on system boundaries)
- Introduce a Design-for-Recycling label for EV drives (drawing attention to unsustainable character of PMs with rare earth metals, among other reasons)

Key messages: investments

- Invest in the roll-out of a network of fast (150 kW) EV chargers along European highways
- Resume investments in electric railway (electrification & development of high speed rail)
- Focus Research & Innovation support on technological development for BEVs and electric trucks (including development of rare-earth-free EV drives)

Key messages

- A more regular revision of Primary Energy Factor (PEF) to avoid hampering decarbonization investments (in particular heat pumps)
- Include provisions for promoting energy efficient heating and cooling in next phase of EU Energy Efficiency Directive
- For heat pump load variation: promote on/off regulation, dual speed induction motor (Dahlander winding), or a number of smaller compressors in parallel, compared to PMSM with a VSD (PM motors containing rare-earth metals)

Motors in Demand Response

- Motor reaction time from zero to full load: 1 sec to 1 min → participation in R2, R3, intraday and day-ahead markets. Participation in R1 through speed variation.
- Sectors with flexibility potential for motors: building HVAC (pumps, fans, compressors), water management (pumps), chemical process plants (pumps)

Key messages

- Develop an EU-wide system of advanced electricity metering
- Open the day-ahead, intraday, R1, R2 and R3 markets for industrial consumers and/or aggregating companies in all EU countries
- Develop a more accurate system for demand forecasting, including contributions of Demand Response

Key messages

- Develop a Design-for-Recycling label for electric motors (and other appliances)
- Focus Research & Innovation support on development of rare-earth-free drives for EVs and heat pump compressors

Input gap

- Recycling figures for Al and Steel in electric motors (or more general electric appliances)

Motor systems market growth estimation

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Key estimations

- By 2040, 30% of all energy use electrical, 60% of all electricity used by electric motors (EMSA)
- + 100 million EVs in Europe by 2040 (BNEF)
- + 45 million heat pumps in Europe by 2040 (based on EU HVAC targets)
- This means + 6 million electric motors per year between now and 2040, on top of the existing sales of 15 million per year (0.75 – 1000 kW)

Question: are that realistic estimations?

Actions (and call to action)

Gather more detailed input

- State of affairs for MEPS for sealed motor units?
- Positioning motor efficiency in Energy Management Standard
- Motor recycling: Al and steel recycling figures?
- Motor sales: realistic growth estimations?

Finalize white paper

- Fill the last gaps in the content
- Organize peer-review: interested?
- Organize language review
- Develop lay-out and illustrations

Thank you

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