

Transforming Markets for Lighting, Appliances and Equipment: Proven Solutions for Developing and Emerging Economies

November 15, 2017 – COP23 Bonn Germany


Motors and Transformers: energy efficiency and emissions potential, policies and programme development

IEA 4E Electric Motor Systems Annex EMSA

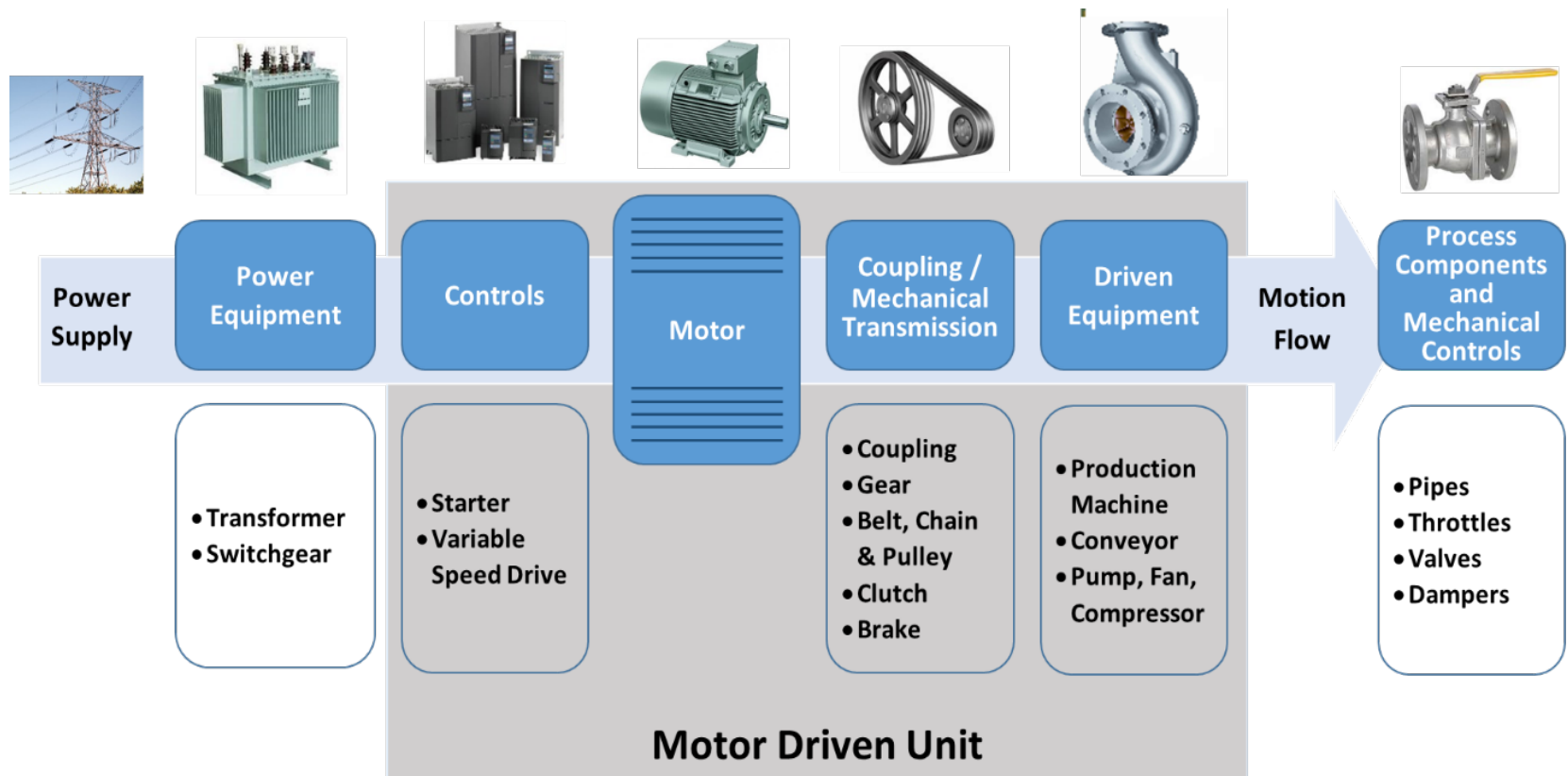
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- Technology
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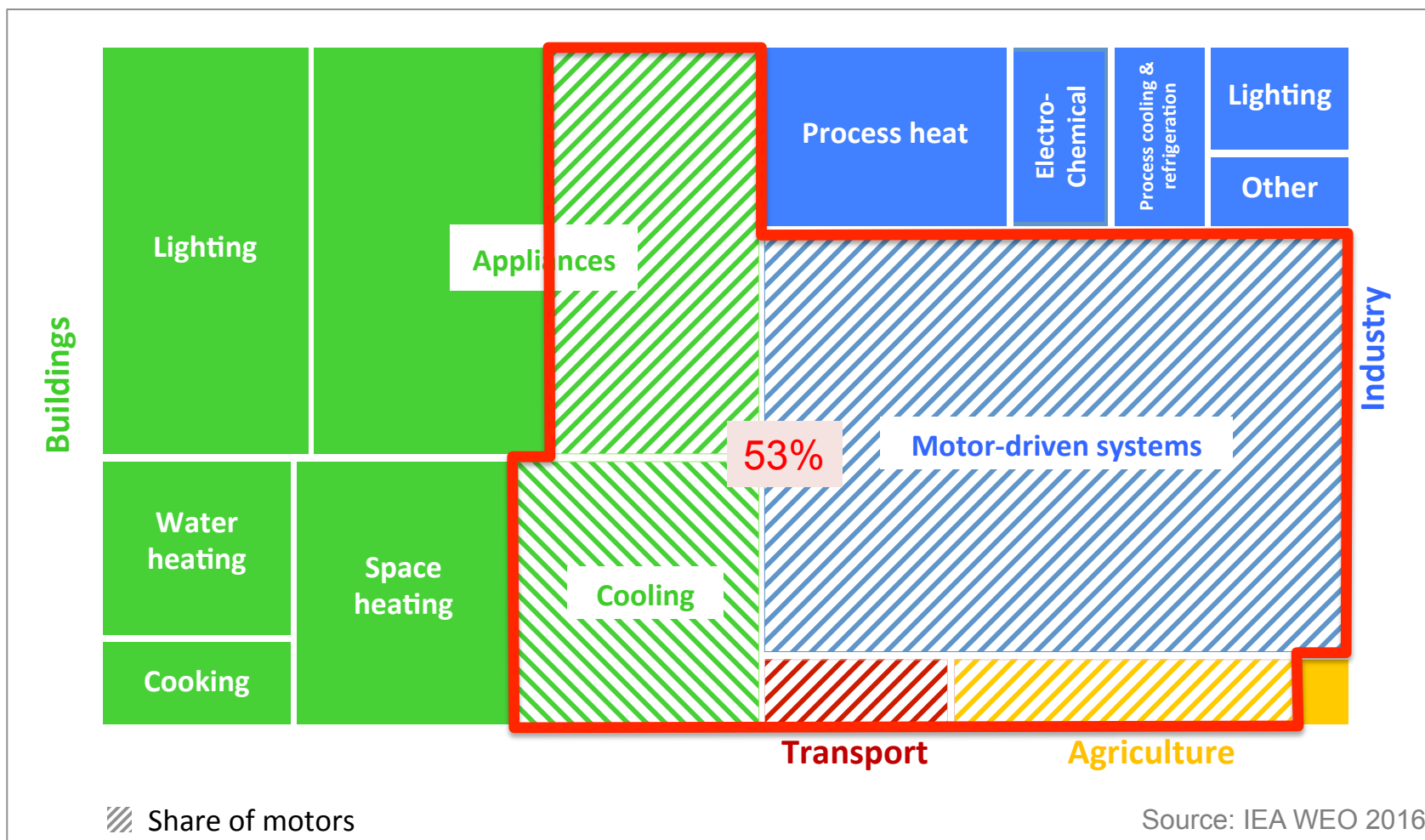
Motor & Motor System



$$\eta_{\text{system}} = \eta_{\text{power equipment}} \times \eta_{\text{controls}} \times \eta_{\text{motor}} \times \eta_{\text{transmission}} \times \eta_{\text{driven equipment}} \times \eta_{\text{components and controls}}$$

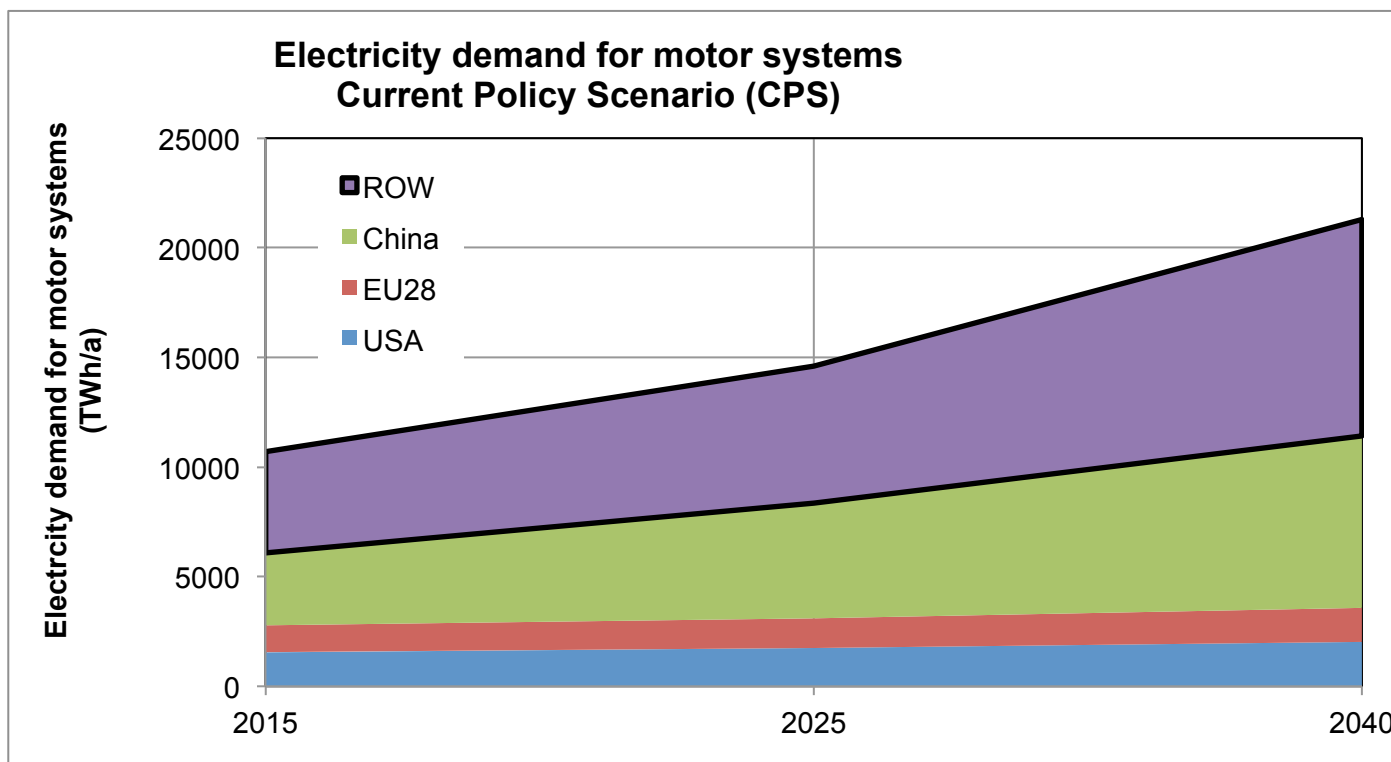
Motors - Global electricity use

account for more than half



Motor market will grow significantly

- Energy use will almost double by 2040
 - Largest contribution China & 'ROW' (rest of world)
 - Systems efficiency increases slowly



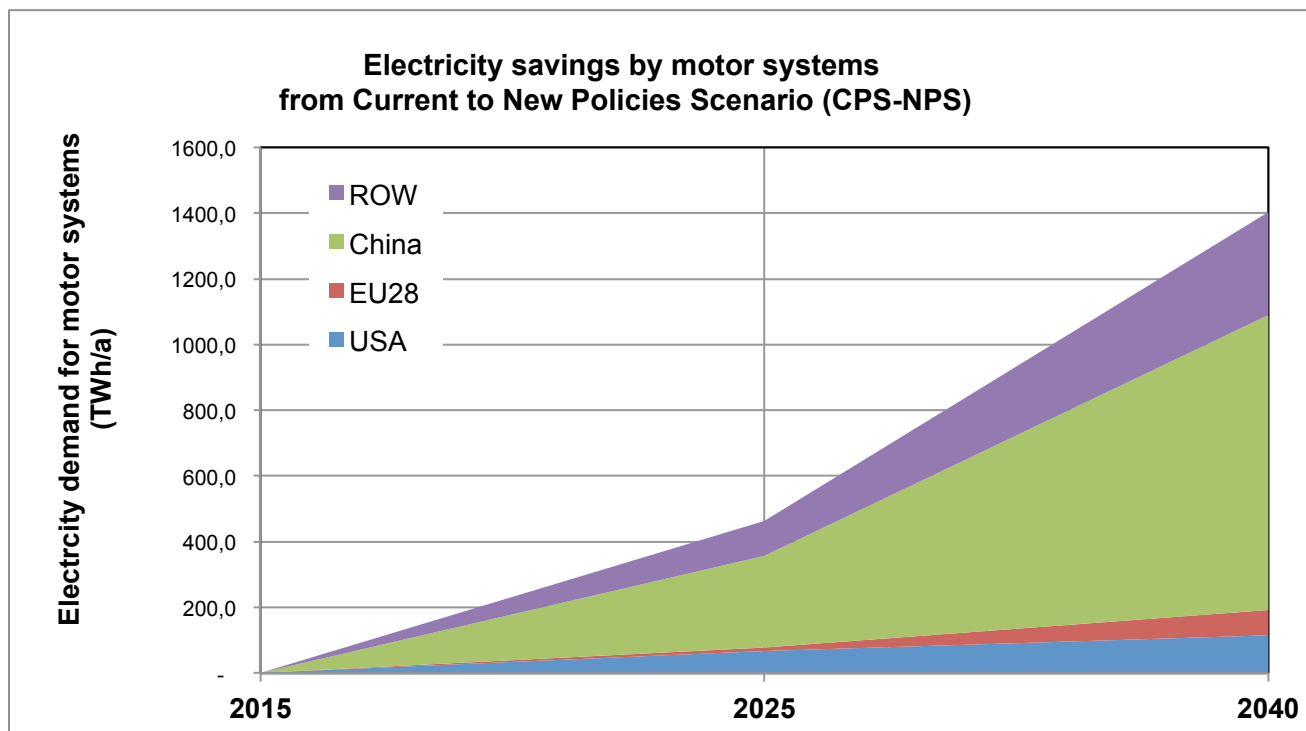
Source: IEA WEO 2016;
EMSA

Savings in electric motor systems

- Through regulations (MEPS) and supporting policies

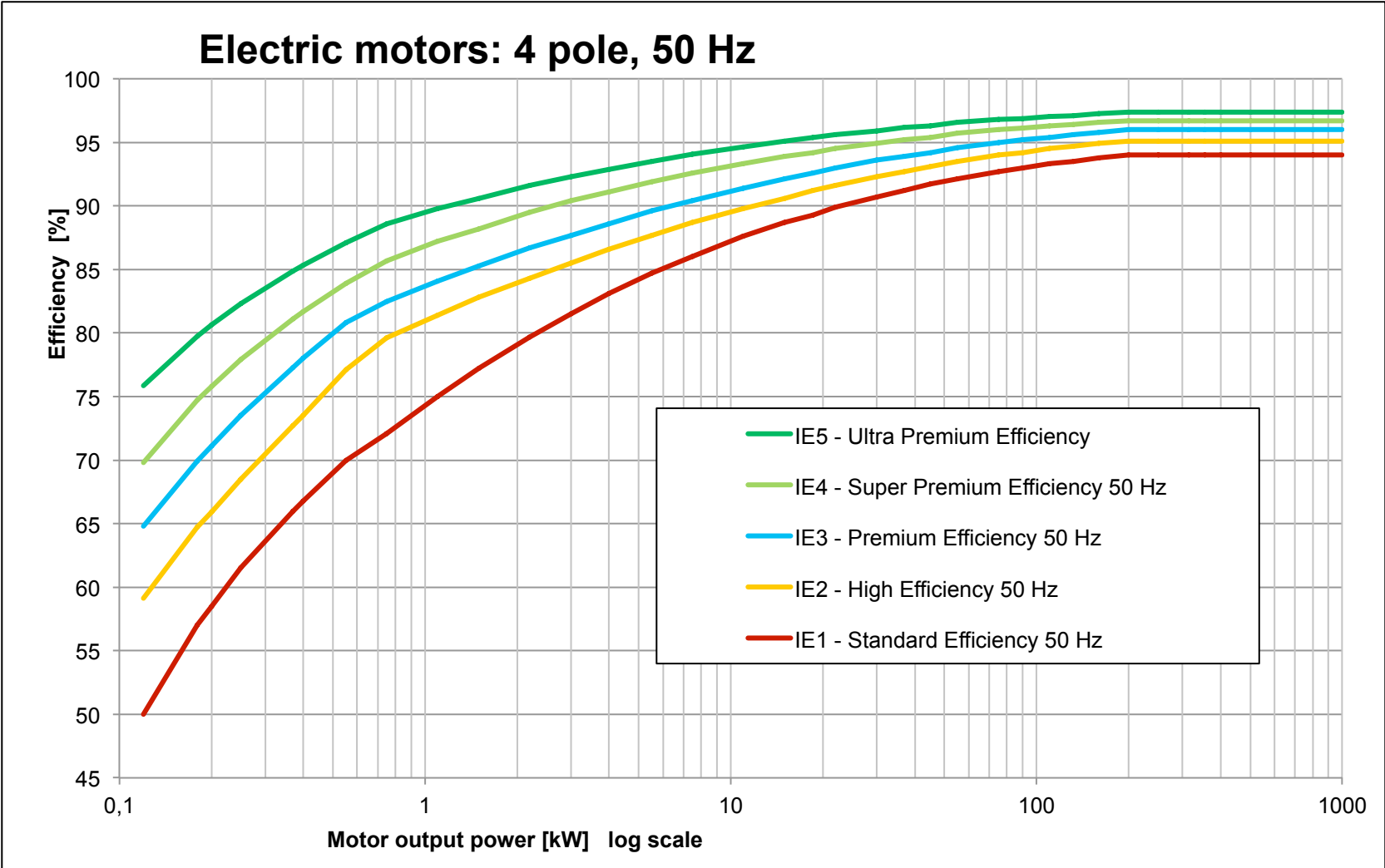
- Savings in 2040

| Sectors | New Policies | 2 C (450) | (*) |
|----------------------|--------------|------------|-------------|
| All | 7% | 14% | 1 700 TWh/a |
| All, excl. Transport | 8% | 24% | 4 900 TWh/a |

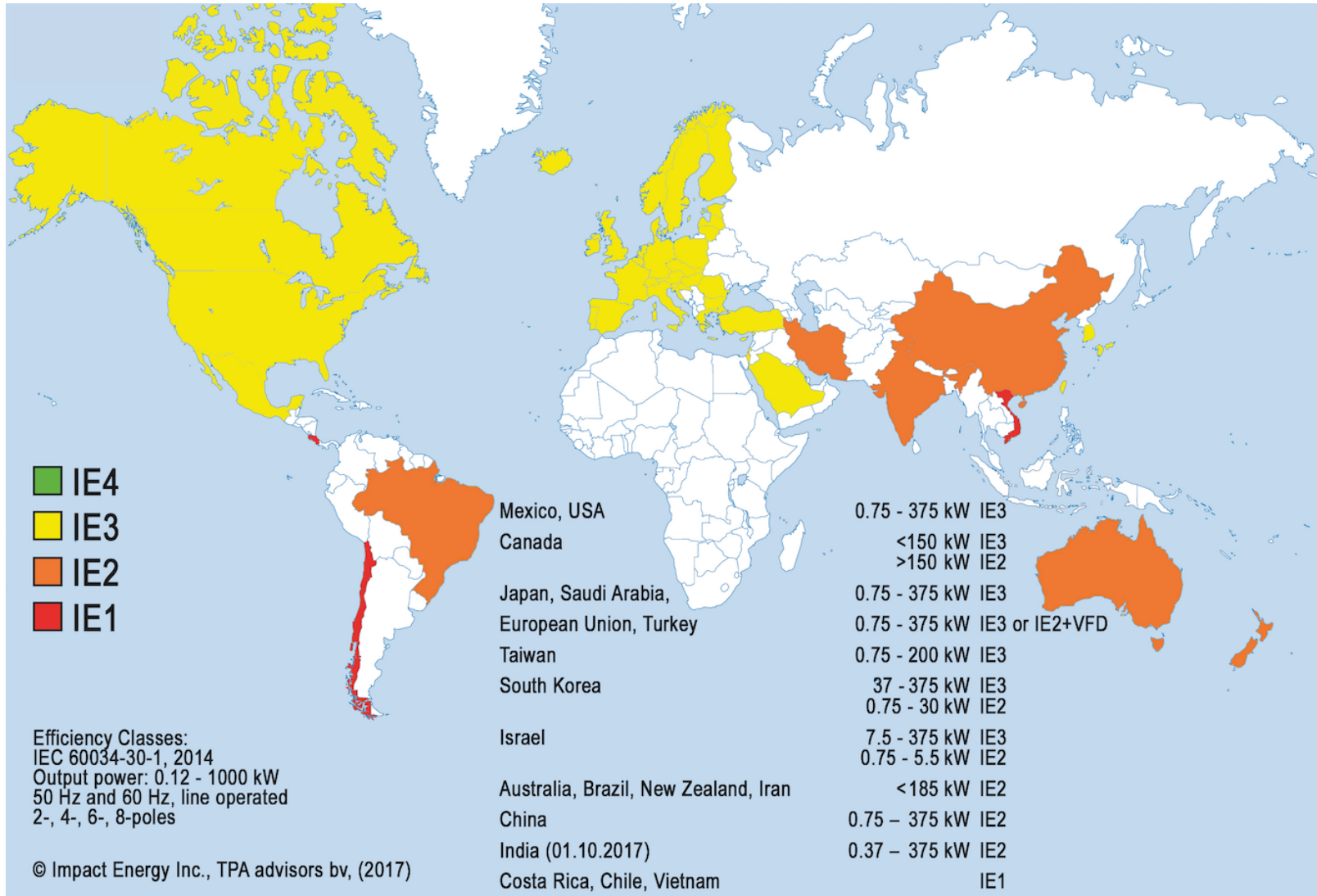


Efficiency Standard Motor

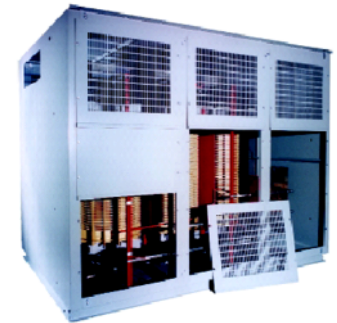
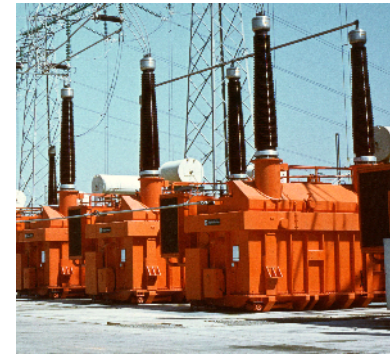
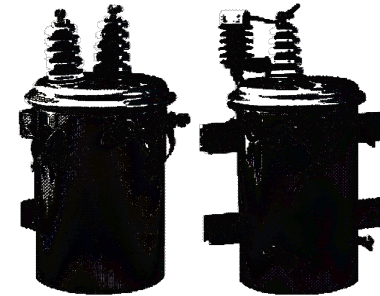
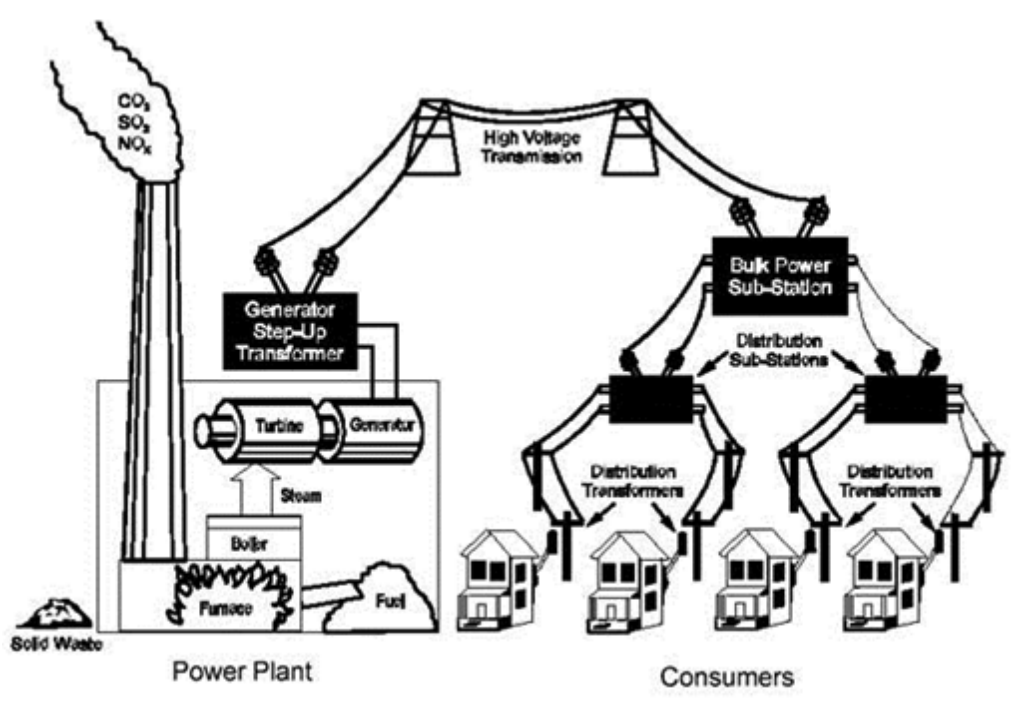
IEC 60034-30-1: ed.1 (2014)



Status of Minimum Energy Performance Standards (MEPS) for Electric Motors



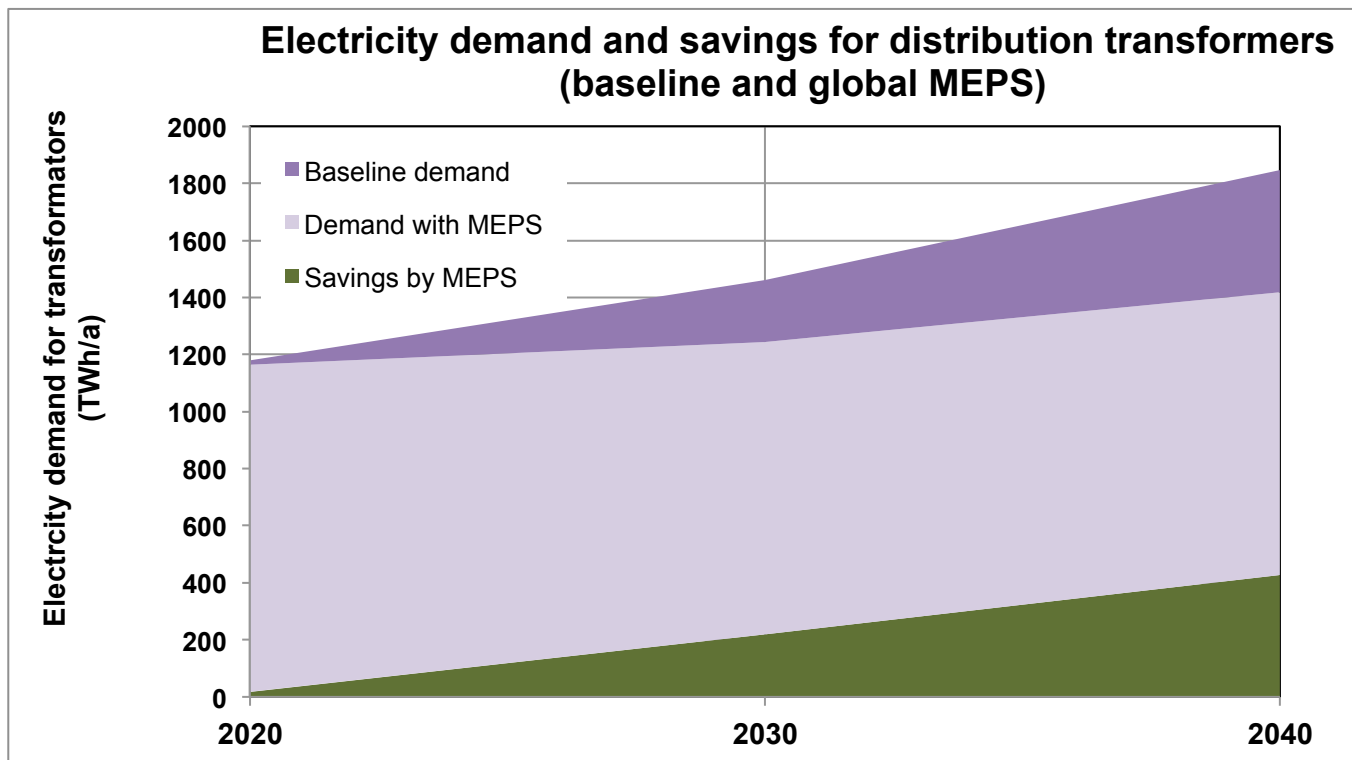
Electricity distribution -transformers



- Static devices that transfer electrical power between circuits
 - Operate non-stop
 - Lose nearly 5% of global electricity
 - Lifetimes of 25 years or more

Transformers market follows electricity demand

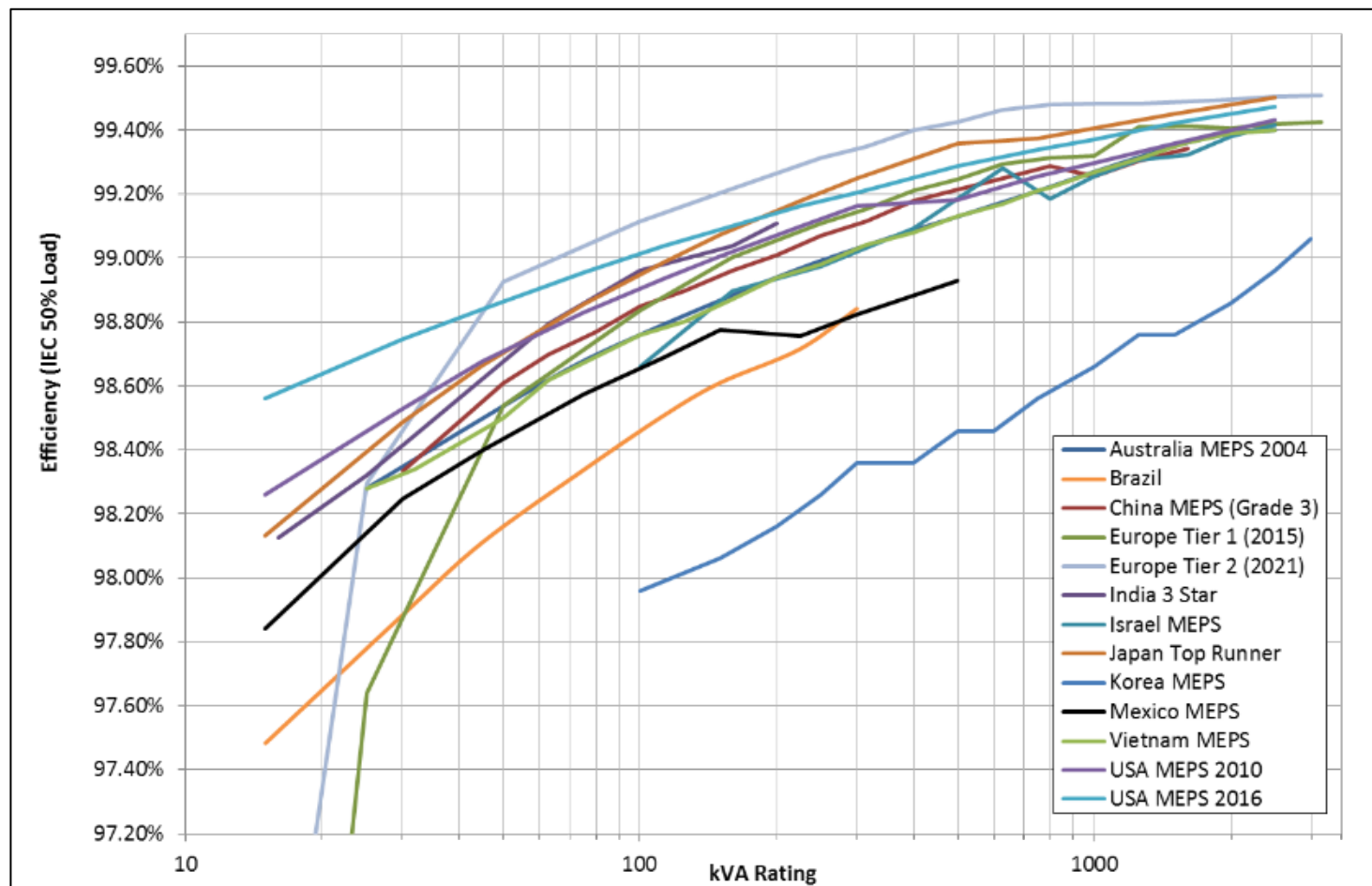
- Electricity use steady at 5% of total electricity demand
- Savings up to 20% feasible by 2040 (global MEPS)



Source: U4E 2017

MEPS Transformers

example Three-Phase Liquid-Filled Transformers



Efficiency at 50% Load (IEC) for Three-Phase Liquid-Filled Transformers

Source: SEAD S&L Working Group Distribution Transformers Collaboration, Part 1, December 2013

Status of MEPS for Transformers

Countries without MEPS for distribution transformers (in red)



Source: U4E 2017

Note: Brazil and India refer to a label program for transformers only

Mandatory and Supporting Policies

Electric Motors/VFD

► 0.75 – 375 kW

MEPS, including

- IEC classification, nameplates
 - IE2 or IE3 + timetable
- Implement MV&E

Supporting Policies

- Communication Campaign
- Professional repairs per ANSI/EASA AR100
- Financial Mechanisms
- Environmentally Sound Management and Health

Transformers

► Low and Medium Voltage

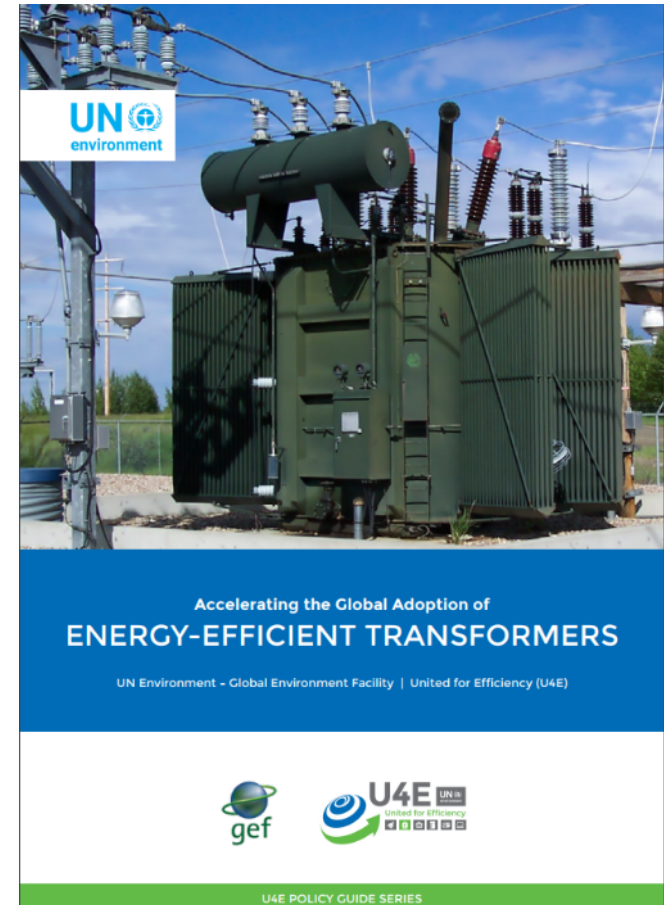
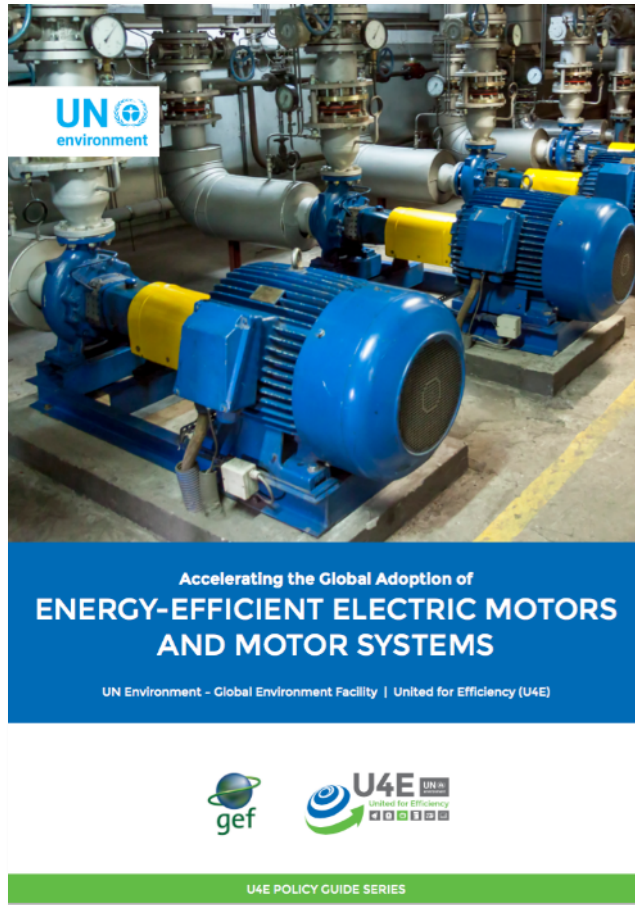
MEPS, including

- IEC test method (no class. yet)
- Efficiency metric
- Implement MV&E

Supporting Policies

- Communication Campaign
- Financial Mechanisms
 - Utility purchasing practices on TCO
- Environmentally Sound Management and Health
 - PCB handling and disposal

See U4E Policy Guides for More Information



<http://united4efficiency.org/resources/>

Thank you

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