

IEA Technology Collaboration Programme:
Energy Efficient End-Use Equipment 4E



Electric Motor Systems Annex EMSA

Motor Workshop ECI 2017, Brussels, Belgium

Maarten van Werkhoven

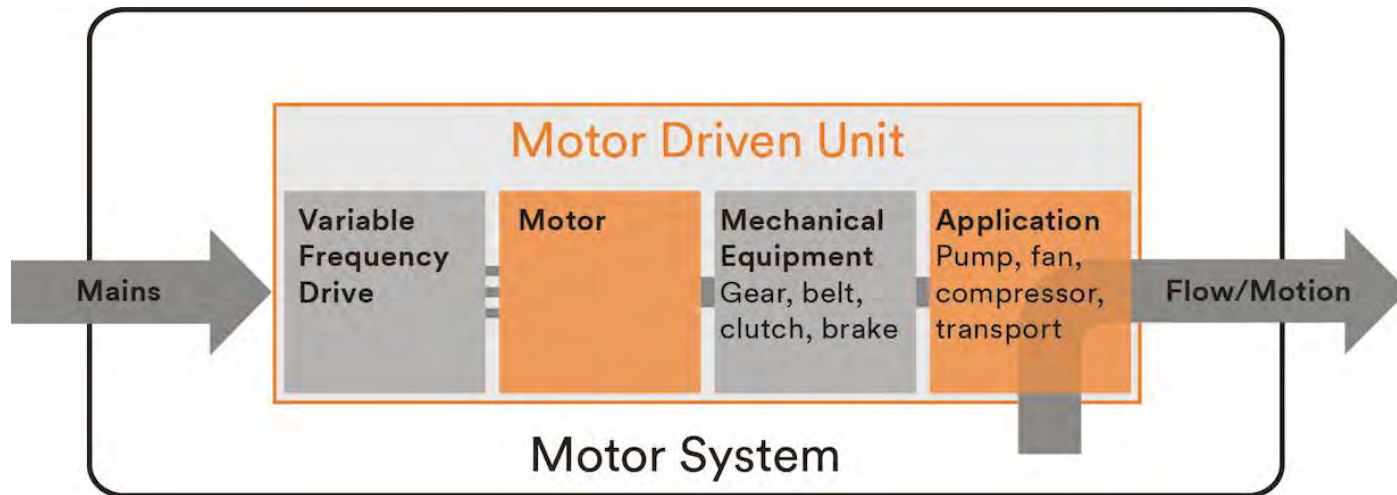
Operating Agent, Electric Motor Systems Annex EMSA

Rita Werle

Program Coordinator, Electric Motor Systems Annex EMSA

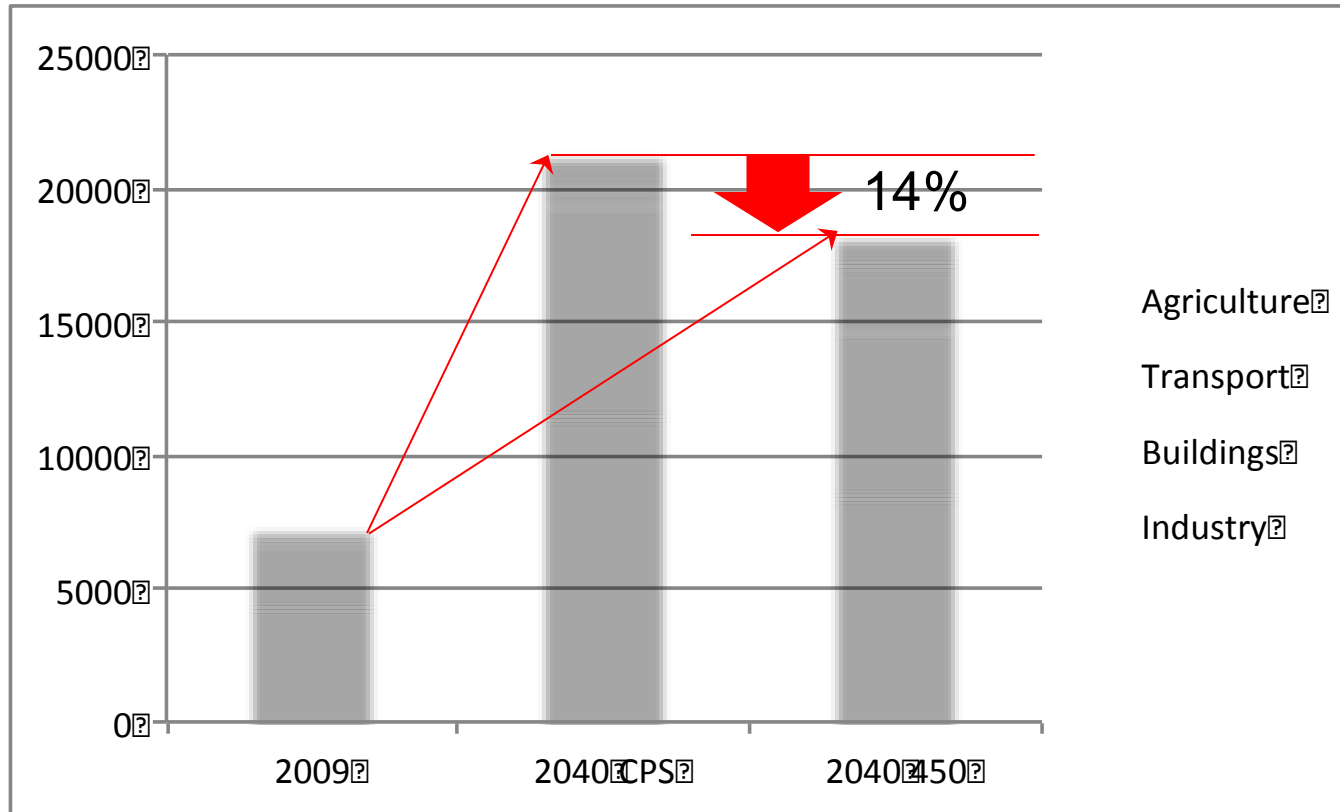


Electric Motor Systems



- Motors Systems use 53% of global electricity use – share is growing
 - Pumps, Fans, Compressors, machines and processes
- Efficiency improvements of 20% - 30% crucial to meet global climate goals
 - Replacing old motors, adding VFD, efficient components, applications, systems design

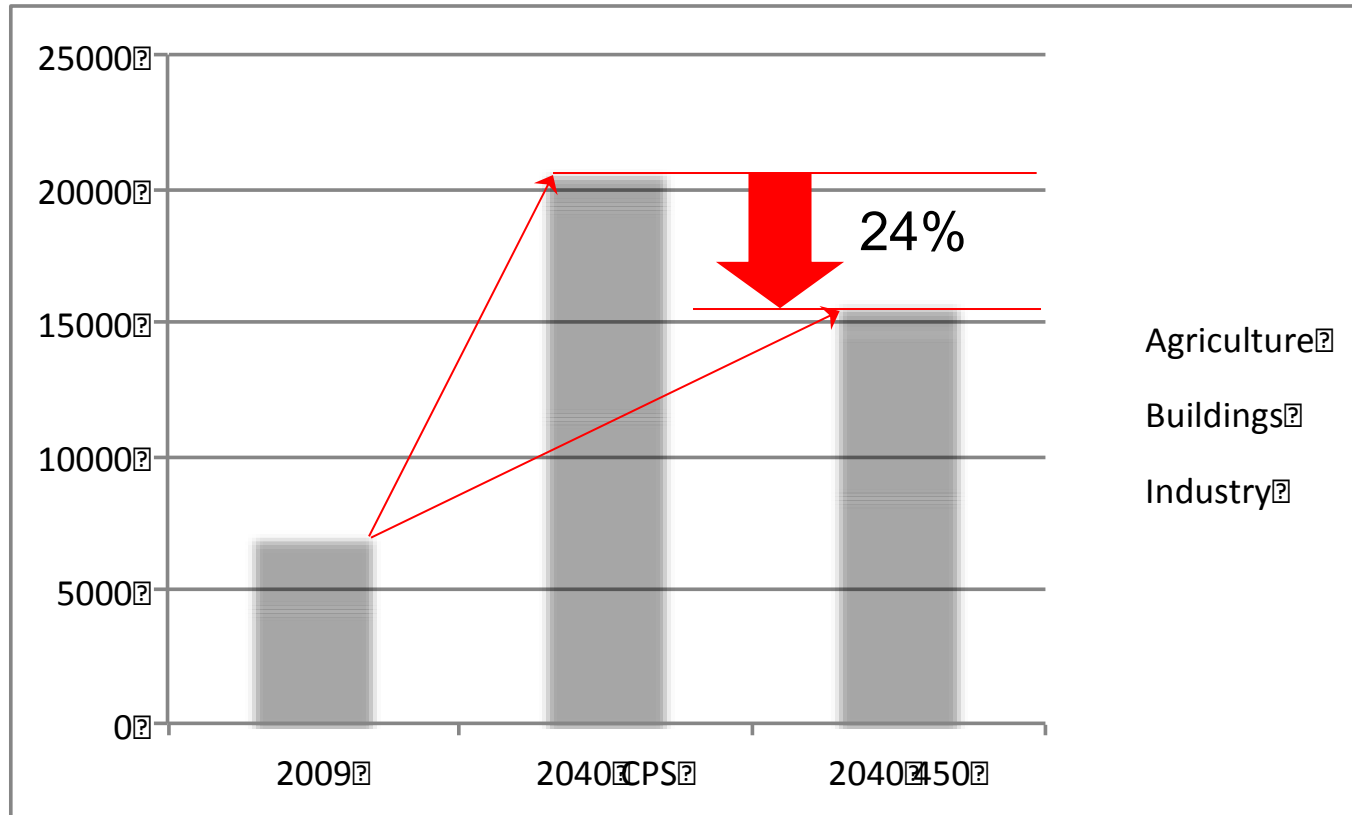
Global Electricity Demand Motors *all sectors 2009-2040*



Source: IEA Waide, Brunner 2009, IEA WEO 2016
CPS, 450: IEA WEO scenario's

Global Electricity Demand Motors

all sectors excl transport 2009-2040



46%

Source: IEA Waide, Brunner 2009, IEA WEO 2016
CPS, 450: IEA WEO scenario's

EMSA Electric Motor Systems Annex

5



- 6 countries
- 2009 – 2017, 3rd phase 2014 - 2017
- [EMSA overview](#)



EMSA for market transformation



...harmonized global standards

...successful policies

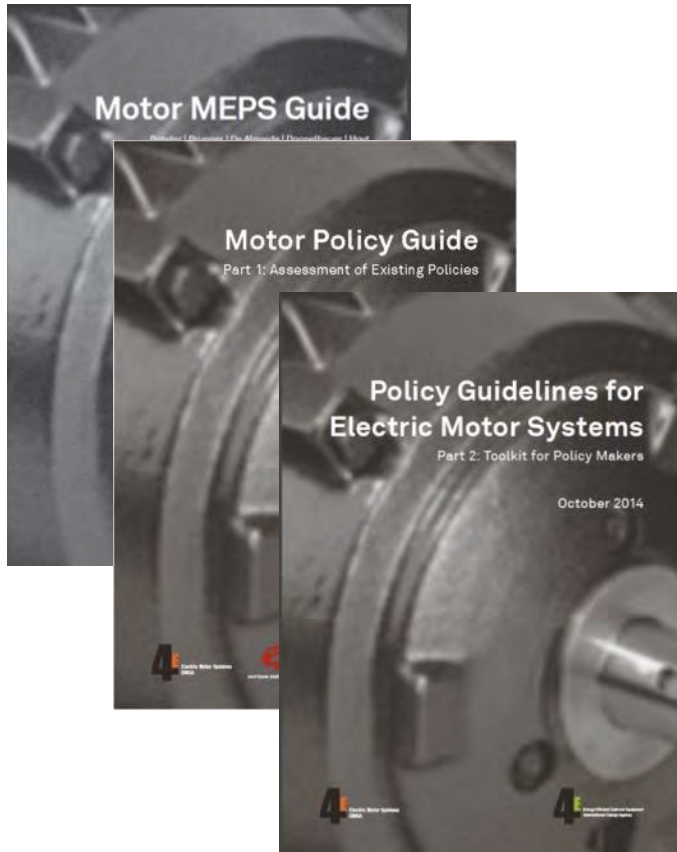
...energy management & audits

...tools & information

Successful policy implementation

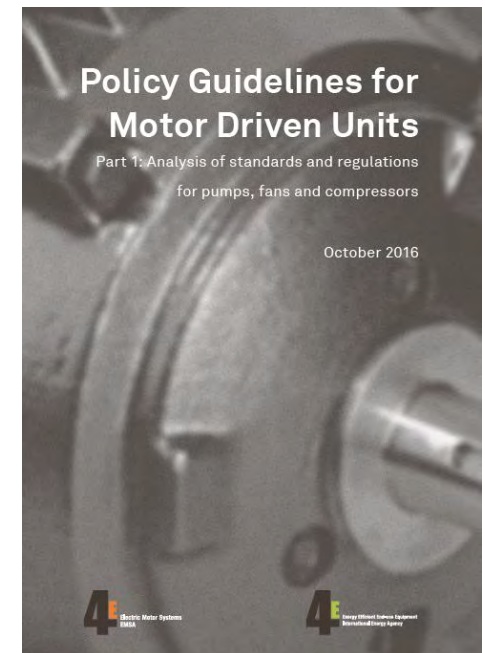
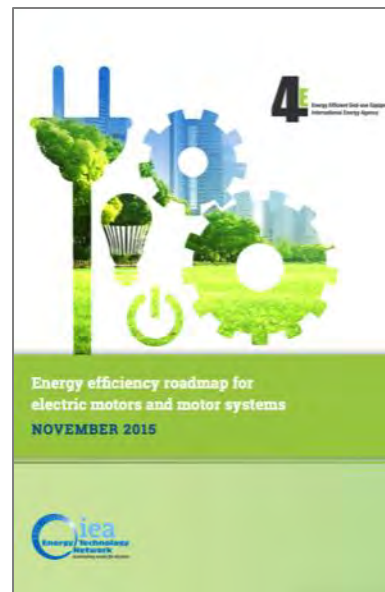
7

EMSA publications



Upcoming

- Policy Guidelines for Motor Driven Units Part 1 (2016) and Part 2 (2017)



Policy briefs, Motor Systems Tool

ENERGY EFFICIENCY POLICY BRIEF

Electric Motor Systems Annex Overview EMSA 0



Electric motor systems in industrial plants, infrastructure applications and buildings that drive pumps, fans, compressors and other equipment, are responsible for 40% of the world's total electricity consumption. New and existing technologies offer the potential to reduce the energy demand of motor systems across the global economy by 20% to 30%. The key now is to realise energy saving.

The 4E Electric Motor systems by Brussels International Energy Agency

- International plan to the developer harmonised and a technical standard
- EMSA participates in international standards (currently independent research of the ECCEP the Program)
- Regulatory Assist: assist design and motor systems per performance level & exchange of paper
- EMSA provides a guide and is a vehicle for co-operation between member states

ENERGY EFFICIENCY POLICY BRIEF

Policy Guidelines for Electric Motor Systems EMSA 2

The 4E Electric Motor Systems Annex (EMSA) promotes the responsibilities for energy efficiency in motor systems by disseminating best practice information worldwide. It supports the development of internationally harmonised best standards and policies to improve the energy performance of new and existing motor systems with the aim of achieving 20% to 30% energy savings. This briefing summarises the key findings and recommendations of the EMSA report Policy Guidelines for Electric Motor Systems. The report describes best practice for transforming markets towards energy efficient motor systems based on a series of policy measures across a range of economies.

Observations for Policy Makers

National governments can take the lead in transforming markets through the implementation of a range of mandatory and voluntary policies and programmes. In doing so, governments will need to have partnerships with relevant bodies amongst product suppliers, end-users and utilities.

Best practice for policies and programmes for electric motor systems include:

- Implement mandatory minimum energy performance standards (MEPS) based on international standards and a level appropriate to national circumstances
- Take an active role in the international standards development process via through direct participation in the relevant standards committees, to ensure these standards meet the needs of national policy implementation
- Implement a national product registration program
- Establish a government laboratory accreditation program, including initiatives to improve the quality of test laboratories (e.g. joint testing, calibration, round-robin programs, etc.)
- Implement an effective national compliance program for MEPS
- Implement energy management and/or energy audit programs covering motor systems
- Set energy efficiency targets for utilities and/or industrial and users
- Implement a program for the systematic replacement of old motor systems
- Establish an awareness-raising campaign for industry and benchmarking databases in cooperation with manufacturer associations
- Establish a framework of financial incentives to support energy efficient motor system in industry (equipment subsidy programs for industry in cooperation with power utility programs)
- Implement procurement programs for public institutions and large buyers

More Information

Download the report at www.motorsystems.org/policy-publications. For specific questions on the Policy Guidelines contact Konstantin Kutzner at konstantin.kutzner@emsa-epa.eu. All policy activities EMSA work outputs can be accessed at www.motorsystems.org. For further information on EMSA contact Martin van Marrewijk at m.vanmarrewijk@emsa-epa.eu.

November September 2015

EMSA Publications

EMSA publishes a range of guides covering a mix of policy instruments applicable to differing national circumstances. They include case studies of successful implementation and the lessons learnt.

EMSA has published the following guides:

- Motor MEPS Guide (2009)
- Motor Policy Guide – Part 1: Assessment of Existing Policies (2011)
- Policy Guidelines for Electric Motor Systems – Part 2: Toolkit for Policy Makers (2014)
- Policy Guidelines for Motor Driven Units (to be published in 2017)

EMSA Capacity Building

The EMSA Motor Systems Tool calculates the energy efficiency of a complete motor system, taking into account the motor and controls, load characteristics and transmission. It is intended for engineers, machine builders, energy consultants and others aiming to optimise existing and new machine systems.

To access: www.motorsystems.org/motor-systems-tool

EMSA Network

Move from component to system

Overcoming barriers to capture the major savings potential of motor systems is best achieved through a phased approach that includes the following steps:

- Targeting at energy relevant components of a motor system, including motor, variable frequency drives, transmission, gears and applications (pumps, fans, compressors)
- Targeting at integrated systems that include the motor, control and/or application (e.g. pump, fan, compressor, etc.)
- Moving to more complex motor systems.

Use international standards and a toolkit of measures

Minimum of energy performance standards (MEPS) are one of the strongest instruments to shape the market. For each motor, consider sub-optimal and applying the international best standards (e.g. IEC 60034-1) and the international efficiency classification standard IEC 60034-30:2 as a basis for MEPS.

To reach the bulk or motor systems that are already installed, additional policy instruments are necessary and have been applied successfully across different economies. These include, besides, voluntary agreements with industry, energy management and audit programs, compulsory motor drives, financial incentives, awareness raising and the provision of information.

Engage all stakeholders

The most effective government policies are those that stimulate action amongst key stakeholders within the motor systems market transformation:

- A comprehensive range of policies are therefore required to engage international national standards makers, industry associations, motor industry users and power utilities, financing relevant activities in the policy development process, address that opportunities and constraints of an particular affected or considered and made to optimal implementation.

International Standardisation

International Standardisation provides a common framework for motor systems, ensuring that the same standards are used across different countries and regions.

Product Registration

Product registration provides a common framework for motor systems, ensuring that the same standards are used across different countries and regions.

Policy Options

Policy options provide a common framework for motor systems, ensuring that the same standards are used across different countries and regions.

The screenshot shows the Motor Systems Tool interface with the following data:

- System Overview:** P1 (Input Power [kW]) = 1.540, P2 (Shaft Power [kW]) = 0.67, Total system efficiency [%] = 39.7.
- Load (P4):** Output power [kW] = 0.14, Torque [Nm] = 72.1, Input current [A] = 0.62.
- Transmission (P3):** Input power [kW] = 0.52, Torque [Nm] = 111.3.
- Motor & Drive (P2):** Shaft power [kW] = 0.67, Torque [Nm] = 148, Input current [A] = 4.4.
- Motor Info:** Motor - 0.75 kW, Change motor & drive.
- Calculation Master:** P2 - Shaft power.

EMSA information

Newsletter

- EN, CN, JP, RU, DE
- 4,800 contacts
- 75 countries

Global Motor Systems Network **4E** Electric Motor Systems EMSA

EMSA Newsletter - Zurich December 2016 - www.motorsystems.org

Dear Maarten,

Welcome to the latest edition of the Electric Motor Systems Annex (EMSA) Newsletter. The number of our readers has reached 4289 people from 74 countries.

Events

EEMODS'17
Energy Efficiency in Motor Driven Systems
6 - 8 SEPTEMBER 2017, ROME

EEMODS'17
The next international conference on Energy Efficiency in Motor Driven Systems will be held on 6 to 8 September 2017 in Rome, Italy. The call for papers is closed.

More information: www.eemods17.org

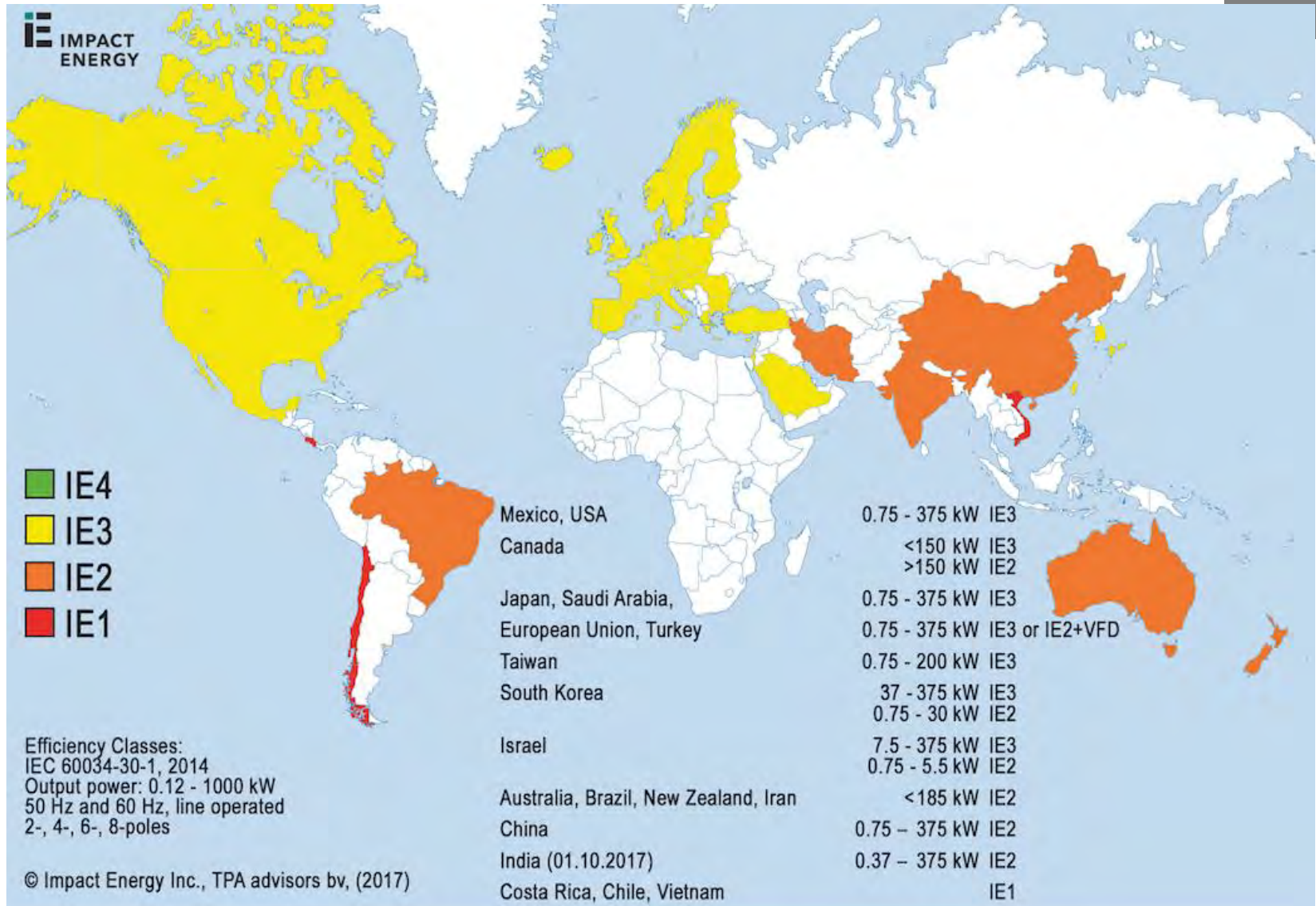
ACEEE Summer Study on Energy Efficiency in Industry
The next ACEEE Industrial Summer Study will be held on 15 to 18 August 2017 in Denver, CO, USA. The call for papers is closed.

More information: [click here](#)

MOTOR SUMMIT 2016

Motor Summit 2016 Awards
The Motor Summit 2016 (MS'16) was held on 11 to 12 October 2016 in Zurich, Switzerland. The MS'16 Steering Committee has given its **MS'16 Award** to three renowned and distinguished personalities:

Global MEPS overview - motors



Policy Guidelines for Motor Driven Units

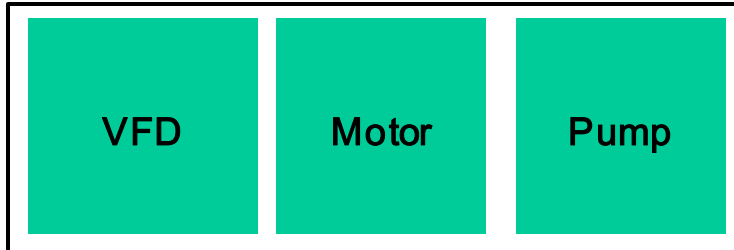
part 2

- Goal: recommendations for further alignment of standards and regulations for MDU's
 - Motor Driven Units: Pumps, Fans, Compressors
- Part 1: Overview of current standards and regulations
 - Published October 2016
- Part 2: on going – US, EU, CN
 - Product definitions
 - Testing and efficiency standards
 - Metrics
 - Recommendations for alignment

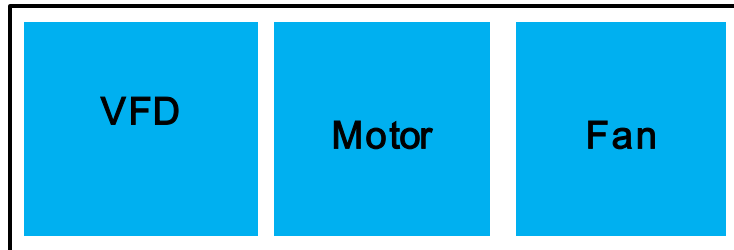
Policy Guidelines for Motor Driven Units

part 2

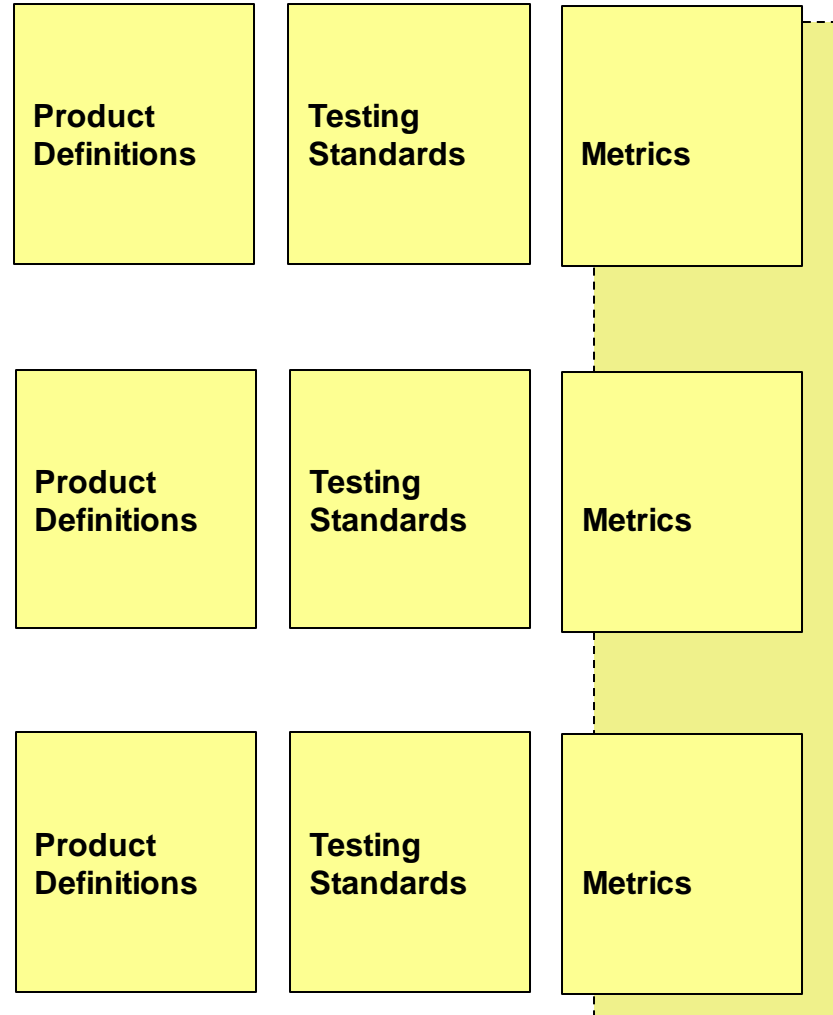
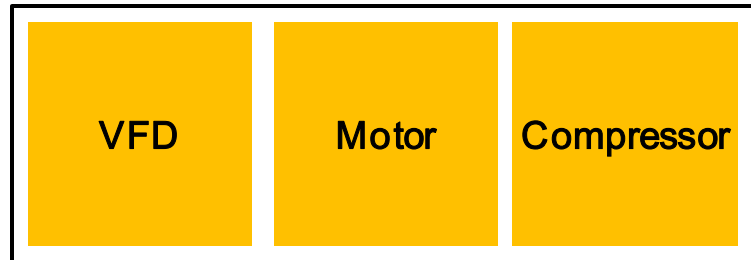
Pump MDU



Fan MDU



Compressor MDU



4E EMSA Energy efficiency roadmap for electric motors and motor systems

1. Set IE3 Premium Efficiency level as global target for MEPS before 2020
2. Expand MEPS to cover VFD and motors plus VFD
3. Expand the coverage of existing regulations in line with IEC 60034-30-1 (i.e. 0.75 – 375 kW -> 0.12 – 1000 kW)
4. Adopt IE4 level as MEPS in major industrial economies after 2020
5. Improve international alignment (frame sizes, 50/60 Hz efficiency curves)
6. Promote technologically neutral policies (no differentiation of efficiency requirements for certain types of technologies, e.g. US small motor rule)
7. Reinforce policy-makers' involvement in standardization (bringing in the policy view, standards fir for policy implementation)

Further areas of interest

- High voltage motors
- Regulating Motor Driven Units: from component to system
 - Pumps, Fans, Compressors
- Compliance, market surveillance

Technology progress

1980



2017



Motor Workshop ECI, 7 March 2017

The new efficient motor

- More efficient
- Smaller
- Lighter
- Less precious active material
- Less rare earth

Contact

Maarten van Werkhoven
Operating Agent
Electric Motor Systems Annex EMSA
mvanwerkhoven@tpabv.nl

Rita Werle
Program Coordinator
Electric Motor Systems Annex EMSA
rita.werle@impact-energy.ch

Download:

www.motorsystems.org

Motor Workshop ECI, 7 March 2017

