How to achieve efficiency through the right mix of policies? - Guidelines for electric motor policy implementation

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IEA FORSCHUNGS KOOPERATION

4E Electric Motor Systems EMSA

bmvit Bundesministerium für Verkehr, Innovation und Technologie

24th of October 2013 // EMSA Meeting

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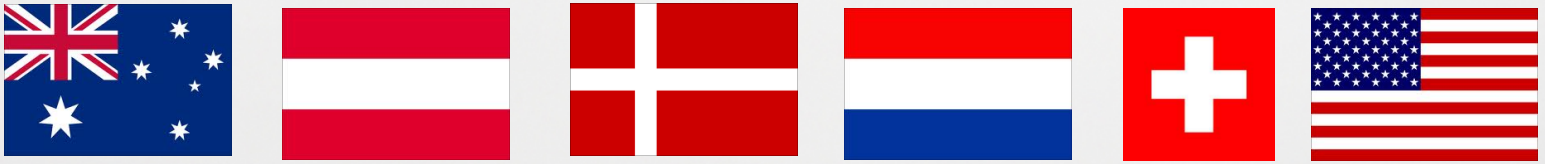
Electric Motor Systems Annex (EMSA)

International Energy Agency

Efficient Electrical End-Use Equipment
International Energy Agency

Electric Motor Systems
EMSA



EMSA goal: market transformation of high efficient motor driven systems

For this, we need…

…global standards

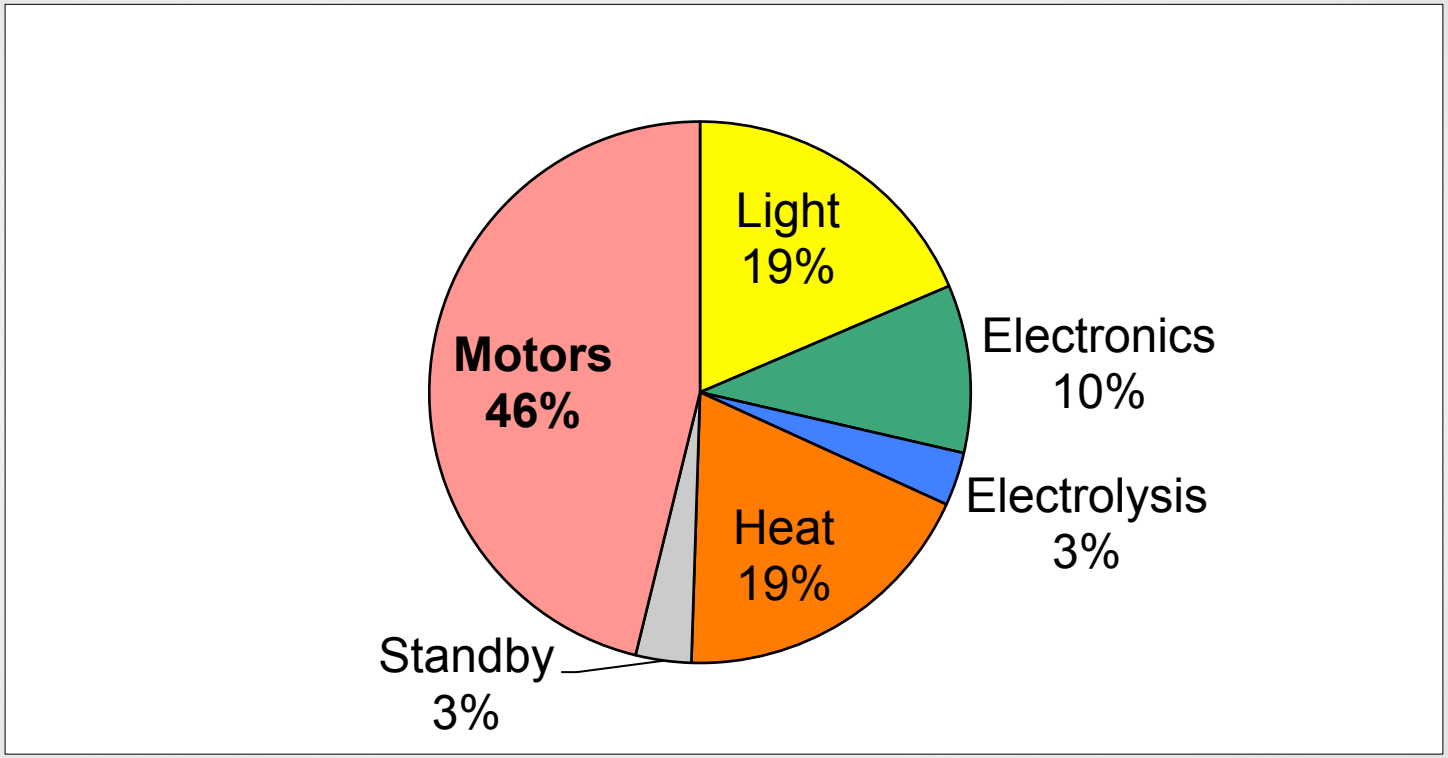
…MEPS & compliance

…energy management

…tools & information

Globaler Electricity Demand

SOURCE: IEA Energy Efficiency Series, Paul Waide, Conrad U. Brunner, et al. 2011



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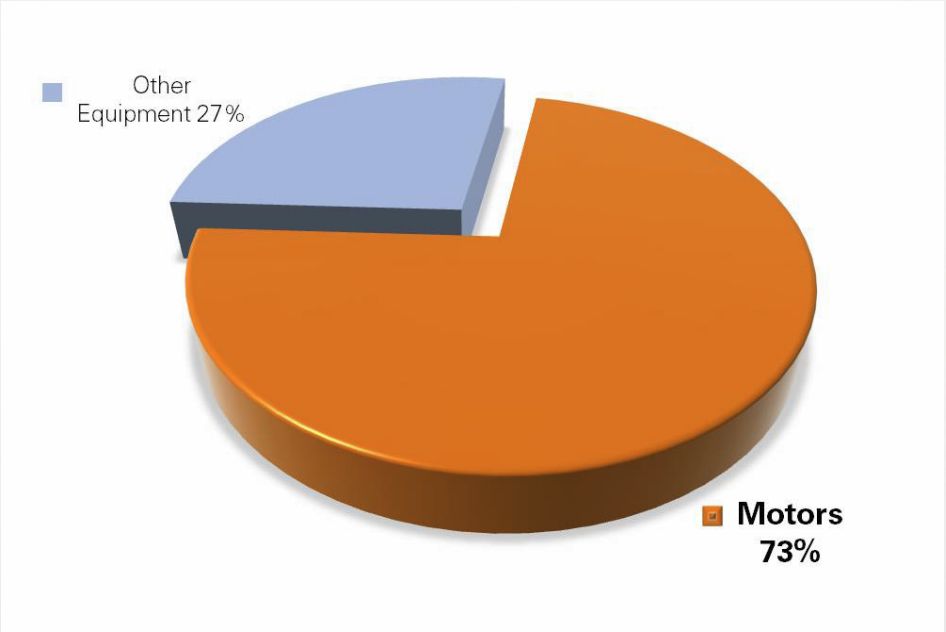
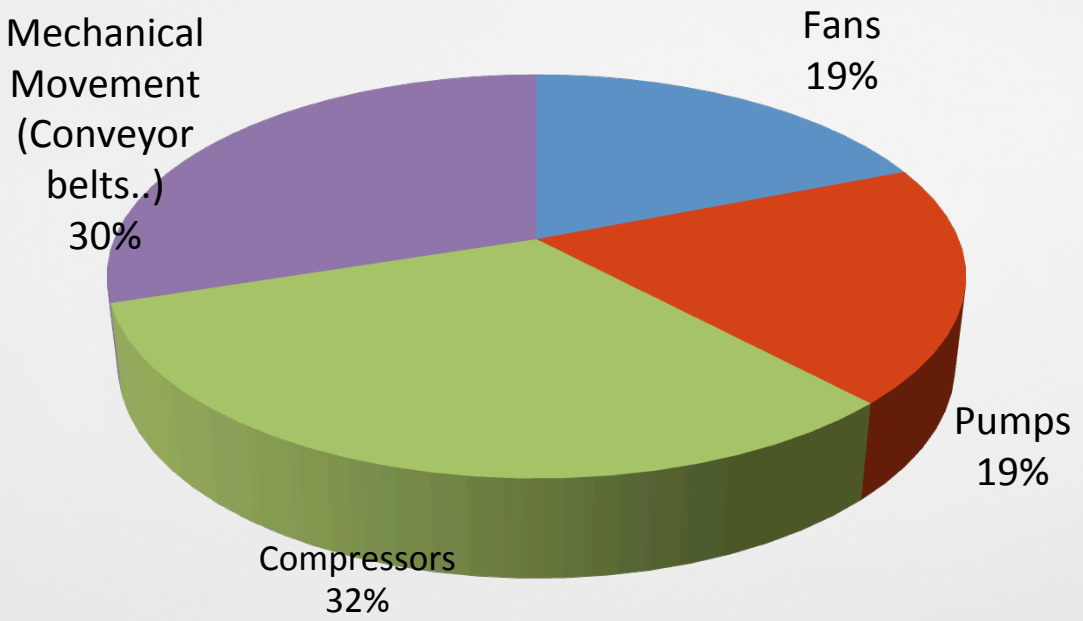
Industrial Electricity Consumption

Source: ISR – University of Coimbra



Share of electricity consumption for different electric motor systems

Source: EuP Lot 30: Electric Motors and Drives, Task 2: Economic and Market Analysis, 3rd Draft, May 2013, Seite 6



Background of Policy Guidelines for Efficient Electric Motor Systems

- There is no single instrument to facilitate energy savings in motor driven systems
- Different elements influence the decision making in industry
- Cost efficiency is no guarantee for implementation
- Therefore a mix of policy instruments is needed to overcome the barriers for energy efficiency

→ Within the IEA 4E Project Electric Motor Systems Annex (EMSA) a **global policy guideline** for exploiting efficiency potentials in motor driven systems has been conducted

→ Final version will be available in October 2014

Goal of the Policy Guideline

The goal is

- to propose guidelines for policy makers on policy instruments that shall be applied to reach market transformation of motor systems (a sort of "cook book")

and to show

- what needs to be taken into account when implementing such policy instruments
- successful examples considered worthwhile to follow

Main Topics of Policy Guideline

The main topics are

- Mandatory measures
- Procedures for monitoring and compliance
- Voluntary measures
- Financial measures

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Mandatory Measures in the Policy Guidelines

- International standards for efficiency testing and efficiency classes for motors and systems
- Build-up of necessary testing capacity and quality (training, accreditation, round robin)
- Mandatory national efficiency requirements (Minimum energy performance standards - MEPS)
- Product certification
- Product registration
- Compliance (monitoring, verification & enforcement)

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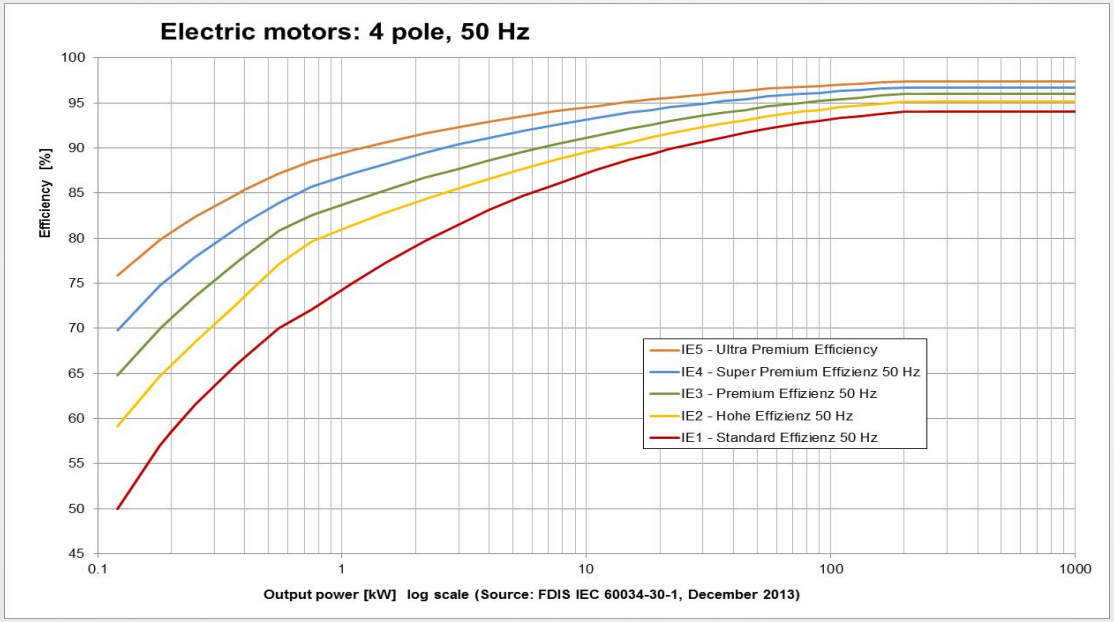
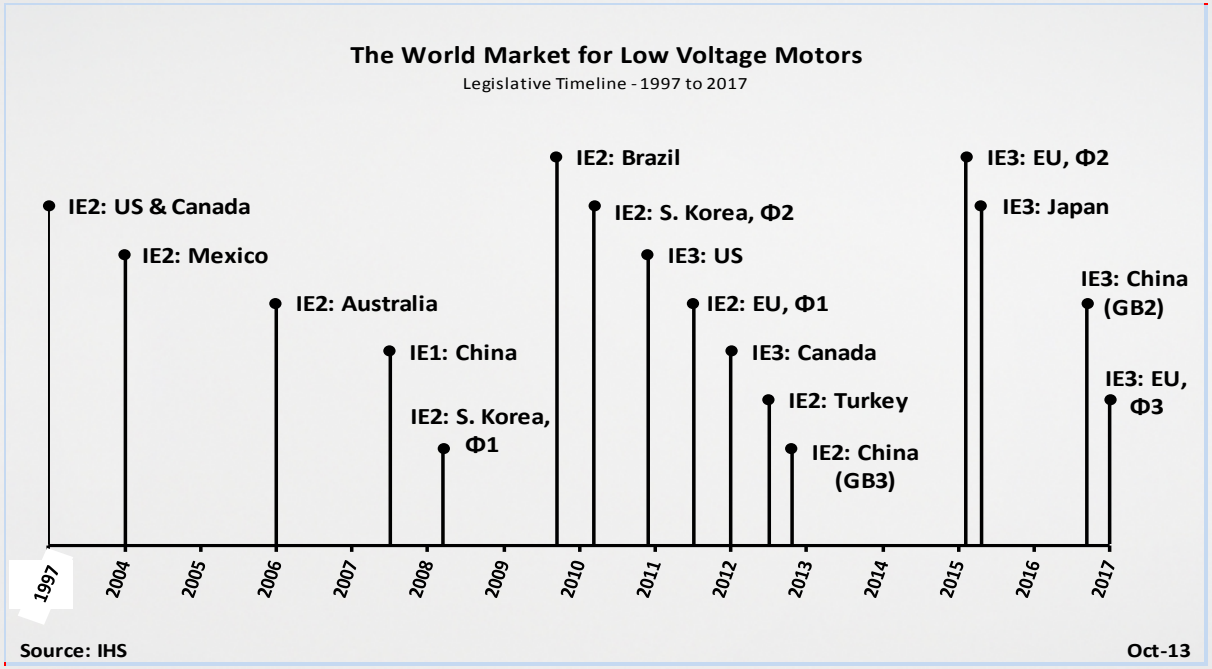
INTERNATIONAL STANDARDS
Efficiency Classes for AC Motors

New IEC Standard IEC 60034-30-1, 2014 - Efficiency classes of line operated AC motors (IE-code) published March 2014 (now includes motors from 0.12 kW to 1 000 kW), for VSD driven motors the IEC 60034-30-2 will follow



STRENGTHENING OF MEPS REGULATION

Legislative timeline for electric motors (source: IHS, 2013)



Australia registration and compliance regime

- **Registration of each model of electric motor** that is regulated for energy efficiency in Australia
- Minimum Energy Performance Standards (MEPS) and
- Testing requirements
- Online- Applications for the registration of electric motors

Compliance: check-testing

- Check testing of electric motors has been **on-going since 2002**.
- Currently, approximately **30 electric motors** undergo check testing **each year** to monitor compliance with the set MEPS level.
- The **E3 Program spends approximately EUR 100,000 per year** on the motors check-testing program.

Selection Criteria for Check-Testing

- Models are selected for check testing according to a range of risk-based criteria. Factors taken into account may include:
  - Reports of possible non-compliance from competitors, consumer groups, individuals and overseas testing programs
  - Models with a high market share
  - Product types with the highest greenhouse gas emissions
  - Brands or models with a history of non-compliance or with no check test history
  - High efficiency claims

Check Testing

- Electric motors selected for check testing are purchased anonymously from the market.
- **Stage One check tests** by National Association of Testing Authorities (NATA), Australia
- If the Stage One test indicates the model fails to meet the performance or marking requirements, the Regulator will notify the registrant of the results of the failed check test.
- The registrant then has the *option of cancelling the model's registration* or *proceeding to Stage Two testing* which involves testing of an additional two or three units of the model.

Enforcement

- If **Stage Two testing** indicates the model complies with relevant requirements, the registrant is informed of the pass result and no further action is taken.
- If the model fails the Stage Two check test, the Regulator may then undertake appropriate enforcement action as specified in the GEMS Act which could include cancellation of the model's registration and other penalties.

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Voluntary Measures in the Policy Guidelines

- Labeling
- Voluntary agreements with industry
  - Energy management programs and Audit programs
- Awareness Raising
  - Training, Guidelines, Tools
  - Life-cycle costing
  - Benchmarking, Best Practices (case studies)
- Company motor policy
  - Purchasing criteria, motor inventory list, guideline for replacement
  - Requirements for installation tests, maintenance and repair

Example: Austrian program “energy efficient enterprises”, objectives

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klima:aktiv

- Awareness Raising for Energy Efficiency in Industry
  - organizing information events in co-operation with sector associations
  - organizing an annual energy efficiency award
- Implementing energy management according to ISO 50001
- Implementing energy efficiency measures in industrial enterprises in co-operation with partners
- Implementing standardized energy audits by organizing standardized trainings for energy auditors

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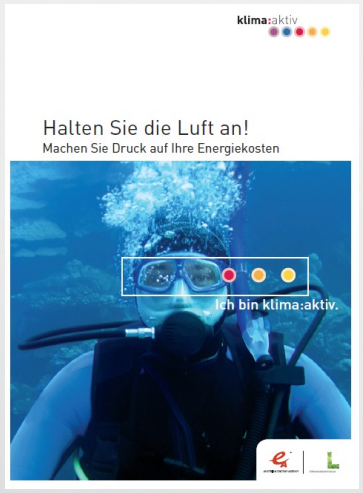
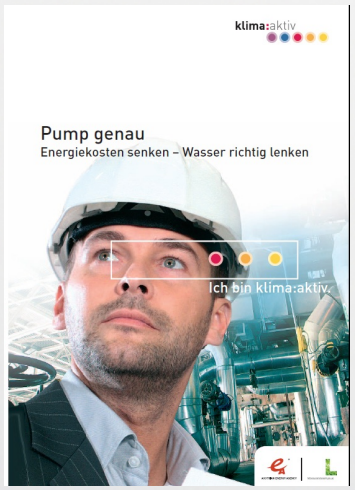
Energy audit guidelines and tools

- Compressed air systems
- Pump systems
- Fan systems
- Ventilation and Air Conditioning systems
- Chilling systems
- Steam System
- Lighting System





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Trainings of energy auditors

Standardized training for 7 days:

- Initial energy audit and energy management
- **Optimisation of compressed air systems**
- **Optimisation of pump systems**
- **Optimisation of fans, ventilation and AC systems**
- **Optimisation of chiller systems**
- Optimisation of steam systems
- Optimisation of lighting systems

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Financial Incentives

- Subsidies of regional audit networks, chambers of commerce and national government (up to 50%)
- Subsidies for investment in energy efficiency measures up to 30%

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Selected results

- 1300 participants in trainings
- Approx. 150 best practice examples online
- 950 companies, decision makers and auditors reached by the newsletter

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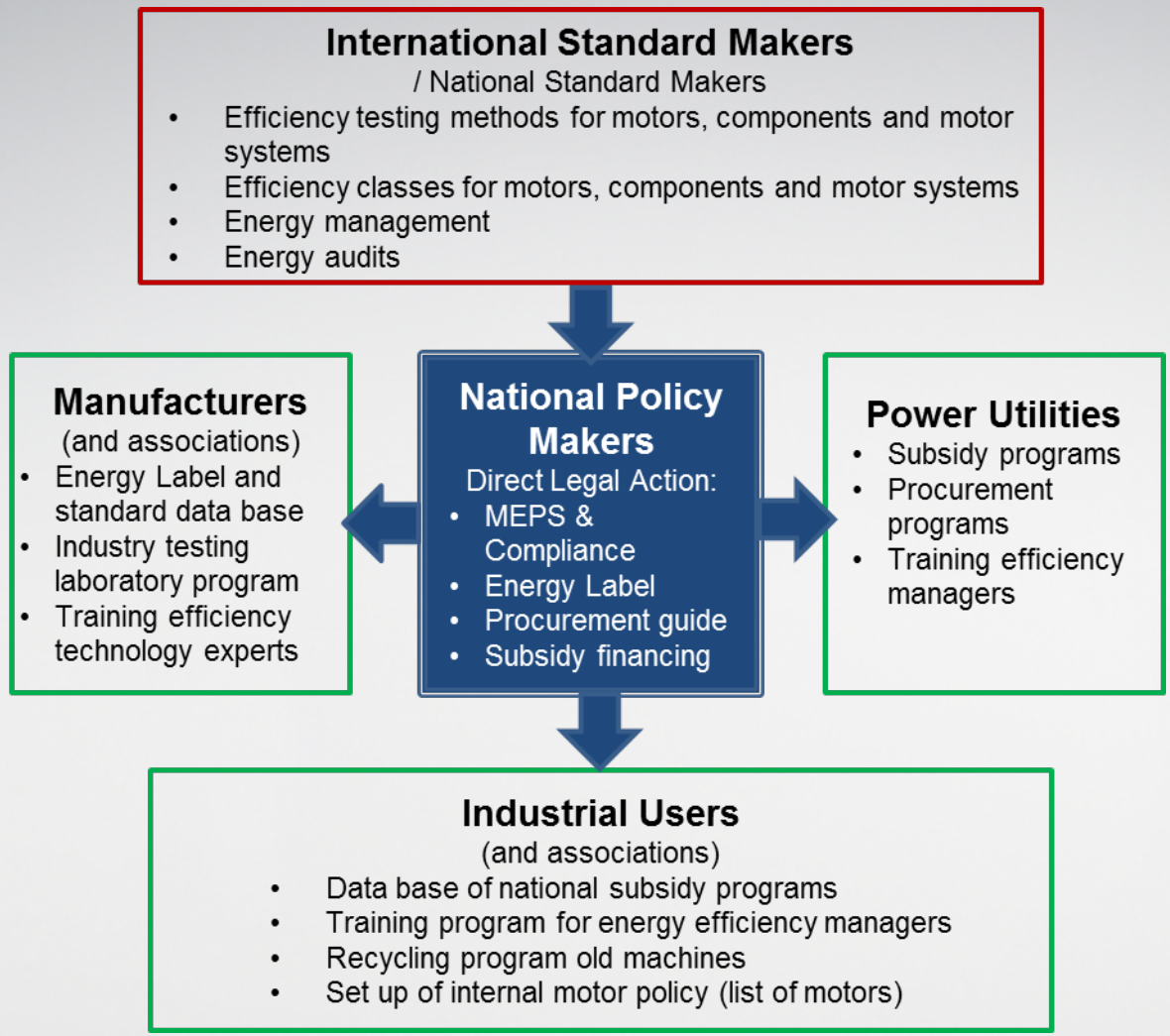
Financial Incentives in the Policy Guidelines

- Description of
  - role of the public sector and
  - sources of funds like private public partnership and dedicated credit lines
- Grants: e.g.: rebates and replacement programs
- Guarantees for loans
- On bill financing
- Tax incentives
- Contracting
- Leasing


International Standard Makers
/ National Standard Makers
• Efficiency testing methods for motors, components and motor systems
• Efficiency classes for motors, components and motor systems
• Energy management
• Energy audits
Manufacturers
(and associations)
• Energy Label and standard data base
• Industry testing laboratory program
• Training efficiency technology experts
National Policy Makers
Direct Legal Action:
• MEPS & Compliance
• Energy Label
• Procurement guide
• Subsidy financing
Power Utilities
• Subsidy programs
• Procurement programs
• Training efficiency managers
Industrial Users
(and associations)
• Data base of national subsidy programs
• Training program for energy efficiency managers
• Recycling program old machines
• Set up of internal motor policy (list of motors)

Preliminary Recommendations for Stakeholders I

- **Government** has to decide on
  - **mandatory energy performance standards (MEPS**) for all relevant motor systems components and there combinations based on international standards and set activities for enforcement, like product registration.
  - *energy efficiency targets*, implementing energy management and energy audit programmes.
  - All those programmes need to be supported by *awareness raising campaigns and financial incentives*.
- **National standard makers** should put emphasis on developing international standards in all relevant areas from motor system components, energy management and energy audits, measurement, verification and benchmarking.

Preliminary Recommendations for Stakeholders II

- **Manufacturers and industrial associations** should develop and/or support
  - *energy label programs*,
  - *set up of testing laboratories,*
  - initiate and *support training programs* and
  - *define purchasing recommendations*.
- **Industrial users** must
  - set *energy saving targets*,
  - *define responsibilities* and
  - implement *processes for training of the key personnel*, for replacement, and improvement of running motor systems.
  - They also should *define requirements for installation.*
- **Electric power utilities** should develop
  - *procurement programs and subsidy programs for end-users* and
  - *use innovative financing instruments* to profit from energy savings recommended to their customers.

First Level: Efficient Equipment, Appliances

Key Measure:
High Efficient Equipment
(Same Performance)

Bild: WEG, http://www.produktion.de/automatisierung/ie4-norm-und-e-motoren-energie-effizienz-macht-dick/

Bild: ANIMEC, http://www.topprodukte.at/de/Products-Lists/topproductscat1/1/topproductscat2/440/topproductscat3/444/topprodukte_sort_listing/x/topprodukte_sort_direction/x/topprodukte_how_many_ds/1.html

Eco-Design Requirements, IEC Standards

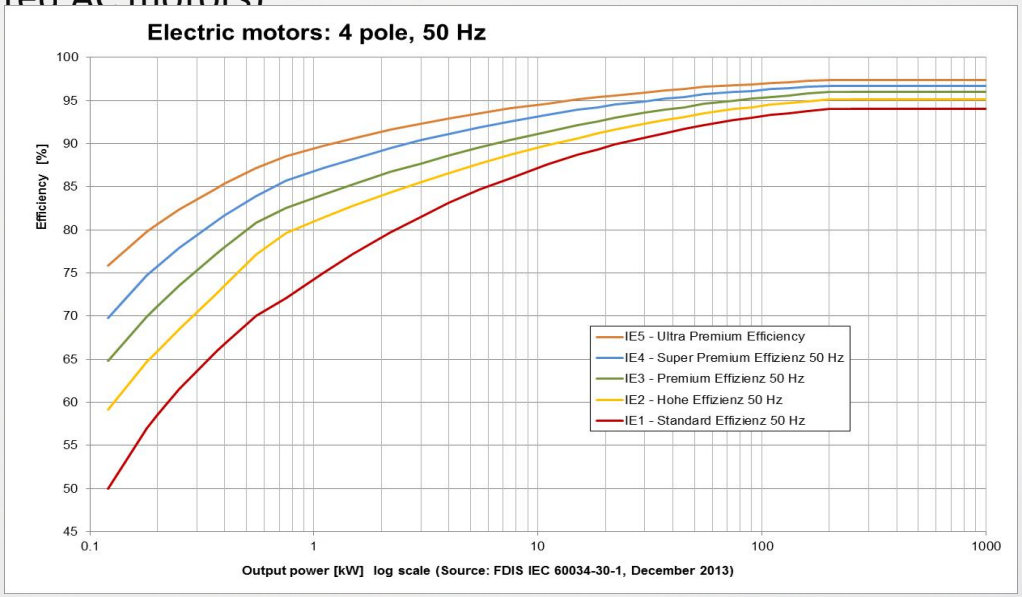
Minimum Energy Performances Standards, e.g. in the EU:

Water Pumps, Fans, Motors, Lighting; In Progress: Process Chillers

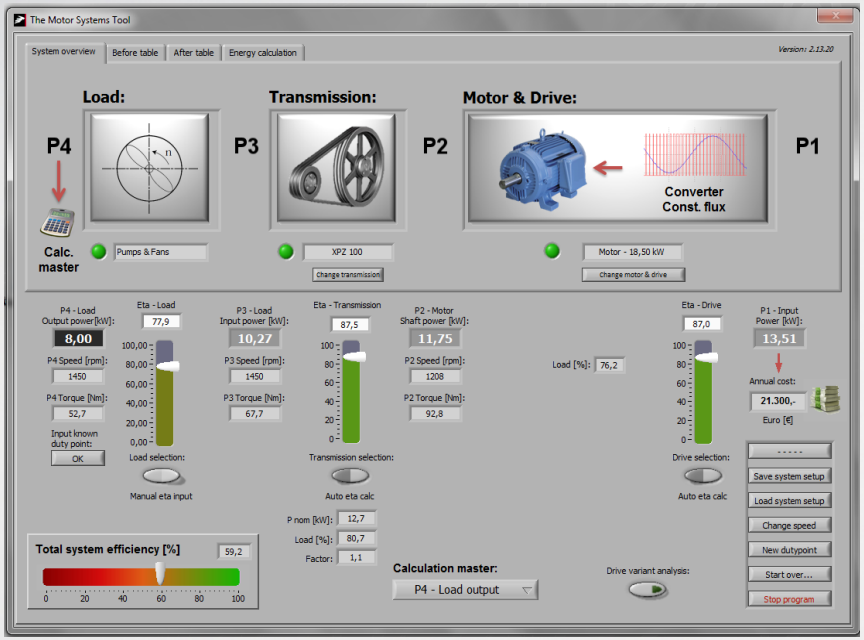
IEC Standards for Efficient Electric Motors (Worldwide), (IEC 60034-30-1, 2014, Efficiency classes of line operated AC motors)

Other relevant policies on this level:

- Certification
- Monitoring & Verification
- Labeling
- Information
- Rebates



2nd Level: Efficient Combination (Motor Core System)

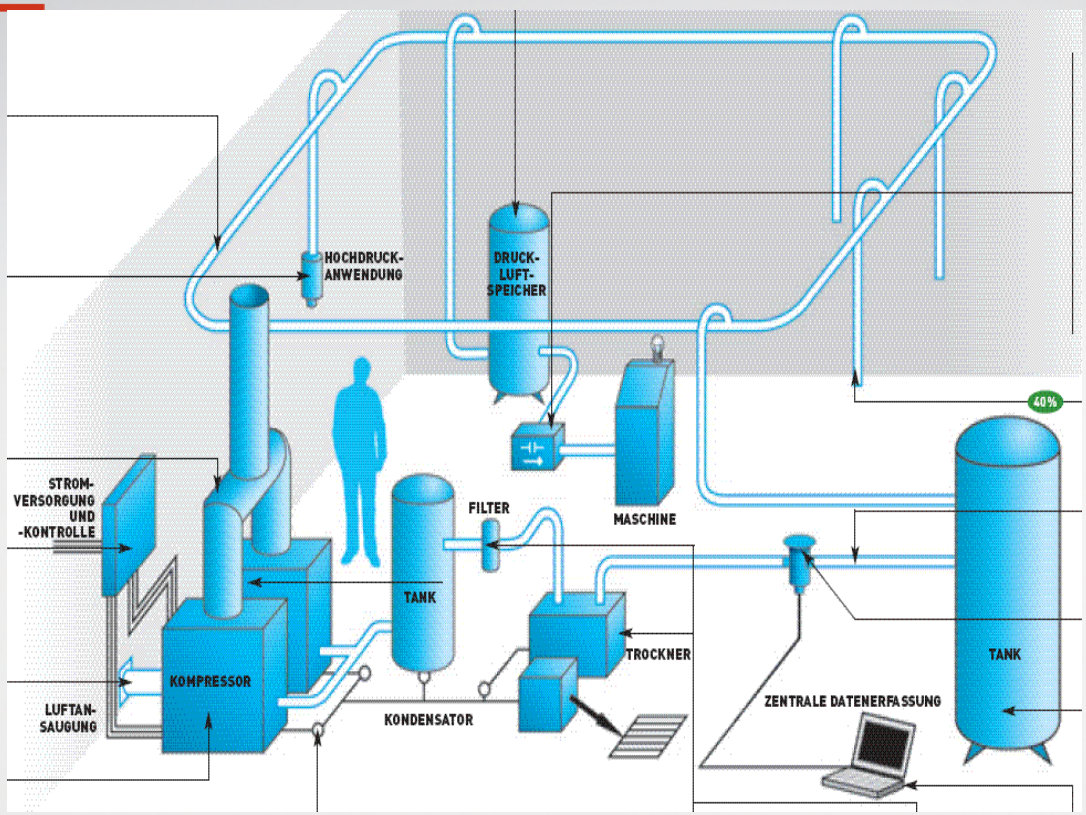


Policy Measures:

- „Motorsystem MEPS“, (Specific Fan Power)
- Training (engineer, installation)
- Tools Development

Motorsystem Tool, Free download: http://www.motorsystems.org/motor-systems-tool

3rd Level: Efficient Systems



Key Measures (example Compressed Air):

- Data Collection, Metering
- Reduction of leakages
- Optimization of the pressure level
- Optimization of the control
- Heat recovery
- Switching off of equipment and users
- Optimization of compressed air use

Technical Guide for Motorsystems, Motor Challenge Programme

Regulation, Standards for Energy Audits

Regulative Energy Efficiency Directive:

Mandatory **Energy Audits** or **Energymanagemen**t for Big Companies (beginning 2015)

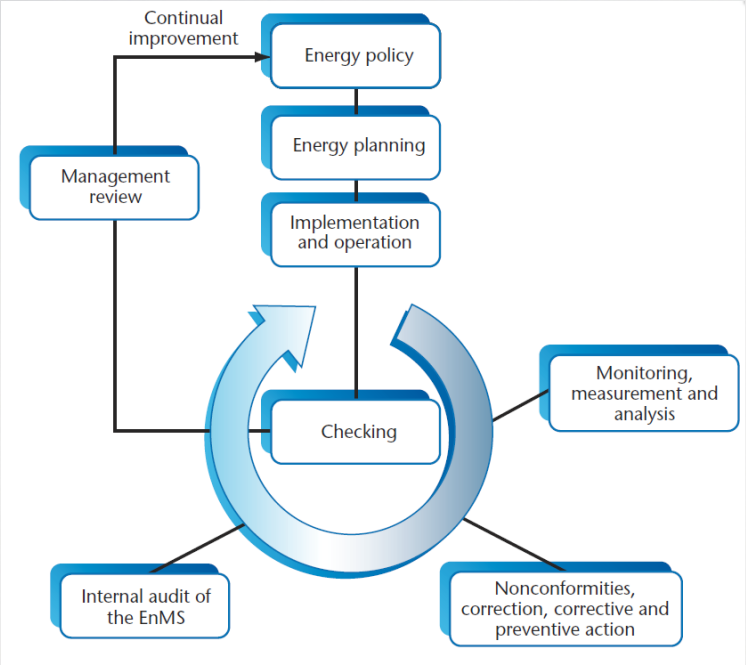
- Energyaudit Standard: EN 16247, ISO 50002
  - EN 16247-1 Energy audits – Part 1: General requirements, published
  - prEN 16247-2 Energy audits – Part 2: Buildings under Approval; 2014-12
  - prEN 16247-3 Energy audits – Part 3: **Processes** under Approval; 2014-12
  - prEN 16247-5 Energy audits – Part 5: **Qualification** of Energy Auditors under drafting; 2014-08

ISO 11011: *Compressed air*- Energy efficiency - Assessment

Other Policy Measures on this level:

- Maintenance, Repair (e.g. Certification of Installers, Green Rewind)
- Mandatory annual control, Re-Comissioning…
- Mandatory Heat Recovery (e.g. for chillers)
- Energymanagement

Highest, Company Level: Energymanagement



Key Measures: Management Commitment, identification of key users, evaluation of saving measures, baseline definition and monitoring, training, procurement

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