Policy Guidelines for Electric Motor Systems
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Background of Policy Guidelines
• The **International Energy Agency (IEA) Implementing Agreement "Energy Efficient End-use Equipment" (4E)** share information and transfer experience in order to support good policy development in the field of energy efficient appliances and equipment.

• **Target of Electric Motor System Annex:**
  – platform for technical and policy exchange within the field of electric motor systems
  – dissemination of best-practice information
  – support standards and policy development processes to improve the energy performance of new and existing motor systems in both industrialized and developing countries.

• **Participating Countries:**

![Flags of participating countries]
TASK MOTOR SYSTEMS POLICY

- US Experience in setting mandatory standards
- Analysis of 11 Instruments from 9 Regions - 2011
- Policy Measures with Definition, Examples, Recommendations - 2014
BACKGROUND OF POLICY GUIDELINES

• There is no single instrument to facilitate energy savings
• Cost efficiency is no guarantee for implementation
• Different elements influence the decision making in industry
• Several barriers exist to buy, install and use energy efficient motor systems
• Therefore a mix of policy instruments is needed to overcome the barriers for energy efficiency
• Policy has to be defined broader than just Minimum Energy Performance Standards (MEPS)
POLICY GUIDELINES AS A “COOK BOOK”

- Framework for policy makers to consider how best to plan and implement a comprehensive energy efficiency strategy for electric motor systems
- Thorough guide to the range of policies most commonly used to stimulate motor efficiency and the key attributes of each type of policy
- The guideline shows policy makers
  - what needs to be taken into account when implementing such policy instruments
  - successful examples considered worthwhile to follow
  - recommendations for implementation
WHY POLICIES ARE NEEDED?

• Motors are built into larger machines by original equipment manufacturers (OEMs), customers demand low prices, total costs are not considered
• Manufacturers hesitant to meet demand for high efficient equipment or struggle to explain advantage of high efficient motors
• Purchasing decisions not consider total cost of ownership
• Energy costs too low
• Complexity of electric motors (know-how, resources)
• Motors oversized, inefficient in low load conditions
• Fear of production standstill
MOTOR POLICY TOOLKIT

- Financial Incentives
- Company Motor Policy
- Labels
- MEPS
- Voluntary Agreements
- Awareness Raising
- Energy Management Programs
- Energy Audit Programs
Elements of the Motor Policy Toolkit
Minimum Energy Performance Standards

• Minimum level of energy performance that products must meet
• Accelerate and focus market transformation towards higher efficiency in motors
• Address barrier that higher efficiency technology is often more expensive
• Strongest instrument to achieve energy efficiency improvements
MEPS Recommendations

• Investigate whether international standards for testing and efficiency classifications are available (E.g. IEC 60043-2-1 (test standard), IEC 60034-30-1 (efficiency classification))
• Apply MEPS similar with other countries within one region
• Learn from experience of other countries
• Assess impact of planned MEPS
• Involve all relevant stakeholders
• Introduce MEPS sequentially (first components, then integrated systems, then more complex systems)
• Update regulation
• Establish registration, monitoring process
• Set up scheme of accredited laboratories
Labeling

- Use of a physical label, displayed on the product itself, to indicate energy performance of product (in terms of energy efficiency)
- Move markets toward improved energy efficiency, provide consumers with the information
- Energy labels facilitate procurement and incentive programs
- Are related to international testing standards
- Strong monitoring, verification and enforcement regime

EXAMPLES
- Chinese Energy Labels for Motors
Labeling Recommendations

• Design must be easy to understand, reflect requirements of labeling scheme
• Registration/authorization procedure for use of the label
• Decide on: labels printed by manufacturer or provided by authority
• Mandatory or voluntary labels
• Decision making process for performance scale for comparative labels (sufficiently broad to allow differentiation)
• Review periodically thresholds
Voluntary Agreements

- Covenant between public authorities and individual firms to improve energy efficiency
- Binding commitment once a party agrees to the agreement
- Quantitative targets
- Commitment from public authorities to support actions
- Effective monitoring system
- May include: Energy audits, preparation of action plans, energy management systems
- Very flexible, high degree of certainty that targets are met, more acceptable to industry

EXAMPLES
- European Motor Challenge Programme
- Netherlands Long Term Agreements
Voluntary Agreements Recommendations

• Consider Motor specific issues in designing Voluntary agreements
  – Set electricity saving targets
  – Define purchasing criteria for motors
  – Motor systems should be identified as target of audits
  – Offer training and capacity building on design, optimisation and maintenance of motor systems
Energy Management Programs

- Systematic approach for reviewing energy need and for implementing measures to reduce consumption
- Energy management programs accelerate uptake of energy management
- Energy management includes: target definition, input/output balance, monitoring of energy consumption, evaluation and tracking of energy efficiency option, trainings, management review...
- International standard ISO 50001 available

EXAMPLES
- Superior Energy Performance Partnership
- Danish Agreement on Industrial EE
- ISO 50001 tax reimbursement Germany
Energy Management Recommendations

- Definition of purpose of program
- Identify what materials and/or trainings are necessary
- Use established tools
- Develop guidance on how motor system efficiency is to be considered (purchasing criteria, guidelines for replacement..)
- Ensure active participation in the program
- Build mechanisms for monitoring the progress of the program
Energy Audit Programs

• Energy audit is a systematic inspection of energy use of a system to identify energy flows and potential for energy efficiency improvements
• Audit programs encourage and support companies to conduct energy audits
• Overcome barriers of know-how, complexity of analysis of systems on-site
• Mandatory or voluntary
• Include
  – Interval at which energy audits should be conducted
  – Specific audit methodology (e.g. ISO 50002, EN 16247, ISO 11011)
  – Reporting obligations
  – Definition of action plans

EXAMPLES
• European EE Directive
• Austrian klima:aktiv
• Swiss Motor-Check Method
• Dutch Green Deal Eff. EMS
• Internat. Standards
Energy Audit Program Recommendations

- Clearly define goals (number of audits or savings achieved)
- Identify what materials are necessary (energy auditing guidelines for motors)
- Define how training qualification of energy auditors will be organized
- Define content and scope of training
- Motor systems as area to be considered
- Monitoring mechanisms
klimaaktiv trainings of energy auditors

Standardised training for 9 days:

1st day: initial energy audit and energy management
2nd day: optimisation of compressed air systems
3rd day: optimisation of pump systems
4th day: optimisation of ventilation and AC systems
5th day: optimisation of steam systems
6th day: optimisation of chiller systems
7th day: optimisation of lighting systems
8th day: optimisation of heat recovery
9th day: measurement & verification plans
**klimaaktiv trainings of energy auditors**

**Participants get from the training:**

- Guidelines to conduct special audits
- Audit tools
- Templates for audit reports
- Contact to klimaaktiv network

- Participants are already energy auditors in different auditor networks (federal programmes)
- This is an advanced, not a basic training
- More than 1,600 participants
Company Motor Policy

- Set of purchasing criteria to consider life cycle costs of the motor
- Establishment of inventory list of motors in use with most important parameters (establish rules when to optimize, replace...)
- Requirements for installation or acceptance test (new equipment, after significant repair)
- Requirements for repair and maintenance

EXAMPLES
- ANSI/EASA Rec. Practice for repair
- Swedish PFE
56% of motors are older than their operating life expectancy; these older motors are 99% too old.

Source: S.A.F.E. 2014
Motor Policy Recommendations

• Purchasing criteria integrated in energy management programs
• Criteria could be defined by manufacturer associations
• National energy audit programs should be required to include motor inventory lists
• Procedures for replacement, installation, repair should be integrated in energy management systems
• Provide training on these issues
Financial Incentives

• Provision of a monetary benefit to individuals to encourage actions that might not occur otherwise
• Tax incentives, rebates, grants, loans, contracting
• Overcome barriers like:
  – high initial costs
  – access to internal funds (energy efficiency projects do not increase gross revenue but reduce costs..)
  – short pay back periods

EXAMPLES
• Swiss EASY Program
• Cash Rebates Xcel Colorado
• KfW-Bank
• San Diego On-bill financing
• UK Enhanced Capital Allowance
• Energy Investment All. NL
• NAESCO Accreditation Program
Swiss EASY Program Using Grants to Encourage Audits

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Measures</th>
<th>Subsidy</th>
</tr>
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<tbody>
<tr>
<td>Step 1</td>
<td>Efficiency potential</td>
<td>100%</td>
</tr>
<tr>
<td>Step 2</td>
<td>Motor list</td>
<td>75%*</td>
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<tr>
<td>Step 3</td>
<td>On-site test</td>
<td>50%</td>
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<tr>
<td>Step 4</td>
<td>Implementation</td>
<td>10%</td>
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</tbody>
</table>

* min. 25 %, max. 75 %.

Source: S.A.F.E. 2014
Financial Incentives Recommendations

- Ensure clear understanding of barriers to be overcome
- Select appropriate instrument, tailored to local circumstances
- Seek active engagement from stakeholders, trade associations and manufacturers
- Consider expected duration (not too short, not too long)
- Ensure that program design is transparent, simple as possible
- Consider sustainability of program
- Build in an evaluation mechanism
Awareness Raising

- General awareness-raising material and activities (best-practice case studies, awards)
- Technical assistance materials, guides and trainings
- Self-assessment materials, such as energy saving/system optimization calculators

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Awareness Raising Recommendations

- Undertake preliminary investigations to understand information gap
- What action you wish the target audience to undertake, which tools are necessary
- Consider how the materials used will be delivered to the audience
- Tailor the materials to the groups
- Engage stakeholders (trade associations, equipment manufacturers, distributors)
- Ensure materials developed are accurate and reliable
Application of the Policy Guidelines
Austria
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Status in Austria</th>
<th>Recommendations for Austria</th>
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</thead>
<tbody>
<tr>
<td><strong>Minimum Standards</strong></td>
<td>Austria part of EU, Eco Design requirements for motors, pumps and fans. For cooling- and compressed air compressors standards are in draft status.</td>
<td>National or international coordinated market surveillance, support for European market surveillance structures: international test-labs, support of EU-wide registration system, incl. database</td>
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<tr>
<td><strong>Labeling</strong></td>
<td>For motors IE1-IE4 is used similar to labels; for pumps, fans, compressors no international label are available;</td>
<td>Support of international labeling initiatives;</td>
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<td><strong>Voluntary Agreements</strong></td>
<td>Voluntary agreements are available, but not broadly used (one national, one local);</td>
<td>Inclusion of purchasing recommendations for high efficient motors; motor systems as topic for energy audits and introduction of energy management systems; offer of trainings</td>
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<td><strong>Energy Management</strong></td>
<td>According to the energy efficiency law big companies have to implement energy management system or conduct energy audits;</td>
<td>Development of guidelines for the integration of motor energy efficiency aspects in energy management systems; trainings for members of the certifying organizations (for ISO 50001) development of national monitoring of the success of energy management systems;</td>
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<tr>
<td><strong>Energy Audits</strong></td>
<td>According to the energy efficiency law big companies have to conduct energy audits (every 4 years); trainings in the field of energy audits for motor systems are accepted to prove the qualification of registered energy auditors; motor systems have to be considered according to annex III of the law.</td>
<td>For big companies it should be checked if enough energy saving measures for motors are implemented; for SMEs: further trainings for energy auditors in this field;</td>
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<td><strong>Company Motor Policy</strong></td>
<td>Status very different depending on companies; there are no trainings in this field;</td>
<td>Development of purchasing criteria with industrial associations; specification for compiling a motor inventory during energy audits; integration of motor systems policy in energy management systems; trainings for stakeholders;</td>
</tr>
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<tr>
<td>Financial Instruments</td>
<td>Energy efficiency measures are subsidized in Austria; there was a special subsidy for high efficient motors; (not enough interest)</td>
<td>Checking of tax reductions for efficiency measures in the field of motor systems; involvement of stakeholders for development of specific financial instruments in this field; information of the banking sector;</td>
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<td>Raising Awareness and Information</td>
<td>In Austria done by klimaaktiv programme: audit guidelines specific for motor systems, trainings, best practice cases, newsletter, award ceremony, benchmarking-tools;</td>
<td>Development of purchasing guidelines for high efficient motor systems together with industrial associations; public procurement in the field of high efficient motors; development of Life Cycle Calculator; further events in the field of energy efficient motor driven systems;</td>
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CONCLUSIONS

• The Policy Guidelines for Electric Motor System can be applied by policy makers as a toolkit
• Depending on the national frame conditions tailor made policies can be implemented
• Use the Policy Guidelines as a guide to develop a national policy framework for motor systems
• Learn from other countries: WHAT worked WHERE and WHY?
• Download the Policy Guideline and start creating your perfect environment for boosting energy efficiency in motor systems!

➔ http://www.iea-4e.org/publications
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