UNIDO: Supporting climate change mitigation through industrial energy efficiency

HLCP side event – Climate Change Mitigation Strategies
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Industrial Energy Efficiency approach

1. Energy efficiency is a measure to reduce

- the investments in energy access
- the need for additional installed power generation capacity
- GHG Emissions from all sectors

For industrialized countries ⇒ a measure for increased competitiveness

For non industrialized countries ⇒ way to achieve economic growth by decoupling energy intensive activities (iron and steel, cement, oil refining, etc) from GHG emissions increase

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1. UNIDO, mandate and energy and climate change programme

2. Energy Efficiency solutions
   - Energy Management Standards and ISO 50001
   - Systems optimization
   - Energy standards

3. Conclusions

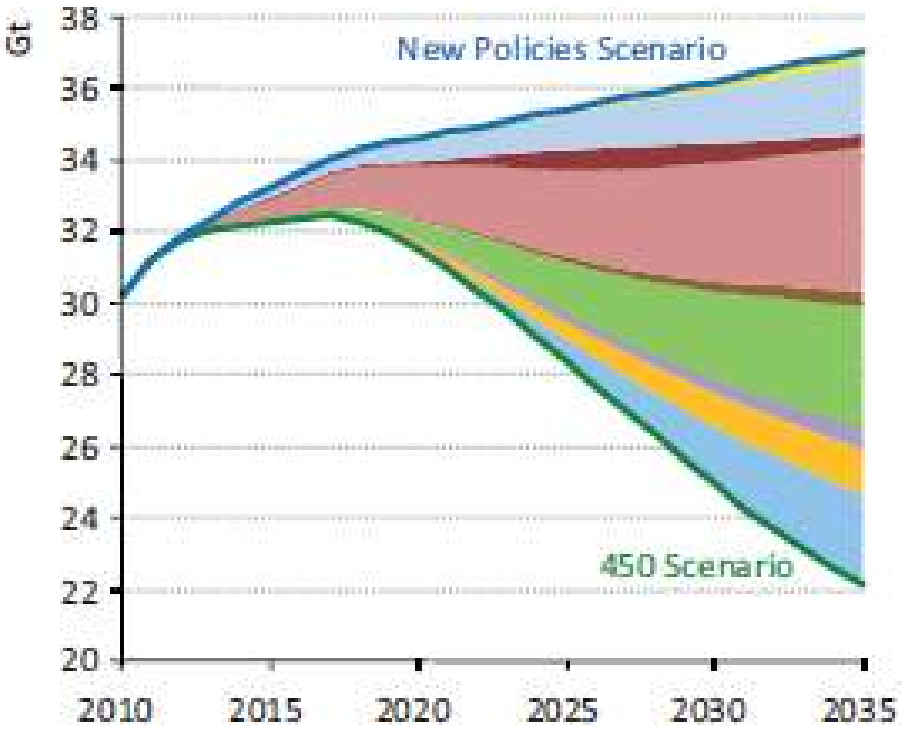
UNIDO
(www.unido.org)

- ✓ **The United Nations Industrial Development Organization (UNIDO)** is a specialized agency of the United Nations with the mandate is:
  - i. to promote and accelerate **sustainable industrial development** in developing countries and economies in transition;
  - ii. to work towards **improving living conditions** in the world's poorest countries by drawing on its combined global resources and expertise.

- ✓ UNIDO activities are focused on three thematic priorities:
  1) **POVERTY REDUCTION THROUGH PRODUCTIVE ACTIVITIES**
  2) **TRADE CAPACITY BUILDING**
  3) **ENERGY AND ENVIRONMENT**

The Context

Climate Change Policy Scenarios



CO_2 abatement	2020	2035
Activity	2%	2%
End-use efficiency	18%	13%
Power plant efficiency	3%	2%
Electricity savings	50%	27%
Fuel and technology switching in end-uses	2%	3%
Renewables	15%	23%
Biofuels	2%	4%
Nuclear	5%	8%
CCS	4%	17%
Total (Gt CO_2)	**3.1**	**15.0**

Source: IEA World Energy Outlook 2012

SE4A, a vision for 2030

A global initiative launched by the UN SG and guided by his High Level Group that brings all key actors to the table to make sustainable energy for all a reality by 2030

SUSTAINABLE ENERGY FOR ALL

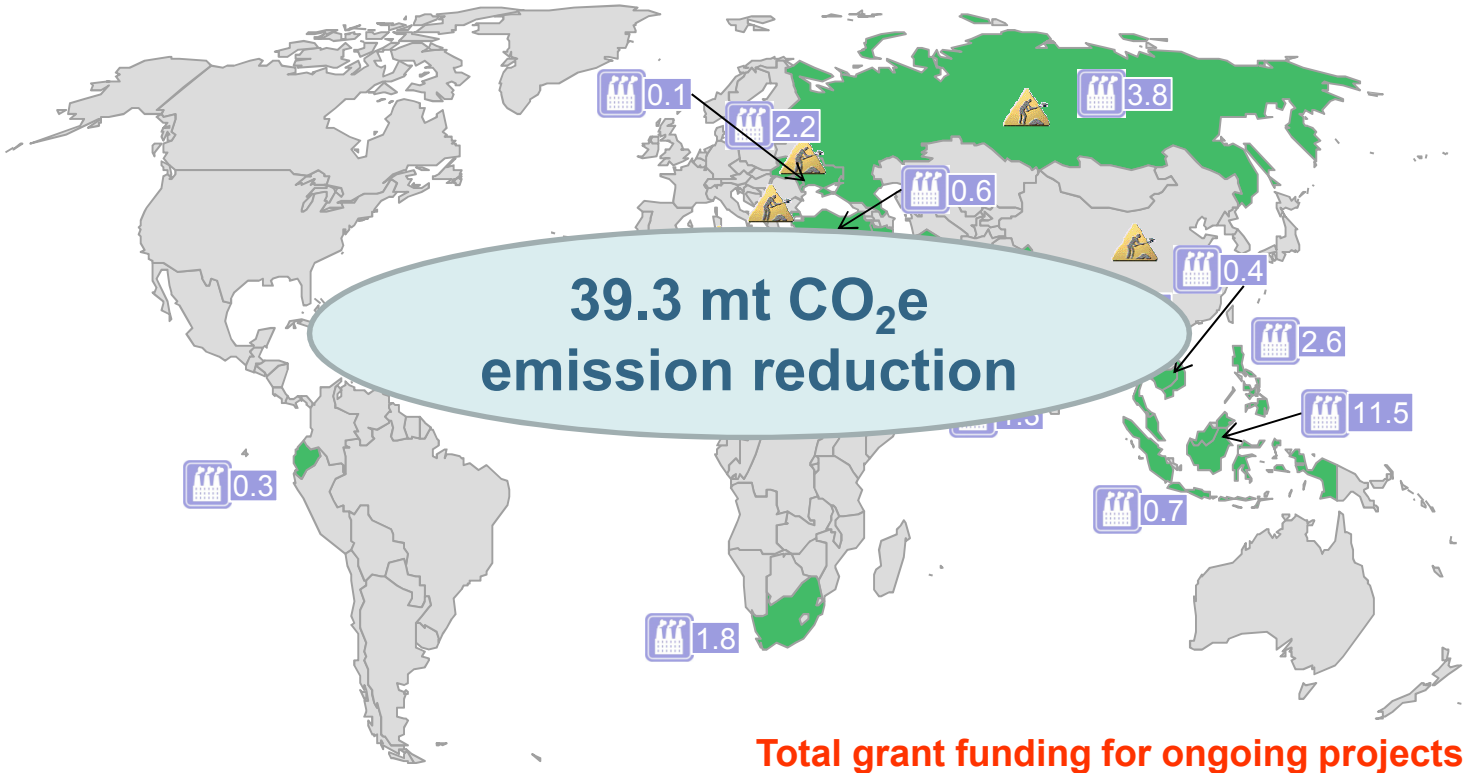
Universal Energy Access

Double Share of RE in Global Energy Mix

Double the global rate of improvement of Energy Efficiency

UNIDO IEE project portfolio covering 18 countries

Burkina Faso
China
Ecuador
Egypt
India
Indonesia
Iran
Malaysia
Macedonia
Moldova
Philippines
Russia
Thailand
Tunisia
Turkey
Viet Nam
Ukraine
South Africa



Ongoing projects

Projects under development

0.3 Direct CO_2e emission reduction in mil. tons over 10 yrs

Total grant funding for ongoing projects
USD 53 million

Expected co-financing
USD 575 million

UNIDO activities in energy and climate change

Activity Areas:

Industrial Energy Efficiency	•Energy management and product standards •Systems Optimization •Benchmarking for energy use and GHG, •Monitoring, Reporting and Verification
Low Carbon Technologies	•Carbon neutral energy sources: Hydrogen •Carbon Capture and Storage (CCS) for Industrial Applications •Resource efficient technologies
Renewable Energy Technologies	•Productive Uses : hybrid mini grids, on/off grid •Industrial Applications •RE business models and enterprises

Why EnMS Standards?

Why Energy Management Systems & Standards

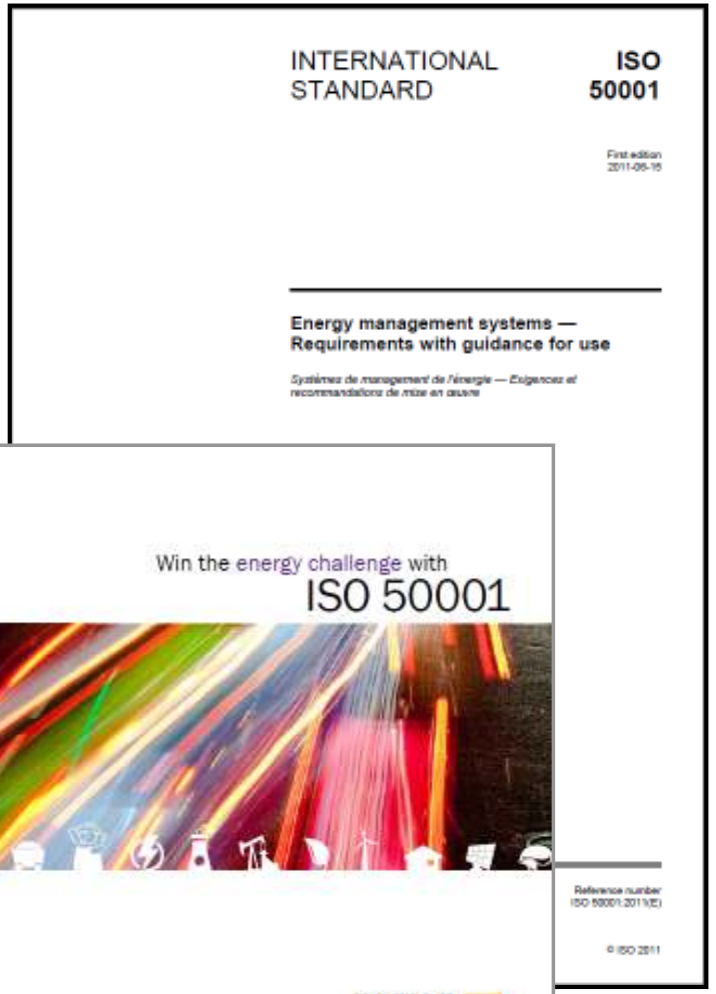
- ✓ Most energy efficiency in industry is achieved through changes in how energy is managed rather than through installation of new technologies
- ✓ Energy management systems (EnMS) standards provide proven policy best-practice to promote and support sustainable IEE
- ✓ Most industrial enterprises that implemented EnMS achieved average annual energy intensity reductions of 2-3% against 1% reduction of BAU

Energy management systems provides:

- ✓ A framework for understanding significant energy use
- ✓ Action Plans to continually improve energy performance
- ✓ Metrics to track and quantify energy performance against a baseline of energy consumption
- ✓ Documentation to sustain energy performance improvements over time and change of personnel

ISO 50001 - Background

- ✓ March 2007 - UNIDO Meeting on EnMS in Industry → Recommendation to ISO Secretariat to consider developing an International EnMS Standard
- ✓ ISO 50001 developed by ISO Project Committee 242 – Energy Management, established in Feb 2008
  - Membership
    - 45 countries full member, incl. Russia
    - 12 countries as observers
    - 11 organizations-in-liaison, incl. UNIDO
- ✓ ISO 50001 developed in less than 3 years (record time!)



ISO 50001 – Energy management system

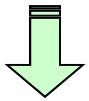
Source: ISO 50001

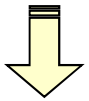
- ✓ **ISO 50001** is based on the **Plan-Do-Check-Act** continual improvement framework **like ISO 9001 and ISO 14001**
- ✓ Compliance with the standard
  - Self-evaluation and **self- declaration** of conformance
  - **Certification** by external organization

UNIDO EnMS/ISO 50001 Capacity Building Programme

The Objective

- ✓ Transfer international best-practices/technologies for IEE, i.e. EnMS and ISO 50001, to a cadre of national experts
- ✓ Promote and support EnMS and EE implementation in manufacturing enterprises
- ✓ Catalyze and contribute to the transformation of national market for IEE services and products





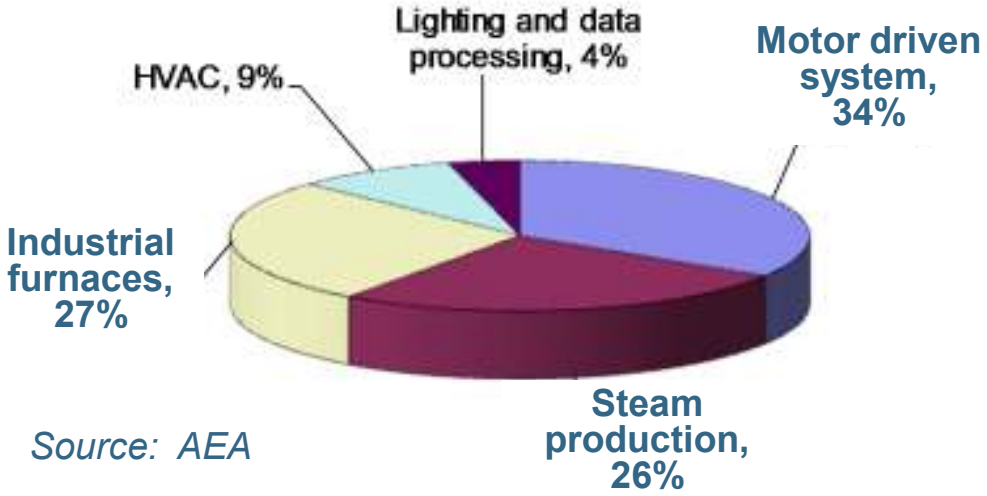
Reduce GHG emissions

Increase competitiveness

Why Energy Systems Optimization?

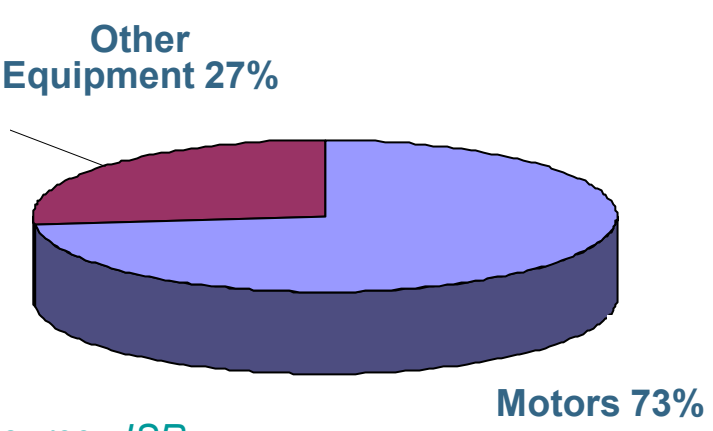
Why motor-driven systems matter in industry

- ✓ The energy saving opportunities from systems are far greater than from individual components
  - 2-5 % efficiency gains for individual components
  - 15-30 % on average through system optimization
- ✓ Steam systems and motor driven systems (compressed-air, pumps, fans, etc.) account for 50 to 60% of final manufacturing energy use



Source: AEA

Energy consumption in Austrian Manufacturing Sector

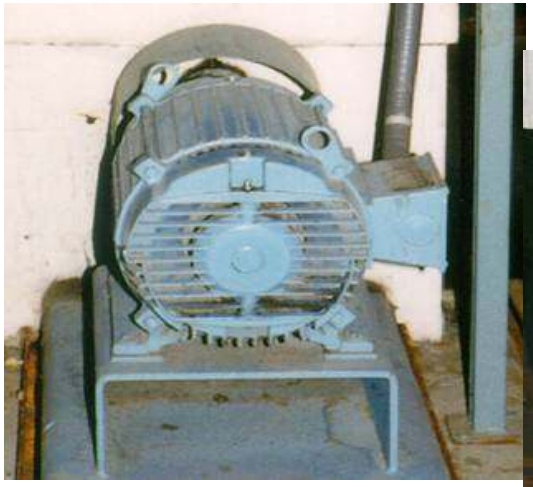


Source: ISR

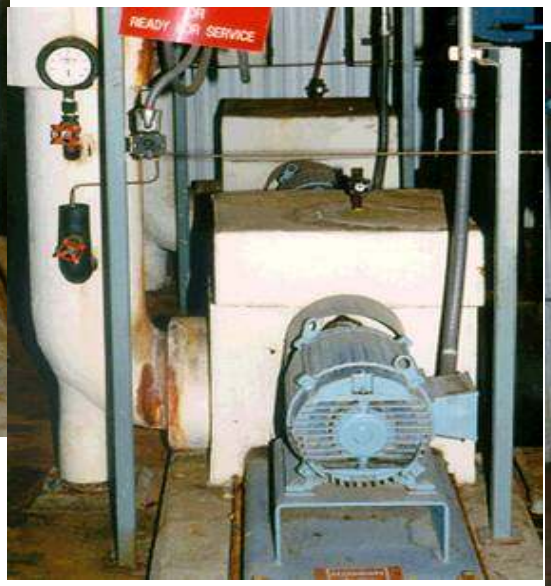
Industrial Electricity Consumption - EU

Energy System Performance

Example



15 kW motor efficiency = 91%



Combined motor & pump efficiency = 59%

System efficiency = 13%

Courtesy of Don Casada,
Diagnostic Solutions and US Department of Energy

Barriers to realizing efficiency potential of motor-systems

- ✓ Lack of transparent methodology for quantifying the EE potential and cost effectiveness (to guide policy makers);
- ✓ Lack of awareness of energy savings opportunities;
- ✓ Lack of support from management to undertake motor system energy efficiency projects, and;
- ✓ Limited understanding on how to identify and implement opportunities for energy saving in new and existing systems.

A new PPP for Motor-System Efficiency

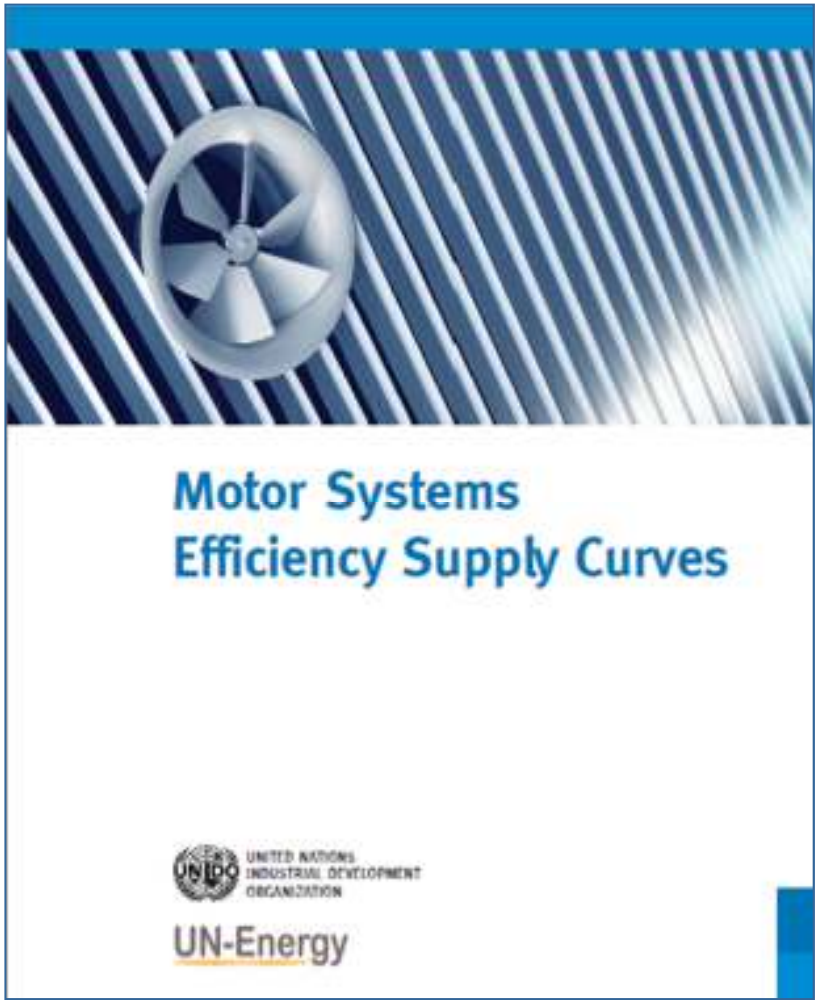
Purpose

Develop motor system efficiency indicators that can serve to inform policy makers, industry and markets; and to direct policy initiatives towards motor systems to realize very substantial energy savings opportunities.

Suggested approaches

- Bottom-up indicator industrial process based (e.g. kWh_e/m^3 liquid transported in a pump system
- Top-down indicator, industrial sector based (e.g. kWh_e/t of cement)
- Industrial efficiency benchmarks (based on UNIDO sectorial indicators in its Working Paper "Global Industrial Energy Efficiency Benchmarking") plant benchmarks based on BPT/BAT and sectorial benchmarks based on specific energy consumption, e.g. % of system energy use as a total energy use by sector

ISO 50001 requirements: Energy Performance Indicators (e.g., kWh/unit of outputs)

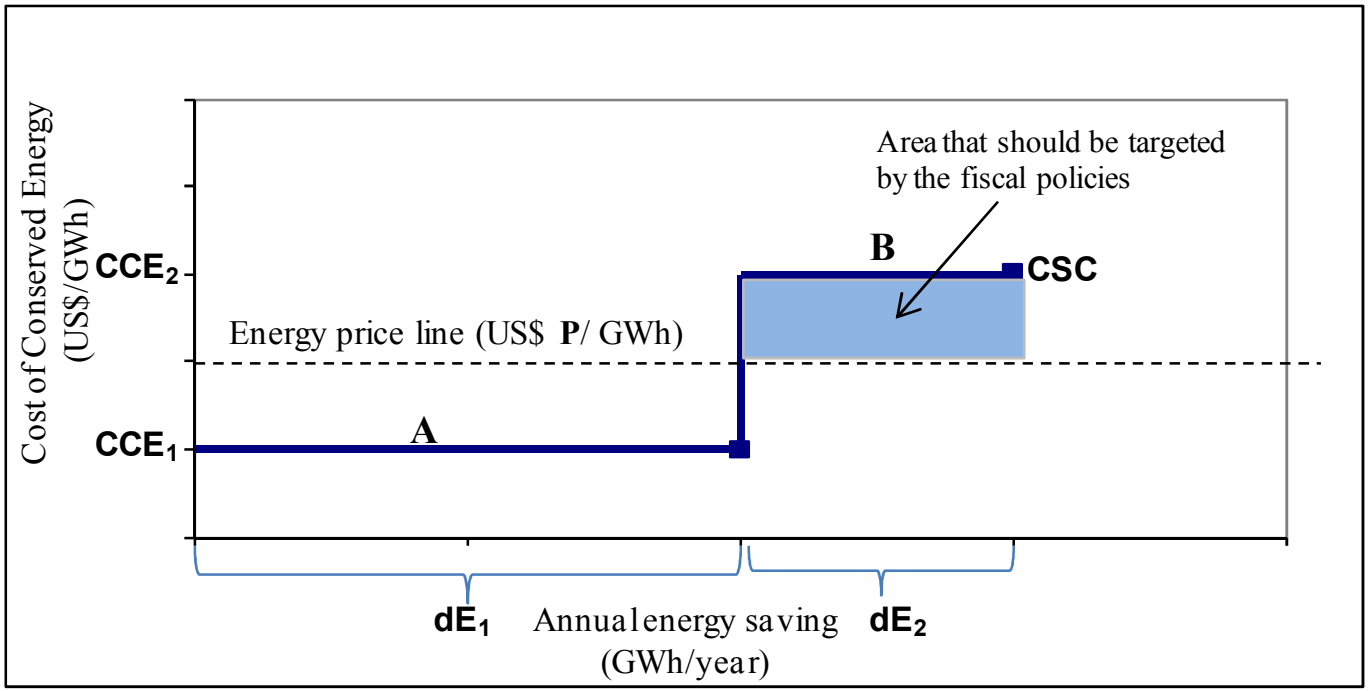


- ✓ Report and supporting analyses represent an initial effort to address methodological barriers data collection and analytical framework for quantifying energy efficiency potential of motor systems;
- ✓ Supports greater global acceptance of the energy efficiency potential of motor systems, through the construction of a series of motor system efficiency supply curves, by motor system and by country studied.
- ✓ Available at UN Energy Knowledge Network www.un-energy.org

The Conservation Supply Curve (CSC)

- ✓ is an analytical tool that shows the energy conservation potential as a function of the marginal Cost of Conserved Energy

$$\text{Cost of Conserved Energy (CCE)} = \frac{\text{Annualized capital cost + Annual change in O\&M costs}}{\text{Annual energy savings}}$$

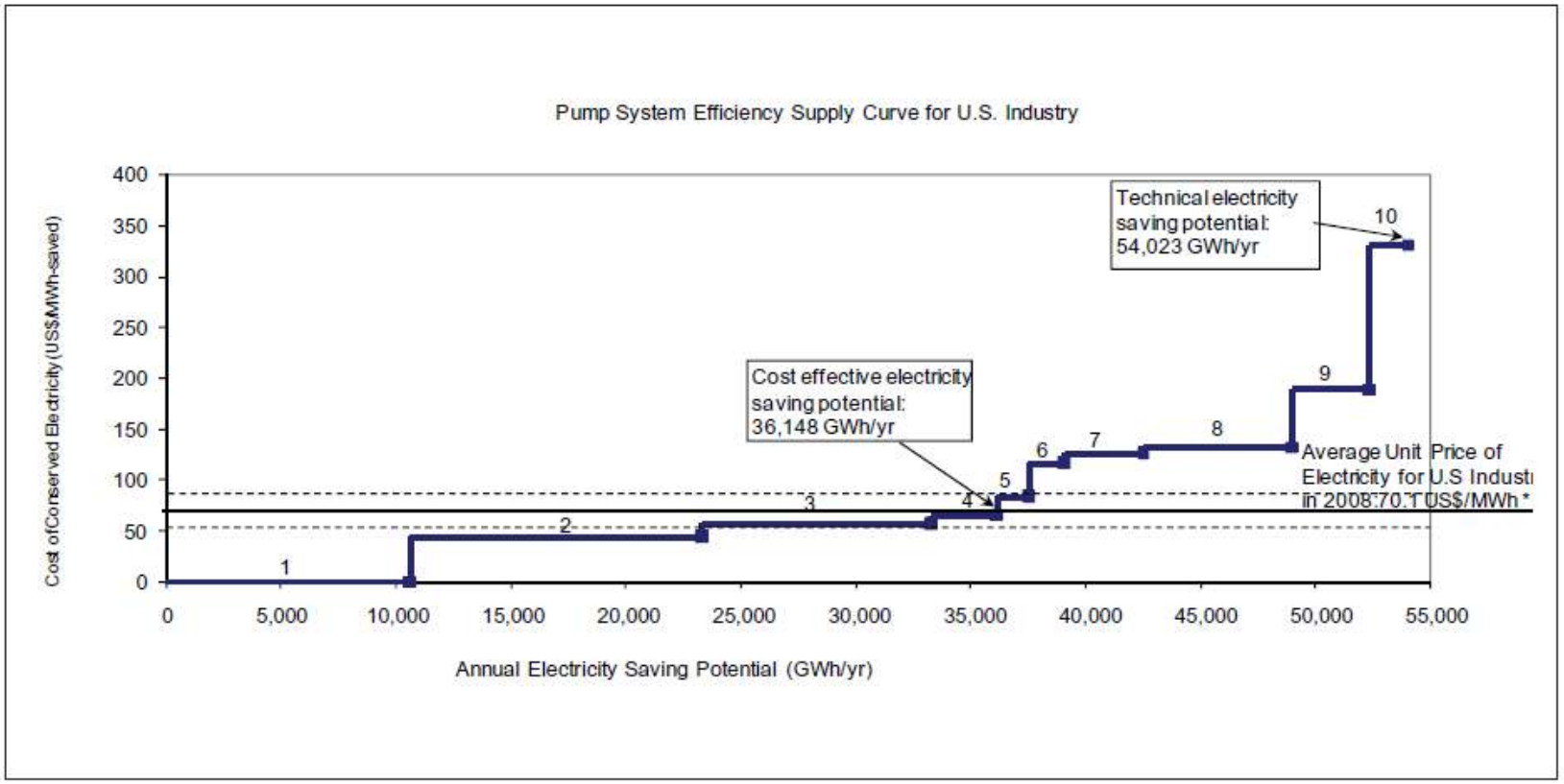


Schematic view of a Conservation Supply Curve (CSC)

dE: Annual energy saving ; P: Energy price

Motor-System Efficiency Supply Cost Curves

Figure 4: US Pumping System Efficiency Supply Curve



* The dotted lines represent the range of price from the sensitivity analysis- see Section 4.5.

NOTE: this supply curve is intended to provide an indicator of the relative cost-effectiveness of system energy efficiency measures at the national level. The cost-effectiveness of individual measures will vary based on site-specific conditions.

Conclusions

- ✓ Industry contributes directly and indirectly about 37% of the global greenhouse gas emissions.
- ✓ Total energy-related industrial emissions have grown by 65% and will continue to grow, particularly in developing countries and industrialization progresses
- ✓ Full use of available mitigation options is not being made in either industrialized or developing nations due to a number of barriers like:

  - limited access to capital
  - lack of management attention,
  - insufficient availability of knowledge, or qualified service providers

Although industry has almost continuously improved its energy efficiency over the past decades, energy efficiency remains the most cost-effective option for GHG mitigation for the next decades

Thank you for your attention

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