



Implementing energy management programs in industry

Marina Ploutakhina

Chief, Industrial Energy Efficiency

UNIDO Industrial Energy Efficiency Unit

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UNIDO (www.unido.org)

- ✓ **The United Nations Industrial Development Organization (UNIDO)** is a specialized agency of the United Nations with the mandate is:

- to promote and accelerate **inclusive and sustainable industrial development** in developing countries and economies in transition;
- to work towards **eradicating poverty and improving living conditions** in the world's poorest countries by supporting the development of productive capacities

- ✓ UNIDO activities are focused on three thematic priorities:

- 1) **POVERTY REDUCTION THROUGH PRODUCTIVE ACTIVITIES**
- 2) **TRADE CAPACITY BUILDING**
- 3) **ENERGY AND ENVIRONMENT**

Content

1. UNIDO programs and projects on EnMS
2. Some lessons from implementation
3. Concluding remarks on relevance to the new industrial safety agenda

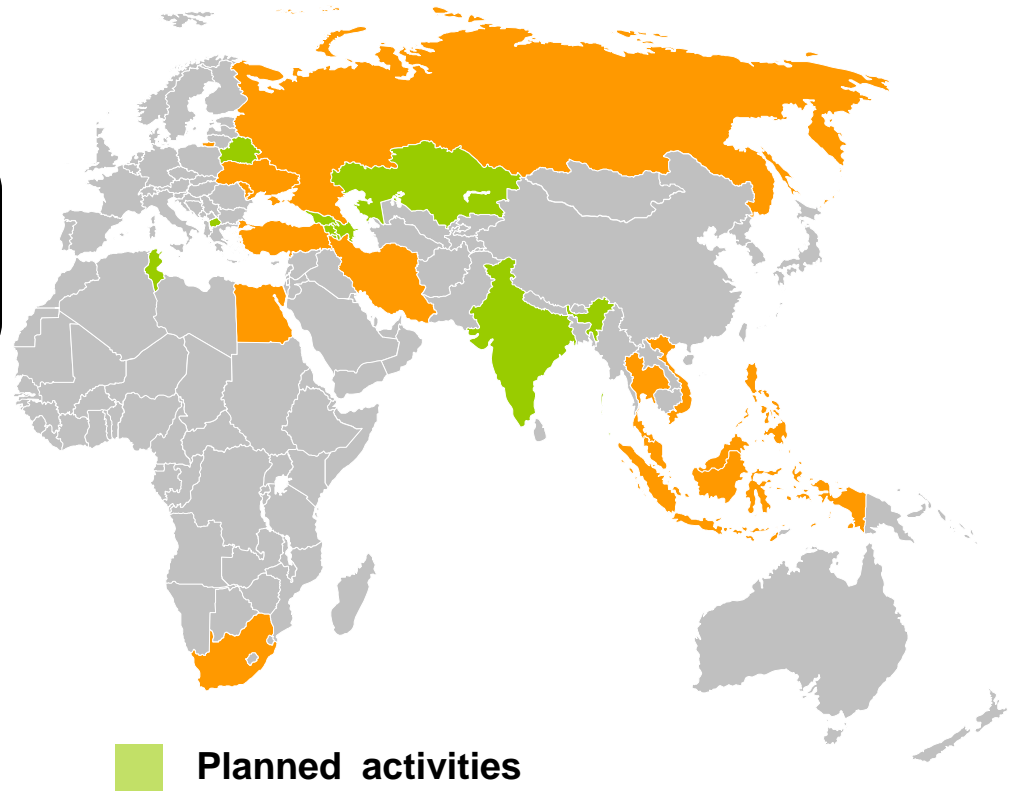
UNIDO Program on Energy Management System



Operational in 17 countries
Planned activities in 10 countries

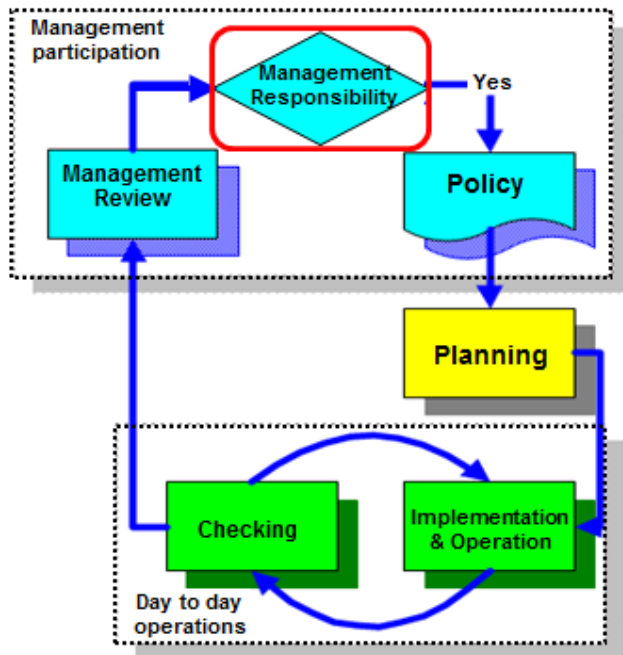
Operational

- | | |
|--------------|-------------|
| South Africa | Viet Nam |
| Moldova | Philippines |
| Russia | Egypt |
| Turkey | Indonesia |
| Ecuador | Iran |
| Malaysia | Ukraine |
| Thailand | Colombia |



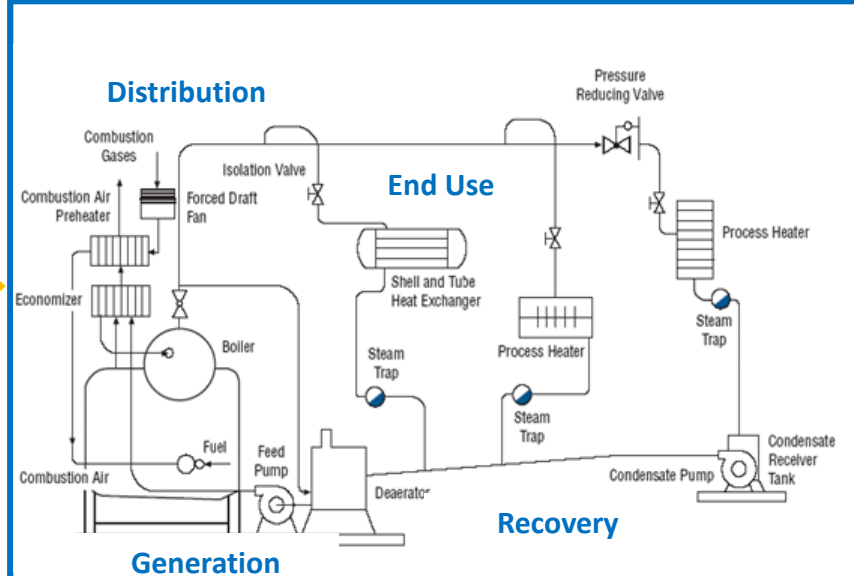
UNIDO Industrial Energy Efficiency Focus Areas

Energy Management Systems



- Integrate Energy Efficiency
- Energy Savings & Investments

Energy System Optimization

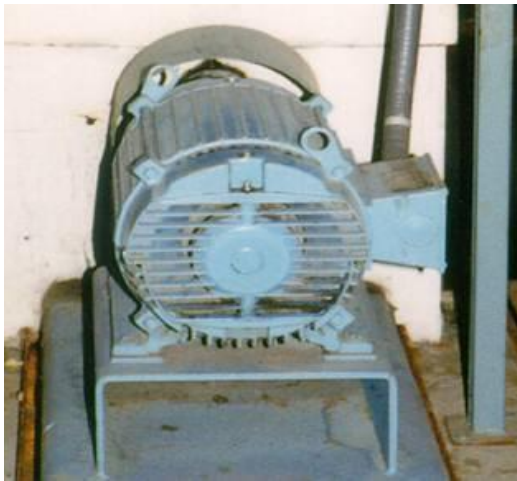


N.B: Auxiliary energy systems account for over 50% of final manufacturing energy consumption

- 15-30% average efficiency gains
- 4-5% of individual components

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

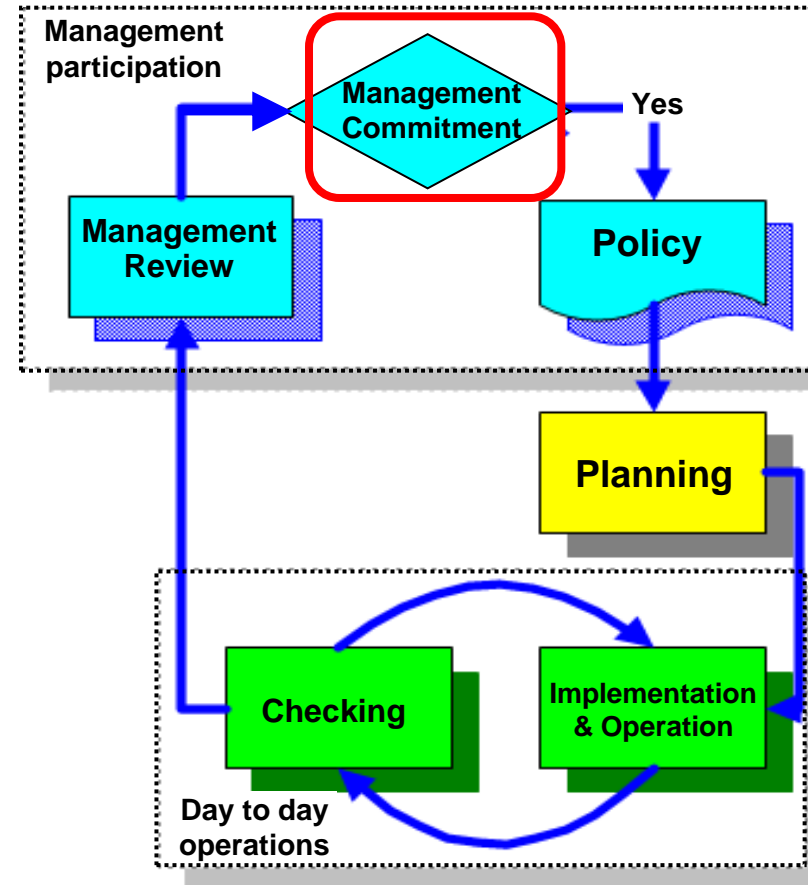
What we mean by EnMS and Standard:

✓ Energy Management System (EnMS)

- Systematic and structured approach to the management of energy use

✓ EnMS Standard

- Standardised approach to implementing an EnMS
- An organization may decide to base its EnMS on a standard e.g. ISO 50001:2011 (*This is best practice*)



Schematic overview of EnMS

1. Why Energy Management Systems

BARRIERS to Energy Efficiency

- ✓ Management focus is on production & not on energy efficiency
- ✓ Lack of information and understanding of financial and qualitative benefits
- ✓ Lack of adequate technical skills for identifying, developing and implementing EE measures and projects
- ✓ Poor monitoring systems and data
- ✓ First costs more important than recurring costs → disconnection between capital and operating budgets
- ✓ When EE knowledge exists it very often resides with individuals rather than with the company/ organization → sustainability risk
- ✓ Financing

1. Why Energy Management Systems

The evidence: Most energy efficiency in industry is achieved through changes in ***how energy is managed*** rather than through installation of new technologies

The problem: *Energy efficiency is not integrated into daily management practices*

The solution: *A systematic approach is required & top management must be engaged in the management of energy on an ongoing basis*

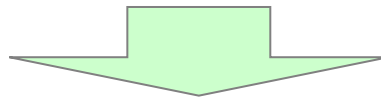
1. What does EnMS achieve?

- ✓ Management focus
- ✓ Systematic activity
- ✓ Obligation to train and raise awareness
- ✓ Obligation to provide resources
- ✓ Continuity through changes of personnel



**Energy and
Cost Savings**

**Continual
Improvement**



- ❑ Most industrial enterprises that have implemented EnMS achieved average annual energy intensity reductions of 2-3% against 1% reduction of business as usual (IRL, NET, DEN, USA)
- ❑ For companies new to energy management, savings during the first 2 years are 10-20%

2. ISO 50001 – Early implementers

✓ Industry

- IBM, Intel, Samsung, Diageo (Guinness), Pfizer, ABB, Schneider Electric, Alcoa, Irish Cement, Coca Cola, Repsol Refinery, China Steel Corporation, Hyundai Motors, Tokyo Energy Service, Bouygues Telecom, etc.

✓ Transport

- Brussels Airport, Arcadia Ship Management Co Ltd, Northern Marine Management, Northern Rail, etc.

✓ Services

- Google Ireland, Equinix Data Centre, Heritage Ahungalla Hotel, University College Cork, etc.

Pilot results: UNIDO-IEE Project in South Africa



ArcelorMittal

- Electricity demand : 160 MW
- Daily water consumption: 8 000 kilo liters (world best for an integrated steel plant)
- Manpower: 548 permanent employees
- Sales output: 1,2 million ton HRC/annum



Energy Efficiency Achievements 2011

Energy Management System Implemented

No. of Projects/Measures	11
Total Capital Investment (USD)	0
2011 Gross Financial Savings (USD)	9,076,000
Overall Payback Period (in years)	0
2011 Energy Savings (GWh)	79.95
2011 GHG Reductions (tons CO ₂)	77,000

Pilot results: UNIDO-IEE Project in Moldova



- Dairy open joint stock company (about 10% of Moldovan market)
- 185 employees
- Management started to look into EE in 2009 to reduce production costs and impact of increased energy prices

Value of EnMS/EE investments planned in 2012 for 2013-2014: 410,000 USD

Implementation by end of 2014: 80%



LACTIS improvements 2011-2012	
Energy Management System Implemented	
No. of Measures/Projects	11
Total Capital Investment (USD)	6,900
Gross Monetary Savings (USD)	22,000
Overall Payback Period (in years)	0.32
Annual Energy Savings (MWh)	328
2011 GHG Reductions (tons CO ₂)	160

South Africa Programme Results - *Training Outcomes*



- ✓ 150 Training Workshops Nationally.
- ✓ +2 300 Engineers, Technicians and Managers trained.
- ✓ 112 EnMS/ES0 National Experts Qualified.
- ✓ 32 National EnMS/ES0 Certified Trainers.

Cooperation with Russian Federation

Collaboration with Russian Energy Agency (REA) and other Russian Federation Ministries and Institutions

- Training of Federal Government officials on IEE policy best-practices
- UNIDO-REA training of Regional Government officials
- Joint events with the Analytical Centre of the Russian Federation
- Policy research and development to support implementation of the Federal Programme for Energy Efficiency



✓ Energy Efficiency Obligations and White Certificates

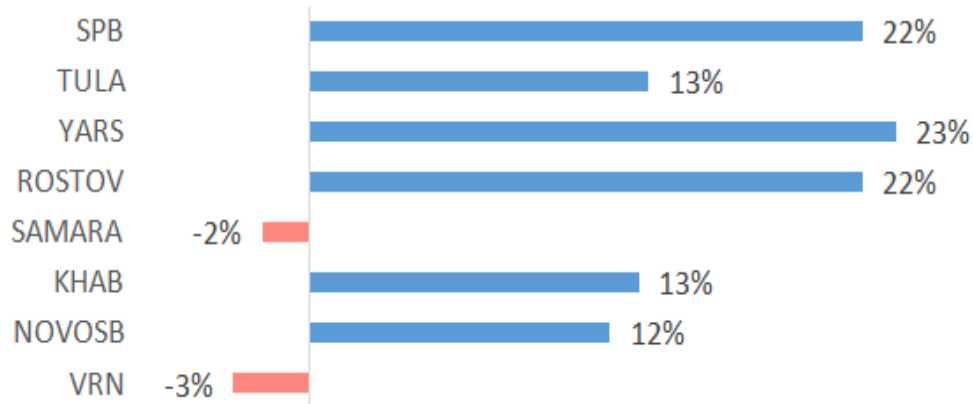
Poverty Reduction through Productive Activities • Trade Capacity Building • Energy and Environment

✓ Incentives for EnMS implementation and strengthening

Energy Management at Baltika breweries

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7	Plant 8	Sub-Total
Water	-1,7	-0,8	-0,4	-1,1	-1,2	-0,1	-0,8	-0,1	-6,2
Electricity	-0,8	-2,2	-4,7	-3,2	0,4	-1,7	-2,2	0,7	-13,6
Heat	0,0	-0,2	0,0	-2,0	3,0	-5,3	-1,4	1,7	-4,3
Total (RUB)	-2,6	-3,1	-5,2	-6,3	2,3	-7,2	-4,4	2,3	-24,1

Table 1 Savings in million Rubles from September 2014 to February achieved without capital investment



This savings achieved without investments

2. ISO 50001 – The importance of a Programmatic Context

- ✓ National EnMS standards and ISO 50001 successful where:
 - Part of larger EE policy programs, targeted primarily to large industrial plants and energy consumers
 - Technical assistance for implementation is available (training and expert services)
 - Case studies are used to publicize benefits
 - Public recognition is provided for outstanding performers
 - **Financial** incentives for compliance or penalties for non-compliance
- ✓ Pilot experiences of mandatory ISO 50001 implementation (China, Germany, Kazakhstan)

2. ISO 50001 – The importance of a Programmatic Context

	Voluntary or Mandatory Standard	Financial incentives for Compliance	Technical Assist. Available	Penalties for Non-Compliance	Recognition Program	Linked to Voluntary Agreement	Training Avail. on Standard Compliance	Reporting to Public Entity Required	Industrial Systems Training Available	Market Penetration by Industrial Energy Use
Denmark	Vol	Yes*	Yes	Yes*	Yes	Yes	Yes	Yes	Lim	60%
Ireland	Vol	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	25%
Sweden	Vol	Yes**	Yes	Yes**	Yes	Yes	No	Yes	No	50%e
United States	Vol	No	Yes	No	Yes	No	Yes	No	Yes	<5%
Japan[^]	Man	No	Yes	Yes	Yes	No	Yes	Yes	Yes	90%

Source: Adapted from A. McKane for UNIDO, 2007



5. ISO 50000 series – new standards

Since the publication of ISO 50001, the ISO Technical Committee developed new standards:

ISO 50002 – Energy audits

ISO 50003 – Requirements for bodies providing audit and certification of EnMS

ISO 50004 – Guidance for the implementation, maintenance and improvement of an EnMS

ISO 50006 – Measuring energy performance using energy baselines (EnBs) and energy performance indicators (EnPIs)

ISO 50015 – Measurement and verification of organizational energy performance- General principles and guidelines (JWG with ISO/TC 257)

Legend: DIS = Draft International Standard; CD = Committee Draft



Thank You for your attention!

For more information:

Marina Ploutakhina

Industrial Energy Efficiency Unit

UNIDO

Vienna International Centre

P.O. Box 300

A-1400 Vienna, Austria

Tel: 0043 1 26026 5051

E-mail: M.Ploutakhina@unido.org