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International experiences with energy management standards supporting policies

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Hotel Ickale, Ankara, Turkey
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Presentation Outline

1. Overview
2. National EnMS experiences around the world
    a. The Netherlands
    b. The United States
    c. South Korea
    d. Japan
    e. The United Kingdom

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Supportive policies of national EnMS - Overview

- In countries with existing energy management standards:
  - ✓ Energy management standards are typically voluntary
  - ✓ Part of larger programs target primarily large industrial plants
  - ✓ Technical assistance is available (training and expert services)
  - ✓ Case studies are used to publicize benefits
  - ✓ Public recognition is provided for outstanding performers
  - ✓ Networking to share information is promoted and facilitated

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Supportive policies of national EnMS - Overview

- In addition, most countries:
  - ✓ Offer financial incentives for compliance, usually as part of a target-setting agreement[1]
  - ✓ Provide training on standards implementation and compliance
  - ✓ Provide opportunities for companies to network and learn from each other
  - ✓ Several countries also offer supplemental training, i.e. energy auditing and system optimization

National EnMS experiences around the world

The Netherlands

Ronald Vermeeren

Agentschap NL

Target-setting agreements, financial incentives and penalties, energy audits, energy management systems

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Long Term Agreements: An overview

- **1st Long Term Agreement (LTA) program started in 1992**
  - Goal: 20% energy efficiency improvement by 2000 (1989 baseline)
  - Over 90% of energy consumption in industries covered by a Long Term Agreement
- **LTA2 (2001 – 2012)**
  - 950 companies equals to 15% of industrial energy consumption
  - Negotiated voluntary agreement between: **Sector Organizations** (and it's member companies), **Ministry of Economic Affairs**, and **Competent Authorities** (Municipal and Provinces Associations)
  - **LTA 2 approach based on Energy Management Systems**
  - LTA 2 experience brought into CEN/CENELEC TF 189 for developing the European Energy Management Standard EN16001

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Long Term Agreements: An overview

- **LTA3 (2009-2020): LTA2 + energy intensive companies (> 0,5 PJ)**
  - Adds up to 1100 companies equals 95% of industrial energy consumption
- **Energy Centre Netherlands**
  - 10.000 companies equals 5% of industrial energy consumption

Agentschap provides support to companies

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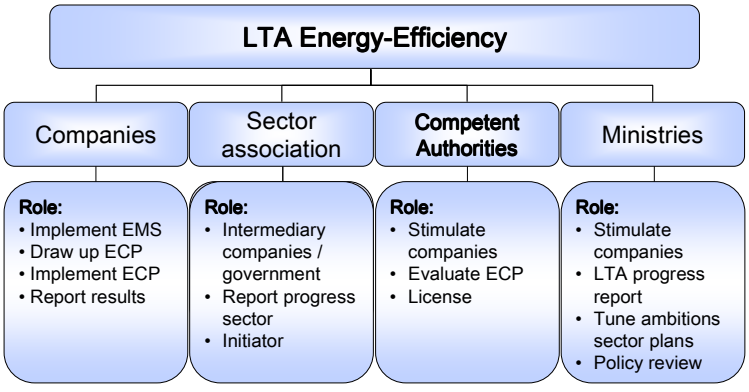
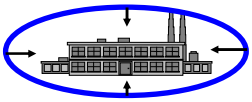
Long Term Agreements : **Organization**



Agentschap is <u>not</u> a participant of the LTA agreement

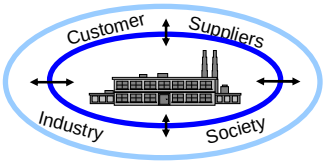
Long Term Agreements: **Scope**

LTA 1: Energy Efficiency



LTA 2: Life Cycle Efficiency

- Renewable energy
- Chain efficiency
- Sustainable production



LTA 3: Includes Energy and Life Cycle Efficiency Road Maps up to 2030

Long Term Agreements: **Results**

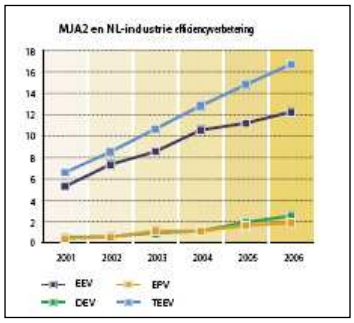
Energy Efficiency improvement for

non LTA organizations:

Autonomously:	**0.7 %**
Policy driven:	**0.3 %**
Total:	**1.0 %**

LTA organizations (2001-2007):

Total average:	**2.4%**



30% over 15 years

This doesn't come easy: a structural approach is needed
It is called Energy Management!

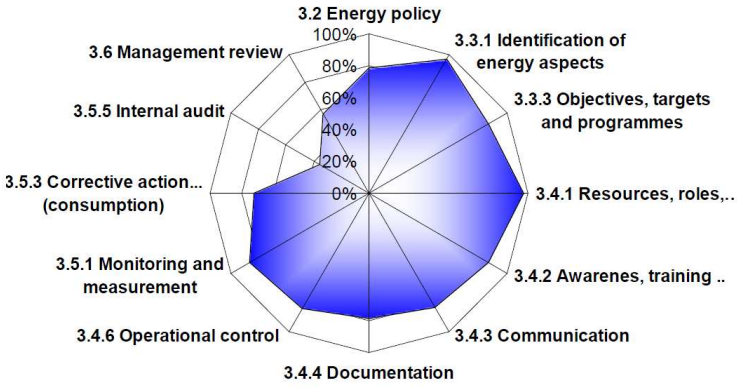
Energy Management: Why it works?

- **Implementation facilitated**
  - Implementation user groups
  - Self assessment checklist
  - Linking documents with existing management systems (ISO 9001, ISO 14001 and HACCP – ISO 22000)
  - Implementation website and forum
  - Minimal procedural requirements and focus on results (no “paper tiger”)
- **Implementation facilitated by gradualism**
  - 2 years requirements (basic EMS)
  - 3 years requirements (full EMS)

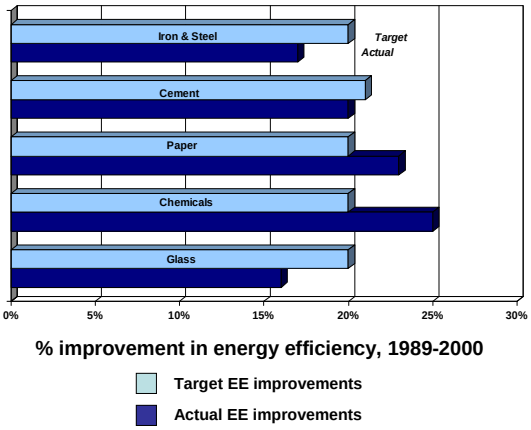
Energy Management Audits: How does it work?

- **Energy Management System audit:**
  - Yearly
  - Executed by Lloyd’s Register
    - 50 companies: different sectors: chemical industry, breweries, hospitals, textile a.o.
    - different sizes: 5 TJ –0,5 PJ
  - Involved company representatives:
    - Management (71): Top (21), Energy (37), Operations (13)
    - Technical services (26)
    - Operators (13)
    - Controllers, purchasers (3)

High scores on core elements of energy management



Evaluation of Netherlands Long-Term Agreements on Energy Efficiency



Results

- **Overall energy efficiency savings of 22.3% realized**
- **157 PJ or 9 MtCO2/year saved**
- **1/3 to 1/2 of the savings stimulated by the agreements (remainder was autonomous)**
- **Cost to government of program was $10-20/tCO2 saved, depending upon whether full costs of all subsidies are included**
- **Industry realizing ~$650 M per year in reduced energy costs**

National EnMS experiences around the world

The United States of America

James Quinn and Paul Scheihing

US Department of Energy

System Energy Assessments, Energy Management Standard, Networking, Certification for Energy Efficiency

Industrial Sector National Initiative

The U.S. Department of Energy (DOE):

- Created the initiative in 2006 based on more than a decade of experience in industrial system energy efficiency

Goal:
Drive a 25% reduction in industrial energy intensity over the next 10 years

Save ENERGY Now

Save Energy Now Initiative

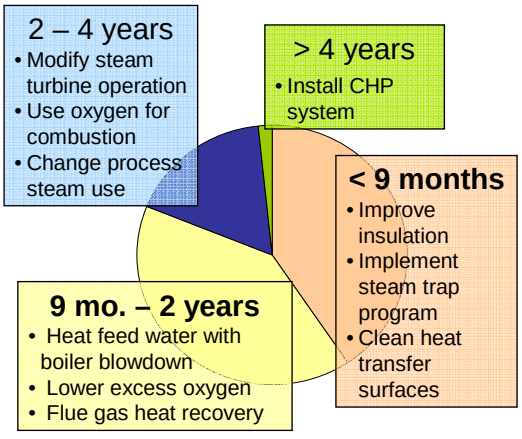
- Trains DOE energy experts to work with plant energy teams to identify opportunities for improving steam, process heating, pump, or compressed air systems through Energy Savings Assessments (ESAs)
- Through energy experts, trains plant personnel to apply DOE software analysis tools to identify additional opportunities
- Recognizes plants with high energy savings resulting from implementation

http://www.eere.energy.gov/industry/saveenergynow/

Save ENERGY Now

Save Energy Now Results 2006-2007

- 303 assessments completed
- Implemented energy savings: 13.1 TBtu/ $69.6 million
- Planned energy savings: 27.4 TBtu/$334 million
- Identified total energy savings: 55.5 TBtu
- Identified energy cost savings: > $548 million
- Total potential carbon dioxide (CO_2) emissions reduction: 3.6 million metric tons



Estimated Payback Periods for Recommended Actions Identified in 2006

Superior Energy Performance Partnership

A U.S. industry initiative that provides industrial facilities with a road map for achieving continual improvement in energy efficiency while boosting competitiveness

- Collaboration of industry, government, and non-profit organizations
- Seek to improve the energy intensity of U.S. manufacturing through a series of initiatives
- Support Plant Certification program

www.superiorenergyperformance.net

Superior Energy Performance Goals

- Foster an organizational culture of ***continuous improvement*** in energy efficiency in U.S. manufacturing facilities
- Develop a ***transparent system*** to validate energy intensity improvements and management practices (conformance with ISO 50001)
- Create a ***verified record*** of energy efficiency/intensity improvements, energy/fuel savings and carbon emission reductions with potential market value that could be recognized both nationally and internationally

Getting Superior Energy Performance Certified

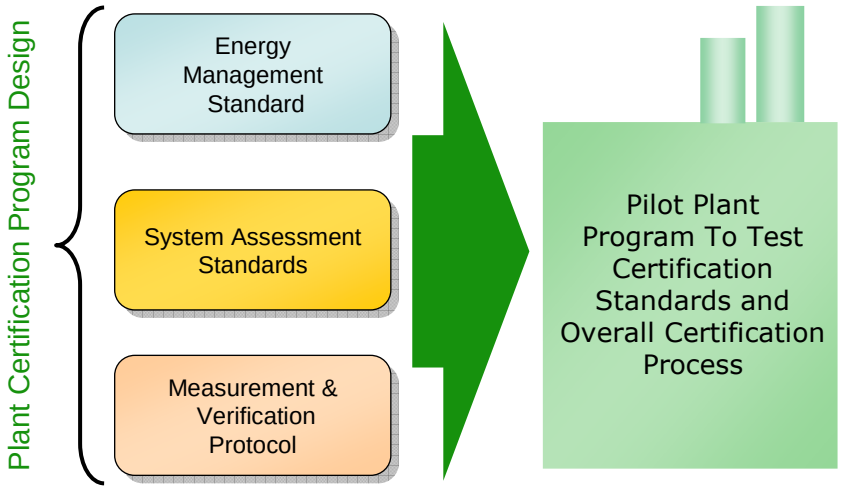
Industry can be expected to respond positively to a certification program for energy efficiency in manufacturing plants that is:

- **Voluntary**
- **ANSI accredited**
- **Third-party validated**
- **Industry backed**

Elements of U.S. SEP Certification

- Implement **Energy Management Standard** *(*ANSI – MSE 2008 and eventually ISO 50001).
- Apply **System Assessment Standards** for industrial systems (pumping, compressed air, steam, process heating) building on industry best practices
- **Measure and validate** energy savings and energy intensity improvement through a third-party certifier (ANSI-Accredited)

Certifying Plants for Energy Efficiency



Superior Energy Performance Program Design

The program accommodates:

- Maturity of plant's energy management program
- Level of verification desired
- Business cycle/climate

Three program tiers:

PARTNER
Self-declaration

Registered Partner
Third-party remote verification

Certified Partner
ANSI-accredited certification

SILVER
GOLD
PLATINUM

Performance levels based on:

- Validated energy intensity improvements
- SEP Best Practice Scorecard

Superior Energy Performance Planned Infrastructure

Standards & Protocols

- Energy Management Standard
- System Assessment Standards
- Measurement & Verification Protocol

Program Administrator (TBD)

- ANSI-accredited Certifying Bodies (TBD)

Certifying Organizations for Professionals (TBD)

- Energy Management Practitioners
- System Assessment Practitioners
- SEP Validation Specialists

Manufacturing Plants Seeking Certification

National EnMS experiences around the world

South Korea

Sang Ku Park,

Korea Energy Management Corporation

Target-setting Agreements, Energy Audits, Networking, Energy Management Standard, Financial Incentives

Industry Energy Efficiency Programs in Korea

Planning	**Voluntary Agreement (since 1998)** ▸ Contracted with heavy energy consuming companies (1,358 workplaces in 2007)
Identification of Energy saving factors	**Energy Audit (since 1980)** ▸ Heavy energy consuming companies(2,000 toe per year) should perform by 5 year periods **ESP (Energy Saving through Partnership) (since 1999)** ▸ Technology or information shares on the common processes (9 industries and 203 companies in 2007)
Investment	▸ **Low interest loans and 10% tax reductions** for specified energy efficient facilities ▸ Facilitate private sector investment through **the ESCOs** (152 companies in 2007)
Monitoring & Assessment	▸ Report on the energy saving and GHG reduction in VA workplaces ▸ Assessment for the activities and achievements in energy efficiency improvements

Energy Savings through Partnership - ESP

- **What is ESP?**
  - Energy Saving through Partnership means Peer-to-Peer Networking
  - ESP scheme has been operating since 1999 in order to achieve energy savings efficiently by sharing information and technology among the similar types of business

ESP Council (9 types of business) → Sharing Information on Good Practices & Problems → Benchmarking & Joint Project

Improving Energy Efficiency & Energy Saving effectively

Energy Savings through Partnership - ESP

9 types of ESP Council

Chemical (19)	Steel (21)	Electrical & Electronics (28)
Chemical Fiber (16)	Cement (11)	Automobile Assembly (12)
Petro-chemical (44)	Paper (26)	Food (26)

- **Total number of participants :203 in 2007**

Condition for joining

- More than **20,000 (toe/year)** of total amount of energy consumption (6 of 9)
- More than **10,000 (toe/year)** of total amount of energy consumption

→ Electrical & Electronics, Food Automobile Assembly industries (3 of 9)

Incentives

- Overseas study tour for excellent members
- Add points when VA evaluation

Energy Savings through Partnership - ESP

Benefits of ESP Projects

Year	No. of Improvements	Energy Savings			Investments (thousand USD)	Payback (year)
		Fuel(toe)	Power(MWh)	Total(toe)		
2000	11	4,060	9,940	6,545	501	0.4
2001	31	7,021	39,432	16,879	3,147	0.8
2002	44	18,410	27,942	25,396	7,727	1.1
2003	70	21,904	75,619	40,809	20,969	1.7
2004	71	37,185	54,074	50,703	21,061	1.6
2005	69	45,396	77,817	64,850	27,514	1.6
2006	44	80,336	29,120	87,616	35,600	1.4
Total	**340**	**214,312**	**313,944**	**292,798**	**116,519**	**1.2**

Examples: Installation of low pressure turbo-compressor; steam saving by heat recovery from refrigerator; improvement of operating method in gas driven heat pump; modification of raw mill duct; installation of high efficiency pump or heat exchanger; integration of boilers; method to apply power rates scheme, etc.

Lessons from ESP Experience

Needs of cooperation among similar industries

- short payback time (average 1.2 years)
  - benchmarking of best practices
  - more effective and technically intensive implement of projects
- energy saving know-how is not a secret

Importance of interest from top management

- unanimous opinion of energy people
- best solution to achieve performance of energy saving

Application of ESP model to Energy Management Standard schemes

- Development of EnMS best practices classified by type of industry through programs similar to ESP in order to achieve energy savings efficiently
  - ➢ It is highly likely to get higher energy saving performance by sharing best practices of technical aspect as well as management aspect among the similar industries
- Emphasis on top management's commitment in EnMS implementation
- Revitalization of EnMS implementation through certification scheme (competition & incentive)

National EnMS experiences around the world

Japan

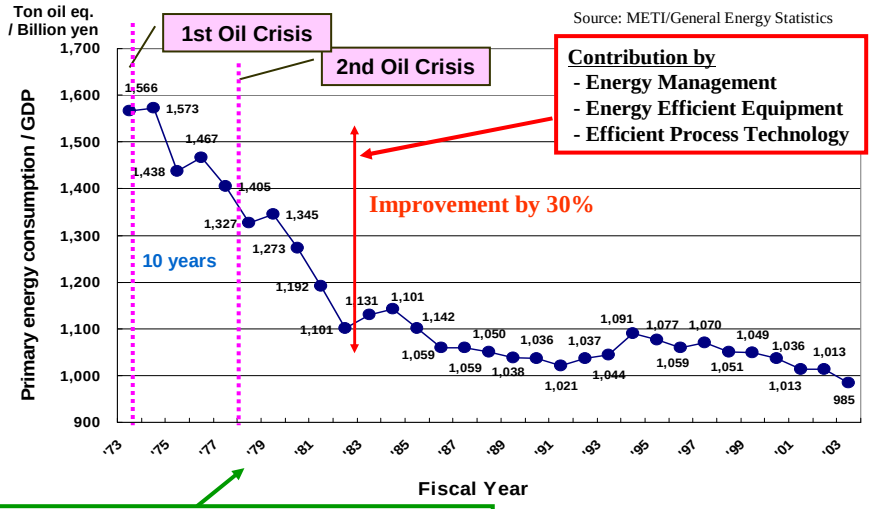
Akira Ishihara

The Energy Conservation Centre,
Japan

Energy legislation requiring energy management,
certified energy manager

1. Outlook of energy conservation in Japan

Changes in Primary Energy Consumption per GDP in Japan



1979 : Legislation of the Energy Conservation Law (the Law Concerning the Rational Use of Energy)

Amendment : 1983 (1st) 1993 (2nd) 1998 (3rd) 2002 (4th) 2005 (5th)

2.Energy conservation policy and law

Overview of the Law Concerning the Rational Use of Energy (1)

(Italic letters : reinforcement in the current ongoing revision)

Fundamental policies: The Minister of Economy, Trade and Industry shall make public fundamental policies related to the measures to be taken by energy users etc. for the rational use of energy

Factories & Places of Business

○ ***Specific business***
Obligation to mange their energy consumption for factories and the like that use more than a certain amount of energy

○ ***Specific business chain***
Introduction of regulations that regard a franchise chain as a single business
Dramatic expansion of the cover rate based on the amount of energy used in the business sector

○ **Type 1: Designated energy management factory**
(Energy use of 3,000 kl/ year)

○ **Type 2: Designated energy management factory**

○ ***The law stipulates that comprehensive assessment (*) be made of (a) the situation of energy use by industrial category and of (b) the efforts made jointly by several businesses.***

Transportation

○ **Specific carriers (freight, passengers)**
(Size of fleet: Over 200 cargo trucks, over 300 railcars, etc.)
・ Obligation to submit a medium and long-term energy plan
・ Periodic reporting on the situation of energy use, etc.

○ **Specific cargo owners (cosigners)**
(Annual carrying capacity exceeds 30 million kg.)
・ Obligation to submit energy plans
・ Periodic reporting on the situation of energy use related to consignment transport

3. Concept of Energy Management in Japan (Industry Sector)

Management of Energy Conservation

(To formulate activities in order to succeed in energy conservation)

Management concept by the Law and Notifications

- Appointment of Energy Manager
- Requirement on management by standards and manuals
- Medium and long term planning with the goal of reducing energy intensity by an annual average of 1% or more in a medium to long term span
- Requirement on report

Continuous efforts by companies, factories, and business establishments

- Continuous improvement activities
  Planning, Small group activities, Energy conservation investment, Pursuit of technology innovation, etc.
- Providing information by report. Information on achievements.

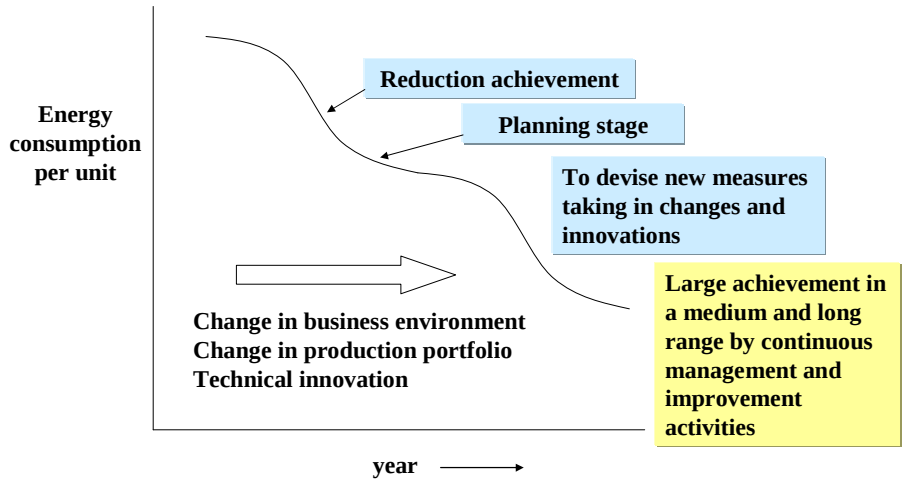
PDCA cycle in management and promotion for achievements

at company
at factory
at group

Support, subsidy, information and technical development promotion

3. Concept of Energy Management in Japan (Industry Sector)

Significance of continuous conservation activities



3. Concept of Energy Management in Japan (Industry Sector)

Role of Registered Energy Manager

- Making the periodical report and medium/long term planning designated by the law
- Management of energy consuming facilities maintenance, of improvements of energy using processes, of energy use audits and etc.
- Advice for activities for energy efficiency, etc

License for Qualified Energy Manager

A. Qualifying examination

- Once a year
- 1 day, 4 subjects
- 1 year technical experience

8,950 Applicants in 2005
Succeeded 2,290 (22.5%)

B. Training seminar

- Once a year
- 6 day training & 1 day examination
- Background : 3 year technical experience

Training Course for Energy Management Officers

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Thank you for your attention!

For more information

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