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Status of ISO 50001- Energy management

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**Industrial Energy Efficiency Improvement Project
in South Africa
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Importance of Industrial Energy Efficiency

- Represents more than **one-third** of global primary energy¹
- Direct industrial energy and process CO₂ emissions represent about **25% of total worldwide emissions** - 6.7 Gigatonnes (Gt)²
- Application of best available technologies worldwide would result in a **19-32% reduction** in current industrial CO₂ emissions²

¹ Price, et al 2006

² IEA 2008 Energy Technology Perspectives: Scenarios and Strategies to 2050 (excludes petroleum refining)



Industrial Energy Use in Developing Economies

- Characteristics of Developing Economies:
 - Industrial energy use can be more than **50%** of the total and can produce supply problems
 - Lead global growth in both industrial energy use and carbon-related emissions
 - Emerging industrial infrastructure requires many new facilities, rapidly built & expanded
 - Includes substantial growth in energy intensive sectors
- It is much more cost-effective to **build in energy efficiency** the first time than retrofit it later
- In industry, a missed opportunity for energy efficiency may not reoccur- **for decades or at all** until the original installation fails or becomes obsolete



Focus on Industrial Energy Efficiency is Growing

- China plans to reduce energy use 20% per unit of GDP over 2005 levels by 2010- focus on Top 1000 industrial enterprises.
- Energy efficiency is now a major focus of G-8 meetings
- International Organization for Standardization (ISO) is initiating a broad portfolio of initiatives to promote energy efficiency.
- UN Industrial Development Organization is promoting systems energy efficiency and energy management standards for both developed and developing nations.
- Energy efficiency is recognized by the International Energy Agency and the Council of Parties (COP) as a primary source of short-term GHG emission reductions





What are Industry's Priorities?

Current

1. Stay profitable
2. Operate a safe workplace
3. Be compliant with environmental regulations
4. Meet legal and social responsibilities
5. Monitor supply chain for potential liability

Emerging

6. Manage GHG emissions, carbon footprint





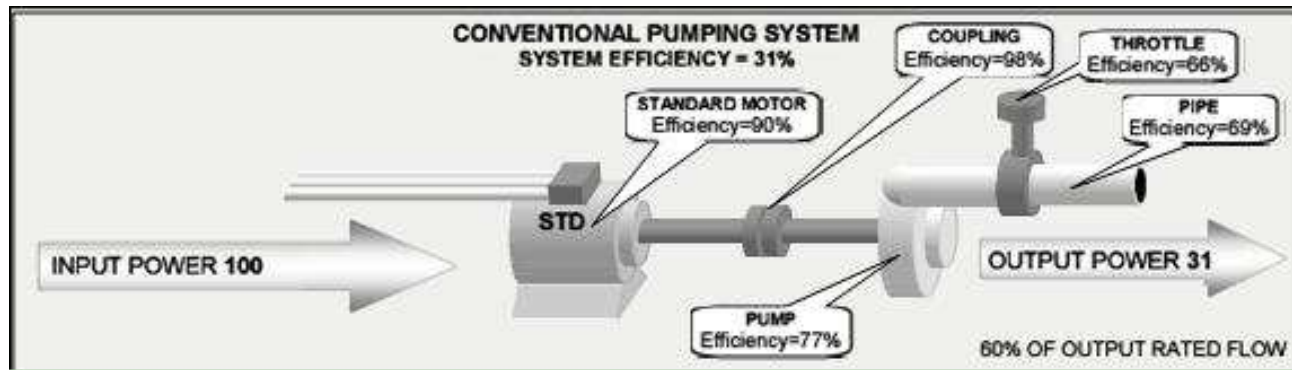
Why Isn't Industry More Energy Efficient?

- The business of industry is *not* energy efficiency
- Facility engineers typically do *not* become CEO or CFOs
- Budgets are *separate* for equipment purchases and operating costs
- Data on energy use of systems is very limited
- Difficult to *assess performance* or evaluate performance improvements
- Opportunities to become more energy efficient are overlooked





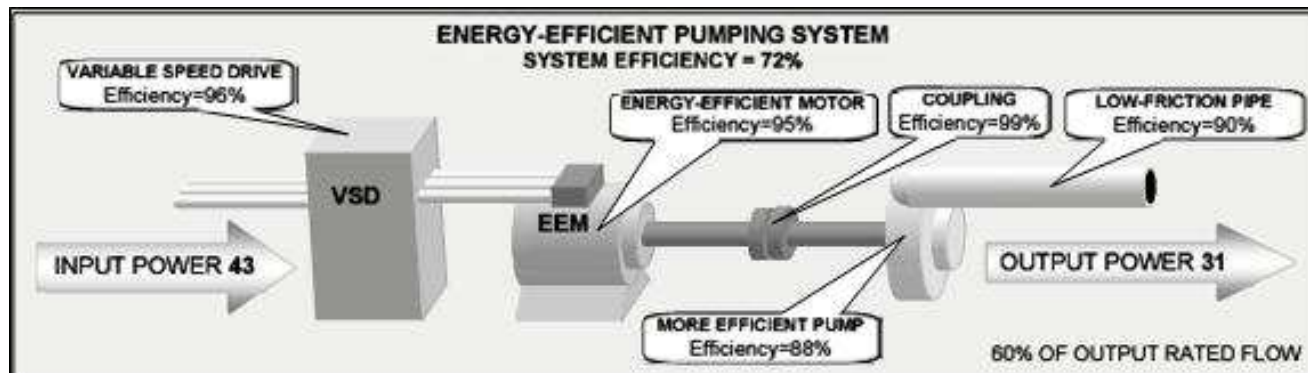
Why System Energy Efficiency Matters



Inefficient?

Or energy efficient?

Same work is done



Source: Almeida, et al., 2005



Industry and Energy Management

- Most energy efficiency in industry is achieved through changes in *how energy is managed* in an industrial facility, rather than through installation of new technologies;
- Companies that establish an energy management plan gain a number of benefits:
 - Develop a baseline of energy use
 - Actively managing energy use and reduce costs
 - Reduce emissions without negative effect on operations
 - Continue to improve energy use/product output over time
 - Document savings for internal and external use (e.g. emission credits)



Energy Management Results

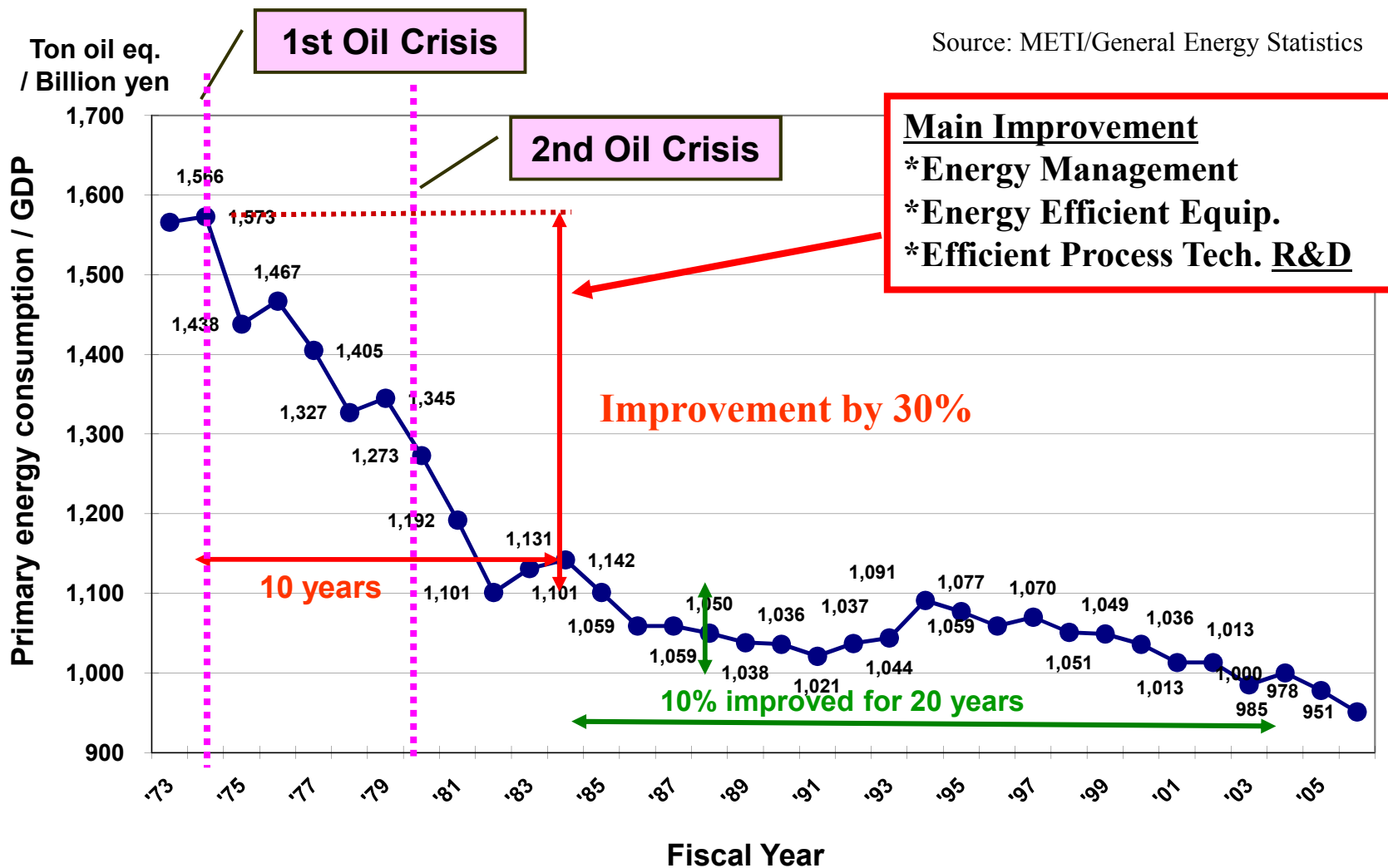
- Companies who have used energy management to achieve major energy intensity improvements¹ include:
 - **Dow Chemical** achieved 22% improvement (\$4B savings) between 1994 and 2005, and is now seeking another 25% from 2005 to 2015
 - **United Technologies Corp** reduced global GHG emissions by 46% per dollar of revenue from 2001 to 2006, and is now seeking an additional 12% reduction from 2006 to 2010
 - **Toyota's** North American (NA) Energy Management Organization has reduced energy use per unit by 23% since 2002; company-wide energy-saving efforts have saved \$9.2 million in NA since 1999.

1 Btu/lb of product



Impact of Energy Efficiency Policies in Japan

Source: METI/General Energy Statistics





Why an Energy Management Standard?

- An energy management standard provides a **method for integrating energy efficiency** into existing industrial management systems for continual improvement;
- All existing and planned energy management standards are compatible with ISO 9000/14000;¹
- Companies who adopt an energy management standard are able to reduce energy use and improve operations, even if they are already complying with ISO 14001.
- Also applicable to commercial, institutional, and transportation sectors

¹ International Organization for Standardization (ISO)



Components of an EM Standard

Typical features include:

1. An *energy policy*, top management's official statement of the organization's commitment to managing energy
2. An *energy management plan* that requires measurement, management, and documentation for continuous improvement for energy efficiency;
3. a *cross-divisional management team* led by a representative who reports directly to management and is responsible for overseeing the implementation of the strategic plan;
4. *operating controls* and *procedures* to address all aspects of energy purchase, use, and disposal;

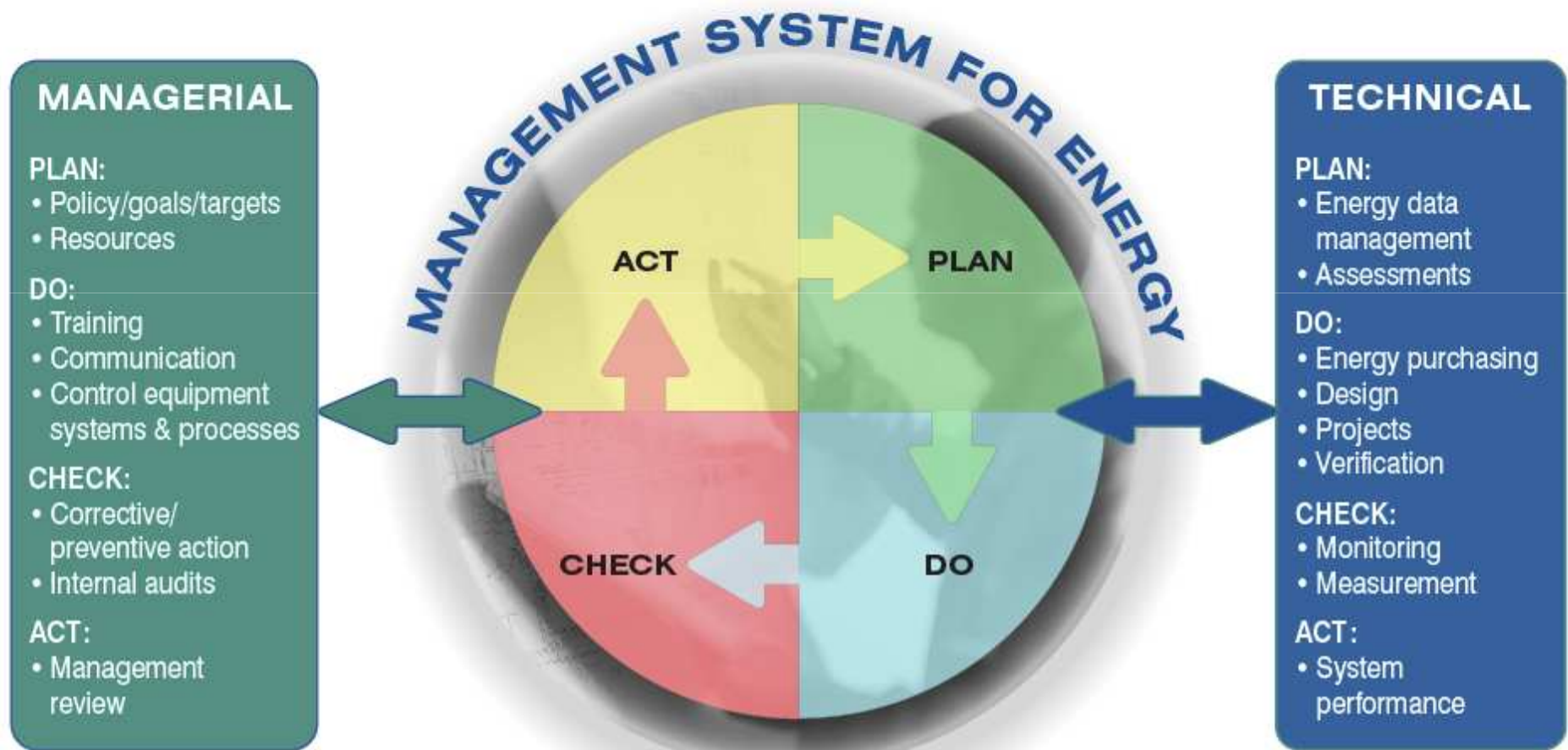


Components of an EM Standard, con't

5. identification of *energy performance indicators*, unique to the company, that are tracked to measure progress; and
6. *action plans or projects* to achieve continuous improvement in energy efficiency;
7. creation of an *Energy Manual*, a living document that evolves over time as additional energy saving projects and policies are undertaken and documented;
8. *periodic reporting* of progress to management based on these measurements



ANSI MSE 2000:2008



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Energy Management Standards

Current Status

- Several countries already have national energy management standards (Denmark, Ireland, Sweden, US, Thailand, Korea)
- The EU has developed a regional energy management standard, pr EN 16001
- Energy management standards are under development in China, Spain, and Brazil
- ISO has initiated work on an international energy management standard (2008-2011), with preparatory assistance from the United Nations Industrial Development Organization (UNIDO)



ISO 50001: Energy management systems - Requirements with guidance for use

Scope

Standardization in the field of energy management, including:

- energy supply,
- procurement practices for energy using equipment and systems,
- energy use, and
- any use-related disposal issues.

The standard will also address measurement of current energy usage, and implementation of a measurement system to document, report, and validate continual improvement in the area of energy management.



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ISO Project Committee 242 - ISO 50001

Leadership: United States and Brazil, in cooperation with the United Kingdom and China

September 2008, 1st meeting in Arlington, VA, USA

- 35 participating countries from all regions of the world, as well as UNIDO, which has liaison status

March 2009, 2nd meeting in Rio de Janeiro, Brazil

- Committee Draft released in June 2009

November 2009, 3rd meeting in London, England

- Two-year accelerated schedule to have ISO 50001 ready for publication by early 2011



ISO 50001- Key Concepts for Demonstrating Continual Improvement

- Establish ***baseline*** of current energy use
- Identify and record ***significant energy uses***
- Identify ***opportunities*** for energy efficiency improvement
- Establish ***energy performance indicators*** to track improvement over time
- Establish energy performance improvement ***targets and objectives***



ISO 50001- Key Concepts for Demonstrating Continual Improvement

- Develop and implement ***action plans*** based on improvement opportunities
- ***Measure and document*** progress and results
- Conduct ***management review***
- Take ***corrective action*** as needed to achieve objectives and targets
- ***Re-assess*** energy use and opportunities
- Establish ***new action plans***



Supportive Policies for National Energy Management Standards

- In countries with existing standards:
 - Energy management standards are voluntary
 - Programs target large industrial plants
 - Financial incentives are offered for compliance, usually as part of a target-setting agreement¹
 - Training and technical assistance are available
 - Opportunities are provided for companies to network and learn from each other
 - Case studies are used to publicize benefits
 - Recognition is given to outstanding performers

¹ typically energy or carbon dioxide tax relief



Energy Management & Systems Optimization

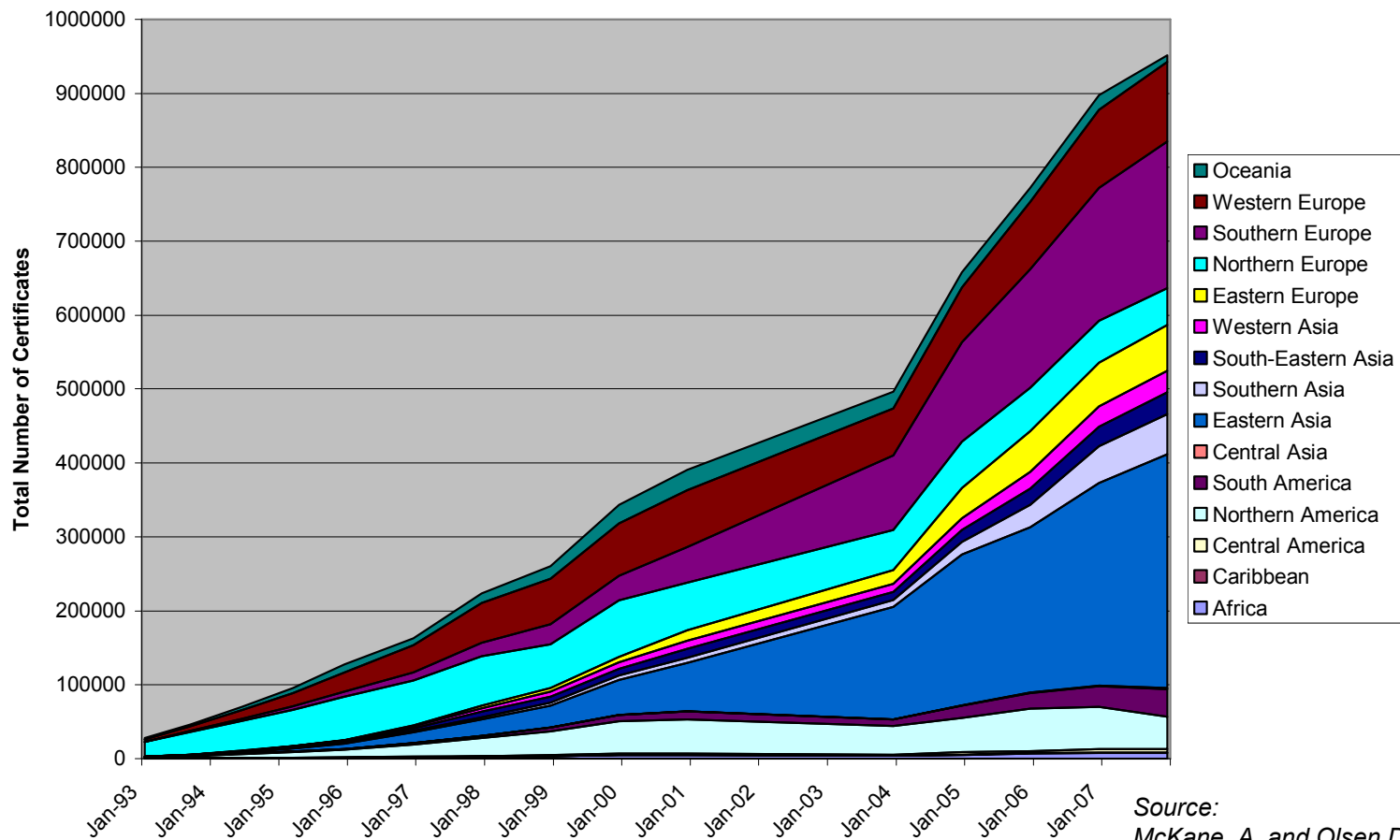
- Energy management standard provides:
 - A framework for understanding significant energy use
 - Action Plans to continually improve energy use
 - Documentation to sustain energy performance improvements
- System optimization provides:
 - A method of assessing systems to identify energy performance improvement opportunities
 - Actions that can provide significant energy savings with limited capital investments
 - More reliable operations

Energy Management + Systems Optimization = Winning Strategy



Global impact of ISO 9001

Adoption of ISO 9001/2/3:1994 and 9001:2000

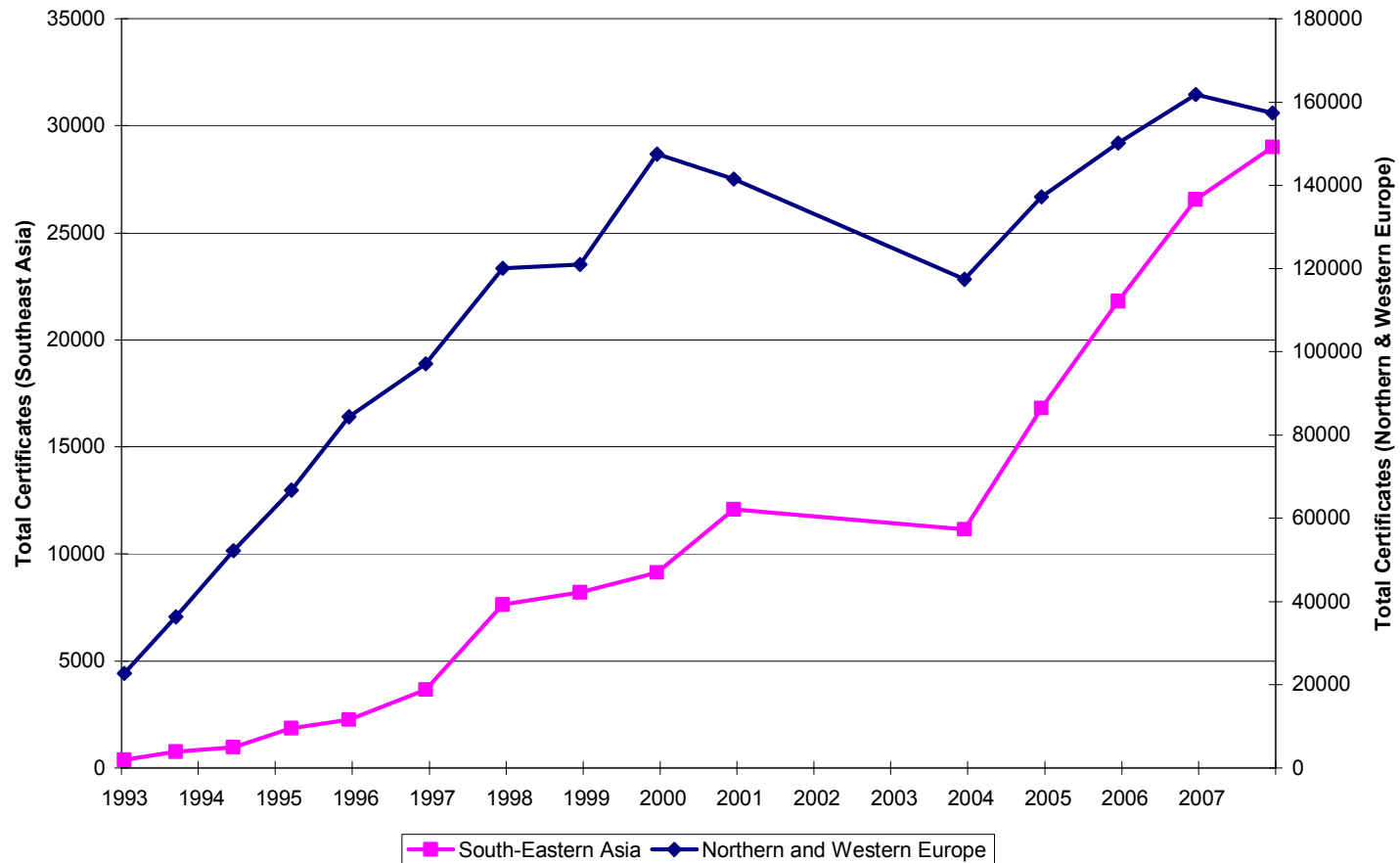


Source:
McKane, A. and Olsen D., LBNL 2009
based on ISO Survey data



ISO 9001 and Export Markets

ISO 9000 Certificates



Source: McKane, A. and Olsen, D., LBNL 2009



ISO 50001 and Trade

- All indications are that ISO 50001 will have an even greater impact on international trade than ISO 9001
- The uptake of ISO 50001 will be driven by companies seeking an internationally recognized response to:
 - International climate agreements
 - National cap and trade programs, carbon or energy taxes
 - Corporate sustainability programs
 - Increasing market value of “green manufacturing” and a reduced carbon footprint
 - Carbon trading schemes, such as in the EU



ISO 50001 and Trade

- Companies will demand participation by their suppliers- this is already happening for environmental and lean manufacturing (i.e.--Wal-Mart, Toyota)
- Uptake of ISO 9001 in the supply chain was driven largely by Western European countries and Japan
- Uptake of ISO 50001 will be driven the US, Canada, the expanded EU, Japan, Korea, China, Brazil, and probably India
- Exporters that position themselves now will be at a competitive advantage



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Positioning Industry for Economic Recovery

- Use energy efficiency to help industry manage operating costs, especially at lower rates of production
- Prepare industry to implement ISO 50001- Energy Management
- Strengthen the skills of the workforce to assist industry to be leaner, cleaner, *and* greener



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Industrial Energy Policy

<http://www.unido.org/index.php?id=o71852>

Energy Management Standards and System Standards

<http://industrial-energy.lbl.gov/node/94>

ISO 50001

<http://www.unido.org/index.php?id=o86084>

<http://www.iso.org/iso/pressrelease?refid=Ref1157>