Climate Change and Growth Strategies
World Bank – New Growth Strategies

Washington DC
October 15, 2014
Theme

1. De-link growth from energy use using policy as a driver
2. Industry and energy efficiency should be areas of focus
3. Energy Management Systems (EnMS) is a solution
4. Restorative manufacturing or Circular Economy must play a key role
Energy Productivity

Source OECD/IEA 2014
Energy Consumption As A Function Of Quality Of Life

Source: Penn State University, Department of Energy and Mineral Engineering
Energy Consumption Differences

• Efficiency of Industrial, Commercial, Residential and Transportation Energy Use

• Climate and Geography

• Lifestyles

• Nature of Products Produced By Country
Delinking Growth and Energy Use
China’s Energy Efficiency Programs

• Comprehensive system of policies and programs based on a mix of government regulation and market-based approaches

• Current aggressive energy efficiency promotion system developed under 11th Five Year Plan (2006 – 2010)
  – Revised Energy Conservation Law - 2007

• Continued under 12 Five Year Plan (2011 – 2015) with focus on capacity building and implementation

• Three Institutional Groups
  – National, provincial and local governments
  – Industrial enterprises
  – Third party service and support organizations
Industry Accounts for 50% of Total Global Energy Use
(Primary Energy Basis*)

Source: DOE EIA International Energy Outlook 2013

* Includes fuel for electricity generation and T&D losses
The U.S., China, and India Represent about 50% of Total Industrial Energy Use

Source: DOE EIA International Energy Outlook 2013
Industry is the Largest Energy Consuming Sector in the U.S., China and India

Primary energy use - 2010

- **U.S.**
  - 97.9 Quads total
  - 31.2% Industrial
  - 75.5% Commercial
  - 68.5% Residential

- **China**
  - 101.2 Quads total
  - 31.2% Industrial
  - 75.5% Commercial
  - 68.5% Residential

- **India**
  - 27.4 Quads total
  - 31.2% Industrial
  - 75.5% Commercial
  - 68.5% Residential

*Source: DOE EIA International Energy Outlook 2013*
Transforming Industry

- Production: 20%
- CO₂: 60%
Achieving Energy Efficiency Potential through energy management

What is an Energy Management System (EnMS)?

• A suite of procedures and practices to ensure systematic tracking, analysis and planning of energy use in industry

What does an EnMS System Do?

• Maximizes energy savings and improves energy performance continuously through organization and technology changes at the facility and enterprise level
• Helps companies overcome informational, behavioural and organisational barriers to energy efficiency

EnMS standards: defined by standardization bodies (e.g., ISO 50001)

EnMS specifications: formulated by a government agency

Institute for Industrial Productivity
Key Elements of Energy management Systems

An EnMS includes:

- **Energy policy**
- **Cross-divisional management team**
- **A baseline**
- **An energy review**
- **Energy performance indicators**
- **Action plans**
- **Internal audits**
- **Third party certification**

...within a *Plan-Do-Check-Act* framework.

Continuous Cost Reduction with Energy Management

Source: Adapted from Kahlenborn et al., (2012)
Number of ISO 50001 certified sites worldwide

R. Peglau (German Federal Environment Agency)
Number of ISO 50001 certified sites in GERMANY

R. Peglau (German Federal Environment Agency)
<table>
<thead>
<tr>
<th>Country</th>
<th>Program Name</th>
<th>EnMS type</th>
<th>Voluntary</th>
<th>Mandatory</th>
<th>Certification</th>
<th>Drivers</th>
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<td>Australia</td>
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<td>EEO Assessment</td>
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<td>South Korea</td>
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<td>Sweden</td>
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<tr>
<td>USA</td>
<td>Superior Energy Performance</td>
<td>ISO 50001</td>
<td>V</td>
<td>Voluntary</td>
<td>Yes</td>
<td>Awards, possible tax rebate</td>
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The Circular Economy – Industrial System That is Restorative By Design

1. Hunting and fishing
2. Can take both post-harvest and post-consumer waste as an input

Source: Ellen MacArthur Foundation circular economy team
We are still losing enormous tonnages of material
Million tonnes, EU27, 2010E

1. Includes services and agriculture, forestry and fishing
2. Also includes sewerage and other waste management activities
3. Includes used oils, rubber, textiles, household waste, chemical waste, and other non-specified

SOURCE: Eurostat waste statistics (2011)
Conclusions

1. Growth strategies must consider opportunities and risks posed by climate change

2. Must delink growth from energy use

3. For industry sector, energy efficiency is key

4. Adoption of Energy Management System (EnMS) will lead to desired results in industry

5. Government policies are necessary to encourage EnMS

6. Must move to Circular Economy