Energy Efficiency: Supporting our climate goals

Philippe Benoit
Head of Energy Efficiency & Environment (Climate) Division, IEA

ADP Technical Experts Meeting: Energy Efficiency
Bonn, 13 March, 2014
A. Why is Energy Efficiency important to our climate aspirations

B. ...
Energy sector is a key driver as it represents over 60% of human generated emissions...
A major role for Energy Efficiency

Emissions Reductions (Gt CO₂)

- Nuclear 8% (8%)
- End-use fuel switching 12% (12%)
- CCS 14% (17%)
- Renewables 21% (23%)
- Power generation efficiency and fuel switching 3% (1%)
- End-use fuel and electricity efficiency 42% (39%)

Portfolio of decarbonising measures
Great needs

‘Great Expectations’

But...
EE is not on track

- Renewable power
  - Nuclear power
  - Gas-fired power
  - Coal-fired power
  - Carbon capture and storage

- Industry
  - Electric and hybrid-electric vehicles

- Biofuels
  - Fuel economy
  - Buildings

- Smart grids
What is slowing us?
Market failures impede EE investment

Principal-Agent Problems
• Moral Hazard
• Split Incentives

Split Incentives

Energy Market Failures (Externalities)

Asymmetric Information
• Moral Hazard
• Adverse Selection

Imperfect Information

Financing

Behavioural Failures (Bounded Rationality)
Good policies are needed. . .
Table of contents

A. Why is EE important to our climate aspirations

B. How can we promote EE – some policy and other areas

C. ...
Policy solutions are often straight-forward. . .
25 EE Policy Recommendations

Cross-sectoral
1. Energy efficiency data collection and indicators
2. Strategies and action plans
3. Competitive energy markets with appropriate regulation
4. Private investment in energy efficiency
5. Monitoring, enforcement and evaluation of policies and measures

Buildings
6. Mandatory building energy codes and minimum energy performance requirements;
7. Aiming for net zero energy consumption in buildings
8. Improving the energy efficiency of existing buildings
9. Building energy labels or certificates
10. Improved energy performance of building components and systems

Appliances and Equipment
11. Mandatory MEPS and labels for appliances and equipment
12. Test standards and measurement protocols for appliances and equipment
13. Market transformation policies for appliances and equipment

Lighting
14. Phase-out of inefficient lighting products and systems
15. Energy efficient lighting systems

Transport
16. Mandatory vehicle fuel efficiency standards
17. Measures to improve vehicle fuel efficiency
18. Fuel-efficient non-engine components
19. Improved vehicle operational efficiency through Eco-driving and other measures
20. Transport system efficiency

Industry
21. Energy Management in industry
22. High efficiency industrial equipment and systems
23. Energy efficiency services for small and medium enterprises
24. Complementary policies to support industrial energy efficiency

Utilities and end-use
25. Energy Utilities and end-use energy efficiency
6 key poles for action

A. **Minimum energy performance standards** (appliances, equipment, vehicles, buildings, etc.)

B. **Information/Awareness** (e.g., labelling)

C. **Designated EE promotion authority**

D. **Financing** (market, concessional, etc.)

E. **Technology development** (from incandescent to CFLs to LEDs; better ceiling fans)

F. **Better Data** (identify EE opportunities, impacts)
Different instruments are used in different sectors

<table>
<thead>
<tr>
<th>Industry</th>
<th>Transport</th>
<th>Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Audit standards</td>
<td>• Vehicle emissions standards</td>
<td>• Mandatory minimum standards for equipment &amp; buildings</td>
</tr>
<tr>
<td>• Energy management support</td>
<td>• Vehicle labelling</td>
<td>• Labelling for equipment &amp; buildings</td>
</tr>
<tr>
<td>• Energy prices</td>
<td>• Vehicle tax incentives</td>
<td>• Loans and grants for refurbishment</td>
</tr>
<tr>
<td>• CO₂ emissions trading</td>
<td>• Fuel taxes</td>
<td>• Direct investment in social housing</td>
</tr>
<tr>
<td>• Tax relief</td>
<td>• User charges</td>
<td>• Tax relief</td>
</tr>
<tr>
<td>• 3rd party finance and ESCOs</td>
<td>• Advanced vehicle subsidies</td>
<td>• 3rd party finance and ESCOs</td>
</tr>
<tr>
<td>• R&amp;D incentives</td>
<td>• Public transport infrastructure investment</td>
<td></td>
</tr>
</tbody>
</table>
Some policy examples . . .
International comparison of light-duty vehicle fuel economy standards

Freight vehicle fuel efficiency is also important but largely unregulated

Source: ICCT, 2013
South Africa: Utility EE programs

Utilities and other energy providers have an important potential role to play in encouraging EE among consumers.

Eskom’s programmes to engage different market segments

- **Funding models**
  - Targeted users

- **Performance Contracting**
  - Industrial

- **Aggregated Standard Product**
  - Industrial and commercial

- **Residential Mass Rollout**
  - Residential

- **ESCO Model**
  - Industrial and commercial

- **Standard Offer**
  - Industrial and commercial

- **Standard Product**
  - Commercial

- **Size of projects**
  - **Energy saved**
    - > 3 GWh in three years

- **Technologies implemented**
  - Custom or hybrid solution

- **Payment mechanisms**
  - Published rate of ZAR/kWh for demonstrated savings. Performance payments over contract period.
  - Incentive value based on detailed financial and technical evaluation. Payment during and on completion.
  - Published ZAR/kWh per technology category. Part payment after project completion, part payment over contract period.
  - Published rate per technology. Full payment on commissioning.

Source: Fortuin, 2013.
For more Examples for:
IEA’s 25 Energy Efficiency Policy Recommendations

-- see Appendix --
Climate policies can also help push EE . . .

Carbon price mediates action economy-wide

Price of CO₂
€/tCO₂e

MtCO₂

Hood-IEA, “Summing up the Parts” 2011
More finance is also needed . . .
Domestic finance is key: reallocating resources to promote EE gains

Germany (KfW) building loan program

Volume of grants and loans under building refurbishment programmes

Note: covers the programmes “CO₂ refurbishment of buildings” (2001-09) and “Energy-efficient refurbishment” (2009-10).
Sources: IEA, 2012; IEA analysis based on Kleemann et al., 2005; Clausnitzer et al., 2007-10; Diefenbach et al., 2011; Diefenbach et al., 2012.
MDBs, others: important source and with potential to scale up finance

IEA Analysis: Plugging the energy efficiency gap with climate finance - 2012
Not just about consumption, also about efficient energy supply . . .
Supply-side efficiency is also important

- Supply-side interventions important part of energy efficiency story
- China has increasing percentage of supercritical and ultra-supercritical coal-fired power plants
- All new plants of 600 MW or more must use supercritical or ultra-supercritical technology

SC and USC capacity in major coal-using countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2010</th>
<th>2012</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Not just about government policy, users/producers are also key . . .
Diverse Key Actors

Government:
- Policy Maker
- Consumer (public buildings, etc.)

Private Sector
- Households
- Companies (SMEs, large industry)
- Financial institutions – fund providers

Commercial Public Sector: utilities, transit systems, industry
A lot of EE is cost effective . . .
EE: often a ‘no-regrets’ investment
Energy efficiency: a huge opportunity going unrealised

Energy efficiency potential used by sector in the New Policies Scenario

Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035
EE is often a neglected part of the story:

Impact of supply- and demand-side improvements on US oil import needs

Source: WEO 2012
To scale-up EE to meet our climate aspirations

Effective policies are key . . .

. . . But more is needed

We need to change the ‘mind-set’ about EE
Table of contents

A. Why is EE important to our climate aspirations

B. How can we promote EE – some policy, etc. areas

C. Going beyond ‘good policies’

D. ...
Facing up to the Fuels Competition

EE keeps producing:

We need to keep measuring EE “output” year after year after year and make this more apparent.
Energy efficiency is . . .

a domestic fuel
(‘the home-grown fuel’)

Microsoft.com
EE supports sound growth, not just conservation . . .
Energy efficiency can help drive economic prosperity

Cumulative investments in energy efficiency of $12 trillion are more than offset by fuel savings & trigger economic growth of a cumulative $18 trillion

GDP in Efficient World Scenario versus New Policies Scenario, 2035

- Japan & Korea
- OECD Europe
- United States
- China
- India
Need to move from ‘Energy intensity’ to ‘Energy productivity’

Figure 3.6 Evolution of energy productivity for selected IEA member countries, GDP per unit of TPES, 2002-12

Notes: left ends of bars represent 2002 values, right ends represent 2012 values. 2012 data are estimated.
Improved EE supports improved access . . .
Improved EE can help in fight against local pollution...
EE generates variety of benefits

Energy efficiency improvement

Sector-wide
- Asset values
- Disposable income
- Poverty alleviation
- Health & wellbeing
- Energy savings
- Climate change mitigation

National
- Disposable income
- Enterprise productivity
- Energy provider benefits
- Public budgets
- Macro impacts
- Job creation
- Energy security
- Development
- Resource management
- Energy prices
- Public budgets

International
- Development
- Energy security
- Energy savings
- Climate change mitigation
- Energy prices
- Resource management
- Public budgets
- Macro impacts
- Job creation
Need to Increase motivation

For EE activities

by expanding set of engaged stakeholders

(what is their EE benefit)
Multiple benefits at multiple levels

- **International**
  - Energy prices
  - Resource management
  - GHG emissions abatement

- **National**
  - Macroeconomic effects
  - Job creation
  - Energy security
  - Public budget impacts

- **Sectoral**
  - Increased asset values
  - Energy provider and infrastructure benefits
  - Industrial productivity and competitiveness

- **Individual**
  - Health, wellbeing and social improvements
  - Poverty alleviation: energy affordability & access
  - Increased disposable income

More Public/Private Stakeholders

© OECD/IEA 2014
EE across countries: Common and Differentiated
‘Different strokes for different folks’

Benefits vs. Co-Benefits → Multiple Benefits

<table>
<thead>
<tr>
<th></th>
<th>Country or Stakeholder A</th>
<th>Cty/Stk B</th>
<th>Ctry/Stk C</th>
<th>Etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Competitiveness</td>
<td>Co-Benefit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Imports</td>
<td>Primary</td>
<td>Co-Benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty Alleviation and</td>
<td></td>
<td></td>
<td>Primary</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHG Emissions</td>
<td></td>
<td>Primary</td>
<td>Co-Benefit</td>
<td></td>
</tr>
<tr>
<td>Job Creation</td>
<td>Co-Benefit</td>
<td>Co-Benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local pollution</td>
<td>Primary</td>
<td></td>
<td>Co-Benefit</td>
<td></td>
</tr>
</tbody>
</table>

• benefits both energy importers and exporters
Objectives

A. Increased affordability for consumers

B. Energy and economic security (managing import dependence)

C. Local pollution

Relevant to many different countries

- Poor and middle-class families in different countries
- E.g., Island states and ‘virtual islands’
- Urban/other areas around the world
EE supports resilience . . .
EE supports resilience . . .
there are fewer assets that are exposed
Table of contents

A. Why is EE important to our climate aspirations

B. How can we promote EE – some policy, etc. areas

C. Need more than good policies

D. Possible Next Steps
Much change will be domestic-driven
25 EE Policy Recommendations are a useful guide

Cross-sectoral
1. Energy efficiency data collection and indicators
2. Strategies and action plans
3. Competitive energy markets with appropriate regulation
4. Private investment in energy efficiency
5. Monitoring, enforcement and evaluation of policies and measures

Buildings
6. Mandatory building energy codes and minimum energy performance requirements;
7. Aiming for net zero energy consumption in buildings
8. Improving the energy efficiency of existing buildings
9. Building energy labels or certificates
10. Improved energy performance of building components and systems

Appliances and Equipment
11. Mandatory MEPS and labels for appliances and equipment
12. Test standards and measurement protocols for appliances and equipment
13. Market transformation policies for appliances and equipment

Lighting
14. Phase-out of inefficient lighting products and systems
15. Energy efficient lighting systems

Transport
16. Mandatory vehicle fuel efficiency standards
17. Measures to improve vehicle fuel efficiency
18. Fuel-efficient non-engine components
19. Improved vehicle operational efficiency through Eco-driving and other measures
20. Transport system efficiency

Industry
21. Energy Management in industry
22. High efficiency industrial equipment and systems
23. Energy efficiency services for small and medium enterprises
24. Complementary policies to support industrial energy efficiency

Utilities and end-use
25. Energy Utilities and end-use energy efficiency
International Cooperative Initiatives also have a role to play . . .
Collective efforts
## Current Initiatives for Energy Efficiency

There are numerous international initiatives working to promote energy efficiency. This table gives an overview of 29 initiatives highlighting their structure, focus and relationship to climate change and emissions reduction goals.

### Some ICIs in EE area:

<table>
<thead>
<tr>
<th>Initiative Name</th>
<th>Multilateral Initiative</th>
<th>Market Transformation Program</th>
<th>Quantitative GHG Emissions Methodology</th>
<th>International Financing Program</th>
<th>Policy Program</th>
<th>Technology or Sector Specific Program</th>
<th>Climate or Emissions Mitigation Focus</th>
<th>Exclusive Energy Efficiency Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB Clean Energy Program (demand &amp; supply side EE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Codes Assistance Project (ASE, ACEEE, NRDC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China Sustainable Energy Program (Energy Foundation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative Labeling and Appliance Standards Program (CLASP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBRD Sustainable Energy Initiative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient Lighting Initiative (China Standard Certification Center, IFC, GEF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>en.lighten initiative for developing and emerging countries (UNEP, GEF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European Motor Challenge Programme (European Commission)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Buildings Performance Network (Climate Works Foundation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Superior Energy Performance Partnership (GSEP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Growth Action Alliance (G2A2) (WEF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEA Efficient Electrical End-Use Equipment (4E)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEA Technology Agreement: Buildings and Communities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEA Technology Agreement: Demand Side Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFC China Utility-based Energy Efficiency Finance Program (CHUEE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inova Energia Program (Brazil)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute for Building Efficiency (Johnson Controls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Partnership for Energy Efficiency Cooperation (IPEEC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable Energy and Energy Efficiency Partnership (REEEP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Super-efficient Equipment and Appliance Deployment (SEAD) Initiative (CEM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top Runner Program (Japan)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TopTen Global Alliance on Product Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNECE Energy Efficiency 21 Programme</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNEP Sustainable Buildings and Climate Initiative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNEP Sustainable Energy for All (SE4All) Energy Efficiency Hub (Risø Centre)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walmart Supplier Energy Efficiency Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBCSD Cement Sustainability Initiative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBCSD Energy Efficiency in Buildings Manifesto</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World Bank Energy Sector Management Assistance Program (ESMAP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: WRI: N. Aden report 2014
SUPER-EFFICIENT EQUIPMENT & APPLIANCE DEPLOYMENT (SEAD)

SEAD ACCELERATES THE PACE OF MARKET TRANSFORMATION FOR ENERGY EFFICIENT PRODUCTS

Awards
Showcase leadership in energy efficiency

Incentives
Increase demand for energy efficient products

Procurement
Lead by example, with tools & best practice

Standards & Labels
Ensure energy efficiency performance

Technical Analysis
Provide foundation for policy success

Technical Assistance
Support implementation
Build alliances/expertise to increase EE

A. Expand Domestic support

B. International partners:
   - Sharing ‘know-how’/experience
   - ICIs/twinning/partnerships

C. Financing
Multi-faceted approach: multiple axes

- National
- State
- Local

Axes:
- Energy savings
- Multi-sector

Types:
- Domestic
- Bilateral
- Multilateral
- International
Matchmaking: Capacity Suppliers with Demand

Willing Suppliers of expertise  

Interested Policymakers, etc.

- Speed dating

Long-term relationship
Appendices
Appendix 1

Examples for:

IEA’s 25 Energy Efficiency Policy Recommendations
25 EE Policy Recommendations

Cross-sectoral
1. Energy efficiency data collection and indicators
2. Strategies and action plans
3. Competitive energy markets with appropriate regulation
4. Private investment in energy efficiency
5. Monitoring, enforcement and evaluation of policies and measures

Buildings
6. Mandatory building energy codes and minimum energy performance requirements;
7. Aiming for net zero energy consumption in buildings
8. Improving the energy efficiency of existing buildings
9. Building energy labels or certificates
10. Improved energy performance of building components and systems

Appliances and Equipment
11. Mandatory MEPS and labels for appliances and equipment
12. Test standards and measurement protocols for appliances and equipment
13. Market transformation policies for appliances and equipment

Lighting
14. Phase-out of inefficient lighting products and systems
15. Energy efficient lighting systems

Transport
16. Mandatory vehicle fuel efficiency standards
17. Measures to improve vehicle fuel efficiency
18. Fuel-efficient non-engine components
19. Improved vehicle operational efficiency through Eco-driving and other measures
20. Transport system efficiency

Industry
21. Energy Management in industry
22. High efficiency industrial equipment and systems
23. Energy efficiency services for small and medium enterprises
24. Complementary policies to support industrial energy efficiency

Utilities and end-use
25. Energy Utilities and end-use energy efficiency
Cross-sectoral

1. Data collection and indicators
2. Strategies and action plans
3. Competitive energy markets, with appropriate regulation
4. Private investment in energy efficiency
5. Monitoring, enforcement and evaluation
MVE activities ensure the integrity of energy requirements by minimizing non-compliance.
Buildings

6 Mandatory building codes and MEPS
7 Netzero energy consumption in buildings
8 Improved energy efficiency in existing buildings
9 Building energy labels or certificates
10 Energy performance of building components and systems
## Priority actions in the buildings sector

<table>
<thead>
<tr>
<th>Areas for policy action</th>
<th>Overall savings potential</th>
<th>Policy urgency</th>
<th>Bulk of savings available</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy efficiency of building shell measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New residential buildings</td>
<td>Medium to large</td>
<td>Urgent</td>
<td>Immediately and medium- to long-term</td>
</tr>
<tr>
<td>Retrofitted residential buildings</td>
<td>Large</td>
<td>Urgent</td>
<td>Immediately and medium- to long-term</td>
</tr>
<tr>
<td>New service buildings</td>
<td>Large</td>
<td>Urgent</td>
<td>Immediately and medium- to long-term</td>
</tr>
<tr>
<td>Retrofitted service buildings</td>
<td>Medium to large</td>
<td>Urgent</td>
<td>Immediately and medium- to long-term</td>
</tr>
<tr>
<td><strong>Energy efficiency of lighting, appliances and equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>Medium</td>
<td>Average</td>
<td>Immediately</td>
</tr>
<tr>
<td>Appliances</td>
<td>Large</td>
<td>Average</td>
<td>Short- to medium-term</td>
</tr>
<tr>
<td>Water heating systems</td>
<td>Large</td>
<td>Urgent</td>
<td>Short- to medium-term</td>
</tr>
<tr>
<td>Space heating systems</td>
<td>Medium to large</td>
<td>Urgent</td>
<td>Short- to medium-term</td>
</tr>
<tr>
<td>Cooling/ventilation systems</td>
<td>Medium to large</td>
<td>Urgent</td>
<td>Short- to medium-term</td>
</tr>
<tr>
<td>Cooking</td>
<td>Small to medium</td>
<td>Average/urgent</td>
<td>Immediately</td>
</tr>
<tr>
<td><strong>Fuel switching</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water heating systems</td>
<td>Medium large</td>
<td>Urgent/average</td>
<td>Short- to long-term</td>
</tr>
<tr>
<td>Space heating systems</td>
<td>Medium large</td>
<td>Urgent/average</td>
<td>Short- to long-term</td>
</tr>
<tr>
<td>Cooking</td>
<td>Small</td>
<td>Average/urgent</td>
<td>Short to medium-term</td>
</tr>
</tbody>
</table>
6. Mandatory Building Codes and MEPs

- **Lower the U-Values**
  (Measurement of the rate of heat loss through a material)

- **Minimum Energy requirements** (Standards)

- **Air tightness**
8. Improved energy efficiency in existing buildings

• Building Codes (France)

• Mandatory Energy Performance Certificates (the EU)

• Financial mechanisms

• Awareness programs

• Public procurement (the EU)
Appliances and equipment

11 Mandatory MEPS and labels
12 Test standards and measurement protocols
13 Market transformation policies
11. Mandatory Energy Performance Requirements or Labels

- Energy performance requirements (Standards) and Labels – a proven cost-effective policy tool

- Cornerstone:
  - mandatory regulations
  - S & L combination

- Must regularly update requirements in line with international best practices
Lighting

14 Phase-out of inefficient lighting products
15 Energy-efficient lighting systems
14. Phase out of inefficient lighting systems

- CFLs use ¼ the electricity of incandescent lamps for the same amount of light.
- Since 2007, all IEA countries and many others are in the process of phasing-out incandescent lamps.
- Global savings potential of 5.5% of all electricity & 500Mt CO2 is currently halfway towards being achieved.

Overall efficiency of an incandescent lamp = 2%
Transport

16 Mandatory vehicle fuel-efficiency standards
17 Measures to improve vehicle fuel efficiency
18 Fuel-efficient non-engine components
19 Eco-driving
20 Transport system efficiency
16. Mandatory Fuel Efficiency Standards for Light and Heavy-duty Vehicles

- Introduce and strengthen Fuel Economy standards for vehicles
- Harmonise vehicle fuel efficiency test methods across countries

Source: JARI
17. Encourage demand for fuel efficient vehicles

- Vehicle fuel economy labels
- Progressive vehicle taxes (engine size or fuel economy)
- Infrastructure and incentives for low CO2-emitting vehicles (electric and CNG vehicles)
18. Fuel-efficient non-engine components

Fuel efficient tyres can reduce a motor vehicle’s fuel consumption by as much as 5%.
Eco-driving has the potential to reduce fuel consumption by around 10%.
20. Improve transport system efficiency

**Figure 1.6** GHG efficiency of different modes, freight and passenger, 2005

<table>
<thead>
<tr>
<th>Mode</th>
<th>GHG Intensity (gCO₂ eq/ktm, log scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping</td>
<td></td>
</tr>
<tr>
<td>Freight rail</td>
<td></td>
</tr>
<tr>
<td>Road freight</td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GHG Intensity (gCO₂ eq/pkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
</tr>
<tr>
<td>Bus</td>
</tr>
<tr>
<td>2-wheelers</td>
</tr>
<tr>
<td>Passengers LDVs</td>
</tr>
<tr>
<td>Air</td>
</tr>
</tbody>
</table>

Note: The clear line indicates world average, the bar representing MoMo regions’ discrepancy.

Sources: IEA Mobility Model database; Buhaug (2008).
Developments since 2009

- EU adopted regulations for TPMS, tyre rolling resistance and labelling.
- Japan started voluntary tyre labelling scheme.
- EU adopted a regulation for CO2 emissions for passenger cars.
- Gear-shift indicators mandatory (all new manual passenger cars) in EU.

Areas for improvement

- Fuel efficiency standards and labelling for heavy-duty vehicles not implemented in many countries.
- Implementation of planned policies needed.
- Eco-driving should be systematic - driving education.
Industry

21 Energy management
22 High-efficiency industrial equipment and systems
23 Energy efficiency services for SMEs
24 Complementary policies to support industrial energy efficiency
Why is the Industry Sector Important?

The share of industry in total final energy consumption is comparable across most countries.

The tails of the distribution do vary greatly – from above 60% to below 5%
The industrial sector accounts for a third global total final consumption. This share has remained quite stable.

Industry will continue to be the largest energy consuming sector
21. Energy management in industry

- Role of energy management systems
  - Enable continuous energy performance improvement
- Role of energy management programmes
  - Overcome barriers and provide guidance and support for the implementation process

ISO 50001 has now established international standards for energy management
23. Energy efficiency services for small and medium-sized enterprises (SMEs)

1. Capacity and audits
2. Information and tools
3. Access to finance

Not all countries are supporting SMEs in implementing energy efficiency actions. A holistic/package approach is needed.
Energy utilities

Utility end-use energy efficiency schemes
IEA’s energy efficiency policy recommendations for energy utilities

- Provide a level playing field for energy efficiency and energy supply options in resource procurement and wholesale markets;
- Oblige energy providers to deliver cost-effective energy efficiency to end-users;
- Require energy customers be provided with cost-reflective pricing and other information they need to manage their energy use; and
- Consider utilizing revenues from end-use energy consumption to fund energy efficiency
Appendix 2
Other Examples of ICIs
SUPER-EFFICIENT EQUIPMENT & APPLIANCE DEPLOYMENT (SEAD)

SEAD ACCELERATES THE PACE OF MARKET TRANSFORMATION FOR ENERGY EFFICIENT PRODUCTS

Awards
Showcase leadership in energy efficiency

Incentives
Increase demand for energy efficient products

Procurement
Lead by example, with tools & best practice

Standards & Labels
Ensure energy efficiency performance

Technical Analysis
Provide foundation for policy success

Technical Assistance
Support implementation
GLOBAL SUPERIOR ENERGY PERFORMANCE (GSEP) ENERGY MANAGEMENT WORKING GROUP

GSEP ACCELERATES THE ADOPTION AND USE OF ENERGY MANAGEMENT SYSTEMS IN INDUSTRIAL FACILITIES AND COMMERCIAL BUILDINGS

<table>
<thead>
<tr>
<th>Set Policy</th>
<th>Provide Support</th>
<th>Make the Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 50001 Auditor Scheme: Establishing consensus-based, internationally relevant certification scheme for ISO 50001 auditors.</td>
<td>EnMS Practitioner’s Toolbox: Developing a toolbox containing a suite of proven and cost-effective energy management tools, measures, and activities.</td>
<td>Energy Performance Database: Collecting energy performance data into a secure portal; analyzing to demonstrate the value of energy management and identify strategies for implementation.</td>
</tr>
<tr>
<td>EnMS Pilot Projects: Sharing information and technical expertise to support pilot projects.</td>
<td>Measurement and Verification: Conducting activities to improve measurement and verification of energy management results.</td>
<td>EnMS Case Studies: Producing suite of energy management system case studies to develop a compelling business case based on real-world data and experiences.</td>
</tr>
</tbody>
</table>
**GLOBAL SUPERIOR ENERGY PERFORMANCE (GSEP) COOL ROOFS WORKING GROUP**

**GSEP COOL ROOFS WORKING GROUP WORKS TO IMPROVE BUILDING EFFICIENCY AND COMFORT AND ADDRESS URBAN HEAT AND CLIMATE CHANGE**

<table>
<thead>
<tr>
<th>Demonstration Projects</th>
<th>Workforce Development</th>
<th>Market Infrastructure, Standards, and Codes</th>
<th>Studies of Deployment Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Conducting pilot demonstrations of cool roofs on low-income homes to support skill set development and to inform efforts to improve low-income housing programs.</td>
<td>- Developing cool surface workforce training center and certification programs.</td>
<td>- Supporting governments in development of voluntary standard for cool roofs.</td>
<td>- Conducting studies on energy savings potential of cool roof deployment for residential and commercial buildings to help lay the groundwork for cool roof policy.</td>
</tr>
<tr>
<td>- Conducting capacity-building sessions with technical experts on cool roof implementation.</td>
<td>- Building support for cool surface materials testing labs to enable product labeling and build consumer confidence in cool surface products.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLEAN ENERGY MINISTERIAL**

Accelerating the Transition to Clean Energy Technologies

100
Thank You

Philippe Benoit
Head of Energy Efficiency & Environment (Climate) Division, IEA