

**INTERNATIONAL ENERGY AGENCY**



**IEA ENERGY EFFICIENCY POLICY RECOMMENDATIONS TO THE  
G8 2007 SUMMIT, HEILIGENDAMM**

June 2007

## EXECUTIVE SUMMARY

The IEA recommends G8 Leaders adopt a suite of 12 energy efficiency measures. This package follows up on the Gleneagles G8 Plan of Action, which mandates the pursuit of a clean, clever and competitive energy future.

All of our recommendations have met a set of strict criteria before they are submitted to the G8. That is, a recommendation is justified if it:

- is likely to save a large amount of energy at low cost
- addresses existing market imperfections or barriers
- addresses a significant gap in existing policy
- is supported by a high degree of international consensus.

The 12 recommendations for action on energy efficiency cover buildings, appliances and equipment, transport, lighting, industry and cross-sectoral issues:

- *Buildings* account for about 40% of energy used in OECD countries. To save a significant portion of this energy, the IEA recommends action to strengthen the energy efficiency requirements of building codes and the promotion of low-energy houses. Systematic effort on monitoring energy efficiency improvement in existing buildings is also needed.
- *Appliances and equipment* represent one of the fastest growing energy loads in most countries. The IEA recommends mandatory energy performance standards and, where appropriate, energy labeling across the full range of mass-produced equipment. Action is also needed to require individual and networked devices to enter low-power modes automatically.
- About 60% of world oil is consumed in *transport* sector. To achieve significant savings in this sector, the IEA recommends the introduction of mandatory fuel efficiency standards for cars and small trucks and the adoption of international test procedures for measuring tyre rolling resistance.
- Saving energy by adopting efficient *lighting* technology is particularly cost-effective. The IEA recommends that governments phase out the most inefficient incandescent bulbs as soon as commercially and economically viable.
- In order to develop better energy policies for *industry*, urgent attention is needed to improve the coverage, reliability and timeliness of industry's energy-use data.
- The IEA also recommends action on energy efficiency *across sectors*. In particular, the IEA calls on governments to provide adequate resources for their energy efficiency policy agencies and publish energy efficiency action plans. Governments also need to encourage investment in energy efficiency. Governments are requested to report progress with implementing the proposed energy efficiency actions to the IEA.

Implementation of IEA energy efficiency recommendations can lead to huge energy and CO<sub>2</sub> savings. The IEA estimates that if implemented globally, the proposed actions could save 5,700 tCO<sub>2</sub>/yr by 2030. This is equivalent to the USA's total CO<sub>2</sub> emissions in 2004.

The IEA submitted a set of four energy efficiency recommendations to the St Petersburg G8 Summit. Together with the St Petersburg proposals, these new measures continue to set out an ambitious road map for improving energy efficiency at a global scale.

## PURPOSE

This paper provides background information on the concrete recommendations for improving energy efficiency that the IEA Secretariat is presenting to the June 2007 G8 Summit in Heiligendamm.

## BACKGROUND

The imperative to promote energy efficiency remains high on the international agenda. Recent meetings of the G8 Heads of State (2005 Gleneagles and 2006 St Petersburg) and IEA Governing Board (December 2006) reaffirmed the critical role that improved energy efficiency can play in addressing energy security, environmental and economic objectives.

G8 Heads of State in particular have asked the IEA to provide detailed policy advice on energy efficiency, particularly in the transport, industry, appliances and building sectors.

At their Gleneagles Summit in July 2005, G8 Leaders addressed the challenges of climate change and securing clean energy and sustainable development.

Agreeing to act with resolve and urgency, they adopted a Plan of Action. A Dialogue was launched, open to other significant energy consumers. Brazil, China, India, Mexico and South Africa were also represented at the Summit.

The G8 Leaders asked the International Energy Agency (IEA) to be a partner in this Dialogue and to play a major role in delivering the Plan of Action. It will focus on six broad areas:

- Alternative energy scenarios and strategies.
- Energy efficiency in buildings, appliances, transport and industry.
- Cleaner fossil fuels.
- Carbon capture and storage.
- Renewable energy.
- Enhanced international co-operation.

How will the IEA's Gleneagles Programme work for energy efficiency?

IEA analysis will identify best practice and indicate potential for efficiency improvements and appropriate policy approaches to realize that potential.

In-depth indicators will provide « state-of-the-art » data and analysis on energy use, efficiency developments and policy pointers.

Construction of the world's leading database on efficiency codes and standards for buildings,

Responding to this request, in April 2006, the IEA presented four energy efficiency policies for implementation to the St Petersburg G8 Summit. These recommendations covered electronic equipment, transport and lighting and were repeated in the communiqué following the St. Petersburg G8 meeting. The IEA has worked steadily to implement these. For example, the Secretariat is currently establishing the New Implementing Agreement on Deployment of Efficient Electrical End-Use Equipment and Appliances. The IEA has also developed new concrete recommendations.

## THE DEVELOPMENT OF NEW CONCRETE RECOMMENDATIONS

The IEA Secretariat has prepared further concrete recommendations for adoption by the 2007 G8 Summit. Following the Ministerial charge for “demonstrating clear and measurable outcomes”, all recommendations draw on extensive ongoing IEA research and analysis. Where appropriate, IEA

publications and workshops have engaged experts, stakeholders and government officials in the process of refining proposals. Such public consultation enhances the proposals' status and improves their chances of adoption.

In addition, we have analysed each recommendation against several criteria. All proposed actions presented here have been shown to:

- lead to significant energy savings (particularly fossil fuels) at low cost and with considerable economic advantages to consumers,
- address existing market imperfections or barriers by enabling consumers to make informed decisions and fully benefit from their investments,
- address a significant gap in existing policy,
- be supported by a high degree of agreement that internationally coordinated actions will lower costs to governments, manufacturers and consumers.

The Secretariat is presenting 12 recommendations covering buildings, transport, industry, appliances, lighting and cross-sectoral recommendations.

Global implementation of these suggested actions is estimated to lead to savings of approximately 1,160 Mtoe/year and 5,800 Mt CO<sub>2</sub>/year by 2030. These CO<sub>2</sub> savings are almost equal to total US CO<sub>2</sub> emissions in 2004.

The proposed recommendations are outlined below (a summary list of the recommendations is provided in Annex 1. Annex 2 provides information on how the recommendations meet our criteria).

## **PROPOSED RECOMMENDATIONS**

Saving energy is the most rapid, least costly way to reduce energy demand, imports, CO<sub>2</sub> emissions and energy supply investment needs. In the rapidly growing OECD non-member country economies, opportunities to exploit more efficient technologies and practices are great. Harvesting these global opportunities require implementation, monitoring and enforcement of new, nationally and internationally coordinated combinations of measures that draw on public calls for greater efficiency.

The following policy recommendations, which cover all the sectors and require only existing technologies, should be considered for early implementation in the G8 to achieve major energy savings.

### ***Buildings***

Buildings account for 40 % of the energy used in OECD countries. The IEA's analysis reveals that the cost effective energy savings potential for these end-uses is enormous<sup>1</sup>. Estimates suggest that the potential savings from improvements in the end-uses of heating, cooling, ventilation and hot water is at least 500 Mtoe per year (or 30% of reference case energy use) by 2030<sup>2</sup>.

The three buildings recommendations are presented as a package. The package aims to address aspects of the energy savings potential (excluding lighting and appliances) for buildings where immediate action could have significant impacts.

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<sup>1</sup> Recommendations addressing the additional potentials for lighting and appliances appear in the Appliances and Lighting sections below

<sup>2</sup> This is a little more than twice the total building contribution to the World Energy Outlook (WEO) Alternative Policy Scenario (APS) in 2030, but only 70 % of the potential in Energy Technology Perspectives for 2050.

## **Building Codes for New Buildings**

Energy efficiency in new buildings is especially feasible and this should be addressed in energy efficiency standards at the national or state level. Energy efficiency standards in building codes set minimum energy performance standards for all new buildings. In doing so, such standards address market setting a minimum standard for all buildings. A common failure that building standards address is the split incentives between owners and tenants that encourages energy-related decisions to be based on immediate building costs rather than of long-term energy efficiency. Most OECD countries already have energy efficiency standards for new buildings. However, most of the standards are below the economically optimal level when considered over a 30-year building life.

Improving the energy efficiency of buildings requires work by all nations and/or federal states. Some jurisdictions lack energy efficiency standards for new buildings. In other countries, energy efficiency standards apply only to certain types of buildings. There is significant potential to increase the energy efficiency requirements in these standards and to approach the conservation optimum calculated over a building's 30-year lifetime.

**Recommendation:** Countries that do not currently have mandatory energy efficiency standards for new buildings in Building Codes should urgently set, enforce and regularly update such standards. Those countries that currently have mandatory energy efficiency standards for new buildings should significantly strengthen those standards. Energy efficiency standards for new buildings should be set by national or state government and should aim to minimise total costs over a 30-year lifetime.

## **Passive Energy Houses and Zero Energy Buildings**

Mandatory energy efficiency standards set the minimum energy performance of new buildings. However, there is also a need to encourage maximum energy-efficiency performance in new buildings and to ensure that these buildings are available in the market place.

Construction of these high-energy-efficiency performance buildings which use very low, or even no net energy is technically and commercially feasible. Over time, these very low energy-consumption "passive energy houses" (PEH) (that use 65-80% less energy than a standard house) are often, less expensive than those of traditional design. "Zero energy buildings" (ZEB) are currently more expensive than traditional buildings, but their costs are dropping over time. The technology for low-energy buildings has been widely available for some time. However, despite the financial benefits of low running costs and technical feasibility, PEH and ZEB command a very small (less than 1%) market presence worldwide.

The limited uptake of low-energy buildings can be attributed to the fragmented nature of this sector (multiple decision makers involved in the construction of a single building) and the limited consideration given to longer-term energy-related running and lifetime costs. Experience has shown that active government support can increase the uptake of low-energy buildings. In countries where there has been government support for these buildings they account for a larger share of the building stock than in other countries.

**Recommendation:** Countries should support and encourage the construction of buildings with very low or no net energy consumption (Passive Energy Houses and Zero Energy Buildings) and ensure that these buildings are commonly available in the market. Governments should set objectives for PEH and ZEB market share of all new construction by 2020. Passive Energy Houses or Zero Energy Buildings should be used as benchmark for energy efficiency standards in future updates of building regulations.

## **Existing Buildings**

Worldwide, existing buildings represent a major potential for energy savings: through renovation, the total energy consumption of existing buildings can be halved over 30 years. Despite the technical and commercial feasibility of improving an existing buildings' energy efficiency, many market barriers hamper its realization. These barriers include split incentives between owners and tenants, limited

interest in energy consumption, lack of knowledge of energy-efficient options and lack of skills to install and maintain energy-efficient technologies. Further studies under the G8 Gleneagles Plan of Action are urgently needed to support policy recommendations for improved energy efficiency in existing buildings. Countries must act now to collect more information on the energy efficiency of their building stock, on barriers to improved efficiency and on the success of existing conservation initiatives. Furthermore, improving energy efficiency is often most feasible during refurbishment. Countries should set efficiency standards for existing buildings to ensure that energy efficiency is improved during any renovation or refurbishment.

To enable a comparative analysis of building-related energy efficiency policies, building information must be collected and analysed in an internationally harmonised manner. Information is particularly needed for comparison of energy efficiency policies and the global identification of best practices. Beyond its clear benefits to policy analysis, such standardisation has at least two other benefits. Such harmonisation could reduce the uncertainties associated with quantifying the benefits of energy-efficient investments. Second, standardised analysis can assist with the transfer of information on experiences and solutions for improved energy efficiency in the building sector.

**Recommendation:** Governments should systematically collect information on energy efficiency in existing buildings and on barriers to energy efficiency. Standardised indicators should also be calculated for energy efficiency in buildings for international comparison, monitoring and selection of best practices. Based on this information governments should construct a package of initiatives to address the most important barriers to energy efficiency in buildings. This package should set standards to ensure that energy efficiency improvements are achieved during the refurbishment of all buildings. Also, the package should increase awareness of efficiency in the building sector and raise the market profile of a buildings' energy performance.

## ***Appliances and Equipment***

### ***Equipment***

#### **Mandatory Energy Performance Requirements or Labels**

Residential appliances account for over 30% of electricity consumption in most countries, and represent one of the fastest growing energy loads. It is estimated that at least one-third of this could be saved cost-effectively by 2030. Industrial motor systems currently use 40% of the world's electricity and lighting another 19%. The cost-effective savings potential for these end-uses by 2030 is approximately 25% and 38% respectively. Mandatory energy performance requirements and labels have proved to be a highly cost-effective policy tool for reducing the average energy consumption of equipment without reducing consumer choice or triggering sustained increases in prices. While national energy efficiency strategies require a mix of policy measures, the effective implementation of mandatory energy efficiency regulations should be the cornerstone. Therefore, existing mandatory regulations should be extended to cover the majority of end-use equipment, and modes of operation, while those countries without regulations should duplicate requirements used elsewhere. All countries should place an emphasis on ensuring that requirements are regularly updated in line with international best practice, and rigorously enforced, in order to realize the optimal energy savings potential.

**Recommendation:** All countries should adopt mandatory energy performance requirements and, where appropriate, comparative energy labels across the spectrum of appliances and equipment at a level consistent with international best practices. Adequate resources should be allocated to ensure that stringency is maintained and that the requirements are effectively enforced.

#### **Low-power Modes for Electronic Equipment**

While progress has been made in reducing the power consumption of many electronic devices in-line with previous recommendations for a 1-Watt Standby power target, some appliances require consumer action to enter this mode and therefore rarely do so. Ensuring that appliances power down

automatically when not in use is technically feasible and is the most cost-effective means to maximize energy savings amongst all consumers.

In addition, measures to ensure effective power management of home digital networks are required to ensure that energy consumption from networked devices does not escalate. Preliminary work in the US suggests that electricity consumption from home entertainment devices may grow by 100% over the next 10 years, without industry-wide protocols to enable power management commands to be communicated between devices within a network. Government intervention is required due to the significant barriers which currently exist preventing the implementation of such protocols. This issue requires attention now in order that technology under development has the technical potential to access low-power modes.

**Recommendation:** All countries should adopt policies which require electronic devices to enter low-power modes automatically after a reasonable period when not being used. Countries should ensure that network-connected electronic devices minimise energy consumption, with a priority placed on the establishment of industry-wide protocols for power management.

### ***Transport***

There are significant energy savings potentials in the transport sector. The WEO APS estimates that measures in the transport sector will produce 7.6mb/d of savings in global oil demand by 2030, close to 60% of all the oil savings in the WEO Alternative Policy Scenario. Achieving such savings requires urgent policy attention in two areas: mandatory fuel efficiency standards for cars and small trucks, and implementing measures for the deployment of fuel-efficient tyres.

#### **Mandatory Fuel Efficiency Standards for Light-duty Vehicles**

Implementation of appropriate mandatory fuel efficiency standards for cars and small trucks (light-duty vehicles) in all countries is a necessary condition for achieving the significant energy savings in this sector. When implementing mandatory standards, although it is desirable to implement them as early as possible, manufacturers should have enough advance warning in order to cost effectively respond to the new requirements.

In addition, vehicle manufacturers operate in a global market. Harmonisation of vehicle fuel efficiency standards would reduce compliance costs for manufacturers by providing consistent regulatory conditions across countries. This will have flow on benefits for drivers; with lower compliance costs manufacturers will be able to direct more resources towards development and distribution of fuel efficient vehicles at affordable prices.

**Recommendation:** All governments should:

- introduce new mandatory fuel efficiency standards for light-duty vehicles if they do not already exist, or, where they do exist, make those standards more stringent,
- announce the more stringent content of the proposed standards as soon as possible, and
- harmonize, if appropriate, as many aspects of the future standards as possible.

#### **Implementing Measures for Deployment of Fuel Efficient Tyres**

Additional measures are also needed to realize the savings. There is now consensus that aggressive policies for promoting the deployment of fuel-efficient tyres and proper tyre maintenance can achieve as much as a 5% reduction in overall vehicle fuel consumption. In April 2006, the IEA recommended for implementation by G8 Heads of State an energy efficiency policy on tyres. This recommendation was based on international best practice and consisted of two elements: maximum allowable levels of rolling resistance for major categories of tyres; and measures to promote proper inflation levels of tyres.

Since then, experts have reached a consensus that international test procedures for measuring tyre rolling resistance are necessary for effective deployment of fuel efficient tyres. Following this, many

activities to establish the test procedures can be expected at international fora including the International Standard Organization and the World Forum for harmonization of vehicle regulations (UNECE/WP29).

**Recommendation:** Governments should adopt new international test procedures for measuring the rolling resistance of tyres to set maximum rolling resistance limits and for road-vehicle tyre labeling. In addition, all governments, in cooperation with international organisations including UNECE, should make the fitting of tyre-pressure monitoring systems on new road vehicles mandatory.

### **Lighting**

Since the July 2006 St Petersburg Summit, the Secretariat has continued to engage nations of the G8 and other IEA policymakers in establishing a consensus on policies to address specific lighting sectors. In support of this the IEA held a very significant workshop on compact fluorescent lamp (CFL) quality and strategies to phase-out incandescent lighting on the 26 February 2007. Conventional incandescent lights are highly inefficient with only 5% of the input energy being converted into light and the rest being converted into waste heat. CFLs are between 4 to 5 times more efficient. Globally incandescent lamps are estimated to have accounted for 970 TWh of final electricity consumption in 2005 and given rise to about 560 Mt of CO<sub>2</sub> emissions. About 61% of this demand was in the residential sector with most of the rest in commercial and public buildings. If current trends continue incandescent lamps could use 1610 TWh of final electricity by 2030. In the hypothetical case that all these lamps were to be replaced by CFLs it would save roughly 800 TWh and 470 MtCO<sub>2</sub> emissions in 2010 rising to 1200 TWh and 700 MtCO<sub>2</sub> in 2030. Cumulatively this would reduce global net lighting costs by US\$1.3 trillion from 2008 to 2030, and avoid 6.4 Gt CO<sub>2</sub> emissions at negative abatement cost of -US\$205 per tonne.

At the February 2007 IEA workshop the major international lamp manufacturers announced a common position in which they agreed to support the phase-out of the most common types of inefficient incandescent lighting. In place of incandescent lamps manufacturers agreed to support higher efficiency alternatives, such as compact fluorescent lamps (CFLs), improved infra-red halogen lamps, solid state lighting and new radically higher efficiency incandescent lamp technologies. Several economies also announced efforts to develop regulatory measures that either will, or are likely to, result in the removal of inefficient incandescent lamps from the market. These include Australia, which has committed to phase-out low-efficacy incandescent lighting by 2010, California, which has legislation under development and the UK, which has been supporting CFL uptake in substantial volumes. The European Commission is also beginning a study to explore regulatory options. In addition to regulatory measures there are a range of important market building and incentive measures that can be usefully deployed to support a market transformation process.

The meeting heard how some of the higher efficiency alternative lamp technologies are already well established but others are just appearing or are imminently expected on the market. In the case of CFLs, there is a problem of poor quality products sometimes being available and being indistinguishable from other products from inspection of the packaging. As a result, a strategy to phase out incandescent lighting needs to ensure there is both sufficient consumer confidence in the alternative technologies and to implement measures that will make lamp quality more apparent to consumers. Governments also need to work with industry (both lamp and luminaire manufacturers) and retailers to ensure that there is sufficient supply of higher efficiency products to meet demand in the event of regulated change.

**Recommendation:** Governments should move to phase out the most inefficient incandescent bulbs as soon as commercially and economically viable.

In aiming for this objective there is a need both for appropriate time scales and performance targets to be established. Also government and industry actions must be coordinated internationally to ensure a sufficient supply of good quality higher efficiency alternative lamps. The IEA is well placed to facilitate such a coordinated transition were this to be requested by international stakeholders.

## **Industry**

### **High-quality Energy Efficiency Data for Industry**

Industry accounts for nearly one third of total global primary energy supply. The IEA is currently finalising a draft of the book “Recent Analysis into Indicators for Industrial Energy Efficiency and CO<sub>2</sub> Emissions”. This analysis highlighted a significant gap in the availability of high-quality energy efficiency data. Without accurate data it is difficult to target and develop appropriate energy efficiency policies for this significant energy-using sector.

**Recommendation:** Governments should support the IEA's energy efficiency indicator work that underpins critical policy analysis by ensuring that accurate energy intensity time series data for industrial sectors is reported regularly to the IEA.

### **Cross-Sectoral Recommendations**

#### **Increased Investment in Energy Efficiency**

Among the many impediments to adoption of cost-effective energy efficiency investments is the “finance barrier”. This refers to the reluctance of investors and financial institutions to invest in energy-efficient technologies because of:

- the unconventional format of energy-efficient investments (often the ancillary benefits of energy-efficient technologies are difficult to quantify and thus not amenable to standard cost-benefit analysis),
- the initial cost barrier (investors avoid energy-efficient investments because the initial costs of these technologies may be greater than other options, despite the fact that their operating costs may be significantly lower),
- financiers’ lack of familiarity with energy efficiency investments, and
- the lack of market information on available financial products for energy-efficient investments.

**Recommendation:** Governments should:

- adopt, and publicise to the private sector, a common energy efficiency savings' verification and measurement protocol, to reduce existing uncertainties in quantifying the benefits of energy efficiency investments and stimulate increased private sector involvement,
- review their current subsidies and fiscal incentive programmes to create more favourable grounds for private energy efficiency investments,
- collaborate with the private financial sector to establish public-private tools to facilitate energy efficiency financing.

#### **National Energy Efficiency Strategies and Energy Intensity Reduction Objectives**

National energy efficiency strategies can accelerate the implementation of energy efficiency practice across all sectors. National energy efficiency strategies are useful because during their development, implementation and evaluation they can help to: make the vision for energy efficiency explicit; focus attention on the important issues; identify gaps in current work programmes; identify necessary tasks and resources; and allocate implementation and monitoring responsibility. Though several countries have adopted energy efficiency strategies, the coverage is by no means complete.

Effective strategies can involve the establishment of specific, measurable and achievable energy efficiency objectives. By illuminating trends in energy use and efficiency, these objectives enable evaluation of a strategy’s progress.

Similarly, policy agencies developing these strategies need to be adequately resourced. A marked improvement in energy efficiency requires a concurrent improvement in funding for policy agencies.

**Recommendation:** All countries should set goals and formulate action plans for improving energy efficiency in each sector of their domestic economies, utilizing on-going IEA works for developing sectoral energy efficiency benchmarks and compiling good practices. Energy efficiency policy agencies should be adequately resourced. Best practice action plans should:

- assess energy consumption by end-use in all sectors,
- identify the economy's energy savings potentials.
- establish objectives and adequate methods for evaluating the success of the plan.

### **Monitoring and Reporting Progress with Concrete Recommendations**

Following the request from the G8 Gleneagles Summit for IEA advice on energy efficiency, G8 countries have invested in the development of concrete recommendations. As yet there is no formal monitoring or reporting function to assess progress with implementing the IEA proposals.

Regular progress reports would not only help G8 and plus 5 countries to assess their performance, but would also assist the IEA in developing appropriate concrete recommendations for the 2008 summit in Japan.

**Recommendation:** Governments should agree to track progress in implementing each of the concrete recommendations and to provide the IEA with regular updates. The IEA will then present an assessment of progress to the 2008 G8 Summit in Japan.

## **CONCLUSIONS**

The IEA Secretariat recommends G8 Leaders at the 2007 Heiligendamm Summit adopt a suite of 12 energy efficiency policy recommendations. These recommendations cover buildings, appliances and equipment, transport, industry and cross-sectoral issues. As a set, the IEA estimates the recommendations could lead to cost-effective energy savings of 1,160 Mtoe/year by 2030.

Together with the initial four recommendations presented to the St Petersburg G8 Summit these new recommendations continue to set out an ambitious roadmap for achieving enhanced cost-effective energy efficiency at a global scale.

## Annex 1: Proposed Recommendations – Summary List of Recommendations

Sector	Recommendation
Buildings	
New Buildings	1. <i>Countries that do not currently have mandatory energy efficiency standards for new buildings in Building Codes should urgently set, enforce and regularly update such standards. Those countries that currently have mandatory energy efficiency standards for new buildings should significantly strengthen those standards. Energy efficiency standards for new buildings should be set by national or state government and should aim to minimise total costs over a 30-year lifetime.</i>
Passive Energy Houses and Zero Energy Buildings	2. <i>Countries should support and encourage the construction of buildings with very low or no net energy consumption (Passive Energy Houses and Zero Energy Buildings) and ensure that these buildings are commonly available in the market. Governments should set objectives for PEH and ZEB market share of all new construction by 2020. Passive Energy Houses or Zero Energy Buildings should be used as benchmark for energy efficiency standards in future updates of building regulations.</i>
Existing Buildings	3. <i>Governments should systematically collect information on energy efficiency in existing buildings and on barriers to energy efficiency. Standardised indicators should also be calculated for energy efficiency in buildings for international comparison, monitoring and selection of best practices. Based on this information governments should construct a package of initiatives to address the most important barriers to energy efficiency in buildings. This package should set standards to ensure that energy efficiency improvements are achieved during the refurbishment of all buildings. Also, the package should increase awareness of efficiency in the building sector and raise the market profile of a buildings' energy performance.</i>
Appliances	4. <i>All countries should adopt mandatory energy performance requirements and, where appropriate, comparative energy labels across the spectrum of appliances and equipment at a level consistent with international best practices. Adequate resources should be allocated to ensure that stringency is maintained and that the requirements are effectively enforced.</i> 5. <i>All countries should adopt policies which require electronic devices to enter low-power modes automatically after a reasonable period when not being used. Countries should ensure that network-connected electronic devices minimise energy consumption, with a priority placed on the establishment of industry-wide protocols for power management.</i>
Transport	6. <i>All governments should:</i> <ul style="list-style-type: none"> <li>• <i>introduce new mandatory fuel efficiency standards for light-duty vehicles if they do not already exist, or, where they do exist, make those standards more stringent,</i></li> <li>• <i>announce the more stringent content of the proposed standards as soon as possible, and</i></li> <li>• <i>harmonize, if appropriate, as many aspects of the future standards as possible.</i></li> </ul> 7. <i>Governments should adopt new international test procedures for measuring the rolling resistance of tyres to set maximum rolling resistance limits and for road-vehicle tyre labeling. In addition, all governments, in cooperation with international organisations</i>

*including UNECE, should make the fitting of tyre-pressure monitoring systems on new road vehicles mandatory.*

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Lighting	8. <i>Governments should move to phase out the most inefficient incandescent bulbs as soon as commercially and economically viable. ... The IEA is well placed to facilitate such a coordinated transition were this to be requested by international stakeholders.</i>
Industry	9. <i>Governments should support the IEA's energy efficiency indicator work that underpins critical policy analysis by ensuring that accurate energy intensity time series data for industrial sectors is reported regularly to the IEA.</i>

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Cross-Sectoral

Increased  
Investment in  
Energy Efficiency

10. *Governments should:*

- *adopt, and publicise to the private sector, a common energy efficiency savings' verification and measurement protocol, to reduce existing uncertainties in quantifying the benefits of energy efficiency investments and stimulate increased private sector involvement,*
- *review their current subsidies and fiscal incentive programmes to create more favourable grounds for private energy efficiency investments,*
- *collaborate with the private financial sector to establish public-private tools to facilitate energy efficiency financing.*

National Energy  
Efficiency  
Strategies and  
Energy Intensity  
Reduction  
Objectives

11. *All countries should set goals and formulate action plans for improving energy efficiency in each sector of their domestic economies, utilizing on-going IEA works for developing sectoral energy efficiency benchmarks and compiling good practices. Energy efficiency policy agencies should be adequately resourced. Best practice action plans should:*

- *assess energy consumption by end-use in all sectors,*
- *identify the economy's energy savings potentials.*
- *establish objectives and adequate methods for evaluating the success of the plan.*

Monitoring and  
Reporting  
Progress with  
Concrete  
Recommendations

12. *Governments should agree to track progress in implementing each of the concrete recommendations and to provide the IEA with regular updates. The IEA will then present an assessment of progress to the 2008 G8 Summit in Japan..*

## **ANNEX 2**

This Annex provides a summary of the 12 recommendations mentioned above. The recommendations are still a work in progress. Where analysis has been completed, the Secretariat has attempted to summarise the findings of this analysis in two matrices. The first matrix outlines how each recommendation compares against five analytical criteria: the size of savings potential, whether the recommendation addresses significant market imperfections and policy gaps, whether the analysis is based on peer-reviewed analysis and the degree of international political consensus/support for the recommendation.

The second matrix identifies which necessary condition for enhancing energy efficiency the recommendation addresses.

**Table 1: Summary of recommendations against analysis criteria**

Sector recommendation	Savings potential by 2030		Addresses significant market imperfection	Addresses significant policy gap	Based on peer-reviewed analysis	Degree of political consensus (H/M/L)
	'Market' potential % savings in 2030 cf BAU energy use (Mtoe/yr 2030)	CO <sub>2</sub> savings potential (Mt/yr)				
<b>Sectoral recommendations</b>						
<b>Buildings</b>						
Building codes and standards	2.5-3% of bldg energy use (95 – 120 <sup>3</sup> )		✓	✓	✓	H
Passive houses and zero energy buildings	1-3% (47 – 120 <sup>4</sup> )	2400 MtCO <sub>2</sub> /yr	✓	✓	✓	H
Existing buildings and standardised indicators	9-25% (358 – 955 <sup>5</sup> )		✓	✓	✓	H
<b>Transport</b>						
Mandatory fuel efficiency standards cars and small trucks	15% (230)	590MtCO <sub>2</sub> /yr	✓	✓	✓	H

<sup>3</sup> If energy performance of new buildings is improved with 25 % in average over time (reduced consumption)

<sup>4</sup> In the maximum case ZEB accounts for 25 % of the buildings in 2030, in the low case 10 % or a mixture of PH and ZEB with visible part of market (25 %)

<sup>5</sup> In the maximum case buildings energy consumption for heating, cooling, ventilation and hot water is halved in the existing buildings in OECD countries but only reduced with 25 % in developing countries because of comfort increase – this is the absolute potential with existing technology. In the low case only 20 % is addressed in OECD and 10 % in Developing countries. Boilers, water tanks and Air-conditioners are addressed in this because they are a clear part of the performance, but lighting and other appliances are not calculated in.

<i>Implementing measures for deployment of fuel-efficient tyres</i>	3-5% (70-120)	190-320MtCO <sub>2</sub> /yr	✓	✓	✓	H
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**Lighting**

<i>Phase out inefficient incandescent lamps</i>	(103)	700 MtCO <sub>2</sub> /yr	✓	✓	✓	H
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**Industry**

<i>High-quality energy efficiency data for industry</i>	NA	NA	✓	✓	✓	H
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**End-use technology recommendations**

**Appliances**

<i>Mandatory energy performance requirements and labeling</i>	10%	1,900 MtCO <sub>2</sub> /yr	✓	✓	✓	H
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<i>Low Power modes</i>	(260)		✓	✓	✓	H
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**Cross-sectoral recommendations**

<i>Increased investment in energy efficiency</i>	NA	NA	✓	✓	<b>I</b>	H
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<i>National energy efficiency strategies and energy intensity reduction objectives</i>	NA	NA	✓	✓	<b>I</b>	M
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<i>Monitoring &amp; progress reporting</i>	NA	NA		✓		H
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<b>TOTAL</b>	<b>(1163-1908 Mtoe/year)</b>	<b>5780-5950 Mt CO<sub>2</sub>/yr</b>				
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**Table 2: Summary of how each recommendation addresses the various necessary conditions for improved energy efficiency**

Sector <i>recommendation</i>	Necessary conditions							
	Better price signals	Improved information provision	Reduce transaction costs	Enhanced access to finance	Improved public and private decision-making frameworks	Proactive energy management	Improved capital stock	Enhanced skills
<b>Sectoral</b>								
<b>Buildings</b>								
<i>Building codes and standards</i>		●	○		●	●	●	
<i>Passive houses and zero energy buildings</i>		●			●	●	●	●
<i>Existing buildings</i>	●	●	●	●	●	●	●	●
<b>Transport</b>								
<i>Mandatory fuel efficiency standards cars and small trucks</i>		●			●		●	
<i>Implementing measures for deployment of fuel-efficient tyres</i>		●			●		●	
<b>Lighting</b>								
<i>Phase out inefficient incandescent lamps</i>		○					●	
<b>Industry</b>								
<i>High-quality energy efficiency data for industry</i>		●			●			
<b>End-use technology</b>								
<b>Appliances</b>								
<i>Standards and labeling</i>		●			●	●	●	

<i>Low Power modes</i>		○	●			●	●	
<b>Cross-sectoral</b>								
<i>Increased investment in energy efficiency</i>	●	●	●	●	○		○	○
<i>National energy efficiency strategies and energy intensity reduction objectives</i>					●			●
<i>Monitoring &amp; progress reporting</i>		●			●			