

EXECUTIVE SUMMARY

The *Energy Efficiency Market Report 2014 (EEMR 2014)* estimates that investment in energy efficiency markets worldwide in 2012 was between USD 310 billion and USD 360 billion. Investment in energy efficiency was larger than supply-side investment in renewable electricity or in coal, oil and gas electricity generation, and around half the size of upstream oil and gas investment. Investment in energy efficiency is distributed unevenly across countries and energy-consuming sectors (buildings, domestic appliances, transport and industry).

EEMR 2014 highlights

- In 2011, energy savings from continued improvement in the energy efficiency of 11 IEA member countries equalled 1 337 million tonnes of oil-equivalent (Mtoe). This level exceeded the total final consumption (TFC) from any single fuel source in these countries, and was larger than the total 2011 TFC for the European Union from all energy sources combined. Energy efficiency savings in 11 IEA member countries were effectively displacing a continent's energy demand.¹
- Energy efficiency finance is expanding and innovating, with new funding approaches and business models; there is a notable expansion in funding for development aid projects, as well as in the use of funding vehicles such as energy service companies (ESCOs) and on-bill financing mechanisms.
- Vehicle fuel economy standards now cover 70% of the global passenger light-duty vehicle (LDV) market and will drive the market for more energy-efficient vehicles in the next five years. New standards are estimated to lead to energy efficiency investments of USD 80 billion annually out to 2020 and will save between USD 40 billion and USD 190 billion in fuel costs.
- The market potential for energy efficiency is growing significantly in OECD non-member economies. This is pronounced in the transport sector, where passenger travel is estimated to increase by 90% by 2020 from 2011 levels.

Confirming energy efficiency's place as the "first fuel"

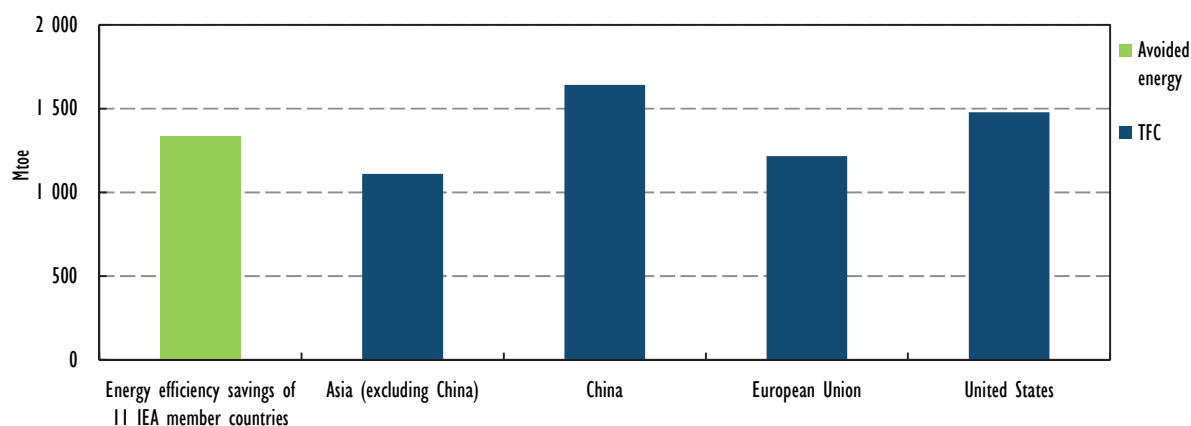
Energy efficiency markets deliver goods and services that reduce the energy required to fuel our economies. Energy efficiency improvements since the 1970s in 11 IEA member countries saved 56 exajoules (EJ) or 1 337 Mtoe in 2011. Avoided energy use was larger than the supply of oil (1 202 Mtoe), electricity (552 Mtoe) or natural gas (509 Mtoe) in 2011; these savings equate to 59% of TFC in the 11 IEA member countries that year. In monetary terms, 56 EJ has a value of USD 743 billion (given an average global price of energy at USD 13.96 per gigajoule [GJ]).²

Energy savings equate to the entire fuel consumption of the European Union

Energy efficiency savings of 1 337 Mtoe in 2011 in these 11 IEA member countries were larger than the combined TFC of the European Union or of Asia, excluding China. These efficiency savings were equal to 80% of TFC in China and 87% of TFC in the United States for that same year.

¹ The 11 countries evaluated are Australia, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States.

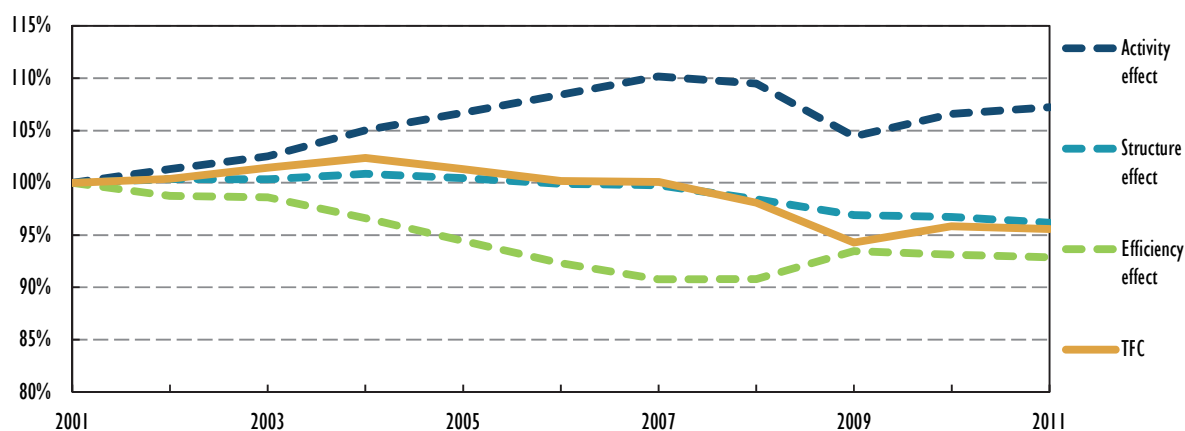
² This assessment draws on a published estimate of 2010 world energy expenditure as USD 6 billion (in constant 2005 USD expressed in purchasing power parity [PPP]). Using IEA energy price data, the calculation converts that 2010 value into 2012 price equivalents, and divides by total primary energy consumption. This generates an average 2012 price of USD 13.96 per GJ. For further information, see Part 1, Chapter 1.

Figure ES.1 Energy efficiency savings compared to TFC in selected regions and countries, 2011

Source: Unless otherwise indicated, all tables and figures in this chapter derive from IEA data and analysis.

What do indicators tell us?

This year's report expands the decomposition of energy demand to 18 IEA member countries (accounting for more than 83% of TFC in OECD member countries and 33% of global TFC). The decomposition finds that energy efficiency had a downward impact on TFC between 2001 and 2011 (Figure ES.2).³ Among the countries analysed, energy demand reduced by 5% between 2001 and 2011. Energy efficiency was the most important factor in this reduction.

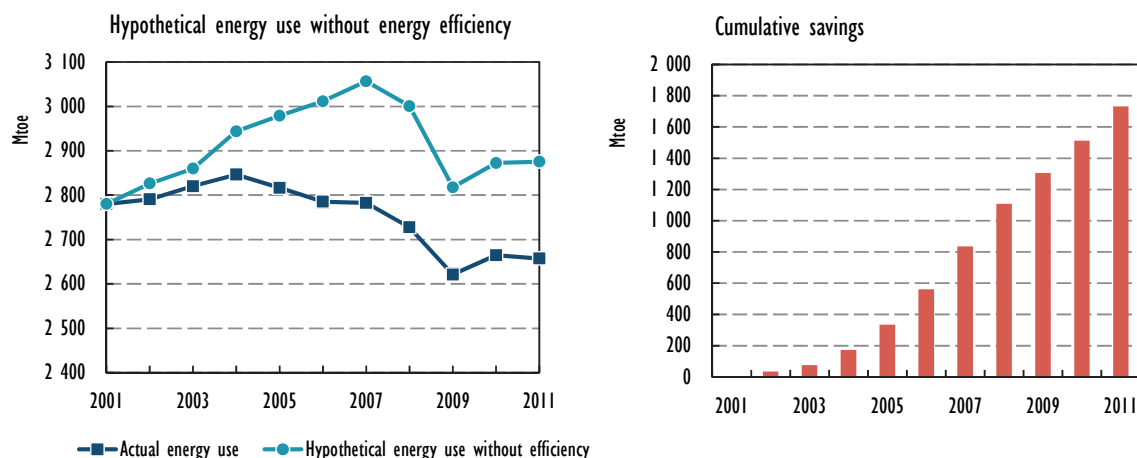
Figure ES.2 Changes in aggregate TFC relative to 2001 levels decomposed by factors for 18 IEA member countries, 2001-11

Notes: Countries comprise Australia, Austria, Canada, Czech Republic, Denmark, France, Finland, Germany, Italy, Japan, Korea, the Netherlands, New Zealand, Spain, Sweden, Switzerland, the United Kingdom and the United States. All values are indexed to 2001 levels.

If there had been no efficiency gains since 2001, TFC in 2011 would have been 218 Mtoe (9 EJ) higher (Figure ES.3). Energy efficiency has consistently reduced annual energy consumption over the past decade. The cumulative savings from efficiency improvements between 2001 and 2011 in these 18 countries was 1 731 Mtoe (72 EJ).

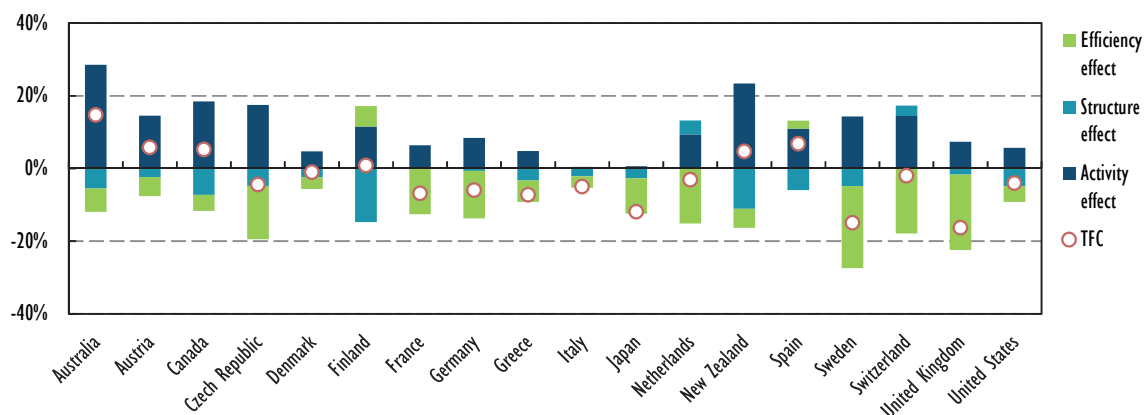
³The 18 countries analysed in the *EEMR 2014* are Australia, Austria, Canada, Czech Republic, Denmark, France, Finland, Germany, Italy, Japan, Korea, the Netherlands, New Zealand, Spain, Sweden, Switzerland, the United Kingdom and the United States. The *EEMR 2013* used a 1990 base year. Only 11 countries had comparable data going back to that time.

Figure ES.3 Hypothetical energy consumption without energy efficiency and cumulative savings from energy efficiency improvements for a set of 18 IEA member countries, 2001-11



At a country level, energy efficiency has served to place downward pressure on TFC in 16 of the 18 analysed countries since 2001, and is the prime mover of the absolute reductions in TFC experienced in 12 countries during this period (Figure ES.4). Of the 12 countries that have reduced TFC since 2001, 8 have experienced energy efficiency effects larger than total increases in activity.

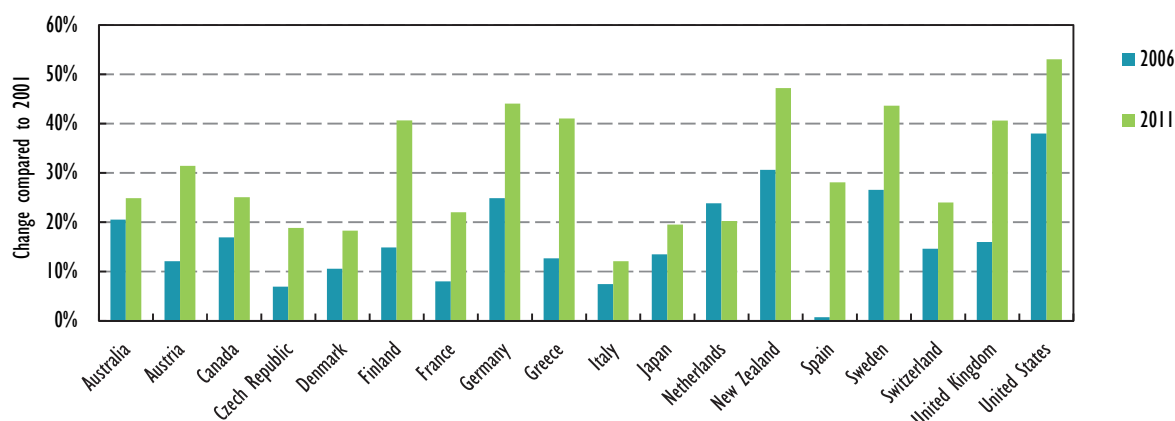
Figure ES.4 Decomposition of TFC between 2001 and 2011 for 18 IEA member countries relative to 2001 levels



Efficiency had the largest percentage improvement in the residential sector, where energy demand reduced by 5% from 2001 levels among the countries analysed. When isolating for the impact of efficiency, energy use would have been 14% lower than 2001 levels. This was driven by efficiency improvements of space heating, water heating, lighting and appliances in residential buildings. Efficiency has more than countered growing populations and preferences for larger dwellings in reducing absolute energy use among the countries evaluated.

Efficiency is reducing energy consumption during a time when energy prices have increased significantly across the countries evaluated. Energy prices increased between 11% and 52% in individual jurisdictions between 2001 and 2011 (Figure ES.5). Energy efficiency and increasing incomes are moderating the impact of increasing prices on households. The share of household income spent on energy has not risen as sharply, and has even levelled off or fallen in some countries between 2001 and 2011.

Figure ES.5 Increase in the weighted price of one unit of energy for individual consumers in 18 IEA member countries, 2001-11



Improved data collection and analysis will help governments and other stakeholders to better track energy efficiency developments, which will in turn support stronger policy design and better identification of market opportunities. Stronger data collection enables a broader and more detailed understanding of how energy efficiency can affect consumption patterns. While the report has been able to draw on improved data from 18 countries this year (as compared to 11 last year), securing better data from an even broader set of countries is important. In addition, better data at a sectoral level, including for industry and transport, can provide better information to allow policy makers and the market to work more effectively to support growth.

Energy efficiency in transport: A huge and growing market

An estimated USD 80 billion is spent per year on investments in energy efficiency in passenger LDVs.⁴ Over the next ten years, passenger LDV purchases, particularly in OECD non-member economies, are expected to offer the largest market opportunity for energy efficiency deployment. Investment in efficient vehicles is expected to represent over 60% of all incremental investment in energy-efficient technologies globally during this period.

The most important short-term driver for energy efficiency investments in passenger vehicles is vehicle fuel economy (VFE) standards, which covered 70% of the global market in 2011, accounting for 50 million vehicles sold that year. Brazil, Canada, China, the European Union, India, Japan, Mexico, Korea and the United States have implemented or updated VFE standards for passenger LDVs that will increase average fuel economy to a range of 3.9 litres to 6.7 litres of gasoline equivalent per 100 kilometres. Standards provide a strong signal for markets to deploy efficient technologies and services over the next 20 years.

Energy efficiency improvements in the transport system could reduce fuel expenditure between USD 40 billion and USD 189 billion annually by 2020 depending on the adoption of new policies and scale of market implementation they achieve. Fuel expenditure is a key driver of transport efficiency investment, with global expenditure expected to reach USD 2.8 trillion in 2020.

⁴This estimate is from the IEA *World Energy Investment Outlook* (International Energy Agency, *World Energy Investment Outlook*, OECD/IEA, Paris).

Trucks and other heavy-duty vehicles (HDVs) account for a growing share of energy consumption in the freight sector, but policies to deploy more efficient HDVs have been less extensive than for passenger LDVs. Japan, Korea and the United States are implementing efficiency-based standards, and standards focusing on greenhouse gases are being implemented in Canada. Energy efficiency market activity for HDVs is likely to intensify in response to new standards and the prospect of high oil prices.

While transport demand is increasing in OECD non-member economies, it is levelling off in OECD member countries, with a corresponding geographical shift in the potential energy efficiency market. Vehicle ownership is levelling off or even declining in OECD member countries, which still have the highest rates of vehicle use and distance travelled per vehicle. Passenger travel demand in OECD non-members is projected to continue to increase – by a further 90% between 2011 and 2020.

Energy efficiency is becoming an established financial market segment

Energy efficiency financing has moved from being a niche to an established financial market segment. This is, in part, the result of the availability of a greater range of financial products, models and intermediaries to facilitate investment.

Large amounts of public finance are being committed to energy efficiency. For example, Germany's public investment bank, KfW, committed a total of EUR 16 billion to energy efficiency in Germany in 2013, and the European Investment Bank (EIB) provided EUR 2.1 billion across the European Union. France's Caisse des Dépôts committed EUR 453 million to energy efficiency in 2012 and the United Kingdom Green Investment Bank provided EUR 181 million. Green investment banks (GIBs) are being established in several countries and are using public capital to leverage private capital, including from institutional investors. Energy efficiency is a target sector for finance in GIBs established in the United Kingdom, Malaysia, South Africa, Australia, Japan, the United Arab Emirates and the United States.

Another important channel for public finance to energy efficiency is through the development aid programmes of bilateral and multilateral agencies. A selection of bilateral and multilateral development banks provided over USD 22 billion in financing in 2012. Bilateral development banks, such as Japan's Bank for International Cooperation, are allocating significant amounts of finance to energy efficiency. Multilateral development banks (MDBs) such as the World Bank, the European Bank for Reconstruction and Development and the Asian Development Bank, are also actively providing energy efficiency finance. MDB finance for energy efficiency under climate mitigation programmes was USD 4.32 billion in 2013.

Financial vehicles are being used to make energy efficiency more attractive to investors. Financial vehicles include the following:

- Specialised entities such as **ESCOs**, which are becoming more active in many countries and implementing new financial models such as energy performance contracting. ESCOs first emerged in the United States in the 1980s, and the market there is already worth more than USD 5 billion a year. The largest market is currently in China, representing over USD 12 billion in 2013.
- **Clean energy bonds**, green bonds, climate bonds and others create new capacity for energy efficiency investment by tapping into fixed income markets. Until late 2013, the green bond market was dominated by MDBs, but corporate green bond issues are now growing very rapidly. For the moment definitions vary widely, but standards and voluntary principles are being developed. Transparent and independent rating systems will be important for further market development.
- **On-bill financing programmes**, such as Property Assessed Clean Energy (PACE), have achieved significant uptake, including in the United States, Mexico and Europe.

Country case studies reveal active and diverse domestic energy efficiency markets

This report highlights the energy efficiency market in 11 geographically and economic developmentally diverse economies, from Korea to Ireland and Canada to India. It documents more than EUR 30 billion of dedicated energy efficiency spending in those countries in 2012. The scale, maturity and drivers of the energy efficiency market vary greatly by country. **India**, for example, is increasingly implementing market-based approaches, whereas **Indonesia** is putting in place basic market-setting standards and labelling programmes. **European Union** member states, including **Ireland, Italy** and the **Netherlands** are putting in place a mix of policies that includes standards, grants, tax deductions, market-based instruments and approaches that leverage public funding with private third-party finance.

Market developments in the 11 economies highlighted in this report include the following:

The light-emitting diode (LED) lighting market is taking off in Japan and Thailand and seeing positive signs in India. In **Japan**, LED sales reached USD 5.2 billion in 2013 and accounted for over 30% of all Japanese bulbs sold that year. The **Thai** LED market has also grown rapidly in recent years, with sales reaching almost USD 15 million in 2011 and growing to USD 38 million in 2013. By 2011, LED lighting had achieved an 8% share of the total Thai lighting market, and has increased to 12% today. **India's** market for LEDs is poised to expand as the country implements a market-based LED roll-out scheme in Puducherry that, once replicated nationally, could lead to the sale and distribution of 33.96 million LED bulbs in 2014 and 3.4 billion bulbs by 2016/17. If this plan is implemented nationally, it could reduce electricity demand by over 50 billion kilowatt hours (equivalent to around 19 000 megawatts of avoided capacity) every year and reduce consumer bills by over EUR 3.1 billion.

The market for energy efficiency improvements in the buildings sector has seen significant government support over the past few years in several of the countries highlighted in this report, including in Ireland, Italy, the Netherlands, Canada and Japan. In **Ireland**, the Better Energy Homes programmes provide financial support to households for energy efficiency investments. These programmes resulted in average annual investment of EUR 230 million in energy efficiency-related construction over the five years (2009 to 2013). **Italy** offered a 55% tax deduction for energy efficiency investments in the residential sector (starting in 2014, the tax deduction has since been increased to 65% for some measures). Between 2007 and 2013, more than 1.8 million applications were approved and around EUR 23 billion of investments were leveraged by households, at a cost of about EUR 13 billion in undiscounted foregone tax revenue. In 2012 alone, more than EUR 2.8 billion was invested in 265 500 energy efficiency measures, which included 2.3 million square metres (m²) of window replacements and 1.2 million m² of rehabilitated solid surfaces. Investments in building insulation in the **Netherlands** have also been growing rapidly at a rate of 10% per year, reaching a value of EUR 680 million in 2012. **Canada** released the Model National Energy Code for Buildings in 2011, which would lead to a 25% energy efficiency improvement compared to the current code for commercial and multi-storey residential buildings, and is predicted to save CAD 70 million for occupants. **Japan** has continued to expand the Top Runner programme, strengthen energy auditing, certification and labelling of buildings, implement more stringent energy performance requirements for new buildings and scale-up efforts to improve the efficiency of the existing building stock.

The energy-saving technology manufacturing and service industries in many countries have been growing, including in Ireland and the Netherlands. In the **Netherlands**, this industry has grown by 9% a year since 1995, with goods and services valued at EUR 4 134 million in 2012. In **Ireland**, exports of

energy efficiency-related products increased from around EUR 100 million in 2010 to over EUR 170 million in 2012 (66% increase). This growth is focused on thermal insulation products and energy-efficient lighting.

The industrial energy efficiency market has benefited from government support in several countries.

In **Ireland**, between 2007 and 2011, the small and medium-sized enterprise (SME) programme of the Sustainable Energy Authority of Ireland supported over 1 470 companies employing the equivalent of approximately 130 000 staff through advice, mentoring and training. In 2012, over 200 SMEs with 2 000 employees and a total annual energy bill of EUR 19.7 million were supported to achieve savings of EUR 2 million. Two schemes in the **Netherlands**, VAMIL and MIA, had budgets of EUR 24 million and EUR 101 million respectively in 2013. The programmes benefit SMEs in particular, with an average investment size of EUR 150 000 for both MIA and VAMIL. Between 2005 and 2010, MIA and VAMIL projects received over 57 000 applications. In **Korea** the government has committed to implement measures to promote the market for smart appliances, energy storage and energy management systems (EMS) using cutting-edge information and communications technology (ICT).

Sub-national governments can drive energy efficiency markets. Much of **Canada's** efficiency programmes and activity occur under provincial government purview. As of 2011, over 200 efficiency programmes and policies were offered through the ten provinces and three territories.

National and supra-national governments can also play a key role in driving energy efficiency markets. **China's** energy efficiency service and investment demands are driven to a large extent by the government's strong and comprehensive energy conservation policies and programmes. During the 11th Five-Year Plan (FYP) of 2006 to 2010, energy efficiency investment surpassed USD 100 billion. Chinese government policies include a variety of administrative programmes, such as mandatory energy savings agreements with large and medium-sized enterprises. China is expected to invest between USD 200 billion and USD 270 billion in energy efficiency between 2011 and 2015 to achieve its 16% energy intensity reduction mandate set in the 12th FYP. In the **European Union**, the European Structural and Investment Funds allocated EUR 5.6 billion to energy efficiency over the period from 2006 to 2013. During the new programme period from 2014 to 2020, energy efficiency funding is expected at least to double.

Some energy efficiency markets are still nascent, but have large potential for growth. Although the market for energy efficiency in **Indonesia** is still in its early days, there is significant potential for growth. Analysis indicates that Indonesia offers more than half of Southeast Asia's energy efficiency investment potential (57%) in the period to 2020. Recent developments in Indonesian energy efficiency policy will help to overcome barriers facing its energy efficiency market.

Strengthening its position as a fuel

Energy efficiency markets are expected to grow worldwide. Energy efficiency is strengthening its position as a fuel option for countries in their efforts to balance supply and demand in support of growth, energy security and environmental objectives. Improving data and analysis are helping to enhance the ability of stakeholders to understand this market – notably in terms of investment inputs, savings outputs, and the impact on energy efficiency outcomes. However, the need remains for further data and methodological improvements. At the same time, increased focus on the issues of energy security, economic growth, sustainable development and climate change mitigation, which can each be enhanced through improved energy efficiency, is likely to support a continued growing emphasis on this “first” fuel.