



Global Energy Efficiency Update

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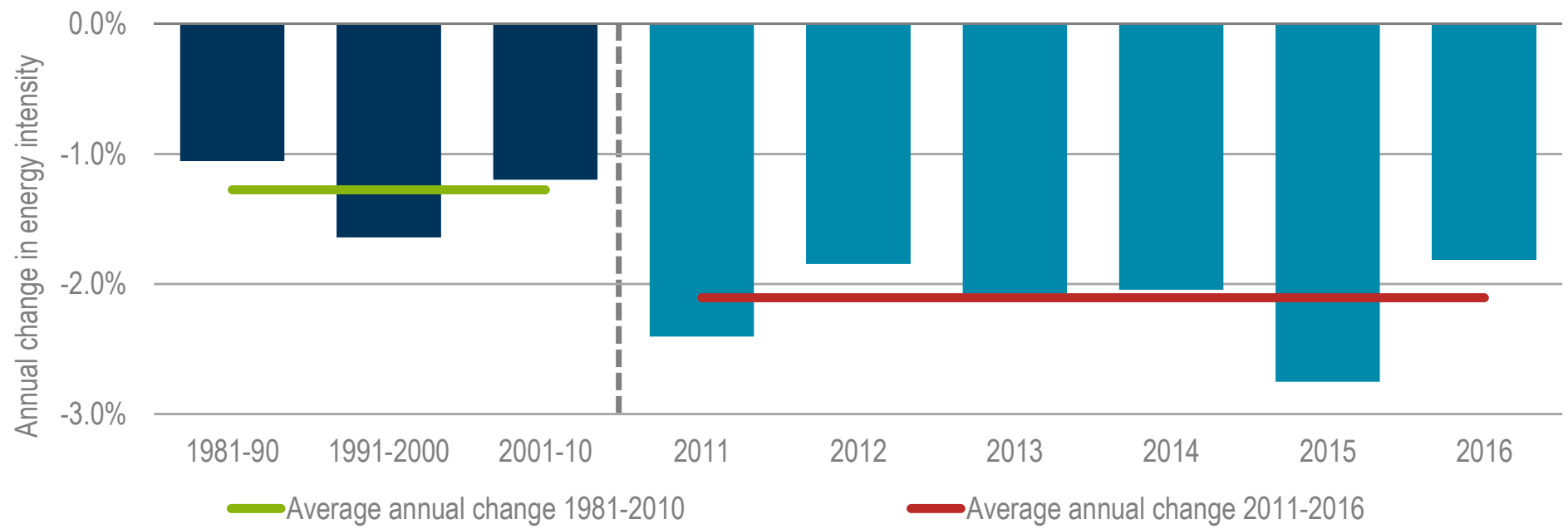
- Energy Efficiency kicking goals globally
 - Bill savings
 - Productivity
 - Greenhouse
 - Security
 - Economic growth
- Policies a key driver
 - Digitalisation
 - Integrated solutions
- Case studies

Energy Efficiency has a major global impact

The world is generating more value from its energy



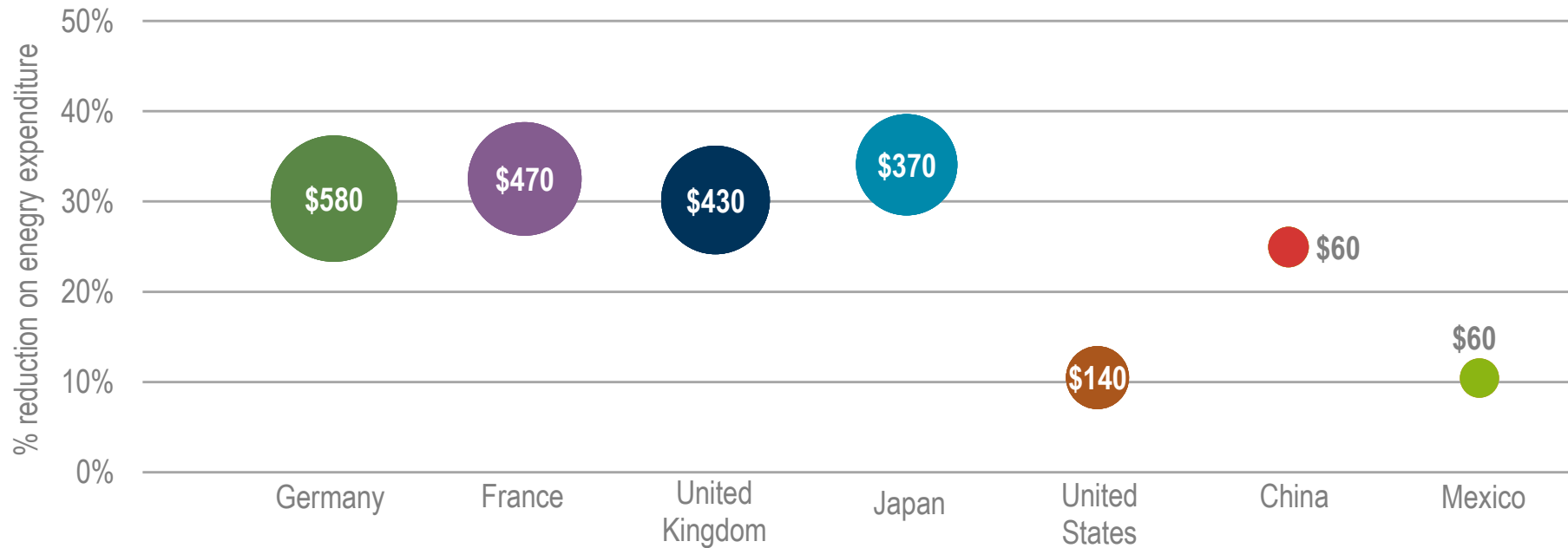
Changes in global energy intensity (energy per unit of GDP)



This decade has seen intensity improvement rates at almost double the historic average, suggesting that the world has entered a new era of faster intensity gains.

Energy consumers are making big savings

Per capita household energy expenditure savings in 2016 due to efficiency

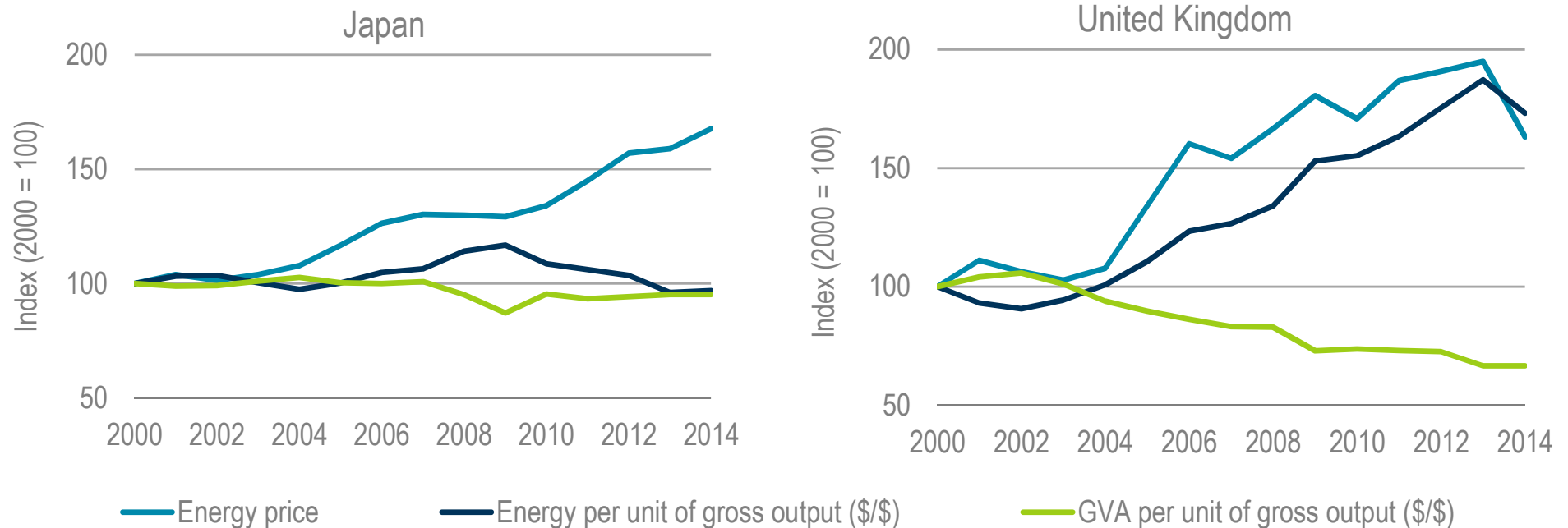


Efficiency improvements made since 2000 reduced energy spending in 2016. German consumers saved nearly USD 50 billion on their annual home and travel energy costs.

Efficiency reduces the negative impact of energy prices on competitiveness



Impact of increasing energy price for the non-metallic minerals manufacturing sub-sector in Japan and the United Kingdom, 2000-14

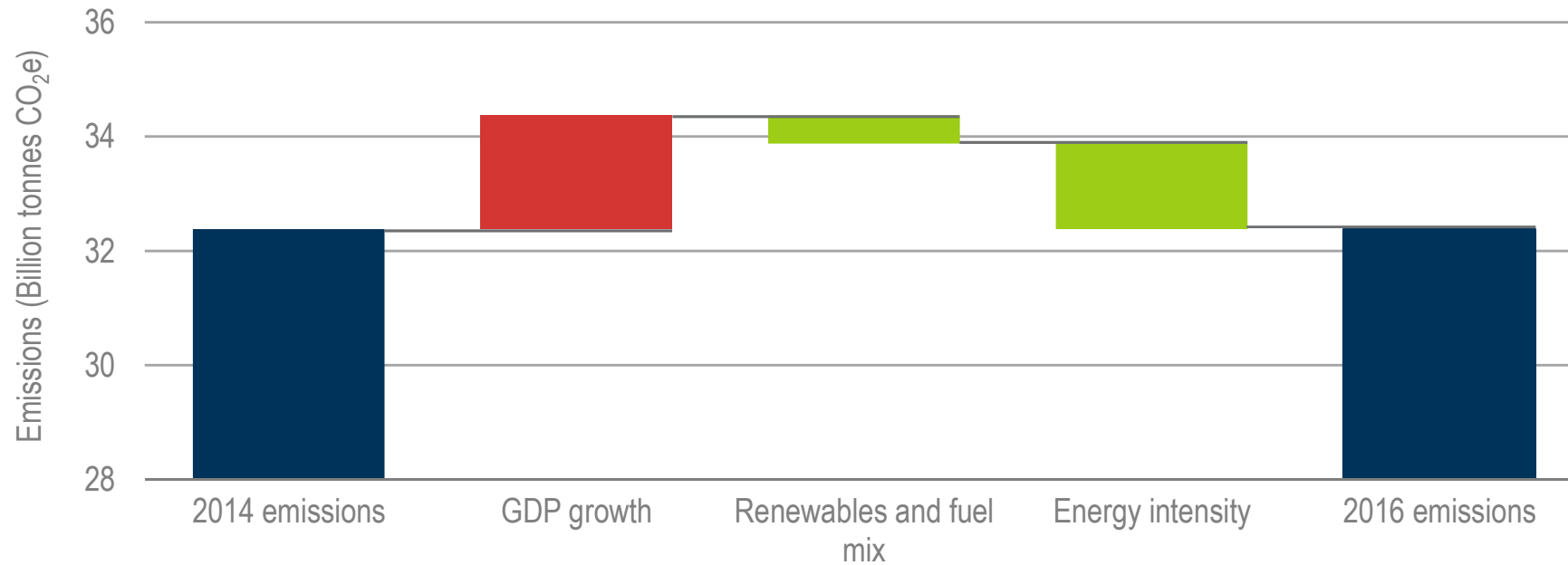


The reduction in energy per unit of gross output in Japan helped avoid a larger reduction in the GVA per unit of gross output

Energy efficiency is helping to keep emissions down



Factors influencing greenhouse gas emissions, 2014-16

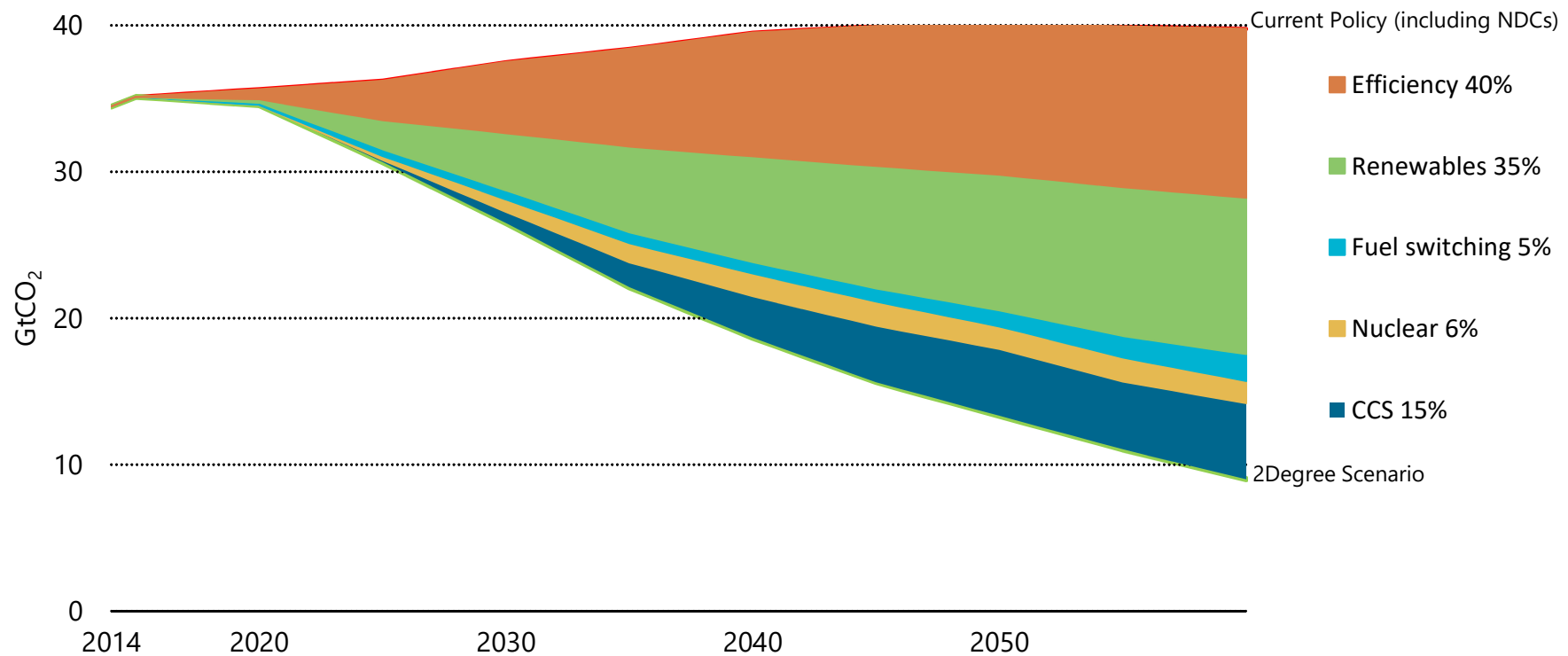


Emissions would have been 2 billion tonnes higher in 2016 without the combination of energy efficiency improvement and the move towards renewables and cleaner fuels.

Energy Efficiency is vital to reaching 2 degrees and below



The IEA projects that energy efficiency and renewables will contribute 75% of the reductions in emissions needed over and above current announced policy to reach 450ppm or 2 degrees scenario

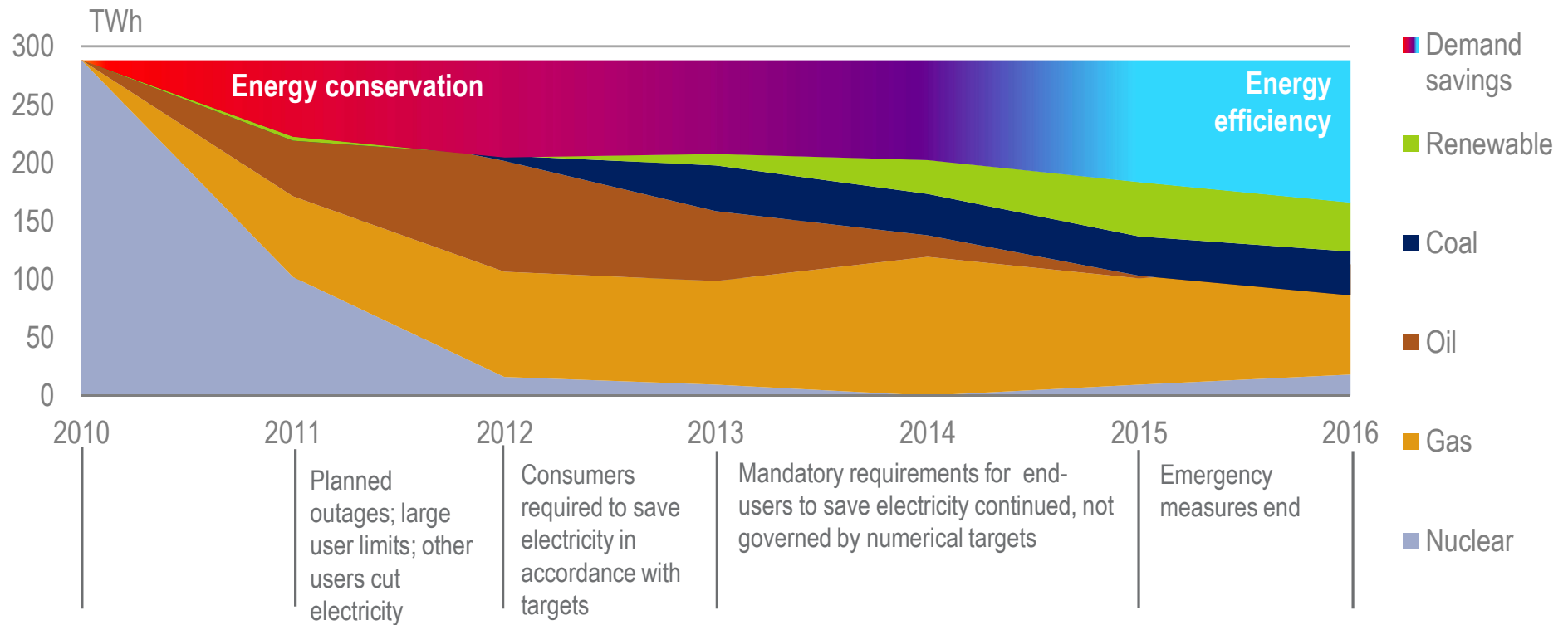


“Reduction efforts are needed on both supply and end use sides; focusing on only one does not deliver 2 degrees” Energy Technology Perspectives 2017

Energy conservation and efficiency drives security



Replacement of nuclear electricity generation capacity in Japan after shutdown

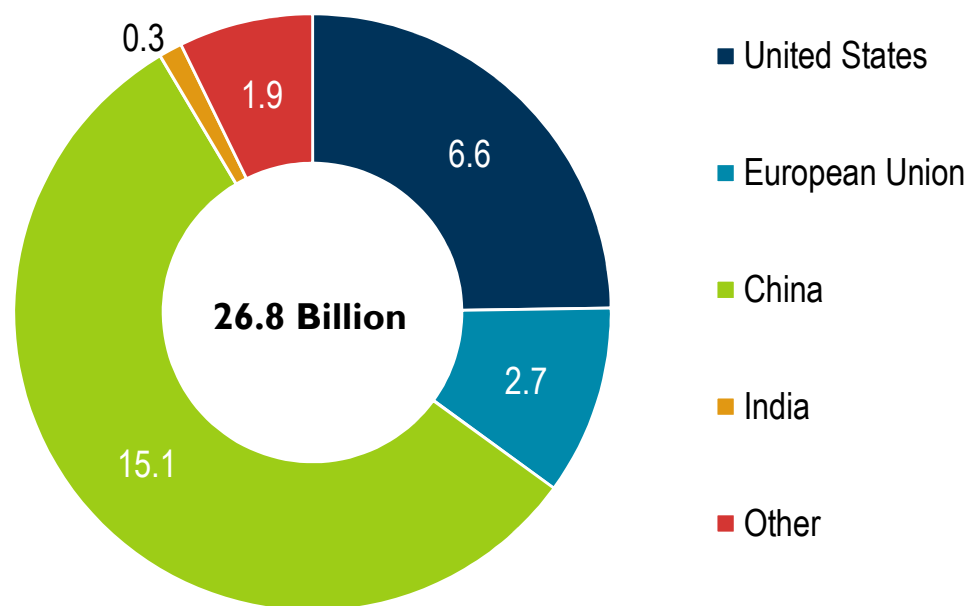


Demand savings from conservation and efficiency measures provided the greatest single contribution (39%) to the replacement of nuclear generation capacity after Fukushima.

The ESCO market grew in 2016, led by China's industry sector



ESCO revenue by region, 2016



ESCO Jobs in China, the United States and the European Union

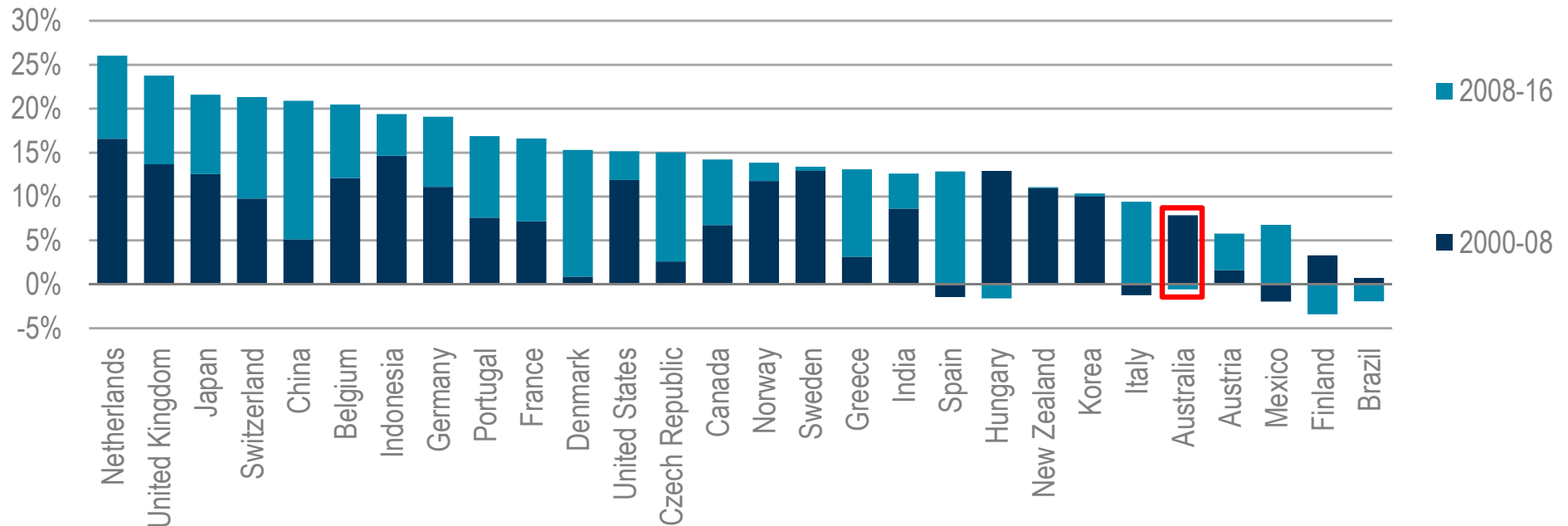
Region	ESCO employment
China	652 000
United States	387 000
European Union	100 000

China has the world's largest ESCO market, with revenue of more than USD 15.1 billion in 2016. More than 1 million people are employed within the global ESCO market.

Policy is a critical driver

Improvement in energy efficiency varies across countries

Percentage improvement in the efficiency effect, 2000-16

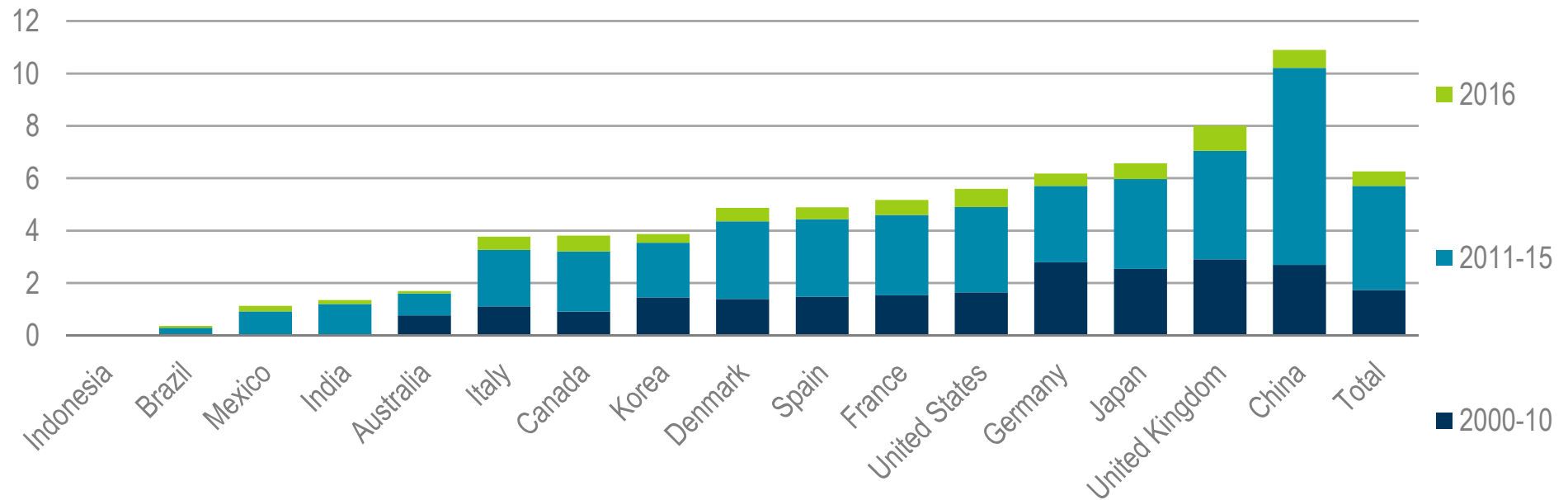


In Australia, improvements in the efficiency effect have been strongest before 2008 and relatively flat since and is low compared to other countries

Policy is a key driver of progress



IEA Efficiency Policy Progress Index (EPPI), 2000-2016

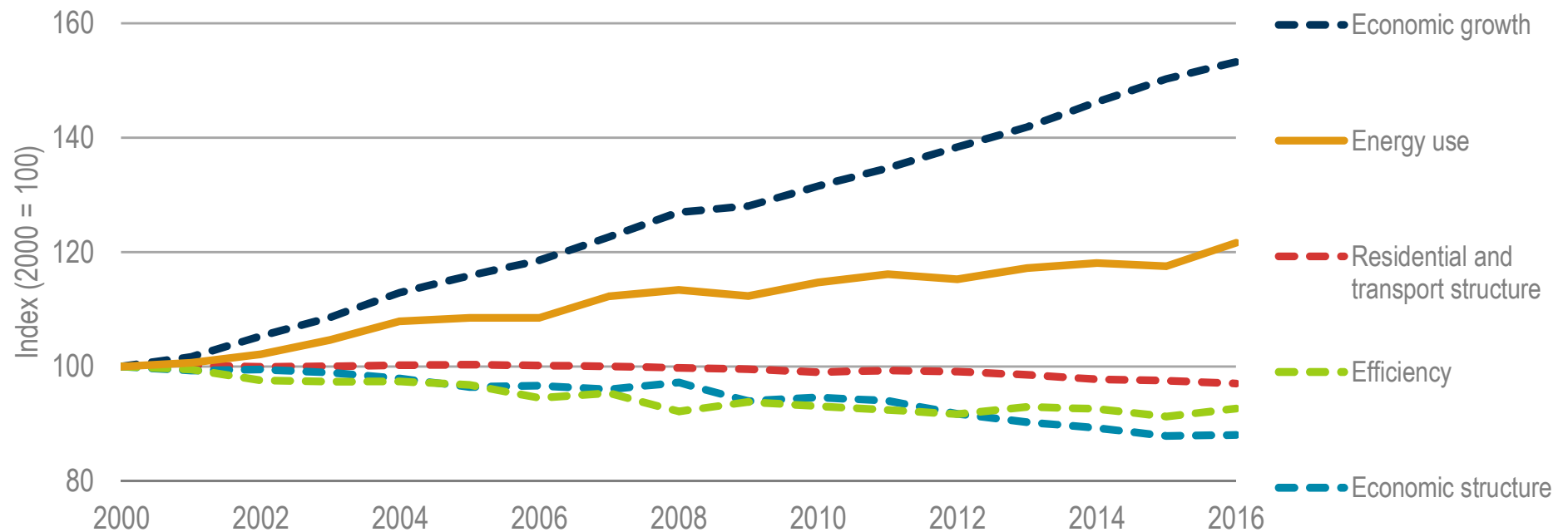


The IEA Efficiency Policy Progress Index reveals where policy progress is strongest and shows that most progress has been made since 2010, particularly in China.

The rate of energy efficiency improvement has not been constant



Decomposition of Australian final energy use, 2000-16



The rate of efficiency improvement across the whole of the Australian economy has been relatively flat since 2008

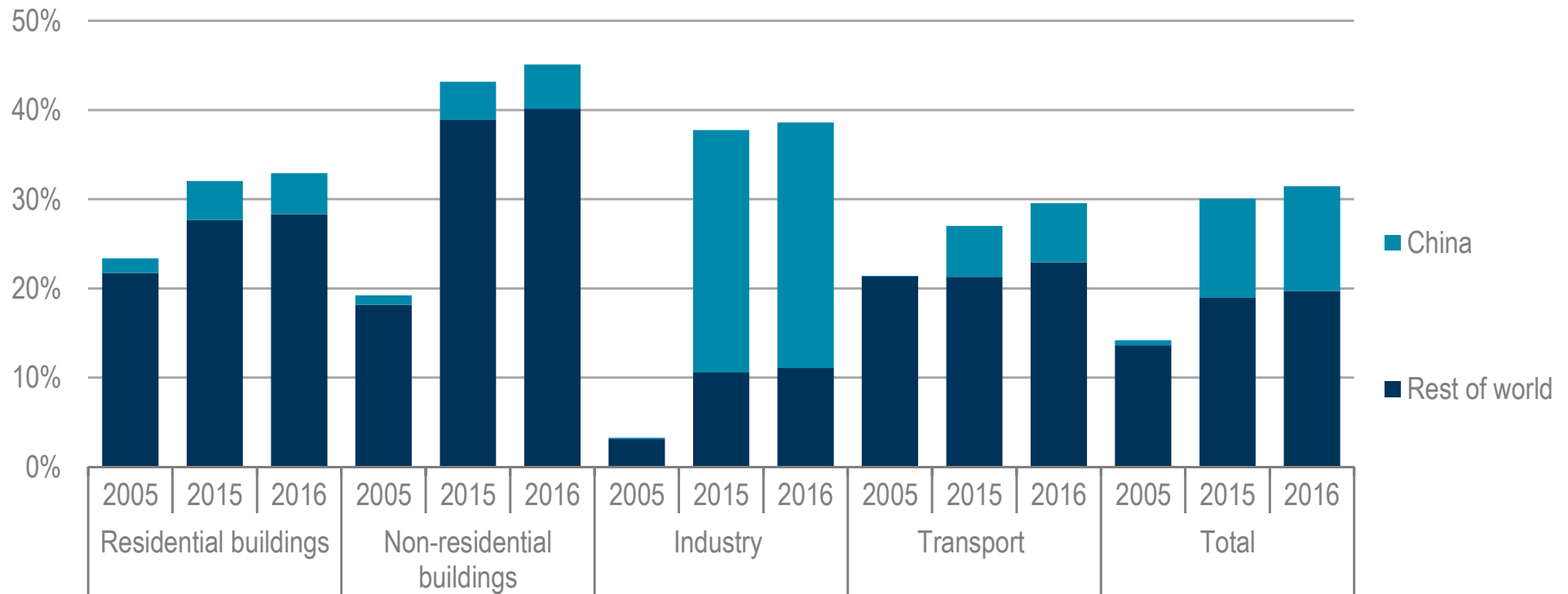
Sticks and Carrots

- Appliance standards and labelling
- Building codes
- Industrial energy management / audits / targets
- Transport – fuel standards & EV support
- Financing implementation and creating a value that others want to pay for -
Energy Service Companies, Capacity Markets, Certificates, Green Bonds, Auctions,
Tax Credits,

Mandatory codes and standards covered 31% of global energy use in 2016



Energy use coverage by mandatory codes and standards

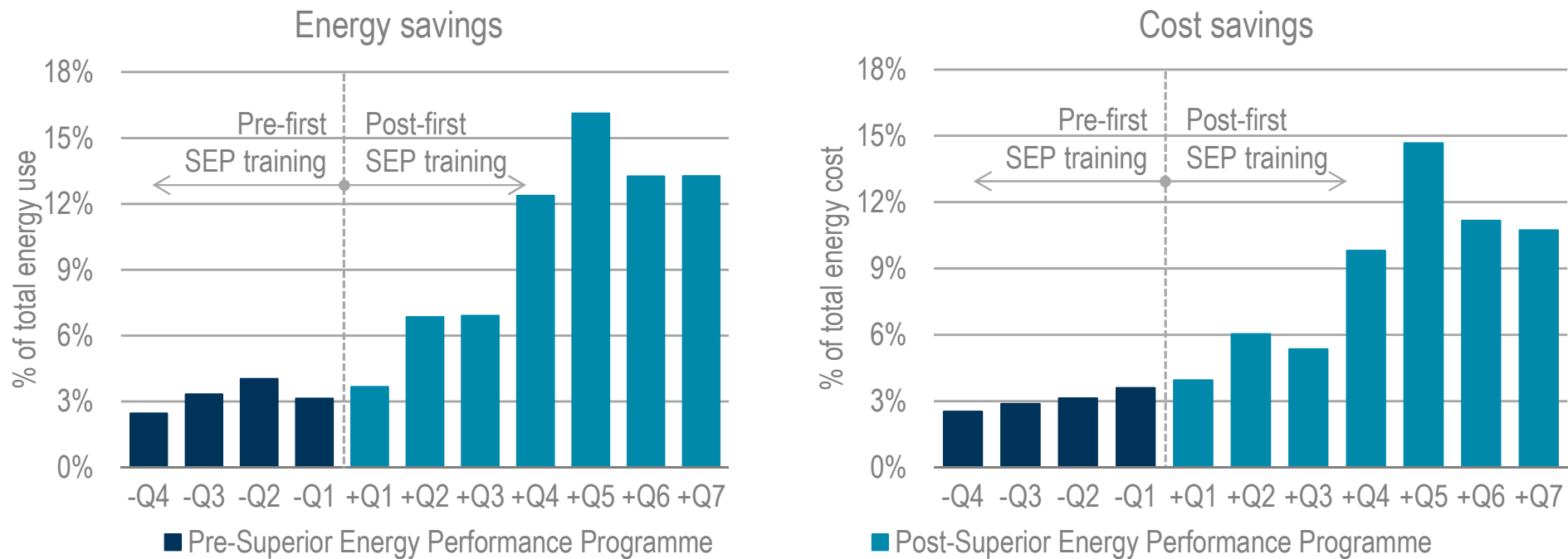


Up 2 percentage points on 2015. Total coverage has increased 17 percentage points since 2005, led by the introduction of mandatory industry targets. Transport coverage increased by 9 percentage points, less than any other sector.

Energy management systems produce real benefits for industry



Verified average quarterly energy and associated cost savings from implementation of the ISO 50001 energy management system



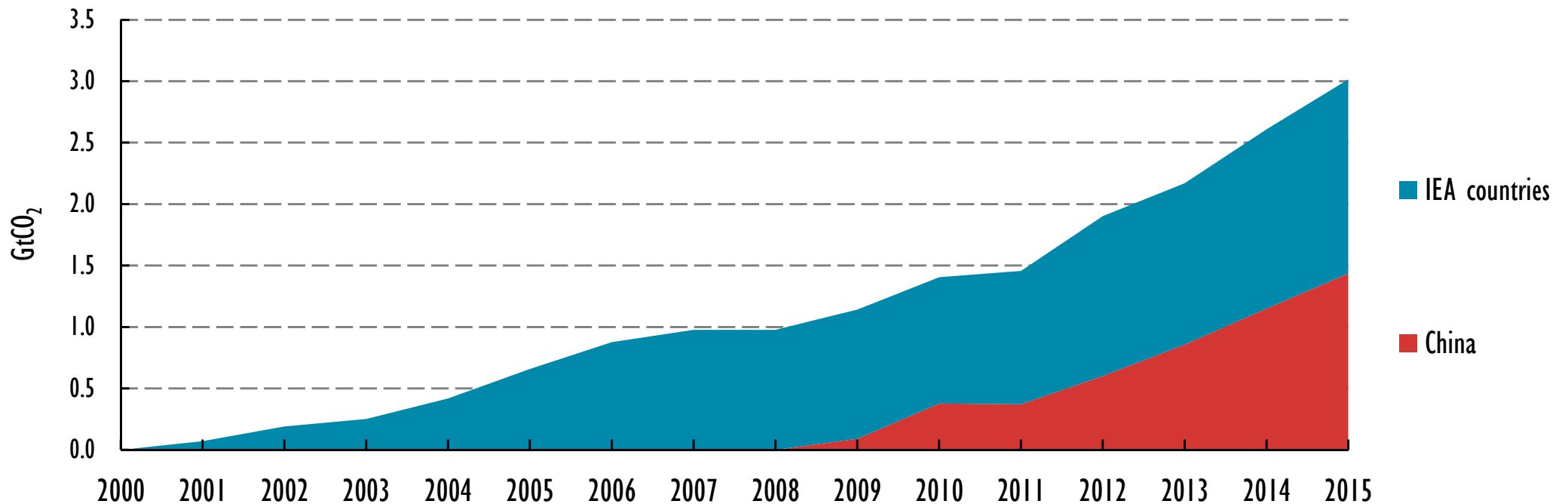
Source: LBNL (2015), Development of an Enhanced Payback Function for the Superior Energy Performance Program.

Companies implementing energy management systems have reported energy and cost savings of over 10%

China's industrial energy efficiency policy key driver of CO₂ emission reductions



CO₂ emissions savings from efficiency improvements since 2000 in IEA countries and China

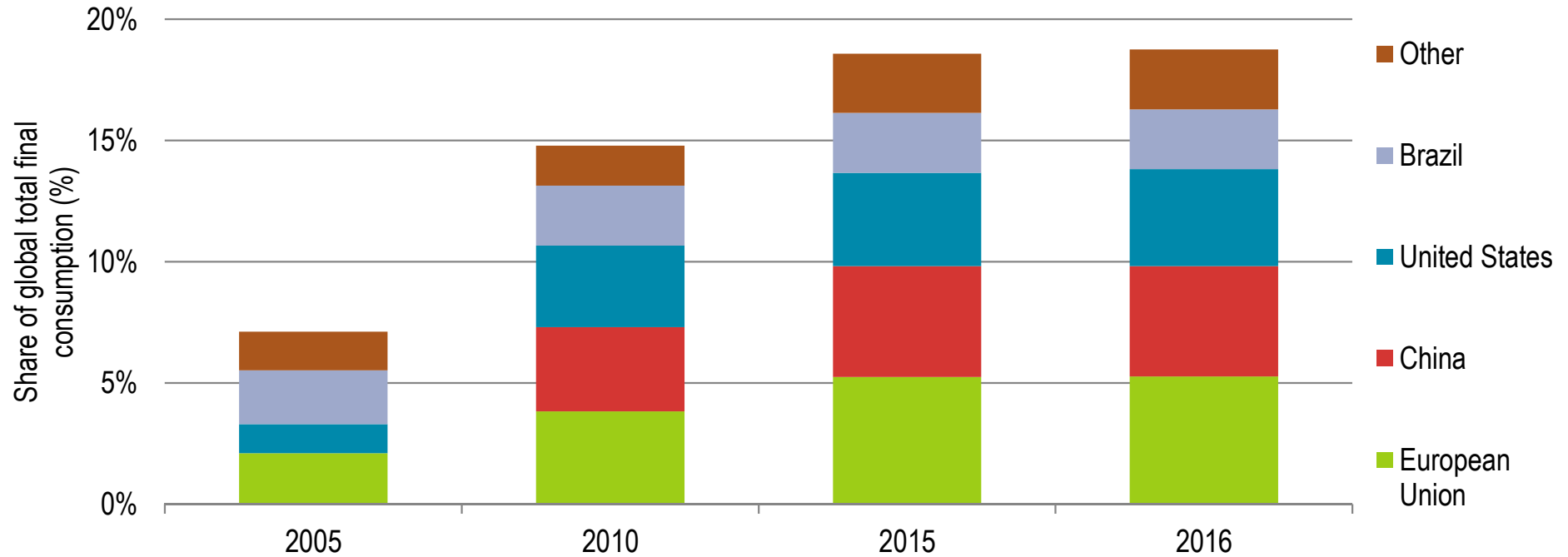


In 2015, efficiency gains in IEA and China reduced their combined emissions by 15%. Efficiency policy in China has become one of the most important global actions to reduce emissions.

Coverage and strength of energy utility obligations increased markedly over the past decade



Coverage of energy utility obligations, 2016

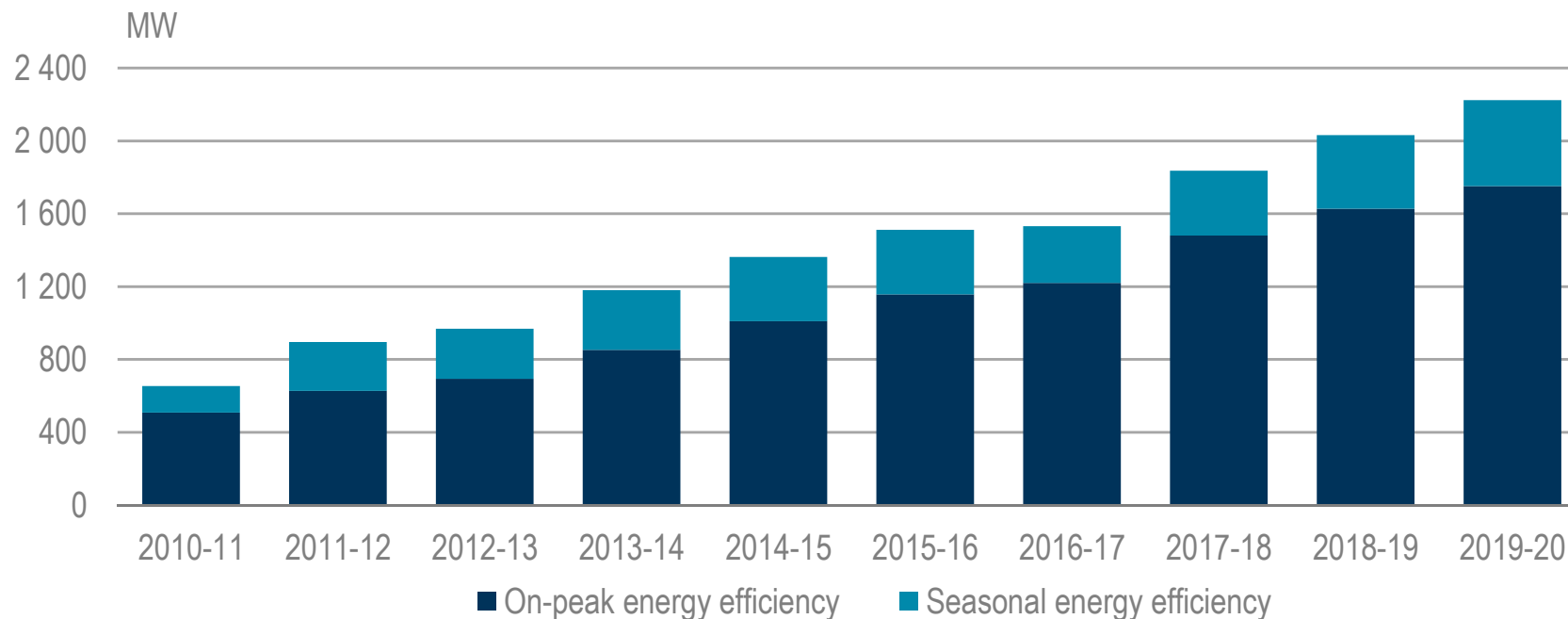


The percentage of global final energy use covered by obligation programmes rose from 7% in 2005 to 19% in 2016. There was no increase between 2015 and 2016 owing to the lack of new programmes.

More efficiency is being accepted in capacity auctions

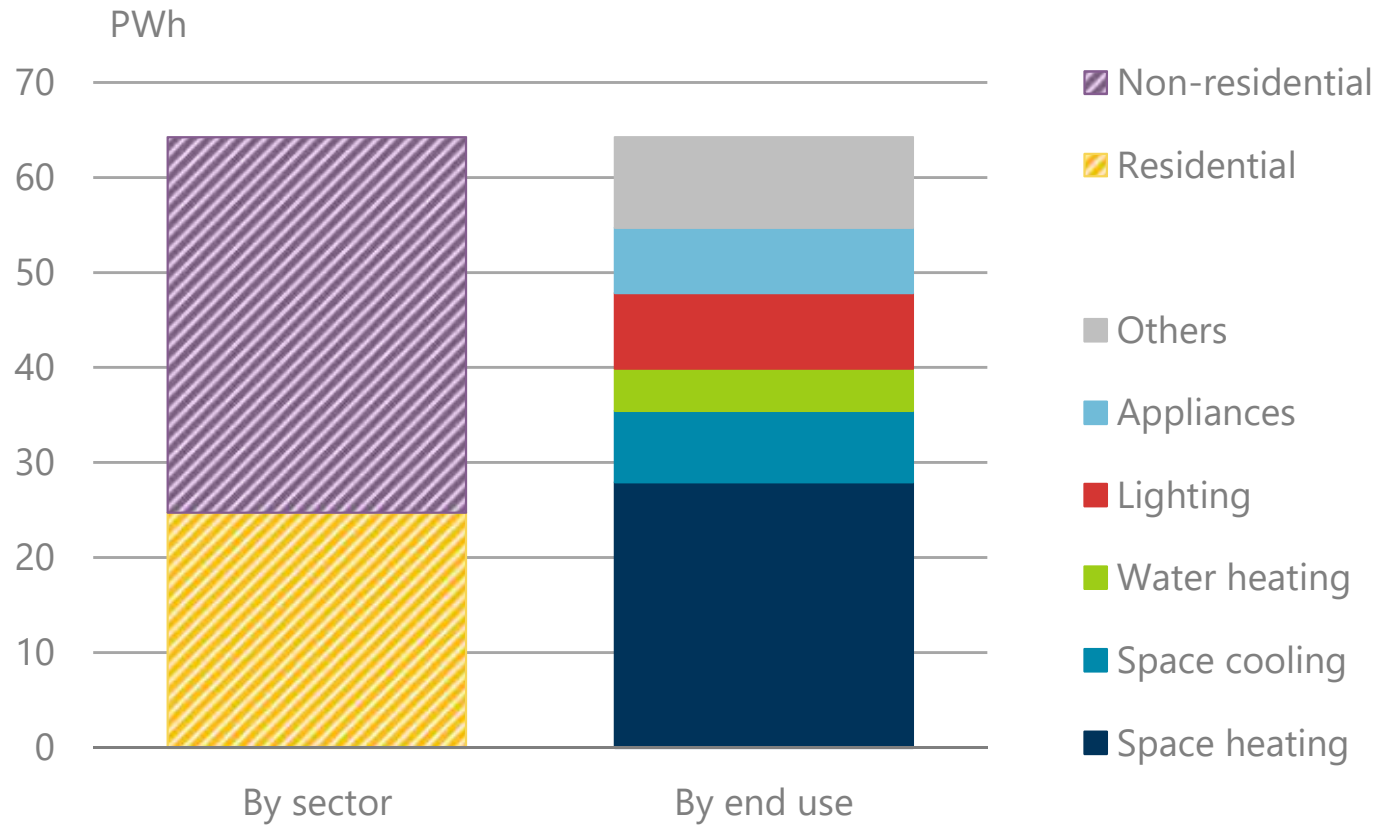


Energy efficiency savings accepted in the ISO-NE capacity market



In the ISO-NE capacity market, over 2 200 MW of efficiency resources cleared the recent auction for delivery in 2019/20. This was more than triple the amount cleared for delivery in 2010/11 and represented 6% of the total capacity cleared.

Digitalization will enable smarter energy management



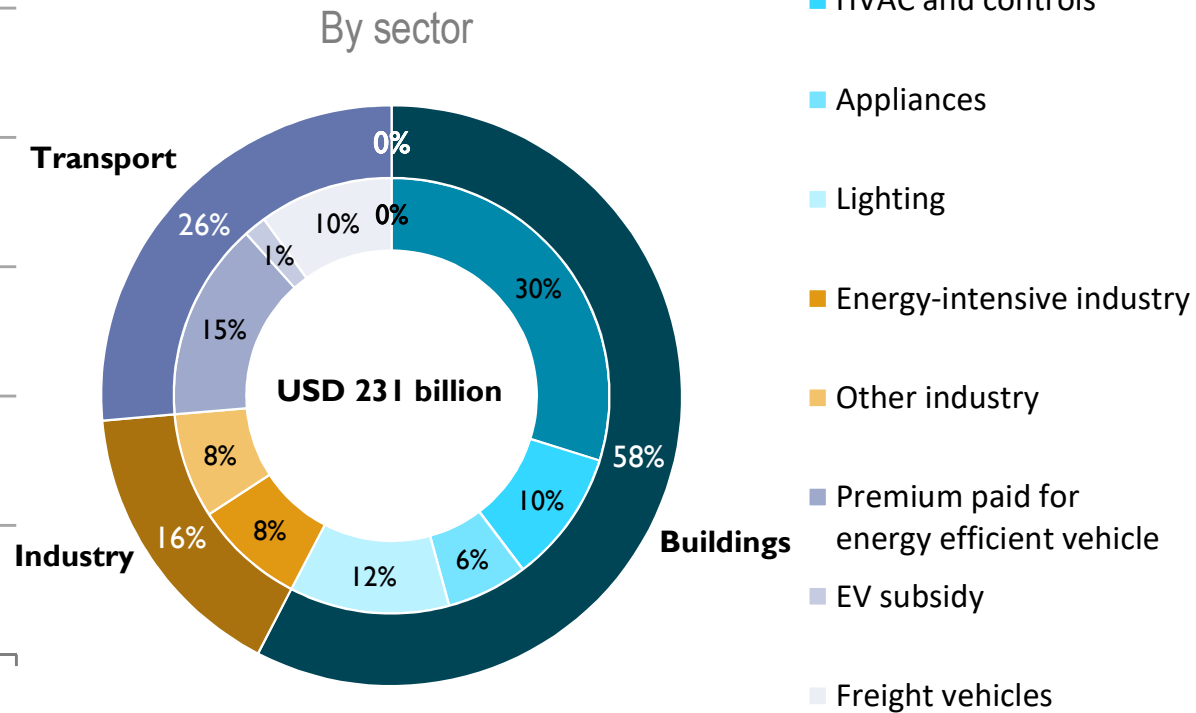
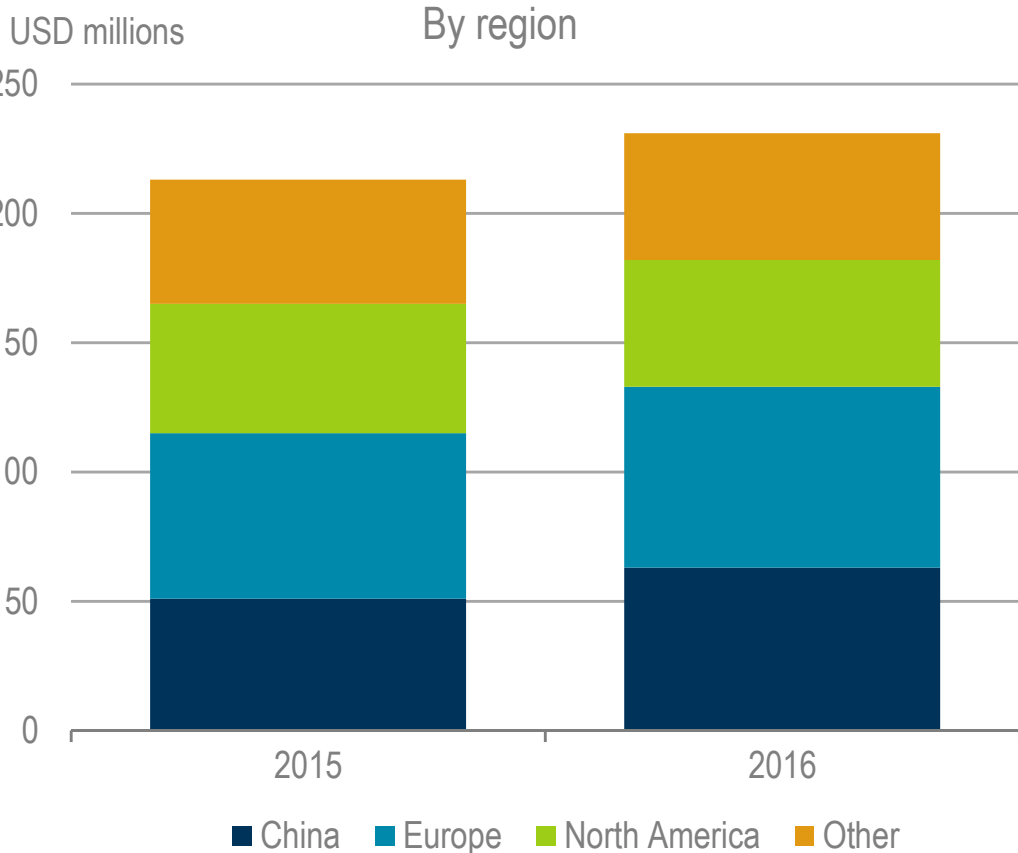
IEA analysis

Widespread deployment of smart building controls could reduce energy use by 10% to 2040

Energy efficiency investment grew in 2016



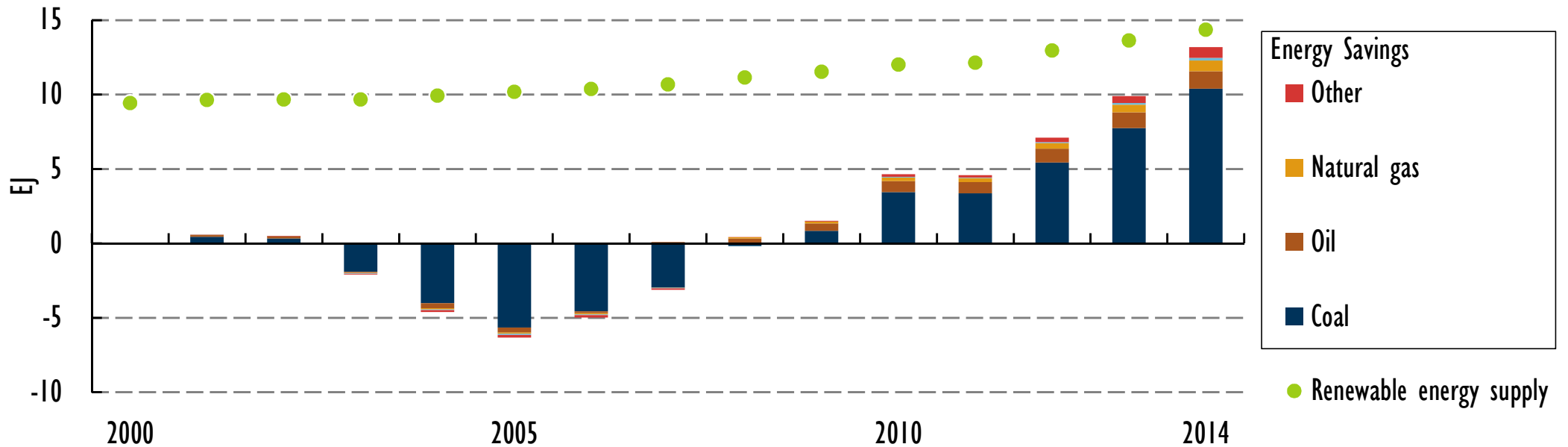
Energy efficiency investment by region and sector



Global investment increased by 9% to USD 231 billion. This represents 14% of the USD 1.7 trillion invested across the entire energy market.

Efficiency and renewables are changing the energy system

Chinese energy use, GDP and energy intensity, 2000-15

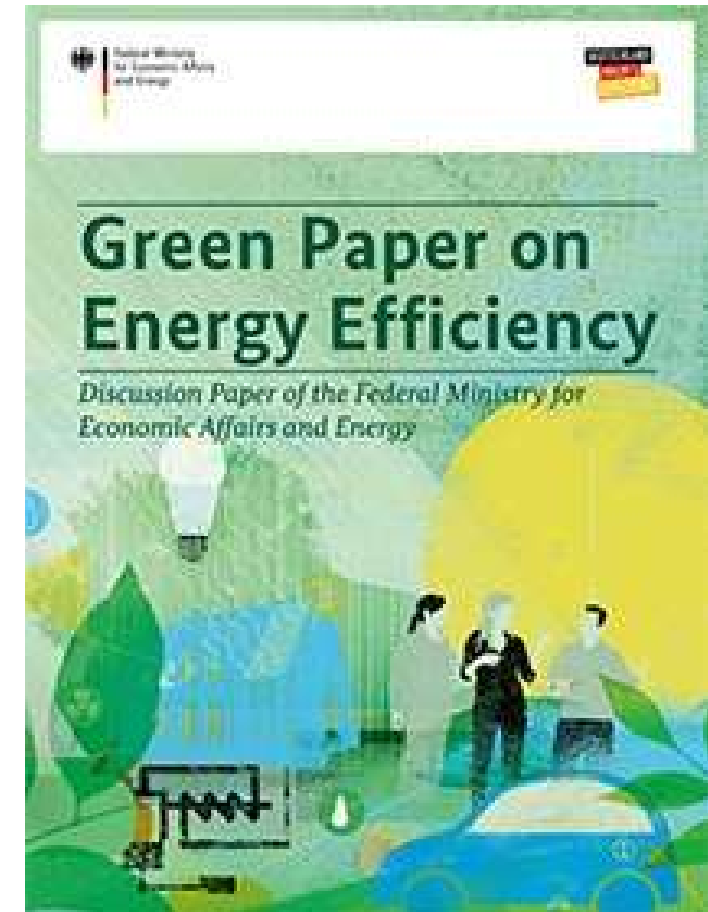


Dramatic progress on energy efficiency since 2006 saved 350 million tonnes of coal in 2014. Energy savings are as large as China's renewable energy supply.

A more integrated policy approach

Germany's Green Paper on Energy Efficiency & Power Markets include 3 pillars

- Reducing demand in all sectors "Energy Efficiency First"
 - Better understanding and reducing demand to reduce the overall cost of supplying clean energy.
- Increasing the direct use of renewable energy,
 - Such as solar thermal, geothermal, waste heat and bioenergy for heating, building air-conditioning and hot water
- Then optimal use of renewables in electricity, heat and transport, through electrification and sector coupling
 - Electrification of the whole energy system will ensure excess power generation is captured through sector coupling





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