

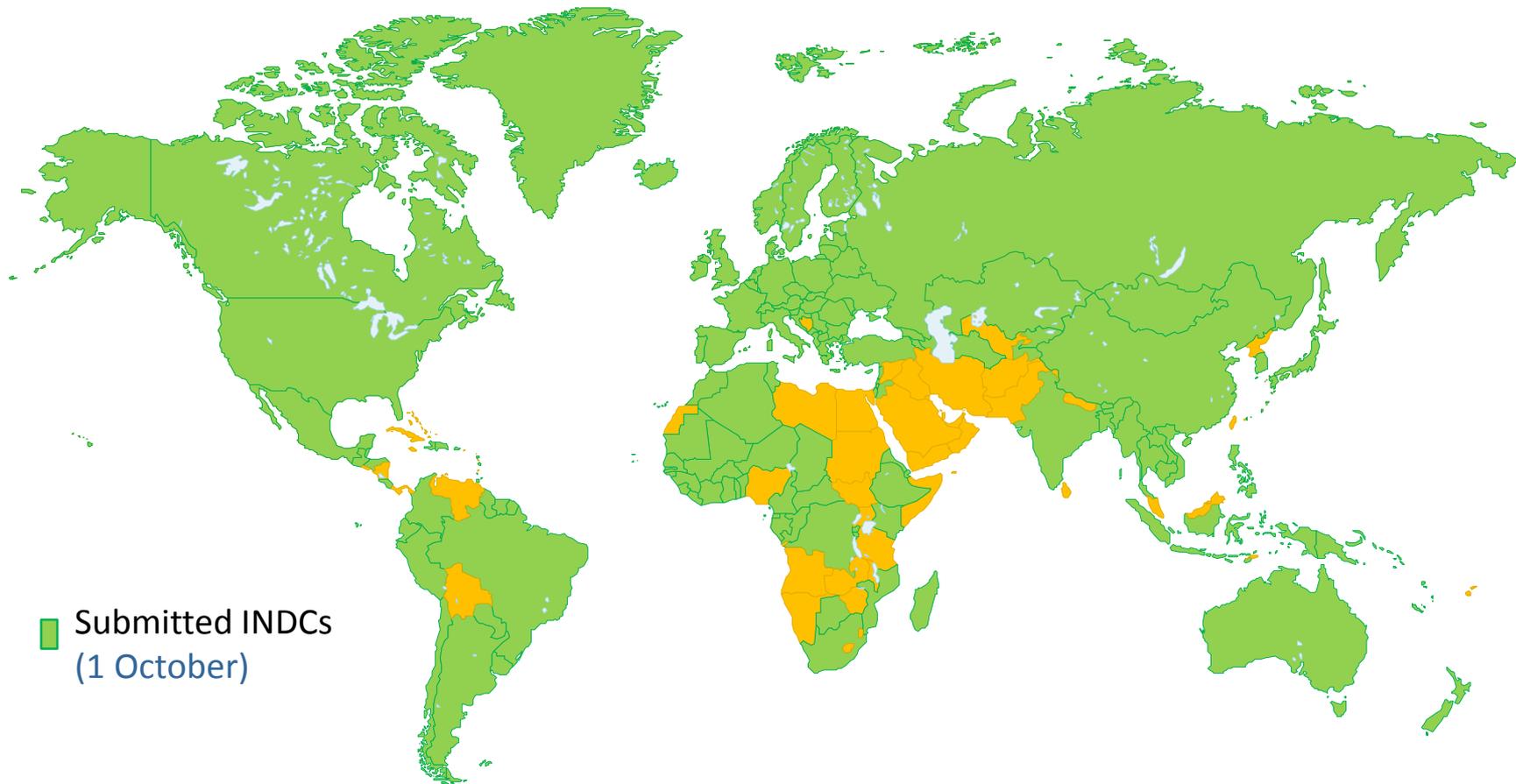
Energy efficiency markets and the energy efficiency transition

Institute of Energy Economics, Japan
October 26, 2016

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www.iea.org/eemr16

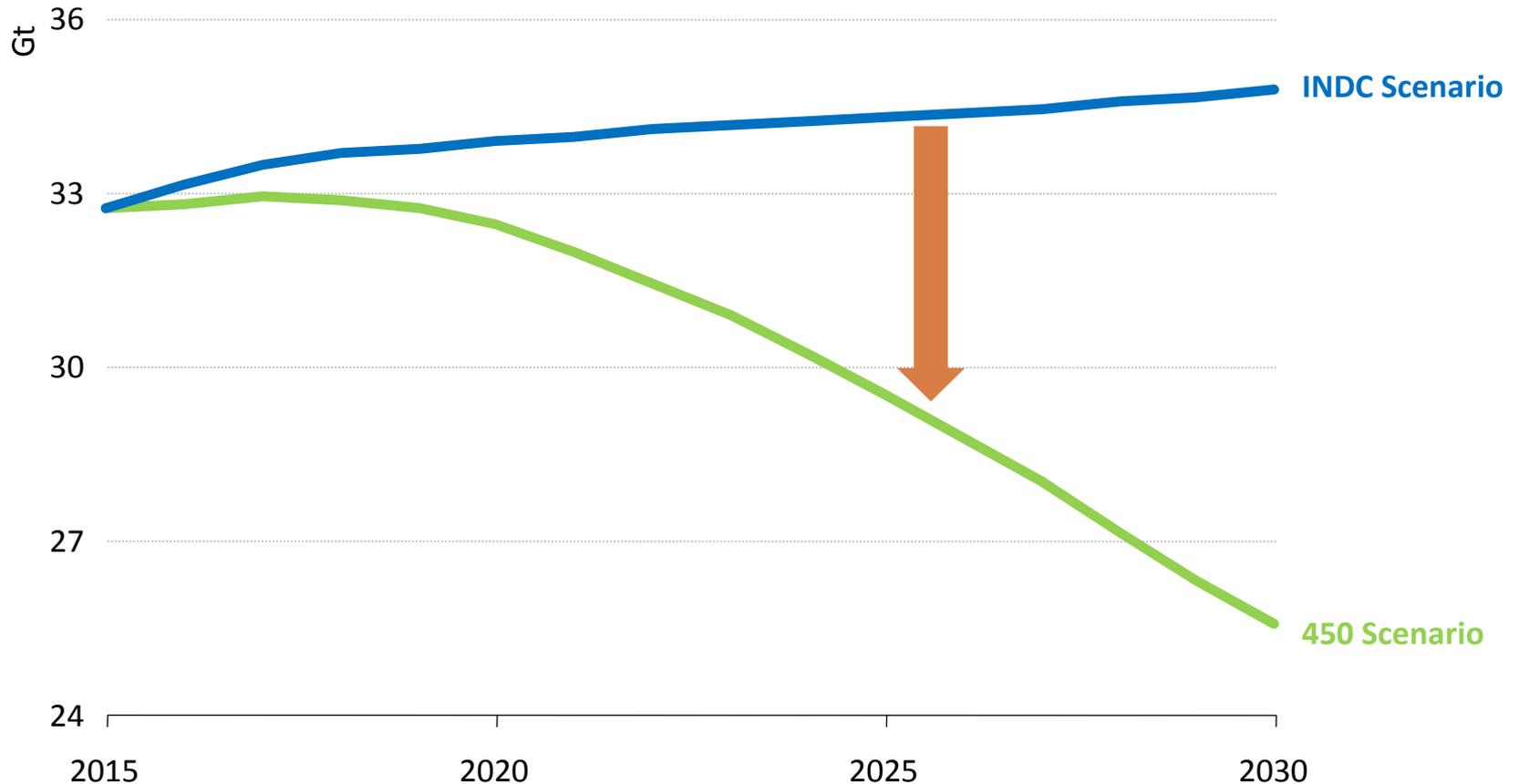
The Paris Agreement is in effect



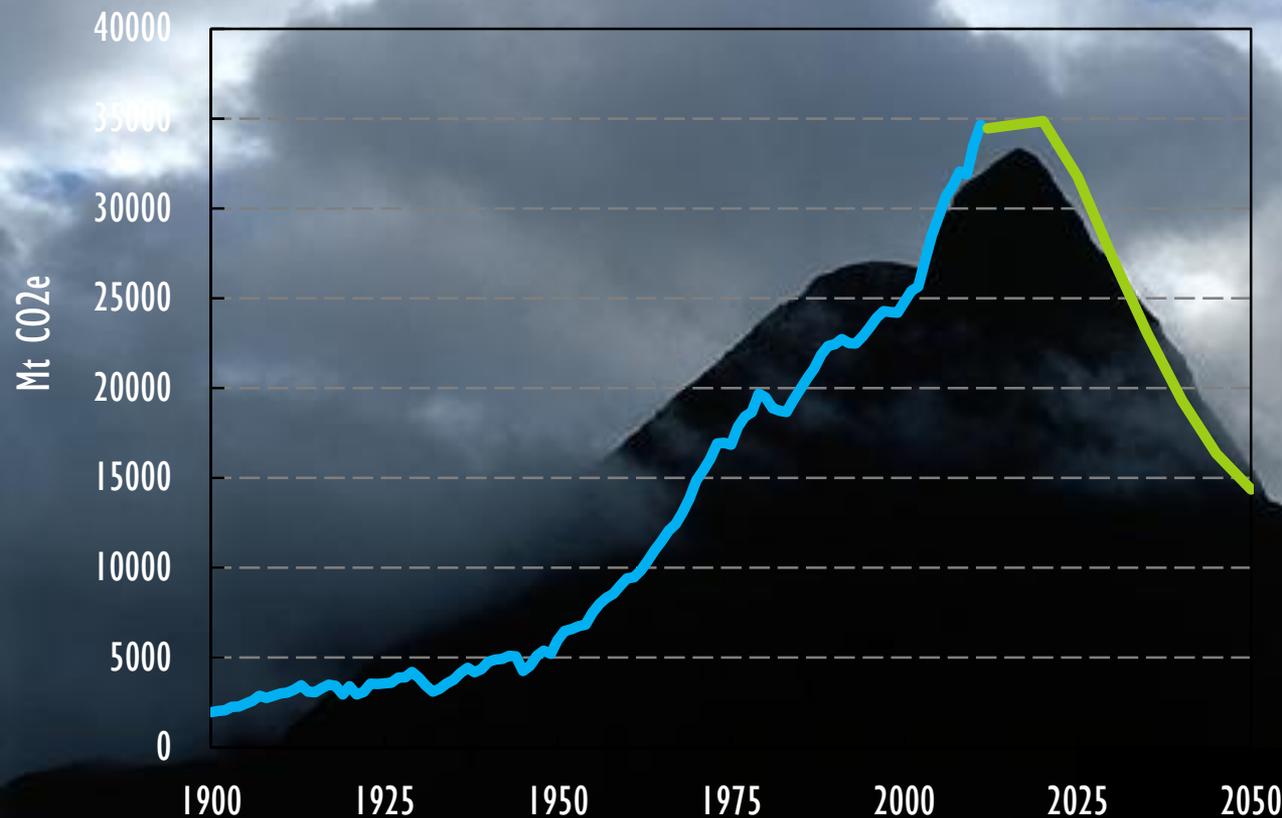
GHGs flattened in 2014 even with 3% global economic growth – first time in 40 years

NDCs one step on the journey but we need a sustainable energy transition

World Energy Outlook Climate Special Report 2015



The global challenge: Climbing down the mountain



“Getting to the top is optional.

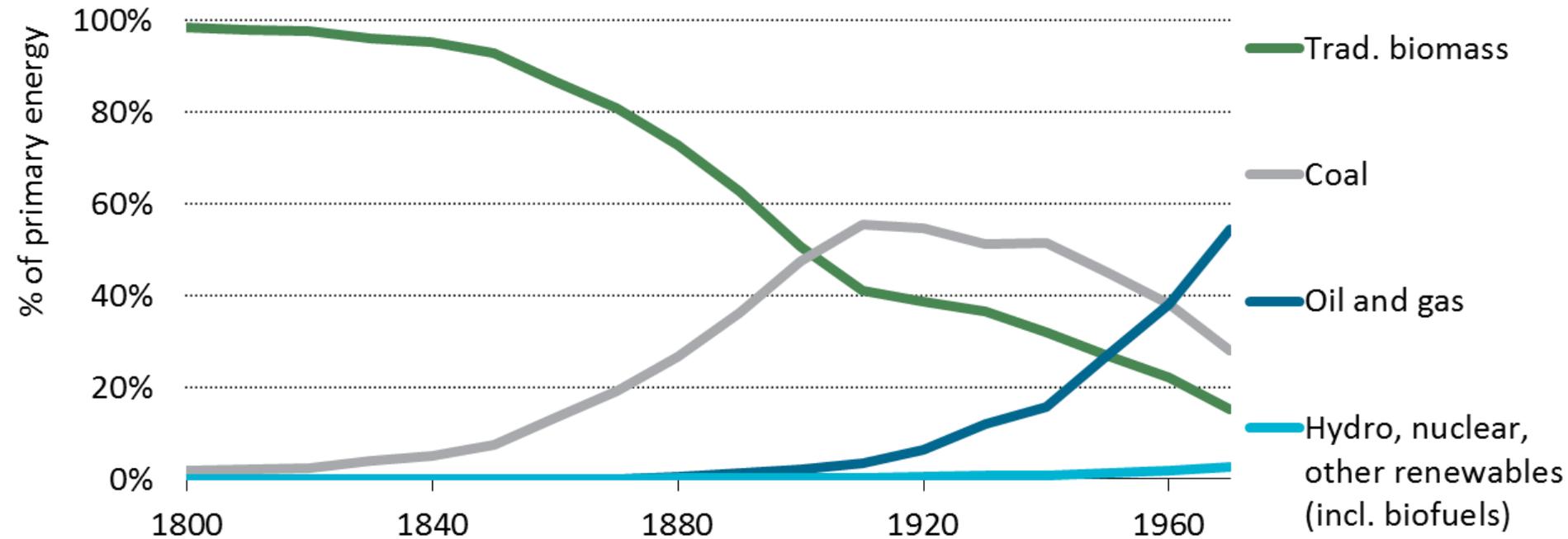
Getting down is mandatory.”

Ed Viesturs

— 2DS

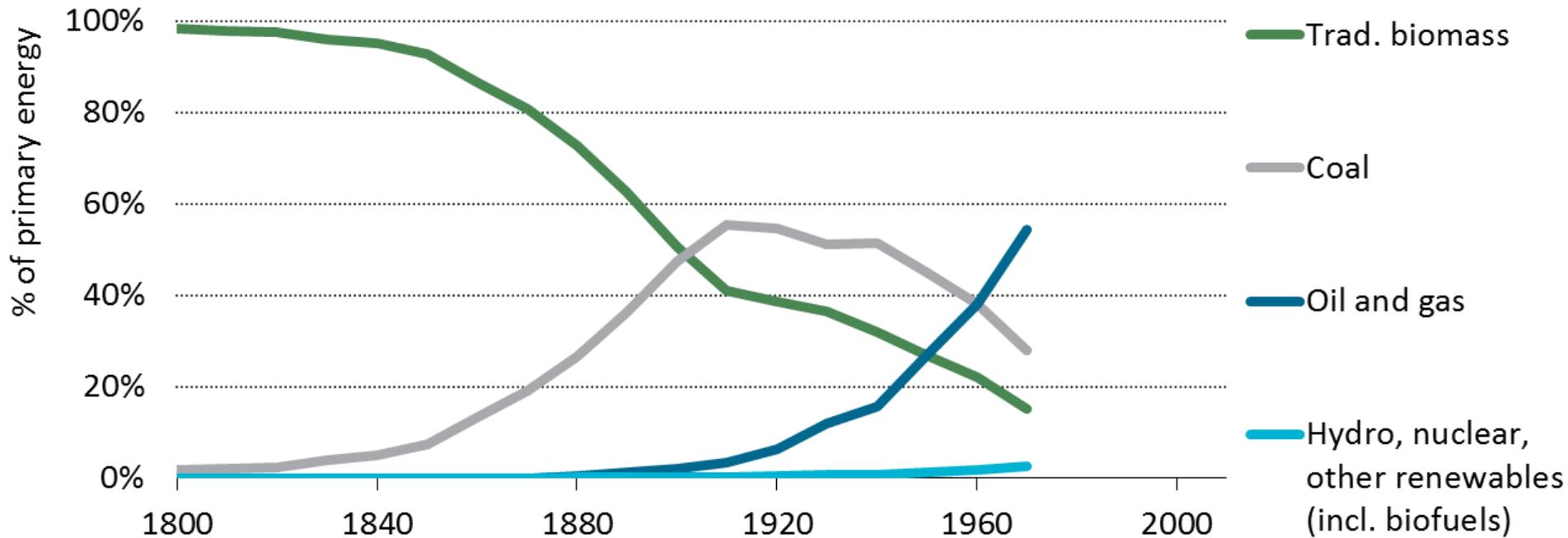
To do this we'll need a sustainable energy transition

Two transitions from 1850 to 1970, each taking over 40 years to increase 5% to 25% of supply



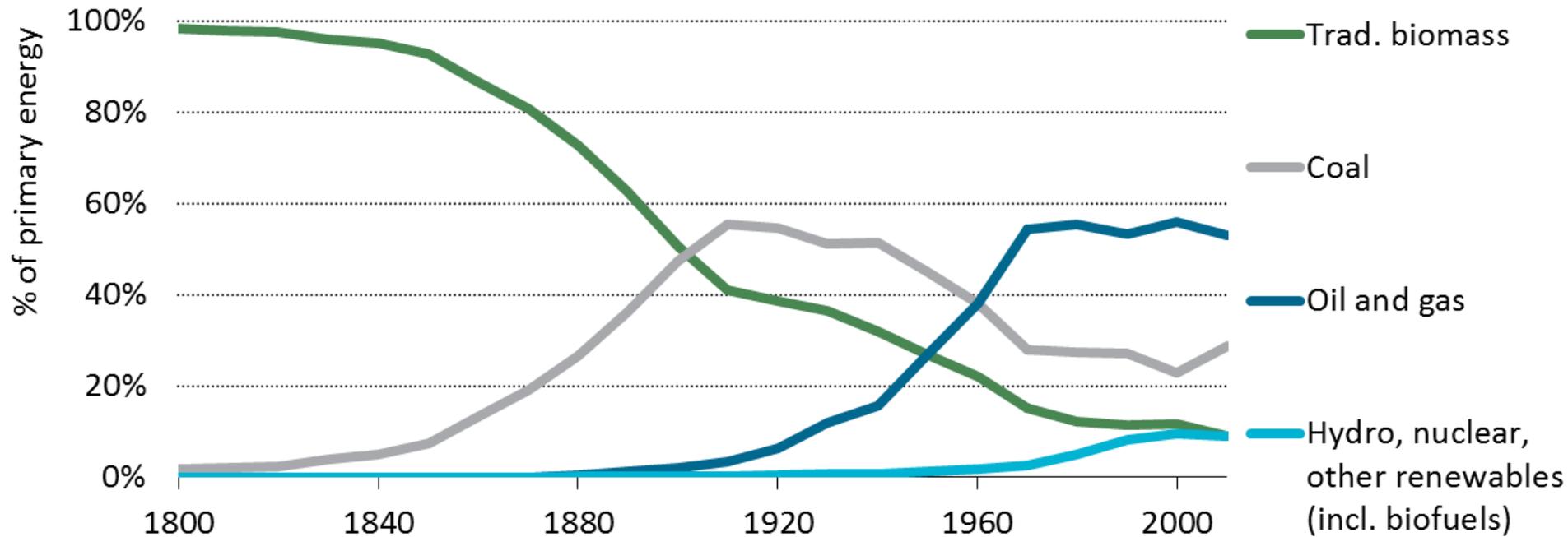
To do this we'll need a sustainable energy transition

In 1970, the world was ready for a third transition



To do this we'll need a sustainable energy transition

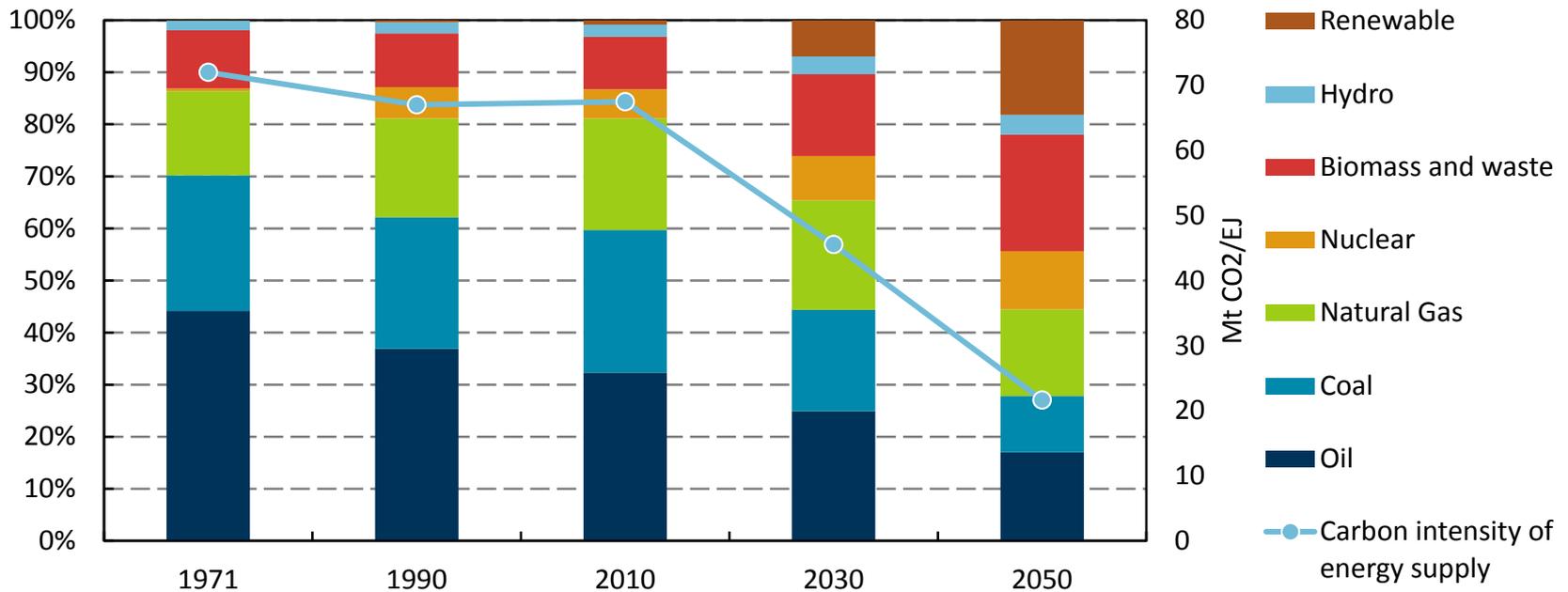
But things have been relatively stable since 1970



Data from Smil (2010) and IEA (2015)

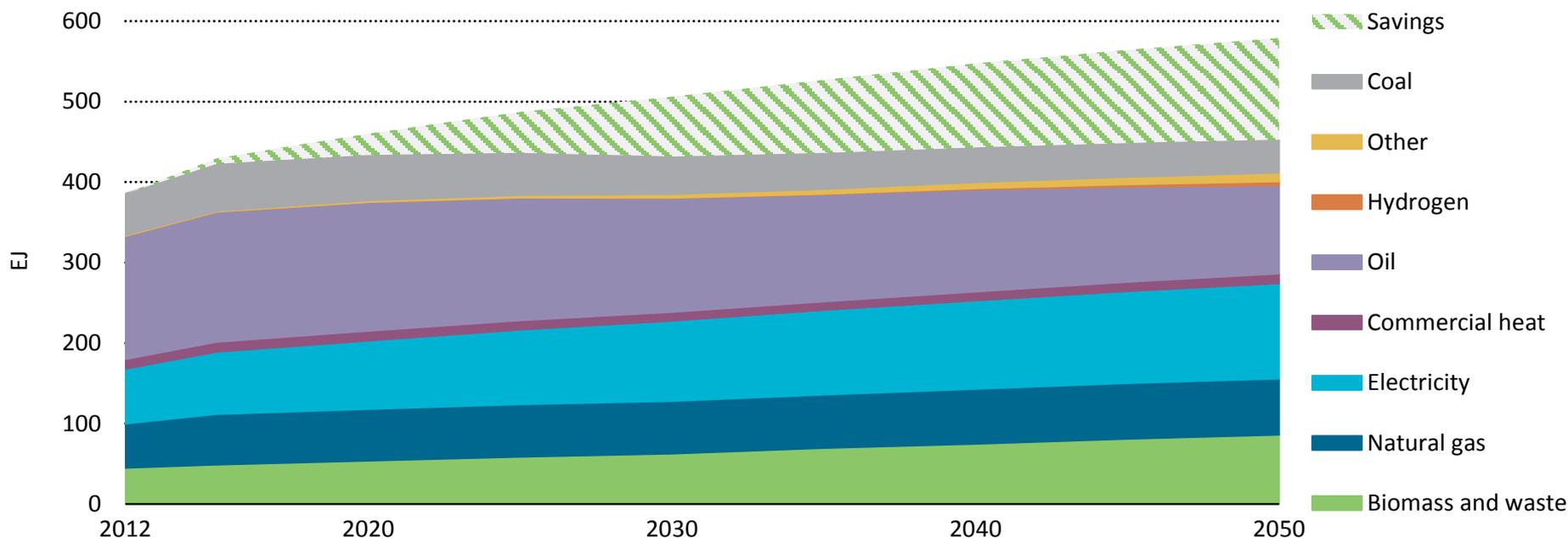
Transitioning energy supply appears to be headed in right direction

- Low carbon energy sources grow from 20 to 50% of primary energy supply
- Variable renewable electricity grows from 7 to 20%



Is renewable energy the savior then?

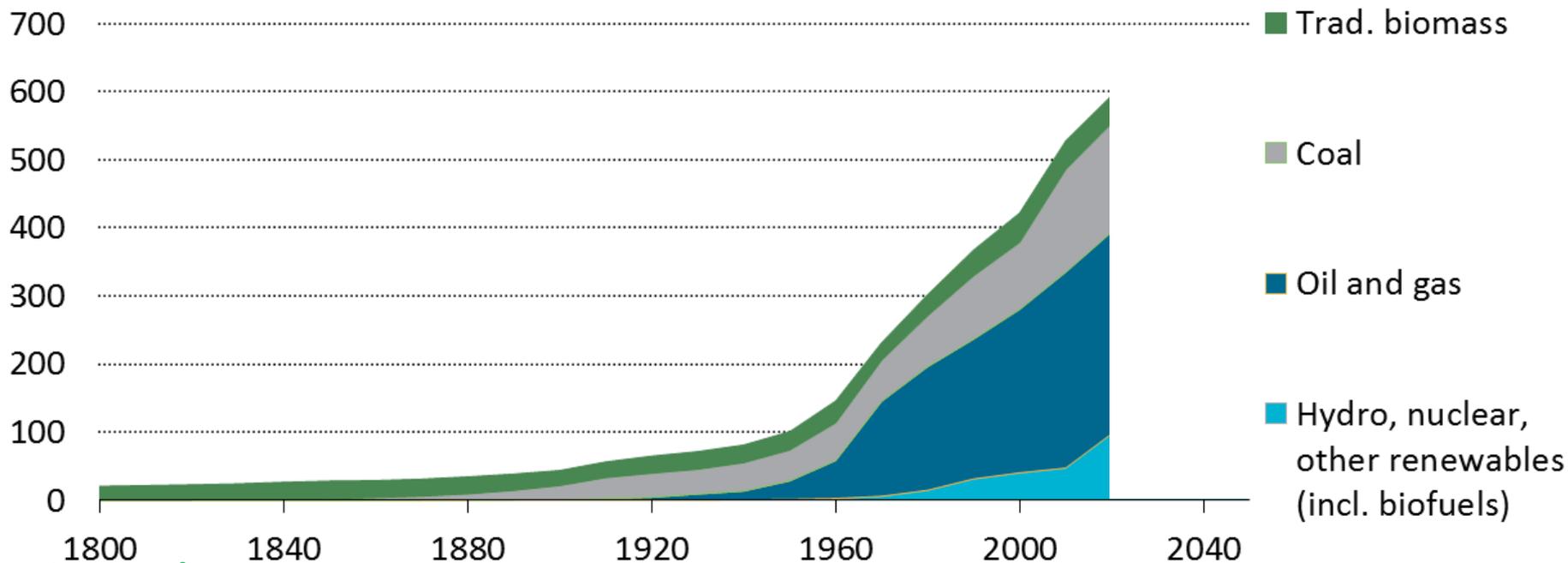
Energy efficiency savings greater than primary renewable electricity



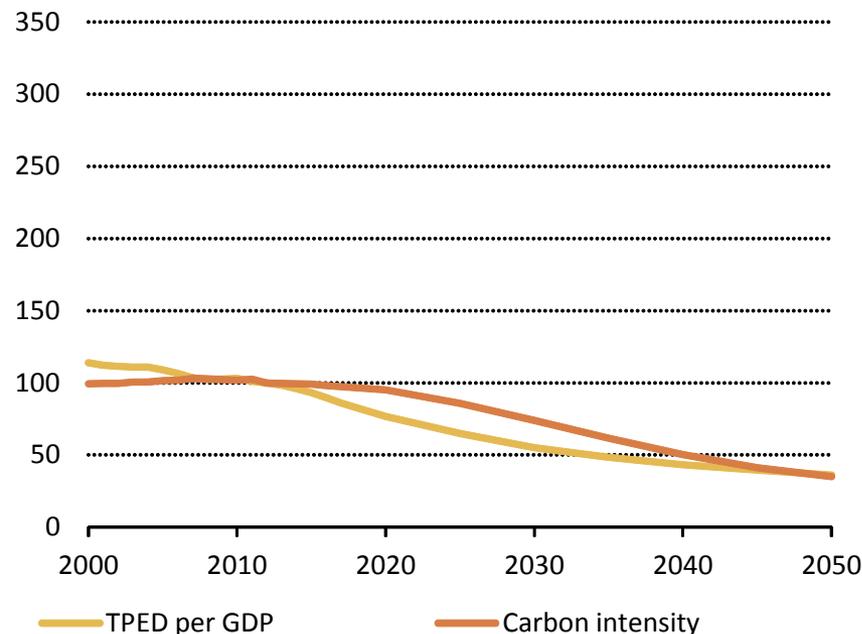
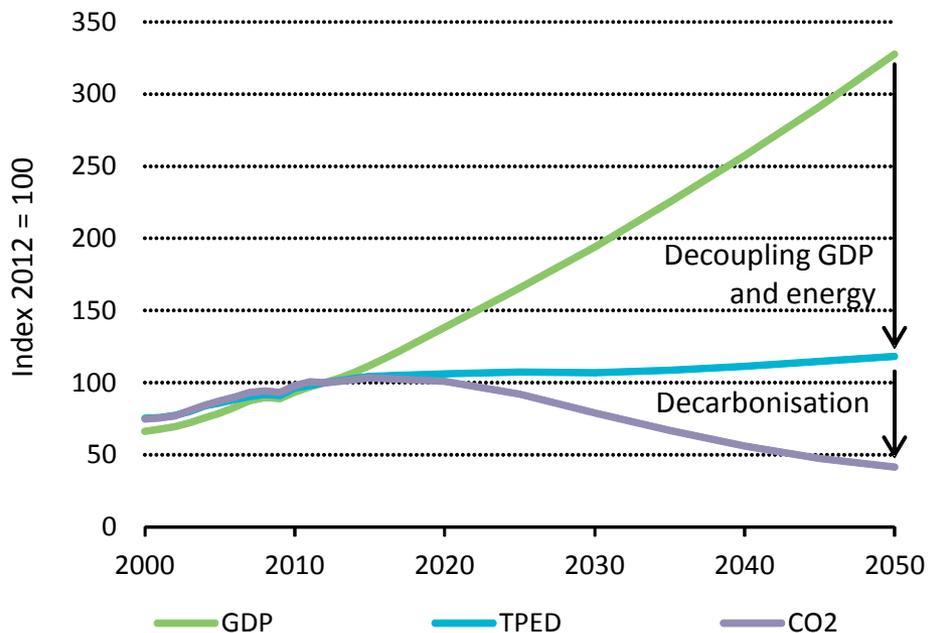
Energy efficiency provides savings by 2050 in the 2DS, being comparable to the final energy use of China and the EU combined in 2012.

So what's missing?

- The sustainable energy transition is more fundamentally about how we use energy
- The age of rapid primary energy supply growth must end to achieve climate targets

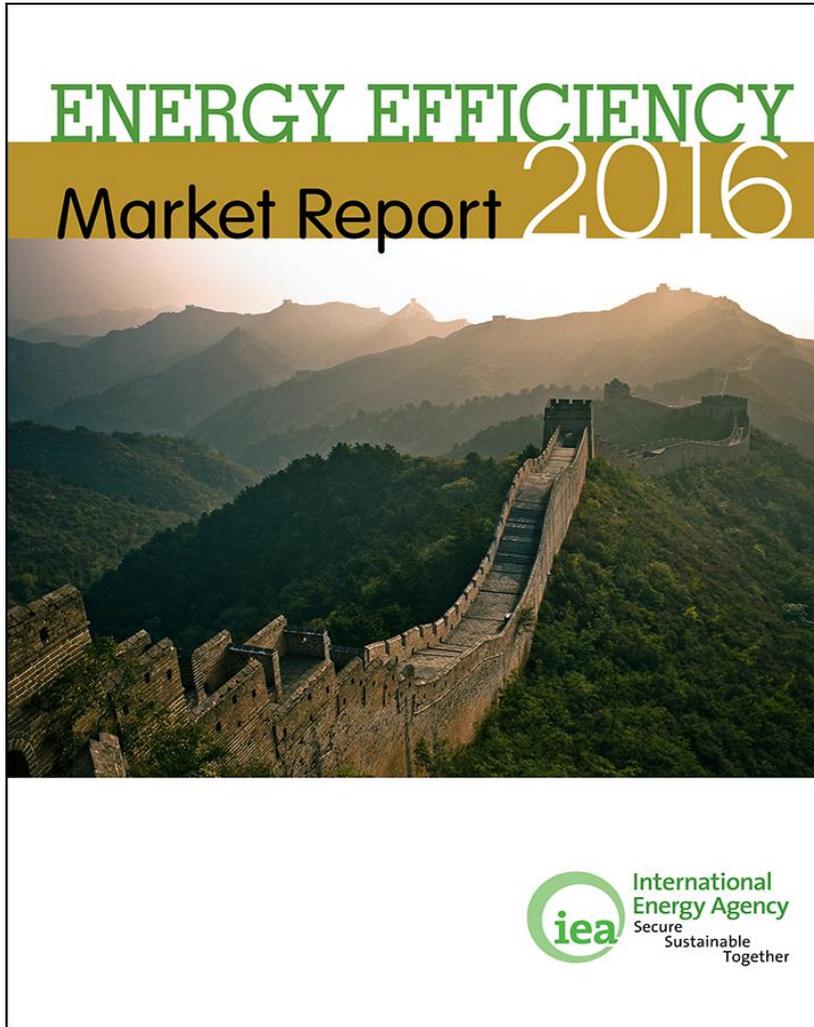


The sustainable energy transition is an energy efficiency transition



Rate of decoupling energy use from GDP needs to be more than doubled over the next four decades

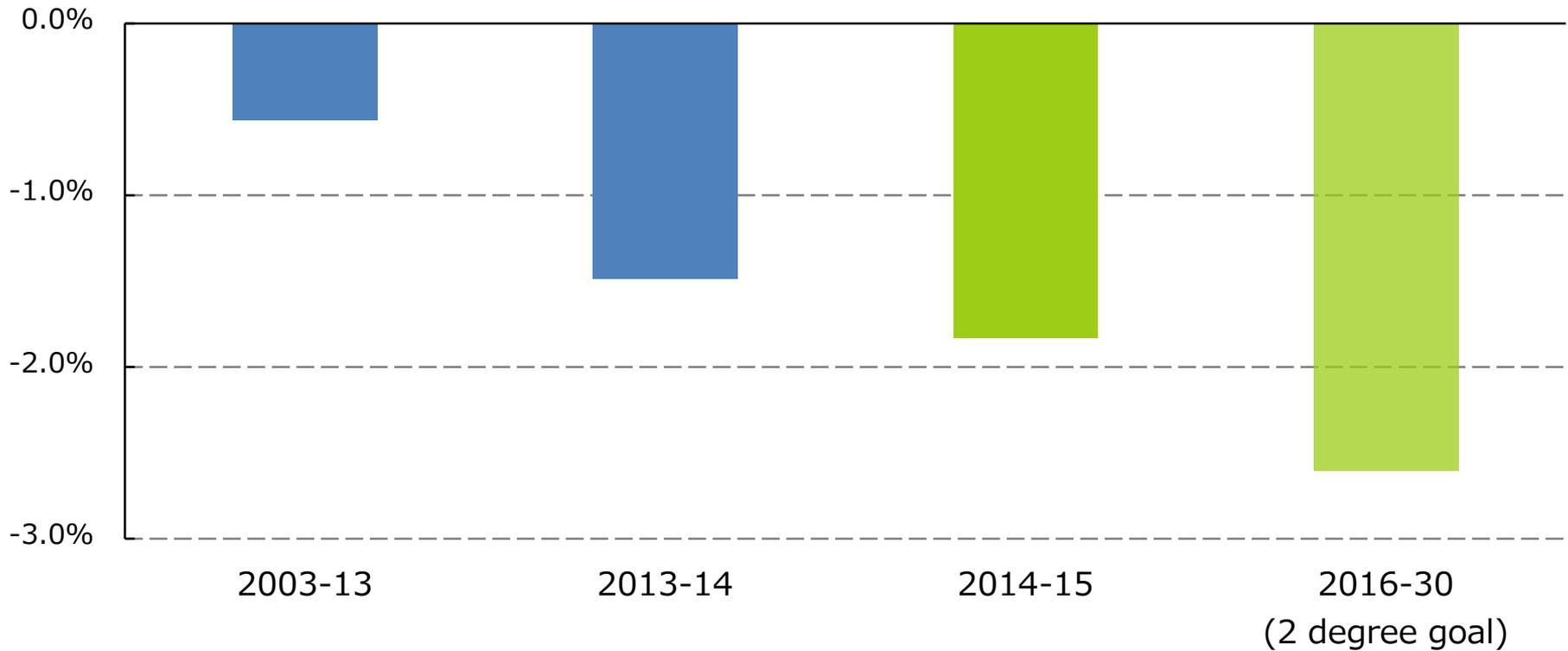
Energy Efficiency Market Report



- The IEA's flagship efficiency report
- Change conversation to infrastructure and energy policy
- Emphasize investment, markets, and importance of efficiency in the system
- Backward looking –real evidence and impacts

Energy intensity is improving but not fast enough

Global annual energy intensity gains

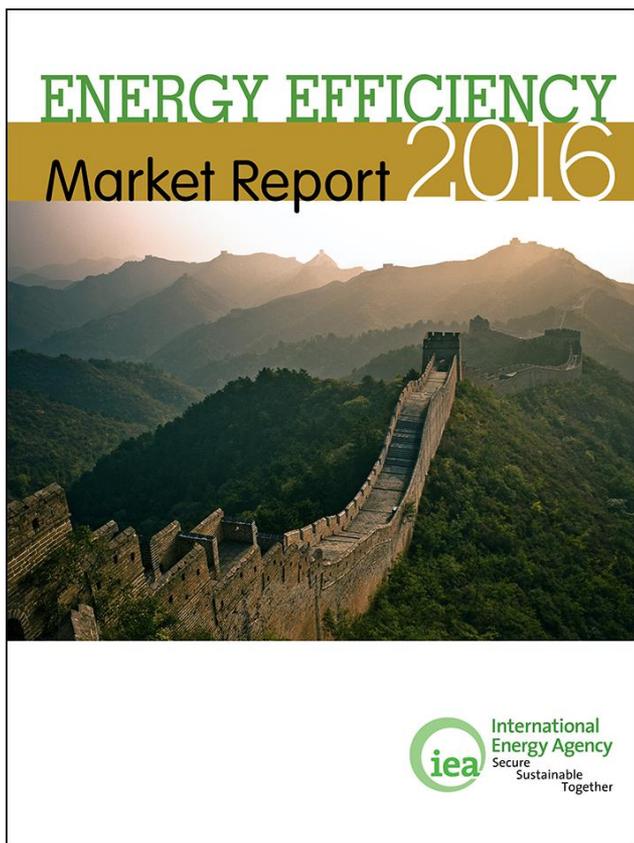


In 2015, global intensity improved by three times the average of the last decade, despite a low price environment. Intensity gains need to increase to 2.6% to achieve our climate goals.

Good policy delivers the benefits of energy efficiency

- **Energy efficiency is the one energy resource all countries possess in abundance, and is an essential part of delivering all energy goals.**
- **Global energy efficiency gains are accelerating, even in the current low price environment.**
- **2015 saw global investment in energy efficiency grow 6% to \$221 billion.**
- **Energy efficiency is now at a scale to influence global energy markets, and is becoming more central in climate change responses.**
- **Strong Government policies are essential to deliver the energy efficiency improvements the world requires.**

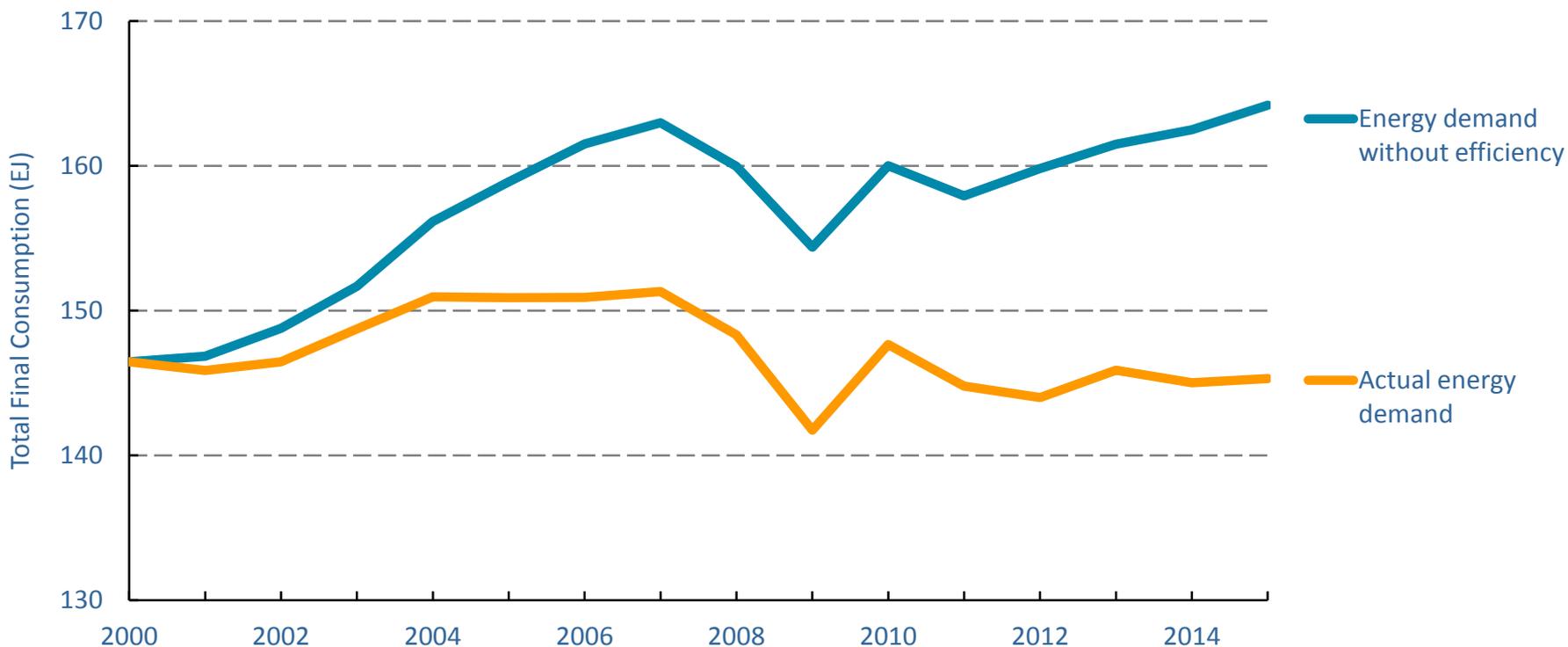
EEMR 2016 Contents



- 1. Energy efficiency core indicators**
- 2. Energy efficiency in China**
- 3. Policy drivers of the efficiency market**
- 4. The impact of changing energy prices**
- 5. Energy efficiency investment**
- 6. The energy efficiency services market**

Energy efficiency is energy supply

Final energy demand and energy demand if efficiency had not improved over 2000 levels in IEA countries

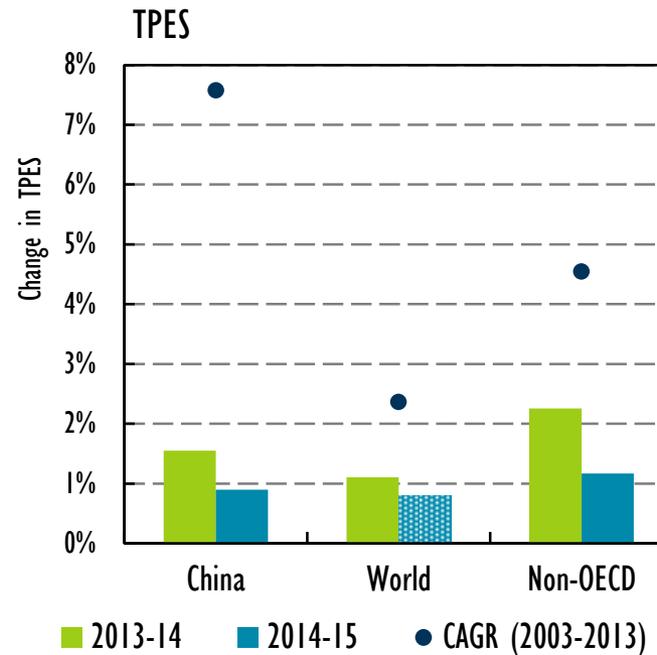
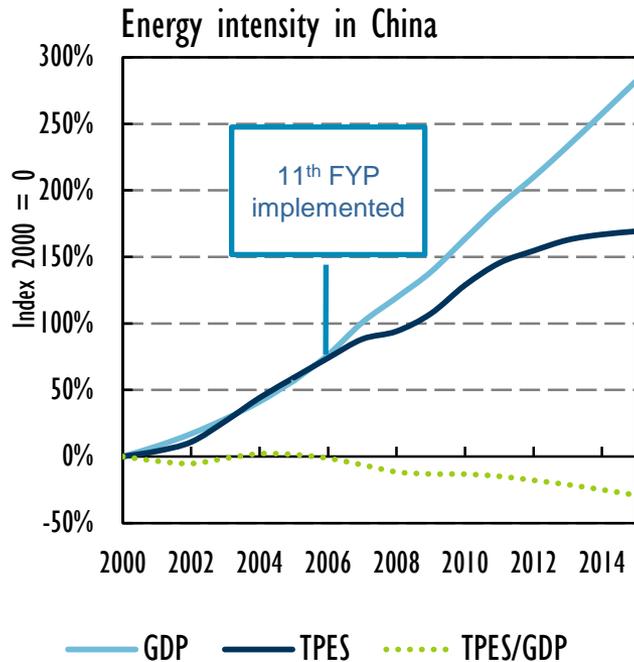


Without efficiency gains energy demand in 2015 in IEA countries would have grown by 1% and would have been higher than the 2007 peak. Instead, energy demand is 1% below 2000 levels.

Thanks to energy efficiency,
IEA members **saved enough energy**
in 2015 to power Japan for a year.

In China, energy demand is decoupling from economic growth

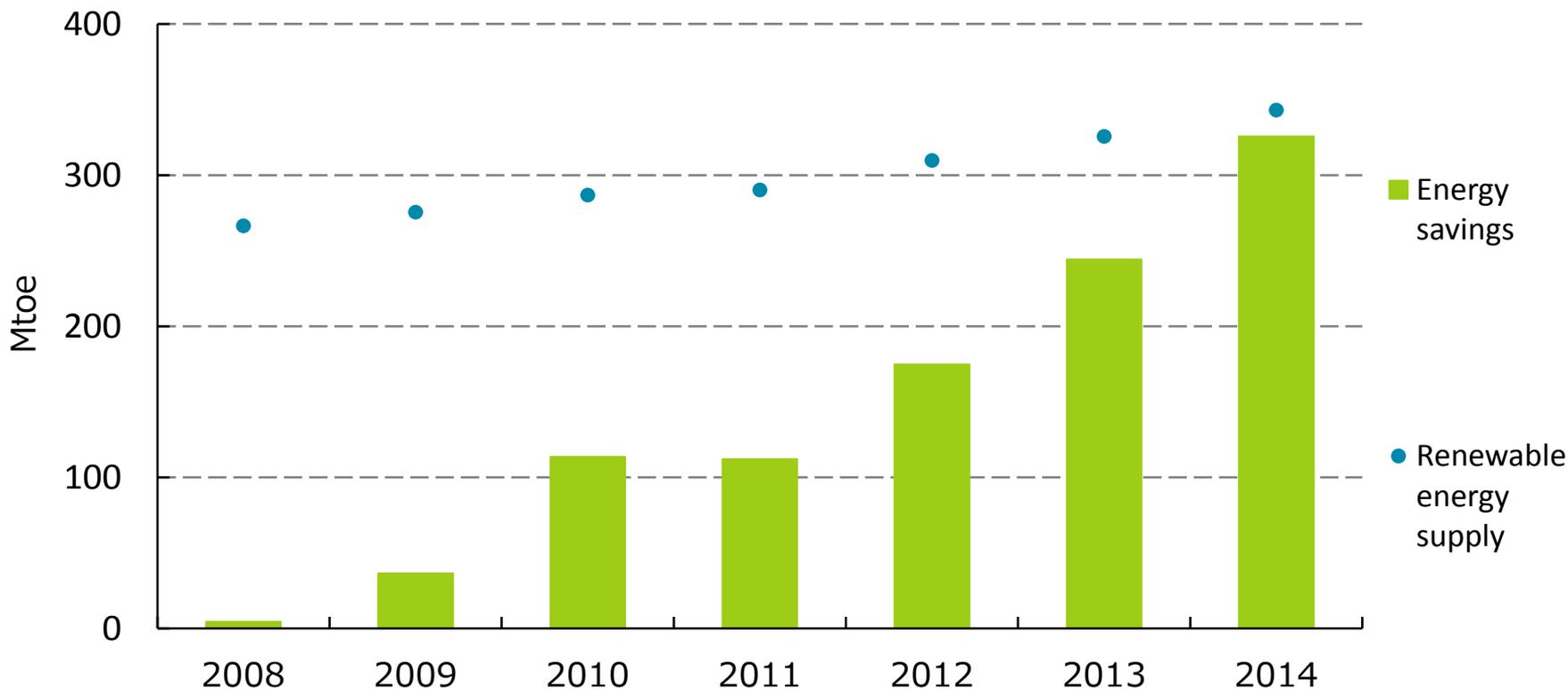
- Policies implemented in the 11th Five-Year Plan appears to be the key factor driving efficiency.



- Total Primary Energy Supply (TPES) growth in 2015 smallest since 1999 a significant change from the average over the last decade.

In China, efficiency and renewables are decarbonizing its energy system

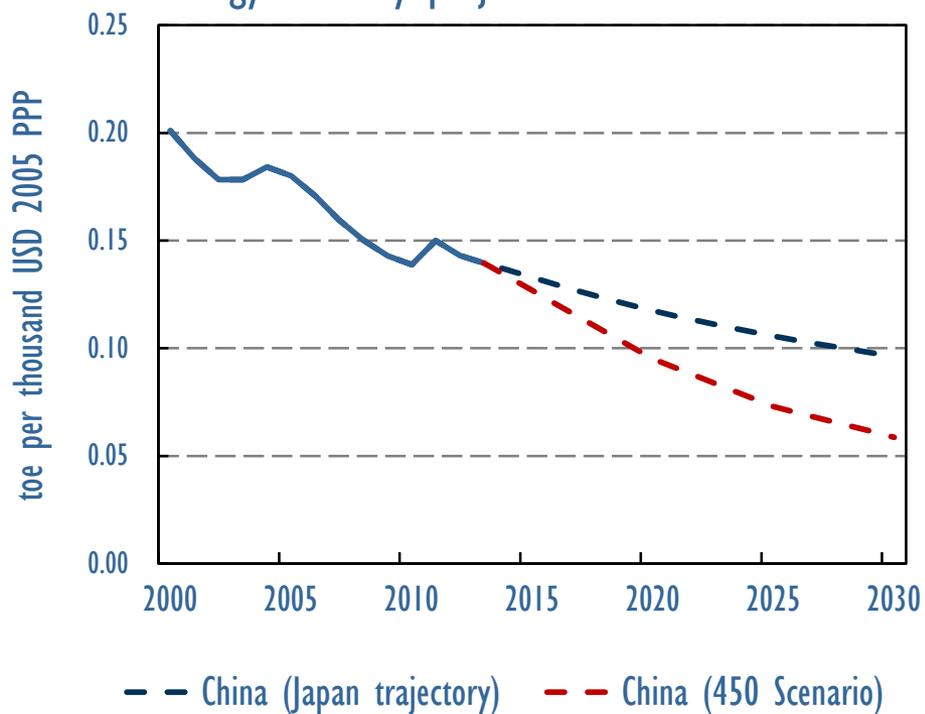
Primary energy savings from efficiency gains since 2000 and renewable energy supply in China



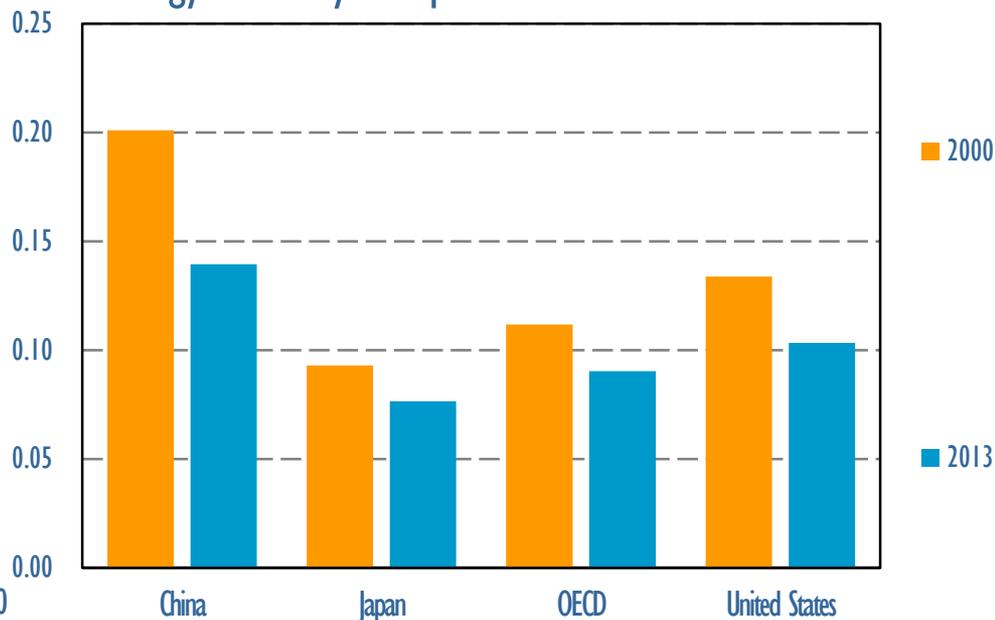
Dramatic progress on energy efficiency saved 350 million tonnes of coal in 2014. Energy savings are as large as China's renewable energy supply.

The scale of the challenge in China

Energy intensity projection



Energy intensity comparison

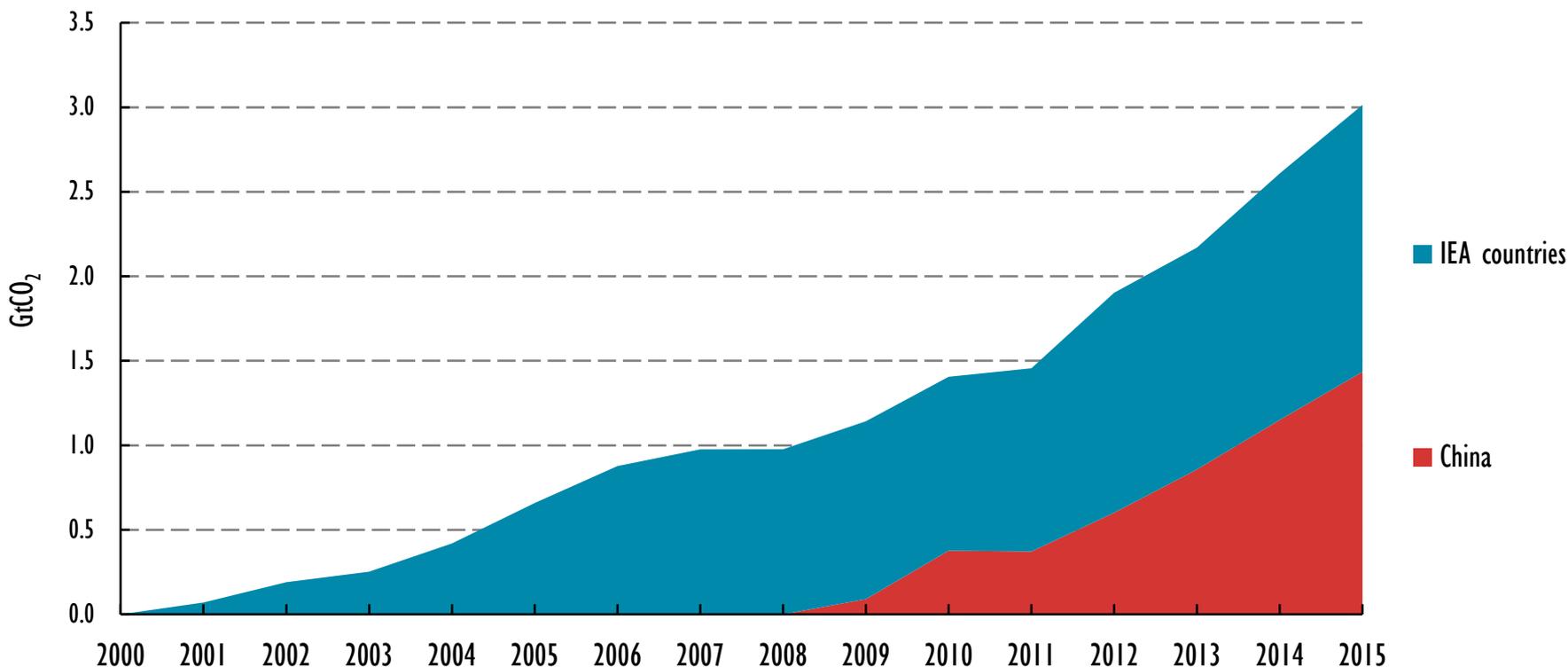


EE generates multiple benefits



Energy efficiency is saving CO₂ emissions

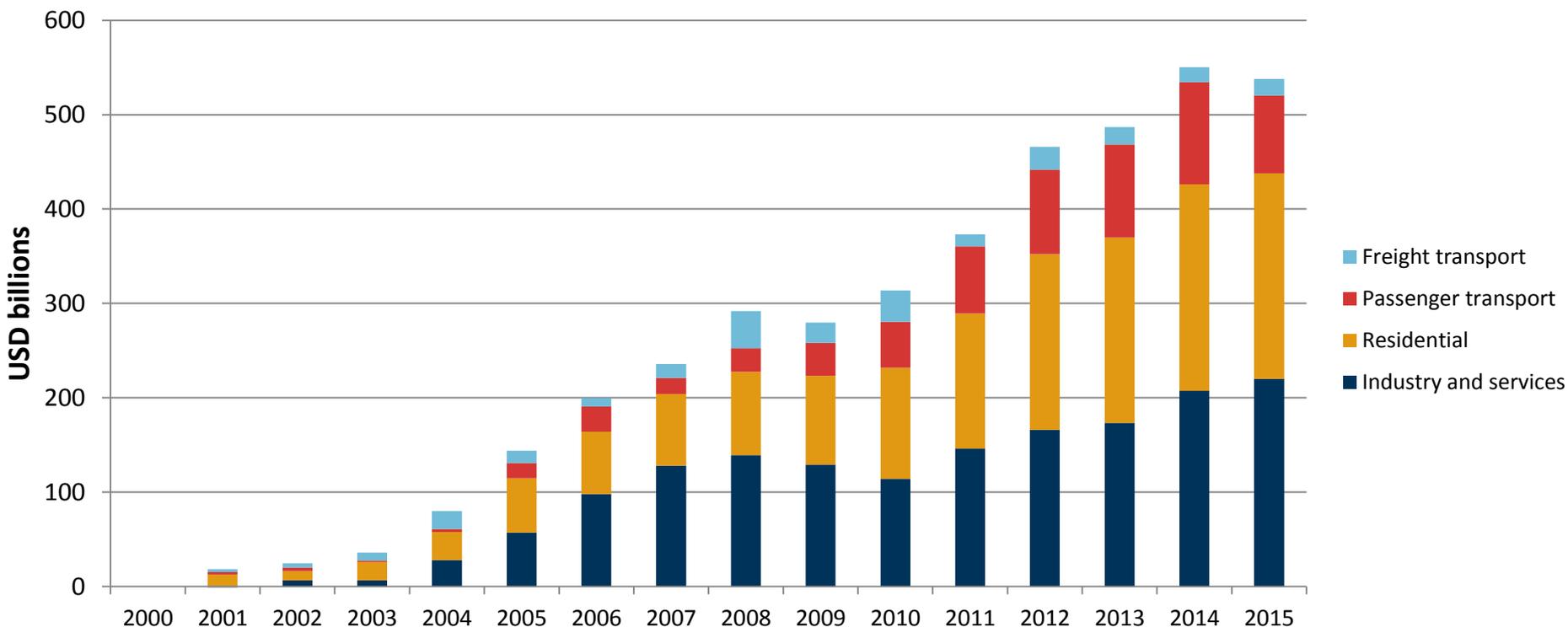
CO₂ emissions savings from efficiency improvements since 2000 in IEA countries and China



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.

Energy efficiency reducing energy bills

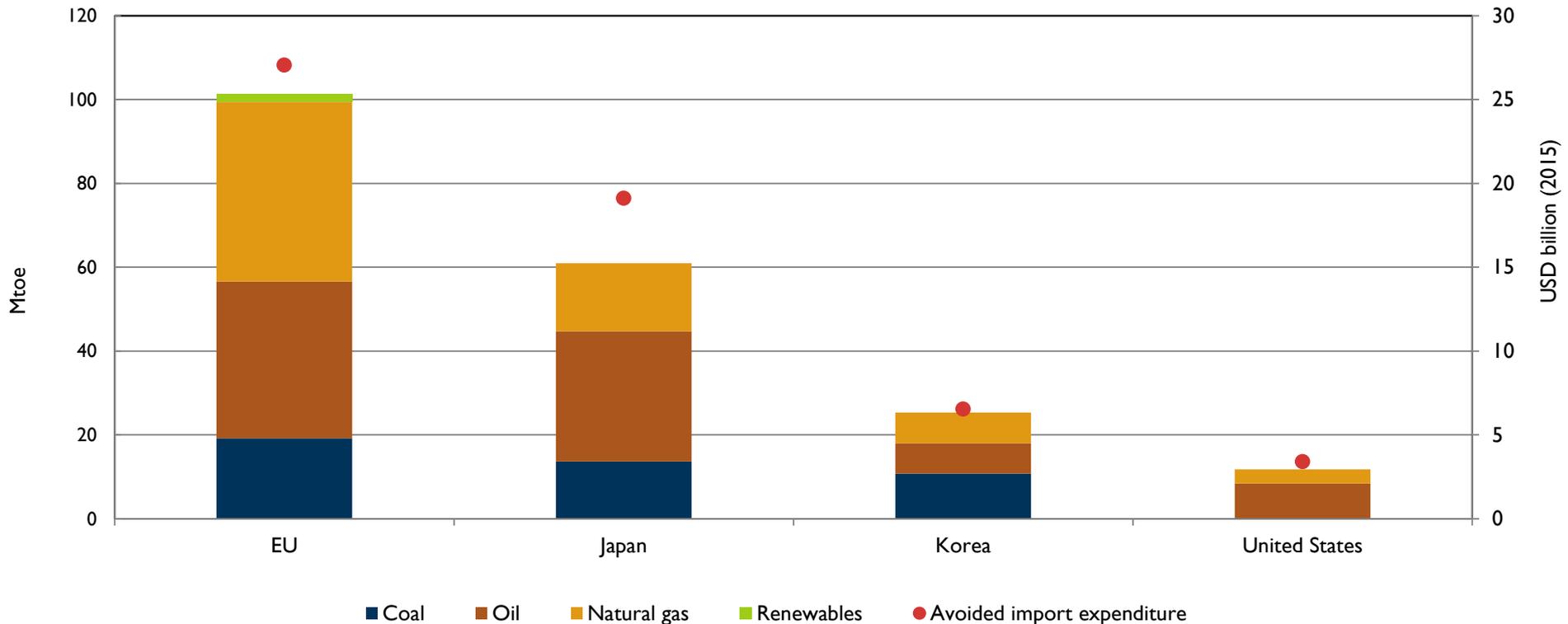
Avoided expenditure on energy from energy efficiency improvements in IEA countries



Energy efficiency led to average per capita savings of \$500 and \$4 trillion cumulatively since 2000. Savings in Japan were USD 90 billion in 2015 and \$700 (JPY 73000) per capita (highest in OECD).

Energy efficiency is improving energy security

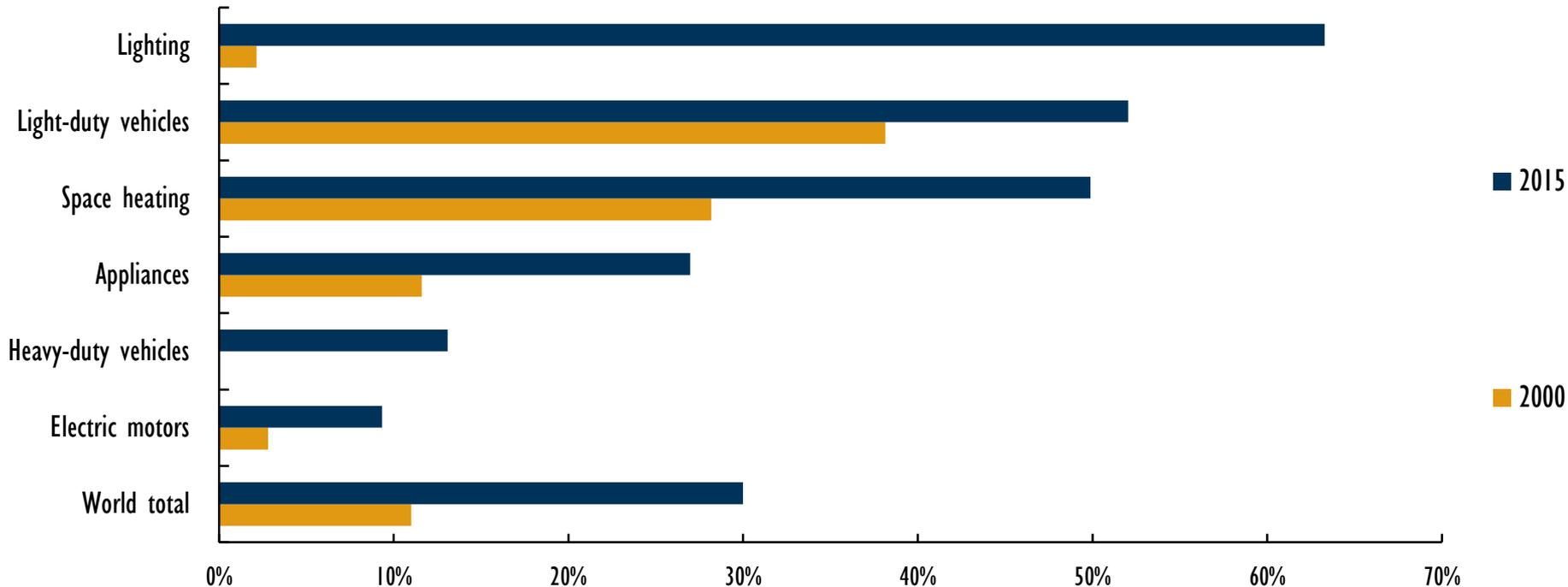
Avoided imports for IEA members from efficiency gains, 2015



Efficiency gains in Japan avoided \$20 billion in imports and boosted its current account by 10%.

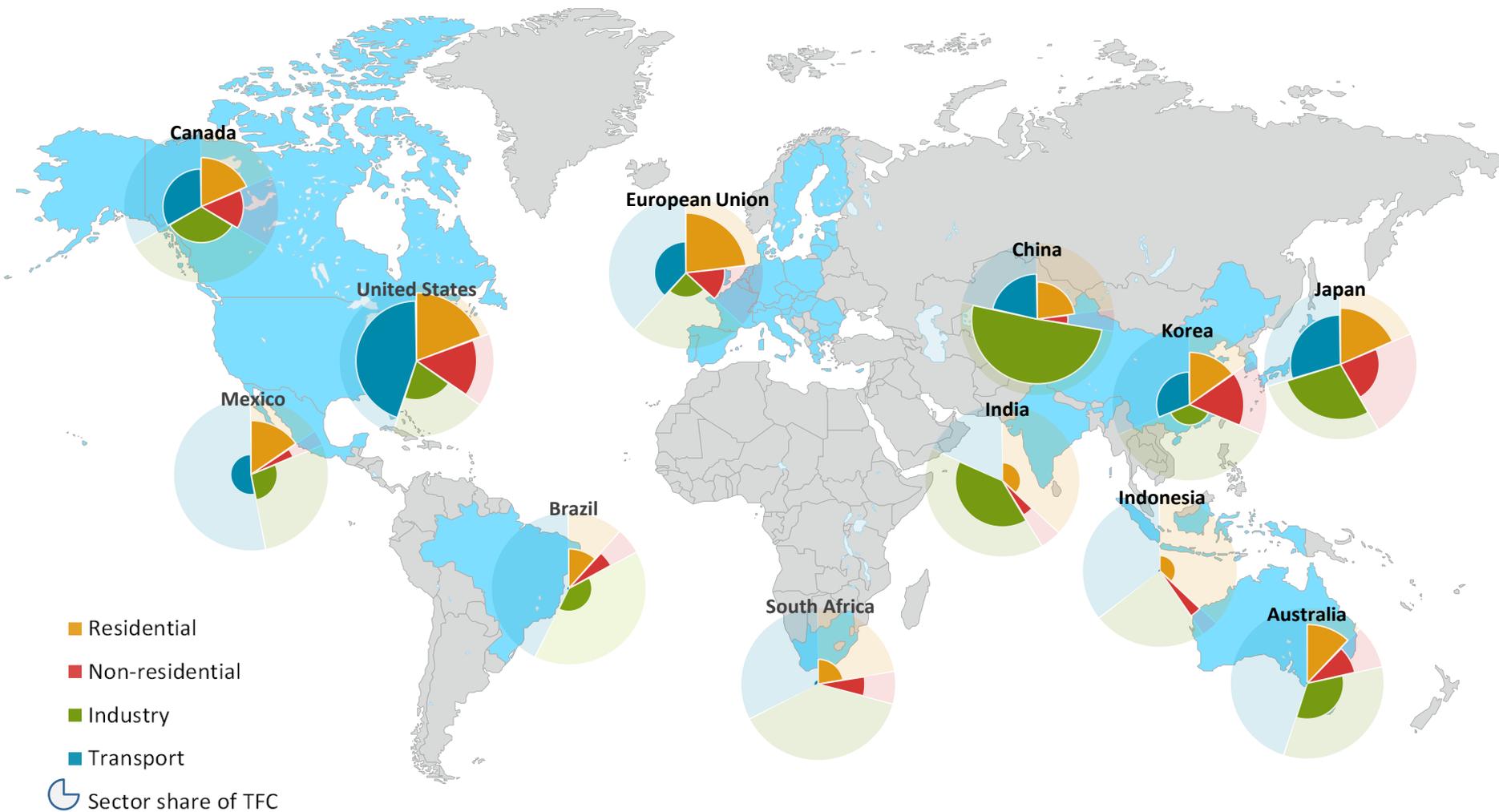
Efficiency gains have been driven by the expansion of policy

Share of global energy use covered by mandatory standards and regulations



30% of the world's energy consumption is now covered by mandatory standards and regulations, up from 11% in 2000.

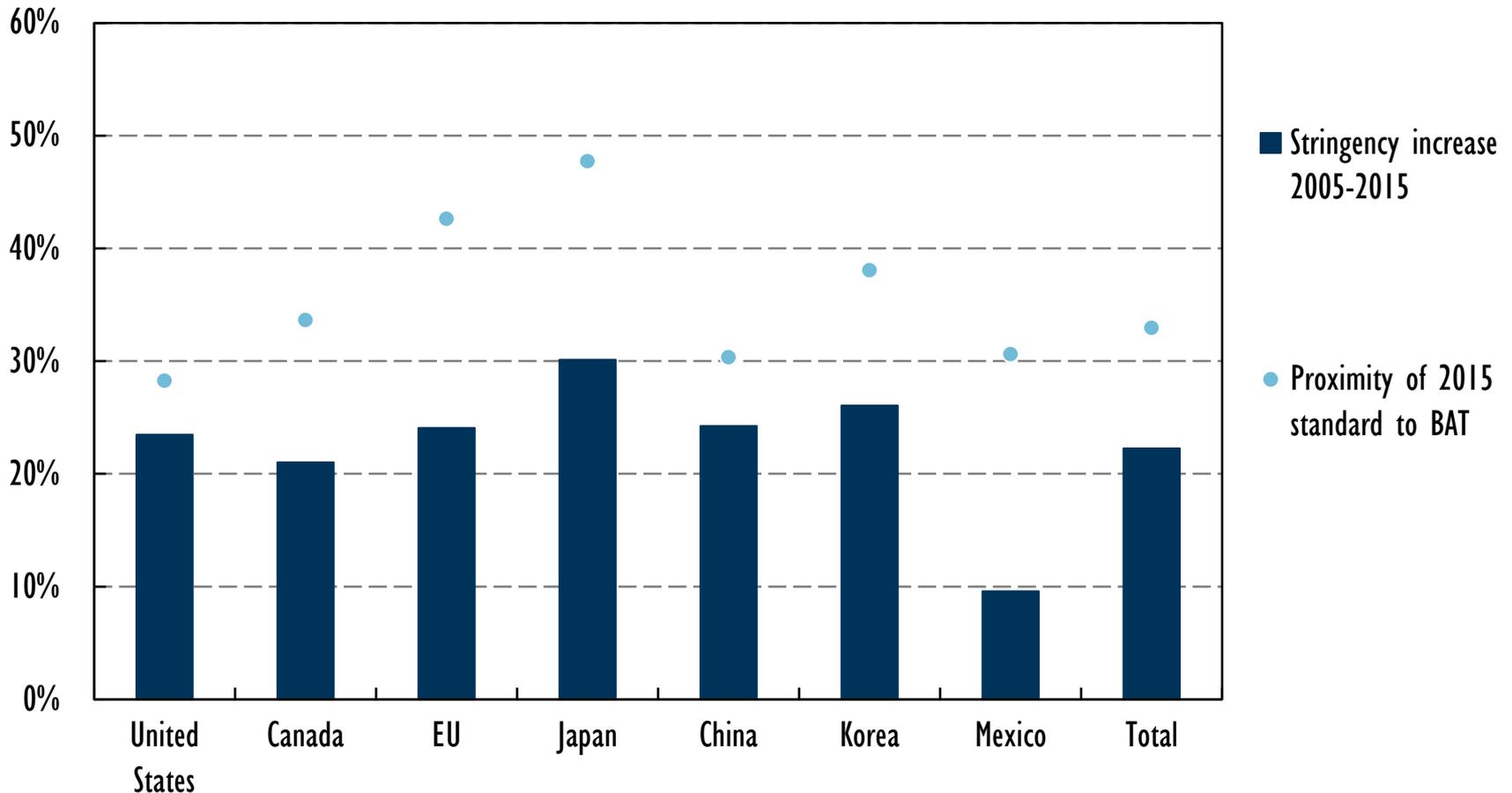
Policy coverage around the world



China has the world's largest coverage thanks to its industrial energy savings targets, Japan increased its coverage from 14% in 2000 to 40% in 2015, third largest coverage of any country.

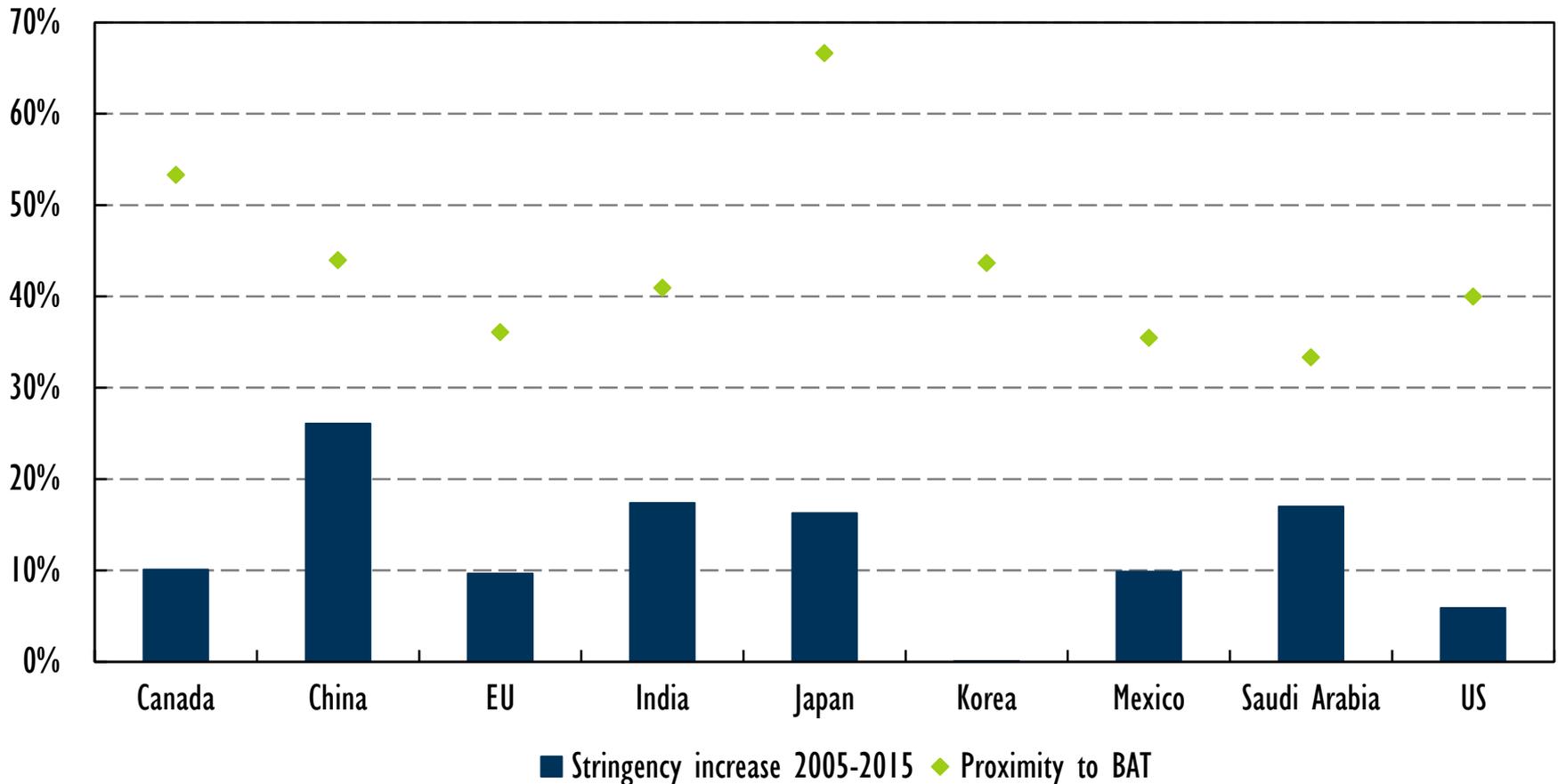
Performance Levels of standards are strengthening

Stringency increase of performance standards for light-duty vehicles, 2005-15



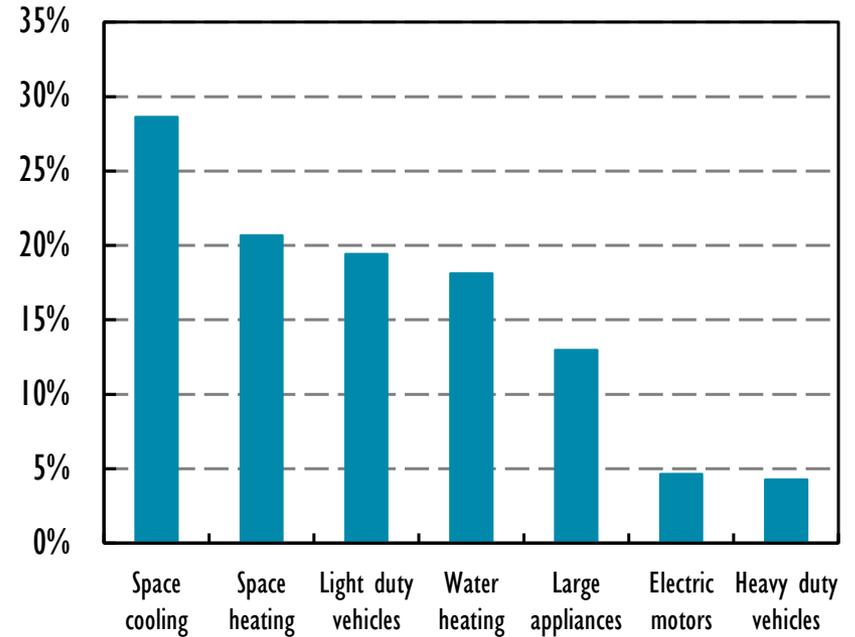
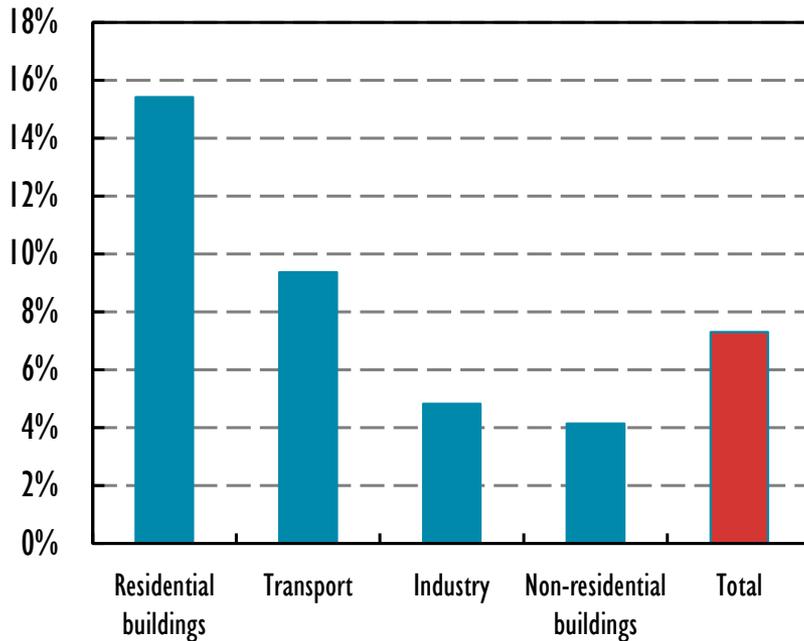
Performance Levels of standards are strengthening

Stringency increase of performance standards for air conditioning, 2005-15



The IEA's Efficiency Policy Progress Index measures growth in policy effectiveness

IEA Efficiency Policy Progress Index (EPPI) increase by end use, 2005-15



The EPPI tracks combined progress of policy coverage and strength. The most progress was in the buildings sector and the largest potential for improvement is in the freight and industrial sectors.

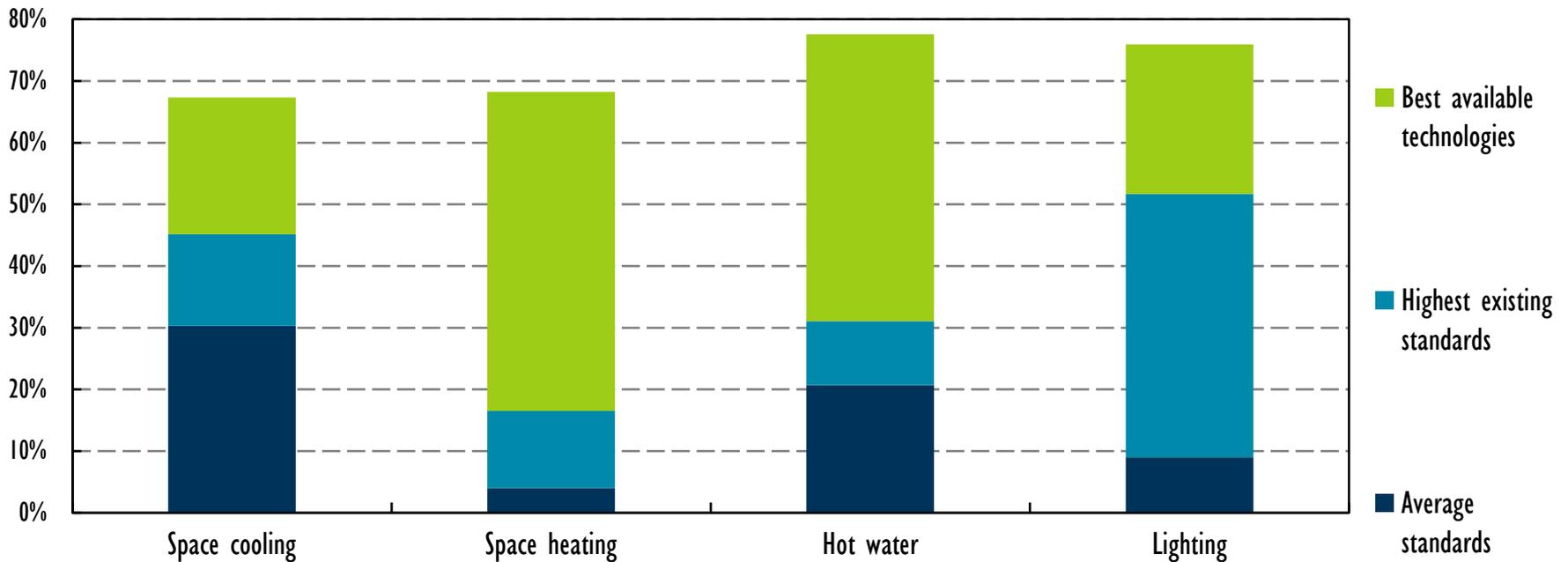
The world's most important efficiency policies since 2005

The top five policies driving the improvement of the Efficiency Policy Progress Index between 2005-15

Rank	Country	Sectors	Policy Name	Share of global EPPI improvement
1	China	Industry	Top 1 000 - 10 000 programme	27%
2	United States	Transport	Corporate Average Fuel Economy standards	21%
3	European Union	Buildings, appliances, small appliances and products, industry	Energy Performance of Buildings Directive and Ecodesign Directive	16%
4	United States	Residential buildings	Building energy codes and standards on space heating and water heating equipment	10%
5	Japan	Appliances, small appliances and products, transport	Top Runner Program	5%

Policies still have significant potential to save energy

Energy savings potential of standards as a share of global end-use energy, 2015

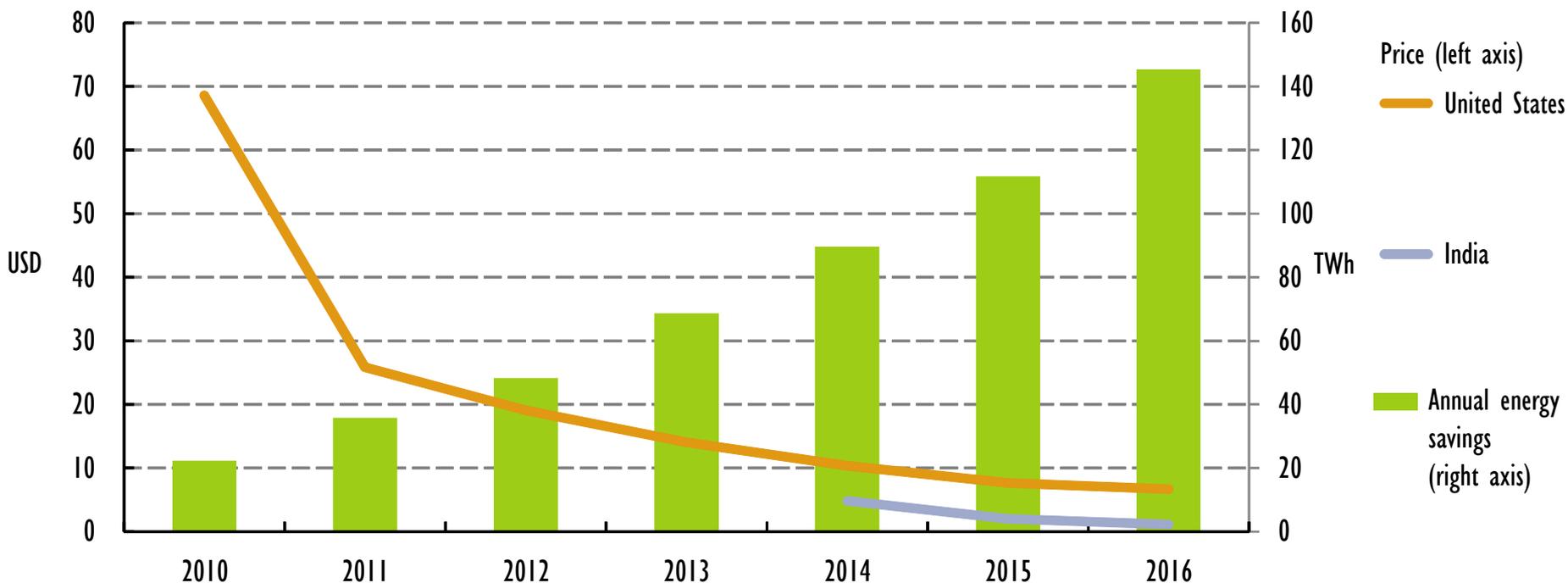


If the best in class standards had been implemented in all countries, global residential energy consumption would have been 14% lower in 2015.

If every nation adopted best-in-class **vehicle fuel efficiency** standards, they would save as much oil as Canada produces every day.

Small tech leads to big savings

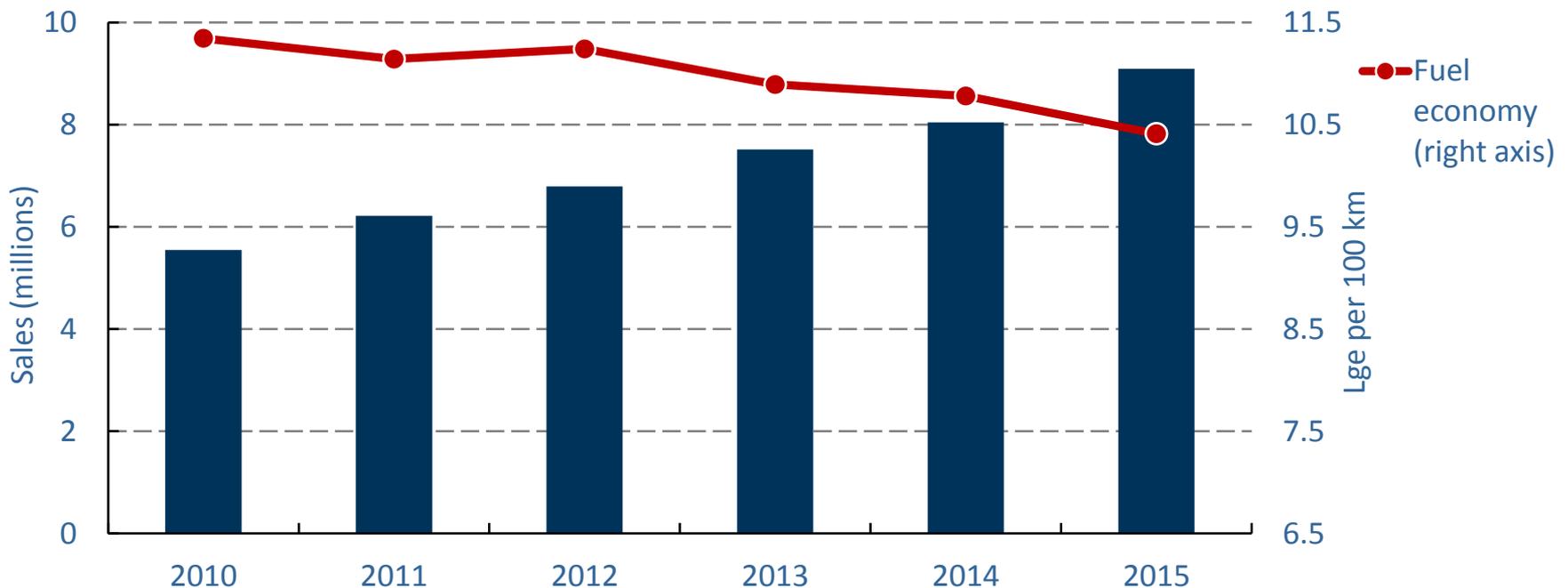
Global annual energy savings from efficient lighting and LED bulb prices



Falling LED prices boosted global investment to \$6 billion and generated incremental annual savings of 140 TWh.

Vehicle fuel economy standards have helped to moderate price falls

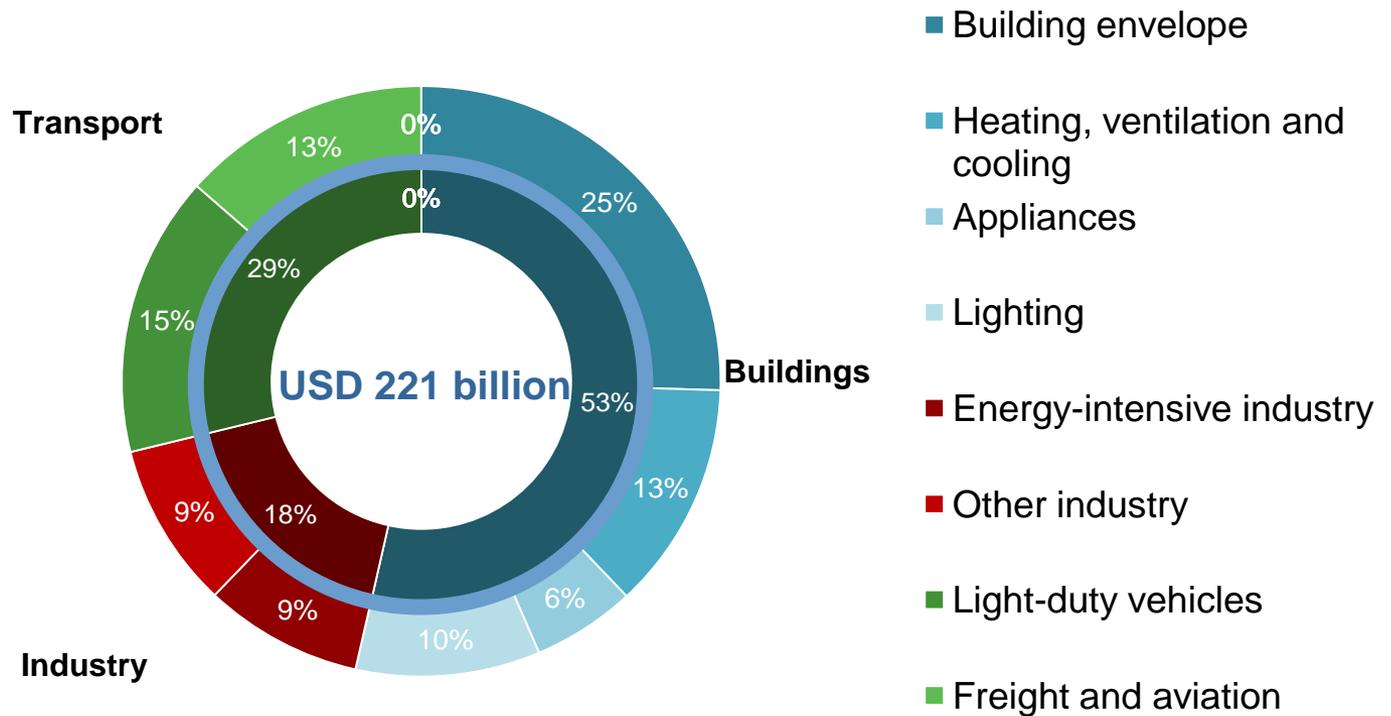
Sales and average annual fuel economy of light-duty trucks, United States



Light-duty truck sales hit record levels in the United States in 2015, but standards ensured overall new vehicle fleet efficiency still improved.

Energy efficiency investment is growing in response to policy

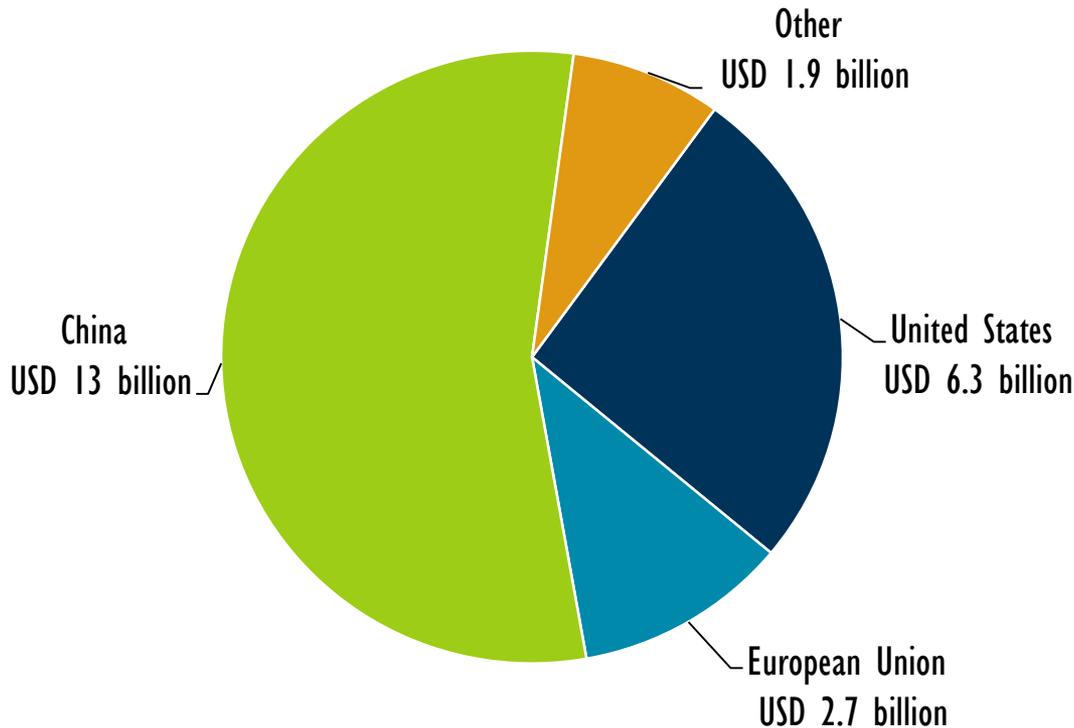
Global investment in energy efficiency by sector, 2015



Investment in energy efficiency increased by 6% in 2015, led by growth in the buildings sector.

The market for energy efficiency services appears poised for growth

Global energy service company revenues by country/region, 2015



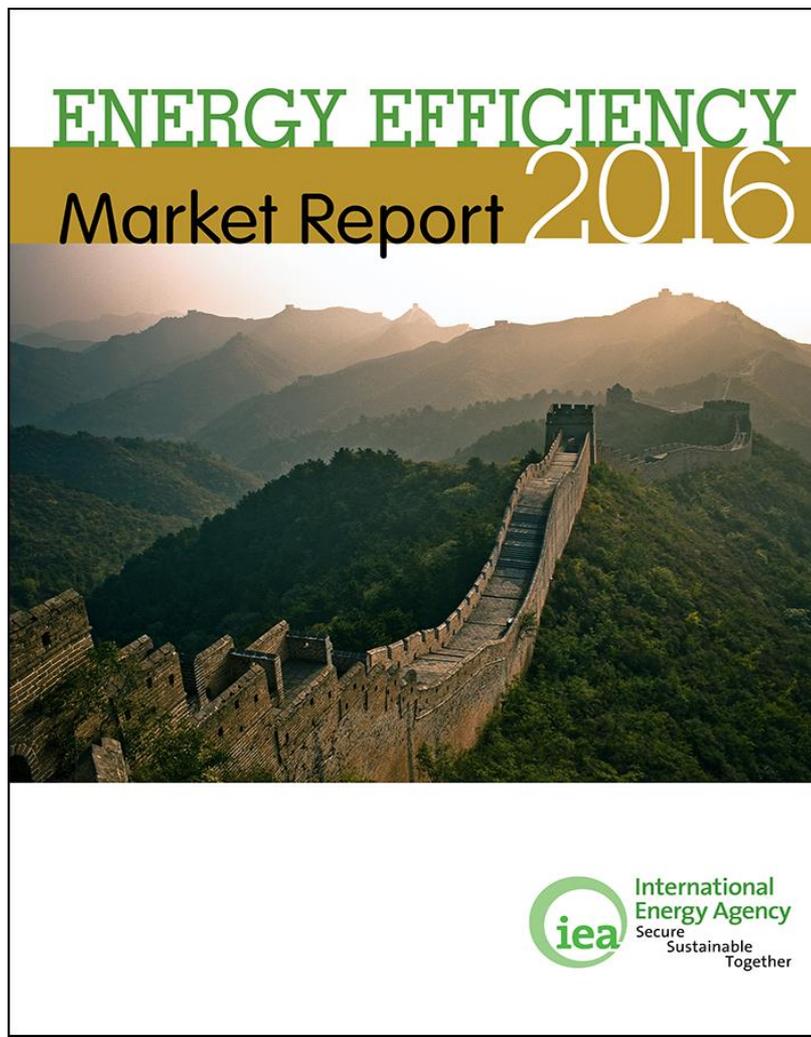
The global energy services market was USD 24 billion in 2015 and indicators point to future growth.

Conclusion

- **Global energy intensity improvement is accelerating, despite declining energy prices, but more is required.**
- **Because of the sheer size of its energy use, energy efficiency gains in China will continue to impact global energy markets.**
- **Policy delivers, but stronger policy is required: Still 70% of global energy use is outside of any mandatory efficiency requirements.**
- **Countries can learn from each other on energy efficiency. The IEA will continue to lead global analysis and knowledge exchange.**

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