International Energy Agency

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Getting the 2 degrees
The role of energy efficiency

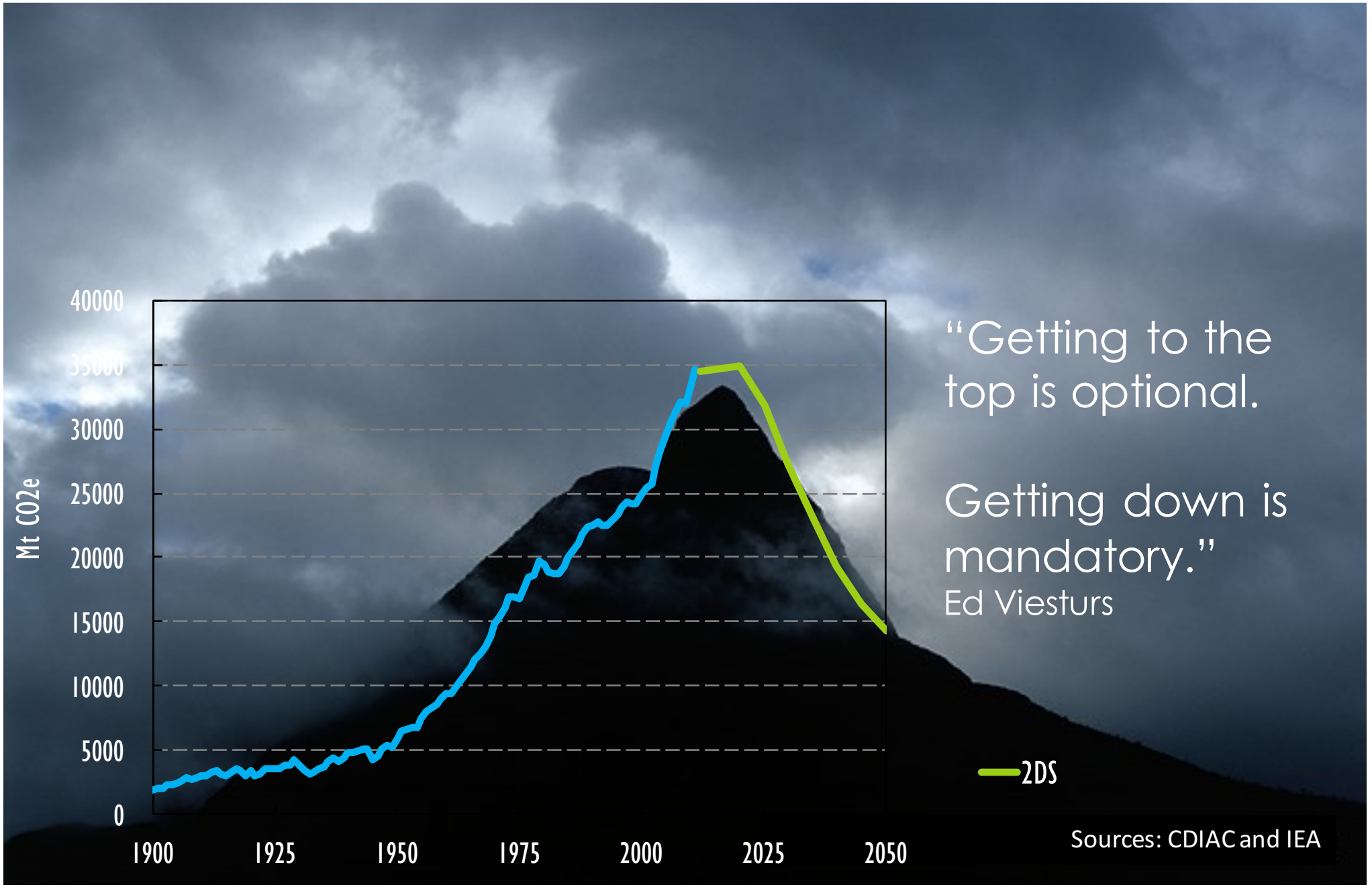
Tyler Bryant

International Energy Agency



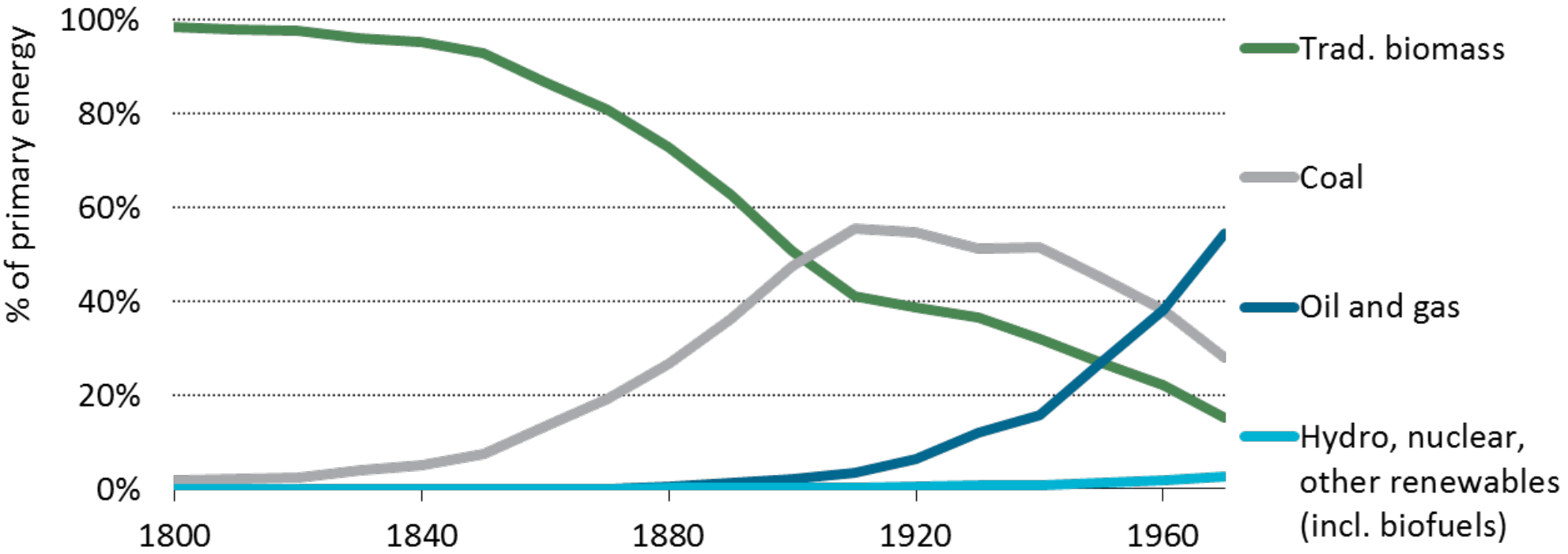
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The global challenge: Climbing down the mountain



To do this we'll need a sustainable energy transition

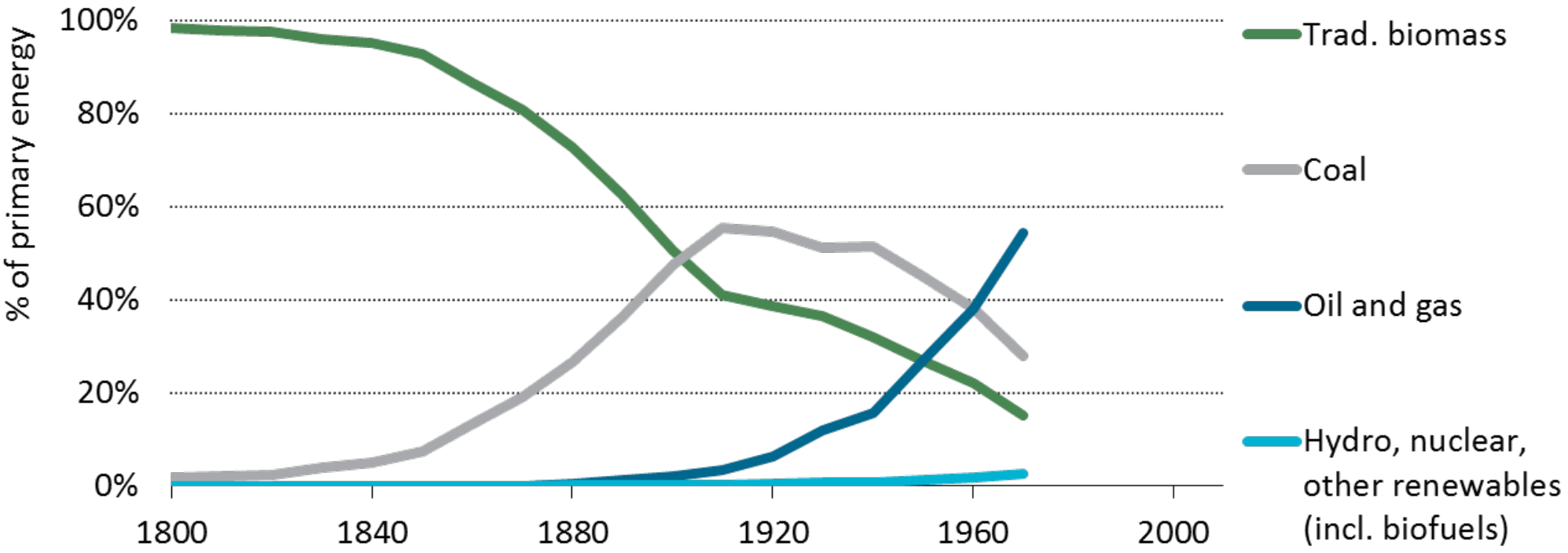
Two transitions from 1850 to 1970, each taking over 40 years to rise form 5% to 25% of supply



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To do this we'll need a sustainable energy transition

In 1970, the world was ready for a third transition

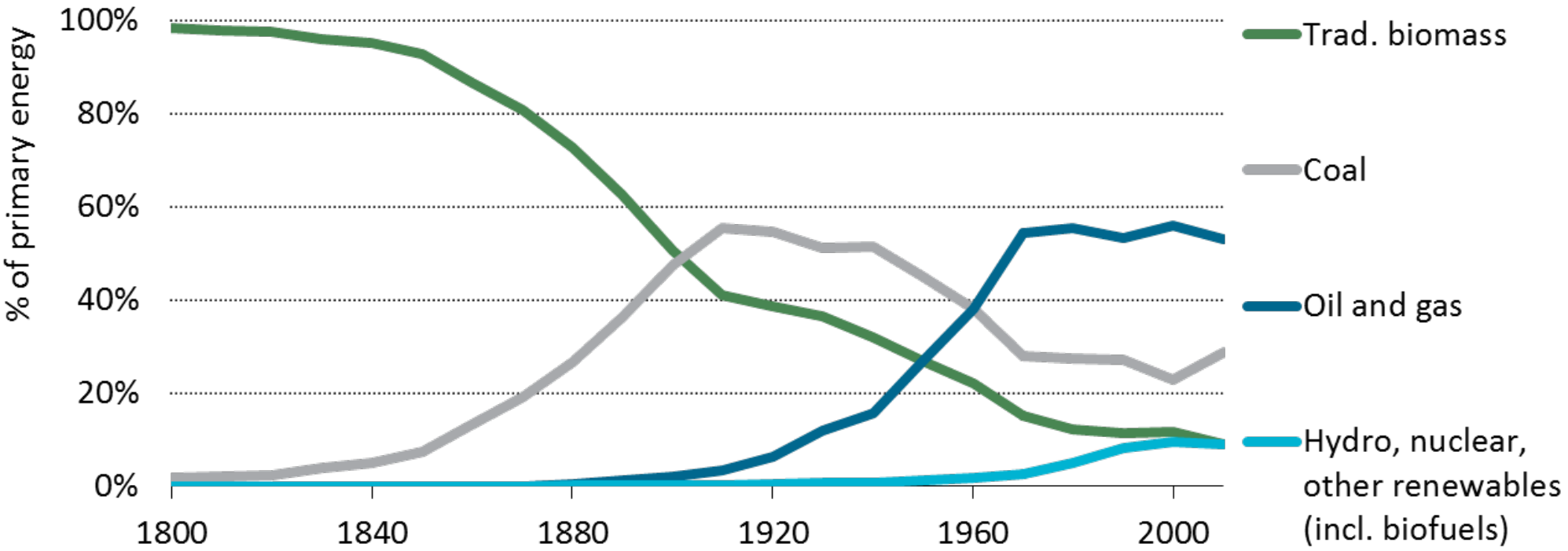


Data from Smil (2010) and IEA (2015)

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To do this we'll need a sustainable energy transition

But things have been relatively stable since 1970

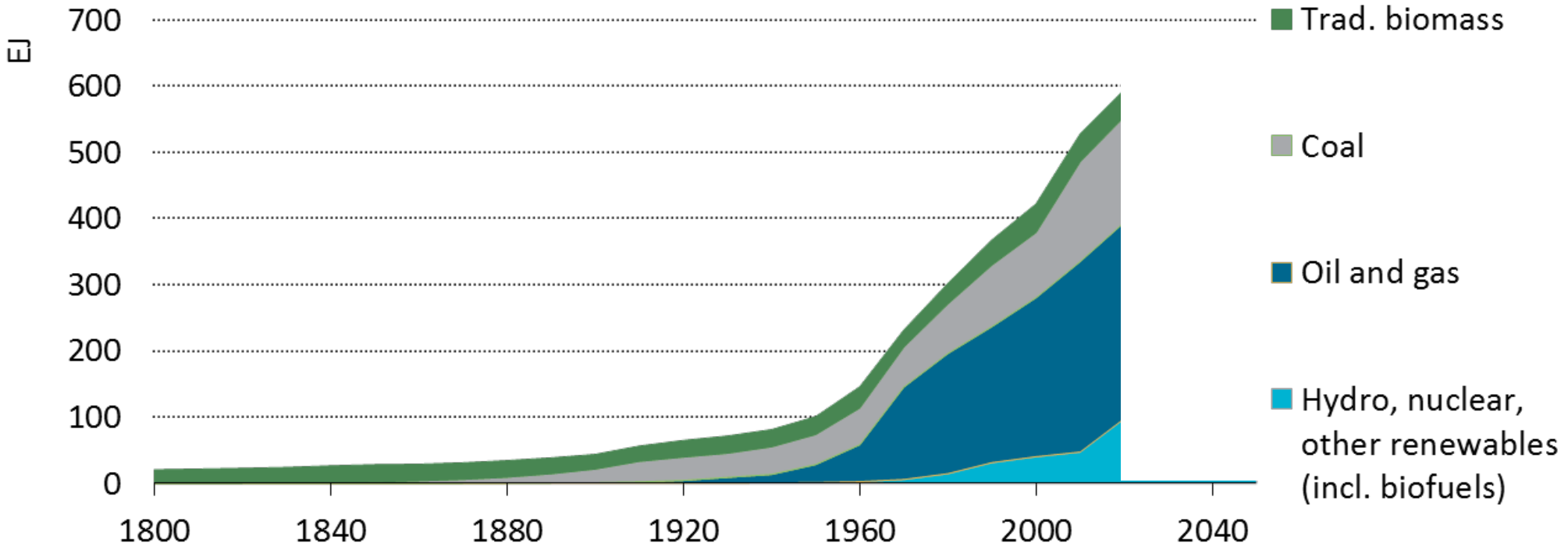


Data from Smil (2010) and IEA (2015)

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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



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Issue: Energy efficiency is critical for the transition to a sustainable energy system

IEA Executive Director Fatih Birol:

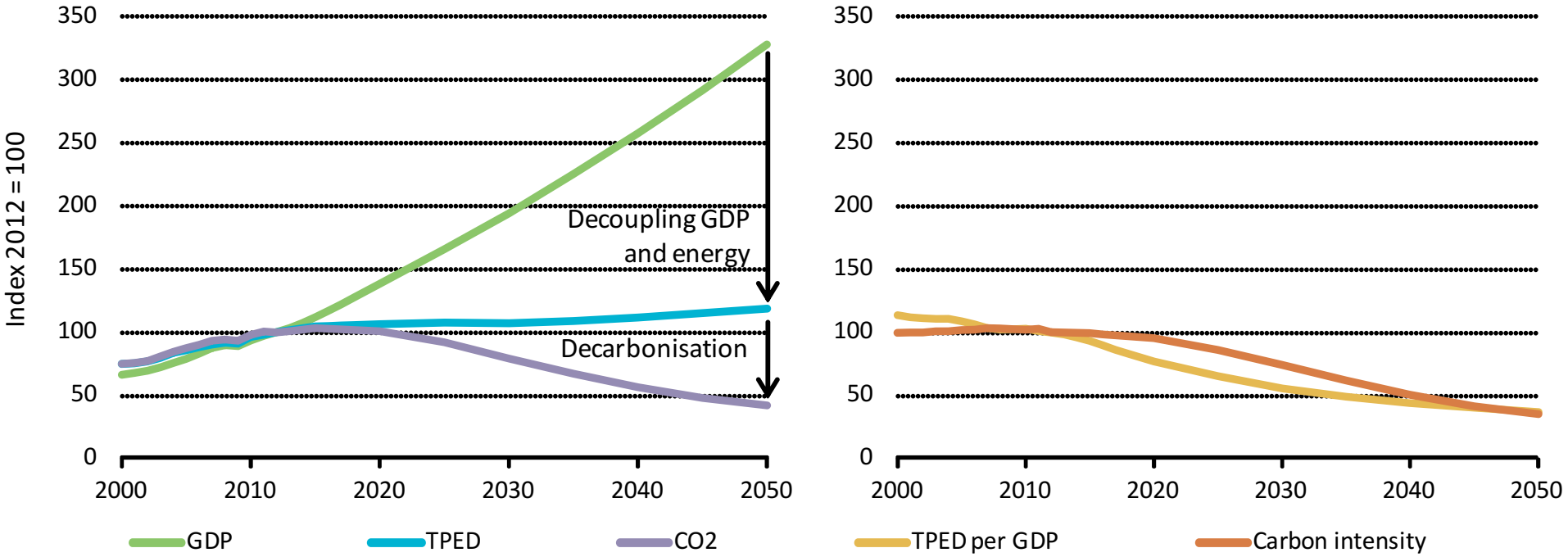


Energy efficiency is an urgent priority. To transition to the sustainable energy system of the future, we need to decouple economic growth from greenhouse gas (GHG) emissions. Energy efficiency is the most important "arrow in the quiver" to achieve this. For its part, the International Energy Agency (IEA) is pursuing a number of strategies to improve energy efficiency both among its member governments and with partner countries.

But with great importance comes great responsibility… the potential needs to be realized

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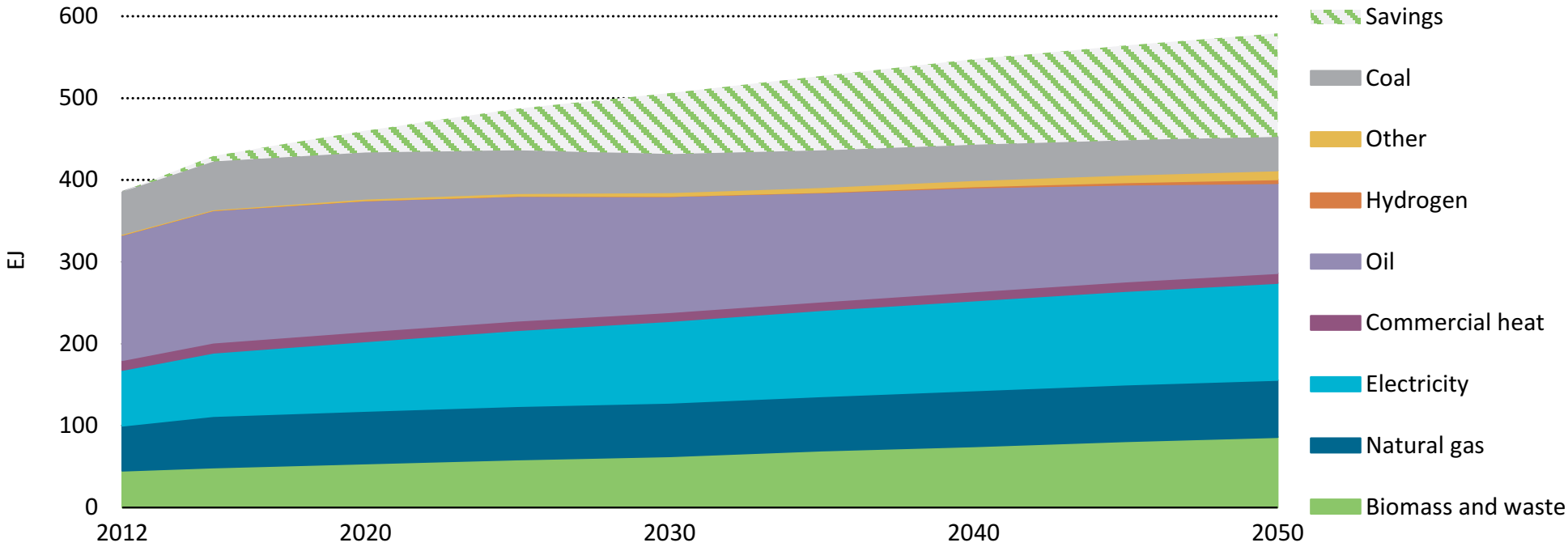
The sustainable energy transition, is if nothing else, an energy efficiency transition



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

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Energy efficiency savings greater than primary renewable electricity



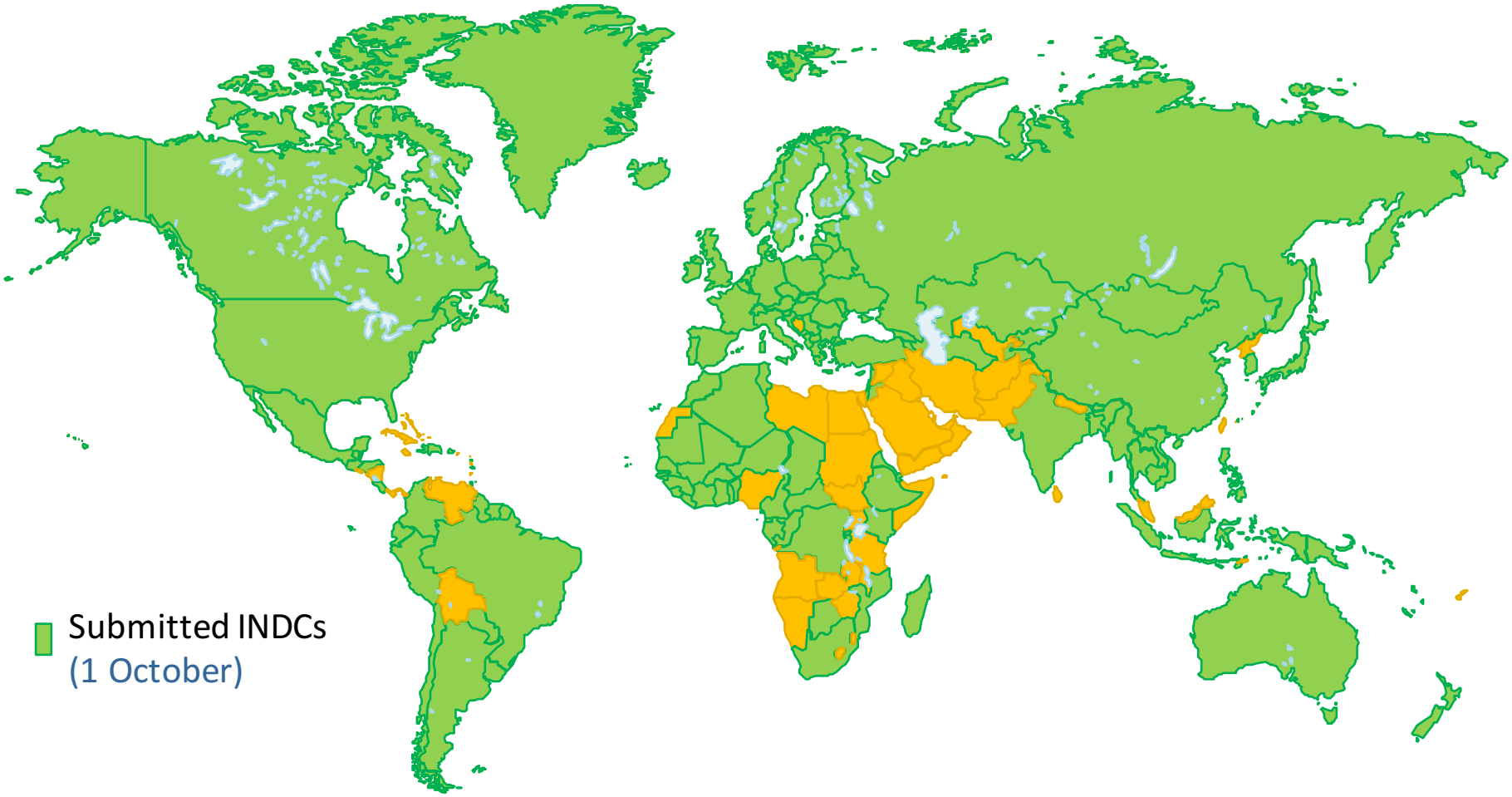
Energy efficiency provides savings by 2050 in the 2DS, being comparable to the final energy use of China and the EU combined in 2012.

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International Energy Agency

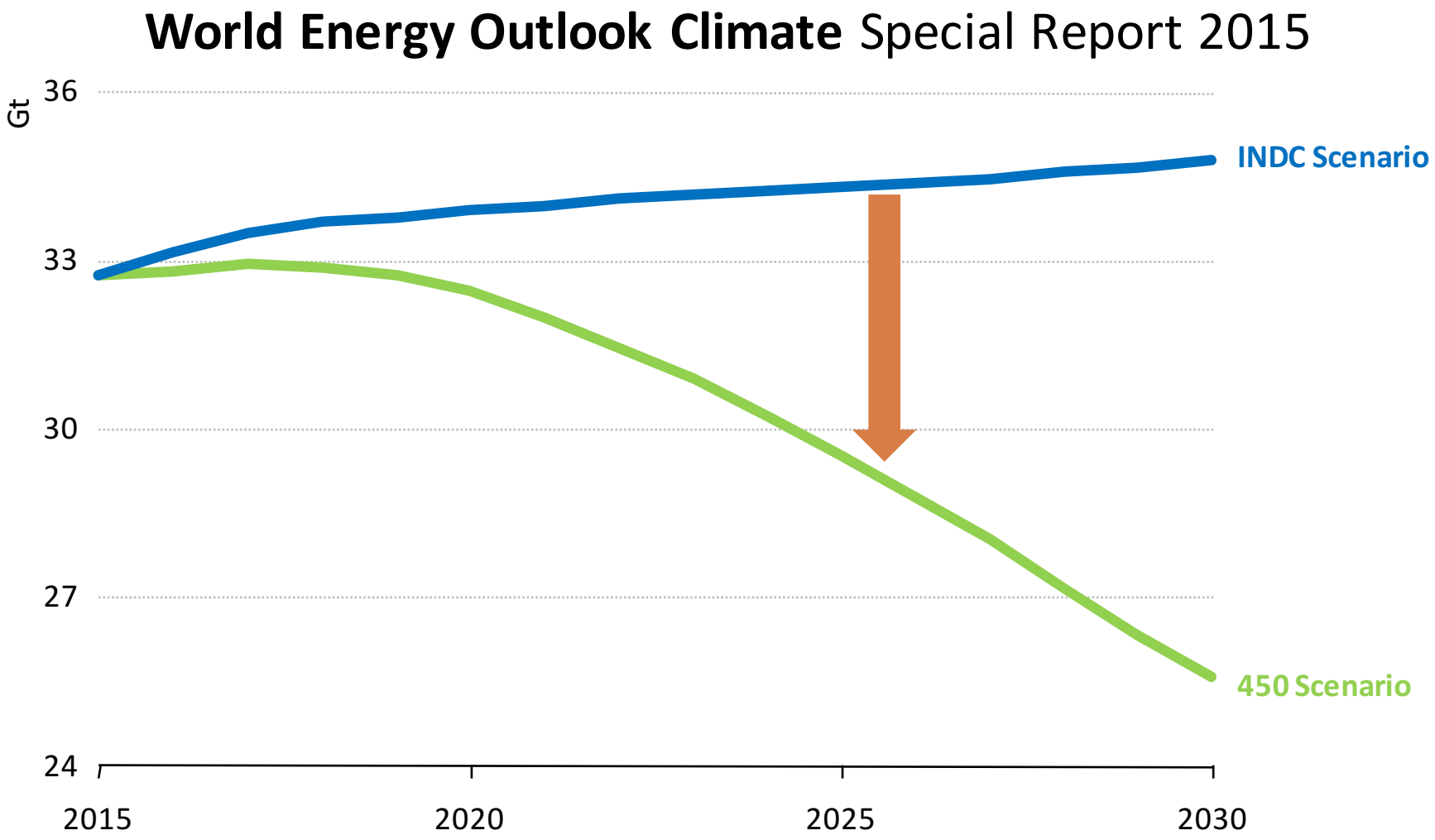
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160 INDCs, over 160 countries
Over 90% of energy related GHG



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INDCs one step on the journey but we need to cross the bridge



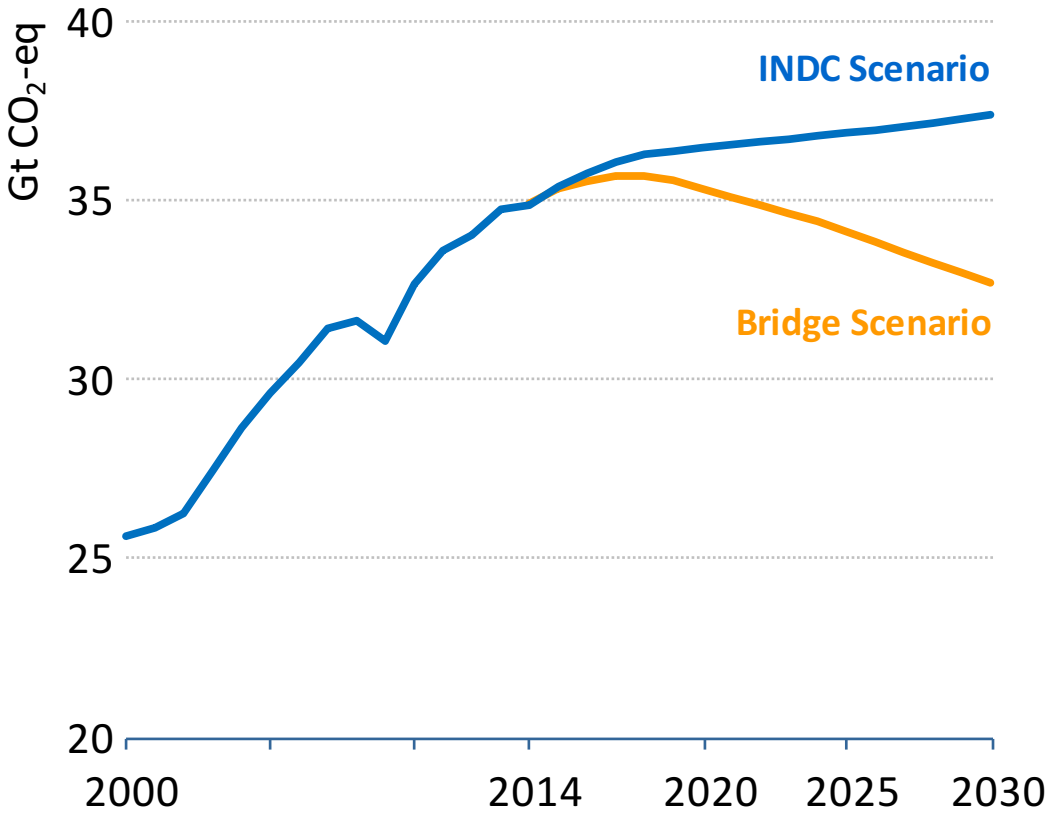
"Room" for more energy efficiency stimulus to support greater climate change mitigation action

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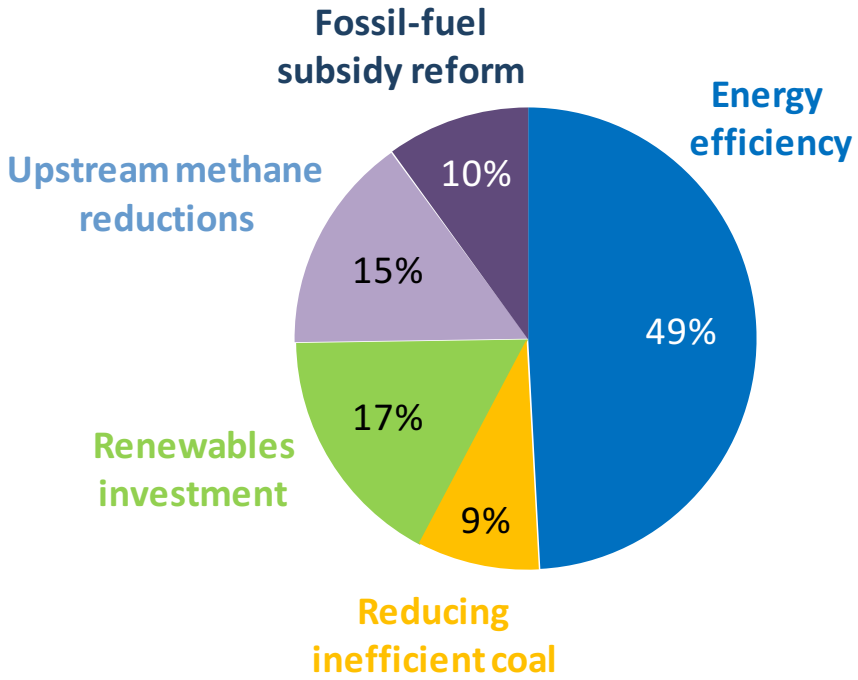
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Energy efficiency is the keystone in the bridge

Global energy-related GHG emissions



Savings by measure, 2030



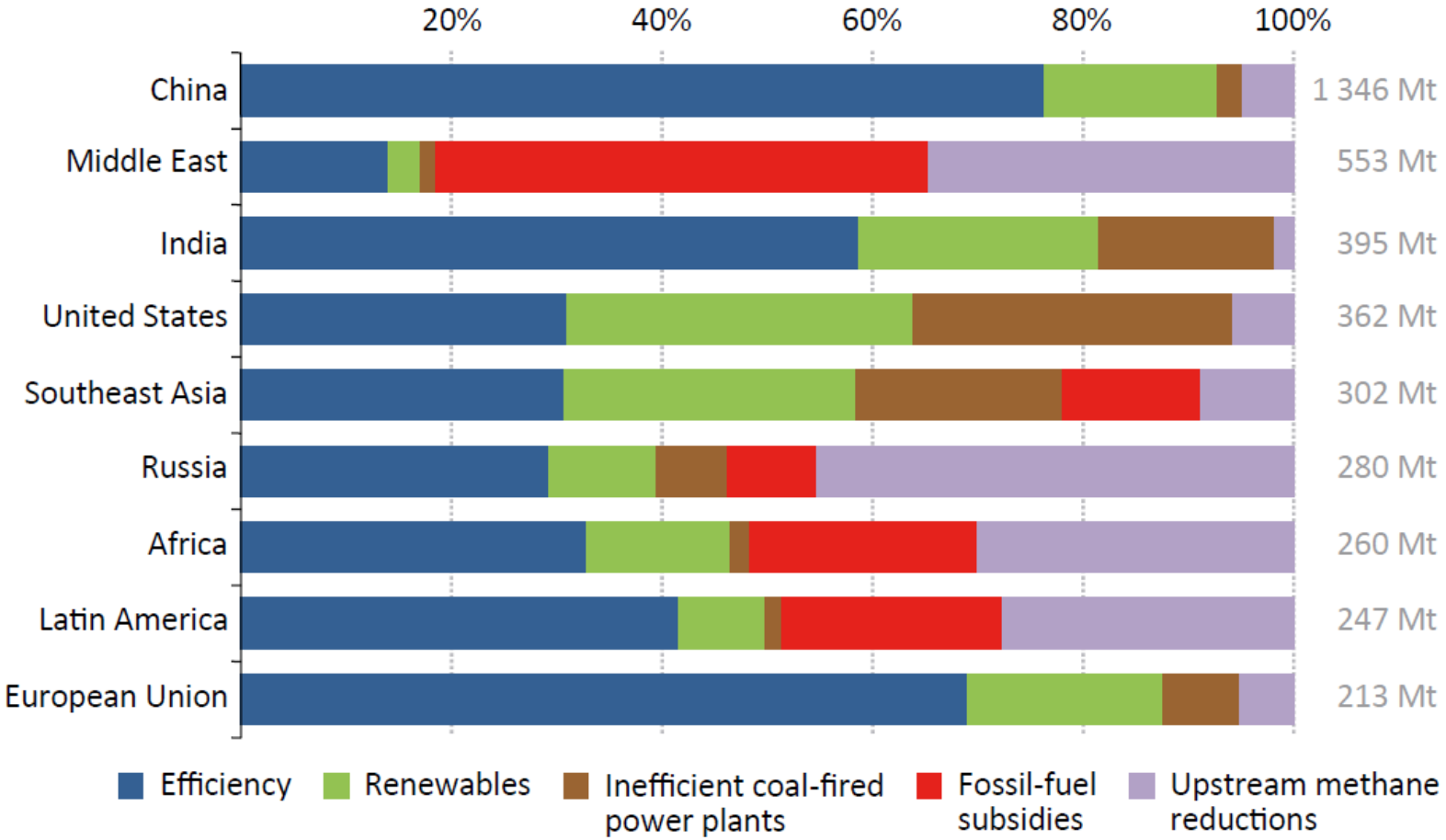
Five measures – shown in a "Bridge Scenario" – achieve a peak in emissions around 2020, using only proven technologies & without harming economic growth

World Energy Outlook Climate Special Report 2015

© OECD/IEA 2015

Where do these efficiency gains come from?

- **Energy-related GHG emissions reduction (CO_2e) in Bridge scenario relative to INDC Scenario**

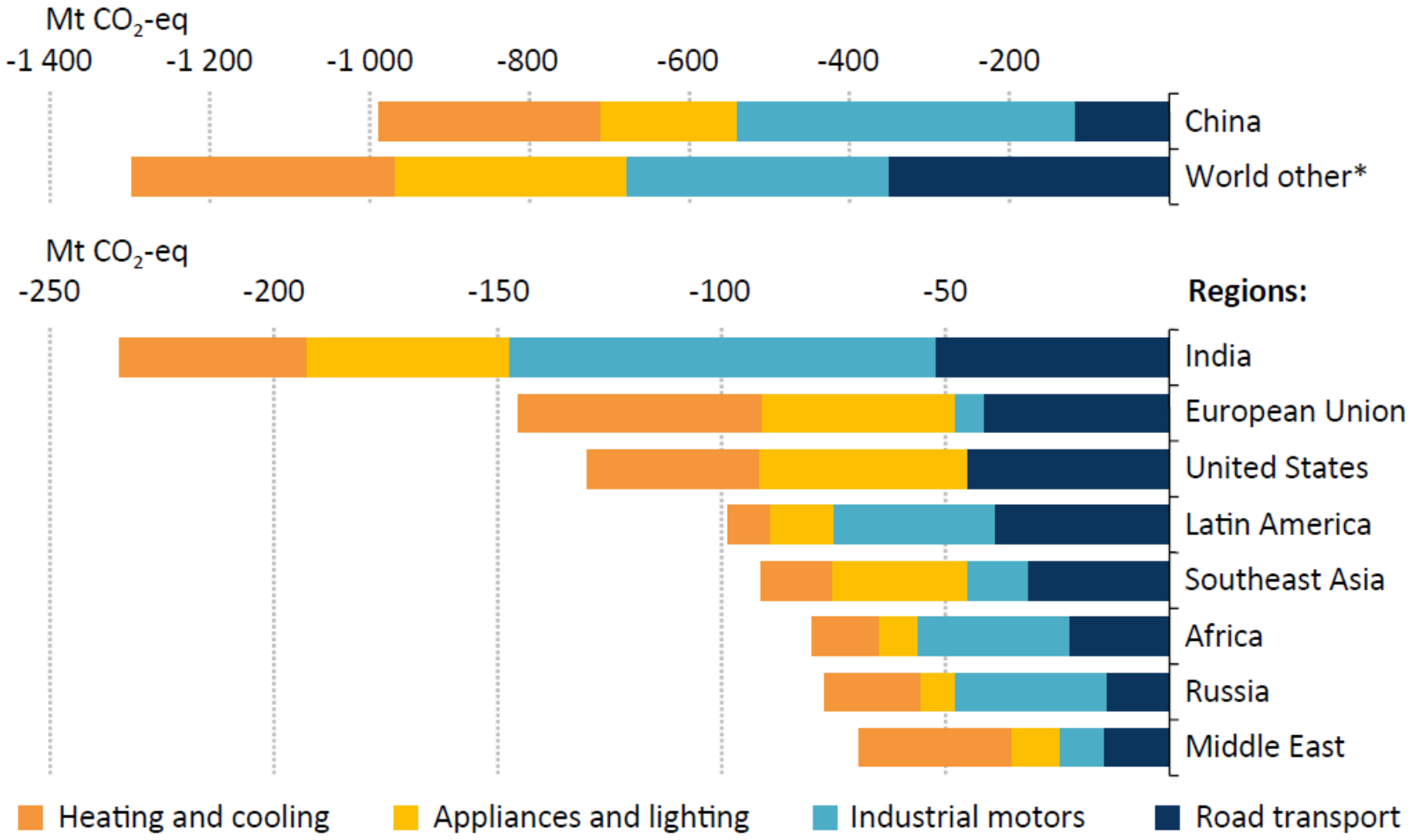


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Where do these efficiency gains come from?

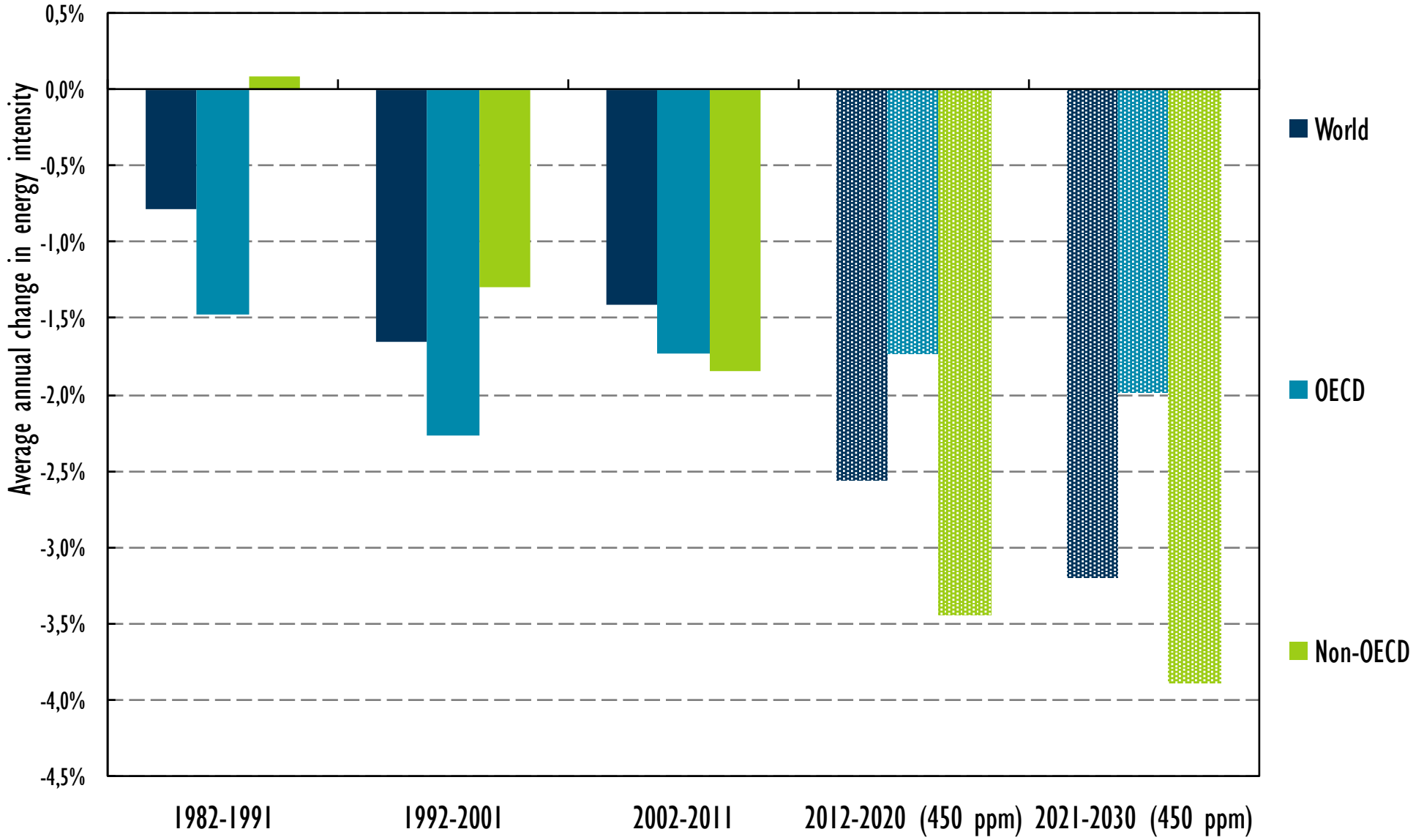
- **Energy-related GHG emissions reduction (CO_2e) in Bridge scenario relative to INDC Scenario**



World Energy Outlook Climate Special Report 2015

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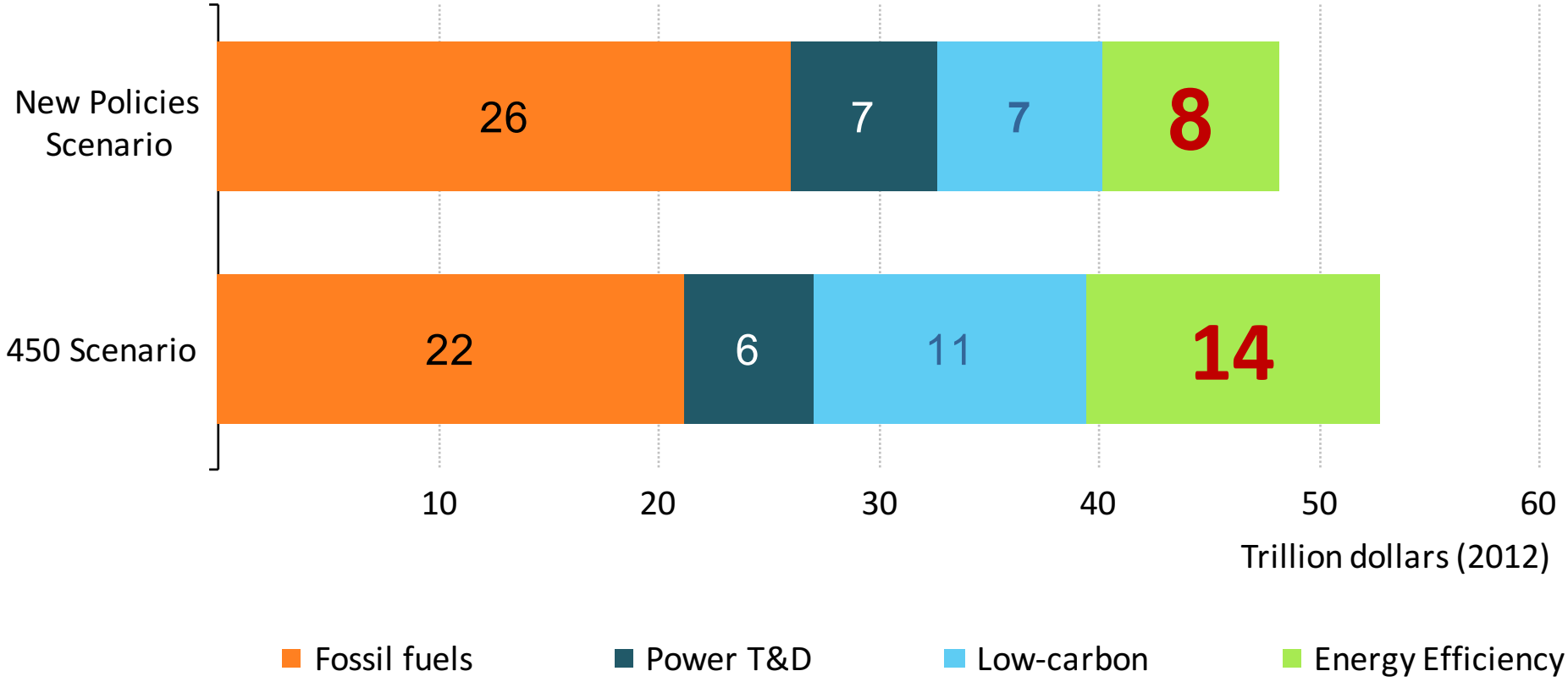
Getting to 2 degrees: Doubling the rate of improvement in energy intensity



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Long term investment landscape for 2 degrees

Cumulative Investment in the New Policies and 450 Scenarios, 2014-2035

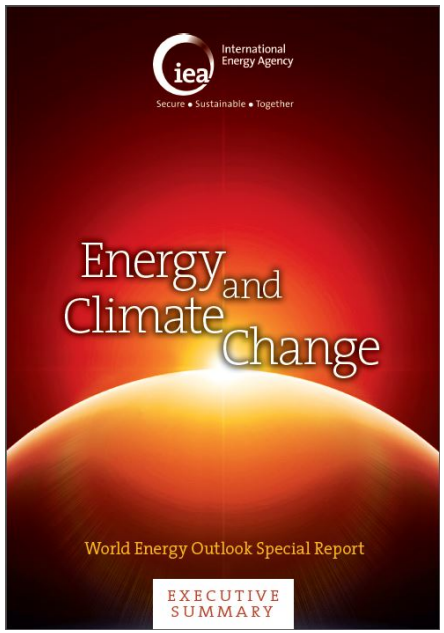


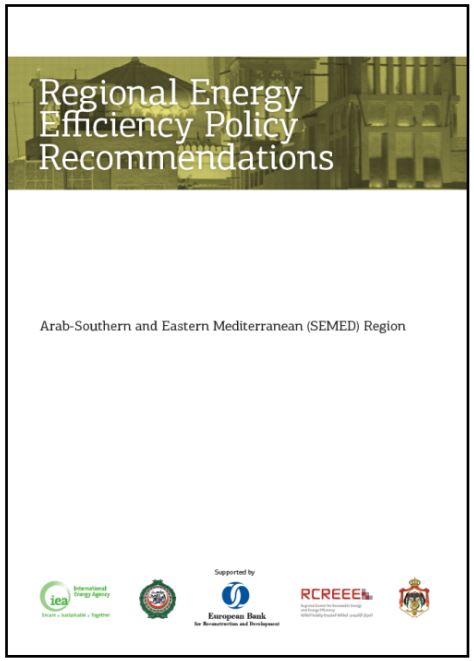
Spending on energy efficiency is $6 trillion higher in the 450 (2DS) scenario

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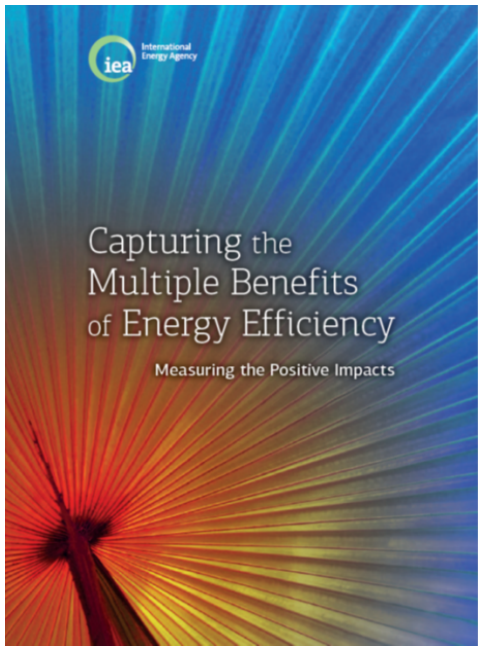
Mobilizing investment in energy efficiency: The IEA's strategy

- **Current program of work includes (but not limited to):**
  - **World Energy Outlook**
  - **Energy Efficiency in Emerging Economies**
  - **Energy Efficiency Market Report (EEMR)**
  - **Multiple Benefits of Energy efficiency**
  - **Energy Technology Perspectives**









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Energy Efficiency Market Report

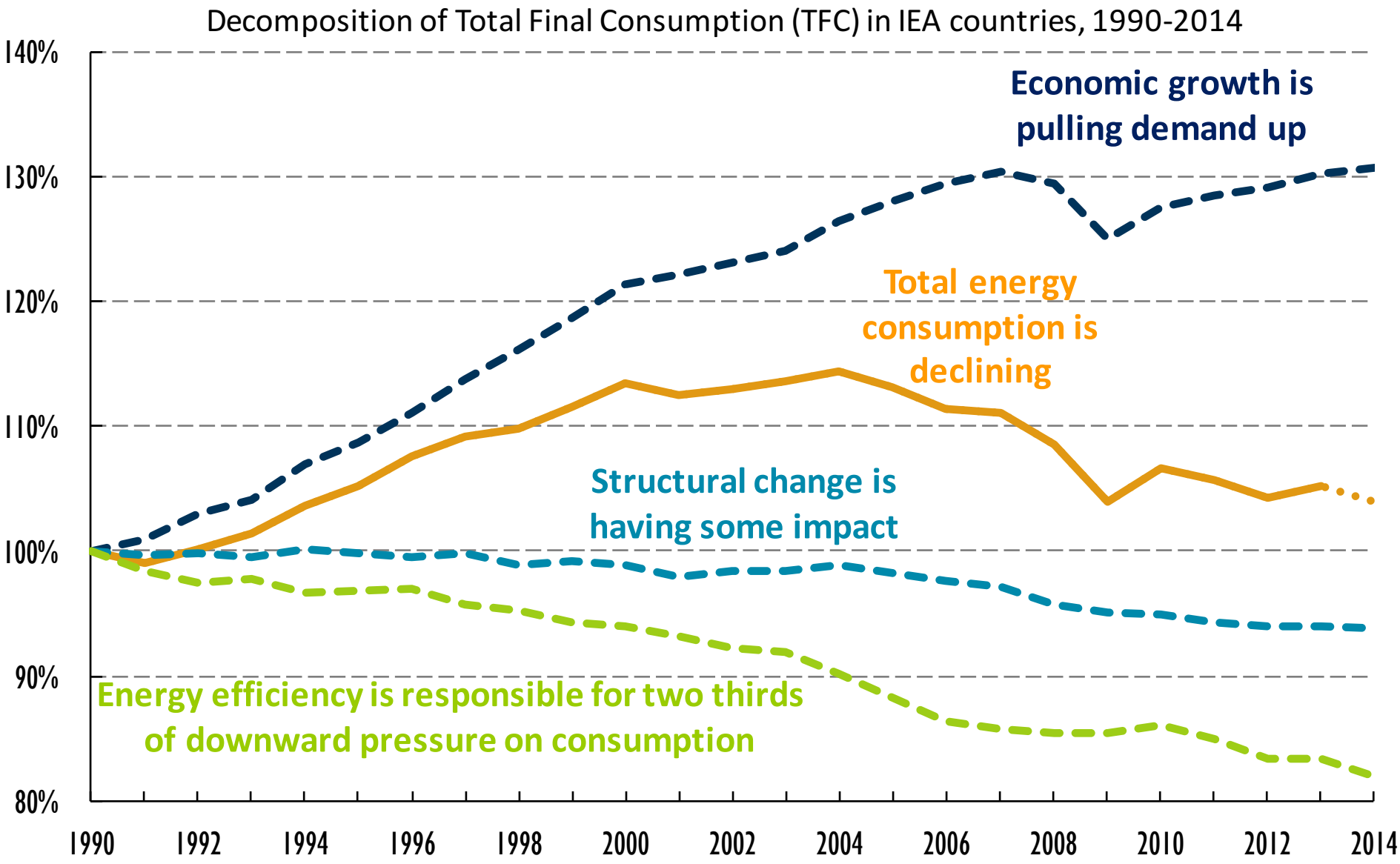


- Change conversation from ‘soft-pathways’ to real infrastructure and energy policy
- Emphasize investment, markets, and importance of efficiency in the system
- Backward looking –real evidence and impacts
- Available for free Download!

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Energy efficiency pulling down TFC



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EE generates multiple benefits

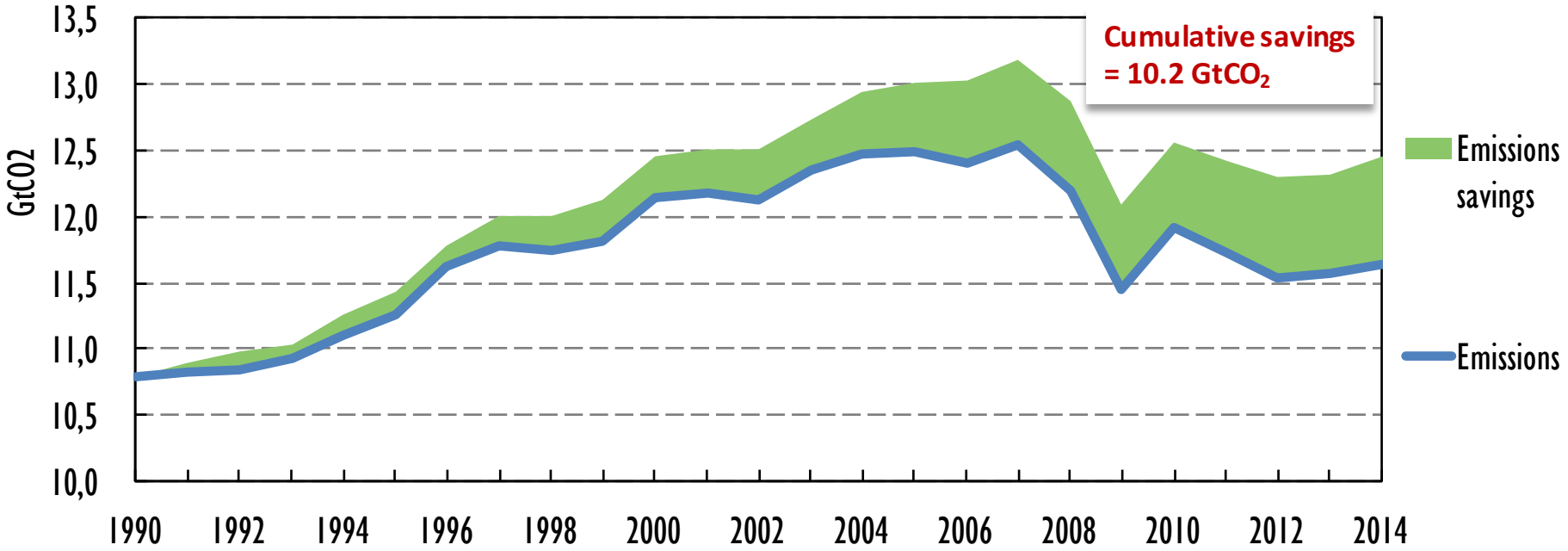


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A clean energy source, efficiency reduces emissions

- Energy efficiency investments since 1990 have helped to reduce IEA country emissions to below 1996 levels
- Without energy efficiency investments, estimated IEA member country emissions would have been 870 Mt CO_2 higher in 2014

IEA emissions from fossil fuel combustion and emissions savings from energy efficiency investments since 1990

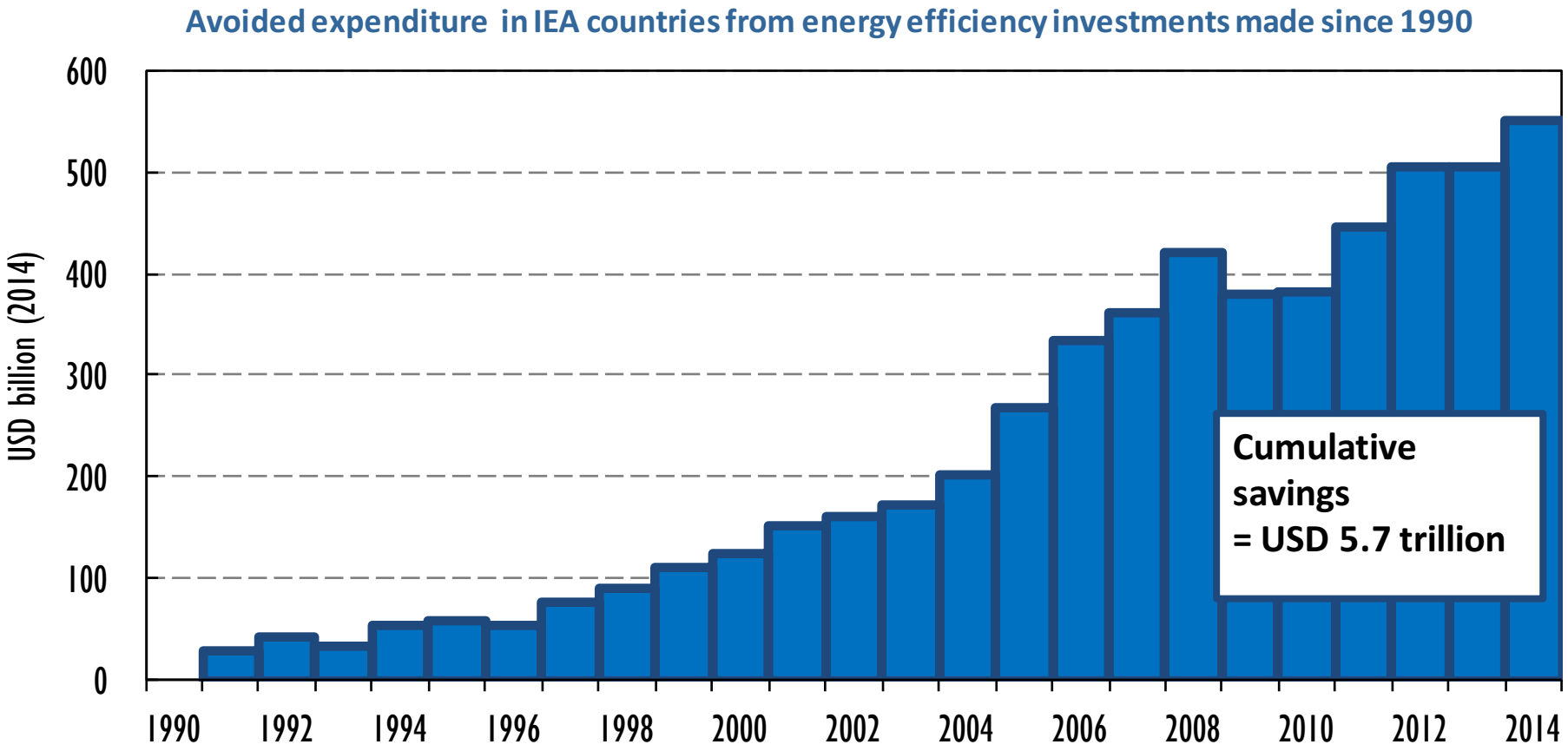


Energy efficiency has helped to make the 2 degrees target more achievable by lowering emissions to date

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IEA consumers are saving hundreds of billions of dollars each year

- **IEA countries saved USD 550 billion in 2014 as a result of energy efficiency investments since 1990**

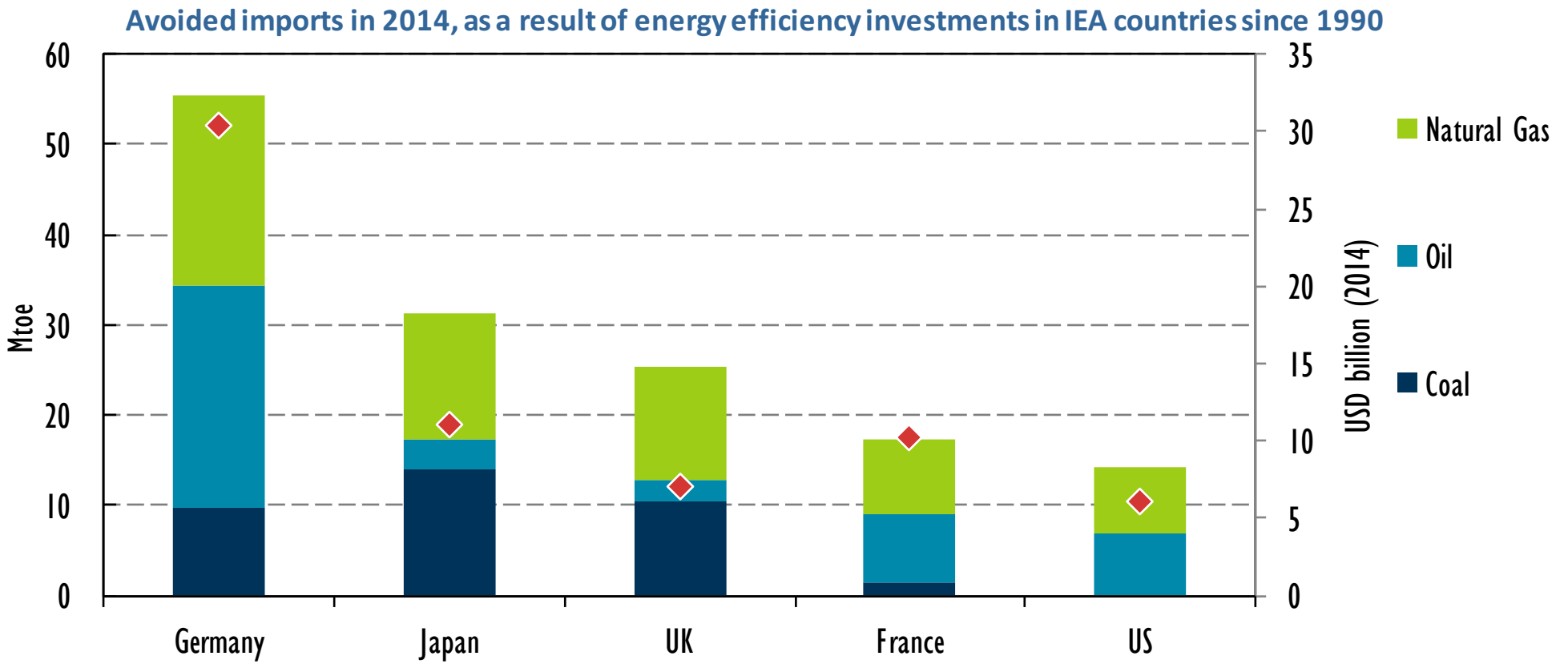


Annual savings are greater than the EU's fuel import bill

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Efficiency's domestic production substitutes for fuel imports

- In 2014, IEA countries avoided primary energy imports totalling 190 Mtoe, saving USD 80 billion in energy import bills and improving trade balances

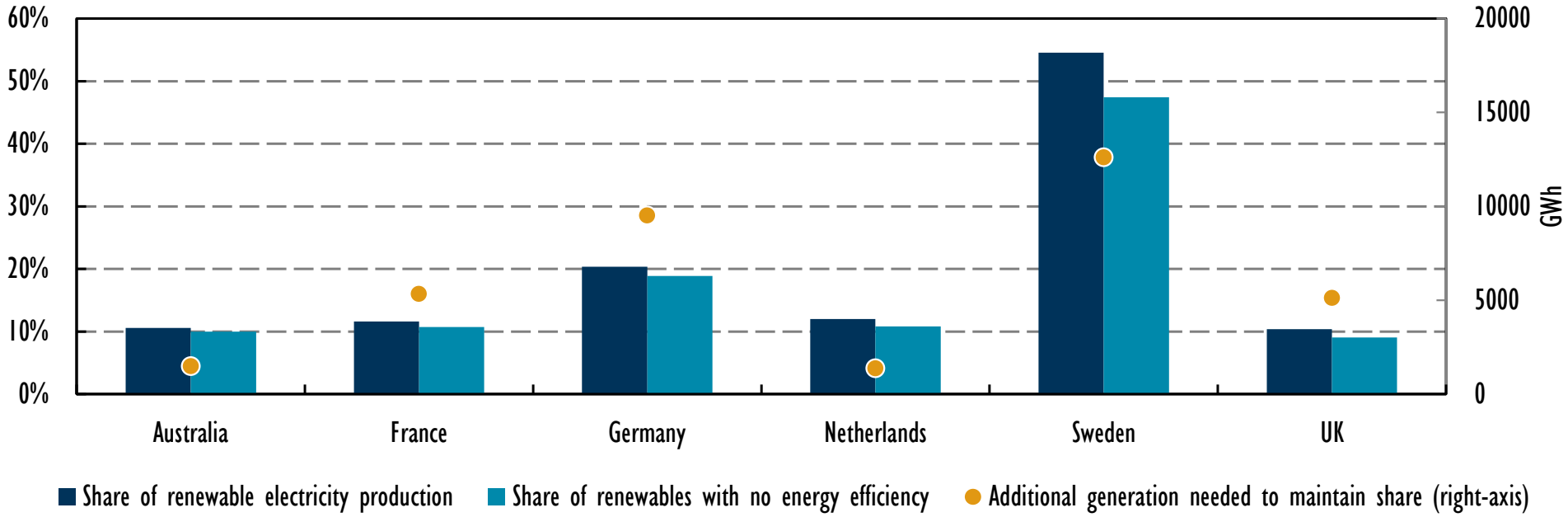


Domestically produced, efficiency supports energy security

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Efficiency works to increase share of renewable energy

Actual share of renewable electricity generation in select countries in 2012, with adjusted share in the absence of energy efficiency improvements since 2001



- ***Additional 5 GW in Sweden and 6 GW in Germany of variable renewable electricity to maintain share without efficiency improvements***

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In Seoul, LEDs are substituting for nuclear power

- Seoul has adopted “One-Less Nuclear Plant” plan to reduce energy consumption equivalent of one nuclear plant (2 Mtoe)



http://www.pennenergy.com/articles/pe/2013/10/



https://upload.wikimedia.org/wikipedia/commons/

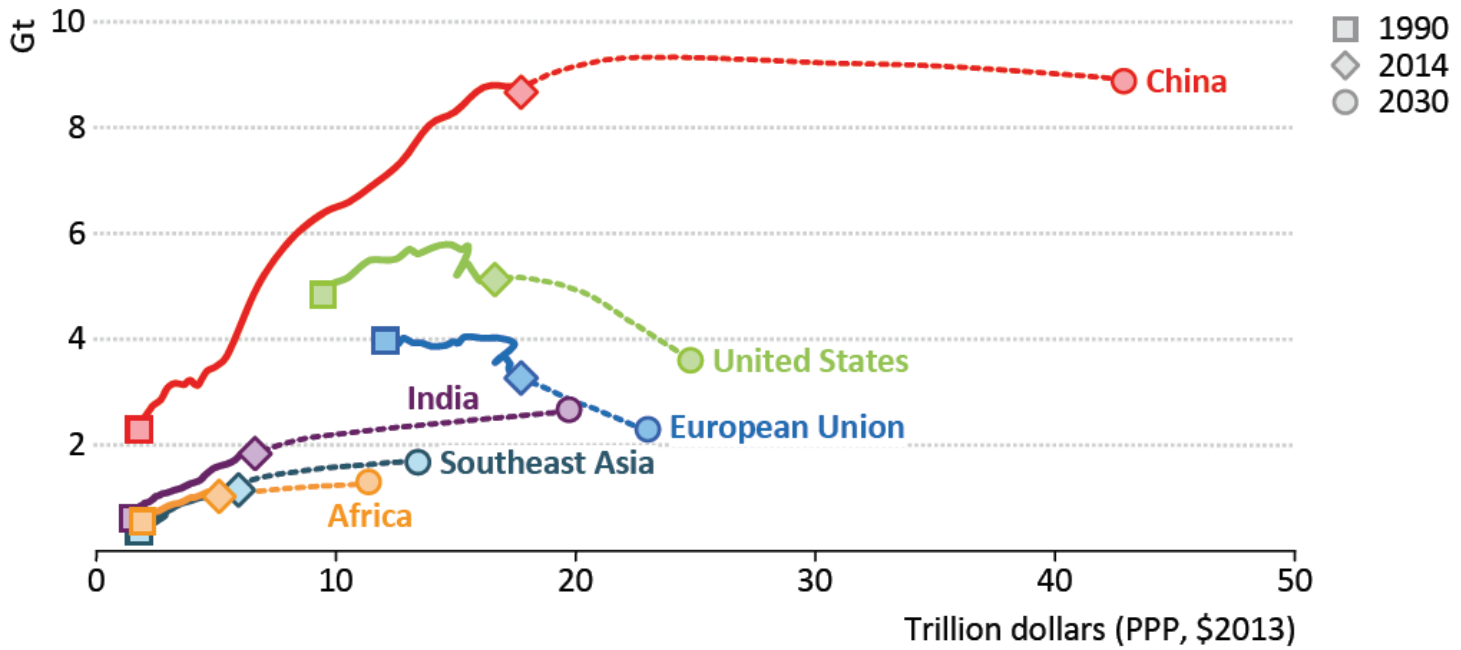
- Plan has retrofit 2 267 buildings – enabled market with low interest financing of up to USD 2 million per project
- Seoul’s lighting plan to go 100% LED replacing 2.2 million security and street lights

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Energy efficiency improvements at this scale would be sustainable development

- India to grow it's economy to China's levels but with 6 billion fewer tonnes of CO2 emissions
- China more than double its GDP with no GHG increase

Figure 2.2 ▷ Energy-related CO_2 emission levels and GDP by selected region in the Bridge Scenario



Note: PPP = purchasing power parity.

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We haven't embarked on an energy efficiency project like this before but that doesn't mean it isn't possible

- 2015 will be the warmest year in thousands of years
- Planetary sustainability thresholds are visible
- This is an opportunity for experiment, creativity, innovation:
- A rethink of status quo that was recently unthinkable

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