IEA Energy Efficiency 2018 and World Energy Outlook 2018

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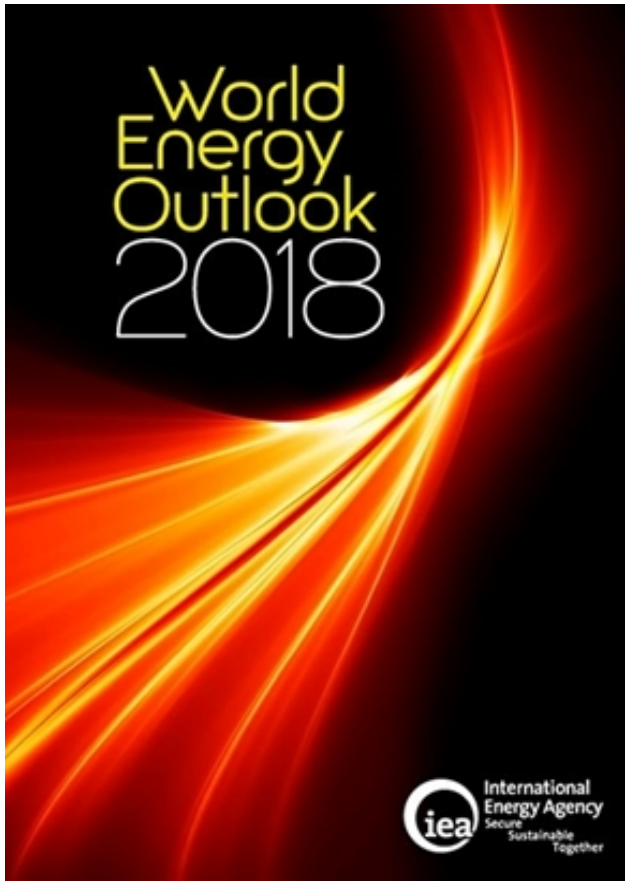
Brussels, 27 November 2018

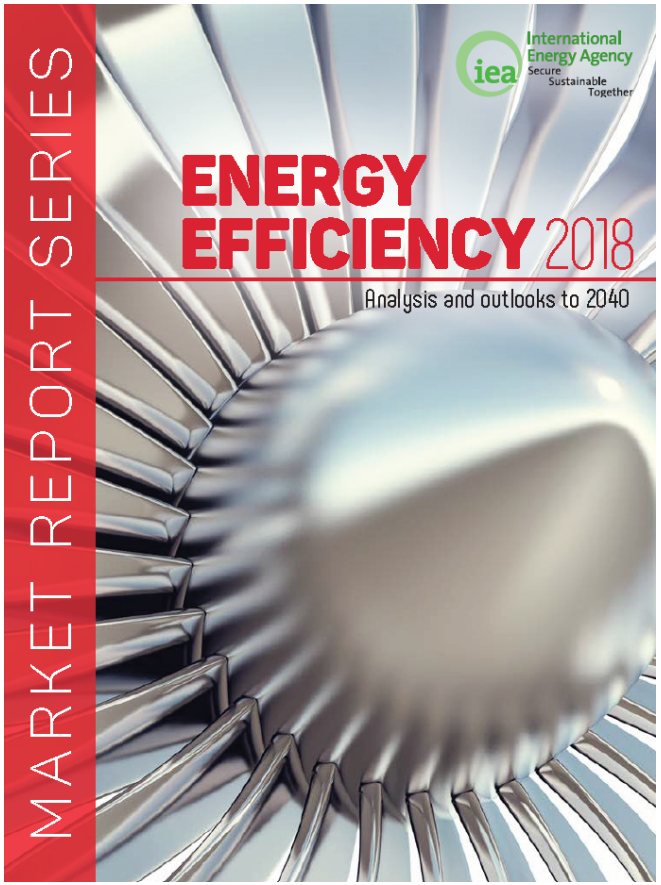
IEA

World Energy Outlook 2018



- Global trends, outlooks
  - Fuel (Oil, gas, coal)
  - Energy efficiency and renewables
- Based on scenarios to 2040
  - Simulation model, detailed data
  - Current Policy Scenario (CPS)
  - New Policy Scenario (NPS)
  - Sustainable Development Scenario (SDS)
- Special focus on electricity
  - Outlook supply, demand
  - Alternative Future is Electric Scenario (FES)
- Report available, and some findings at: www.iea.org/weo2018

Energy Efficiency 2018

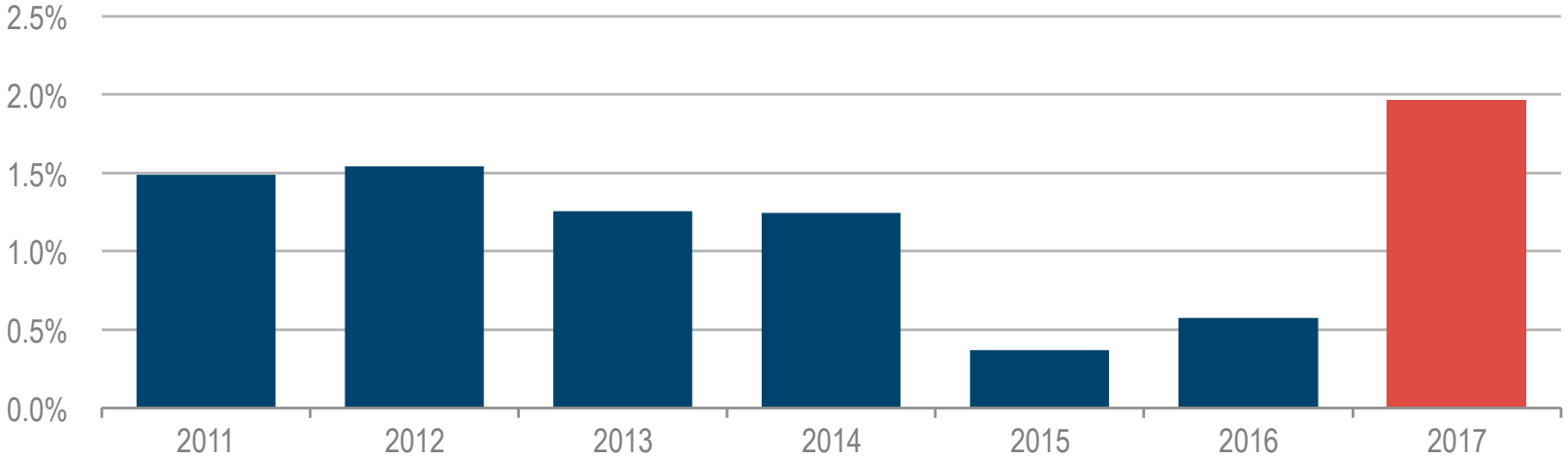


- Global trends and outlooks
  - Energy intensity and efficiency trends
  - Policy progress and trends
  - Introduction to efficient world scenario
  - IEA Efficient World Strategy
- Sector chapters
  - Transport, Buildings and Industry
- Investment finance and business models
- Energy Efficiency in Emerging Economies
  - Brazil, China, India, Indonesia, Mexico and South Africa
- Available for free from www.iea.org/efficiency2018

Recent trends in energy efficiency

2017 saw a resurgence in global demand growth

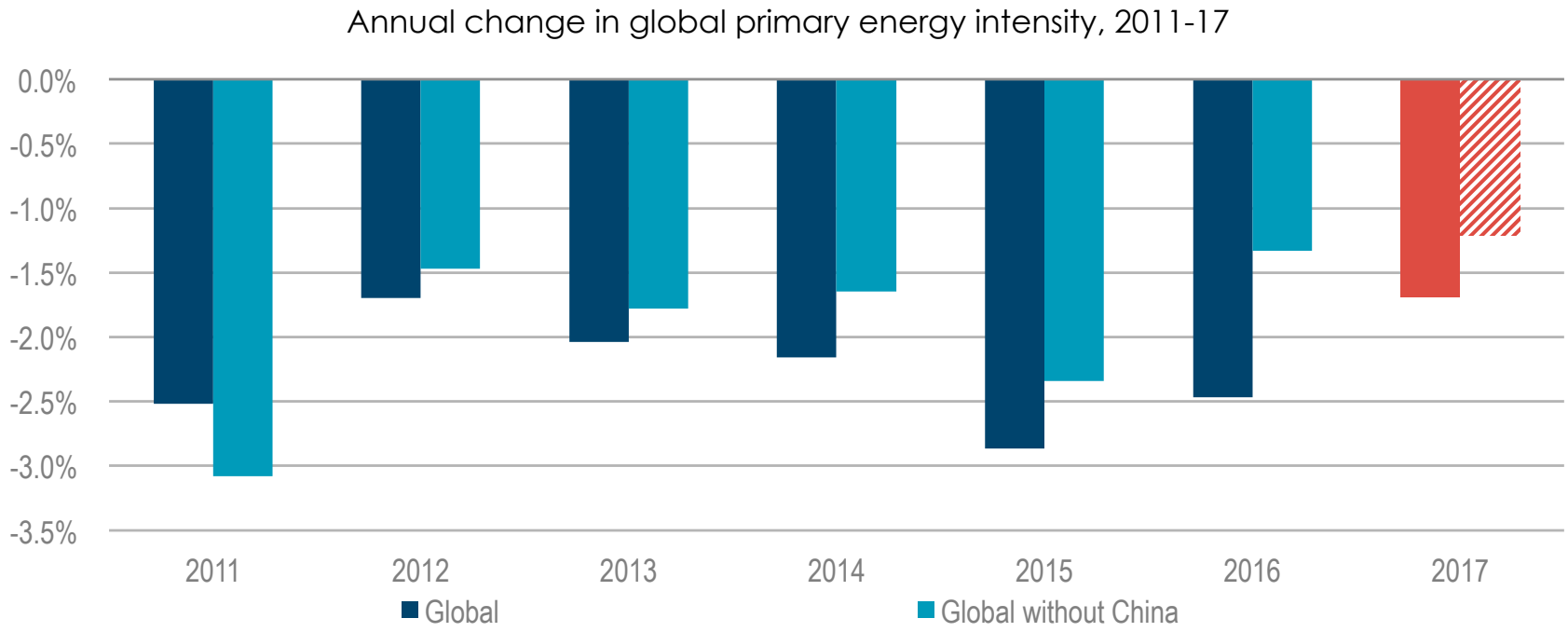
Change in global primary energy demand, 2011-17



Source: Adapted from IEA (forthcoming), *World Energy Outlook 2018*; IEA (2018c) *World Energy Statistics and Balances 2018* (database)

Global energy demand rose by nearly 2% in 2017, the fastest rise this decade, driven by economic growth and changes in consumer behaviour.

Global energy intensity is improving at a slower rate

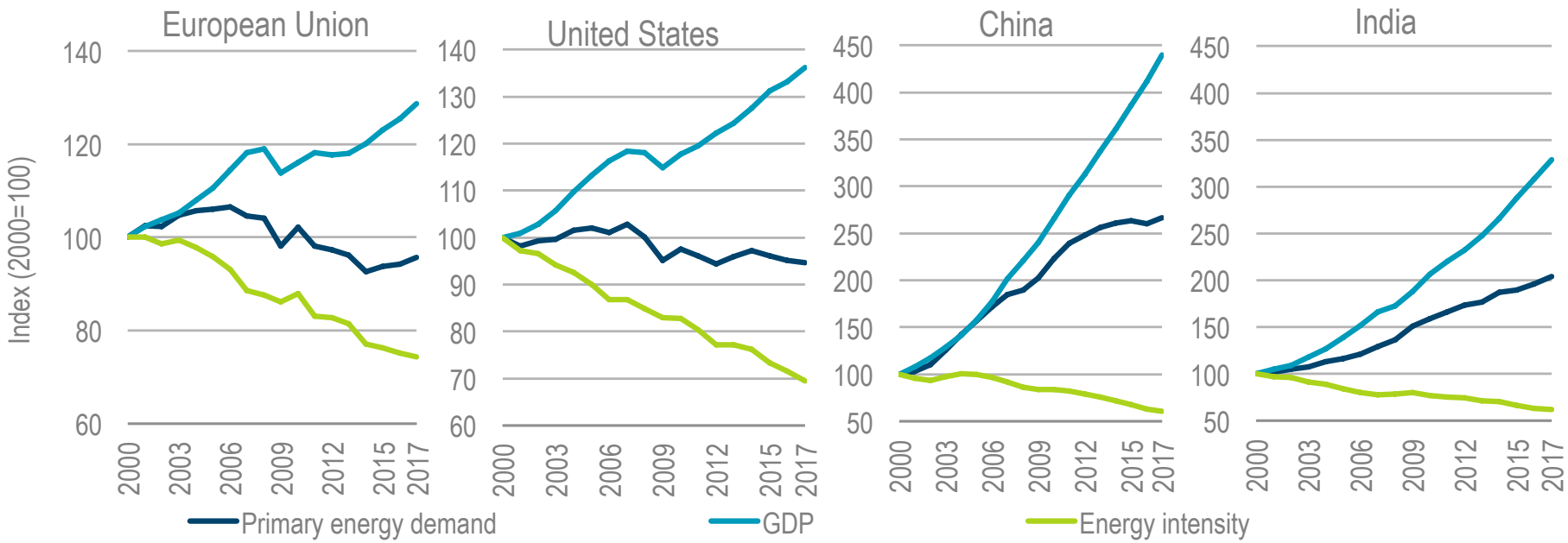


Source: Adapted from IEA (forthcoming), *World Energy Outlook 2018*; IEA (2018c) *World Energy Statistics and Balances 2018* (database)

Global primary energy intensity improved in 2017, but at the slowest rate this decade. The rate of global improvement would have been worse if not for continuing gains in China.

Energy use and intensity trends differ by country and region

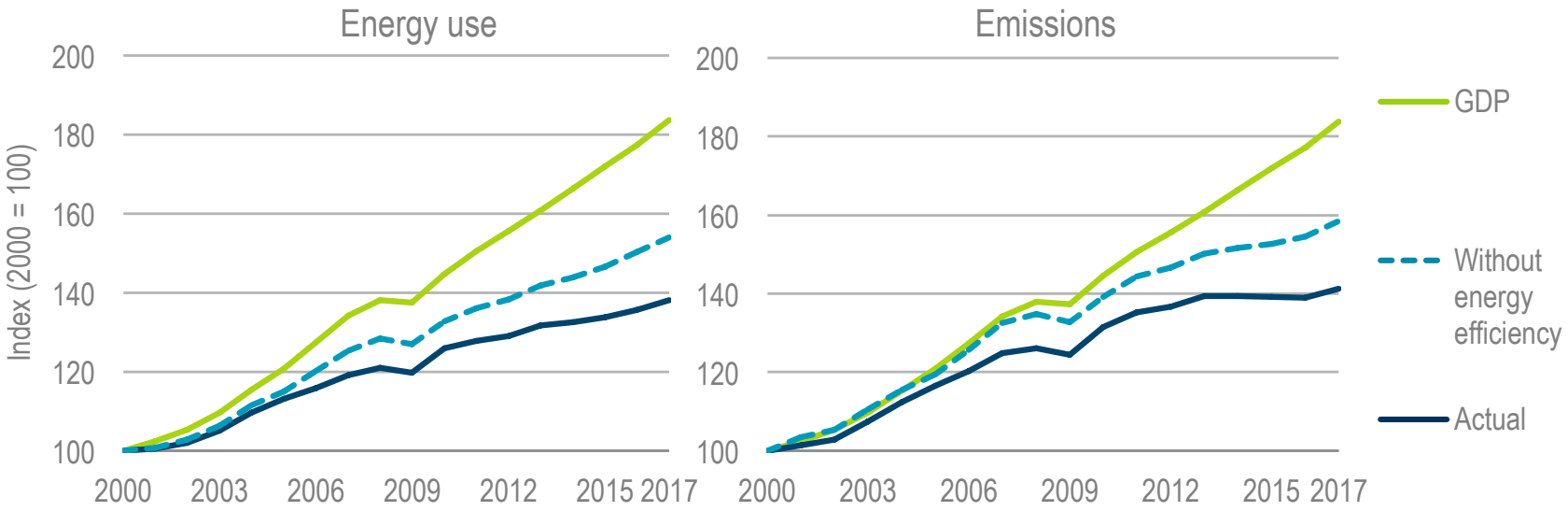
Primary energy demand, GDP and energy intensity in selected economies, 2000-17



Energy intensity is improving across major economies, but the rate of change and relationship to energy demand varies.

The impacts of energy efficiency are already significant

Global final energy use and emissions with and without energy efficiency improvements, 2000-17



Energy efficiency improvements since 2000 prevented 12% more energy use and emissions in 2017.

Why is energy use on the rise?

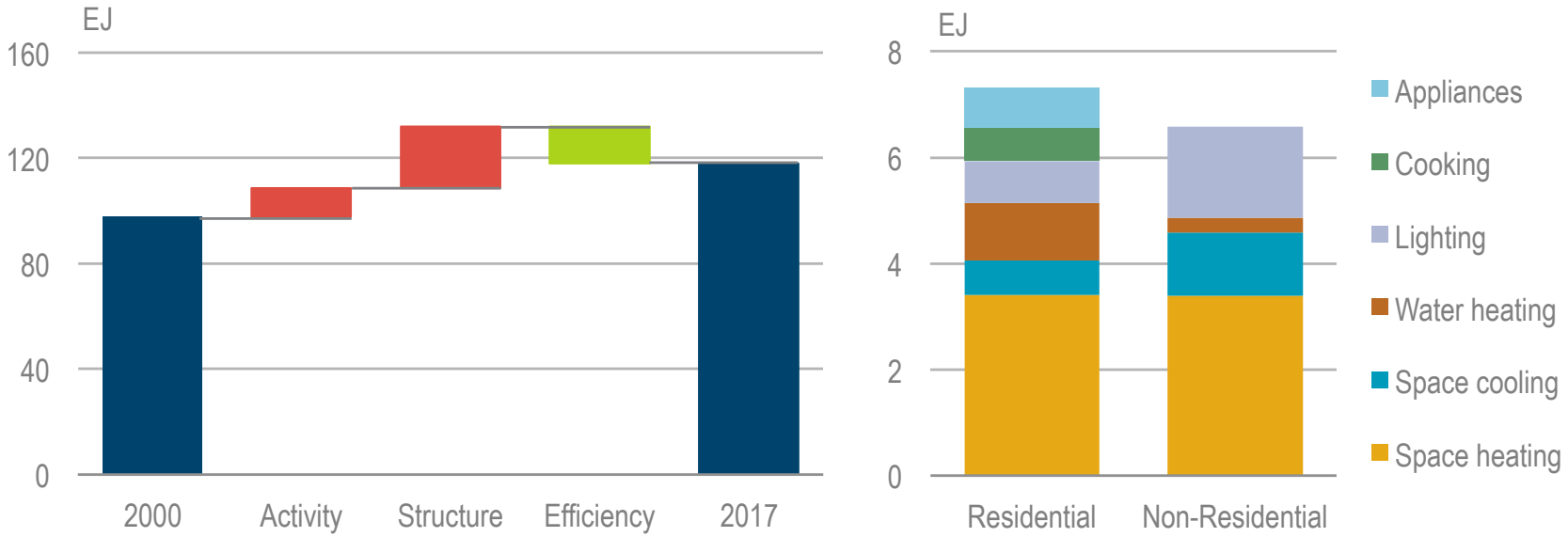
Decomposition of final energy use in the world's major economies

Note: Countries covered are IEA countries plus China, India, Brazil, Indonesia, Russia, South Africa and Argentina.

Global energy efficiency is improving, but its impact is being overwhelmed by factors that create more demand for energy.

Buildings sector energy use is continuing to rise

Decomposition of buildings global final energy use, 2000-17 (left) and end-use contribution to efficiency savings (right)



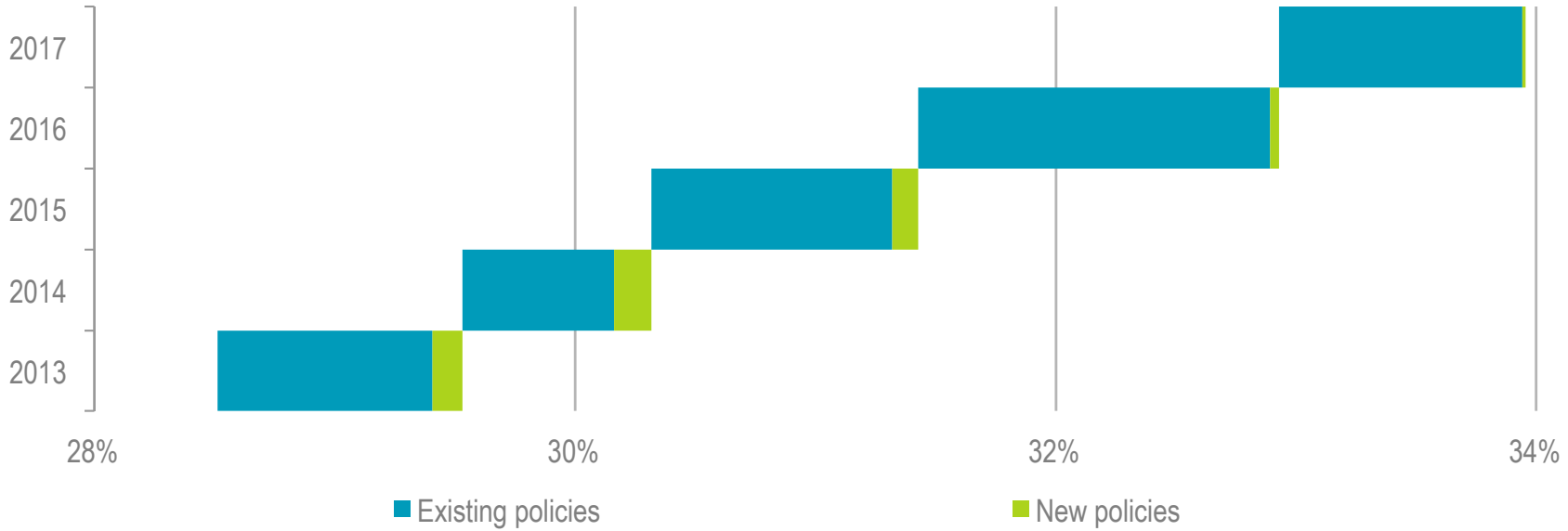
Sources: Adapted from IEA (2018a), *Energy Efficiency Indicators 2018* (database) and IEA Energy Technology Perspectives Buildings model (www.iea.org/etp/etpmodel/buildings/).

Growth in building sector energy use is linked to increasing floor space and appliance ownership. Space heating is driving savings across all building types.

Energy efficiency policy trends

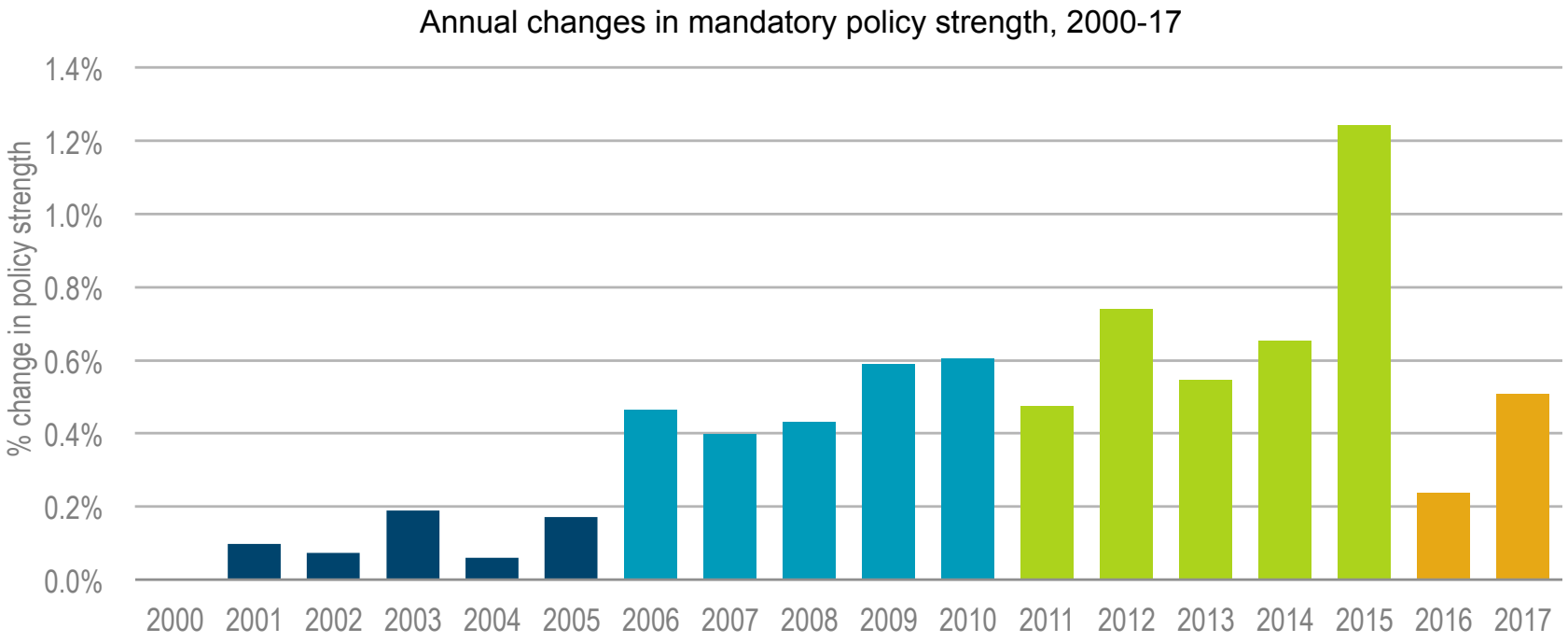
Coverage is growing slowly

Annual additions to the global coverage of mandatory energy efficiency policies, 2013-17



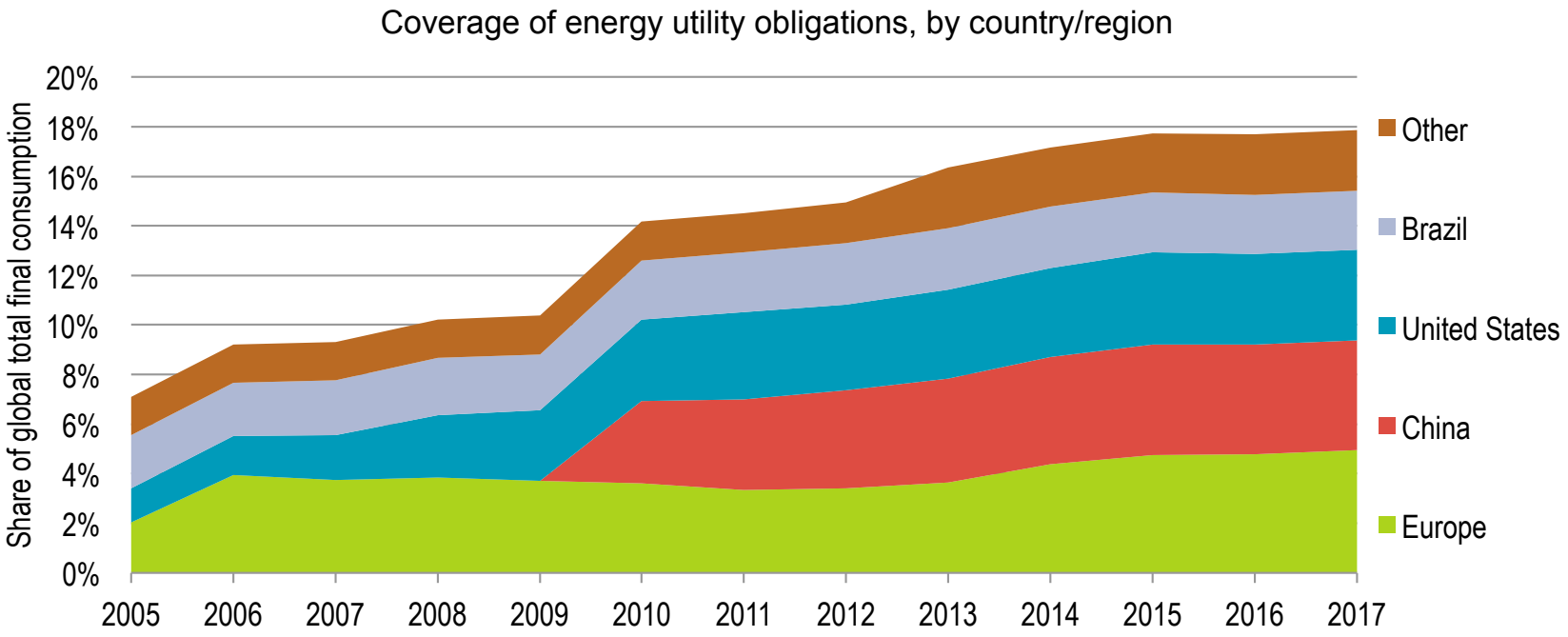
Nearly 34% of global energy use in 2017 was covered by mandatory energy efficiency policies. A 1.1% increase on levels in 2016

Coverage is just the first part of the policy story



Strength is an important indicator of the impact that mandatory policies could have.
In the past two years, policies have been strengthened at a slower rate than preceding years.

Obligation schemes have become a common policy tool



Nearly 18% of global energy use is captured by a utility obligation. However, the implementation of new policies has slowed, with few new or strengthened policies in the last few years.

World Energy Outlook 2018

New Policy Scenario: What we expect to happen with current and expected policies

Sustainable Development Scenario: To meet climate and SDG goals

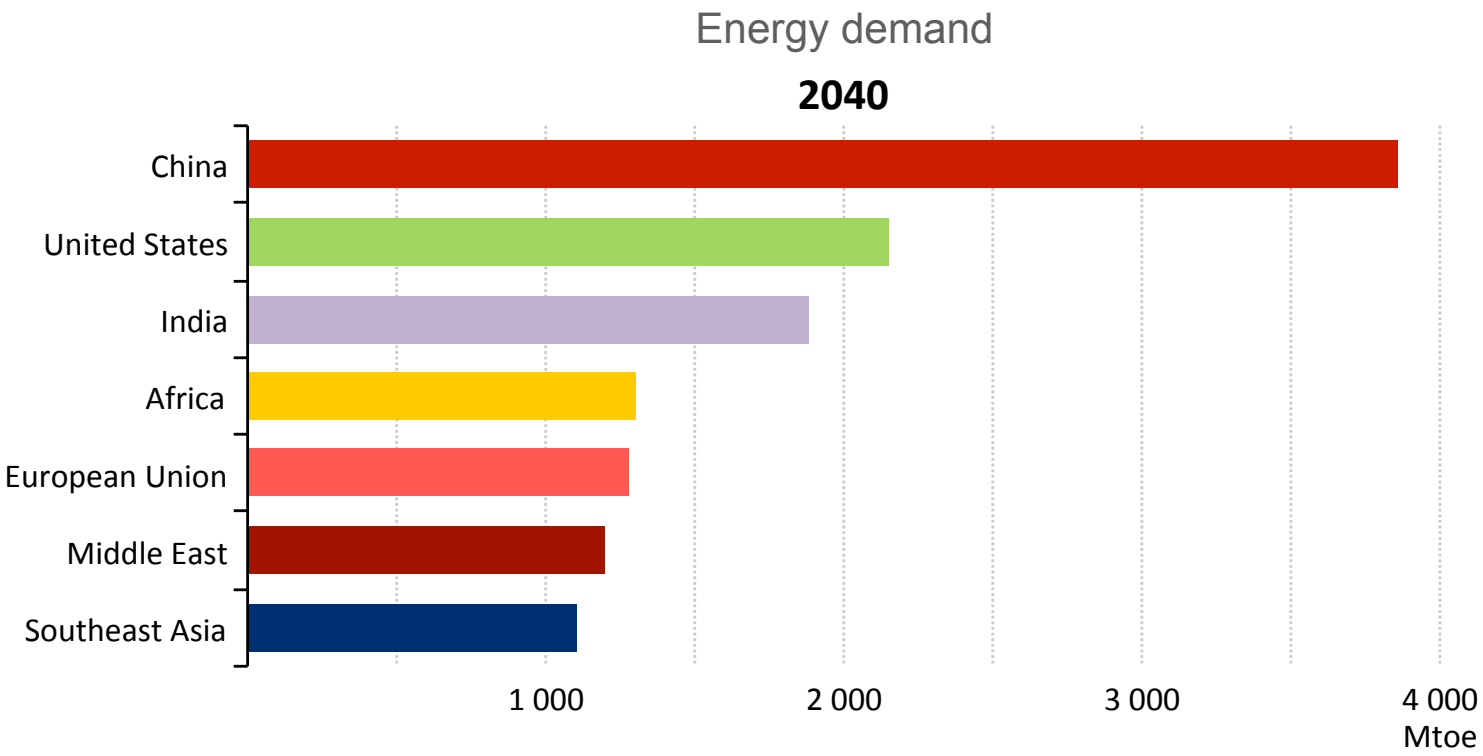
Energy context

- Mixed signals about the pace & direction of change in global energy:
  - Oil markets are entering a period of renewed uncertainty & volatility
  - Natural gas is on the rise: China's rapid demand growth is erasing talk of a 'gas glut'
  - Solar PV has the momentum while other key technologies & efficiency policies need a push
  - Our assessment points to energy-related CO2 emissions reaching a historic high in 2018
  - For the first time, the global population without access to electricity fell below 1 billion

- Electricity is carrying great expectations, but questions remain over the extent of its reach in meeting demand & how the power systems of the future will operate

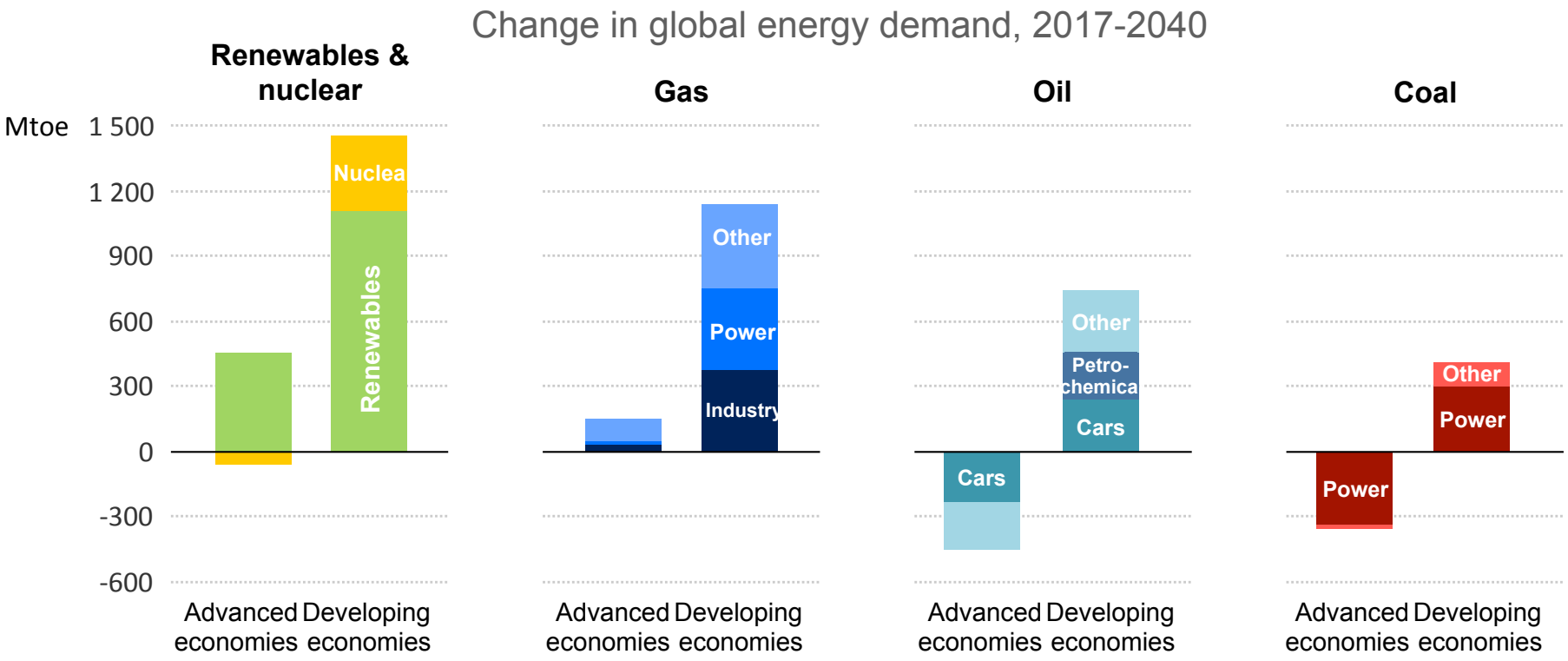
- Policy makers need well-grounded insights about different possible futures & how they come about. The WEO provides two key scenarios:
  - New Policies Scenario - Sustainable Development Scenario

The new geography of energy



In 2000, more than 40% of global demand was in Europe & North America and some 20% in developing economies in Asia. By 2040, this situation is completely reversed.

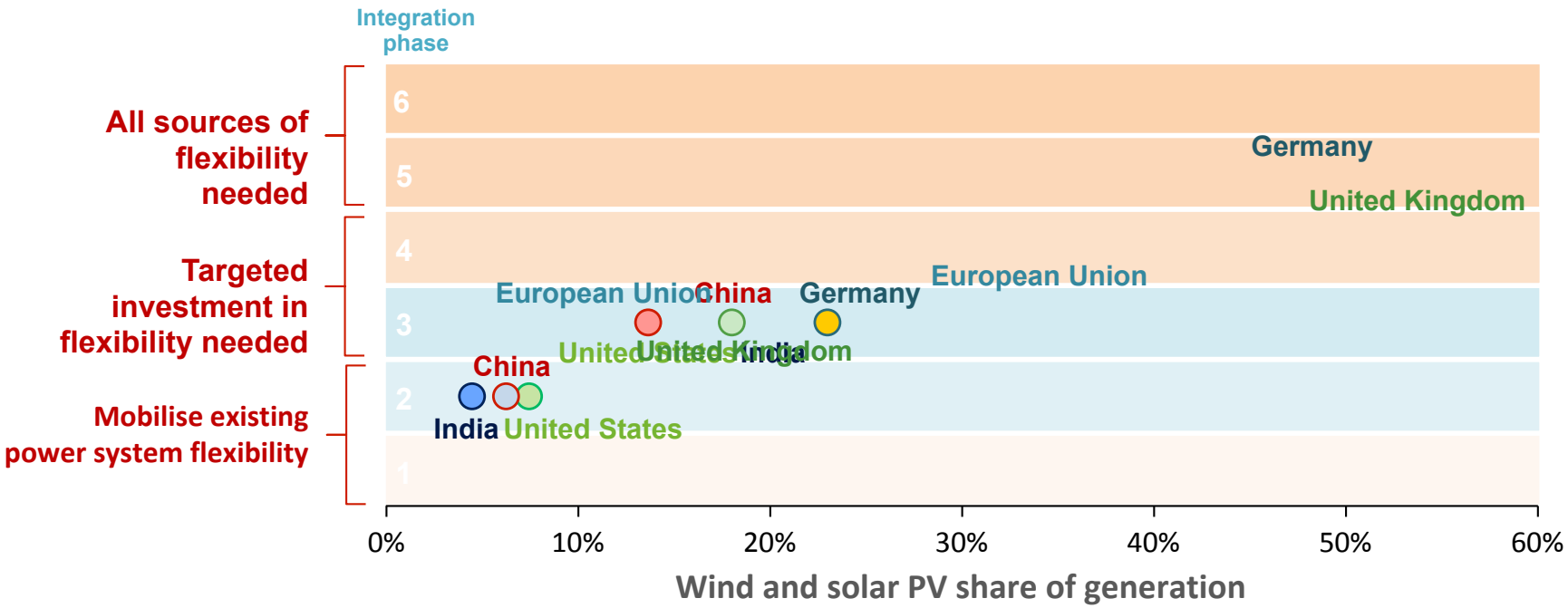
Fuelling the demand for energy



The increase in demand would be twice as large without continued improvements in energy efficiency, a powerful tool to address energy security & sustainability concerns

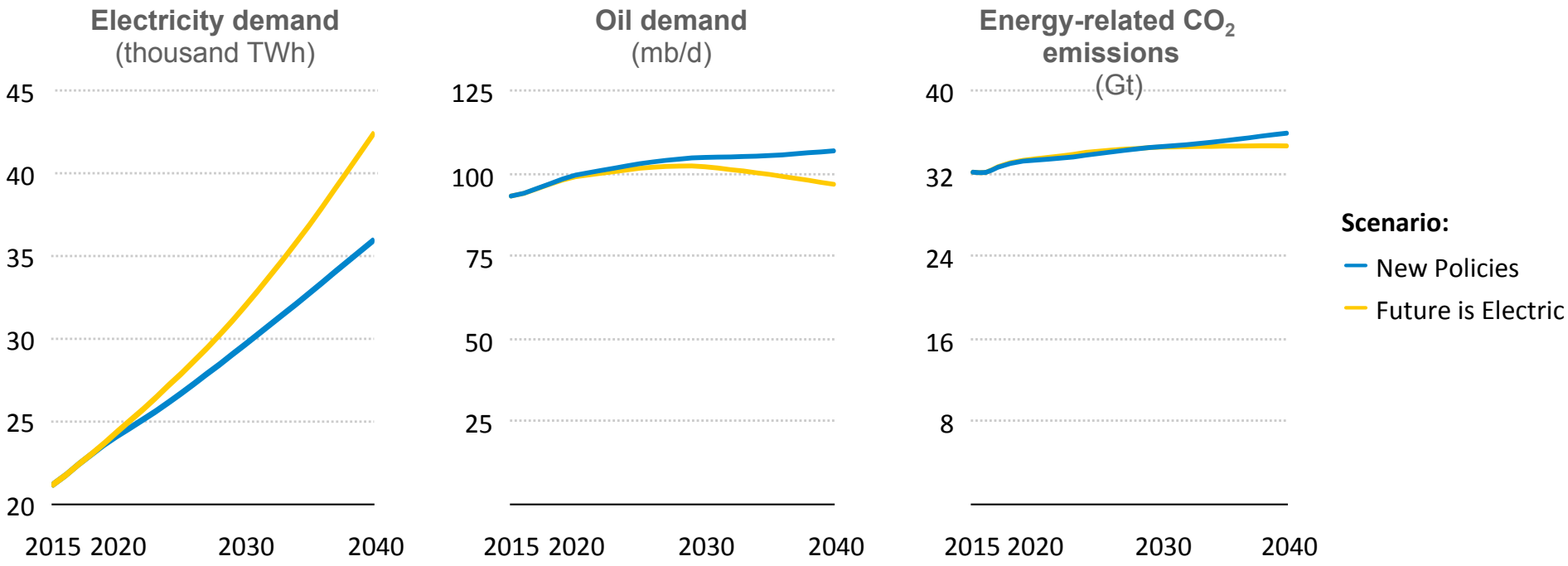
Flexibility: cornerstone of tomorrow's systems

Phases of integration with variable renewables share, 2030



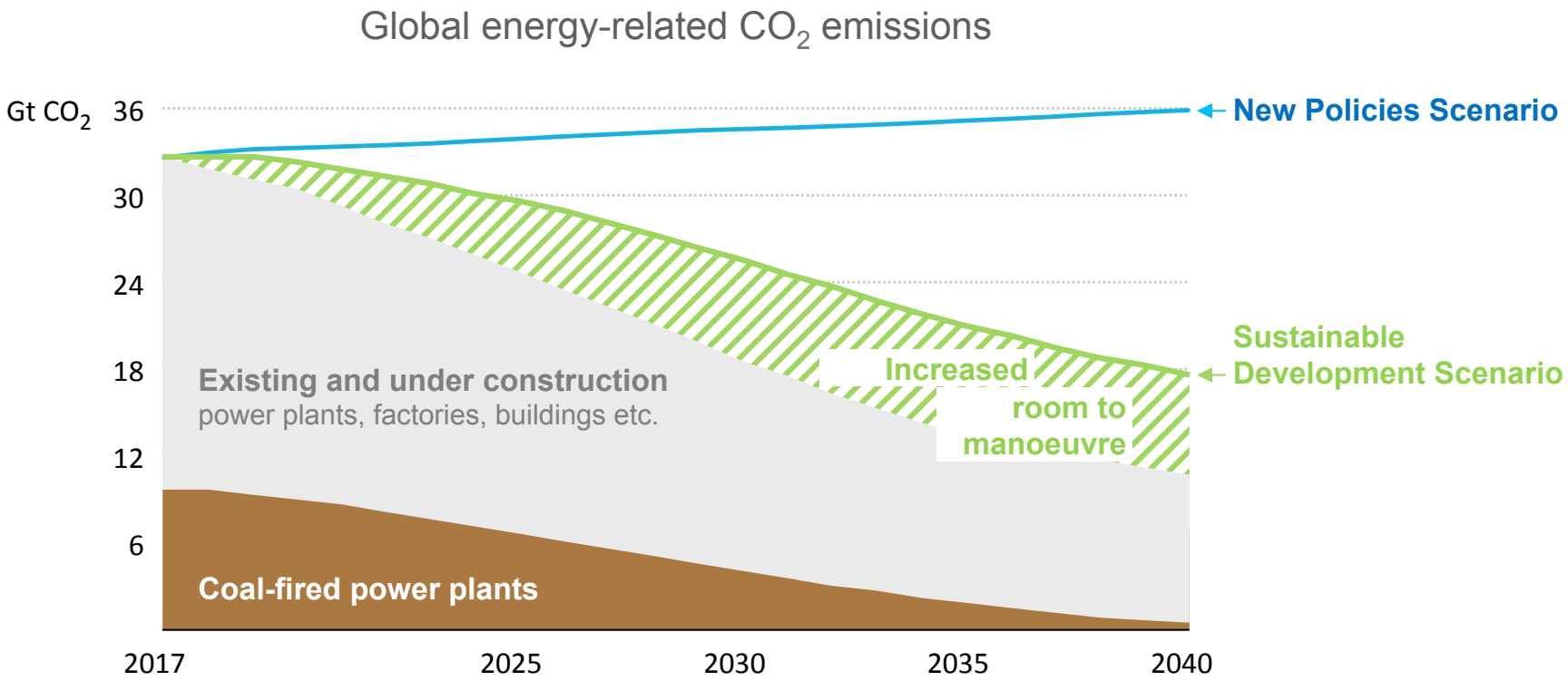
Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response

What if the future is electric?



Increased electrification leads to a peak in oil demand , avoids 2 million air pollution-related premature deaths, but does not necessarily lead to large CO_2 emissions reductions

Can we unlock a different energy future?



Coal plants make up one-third of CO_2 emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation

An Efficient World Scenario

What does a more efficient world look like?

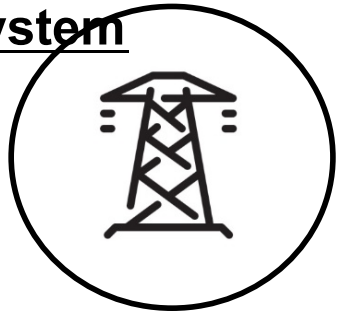
- The world is missing opportunities to improve energy efficiency, policy is not delivering the full potential gains that are available with current technology.

- What is possible with greater efforts on energy efficiency? The IEA's new Efficient World Scenario answers the question:

What would happen by 2040 if countries realised all the economically viable energy efficiency potential that is available today?

The Economy

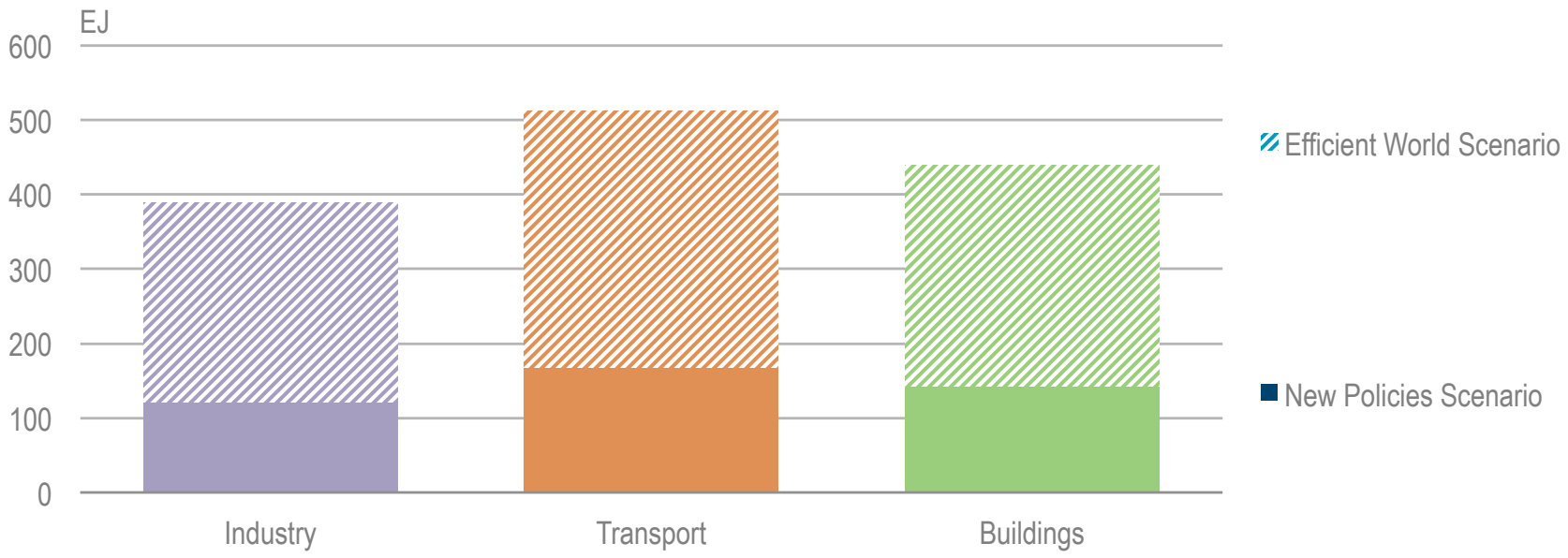
The Energy System



The Environment

There is significant cost-effective savings potential in every sector

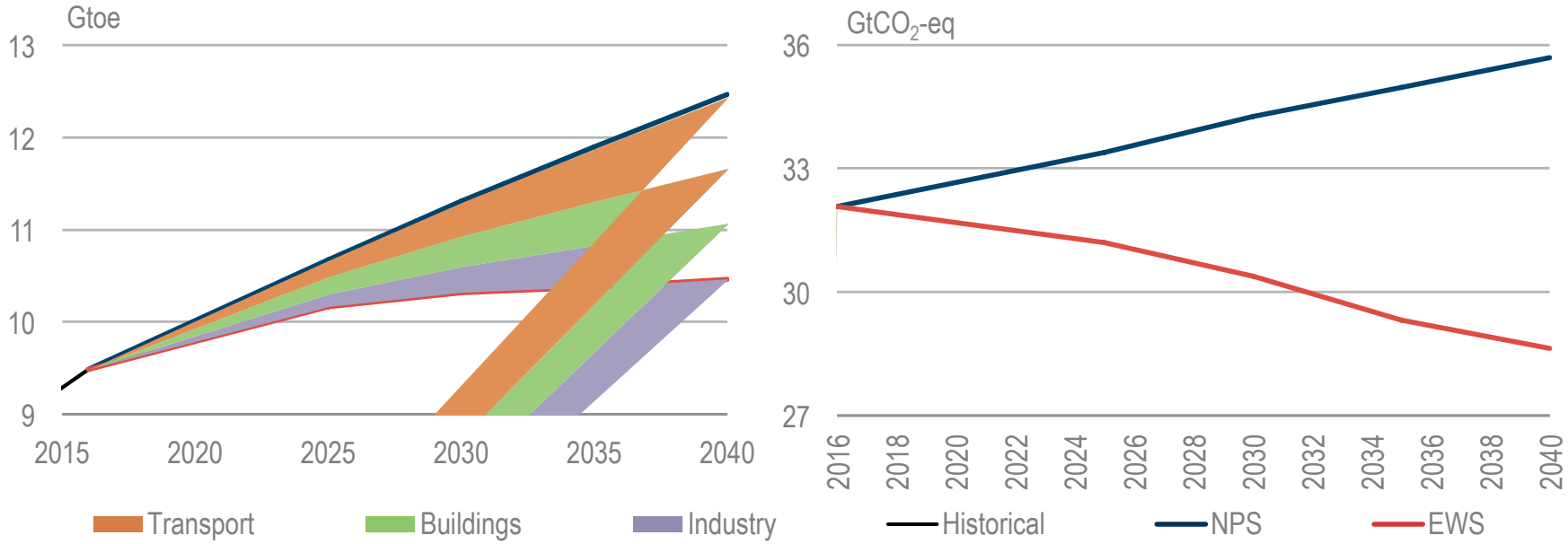
Cumulative energy savings in NPS and additional potential in the EWS to 2040



Only one third of the potential cumulative energy savings from efficiency gains by 2040 are realised in the NPS.
The majority of potential across all sectors is realised in the EWS.

Global final energy use and emissions would be vastly different

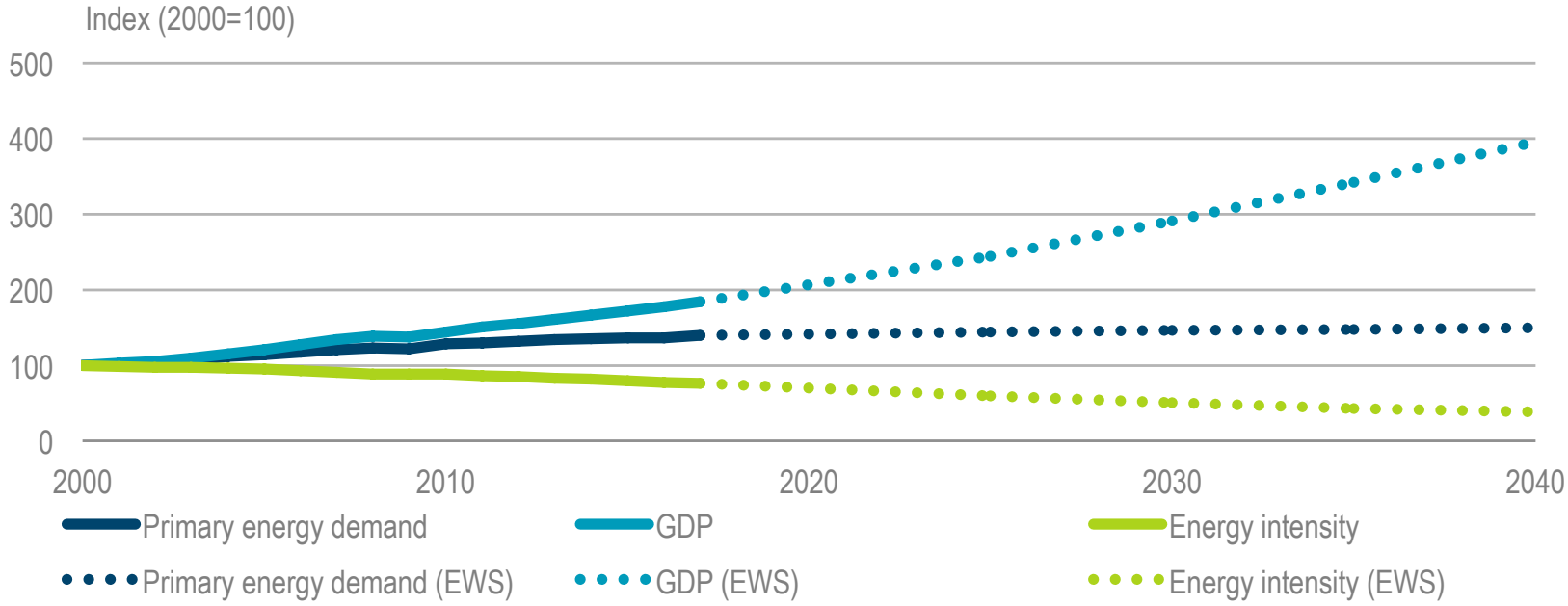
Energy use and emissions in the *Efficient World Scenario* and *New Policies Scenario*



The adoption of all cost-effective energy efficiency measures between now and 2040 could see energy use fall by 16% compared to the NPS. Emissions would fall by over 10% compared to current levels.

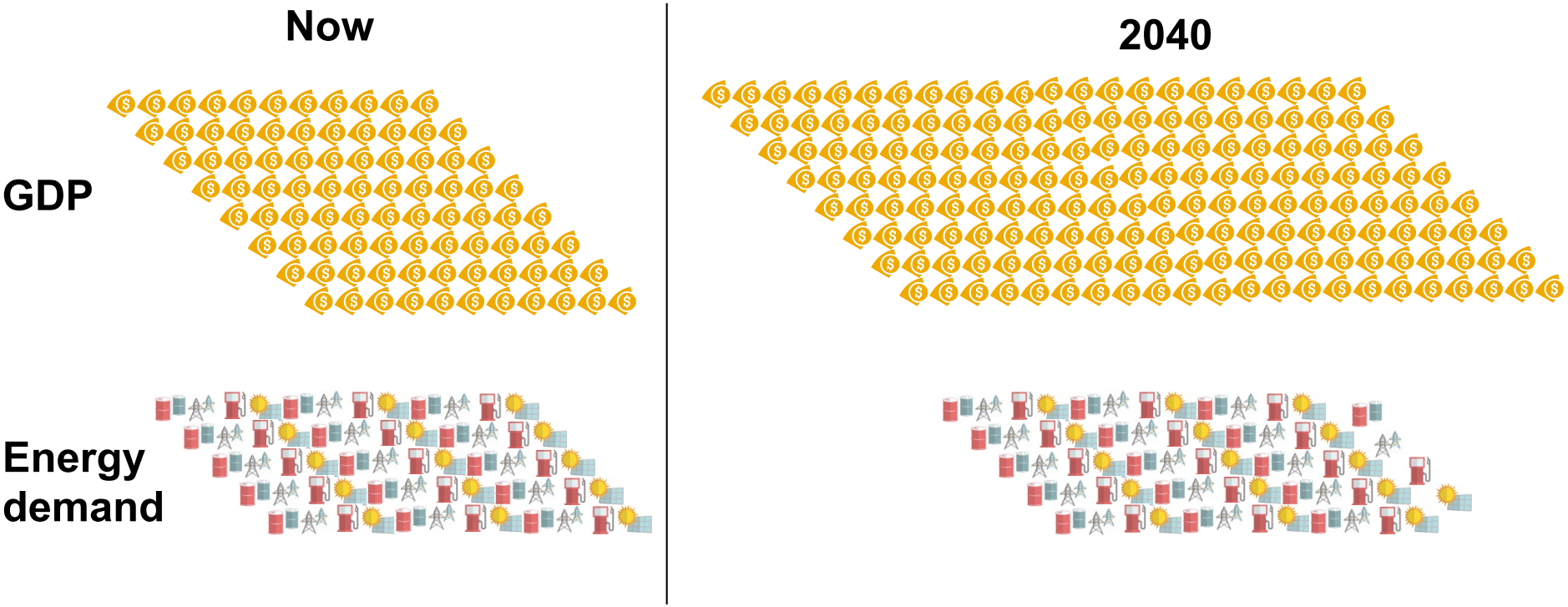
Energy intensity improvements will accelerate

Global primary energy demand, GDP and intensity, historically and in the EWS, 2000-40



In the Efficient World Scenario, energy intensity will improve by around 3% per year, a step-up from current levels, resulting in minimal increases in energy demand, despite the global economy doubling.

Doubling global GDP for a marginal increase in energy demand



Energy productivity can more than double, from USD 9000 to USD 18 000 of GDP for every tonne of oil equivalent of energy demand.

Efficiency bring benefits to all levels of the economy

USD 700 billion

Avoided energy imports in the EU, China and India

USD 600 billion

Avoided energy expenditure in industry

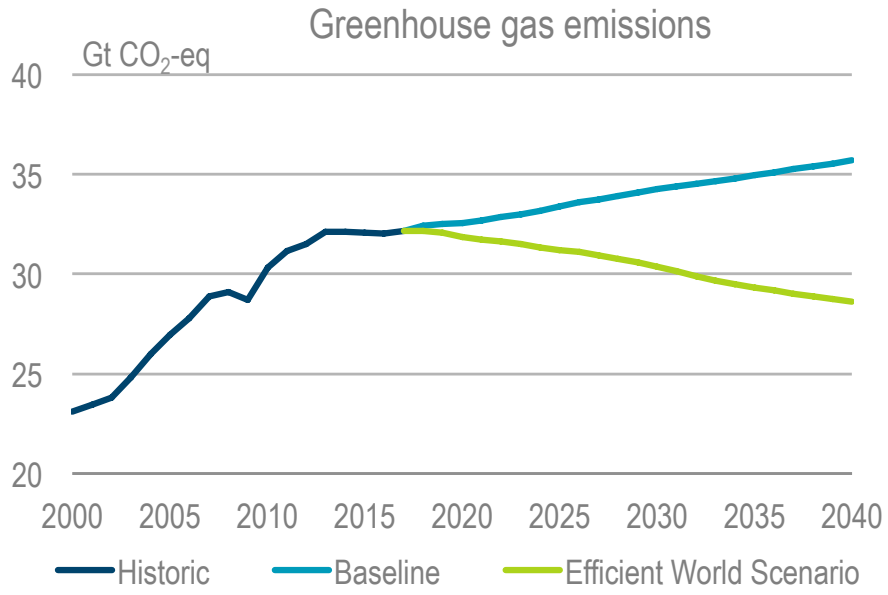
USD 550 billion

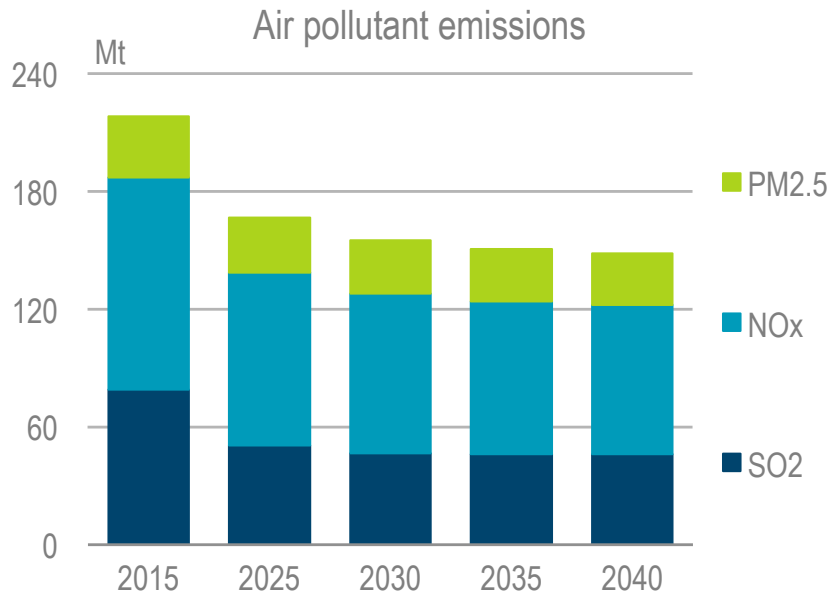
Avoided household energy spending

The Efficient World Scenario also fully delivers the energy efficiency target (Target 7.3) of the UN Sustainable Development Goals

Efficiency would deliver immediate environmental benefits

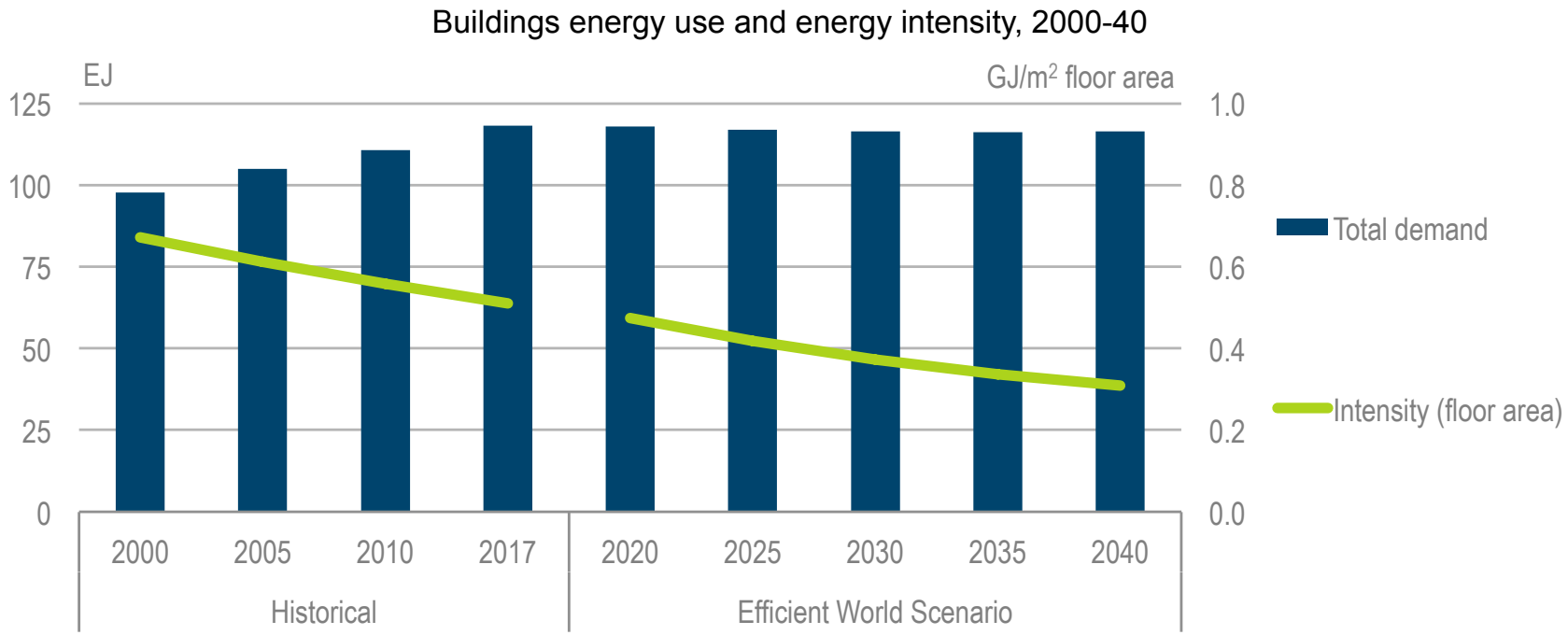
Greenhouse emissions in the NPS and EWS, 2000-40 (left) and air pollutant emissions in the EWS, 2015-40 (right)





The EWS results in an early emissions peak and over 40% of the abatement required by 2040 to be in line with Paris targets. Energy efficiency is essential to achieving global climate targets.

Buildings energy intensity has been improving



Buildings energy use has been rising, but could stay flat to 2040, despite 60% more floor space. Buildings energy intensity has been improving at 1.6% per year, but this could be 2.2% per year.

The IEA's Efficient World Strategy shows where policy action must focus

	The EWS opportunity	Key policy actions
Transport	• Energy demand could stay flat, despite doubling activity levels. • Passenger cars and trucks offer two-thirds of potential savings.	• Stronger and broader policies for cars and trucks and non-road modes. • Provide incentives to support uptake and sustainable use of efficient vehicles.
Buildings	• Building space could increase by 60% for no additional energy use. • Space heating, cooling and water heating offer 60% of savings.	• Efficiency policies, targeting both new and existing building stock and appliances. • Incentives to encourage adoption of efficient appliances and deep energy retrofits.
Industry	• Value-added per unit of energy could double. • Less energy-intensive industry offers 70% of potential savings.	• Standards for key industrial equipment, including electric heat pumps and motors. • Incentives to encourage the adoption of energy management systems.

Concluding remarks

- Global energy demand rose by nearly 2% in 2017, and CO_2 emissions rose by 1.4% after three years of being flat.
- The IEA EWS shows a 2040 world with double GDP, 20% more people and 60% more building space, with lower emissions than today
- Efficiency can reduce air pollution, imports and consumer bills, and EWS maps out the path to delivering the UN SDG on energy efficiency
- The efficiency opportunities are cost-effective and use only technology available today, but require a significant step up in policy action
- Investments need to double now and double again after 2025, but these investments will payback threefold on energy savings alone
- There are good examples today of all the policies required for tomorrow. These form the basis for increased ambition and impact.

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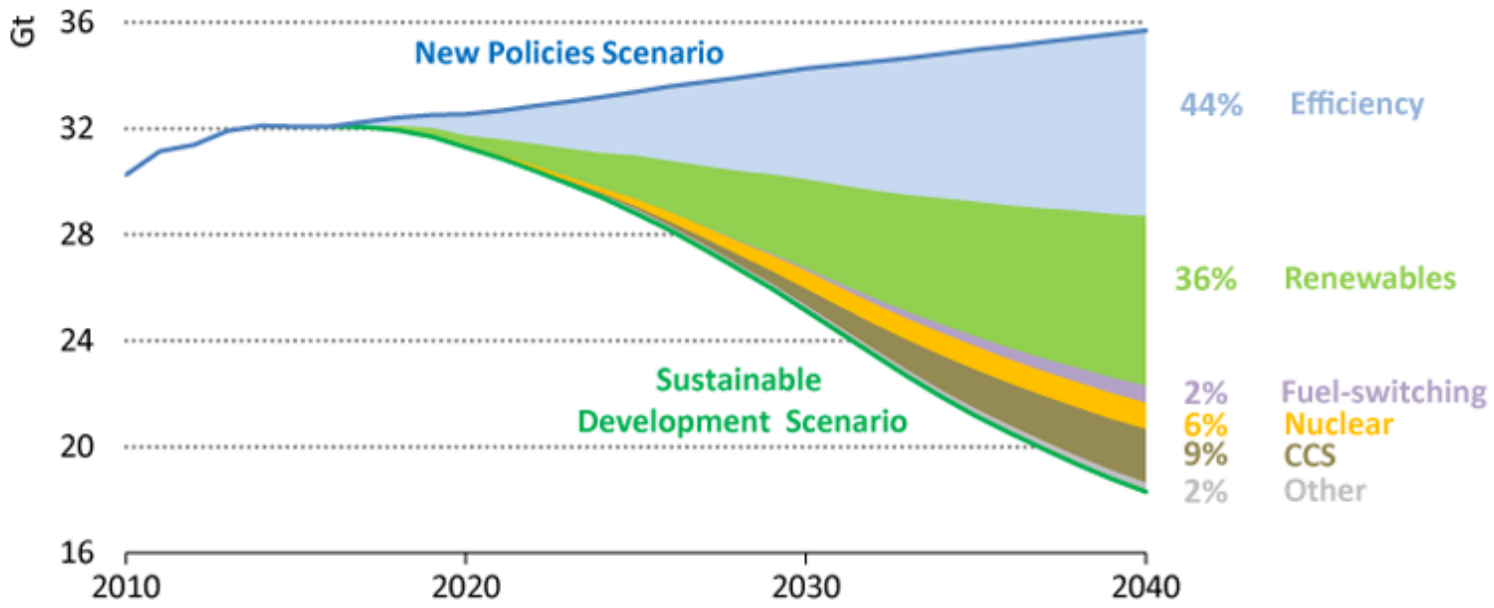
The EWS is the efficiency component of the SDS scenario (2017)

Emissions in the *New Policies Scenario and Sustainable Development Scenario*

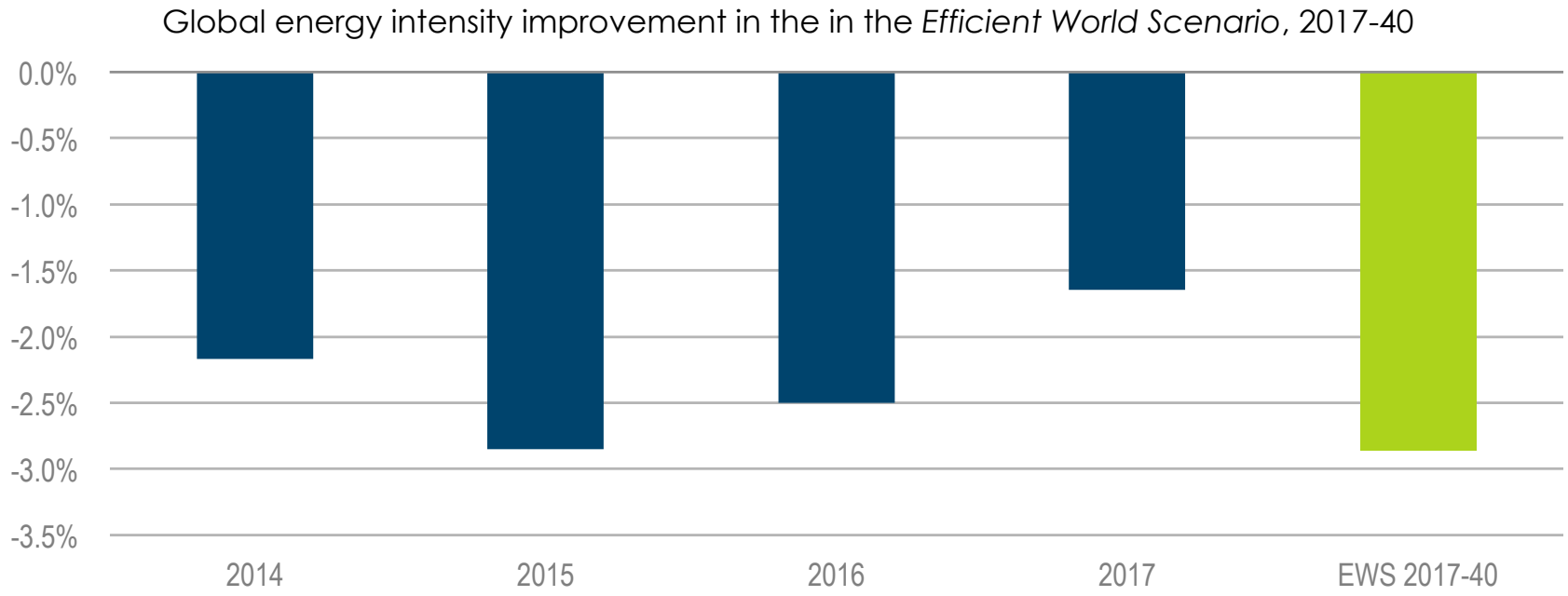


Energy efficiency and renewables account for 80% of the cumulative CO2 emission reduction in the SDS

Key messages

- Global energy demand rose by nearly 2% in 2017, and CO_2 emissions rose by 1.4% after three years of being flat.
- Energy efficiency improvements are enhancing productivity and reducing emissions, but policy action is weakening.
- Expectation is increasing global energy consumption and emissions
- The Efficient World Scenario sees global GDP double between now and 2040 with emissions lower than today, and large savings in air pollution and energy costs.
- The IEA sets out an Efficient World Strategy that, through cost-effective measures and available technologies, unlocks the untapped potential for energy efficiency.

A lot of energy efficiency potential remains untapped



The IEA's new *Efficient World Scenario* shows that global energy intensity improvements could average 2.9% per year to 2040, a 75% increase on levels observed in 2017.