

***World Energy Outlook 2011:  
what role for technologies ?***

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***Paris, 6 December 2011***

# *The context: fresh challenges add to already worrying trends*

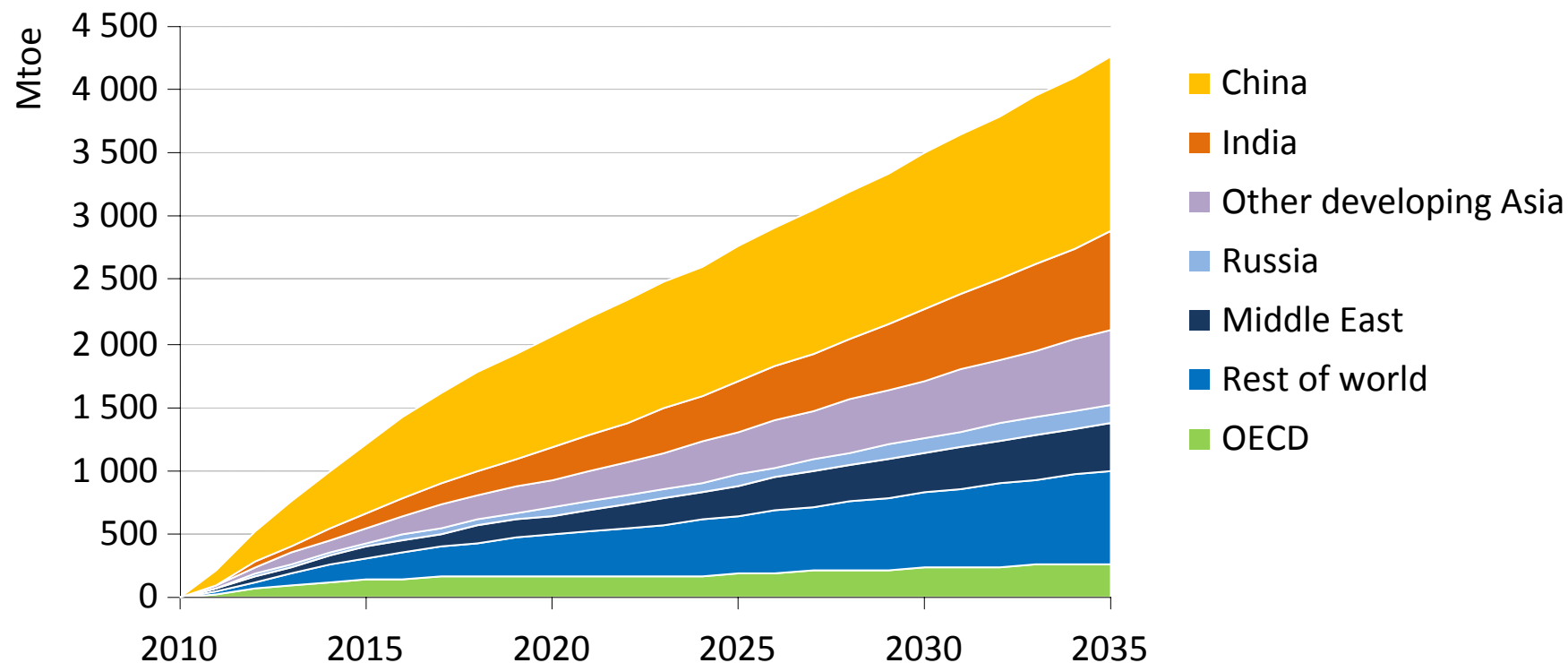
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- Economic concerns have diverted attention from energy policy and limited the means of intervention
- Post-Fukushima, nuclear is facing uncertainty
- MENA turmoil raised questions about region's investment plans
- Some key trends are pointing in worrying directions:
  - *CO<sub>2</sub> emissions rebounded to a record high*
  - *energy efficiency of global economy worsened for 2<sup>nd</sup> straight year*
  - *spending on oil imports is near record highs*

# Emerging economies continue to drive global energy demand

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## Growth in primary energy demand

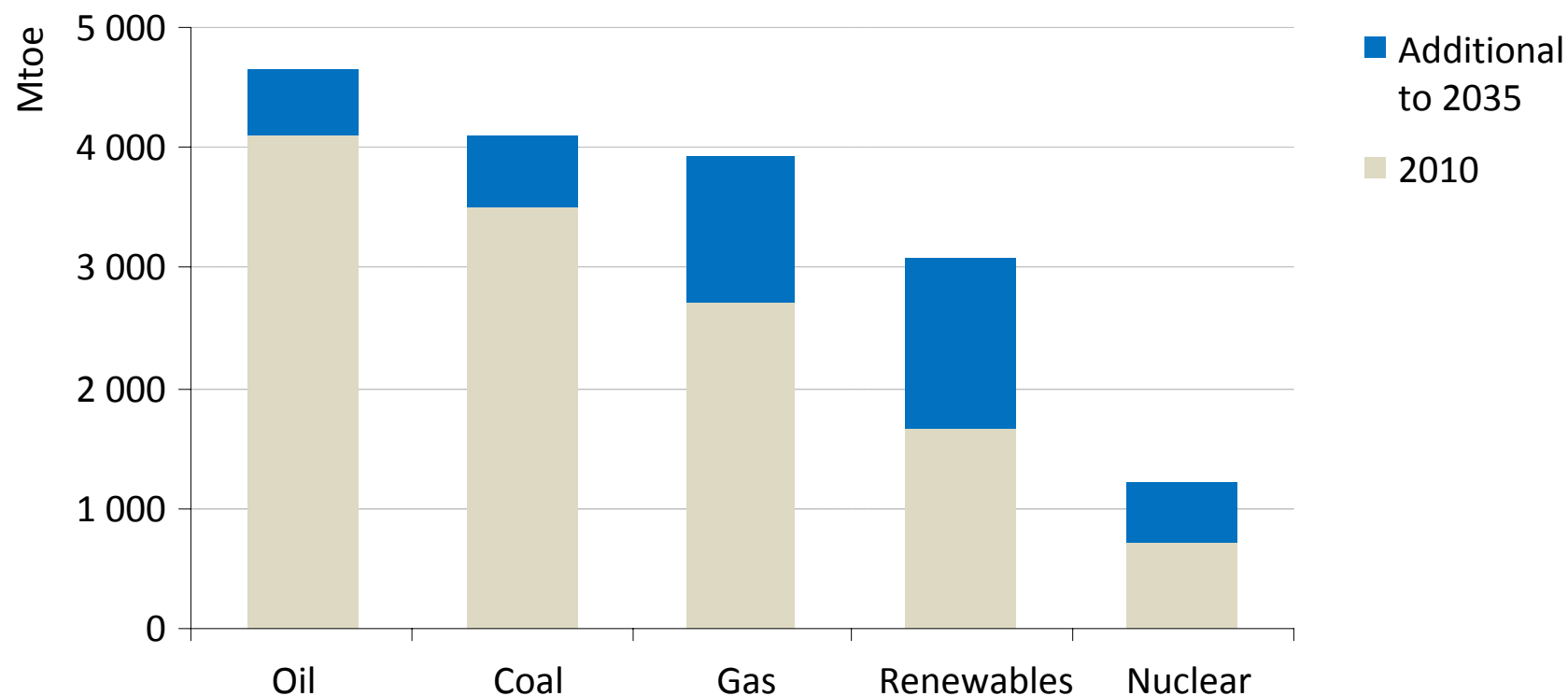


**Global energy demand increases by one-third from 2010 to 2035, with China & India accounting for 50% of the growth**

# Natural gas & renewables become increasingly important

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### World primary energy demand

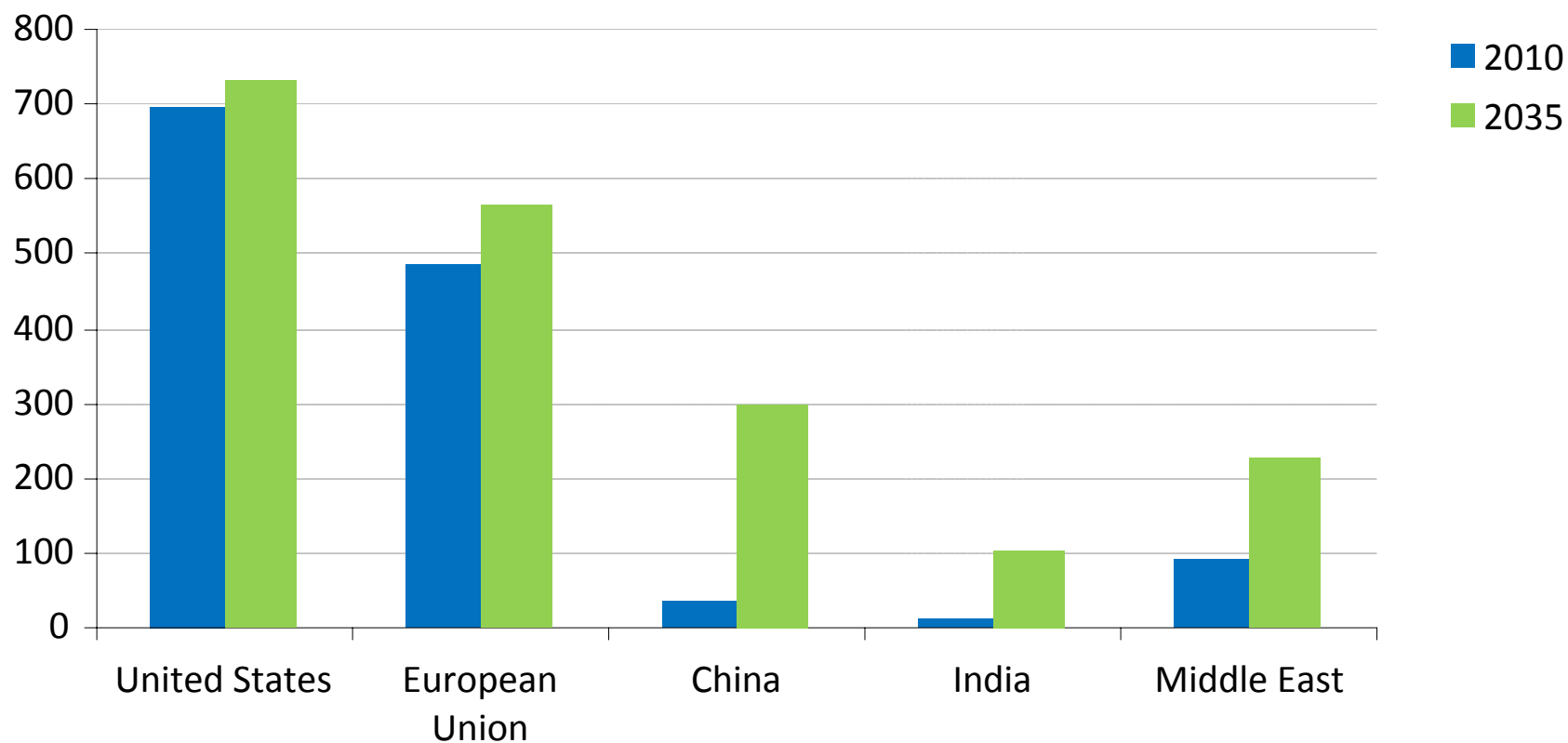


**Renewables & natural gas collectively meet almost two-thirds of incremental energy demand in 2010-2035**

*Oil demand is driven higher  
by soaring car ownership*

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Vehicles per 1000 people in selected markets

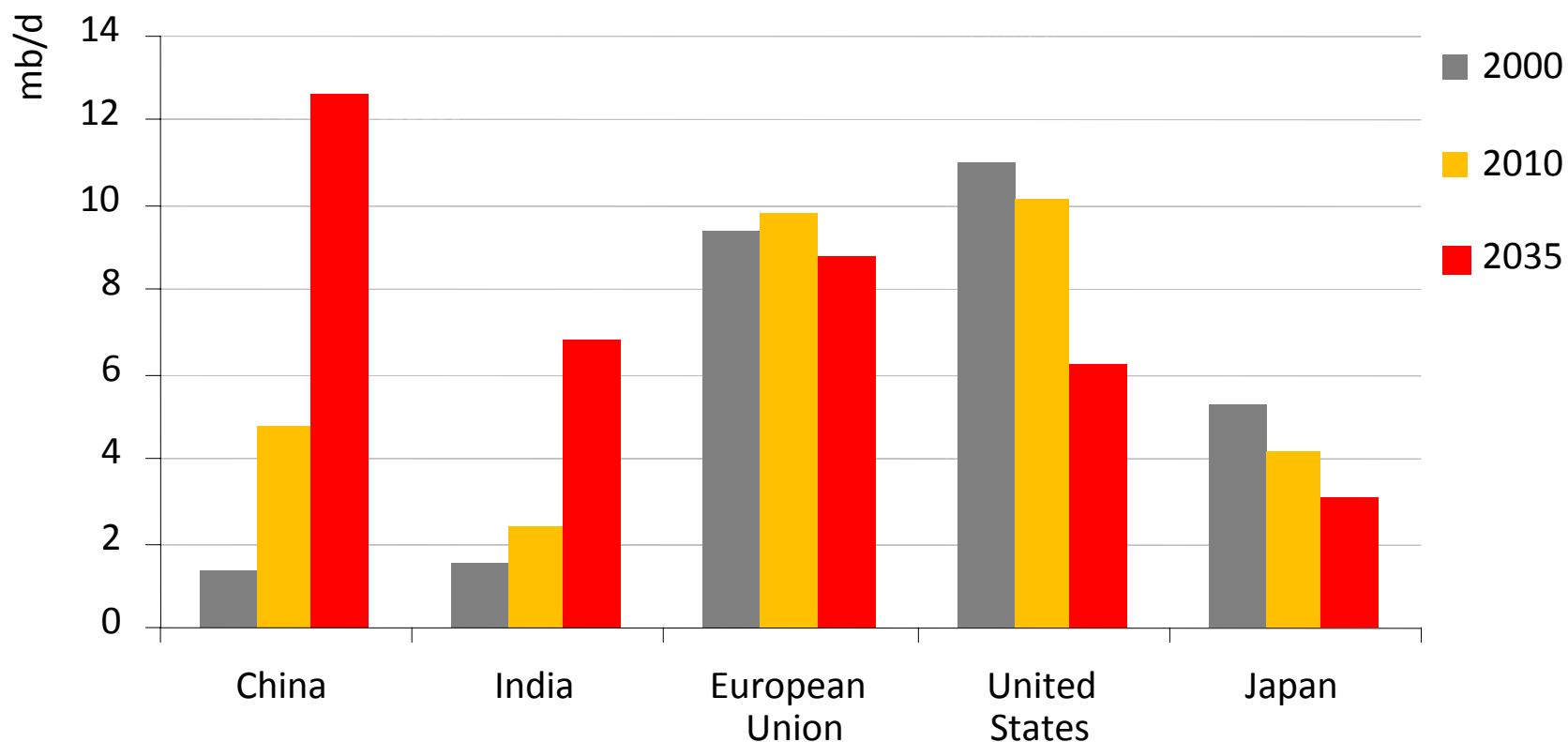


*The passenger vehicle fleet doubles to 1.7 billion in 2035; most cars are sold outside the OECD by 2020, making non-OECD policies key to global oil demand*

# Changing oil import needs are set to shift concerns about oil security

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## Net imports of oil

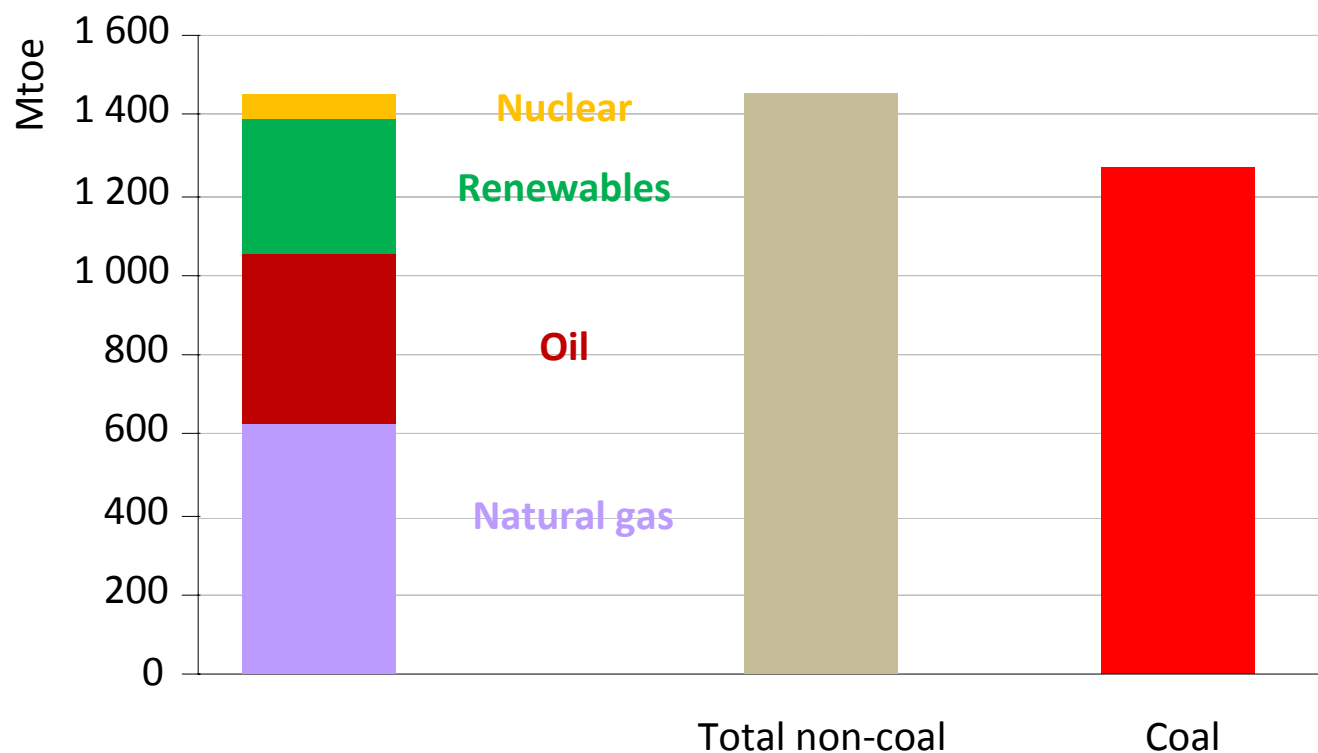


**US oil imports drop due to rising domestic output & improved transport efficiency: EU imports overtake those of the US around 2015; China becomes the largest importer around 2020**

# Coal won the energy race in the first decade of the 21st century

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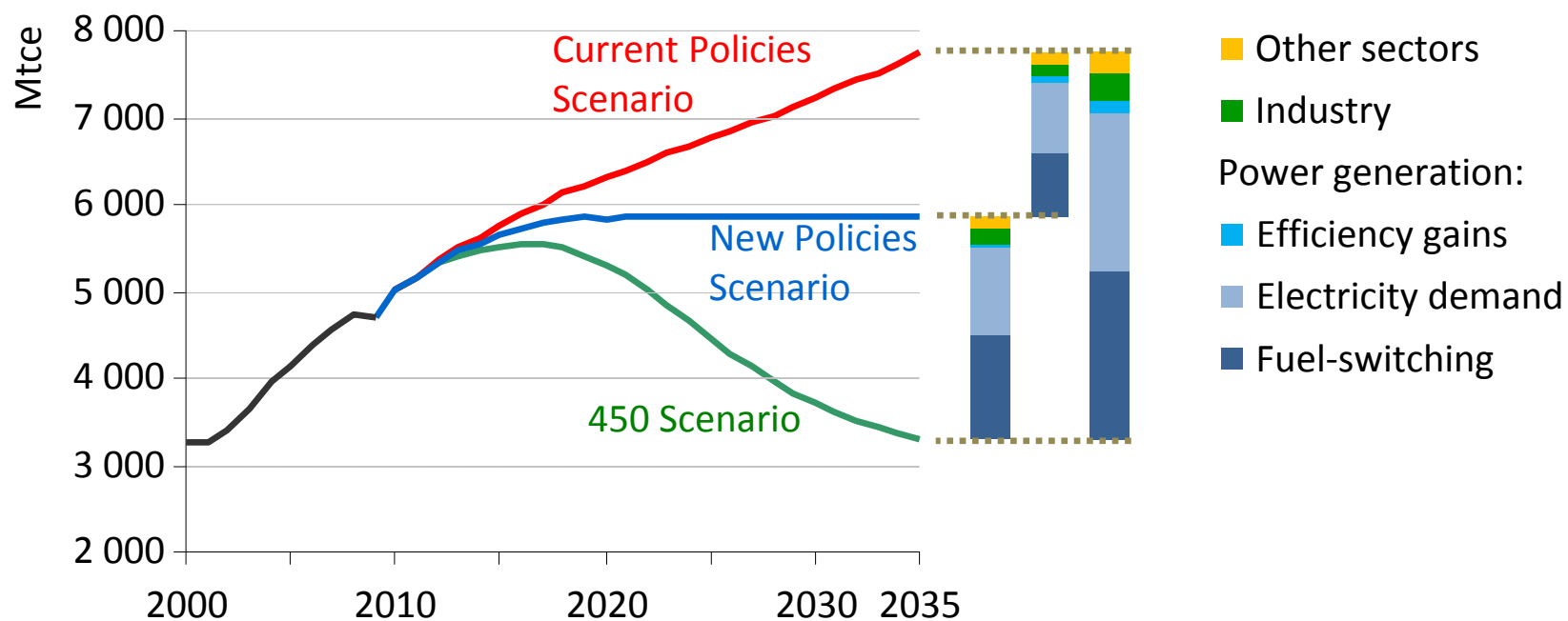
Growth in global energy demand, 2000-2010



**Coal accounted for nearly half of the increase in global energy use over the past decade, with the bulk of the growth coming from the power sector in emerging economies**

# But coal is now at a crossroads

### World primary coal demand by sector and scenario



**Coal demand prospects depend critically on government energy and environmental policies, mainly through their impact on fuel & technology choices in power generation**



# *Second thoughts on nuclear would have far-reaching consequences*

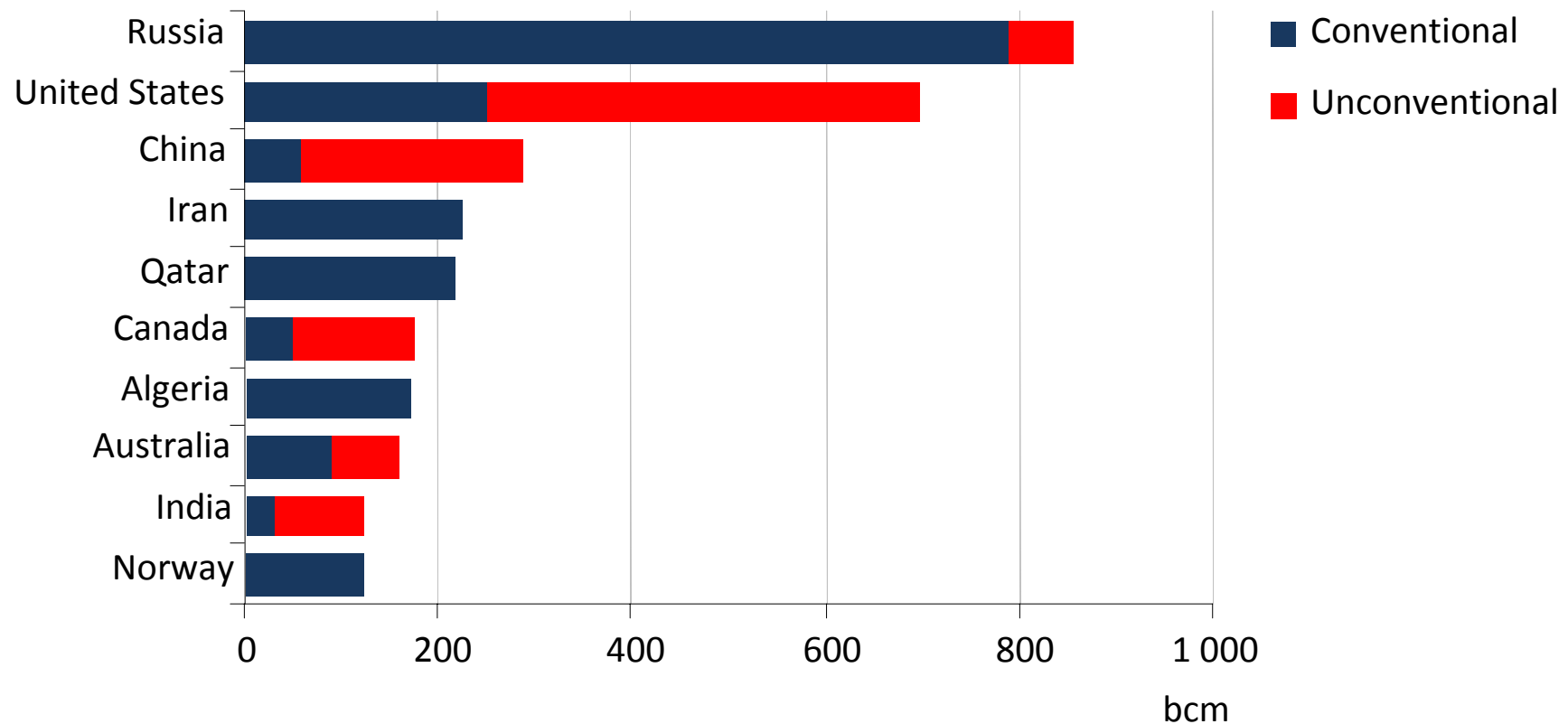
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- **“Low Nuclear Case” examines impact of nuclear component of future energy supply being cut in half**
- **Gives a boost to renewables, but increases import bills, reduces diversity & makes it harder to combat climate change**
- **By 2035, compared with the New Policies Scenario:**
  - *coal demand increases by twice Australia’s steam coal exports*
  - *natural gas demand increases by two-thirds Russia’s natural gas net exports*
  - *power- sector CO<sub>2</sub> emissions increase by 6.2%*
- **Biggest implications are for countries with limited energy resources that planned to rely on nuclear power**

# Golden prospects for natural gas

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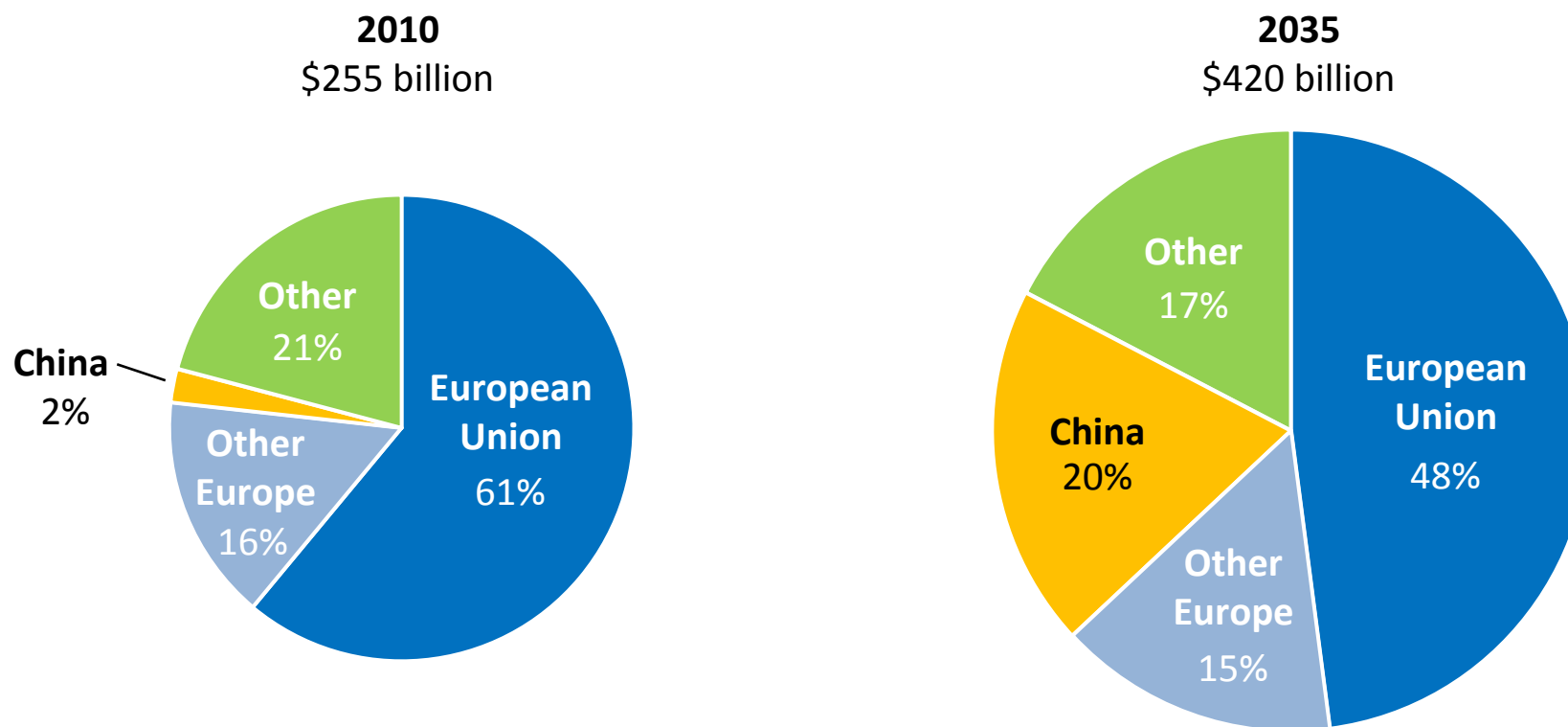
### Largest natural gas producers in 2035



**Unconventional natural gas supplies 40% of the 1.7 tcm increase in global supply, but best practices are essential to successfully address environmental challenges**

# Diversity of Russian export markets brings diversity of revenue

## Russian revenue from fossil fuel exports

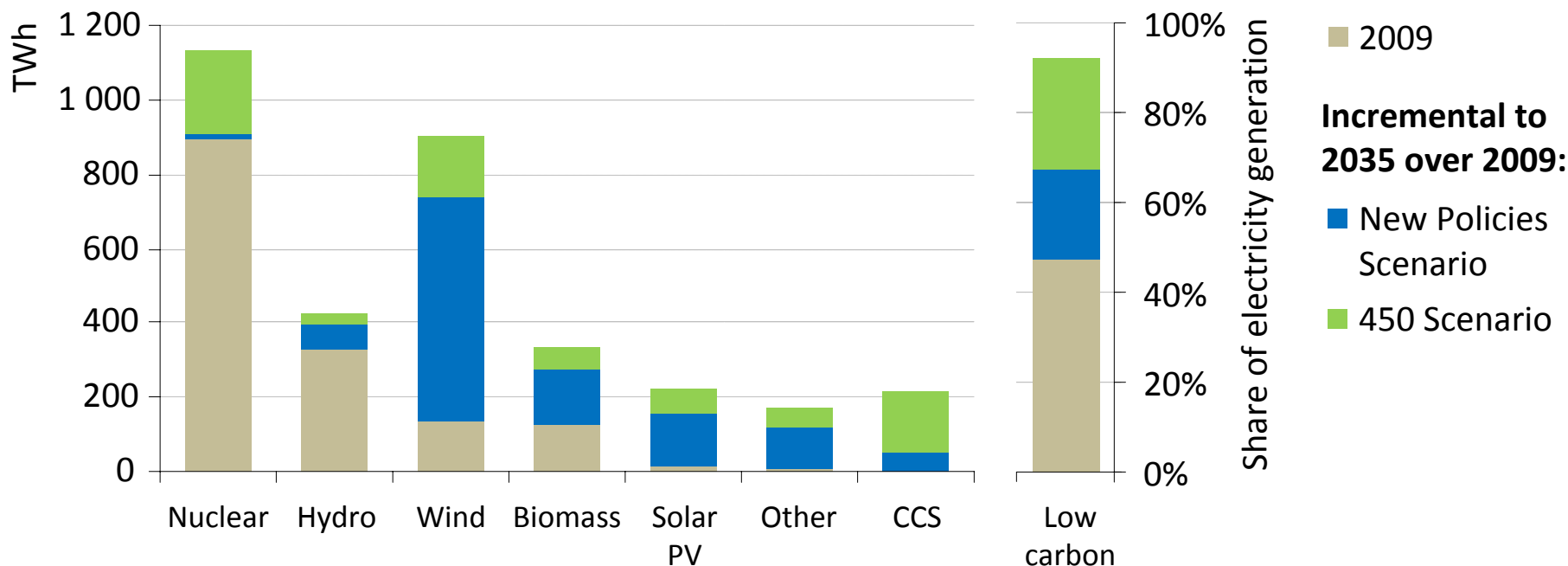


*An increasing share of Russian exports go eastwards to Asia, providing Russia with diversity of markets and revenues*

# EU moving towards cleaner forms of electricity generation

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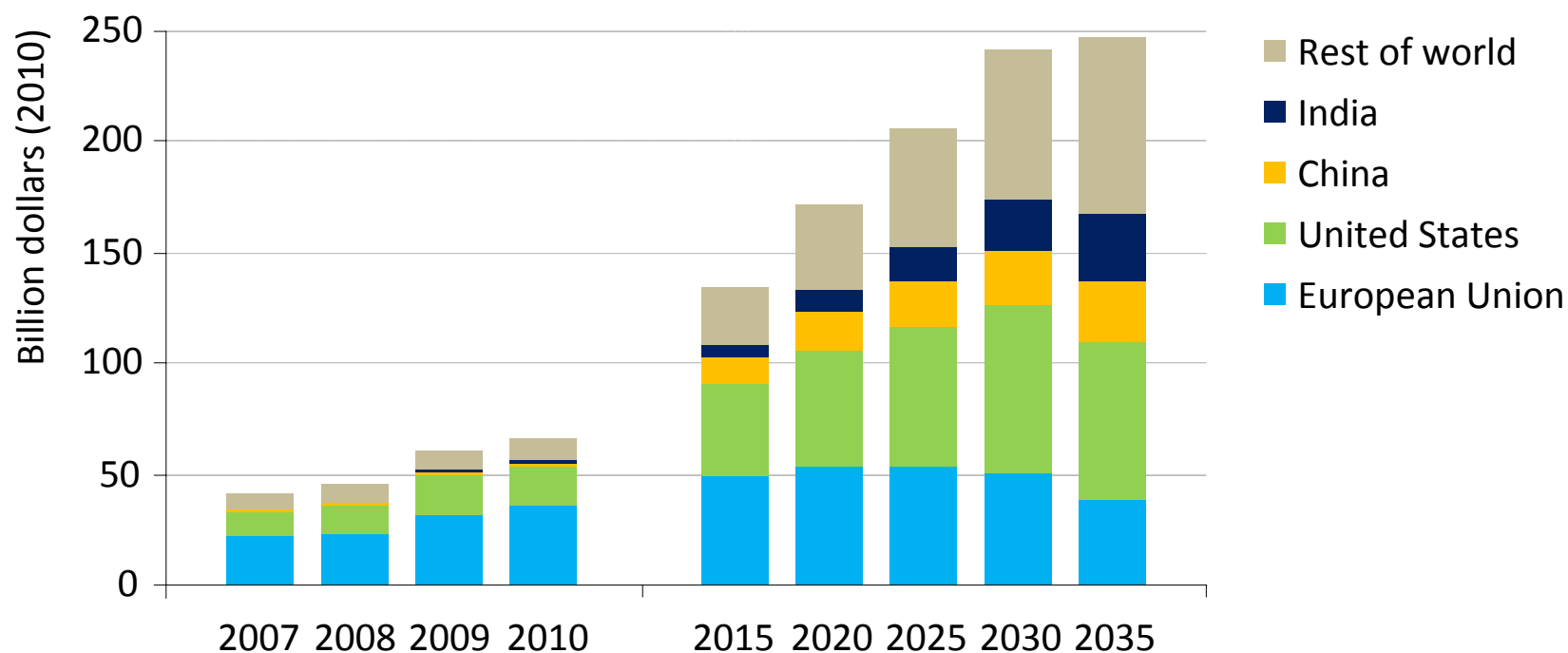
Electricity generation by selected low carbon technology & share of generation by scenario in the European Union, 2009 & 2035



**Wind spearheads the low-carbon growth between 2009 & 2035 in the New Policies Scenario but nuclear and CSS also play an important role in meeting the 2° goal**

# The value of EU renewable subsidies set to peak in the 2020s

Global subsidies to renewables-based electricity & biofuels by region in the New Policies Scenario

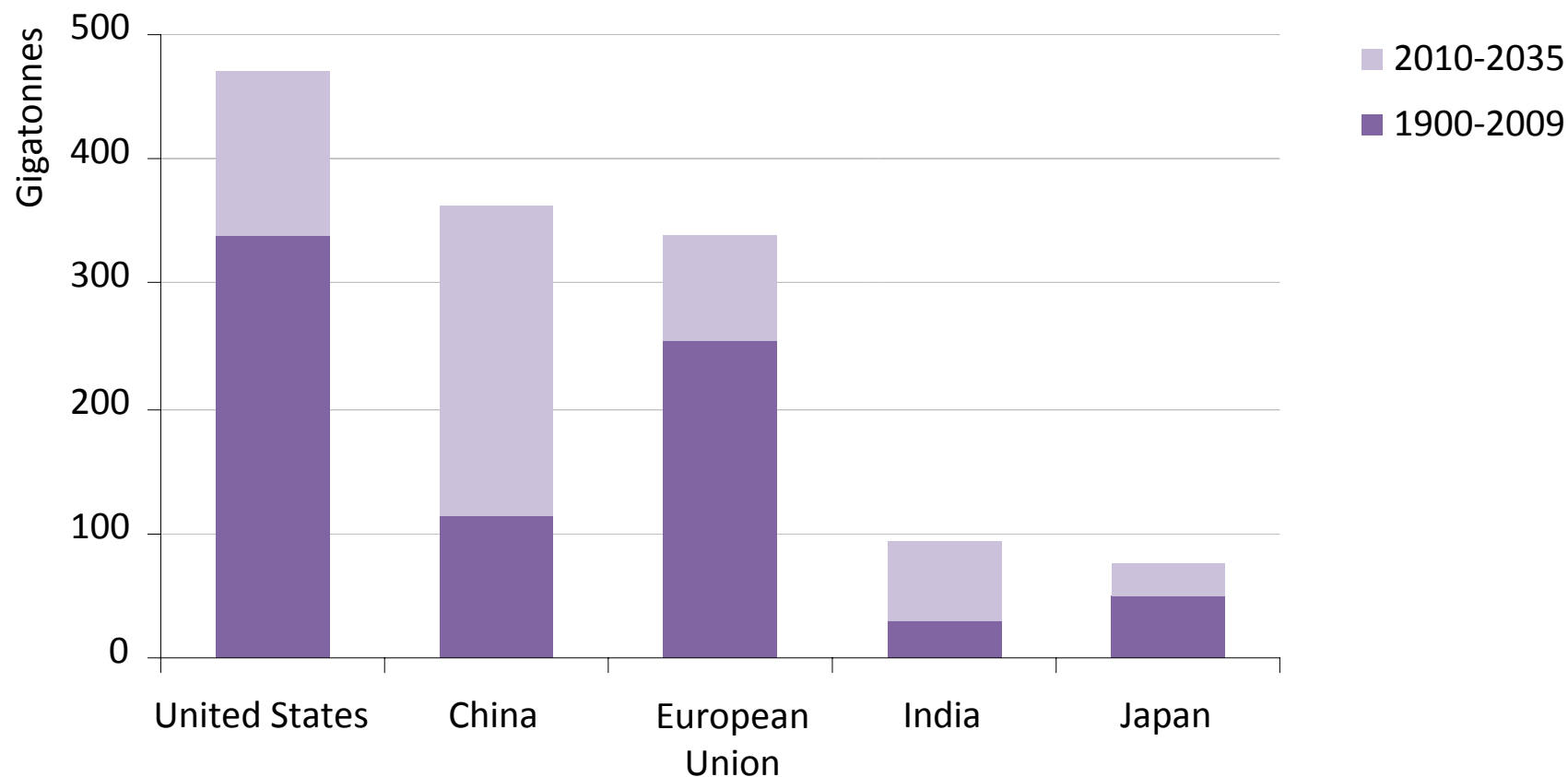


**Global renewable subsidies grow from \$66 billion in 2010 to \$250 billion in 2035, while they peak after 2025 in the EU thanks to increasing fuel & carbon prices and technological learning**

# Energy is at the heart of the climate challenge

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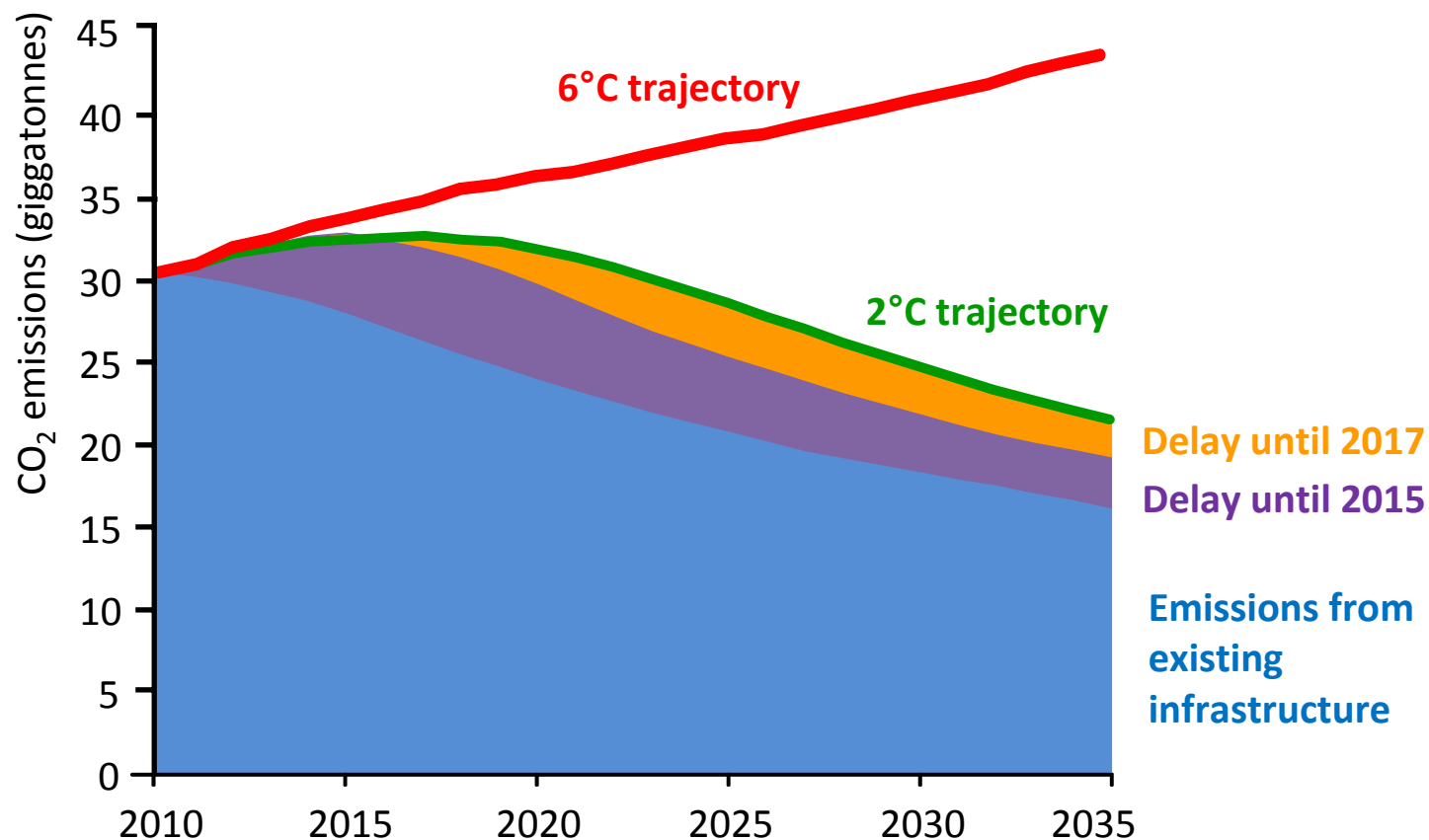
### Cumulative energy-related CO<sub>2</sub> emissions in selected regions



**By 2035, cumulative CO<sub>2</sub> emissions from today exceed three-quarters of the total since 1900, and China's per-capita emissions match the OECD average**

*The door to 2°C is closing,  
but will we be “locked-in” ?*

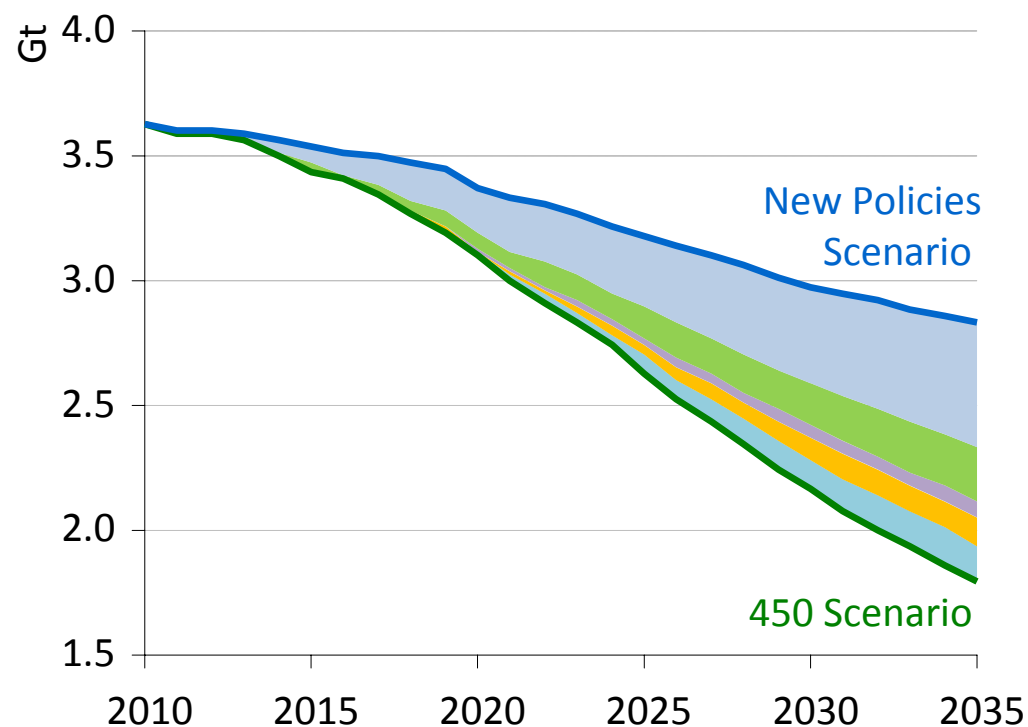
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*Without further action, by 2017 all CO<sub>2</sub> emissions permitted in the 450 Scenario will be “locked-in” by existing power plants, factories, buildings, etc*

# Efficiency gains can contribute most to EU emissions reductions

European Union energy-related CO<sub>2</sub> emissions abatement in the 450 Scenario relative to the New Policies Scenario



	Abatement	
	2020	2035
Efficiency	68%	48%
Renewables	25%	21%
Biofuels	2%	6%
Nuclear	1%	11%
CCS	3%	14%
<b>Total (Mt CO<sub>2</sub>)</b>	<b>269</b>	<b>1032</b>

**Energy efficiency measures – driven by strong policy action across all sectors – account for 50% of the cumulative CO<sub>2</sub> abatement over the Outlook period**



## *Implications for the EU*

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- In a world full of uncertainty, one thing is sure: rising incomes & population will push energy needs higher
- EU is already the largest importer of natural gas; a competitive, integrated market remains the best bet for gas security.
- EU becomes the largest oil importer around 2015 (until overtaken by China in the 2020), a shift with clear geopolitical implications
- Power sector investment will become increasingly capital intensive with the rising share of renewables
- Steps in the right direction, but the door to 2°C is closing