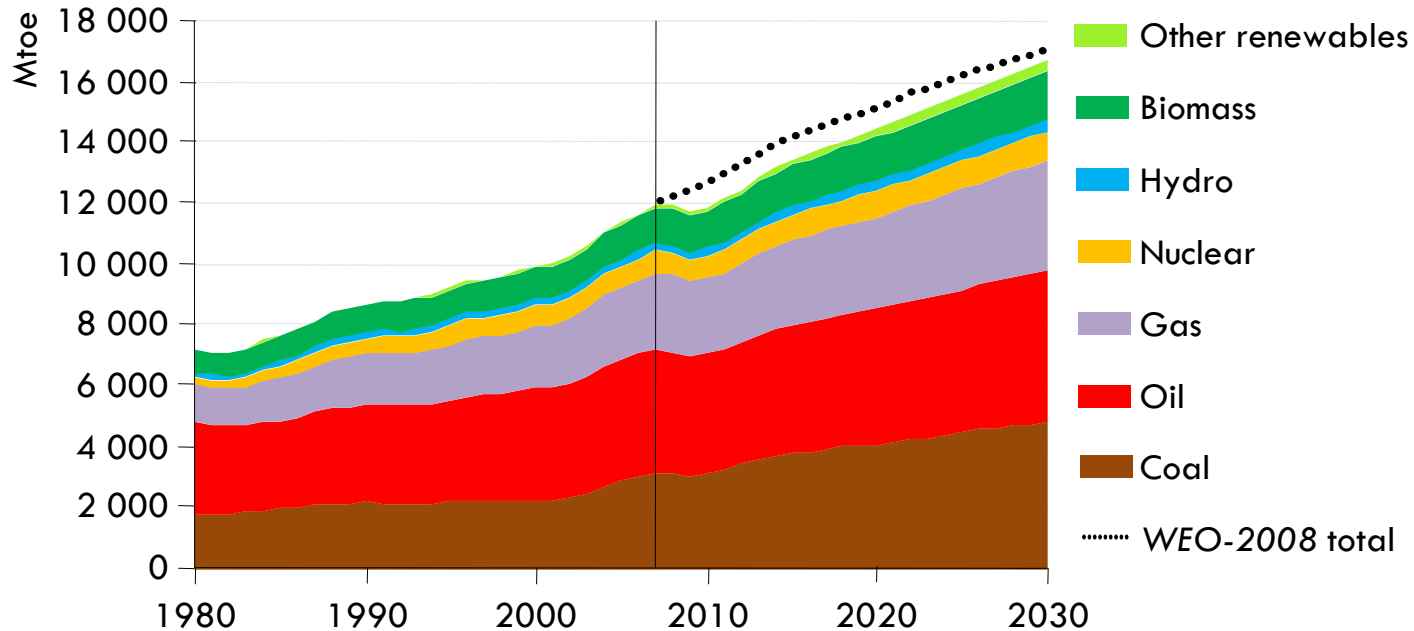




UNCERTAINTY AND OPPORTUNITY IN A CHANGING ENERGY LANDSCAPE

Nobuo Tanaka
Executive Director, International Energy Agency
Brussels , 18 March 2010

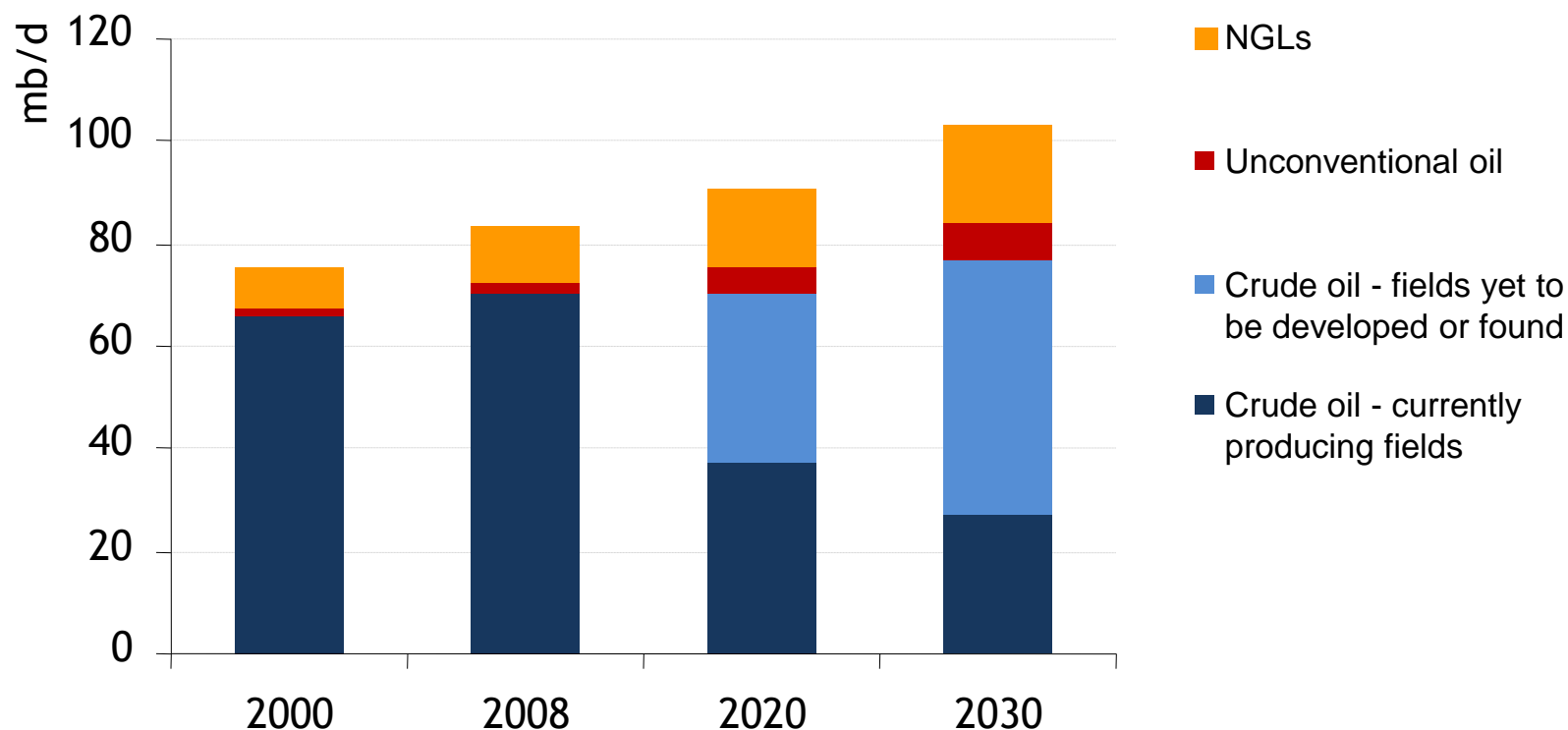
World primary energy demand in the Reference Scenario



Source: World Energy Outlook 2009

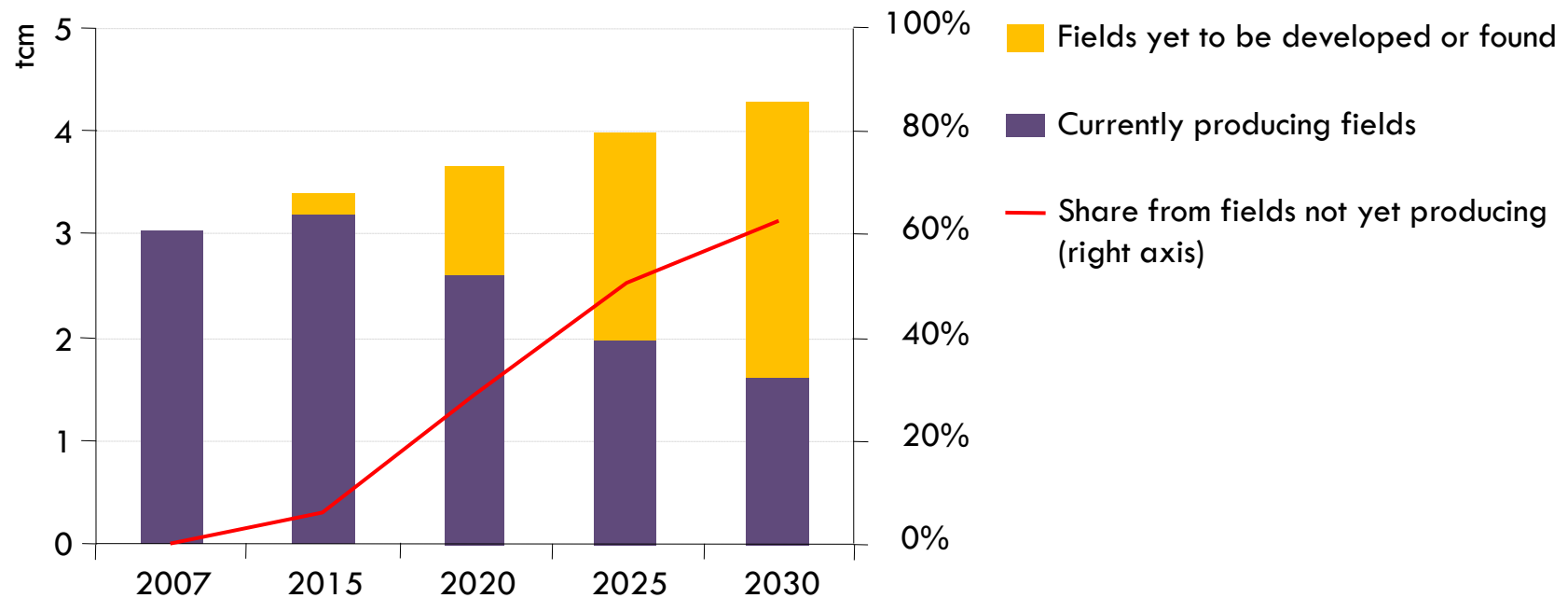
**Global energy demand grows by average 1.5% p.a. to 2030;
22% more oil, 42% more gas, 53% more coal than today**

Oil production in the Reference Scenario



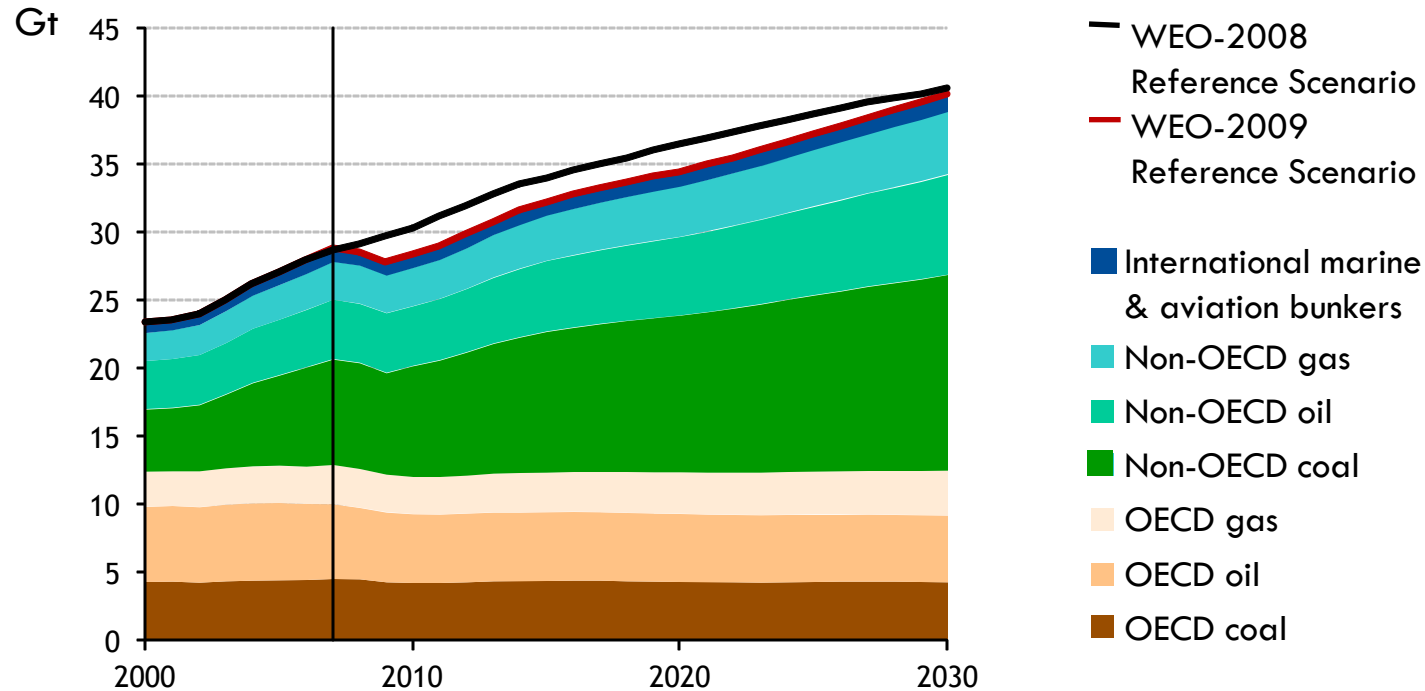
■ *Sustained investment is needed mainly to combat the decline in output at existing fields, which will drop by almost two-thirds by 2030*

Impact of decline on world natural gas production in the Reference Scenario



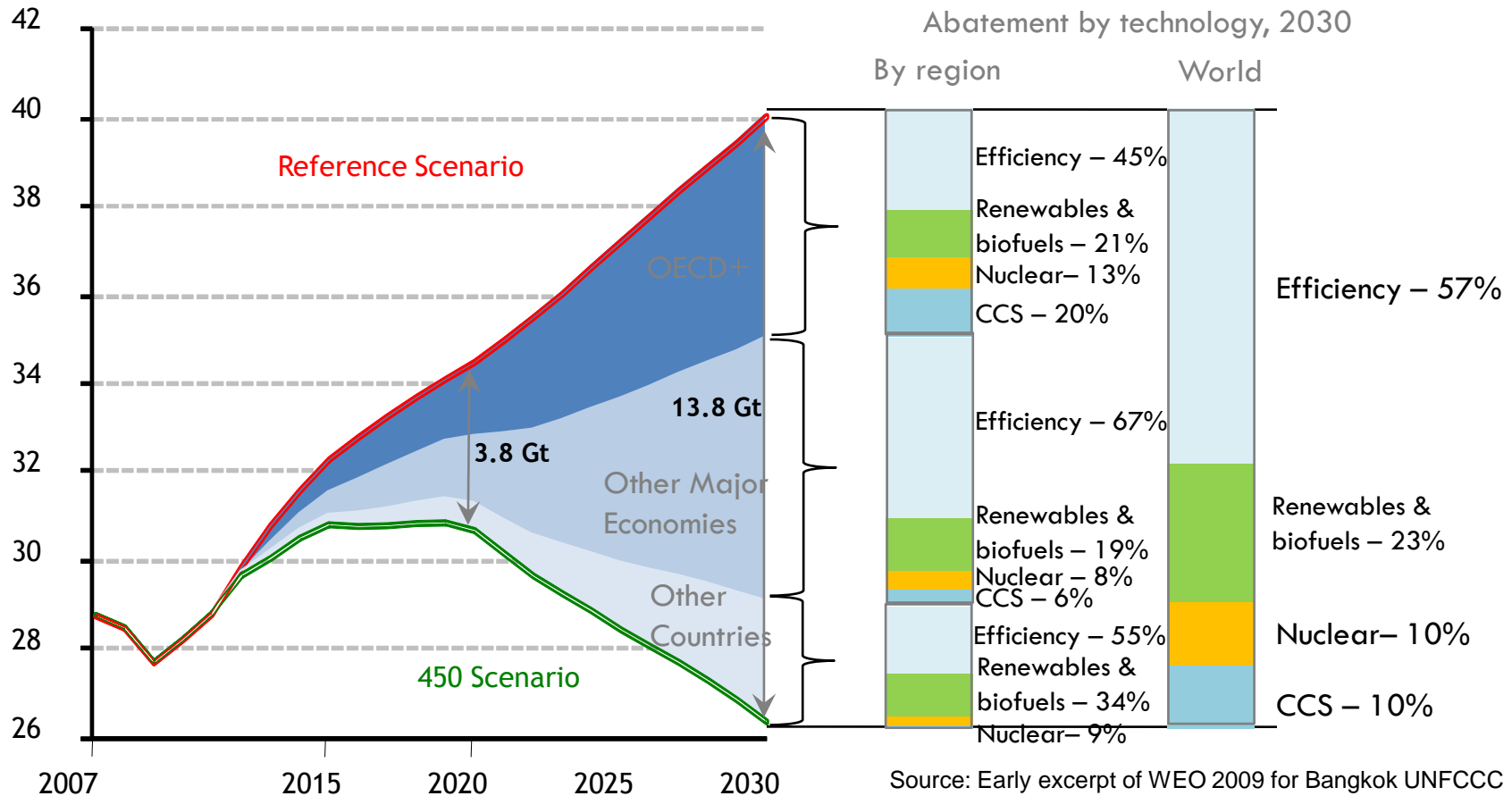
Additional capacity of around 2 700 bcm, or 4 times current Russian capacity, is needed by 2030 – half to offset decline at existing fields & half to meet the increase in demand

World energy-related CO₂ emissions in the Reference Scenario in *WEO-2009* and *WEO-2008*



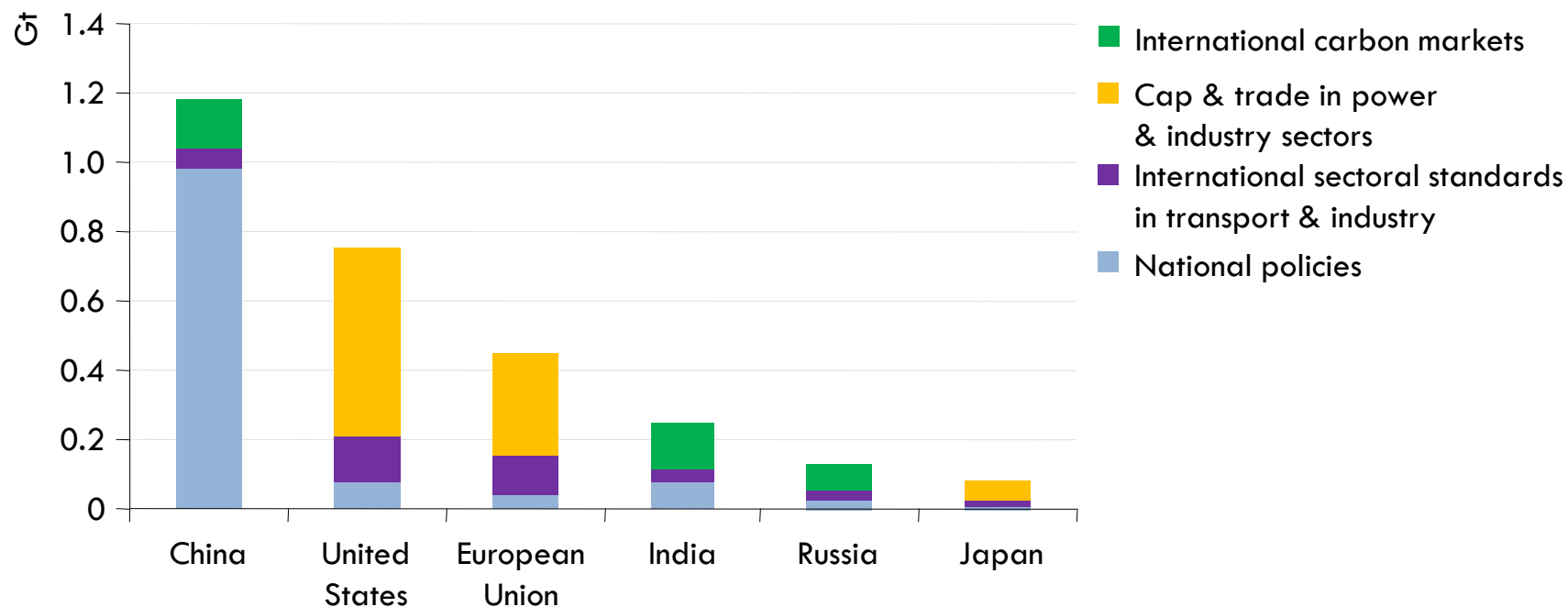
The effect of the crisis on global trend would only be temporary. Existing policies can stabilise CO₂ in OECD countries. Without new policies, global CO₂ emissions are set to rise by 40% in 2030. Most of the increase is caused by new coal use outside OECD.

A sustainable energy future: the '450 Scenario'



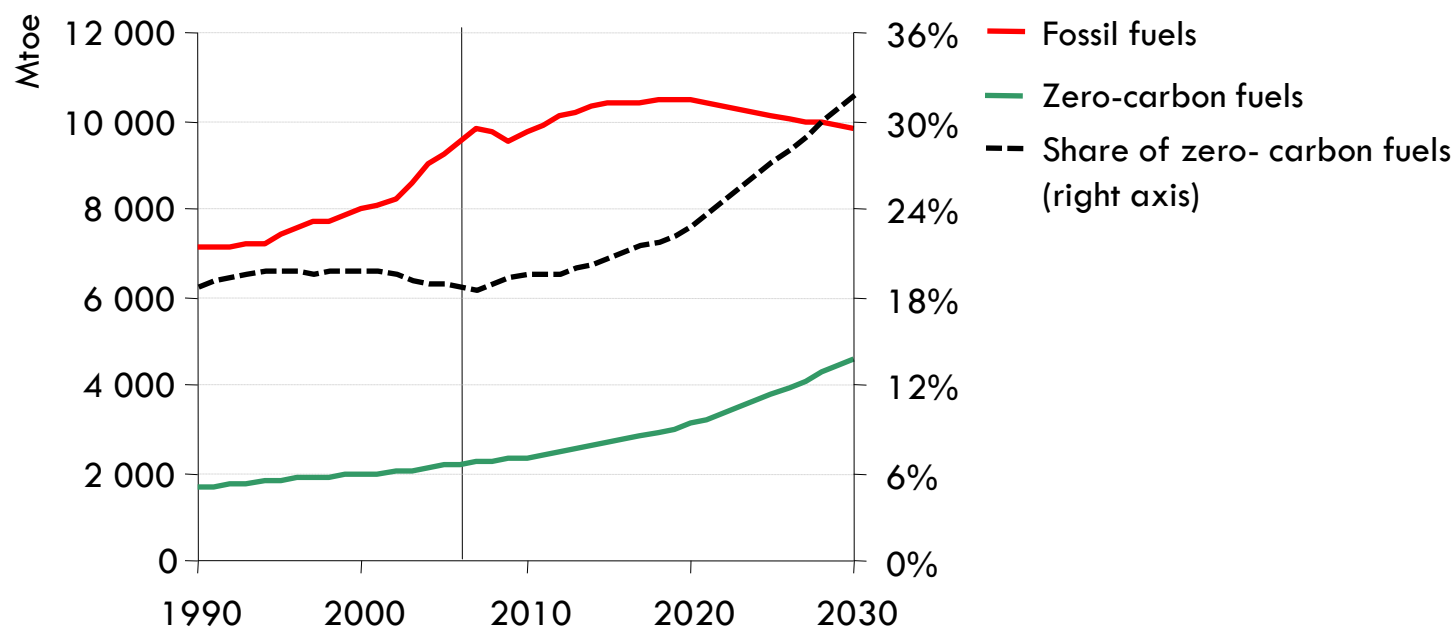
Efficiency measures account for 2/3 of the 3.8Gt abatement in 2020. Renewables contribute 20%. With substantial abatement potential outside the OECD+ region, financing will hold a key to the energy sector meeting a 450 ppm trajectory.

Abatement in the 450 Scenario by key emitters, 2020



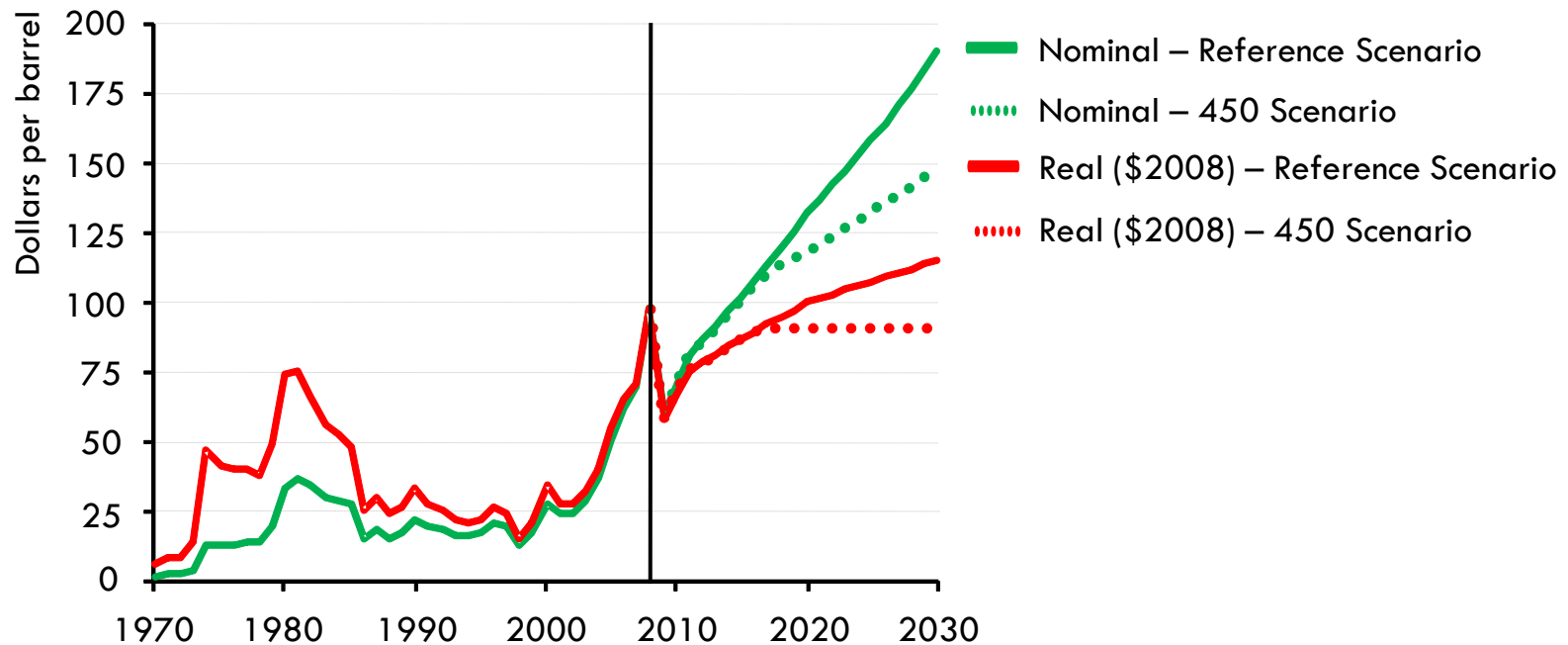
China, the United States, the European Union, India, Russia & Japan account for almost three-quarters of the 3.8 Gt reduction in the 450 Scenario

World primary energy demand by fuel in the 450 Scenario



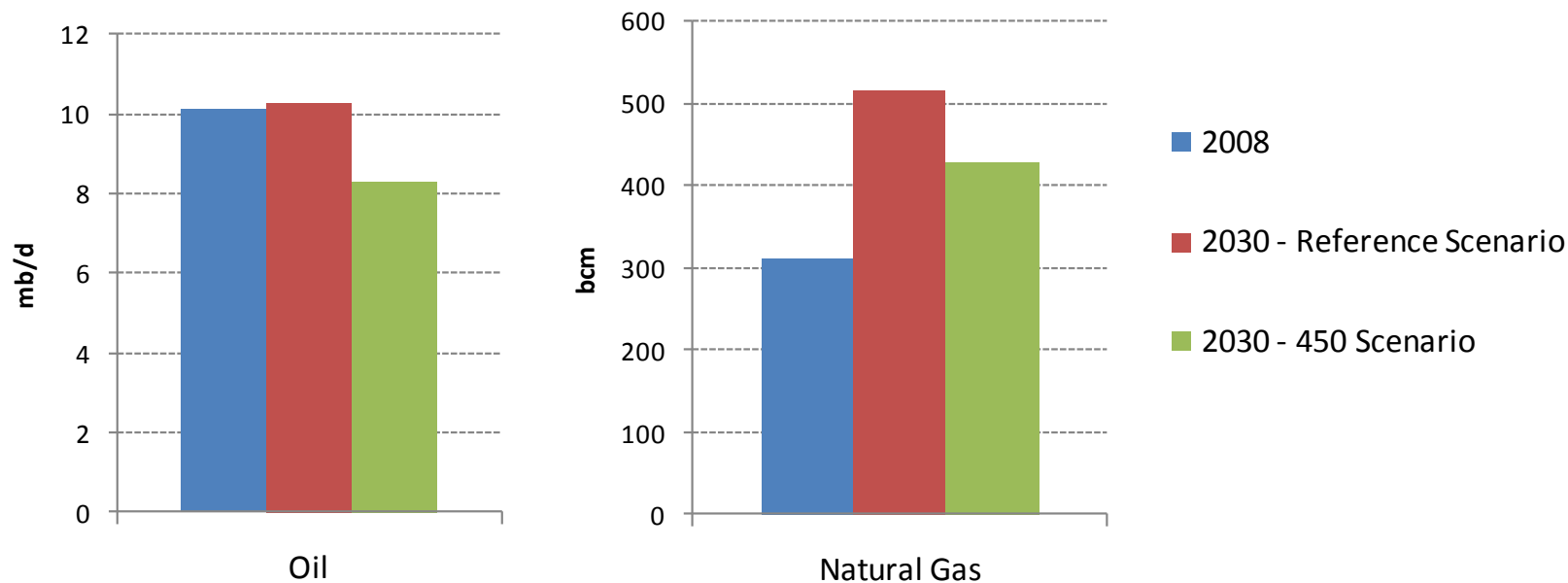
■ *In the 450 Scenario, demand for fossil fuels peaks by 2020, and by 2030 zero-carbon fuels make up a third of the world's primary sources of energy demand*

Average IEA crude oil import price



The oil price in real terms is assumed to rebound from around \$60 per barrel in 2009 with the economic recovery, reaching \$100 by 2020 & \$115 per barrel by 2030 in Reference Scenario

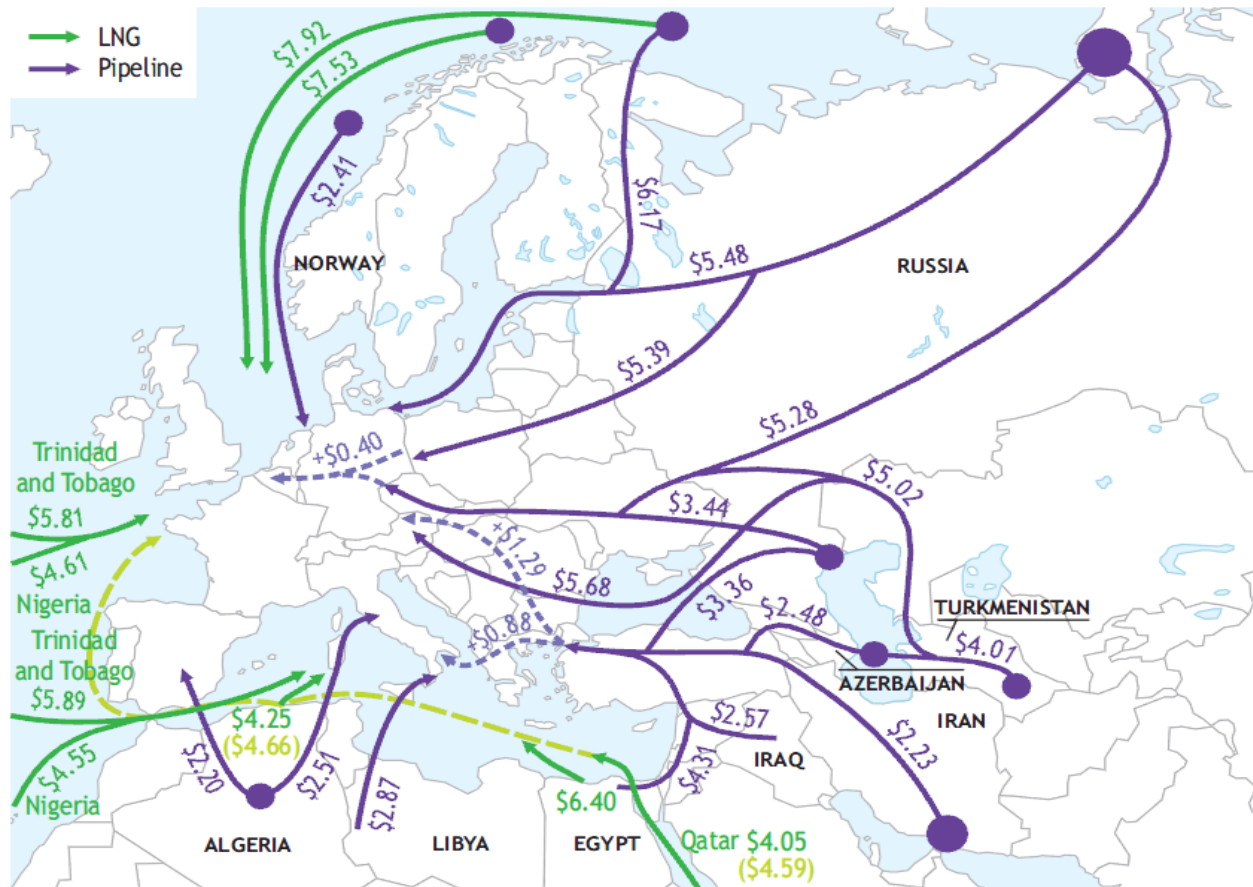
European Union oil and gas net imports



Source: World Energy Outlook 2009

***Even in 450 Scenario, Europe's oil net imports will be over 8 mb/d;
gas net imports +100 bcm more than currently***

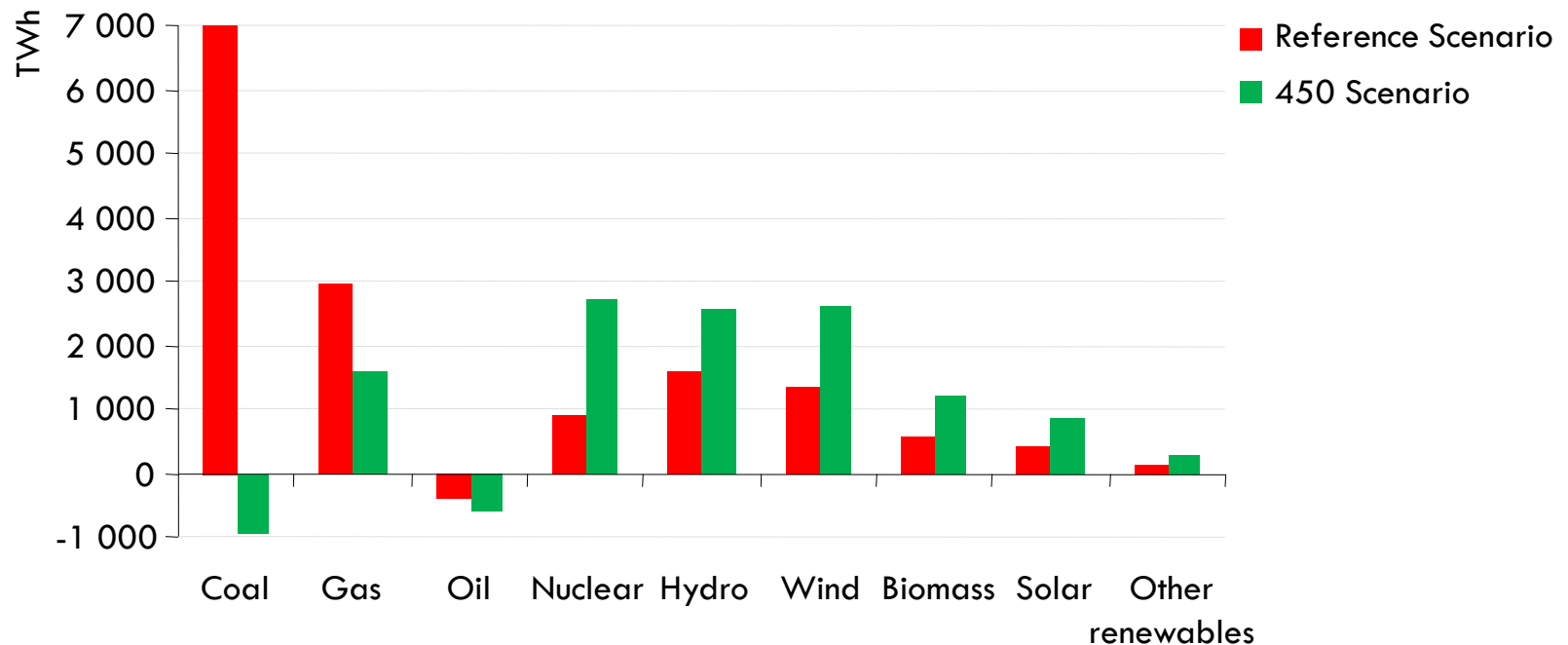
Indicative costs for potential new sources of gas delivered to Europe, 2020 (\$/MBtu)



The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement or acceptance by the IEA.

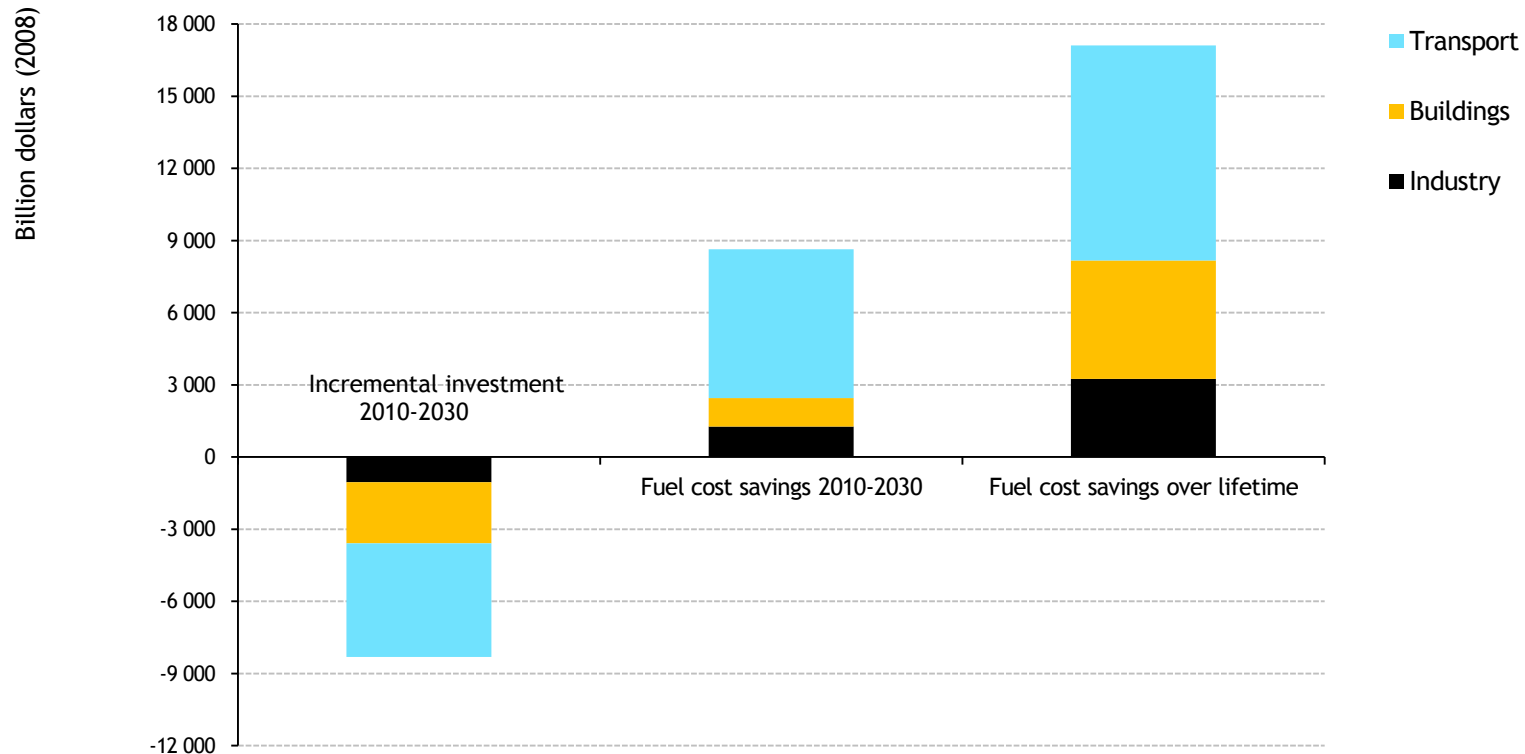
- *Although indigenous resources are limited & output is declining, Europe is*
- *geographically well placed to secure gas supplies from a variety of external sources*

Incremental world electricity production in the Reference and 450 Scenarios, 2007-2030



Renewables, nuclear and plants fitted with CCS account for around 60% of electricity generation globally in 2030 in the 450 Scenario, up from less than one-third today

Additional investment and fuel cost savings in the 450 Scenario vs. the Reference Scenario

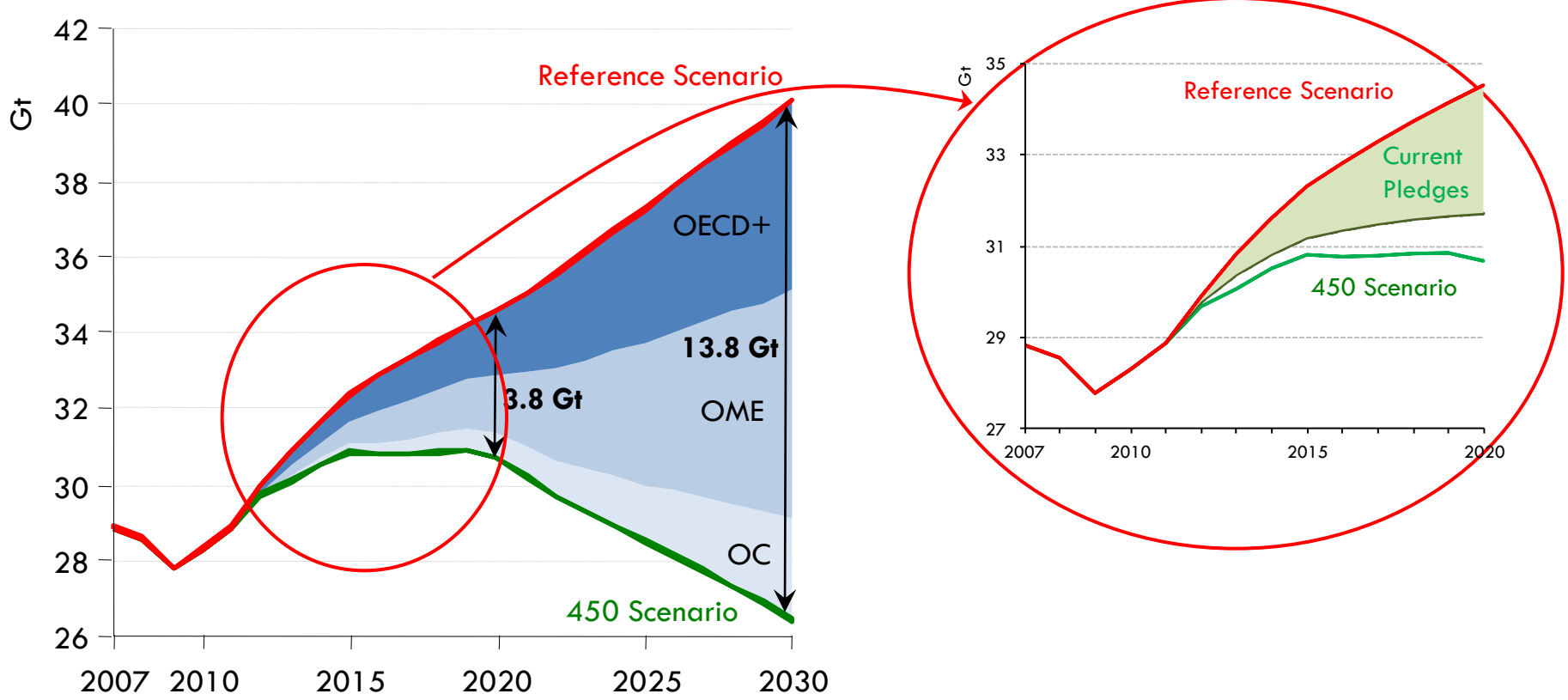


Fuel costs saving in industry, buildings and transport of \$8.6 trillion over the 2010-30 period more than offset these sectors additional investment of \$8.3 trillion

However, every year of delay adds \$500 billion to the required investment, to remain on track with the 450 Scenario

Source: IEA analysis, and World Energy Outlook 2009

World abatement emissions in the 450 Scenario



Current pledges point in the right direction but further efforts would be needed to close the gap and reach the 450 Scenario

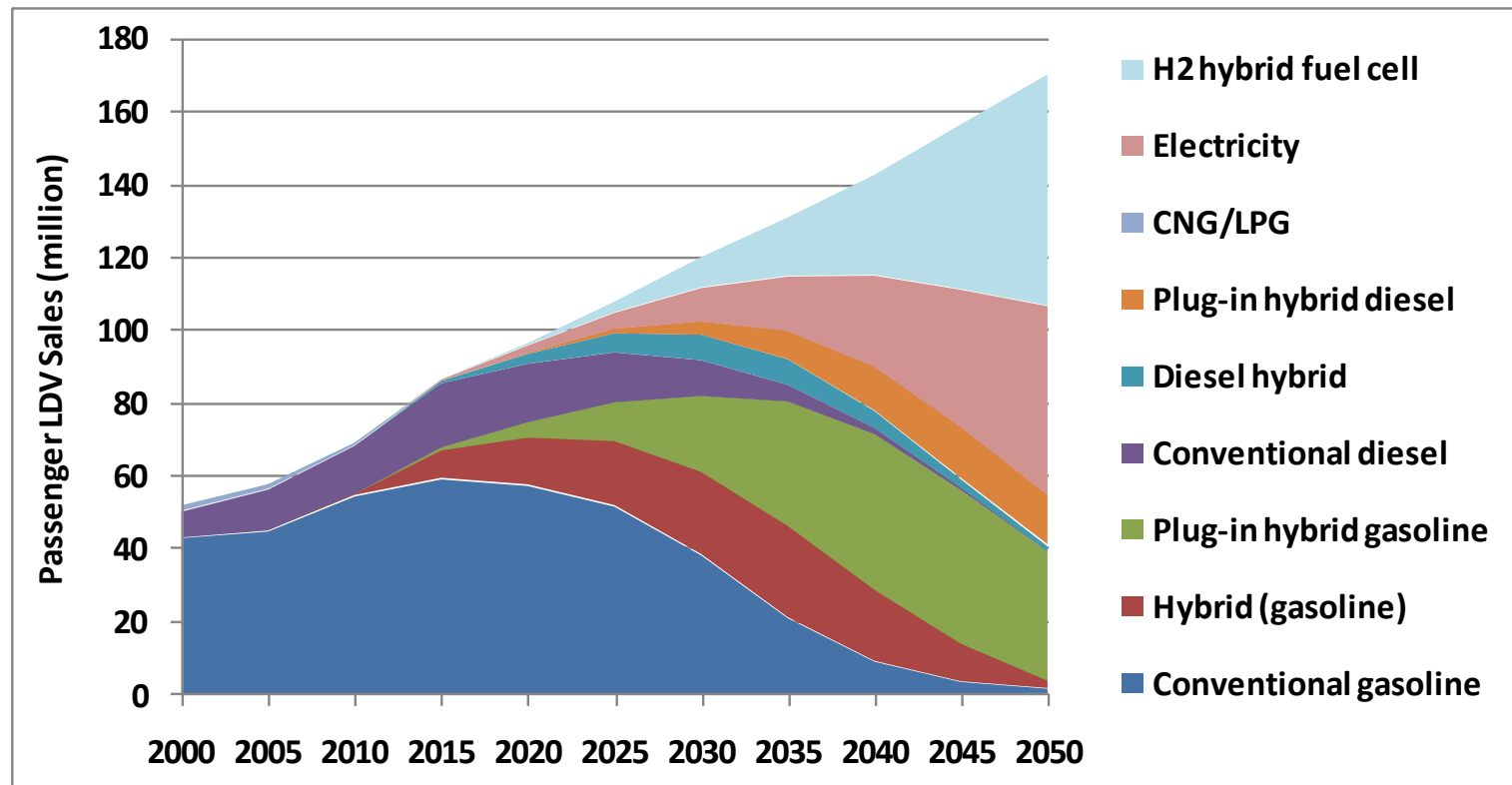
How do we get there from here?

The role of energy technology roadmaps

- Based on scenario to halve CO₂ emissions by 2050
- Establish a baseline of technology status today
- Create technical, policy, legal, financial, and public acceptance milestones and priority near-term actions
- Create a process for stakeholder collaboration
 - > Special developing country focus on engagement, national roadmaps
- Identify partners for implementation
- Roadmaps developed: CCS, electric vehicles, wind, cement sector
- Roadmaps coming soon: solar PV
- Roadmaps for 2010: smart grids, biofuels, nuclear power, EE buildings, concentrated solar power
- Working closely with the MEF
 - > RD&D mapping exercise for the 8 MEF technology areas
 - > Collaboration between the IEA roadmaps and MEF Action Plans

Electric vehicles: A roadmap to 2050

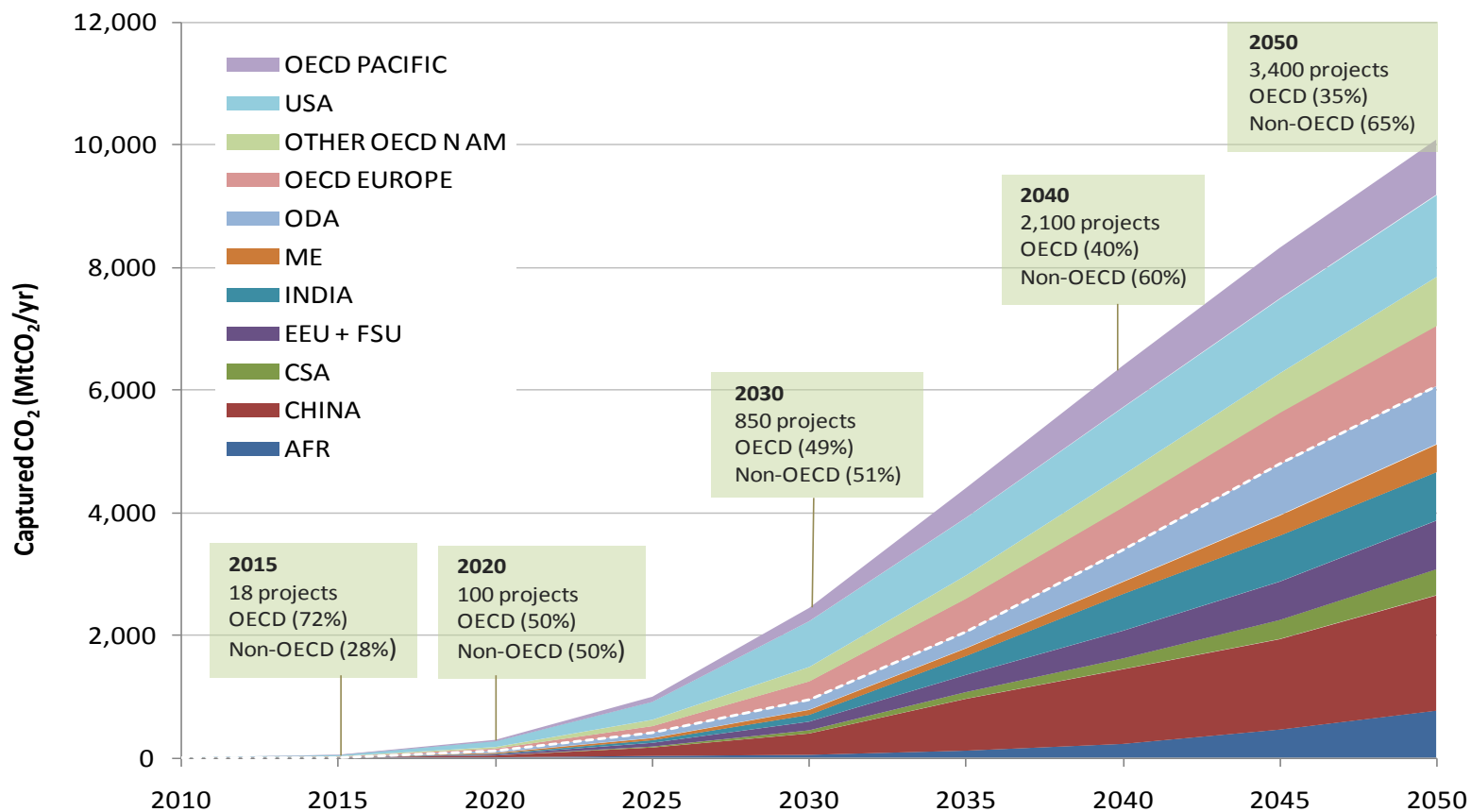
Light-duty vehicle sales by technology type to 2050, ETP BLUE Map Scenario



Source: IEA, EV Roadmap

Unprecedented rates of change in market penetration of advanced technologies

CCS: A roadmap to 2050

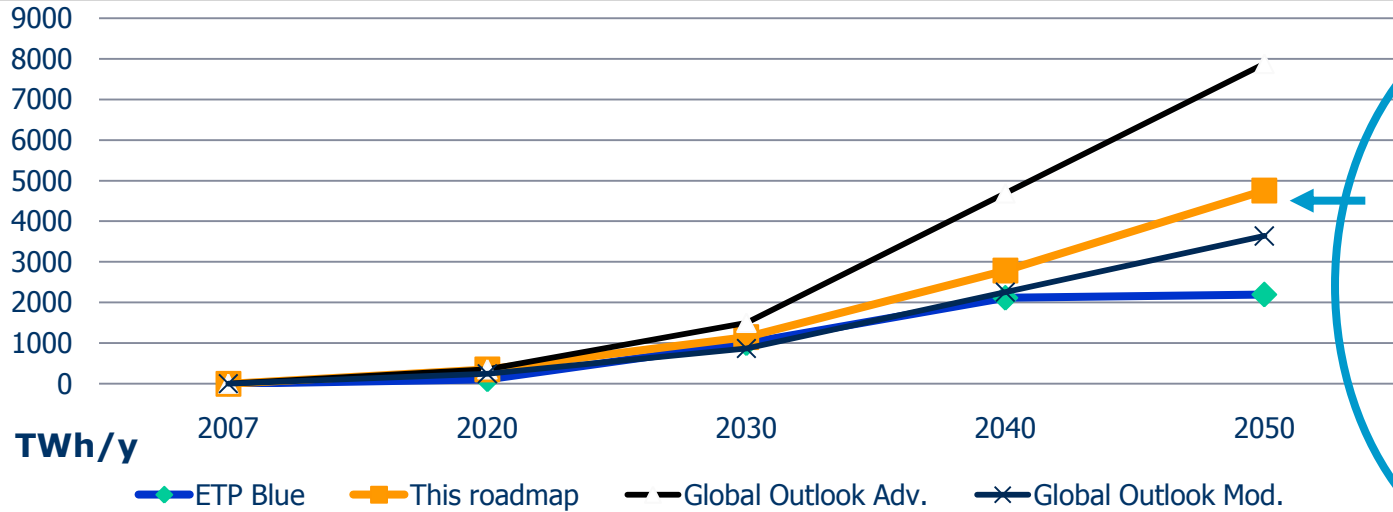


Source: IEA, *CCS Roadmap*

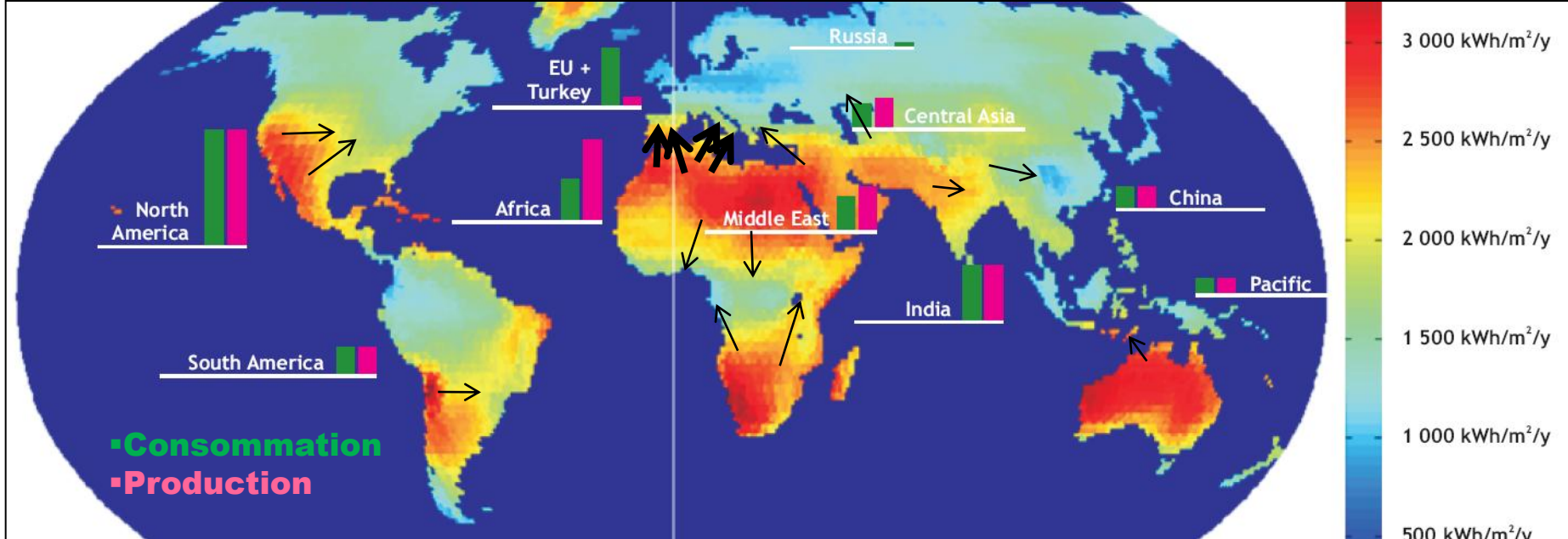
CCS will require additional investment of 2.5-3 trn by 2050

Electricité solaire à concentration

Résultats préliminaires de la feuille de route

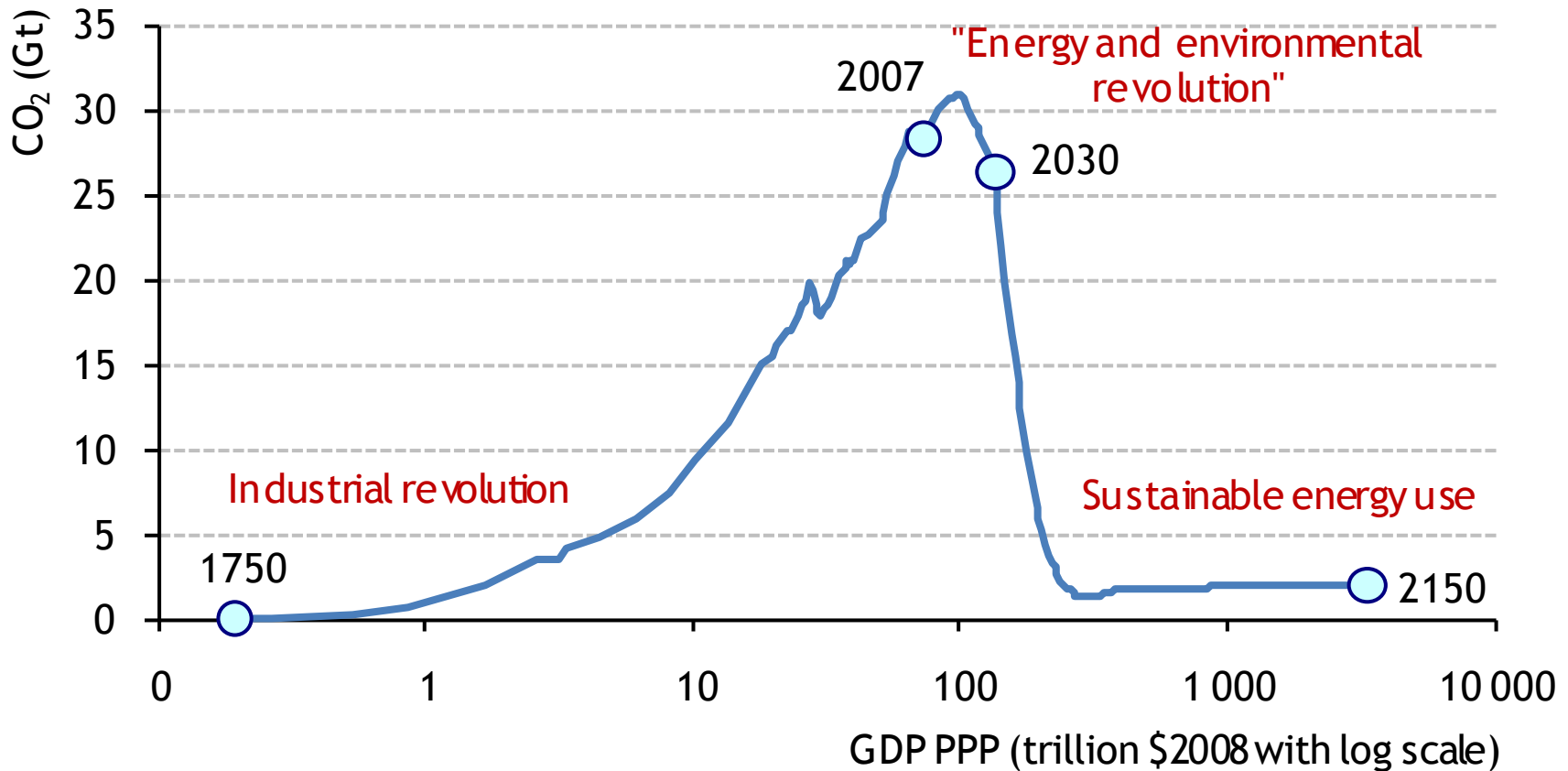


11% de la production d'électricité mondiale en 2050, dont 9.5% solaire



- **More potential to implement energy efficiency, the low hanging fruit.**
- **Strengthen support for zero carbon technology including renewable energy, nuclear power, CCS and advanced vehicle.**
- **Increase spending on clean energy R&D.**
- **Improve Gas security: diversify supply routes and sources including LNG, enhance regional co-operation and emergency preparedness, speak one voice to producers**
- **IEA is ready for further co-operation to overcome shared challenges**

Historical link between CO₂ emissions and economic output and the pathway to achieving a 450 Scenario



Further efforts will be needed to ensure that the historical link between CO₂ emissions and economic output can finally be broken