

# **World Energy**

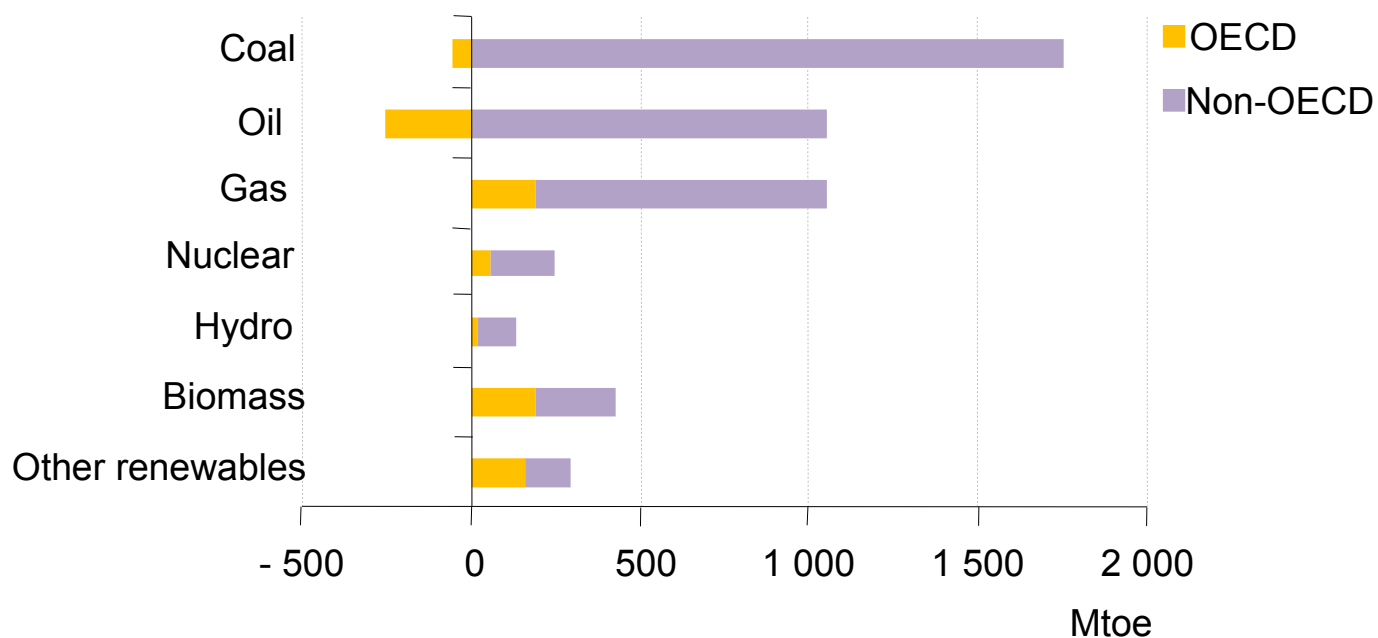
## **Outlook:**

### **Key trends, challenges and responses**

**Dr. Fatih Birol**

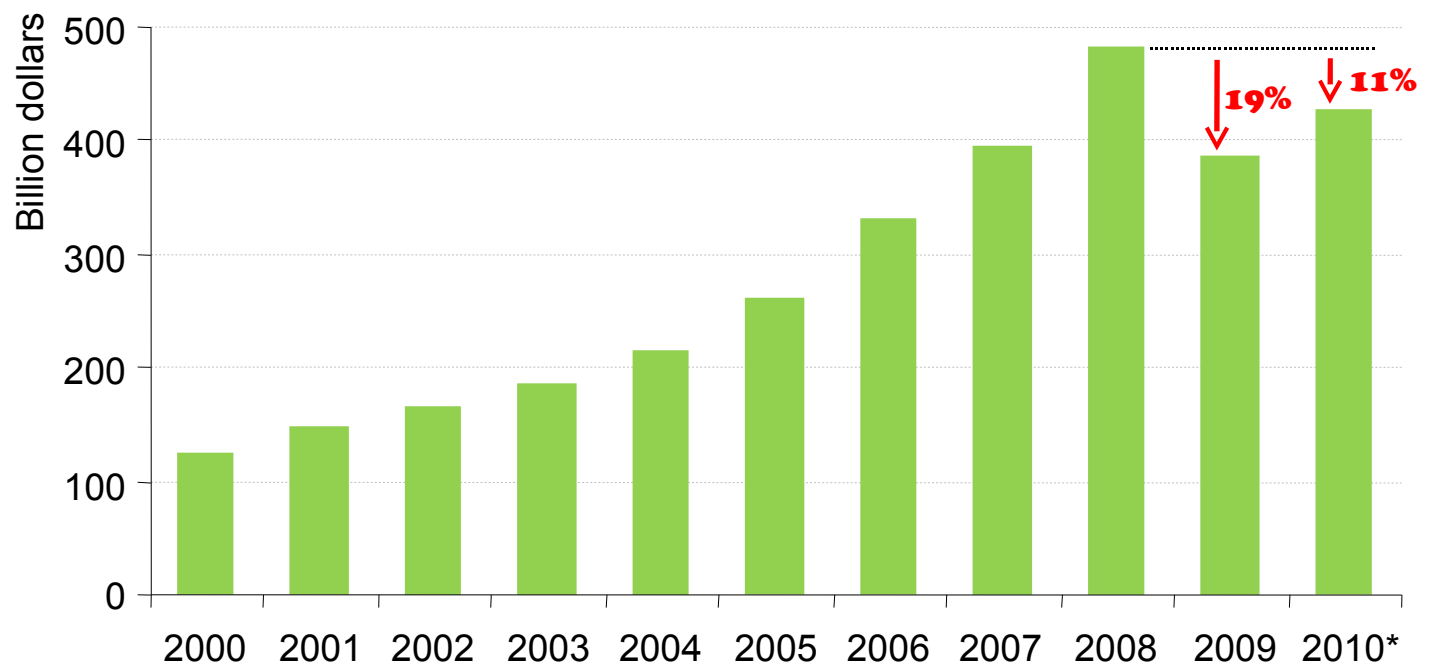
**IEA Chief Economist**

# Change in primary energy demand in the Reference Scenario, 2008-2030



**Fossil fuels account for 77% of the increase in world primary energy demand in 2007-2030, with oil demand rising from 85 mb/d in 2008 to 88 mb/d in 2015 & 105 mb/d in 2030**

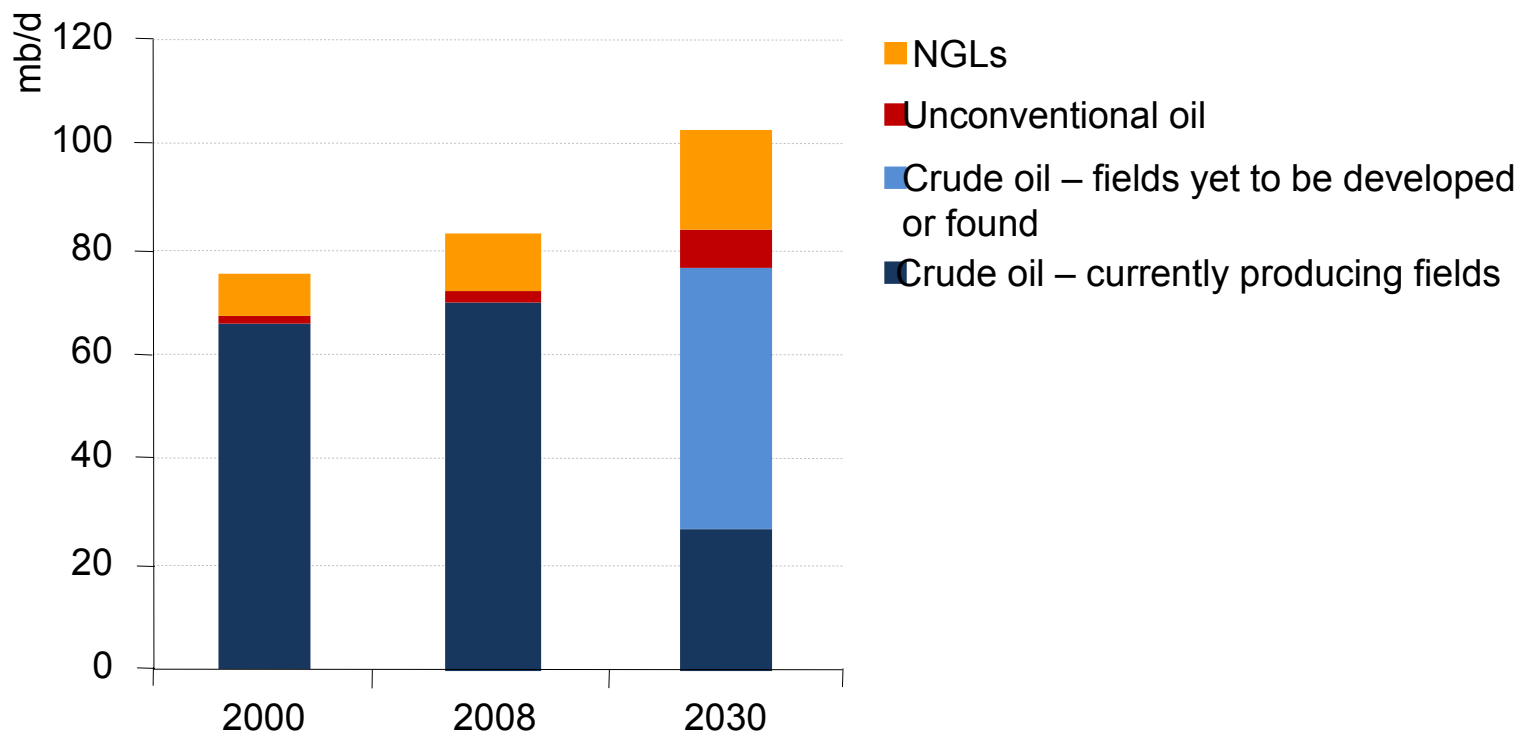
# Worldwide upstream oil & gas capital expenditures



\* Estimated spending

**Global upstream spending fell in 2009, for the first time in a decade, by over \$90 billion in 2009, but is set to bounce back by around 10% in 2010 on current plans**

# Oil production in the Reference Scenario

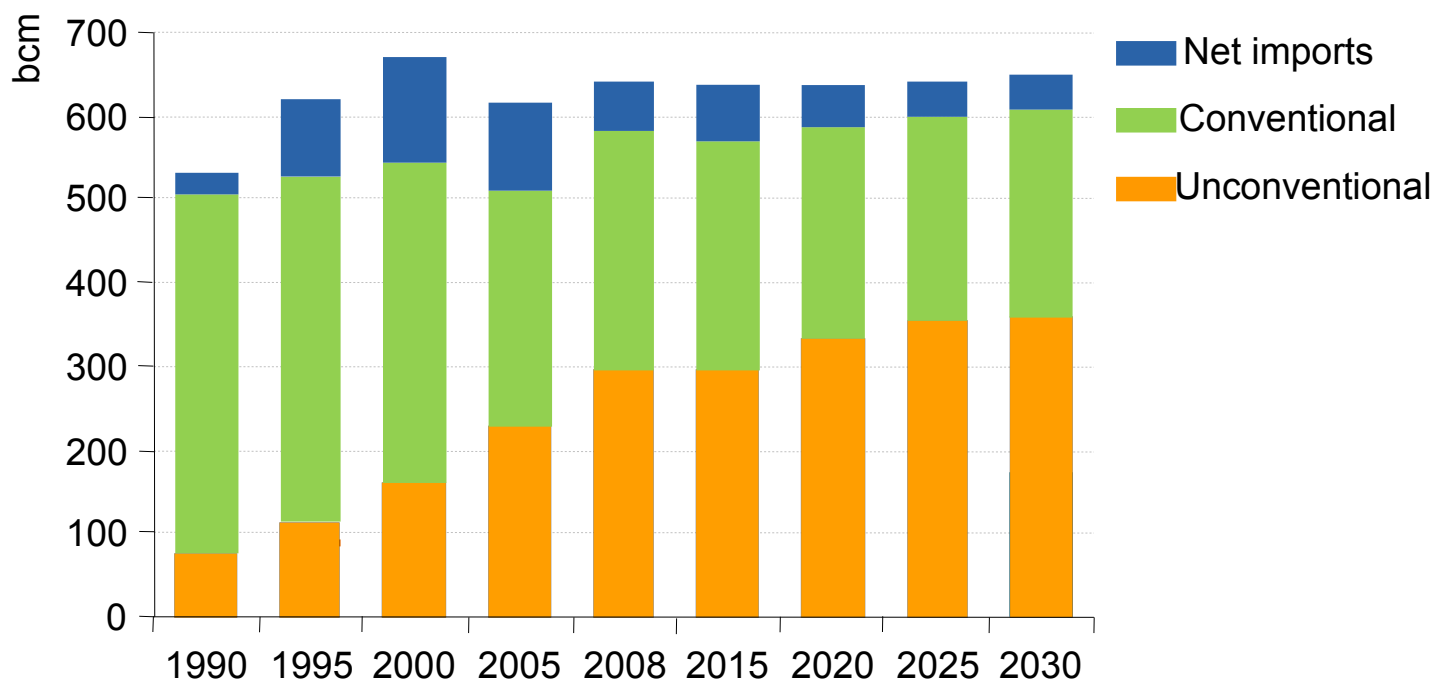


***Sustained investment is needed mainly to combat the decline in output at existing fields, which will drop by almost two-thirds by 2030***

# **What future for Iraqi oil ?**

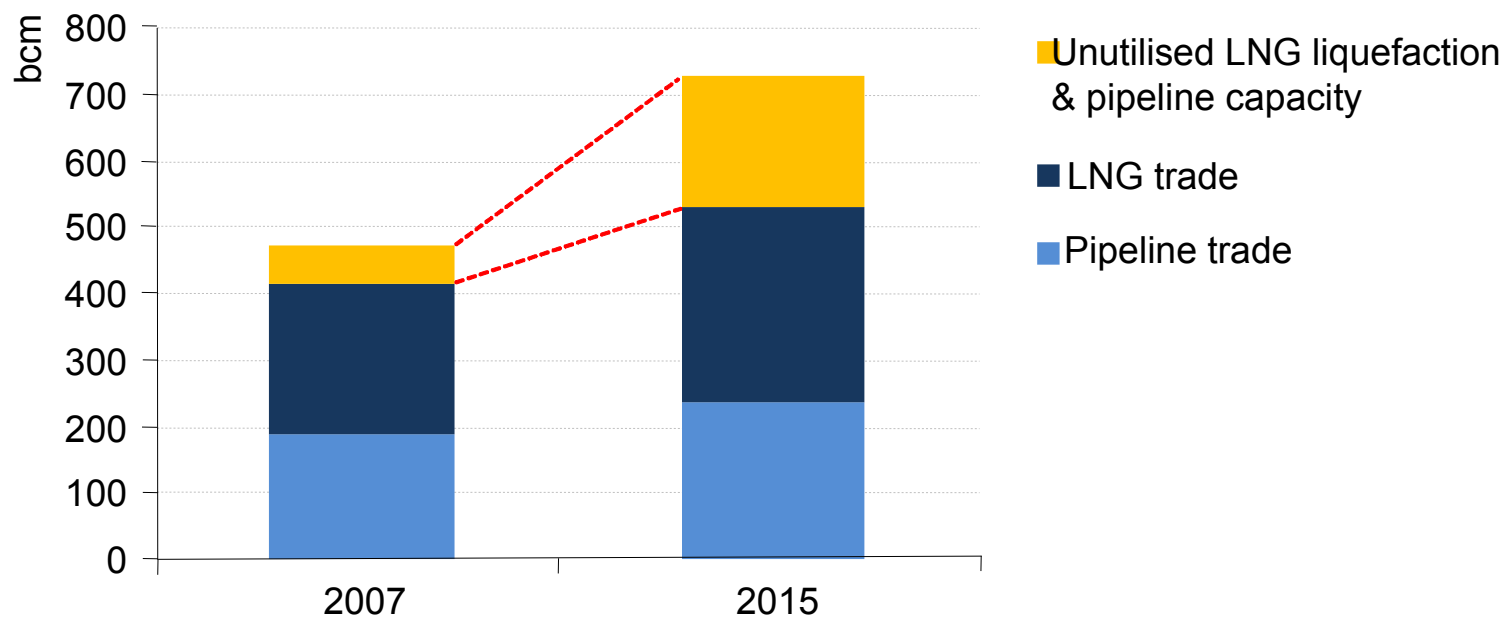
- **Iraq: a decisive driver of global oil markets in the coming decade?**
- **Iraqi oilfields are mostly technically straightforward and relatively cheap to develop**
- **The very rapid capacity expansion claimed by politicians is overly optimistic**
- **But even a modest achievement – e.g. a doubling of current production – would have a significant impact on global oil markets**
- **Main challenges: security, infrastructure, water and personnel**

# US natural gas supply in the Reference Scenario



**Mainly as a result of shale gas production growth, US gas output grows gradually through to 2030, outstripping US demand & squeezing US net imports**

# Natural gas transportation capacity



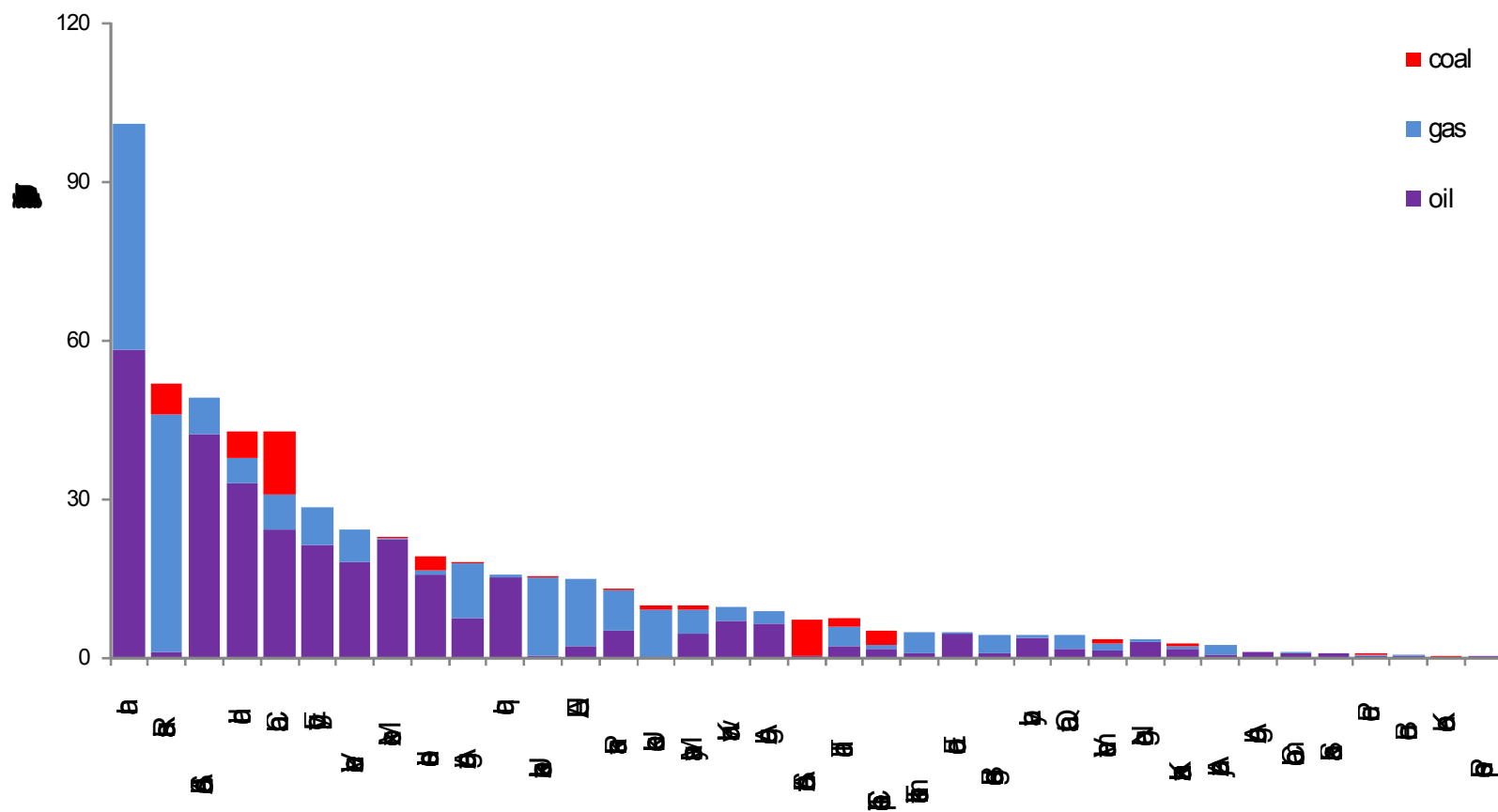
**A glut of gas is developing – reaching 200 bcm by 2015 – due to weaker than expected demand & plentiful US unconventional supply, with far-reaching implications for gas pricing**



## **More on natural gas**

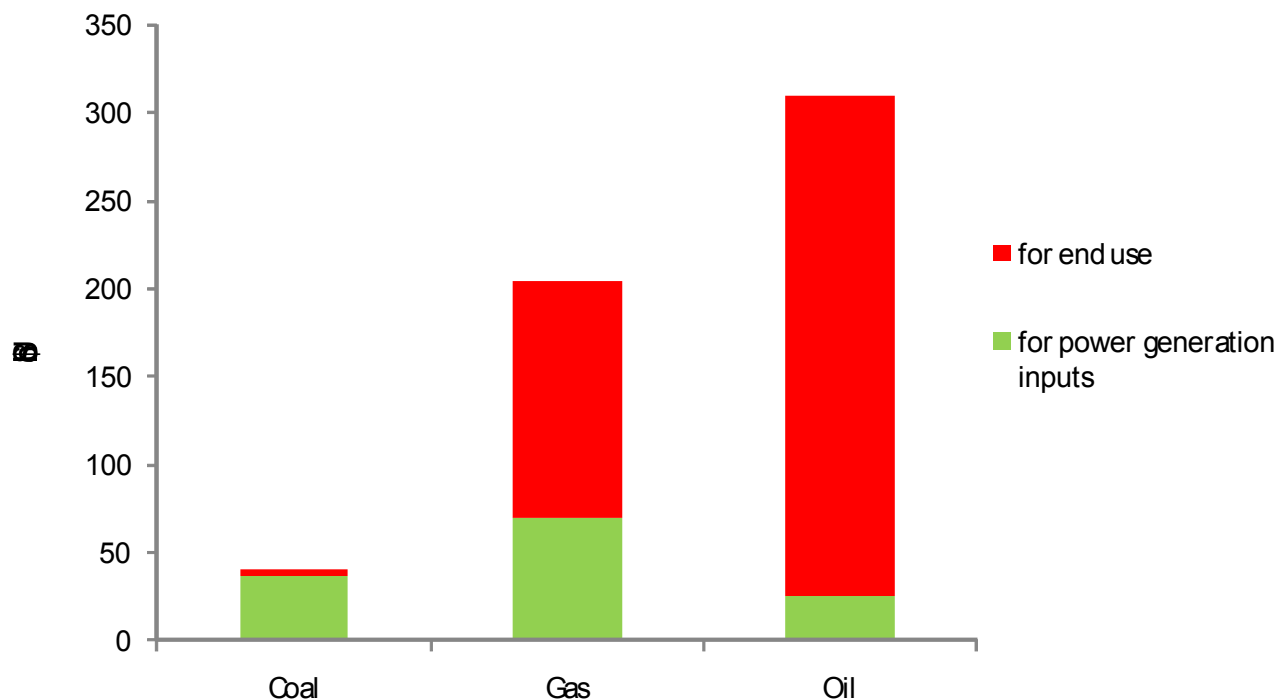
- **Pace of global economic recovery is key to gas and electricity demand prospects**
- **Pressure on oil-indexed pricing – more innovative gas pricing formulae?**
- **Growing interest in LNG in Europe and Asia**
- **More unconventional gas: can the North American success story be replicated elsewhere ?**
- **Gas glut: putting pressure on renewables and others ?**

# Fossil fuel subsidies – by country, 2008



**Global subsidized consumption of fossil fuels amounted to US\$ 557 billion in 2008**

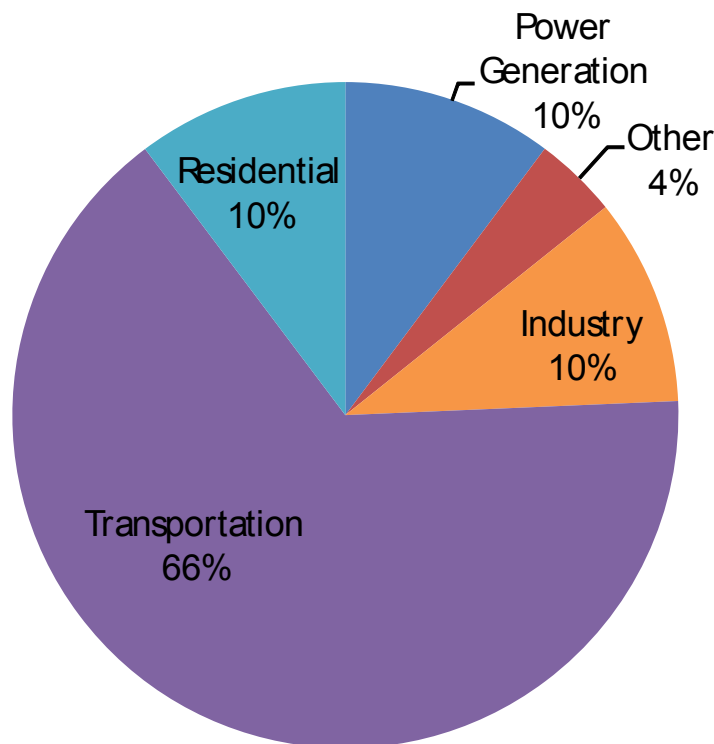
# Fossil fuel subsidies – by fuel, 2008



**In 2008, subsidies for energy consumption by fuel were as follows: oil products at US\$ 312 billion, natural gas at US\$ 204 billion, and coal at US\$ 40 billion**

# Oil savings resulting from subsidy phase out, 2020

**Oil savings in 2020 from subsidy phase out: 6.5 mb/d**

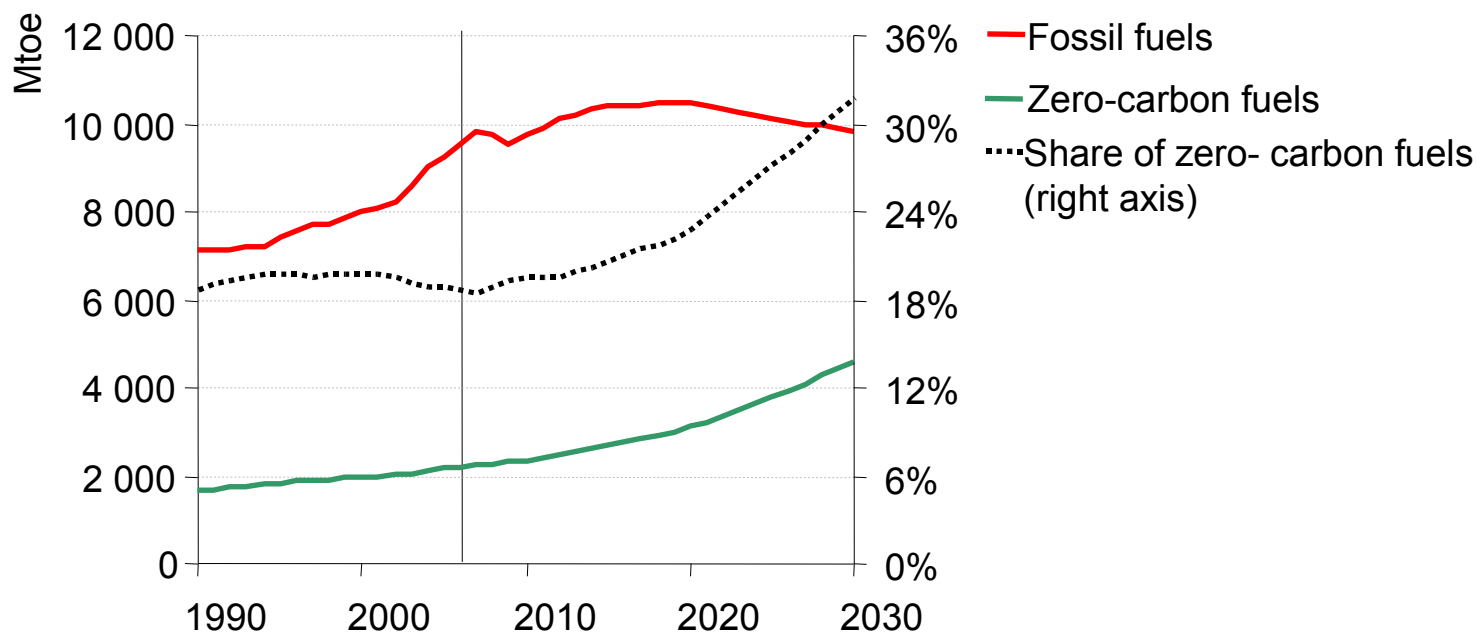


**Compared to a baseline in which subsidy rates remain unchanged, global subsidy phase out would cut global oil demand by 6.5 mb/d in 2020, predominately in the transport sector**

A world map where the colors represent temperature variations. The map shows a color gradient from blue (cooler) in the northern and southern poles to red and orange in the mid-latitudes, and yellow and green in the southern tropics. The text is overlaid in the center of the map.

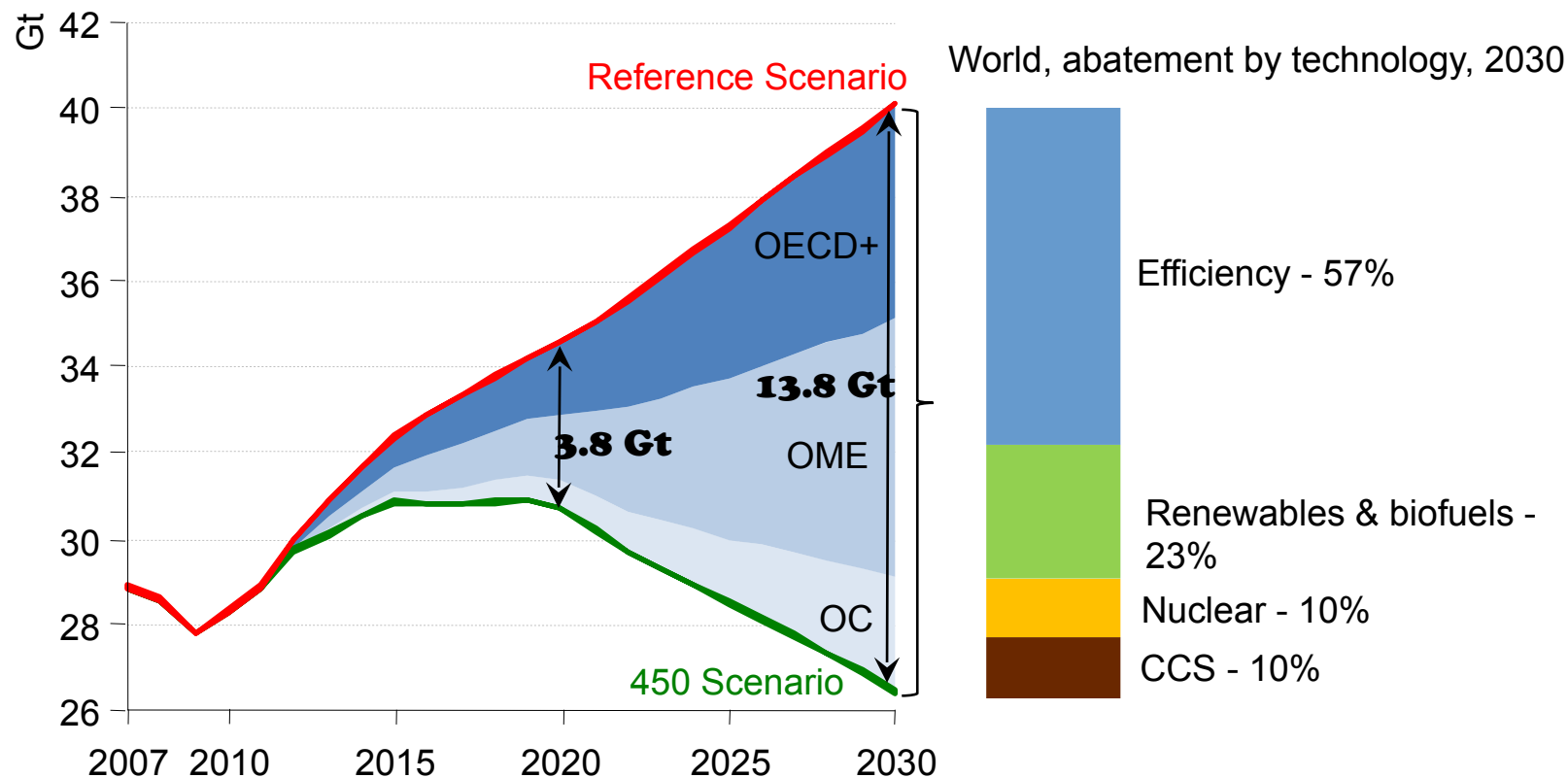
***How to Limit  
Temperature Increase  
to 2°c ?***

# World primary energy demand by fuel in the 450 Scenario



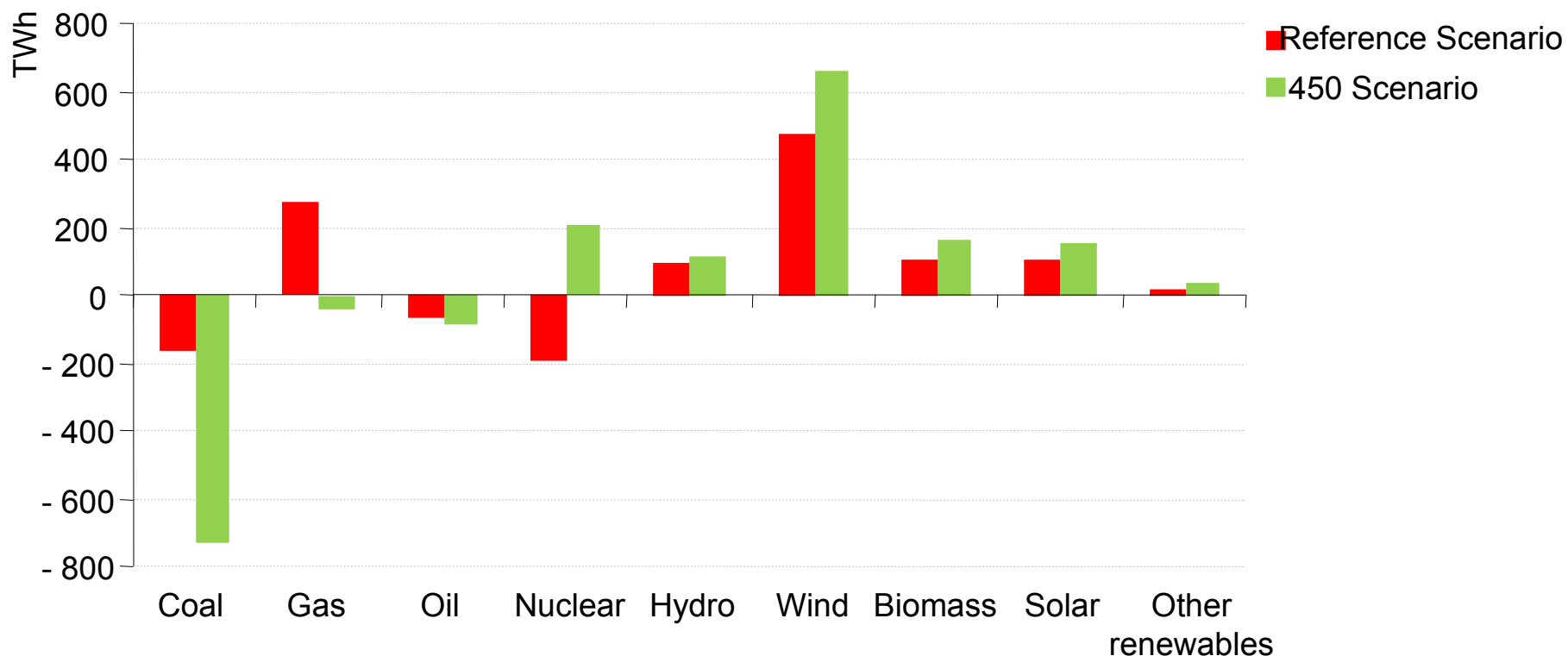
**In the 450 Scenario, demand for fossil fuels peaks by 2020, and by 2030 zero-carbon fuels make up a third of the world's primary sources of energy demand**

# World abatement of energy-related CO<sub>2</sub> emissions in the 450 Scenario



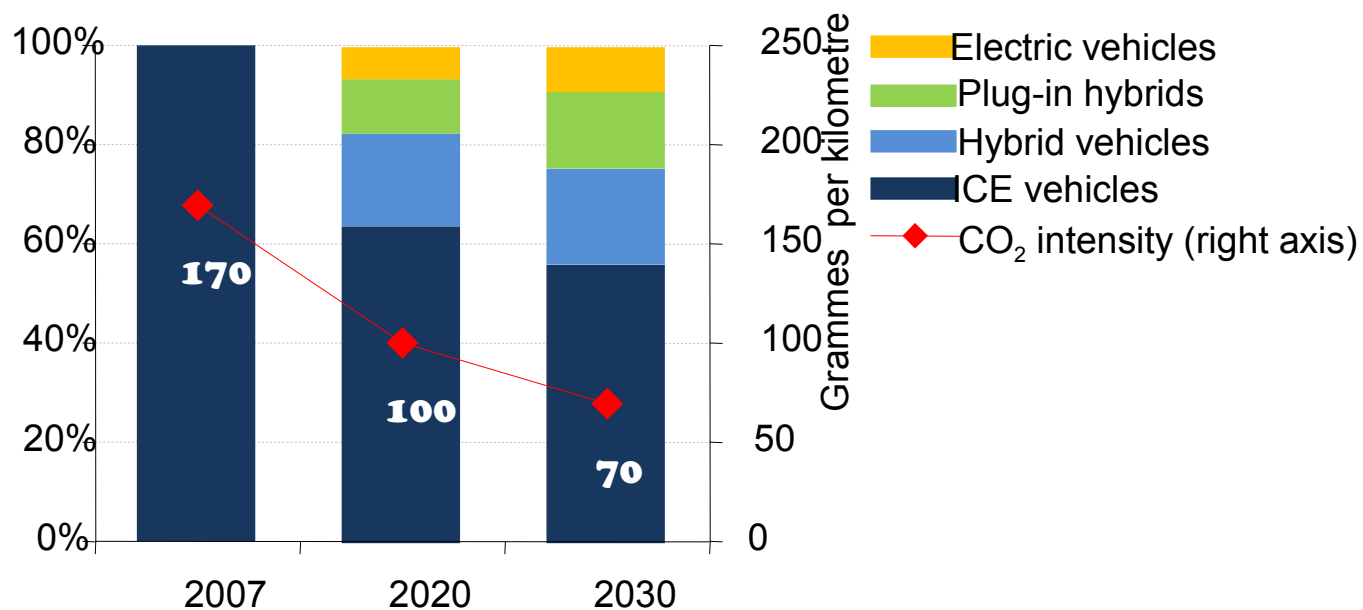
**An additional \$10.5 trillion of investment is needed in total in the 450 Scenario, with measures to boost energy efficiency accounting for most of the abatement through to 2030**

# Incremental EU electricity production by scenario, 2008-2030



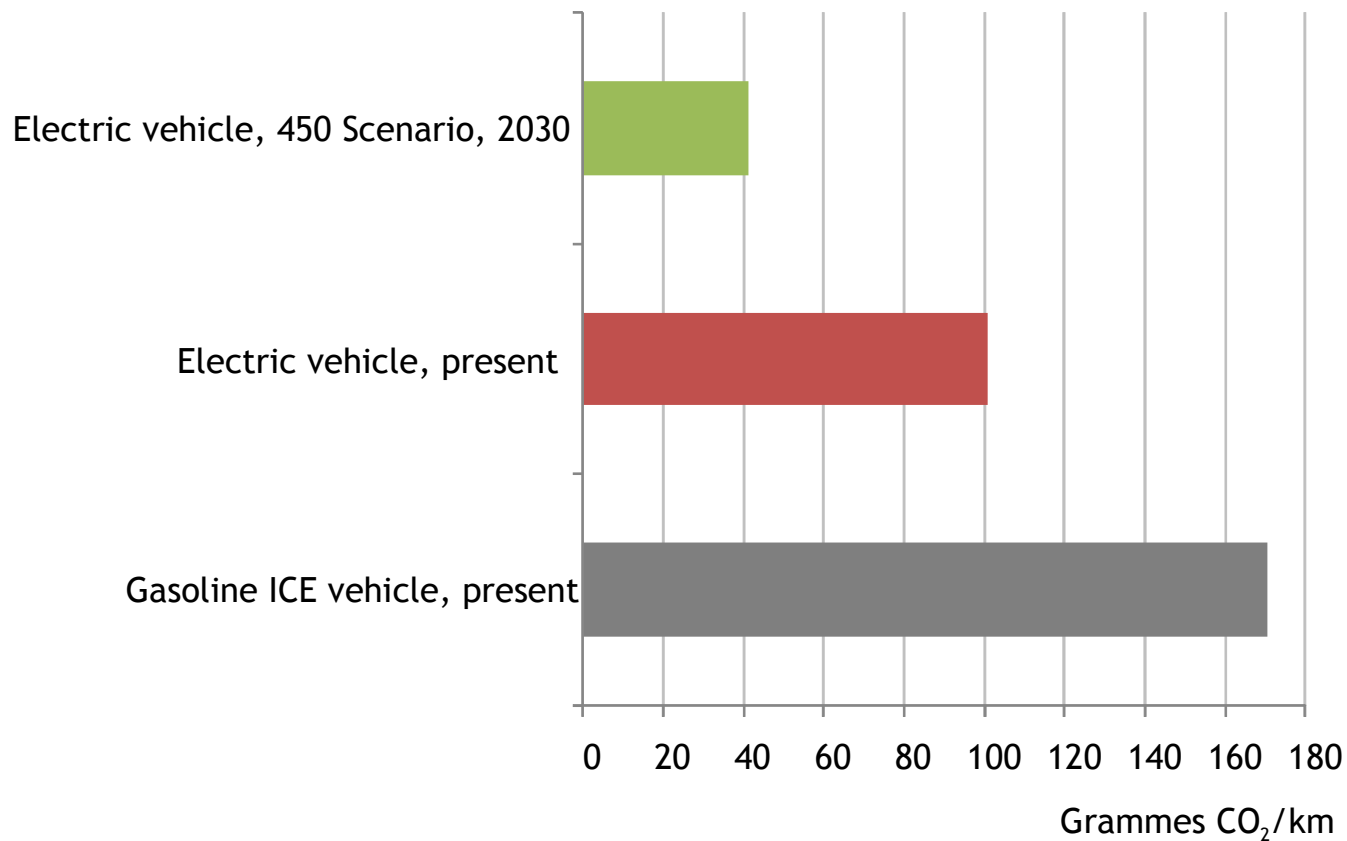
**Renewables, nuclear and plants fitted with CCS account for 80% of electricity generation in EU in 2030 in the 450 Scenario, up from 44% today**

# European Union passenger vehicle sales & average new vehicle CO<sub>2</sub> intensity in the 450 Scenario



**The already strong policy action to reduce CO<sub>2</sub> emissions in EU road transport must be further strengthened in order to reach a 450 trajectory.**

# Global CO<sub>2</sub> emissions from the power sector and the use of electric cars

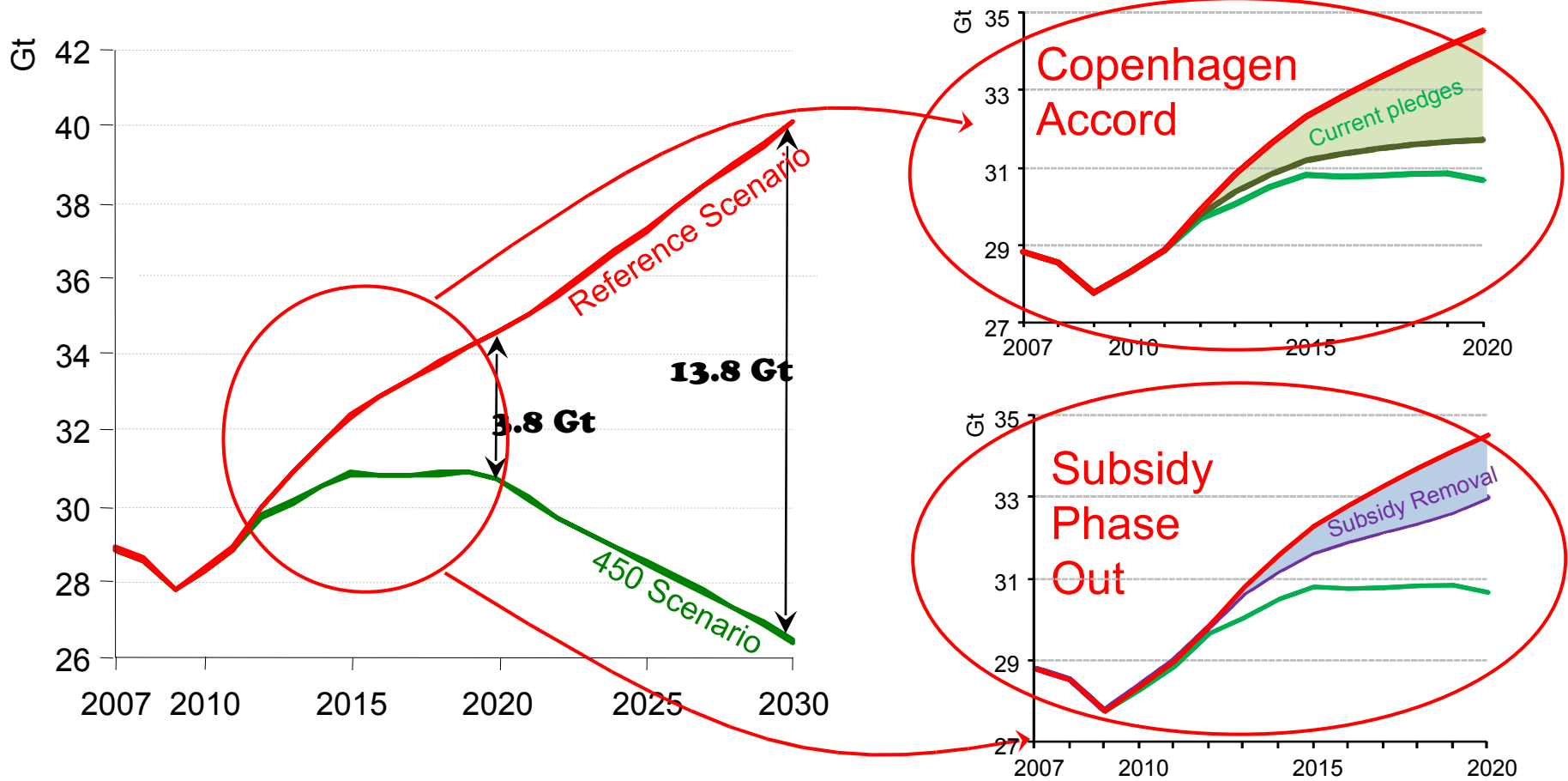


***Electric cars only are not enough: a holistic approach is required, reducing CO<sub>2</sub> emissions of the power generation system too...***

# What does the Copenhagen Accord entail?

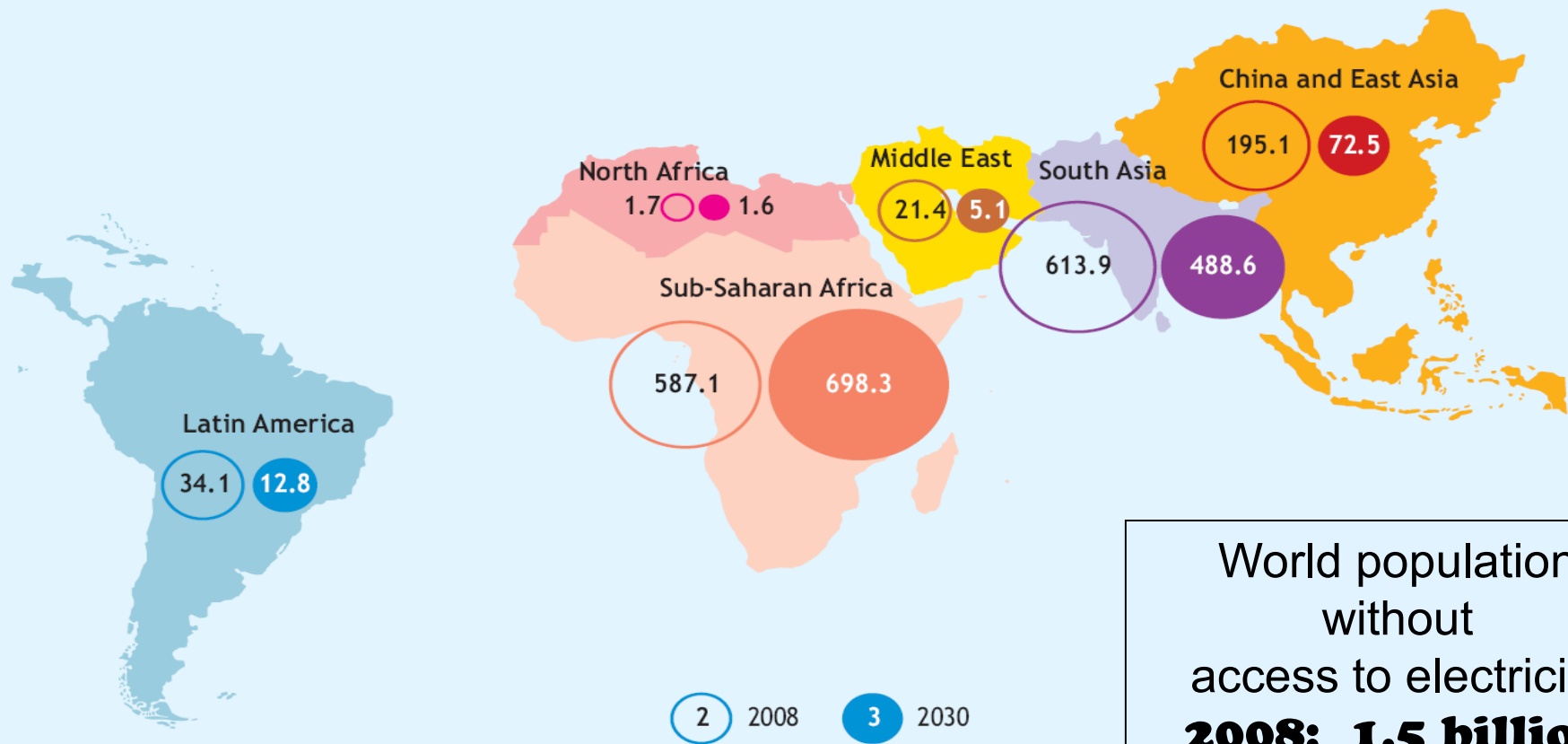
- **A politically significant step towards a legally binding deal:**
  - > *Recognises the need to limit the global temperature increase to 2°C*
  - > *Sets a goal of mobilising \$100 billion/year of funding for mitigation & adaptation from developed to developing countries by 2020*
  - > *Several countries made pledges by 2020;*
- **The Conference took note of the Accord, but not binding and no guarantee of real action**
- **Will the accord pave the way for a much stronger deal later to ensure that the 2°C goal is achieved?**

# World abatement of energy-related CO<sub>2</sub> emissions



**Although the savings are not strictly cumulative, the Copenhagen Accord and the G-20 commitment to phase out subsidies are complementary steps towards the 450 Scenario**

# Number of people without access to electricity in the Reference Scenario (millions)



World population without access to electricity  
**2008: 1.5 billion people**  
**2030: 1.3 billion people**

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.

**\$35 billion per year more investment than in the Reference Scenario will be needed to 2030 – equivalent to just 5% of global power generation investment – to ensure universal access**

# Concluding remarks...

- **The era of cheap oil is over**
- **A sizable glut of natural gas is looming – with major implications for energy markets**
- **A 450 path requires massive investments but would bring substantial benefits**
- **Copenhagen Accord takes significant steps forward on international climate policy but not sufficient to limiting temperature rise to 2 °C**
- **Major growth potential in alternative energy technologies – renewables, nuclear, advance car technologies**