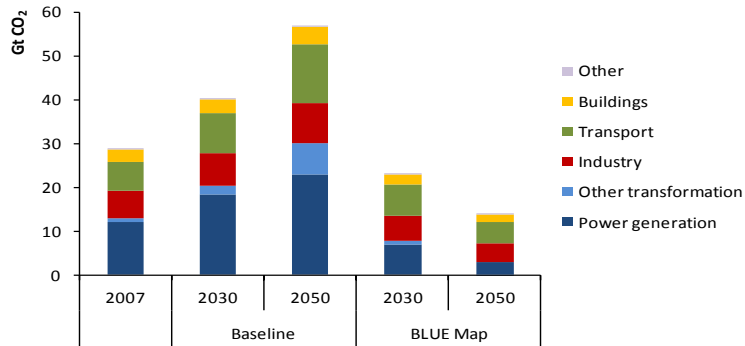


## The context

- **Need a global energy technology revolution to meet climate change and energy security challenges.**
- **Some early signs of progress, but much more needs to be done.**
  - **Which technologies can play a role?**
  - **What are the costs and benefits?**
  - **What policies are needed?**



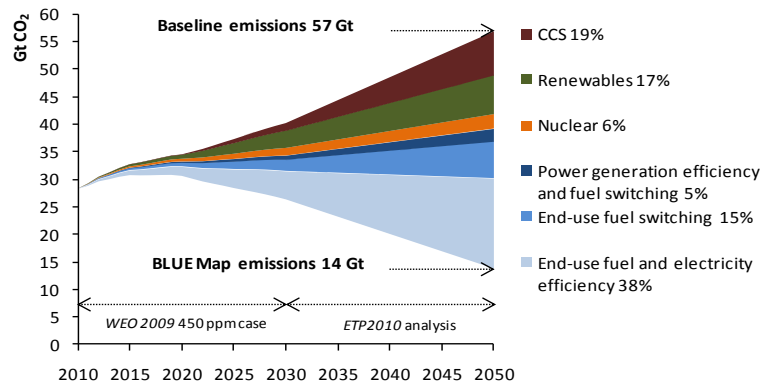
## Global energy-related CO<sub>2</sub> emissions in the Baseline and BLUE Map scenarios



Global CO<sub>2</sub> emissions double in the Baseline, but in the BLUE Map scenario abatement across all sectors reduces emissions to half 2005 levels by 2050.



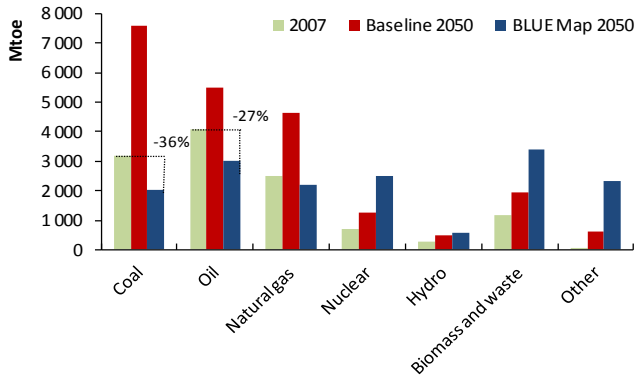
## Key technologies for reducing global CO<sub>2</sub> emissions



A wide range of technologies will be necessary to reduce energy-related CO<sub>2</sub> emissions substantially.



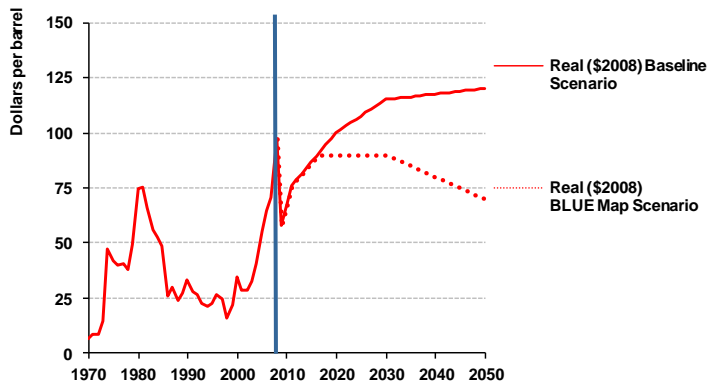
## Primary energy demand by fuel and by scenario



By 2050, coal, oil and gas demand are all lower than today under the BLUE Map scenario.



## Crude oil price

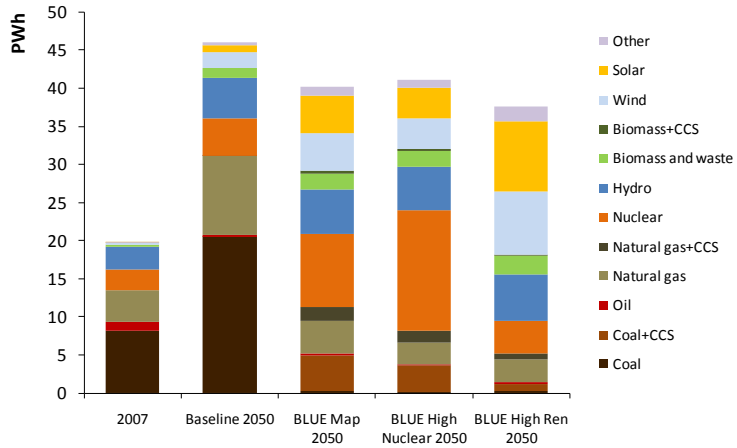


Impact of CO<sub>2</sub> price on costs for crude oil:

2020 50 USD/t CO<sub>2</sub>= 21 USD/bbl: 90+21 =111 USD/bbl  
 2030 110 USD/t CO<sub>2</sub>= 43 USD/bbl: 90+43 =133 USD/bbl  
 2050 175 USD/t CO<sub>2</sub>= 73 USD/bbl: 70+73 =143 USD/bbl



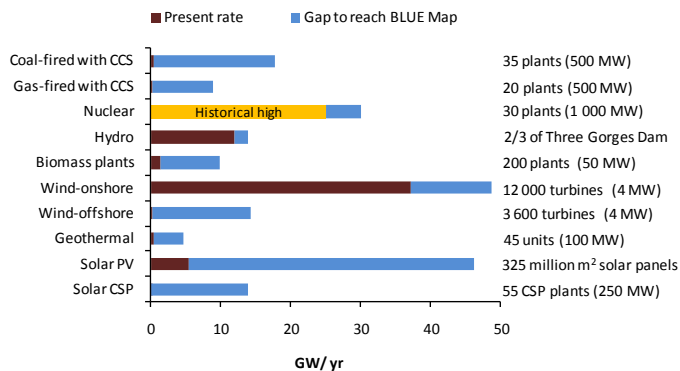
## Decarbonising the power sector – a new age of electrification?



A mix of renewables, nuclear and fossil-fuels with CCS will be needed to decarbonise the electricity sector.



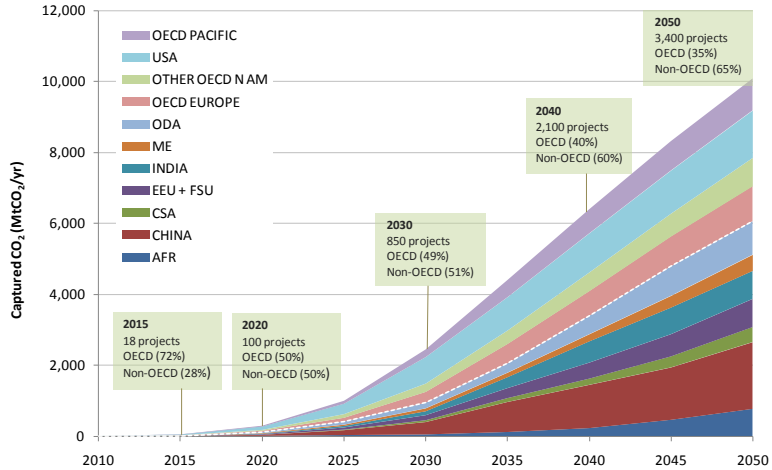
## Average annual electricity capacity additions to 2050, BLUE Map scenario



Annual rates of investment in many low-carbon technologies must be massively increased from today's levels.



## CCS Roadmap



## Projected electric and plug-in hybrid vehicle sales through 2020, based on national targets

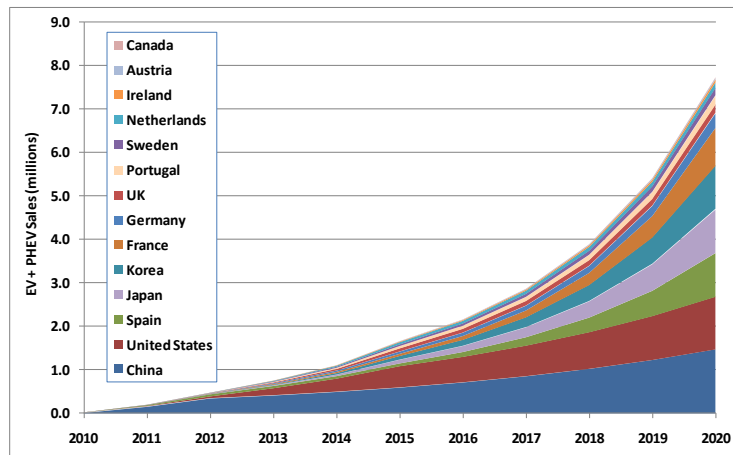
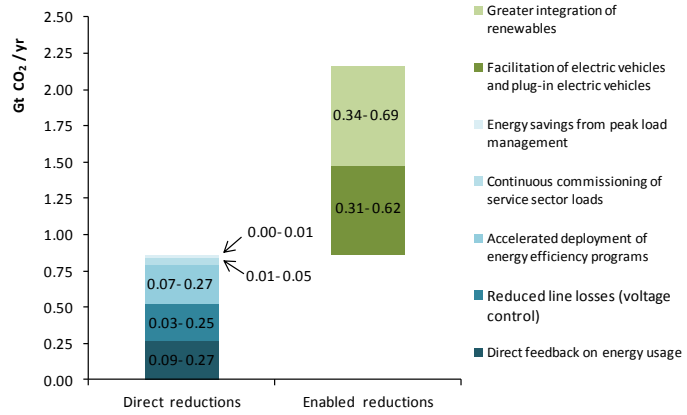


Figure based on announced national sales and stock targets, with assumed 20% annual sales growth after target is met, if target is before 2020 (e.g. China's target is for end of 2011).

**EV / PHEV sales could reach nearly eight million by 2020**



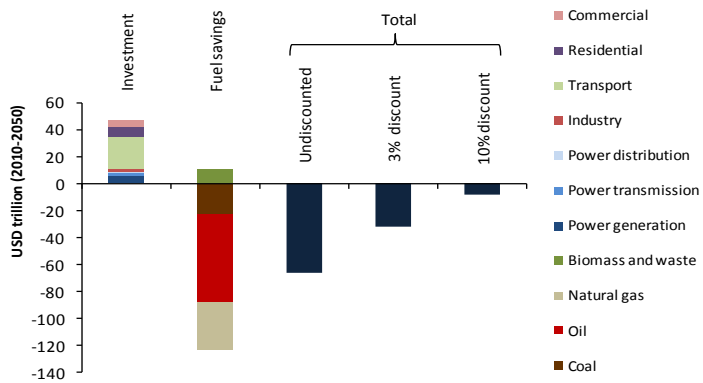
## Smart grid CO<sub>2</sub> reductions in 2050



Smart grids allow better management of the grid and can facilitate the deployment of low-carbon technologies, such as renewables and electric vehicles.



## Additional investment and fuel savings, 2010-2050



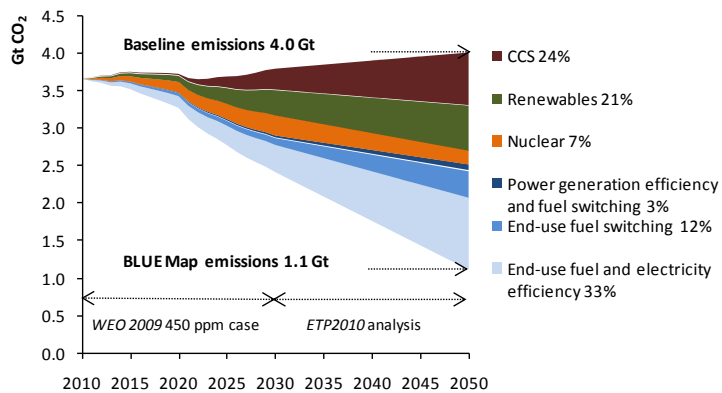
Even using a 10% discount rate, fuel savings in the BLUE Map scenario more than offset the additional investment required.



## OECD EUROPE



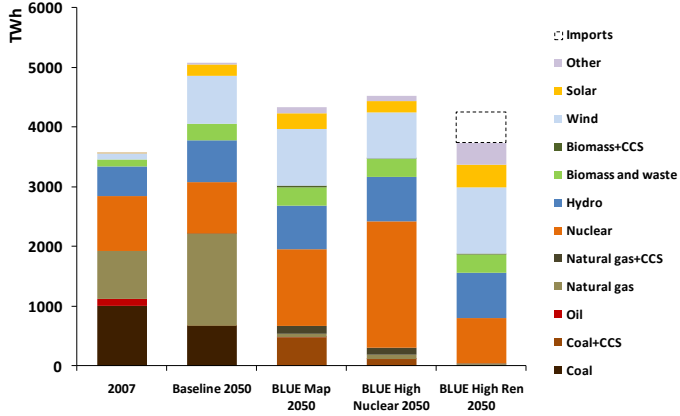
## Contributions to emissions reductions in OECD Europe



End-use sector measures contribute nearly two-thirds of the emissions reductions between the Baseline and BLUE scenarios in 2050.



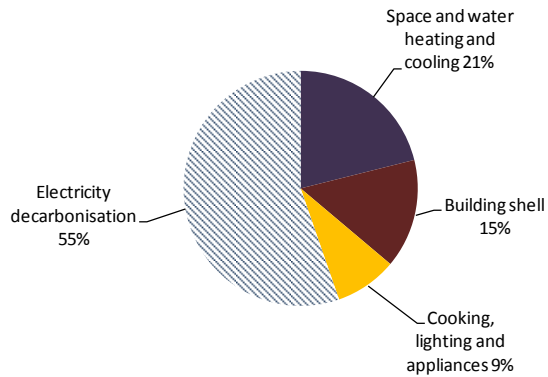
## Decarbonisation of power generation in OECD Europe



A mix of nuclear, renewables and fossil-fuels with CCS will be needed to decarbonise the electricity sector.



## CO<sub>2</sub> emissions in the buildings sector in OECD Europe



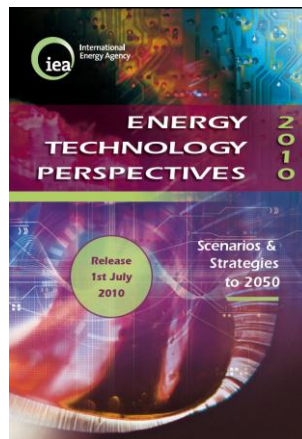
Decarbonisation of the electricity sector contributes over half of emissions reduction in the buildings sector.





## Key messages

- **Some early signs of an energy technology revolution, but change is still fragile and fragmented**
- **Rapid, large-scale deployment of low carbon technologies is needed to halve CO<sub>2</sub> emissions by 2050**
- **This will also reduce fossil fuel use and improve energy security**
- **Fuel savings may outweigh additional investments**
- **Improved energy efficiency and decarbonising electricity are key; new technologies needed after 2030**
- **Urgent action required – emissions must peak by around 2020**
- **Non-OECD countries also need to cut emissions**
- **Governments must take lead to set the policy framework, but industry also has a role**



**Thank You**

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