International Energy Agency

IEA Energy Technology Model

Energy Technology Perspectives 2010

Energy Technology Perspectives project

- IEA flagship project on energy technology, complementing the WEO
- Provides impartial advice to decision makers on energy technology policy
- Main output is Energy Technology Perspectives (ETP) publication – released every two years
- Input to high-level inter-governmental discussions

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Scenarios & Strategies to 2050

ETP Scenarios

- **Baseline scenario:**
  - Following the World Energy Outlook 2009 Reference Scenario
  - World GDP grows by factor 2.75 between 2007 and 2050
  - Energy prices: Oil USD 120/bbl in 2050, Coal USD 115/tonne
- **BLUE scenario:**
  - 50% reduction of energy related CO_2 emissions by 2050 compared to 2005
  - Options with marginal reductions of up to USD 175/t CO_2 are needed
  - Due to uncertainties number of variants being considered

Key messages from scenarios

- The Baseline scenario is unsustainable – environmentally, economically, socially
- Widespread deployment of low carbon technologies (costs < USD 175/tCO_2) needed to halve CO_2 emissions by 2050
- Improved energy efficiency and decarbonising electricity are key
- New technologies needed after 2030
- Shares of biomass and electricity increase
- Urgent action required – emissions must peak by around 2020
- Non-OECD countries also need to cut emissions below current levels

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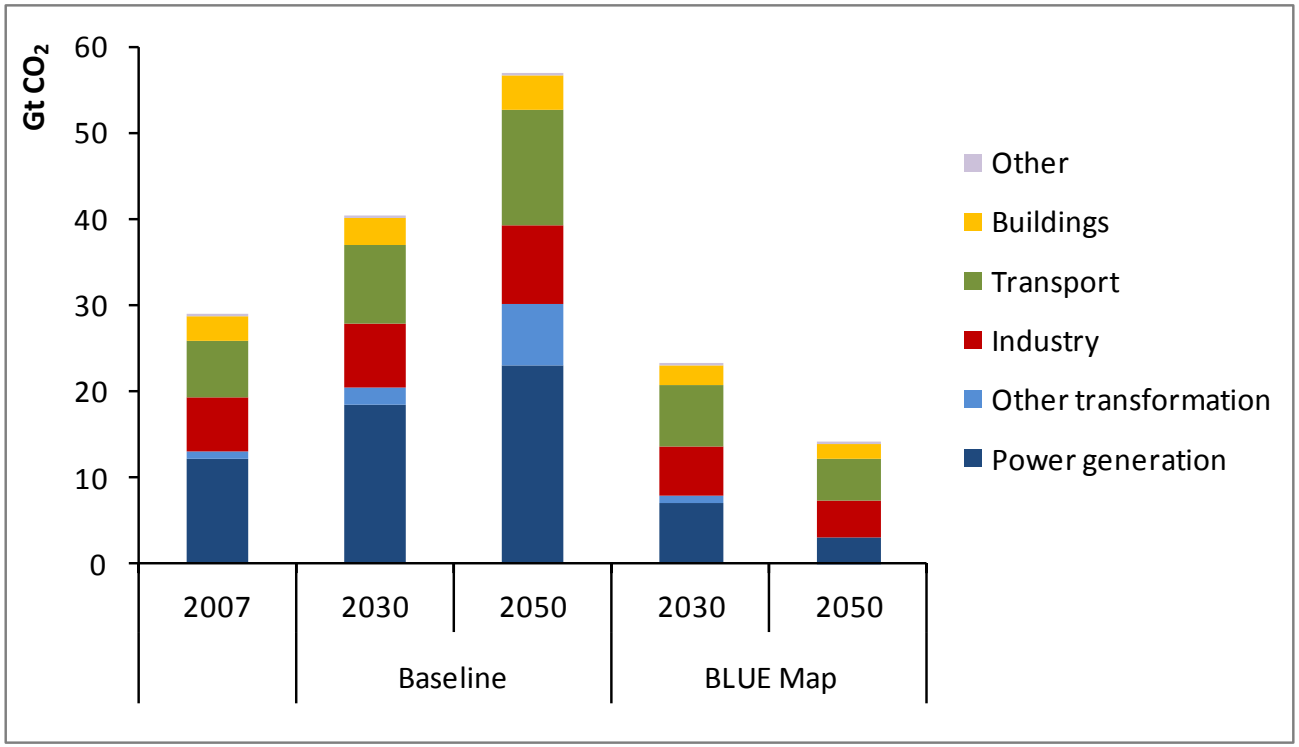
World: CO_2 emissions



- *Global emissions double by 2050 in Baseline*
- *50% reduction in 2050 on 2005 levels in BLUE, equivalent to 75% reduction from 2050 Baseline*

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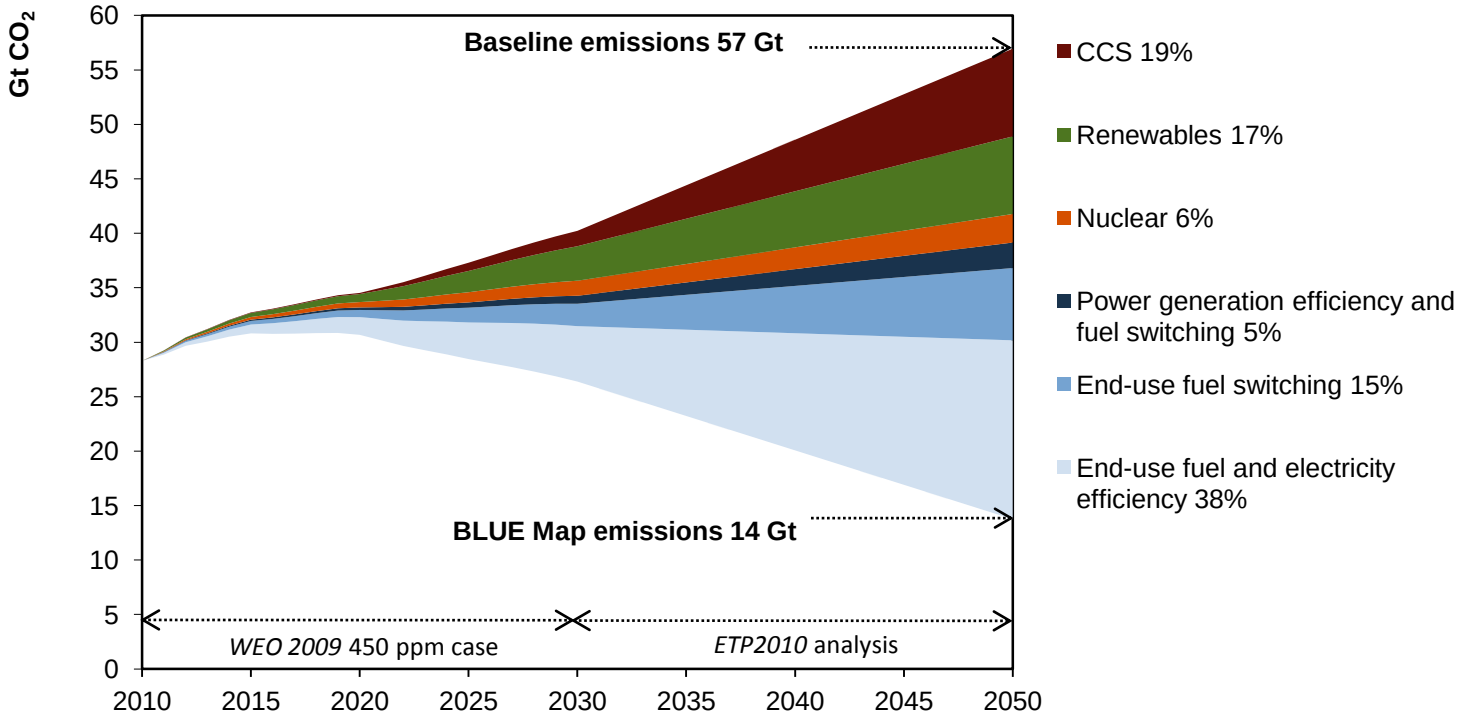
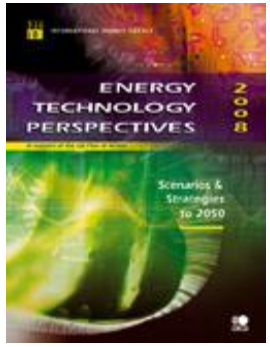
Key technologies for reducing global CO_2 emissions under the BLUE Map scenario

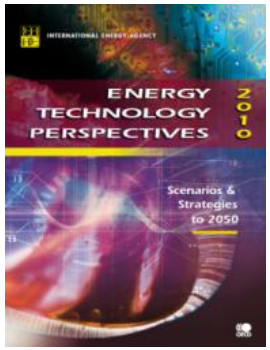


A wide range of technologies will be necessary to reduce energy-related CO_2 emissions substantially.

Modelling the Buildings Sector

- Model for buildings sector developed for ETP 2006
- Regional model, but model large countries separately
- Bottom-up approach, focusing on end-uses, includes stock models
- Very data intensive
- Continuously working to improve understanding of global building stock and energy consumption by end-use





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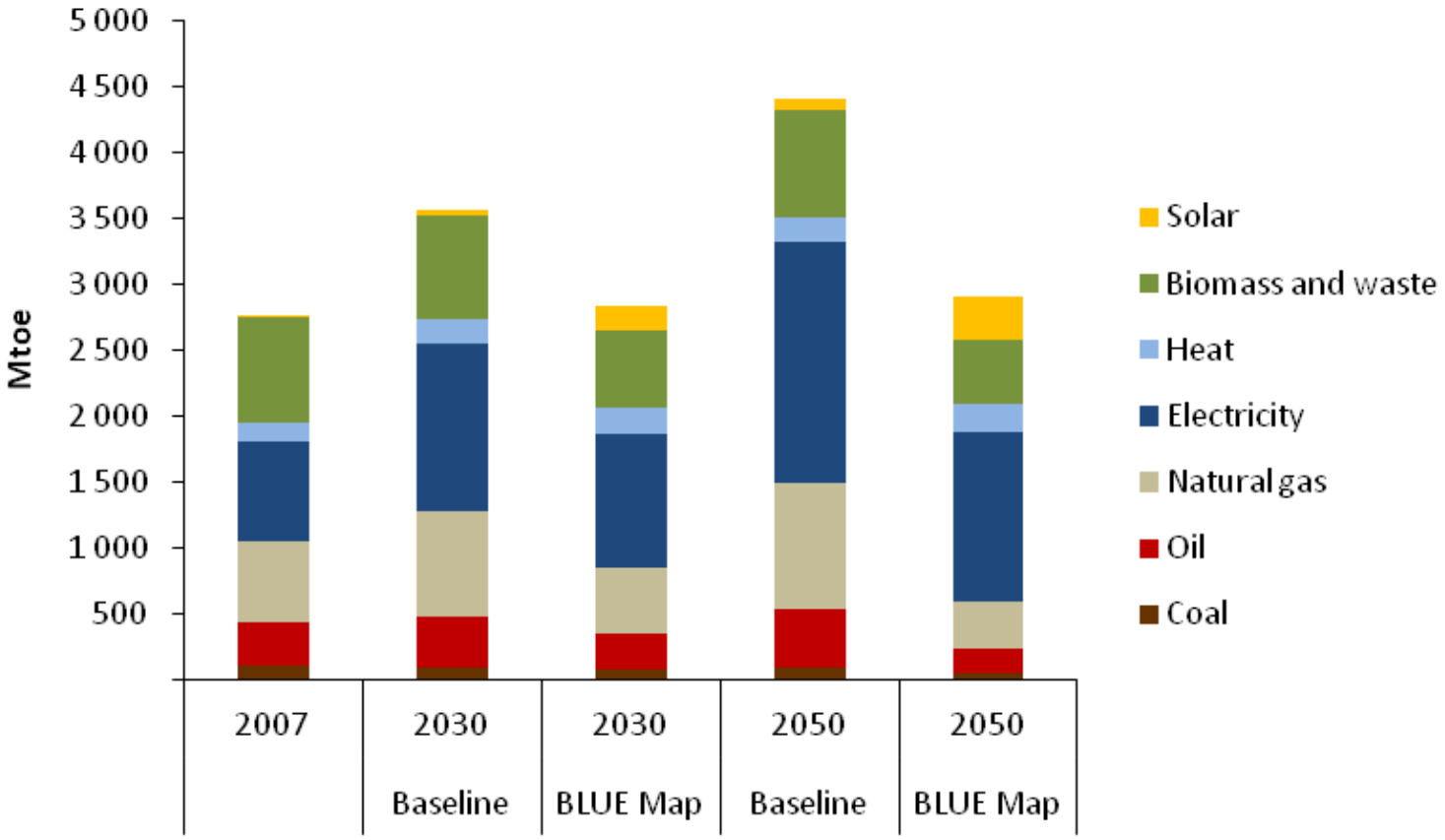
Energy consumption by fuel and by scenario



Energy consumption in the building sector is 5% higher in 2050 than in 2007 in the BLUE Map Scenario.

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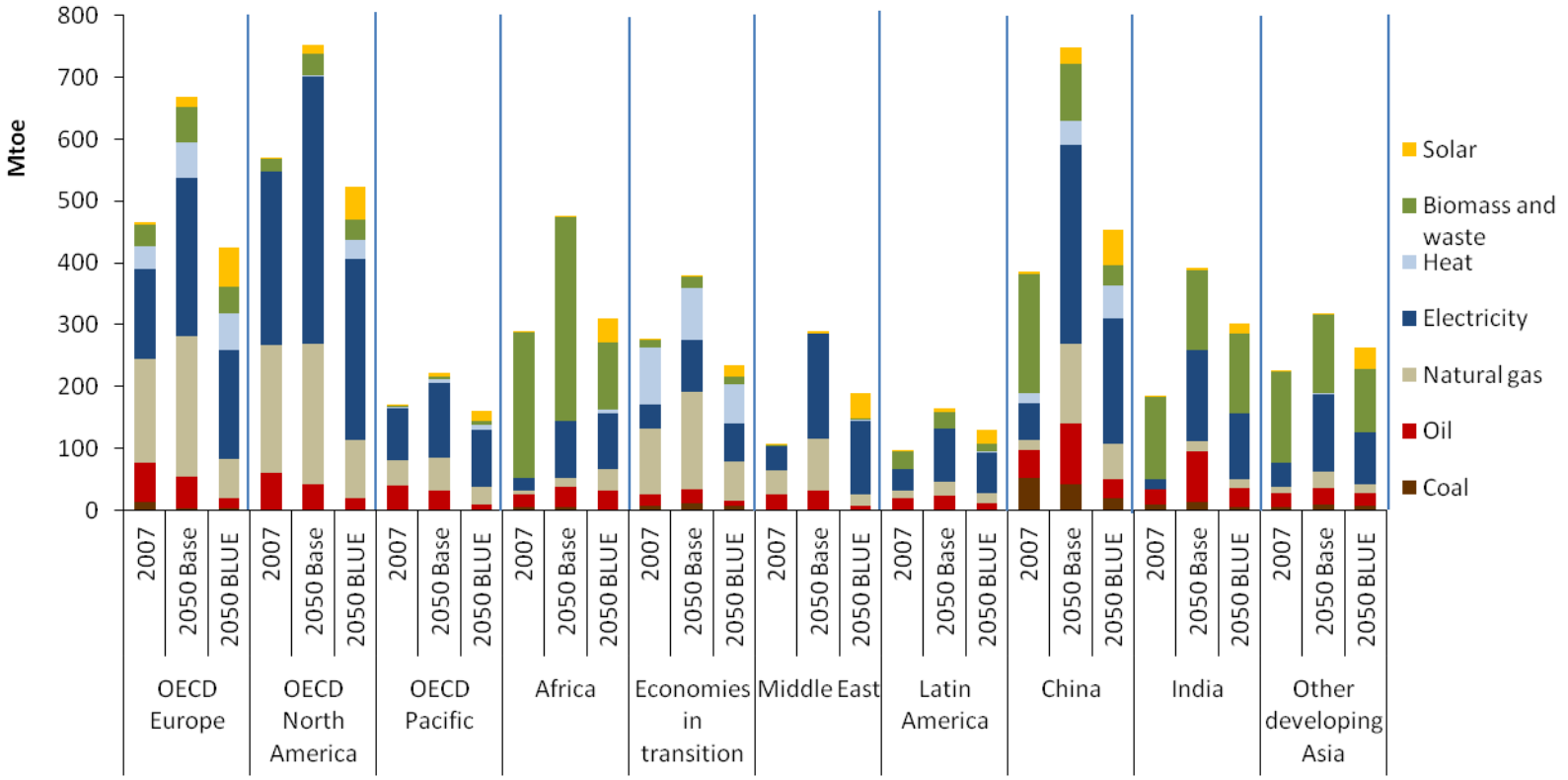
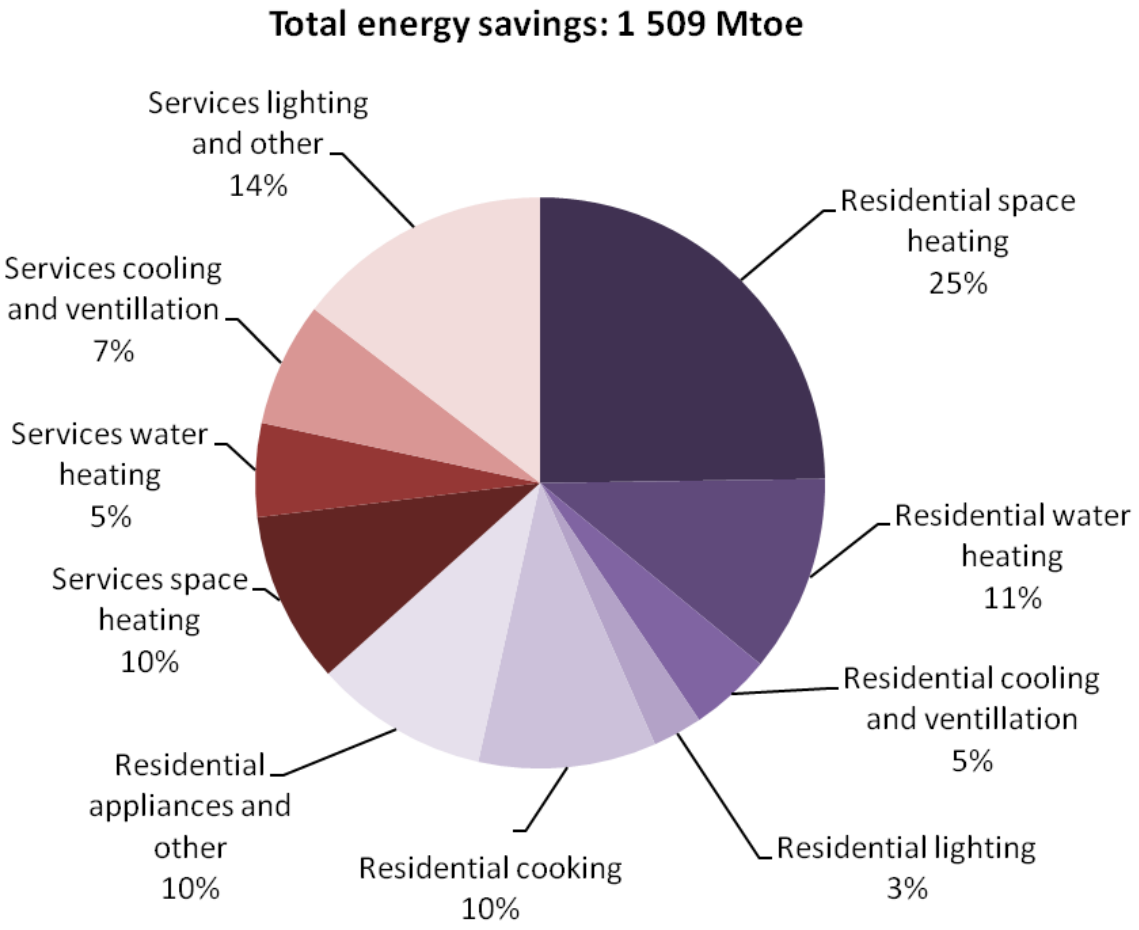
Energy consumption by fuel, by scenario and region



OECD regions reduce energy consumption below 2007 levels in the BLUE Map scenario by 2050.

Energy savings by sector and by end use, 2050



Two-thirds of the energy savings in the BLUE map scenario come from the residential sector.

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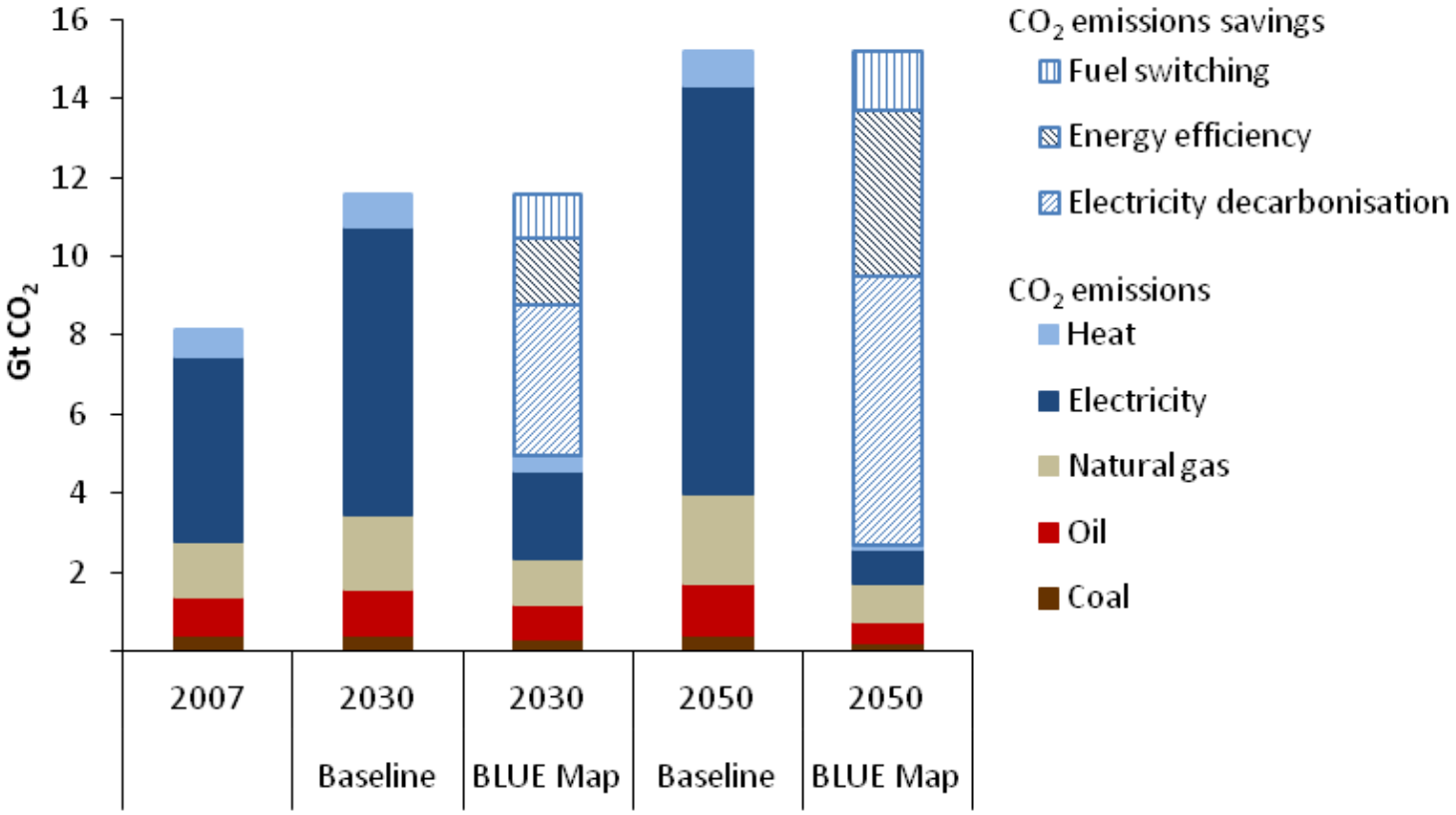
BLUE Map results for Buildings: CO_2 emissions



In the BLUE Map scenario, buildings sector CO_2 emissions in 2050 are 83% lower than in the Baseline scenario.

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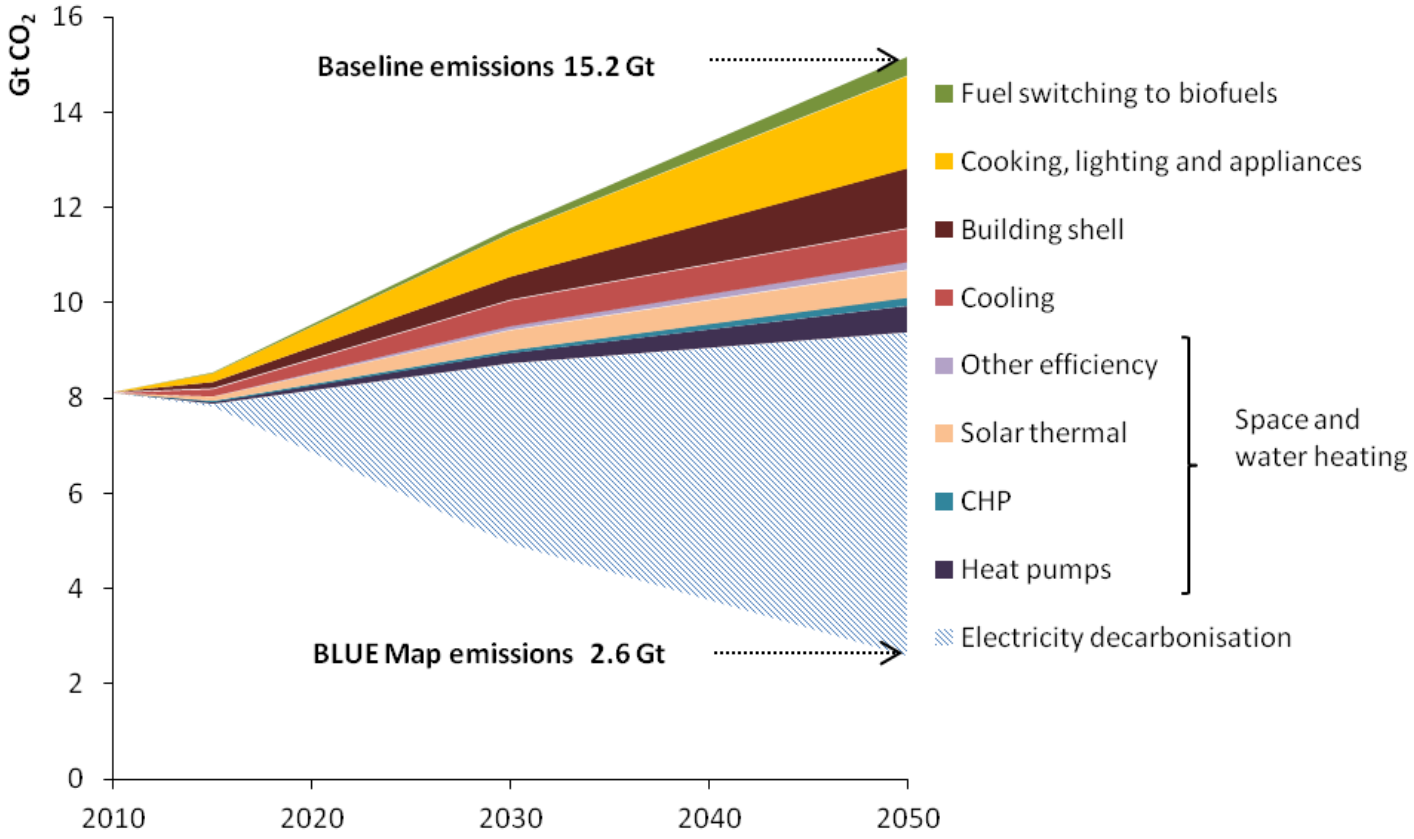
BLUE Map results for Buildings: CO_2 emissions



Improvements in the building shell and energy savings in electrical end-uses dominate total CO_2 reductions in the BLUE Map scenario.

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Key Technologies for the Buildings Sector in BLUE Map

- Tighter building standards and codes for new residential and commercial buildings
- Large-scale refurbishment of residential buildings in the OECD
- Highly efficient heating, cooling and ventilation systems
- Improved lighting efficiency
- Improved appliance efficiency
- The widespread deployment of CO_2-free technologies. Including the widespread deployment of solar thermal, bioenergy, heat pumps, and fuel cell CHP.
- Cross-cutting technologies: thermal energy storage and importance of future proofing for smart grid

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Key Messages

- Baseline scenario: CO_2 emissions grow from 8.1 gigatonnes (Gt) of CO_2 to 15.2 Gt CO_2 in 2050
- BLUE Map scenario reduces this by 83% in 2050
  - Decarbonisation of electricity reduces emissions by 6.8 Gt CO_2)
- Buildings are the key to low-cost CO_2 abatement scenarios
  - Energy efficiency and switch to low- and zero-carbon technologies reduces emissions by 5.8 Gt CO_2
- Very different challenges in OECD and non-OECD
- Most of the technology solutions are available today and are generally mature, but more R&D needed
- However, uptake is far from optimal from an economic or environmental perspective
- Strong policy action is required

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Next steps

- **Model update – ETP 2012**
  - **Expand regional coverage of the buildings sector**
  - **Expand the time horizon to 2075**
  - **Increase technological specificities**
    - **E.g. include hydrogen fuel-cell; solar space cooling; etc.**
  - **Refine stock accounting models**
  - **Better tracking of appliance stock**
  - **Update data with most up-to-date information**
    - **Including the newly released World Energy Outlook**

Thank you