Building a Paris Agreement Compatible (PAC) energy scenario

CAN Europe/EEB technical summary of key elements

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1.3 Tertiary sector

Key assumptions

In accordance with the residential sector, the tertiary sector cuts its energy demand with the help of technology changes and behavioural changes. Final energy demand decreases by almost two thirds between 2015 and 2050.

- Following assumptions on buildings in the residential sector, the annual renovation rate of the EU building stock will increase from 1% to 3%. More than two thirds are deep renovations that cut the energy need of buildings by 60%. Remaining renovations cut 40% of energy need on average.
- A high annual demolition rate of 1% is also foreseen with 70% of new constructions being highly efficient. The floor area per building remains stable between 2015 and 2050.[1]
- In addition to renovation and replacement of inefficient heating systems, new societal trends (urbanisation, building automation, behavioural changes triggered by improved awareness-raising) contribute to overall energy demand reduction with roughly one third.[2]

Evolution of energy demand

The final energy demand of buildings in the tertiary sector comprises offices, wholesale and trade, hotels, gastronomy, education, health care and other building facilities for services. Like in the residential sector, deep renovation reduces massively the final energy demand, however to a slightly minor extent. In accordance with the residential sector, primary energy will be used more efficiently because of a gradual replacement of inefficient individual fossil fuel-fired heating systems by district heating networks and heat pumps.[3]

Although in the tertiary sector the share of electricity demand in final energy demand is more important than in the residential sector, it slumps by more than one third between 2015 and 2050. The strong increase of electricity demand for heat pumps is at the same time offset by reduced demand for space heating and hot water. In addition, the electricity demand for lighting and appliances (including refrigeration and ventilation) falls from 473 TWh in 2015 to 193 TWh in 2050.[4] The energy savings potential of new societal trends can unfold without rebound effects. A precondition is that building automation, digitalisation and behavioural changes go hand in hand with improved awareness-raising on energy consumption.

Integration of members' and experts' feedback

Like for buildings in the residential sector, the annual renovation rate was set at 3%, based on modelling of the EUCalc project. The feedback on mobilising energy savings through behavioural changes and societal trends in the residential sector relates also to the tertiary sector. Assumptions were taken over in accordance while reflecting again the trajectories for energy demand reduction in the tertiary sector from Fraunhofer ISI.

1 Taking over assumptions from EUCalc.

2 Taking over assumptions from Fraunhofer ISI.

3 Aalborg University.

4 Taking over assumptions from Fraunhofer ISI.

Sensitivities and limitations

The same limitations as in the residential sector apply. Behavioural changes are difficult to predict and imply higher uncertainties. Regarding the important share of electricity demand caused by information and communication technologies (ICT) and building technologies in the tertiary sector, future impacts of connected appliances would merit a more in-depth analysis. This would improve the first assessment that was integrated into the PAC scenario.

Key results

- With 54% less final energy demand in 2050 compared to 2015, the reduction in the tertiary sector is significant but not to the same extent as in the residential sector. It is enabled by increased deep renovation, as well as by societal trends (building automation, digitalisation and behavioural changes).
- Electricity constitutes 67% of final energy demand in 2040. Demand for fossil fuels disappears after 2035 while district heating and heat pumps take over most of the demand.
- The demand for gaseous energy carriers beyond 2035 is limited to marginal amounts for cooking. No demand for renewable hydrogen neither for synthetic methane is expected in the tertiary sector.