



2018-IP16: Cement technology roadmap plots path to cutting CO₂ emissions 24% by 2050

The IEA and The Cement Sustainability Initiative (CSI)¹ have published an update of the 2009 sectoral roadmap for the cement industry. The technology roadmap, called **Low-Carbon Transition in the Cement Industry**, aims to identify and develop international collaborative efforts and provide evidence for public and private sector decision-makers to move towards a more sustainable cement sector that can contribute to long-term climate goals. The technology roadmap report can be found at: <https://webstore.iea.org/technology-roadmap-low-carbon-transition-in-the-cement-industry>

For reference, the cement sector is the third-largest industrial energy consumer in the world, responsible for 7% of industrial energy use, and the second industrial emitter of carbon dioxide, with about 7% of global emissions. Cement is the key ingredient of concrete – which is used to build homes, schools, hospitals and infrastructure, all of which are important for quality of life, social and economic wellbeing. As global population rises and urbanization grows, global cement production is set to increase between 12 to 23% by 2050.

The report suggests that despite energy efficiency improvement across the global cement industry, direct carbon emissions from the cement industry are expected to rise by 4% globally by 2050 under the IEA Reference Technology Scenario (RTS). Note: the RTS is a base case scenario that takes into account existing energy and climate commitments under the Paris Agreement. Realising the IEA's more ambitious 2°C Scenario (2DS) by 2050, which seeks to limit average global temperature increases to 2°C, implies significantly greater efforts to reduce emissions from cement manufacturing.

The key conclusion of the Roadmap is that the low-carbon transition of the cement industry can only be reached with a supportive regulatory framework as well as effective and sustained investments. Meeting the RTS already requires additional cumulative investments compared to the status quo. Achieving the transformation described by the 2DS could mean up to a doubling of these investments compared to the RTS. Governments, in collaboration with industry, can play a determinant role in developing policy and regulatory mechanisms that unlock the private finance necessary for such a boost in investment.

The roadmap uses a bottom-up approach to explore a possible transition pathway based on least-cost technology analysis for the cement industry to reduce its direct CO₂ emissions in line with the IEA's 2DS. Reaching this goal would require a combination of technology solutions, supportive policy, public-private collaboration, financing mechanisms and social acceptance.

The main carbon mitigation options for the cement sector are:

- Improving energy efficiency and switching to alternative fuels, in combination with reducing the clinker content in cement are seen as key near term measures.
- In the longer term, the deployment emerging and innovative technologies like carbon capture and the use of alternative binding materials are required.

Further emissions savings can be achieved by taking into account the overall life cycle of cement, concrete and the built environment. This can include optimising the use of concrete in construction by maximising design life of buildings and infrastructures, encouraging reuse and recycling, reducing waste and benefiting from concrete's properties to minimise energy needs for heating and cooling of buildings.

¹ <http://www.wbcscement.org/>



The roadmap outlines policy priorities and regulatory recommendations, discusses investment-stimulating mechanisms and describes technical challenges with regard to research, development and demonstration.

With specific reference to CCS, the roadmap lists a series of actions that need to be taken which are:

- Governments and international development institutions to mitigate risks through investment mechanisms that use private funding for low carbon innovative technologies and through the promotion of private-public partnerships. For example, research programmes such as Horizon 2020 or the Innovation Fund in the European Union help to attract private investment and reduce the risks associated with innovative technologies like CCS.
- Governments to co-ordinate identification and demonstration of CO₂ transport networks at regional, national and international levels, to optimise infrastructure development and to lower costs by collaborating with industry, to investigate linkages into existing or integrated networks and opportunities for cluster activities in industrial zones.
- Governments and industry to promote international co-operation, for example through the UNFCCC, to harmonise approaches for safe site selection, operation, maintenance, monitoring and verification of CO₂ permanent storage.
- Governments to develop internationally coordinated regulatory frameworks for CCS and CCU and to collaborate with industry to significantly expand efforts to educate and inform the public and key stakeholders about carbon storage, to build social acceptance.
- Governments to reward clean energy investments and provision of flexibility to local energy grids – for example fiscal incentives for EHR.
- Governments and industry to encourage joint scientific and engineering research projects among countries, and to establish collaborative research programmes or networks among companies and equipment suppliers.

Comments:

The Cement sector Road Map follows a recent report by the Carbon Disclosure project (CDP) entitled 'Building Pressure' which has analysed the greenhouse gas emissions of 13 of the world's largest publicly-listed cement companies. The report was summarised in 2018-IP10: 2017 A Critical Look at the Cement Industry, see:

http://www.ieaghg.org/docs/General_Docs/Information_Papers/2018/2018-IP10_A_critical_look_at_the_Cement_Industry.pdf

The key headline from the report was that: cement companies need to more than double their emissions reductions if they are to limit global warming to below two degrees, as agreed in the Paris climate deal. The report also felt, as does the IEA Roadmap, that regulation is key - tightening building regulation and a rise in low carbon cities could drive change in the sector.

The GCP report stated that significant innovation in technology is required to reduce carbon emissions from cement and the Roadmap sets out the innovation challenges. Both the Roadmap and the GCP see CCS as an important technology for creating low-carbon cement.

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