

## Frequently Asked Questions (FAQs)

**FAQ 11.1 | What are the key options to reduce industrial emissions?**

Industry has a diverse set of greenhouse gas (GHG) emission sources across subsectors. To decarbonise industry requires that we pursue several options simultaneously. These include energy efficiency, materials demand management, improving materials efficiency, more circular material flows, electrification, as well as carbon capture and utilisation (CCU) and carbon capture and storage (CCS). Improved materials efficiency and recycling reduces the need for primary resource extraction and the energy-intensive primary processing steps. Future recycling may include chemical recycling of plastics if quality requirements make mechanical recycling difficult. One approach, albeit energy intensive, is to break down waste plastics to produce new monomer building blocks, potentially based on biogenic carbon and hydrogen instead of fossil feedstock. Hydrogen can also be used as a reduction agent instead of coke and coal in ironmaking. Process emissions from cement production can be captured and stored or used as feedstock for chemicals and materials. Electricity and hydrogen needs can be very large but the potential for renewable electricity, possibly in combination with other low carbon options, is not a limiting factor.

**FAQ 11.2 | How costly is industrial decarbonisation and will there be synergies or conflicts with sustainable development?**

In most cases and in early stages of deployment, decarbonisation through electrification or CCS will make the primary production of basic materials such as cement, steel, or polyethylene more expensive. However, demand management, energy and materials efficiency, and more circular material flows can dampen the effect of such cost increases. In addition, the cost of energy-intensive materials is typically a very small part of the total price of products, such as an appliance, a bottle of soda or a building, so the effect on consumers is very small. Getting actors to pay more for zero-emission materials is a challenge in supply chains with a strong focus on competitiveness and cutting costs, but it is not a significant problem for the broader economy. Reduced demand for services such as square metres of living space or kilometres of car travel is an option where material living standards are already high. If material living standards are very low, increased material use is often needed for more sustainable development. The options of materials and energy efficiency, and more circular material flows, generally have synergies with sustainable development. Increased use of electricity, hydrogen, CCU and CCS may have both positive and negative implications for sustainable development and thus require careful assessment and implementation for different contexts.

**FAQ 11.3 | What needs to happen for a low-carbon industry transition?**

Broad and sequential policy strategies for industrial development and decarbonisation that pursue several mitigation options at the same time are more likely to result in resource-efficient and cost-effective emission reductions. Industrial decarbonisation is a relatively new field and thus building capacity for industrial transition governance is motivated. For example, policy to support materials efficiency or fundamental technology shifts in primary processes is less developed than energy efficiency policy and carbon pricing. Based on shared visions or pathways for a zero-emission industry, industrial policy needs to support development of new technologies and solutions as well as market creation for low- and zero-emission materials and products. This implies coordination across several policy domains including research and innovation, waste and recycling, product standards, digitalisation, taxes, regional development, infrastructure, public procurement, permit procedures and more to make the transition to a carbon neutral industry. International competition means that trade rules must be evolved to not conflict with industrial decarbonisation. Some local and regional economies may be disadvantaged from the transition which can motivate re-education and other support.