BASF
We create chemistry

Position on future carbon feedstock

Key messages

- BASF aims to become net-zero globally by 2050 on its scope 1, 2 and 3.1 emissions (2045 in Germany) and aims to enable its customers by offering products with a low or net-zero product carbon footprint (PCF).
- There is no single solution to substitute fossil feedstock for carbon-based materials. Bio-based and recycled raw materials as well as fossil feedstock in combination with Carbon Capture and Storage (CCS) will all be required and increase energy needs of the chemical industry. Technological development must span biotechnology and new routes for bringing biomass into value chains, diverse recycling pathways for waste management, and CO/CO2 utilization.
- An enabling political framework should support the chemical industry's transition into a multi-raw-material system. This requires a business case for all value chain partners and consistent sustainability criteria for each pathway. Such a system should embrace emerging recycling technologies, establish a cascading use for carbon feedstocks, remove barriers for CCS and Carbon Capture and Utilization (CCU) and facilitate harmonized availability of PCF information - including acceptance of a flexible mass balance credit method approach

About the topic

The global chemical industry uses about 700 million tons of fossil-based carbon feedstock per year to produce the carbon-based materials required in all industries and value chains[i]. Carbon demand is expected to grow to more than 1 billion tons by 2050.[ii] A gradual shift to sustainable alternatives will only be possible if all technical and financially feasible options are pursued. Defossilization will only become possible with time and excessive amounts of renewable energy. Recycled and bio-based feedstocks availability is physically limited. CCU requires substantial amounts of renewable energy for hydrogen, and even more energy when using atmospheric CO_2 (Direct Air Carbon Capture, DAC). All non-fossil solutions have drawbacks [ii-vi] and the chemical industry's demand for these competes with the demand from other sectors such as fuels. Thus, as complementary path, fossil feedstock combined with CCS is also required.[iii,iv]

Circularity does not only address climate issues but also waste-management needs. For plastic products, maximizing recycling by leveraging all available technologies is a priority.[v,vi,vii] Several other chemical products' streams, e.g., solvents, also have a potential for recycling. End products that are consumed (e.g., food and feed) or dispersed during use (e.g., paints, adhesives, hygiene products) are typically not available for recycling.

What does BASF offer?

BASF is committed to become net-zero globally by 2050 on its scope 1, 2 and 3.1 emissions. Since 1990, BASF has already reduced its scope 1 and 2 GHG emissions by almost 50%. BASF invests heavily into subsequent electrification measures, future technologies development and CCS evaluation to further decarbonize its own energy use and production. BASF offers an increasing share of non-fossil and low / net-zero PCF products to meet customers' demand and aims to become the preferred partner for its customers' climate transformation.

Biomass: In 2024, BASF purchased around 1.2 million tons of renewable raw materials based on vegetable oils, fats, grains, sugar, wood and residues. Biomethane, Bionaphtha and Green Methanol are key raw materials to enable low- and zero PCF products.These renewable raw materials are used to produce, e.g., ingredients for the detergents & cleaning and the cosmetics industry, for pharmaceuticals or to produce additives or plastics for automotive applications or electric cables. Furthermore, BASF offers certified bio-based and compostable plastics used for, e.g., organic waste collection or agricultural applications. BASF commits to sourcing biomass sustainably. BASF is the first chemical company offering Rainforest Alliance Certified personal care ingredients based on coconut oil and engages in sustainable castor oil production. BASF continuously develops and adapts sourcing criteria further to ensure the purchase of sustainably grown biomass

Plastics recycling: BASF innovates and collaborates with partners to enable mechanical, solvent-based, chemical, and organic recycling, to establish the most sustainable treatment for each waste stream. BASF also strives to establish recyclability of its plastics products and enable access to recycled carbon. Examples include establishing mechanical recycling of its plastics, e.g., (expanded) polystyrene and polyethylene/polyamide multi-layer films, cleaning solutions for mechanical recycling processes, as well as chemical recycling of tires, mixed packaging, textiles, automotive shredder light fraction, industrial scrap, and matrasses.

CCU: BASF is already using CO_2 as a feedstock in selected reactions and processes, e.g., urea and carbonates (diethyl-, dipropylcarbonates). Also, BASF has developed dedicated CCU catalytic systems for conversion of CO_2 to synthetic methane and methanol, using CO_2-free hydrogen. Both technologies are mature and available on a commercial scale.

CCS: BASF is already participating in explorative CCS projects with industrial partners, e.g., in a cross-border CCS value chain with Air Liquide in Antwerp (co-funded by the European Union and the Flemish government), and exploration of a 10 million-ton-scale CCS project in East China area with Sinopec, Shell and Baosteel.

The Mass balance approach is a key enabler for BASFs operation divisions to offer solutions to the customers: They can offer mass-balanced products with an attributed share of recycled, renewable or low PCF raw material. This chain of custody concept is certified by independent third parties and allows BASF to communicate transparently the sustainability benefits of alternative feedstocks (biomass, chemical recycling) and improved production (e.g. renewable energy).

Gas treatment: For more than 50 years, BASF is working in the field of industrial gas treatment and technologies, including OASE® blue to capture various compositions of CO/CO_2 and OASE® green, targeted for biogas applications.

Our position

1. Apply **a "feedstock-agnostic" approach** and avoids promoting any specific raw material over the other
2. Increase the availability of sustainable non fossil carbon sources. **Acknowledge the role of biomass, recyclate and CCU** (CO2/hydrogen) in substituting fossil input. This allows to leave fossil carbon in the ground*. The CO2 emission savings happen upstream. They are independent from the lifetime of the products made thereof, thus should be accounted for product carbon footprints. End of life emissions depend on waste management choices, not on a specific source of carbon in a molecule.
3. Implement **a "cascading use" of materials.**
   a. Reduce carbon use for materials, where possible, by responsible consumption and by using electricity wherever it can substitute energy use from molecules in a meaningful way (incl. hydrogen, biomass)
   b. Use carbon in **energy- and cost-efficient way based on molecular structure** of input
      i. **Recognize various existing and emerging recycling technologies** (such as solvent-based, chemical, and organic) to exploit synergies for the efficient processing of wastes.
      ii. **Prioritize biomass for industry** use (after ensuring food and feed needs), recognizing that chemical structure matches allow for efficient use of biomass for specific chemicals.
      iii. Apply **CCU for selected areas** with low energy costs/investment needs only. Match a broad CCU roll-out with EU and global availability of sufficient renewable energies and hydrogen at competitive costs.
      iv. Develop a **CCS** infrastructure. Until enough sustainable alternative raw materials are available at competitive costs, **fossil input in combination with an equivalent capacity for CCS** is needed.
4. Ambitious climate and circularity targets must be accompanied by **market pull mechanisms to create a business case** for the whole value chain. The disadvantage of chemicals vs. the fuels sector, where incentivizing policies are already in place, needs to be better addressed.
5. **Recognize a pragmatic (bio-)mass balance approach** for the calculation of circular and low carbon feedstocks with claiming based on facts and credible verification and certification
6. **Synchronize the conversion of existing infrastructures**, e.g., natural gas to hydrogen and/or CO2 pipelines, with the transition and raw material change of the industry, to continuously fulfill the needs. Established CCS infrastructure also has the potential to sequester biogenic or atmospheric CO2 and contribute to negative emissions needed to reach net zero. The development of a sufficient CO2 grid across national borders requires that public de-risking instruments should not discriminate against first movers and to incentivize investments by pipeline operators.

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i Levi, P.G; Cullen, J.M. Environ. Sci. Technol. 2018, 52, 1725.
ii Carus et al, RCI Study, 25-02-03_Is-there-enough-biomass-to-defossilise-the-chemicals-and-derived-materials-sector-by-2050-vdq5jg.pdf
iii SystemIQ 2022, Plant Positive Chemicals
iv Mazzotti et al., Industrial & Engineering Chemical Research 2020, 59 (15), 7033–7045
[v] Vidal et al., Nature **2024**, *626*, 45 - 57
[vi] Bachmann, Bardow et al, Nature Sustainability **2023**, *6*, 599-610
[vii] Stegmann et al, Nature **2022**, *612*, 272–276