Argumentation for the Central German Chemical Industry at "The Critical Chemical Alliance" represented by Forum Rathenau

Initial Situation

The chemical industry of Central Germany faces its greatest challenge since reunification: the transition to climate neutrality while maintaining the competitiveness of domestic industry. The inland location far from the coast creates special requirements for the upcoming transformation.

Structural change due to altered raw material supply has always existed. The Central German chemical triangle developed over a hundred years ago based on lignite, was gradually converted to oil and gas from the Soviet Union during the GDR era, and was completely modernized after privatization in 1990. Following Russia's invasion of Ukraine in 2022, a tremendous effort was made to break away from Russian imports.

This decade now presents the challenge of achieving greenhouse gas neutrality at a rapid pace. **Carbon and hydrogen are the molecules without which hydrocarbons cannot be produced.** Consequently, there can be no decarbonization, only a gradual defossilization based on:

- **Carbon circular economy** using CO_2 **- Carbon Capture and Utilization** (CCU)
- **Chemical recycling** of plastic waste
- **Expanded use of biogenic raw materials**
- **Carbon Capture and Storage (CCS)** to ensure greenhouse gas neutrality

The chemical industry of Central Germany is capable and willing to transform. The prerequisite is economic survival amid high energy and raw material costs.

In January 2025, the EU Commission published the "Compass for Competitiveness." The Cooperation Network Chemie+ responded swiftly with position papers "A 'Compass' for EU Competitiveness" dated January 29, 2025, and "Compass for EU Competitiveness and the Future of the Chemical Industry" from March 2025, explaining the particular impact on the Central German chemical triangle. Following the publication of the Commission's Chemical Industry Action Plan, a statement from the Central German chemical industry on the EU Commission's Chemical Industry Action Plan was prepared in September 2025 and submitted to the responsible EU Cabinet.

The EU Commission will identify basic chemicals and chemical sites through "The Critical Chemical Alliance" that are critical for the future supply of European economies for reasons of resilience. This paper demonstrates that the Central German chemical triangle should be considered in this process.

The Central German Chemical Triangle

With approximately **35.200 employees** and an annual production capacity of about **8.7 million tons** (16% of German chemical production), the East German chemical cluster is a significant industrial location. The region comprises the sites:

- **Leuna** (12.000 employees) -- Germany's largest chemical site - with refinery, Germany's largest methanol production, gas center with Germany's largest capacity for hydrogen supply through steam reforming. Diverse chemical production utilizing supply chains
- **Böhlen/Schkopau** (3.500 employees) -- steam cracker and plastics production
- **Piesteritz** (4.500 Beschäftigte) – (4.500 employees) -- Germany's largest ammonia and urea production
- **Bitterfeld-Wolfen** (11.000 employees) – broad spectrum of chemical specialties
- **Zeitz** – biobased product portfolio

Particularly noteworthy is the **medium-sized character** of the region: Unlike West German chemical sites, small and medium-sized enterprises dominate here. Large corporations such as Dow Chemical, TotalEnergies, Linde, SKW Piesteritz, Solvay, and Wacker form the backbone of the raw material network, while numerous SMEs benefit from the established integrated structures.

Logistically, the Central German chemical triangle is excellently positioned: pipeline system for chemical products and raw materials; good integration into the energy system; Halle railway junction with connections to chemical sites; direct or nearby motorway access for chemical parks in Leuna, Schkopau, Böhlen, Bitterfeld-Wolfen, Piesteritz, and Zeitz.

Critical Basic Chemicals of the Central German Chemical Triangle

Basic chemicals such as ammonia, methanol, and olefins and aromatics as products of steam crackers are "critical" because they function as raw materials for resilient supply chains. Should their regional production cease, these basic chemicals would not simply be imported, but rather the end products would be imported directly.

Ammonia as a Critical Basic Chemical

SKW Piesteritz is Germany's largest industrial natural gas consumer at 2% and simultaneously already the largest industrial hydrogen producer and the largest potential future hydrogen consumer in Germany. The prerequisite, however, is survival. Without basic chemistry, e.g., ammonia, there would be no nutrition, supply, and resilience. SKW operates one of the last facilities in Germany producing nitric acid, which is needed for the explosives industry, among other things. The basic chemical industry finds itself in

economic warfare with China, Russia, and now also the USA. One must already compete with the framework conditions of energy costs.

Methanol as a Critical Basic Chemical

In the transformation to climate neutrality, green methanol is assigned a special role. On one hand, green methanol can be used as a basic chemical for C1 chemistry to produce olefins and thus the polymers that have previously been produced on a fossil basis through ethylene chemistry. On the other hand, green methanol can be used as fuel for vehicles and ships, but also as starting material for synthetic kerosene for aviation.
Policy focuses both on the import of green methanol and on decentralized production in small facilities with their electrolysis systems.
This is too one-sided. Resilience requires first utilizing the large-scale facilities that are available. Large-scale facilities are inherently more economical than the sum of many small facilities. This applies particularly when such large-scale facilities already exist. Germany's largest methanol facility is operated by TotalEnergies at the Leuna site. A large-scale trial demonstrated that partial oxidation can be operated with biogenic feedstocks instead of fossil ones. Consequently, the task is to gradually convert this facility to the production of green methanol according to the availability of renewable electricity, green hydrogen, and biogenic raw materials.

Critical Supply Chains

Due to the lack of legal basis for CCS, Dow Chemical has decided to shut down structurally defining facilities such as the cracker in Böhlen and the chlor-vinyl facilities in Schkopau. This will eliminate the production of ethylene, propylene, butadiene, aromatics, chlorine, and caustic soda from the end of 2027. Stabilizing the supply chains affected by this for other companies is "critical." This particularly concerns the plants in Schkopau for the production of more than 300 kt/a synthetic rubber and for the production of more than 200 kt/a polypropylene.
However, supply chains for the production of engineering plastics are also affected. One of the largest chemical companies in Saxony-Anhalt had to file for insolvency shortly before the end of 2025: The corporate group DOMO Caproleuna GmbH and DOMO Chemicals GmbH from Leuna.
DOMO's supply chain in Leuna is deeply integrated into the Leuna Chemical Park and includes the production of polyamide 6 and precursors such as caprolactam, which are supported by synergies with other companies such as TotalEnergies (benzene supply) and Linde (hydrogen). The infrastructure (energy/steam) is provided by InfraLeuna. Ammonia is sourced from SKW Piesteritz. The insolvency administrator has announced that interim financing could not be arranged. Therefore, the plants are being shut down.

Critical Chemical Sites in the Central German Chemical Triangle

The raw material network of chemical parks and chemical sites in the Central German chemical triangle is "critical" because it supplies SMEs on one hand and secures economic conditions for numerous SMEs through supply and disposal, service offerings, and logistics on the other.

The Central German Refinery is integrated into the "critical" raw material network with its chemical products.

The transformation of the chemical industry with the circular economy of CO_2 (CCU), the circular economy of waste plastics, the increased use of biogenic raw materials combined with ensuring negative emissions can only be managed if the "critical" structures are led into the future.

Theses for "The Critical Chemical Alliance"

The ETS with its rising CO_2 costs threatens the survival of energy-intensive industry

In 2005, the European Union introduced the Emissions Trading System (ETS). At the time, a clever and market-based solution aimed at pursuing the most cost-effective paths of emission reduction. Energy-intensive industry was deliberately equipped with free certificates measured according to the benchmark of the best facilities. This provided an incentive to improve technologies to reduce emissions. Between 2005 and 2024, greenhouse gas emissions in the EU decreased by 50 percent. The reductions are concentrated primarily in the areas of industry and energy supply, which have been subject to emissions trading for 20 years.

The free certificates are being reduced further and further. The second stage, ETS 2, is scheduled to start in 2028.

For energy-intensive industry, the system no longer functions.

Why? The transformation and greenhouse gas reduction projects planned by companies are not ready for decision-making because cost-effective electricity and especially the infrastructure of networks and storage for electricity, hydrogen, and CO_2 are not available or not yet available. The scarcity of certificates cannot be met with new technologies, so the CO_2 price will reach heights that cannot be passed on in the market. The viability of industrial companies is seriously threatened.

Recommended framework for action:

Harmonization of global climate goals, harmonization of global CO_2 prices, return of ETS funds to companies for sustainable transformation, reform of CBAM as it currently no longer functions, CBAM test phase without additional burden on the EU economy (tests can fail -- in the economy, this means deindustrialization of the EU in this case);

Short-term: immediate freezing of the ETS at the 2025 level -- maintenance of all free allocations as in 2025.

Electricity Supply for Green Hydrogen Production

More flexible handling of electricity supply criteria would make hydrogen production more economical, improve grid stability, enable the use of surplus electricity, and secure the competitiveness of Germany and Europe.

Targeted regulatory adjustments are required. The additionality criterion should not take effect until 2035 instead of 2028. At the same time, monthly correlation should be maintained and the switch to hourly correlation from 2030 should be waived, or at least the activation of hourly correlation should be postponed to 2035, analogous to additionality. Additionally, there needs to be expanded flexibility in CO_2 accounting, for example through hourly calculation of the CO_2 intensity and the renewable energy share of electricity supply. These adjustments should already be implemented by 2026 at the latest and not subject to review in report form by 2028 as planned.

CCS

For inland regions, there are offshore and onshore options, with onshore being significantly more cost-effective.

CCS offshore requires an approximately 400 km pipeline from the collection network node to the coast for the Central German chemical triangle. The investigations for pipeline routing should be coordinated by the BMWE. They are being examined by VNG, Ontras, and DBI within the framework of the CCUS Initiative East Germany. The current funding conditions unilaterally support companies near the coast. Inland regions require special funding to realize the pipeline system, with companies away from the collection node requiring particular support.

CCS onshore is substantially more cost-effective. Past geological investigations have revealed significant CCS potential in the Altmark region.

Furthermore, Brandenburg has significant CCS potential. The Ketzin project, once Germany's only demonstration facility, was located there. Now the task is to resume

current geological investigations so that potential investors can initiate mining law approval procedures for specific sites as soon as federal legislation permits this.

Import or Resilient Supply Chains

Some studies recommend importing basic chemicals such as methanol, ammonia, ethylene, propylene, etc., since energy would have to be imported anyway. The importance of resilient supply chains is not recognized. Furthermore, it is not considered that globally positioned corporations will hardly import basic chemicals. The companies certainly have the option of then importing the end products such as plastics, synthetic rubber, fibers, fertilizers, urea, etc. directly and supplying the market.

In May 2023, the European Commission introduced the Carbon Border Adjustment Mechanism (CBAM).

CBAM is a second emissions trading system for importers and represents the first border adjustment for CO_2 prices worldwide. CBAM must be critically questioned, as certificates in paper form invite criminal activities that are supported in some states.

Circular Economy

Circular economy with CCU and the recycling of waste plastics will gain importance in the future.

Central Germany houses Germany's largest **CCU facilities** with methanol production by TotalEnergies in Leuna and urea production by SKW Piesteritz. Technologically, the use of CO_2 in these processes is CCU. No chemical or thermal decomposition of CO_2 is required; rather, the gas is directly converted into the widely usable derivative forms of methanol or urea. Legally, however, this CCU -- especially in European emissions trading -- is not recognized, as according to the EU Commission's Delegated Act, currently only carbonization, i.e., the production of permanent solids, is recognized. Only the legal change to be pursued will recognize the production of basic chemicals with CCU in the future.

Changed legislation is also a prerequisite for increased use of CCU through the use of unavoidable CO_2 emissions from cement, lime, and waste incineration.

In waste plastics recycling, sorting and mechanical recycling will continue to be improved.

Particularly high recovery rates exist in the recycling of PET bottles. This is supplemented by the chemical recycling of Equipolymers at the Schkopau site, which proportionally feeds flakes into melt polycondensation.

Chemical recycling using the hydrothermal process of mura Technology was planned for two facilities in Böhlen and in Lusatia. Since the use of the oils and gases thus obtained in Dow Chemical's cracker in Böhlen will not occur, these investments will not be made.

Bioeconomy

A study by the Bioeconomy division of the House of Transfer (HoT) on the Central German material network will be available at the end of 2025 and will evaluate the potential currently. The use of biogenic raw materials continues to gain importance. With UPM, Südzucker, and Verbio, there is highly developed industrial use of beech wood, sugar, and other agricultural products or waste.

The proposal for a Carbon Utilization Trading System (CUTS) was adopted by the Renewable Carbon Initiative (RCI) and published in April 2025 in their "Policy Proposals for Facilitating the Transition to Renewable Carbon."

Future development possibilities for the bioeconomy should be identified.

Agricultural crops (e.g. corn) are enabled through urea fertilization to absorb approximately twice the amount of CO2 from the atmosphere during their growing season (which corresponds to approximately 17 times the CO2 emissions from the corresponding nitrification-inhibited urea fertilizer application) compared to the same unfertilized agricultural land.

In this way, they effectively bind atmospheric CO2 materially into versatile biomass (cellulose & hemicellulose => biogas to bio-methane or via pyrolysis/plasmolysis to synthesis gas) in terms of a bioeconomic circular economy. This potential is only just beginning to be communicated, but has long been known in scientific circles.

Negative Emissions

CDR (carbon dioxide removal) stands for the targeted removal of CO_2 from the atmosphere and its storage in other carbon reservoirs. The combination of biogenic raw materials and energies with CCS opens up this option.

To enable ramp-up, a bundle of public funding instruments is required, including government procurement of CDR certificates, one-time grants for CDR projects, and Carbon Contracts for Difference (CCfDs).

e-Fuels

For the development of e-kerosene, there is a DLR platform in Leuna.

The previously announced projects for industrial implementation based on methanol by TotalEnergies in Leuna and based on Fischer-Tropsch by ELG in Böhlen are currently not being realized.

Studies on the Future of the Central German Chemical Triangle

There are three current studies from 2025 that evaluate the transformation of the Central German chemical industry. They demonstrate that the transformation can succeed if the basic structures of basic chemistry are led into a sustainable future.

The two 2025 studies by Fraunhofer IFF "SAXONY-ANHALT - Systemic and Sustainable Energy Transformation for the Future of Energy-Intensive Industry"[1] and Fraunhofer IKTS "Chemical Industry in East Germany -- Perspectives for a Climate-Neutral Future"[2] describe the network of sites in great detail. The Forum Rathenau study "Structural Change: Carbon-Based Industries in Central Germany on the Path to New Markets -- Economic Starting Position and Development Potentials"[3] was authored by the Wuppertal Institute and Arvid Friebe and published in March 2025.

The results of the Fraunhofer IFF study from April 17, 2025, show that energy transformation can be successfully implemented and advanced through joint action by business, science, and politics. The developed measures must be validated with industry and brought to implementation. There are concrete project ideas for this. It becomes clear that the Central German chemical industry, as a result of privatization, was focused on basic chemicals. A sophisticated network and Germany's first chemical parks ensured economic viability at the time, which is no longer given with the decline of European petrochemicals.

The results of the Fraunhofer IKTS study identify the transformation options. The transformation of the East German chemical industry towards a climate-neutral future requires comprehensive realignment in three areas:

1. The conversion of energy supply
2. The use of sustainable raw materials
3. The development of new environmentally friendly products.

[1] file:///C:/Users/m.bitzer/Downloads/setup-studie-2025-1.pdf (Zugriff: 08.12.2025).
[2] file:///C:/Users/m.bitzer/Downloads/HBS_Studie_Chemieindustrie_Ostdeutschland.pdf (Zugriff: 08.12.2025).
[3] file:///C:/Users/m.bitzer/Downloads/basisstudie_2-0_kohlenstoffwirtschaft_forum_rathenau_revidiert.pdf (Zugriff: 08.12.2025)

Concrete transformation options are presented for the sites in Leuna, Böhlen/Schkopau, Piesteritz, Bitterfeld-Wolfen and Zeitz. The necessity of large-scale funding for investments is justified.

There are key political starting points for the success of the transformation of the chemical industry in East Germany. The expansion of renewable energies, particularly wind and solar energy, is necessary to supply the chemical parks with CO2-neutral electricity. Furthermore, hydrogen and its derivatives are essential for defossilization and require appropriate infrastructure. Additionally, robust supply chains for alternative carbon sources must be established. A clear regulatory framework for CO2 capture, utilization and storage is also required. Large-scale funding of investments and targeted research and development support for medium-sized enterprises are indispensable to enable the transition to sustainable technologies and thus secure the region's competitiveness.

The study by Forum Rathenau from March 20, 2025 shows how industry in the Central German mining region can become climate-neutral. The focus is on circular economy, bioeconomy and CO2 utilization.

A roadmap outlines the necessary steps until 2045 to secure value creation and jobs. The Central German mining region, particularly the Central German chemical triangle, can develop into a central driver of the transformation to a climate-neutral carbon economy. Its integrated material networks and interconnected actor chains offer great potential for climate-neutral value creation. For companies to be economically successful in a climate-neutral carbon economy, numerous political and regulatory framework conditions still need to be created at regional, national and EU level. Based on regional lead markets, the Central German region can assume a pioneering role in implementation.

The studies available so far have primarily focused on the chemical industry. Since CCU/CCS is structured across sectors, CapTransCO2 also covered other energy-intensive industries such as cement, lime, glass and waste incineration.

Some studies by other authors recommend importing basic chemicals such as methanol, ammonia, ethylene, propylene and others, since energy would have to be imported anyway. The importance of resilient supply chains is underestimated. Should their regional production cease, it would not be these basic chemicals that would be imported, but rather the end products directly. The basic chemicals are produced in Central Germany by globally positioned corporations that have production facilities in regions with good energy and economic positioning. These corporations have the option of then importing the end products such as plastics, synthetic rubber, fibers, fertilizers, urea and others directly and supplying the market.Claude ist eine KI und kann Fehler machen. Bitte überprüfe die Antworten.

The CapTransCO2 Project

The Cooperation Network Chemie+ has accompanied a feasibility study from 2021 to 2024 with the **CapTransCO2** project, which investigated CCU (Carbon Capture and

Utilization) and CCS (Carbon Capture and Storage) for the climate-neutral transformation of Central German basic materials industry. It is unique that energy-intensive companies came together across sectors to secure a sustainable carbon supply for the chemical industry and refinery with CCU.

CapTransCO_2 Project Partners

- **Leuna:** TotalEnergies Refinery
- **Leipzig:** VNG Gas Transport
- **Böhlen:** Dow Olefin Network Cracker
- **Schkopau:** Dow Olefin Network Plastics Facilities
- **Piesteritz:** SKW Nitrogen Works
- **Karsdorf:** Thomas Cement Group
- **Wissenschaftliche Begleitung:** DBI Leipzig, Ontras

CO_2 Emissions and Potentials

In the study area, there are **137 industrial facilities** responsible for approximately **12% of Germany's total greenhouse gas emissions**. Of these, approximately **9 million t/a CO_2** are available for CCU/CCS and more than **5 million t/a CO_2** for CCS.

Infrastructure Concept

The planned CO_2 collection network is intended to connect the largest emitters in Central Germany with a future intermediate storage facility in Bad Lauchstädt. From there, two main routes lead alternatively to the coast:

- **Bad Lauchstädt – Stade** (375 km, approx. €1,104 million)
- **Bad Lauchstädt – Rostock** (550 km, approx. €1,614 million)

The Rostock variant enables the integration of additional large emitters in Brandenburg, including the PCK Schwedt refinery and cement and lime works near Berlin.

The Cooperation Network Chemie+ represents the interests of large emitters in East Germany through the Carbon Capture Partner network. Through CCU/CCS/CDR topics, sectors beyond the chemical industry and refineries are also integrated, including cement, lime, glass, and waste incineration industries.

Innovation and Research

The transformation of the chemical industry requires intensive research and development. The Central German chemical triangle has a **unique research landscape**:

Fraunhofer Institutes and DLR Development Platform Integrated into Chemical Sites

- **Pilot Plant Center (PAZ)** in Schkopau – polymer synthesis and processing
- **Center for Chemical-Biotechnological Processes (CBP)** in Leuna – processes from renewable raw materials
- **Hydrogen Lab** in Leuna – water electrolysis and methanol synthesis
- **DLR- Development Platform** in Leuna – e-kerosene production

Major Research Center for Chemical Industry Transformation

The **Center for the Transformation of Chemistry (CTC)** in Delitzsch and Merseburg will develop innovative approaches for the chemical industry, such as polymer molecules with predetermined breaking points for improved chemical recycling.

This establishment of research facilities **directly within or in immediate proximity to chemical parks is unique in Germany** and underscores the site's importance for industrial transformation.

Applied Research of SKW Piesteritz

SKW operates Central Germany's largest agricultural applied research facility with a 180-hectare experimental farm in Cunnersdorf near Leipzig. Also located in the Agro-Chemical Park Piesteritz (ACP) is the Agrochemical Institute Piesteritz (AIP), an affiliated institute with Martin Luther University Halle-Wittenberg and ACP site companies for application-oriented basic research.

Conclusion

In the Central German chemical triangle, companies have set out to shape the future of the chemical industry. Critical basic chemicals such as ammonia, methanol, as well as olefins and aromatics are the foundation of the raw material network's transformation. CCU, the circular economy of waste plastics, and additional biogenic raw materials will secure future carbon needs. With CCS and CDR, emissions can be avoided and negative emissions achieved. The developments of the CapTransCO2 project as well as the research institutions of Fraunhofer, CTC, and DLR integrated into or near the chemical sites have the innovative potential to shape the transformation.

The prerequisite is the survival of critical chemical sites through redesigning the framework conditions for ETS, electricity supply, and gas supply.

Forum Rathenau has strong arguments for securing the future of the Central German chemical triangle with "The Critical Chemical Alliance."

Dr.-Ing. Christoph Mühlhaus

Sprecher Kooperationsnetzwerk Chemie ⁺

Ansprechpartner Chemie des Forum Rathenau

✆ +49 176 41831425
christoph.muelhaus@web.de

January 2026