## eFUEL ALLIANCE – CONTRIBUTION TO THE EUROPEAN COMMISSION ON THE CLIMATE TARGETS FOR 2040

The European Climate Law, which came into force in summer 2021, enshrines in law the goal of the European economy and society to becoming climate neutral by 2050. To achieve this goal, the Law sets two interim targets: First, net greenhouse gas (GHG) emissions are to be reduced by at least 55% by 2030 compared to 1990. As part of the Fit for 55 package, relevant climate legislation has been largely adapted and new regulations have been adopted in line with this target.

Secondly, the EU Climate Law requires the European Commission to present a legislative proposal for a 2040 climate target by 2024. The eFuel Alliance strongly supports the EU climate targets and welcomes the opportunity to give feedback within the European Commission consultation. To make reaching those targets achievable, $C0_2$ neutral energy carriers based on renewable energy, so-called eFuels, need to be included cross-sectoral in the legislative framework with the goal to replace fossil fuels and reach climate neutrality as soon as possible.

Our **key recommendations** for achieving the ambitious EU climate targets:

1. We need **ambitious action across sectors** and the promotion of **all relevant climate-friendly solutions** to accelerate the transition towards carbon neutrality.
2. A targeted **import strategy** for eFuels will **support emerging economies and developing countries** in their transition to a more sustainable, low-carbon future, while at the same time ensuring that the volumes of **$CO_2$-neutral fuels needed for Europe's decarbonisation and energy security strategy are made available**.
3. **Pre-qualifications schemes** for eFuels production facilities and a clear **planning horizon until 2050** in the Renewable Energy Directive and other relevant legislation must be set to provide the investment security needed for the industrial scale-up of eFuels.
4. Regulatory support for the deployment of **Direct Air Capture** technology is required to achieve negative emissions and create closed carbon cycles.
5. We need to establish a legislative framework that enables climate-friendly technologies to be deployed at a large scale.

### Status Quo

The European Scientific Advisory Board on Climate Change recommends keeping the EU's greenhouse gas emissions budget within a limit of 11-14 Gt $CO_2$e for 2030-2050. Accordingly, to achieve this, the EU will need to reduce its emissions by 90-95% relative to 1990 levels by 2040.

In addition, the Intergovernmental Panel on Climate Change (IPCC) clearly shows that strong GHG reduction in all sectors is needed:

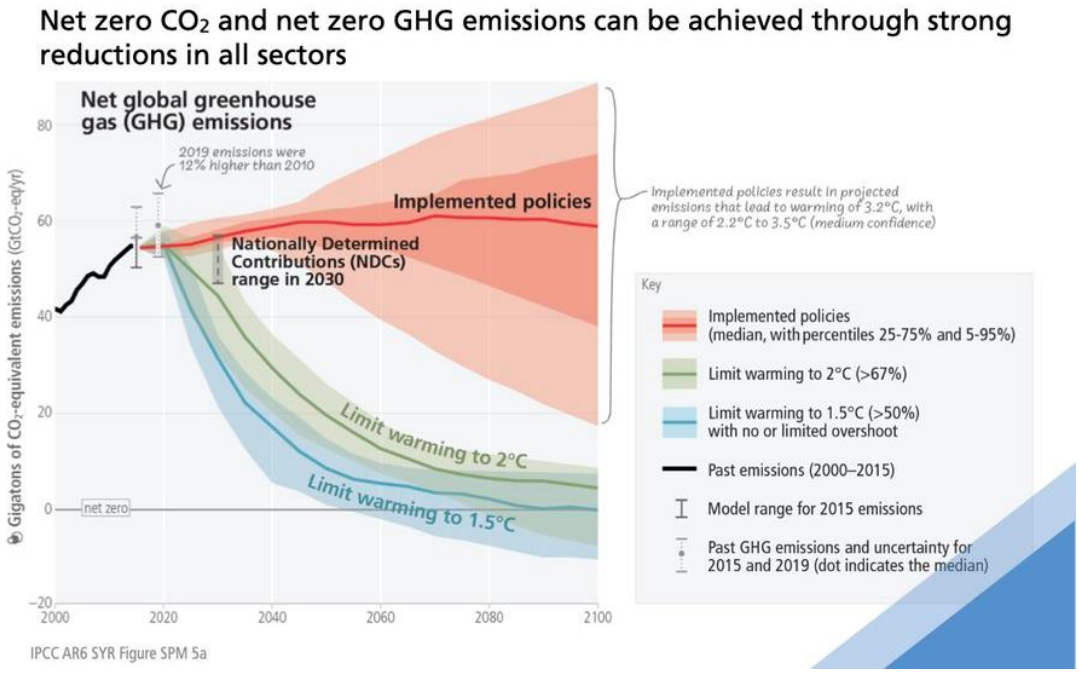


*Figure 1, IPCC need for GHG emission reductions in all sectors.*

The main drivers of GHG emissions in the EU are the industrial and transport sectors. Final energy consumption of those sectors makes up for roughly 54% in 2020 (Source Eurostat, data currently available until 2020). **Only about 17%** of the gross available energy in the EU, which amounts to roughly 58,000 PJ, comes from **renewable energy**. Oil and petroleum products (33%), natural gas (22%) and solid fossil fuels (10%), on the other hand, account for about 65%. Primary energy production in the EU was decreasing from 2019 to 2020 (- 7.1%), mainly due to less fossil energy sources – which in general is a positive trend but indicates the pressure to increase renewable energy production. The first take away therefore is: the **share of renewable must grow immensely**.

Secondly, the EU is an **energy importer** (Source Council). In 2020, energy imports made up for a share of 58%, which are being realized mainly with fossil energy carriers, namely crude oil (18.675 PJ), natural gas (13.786 PJ) as well as gas oil, diesel oil, solid fossil fuels, naphtha and fuel oil. Consequently, the key takeaway is to invest more in our own energy supply. Europe certainly needs to invest more in domestic energy supply. Nevertheless, the EU will remain a net energy importer. Therefore, **we must prioritize renewable energy imports** in terms of legislation besides increasing domestic production.

Electrification is one of the key strategies for decarbonizing the European economy, but electricity is not emission-free per se. After all, a look at the energy mix shows that only 33% of net electricity generation in the EU in 2021 was be based on renewable energies (Source Commission data). Next to nuclear energy (25%), combustible fuels (41.9%) are the most important type of electricity generation. When it comes to electrifying large parts of our economy, there are two challenges to overcome: on the one hand, the share of renewable electricity must increase significantly. On the other hand, implementing electric powertrain and heating applications will massively increase electricity demand, thus further increasing the demand for green electricity. Accordingly, **the absolute amount of directly usable renewable energy will have to rise substantially** to not lock in the fossil gap between rapidly rising demand and slowly rising supply.

## We should not underestimate the future demand for defossilized electricity

A politically intended focus on the electrification of many sectors underestimates the simultaneous need to expand the production of green electricity. Scope 1 emissions must not be shifted to Scope 2 emissions of electricity generation, for example through electromobility (in this example a shift of emissions from tailpipe towards electricity generation). The International Energy Agency shows that renewable energy capacity is not on track to achieve the Net Zero target by 2050. In its electricity report 2023, the International Energy Agency shows that renewables and nuclear will cover the growth in electricity demand up to 2025. However, the growth in demand is so large that renewables will not be sufficient to defossilize the stock. In other words: while the growth is green, **emissions do not decrease, but remain at the same level**. To address this problem, all additional emission reduction potential needs to be tapped, including **indirect, transportable green electricity in the form of liquid and gaseous renewable energy sources**. In a recent study, LUT University (Source) shows the necessity of scaling up these liquid and gaseous renewable energy sources as the demand for substituting fossil fuels with eFuels is rising drastically:

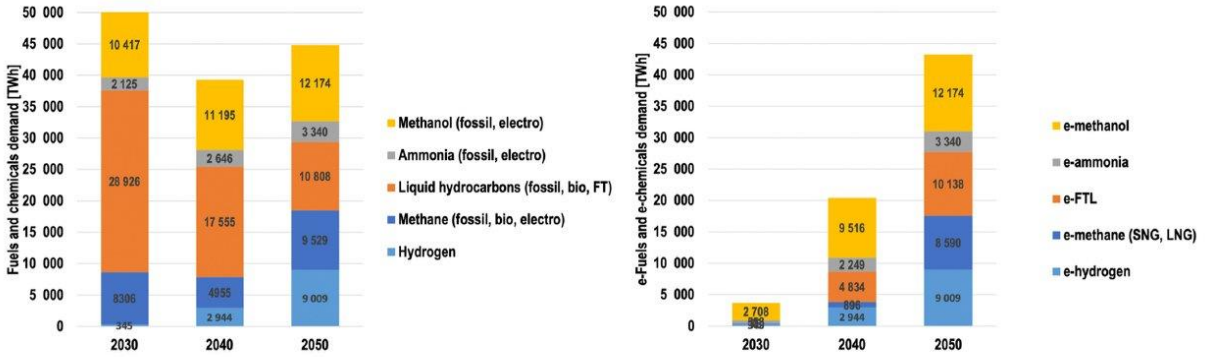


Fig. 2. Development of the global demand for all fuels and chemicals (fossil, bio, renewables) (left) and for e-fuels and e-chemicals (right) from 2030 to 2050.

*Figure 2, LUT University, Global Demand for eFuels and eChemicals*

## What does this mean for the EU 2040 climate target?

Key legislative initiatives of the Fit-For-55 climate package address the expansion of renewable fuels, including eFuels, which we generally welcome. (1.) In our view, however, the policies are not ambitious enough, particularly the Renewable Energy Directive, (2.) and secondly, they do not provide a sufficient time horizon to sufficiently stimulate the necessary investments in the industrial scale-up of eFuels. (3.) Thirdly, areas of application are politically impeded or limited, which in essence leads to a slower and less cost-effective market ramp-up.

(1.) Taking stock of the Fit-for-55 package that is now being finalized and certainly will be the basis for implementing the 2040 climate target, there are some points we would like to highlight. The ambition level of the revised Renewable Energy Directive (1% in 2030 for Renewable Fuels of Non-Biological Origin (RFNBOs)) is too low. As reference, our member companies have agree that a sub-target of 5% for eFuels in the transport sector by 2030 is feasible. In the legislative process, this was acknowledged by the European Parliament and the European Commission. However, during the trilogue negotiations the Council reduced this sub-target significantly. Additional problems are multipliers that artificially increase the share of electricity by a factor of 4 without achieving real $CO_2$ savings as a result. The existing car and truck fleet is incomprehensibly not sufficiently addressed. It is precisely this area where we see a great potential for $CO_2$ savings through

renewable fuels that European legislation fails to address. Finally, the aviation and shipping sectors also contain quotas for RFNBOs, which in our view are also not ambitious enough.

(2.) The development of eFuels production requires a sufficient planning horizon to provide operators with the necessary investment security. Legislation like the Renewable Energy Directive or FuelEU Maritime lacks longer term targets for RFNBOs. For RED the targets end in 2030, for FuelEU Maritime in 2034. Future legislation should be more ambitious as well as looking further into the future. ReFuelEU Aviation as an example shows the path to 2050, even though the share of Sustainable Aviation Fuels (SAF) and RFNBOs at 70% (with 35% RFNBO) is not yet aligned with the climate neutrality goal. Another concern is the halt of the revision of the Energy Taxation Directive. We urge the completion of this legislative process as it makes no sense to tax renewable solutions like fossil ones. This will also reduce the price gap between fossil fuels and sustainable renewable fuels.

(3.) Leveraging the entire product range of synthetic fuels is the most cost-effective way of providing affordable marine fuels. In addition, it is technically not possible to just produce, for example, eKerosene for aviation, or synthetic fuels for maritime vessels. Although production can be focused towards a desired product area, both shorter and longer molecules are always produced during the reaction of $CO_2$ and green hydrogen considering the Fischer-Tropsch route. The bi-products are separated in the refinery process into different end products, namely gaseous and liquid fuels and combustibles such as paraffin, diesel/heating oil and gasoline, but also solids, such as waxes/paraffins. Thus, eKerosene or synthetic marine fuels are only two of several end products of the refining process. Production costs are incurred for all bi-products. The most cost-effective production of eKerosene and synthetic marine fuels can therefore be achieved if the entire product range can be sold on the market. This requires suitable regulatory framework conditions for all target markets to achieve commercial viability for these products. More cost-efficient production is possible. A study by Frontier Economics illustrates this point and shows, for example, that reducing emissions in the transport sector is more cost-effective and faster through a mix of technologies. In the area of electromobility, there are also risks that cannot be assessed today, such as the sufficient development of the necessary infrastructure or the dependence on raw materials (that was highlighted by the European Court of Auditors recently published report). The European Emissions Trading System creates market-based incentives to reduce emissions cost-effectively: By putting a price on $CO_2$ and making fossil fuels more and more expensive to use with the steady phase-out of allowances, companies will have to invest in green alternatives to compete in the market. Instead of a rigid planned economy, competition will allow for more innovation and the uptake of green technologies, ultimately leading to climate targets being met in a cost-effective way.

There has been extensive research into the fundamentals of eFuels. The technology can be transferred to an industrial scale. Economies of scale mean that the production cost will fall over in the long term, as we have seen in the case of wind power and photovoltaics. Prices for eFuels from suitable regions will have production costs below 1 euro per liter in the long term.

**International dimension: Enabling emerging markets and developing countries while ensuring European energy security**

The EU is dependent on energy imports. To overcome the dependence on fossil energy imports, **trade agreements should be revised to include dedicated chapters on green energy imports,** in addition to the expansion of domestic renewable energy. The shift to renewable energy sources means the shift to hydrogen-based products. Yet, hydrogen cannot be easily shipped today due to the complex liquefaction at a very low temperature of -253 degrees Celsius and as a pipeline infrastructure is not feasible on a large scale over long distances. Electricity is also not transmittable beyond a certain radius and electric power transmission has already put a strain on the overloaded power grid in Europe. An **eFuels (or Power-to-X) import strategy is therefore essential to enable a solution for the replacement of fossil fuels**.

The Finish LUT University has used a global renewable energy model to calculate which countries are suitable for the production of eFuels based on regional conditions and can export eFuels in addition to their own supply. In total, more than 30 countries are available to export synthetic fuels – significantly more countries than those from which we import fossil fuels today. The PtX-Atlas of the Fraunhofer Institute for Energy Economics and Energy System Technology (PtX-Atlas, see below) also impressively illustrates the global potential of eFuels: according to the PtX-Atlas, there is a convertible potential of 69,100TWh of hydrogen and 57,000TWh of eFuels outside Europe, significantly higher compared to the demand of the global transport sector of 33,603TWh in 2019. The world's large, unused potential sources of renewable energy can be tapped and made available around the globe in the form of eFuels. Converting available energy into an energy carrier that can use existing infrastructure solves one of our biggest challenges of the energy transition: reliable, available and distributable green energy.

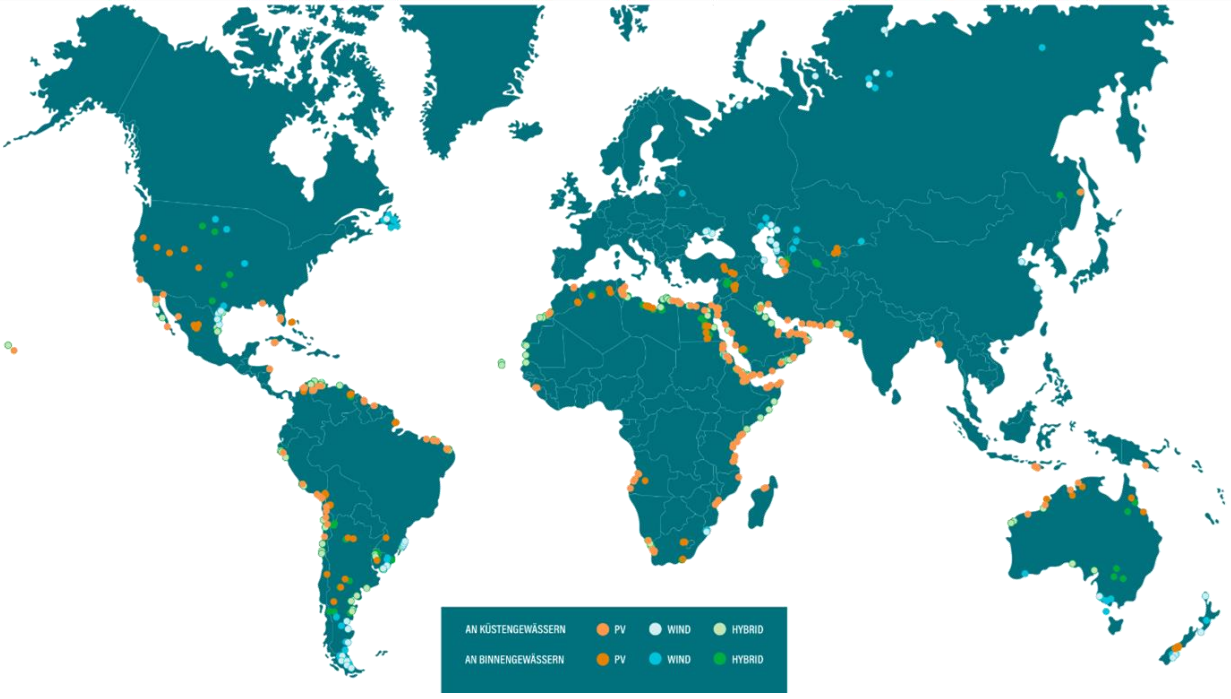


*Figure 3, Fraunhofer IEE PtX-Atlas showing the global potential of PtX technologies.*

It is important to emphasize that the energy produced in the region concerned exceeds local demand. It is not produced for the European market at the expense of the partner. On the contrary, eFuels offer economic potential for both sides. While technology is exported for production from the EU, investments are made and value is created in the partnering countries.

By analyzing multiplier effects that amplify the impact of local investments, research shows that the production of eFuels could create up to 278,700 new jobs, 18,900 directly and 259,800 indirectly with upstream suppliers (source: Frontier Economics and corresponding study). This assumption is based on a 10% share of eFuels in the European fuel market and may increase significantly in the future. This applies to almost all countries in Africa and the Middle East, but also to large parts of Central and South America and many countries in Asia as well as in Australia and Oceania. Economically weaker countries would benefit from this in particular, but also those that are still heavily dependent on the export of fossil fuels. Further studies using the example of Morocco show that every euro invested in eFuels generates an additional €12 in value added locally (source: Preissler, 2020). In addition to the economic effects on both sides, green energy is also produced, which means that both importer and exporter are driving forward the energy transition. The large number of possible partner countries also allows the EU to diversify its energy supply and reduce dependencies. Through global energy partnerships, the energy transition can become a global success story. The need for an import strategy is also shown by the LUT University's projection of the necessary import volume that shows the need for the EU to establish partnerships:

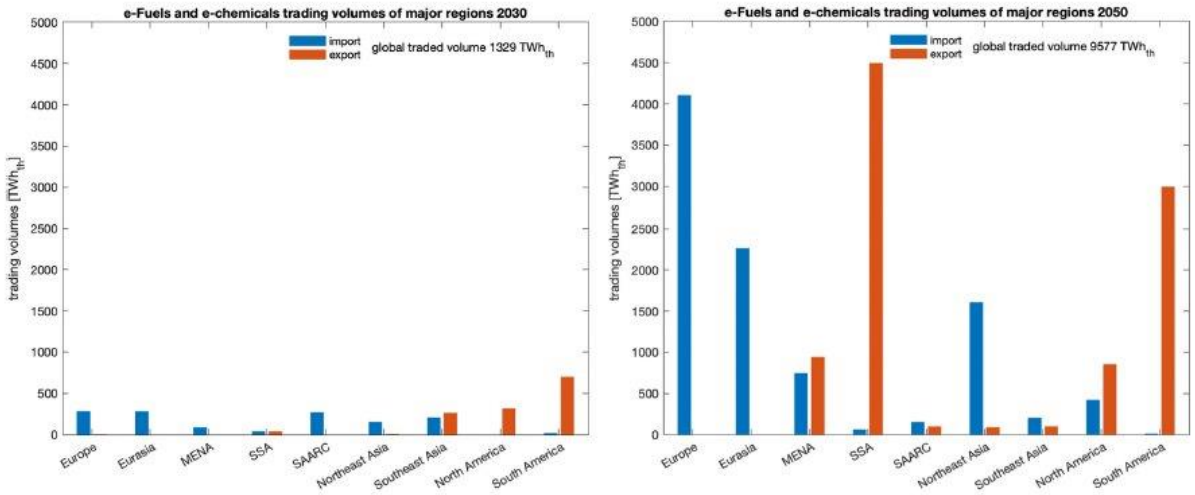


Fig. 5. Global trading volumes of e-fuels and e-chemicals across major regions in 2030 and 2050.

*Figure 4, Import Demand for Europe for eFuels and eChemicals*

However, the recently adopted delegated act on the Greenhouse Gas Reduction Methodology for RFNBOs (Article 28, REDII) poses a significant barrier to the trade of eFuels from third countries. Although the EU allows RFNBO production with industrial $CO_2$ sources until 2041, which is needed as transitional period, the new provisions limit the use of industrial $CO_2$ sources to emissions captured from an activity listed under Annex I of Directive 2003/87/EC (EU Emissions Trading System – ETS) and that has been taken into account upstream in an **effective carbon pricing regime.** As there is no effective carbon pricing system outside Europe equivalent to the ETS, this requirement will de facto lead to a ban on imports of synthetic fuels/RFNBOs produced with $CO_2$ from industrial point sources in third countries. Moreover, the $CO_2$ emissions covered by the ETS differ in nature. By setting the ETS as a reference, it is not possible to distinguish between ‘avoidable’ emissions from ‘unsustainable’ industrial processes and ‘unavoidable’ emissions. As a result, there is not only a substantial risk of limiting the supply of RFNBOs, which are crucial for Europe's decarbonization and energy security strategy, and of ultimately having insufficient quantities of RFNBOs available in time to meet the various relevant climate targets as set out in the Fit-for-55 package and the European Commission's REPowerEU plan.

Moreover, this provision conflicts with existing climate and development policy: international climate mitigation measures are subject to negotiations in the framework of the UN Climate Change Conference. The COP has proven to be a useful instrument to address the concerns of emerging economies and developing countries in particular, and to support them in their transition to a more sustainable, low-carbon future. In terms of climate justice, the requirement criticized above would constitute an indirect trade barrier for these countries and impede the sustainable transformation of their industries. **Clarification on the classification of imported RFNBOs is urgently needed.**

**Creating a Circular Carbon Economy by accelerating Direct Air Capture technology**

In all climate scenarios, we are not currently heading towards achieving 100% $CO_2$ savings. In the medium term, we must achieve negative emissions to reduce the $CO_2$ level in the atmosphere. The EU should therefore develop a dedicated strategy on how to achieve negative emissions, for example through Direct Air Capturing (DAC). DAC technology will be essential to close $CO_2$ cycles as well as to achieve negative emissions by means of Carbon Capture Storage and Utilization (CCUS). If CCU technologies are used to recycle $CO_2$ molecules emitted by an industrial process into useful fuels or chemicals, $CO_2$ gets only emitted once (end of the lifetime of the product) instead of twice (at the chimney and at the product end) which leads to $CO_2$ avoidance in the first step. By 2041 at the latest, RFNBOs must be produced using direct air capture, due to the Delegated Act of the Renewable Energy Directive. International Energy Agency calls for more efforts in deploying DAC technology. In the Net Zero Emissions by 2050 Scenario, direct air capture is scaled up to capture almost 60 Mt $CO_2$/year by 2030 – which is in reach but needs more large-scale demonstration plants to refine the technology and reduce capture costs. DAC is at the beginning of its industrialization and must be supported politically.

**Enabling an all-hands-on solution with technology-neutral legislation**

Whether in the aviation, shipping, rail, road and off-road, in the chemical industry or in steel production: eFuels can be used in various forms, from hydrogen to motor fuels, ammonia or naphtha, to meet climate targets and fight climate change. In certain contexts, however, other technologies will be employed such as electric solutions like battery electric vehicles and heat pumps. **The more technological paths are enabled, the faster we can cut $CO_2$ emissions and the more options are available to users**. Acceptance of the end-user further is increased if consumer choices are possible. Moreover, the aim is also to be as cost-efficient as possible to save resources and keep production and mobility as affordable as possible. For that reason, we support an approach that is **open to different technological solutions** and want to create an environment that permits as much competition as possible and requires as few regulatory interventions as necessary to achieve the climate targets.

**>>>The eFuel Alliance e.V.<<<**

The eFuel Alliance is an interest group committed to promoting political and social acceptance of eFuels and to securing their regulatory approval. We represent more than 170 companies, associations and consumer organizations along the eFuel production value chain. We stand for fair competition and equal competitive condition for all relevant emission reduction solutions. We are firmly committed to further climate change mitigation and seek recognition for the significant part eFuels can play in sustainability and climate protection. Our aim is to create the conditions for the industrial production and widespread use of $CO_2$-neutral fuels from renewable sources of energy.