



Bioeconomy between food and the energy crisis

Opinion of the German Bioeconomy Council

How the war in Ukraine is changing the world

Russia's invasion of Ukraine brings suffering and destruction to Ukrainian citizens. The political and economic effects of this war are being felt around the world. The significant hike in energy costs since 24 February 2022 has led to additional financial pressure on private and public budgets as well as on industry. German and European efforts to find alternatives to Russian gas and oil supplies, in order to continue to secure supplies in the European region, are resulting in rising consumer prices and increasing fears in society of literally suffering a "cold" winter. It is also becoming increasingly difficult to secure industrial raw materials such as precursors for the chemical industry. This could result in further losses in production and an adverse economic impact on the entire eurozone.¹

The interrupted or impeded export of harvested products such as wheat and corn from Ukraine is also causing shortages and uncertainty in supply on agricultural markets as well as highly volatile prices. Further price increases are expected due to speculation on commodity exchanges and crop failures due to extreme weather events, including floods in Pakistan and Australia, heat waves in Bangladesh and India or droughts in many African countries. This development will hit the Global South particularly hard: Russia and Ukraine export more than 75% of their wheat to the Middle East and Africa. Approximately 75% of Turkey's wheat imports come from Ukraine and Russia. For Egypt the figure is 70%, and for Tunisia it is over 50%. The World Bank expects Gambia, Lebanon, Moldova, Djibouti, Libya, Tunisia and Pakistan to be most affected by the impact of the war.²

The war in Ukraine marks a turning point, not only in Germany but in the world in general. It affects all aspects of sustainable human security³, including protection against physical violence and threats to livelihoods such as environmental degradation, disease and economic instability. This war adds yet another global crisis to the existing list: climate and hunger crises, increasing indebtedness of both private households and national economies as well as the after-effects of the Covid-19 pandemic – the latter impacting socio-psychological aspects.⁴ These crises overlap and exaggerate the situation even further. The major task of politics is to take this maze into account in its actions. For Germany, in particular, this means developing effective measures in the short, medium and long term that will help overcome this complex situation. Short-term measures will undoubtedly be an enormous test of endurance on our society and for our democracy. Consequently, they must serve only as emergency measures and must be accompanied by medium- and long-term measures that substantially accelerate and support the transformation required at this turning point.

¹ VCI (2022): Ukraine Krieg - Wirtschaftliche Auswirkungen auf die Branche, <https://www.vci.de/themen/ukraine/wirtschaftliche-auswirkungen/kennzahlen-ukraine.jsp>

² Zinke, Olaf (2022): Wieviel Getreide braucht die Welt? – Die große Hungerkrise, in: Agrarheute, <https://www.agrarheute.com/markt/marktfruechte/wieviel-getreide-braucht-welt-grosse-hungerkrise-591750>

³ Deutscher Bundestag (2006): Das Konzept der menschlichen Sicherheit, <https://www.bundestag.de/resource/blob/414990/4538663de8880fa70263d18cca79c02a/WD-2-191-06-pdf-data.pdf>

⁴ Deutscher Ethikrat (2020): Ad-Hoc-Empfehlungen - Solidarität und Verantwortung in der Corona-Krise, Berlin

The bioeconomy is a key to transformation

A sustainable bioeconomy can help provide answers to the issues of how the consequences of the food crisis can be mitigated in the short, medium and long term, and how the energy and raw materials transition can succeed. These future tasks require rapid and comprehensive further development of the bioeconomy and its implementation. It is essential that this occurs without putting further pressure on the already strained global food situation. It is therefore imperative that food security be given priority over the material and energy use of agricultural products and biomass. Solutions for securing energy are, above all, a reduction in the use of fossil fuels, an increase in energy efficiency, expansion of wind and solar energy, better use of biomass, and a consistent circular economy. Besides this statement, the Bioeconomy Council has provided the German government with recommended measures for enabling Germany and Europe to assist in supplying food and animal feed in the short term and to stabilise the energy supply. In the medium and long term, the aim is to make agricultural production more resilient, to strengthen food sovereignty in Germany, Europe and the Global South, and to reduce dependence on the import of energy and raw materials.

Food security and food availability versus energy and raw materials transition

Food and animal feed supply

In view of the relatively high prices paid for food and wheat, in particular, it is becoming increasingly difficult for millions of people to buy enough with their income. A rapidly worsening hunger crisis can destabilise entire regions of the world and lead to new refugee movements. Rising prices for staple foods have skyrocketed since Russia invaded Ukraine. Furthermore, world market prices are currently also reflecting the expectation that grain from Ukraine cannot be exported to target countries and that war-related crop failures will cause supply shortages. Assuming that Ukraine's normal volume of exports is halved, the resulting gap is approx. 10 million tonnes of wheat, about 15 million tonnes of maize (animal feed) and around 3.3 million tonnes of sunflower oil. In terms of wheat, this corresponds to a global consumption of approx. 1.3% in 2022/2023⁵. The real war-related shortfalls in sowing and tending fields and crops will not become apparent until 2023. The humanitarian and geostrategic consequences of these price increases can only be averted in the short term by eliminating the basis for the expectation of a shortfall. As neither grain reserves of supranational organisations are available to cushion price peaks, nor is surplus production conceivable in the short term, the only way forward is to focus on consumption and prioritising use. Areas in which raw materials can be substituted or saved in the short term are, first and foremost, in the provision of animal feed for meat production and in the generation of energy. With the resumption of grain exports via the Black Sea in the wake of the grain agreement with Russia

⁵ Ahrens, Sandra (2022): Infografik: Konsum von Weizen weltweit in den Jahren 1993/1994 bis 2022/2023, in: Statista, <https://de.statista.com/statistik/daten/studie/226139/umfrage/verteilung-der-weltgetreideproduktion-nach-arten/>

on 1 August 2022, exports from Ukraine have once again increased, but the pre-war level has not yet been attained. Consequently, the situation cannot by any means be described as stable.

Impact on energy supply

Not only have grain prices risen, but energy costs, including natural gas and oil, have climbed significantly. In terms of energy supply and the supply of industry with critical raw materials i.e. metals, in particular, Germany's dependence on Russia is evident.⁶ The German energy mix⁷ illustrates this very clearly. In 2021, 34% of oil used in Germany, 55% of the gas and 26% of the lignite and hard coal stemmed from Russian sources.⁸ Following the boycott of imports from Russia and curtailed oil and gas supplies to Europe, there was a significant drop in the availability of energy and raw materials. Germany's gas supply, in particular, is strained.⁹ A gas shortage not only threatens the energy supply of private households, it will also have an adverse effect on industrial production, especially in the chemical industry where most processes are currently fuelled with natural gas. Examples include the production of fertilizers (ammonia synthesis) and important chemical base materials/base chemicals such as methanol. Although industry could quickly save roughly 26 terawatt hours (TWh) (about 5% of Russian imports) in the event of a gas embargo,¹⁰ this corresponds to only 2.6% of annual gas consumption in Germany.¹¹ The German Association of Energy and Water Industries (2022) estimates the short- to medium-term substitution potential of natural gas in industry at just under 8% of total consumption in Germany. The highest potential, at around 13%, is in the food and tobacco industry and just under 4 % in base chemicals as the largest gas consumers. Nevertheless, huge savings can only be achieved in the short term by shutting down energy-intensive operations such as glass or paper factories, or by reducing the production of natural gas-processing operations such as artificial fertilizer production.^{12 13}

⁶ Weikard, Andre und Eder, Stephan (2022): Abhängig von Putins Rohstoffen: Wo ein Handelskrieg mit Russland die deutsche Wirtschaft treffen könnte, in: VDI Nachrichten, <https://www.vdi-nachrichten.com/wirtschaft/politik/abhaengig-von-putins-rohstoffen-wo-ein-handelskrieg-mit-russland-die-deutsche-wirtschaft-treffen-koennte/>

⁷ Destatis (2022): Pressemitteilung: Stromerzeugung im 1. Quartal 2022: Kohle weiter wichtigster Energieträger, https://www.destatis.de/DE/Presse/Pressemitteilungen/2022/06/PD22_233_43312.html

⁸ Johnson, Matthias (2022): Infografik: So viel Energie importiert Deutschland aus Russland, in: Statista, <https://de.statista.com/infografik/27312/energieverbrauch-deutschlands-nach-energetraeger-und-anteil-der-importe-aus-russland/>

⁹ Dpa (2022): Energie - Netzagentur: Gasversorgungslage in Deutschland „angespannt“, https://www.zeit.de/news/2022-06/17/netzagentur-gasversorgungslage-in-deutschland-angespannt?utm_referer=https%3A%2F%2Fwww.bing.com%2F

¹⁰ IEK-3 am Forschungszentrum Jülich (2022): Wie sicher ist die Energieversorgung ohne russisches Erdgas? Daten, Fakten und Handlungsempfehlungen. Analyse.

¹¹ Statista (2022): Erdgasverbrauch in Deutschland in den Jahren 2005 bis 2021, <https://de.statista.com/statistik/daten/studie/164119/umfrage/erdgasverbrauch-in-deutschland-seit-1999/>

¹² Giehl J et al. (2022): Analyse möglicher Maßnahmen zur Reduktion der Erdgasimporte aus Russland. Discussion Paper Energie und Ressourcen der Technischen Universität Berlin.

¹³ Burmeister H et al (2022): Energiesicherheit und Klimaschutz vereinen – Maßnahmen für den Weg aus der fossilen Energiekrise. Agora Energiewende Impuls.

What can be done?

The increased cultivation and use of biomass for the purpose of energy production must not be carried out at the expense of food production. In Germany, the potential contribution from suspending the 4% set aside for the coming years and using these areas for the production of food, animal feed or energy crops is small. These are predominantly marginal sites with low productivity, but which are extremely important for the conservation of biodiversity.¹⁴ The use of biomass for material and energy purposes must therefore meet two requirements. Firstly, it must not further exacerbate the food crisis and, secondly, it must guarantee supply,^{15 16} without further exacerbating the climate and biodiversity crises.

Measures to alleviate the food crisis

A distinction is made below between measures that can have a short-term impact and those that can have an impact in the medium to long term. Short-term measures serve to provide a rapid response to acute supply shortages, which also have an impact in the medium term. Medium to long-term measures provide resilience in the long run and ensure a sustainable supply of food and raw materials.

In the short term, the following measures are high on the list:

Facilitate the import conditions of Ukrainian grain shipments to the European Union (EU)

Lifting the maritime blockade through the agreement signed between Turkey, Russia and Ukraine was an important step. However, the EU's efforts to secure food exports from Ukraine via various land routes remain important. It is also essential to secure transit to third countries and to support this by upgrading the infrastructure of train routes and ports. The so-called „Solidarity Lanes“ to improve links between the EU and Ukraine for grain exports are a welcome step in the right direction, as are the proposed measures for simplified customs procedures and other controls.¹⁷

¹⁴ Ifeu (k.D.): Marginalstandorte, <https://www.ifeu.de/themen/biomasse/landwende/marginal-standorte/>

¹⁵ Rat der Europäischen Union (k.D.): Fit für 55, <https://www.consilium.europa.eu/de/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>

¹⁶ Europäische Kommission (2022): REPowerEU: erschwingliche, sichere und nachhaltige Energie für Europa, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/repo-wereu-affordable-secure-and-sustainable-energy-europe_de

¹⁷ Europäische Kommission (2022): EU-Kommission schlägt alternative Transportwege für Getreide aus der Ukraine vor, https://germany.representation.ec.europa.eu/news/eu-kommission-schlaegt-alternative-transportwege-fur-getreide-aus-der-ukraine-vor-2022-05-12_de

Focus on food security

Agricultural products that are basically suitable as food should no longer be used for producing energy such as biodiesel and ethanol for the next twelve months. In order to divert imports from abroad intended for energy production to the food sector as far as possible, the political framework conditions should be adapted accordingly. With this in mind, we recommend that the German government launches a European initiative to develop a binding compensation mechanism in Europe for financial losses incurred by bioenergy producers as a result of production losses. Support measures should be linked to the condition that companies invest in research and development, in order to permanently increase plant and production efficiency. Special depreciation allowances via tax incentives for research and a depreciation allowance on investments in new plants or their components should be examined and, if appropriate, introduced as an accompanying measure.

Temporarily reduce livestock numbers and redirect animal feed

A short-term drop in the number of pigs fattened with imported animal feed and mostly kept in inappropriate housing is recommended. One aim would be to examine to what extent the resulting saving in animal feed is qualitatively suitable as food and can thus compensate for the losses incurred as a result of fewer Ukrainian exports. Suitable measures should be developed in dialogue with representatives from the agricultural sector so that livestock numbers can be reduced in the short term without jeopardising domestic agricultural production.

Reduce meat consumption through fiscal incentives and investment in new processes

Consumers should be encouraged to switch to a more plant-based diet but it is important to recognise that highly processed plant-based foods may not contribute to a sustainable diet. Besides tax policy instruments, such as a repeal of the reduced VAT rate on animal products,^{18 19 20} and a reduction in VAT on plant-based products, it may make sense to increasingly promote the development of plant-based alternative products that are as similar as possible to animal-based

¹⁸ BMEL (2020): Politik für eine nachhaltigere Ernährung: Eine integrierte Ernährungspolitik entwickeln und faire Ernährungsumgebungen gestalten - WBAE-Gutachten, https://www.bmel.de/SharedDocs/Downloads/DE/_Ministerium/Beiraete/agrarpolitik/wbae-gutachten-nachhaltige-ernaehrung.html

¹⁹ BMEL (2022): Empfehlungen des Kompetenznetzwerks Nutztierhaltung, https://www.bmel.de/SharedDocs/Downloads/DE/_Tiere/Nutztiere/kompetenznetzwerk-nutztierhaltung-april-2022.pdf?__blob=publicationFile&v=4

²⁰ Zukunftskommission Landwirtschaft (2021): Zukunft Landwirtschaft. Eine gesamtgesellschaftliche Aufgabe - Empfehlungen der Zukunftskommission Landwirtschaft, https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/abschlussbericht-zukunftskommission-landwirtschaft.pdf?__blob=publicationFile&v=15

foods in terms of sensory characteristics and properties. This also involves the aroma, taste and texture of substitute products.

Make better use of opportunities for national implementation of the Common Agricultural Policy (CAP) to sustainably increase agricultural productivity

In order to increase food production without detrimental effects on climate protection and biodiversity, comprehensive innovations and investments are required in agricultural production methods that increase resource efficiency. Here, Germany should make use of considerable opportunities offered by CAP to provide appropriate support under Rural Development Programmes, the so-called „second pillar“ of CAP. From 2023, Member States will be able to transfer a flat rate of up to 25% of allocations for direct payments to rural development policy funds. This rate can be increased further – up to 15 percentage points – to fund programmes on mitigating climate change, on efficient natural resource management or on the promotion of biodiversity, ecosystem services, habitats and landscapes.²¹ Overall, Germany could shift up to 40% of allocations for direct payments to the second pillar. Under the current resolution, this percentage will gradually be increased to only 15% by 2027. Accordingly, it would be possible to mobilise a further 25 % of EU allocations (more than €1 billion per year) for direct payments for resource efficiency programmes. The corresponding reduction in area-based direct payments appears justified, as most farms are benefiting from the sharp rise in producer prices and are therefore less dependent on government income support than in the past. Specifically, the following measures could be funded:

- Comprehensive cooperation in terms of innovation between farms, the private sector and knowledge organisations in the European Innovation Partnerships (EIP-Agri) programme line.
- Installation of systems for the recovery of nutrients and the production of mineral fertilizers, such as struvite (phosphorus fertilizer), from organic residues from animal and biogas production, especially from liquid manure and biogas fermentation residues.
- Investments for converting existing agricultural infrastructure for new production sectors, such as aquaculture, or for processing biomass into higher value products such as building materials, fibres, biochar or fertilizers.

²¹ Europäisches Parlament und Rat der Europäischen Union (2021): Verordnung (EU) 2021/2115, Art. 103.

- Integration of photovoltaic applications in agricultural production, e.g. also for agri-PV systems on less productive agricultural land or as protection from hailstorms for fruit and berry plants.

In the medium to long term,
the following measures are needed, in particular:

Making agricultural production systems more resilient worldwide

In the past, many regions have increasingly switched their agricultural economy to cash crops that can be exported with a high profit margin. In Africa, for example, there was a cutback in grain production - encouraged by development cooperation - because imports from abroad seemed reliable and cheap. Now that the situation has changed, these countries must increase domestic food production again and be encouraged to use the development and implementation of technologies (especially digital methods adapted to smallholder structures) and adapted varieties freely available that improve food sovereignty. This can also help to develop stable and diverse farming systems.

In addition, the extensification of land use and the expansion of protected areas that may occur with the European Green Deal may have an impact on production. It is important that the restructuring of the European agricultural economy does not lead to African countries increasingly relying on agricultural exports and neglecting their own supply.²² It is now necessary to discuss these issues with the African countries within the framework of the European Green Deal.

Securing national food sovereignty through international agreements

Food sovereignty must go hand in hand with a reduction in food waste and post-harvest losses, as well as a long-term reduction in animal husbandry and the consumption of its products. The principle that human nutrition has priority in the use of natural resources (food first) must be secured through effective international agreements.

²² Fuchs, Richard, Brown, Calum und Rounsevell, Mark (2020): Europe's Green Deal offshores environmental damage to other nations, in: Nature, <https://www.nature.com/articles/d41586-020-02991-1>

Achieving net-zero land consumption through intelligent control methods

In order to ensure sustainable use of land and to prevent the loss of arable land, an orientation towards the concept of the integrated landscape approach with its intelligent control methods should take place (landscape approach).²³ The aim is to immediately prevent the further loss of particularly valuable farmland due to building developments or building regenerative energy sources. Instead, building densification through adding storeys, reusing brownfield land or the building of solar panels above motorways or railway lines should be encouraged by the legislator in order to preserve valuable soil for food production. Similarly, the introduction of tradable land use rights can help to reduce increased land consumption.

Strengthening the circular economy in agriculture

In Germany, more consideration is needed for the potential of the circular economy in agriculture, in particular by linking urban and rural material flows more closely. For example, plant nutrients recycled from agricultural and urban residues should be used to produce fertilizers. Although the production of fertilizers with the processing of residues and extraction of plant nutrients is energy-intensive, this measure reduces the import dependency of German agriculture. This is also supported if a large part of the energy required for nutrient recovery can be obtained by coupling with biogas plants, e.g. from residual heat.

Promoting new business models to establish alternative production methods

Similarly, business models that open up cascading use of all mass streams or the opportunities of precision fermentation - e.g. for the production of alternative protein sources - should be promoted. For example, start-ups now use fungal or yeast cells to produce high-quality food from agricultural or food production by-products in a biotechnological and land-saving way. The same applies to a corresponding land-saving transformation of traditional models.

Bringing about behavioural changes in lifestyles

In order to survive the food and energy crisis and to achieve the climate goals that have been set, changes in lifestyles are urgently needed that are strongly related to consumption. Changing eating habits can have the greatest impact, for example, on the emission of climate-damaging greenhouse gases.²⁴ To make it easier for people to change their behaviour, a variety of measures and

²³ WBGU (2020): Landwende im Anthropozän: Von der Konkurrenz zur Integration, <https://www.wbgu.de/de/publikationen/publikation/landwende>

²⁴ Fischer, Günther (2018): Transforming the global food system, in: Nature 2018, Oct; 562(7728):501-502

different categories of measures are needed, as well as policies that promote innovation in the best possible way. Besides the fiscal policy measures already mentioned, flanking measures must be introduced in the social policy for low-income households, in the same way as the social cushioning of rising energy prices. Furthermore, there is the need to increase public education about sustainable nutrition and the climate impact of different eating habits.^{25 26}

²⁵ BMEL (2020): Politik für eine nachhaltigere Ernährung: Eine integrierte Ernährungspolitik entwickeln und faire Ernährungsumgebungen gestalten - WBAE-Gutachten, https://www.bmel.de/SharedDocs/Downloads/DE/_Ministerium/Beiraete/agrarpolitik/wbae-gutachten-nachhaltige-ernaehrung.html

²⁶ BMEL (k.D.): Zukunftskommission Landwirtschaft, <https://www.bmel.de/DE/themen/landwirtschaft/zukunftskommission-landwirtschaft.html>

Measures for the success of the energy and raw materials transition

The German government has launched various relief packages and is planning further ones to compensate, at least temporarily, the financial pressure on private and public budgets as well as industry. These measures do not represent a long-term and viable solution for securing supplies and independence from Russian raw materials. Furthermore, the short-term use of coal-fired power plants in the event of a gas shortage makes it more difficult to achieve climate targets. Not only is it important to maintain energy and raw material supplies in the coming months, they need to be resilient for the future.²⁷ The switch to liquefied natural gas (LNG), limited in time and volume, can be an interim solution for reducing the amount of electricity generated from coal. In order to make Germany's energy and heat supply more independent of (Russian) imports in the long term, the energy and heat transition expedited by the German government must be driven forward by means of accelerating the installation of solar and wind power plants.²⁸ This is particularly the case, as a continued shift from gas imports from Russia to LNG imports from other countries in the Middle East or Africa needs to be avoided and the expensive expansion of new fossil infrastructures must be limited to what is strictly necessary.²⁹ However, the envisaged energy transition will not be able to solve the bottlenecks in supply encountered in the short term due to time-consuming development and construction of the required infrastructure. For example, project development until the commissioning of wind power plants takes on average around five years.³⁰

Since it will not be possible to fully compensate for the lack of gas supplies with alternative supply options and other energy sources in the short term, the energy supply in the coming winters is not secure, so the focus must be on adapting options on the part of consumers. Energy savings must therefore be made across all sectors of society and by the public sector as a role model. It is imperative that individual areas, such as education (schools, universities), which also have social functions and were already heavily burdened during the Covid-19 pandemic, are not called upon disproportionately to make savings. The solidarity of citizens in enduring savings can only be ensured if these are spread over as many shoulders as possible. To this end, aspects need to be examined where there is particularly large potential for savings to be made. Besides short-term and temporary socio-political cushioning of high gas prices, including the Federal Government's gas levy,

²⁷ Fischer, Andreas, Küper, Malte und Schaefer, Thilo (2022): Gaslieferungen aus Russland können kurzfristig nicht kompensiert werden, in: Wirtschaftsdienst, 102. Jg., Heft 4, S. 259–261

²⁸ Bundesregierung (2022): Mehr Windenergie für Deutschland, <https://www.bundesregierung.de/breg-de/themen/klimaschutz/wind-an-land-gesetz-2052764>

²⁹ LNG-Terminals sind nur mit zusätzlichem Aufwand auch für den Transport von Wasserstoff tauglich.

³⁰ Pietrowicz, Marike und Quentin, Jürgen (2015): Dauer und Kosten des Planungs- und Genehmigungsprozesses von Windenergieanlagen an Land, Fachagentur Windenergie an Land, https://www.fachagentur-windenergie.de/fileadmin/files/Veroeffentlichungen/FA-Wind_Analyse_Dauer_und_Kosten_Windenergieprojektierung_01-2015.pdf

instruments must be created immediately with which the long-term transformation of the energy industry can be implemented as quickly as possible, as long-term effects require appropriate measures be taken now by individual households, companies and institutions.

In the short term, the following measures are high on the list:

Significant reduction in the consumption of fossil-based energy

Further incentives must be created to substitute and save fossil energy in all sectors. All measures already taken in this respect by the Federal Government and by the Länder and local authorities should be intensified and expanded.

Better exploitation of unused biogenic raw materials

Appropriate incentive systems in the Renewable Energy Sources Act (EEG) should result in a targeted mobilisation of unused residual and waste materials and support the establishment of catch crops for biogas production with nutrient recycling,³¹ in order to be able to implement the important contributions of biomass for (priority) material and (ultimately) energy use.

Customising biofuel controls

Simplified and accelerated approval procedures for advanced bioenergy sources (e.g. biogas, green hydrogen) - without the use of relevant raw materials for food and animal feed - must be initiated. The biogas sector should also replace natural gas applications in as targeted a manner as possible. To this end, the EEG should temporarily suspend the permissible production quantities for the individual biogas plants (bases of assessment), thus enabling biogas production to be brought forward to the coming winter. In this way, biogas substrates that have already been stored can then be fully utilised when energy demand is at its highest. A corresponding adjustment of the approval and remuneration regulations is necessary, so that plant operators do not lose their entitlement to remuneration. In addition, a federal programme is needed to upgrade large parts of the plant portfolio, e.g. by providing incentives for the transition from feed-in tariffs to a market premium.

Adjust energy consumption in transport

Food- and feed-based fuel blends should be suspended. As with the short-

³¹ Thrän, Daniela, Schindler, Harry et al. (2022): Die Rolle von Biogas für eine sichere Gasversorgung in Deutschland, Deutsches Biomasseforschungszentrum (DBFZ), https://www.dbfz.de/fileadmin//user_upload/Referenzen/Statements/Positionspapier_Biogas_Ukraine.pdf

term reduction in livestock numbers, appropriate measures to compensate for possible loss of income for producers should be examined. In addition, temporary speed limits on motorways and driving bans in inner cities should initially be introduced, so that the limited availability of agricultural raw materials does not lead to additional demand for fossil raw materials and associated climate gas emissions. According to the Federal Environment Agency (UBA), a speed limit of 120 km/h on motorways would reduce emissions by 2.0 million tonnes of CO₂ equivalents per year and fuel consumption by 800 million litres.³²

Supporting the market introduction of biorefineries

The establishment of biorefinery plants, which provide the feedstock needed for downstream industries, should be expanded and supported. This requires not only continuous research, development and demonstration of different biorefinery routes and concepts, but also an adequate information base on the feedstock situation and the provision of sustainable infrastructure such as green steam or green hydrogen. Besides industrial plants, it is also important to establish modular plant concepts for the direct processing of raw materials on site (e.g. in agriculture or urban waste disposal).

In the medium to long term,
the following measures are needed, in particular:

Developing a carbon strategy

Approaches for climate-friendly carbon cycles, such as those currently being discussed in primary industries, have a high priority for renewable natural gas substitutes, but will only be able to help relieve the burden in the medium term.³³ Alongside the hydrogen strategy, a comparable strategy for carbon must be formulated, adopted and implemented as soon as possible. The planned biomass strategy could already be a module for this.

³² DPA (2022): Ein Faktencheck - So viel Sprit spart ein Tempolimit auf der Autobahn, <https://www.tagesspiegel.de/verbraucher/ein-faktencheck-so-viel-sprit-spart-ein-tempolimit-auf-der-autobahn/28267710.html>

³³ VCI (2018): VCI-Position zu Kreisläufen für Kohlenstoff, <https://www.vci.de/themen/rohstoffe/vci-position-kreislaeufe-fuer-kohlenstoff.jsp>

Using the incentive effect of CO₂ prices

The increase in German CO₂ prices for mobility and heat can have a steering effect. This measure would also prepare the aforementioned sectors for the expansion of the EU emissions trading system, as envisaged in the EU's Fit for 55 package. According to this, a separate emissions trading system is to be introduced for road transport and building sectors. Such measures induce technological innovations that accelerate the transition to a carbon-neutral economy.

Paving the transition from fossil to renewable energy sources

The Federal Government needs its own strategy with which the goals for a transition from fossil fuels to renewable and CO₂-neutral or CO₂-negative energy sources can be achieved. These include gaseous and/or liquid substances that strengthen the resilience of the energy supply, as well as a rapid expansion of photovoltaic applications without using agricultural land. Examples include building on car parking spaces and car parks, public buildings, the use of brownfield sites, roadsides or roofs. Agri-PV systems should preferably be installed on less productive or marginal agricultural land or as protection from hailstorms for fruit and berry plantations, but under no circumstances on good soil.

Strengthening the circular economy and cascade use of energy-intensive raw materials

Concepts for a circular economy based on resource efficiency must be pursued. They should aim to keep nutrients such as nitrogen, phosphate or the „carbon“ used in the cycle for as long as possible. Only at the end of cascading use are products containing carbon, in particular, to be sent for thermal recycling. In Germany, for example, 30% of the N requirement and the entire P requirement could be obtained from pig slurry and biogas fermentation residues.

Encouraging behavioural changes in lifestyles

Changes are also needed to meet the climate targets set in the energy sector.³⁴ Significant effects can be achieved by changing mobility habits and the consumption of goods.³⁵ To make it easier for people to change their behaviour, various categories

³⁴ BMWK (2021): Wie kann das Energiesystem der Zukunft aussehen?, https://www.bmwk.de/Redaktion/DE/Downloads/Monatsbericht/Monatsbericht-Themen/2021/2021-03-wie-kann-das-energiesystem-der-zukunft-aussehen.pdf?__blob=publicationFile&v=4

³⁵ Umweltbundesamt (2022): Energieeinsparpotenziale, <https://www.umweltbundesamt.de/themen/klima-energie/energiesparen/energieeinsparpotenziale>

of measures are needed, such as multimodal mobility or repair obligations, and a policy that researches and promotes not only technical but also social innovations in the best possible way. For example, the EU Ecodesign Directive is an attempt to improve the environmental performance of energy-related products, taking into account their entire life cycle, by setting ecodesign requirements.³⁶ This could be extended to other product groups - while tightening the requirements - in order to spread repair obligations and increase the longevity of products. There is also a need for increased public education on the climate impacts of different production and consumption habits.

³⁶ Umweltbundesamt (2022): Ökodesign-Richtlinie, <https://www.umweltbundesamt.de/themen/wirtschaft-konsum/produkte/oekodesign/oekodesign-richtlinie#umweltfreundliche-gestaltung-von-produkten>

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