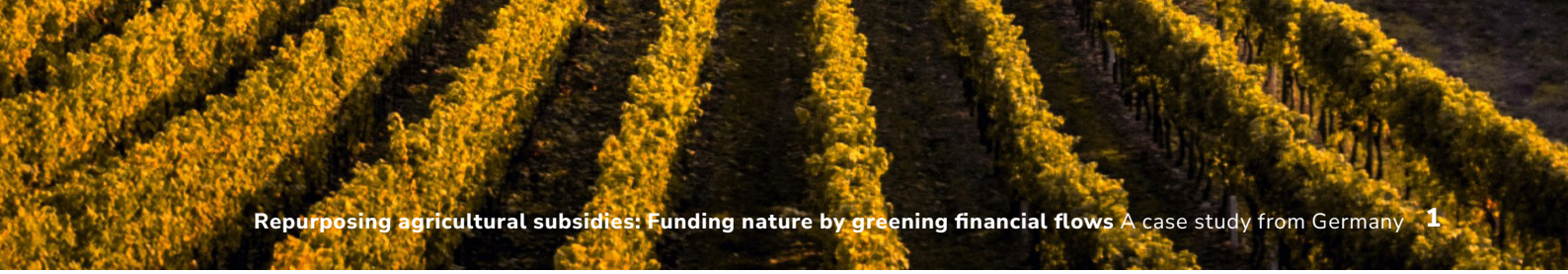
ECONOMICS OF LAND DEGRADATION INITIATIVE

Forum Ökologisch-Soziale Marktwirtschaft

Repurposing agricultural subsidies: Funding nature by greening financial flows

A case study from Germany



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List of acronyms

BMEL	Federal Ministry of Food and Agriculture Germany (Bundesministerium für Ernährung und Landwirtschaft)
BMF	Federal Ministry of Finance Germany (Bundesministerium für Finanzen)
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection Germany (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz)
BÖLN	Federal Program of Organic Farming and Other Forms of Sustainable Agriculture
CAP	Common Agricultural Policy
CFP	Common Fisheries Policy
COP15	UN Biodiversity Conference 2022
FAO	Food and Agriculture Organization of the UN
FNR	Agency for Renewable Resources (Fachagentur Nachwachsende Rohstoffe)
GAK	Joint Task Agricultural Structure and Coastal Protection (Gemeinschaftsaufgabe Agrarstruktur und Küstenschutz)
GDP	Gross domestic product
GHG	Greenhouse gas
IMF	International Monetary Fund
NbS	Nature-based solutions
UBA	Federal Environmental Agency (Umweltbundesamt)
UNDP	UN Development Programme
UNEP	UN Environment Programme
UFZ	Helmholtz Centre for Environmental Research (Helmholtz-Zentrum für Umweltforschung GmbH)
VAT	Value Added Tax

Executive Summary

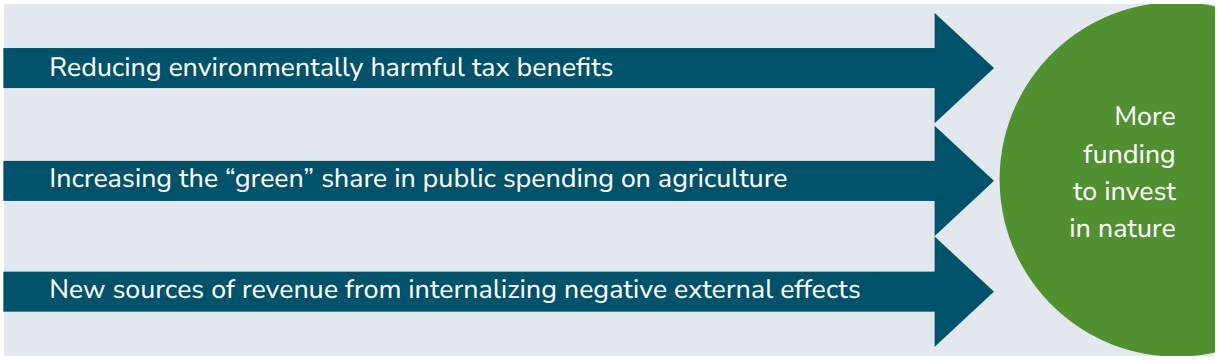
The purpose of the study is to outline a new perspective on the reform of public financial flows towards environmentally harmful agricultural practices. The context for this approach is German agriculture and the public financial flows from the European and German level. Given the complexity of policymaking around the European agricultural policy, the reforms outlined here, focus on financial flows on the national level.

The **stocktaking** part of this study details both the environmental impacts of German agriculture and the public financial flows – environmentally harmful, ambivalent, and environmentally positive ones – to German agriculture. Additionally, the study discusses two cases of non-internalization of external effects from the overuse of fertilizers and pesticides that should, from an economic perspective, be recognized as environmentally harmful subsidies.

The central contribution of this study is a new perspective on the reform of environmentally-negative financial flows – to reduce negative environmental impacts while repurposing them to increase funding for nature and thus positive impacts. To do that, we outline three different levers that can be used to finance investments in nature[1]: reducing tax benefits that have negative environmental impacts; increasing the "green" share in public spending on agriculture and internalizing negative external effects (from fertilizer overuse or pesticides) while raising revenue. Taking the example of German financial flows, we develop three reform packages to show how such reforms could look like and what the impacts of reforming subsidies as well as the impacts of increased funding for nature would be. The examples show that there are multiple options for reforming financial flows to better align agricultural and environmental goals and to support the transformation of agricultural and food systems – in Germany and beyond. The results indicate that fiscal reforms in German agriculture could mobilize billions of Euros in additional funding for nature while having substantial positive environmental impacts (► chapter 5).

FIGURE 1 Logic of fiscal reforms in this study

Source: (FÖS depiction)



1 As well as accompanying measures necessary to mitigate the impacts of reforms, see package 2 in chapter 5.5.

01

Introduction: agricultural subsidies and their impact on the environment

Global environmental challenges, such as climate change, biodiversity loss, ecosystem and land degradation are all intertwined and threaten the achievement of the SDGs. Agriculture is a key sector: as a source of emissions (e.g., from livestock farming) and degradation, but it is also negatively affected by them (e.g., increasing extreme weather events and changing weather patterns lead to challenges in agricultural production and lower yields in crop production).

Germany committed to achieve greenhouse gas neutrality by 2045 in its climate protection law in 2021 (Bundesregierung, 2022b). While the government is continuously increasing its spending in favour of the environment and climate throughout the last decade, it is thwarting its effectiveness by granting record-levels of environmentally harmful subsidies at the same time (Bundesrechnungshof, 2022b; FÖS, 2022a; UBA, 2021a). Agricultural subsidies are part of that. Several of them support unsustainable intensive farming methods, which encourage environmental degradation and loss of biodiversity. European agricultural subsidies were introduced after the Second World War to ensure food security by increasing the production of agricultural goods (European Council, 2021). Today, their goals under the EU's common agricultural policy (CAP) are to provide affordable, safe and high quality food, a fair living standard for farmers and the preservation of natural resources and the environment (European Council, 2023). But the share of EU agricultural subsidies tied to environmental criteria is low (Koester, Ulrich, 2012; Tangermann, 2014).

The most common subsidies include direct payments, tax incentives, grants, and price support mechanisms. While some include environmental criteria, others do not and have negative environmental impacts in practice. They also require financial resources which could be spent to advance a more sustainable type of agriculture.

Numerous national commitments, supranational and global agreements commit to reforming and reducing environmentally harmful (agricultural) subsidies, e.g., the G7, COP15. On the national level, Germany has developed the climate action plan 2050 (in 2016) and the climate action program 2030 (in 2019). The climate action program has set itself the goal of connecting agricultural subsidies with climate protection measures (BMU, 2019), e.g. national trading emissions in transportation sector. The climate action plan aims to link all agricultural subsidies to sustainable and environmentally friendly practices (Bundesregierung, 2016). The G7's members declare their commitment to the redirection or elimination of subsidies harmful to biodiversity by 2030 (G7, 2022b). At the UN Biodiversity Conference, the negotiating states agreed on the Kunming-Montreal Global Biodiversity Framework for the conservation and sustainable use of nature (FAO, 2022). Its target 18 outlines the goal to "identify by 2025, and eliminate, **phase out or reform incentives, including subsidies, harmful for biodiversity** (...) substantially and progressively reducing them **by at least $ 500 billion per year by 2030** (...) and **scale up positive incentives for the conservation and sustainable use of biodiversity**" (UN Environment Programme, 2022, p.12).

Climate and environmentally harmful subsidies hamper socio-ecological transformation by continuing to fund a destructive form of agriculture and placing a double burden on society: with their cost of spending and the harmful impacts on environment they create. Thus, agricultural subsidies should better align agriculture with the preservation of biodiversity, and the protection of the climate and local ecosystems. This has the potential to significantly reduce the negative impact of agriculture on the environment (FAO et al., 2021).

Investments in nature-based solutions (NbS) support climate and biodiversity goals and the transformation of agricultural and food systems. Yet they are severely underfunded (United Nations Environment Programme & Economics of Land Degradation, 2022), to achieve the goals of the Rio Conventions. Linking subsidy reform with NbS-investments and repurposing spending or using additional revenue from the reform of harmful tax incentives to "finance nature" can support aligning agriculture with climate and biodiversity challenges, reduce their negative, while scaling up the sector's positive contributions. This study picks up that idea and discusses what such reform would mean for German agriculture.

This study first examines the environmental impacts of German agriculture in more detail. It will then provide a detailed description of the negative and positive financial flows in the German agricultural sector. This is followed by an overview of two of the most relevant external costs in German agriculture and ways to internalize them. Finally, it outlines possibilities for the repurposing of environmentally harmful subsidies in different scenarios and the resulting opportunities.

02

German agriculture’s environmental impact – in and beyond Germany

Agriculture plays a central role in shaping rural areas and cultural landscapes. However, the increasing intensification of agriculture against the background to produce cheap raw material for the food industry has led to a **wide range of negative environmental and social impacts,** ranging from greenhouse gas emissions (GHG) to the expansion of land use, water, soil and air pollution, pesticides reducing biodiversity and excess nitrogen causing eutrophication as well to a reduction of farms in Germany ("Höfesterben").

Climate

German agriculture emitted **54.8 million tons of carbon dioxide equivalents (CO_{2e}) (7% of Germany's total emissions)** in 2021. Only marginal reductions have been achieved over the last twenty years. There was a significant drop from 70.6 million metric tons of CO_{2e} in 1990 to 62,5 million metric tons of CO_{2e} in 1992, caused by structural changes accompanying the German reunification. Since then only small progress was made (UBA, 2022a). Germany has set itself the goal to reduce its agricultural emissions by at least 65% until 2030 and within the climate protection act Germany will get climate-neutral by 2045. Germany maintains the current pace, these targets will not be met (BMEL, 2022f).

The main greenhouse gas in agriculture is **methane,** which accounts for 56.4% of CO_{2e} in agriculture. Methane emissions arise from digestive processes of ruminants (mostly cows), from the use of farm manure and from chemical processes in biogas plants. **Nitrous oxide** emissions account for 38.8% and originate from the use of mineral and organic fertilizers. **Carbon dioxide** emissions account for only 4.7% of emissions (UBA, 2022a).

Livestock farming is responsible for most emissions. 36 million metric tons of CO_{2e} (**66% of agricultural emissions and 5% of total GHG emissions in Germany**) can be directly attributed to livestock farming. These include emissions from livestock farming, farm manure, farm urea (UBA, 2022a).

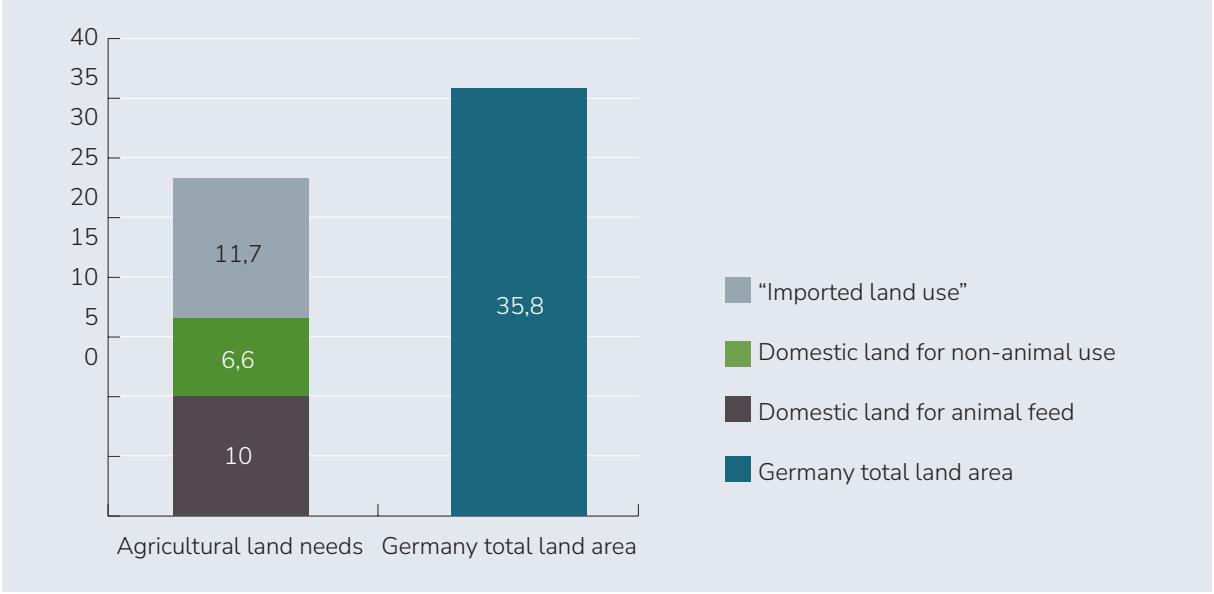
Land use

Around **half of Germany's land area, 16.6 million hectares**, was used for agriculture in 2021 (Bundesinformationszentrum Landwirtschaft, 2022a). Around 11.8 million hectares (71%) of the agricultural land is used for arable land (Ackerland) and 4.6 million hectares (28%) as permanent grassland (Dauergrünland). Permanent crops and other agricultural land account for the remaining 1% (UBA, 2022d).

60.2% (over 10 million hectares) of the agricultural land in Germany is used for domestic feed production. A large part of this land is intensively farmed (Bundesinformationszentrum Landwirtschaft, 2022a). 4.7 million hectares (47%) of this area is used as grassland for feed (UBA, 2022d). Only **6.6 million hectares** (53%) of agricultural land in Germany is used to grow crops **for non-animal purposes** (Bundesinformationszentrum Landwirtschaft, 2022a).

FIGURE 2 Land use for food and feed, in million hectares

Source: (Bundesinformationszentrum Landwirtschaft, 2022a; UBA, 2020b)

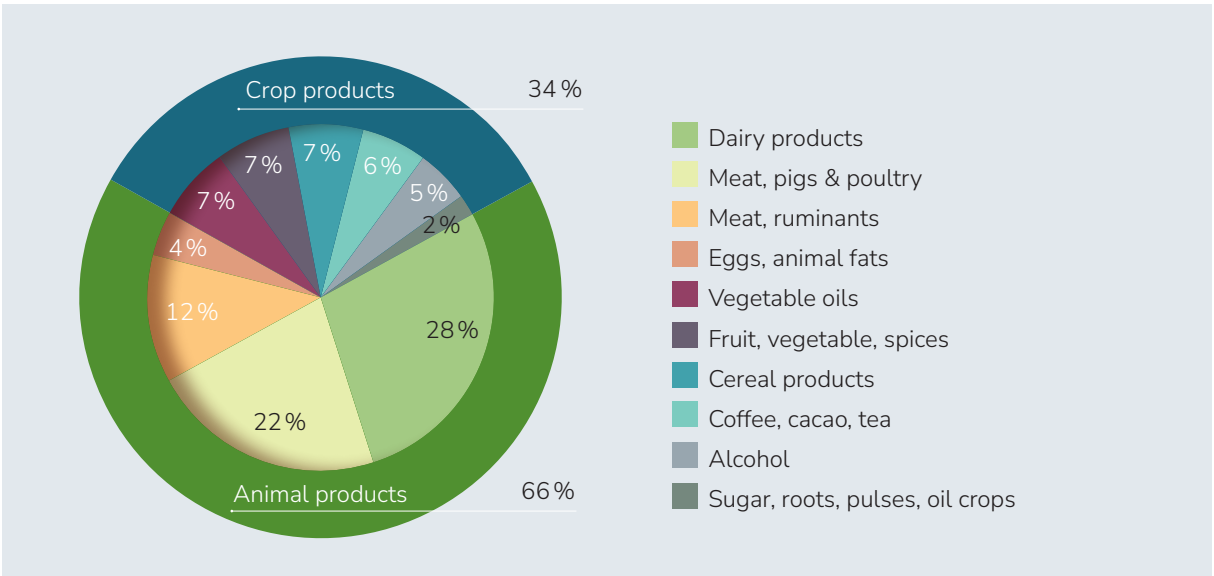


In addition, it is estimated that more than **11.7 million hectares of land outside** Germany were used to produce feed for German production and consumption (UBA, 2020b). Protein-rich feedstuffs in particular are frequently imported (Bundesinformationszentrum Landwirtschaft, 2022a). Production abroad contributes to the destruction of natural habitats, the loss of species-rich habitats for flora and fauna and the release of greenhouse gas emission, as ecosystems that function as climate sinks are destroyed (Heinrich-Böll-Stiftung, 2021).

▷ **Figure 3** further details how much German land is "consumed" by the production of different types of foodstuffs.

FIGURE 3 Composition of cropland footprint for food consumption, in Germany (2010)

Source: (Bruckner et al., 2017)



Biodiversity

The increased consumption of animal-based diets, the increased export of animal-based products and as a result of that the **industrialisation of animal husbandry** and the **intensification of arable farming** promote the decline of biodiversity. Natural landscape elements such as hedges or flower strips, ponds, and field margins have been removed in many cases and are now rarely found. These **habitats** are extremely important for animal and plant life but have **declined drastically over the last century**. The high **use of pesticides and fertilizers** aggravates the situation (UBA, 2022c). Serious effects can also be observed within insect populations. In Germany, less than 25 % of the total mass of flying insects remain (Heinrich-Böll-Stiftung et al., 2020). This problem is exacerbated by monocultural cultivation, e.g. for renewable resources such as biofuel production (rapeseed and corn) (UBA, 2022c).

Other effects

The use of heavy machinery and intensive tillage can lead to **soil compaction**, increased risk of water and wind erosion, and loss of soil fertility.

Intensive **nitrogen fertilization** (organic and mineral) is primarily responsible for nitrate pollution of groundwater and nutrient oversupply (eutrophication) of rivers, lakes and seas (UBA, 2022d). **Nitrogen surpluses** are particularly problematic in regions with intensive livestock farming. These regions suffer from nitrate pollution due to the high proportion of farm manure. This has a negative impact on groundwater, leads to soil acidification and eutrophication of water bodies (UBA, 2021b). Further agriculture contributes significantly to emissions of nitrous oxide, mainly due to nitrogenous fertilizers used in agriculture.

In addition to the impact on the environment, livestock farming and meat consumption also have **negative impacts on human health**. On average, Germans consume twice as much meat as recommended. Excessive consumption of red meat has been associated with negative health effects and disease, as well as resulting health care costs (Roolfs et al., 2021). Red meat consumption increases the likelihood of cardiovascular disease and other so-called non-communicable diseases (Maretzke et al., 2021).

03

Status quo of nature-based negative and positive financial flows in German food and agriculture sector

3.1 What are environmentally harmful subsidies?

A study by FAO, UNDP and UNEP found that 87 % of global financial flows to agricultural producers distort prices and have environmentally damaging effects. Support measures for agriculture account for 509 billion € (540 billion $) – or 15 % of the total value of agricultural production (FAO et al., 2021). According to a United Nations study published in 2021, 456 billion € (483 billion $) are spent annually on the agricultural sector worldwide, with 87 % of these subsidies classified as price-distorting and environmentally and socially harmful (FAO et al., 2021).

All estimates of subsidies that are harmful to climate, biodiversity, or the environment in general raise numerous **methodological questions**. What is a harmful – a "nature-damaging" subsidy – and what is it not? The questions are practical, e.g., which financial flows are included in the national, European, or international reporting framework – and conceptual, e.g., whether the failure to repair environmental damage should also be considered a subsidy or only a direct financial impact.

Within the federal government, there are two competing subsidy definitions: a narrower one used by the **Ministry of Finance** (BMF) in its subsidy reporting (BMF, 2021) (focusing on direct budget transfers from tax breaks and grants) and a broader one used by the **Federal Environment Agency** (UBA) which includes non-financial, implicit subsidies such as guarantees, targeted preferential treatments or the provision of goods below market prices (see ▷ table 1 in UBA, 2021a).

TABLE 1 Different subsidy definitions: BMF, UBA, IMF Source: (FÖS summary of table 1 in UBA, 2021a)

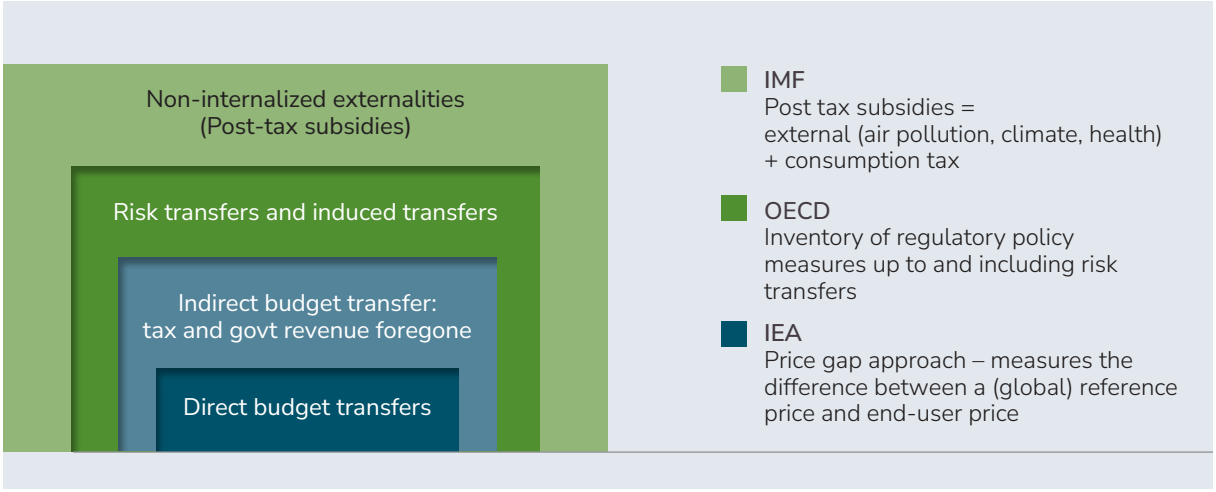
Research stages	BMF	UBA	IMF
Tax concessions			
Financial assistance			
Sureties and guarantees			
Regulatory benefits and provision of services at below-market prices			
Non-internalisation of externalities[2]			

While the definition of the Finance Ministry refers to two specific types of instruments that directly affect beneficiaries (grants as well as tax incentives), the UBA additionally includes various instruments that have similar environmentally harmful effects: they result in beneficiaries "causing negative impacts on the environmental goods climate, air, soil, water and biodiversity, if they cause environmental health problems, or if they favour the use of raw materials" (UBA & Bretschneider, 2021).

2 IMF methodology recognises external effects of fossil fuel subsidies as implicit subsidies and calculates their volume. It should be noted that it does not calculate environmental damage costs or all kinds of external effects.

FIGURE 4 Illustration of different definitions of environmentally harmful subsidies

Source: (Cottrell et al., 2021)



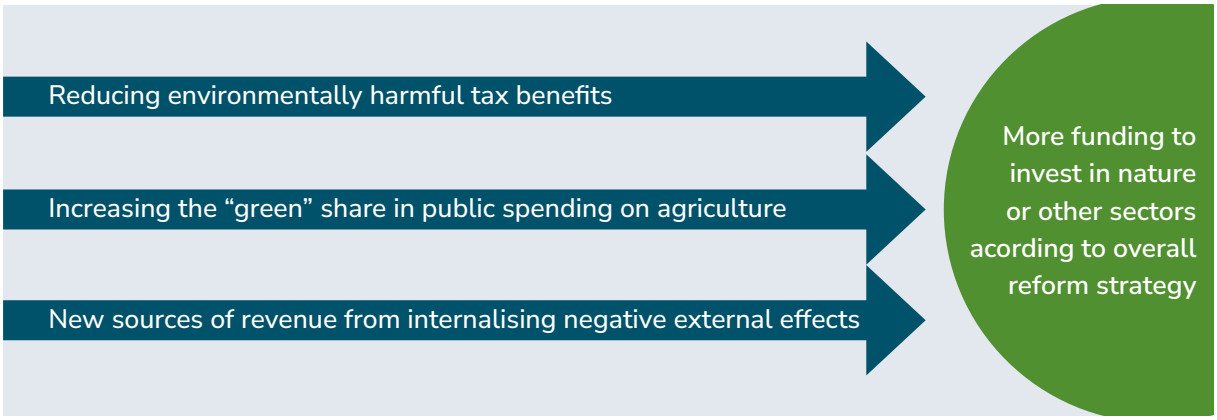
The broadest definition for environmentally harmful subsidies is used by the International Monetary Fund (IMF). The IMF explicitly includes externalities arising from fossil fuel consumption that are not internalized in its reporting on climate-damaging subsidies. The externalities included in the IMF's subsidy reporting range from climate impacts and local air pollution to external effects from vehicles (IMF, 2021).

The following chapters report on the status quo of financial flows into German agriculture that arise at the European (► **chapter 3.3**) and German levels (► **chapter 3.4**). Some harm the environment, some benefit the environment, some flows have both positive and negative impacts (are ambivalent). We classify the financial flows in ► **section 3.5**.

In ► **chapter 4**, we will discuss two types of non-internalized environmental damage caused by agricultural activities that are harmful subsidies under a broader definition and how they could be internalised by market-based instruments. The two examples are the eutrophication from excess nitrogen and phosphorus and damage to environment from pesticide use.

FIGURE 5 Logic of fiscal reforms in this study

Source: (FÖS depiction)



3.2 Overview of financial flows and subsidies from the EU and Germany to German agriculture

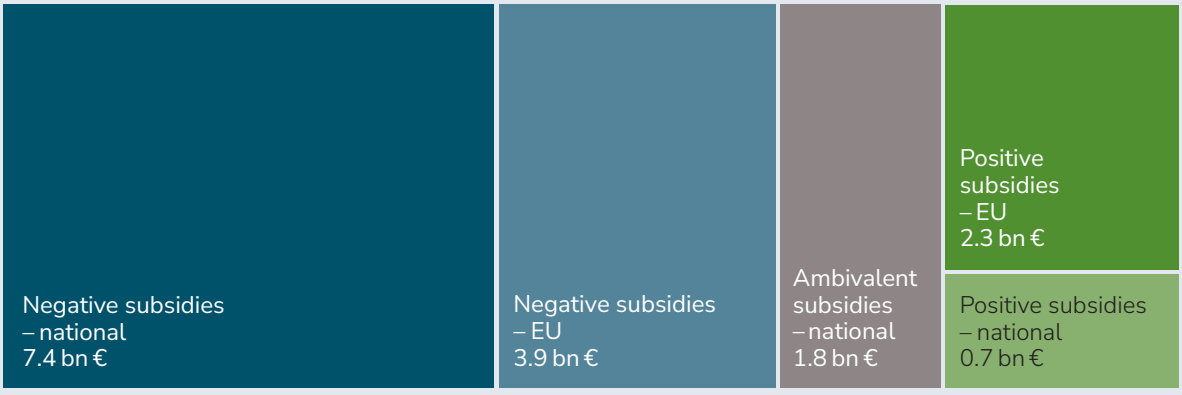
Germany ranks third after France and Spain in terms of the highest agricultural subsidies in the EU. In 2020, German farmers received 6.84 billion € in agricultural subsidies from the European Union. 70 % of these subsidies are area-based, regardless of farming. For full-time farmers, however, EU agricultural subsidies account for more than 40 % of income (Bundesinformationszentrum Landwirtschaft, 2022b). In addition, farmers receive some national subsidies.

▷ Figure 6 shows the financial flows in the EU and Germany, classified by environmental impact. Most of the agricultural subsidies – in the EU and in Germany – can be classified as negative or predominantly negative. Some subsidies cannot be classified in detail as negative subsidies, such as the EU's direct payments. But the subsidies were paid regardless of cultivation and associated environmental impacts thereof. Therefore, these subsidies were classified as predominantly negative.

In the following sections the financial flows of the European and German levels are described and a classification of these subsidies into ecologically positive, negative, predominantly negative, and ambivalent is made. Criteria for the classification are given as well as the amount of the subsidies. Each subsidy is characterized and the extent of its impact in ecological, economic, and social terms is shown.

FIGURE 6 Overview chart: EU & national financial flows have negative, positive & ambivalent impacts on nature

Source: FÖS depiction based on (BfN, 2022; BMF, 2021, 2022; BMUV, 2022; Directorate-General for Agriculture and Rural Development, 2022; Sumaila et al., 2019; UBA, 2021a)



3.3 EU financial flows that favour German agriculture

3.3.1 The Common Agricultural Policy

The Common Agricultural Policy (CAP) is an important spending area of EU agricultural funding. Its main objectives are to maintain food security and increase productivity, safeguard farmers' incomes, preserve rural areas, promote the rural economy and protect climate and the environment (Europäische Kommission, 2022). The CAP consists of two pillars: the first pillar comprises direct payments and agricultural market measures, while the second pillar serves to promote rural areas in the European Union and rewards farmers for environmental services they provide voluntarily. The new CAP funding period began in January 2023. The overall structure of the CAP has not changed, but the focus is now on eco-schemes and greater flexibility for member states in the design and implementation of individual instruments.

The European Maritime, Fisheries and Aquaculture Fund (MFAF) is the funding instrument under the EU's Common Fisheries Policy (CFP). Its objectives include the promotion of sustainable fisheries, the conservation of aquatic bioresources, the promotion of sustainable aquaculture, and the processing and marketing of fisheries and aquaculture products.

3.3.2 CAP 1st pillar

The first pillar of the CAP provides farmers in the EU with direct income support and market measures.

CAP 1st pillar: basic payment scheme

The majority of payments under the first pillar of the CAP are made under the basic payment scheme. These payments are paid according to the available area, regardless of the environmental services provided (UBA, 2021a).

In the new CAP funding period from 2023, 40 % of all payments are supposed to contribute to climate protection (UBA, 2022f). The area-based payments are tied to so-called "conditionality measures" (formerly cross-compliance). These are basic environmental requirements that must be fulfilled to receive the payments of the subsidies. They go beyond the previous requirements and are intended to improve the environmental compatibility of agriculture (BMEL, 2022b). A study by the UBA concludes that, despite some progress, the new measures are not sufficient to achieve the goals set by the EU (UBA, 2022f).

TABLE 2 CAP 1st pillar: basic payment scheme

CAP 1st pillar: basic payment scheme			
Status quo			
Beneficiaries	Farmers (holders and managers of agricultural land)	Legal basis	Art. 38-44 TFEU, Regulation (EU) No 1306/2013, Regulation (UE) No 1307/ 2013, Regulation (EU) 2017/2393
Type of subsidy	Payment	Level of funding	EU
Fiscal volume	**3.200 billion €** (3.392 billion $) in 2020 (Directorate-General for Agriculture and Rural Development, 2022)	Introduction	1992
Classification of the subsidy	(mainly) Negative		
Areas of impact			
Environmental significance	Payments are made regardless of management (e.g., organic or conventional) and require only low environmental standards, the Cross Compliance as legal management requirements which are not sufficiently effective. This subsidy also has a negative impact on land use. Payments based on size of area drive up demand for land, as payments are an important source of income (UBA, 2022b).		
Economic significance	On average (2018/19 – 2020/21), direct payments account for 43 % of farmers' income. The share of direct payments is highest for farmers in arable farms (61%) (Weber et al., 2023).		
Social significance	This subsidy has a positive impact on the availability of food. The payments ensure the profitability of farms and thus create incentives for production. This also lowers consumer prices. Direct payments have accounted for over 40 % of farmers' income in the past (BLE, n.d.-e). Area-based payments have a negative distributional effect, as larger companies receive more payments (Landesportal Sachsen-Anhalt, n.d.).		

CAP 1st pillar: Direct payments for greening

Currently, the CAP (agricultural reform in 2014) pays 30 % of direct payments, the so-called "greening premium", for the provision of additional environmental services. These greening measures include the protection of permanent grassland, crop diversification and certain crop rotations. The aim is to improve the impact of agriculture on the environment (BMEL, 2019b).

The new CAP (from 2023) trades greening for so-called "eco schemes". 23 % of first pillar funds are earmarked for these voluntary eco-schemes. These include measures such as making land available for biodiversity, switching to more sustainable crop rotation circles or abandoning pesticides (Landwirtschaftskammer Niedersachsen, 2022). An evaluation found that the eco-schemes together with conditionality measures will account for only 8 % of the GHG emission reductions needed by 2030 (UBA, 2022f).

TABLE 3 CAP 1st pillar: direct payments for greening

CAP 1st pillar: direct payments for greening			
Status quo			
Beneficiaries	Farmers	Legal basis	EU Regulation 1307/2013, EU Delegated Regulation 639/2014, EU Implementing Regulation 641/2014
Type of subsidy	Payment	Level of funding	EU
Fiscal volume	**1.400 billion €** (1.484 billion $) in 2020 (Directorate-General for Agriculture and Rural Development, 2022)	Introduction	2014
Classification of the subsidy	Positive		
Areas of impact			
Environmental significance	The years-long decline in ecologically valuable areas was halted by the greening measures. Fallow land has also increased again. The same applies to permanent grassland. However, neither the diversity of arable cultures has been significantly increased nor the environmental risk from pesticides- and herbicides noticeably reduced (UBA, 2022g).		
Economic significance	The greening premium per hectare amounted to around 81.7 € (87 $) in 2022 (Landesportal Sachsen-Anhalt, n.d.).		
Social significance	Important source of income for farmers and positive effects on rural development.		

CAP 1st pillar: agricultural market measures

The EU market measures are also part of the first pillar of the CAP (agricultural reform in 2014). The market measures are intended to compensate for difficult market situations, for example a sudden drop in demand due to a health warning or a drop in prices due to a temporary oversupply (Europäische Kommission, 2022).

TABLE 4 CAP 1st pillar: agricultural market measures

CAP 1st pillar: agricultural market measures			
Status quo			
Beneficiaries	Farmers	Legal basis	EU Regulation 1308/2013
Type of subsidy	Payment	Level of funding	EU
Fiscal volume	**0.125 billion €** (0.133 billion $) in 2020 (Directorate-General for Agriculture and Rural Development, 2022)	Introduction	1962
Classification of the subsidy	(mainly) Negative		
Areas of impact			
Environmental significance	The market support measures are not linked to any sustainability criteria but aim to stabilize EU agricultural markets and provide consumers with high-quality and safe food.		
Economic significance	Not applicable.		
Social significance	This subsidy has a positive impact on the availability of food. The payments ensure the profitability of farms and help to hedge against external risks.		

3.3.3 CAP 2nd pillar

The second pillar of the CAP focuses on rural development. The funds come from the European Agricultural Fund for Rural Development (EAFRD) and from national as well as regional sources (Europäische Kommission, 2022). The main objectives are strengthening competitiveness, the sustainable management of natural resources, mitigation of climate change and a balanced development of rural economies and communities (Europäische Kommission, 2022).

In the new policy circle the second pillar will include area-based climate and environmental measures, growth promotion and business development in rural regions as well as infrastructural measures (BMEL, 2022e). 52 % of the fiscal volume will be used for the

goal of environmental protection, 31% for improving the attractivity of rural areas and 17% for promoting the competitiveness of the agricultural sector (BMEL, 2022e).

TABLE 5 CAP 2nd pillar

CAP 2nd pillar			
Status quo			
Beneficiaries	Farmers	Legal basis	Art. 38 & 44 TFEU Regulation (EU) No 1303/2013, No 1305/2013, No 1306/2013
Type of subsidy	Payment	Level of funding	EU & Federal Government
Fiscal volume	(mainly) harmful: **0.577 billion €** (0.612 billion $) in EU funds **0.268 billion €** (0.284 billion $) in German funds in 2020 (Europäisches Parlament, 2022) Positive: **0.754 billion €** (0.799 billion $) in EU funds **0.345 billion €** (0.366 billion $) in German funds in 2020 (Directorate-General for Agriculture and Rural Development, 2022)	Introduction	1992
Classification of the subsidy	Ambivalent		
Areas of impact			
Environmental significance	Priorities 2, 3 & 6: Three of the six main objectives of the second pillar of the CAP are identified as environmentally harmful subsidies. This includes enhancing the competitiveness of all types of agriculture and improving farm profitability, promoting food chain organization and risk management in agriculture and promoting social inclusion, poverty reduction and economic development in rural areas (Europäisches Parlament, 2022). They are classified as environmentally harmful because they do not distinguish between environmentally friendly and harmful production methods. Priorities 4 & 5: Two of the six main objectives of the second pillar of the CAP are identified as environmentally positive subsidies. These include the goal of restoring, preserving and enhancing ecosystems dependent on agriculture and forestry and promoting resource efficiency and supporting the transition to a low-carbon and climate-resilient economy in the agriculture, food, and forestry sectors (Europäisches Parlament, 2022).		
Economic significance	Dependent on individual measures taken.		
Social significance	These subsidies have a positive impact on food availability and rural livelihoods.		

3.3.4 European Maritime and Fisheries Fund

Many of the world's commercial fish stocks are in poor condition. They are overfished or threatened with over-fishing (BMEL, 2019a). A reform of the Common Fisheries Policy in 2014 was intended to counteract this. The European Maritime and Fisheries Fund was introduced. Sustainability was made the most important principle in fisheries, with strict measures to rebuild fish stocks and modern fisheries management (BMEL, 2019a). However, this is not the only goal of the program. While the rules adopted under the EU's Common Fisheries Policy (CFP) also aim to conserve fish stocks, the promotion of a com-petitive fishing industry and the stabilization of markets for fisheries products play an equally important role (BMEL, 2019a).

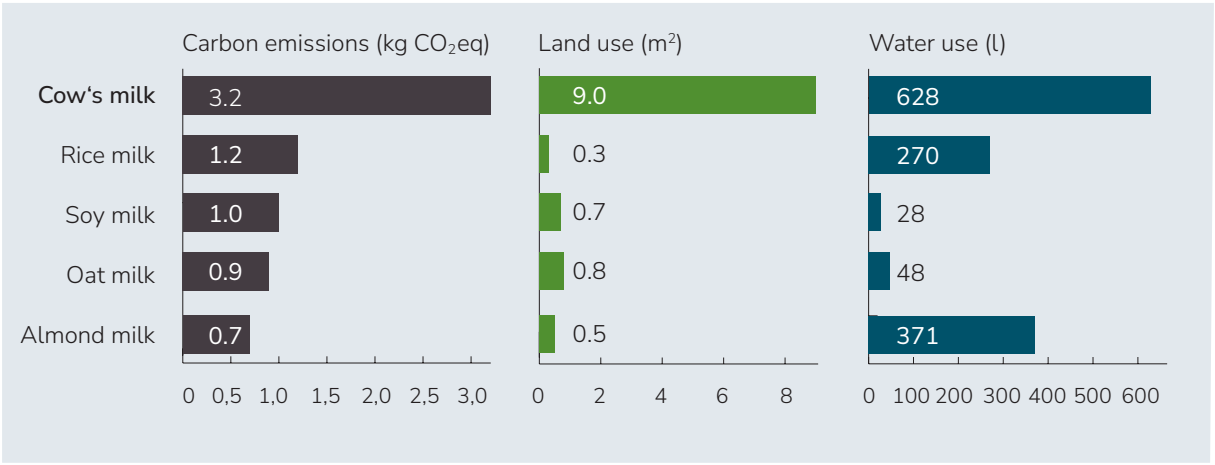
TABLE 6 European Maritime and Fisheries Fund

European Maritime and Fisheries Fund			
Status quo			
Beneficiaries	Farmers	Legal basis	Regulation (EU) No 508/2014, 1255/2011 and Council Regulations (EC) No 2328/2003, 861/2006, 1198/2006, 791/2007
Type of subsidy	Payment	Level of funding	EU
Fiscal volume	(mainly) harmful: **0.075 billion €** (0.080 billion $) in 2018 Positive: **0.122 billion €** 0.129 billion $) in 2018 (Sumaila et al., 2019)	Introduction	2014
Classification of the subsidy	Ambivalent		
Areas of impact			
Environmental significance	Sustainable, low-impact and low-carbon fishing activities, the promotion of biodiversity and ecosystems, and the circular economy are funded. Investments in buildings and vessels are also eligible. If used improperly, these funds can increase catch rates. This is accompanied by environmental problems such as overfishing. The effects on the environment are therefore ambivalent (UBA, 2021a). Fishing also has a climate-relevant effect. In addition to emissions from fishing (e.g., fuel), it also reduces the effect of the ocean as a climate sink. Fish consist of 10–15 % carbon. Higher stocks could therefore effectively store carbon from the atmosphere (Mariani & Mouillot, 2021).		
Economic significance	Not applicable.		
Social significance	This subsidy has a positive impact on the availability of food. The payments ensure the profitability of fisheries and related industries, creating incentives for production. This also reduces consumer prices.		

3.4 German financial flows that favour German agriculture

While European financial flows all involve spending, numerous tax incentives for certain agricultural inputs and products play an important role alongside public spending.

FIGURE 7 Environmental footprint of animal and plant-based foodstuffs compared
Source: (Haake, 2019; based on Poore & Nemecek, 2018, Science; additional calculations for plant milks, milk chocolate, and pasta)



3.4.1 Reduced VAT for animal products

In Germany, there are two different VAT rates: the reduced rate (7 %) and the normal rate (19 %) (§ 12 para. 2 UStG). Most food items have always been taxed at the reduced rate – irrespective of their environmental impact. Animal products (meat, milk, cheese, eggs) generally have a much larger environmental footprint than plant-based and vegetarian/vegan foods, creating an incentive to consume more of them.

These environmentally harmful incentives are exacerbated by the tax structure, as some "modern" vegetarian foods such as oat or soy milk, or vegetarian substitutes for animal products such as meat or cheese, are taxed at the regular 19 % rate.

TABLE 7 Reduced value added tax on animal products

Reduced value added tax on animal products			
Status quo			
Beneficiaries	Consumers, livestock farmers (producers of animal products)	Legal basis	§ 12 Abs. 2 Nr. 1 Umsatzsteuergesetz (UStG)
Type of subsidy	Tax privilege	Federal level	Federal Government
Fiscal volume	**5.242 billion €** (5.560 billion $) in 2018 (UBA, 2021a)	Introduction	1968
Classification of the subsidy	Negative		
Areas of impact			
Environmental impacts	The production of animal products has negative implications for the environment. If subsidies were removed, a reduction in greenhouse gas emissions in the order of around **1.6 to 6.3 million tons of CO_{2e}** can be expected as a result of the declining consumption of animal products, depending on the demand elasticities (Postpischil et al., 2022b). Animal husbandry also has a negative effect on land use. 10 million hectares of agricultural land are used for feed production in Germany (Bundesinformationszentrum Landwirtschaft, 2022a).		
Economic impacts	Depending on the real elasticities of demand, **additional tax revenues** of between **4.3 to 5 billion €** (4.6 to 5.3 billion $) are expected. If the tax on plant-based products is reduced to 5 % as an accompanying measure, the additional revenue is still between 2.1 to 2.7 billion € (2.2 to 2.9 billion $) (Postpischil et al., 2022b).		
Social impacts	The adjustment of VAT on animal products would increase the price of meat, milk (products), eggs and fish by roughly 11 %. The additional costs depend on households and their demand elasticities (Postpischil et al., 2022b). In order to prevent low- and middle-income households from becoming even more financially burdened, it is important to take social measures or reduce taxes on plant-based products in addition to the abolition of this subsidy.		

3.4.2 Exemption of agricultural vehicles from motor vehicle tax

Agricultural machineries are exempt from motor vehicle tax under Section 3 No. 7 KraftStG. The aim of this law was to promote the motorization of agriculture and forestry (UBA, 2021a). This goal is no longer relevant and can therefore be neglected (BMF, 2015).

TABLE 8 Exemption of agricultural vehicles from motor vehicle tax

Exemption of agricultural vehicles from motor vehicle tax			
Status quo			
Beneficiaries	Farmers	Legal basis	§ 3 Nr. 7 KraftStG
Type of subsidy	Tax privilege	Federal level	Federal Government
Fiscal volume	**0.480 billion €** (0.509 billion $) in 2021 (BMF, 2021)	Introduction	1922
Classification of the subsidy	Negative		
Areas of impact			
Environmental impacts	Large agricultural machines emit climate gases through fuel combustion. In addition, heavy machinery damages the soil through compaction. This can limit natural soil functions (S. UBA, 2019). Around **two-thirds of energy-related emissions from agriculture** are caused by combustion engines of mobile machinery and equipment. By 2030, these emissions are to **be reduced by 0.9 million metric tons to 1.5 million metric tons of CO_{2e} per year** (BMEL, 2021a).		
Economic impacts	Not applicable		
Social impacts	Larger farms generally use more and heavier machinery. This tax cut gives them further advantages over smaller farms (UBA, 2021a).		

3.4.3 Tax relief for agricultural diesel

Agricultural and forestry enterprises are being refunded 0.23 $ per litre (45.7 % of the full 0.5 $ energy tax rate) when they use agricultural diesel for farm tractors, stationary or mobile equipment and engines, and special vehicles (§ 57 EnergieStG).

The aim is to promote the competitiveness of agricultural and forestry enterprises (UBA, 2021a). In an evaluation of tax cuts several research institutes concluded, that the agricultural diesel subsidy is only partially suitable for ensuring the competitiveness of agricultural and forestry businesses and should not be continued unchanged (FiFo Köln et al., 2019a).

Between June and August 2022, the federal government lowered the regular diesel tax rate as a “relief measure” due to increased Diesel and gasoline prices. During that time, agricultural diesel was effectively taxed at only 0.12 $ per litre (less than a quarter of the “full” rate of 0.5 $) (Koch, 2022).

TABLE 9 Tax relief for agricultural diesel

Tax relief for agricultural diesel			
Status quo			
Beneficiaries	Farmers (owners and managers of agricultural land)	Legal basis	§ 57 EnergieStG
Type of subsidy	Tax privilege	Federal level	Federal Government
Fiscal volume	**0.440 billion €** (0.466 billion $) in 2021 (BMF, 2021)	Introduction	1951
Classification of the subsidy	Negative		
Areas of impact			
Environmental impacts	Energy-related emissions are to be reduced to 1.5 million metric tons of CO_{2e} per year. two-thirds of these emissions from agriculture are caused by combustion engines in mobile machinery and equipment. (BMEL, 2021a). This subsidy is contrary to this goal. Depending on the elasticity of demand, removing this subsidy would reduce greenhouse gas emissions by **0.14 million metric tons to 0.45 million metric tons of CO_{2e} per year** (FÖS, 2020).		
Economic impacts	If no adaptation measures are taken, farmers will incur average annual additional costs of around 1,600 € (1,700 $) per farm. However, this financial burden can be reduced by implementing efficiency measures that reduce fuel consumption. It has been estimated that the additional annual cost per farm can be reduced to 525 € (557 $) (FÖS, 2021).		
Social impacts	If farmers were to pass on the increased costs to food prices, food costs would increase by an average of about 5 € per person per year (excluding adjustment measures). The amount decreases to less than 2 € per person per year upon successful implementation of the efficiency measures described above (FÖS, 2021). Due to the small quantity, this effect can be neglected.		

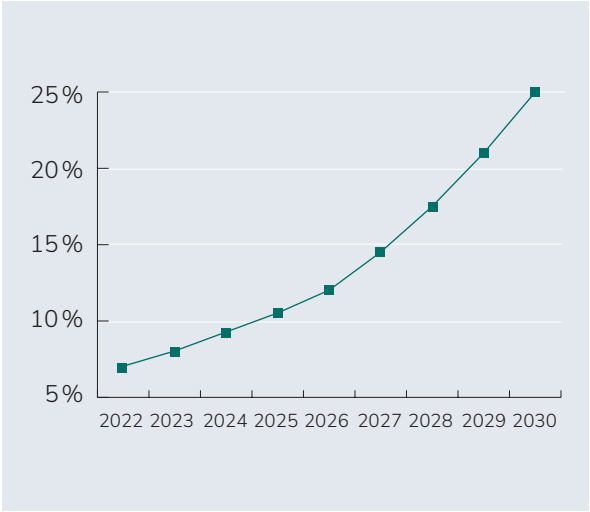
3.4.4 Energy crop cultivation: Biofuel quota

Biofuels are liquid (for example ethanol, biodiesel and pyrolysis oils) or gaseous (biogas) fuels produced from biomass. They are intended for the operation of internal combustion engines in vehicles. In the context of the circular economy, the use of biomass to produce biofuels has the **potential to reduce greenhouse gases** (Pratt et al., 2022).

The regulation BImSchG §37a regulates the biofuel quota which is not budgetary. In addition, there is the Biofuel Sustainability Ordinance, which sets sustainability criteria for the biomass on which biofuels are based. The petroleum industry was required by law to increase the market share of biofuels (either as biofuel or blended with conventional gasoline and diesel). The share is determined by the quota system. The share can be

achieved by blending biofuels with gasoline and diesel fuel or by marketing pure biofuel (FNR, n.d.). In 2015, the regulation was changed from an energy biofuel quota to a climate protection quota to reduce greenhouse gases. As Figure 8 shows, the contribution of biofuels to **climate protection is expected to increase sharply** in the decade 2020.

FIGURE 8 Emission reduction targets for liquid fuels, in % by 2030
Source: (DBFZ, 2022)



While the land required for energy crops has shrunk over time, the area required for biodiesel and bioethanol in Germany is still 758,000 ha, which accounts for 4,6 % of the total agricultural land in Germany (FNR, 2022).

FIGURE 9 Land use for the production of biodiesel and bioethanol for the transport sector in Germany, 2010 to 2021
Source: (FNR, 2022)

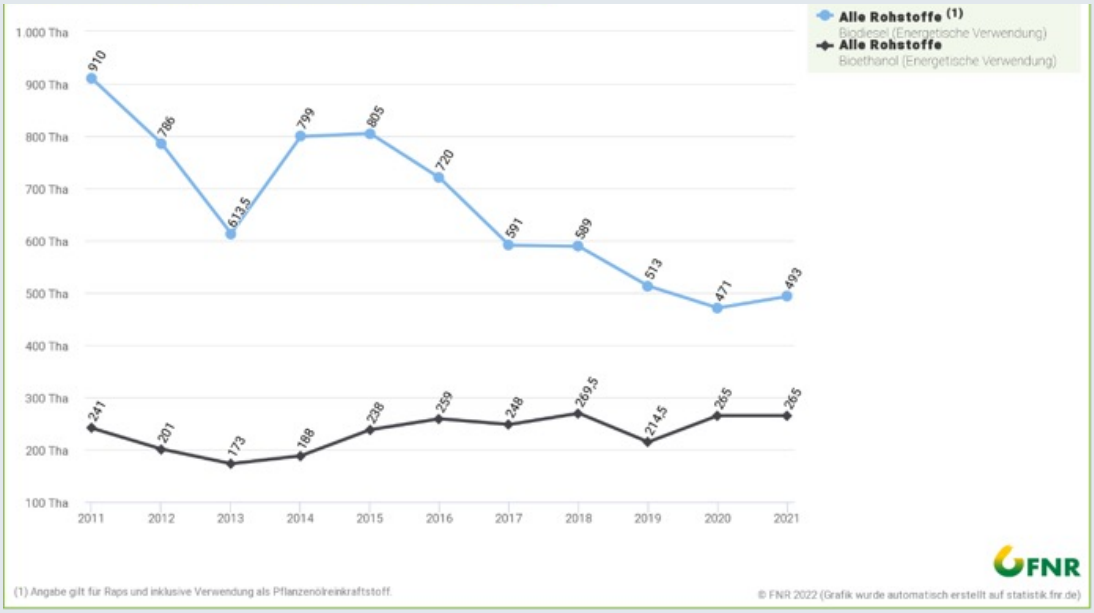


TABLE 10 Energy crop cultivation: Biofuel quota

Energy crop cultivation: Biofuel quota			
Status quo			
Beneficiaries	Farmers	Legal basis	§ 37a BImSchG
Type of subsidy	Quota	Federal level	Federal Government
Fiscal volume	**0.960 billion €** (1.018 billion $) in 2018 (UBA, 2021a) – non budgetary	Introduction	2007
Classification of the subsidy	(mainly) Negative		
Areas of impact			
Environmental impacts	Biofuels have the potential to reduce climate gas emission by substituting other fuels. However, their environmental impact largely depends on the origin of the biomass. If crops are grown solely for the purpose of biomass utilization, the demand for agricultural land increases and so does the intensity of cultivation. There is a tendency towards monocultures, which have a negative impact on biodiversity (UBA, 2021a). In **land use**, direct and indirect effects are relevant. The direct effect is that land which could be used for food production is instead used for fuel production. In addition, the **indirect effects** must also be considered here: For example, interest in cultivated biomass for biofuels increases the demand for land and thus land prices both in Germany and abroad. This makes it increasingly worthwhile to convert nature into agricultural land. This is in direct conflict with the EU's 2030 biodiversity and nature conservation targets. This **indirect land use change** also contributes to global greenhouse gas emissions – and offsets the positive effects mentioned above (Ludwiczek, 2017). In 2021 **2,339 million hectares** of land were used for energy crop cultivation in Germa-ny. This corresponds to **14.1%** of the total agricultural land in Germany. Crop cultivation for diesel and petrol substitutes alone uses **758,000 hectares** which accounts for **4.6%** of all agricultural land in Germany (FNR, 2022).		
Economic impacts	Not applicable.		
Social impacts	The arable crops containing oil, starch or sugar are also suitable for human consumption or for feeding livestock. In this respect, there is competition for land.		

3.4.5 Joint task "Improvement of agricultural structure and coastal protection"

The Joint task "Improvement of Agricultural Structure and Coastal Protection" (GAK) is the main instrument of national agricultural structure support in Germany (BMEL, 2022d). After agricultural social policy, it is the second largest area of expenditure of the Federal Ministry of Food and Agriculture.

The GAK contains a wide range of agricultural and infrastructural measures, such as future requirements, coastal protection, and vitalization of rural areas, organic agriculture and climate-change related challenges for forests (Bundesrechnungshof, 2022c). The aim is to support structurally weak regions and compensate for locational disadvantages through investment. It is intended to enable structurally weak regions to catch up with general economic development, to reduce regional development disparities and to provide incentives for the creation of income and employment (UBA, 2021a).

The GAK is the main instrument for the implementation of the second pillar of the CAP and constitutes the financial and content-related basis for programs of the federal states and the co-financing of the EU-budget. The GAK is financed from federal funds (60 – 80 %) and state funds (20 – 40 %) (Köder & Bretschneider, 2016).

TABLE 11 Joint task for the improvement of agricultural structure and coastal protection (GAK)

Joint task for the improvement of agricultural structure and coastal protection (GAK)			
Status quo			
Beneficiaries	Farmers, Communities	Legal basis	GAK-Rahmenplan 2022 – 2025
Type of subsidy	Payment	Federal level	Federal Government & States
Fiscal volume	**1.791 billion €**[3] (1.898 billion $) federal funding (2022) (BMEL Bundesministerium für Ernährung und Landwirtschaft, 2020)	Introduction	1969
Classification of the subsidy	Ambivalent		
Areas of impact			
Environmental impacts	The GAK has an environmentally damaging effect in some parts and an environmentally protective effect in others. For example, the GAK includes support for integrated rural development, which includes infrastructure measures such as the expansion of agricultural roads (Köder & Bretschneider, 2016, UBA, 2020b).		
Economic impacts	Not quantifiable.		
Social impacts	Positive social impacts result from the support for and development of disadvantaged rural communities.		

3 The GAK is a main element within the second pillar of the CAP, the regulations of ELER. The payments of ELER which are co-financed by federal and state are also included in the total GAK volume, but detailed information about them is missing.

3.4.6 Fishing fleet: Adaptation and development measures

The objective of this program is to support the adaptation and growth of the EU fishing fleet through the implementation of various measures. The measures aim to maintain the sustainability of the fishing industry and make the fleet more efficient, environmentally friendly and competitive. The program involves fleet restructuring and decommissioning, investment in modern vessels and equipment, promotion of sustainable fishing practices, and education and training programs for sector workers (BMWK, n.d.).

TABLE 12 Fishing fleet: Adaptation and development measures

Fishing fleet: Adaptation and development measures			
Status quo			
Beneficiaries	Farmers	Legal basis	Directive on the promotion of measures for the adaptation of fishing activity and the development of the fishing fleet
Type of subsidy	Tax privilege/payment	Federal level	Federal Government
Fiscal volume	**0.004 billion €** (0.004 billion $) in 2021 (BMF, 2021)	Introduction	2015
Classification of the subsidy	Ambivalent		
Areas of impact			
Environmental impacts	This subsidy has an ambivalent effect. It includes both environmental protection measures and capacity-enhancing measures, which have a negative impact on fish stocks, biodiversity, and the environment.		
Economic impacts	Varying impact, depending on factors such as size and type of fishing vessel, location of fleet, and specific measures implemented.		
Social impacts	The goal of improving the competitiveness, sustainability, and safety of the fishing industry, can have positive effects on the livelihoods of fishing communities.		

3.4.7 Natural climate mitigation: Marshland restoration

Natural climate protection combines biodiversity conservation and climate action by utilizing the synergies between these two elements.

Healthy ecosystems can bind climate gases and are crucial for biodiversity. The goal of this program is to significantly improve the general condition of ecosystems in Germany and strengthen their climate protection performance. The restoration of marshlands is an integral part of this approach (BMUV, 2022).

TABLE 13 Natural climate mitigation: Marshland restoration

Natural climate mitigation: Marshland restoration			
Status quo			
Beneficiaries	Farmers	Legal basis	Action Program for Climate Protection
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.345 billion €** (0.366 billion $) in 2022 (BMUV, 2022)	Introduction	First significant measures in the 1980s
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Marshlands are ecologically important carbon dioxide sinks. In many cases, however, these wetlands have been lost due to widespread drainage for agricultural purposes. To reduce the release of carbon dioxide into the atmosphere and mitigate the effects of climate change, it is essential to rewet degraded wetlands. This measure will not only bind carbon dioxide, but also create a vital habitat for numerous species of insects, plants, and wildlife, thus contributing to the preservation of biodiversity (BMUV, 2022). Rewetting leads to positive environmental effects, but after 30 years, biodiversity in rewetted peatlands is still lower than in natural ones. Therefore, it is also essential to further protect the existing peatlands (Kreyling et al., 2021). Most recently, around **53 million tons of CO_2** emissions, and thus around **6.7 percent of Germany's greenhouse gas emissions**, came from the extraction of peat soils through drainage measures and peat use (BMEL, 2022c).		
Economic impacts	Natural climate mitigation efforts are to be drastically increased in the coming years. The federal government expects to spend **1.6 billion €** (1.7 billion $) for these measures **by 2026** (Bundesregierung, 2022a).		
Social impacts	No significant social impact.		

3.4.8 Various public expenditures with environmentally positive goals

Grants for the promotion of organic farming and other forms of sustainable agriculture

The European farm-to-fork strategy has the goal of at least 25 % of agricultural land in the EU being farmed organically by 2030. Germany has even higher targets. In its coalition agreement of 2021, the German government set itself the goal that 30 % of all agricultural land is to be farmed organically by 2030 (UBA, 2022h). In 2020 only 9.6 % of agricultural land in Germany was farmed organically (UBA, 2022h). Grants to promote organic farming and other forms of sustainable agriculture are a tool to create incentives for organic farming.

TABLE 14 Grants for the promotion of organic farming and other forms of sustainable agriculture

Grants for the promotion of organic farming and other forms of sustainable agriculture			
Status quo			
Beneficiaries	Farmers (holders and managers of agricultural land)	Legal basis	Federal Program of Organic Farming and Other Forms of Sustainable Agriculture (BÖLN)
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.004 billion €** (0.004 billion $) in 2021 (BMF, 2021)	Introduction	1989
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	The promotion of organic farming and other forms of sustainable agriculture has a positive impact on soils (no mineral fertilizers, more diverse crop rotations), water bodies (less nitrate pollution due to the ban on mineral fertilizers) and the environment in general (lower GHG emissions, greater biodiversity due to the ban on chemical pesticides). Organic farming has increased species richness by about 30 % on average. The positive effect on biodiversity is greater in intensively farmed regions. It also depends on the taxonomic group, functional group and crop type (Tuck et al., 2014).		
Economic impacts	200 to over 1,000 € per hectare depending on the federal state, the time of conversion and the use of the area (Ökolandbau, 2022).		
Social impacts	Subsidizing organic production makes sustainable products more affordable for consumers.		

Energy consulting for agricultural companies (National Action Plan on Energy Efficiency NAPE) and promotion of energy efficiency in agriculture and horticulture

Energy efficiency is of integral importance for climate protection. The German government is pursuing the goal of halving primary energy consumption by 2050 compared with 2008. By continuously increasing energy efficiency, the energy transition and climate protection can be implemented effectively and cost-efficiently (BWE, 2019).

TABLE 15 Energy consulting for farms (National Action Plan on Energy Efficiency NAPE) and promotion of energy efficiency in agriculture and horticulture

Energy consulting for farms (National Action Plan on Energy Efficiency NAPE) and promotion of energy efficiency in agriculture and horticulture			
Status quo			
Beneficiaries	Farmers	Legal basis	Guideline for the promotion of energy efficiency and CO_2 savings in agriculture and horticulture
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.042 billion €** (0.045 billion $) in 2021 (BMF, 2021)	Introduction	2016
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Around two-thirds of energy-related emissions in agriculture are caused by combustion engines of mobile machinery and equipment, and around one-third by heat generation with fossil fuels. By 2030, these emissions are to be **reduced by 0.9 to 1.5 million metric tons of CO_{2e} per year**. This program aims to facilitate this process (BMEL, 2021a).		
Economic impacts	Not applicable.		
Social impacts	No significant social impacts.		

Investment support for the reconstruction of stables to ensure animal welfare

Animal welfare is increasingly becoming the focus of sustainable agriculture. Animal-friendly husbandry is based on the natural needs of animals, considers their innate behaviours, and is committed to animal welfare. The goal is to achieve a practicable and economically viable consensus between the expectations of consumers and agriculture (BLE, n.d.-f). The Investment Support for the Reconstruction of Stables to Ensure Animal Welfare supports this goal by providing funds.

Promotion of model and demonstration projects in the field of conservation and innovative, sustainable use of biological diversity

Agrobiodiversity is a central component of sustainable agriculture. The diversity of agricultural and horticultural crops, forest plants, farm animals, aquatic life and other plants, animals and microorganisms are important for agriculture, forestry, fisheries, and food production. Biodiversity provides various ecosystem services which are an important component of our livelihoods (BLE, n.d.-a). The funding of model and demonstration projects is intended to show ways of reducing existing deficits and problems in the conservation and sustainable use of agrobiodiversity in an exemplary manner (BLE, n.d.-a).

TABLE 16 Investment support for barn conversion to ensure animal welfare

Investment support for barn conversion to ensure animal welfare			
Status quo			
Beneficiaries	Farmers	Legal basis	Support for the implementation of the requirements of the Seventh Ordinance on the Amendment of the Animal Welfare Ordinance & Guideline for the Support of the Reconstruction of Stables to Improve the Housing Conditions of Sows
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.200 billion €** (0.212 billion $) in 2021 (BMF, 2021)	Introduction	2020
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Animal welfare is improved.		
Economic impacts	40 % of all eligible expenses are funded. The maximum funding limit is 500,000 € per farm and investment project. The federal program also provides funding for the use of on-farm consulting services to develop a conversion or replacement concept. However, only investments that do not involve an increase in livestock are eligible for funding (BLE, n.d.-c).		
Social impacts	No significant social impacts.		

TABLE 17 Promotion of model and demonstration projects in the field of conservation and innovative, sustainable use of biological diversity

Promotion of model and demonstration projects in the field of conservation and innovative, sustainable use of biological diversity			
Status quo			
Beneficiaries	Farmers	Legal basis	Model and demonstration Projects – Biodiversity
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.002 billion €** (0.002 billion $) in 2021 (BMF, 2021)	Introduction	2020
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Agrobiodiversity concepts reduce the intensity of land use. This creates habitats and promotes biological diversity (BLE, n.d.-d).		
Economic impacts	Depending on the project.		
Social impacts	No significant social impacts.		

Subsidies for the promotion of measures to build up humus

The German government's Climate Protection Program 2030 stipulates that the carbon storage potential of agricultural soils should be increasingly activated. The build-up of humus in the soil is an effective way to do so (BLE, n.d.-b).

TABLE 18 Subsidies for the promotion of measures to build up humus

Subsidies for the promotion of measures to build up humus			
Status quo			
Beneficiaries	Farmers	Legal basis	BÖLN & NAP
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.005 billion €** (0.005 billion $) in 2021 (BMF, 2021)	Introduction	2020
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Humus in agricultural soils is of great importance for central functions such as soil life and fertility, water balance, nutrient availability, or erosion control. In addition, humus in soil binds large amounts of carbon. Thus, humus in soils is the largest terrestrial store of organic carbon (BLE, n.d.-b). In Germany agricultural soils (mineral soils and peat soils) have the highest share of all forest and agricultural ecosystems, with around 2.5 billion metric tons of stored carbon. A loss of organic carbon in the soil through mineralization is accompanied by the emission of CO_2. In agricultural soils, this loss can be prevented and, if necessary, further CO_2 captured. Permanent increases in humus content can only be achieved over longer periods of time. Subsidies for the promotion of measures to build up humus aim to facilitate this process (BLE, n.d.-b). The build-up of 0.1 % humus per hectare corresponds to a binding of about three to six tons of CO_2 per hectare, depending on the soil type (Graf, 2019).		
Economic impacts	No information.		
Social impacts	No significant social impacts.		

Grants to promote measures to protect peat soils and reduce peat use as well as grants for investments to promote measures to protect peat soils and reduce peat use

As mentioned above, peatlands store huge amounts of carbon, but are often drained to convert them into arable land (BMUV, 2022).

Grants to promote measures to protect peat soils and reduce peat use as well as grants for investments to promote measures to protect peat soils and reduce peat use have the goal of financing more sustainable practices and protecting existing peatlands.

TABLE 19 Grants to promote measures to protect peat soils and reduce peat use as well as grants for investments to promote measures to protect peat soils and reduce peat use

Grants to promote measures to protect peat soils and reduce peat use and grants for investments to promote measures to protect peat soils and reduce peat use			
Status quo			
Beneficiaries	Farmers	Legal basis	Different federal programs
Type of subsidy	Payment	Federal level	Federal Government
Fiscal volume	**0.027 billion €** (0.029 billion $) **0.028 billion €** (0.030 billion $) in 2021 (BMF, 2021)	Introduction	2019
Classification of the subsidy	Positive		
Areas of impact			
Environmental impacts	Peatlands are an important reservoir of CO_2. They are often drained to be used for agriculture. Rewetting can therefore bind emissions. **53 million tons of CO_2** emissions, and thus around **6.7% of Germany's greenhouse gas emissions**, come from the decomposition of peat soils through drainage measures and peat use. (BMEL, 2022c). In Germany, peat soils account for around **1.34 million hectares** (eight percent of the area used for agriculture) (BMEL, 2022c).		
Economic impacts	No information.		
Social impacts	No significant social impacts.		

3.5 Classification of agricultural financial flows: Which have negative or positive impacts? Which are ambivalent?

At the European and national level, the financial flows of the agricultural subsidies can be divided into payments with positive, negative, and ambivalent environmental effects. A classification of the financial flows enables a steering into sustainable paths as well as a reduction of barriers for environmentally friendly investments.

3.5.1 Negative financial flows and environmental harmful subsidies

Some subsidies in the agricultural sector create incentives for environmentally harmful behaviour and impede the transformation to sustainable production and consumption patterns.

Agricultural subsidies with harmful effects on the environment include at EU and national level:

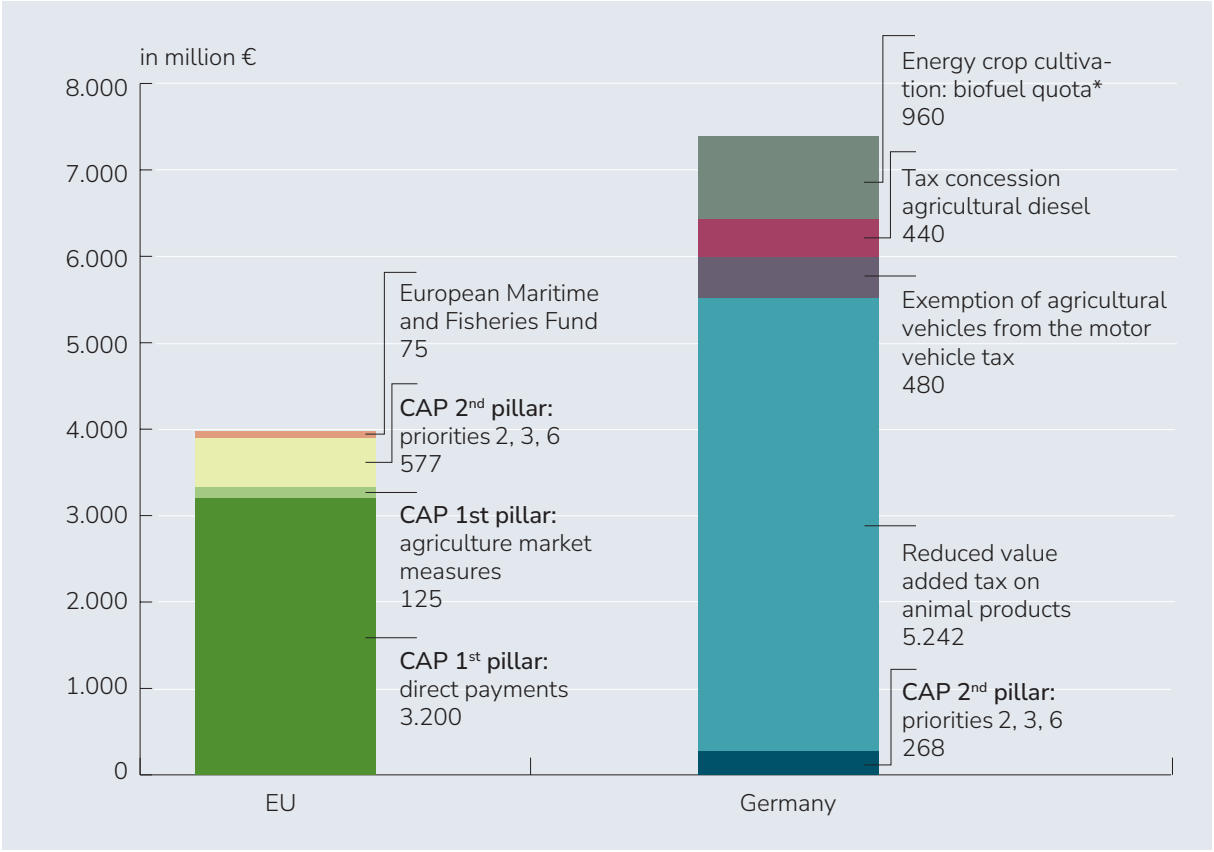
- EU: CAP first pillar – direct payments and agricultural market measures,
- EU: CAP second pillar – priorities 2, 3 and 6,
- EU: European Maritime and Fisheries Fund
- Reduced VAT for animal products,
- Exemption of Agricultural Vehicles from the Motor Vehicle Tax,
- Tax concession Agricultural Diesel
- Energy Crop Cultivation: Biofuel Quota[4].

► Figure 10 presents the negative financial flows of agrarian subsidies at EU and national level. At the EU level, direct payments of the first pillar of the CAP have the largest volume of financial flows with negative environmental impacts. In Germany the reduced value added tax on animal products has the largest fiscal volume. For completeness, the biofuel quota is also listed, although it is not budgetary.

Financial flows from EU level: the area-based payments of the first pillar of the CAP favour large farms and do not differentiate between environmentally friendly and environmentally harmful farming. Moreover, the market measures are not tied to environmental standards. Therefore, this subsidy is classified as mainly negative. It cannot be differentiated which payments are received by farmers who work in an environmentally friendly or environmentally harmful way. In the second pillar of the CAP, three of the six main objectives are identified as predominantly environmentally harmful subsidies. The payments of this subsidy are also not that transparent enough, to distinguish between environmentally friendly and environmentally harmful farming. The subsidies are paid regardless of these aspects. The goals of increasing the competitiveness of all types of agriculture and improving the viability of farms, promoting food chain organization and risk management in agriculture, and supporting social inclusion, poverty reduction and economic development in rural areas are environmentally harmful (Europäisches Parlament, 2022). Finally,

4 The biofuel quota is considered an environmentally harmful subsidy by the Federal Environmental Agency. Therefore, it is included in Figure 10. It must be underscored though that it is a non-budgetary subsidy: it is not a budget expenditure or tax benefit, but an implicit subvention. The subsidy volume given for it describes the economic value of the quota in the form of additional costs for producers and consumers of fuels, which incentivize a greater production of biofuels.

FIGURE 10 Negative financial flows (and non-budgetary harmful subsidies*) at EU and national level in millions of Euros
Source: FÖS compilation based on (DG Agri 2022, Sumaila 2019) (*not budgetary)



the European Maritime and Fisheries Fund has a share in the negative financial flows in agriculture. The subsidy explicitly increases fishing capacity and thus contributes to an intensification of fishing activities. The share of these capacity-enhancing measures has declined in recent years, but still accounted for 40 % in 2018 (Skerritt et al., 2020).

Flows from national level: In the area of consumption, the reduced VAT on animal products leads to higher consumption due to the price effect. However, the production of animal products is accompanied by high environmental costs (UBA, 2021a). In the area of motor vehicles, the exemption of agricultural vehicles from the motor vehicle tax reinforces the trend toward the use of heavy machinery in agriculture. On average, this increases fuel consumption and causes more damage to agricultural soils through compaction (UBA, 2021a). The tax subsidy for agricultural diesel leads to an increase in fuel combustion. The subsidization of agricultural diesel significantly reduces the incentives to use more efficient, smaller and lighter agricultural machinery. The use of machines powered by natural gas or electric engines is also less attractive due to the subsidization of fossil fuels (FÖS, 2021; UBA, 2021a). Within the energy crop cultivation (biofuel quota) the individual effects depend to a large extent on the biomass used, the cultivation conditions, and the subsequent process steps. The intensive cultivation of rapeseed, corn, sugar beet, sugar cane, soy and other agricultural products for the production of biofuels is usually accompanied by pollution of soil, water and air

due to residues from fertilizers and pesticides, greenhouse gas emissions from soil cultivation and impairment of biodiversity (UBA, 2021a). In addition, the production of biomass for biofuels favours the global expansion of arable land. Land use has a negative effect on the environment. Valuable natural areas and habitats are often converted into cropland for biomass, resulting in high greenhouse gas emissions and significant loss of biodiversity (UBA, 2021a).

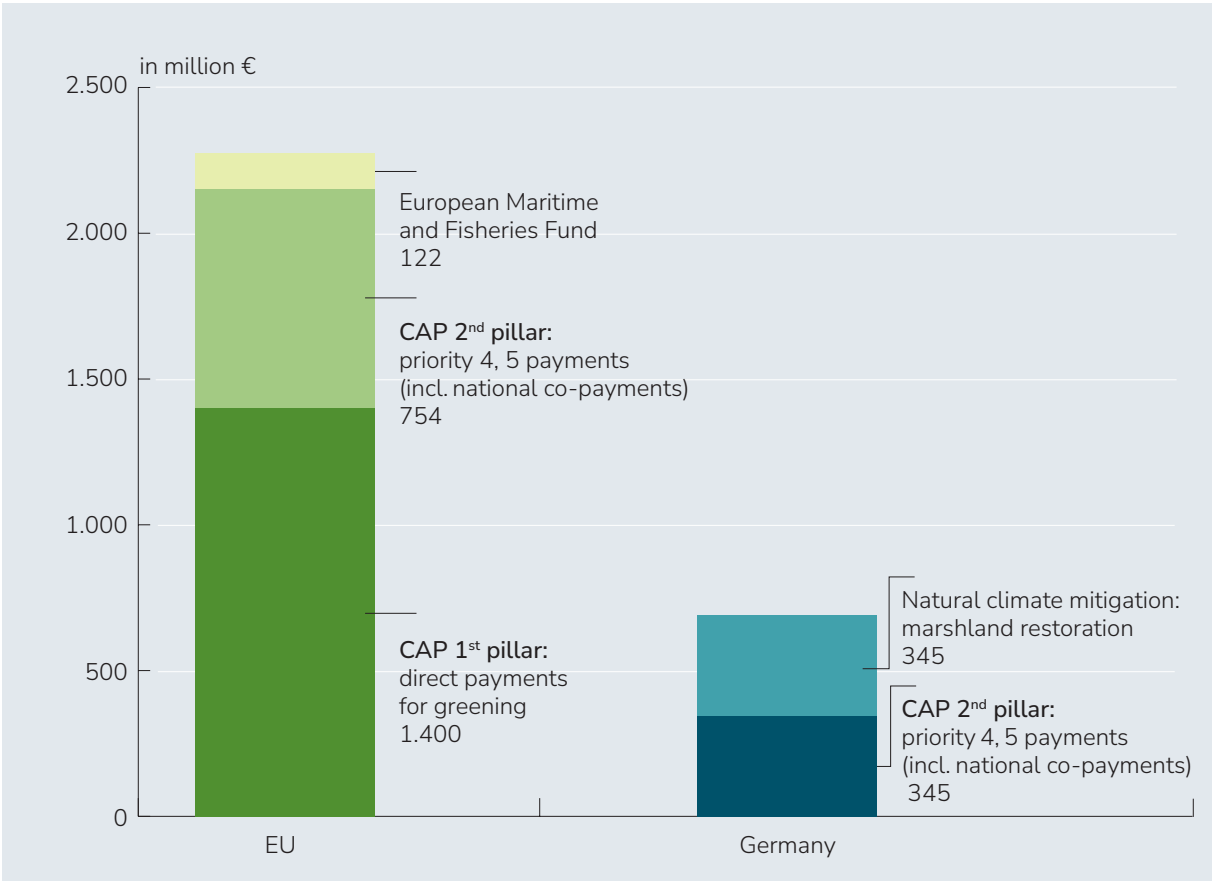
3.5.2 Positive financial flows

Besides the negative financial flows in agriculture there are also some agricultural subsidies with positive environmental impacts. The fiscal volume of the positive financial flows is significantly lower than that of agrarian subsidies with negative environmental impacts. ▷ **Figure 11** shows these financial flows with positive environmental impacts at EU and national level.

The implementation of greening measures in the first pillar of the CAP should improve water and soil quality, protect the climate, and increase biodiversity. This instrument was only effective to a very limited extent. In the CAPs second pillar two of the six main objectives are identified as environmentally positive: Promoting resource efficiency and supporting the transition to a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors, and restoring, preserving and enhancing ecosystems dependent on agriculture and forestry

FIGURE 11 Positive financial flows at EU and national level

Source: Presentation in accordance to (DG Agri 2022, Sumaila 2019)



(Europäisches Parlament, 2022). The European Maritime and Fisheries Fund also provides for various sustainability measures. The 2014 reform introduced strict requirements for the recovery of fish stocks and modern fisheries management (BMEL, 2019a).

3.5.3 Ambivalent financial flows

In addition to the positive and negative financial flows, some agricultural spending programmes do not fit easily into either category. They are considered as "ambivalent".

The environmental impact of the joint task for the "Improvement of Agricultural Structures and Coastal Protection" (GAK) is a case in point. The many different components of the instrument make a uniform assessment impossible. For example, subsidizing the development of industrial and commercial land as a measure of regional structural policy has a negative impact on land use, but is not an instrument of agricultural policy (UBA, 2021a). It is difficult to assess what proportion of government spending is environmentally positive or negative. The Federal Ministry of Finance itself classifies 60.9 %[5] of its 2021 GAK expenditures as environmentally positive (see section 7.14 in BMF, 2022).

The same is true for some fisheries-related EU payments that have ambivalent effects: both advancing environmental protection in the sector as well as capacity enhancement. The latter have negative impacts on fish stocks, biodiversity, and the environment.

5 The government itself labelled 603 million € out of a total GAK spending of 991 (2021) as environmentally beneficial. There are no corresponding figures for Länder spending, nor can be verified whether the labelling is "correct" or overly optimistic.

04

Considering non-internalised externalities in subsidies

Depending on the definition of the term subsidy (► 3.1 What are environmentally harmful subsidies?), it may include the non-internalization of externalities (▷ IMF, 2013). This means that the negative impact of a person's or organization's actions is not factored into the costs of their decisions. Consequently, the effects of these actions are imposed on others and are not considered in the decision-making process. In the following section we highlight two relevant areas of externalities in the agricultural sector and identify ways to internalize them. A study by Boston Consulting Group on the external effects in German Agriculture underscores the importance of **reducing the use of fertilizers and pesticides** as part of "optimized inputs": their data show that reducing fertilizers and pesticides is a large **lever for reducing negative externalities** – worth **15.9 billion €** (16.9 billion $) **of damage costs** (BCG, 2019). The university of Augsburg calculated in 2017 subsequent costs for nitrogen surpluses of 11.53 billion €. These costs can be split into costs for health (like fine dust pollution or drinking water treatment) of 10.76 billion €, for ecosystems (like losses of biodiversity) of 9.22 billion € and for climate (like cooling effects of nitrogen oxide and ammonia and warming effects of laughing gas) of 0.26 billion €. In contrast the agriculture benefits (like higher yields due to fertilisation and lower yield through ground-level ozone formation) of 8.71 billion € (Gaugler & Michalke, 2017). According to a study from UBA drinking water treatment of agricultural conditioned due to nitrate pollution of groundwater arise annually costs for water suppliers between 580 – 767 million € (UBA, 2017b).

4.1 Internalisation of external effects from the (excessive) use of fertilizers

4.1.1 Basic idea

Nitrogen is an essential nutrient for plant growth and one of the three primary macronutrients, along with phosphorus and potassium. In agricultural systems, nitrogen and other nutrients are often added to the soil in the form of fertilizer to supplement the limited amounts of nutrients which remain after a conventional crop rotation. This helps to ensure that crops receive sufficient nitrogen to grow and produce a high yield. Fertilizers can consist of inorganic materials in the form of minerals and synthetic fertilizers or organic material in the form of manure and compost (UBA, 2021b). In regions with intensive livestock farming, however, farm manure is usually "disposed of" on the fields instead of being used specifically as fertilizer, resulting in high nitrogen surpluses (Öko-Institut, 2020). This practice leads to negative environmental effects. Excess nitrogen from agriculture enters ground-water and surface waters in the form of nitrates and the air in the form of ammonia and nitrous oxide. Nitrous oxide is a strong greenhouse gas and contributes to climate change, as does ammonia. Excessive nitrate levels have negative impacts on land and water ecosystems. The consequences include **nitrate contamination of groundwater**, (over) enrichment of nutrients (**eutrophication**) in surface waters and seas, and acidification of **soil and water**. The latter in particular contributes to the decline in biodiversity. High nitrogen inputs particularly impair the delicate interplay between forest trees and fungi (Thünen-Institut, 2018). In the period between 2012 and 2016, 74% of nitrogen inputs to surface waters came from agriculture (UBA, 2021b).

The high environmental costs are compounded by the constant threat of sanctions from the EU. Germany is one of three member states that do not comply with the European directive of limiting nitrate pollution (Storch, 2022). In 2016, the European Commission initiated proceedings against Germany before the European Court of Justice, as excessive nitrate contamination of groundwater was found in numerous regions of the country (Europäische Kommission, 2016). Germany has formulated the **target** in its national sustainability strategy, which states that Germany aims **to limit nitrogen surplus to a five-year average of 70 kilograms N per hectare**. This target was repeatedly missed. On average for the years 2015 to 2019, the nitrogen surplus from the overall balance for Germany was around **92 kilogram N per hectare** (UBA, 2021). However, nitrogen surpluses have shown a downward trend in recent years. Since 1992, there has been an annual decline in the nitrogen surplus of 1% on average, which is due to a reduction of livestock farming (UBA, 2022).

The status quo is ineffective at mitigating environmental impacts because of:

- a lack of coordination between fertilizer regulations and other environmental laws,
- deficiencies in control mechanisms,
- an accumulation of pollutants in the soil and groundwater and
- the appeal of intensive meat production through factory farming (Gawel et al., 2011).

4.1.2 Instruments for internalisation

In the context of this regulatory failure, the introduction of a **nitrogen surplus levy** has been suggested by several stakeholders, including the German Advisory Council on the Environment. Its aim is to internalize the costs of environmental damage caused by excessive fertilization and thus create a monetary incentive for sustainable fertilizer use.

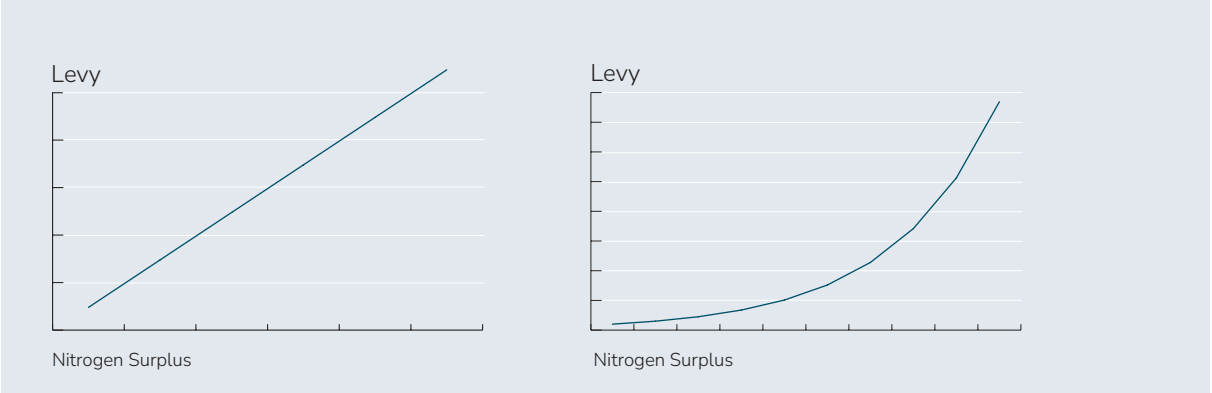
The proposal is to impose a levy not on nitrogen itself, but on nitrogen surpluses. There are two approaches for calculating these surpluses. A static tax could approximate the surpluses on inputs according to available land. But surpluses cannot be calculated precisely with this method. Furthermore, a tax can be based on the material flow balance, which is mandatory since January 1, 2018. All farms of a certain size have to prepare a material flow balance. Since January 1, 2023 the regulations have been tightened depending on the size of the operation (BMEL, n.d.-b). Farmers already collect data in form of all inputs (fertilizer, seed, livestock) and outputs (farm manure, feed, livestock) (FÖS, 2018b). The difference in nitrogen input and output represents the nitrogen surplus. This balance can be subject to a levy. This levy can either be linear (▷ **Figure 12**) or progressive (▷ **Figure 12**). The progressive design has the advantage that a graduation would be possible. Low surpluses with lower environmental impact would be subject to a lower levy than high surpluses (Möckel, 2017). The levy could also be adapted to regional differences in nitrogen concentration, for example, through regional levy rates or load-specific exemption limits (Sachverständigenrat für Umweltfragen, 2004).

The levy may create incentives for a better distribution of manure between regions with intensive livestock farming, and regions where arable farming dominates, since trading surplus manure from livestock production to arable farms becomes necessary to avoid the levy (Möckel, 2017). Furthermore, a nitrogen surplus levy may also be an alternative to the lack of CO_2 pricing in agriculture in terms of measuring sectoral GHG emissions , as nitrogen is one of the most important sources of GHG emissions in this sector (FÖS, 2022b).

To optimize policy design, it could be useful to also exempt small farms that are not required to prepare a material flow balance from the nitrogen surplus levy. This is due to the fact that the costs associated with preparing such a balance

FIGURE 12 Linear vs. progressive design of a nitrogen surplus levy

Source: (FÖS depiction)



are often higher than the anticipated tax liability for a surplus tax, particularly for farms with small acreage (FÖS, 2018b; Möckel, 2017). Legally, a nitrogen surplus levy is compatible with federal and EU law, provided that certain conditions are met when calculating the amount of the levy (FÖS, 2018b).

4.1.3 Environmental externalities and potential revenues

A nitrogen surplus levy would serve both an environmental steering goal (fewer chemical fertilizers in agriculture) as well as a fiscal goal (revenue for reuse). Studies have calculated **the external effects** (environmental damages) of the excessive use of fertilizers and their impact on groundwater and the eutrophication of surface waters. Roolfs et al. (2021) calculated the harmful effects per year of **phosphorus surpluses (1.6 billion €)** and **nitrogen surpluses (4.8 billion €)** from German agricultural sources.[6]

The methodology convention by the Federal Environmental Agency provides estimates of the costs of environmental damage from nitrogen and phosphorus (UBA, 2020a, p. 43f.):

- 6.30 € per kilogram of nitrogen
- 4.44 € per kilogram of phosphorus.

Thus, the externalities are significantly higher than the actual product price of fertilizers.[7] We do not have solid data on price elasticity for the use of fertilizers. Since it is necessary to apply (some) fertilizer, it is difficult to determine how much fertilizer use would decline for a given level of tax on nitrogenous or phosphorous fertilizers. This area shows that better impact assessments and further research are needed.

6 Besides agriculture, sewage is another significant source of both phosphorus and nitrogen.

7 Wholesale prices for (nitrogen or phosphorous based) fertilizers are generally well below the costs of their externalities. E.g., https://markt.agrarheute.com/duengemittel-4/stickstoffduenger-20

4.2 Internalising environmental harm from pesticides

4.2.1 Environmental costs

In agriculture, pesticides are utilized to safeguard plants by eradicating other organisms such as fungi, plants, or animals. However, this action does not only affect the target organisms but also has indirect effects, such as reducing available food sources for other animals. The widespread use of pesticides **reduces biodiversity and can also be harmful to humans** if they accumulate in drinking water or foodstuffs.

Several studies have estimated the external costs of pesticides. They fall into two categories: **prevention costs** (e.g., water filtration) and **damage costs** (to biodiversity and human health) (Roolfs et al., 2021). Uncertainty about the extent of damages to the environment and human health is high – especially because little is known about the chronic effects of pesticides (Hamdan, 2019). The most prominent example of this uncertainty is the potentially carcinogenic effects of glyphosate/Roundup (Roolfs et al., 2021).

The **negative impact on biodiversity** is estimated at about 24 billion € (25.4 billion $), and the **cost of monitoring and filtering drinking water** at around 700 million € (742 million $) (based on (UBA, 2017a). External impacts on **human health** are **highly uncertain** – estimated at up to 24 billion € (25.4 billion $) (Roolfs et al., 2021).

4.2.2 Current legal framework

In Germany, there are **numerous environmental regulations for the application of plant protection products** and the compensation of their negative effects. The legal basis for the use of plant protection products is derived from the Plant Protection Act (PflSchG), the European Plant Protection Products Regulation (1107/2009/EC) and the Framework Directive on the Sustainable Use of Pesticides (2009/128/EC). The focus is on measures to improve water protection, preserve biodiversity, educate and advise users, and monitor compliance with regulations (Stoll, 2013). The principles of integrated pest management apply, i.e. the use of plant protection products and other control methods must be limited to what is necessary (BMEL, 2021b). In addition, the introduction of exclusion criteria for the approval of active substances ("cut-off criteria") in the new European Plant Protection Products Regulation (1107/2009/EC) should further reduce the application of plant protection products with active substance properties that are of particular concern (Wilke, 2022).

Despite the numerous regulations aimed at reducing pesticide use, **both the number of agents approved and their domestic sales increased again in 2020**.

4.2.3 European experiences

A tax or levy on the sale of pesticides could complement regulatory measures and provide incentives to reduce consumption and increase pressure to innovate in the development of less harmful products (FÖS, 2018c).

There are a variety of pesticide tax concepts in European countries. They show the strengths and weaknesses of different systems and can serve as a basis for the debate in Germany. In **Sweden, a pesticide tax** was temporarily imple-

mented in the form of a volume tax (uniform € value per quantity of pesticide). This led to the development of very potent pesticides. These new pesticides evaded the tax because they have the same effect as conventional pesticides in smaller quantities. Even when used more sparingly, these potent chemicals had comparable negative effects to the conventional ones. This quantity regulation did not lead to any significant improvement (Möckel et al., 2021).

On the other hand, modelling of a pesticide tax in **France** by the INRA Institute shows that the design of an ad valorem **tax is particularly successful in reducing when combined with low-input practices**. The institute calculated that an ad valorem tax equal to 35% of the net sales price would encourage 90% of farms to adopt low pesticide practices, resulting in a 25% reduction in overall pesticide use in France compared to average use over the past decade. Without alternative management practices, the same pesticide reduction would require a comparatively immensely higher levy of 130%. A 50% reduction in pesticide use by 2025 could be achieved, according to the simulation, if the levy rate were at least 200%.

In **Denmark**, the quantity-based pesticide tax includes the risk factors of human health, environmental behaviour and environmental toxicity, so that the tax amount per kilogram or litre of pesticide is calculated on the basis of the number of active substances contained and the active substance-specific risks in a pesticide load index (Möckel et al., 2021). On average, sales of pesticides in Denmark decreased annually from 2007 to 2011 due to the pesticide tax, and by approximately 38% from 2014 to 2018, with a decrease in the use of active ingredients with high toxicity. However, a permanent reduction in treatment intensity and the number of treated areas could not be achieved even with the modified tax concept (Möckel et al., 2021).

A pesticide tax would be a reasonable measure to set a price signal that would reduce pesticide use or shift demand to other, less harmful methods and internalize the costs of harmful agricultural practices. To achieve this effect, the tax should reflect as much of the external costs of environmental consequential damage as possi-ble (Finger et al., 2017). In order to balance the loss of income for farmers, compensation is required.

4.2.4 Proposal for a German pesticide tax

The Helmholtz Centre for Environmental Research (UFZ) developed a concept for a German pesticide tax in 2015. The goal of this risk-based instrument is to reduce the use of pesticides and provide incentives for the development of environmentally friendly alternatives. The concept is based on the idea that pesticides can have different effects on the environment and health, and that the distribution of pesticides should be staggered according to the risk they pose. Under this concept, pesticides with higher environmental and health risks would be taxed higher than pesticides with lower risks. The risk assessment of pesticides is based on criteria such as toxicity, persistence, mobility of active substance, as well as their impact on biodiversity and ecosystems (Möckel, Gawel, Kästner, et al., 2015).

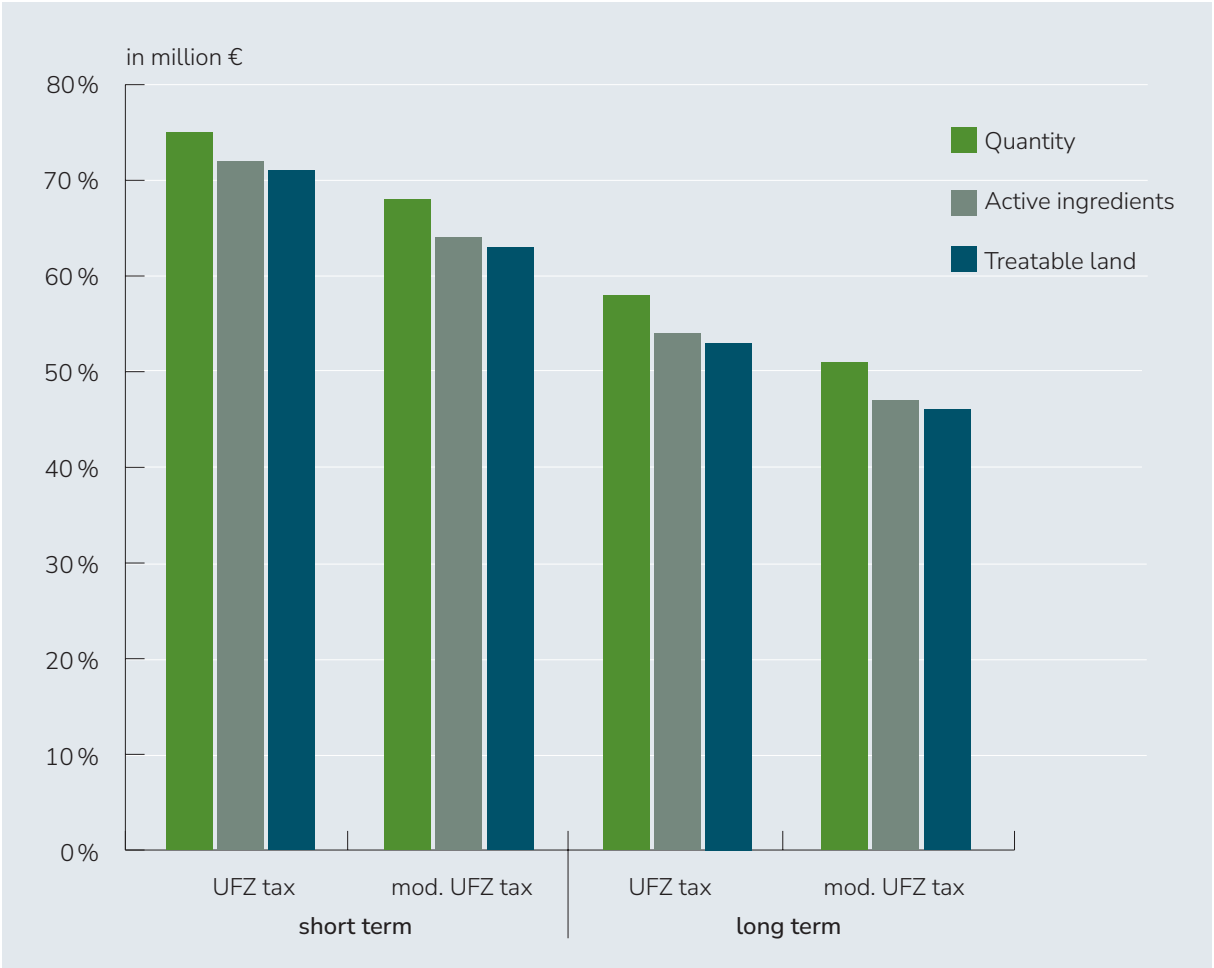
This instrument would consist of an excise tax on domestic manufacturers and importers, which would then be passed on to consumers via sales prices. The tax is first calculated as a quantity-based levy with a risk-based surcharge per kilogram or litre of a plant protection product and then related to the sales unit and converted into a percentage surcharge on the sales price, resulting in a specific value contribution for each plant protection product. This results in a **specific value levy for each crop protection product**.

To equally charge differently dosed agents, the concept provides for charging the maximum permissible application rate per hectare and year of each agent with a **uniform levy rate of 20 €**. Furthermore, **additional levies based on human toxicity and environmental impact** factors, as well as a 50 % across-the-board increase in the tax rate on all substitution candidates, insecticides and herbicides are envisaged (Möckel, Gawel, Bretschneider, et al., 2015). The UFZ anticipates an **average price increase per pesticide of more than 40 % per hectare and year,** with an **average decrease in pesticide use of 20 % in the short term and 35 % in the long term.** Depending on its design and scope, the tax could generate revenues of around **1 billion €** (1.06 billion $) **per year** (Möckel, Gawel, Kästner, et al., 2015).

Using sales data for the years 2014 to 2018, it was possible to model the potential change in sales of pesticides and active substances, as well as the area potentially treatable with them, when applying the levy concept proposed by the UFZ. In the **short term, an average of 25 % of pesticide sales could have been reduced** during this period if the pesticide tax concept had been implemented. In the **long term**, assuming higher price elasticity, the tax could reduce sales **by 42 %**. This study also models the effects of a

FIGURE 13 Impacts of a pesticide tax on pesticide use in the short and long term

Source: (Möckel et al., 2021)



modified UFZ tax with a 50 % higher factor on particularly harmful herbicides and pesticides. In this case, **pesticide sales could decline by 32 % in the short term. In the long term, the tax could lead to a 49 % decline in sales**. The modelling also shows a 36 % reduction in active ingredient sales volumes in the short term, when the modified UFZ tax is applied. This is accompanied by a reduction of the potentially treatable area by 37 %. In the long term, an area reduction of 54 % is to be expected (Möckel et al., 2021).

The modelling also shows that the tax could reduce the quantities of plant protection products containing active ingredients with special risk potential for pollinators, groundwater, and human health, as well as the sales quantities of substitution candidates, by between 32 % and 54 % in the short term. The **potential treatment area for human toxic agents** could also be reduced significantly by up to 68 % (Möckel et al., 2021).

4.2.5 Tax revenues

The modelling results of Möckel et al. (2021) show additional **tax revenues of between about 606 million and 1.2 billion €** (640 million and 1.3 billion $) per year, depending on the specific settings of the levy and price elasticities. Based on the agricultural area that is regularly treated with pesticides, this results in an **average cost per hectare of 41 to 106 €** (43 to 112 $) per year. In relation to other total operating expenses, the proposed tax concept would lead to an average levy burden of **between 0.4 % and 5.5 % of the total operating expenses**, depending on the short-term or long-term view (Möckel et al., 2021). Although the tax driven increase in pesticide prices is expected to initially increase costs for farmers, data from other countries show that the drop in income is small, while the drop in pesticide is significant (FÖS, 2018a). In addition, the tax is an instrument with low transaction costs, that makes efficient use of the resulting tax revenues (Finger et al., 2017). The proceeds could be used to finance investments in nature and ecosystems. Other efficient uses would be an increase in research funds, an expansion of environmental protection, or investments in water protection facilities. To avoid further burdening of farmers, the revenues could also be used to compensate farmers by further rewarding environmentally friendly practices (FÖS, 2018a).

05

Reforming agricultural and food subsidies: Repurposing environmentally harmful financial flows

5.1 Political commitments for subsidy reform: Little to no progress

The **German government's** coalition agreement set out the goal of developing a **social and ecological market economy**. To reform European agricultural policy, the German government intends "to present a concept on how direct payments can be adequately replaced by rewarding climate and environmental services" (SPD et al., 2021). Consequently, the German government committed to shifting subsidies in current European agricultural policy from area subsidies, which account for two-thirds of the total subsidy expenditure in the first pillar, to rewarding ecosystem services (BMEL, 2022a). For 2023, the German government planned to update its current subsidy definition and reporting. Until publication of this report, no concrete action has been taken and the government reaffirmed its intention to do that in its climate protection programme published in October 2023 (Bundesregierung 2023).

These national commitments are complemented by efforts at the **European and international level.** Moreover, they have largely focused on setting targets, but have made little progress. These include the reform process to green the CAP, the development of "a new methodology to identify other environmentally harmful subsidies", the call by the European Parliament to "phase out all fossil fuel subsidies by 2025 and all other environmentally harmful subsidies by 2027"[8] or complementary monitoring tools. The Green Deal aims at Europe being the first climate-neutral continent. The farm-to-fork strategy is intended to help achieve climate neutrality by 2050. However, EU agricultural subsidies, especially in the area of direct payments for livestock farms, hinder the promotion of a sustainable EU food system within the framework of the farm-to-fork strategy, one of the most important measures of the European Green Deal. The **G7** confirmed the goal of eliminating "inefficient fossil fuel subsidies by 2025" (G7, 2022a). To track the state of phasing out or reallocation of such subsidies, the G20 initiated a voluntary peer review system back in 2009. Only six G20 members, among them Germany, have done so. The same applies to harmful subsidies for biodiversity. The harmful effects of agricultural subsidies and the need for their reform have been recognized. But there is still no globally agreed system for mandatory reporting of harmful subsidies (Cottrell et al., 2021).

8 It is noteworthy though that the EU's Environment Action plan 2030 is lacking references to specific years for the phase-out (European Parliament, 2021).

5.2 Reform of harmful financial flows: A necessary condition for the transformation of the agri-food system

The German Ministry for Development Cooperation emphasizes the need for **transformation of agri-food systems** to achieve a world without hunger within the planetary boundaries. It also points out agriculture as an important "area of intervention" and underscores the linkages between global agricultural and climate policy and points out the need to address "**global, European, and local agricultural policy**, and coordinate this **more coherently with economic, climate and trade policies** at all levels"(BMZ, 2021). Internationally, the Global Forum for Food and Agriculture (GFFA) 2023 has also emphasized this need for "policy coherence" and "to better align our various policy instruments" (Global Forum for Food and Agriculture, 2023). Crucially, among them, are public and private financial flows.

Thus, reforming existing environmentally harmful subsidies is an **important component of transforming agricultural production and food consumption patterns** as their continued existence thwarts/slows down changes in the sector. In the status quo, they support an unsustainable type of agriculture. While research shows transformative change is about much more than changing the parameters of subsidies and taxes, reforming them to a more sustainable form of agriculture will support the transformation in this sector (cp. leverage points for transformation in Meadows, 1999).

5.3 A new perspective on reform: Less harm and more funding for investments in nature

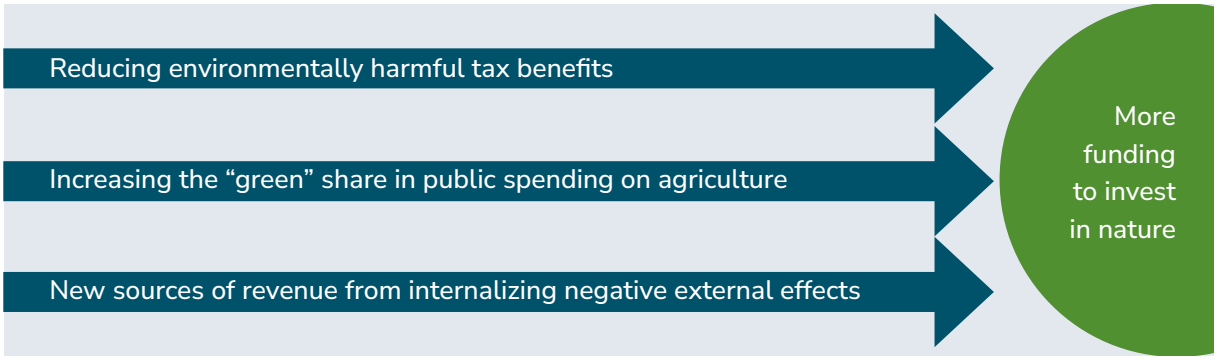
For a long time, the debate on environmentally harmful subsidies was framed as a means of reducing environmental damage. The beneficiaries of these subsidies, in turn, considered themselves losers and opposed reforms. The consequence was: a lot of commitment to reform, but little tangible action. **Reframing subsidy reform** as a way of not eliminating specific subsidies but **reforming** them to **shift funding from environmentally harmful to environmentally positive ones** and **investing in nature**, could reduce resistance to reforms that improve the environmental impact of the agricultural sector. ▷ **Figure 14** summarizes this new perspective on subsidy reform.

Within financial flows, three types can be distinguished: **tax benefits** that are granted that have environmental harmful effects; **financial support/public spending related to agriculture** and the **non-internalisation of negative external effects** from agricultural practices, such as the use of pesticides & fertilizers. These are not (yet) considered "subsidies" by the German government, yet they are from an economic perspective. A rule of thumb for reforming these three different types could be:

- Environmentally harmful **tax benefits should be reduced and removed** to stop distorting prices and to mobilize resources for investments in nature,
- **Public spending and financial assistance** measures should be reviewed for their harmful effects and get "greener": nature-positive ex-penditures should increase while nature-negative expenditures are reduced.
- **Negative externalities** (damages) **should be internalised**. Externalities are considered implicit subsidies by some institutions (such as the International Monetary Fund), but not by others. For example, the use of pesticides or nitrogen in agriculture causes billions of Euros in damages that are not factored in by the polluters and the damage costs are borne by society. These **externalities should be internalised** using economic instruments to reduce environmental and public health problems while generating public revenue.

FIGURE 14 Logic of fiscal reforms in this study

Source: (FÖS depiction)



Repurposing increased revenues/funds as **financial flows to nature** is advocated by many (Business for Nature, 2022; Finance for Biodiversity Foundation, 2022; Prakash, 2022; UNEP & ELD, 2022). Reforming harmful subsidies and internalizing external effects can deliver **double benefits**: contribute to lower environmental harm while mobilizing greater revenues – e.g., to close the funding gap for nature-based solutions. This reform logic is applied in the three reform packages discussed below (► also Textbox 3).

Of course, the **decision on how financial means are being repurposed** and what they are "spent on" is **ultimately a political one** and must consider the need to fund complementary measures that address distributive effects, etc. How "wide"[9] repurposing is defined, will ultimately also depend on political priorities and acceptance. Therefore, the reason for repurposing most revenue for nature in the reform packages below is to point out the scale of potential effects of such reforms.[10]

Potential fiscal reform measures are grouped into three categories in the following sections: one on subsidy reforms that could be implemented relatively quickly compared to the second package. The third goes beyond the traditional scope of subsidies and discusses the potential of new economic instruments to internalize environmental harm while generating revenue for nature.

BOX 1

A new perspective on subsidy reform: Repurposing as investments in nature, ecosystem services and socio-ecological transformation

Why is it so important to invest in nature and nature-based solutions? The need for investment is highlighted by UNEP & ELD (2022). The reasons are climate change, biodiversity, soil protection and the provision of ecosystem services. And economics: nature's services are still worth more than the global economy. The destruction of nature in recent decades has already cost us trillions and we must invest in nature to prevent this downward spiral from continuing. Changing financial flows in agriculture and (fossil) energy are key sectors for reform.

According to best available data, the economic value of ecosystem services provided by nature is still higher than global GDP (► Figure 15). Costanza et al (2014) show that global ecosystem services are valued at 118 trillion € (125 trillion $), compared to global GDP at 71 trillion € (75 trillion $) (60 %). Between the two evaluations of global ecosystem services in 1997 and 2014, their value declined by more than 19 trillion € (20 trillion $). Half of this due to changes in marine environments (e.g., destruction of coral reefs) as well as land-use changes that have reduced the value of tropical forests and wetlands in particular[11] – both of which are very strongly related to agricultural production (Costanza et al., 2014).

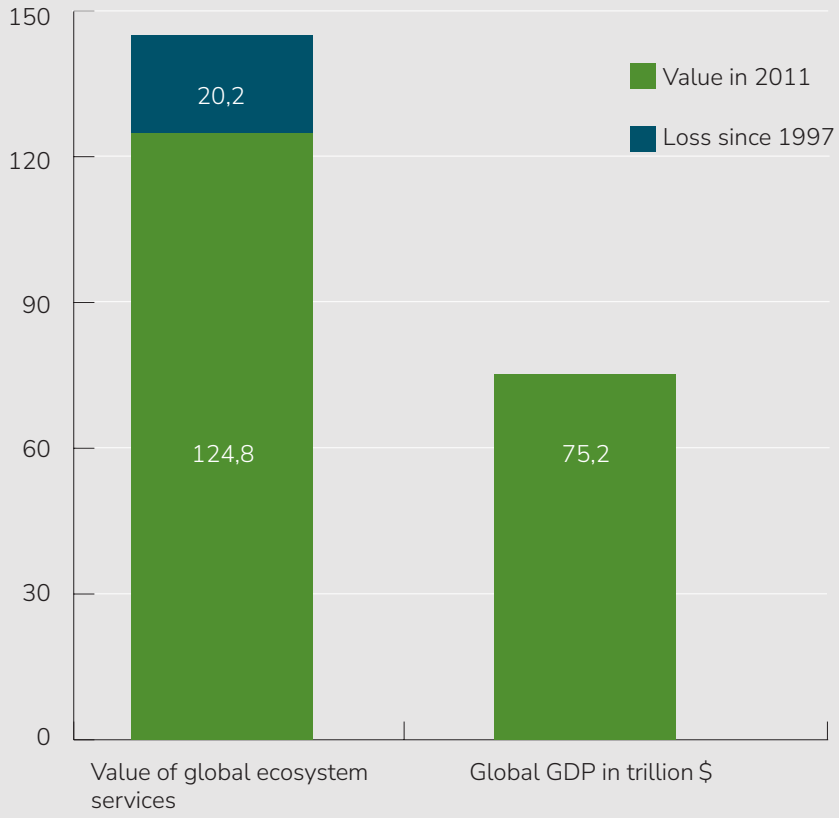
9 A narrow understanding of repurposing the subsidies for agricultural in reform package 1 could mean that the benefits of repurposing should fall to farmers with agricultural machines solely – a wider understanding of re-purposing would allow this revenue to be used for funding nature protection.

10 An additional reason is to not get distracted by the myriad of options on how to repurpose financial means.

11 Other ecosystems improved in value, such as grasslands, cropland, and urban environments.

FIGURE 15 Economic value of ecosystem services (left column) and global GDP (right column), 2011; including loss of ecosystem services since 1997

Source: (Costanza et al., 2014)



Investing in the restoration of these ecosystems can not only reduce/prevent further losses in these ecosystems but improve the **resilience of ecosystems, climate mitigation as well as employment opportunities**. Such investments have to be made by both private and public funders. Reallocating environmentally harmful subsidies and greening agricultural grants can increase funding for investments in nature and ecosystems while creating several positive co-benefits (finance, climate, land use, employment, etc.).

5.4 Package 1: Repurposing production-related subsidies

5.4.1 Description of the reform package

The first package of subsidy reforms could be implemented in a relatively short timeframe. It would primarily affect producers and increase their costs or reduce economic incentives for production. It consists of:

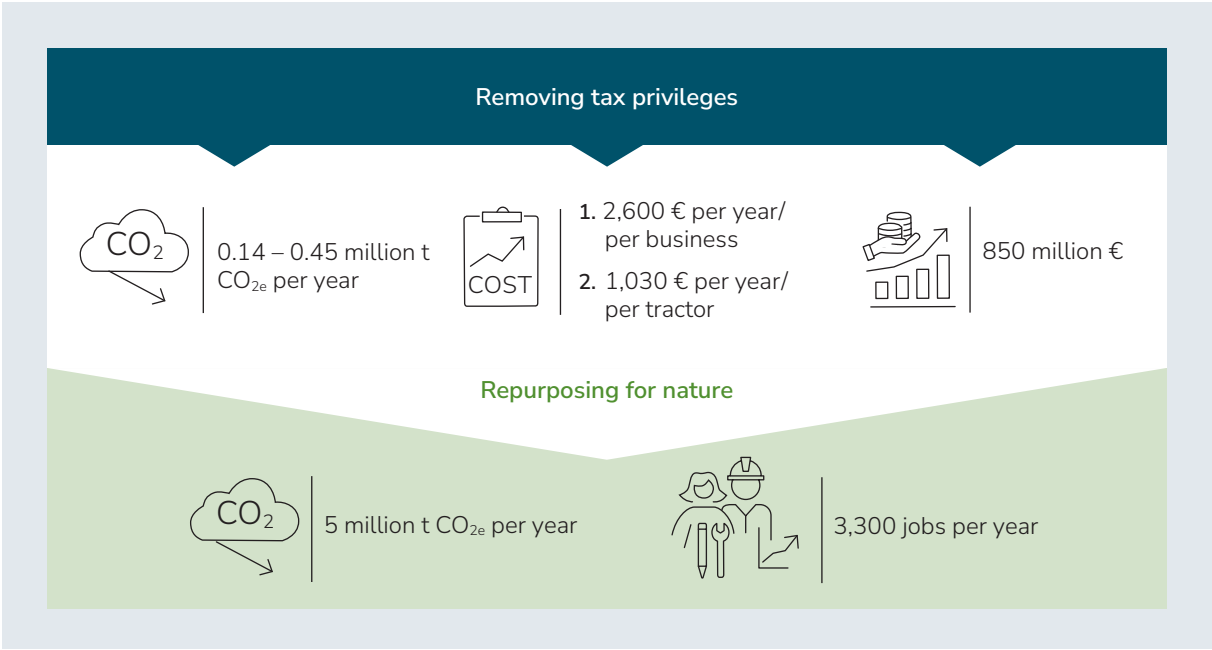
- Tax concession for agricultural diesel (to be removed)
- Exemption of agricultural vehicles from motor vehicle tax (to be removed)[12]

Reducing and eliminating harmful subsidies will result in increased tax revenues, which should be **transformed** into increased investments in ecosystem restoration and, in turn, income opportunities for farmers. The purpose of the package is therefore not to increase tax revenues, but to shift financial flows by reducing environmentally harmful flows and using the resulting revenues for necessary investments in ecosystems.

▷ **Figure 16** summarizes the results of the subsidy reforms in package 1 and its repurposing.

FIGURE 16 Summary of impacts of reform package 1

Source: (FÖS depiction)



12 In December 2023, the coalition government proposed ending both tax privileges on short notice. Due to disagreement within the coalition government and protests from farmers and their lobby organization, adjustments were made. As of 19.01.2024, the motor vehicle tax exemption for agricultural vehicles remains unchanged and the tax concession for agricultural diesel is planned to be phased out gradually by 2026.

5.4.2 Quantitative and qualitative assessments of the impact of the reform package

Qualitative assessment

The reform of the two **tax benefits** will primarily affect the operating costs of farmers who currently benefit from them. This is likely to lead to political opposition from farmers but is unlikely to have much impact on the actual use of machinery in production. The German Federal Court of Auditors called for the abolishment of the motor vehicle tax exemption in its last report – pointing out that the original subsidy was introduced 1922 with the goal of motorizing agriculture – a goal, which has been achieved for a long time (Bundesrechnungshof, 2022d). Both tax privileges have been evaluated with very critical results in a comprehensive evaluation of tax privileges (FiFo et al., 2019; FiFo Köln et al., 2019b). Both fall within the scope of "wasteful, ineffective, and environmentally harmful subsidies" that the German government vowed to abolish in its coalition agreement. Repurposing revenue in a way that allows farmers to earn additional income can help address concerns.

Quantitative assessment of subsidy reform

Fiscal impacts. The **volume of environmentally harmful subsidies** in the package amounts to 1.9 billion € (2.01 billion $). The abolition of tax privileges (Diesel tax privilege and exemption of agricultural vehicles from motor vehicle tax) will lead to higher government revenues. This additional reuse **revenue potential for repurposing** can be estimated at **850 million €** (901 million$). It is lower due to behavioural changes in response to higher Diesel prices for agricultural vehicles.

Environmental impacts. The impact of the subsidy reform on greenhouse gases is difficult to estimate – for both the biofuel quota as well as motor tax exemption, there are no studies that estimate their impact. FÖS (2020) estimates the positive climate protection effect of abolishing the diesel tax benefit at 0.14 – 0.45 million tons of CO_2 per year.

Social impacts. The abolition of the two tax privileges for farmers will increase their production costs for the use of diesel-powered agricultural vehicles and machines. The **additional costs** of abolishing the vehicle tax exemption can be estimated using data from the German government's subsidy reporting. It estimates that 1,7 million vehicles are profiting from the tax privilege (BMF, 2023). Per vehicle, the abolition of the subsidy would amount to an average of 285 € per year – or about 1,900 € per farm on average.

The abolition of the **agricultural diesel tax benefit** increases the price of each litre of diesel by 0.25 € (0.21 € energy tax and 0.04 € VAT). The total impact is therefore very much dependent on a farmer's diesel consumption.[13] In terms of the number of farms in Germany (256,000 in 2022), each of them would be affected by an average of 1,700 € per year.

Quantitative assessment of repurposing as investments in ecosystems

Redirecting higher tax revenues to **investments in ecosystem restoration** can bring multiple environmental, but also economic benefits. The latter provide the agricultural sector with the opportunity to offset the slightly higher costs of the subsidy reform.

13 As there are more types of machinery than tractors using agricultural diesel, the impact can also not be simply divided by the number of tractors.

850 million € is expected to be reallocated to increase spending on ecosystem restoration. This spending can contribute to reduce **greenhouse gas emissions** by at least[14] **5 million tons of CO_{2e} per year**. In addition, there would be positive **employment effects** of more than **3,300 jobs** (primarily in forestry, public works, engineering, and gardening and landscaping companies).

Other positive impacts, such as reduced damages from floodings or cooling effects of wetlands are important but cannot be quantified.

BOX 2

Methodology in qualitative and quantitative assessments

The individual agricultural subsidies included in the three reform packages cover a wide range of different economic activities related to agriculture. Some are tax privileges that reduce production costs for farmers (diesel tax concession or vehicle tax exemption), others affect consumer demand for animal products with higher environmental impacts, while financial assistance programmes directly affect financial flows to nature.

For some of them, it is relatively easy to estimate financial and climate impacts, but it is impossible to model other environmental impacts, such as on land use or biodiversity (e.g., in the case of vehicle tax exemption) or to estimate social impacts. Our presentation of the potential impacts of subsidy reform therefore draws on data from literature, our own studies and other published studies on these subsidy reforms and attempts to present fiscal, economic, environmental, and social impacts as comprehensively as possible, depending on availability of the data. Where quantitative assessments are not possible, we aim to describe them in a qualitative manner.

Box 3

Estimating the environmental and economic benefits of investments in nature

A study by FÖS and DIW Econ (DIW Econ et al., 2022) modelled the impact of higher investments in the restoration of different ecosystems. Among the measures modelled were investments in a nature-oriented forestry, the restoration of peatlands, wetlands and rivers. This model and the assumptions made are being used to estimate impacts of the repurposed spending here.[15] There are numerous limitations[16] in this approach and the primary purpose is to provide an estimate of how large the positive economic and environmental effects of such investments could be. The limitations of the data we (have to) use underscores the need for better data on the positive impacts of investing in nature and a more sustainable agriculture.

14 There is no data for example on the positive climate impacts of the restoration of rivers. While it is likely there is one, the impact is not reflected in the quantitative data.

15 Two assumptions are being made here in which values determined for Bavaria are applied to all of Germany: a) the shares of spending allocated to each ecosystem: (41 % of forestry, 5 % on peatlands, 38 % on wetlands and 16 % on rivers); b) the original study used a Bavaria-specific economic model to estimate employment impacts.

16 Some of them are that Bavaria's landscape is – of course – not identical to the rest of the Germany; that positive environmental effects are not immediate but accrue over time (the timeframe applied in the DIWEcon/FÖS study is ten years); and that not all investments in nature have similar positive effects.

5.5 Package 2: Greening VAT and spending on food and agriculture

5.5.1 Description of the reform package

The second package of subsidy reforms includes two measures that are less likely to be implemented in a short time span. It consists of two items[17] :

- Taxing animal products at the regular VAT rate and reducing VAT for all plant-based foods (see details below)
- increasing the share of GAK that is environmentally positive

There are several reasons why reforming these financial flows is more difficult and why their implementation would take more time than Package 1: VAT reform for political reasons, especially after the increase in food prices due to the Russian war against Ukraine and its impact on food production, fertilizer production, etc. – all of which contribute to higher food prices.

The alignment on the GAK with environmental standards due to administrative issues and the need for cooperation between federal and state ministers of agriculture. Given the landscape diversity of the federal states, their priorities are naturally different.

VAT reform would lead to higher tax revenues than today. Similarly, a GAK reform would lead to lower expenditures for measures without nature-enhancing effects and to higher expenditures for nature-enhancing measures. There are modelling data on various effects of VAT reform. They are presented in the following sections. The effects of the GAK reform are of course much more difficult to describe and can neither be modelled nor quantified here.

► Figure 17 summarizes the results of the subsidy reforms of package 2 and its repurposing.

Box 4

Alternative options for VAT reform

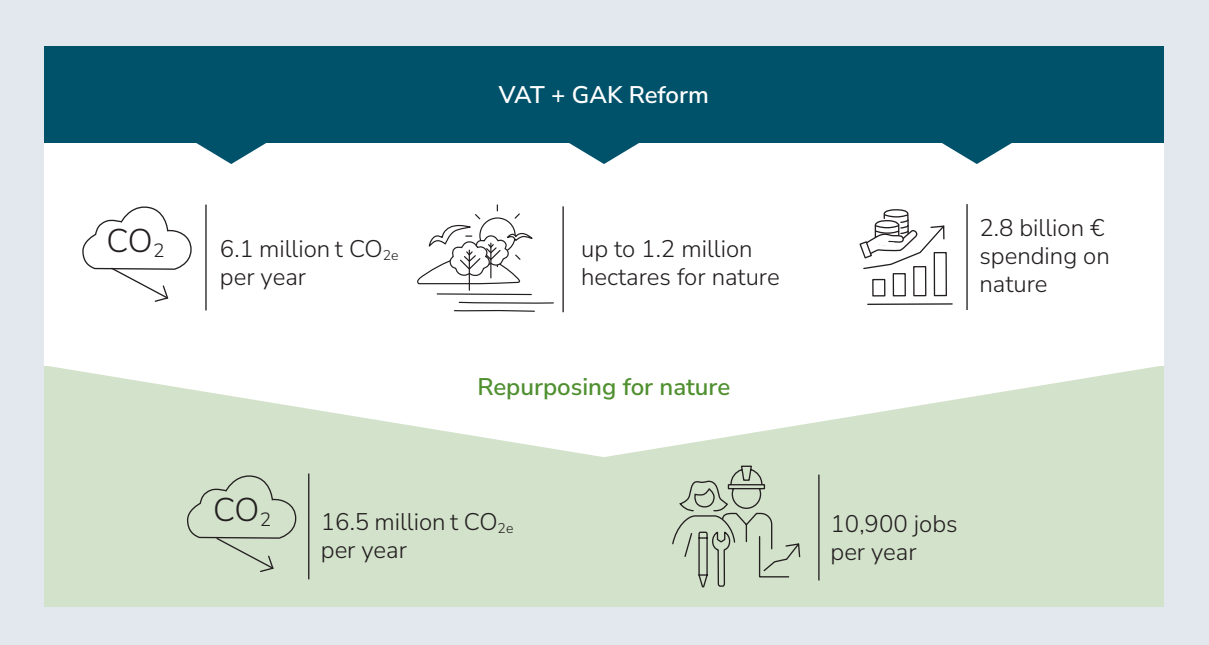
There are different options for reforming VAT for plant and animal-based products and applying the reduced and regular VAT rates. Some of them have been modelled and have a repurposing potential, such as the one discussed below.

Others have been outlined, e.g., by the Federal Environmental Office that plan to reduce the VAT rate for plant-based substitutes (e.g. plant-based milk and meat products) from the regular to the reduced rate and reducing VAT to 0 % for all plant foodstuffs while planning to increase the VAT rate for animal products at a later stage (UBA, 2022e). This reform option was not discussed here as its effects have not yet been modelled.

17 There are arguments in favour and against grouping these two reforms together. We separated them from those reforms in package 1 as they will take longer to implement and from those in package 3 as they reform existing financial flows.

FIGURE 17 Summary of the effects of reform package 2

Source: (FÖS depiction)



5.5.2 Quantitative and qualitative assessment of the impact of the reform package

Qualitative assessment

A VAT reform would increase overall tax revenue, partially shift consumption from animal to plant-based products and reduce the environmental impact of animal production. An important caveat is the link between consumption and production of animal products in Germany: Between 2000 and 2015, they decoupled while per capita consumption shrank, rising exports led to an increase in production – and thus to environmentally harmful effects in Germany (and abroad). This gap between consumption and production has slowly started to shrink again since 2015 (Destatis, 2023b, 2023a). Fewer animal products in Germany would reduce greenhouse gas emissions from agriculture, reduce land use for feed, and reduce soil and water pollution from nitrates, drugs and hormones, excess nitrogen, manure, etc. The reform would have positive environmental impacts, but studies show that VAT reform alone can contribute to internalising environmental damage linked to the consumption of animal products (in terms of energy consumption, greenhouse gas emissions and excess nitrogen), but only to a limited extent (Universität Augsburg, 2020). To fully internalise these effects, additional instruments (e.g., a nitrogen levy or a "meat tax") would be necessary.

The **GAK** has a wide range of different funding areas – e.g., from support for agricultural sales to animal health, compensation for damage related to extreme weather, flood prevention measures. Some programs are inherently for the environment, while others are not and can be made "greener" by attaching environmental criteria to funding.

Quantitative assessment of subsidy reform

VAT rate on animal products. There are evaluations estimating the impact of ending the preferential treatment of animal products by taxing them at the reduced VAT rate of 7%. The quan-

titative impacts presented here are based on a study presented in chapter 3.1 in Postpischil et al. (2022a). The reform not only **ends the preferential treatment of animal products**, but also employs additional revenue to simultaneously **lower the VAT on plant-based foods to 5%.**[18] [19] The quantitative fiscal, environmental and social impacts are presented here.

Fiscal impacts. The VAT reform would cause some shifts in demand from animal to plant-based products, but only partially. According to the model calculations, **meat consumption would fall by 11.4%** (10.9% for other animal-based products), while demand for **plant-based foods would increase by 1%**, leading to an overall **increase in tax revenues of 2.1 billion €** (2.3 billion $).[20]

The federal government's current drafts indicate its intention to significantly **increase GAK spending** – from 1.090 billion € in 2020 to a (planned) 1.283 billion € in 2023. While the size of the "overall GAK" is growing, it is important to increase its share of environmentally positive spending as well (►section 3.5.3). To estimate the fiscal potential, we assume that the share of environmentally positive spending can be increased to **80% of GAK spending** and that **Länder spending** (702 million € in 2020) would reflect these changes. Based on these assumptions, we estimate that the "greening of the GAK spending" by the federal and Länder governments could further **increase funding for nature by 696 million €** per year (2023).[21]

Environmental impacts. The quantifiable environmental impacts are related to greenhouse gases and land use (to produce animal foods).

The VAT reform would reduce consumption-based **greenhouse gas emissions by up to 6.1 million tons of CO_2 per year**. This is based on the premise that lower domestic consumption will not be compensated by higher exports of animal products from Germany. While meat exports (and thus production in Germany) had risen sharply between 2000 and 2015, there has been a slight trend reversal in recent years, as statistical data show (Destatis, 2023a, 2023b).

Reducing demand for animal products also "frees up" land that is currently used to produce animal feed (► Figure 3). Using data on consumption-based land use in Germany, we see that two thirds of arable land is currently used for the production of animal products (Örtl, 2017). Extrapolating these figures shows that the reform could **"free up" up to 1.2 million hectares of arable land in Germany**. This land could help

18 The original study considered various settings for reform: two variants, „Variant 1" which raises VAT on animal products and leaves the rate for all plant-based products at 7%. „Variant 2" would simultaneously raise VAT on animal products and repurpose some of the additional revenue to lower the VAT rate of plant-based products to 5% (from 7% on most plant-based foods and from 19% on some plant-based foods (such as soy or oat milk) that are taxed at the full rate currently). Additionally, both variants were modelled using different price elasticities – ▷ **footnote below**.

19 The modelling in the study compared two different scenarios: Scenario 1 with a lower price elasticity and scenario 2 with a higher price elasticity, which also distinguished between three income groups (high/middle/low-income). The latter recognizes that low-income households respond more „elastically" to changes in prices for animal-based foods while they are inelastic for plant-based staple foods, such as bread or vegetables. See table 3-3 in Postpischil et al. (2022a, p. 56).
The data presented here is based on „Variant 2"and scenario 2 with higher price elasticity. This scenario is the most conservative in terms of fiscal and environmental impacts.

20 The modelling shows that with a lower price elasticity (scenario 1), additional revenue could be significantly higher (2.7 billion €/3 billion $).
The comparison with reform variant 1 underscores the importance of the underlying assumptions about consumer response and the policy reform: in variant 1, additional revenue would be even higher and generate up to 5 billion € (5.5 billion $) in additional revenue.

21 Another challenge associated with that is to spend the funds on actual projects. Therefore, we speak of a fiscal potential.

Germany meet its 2030 biodiversity targets for rewetting marshlands or restoring other valuable ecosystems (Postpischil et al., 2022a).

Other positive impacts from lower nitrate levels in soils and groundwater, excess nitrogen, or traces of pharmaceuticals in groundwater related to livestock cannot be quantified.

The environmental impact of a GAK reform cannot be quantified.

Social and redistributive impacts. Reducing the consumption of animal products would have positive effects on public health, as German consumption (on average) is far above the levels recommended by the German Nutrition Society. The external health costs to society of (over-) consumption of (red meat) are estimated at 10 billion € per year in Germany (Roolfs et al., 2021).

The analysis of consumption data on animal products (particularly meat) shows that in Germany men consume almost twice as much meat as women, that meat consumption is highest in the middle class and lowest in the poorer and richer classes; and that price elasticity is highest in poor households. The average impact of the VAT reform thus depends very much on all these features. The modelling results show that people across all income groups spend less money on food after the reform, as consumption of animal products declines, and plant-based foods are cheaper and taxed at a lower VAT rate.[22]

GAK reform would have no discernible redistributive effects.

Quantitative assessment of repurposing funds as investments in ecosystems

The reforms in this package could mobilize about **2.8 billion € in additional funds**. Reallocating these funds "for nature" in the same way as in package 1 would reduce **GHG emissions by 16.4 million tons of CO_{2e} annually** and have positive **effects on the labour market by creating more than 10,300 jobs**.

22 When people are less responsive to higher prices, they are faced with higher expenses (see table 3.7 in Postpischil et al., 2022a). In practice, results for men and women will likely differ as their diets contain vastly different shares of meat.

5.6 Package 3: Internalising environmental harm while increasing revenue for nature

5.6.1 Description of the reform package

From an economic perspective, the non-internalisation of environmental harm has similar effects to the granting of environmentally harmful subsidies. Applying fiscal instruments (e.g., taxes and levies), can reduce environmental harm while generating tax revenues to fund investments in nature. A third package could consist of economic instruments that do exactly that, such as a pesticide tax or a tax or a levy on overuse of fertilizers. ▷ **Figure 18** summarizes the results of package 3 and its repurposing.

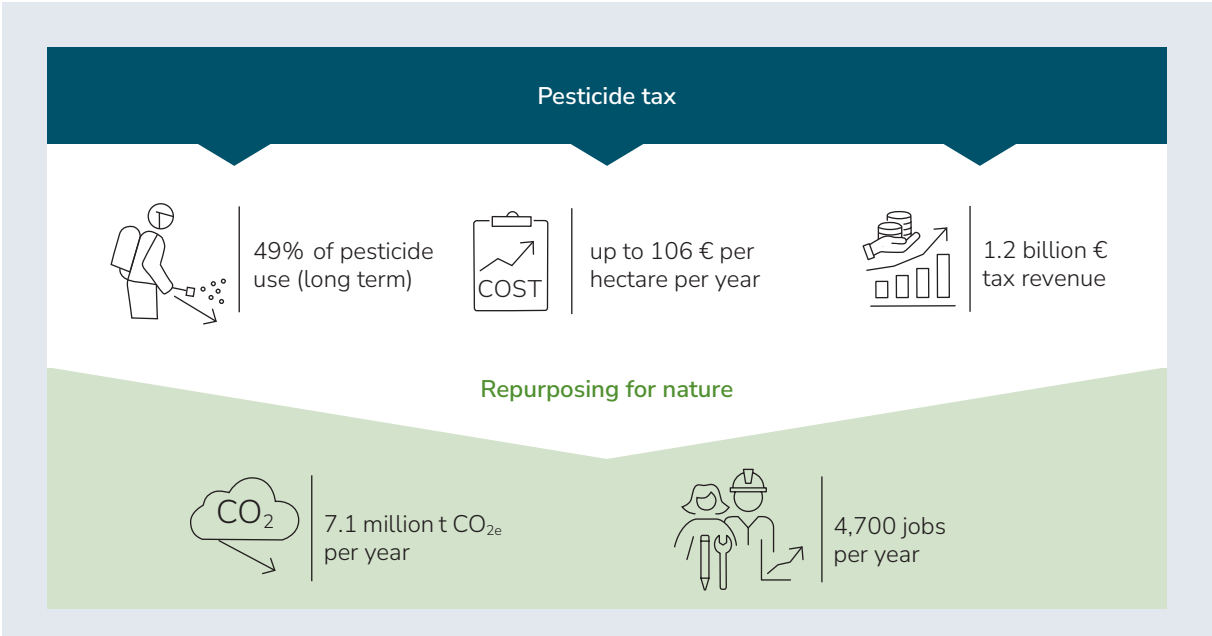
5.6.2 Quantitative and qualitative assessment of the impact of the reform package

Qualitative assessment

Overfertilisation and the excessive use of chemical fertilizers are directly linked to numerous environmentally harmful externalities. A tax on the excessive use of pesticides and fertilizers can encourage farmers to adopt more sustainable farming practices and thus reduce the amount of chemicals released into the environment. This would in turn improve soil health, reduce water pollution, and protect biodiversity. Greenhouse gas emissions associated with the production and transport of these chemicals could also be reduced. A tax on overuse of pesticides and fertilizers has the potential to incentivise more sustainable agricultural practices, improve environmental health, and mitigate climate change.

FIGURE 18 Summary of impacts of reform package 3

Source: (FÖS depiction)



Quantitative assessment of subsidy reform

While the **negative environmental impact of excessive use of fertilizers** has been estimated for Germany – 1.7 billion € from phosphorous and 5.1 billion € from excess nitrogen – the potential tax revenue cannot simply be deducted from that figure. The **negative environmental effects of over-use of pesticides** have even higher costs: for biodiversity (24 billion €), drinking water (742 million €) and human health (up to 24 billion €). The following quantitative assessment of impacts is limited to the pesticide tax. The data shown here, are based on the "modified UFZ tax" (► section 4.2).

Fiscal impact. Möckel et al. conclude that a pesticide tax in Germany could generate between 606 million to **1.2 billion € in additional tax revenue**. This means higher costs of 41 to 106 € per hectare per year.

Environmental impacts. The concrete results of a pesticide tax depend on the specific framework conditions. Model calculations show that pesticide sales could decline by 32 % in the short-term and by **up to 49 % in the long term**.

Social impacts. Cannot be estimated.

Quantitative assessment of repurposing funds as investments in ecosystems

The reforms in this package could mobilize about **2.8 billion € in additional funds**. Reallocating these funds "for nature" in the same way as in package 1 would reduce **GHG emissions by 7.1 million tons of CO_{2e} annually** and have positive **employment effects of more than 4,700 jobs**.

06

Conclusion

The way we farm – what inputs (including pesticides and fertilizers) the sector uses and what agricultural products we produce (particularly the share of animal and plant-based foods and goods) – has an enormous impact on the **environmental footprint of agriculture**. The way we farm also depends to a large extent on **fiscal incentives provided by EU and national subsidies**, tax incentives and spending. Transforming agriculture and food systems thus also requires reforming financial flows.

Scope and structure of the study

Therefore, this study **examines the existing financial flows and incentives** affecting German agriculture for their environmentally positive or negative effects and discusses how harmful financial flows can be reformed, how spending programs can become "greener" to respond to the environmental impact of these financial flows and to increase "funding for nature". The goal is to demonstrate how subsidy reforms can be designed to reallocate funds in ways that are politically acceptable to many, while shifting funds away from environmental harm and towards nature.

The study **takes stock of existing financial flows at European and national level** and categorizes financial support measures and tax incentives according to their environmental impact (► chapter 3). It further makes an economic argument for using economic instruments to internalise the harmful external effects of pesticides and fertilizers as part of a green fiscal reform of the agricultural sector (► chapter 5).

Reforming environmentally harmful subsidies is a widely recognized and agreed political goal – but one that lacks an internationally shared definition and thus implementation. The prospect of "repurposing" harmful subsidies and finding new sources of finance for nature offers a new perspective and story for their reform that can help overcome the obstacles that have prevented reforms: by not "taking away" subsidies and financial flows towards farmers or consumers, but "greening" them so that financial incentives by EU and national governments contribute to changing the way we farm toward a more sustainable agriculture.

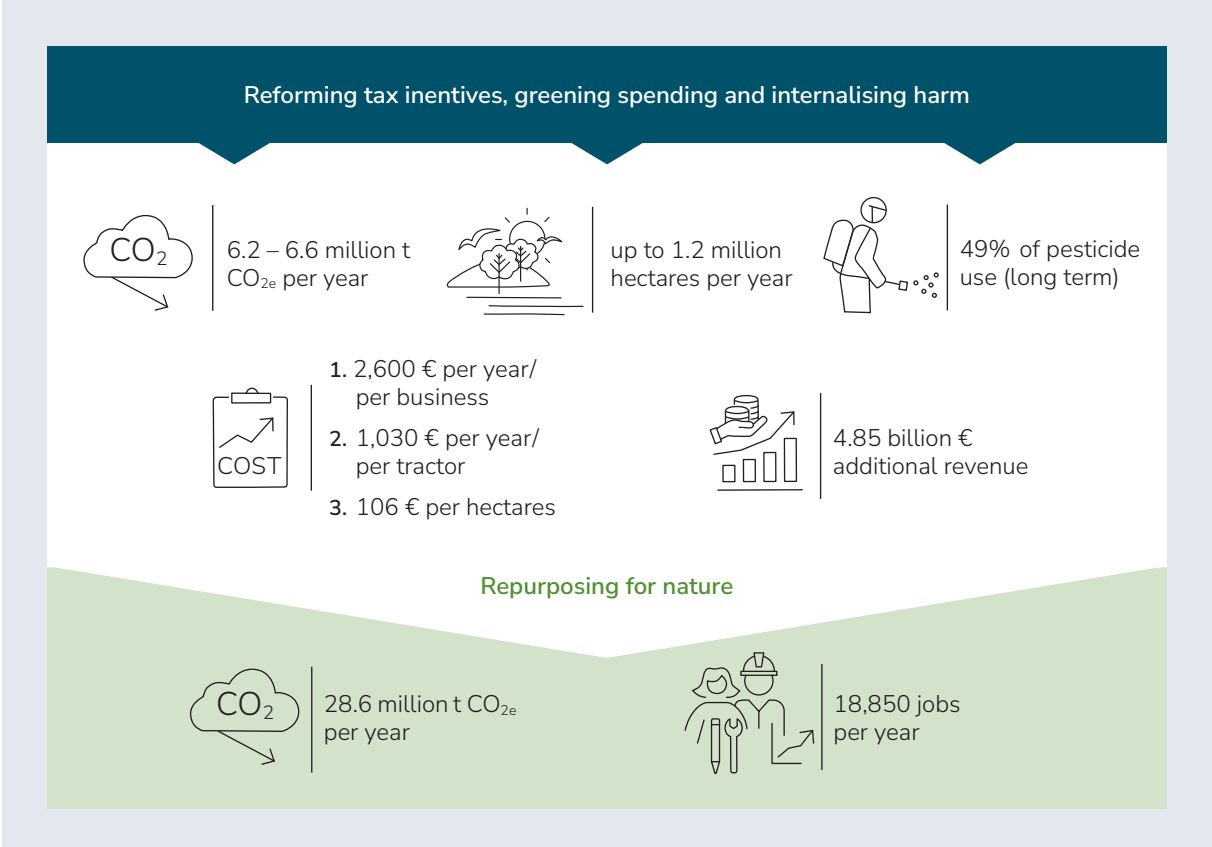
Estimated potentials of subsidy reform and of repurposing agricultural subsidies for spending on nature

In ► chapter 5, we discuss green fiscal reforms in three packages, each aimed at reducing harmful incentives, greening spending, and generating additional funds for nature. Not all their effects can be quantified and each of these reforms affects different aspects and groups of beneficiaries. Reforming them will require a strategic approach, sequencing of reform and managing their distributive effects. What the results for the **reform of environmentally harmful subsidies** indicate, are the various fiscal (**close to 5 billion € in additional revenue**) and environmental potentials (in **more than 6 million tons of CO_{2e}** in **reduced GHG emissions, reduced land and pesticide use**). The results also indicate likely additional costs for farmers.

Secondly, there are the potential **effects of repurposing additional revenues** for nature resulting from the subsidy reforms. Using them in the

FIGURE 19 Summary of estimated quantitative effects of the three reform packages

Source: (FÖS depiction; see individual estimation in chapter 5. Note that not all effects could be quantified and therefore are not presented here.)



way outlined in ► section 5.4.2 would generate positive climate and employment effects (additional **28.6 million tons of CO_2** in addition to close to an additional **19,000 jobs**).

Alternative uses of the additional funds and revenues would lead to different effects. It is ultimately up to political decisionmakers to design such reforms, determine to what degrees revenue is repurposed and for which specific investments it is used. The purpose of the estimates here is to outline its dimensions and possible use.

Recommendations for policymakers in and beyond Germany

A more sustainable agriculture in Germany – and elsewhere – needs a more sustainable green fiscal policy framework. Repurposing harmful subsidies, greening spending, and exploring new environmental taxes to internalize harmful effects are key levers to increase funding for nature and an agricultural sector with a lower environmental footprint. The discussion of the German case provides an example of how repurposing finance for nature in agricultural can look like. Thus, it can inform the reform debate within Germany as well as on the international level. **Key take-aways** for both German and international policymakers are to increase funding for nature/NbS using several levers:

- **continuing CAP reform:** decoupling of direct payments from agricultural land should be continued. In that context, the share of eco schemes in direct payments under pillar 1 of the CAP should be further increased after the

funding period until 2027. However, only a small proportion of the funds for eco schemes were retrieved in the first half of the claim year. While more than 100 % of the funds of individual measures of the eco schemes were retrieved such as in the case of indicator species. Other measures, such as agroforestry, were not used at all (BMEL, n.d.-a). Here, an adjustment of the funding amounts or better accessibility could strengthen participation in the measures.

- **reviewing harmful incentives:** policymakers should review existing tax incentives for agricultural production as well as those that can artificially increase non-sustainable consumption.
- **using levers for positive incentives** ("green carrots"): fiscal reforms should end discrimination of sustainable consumption pattern (e.g., alternative milk/soy products, etc.) and consider preferential tax rates for foodstuffs with lower environmental impacts (plant-based foods). At least they should establish a level-playing field.
- **introducing economic instruments to internalise harm** ("green sticks"): governments should explore options on pesticides, fertilizers and meat taxes.
- **exploring further sources of revenue for NbS**: such as carbon or biodiversity credits/offsets, trading schemes or payments for ecosystem services.

Managing reform processes

Research as well as the experts consulted in interviews and workshops for this study emphasized the **challenges of managing reforms** and the ability of **special interests to defend** the status quo when they benefit from certain financial flows and fiscal policies.[23] As a consequence, politicians are often unable to end tax privileges that are not time-limited by design. Despite the German government having guidelines for subsidy policy aimed at restricting and reforming/ending tax privileges, the line ministries in charge of managing such subsidies are often not able or willing to reform them (e.g., Bundesrechnungshof, 2022a).

Successful fiscal reforms from the past can inform us how to design today's political processes. It shows that the drastic reduction of subsidies is rare and happens mostly under enormous (fiscal) reform pressures (e.g. agricultural subsidy reform in New Zealand in the 1980s) (Bär et al., 2011).

All successful reforms show the **need to find areas of agreement between competing interests**. Several approaches can support that. The use of **mediation processes** can help to focus on a factual debate and find shared reforms that are agreeable to all. This can, for example, mean that current beneficiaries do not lose support in total, but receive support upon other conditions (e.g., environmentally positive activities). Another approach is to **integrate fiscal reforms into a longer process**, in which the reform of the status quo is key to reaching future goals. Taking a look from the future at a challenge like financing for nature **can offer a new perspective** on the contribution the reform of current fiscal flows can deliver and may provide a way to integrate the concerns of opposing interests and allow them to adapt over time.

23 A good example for this is the motor vehicle tax exemption for agricultural vehicles that has been in place in Germany now for more than 100 years. Its original purpose has been reached, but the exemption is then kept for changing reasons – despite critical evaluations.

07
Literature

Bär, H., Jacob, K., Meyer, E., & Schlegelmilch, K. (2011). *Wege zum Abbau umweltschädlicher Subventionen.* Friedrich-Ebert-Stiftung. **http://www.foes.de/pdf/Studie Subventionsabbau fin.pdf**

BCG. (2019). *Die Zukunft der deutschen Landwirtschaft nachhaltig sichern Denkanstöße und Szenarien für ökologische, ökonomische und soziale Nachhaltigkeit.* **https://web-assets.bcg.com/7a/17/971c6d0e4fcb8067d406b8a9bb4a/die-zukunft-der-deutschen-landwirtschaft-sichern.pdf**

BfN. (2022). *Monitoring von Landwirtschaftsflächen mit hohem Naturwert.* **https://www.bfn.de/monitoring-von-landwirtschaftsflaechen-mit-hohem-naturwert**

BLE. (n.d.-a). Biologische Vielfalt. Retrieved November 29, 2022, from **https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Modellvorhaben/Biologische-Vielfalt/biologische-vielfalt_node.html**

BLE. (n.d.-b). Bundesprogramm Humus. Retrieved November 29, 2022, from **https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Bundesprogramm_Humus/Humus_node.html**

BLE. (n.d.-c). Bundesprogramm Stallumbau. Retrieved November 29, 2022, from **https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Bundesprogramm_Stallumbau/Stallumbau_node.html**

BLE. (n.d.-d). Modell- und Demonstrationsvorhaben (MuD) im Bereich der Erhaltung und innovativen Nutzung der Biolo-gischen Vielfalt. Retrieved November 1, 2022, from **https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Modellvorhaben/Biologische-Vielfalt/biologische-vielfalt_node.html**

BLE. (n.d.-e). Praxis-Agrar—BLE::Was verdienen Landwirte in Deutschland? Retrieved January 5, 2023, from **https://www.praxis-agrar.de/betrieb/betriebsfuehrung/was-verdienen-landwirte-in-deutschland**

BLE. (n.d.-f). Tierwohl. Retrieved November 29, 2022, from **https://www.ble.de/DE/Themen/Landwirtschaft/Tierwohl/tierwohl_node.html**

BMEL. (n.d.-a). Inanspruchnahme Öko-Regelungen nach vorläufigen Antragsdaten der Länder ohne Kontrollen und Plau-sibilitätsprüfungen. **https://www.bmel.de/SharedDocs/Downloads/DE/Presse/inanspruchnahme-oekoregelungen.pdf?__blob=publicationFile&v=3**

BMEL. (2021a). Energieeffizienz und CO2-Einsparung in Landwirtschaft und Gartenbau Das Bundesprogramm kompakt. **https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/energieeffizienz-landwirtschaft-gartenbau.pdf?__blob=publicationFile&v=4**

BMEL. (2021b). *Integrierter Pflanzenschutz in der Praxis—Erfahrungen aus acht Jahren Modell- und Demonstrations-vorhaben „Demonstrationsbetriebe integrierter Pflanzenschutz“.* **https://www.ble.de/SharedDocs/Downloads/DE/Landwirtschaft/Pflanzenschutz/ErfahrungenIntegrierterPflanzenschutz.pdf?__blob=publicationFile&v=3**

BMEL. (2022a). *Den Wandel gestalten! Zusammenfassung zum GAP-Strategieplan 2023 – 2027.* **https://www.bmel.de/SharedDocs/Downloads/DE/_Landwirtschaft/EU-Agrarpolitik-Foerderung/gap-strategieplan-kurzueberblick.pdf?__blob=publicationFile&v=4**

BMEL. (2019a, August 14). *Gemeinsame Fischereipolitik der EU.* BMEL. **https://www.bmel.de/DE/themen/fischerei/fischereipolitik/gemeinsame-fischereipolitik.html**

BMEL. (2019b, August 20). *Fragen und Antworten zum Hintergrund des geltenden Stands der GAP.* BMEL. **https://www.bmel.de/SharedDocs/FAQs/DE/faq-GAP/FAQ-GAP_List.html**

BMEL. (2022b). *Direktzahlungen.* BMEL. **https://www.bmel.de/DE/themen/landwirtschaft/eu-agrarpolitik-und-foerderung/direktzahlung/direktzahlungen.html**

BMEL. (2022c). *Moore schützen – Klimaanpassungen erleichtern.* BMEL. **https://www.bmel.de/DE/themen/landwirtschaft/klimaschutz/moorbodenschutz.html**

BMEL. (2022d, August 5). *Gemeinschaftsaufgabe “Verbesserung der Agrarstruktur und des Küstenschutzes.”* BMEL. **https://www.bmel.de/DE/themen/laendliche-regionen/foerderung-des-laendlichen-raumes/gemeinschaftsaufgabe-agrarstruktur-kuestenschutz/gak.html**

BMEL. (2022e, November 21). *Gemeinsame Agrarpolitik (GAP) – GAP-Strategieplan für die Bundesrepublik Deutschland.* **https://www.bmel.de/DE/themen/landwirtschaft/eu-agrarpolitik-und-foerderung/gap/gap-strategieplan.html**

BMEL. (2022f, November 21). *Landwirtschaft, Klimaschutz und Klimaresilienz.* BMEL. **https://www.bmel.de/DE/themen/landwirtschaft/klimaschutz/landwirtschaft-und-klimaschutz.html**

BMEL, B. für L. und E. (n.d.-b). *Stoffstrombilanz: Mehr Transparenz über Nährstoffe in landwirtschaftlichen Betrieben.*

BMEL Bundesministerium für Ernährung und Landwirtschaft. (2020). *Rahmenplan der Gemeinschaftsaufgabe „Verbesserung der Agrarstruktur und des Küstenschutzes“ 2020 – 2023.*

BMF. (2015). *25. Subventionsbericht: Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2013 bis 2016.* **https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Subventionspolitik/2015-08-26-subventionsbericht-25-vollstaendig.pdf?__blob=publicationFile&v=**

BMF. (2021). *28th Subsidy Report: 2019 – 2022.* **https://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Press_Room/Publications/Brochures/28-subsidy-report.pdf?__blob=publicationFile&v=3**

BMF. (2022). *Finanzbericht 2023.* **https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/finanzbericht-2023.pdf?__blob=publicationFile&v=3**

BMF. (2023). *29. Subventionsbericht des Bundes.* https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/29-subventionsbericht.pdf?__blob=publicationFile&v=8

BMU. (2019). *Klimaschutzprogramm 2030 der Bundesregierung zur Umsetzung des Klimaschutzplans 2050.* https://www.bundesfinanzministerium.de/Content/DE/Downloads/Klimaschutz/klimaschutzprogramm-2030-der-bundesregierung-zur-umsetzung-des-klimaschutzplans-2050.pdf?__blob=publicationFile&v=4

BMUV. (2022). *Entwurf: Aktionsprogramm Natürlicher Klimaschutz.* https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Naturschutz/aktionsprogramm_natuerlicher_klimaschutz_entwurf_bf.pdf

BMWK. (2023). *Klimaschutzprogramm 2023 der Bundesregierung.* https://www.bmwk.de/Redaktion/DE/Downloads/klimaschutz/20231004-klimaschutzprogramm-der-bundesregierung.pdf?__blob=publicationFile&v=4.

BMWK. (n.d.). *Förderprogramme – Förderung von Maßnahmen zur Anpassung der Fischereitätigkeit und der Entwicklung der Fischereiflotte (MAF-BMEL).* Retrieved January 5, 2023, from https://www.foerderdatenbank.de/FDB/Content/DE/Foerderprogramm/Bund/BMEL/anpassung-fischerei.html

BMZ. (2021). *Sustainable Agri-Food Systems A World without Hunger. BMZ Core Area Strategy.* https://www.bmz.de/resource/blob/100758/bmz-core-area-strategy-a-world-without-hunger.pdf

Bruckner, M., Giljum, S., Fischer, G., Tramberend, S., Wunder, S., & Kaphengst, T. (2017). *Development of consumption-based land use indicators. Synthesis Report* (81; TEXTE). UBA. https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2017-09-06_texte_81-2017_synthesebericht.pdf

Bundesinformationszentrum Landwirtschaft. (2022a, August 24). *Was wächst auf Deutschlands Feldern?* https://www.landwirtschaft.de/landwirtschaft-verstehen/wie-arbeiten-foerster-und-pflanzenbauer/was-waechst-auf-deutschlands-feldern

Bundesinformationszentrum Landwirtschaft. (2022b, August 25). *Warum wird die Landwirtschaft so stark subventioniert?* https://www.landwirtschaft.de/landwirtschaft-verstehen/wie-funktioniert-landwirtschaft-heute/warum-wird-die-landwirtschaft-so-stark-subventio-niert#:~:text=Im%20Jahr%202020%20wurden%20aus,im%20Agrarbereich%20in%20Deutschland%20gezahlt.

Bundesrechnungshof. (2022a). *Bericht nach § 88 Absatz 2 BHO an den Rechnungsprüfungsausschuss des Haushaltsausschusses des Deutschen Bundestages 28. Subventionsbericht der Bundesregierung hier: Evaluierung von Steuervergünstigungen.* Bundesrechnungshof. https://www.bundesrechnungshof.de/SharedDocs/Downloads/DE/Berichte/2022/subventionsbericht-evaluierung-volltext.pdf?__blob=publicationFile&v=2

Bundesrechnungshof. (2022b). *Bericht nach §99 BHO zur Steuerung des Klimaschutzes in Deutschland.* https://www.bundesrechnungshof.de/SharedDocs/Downloads/DE/Berichte/2022/steuerung-klimaschutz-deutschland-volltext.pdf?__blob=publicationFile&v=1

Bundesrechnungshof. (2022c). *Information über die Entwicklung des Einzelplans 10 (Bundesministerium für Ernährung und Landwirtschaft) für die Beratungen zum Bundeshaushalt 2023.* https://www.bundesrechnungshof.de/SharedDocs/Downloads/DE/Berichte/2022/entwicklung-einzelplan-10-bundeshaushalt-2023.pdf?__blob=publicationFile&v=2

Bundesrechnungshof. (2022d). *Überholte Vergünstigungen bei der Kraftfahrzeugsteuer – Bund verzichtet auf mehr als 1 Mrd. Euro Steuereinnahmen* (19; Bemerkungen 2022 zur Haushalts- und Wirtschaftsführung des Bundes). https://www.bundesrechnungshof.de/SharedDocs/Downloads/DE/Berichte/2022/bemerkungen/bemerkung-19.pdf?__blob=publicationFile&v=1

Bundesregierung. (2016). *Klimaschutzplan 2050. Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung.* https://www.bmwk.de/Redaktion/DE/Publikationen/Industrie/klimaschutzplan-2050.pdf?__blob=publicationFile&v=4

Bundesregierung. (2022a). *Finanzplan des Bundes 2022 bis 2026* (Drucksache 20/3101). Bundesregierung. https://dserver.bundestag.de/btd/20/031/2003101.pdf

Bundesregierung. (2022b). *Generationenvertrag für das Klima.* https://www.bundesregierung.de/breg-de/themen/klimaschutz/klimaschutzgesetz-2021-1913672

Business for Nature. (2022). *Reform $1.8 trillion yearly environmentally harmful subsidies to deliver a nature-positive economy.* Business For Nature. https://www.businessfornature.org/news/subsidy-reform

BWE. (2019). *ENERGIEEFFIZIENZ- STRATEGIE 2050.* https://www.bmwk.de/Redaktion/DE/Publikationen/Energie/energieeffiezienzstrategie-2050.pdf?__blob=publicationFile&v=12

Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., Farber, S., & Turner, R. K. (2014). Changes in the global value of ecosystem services. *Global Environmental Change*, 26, 152–158. https://doi.org/10.1016/j.gloenvcha.2014.04.002

Cottrell, J., Zerzawy, F., & Svehla-Stix, S. (2021). *Reforming Biodiversity Harmful Subsidies: Practical steps to untangle the subsidies knot.* https://foes.de/publikationen/2021/2021-05_FOES_EAA_Reforming_Biodiversity_Harmful_Subsidies_Expertise_on__26.pdf

DBFZ. (2022). *Monitoring erneuerbarer Energien im Verkehr.* https://www.tfz.bayern.de/mam/cms08/biokraftstoffe/dateien/dbfz_report_44_de.pdf

Destatis. (2023a). *Fleischexporte in den vergangenen fünf Jahren um 19 % zurückgegangen.* Statistisches Bundesamt. https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/03/PD23_N018_413.html

Destatis. (2023b). *Fleischproduktion im Jahr 2022 um 8,1 % gesunken.* Statistisches Bundesamt. https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/02/PD23_051_413.html

Directorate-General for Agriculture and Rural Development. (2022). *Financing the CAP.* https://agridata.ec.europa.eu/extensions/DashboardIndicators/Financing.html?select=EU27_FLAG,1

DIW Econ, FÖS, Goerge, M., Mecke, M., Bär, H., Leisinger, C., & Runkel, M. (2022). *Zukunftsfähiges Bayern: Wie Bayern Vorreiter für einen ökologisch-sozialen Strukturwandel werden kann* (p. 180). Greenpeace e.V. & BUND Naturschatz in Bayern e.V. https://foes.de/publikationen/2022/2022-05_Studie_Zukunftsfaehiges_Bayern.pdf

Europäische Kommission. (2016, April 18). *Wasser: Kommission verklagt Deutschland vor dem Gerichtshof der EU wegen Gewässerverunreinigung durch Nitrat* [Text]. European Commission - European Commission. **https://ec.europa.eu/commission/presscorner/detail/DE/IP_16_1453**

Europäische Kommission. (2022). *Die GAP im Überblick.* **https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_d**

Europäisches Parlament. (2022, April). *Second pillar of the CAP: Rural development policy | Fact Sheets on the European Union | European Parliament.* **https://www.europarl.europa.eu/factsheets/en/sheet/110/second-pillar-of-the-cap-rural-development-policy**

European Council. (2021, June 28). *Timeline – History of the CAP.* Consilium. **https://www.consilium.europa.eu/en/policies/cap-introduction/timeline-history/**

European Council. (2023, January 31). *Common agricultural policy.* Consilium. **https://www.consilium.europa.eu/en/policies/cap-introduction/**

European Parliament. (2021). *EU environmental policy to 2030: A systemic change | News | European Parliament.* **https://www.europarl.europa.eu/news/en/headlines/society/20210701STO07544/eu-environmental-policy-to-2030-a-systemic-change**

FAO. (2022, December 23). *FAO at COP15: What comes now?* Newsroom. **https://www.fao.org/newsroom/detail/fao-at-cop15-what-comes-now/en**

FAO, UNDP, & UNEP. (2021). *A MULTI-BILLION-DOLLAR OPPORTUNITY: Repurposing agricultural support to transform food systems.* FAO, UNDP, UNEP. **https://doi.org/10.4060/cb6683en**

FiFo Köln, ZEW, ifo Institut, & Fraunhofer FIT. (2019a). *Evaluierung von Steuervergünstigungen. Ergebnisüberblick, Evaluationsschema, Methoden.* **https://www.fit.fraunhofer.de/content/dam/fit/de/documents/FiFo-Bericht%2028-0%20BMF-fe10-16_StV-Ergebnisüberblick.pdf**

FiFo Köln, ZEW, ifo Institut, & Fraunhofer FIT. (2019b). *Evaluierung von Steuervergünstigungen. Evaluierungsgruppe A: Energie- und Stromsteuer.* **https://www.fit.fraunhofer.de/content/dam/fit/de/documents/FiFo-Bericht%2028-A%20BMF-fe10-16_StV-Eval_A.pdf**

FiFo, ZEW, ifo Institut, & Fraunhofer FIT. (2019). *Evaluierung von Steuervergünstigungen: Evaluierungsgruppe B: Kraftfahrzeugsteuer.* **https://www.fifo-koeln.org/images/projekte/2019/fifo-bericht_28-b_bmf-fe10-16_stv-eval_b-1.pdf**

Finance for Biodiversity Foundation. (2022). *Aligning financial flows with biodiversity goals and targets.* **https://www.financeforbiodiversity.org/wp-content/uploads/Finance-for-Biodiversity-Foundation-Paper_Financial_Flows_16Feb2022.pdf**

Finger, R., Möhring, N., Dalhaus, T., & Böcker, T. (2017). Revisiting Pesticide Taxation Schemes. Ecological Economics, 134, 263 – 266. **https://doi.org/10.1016/j.ecolecon.2016.12.001**

FNR. (n.d.). *Bioenergie: Biokraftstoff-Quotengesetz.* Retrieved November 9, 2022, from **https://bioenergie.fnr.de/klimaschutz/gesetze-verordnungen-richtlinien/gesetzeslage/biokraftstoff-quotengesetz**

FNR. (2022, April 11). *Anbau nachwachsender Rohstoffe 2021 konstant.* **https://www.fnr.de/presse/pressemitteilungen/aktuelle-mitteilungen/aktuelle-nachricht/anbau-nachwachsender-rohstoffe-2021-konstant**

FÖS. (2018a). *Eine Pflanzenschutzmittelabgabe für Deutschland?* **http://www.foes.de/pdf/201803-Pestizidsteuer.pdf**

FÖS. (2018b). *Eine Stickstoffüberschussabgabe für Deutschland?* **http://www.foes.de/pdf/201803-Stickstoffueberschussabgabe.pdf**

FÖS. (2018c). *Neue Impulse für die Agrarwirtschaft – Wege zu einer umweltfreundlicheren Landwirtschaft.* **https://foes.de/publikationen/2018/2018-04-FOES-Ueberblickspapier-Neue-Impulse-fuer-die-Agrarwirtschaft.pdf**

FÖS. (2020). *Zehn klimaschädliche Subventionen im Fokus – Wie ein Subventionsabbau den Klimaschutz voranbringt und den Bundeshaushalt entlastet.* Forum Ökologisch-Soziale Marktwirtschaft. **https://foes.de/publikationen/2020/2020-11_FOES_10_klimaschaedliche_Subventionen_im_Fokus.pdf**

FÖS. (2021). *Zehn klimaschädliche Subventionen sozial gerecht abbauen – ein Zeitplan.* **https://foes.de/publikationen/2021/2021-02_FOES_Klimaschaedliche_Subventionen_sozial_gerecht_abbauen.pdf**

FÖS. (2022a). *Green Budgeting in Deutschland: Handlungsbedarf, Anknüpfungspunkte und Erfolgskriterien.* Forum Ökologisch-Soziale Marktwirtschaft. **https://foes.de/publikationen/2022/2022-09_FOES_Green_Budgeting_Deutschland.pdf**

FÖS. (2022b). *Marktkräfte für den Klimaschutz nutzen: Reformimpulse für mehr Klimaschutz in den öffentlichen Finanzen.* **https://foes.de/publikationen/2022/2022-09_FOES_11-Massnahmen-Klimaschutz.pdf**

G7. (2022a). *G7 Climate, Energy and Environment Ministers' Communiqué.* **https://www.bundesregierung.de/resource/blob/974430/2044350/84e380088170c69e6b6ad45dbd133ef8/2022-05-27-1-climate-ministers-communique-data.pdf?download=1#:~:text=1.,generations'%20needs%20around%20the%20world**

G7. (2022b). *G7 Leaders' Communiqué.* **https://www.g7germany.de/resource/blob/974430/2062292/9c213e6b4b36ed1bd687e824800-40399/2022-07-14-leaders-communique-data.pdf?download=1**

Gaugler, T., & Michalke, A. (2017). Was kosten uns Lebensmittel wirklich? Ansätze zur Internalisierung externer Effekte der Landwirtschaft am Beispiel Stickstoff. GAIA, 26/2, 156 – 157

Gawel, E., Köck, W., Kern, K., Möckel, S., Holländer, R., Fälsch, M., & Völkner, T. (2011). *Weiterentwicklung von Abwasserab-gabe und Wasserentnahmeentgelten zu einer umfassenden Wassernutzungsabgabe* (Umweltbundesamt, Ed.). **https://www.umweltbundesamt.de/publikationen/weiterentwicklung-von-abwasserabgabe**

Global Forum for Food and Agriculture. (2023). *2023 Final Communiqué: Food Systems Transformation: A Worldwide Response to Multiple Crises.* **https://www.bmel.de/SharedDocs/Downloads/EN/_International-Affairs/gffa-2023-communique-en.pdf?__blob=publicationFile&v=6**

Graf, U. (2019, December 2). *Klimaschutz: Humus als riesiger CO2-Speicher* [Text]. Bayerisches Landwirtschaftliches Wochenblatt. **https://www.wochenblatt-dlv.de/politik/klimaschutz-humus-riesiger-co2-speicher-560017**

Haake, D. (2019). *Which milk has the smallest impact on the planet?* https://blog.datawrapper.de/cow-milk-and-vegan-milk-alternatives/

Hamdan, J. (2019). *Externe Kosten in der Landwirtschaft.* https://www.foodwatch.org/fileadmin/-DE/Themen/Klima_und_Landwirtschaft/2019-09-18_Studie_Externe_Effekte_Landwirtschaft.pdf

Heinrich-Böll-Stiftung. (2021). *Fleischatlas: Daten und Fakten über Tiere als Nahrungsmittel.*

Heinrich-Böll-Stiftung, Bund für Umwelt und Naturschutz Deutschland, & Le Monde diplomatique. (2020). *Insektenatlas 2020: Daten und Fakten über Nütz- und Schädlinge in der Landwirtschaft.* Heinrich-Böll-Stiftung.

IMF. (2013). *Case studies on energy subsidy reforms: Lessons and implications.* http://www.imf.org/external/np/pp/eng/2013/012813a.pdf

IMF. (2021). *Fossil Fuel Subsidies Database.* https://www.imf.org/en/Topics/climate-change/energy-subsidies

KBA. (2021). *Fahrzeugzulassungen (FZ) Bestand an Kraftfahrzeugen und Kraftfahrzeuganhängern nach Haltern, Wirtschaftszweigen, 1. Januar 2021, FZ 23.* https://www.kba.de/SharedDocs/Downloads/DE/Statistik/Fahrzeuge/FZ23/fz23_2021_pdf.pdf;jsessionid=AE9A66D6AB21303D-302380C57BABE33F.live11292?__blob=publicationFile&v=5

Koch, J. (2022, April 13). *Agrardiesel: Wirklich ab Juni günstiger?* [Text]. Bayerisches Landwirtschaftliches Wochenblatt. https://www.wochenblatt-dlv.de/politik/agrardiesel-wirklich-ab-juni-guenstiger-568918

Köder, L., & Bretschneider, A. (2016). *Umweltschädliche Subventionen in Deutschland. Aktualisierte Ausgabe 2016.* https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/uba_fachbroschuere_umweltschaedliche-subventionen_bf.pdf

Koester, Ulrich. (2012). *Keine Mutige Reform. Kommentar in: Wirtschaftsdienst: Zeitschrift für Wirtschaftspolitik. Volume 92, Heft 5, Seite 289 – 290*

Kreyling, J., Tanneberger, F., Jansen, F., van der Linden, S., Aggenbach, C., Blüml, V., Couwenberg, J., Emsens, W.-J., Joos-ten, H., Klimkowska, A., Kotowski, W., Kozub, L., Lennartz, B., Liczner, Y., Liu, H., Michaelis, D., Oehmke, C., Para-kenings, K., Pleyl, E., … Jurasinski, G. (2021). Rewetting does not return drained fen peatlands to their old selves. *Nature Communications,* 12(1), 5693. https://doi.org/10.1038/s41467-021-25619-y

Landesportal Sachsen-Anhalt. (n.d.). *Direktzahlungen.* Landesportal Sachsen-Anhalt. Retrieved January 5, 2023, from http://mwl.sachsen-anhalt.de/landwirtschaft/landwirtschaft-in-sachsen-anhalt/direktzahlungen

Landwirtschaftskammer Niedersachsen. (2022, October 11). *Die neue GAP ab 2023 – Eine ökonomische Optimierung der Anträge wird wichtiger! : Landwirtschaftskammer Niedersachsen.* https://www.lwk-niedersachsen.de/lwk/news/38437_Die_neue_GAP_ab_2023_-_eine_%C3%B6konomische_Optimierung_der_Antr%C3%A4ge_wird_wichtiger

Ludwiczek, N. (2017). *Einleitung. In N. Ludwiczek, Biokraftstoffe und Landkonkurrenz* (pp. 23 – 33). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-17423-1_1

Maretzke, F., Schmidt, A., Lehmann, A., Kalotai, N., Amini, A. M., Bechthold, A., Boeing, H., & Watzl, B. (2021). Prävention chronischer Erkrankungen durch Ernährung. In 14. *DGE-Ernährungsbericht* (pp. 355 – 389). https://www.openagrar.de/receive/openagrar_mods_00065518

Mariani, G., & Mouillot, D. (2021). How fisheries bring carbon dioxide back to the atmosphere. *TheScienceBreaker,* 07(03). https://doi.org/10.25250/thescbr.brk570

Meadows, D. (1999). *Leverage Points – Places to Intervene in a system.* The Sustainability Institute. http://www.donellameadows.org/wp-content/userfiles/Leverage_Points.pdf

Möckel, S. (2017). *Rechtsgutachten zur Klärung von Rechtsfragen zur Erhebung einer Abgabe auf Stickstoffüberschuss und einer Abgabe auf stickstoffhaltigen Mineraldünger durch den Landesgesetzgeber.* https://www.umwelt.nrw.de/fileadmin/redaktion/PDFs/landwirtschaft/stickstoff-%C3%BCberschussabgabe_moeckel_endbericht.pdf

Möckel, S., Gawel, E., Bretschneider, W., Kästner, M., Liess, M., & Knillmann, S. (2015). Eine Abgabe auf Pflanzenschutzmittel für Deutschland. *Natur und Recht,* 37(10), 669 – 677. https://doi.org/10.1007/s10357-015-2902-x

Möckel, S., Gawel, E., Kästner, M., Knillmann, S., Liess, M., & Bretschneider, W. (2015). *Einführung einer Abgabe auf Pflanzenschutzmittel in Deutschland* (Duncker & Humblot, Ed.). Duncker & Humblot. https://www.duncker-humblot.de/buch/einfuehrung-einer-abgabe-auf-pflanzenschutzmittel-in-deutschland-9783428548002/?page_id=1

Möckel, S., Gawel, E., & Liess, M. (2021). *Wirkung verschiedener Abgabenkonzepte zur Reduktion des Pestizideinsatzes in Deutschland – eine Simulationsanalyse.* https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Landwirtschaft/UFZ-2021-Studie-Pestizid-Abgabe-in-Deutschland.pdf

Öko-Institut. (2020). *Instrumente und Maßnahmen zur Reduktion der Stickstoffüberschüsse.* https://www.oeko.de/fileadmin/oekodoc/Instrumente-und-Massnahmen-zur-Reduktion-der-Stickstoffueberschuesse.pdf

Ökolandbau. (2022, April 12). *Fördersätze der Bundesländer.* https://www.oekolandbau.de/landwirtschaft/betrieb/oeko-foerderung/foerdersaetze-der-bundeslaender/

Örtl, E. (2017). *Entwicklung von konsumbasierten Landnutzungsindikatoren* (Texte). Umweltbundesamt. https://www.umweltbundesamt.de/publikationen/entwicklung-von-konsumbasierten

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science, 360* (6392), 987 – 992. https://doi.org/10.1126/science.aaq0216

Postpischil, R., Jacob, K., Bär, H., Beermann, A.-C., Siemons, A., Schumacher, K., & Keimeyer, F. (2022a). *Ökologische Finanzreform: Produktbezogene Anreize als Treiber umweltfreundlicher Produktions- und Konsumweise: Reformvorschläge für die Mehrwertsteuer* (38/2022; Texte). Umweltbundesamt. https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/texte_38-2022_oekologische_finanzreform.pdf

Postpischil, R., Jacob, K., Bär, H., Beermann, A.-C., Siemons, A., Schumacher, K., & Keimeyer, F. (2022b). *Ökologische Finanzreform: Produktbezogene Anreize als Treiber umweltfreundlicher Produktions- und Konsumweisen: Verbrauchsteuern und weitere produktbezogene ökonomische Instrumente.* Umweltbundesamt. https://www.umweltbundesamt.de/publikationen/oekologische-finanzreform-produktbezogene-anreize-0

Prakash, A. (2022). *REPURPOSING PERVERSE INCENTIVES FOR LAND RESTORATION.* UNCCD Global Land Outlook Working Paper.
https://www.unccd.int/sites/default/files/2022-03/UNCCD%20GLO%20WP%20incentives.pdf

Pratt, N., Kruppe, C., & Rafalski, S. (2022). Biokraftstoff E20 als ein Geschäftsmodell der zirkulären Bioökonomie. In B. G. Jeschke & T. Heupel (Eds.), *Bioökonomie* (pp. 335 –3 63). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-34322-4_16

Roolfs, C., Kalkuhl, M., Bergmann, T., & Meyer, H. (2021). *Quantifizierung externer Effekte als Steuerbasis für ein nachhal-tiges Steuersystem.*
https://ariadneprojekt.de/media/2021/06/Ariadne-Hintergrund_Steuerreform_Juni2021.pdf

Sachverständigenrat für Umweltfragen. (2004). *Umweltgutachten 2004: Umweltpolitische Handlungsfähigkeit sichern.* https://www.umweltrat.de/SharedDocs/Downloads/DE/01_Umweltgutachten/2004_2008/2004_Umweltgutachten_BTD.pdf?__blob=publicationFile

Skerritt, D. J., Arthur, R., Ebrahim, N., Le Brenne, V., Le Manach, F., Schuhbauer, A., Villasante, S., & Sumaila, U. R. (2020). *A 20-year retrospective on the provision of fisheries subsidies in the European Union. ICES Journal of Marine Science, 77* (7 – 8), 2741 – 2752.
https://doi.org/10.1093/icesjms/fsaa142

SPD, Bündnis 90/ Die Grünen Bundestagsfraktion, & FDP. (2021). *Mehr Fortschritt wagen. Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit. Koalitionsvertrag 2021 – 2025 zwischen der Sozialdemokratischen Partei Deutschlands (SPD), BÜNDNIS 90/DIE GRÜNEN und den Freien Demokraten (FDP).*
https://www.spd.de/fileadmin/Dokumente/Koalitionsvertrag/Koalitionsvertrag_2021-2025.pdf

Stoll, J. (2013, May 27). *Pflanzenschutzmittel in der Landwirtschaft* [Text]. Umweltbundesamt; Umweltbundesamt. https://www.umweltbundesamt.de/themen/boden-landwirtschaft/umwelt-belastungen-der-landwirtschaft/pflanzenschutzmittel-in-der-landwirtschaft

Storch, L. (2022, March 23). *Nitrat im Grundwasser: EU macht Druck*. BR24.
https://www.br.de/nachrichten/bayern/nitrat-im-grundwasser-eu-macht-druck,T0qHvot

Sumaila, U. R., Ebrahim, N., Schuhbauer, A., Skerritt, D., Li, Y, Kim, H.S., Mallory, T.G., Pauly, D., & Lam, V.W. (2019). *Updated estimates and analysis of global fisheries subsidies.*
https://www.sciencedirect.com/science/article/pii/S0308597X19303677

Tangermann, S. (2014). Direktzahlungen: Ein bleibender Bestandteil der EU-Agrarpolitik? In E. Schmid & S. Vogel (Eds.), *Europäische Agrarpolitik im 21. Jahrhundert.* Facultas Verlag.

Thünen-Institut. (2018, June 12). *Stickstoff-Einträge schaden dem Zusammenspiel von Waldbäumen und Pilzen.* Thünen Institut.
https://www.thuenen.de/media/ti/Newsroom/Presse/Pressemitteilungen/2018/2018-06-12/180612_Nature.pdf

Tuck, S. L., Winqvist, C., Mota, F., Ahnström, J., Turnbull, L. A., & Bengtsson, J. (2014). Land-use intensity and the effects of organic farming on biodiversity: A hierarchical metaanalysis. *Journal of Applied Ecology, 51*(3), 746–755. https://doi.org/10.1111/1365-2664.12219

UBA. (2017a). Quantifizierung der landwirtschaftlich verursachten Kosten zur Sicherung der Trinkwasserbereitstellung. https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2017-05-24_texte-43-2017_kosten-trinkwasserversorgung.pdf

UBA. (2017b). *Wieviel zahlen Trinkwasserkunden für die Überdüngung?* **https://www.umweltbundesamt.de/sites/default/files/medien/2546/dokumente/factsheet_kosten_nitrat_trinkwasser_0.pdf**

UBA. (2020a). *Methodenkonvention 3.1 zur Ermittlung von Umweltkosten. Kostensätze. Stand 12/2020.* **https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2020-12-21_methodenkonvention_3_1_kostensaetze.pdf**

UBA. (2020b). *Von der Welt auf den Teller Kurzstudie zur globalen Umweltinanspruchnahme unseres Lebensmittelkonsums*. **https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/uba_210121_kurzstudie_nahrung_barr.pdf**

UBA. (2021a). *Umweltschädliche Subventionen in Deutschland. Aktualisierte Ausgabe 2021.* **https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/texte_143-2021_umweltschaedliche_subventionen.pdf**

UBA. (2022a). *Beitrag der Landwirtschaft zu den Treibhausgas-Emissionen.* **https://www.umweltbundesamt.de/daten/land-forstwirtschaft/beitrag-der-landwirtschaft-zu-den-treibhausgas#treibhausgas-emissionen-aus-der-landwirtschaft**

UBA. (2022b). *Evaluierung der GAP- Reform von 2013 aus Sicht des Umweltschutzes anhand einer Datenbankanalyse von InVeKoS-Daten der Bundesländer.* **https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/texte_75-2022_evaluierung_der_gap-reform_von_2013.pdf**

UBA. (2022c). *Gefährdung der Biodiversität.* **https://www.umweltbundesamt.de/themen/boden-landwirtschaft/umweltbelastungen-der-landwirtschaft/gefaehrdung-der-biodiversitaet**

UBA. (2022d). *Umweltbelastungen der Landwirtschaft.* **https://www.umweltbundesamt.de/themen/boden-landwirtschaft/umweltbelastungen-der-landwirtschaft**

UBA. (2020c, October 14). *Flächenrecycling und Innenentwicklung.* **https://www.umweltbundesamt.de/themen/boden-landwirtschaft/flaechensparen-boeden-landschaften-erhalten/flaechenrecycling-innenentwicklung#massnahmen-und-instrumente-zur-forderung-der-innenentwicklung-und-des-flachenrecycling**

UBA. (2021b, July 30). *Stickstoffeintrag aus der Landwirtschaft und Stickstoffüberschuss* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/daten/land-forstwirtschaft/stickstoffeintrag-aus-der-landwirtschaft**

UBA. (2022e). *Mehrwertsteuer ökologisch und sozial gestalten* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/presse/pressemitteilungen/mehrwertsteuer-oekologisch-sozial-gestalten**

UBA. (2022f, February 21). *Die neue GAP – wieviel Klimaschutz steckt in der 1. Säule?* [Text]. Umweltbundesamt; Umwelt-bundesamt. **https://www.umweltbundesamt.de/themen/die-neue-gap-wieviel-klimaschutz-steckt-in-der-1**

UBA. (2022g, July 4). *EU-Agrarpolitik: „Greening" brachte kaum Verbesserung für Umwelt* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/themen/eu-agrar-politik-greening-brachte-kaum-verbesserung**

UBA. (2022h, July 28). *Ökologischer Landbau* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/daten/land-forstwirtschaft/oekologischer-landbau**

UBA, & Bretschneider, W. (2021). *Environmentally Harmful Subsidies in Germany. Update 2021.* Umweltbundesamt. **https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/texte_117-2022_environmentally-harmful-subsidies.pdf**

UBA, S. (2019, April 29). *Verdichtung* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/themen/boden-landwirtschaft/bodenbelastungen/verdichtung**

UBA, U. (2021, December 22). *Stickstoff.* **https://www.umweltbundesamt.de/themen/boden-landwirtschaft/umweltbelastungen-der-landwirtschaft/stickstoff#einfuhrung**

UBA, U. (2022, July 18). *Stickstoffeintrag aus der Landwirtschaft und Stickstoffüberschuss.* **https://www.umweltbundesamt.de/daten/land-forstwirtschaft/stickstoffeintrag-aus-der-landwirtschaft#stickstoffuberschuss-der-landwirtschaft**

UN Environment Programme. (2022, December 19). *Decision adopted by the conference of the parties to the convention on biological diversity – 15/4. Kunming-Montreal Global Biodiversity Framework.* conference of the parties to the convention on biological diversity, Montreal, Quebec. **https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf**

UNEP, & ELD. (2022). *State of Finance for Nature: Tripling investments in nature-based solutions by 2030.* **https://www.unep.org/events/publication-launch/state-finance-nature-tripling-investments-nature-based-solutions-2030**

United Nations Environment Programme, & Economics of Land Degradation. (2022). *State of Finance for Nature 2022 – Time to Act: Doubling Investment by 2025 and Eliminating Nature-negative Finance Flows* (State of Finance for Nature). United Nations Enviroment Programme. **https://wedocs.unep.org/20.500.11822/41333**

Universität Augsburg. (2020). *Die wahren Kosten von Lebensmitteln.* **https://www.uni-augsburg.de/de/campusleben/neuigkeiten/2020/09/04/2735/**

Weber, E.-C., Ellßel, R., & Hansen, H. (2023, February 1). *Einkommen in der Landwirtschaft.* **https://www.thuenen.de/de/themenfelder/einkommen-und-beschaeftigung/einkommen-in-der-landwirtschaft**

Wilke, S. (2022). *Pflanzenschutzmittelverwendung in der Landwirtschaft* [Text]. Umweltbundesamt; Umweltbundesamt. **https://www.umweltbundesamt.de/daten/land-forstwirtschaft/pflanzenschutzmittelverwendung-in-der**

08

Annex

TABLE 20 Agricultural subsidies affecting German agriculture

Source: FÖS depiction based on (BfN, 2022; BMF, 2021, 2022; BMUV, 2022; Directorate-General for Agriculture and Rural Development, 2022; Sumaila et al., 2019; UBA, 2021a). For EU direct payments, it is impossible to quantify the share of harmful payments. Those without environmental cri-teria are listed here as negative as they provide incentives to expand agricultural production.

Subsidies in the agricultural sector	Origin	Env. impact	EU funds in billion € ($)	GER funds in million €	Year	Source
CAP 1st pillar: Direct payments: Basic payments	EU	(mainly) negative	**3.200** (3.392)[24]		2020	DG Agri 2022
CAP 1st pillar: Direct payments for greening	EU	positive	**1.400** (1.484)		2020	DG Agri 2022
CAP 1st pillar: Agriculture market measures	EU	(mainly) negative	**0.125** (0.133)		2020	DG Agri 2022
CAP 2nd pillar: Priorities 2,3,6 payments (incl. national co-payments)	EU + GER	negative	**0.577** (0.612)	**0.268** (0.284)	2020	DG Agri 2022
CAP 2nd pillar: Priority 4 & 5 payments (incl. national co-payments)	EU + GER	positive	**0.754** (0.799)	**0.345** (0.366)	2020	DG Agri 2022
European Maritime and Fisheries Fund	EU	negative	**0.075** (0.080)		2018	Sumaila 2019
European Maritime and Fisheries Fund	EU	positive	**0.122** (0.129)		2018	Sumaila 2019
Joint task for the improvement of agricultural structure and coastal protection (GAK), federal + state govt. Funding	GER	ambivalent		**1.791** (1.898)	2020	BMEL 2020
Reduced value added tax on animal products	GER	negative		**5.242** (5.560)	2018	UBA 2021
Exemption of agricultural vehicles from the motor vehicle tax	GER	negative		**0.480** (0.509)	2021	BMF 2021
Tax concession agricultural diesel	GER	negative		**0.440** (0.466)	2021	BMF 2021
Energy crop cultivation: biofuel quota	GER	negative		**0.960** (1.018)	2018	UBA 2021
Fishing fleet: Adaptation and development measures	GER	ambivalent		**0.004** (0.004)	2021	BMF 2021

24 The sum consists of (2,8 billion €), young farmers (50 million €), small farms (20 million €) and redistributive payments (320 million €).

Natural climate mitigation: Marshland restoration	GER	positive		**0.345** (0.366)	2022	BMUV 2022
Grants for the promotion of organic farming and other forms of sustainable agriculture	GER	positive		**0.004** (0.004)	2021	BMF 2021
Energy consulting for agricultural companies (national action plan on energy efficiency nape) and promotion of energy efficiency in agriculture and horticulture.	GER	positive		**0.042** (0.045)	2021	BMF 2021
Investment support for barn conversion to ensure animal welfare	GER	positive		**0.200** (0.212)	2021	BMF 2021
Promotion of model and demonstration projects in the field of conservation and innovative, sustainable use of biological diversity	GER	positive		**0.002** (0.002)	2021	BMF 2021
Subsidies for the promotion of measures to build up humus	GER	positive		**0.005** (0.005)	2021	BMF 2021
Grants to promote measures to protect peat soils and reduce peat use	GER	positive		**0.027** (0.029)	2021	BMF 2021
Grants for investments to promote measures to protect peat soils and reduce peat use	GER	positive		**0.028** (0.030)	2021	BMF 2021

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