

INPUT PAPER

Shifting finance towards sustainable land use:

Repurposing public support to agriculture





On behalf of:



of the Federal Republic of Germany

Shifting finance for sustainable land use: Repurposing public support to agriculture

For Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)

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About the project

This report was developed in the context of a broader project on the practical policy challenges for 'Shifting finance towards sustainable land use' with five parallel workstreams. All project outputs are available on the web platform of the Food, Environment, Land and Development (FELD) Action Tracker, at www.feldactiontracker.org. The website also includes a dedicated section on "Shifting Finance" with a direct link through www.greytogreenfinance.org and an opportunity for individual download of the following five project reports:

- A: Shifting finance towards sustainable land use: Aligning public incentives with the goals of the Paris Agreement
- B: Climate-consistent finance flows in the agriculture, forest and other land use sector: A framework for reporting on Article 2.1(c) of the Paris Agreement
- C: Shifting finance towards sustainable land use: Repurposing public support to agriculture

The focused analysis undertaken under this project and towards a proposed reporting framework were supported and complemented by two case studies for a closer look at the policy instruments employed in the land sector. These also include specific examples to illustrate the opportunities for policymakers to redirect existing finance flows to become more consistent and supportive of the Paris Goals.

- D: Shifting finance towards sustainable land use: A case study from Colombia
- E: Shifting finance towards sustainable land use: A case study on the European Union

Project partners

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The Food, Environment, Land and Development (FELD) Action Tracker is a strategic initiative under the Food and Land Use Coalition (FOLU), led by SDSN in cooperation with other partners, to support countries in their transformation toward sustainable food systems and land use.

Shifting finance towards sustainable land use:

Repurposing public support to agriculture

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Executive summary



Public support to farmers is substantial and has been growing over the past decade. Globally, agricultural production receives transfers from taxpayers or consumers to the tune of USD 619 billion per year,¹ almost double the value received by the sector 10 years ago, and 56 times the USD 11 billion of climate finance aimed at land use. Highly concentrated in particular countries/regions and commodities, market price support (MPS) is the largest source of support; direct payments linked to output continue to be an important source, although the EU has switched funding to decoupled payments over the last decade.

Such support is often introduced for good reasons — particularly to improve food security by increasing aggregate food availability or decreasing the cost of food for consumers. Protecting farmer and rural incomes and resilience, stabilizing agricultural markets and improving productivity are also common goals, with farm incomes often being the dominant driver.

But in many cases, the original aims have been obscured as support morphs and recipients' interests become entrenched. The subsidies do not always realize their objectives, and much public money can go to large-scale farmers who may need it less than smaller-scale and poorer farmers.

Moreover, some of this support leads to environmental harm — conversion of valued habitats or elimination of biodiversity — and increased greenhouse gas (GHG) emissions. Through both production processes and land use change, agriculture is estimated to contribute up to 23 percent of GHG emissions and is the largest source of methane and nitrogen dioxide emissions (IPCC, 2019). Cattle and rice are the main sources of production emissions, with enteric fermentation, manure and flooding of paddy fields accounting for 65 percent of agricultural production's emissions; over-fertilisation of soils across different crops is the next-most important contributor (Searchinger et al., 2019). Cattle, soyabean and oil palm are the main agricultural drivers of deforestation, responsible for 64 million hectares of forest loss from 2001-15; that represents 20 percent of the 314 million hectares lost across the world in that period (Curtis et al., 2018).

The existing structure of agricultural support generally provides little incentive to farmers to switch from high to low emission-intensive commodities or production

practices. Yet simply removing payments is not the answer. Withdrawing coupled payments to production across the globe would reduce GHG emissions – but only by 0.6 percent (Laborde et al., 2020); removing MPS in the countries that use this could actually *increase* emissions globally as global consumption would rise, and production of high emission-intensive commodities would not be reduced in countries where MPS is not used (ibid).

Ultimately, the impact of agricultural support depends on where that support is applied and to which commodities, and under which conditionalities it is applied (DeBoe, 2020; Mamun et al., 2019; Laborde et al., 2020; Searchinger et al., 2020; Bellmann, 2019) as the land use and GHG emissions from crop and livestock production can vary significantly from one country to another and by commodity.

The scale of farm subsidies presents a great opportunity. Public support to agriculture can strongly influence the levels of emissions from agricultural production processes and land-use change, establishing incentives for farmers to adjust production levels, output mix and agricultural practices, and affecting consumption levels. Policymakers can redirect this public money towards environmental public goods, including a stable climate, working towards the Paris Agreement's goals of keeping global warming well below 2°C, and pursuing efforts to maintain warming below 1.5°C.

Farm emissions could be reduced substantially through a number of measures (IPCC, 2019; UN, 2020; Searchinger et al., 2019):

- Promote more accurate fertiliser use and develop improved fertilisers to reduce their emissions footprint.
- Improve manure management and management of grazing lands, improve productivity of farm animals and reduce enteric emissions through diet modification.
- Cut the number of ruminants overall by encouraging greater reliance on plant-based diets in key consumer groups in high-income countries and emerging economies.
- Reduce the duration of flooding paddy fields and improve paddy yields.
- Stop livestock or crop production on forested land or peatland.

¹ An estimated transfer of USD 708 billion to producers, minus the taxation of farmers worth USD 89 billion (OECD 2019).

Alongside this, there is another major target for farming: to lock up carbon on the land and in the plants that grow on it. For example, agroforestry, targeted at areas most under environmental pressure and with species appropriate to local ecological systems, has significant potential for carbon capture and storage.

Policymakers have a number of tools at their disposal to incentivize farmers (and consumers) to change their practices:

- Move away from coupled towards decoupled payments, which are not contingent on output, to reduce incentives to expand production.
- Make public support to farmers conditional on achieving environmental goals and producing public environmental goods.
- Target support more effectively by focusing on regions or sub-regions with the lowest marginal abatement costs, and crops or livestock with the highest GHG emissions intensity. Allowing flexible targeting within national emissions reductions targets – and a mechanism that enables this – will be key.
- Improve policy coherence, making sure that policy instruments are pulling in the same direction, ideally reinforcing interventions to reduce environmental harm and GHG emissions while achieving other development objectives.
- Make the most of no-regret actions that minimise trade-offs between environmental and socio-economic goals and support a just transition.

Cutting across all of these measures, policymakers need to boost funding to research and development that puts emissions reductions and other environmental goals alongside the more traditional aims of raising productivity and increasing resilience. And public funding needs also to plug the knowledge gaps that still exist to gain a better understanding of which types of support are most climate compatible, to assess policy coherence and identify further actions that can minimise trade-offs and maximise synergies among different goals.

Policymakers will also need to address the problems of leakage and non-additionality, putting measures in place to disincentivize production from relocating to places with lower environmental standards or higher emissions intensity. Carbon border adjustment taxes are one way of addressing this, but they need further review to tackle concerns about distributional impacts, particularly on low-income countries.

Attempts at reforming agricultural policy have often hit political economy barriers. Opposition can come from interest groups benefitting from the *status quo*; momentum for reform can be stalled through lack of information about the scale and nature of public support, concerns about government capacity to manage change and distributional impacts effectively, and governance structures that impede deeper reform (Coady et al., 2015; Megersa, 2020; Inchauste and Victor, 2017).

The reforms, policies and investments that are easiest to push through are ones that do not arouse any opposition – because almost everyone wins – rather than those in which either significant trade-offs exist, or costs are increased for everyone.

This requires coordinated and creative action within and across countries to identify policy measures that can meet those criteria – at least as a starting point for reform; define a clear reform plan that lays out the phases and goals for each phase and sequence them in a way that frontloads the benefits of reform as much as possible

But momentum will always need to be generated to move away from the *status quo*. This can be done using windows of opportunity – such as the COP26 and the global stocktake in 2023 – to trigger reform, building and sustaining new coalitions around these opportunities.

A well-constructed communications strategy that delivers clear, well-evidenced messages is key to such momentum. Such messages can correct misconceptions and increase transparency around the nature of public support and opportunities for making that support more climate compatible; they can also be tailored to specific groups, helping to build – and maintain – coalitions of unusual suspects.

Global cooperation needs to underpin this to build credibility and trust in the reform process, and exchange learning on how to best achieve the common goals in the Paris Agreement. The ‘super year’ for climate and nature is the ideal opportunity to strengthen such cooperation.





CHAPTER 1
Introduction

1.1 Agriculture and climate change

The agricultural sector is both a significant source of greenhouse gas (GHG) emissions and one of the most heavily impacted by climate change. Agricultural production is estimated to contribute up to 23 percent of global GHG emissions via production processes and land use change, and it is also the largest emitter of non-CO₂ GHG emissions (IPCC, 2019). In addition, from 2010-14 expansion of agriculture and tree plantations into forests across the tropics was associated with net emissions of approximately 2.6 Gigatonnes of CO₂ per year (Pendrill et al., 2019); cattle and oilseeds were responsible for over half of these emissions (ibid.).

More concerning yet, agricultural GHG emissions are projected to increase by 30 percent by 2050 if we are to feed an increasingly large and wealthy global population with changing consumption patterns using current production techniques (World Bank, 2016). In order to feed the world's population in 2050 at current productivity levels, an additional area of land the size of India would be required, leading to an increase in GHG emissions of 15 Gigatonnes per year (Searchinger et al., 2019). However, the Paris Agreement's goals of keeping global warming well below 2°C, and also pursuing efforts to maintain temperature rise below 1.5°C, require reducing or eliminating some agriculture-related emissions entirely by 2050 relative to the 2010 baseline: a pathway to 1.5°C, with a low risk of overshoot, requires eliminating CO₂ emissions and sequestering 2.3 GtCO₂ annually; cutting methane emissions by 50-60 percent; and reducing nitrous oxide emissions by 20-30 percent (Ahmed et al., 2020).

1.2 The role of public support to agriculture

The link between public support to the energy sector and emissions from fossil fuels has been the primary focus of attention for the last decade (e.g., Whitley, 2013), but more recent research has focused on the impact of public support to agriculture on GHG emissions. The IPCC Special Report on Land (IPCC 2019) and the advent of COP26 have highlighted the contribution of agricultural production processes and land-use change to the climate crisis, and the need to redirect public support to agriculture to align with the goals of the Paris Agreement.

The vast majority of support to the agricultural sector is aimed at guaranteeing minimum incomes for producers or ensuring the affordability of food for producers, rather than climate adaptation and mitigation. The net transfer

to agriculture through subsidies dwarfs global climate finance: while agricultural production receives transfers from taxpayers or consumers to the value of USD 619 billion per year,² climate finance aimed at land use is only around USD 11 billion per year, and only USD 6-8 billion is earmarked for adaptation and mitigation in agriculture (OECD, 2019; World Bank, 2016).

1.3 Redirecting public support to agriculture

Public support to agriculture can strongly influence the levels of emissions from agricultural production processes and land-use change, establishing incentives for farmers to adjust production levels, output mix and agricultural practices, and affecting consumption levels. As transfers to agricultural producers are likely to remain a significant component of the agricultural sector for the foreseeable future, restructuring these in a way that aligns agricultural production with the goals of the Paris Agreement could incentivize the large reductions in GHG emissions needed to close the emissions gap.

1.4 Aims of the paper

This paper takes a closer look at the contribution of agriculture to GHG emissions and the level of public support to agriculture to determine the types of support that are prevalent in the agricultural sector, which goals they seek to address, and how the levels and types of support have changed over time.³ It then discusses the likely impact of this support on GHG emissions and considers how public support to the sector could be redirected to reduce emissions from agricultural production practices and land use. It highlights the political economy of reform, drawing on the experience of reforming fossil fuel subsidies and previous agricultural policy reform, and tying this to the increasing focus on achieving a just transition in moving to a low-emissions development path that protects and restores nature.

² An estimated transfer of USD 708 billion to producers, minus the taxation of farmers worth USD 89 billion (OECD 2019).

³ This is not to underestimate the other environmental impacts of agriculture, e.g., on soil and water use and quality, and biodiversity. However, the focus of this paper is on the emissions themselves.

1.5 Approach and methodology

The approach and methodology of this paper echo that taken in recent papers assessing the link between public support to agriculture and GHG emissions, including: Laborde et al. (2020); DeBoe (2020); Searchinger et al. (2019 and 2020); Bellmann (2019); Henderson and Lakoski (2019); and Mamun et al. (2019). The main source of data for these papers and our own analysis is the OECD (2020) database on support to agriculture for 54 countries – 37 OECD countries, 5 non-OECD EU Member States and 12 emerging economies.

The starting point for our analysis is identifying the main sources of emissions from the agriculture sector: through production processes and land use change; by commodity; and by geographic location.^{4,5} We have not included emissions along the supply chain related to distribution and trade, which in some areas can outweigh the impact of land use change (Escobar et al., 2020) and mean that emissions can vary significantly even within a country.

The next step is to assess the level and types of support to agriculture, taking into account output levels and the emission intensity of that production, analyzing overall levels of support, types of support, and levels and average rates across commodities and countries:

- The **type of support** influences overall incentives to both producers and consumers in terms of production levels, output mix, agricultural practices and consumption levels.
- Understanding **average rates of support** to different commodities can enable us to differentiate the impact on GHG emissions, given substantial differences in emission intensities of different commodities and incentives for farmers to move from high emission-intensity commodities to ones low in emission intensity.

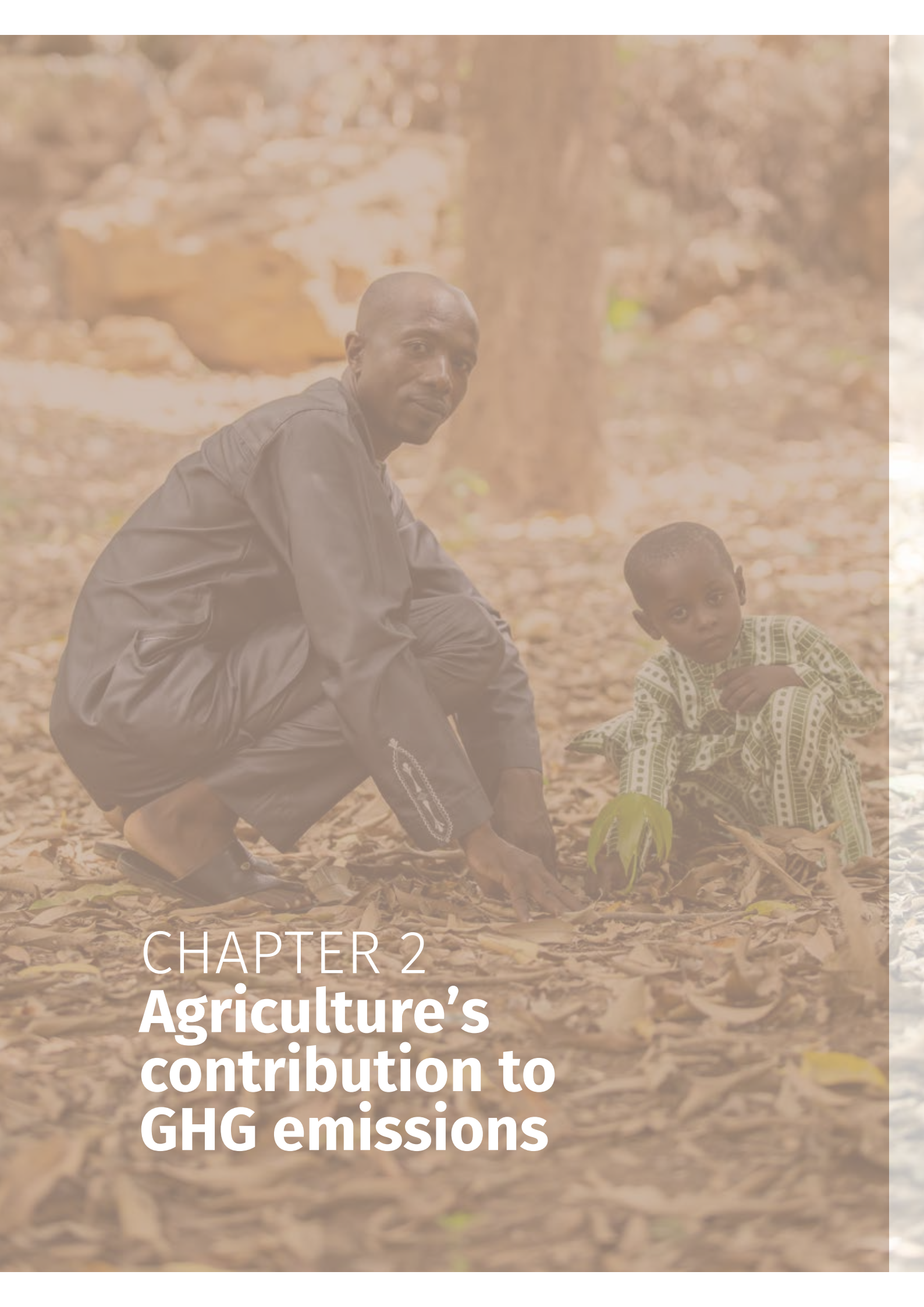
- **High-income and low-income countries** tend to have large differences in emission intensities of production for the same commodity; this can also occur within those groups of countries.

1.6 Outline of paper

This report consists of six sections. The first examines different aspects of the contribution of agricultural production and agriculture-related land-use change to GHG emissions. The second section discusses the levels of support to agriculture in more depth, including some important changes in the last decade and the differences in support among high-income countries, low-income countries, and emerging economies. The third section discusses the implications of different types of public support for GHG emissions, while the fourth provides a brief political economy analysis to determine which political factors might undermine or support the reform process. The fifth section brings together information from these sections to offer some reflections on how public support to agriculture might be redirected to reduce GHG emissions from agricultural production and consumption. The paper concludes with a short summary and key recommendations.

4 Data on the contribution of agricultural production processes and commodity-induced LUC come from different sources, which can have different methodologies and cover different time periods. We encourage readers to view the data presented in this report as expressing general magnitudes of GHG emissions related to agriculture and contributions to global emissions in order to paint a big picture rather than providing precise calculations.

5 We have not included the contribution of energy in our analysis, nor the impact of activities beyond the farmgate.



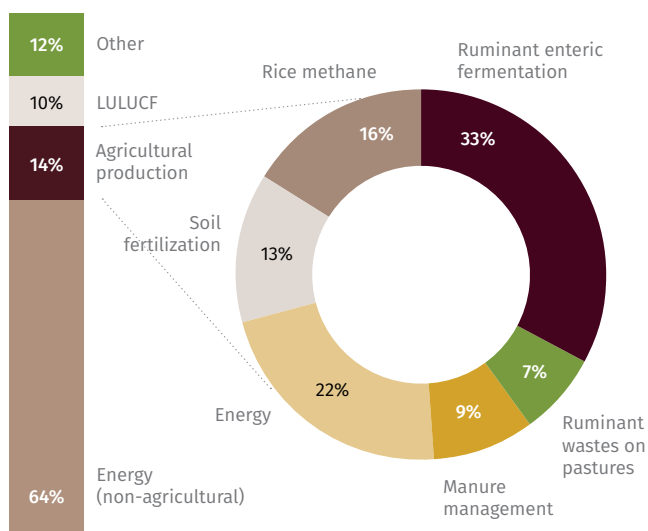
CHAPTER 2
**Agriculture's
contribution to
GHG emissions**

2.1 Production processes

Within agricultural production processes, emissions stem predominantly from certain subsectors and crops: livestock production and rice together make up almost half of all GHG emissions from agricultural production (see Figure 1). If ruminant waste, pastures and manure management are included, these factors combined account for 65 percent of the sector's emissions (Searchinger et al., 2020).⁶

Increases in the world's population coupled with rising per capita meat consumption in an emerging global middle class (Gerber 2013; Muhammed et al., 2013) are likely to expand the contribution of livestock-related GHG emissions: total demand for meat and milk in 2050 is projected to grow by 62 percent and 58 percent, respectively, from their levels in 2010 (Revell, 2015; FAO, 2011), increasing total meat consumption by 464 million tonnes, with the greatest increases in Africa and Asia (Revell, 2015).

FIGURE 1. Contribution of agricultural production processes to global GHG emissions

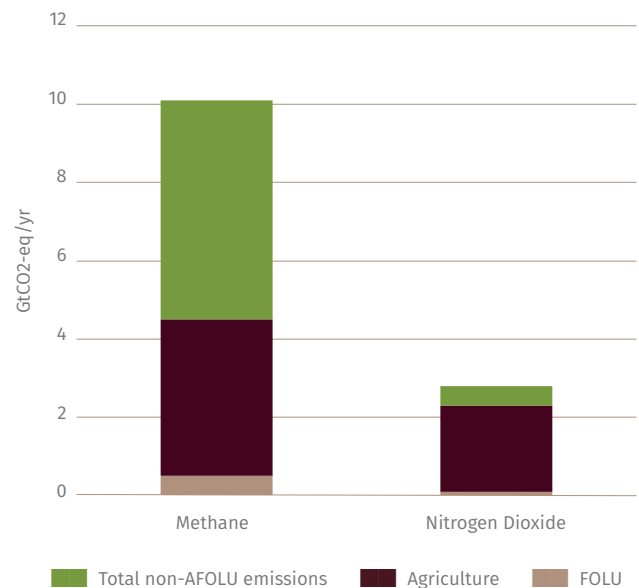


Source: Searchinger, 2019.

Within global GHG emissions, the agriculture sector is responsible for 81 percent of nitrogen dioxide emissions and 44 percent of methane emissions (see Figure 2). The IPCC Special Report on Climate Change and Land (2019) states that livestock on managed pastures and rangelands accounted for more than half of total anthropogenic N₂O emissions from agriculture in 2014. In croplands, the main driver of N₂O emissions is over-fertilisation, with approximately 50 percent of nitrogen applied to agricultural land not taken up by the crop (Zhang et al., 2017 in IPCC, 2019).

Livestock production has been responsible for 33 percent of total global methane emissions and 66 percent of agricultural methane emissions since 2000. Flooded rice paddies emit as much as 500 million tons of methane per year, which is around 20 percent of total man-made emissions of methane (ibid.).

FIGURE 2. Methane and N₂O emissions from agriculture, 2007-2016 (GtCO₂-eq/yr, annual average)



Source: IPCC Special Report 2019, derived from Table 2.2; 151.

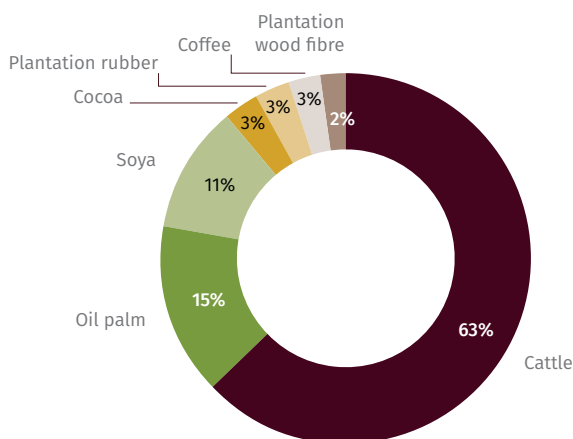
⁶ Estimates vary across the literature in accordance with the time period analysed and the methodology used, e.g., FAO has calculated emissions from the livestock value chain (Gerber 2013), which includes emissions from feed production and post-farmgate transport and processing. Others estimate the total contribution of livestock through production processes and land use change.

2.2 Land use change (deforestation)

The agriculture sector also generates GHG emissions through land use change (LUC) that, combined with LUC from other sources, accounts for 10 percent of global GHG emissions: recent estimates calculate that agriculture resulted in 123 million hectares of forest loss from 2001-15 (Curtis et al., 2018). Despite corporate commitments, the rate of commodity-driven deforestation has not declined, and companies would need to eliminate five million hectares of forest conversion from supply chains each year to end deforestation from agricultural commodities (ibid.).

Between 2001-15, the land used for seven commodities — oil palm, soya, cattle, plantation wood fibre, cocoa, coffee and plantation rubber — replaced forests, accounting for 58 percent, or nearly 72 million hectares, of forest loss⁷ (Goldman et al., 2020). Within the seven commodities, cattle, soya and oil palm are responsible for 89 percent of the forest area lost (see Figure 3).

FIGURE 3. Total forest area replaced by seven commodities, 2001-15 (million hectares)



Source: Goldman et al (2020);⁹

⁷ Direct attribution to a single commodity is complicated by the fact that soya may be planted on land originally cleared for livestock pasture or after two years of rice cultivation (Rudorff et al., 2012; Zalles et al., 2019 in Goldman et al., 2020). Deforestation is considered 'direct' when the commodity was established within four years (for oil palm) or three years (for soya) of the deforestation event.

2.3 Geographical and commodity concentration of GHG emissions

To determine the link between emissions and public support to agriculture, and understand where to target reform efforts, two pieces of data are required: the production level of different commodities and regions producing the most emissions; and the emissions intensity — the emissions produced per unit of output — of those products.

Four commodities stand out as the main contributors to GHG emissions through production processes and LUC: livestock, oil palm, rice and soya.

Livestock

Combining the GHG emissions resulting from production processes and land use change in the livestock sector,⁸ Figure 4 demonstrates that the **Latin American and Caribbean** region is the top emitter of livestock-related emissions, followed by **East and Southeast Asia** (Gerber, 2013).

Emissions in the LAC region arise from a combination of LUC from a large number of cattle and relatively high emissions intensity. In 2018, Brazil and Argentina produced nearly 270 million head of cattle, with an average intensity of nearly 36 kilograms of CO₂eq. per kilograms of beef produced in Brazil and just under 30 kilograms of CO₂ eq. in Argentina.

As Table 1 demonstrates, beef has much higher emission intensities across the world, compared to other products, as a result of high levels of methane from enteric fermentation (Rojas-Downing et al., 2017) and manure left on pastures. However, there are substantial differences between intensities of beef production among countries, ranging from 108 kilograms CO₂eq. in India to 12.1 kilograms CO₂eq. in the US.⁹

Variation is less pronounced for other commodities, but the emissions intensity of pork varies quite widely across countries — peaking in India — and of rice, where the EU has the highest rate of emissions.

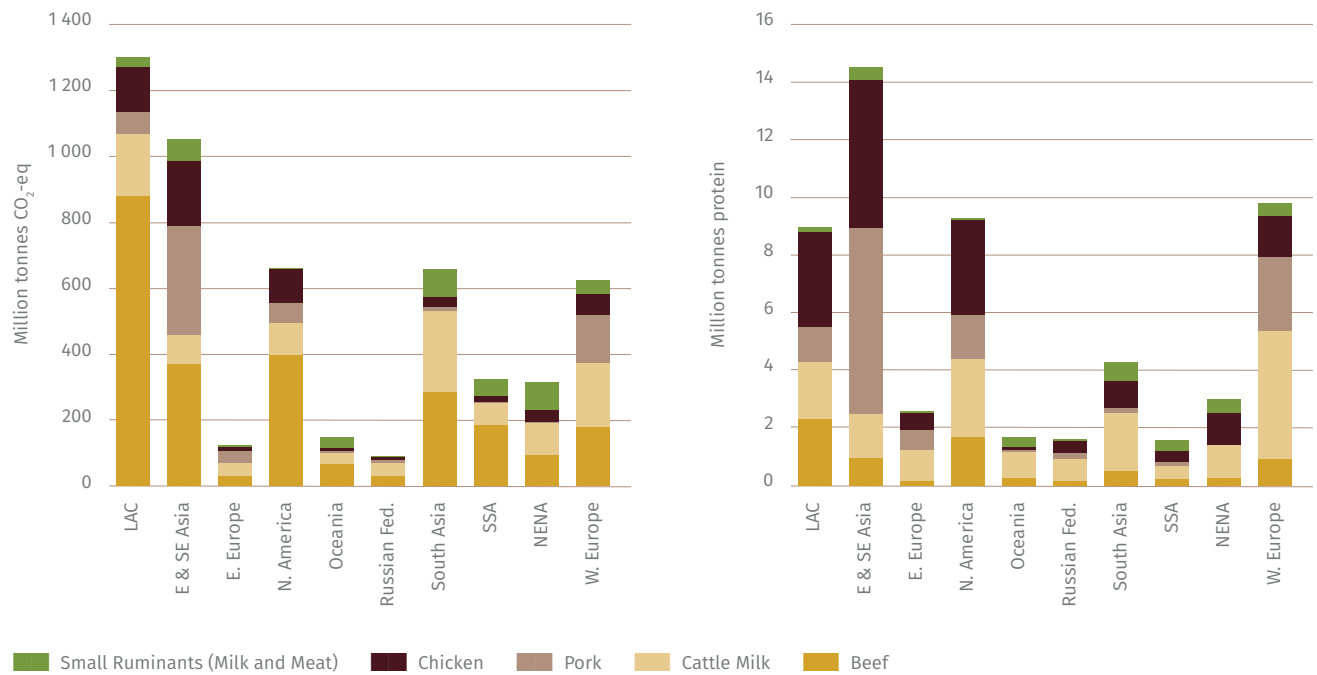
⁸ Beef, milk, poultry and pork.

⁹ The data available computes relative emissions intensity from production processes alone, excluding the impact of land use change, which underestimates emissions in countries, such as Brazil. Numbers for India are surprisingly high and likely reflect the relatively long lifespan of cattle, low feed digestibility and slow growth rates, and separation between meat and dairy herds.

Emissions intensities in production processes are generally lower in higher-income countries. However, if LUC were to be incorporated, it is likely that countries such as

Brazil and Argentina would display much higher emissions intensity related to products such as beef or soyabeans.

FIGURE 4. Global livestock production and GHG emissions from livestock, commodity and region, 2005



Source: Gerber et al., 2013.

Note: The most recent year for which comprehensive data was available at the time of analysis.

TABLE 1. Emission intensity for key products and countries/regions, 2015-17 (Kg CO₂ eq./kg of product)

	Cereals (excl. rice)	Eggs	Beef	Chicken	Pork	Milk	Rice
Australia	0.3	0.4	20.2	0.2	2.5	0.7	0.7
Brazil	0.2	0.8	35.7	0.3	2.6	1.2	0.5
China	0.2	0.6	16.0	0.6	0.95	0.8	0.8
EU	0.2	0.7	15.4	0.3	1.6	0.6	3.0
India	0.3	0.5	108.3	0.5	5.0	1.1	0.7
USA	0.2	0.5	12.1	0.3	2.0	0.4	1.1
OECD	0.2	0.5	15.1	0.3	1.7	0.5	1.2
Non-OECD	0.2	0.8	32.8	0.7	1.4	1.3	0.9
World	0.2	0.7	25.4	0.6	1.5	0.9	0.9

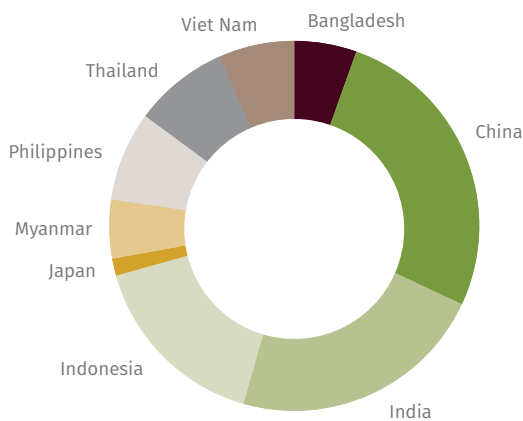
Source: FAOSTAT.

Rice

Worldwide, about 80 million hectares of irrigated lowland rice provide 75 percent of the world's rice production (FAOSTAT). Nine of the top ten rice-producing countries in the world are in **Asia**: China, India, Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, Philippines and Japan (ibid.).

Rice's contribution to GHG emissions arise principally through the production process. Figure 5 displays each country's contribution to the total of 432 million tonnes of CO₂ eq. produced by the nine countries in 2017, where contributions to emissions broadly mirror production proportions (e.g., China, India and Indonesia produced, respectively, 143 million tonnes, 112 million tonnes and 40 million tonnes of rice, milled equivalent in 2017).

FIGURE 5. Contribution of world's top nine rice producers to rice-related GHG emissions, 2017



Source: FAOSTAT (<http://www.fao.org/faostat>) accessed on December 13, 2020.

Oil palm

Oil palm generates GHG emissions mainly through LUC. Oil palm production – and related deforestation – has been concentrated in **Southeast Asia**, particularly Indonesia and Malaysia (Goldman et al., 2020). Indonesia currently accounts for about one-half of the world's palm oil production, with 10.27 million hectares under oil palm in 2017 (Meijide et al., 2020).

Soyabean

Depending on where – and how – it is grown, soyabean production generates GHG emissions mainly through LUC or production. A study of soyabean cultivation and transport in Brazil and Argentina (Castanheira and Freire, 2013) calculated that LUC dominated most scenarios of GHG emissions; the contribution of cultivation to total emissions could range from 2 percent (rainforest conversion in the tropical region, no-tillage soyabean) to 53 percent (no LUC in all regions, soyabean produced under tillage).

Since the 1950s, global soyabean production has increased 15 times over, with average yearly output in 2017-2019 exceeding 365 million tonnes. The United States, Brazil and Argentina together produce about 80 percent of the world's soyabeans (FAOSTAT, 2017-19). China imports the most soya and is expected to significantly increase its level of soyabean imports. Land use change from soyabean cultivation has been concentrated in **South America**, particularly Brazil and Argentina (Goldman et al., 2020).

A man in a dark suit, white shirt, and dark tie stands in a field of golden hay bales. He is leaning his right arm on a large hay bale. The background shows a vast field of hay bales stretching towards distant hills under a clear sky. The overall tone is warm and professional.

CHAPTER 3
Levels of public support to agricultural production

3.1 Defining subsidies or public support

The experience of fossil fuel subsidy reform highlights that the first stage of any reform process is agreeing upon a common definition of what constitutes a subsidy or public support. In the case of fossil fuels, definitions of what constitutes a subsidy or public support range from a fairly broad categorization, including both production and consumption subsidies and externalities (e.g., the IMF),¹⁰ to a narrower one focused on consumption subsidies using the price-gap approach¹¹ used by the International Energy Agency (IEA).

The literature analyzing the link between agricultural subsidies relies principally on the definition of agricultural support from the OECD (OECD 2020):

‘... the annual monetary value of gross transfers to agriculture from consumers and taxpayers arising from government policies that support agriculture, regardless of their objectives and economic impacts’.

The OECD classifies support to agriculture into three main categories:

1. **Support to producers:** market or budgetary transfers to producers through reducing the cost of production or increasing the price of the final product.
 - a. In the case of market barriers or import restrictions, domestic producers receive implicit transfers from domestic consumers through higher prices for agricultural outputs, with no public expenditures, known as **market price support** (MPS).¹²
 - a. Governments may also make **direct budgetary payments** through public spending for the public procurement of farm outputs or subsidies through lowered interest rates on agricultural credit or lowered prices of specific inputs (either variable or fixed capital) such as fertilisers, pesticides, seeds, water and electricity.

2. **General services support (GSSE):** measures creating enabling conditions for the primary agricultural sector through development of private or public services, institutions and infrastructure, without directly altering producer costs/revenues or consumer expenditures. Such services can be critical to increasing productivity, boosting farmer income and reducing consumer prices
3. **Support to consumers:** market or budgetary transfers from or to consumers. If negative, consumers are implicitly taxed through market price support generating higher prices, which more than offset consumer subsidies that lower prices to consumers. Part of this support tends to be captured in MPS and assessed under Producer Support Estimates (PSE).

Public support to agriculture often further distinguishes between coupled and decoupled payments to agricultural producers:

1. **Coupled payments:** direct subsidies to certain inputs or outputs, reducing unit costs of production or increasing the price received by the farmer for the product (Mamun et al., 2019) p105. This can include market price support and variable input subsidies.¹³
1. **Decoupled payments**, where support is not directly related to output: levels of support to producers remain consistent regardless of production levels. These include payments based on land, payments based on historical entitlements (non-current crop areas) and payments based on individual characteristics not related to farming (Henderson & Lankoski, 2019). Most commonly, the level of income support is determined by a fixed variable, such as production levels or livestock numbers, at some point in the past or land area cultivated (Mamun et al., 2019).

Table 2 lists the types of support reviewed, with examples of each one.

¹⁰ See [Explainer: The challenge of defining fossil fuel subsidies | Carbon Brief](#), accessed February 28, 2021, for a comparison of different subsidy definitions.

¹¹ See <https://www.iea.org/topics/energy-subsidies>, accessed on February 28, 2021. The price-gap approach calculates the “amount by which an end-use price falls short of the reference price”; if the end-use price is lower than the reference price, this indicates that a subsidy is being applied.

¹² The OECD and WTO calculate market price support in different ways, often resulting in significantly different levels of calculated support (Brink 2015). We have used the OECD calculations.

¹³ Some analysis includes MPS as a coupled payment; other research analyses this as a stand-alone category.

TABLE 2: Types and examples of public support to agriculture

Type of support	Definition	Subcategories	Examples
Market price support	Gross transfers from consumers and taxpayers to agricultural producers from policy measures that create a gap between domestic market prices and the border prices of a specific commodity.	Trade barriers (tariffs, quotas)	Japan – tariff-rate quotas with high out-of-quota tariffs on rice, wheat, barley and dairy products
		Domestic minimum price guarantees	China – minimum purchase prices for wheat and rice
Producer Support			
Total production payments	Direct commodity payments arising from transfers from taxpayers to agricultural producers.	Payments based on holdings tied to current production (coupled payments)	China – payments to producers targeting expansion of soyabean production
		Payments based on holdings independent of current production (decoupled payments)	EU – Basic Payment Scheme/ Single Area Payment Scheme offering a uniform per hectare payment rate (with free conditionalities)
		Insurance subsidies	US – subsidized crop insurance to protect farmers against losses in yield, crop/whole farm revenue
Input subsidy	Transfers from taxpayers to agricultural producers that reduce the on-farm cost of a specific variable input or a mix of variable inputs.	Chemical, energy, and seed subsidies	India – subsidies to fertiliser, seeds, water
		Financial and other input subsidies	Indonesia – subsidies to credit and grants for equipment
Other production support	Miscellaneous transfers from taxpayers to agricultural producers.	Promotion/marketing of agri-food products	EU – EUR200.9 million in 2020 to fund promotion activities for EU agri-food products at home and abroad
		Public stockholding (storage, depreciation and disposal of public storage of agricultural products)	South Korea – public stockholding scheme for rice (Public Storage System for Emergencies)

Type of support	Definition	Subcategories	Examples
General Services Support			
Infrastructure	Transfers from taxpayers to agricultural producers that reduce the on-farm investment costs of fixed capital.	Irrigation and hydrology Storage, marketing and other physical infrastructure Other infrastructure	Australia – government support for irrigation infrastructure in Murray-Darling Basin
Research, education and technical assistance	Budgetary expenditure supporting agricultural knowledge and innovation.	R&D Knowledge transfer (vocational schools, higher education) Generic training and advice to farmers	Brazil – majority of GSSE expenditures is on R&D and innovation through, e.g., the Brazilian Agricultural Research Corporation – EMBRAPA
Safety, health and inspection	Budgetary expenditure supporting agricultural product health and safety.	Agricultural product safety and inspection Pest and disease control and inspection Input control and certification	Canada – Canadian Food Inspection Agency (CFIA) provides standards, enforcement action and data
Conservation-related payments ¹⁴	Budgetary expenditure supporting conservation-related goals.	Conservation payments Production retirement Other public goods	China – Payments for grassland ecological protection US – Conservation Reserve Program (CRP) with 10-15-year agreements for resource conservation purposes through annual rental payments n/a

Source: OECD 2020, Annex 1B & country profiles; based on classification in Searchinger et al. (2020).

¹⁴ Conservation payments can be classified as both general services support, if applied to a whole sector, or production support, if directed at individual producers.

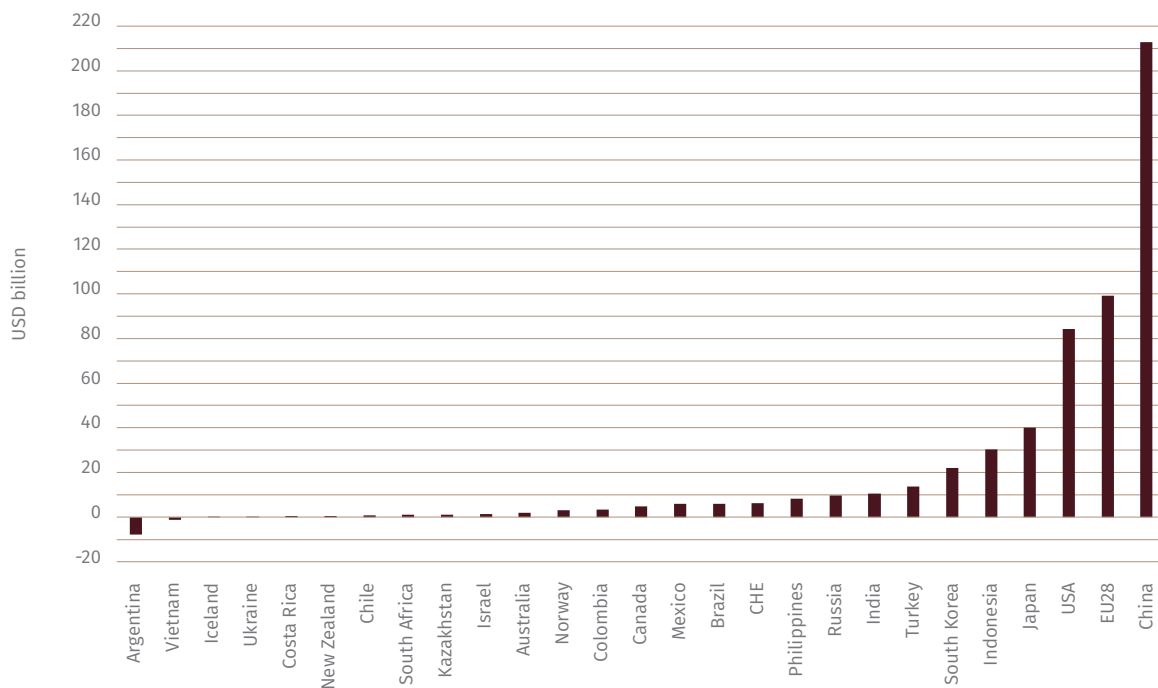
3.2 Value and trends in support

Public support by country

As Figure 6 demonstrates, just three countries and one region were responsible for nearly 80 percent of all

transfers between 2015 and 2019: 38 percent of global transfers were provided by the **Chinese** government to its producers; 18 percent by the **EU**; 15 percent by the **US**; and 7 percent by **Japan** (OECD, 2020).

FIGURE 6. Agricultural support by country, average 2015-19 (USD billion)



Source: OECD (2020), *Agricultural support (indicator)*. doi: 10.1787/6ea85c58-en (Accessed on 19 December 2020).

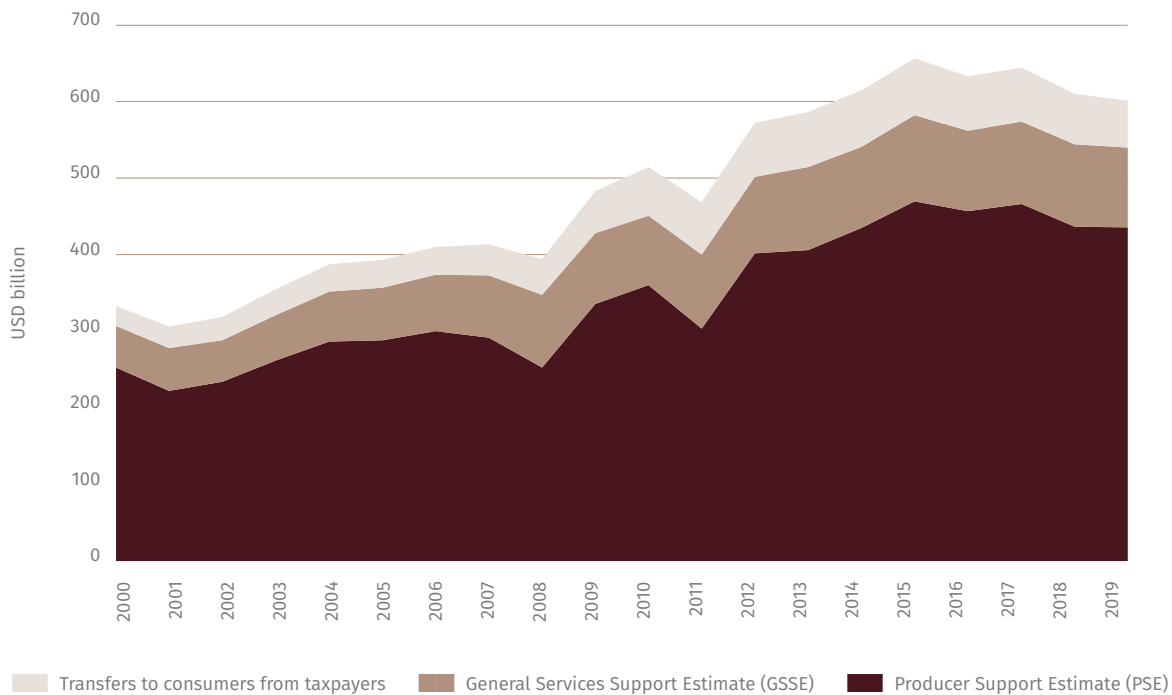
Given the size of the agricultural sector in each country and region, this translates into vastly different levels of support for producers (Searchinger et al., 2020). In these terms, **Japan** provides the highest level of public support, providing 92 percent of value-added in support between 2014 and 2016; the **EU** remains in second place, offering 48 percent; while producers in **China** and the **US** received 27 percent and 24 percent, respectively, of value-added in

support. By contrast, this support was only 10 percent in Brazil and as low as 4 percent in New Zealand (ibid.).

Public support by type and over time

Figure 7 traces the evolution of these categories along the last decade, demonstrating that overall levels of net support to producers have increased from just over USD 300 billion to USD 619 billion in the last two decades.

FIGURE 7. Composition of Total Support Estimate across 54 Countries, 2000-2019



Source: OECD (2020), *Agricultural support (indicator)*. doi: 10.1787/6ea85c58-en (Accessed on 19 December 2020).

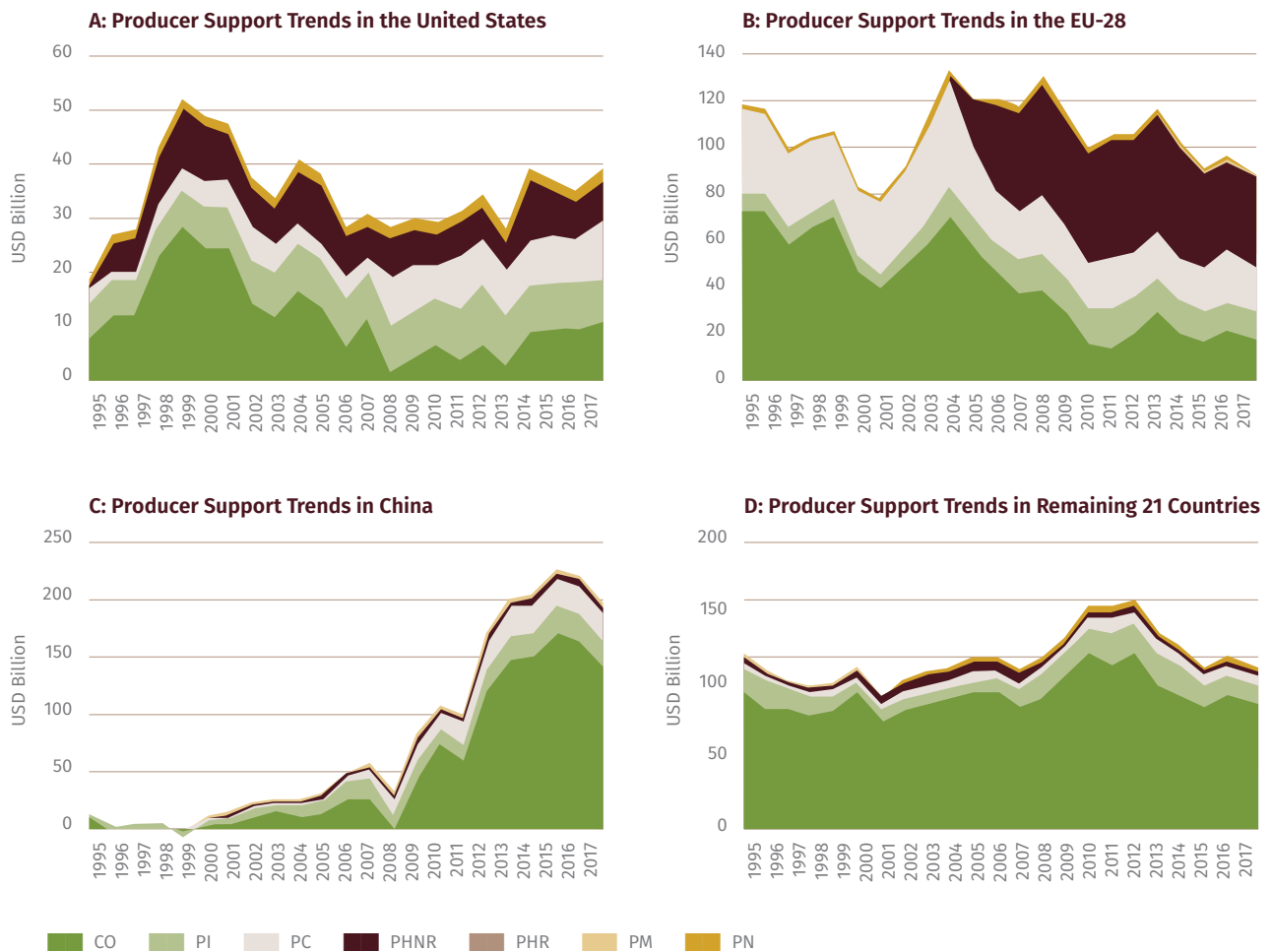
Across time, producer support estimates have remained the largest component of support to agriculture. Within this, MPS is by far the most ubiquitous form of producer support, accounting for half of all transfers to producers (Searchinger et al., 2020; Laborde et al., 2020; OECD, 2020).

As Figure 8 demonstrates, the increase in MPS has been driven mainly by growth in China's overall support to agricultural producers and reliance on this form of support. Other countries outside of the EU and US have also continued to use MPS as the dominant source of support (World Bank, 2018). China's outlays on input subsidies have also grown during this period.

In high-income countries and regions, such as the EU and the US, average rates of support to agriculture have fallen, and there has been a move away from trade measures and towards decoupled protection that seeks to avoid pushing for higher agricultural production and reducing the market access opportunities of other countries (Mamun et al., 2019; OECD, 2020). Market price support made up 64 percent of transfers in OECD countries in 1986-88 and only 30 percent in 2017-19 (OECD, 2020; 96).

Nonetheless, the US has increased overall expenditures on input subsidies, and support via coupled payments has remained fairly constant over the last 10 years.

FIGURE 8. Trends in support to agricultural producers: China, EU-28, US and other countries, 2010-19



Note: CO = support based on commodity outputs, predominantly market price support; EU-28 = EU's 28 member states; PC = direct payments based on current area/animals, production required; PHNR = direct payments with no production required; PHR = direct payments based on non-current area/animals, production required; PI = payments based on input use; PM = miscellaneous payments; PN = payments based on non-commodity criteria and include payments for conservation, land retirement, and so on.

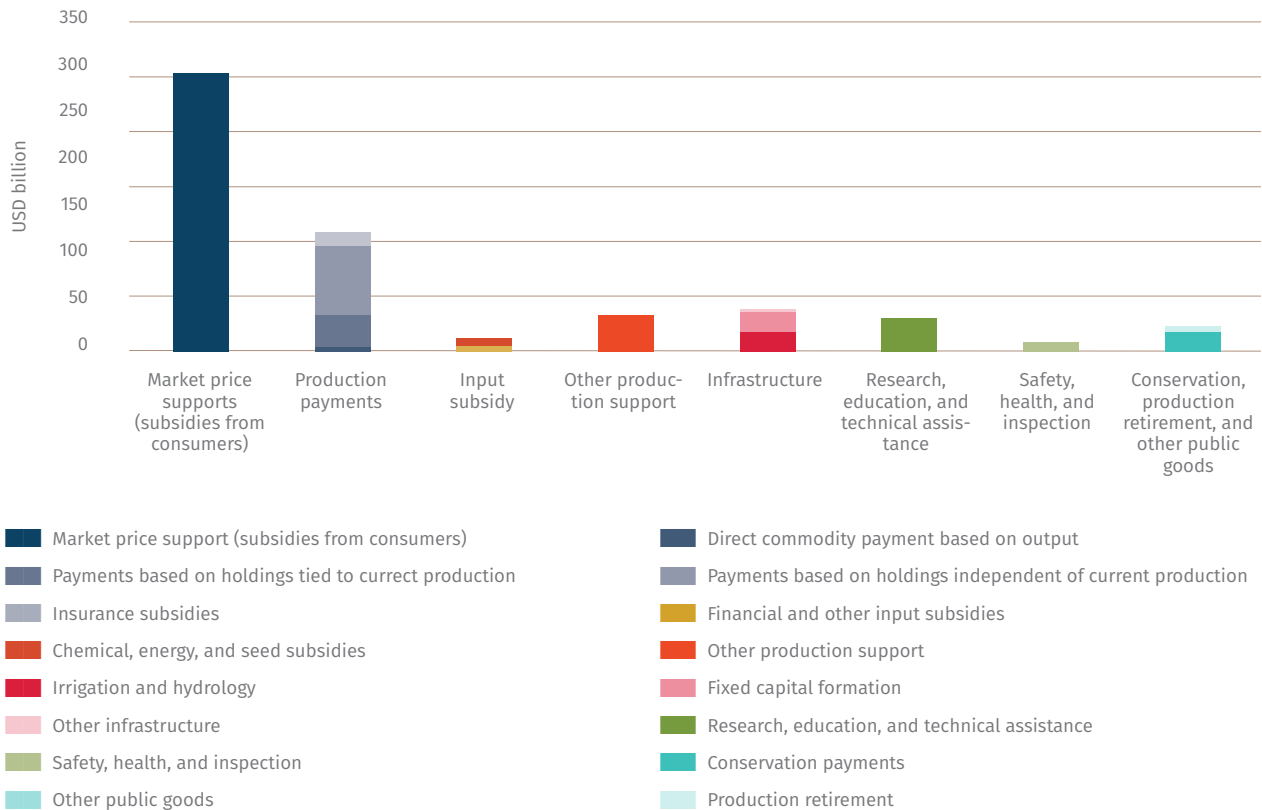
Source: OECD (2020) based on World Bank (2018).

In low-income countries, producers have typically been taxed, particularly for the production of export crops that lend themselves to easy taxation. However, over the last few decades, agricultural support has shifted from net taxation to net assistance, on average. Producers in low-income countries today experience more support and less taxation than previously; support usually takes the form of tariffs and – to a lesser extent – coupled subsidies (Mamun et al., 2019; OECD, 2019).

Figure 9 further breaks down the level of agricultural support provided across the 54 countries analyzed,¹⁵ by category of support (Table 2). Within these totals, the majority of interventions provided income support to farmers through payments for production, input subsidies and market support to activities such as marketing of agri-food products or public stockholding. Around 6 percent of total outlays was directed at activities supporting agricultural knowledge and innovation. Spending that directly targets environmental outcomes, such as

15 All 37 OECD countries, the five non-OECD EU Member States and 12 emerging economies.

FIGURE 9. Level of agricultural support across 54 countries, by category/subcategory average 2014-16



Source: Searchinger et al., 2020 based on OECD database.

conservation or restoration, remains limited – currently at about 1 percent of the total support to agriculture.

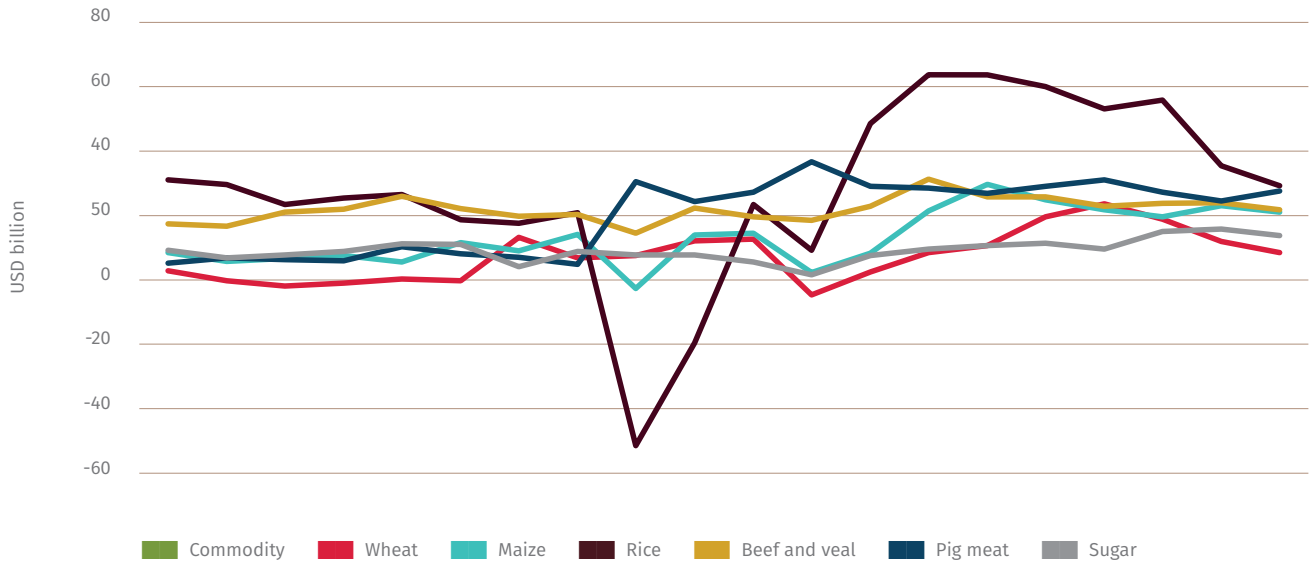
Public support by commodity

Figure 10, derived from data about commodity-specific support from estimates of single commodity transfers, shows that support tends to be clustered around a small number of crops (OECD, 2020). Those crops typically are important either to food security or to the incomes of politically influential groups within society. Just six products – rice, maize, pig, beef, veal and milk – receive 75 percent of total global producer commodity support¹⁶ (Bellmann, 2019; OECD, 2020). These products are followed by wheat, poultry, cotton, sugar and sheep meat.

Analyzing single commodity transfers by commodity as a share of gross farm revenue confirms that support is heavily concentrated on specific products in different countries. In South Korea and Japan, for example, subsidies for rice, pork, dairy, beef and veal, and sugar represent up to 80 percent of the value of production – implying that farmers obtain the majority of their income through government transfers (Bellmann, 2019). China's support to single commodities as a share of farm revenue is more in line with that provided by the EU or the US, and often considerably lower than that in Japan, South Korea or Turkey (ibid.).

¹⁶ Producer commodity support is the sum of gross transfers from consumers and taxpayers to producers arising from policies linked to the production of specific commodities; a producer must produce the designated commodity to receive the payment (OECD, 2020). The numbers cited here are derived from average support between 2007-19 using data downloaded on 15 March 2021 from the OECD database.

FIGURE 10. Public support to agriculture by commodity, 2000-19



Source: OECD (2020), accessed on March 15, 2021.

An aerial photograph of a valley with terraced rice fields. The fields are arranged in neat, curved rows on the slopes of the hills. A river flows through the center of the valley. In the background, there are more hills and mountains under a hazy, golden sky. The overall scene is lush and green, with a warm, golden light suggesting either sunrise or sunset.

CHAPTER 4
**Public support and
its implications for
GHG emissions**

4.1 Approaches to estimating links between public support and emissions from agriculture

Several papers have emerged over the past 18 months looking specifically at how public support to agriculture has impacted GHG emissions: DeBoe (2020), Henderson and Lankoski (2019) and Bellmann (2019) assess the evidence on the impact of agricultural policies on environmental issues, including GHG emissions, while Mamun et al. (2019), Searchinger et al. (2020) and Laborde et al. (2020) focus on the link to climate change mitigation through the lens of emissions.

All adopt a similar approach in terms of breaking down public support to agriculture by type, across countries and between commodities. Laborde et al. (2020) take the analysis a step further towards a full evaluation of the impacts using a 'counterfactual global model scenario showing how much emissions from agricultural production would change if agricultural support were abolished worldwide'.

Initial results are fairly consistent across different analyses with some differences in emphasis. However, there are limitations with the existing evidence base, including:

1. The 'absence of a universally agreed definition of what constitutes a subsidy' (Bellmann 2019; 5).
2. The lack of work to isolate the individual impact of specific policy instruments, distinguish between policies with or without accompanying mandatory conditions and the nature of the conditionality, particularly its environmental aims (DeBoe 2020).
3. The limited number of studies that consider economic, social and environmental impacts in order to assess the potential for complementarities or trade-offs between productivity, equity and sustainability objectives (ibid.).

4.2 Existing evidence on the impact of agricultural support on GHG emissions

Among the evidence reviewed, there is some agreement on the impact of different types of support to agriculture on GHG emissions. Mamun et al. (2019) conclude that, on average, the existing structure of agricultural support provides little incentive to farmers to switch from high to low emission-intensive commodities. However, opinion differs as to the impact of different types of support.

There is also consensus that the impact will ultimately depend on where the support is applied, to which commodities and under which conditionalities as the land use and GHG emissions from crop and livestock production can vary significantly from one country to another and by commodity (DeBoe, 2020; Mamun et al., 2019; Laborde et al., 2020; Searchinger et al., 2020; Bellmann, 2019). Support in countries with high emission intensities increases global output in those countries and, other things being equal, increases global emissions per unit of global output (Laborde et al., 2020).

Finally, the literature emphasizes the importance of policy coherence – both within agricultural policies and between agricultural and non-agricultural policies – and the impact of attaching conditions to different types of support for emissions from agriculture.

4.3 The influence of types of support

Coupled (direct) payments

The evidence points to coupled payments generally boosting greenhouse gas emissions and impacting negatively on other indicators of environmental health, such as water quality, attributed to incentives for intensification and production expansion. Analysis conducted by DeBoe et al. (2020) concluded that support coupled to production or input use is particularly harmful for the environment, while other instruments, such as largely decoupled payments, which do not depend on current production choices, are among the least environmentally harmful forms of support.

However, Laborde et al. (2020) indicate that simply removing coupled payments to production across the globe would only reduce GHG emissions by 0.6 percent. Fertiliser subsidies account for over 30 percent of the reduction in emissions, while removing existing subsidies related to enteric fermentation would reduce emissions by 17 percent of the total. Emissions would fall the most in China, the EU, Mexico and other countries that currently provide substantial coupled payments to agriculture.

Decoupled payments

Results for decoupled payments were more mixed for assessments of greenhouse gas emissions, both compared to baseline and when comparing alternative decoupling scenarios (DeBoe, 2020). Some authors (e.g., Schmid et al., 2007) found that decoupling without constraints (the EU's mandatory Good Agricultural and Environmental requirements) produced greater reductions in methane

emissions,¹⁷ whereas Gallo et al. (2011) showed mixed performance compared to the baseline and between decoupling scenarios for different specific greenhouse gases and in total (ibid.).

Market price support

There is also less consensus on the impact of MPS. Researchers agree that MPS is likely to increase levels of production of the target crop, normally through some combination of intensification, the dedication of a greater proportion of land to its production, and an increase in the overall land under production. Unless the crop receiving MPS replaces one that is more GHG emissions intensive, the result is likely to be an increase in both overall emissions and emissions intensity (Mamun et al., 2019). Equally, MPS does not encourage better agricultural management practices, efficient production or innovation (ibid.).

However, Laborde et al. (2020; 3) find that adding the impact of market price support to direct payments to agricultural producers mitigates against the rise in emissions from direct payments at a global level: **‘without subsidies paid directly to farmers, output of some emission-intensive activities and agricultural emissions would be smaller. Without agricultural trade protection, however, emissions would be higher.’**¹⁸ This is partly because protection reduces global demand more than it increases global agricultural supply, and partly because some countries that currently tax agriculture have high emission intensities.... On balance, current agricultural subsidies and trade protection as such do not drive up GHG emissions from agricultural production’.

4.4 The importance of geography and commodity

The mixed evidence above points to the need to understand the link between support to particular commodities that are emissions-intensive and the countries in which they are produced. Accurately assessing this link and providing an overview of the different components requires an integrated model able to take into account issues of LUC, ILUC, output mixes, production practices and consumption patterns across and within countries (see Laborde et al., 2020 for plans to develop

more comprehensive analysis). It also requires emissions along the supply chain to be incorporated into modelling.

However, a partial analysis – based on figures in previous sections – reveals some key points:

1. Agricultural emissions are highly concentrated by commodity – with beef, dairy and rice accounting for over 80 percent of agricultural GHG emissions from cultivation practices (Mamun et al., 2019).
2. A substantial portion of emissions comes from land use and land use change (ibid.) with beef, oil palm and soyabean production accounting for the majority of emissions resulting from land use change (deforestation).
3. The highest levels of public support around the world go to rice, maize, pork, beef, veal and milk (Bellmann, 2019) some of which (rice, beef and milk) account for the greatest contributions to emissions through production processes.
4. Soyabean and oil palm do not receive high levels of transfers relative to other crops, either through MPS or direct payments, although they receive support in other forms, such as very low-cost access to land. Returns to – and production of – these crops are driven principally by direct demand, often from consumers in high-income countries (HICs), or derived demand (in the case of soyabean) for feed for livestock.
5. The highest levels of support, both overall and in value-added support, are provided by a handful of countries and one region: China, the US, Japan and the EU.
6. Emission intensity of production (relating to production processes) can vary substantially across countries and regions for different products, particularly beef and pork. Beef production has the widest range of emissions intensities per kilogram of output.

¹⁷ Compared to coupled payments.

¹⁸ Despite an overall decline in output, removing trade barriers that provide MPS could lead to a production shift from relatively low-emission-intensity countries to somewhat higher-emission-intensity countries, such as Brazil.

CHAPTER 5

Political economy considerations for greening finance



Reform of public support usually entails narrower targeting, a reduction in transfer size, or complete removal of support, ideally coupled with conditionality and greater policy coherence. However, this is not a purely technical exercise, and the political economy of such reform highlights the need to understand several factors to determine the space for reform and the levers and leverage points to spark transformation, including:

1. Underlying aims of different types of support.
2. Influences on the level and type of support offered – in general and to specific commodities.
3. Opportunities and barriers to reform that reveal lessons for future changes that put climate and sustainability considerations more at the heart of public support to agriculture.

Analysis in this section draws on the literature on the reform of agricultural policy (e.g., Anderson et al., 2013; Giovanni et al., 2015; and Swinnen et al., 2010), fossil fuel subsidies (see Coady et al. 2015; Inchauste and Victor, 2017) and climate policy in general (e.g., Zachman et al., 2018).

5.1 Aims of public support to agriculture

Public support for agriculture tends to focus broadly on improving **food security**, often with the aim of increasing aggregate food availability or decreasing the cost of food for consumers. Many government policies have achieved – or made substantial progress – towards this goal (World Bank, 2018).

Most often, policymakers are aiming to achieve a **combination of goals** – mainly socio-economic – with their support to producers (Bellmann, 2019; World Bank, 2018). These goals usually fall into the category of protecting farmer and rural incomes and building resilience (e.g., in China – see Gale et al., 2004), stabilizing markets and improving productivity. For example, Europe’s first joint agricultural policy was implemented in the aftermath of World War II when Europe was short of food; the Common Agricultural Policy (CAP) originally aimed to make Europe self-sufficient in food and to secure an adequate food supply and the free flow of food and agricultural products within Europe (Nieminen, 2018).

More recently, greater support has also been designed with the aim of reducing the environmental impact of agricultural production and practices, although this support remains limited, and there are concerns that promoting climate and sustainability outcomes may come

with a reduction in food security (OECD, 2020; World Bank, 2018).

The aim of promoting **equity** across different income groups with public support to agriculture is much less explicitly voiced and tends to be marginalised in reform outcomes (Petit, 2019).

5.2 Influences on the level and type of public support

The level and type of public support provided to agricultural producers is influenced by several factors:

- Political pressures and interest groups that form around the support;
- Transparency of different measures;
- Costs of administering and policing different types of support.

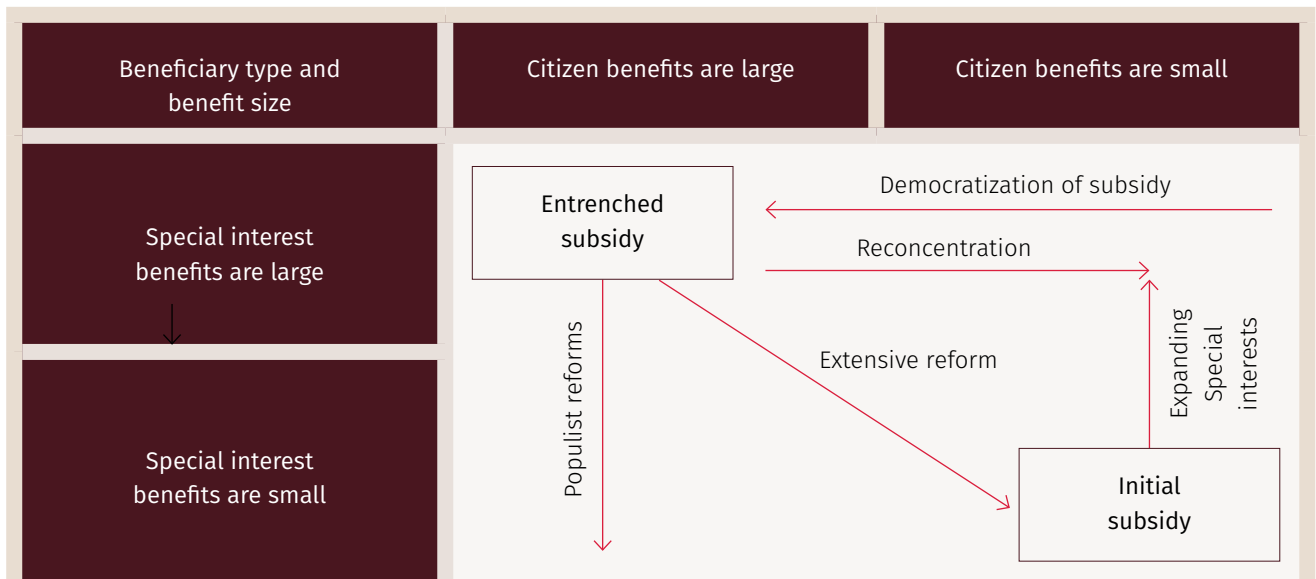
Political pressures and interest groups

Support may be introduced, maintained and even increased as a result of political pressures and special interest groups that stand to benefit from their expansion (Commander, 2012; Inchauste & Victor, 2017; Sovacool, 2017). As demonstrated in Figure 11, a subsidy that starts out targeted at a small number of producers with a well-defined goal (in the bottom, right-hand corner of the diagram) may gradually expand to include a larger group of beneficiaries (in this case agricultural producers or consumers) and the size of the subsidy may increase (moving to the top, left-hand corner of the diagram). The size of the subsidy and level of targeting also dictates the room for subsequent reform.

The popularity of market price support with policymakers is at least partly explained by the fact that its costs can be passed on to large groups of consumers, who may not be aware that they are bearing additional costs or may not be politically influential or well-organized.

Typically, the longer a subsidy is in place, the more likely it is to be expanded to include more beneficiaries and for the value of the transfer to increase. The democratization of the subsidy – where benefits expand beyond special interest groups to encompass larger numbers of individuals – combined with an increase in the size of transfers make it harder to introduce reforms as interest groups arise to ensure a subsidy’s continuity (and possibly even further expansion). Such dynamics may also change the nature of the subsidy, for example from a coupled

FIGURE 11. Lifecycle of a subsidy regime



Source: Victor and Inchauste, 2017; 27.

subsidy to market price support, so as to provide greater transfers to a larger beneficiary group.

Low levels of funds to research and innovation can also be at least partially explained by the fact that agricultural producers have the means to exert political influence over the policymaking process in many countries, while there is not a large constituency pushing for research into efficient, GHG-extensive production techniques.¹⁹

Reforms may be more likely when benefits from the transfer accrue mainly to specialist interests, rather than large number of farmers. The most difficult situation in which to introduce reforms would occur when large benefits accrue both to a large number of individuals as well as well-organized special interest groups. This might be the case, for example, where a fertiliser subsidy benefits a large proportion of farmers as well as fertiliser producers and suppliers (e.g. Chinsinga & Poulton, 2014).

Transparency

The information available on the level of support and their beneficiaries can push policymakers in different ways:

- It can create the incentive to use support measures like MPS if the costs of other types of support are more transparent (Anderson et al.,

2013).²⁰ Coupled or decoupled subsidies tend to attract greater scrutiny due to their direct costs to government budgets.

- However, it can also allow greater scrutiny overall, which can put pressure on policymakers to reduce the level of support provided, particularly in the presence of active and diverse media.

Implementation costs

The prevalence of market price support can also be explained by the fact that trade taxes are easier and less costly to implement (Anderson et al., 2013) particularly for governments with weaker administrative capacity. The costs of implementing and enforcing policies can also be commodity-specific, determined by the structure of production and marketing. For example, commodities that are perishable and require processing (with scale economies), such as sugar and dairy products, are typically marketed through processing companies where governments can intervene at relatively low cost. By contrast, it can be more costly to intervene in the case of products that are easy to store and/or that farmers can market directly to consumers or other farmers (ibid.).

19 The extended time horizon of R&D is also an issue.

20 Anderson et al. (2013) discuss this in terms of more efficient or less efficient forms of support.

BOX 1. REFORM OF SUPPORT TO AGRICULTURE IN BRAZIL

Over the past 30 years, Brazil has experienced twin leaps in both agricultural growth and GHG emissions: the country has moved from a net importer of food in 1990 to the world's third-largest export producer. By 2005, however, 80 percent of Brazil's GHG emissions could be traced back to agricultural production, and 57 percent of emissions were due to deforestation.

Overall transfer levels to the sector are low, amounting to only 0.4 percent of GDP and 10 percent of value-added in the sector. A quarter of public support to agriculture takes the form of market price support or direct farm payments, while the rest is spread across subsidies aimed at boosting productivity (such as concessional loans), infrastructure expansion, and research and development.

Brazil has been able to shift to greener support mechanisms in recent years, moving away from subsidized loans and market price support - in the form of minimum guaranteed prices for wheat, rice, beef, and cotton - and towards policies that prevent land use change. In the absence of such environmental policies, deforestation occurred at a rate of approximately 2.3 million hectares per year between 1990 and 2010. However, after subsidized loans were restricted to farmers who could also demonstrate that they were shifting to sustainable intensification and not clearing more land, the rate of deforestation was gradually reduced to 1 million hectares in 2015. In the interim, loans worth USD 1.4 billion were denied, mainly to large-scale producers who had not shifted to more sustainable production methods.

Beneficiaries of Brazil's support mechanisms are spread across diverse political constituents, including numerous small-scale producers, urban consumers, and a smaller group of commercial producers. This may go some way towards explaining why such shifts have been possible.

Sources: Searchinger et al., 2020; Bellmann, 2019.

5.3 Opportunities and barriers to reform

Previous experience of reforms to agricultural support and fossil fuel subsidies reveals that a variety of factors combine to provide opportunities for reform; however, such reforms have also encountered – and continue to encounter – obstacles.

Barriers to reform

Barriers to reform include (Coady et al., 2015; Megersa, 2020; Inchauste and Victor, 2017):

- Opposition from specific interest groups benefitting from the *status quo*.
- Lack of information about the size, costs and impacts of subsidies.
- Concerns about distributional impacts and trade-offs.
- Perceived or actual lack of government capacity to commit or deliver public goods in place of subsidies, or direct payments in lieu of MPS.
- Concerns about impacts on macroeconomic indicators, e.g., inflation or volatility of prices.

- Lack of budgetary funds to finance reoriented support.
- Governance structures, including voting and decision-making procedures, that can impede reform.²¹

These issues can be compounded by the lag between the immediate loss of current forms of support and the future benefit from more targeted and efficient social spending (Megersa, 2020).

Opportunities or triggers for reform

However, the literature also identifies opportunities or triggers for reform. These often take the form of crises, usually financial or fiscal (Anderson et al., 2013; Inchauste and Victor, 2017); examples of other reforming countries

²¹ Prior to the major reform of the European Union's agricultural policy in the 2000s, reforms were diluted by the veto power of Member States, exerted through the unanimity rule (Anderson et al., 2013; Pokrivcak et al., 2006) modelled the influence of voting rules on the influence of the EU Commission and concluded that such rules can impact the European Commission's ability to influence the final policy decision.

leading changes; and donor pressures (Inchauste and Victor, 2017).

For example, major fiscal issues played an important role in stimulating agricultural policy reform in Sweden and New Zealand in the 1980s (Anderson, 2009). Policy reforms were also triggered by global financial crises, including the financial crises in Latin America in the 1980s and in

Asia in the late 1990s, and structural adjustment in Africa (Anderson et al., 2013).

International agreements, and the pressure for reform that they bring, can also catalyse reform. Integrating agriculture into the General Agreement on Tariffs and Trade (GATT) in 1994 provided a trigger for CAP reforms within the EU, for example.

CHAPTER 6

Repurposing support to agriculture to reduce GHG emissions



This section identifies options for redesigning public support to agriculture and the lessons from political economy analysis that can guide this.

6.1 Options for redesign

Changing the type of public support

Reorienting policy towards more decoupled forms of support could ‘pay a “double dividend” in terms of both improved economic efficiency and environmental performance’ (De Boe, 2020; summary). The idea that decoupled subsidies have the potential to provide greener finance mechanisms and to break the very direct link between production and GHG emissions is supported elsewhere (e.g., Searchinger et al., 2020). The switch toward less ‘distorting’ payments could also contribute towards greater global equity between countries (ibid.).

However, the result from Laborde et al. (2020) about potential increases in emissions that could result from abolishing MPS worldwide highlights the need to proceed with caution about making sweeping statements regarding the removal of certain types of support.

Promoting policy coherence, maximising synergies and minimising trade-offs

Policies aiming to achieve different goals tend to be made in isolation from each other, raising the risk of divergent policy objectives, activities and outcomes.

An assessment of the EU’s CAP (Parsons and Hawkes, 2019) found that there was both coherence and incoherence between different CAP measures. Examples of coherence included positive (or potentially positive) relationships between climate goals and the CAP’s crop diversification obligations, and its support for cooperation and farm advisory services on implementing greening obligations. Examples of incoherence included the availability of voluntary coupled support for livestock.

Policy coherence can improve the efficiency and effectiveness of existing policies, achieve multiple objectives at a lower cost and reduce the need to use other policy mechanisms to counteract negative effects of agricultural policies (Parsons and Hawkes, 2020; DeBoe, 2020). For example, a policy designed to increase plant-based diets for individuals’ health benefits could reinforce climate change policies. China achieved positive synergies by supporting improvements in both nitrogen-use efficiency and yields (Searchinger et al., 2020): small farms in China produced fewer greenhouse gas emissions

after farmers participated in training programs focusing on fertiliser management (Cui et al., 2018).

Policies also need to **minimise potential tradeoffs** between emissions reductions and other indicators of environmental health, e.g., biodiversity. This applies to both the way in which support is provided and the nature of the support itself. One example is that of land abandonment or retirement: DeBoe (2020) found that long-term rice field abandonment generally reduced GHG emissions and improved water quality but had a negative impact on biodiversity, especially if land was previously used for livestock production.

Using targeting and conditionality

While general impacts of coupled and decoupled support can be inferred from their broad nature and likely influence on farmer behaviour, ultimately, they will depend on the details of the programmes, particularly whether payments are conditional on switching to more positive environmental practices and avoiding indirect land use change. This underlines the fact that simply switching from one type of payment (e.g., coupled to decoupled payments) in itself is unlikely to make a significant contribution to reducing emissions from agriculture (Searchinger et al., 2020). Two elements are important in making such a switch effective: targeting producer support policies (Searchinger et al., 2019); and attaching conditionalities to such support (De Boe, 2020; Mamun et al., 2019).

Improving targeting of support

‘Targeting policies towards precise aims and tailoring measures to precise needs is expected to achieve a better result with lower transfers than broad-based policies...(it) only provides transfers in pursuit of specific objectives to specific spatially defined areas and specific (farm) groups’ (Van Tongeren, 2008; 12).

More precise targeting requires distinguishing among target groups and regions, production practices, sources of emissions, and the different role of production in livelihoods across countries. For example, livestock production by small livestock farmers provides livelihoods to millions of poor smallholders in Southeast Asia (Ranganathan et al., 2016).²²

Fellmann et al. (2018) underscore the need for flexible targeting at areas where emissions are least costly to

²² Livestock play an important role in Asia. Beyond the traditional supply of meat and milk, they are also used for draft power, transportation, capital, credit, social value and hides, and provide a source of organic fertiliser for seasonal cropping.

reduce. This can mean spatial targeting within countries – tailoring greening measures to local conditions and priorities – to improve environmental outcomes (Hristov et al., 2020). Such targeting can be incompatible with common direct payments schemes, such as the EU’s CAP (ibid.); however, more flexible targeting can move beyond national mitigation targets or targeting Member States with the highest absolute levels of emissions to target regions with particular emissions sources, production structures and farm sizes where marginal abatement costs²³ are lower (Fellmann et al., 2018). (See Box 2 for a discussion of the potential role of emissions trading schemes in allowing greater flexibility.)

Attaching conditions to support

Attaching climate mitigation conditions to support provided to producers can pay farmers not to do something that is environmentally harmful or pay them to start using practices that are considered less harmful to the environment (Mamun et al., 2019). While not used extensively, several countries are now looking at this as a way to advance environmental objectives (Searchinger et al., 2020). This can also minimise trade-offs, e.g., combining a policy supporting land retirement with the restoration of native habitats (ibid.).

For example, under the 2014–20 Common Agricultural Policy, the EU provides direct, per hectare, decoupled payments to farmers (the ‘greening payment’) on top of the basic payment per hectare under the Basic Payment Scheme, if certain requirements are met on using climate and environmentally friendly farming practices. These include cultivating a diversified set of crops; maintaining existing permanent grassland; and allocating a share of arable land to ecological practices such as the maintenance of buffer strips, fallowing land or cultivating nitrogen-fixing crops (European Parliament, 2020). With the incentive of additional payments come ‘extremely severe’ penalties for not fulfilling these greening requirements (ibid.).

Such conditions can be mandatory or voluntary. The EU’s new CAP (2021–27) proposes a new system of ‘enhanced conditionality’, which increases the scope of mandatory activities for producers to receive direct payments under the CAP, including requirements to maintain permanent grasslands and protect wetlands and peatlands. The new CAP also proposes new voluntary, ‘eco-schemes’ – optional environmental and climate rules that qualify farmers to receive a certain amount of annual area-based

direct payments to be determined by Member States (Lotz et al., 2019).

Finally, for any conditionality to be effective, it needs to be enforced and monitored, requiring resources to be ploughed into this and political will to penalize those found not to be adhering to requirements.

Minimising leakage and non-additionality

Concerns have been raised that schemes to impose greater conditionality on recipients of support may create leakage and non-additionality (Mamun et al., 2019), undermining the impact of such conditions and their cost effectiveness.

Leakage effects arise where production moves from areas with stricter conditionality to areas with less rigorous conditions or standards, which can prevent a reduction in overall emissions depending on the relative emissions intensity of agriculture in each area (Fellmann et al., 2018).

Fellmann (2018) suggests that flexible targeting – coupled with better application of technological mitigation options – could be key to reducing leakage, as this would reduce the production displacement itself (see also Box 3 on carbon border taxes, which could also reduce leakage effects). Allowing farmers and regions to trade mitigation obligations could also help (ibid.) as would harmonizing conditions across countries through international cooperation.

Non-additionality occurs when producers are paid to do something that they would have done in the absence of such a condition, indicating that the finance could have been spent better on other activities. Specific additionality tests have been developed in the case of carbon markets (Michaelowa et al., 2019), which could be tailored to particular activities to check that policies are changing behaviour. Rewarding farmers for emissions reductions against predefined baselines is key to additionality, with baselines established on historical data at individual farm level, similar farms in the sector and considering existing trends in emissions).²⁴

Redirecting research and development in agriculture

Government investment in research and innovation in agriculture is an important instrument in supporting agriculture, which can be targeted at reducing emissions intensity while raising productivity and resilience. Although currently a tiny proportion of overall support in most

23 The marginal costs of achieving a cumulative level of emissions abatement (Gillingham and Stock, 2018).

24 Findings from workshop on ‘The role of agriculture and land use sectors in a climate-neutral EU in 2050’, 25 February 2021, organized by Cowi and the Technopolis Group, study forthcoming.

BOX 2. CAN EMISSIONS TRADING SCHEMES PLAY A ROLE IN REDUCING EMISSIONS IN THE AGRICULTURAL SECTOR? THE EU AND NEW ZEALAND CASES

The EU agricultural sector is currently exempt from the EU emissions trading system (EU-ETS) — the cornerstone of EU efforts to limit global warming — due to concerns about emissions leakage, i.e., reallocation of production to other countries, and due to difficulties monitoring emissions in the sector (European Commission, 2016; Jansson et al., 2020).

However, New Zealand is in the process of applying a carbon price to emissions from agricultural production. Following the passing of New Zealand's 2019 Zero Carbon Act, the New Zealand government enacted a Climate Change Response (Emissions Trading Reform) Amendment Act in June 2020 to reduce emissions from agriculture. The Act put a price on biogenic emissions from agriculture (methane from livestock and nitrous oxide from fertilisers) to be applied from 2025 at the latest, with a levy/rebate system planned to operate in parallel with the New Zealand Emissions Trading Scheme (<https://legislation.govt.nz/act/public/2020/0022/latest/LMS143384.html>).

countries, such investment can yield high returns and, if designed and communicated in a way that accounts for the needs of different producers and farming systems, can also contribute to economic and social goals. Such investment could focus on, for example, reducing emissions from enteric fermentation through improved cattle feed or developing fertilisers with a lower emissions footprint.

Changing consumption behaviour

The contribution of agricultural production to GHG emissions represents one side of the climate mitigation coin; the other side is the shift in diets towards more emission-intensive products that has happened in many emerging economies as income per capita has grown.

The typical Western diet is associated with high levels of greenhouse gas (GHG) emissions as well with obesity and other diet-related diseases. Animal-based foods are generally the most important contributors to resource use and dietary GHG emissions (van de Kamp et al., 2018). Reducing the emission intensity of diets in HICs and avoiding a shift to such consumption patterns in emerging economies could complement policy interventions in agricultural production.

For example, emissions per kilocalorie consumed of beef are 44 times that of rice (Ranganathan et al., 2016). Levels of GHG emissions per consumer are much lower in many poorer countries, particularly in Africa, where diets remain richer in plant, rather than animal, products (Mamun et al., 2019) p105.

A shift towards Western diets in poorer countries would see an increase in global GHG emissions that is incompatible with keeping global warming below 2°C, let alone 1.5°C (Searchinger et al. 2019). However, promoting changes in diets around the globe cannot mean that the world's poor reduce their consumption or see their livelihoods endangered. About 3.5 billion people get at least 20 percent of their calories from rice, and about one-half billion get most of their calories from rice. Meeting global goals of improving nutrition in low-income countries and groups requires the provision of additional, affordable protein sources to the world's poorest people; to avoid expanding livestock consumption, alternative sources of protein, such as fish, need to be made available at affordable prices (ibid.).

Strengthening land and property rights

Clear land and property rights that provide tenure security — the expectation that you can use your land or property for a period of time — are vital for giving people the certainty that they need to make longer-term investments in their land to boost productivity and maintain soil health.

One billion people around the world think that they may lose access to their land or property over the next five years (Prindex, 2020). Interventions to improve how secure people feel about being able to stay on their land — perceived tenure security — in areas of high emissions may be key to many measures aiming to reduce emissions.

Strengthening perceived tenure security does not necessarily mean issuing formal documentation. However, this may be helpful in particular contexts or for particular

BOX 3. CARBON BORDER TAXES AS A MECHANISM TO INFLUENCE CONSUMPTION PATTERNS

Worldwide, the share of emissions linked to trade has grown sharply. In the case of the United Kingdom, net imported emissions now account for over 40 percent of the country's total footprint and have risen to such an extent that they now cancel out almost all domestic, territorial reductions that have been achieved.

The European Commission's proposal for a 'European Green Deal', published in December 2019, proposes to incorporate the Paris Agreement in all future trade agreements (European Commission, 2019) and introduce carbon border adjustments or taxes on imports by 2023. This would tax imported goods based on their carbon (equivalent) content to avoid carbon leakage, whereby businesses transfer production to other countries with laxer emissions constraints.

Pricing emissions into imported food products could reduce consumption of emissions-intensive commodities, contributing to climate mitigation.

However, many aspects of such a mechanism need to be hammered out, with concerns about impacts on livelihoods in LICs, how to set an appropriate price, what should be covered, and the compatibility with WTO rules, to name but a few.

Sources: Krishnan and Maxwell, 2020; Tsafos, 2020: <https://www.csis.org/analysis/how-can-europe-get-carbon-border-adjustment-right>

groups of people, such as farmers wanting to access credit for investment. Such measures can draw on best practices from land titling programmes, including the need to strengthen land administration systems to maintain clarity over land and property rights.

Outside of formalization, a wide range of tools are available to improve how secure people feel about their land and property: strengthening community tenure; providing legal empowerment; and addressing wider governance issues, such as corruption, to improve confidence in government authorities to enforce rights. These may be particularly effective for forest communities or indigenous peoples but are also important for farmers.

6.2 Creating opportunities, overcoming barriers: lessons from political economy analysis

'Sustainable policy reform can be implemented, inter alia, by sound advice in the face of crises, changes in governance structures, political entrepreneurship, provision of information and mass media, effective compensation to counter recalcitrant interest groups, and breaking up powerful coalitions that detract from the public interest'. Anderson et al., 2013; 469

Overall, the literature highlights the need to use windows of opportunity to:

- Shift political-economic equilibria that reflect relative political power away from stasis or the status quo.
- Build and sustain coalitions that will support ambitious reform.

Several opportunities exist to identify or actively generate windows of opportunity in the current context. The first is to treat climate change as a genuine crisis, ratcheting up the urgency of addressing it before the world reaches a tipping point and using it as a trigger for reform.

Another is to use the international moments available in 2021 (COP26, COP 15 and the UN Food Systems Summit), the rhetoric of building back better' after COVID-19 and momentum created by announcements of deep carbon cuts to move to net zero emissions by the middle of this century, to frame discussions and build pressure for reform.

There are several lessons or pointers from political economy analysis of reform of public support that demonstrate how best to use windows of opportunity:

1. **Understand the nature of stakeholders and existing alliances around climate and sustainability, widening the stakeholders assessed and identifying unconventional**

BOX 4. THE INFLUENCE OF INCOME LEVELS ON PUBLIC SUPPORT TO AGRICULTURE

The level of per capita income in different countries can affect both the level and nature of support to agriculture. As income per capita rises, taxation of agriculture tends to be reduced — or support to agriculture to be increased. As growth has occurred in some LICs, so has penalisation of agriculture dropped or support risen (e.g., India). However, this support tends to plateau after a certain point (not specified) in income levels, after which it can even start to fall.

If administrative capacity strengthens alongside income increases, it is expected that governments will choose trade (and market) interventions less often. In parallel, their ability to provide public goods (especially agricultural research) and to address efficiently any externalities that may arise may also improve.

Source: Anderson et al., 2013.

- alliances.** Giovanni et al. (2015) conclude that ‘when thinking about climate and sustainability, political economy models need to extend beyond the three types of agent: producers, consumers and taxpayers used in traditional political economy analysis of agricultural policy reform to include other types of agents’. These may be environmental groups, landowners, agenda-setters, and influential political actors, such as Parliaments. Even within the traditional groups of stakeholders, opportunities exist for new coalitions, for example, between consumers and taxpayers (Anderson et al., 2013). Once such coalitions are established, experience demonstrates that they need to be sustained throughout the reform process; such alliances can come together to achieve initial goals but may unravel quickly beyond that, undermining more ambitious reform goals.²⁵
2. **Plan reform**, with a comprehensive reform plan that phases and sequences changes transparently, and identifies the timing of benefits and costs, as benefits usually come further down the line than costs.
 3. **Assess governance structures and procedures** to see if voting and decision-making procedures lend themselves to reform, and whether these may also need to be adjusted.

4. **Develop strategic communications** to disseminate information, correct misconceptions and increase transparency through information campaigns and mass media in order to help generate broad political and public support. Information is best presented in a way that speaks to policymakers and other stakeholders and identifies clear pathways for success.
5. **Understand and address trade-offs** between different socio-economic and environmental goals, including the impact on equity, or the distribution of impacts. This is perhaps the most difficult issue to address given entrenched interests and large differences in voice and agency among stakeholders. Some recommendations include: the need to focus on less-regressive policy tools, reflecting not only effectiveness and efficiency considerations, but also distributional aspects; and using climate diplomacy to mitigate the concern that reforms that account for equity objectives will undermine competitiveness (Zachman et al., 2018).

6.3 Summary of potential redesign options

Table 3 summarizes some possible activities to reduce GHG emissions in agricultural production processes and LUC, identifying policy levers and political economy considerations that can be applied. It also highlights the potential for carbon capture and storage on farmland (Box 5).

²⁵ In several reforms of the CAP, an attempt was made to create a coalition between keeping CAP payments for farmers (farm organizations) in exchange for better targeting (economists) and more environmental benefits (ecologists). The coalition worked for saving the budget, but not for greening or better targeting (Giovanni et al., 2015).

BOX 5. AGROFORESTRY TO CAPTURE GHG EMISSIONS

Agroforestry provides an important, but underused, means to mitigate emissions from agricultural production. While carbon sequestration in soils appears to be much harder to achieve, with soils capable of holding much smaller amounts than was originally thought, agroforestry has significant potential for mitigation (Searchinger et al., 2019). Beyond acting as carbon sinks, forests also create diverse ecosystems and further ecological benefits, including binding nutrients in the soil. Tree cover on farms makes similar contributions, albeit on a smaller scale (Franzluebbers et al., 2016).

However, not all forms of agroforestry have the same potential for binding carbon. Agroforestry needs to be targeted at those geographic areas most under environmental pressure and be appropriate to local ecological systems (Kay et al., 2019). If appropriate techniques are implemented, as much as 43.4 percent of European agricultural GHG emissions could be absorbed through the ecosystems created and the increased biodiversity (ibid.).

TABLE 3: Activities and policy levers for reducing GHG emissions from agricultural production and consumption – initial ideas

Area	Activity	Policy Levers
Reduce fertiliser GHG footprint	Encourage improved farming practices that increase nitrogen use efficiency (NUE).	Research and development to improve NUE in a cost-effective manner. Make existing direct payments conditional on uptake of new practices.
	Develop improved fertilisers.	Regulation and financial support.
Improve paddy rice yields	The area of land under rice cultivation, rather than the amount produced, is key to determining overall emissions.	Boost funding to research and development to support the breeding of better varieties and the development of better production techniques.
Improve paddy management practices	Encourage the removal of rice straws from paddies before flooding them and reduce the duration of flooding.	Increase support to extension; make existing direct payments conditional on uptake of new practices.
Breed and make available dryland rice varieties	Support the use of dryland varieties that do not require the flooding of paddies.	R&D; increase support to extension to scale up use of varieties.
Reduce emission intensity in livestock	Improve grazing land management to reduce the emissions from land under livestock. Sustainable land management approaches could address both adaptation and mitigation goals.	R&D; extension; make existing or redirected payments conditional on uptake of new practices.

Area	Activity	Policy Levers
	Innovate on manure management, e.g., through using digesters at farm level.	R&D; extension; subsidies on digesters; make existing or redirected payments conditional on uptake of new practices.
	Change animal diets ²⁶ and use particular breeds combined with genetic improvement to reduce emissions from enteric fermentation.	Support R&D on diets and breeding. Make existing payments conditional on reducing emissions from enteric fermentation as way of incentivizing uptake.
Reduce meat consumption in Western diets	Promote alternatives to meat, e.g., mycoproteins.	Investment in R&D to reduce production costs; other interventions to reduce production costs, e.g., low-cost loans to purchase equipment.
	Promote alternative protein sources in LICs, e.g., fish.	Provide support to establish infrastructure.
	Promote more plant-based diets.	Funding of communications campaigns and nudging towards health and climate benefits of plant-based diets, particularly in consumer groups with high per capita meat consumption and obesity.
Promote carbon capture and storage	Promote agroforestry.	Direct payments conditional on uptake of new practices. Research on barriers to uptake at scale, including clear land and property rights and tenure security.

Sources: (Searchinger et al., 2019; IPCC, 2019). See also the Marrakech Partnership Action Table (United Nations, 2020) for a series of actions to reduce emissions and improve adaptation by: protecting, restoring and producing on land-based systems; and transforming supply chains, consumption, diets and food waste.

²⁶ Scientists in South East Asia have measured GHG emissions from goats and cattle in a series of research projects investigating the effects of different feeding regimes. By changing the animals' diets, **GHG emission reductions of up to 60 percent** have been achieved. <https://www.gasmet.com/whats-new/livestock-research-shows-dramatic-greenhouse-gas-reduction/>

A woman with dark curly hair, wearing a brown jacket and a patterned scarf, is in a field of corn. She is wearing blue gloves and holding a magnifying glass over a yellow corn cob. She is also holding a white clipboard. The background is filled with corn stalks and husks.

CHAPTER 7 **Conclusion**

There is an urgent need to reduce GHG emissions from agriculture if catastrophic climate change is to be avoided. This is especially important – and especially challenging – due to a growing population and the demands of its ever-wealthier members for more meat-heavy diets.

Existing support to agriculture through market price support and direct budgetary outlays can better meet climate and environmental goals if they are more targeted and made conditional on changing agricultural practices. Potentially harder to influence through repurposing public support are the emissions through LUC in countries where agriculture does not receive much direct support through transfers.

In addition, a greater percentage of support needs to go to funding research and development that is focused on reducing GHG emissions. Of particular importance here would be developing the next generation of fertilisers that limit nitrous oxide emissions, supplements that reduce GHG emissions from enteric fermentation, and improved techniques that boost rice production.

Political economy analysis indicates that ways of overcoming barriers to reform include shifting existing political-economic equilibria and building and sustaining new coalitions through:

- Developing strategic communications to disseminate information, correct misconceptions and increase transparency;
- Using windows of opportunity, such as budgetary crises;
- Building credibility and trust in the reform process through developing a clear reform plan that is appropriately phased and sequenced;
- Considering compensation or mitigating measures for those negatively affected by reform.

To explore more fully the opportunities for targeted reform, further research would usefully assess:

- Which elements could be classified as public support to agriculture;
- How to gather additional disaggregated data on elements of support and policy coherence, and more evidence bringing together emissions from production processes and LUC;
- The impact of changing consumption patterns if measures incentivizing such shifts were to be put in place.

Finally, any discussion of public support to agriculture needs to go beyond the notion of monetary transfers to include a broader exploration of public support to agriculture, through financial regulation and land tenure systems, among other issues. That discussion should also include an analysis of private financial flows to agriculture and the levers for making that more effective in tackling climate and sustainability goals.

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