Task Force 2
**Climate Change, Sustainable Energy & Environment**

**Policy brief**

# REPURPOSING AGRICULTURAL POLICY SUPPORT FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

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# ABSTRACT

Agricultural production is both strongly affected by climate change and a major contributor to climate change, with agriculture and land-use change accounting for about one fifth of total global greenhouse gas emissions – more than for transport or industrial uses. Agricultural production benefits from substantial government support, costing at least US$ 640 billion per year worldwide. Past and current support have an impact on greenhouse gas emissions by influencing the composition and location of output, and production practices. This brief summarises the evidence indicating that simple elimination of all existing support measures would do little to reduce global emissions from agriculture, but the latter could be cut by as much as 40% by "smart repurposing", which would shift resources towards R&D and generate incentives for the widespread adoption of productivity-enhancing and climate-resilient production practices.

The brief recommends that the G20: (i) supports the international AgIncentives Consortium to serve as an enhanced platform to monitor the environmental, as well as the economic and social impacts of agricultural support measures; (ii) prepares a guidance note for the international coordination of smart repurposing of agricultural support measures to align these with common objectives of sustainability and efficiency of food systems, poverty reduction, food security and affordability of healthy diets for all; (iii) organises joint sessions of Agriculture, Finance and Development Track Ministers to engage in policy dialogue leading to concerted action for the repurposing of agricultural support measures.

# CHALLENGE

Agricultural production is both strongly affected by climate change and a major contributor to climate change. Agriculture and land-use change account for one fifth of global greenhouse gas (GHG) emissions (FAO 2021). When also including other parts of supply chains (transport, storage, processing, distribution, etc.), the agrifood system contributes one third of global GHG emissions (Tubiello et al. 2021). At the same time, the agrifood system is a direct victim of climate change, with production, yields and nutritional value of food already being affected by greater climate variability and more frequent and intense extreme weather shocks. At the core of this conundrum are the incentives facing the agrifood system.

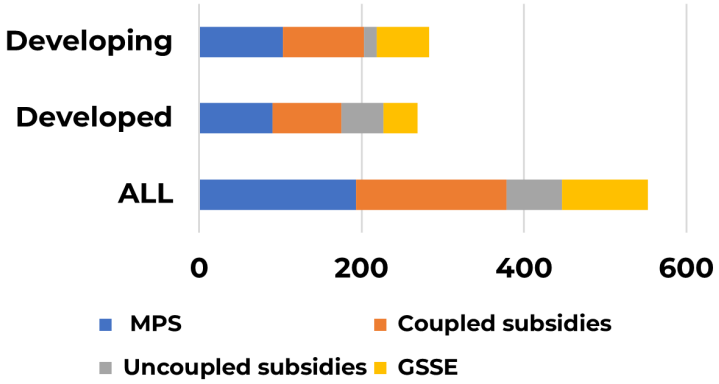
## *CURRENT AGRICULTURAL SUPPORT*

Current agricultural support provided by 54 countries for which comparable data is available amounts to about US$640 billion per year. This support is mainly provided to agricultural producers. Nearly all this support is provided by G20 countries and most of it in forms that distort incentives to producers, often promoting production processes and products that generate substantial GHG emissions.

During 2017-2019, an estimated US$446 billion (equivalent to 12.5% of gross farm receipts) was provided annually in the form of direct subsidies to farmers from governments (Figure 1). Near US$ 200 billion per annum took the form of market price support through trade restrictions, mostly in the form of tariffs that push up domestic prices. In addition, direct subsidies to farmers are either “coupled” to output levels and input use, or (at least notionally) “decoupled” from specific production and provided as direct payments to farmers. The 54 countries for which such data are collected by the OECD spent an average of US$ 185 billion per year on coupled subsidies and US$68 billion per year on subsidies decoupled from production during 2017-19. They spent a further US$ 106 billion per year on General Services Support (GSS) policies designed to create enabling conditions for agriculture, such as agricultural innovation systems, sanitary and phytosanitary standards, and rural infrastructure.

**FIG. 1 - AGRICULTURAL PRODUCER SUPPORT BY MAIN TYPES OF SUPPORT, 2017-2019**

(Billions of US$ per year)




Source: Laborde et al. 2021.

The support provided by countries has a long history and mostly has been grounded in perceived needs to promote agricultural productivity, protect farm incomes and/or ensure adequate and accessible food availability. No doubt in many instances these objectives have been served by the support measures. At the same time, however, they have provided incentives for modern farming systems that are a major cause of global GHG emissions and excessive pressures on land, water and other natural resource systems.

## *IMPACT ON GLOBAL GHG EMISSIONS OF TODAY'S AGRICULTURAL SUPPORT MEASURES*

Few of the existing agricultural support measures have been explicitly designed to meet environmental objectives, such as the reduction of GHG emissions from agriculture. In fact, some countries allocate much of their support to emission-intensive agricultural products like rice, beef and dairy, and hence unintentionally contribute to higher GHG emissions.

It would therefore be logical, although perhaps naïve, to ask the question: would the world be environmentally better off by doing away with all agricultural support? The short answer is, probably not. Despite its significant influence over time, recent global model-based analysis points to two important insights.

*First*, perhaps surprisingly, current support measures have only a small influence on the overall (global) volume of agricultural production. This does not mean that support measures have no effect on production; they do in individual countries. When incentives are changed (e.g. by taking current support away), however, this also influences production patterns across products and between countries. Furthermore, removing subsidies increases agricultural prices, thus reducing demand and eventually also production. Therefore, on balance, the net effect on global production is limited.

*Second*, by implication, the current support has, on balance, a limited net impact in terms of inducing additional global GHG emissions from agricultural production and land-use change (Laborde et al. 2020 and 2021; Gautam et al. 2021). This limited impact is explained, in part, by the fact that, on average, high-emission products (such as livestock and rice) are not subsidised more relative to less emission-intensive types of agricultural production, and, in part, by the impact of agricultural trade protection on consumer prices for some high-emission products: without the protection, those prices would fall, thereby increasing demand, production and land use for those products, which in turn would induce more GHG emissions.

On balance, however, the removal of current coupled subsidies and border measures would reduce emissions, but only slightly. This gain for the environment would come, however, at the cost of lower yields and farm incomes, which in turn could affect global food security. This shows that a naïve reform, involving the abolition of all support, would not simultaneously meet multiple goals of sustainable food system transformation and generate important trade-offs between environmental, economic, and social objectives.

Consequently, agricultural policy reform needs to be carefully thought through in order to strike a proper balance across all dimensions of sustainable development countries. That is, can the substantial resources that support agriculture be repurposed in a way that, on the one hand, provides strong incentives to reduce GHG emissions and adapt to climate change, and, on the other hand, improves food system efficiency, protects farm incomes and helps combat poverty, hunger and malnutrition?

# PROPOSAL

## *POTENTIAL FOR GHG EMISSION REDUCTION BY REPURPOSING SUPPORT MEASURES*

Many possible scenarios could be considered for repurposing current support to serve both global climate and food security goals. Further model-based analyses (Gautam et al. 2021, forthcoming) point out, however, that – in particular – shifting support towards investments in and incentives for technology improvements aimed at increasing the efficiency of production and resource use, while at the same time reducing the emission-intensities of agricultural production, would make significant progress towards achieving both global objectives.

Incentives for investing in emission-reducing agricultural productivity growth could be provided by shifting resources currently provided as distorting subsidies towards more spending on appropriate R&D, and compensating farmers for any financial loss from subsidy removal and the upfront costs of adopting more sustainable technologies and production practices. Many studies indicate that the economic returns from R&D focused on increasing agricultural productivity are extraordinarily high (see Alston et al. 2009, for example) and agricultural productivity growth appears to have a much bigger impact on poverty reduction than productivity growth in other sectors (Ivanic and Martin 2018), such that this has the potential to create significant simultaneous impacts in terms of climate change mitigation and adaptation, poverty reduction and improvements in global food security.

While research with a strong focus on emission reductions as well as productivity increases is relatively new, there are already promising new technologies and practices that could reduce methane emissions from rice and cattle by up to 50% (see, for example, Mernit 2018, on dietary supplements for cattle and Chidthaisong 2013, on alternate wetting and drying in rice). The hurdles to adoption of some of these new technologies can be formidable (see, for example, Liu 2018), but many types of improved farm management practices could provide substantial environmental benefits at low cost (Valin et al. 2021). Since research programmes have placed relatively little emphasis on reducing GHG emissions, it seems likely that the portfolio of lower-emission innovations could be expanded quite rapidly if greater priority was given to innovations that reduce emissions from the largest single source of GHG, namely enteric fermentation by ruminants. This would seem particularly likely to result in both emission reduction and increases in productivity, since these emissions involve an obvious waste of a potentially valuable hydrocarbon.

An *internationally concerted* effort to effectively shift existing budgetary resources now used for agricultural subsidies towards incentives for the adoption by farmers of such emission-intensity reducing technologies could yield a reduction of almost 20% in global emissions. In the scenario analysis cited (Laborde et al. 2021), it is assumed that the new support

structure would lower emission-intensities on average by 30% and would apply to agricultural production that currently accounts for roughly two-thirds of global GHG emissions from agriculture.

Further analysis by Gautam et al. (2021) reconfirms this finding in an illustrative scenario that assumes *all* countries concertedly repurpose current coupled subsidies into conditional payments to farmers adopting higher productivity and lower emission-intensity technologies, and supplement them with additional government support for R&D in such technologies and infrastructural improvements. This would not only help reduce GHG emissions from both agricultural production and land-use change by about 40%, but would also increase yields globally, improve farm incomes in developing countries, reduce poverty and hunger, and make the cost of a nutritionally adequate diet affordable to more poor people (see Table 1 and Annex Figure A.1).

**TAB. 1 - GLOBAL MODEL-BASED SCENARIO OF CONCERTED EFFORT OF REPURPOSING EXISTING COUPLED AGRICULTURAL SUBSIDIES INTO CONDITIONAL PAYMENTS TO FARMERS ADOPTING PRODUCTIVITY AND EMISSION-REDUCING TECHNOLOGIES AND INVESTMENTS IN R&D AND BASIC INFRASTRUCTURE (2020-2040)**

| | | Direction of impact |
|---|---|---|
| **Macro** | Global GDP | +/0 |
| **Farm** | Real farm income per worker | -/0 |
| | Agricultural prices (world) | - |
| | Yields – crops | + |
| | Yields – livestock | + |
| **Social** | Farm employment | - |
| | Poverty (at $3.20 ppd poverty line) | -/0 |
| | Food insecurity (PoU) | -/0 |
| **Diets** | Sugar consumption per capita | ++ |
| | Dairy consumption per capita | ++ |
| | Fruit & vegetable consumption per capita | ++ |
| | Affordability of healthy diets | + |
| **Climate** | GHG emissions from production | - |
| | GHG emissions from land-use change | - |
| | GHG emissions – total | - |

Source: Gautam et al. (2021, forthcoming).

*Legend*: ++ = strong increase in indicator; + = moderate increase; +/0 = small-to-very small increase; -/0 = small-to-very small decrease; - = moderate decrease; -- = strong decrease. Colours indicate change towards desired outcomes: **dark green** = moderate-to-strong positive impact; **light green** = weak but positive; **red** = moderate-to-strong negative impact; pink = weak but negative.

*Note:* Simulation results with IFPRI's MIRAGRODEP global dynamic general equilibrium model, assuming globally concerted policy reform. Simulation results show average impact over period 2020-2040.

These findings show that smart repurposing of current agricultural support has the potential to contribute to the environmental sustainability of agriculture, while also contributing (moderately) to poverty reduction, food security and better nutrition. Key to these outcomes is ensuring that the reorientation of support leads to significant efficiency improvements (both in terms of higher yields and lower emission intensities). It is also clear that reorienting agricultural incentives in this way will not address all food system challenges in full.

The above assessment illustrates the potential of internationally concerted policy reform with improved outcomes for sustainable development. Findings from additional repurposing scenarios are summarised in the Annex to this Policy Brief. They are intended to foment policy discussion in the search for solutions that balance global and national societal interests, and also can be made politically feasible.

## *POLICY CHALLENGES AND THE ROLE OF THE G20*

Agricultural support policies are the prerogative of national governments. Such positive effects on global development would require considerable policy coordination between all countries, since present support is distributed unevenly, as poorer nations have less fiscal space to provide agricultural support and, perhaps even more importantly, because national agricultural research systems have generally weaker resource capacity to develop high-productivity and sustainable farm technologies and practices relevant to the local context, and because farmers in those countries face bigger obstacles in adapting those practices. To be effective at the global level, an even-handed diffusion of both technologies and financial resources would be needed to let all countries reap the benefits of such agricultural policy reform.

Overcoming national resistance to agricultural policy reform could arguably be the biggest challenge. As mentioned, national farm and agricultural policies have a long history in most countries and have established entitlements and vested interests. Clearly, policy reform needs to be politically sensitive. With an eye on protecting the global common good, internationally concerted efforts by the G20 could help create broader consensus between and within countries on how to implement the much-needed reforms.

International coordination is a must, if only because environmental sustainability is a global priority that transcends borders. While agriculture and food policies are the responsibility of national governments, which need to align these with national priorities, the implications of these policies have strong international spill-over effects, including through their impact on competitiveness in international markets and on the environment. Based on existing commitments, the G20 is well placed to provide leadership and guidance. G20 Summits and ministerial meetings have repeatedly made urgent calls to take the necessary action to combat the impacts of climate change on the world's ability to produce enough healthy, affordable food that is accessible to all.

## *PROPOSALS*

The following three proposals would promote and support international coordination of the smart repurposing of agricultural subsidies under the leadership of the G20:

- *Monitoring and evidence for informed policy decisions: the G20 supports the strengthening and enhancement of the* **AgIncentives Consortium** established by several international organisations (FAO, IADB, IFPRI, OECD and The World Bank) to monitor agricultural support policies. Support to the Consortium would aim to expand coverage of the monitoring of support policies to all countries and further detail the nature of the support, such as to also facilitate continuous monitoring of the environmental, economic and social impacts of agricultural support measures, as relevant to the sustainable development goal of ending hunger and all forms of malnutrition (SDG2).

- *Evaluating policy solutions for sustainable, resilient and green food systems:* the G20 asks the AgIncentives Consortium to provide comprehensive scenario analyses to assess alternative options for effective and smart repurposing of existing agricultural support measures aligned with objectives of sustainability and efficiency of food systems, poverty reduction, food security and affordability of healthy diets and considerate of national conditions and capabilities. These scenario analyses should help underpin a G20 guidance note for the international coordination of the repurposing of agricultural support measures.

- *Building the momentum for repurposing public policies and support*: in joint sessions of Ministers for Agriculture, Finance and the Development Track, the G20 fosters dialogue between members on the repurposing of agricultural support measures leading to a concerted agenda for enacting such policy reforms in pursuance of common goals, while recognising differences in country-specific conditions and capacities.

# APPENDIX

## *ADDITIONAL RESULTS OF REPURPOSING SCENARIOS*

Gautam et al. (2021, forthcoming) present a range of additional repurposing scenarios to better understand possible trade-offs across multiple objectives, including environmental sustainability, food security, poverty reduction, yield growth and protecting farm incomes.

Annex figure A.1 below compares key results for seven scenarios. The first two consist of two versions of the elimination of support scenarios discussed above in the Policy Brief: (a) elimination of all domestic support ("Dom. Support"); and (b) elimination of "All Support" (domestic subsidies and market price support through border measures). Figure A.1 confirms the findings discussed in the text, that abolishing existing support would do little to move closer to environmental, social and economic goals.

Figure A.1 shows the findings of two further scenarios, which (c) distribute support uniformly across agricultural products ("Uniform") or (d) prioritise support to products with low-emission intensity ("CO2 efficient crops"). In experiment (c), changing from the current disparate pattern of subsidies to a uniform output subsidy with the same budget cost also has generally modest impacts. Surprisingly, real national income falls, albeit very slightly, representing a second-best welfare result associated with the continuing distortions in border measures. Global farm income per worker falls, while production shifts towards livestock, suggesting that livestock are, on average, less subsidised than crops – a not surprising result considering much of the support to crops is provided through input support that is crop-specific. This, in turn reduces prices of dairy products and raises their consumption levels. Emissions from agricultural production rise by 0.5%, but this increase is more than offset by a decline of 1.1% in land-use emissions.

Simulation (d) involves withdrawing support from the most emission-intensive agricultural commodities – livestock production and rice – and reallocating the available funding to all other agricultural commodities, which are mostly crops with much lower emission intensities. This scenario would reduce average real farm income only slightly and reduces world prices by around 2%, as production of highly traded grains and other non-livestock commodities expands. The cost of a healthy diet dominated by non-livestock products falls by almost 2%. Perhaps surprisingly, global GHG emissions would increase slightly in this scenario, as the decline in emissions caused by lower agricultural production would be outweighed by increased emissions from land-use change.

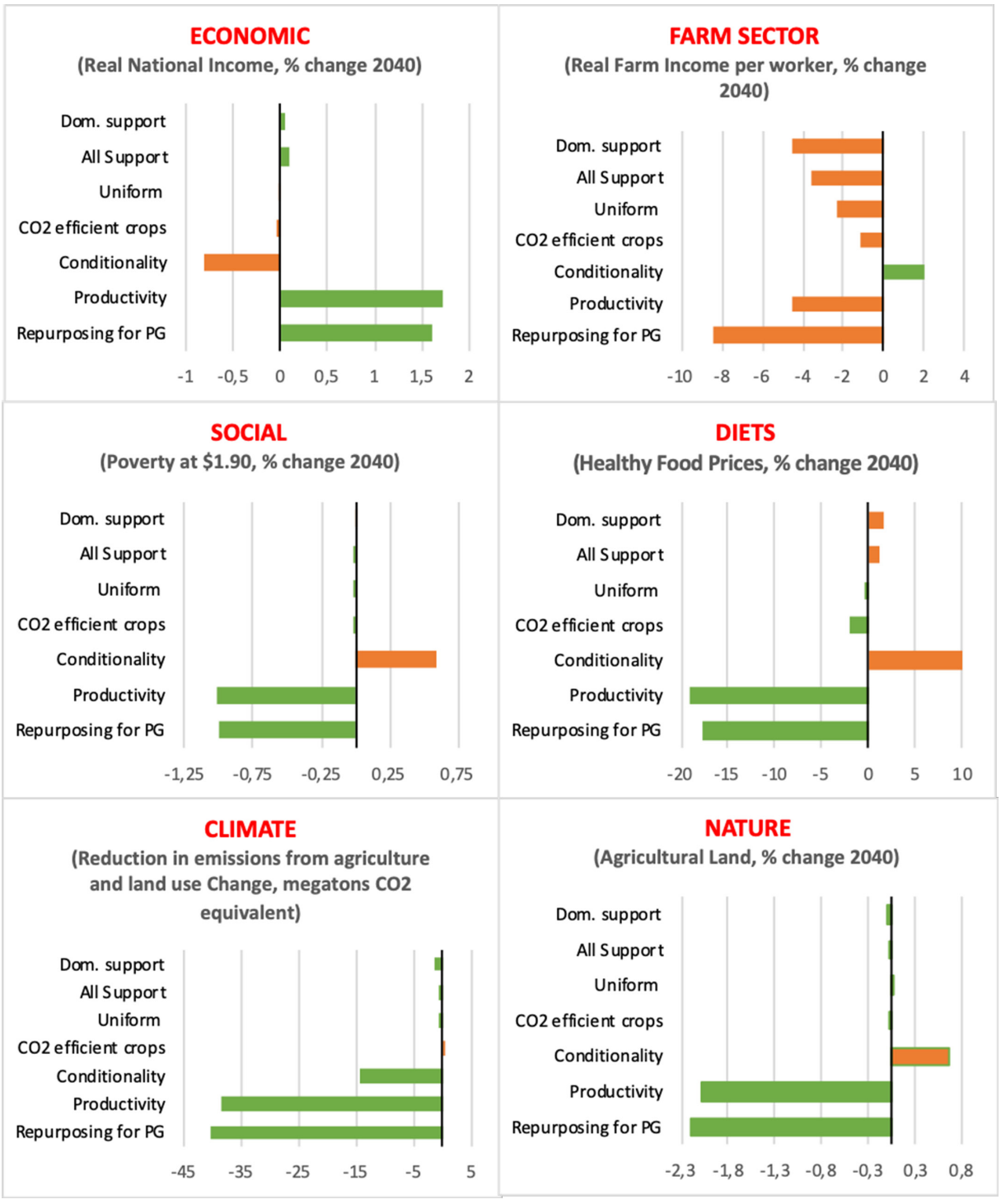
The three final scenarios presented in Figure A.1 refer to repurposing of support for the adoption of more sustainable production practices. Scenario (e) ("Conditionality") involves a scenario along the lines of agricultural policy reform that would transform coupled subsidies into direct payments to farmers, conditional upon their adoption of "organic" farming practices that reduce the use of chemical fertilisers and pesticides, along proposals by the European Union. Based on available evidence, this experiment involves a "productivity penalty" owing to reduced use of modern inputs. As a result, crop production would fall by more than 6% and livestock production by nearly 5%.  The decline in output raises world

food prices by a substantial 12.7%, which helps raise real farm income per worker. Agricultural land use would increase, as resources are drawn into the sector to offset the decline in productivity. On balance it would leave the amounts of emissions from agriculture and land-use change virtually unchanged.

The final two scenarios focus on incentives for and additional investments in R&D to induce productivity growth and promote emission-reducing technologies. Scenario (f) ("Productivity") assumes such repurposing could achieve a 30% increase in agricultural productivity. The final scenario (g) ("Repurposing for PG") refers to the case discussed further in the brief in which productivity increases, but in which existing coupled subsidies are also removed, with resources equivalent to 1% of the NRA repurposed from subsidies to finance R&D and the remainder used as direct and decoupled payments to farmers (at least until the benefits of R&D start to pay off). The results from these two scenarios are similar and in line with the findings discussed in the text: positive impacts on overall welfare and improvements in yields, food prices would decline, making food more affordable, with commensurate benefits in the form of less poverty and improved food security and access to healthy diets. Global greenhouse gas emissions would drop by around 40%. As a potentially sensitive trade-off, farm incomes would fall with lower agricultural prices.

**FIG. A.1 - GLOBAL IMPLICATIONS OF REPURPOSING DOMESTIC SUPPORT**

(% change relative to baseline projections for 2040)




Source: Gautam et al. (2021; forthcoming). Note: **green** bars indicate movement towards societal goals; **orange/red** bars indicate movement away from societal goals.

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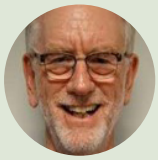

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