Policy Incentives for Climate Change Mitigation Agricultural Techniques

PICCMAT

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Climate change mitigation through agricultural techniques

Policy recommendations

Executive summary

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Policy recommendations

AGRICULTURAL TECHNIQUES FOR MITIGATION

Promoting PICCMAT practices for climate change mitigation at farm level

Policy measures for agricultural climate change mitigation need to be tailored to regional circumstances. The PICCMAT practices (see section 2) provide a menu of measures with detailed information on their mitigation potential, cost and feasibility of implementation, co-benefits and trade-offs, and their compatibility with adaptation to climate change. From this list, measures can be chosen and combined according to regional needs and opportunities.

PRIORITIES FOR POLICY ACTION

Supporting climate change mitigation as part of a strategic and integrated approach to sustainable agriculture

Climate change mitigation in agriculture should be pursued as part of an integrated approach to sustainable agriculture in order to build synergies and avoid conflicts between climate change mitigation and other policy objectives, and to avoid offsetting mitigation efforts through intensification of production or land use change. Strategic integrated rural land use programmes could be established at EU, national and/or regional level. They should overlay water, biodiversity and climate change objectives, and integrate mitigation and adaptation concerns.

As a starting point, a “climate-checking” of the Common Agricultural Policy (CAP) instruments may be carried out to assess whether they support or hamper climate change mitigation, and determine how they could be improved in this context.

Protecting existing carbon stocks

The preservation of existing carbon stocks needs to be set as a mitigation priority. The protection of soils that are rich in organic carbon, for instance wetlands, peatlands and certain grasslands, would bring great benefits for mitigation. Significant emission reduction could be obtained if drained peatlands currently used for agriculture were rewetted and restored.

A combination of regulation and financial compensation is needed to ensure effective protection of important carbon stocks in soils. Compulsory regulation can include bans on the conversion of intact peatlands or wetland areas with high soil carbon, and requirements to rewet drained peatlands and use them in a way that minimises carbon loss. Financial compensation can be offered to farmers to offset potential loss of income, and to ensure that individual farms or specific regions with a high proportion of land with such soils are not placed at a disadvantage.

Reducing peat extraction for energy use and for horticultural and agricultural purposes would also contribute to emission reductions. In order to ensure policy coherence, peat should not be allocated the status of renewable energy under the revised EU Directive on renewable energy.

EU ENVIRONMENTAL DIRECTIVES

Ensuring the implementation of existing policies and strengthening protection standards

Several policy instruments already exist at EU level that control the environmental impacts of agriculture and, usually as a side-effect, influence the emission of greenhouse gases (GHG) from agriculture. When developing strategies for agricultural mitigation, these existing policies, in particular the Habitats and the Nitrate Directives, should be taken into account in order to ensure policy coherence, avoid contradicting policy messages and doubling of efforts.

- Where there are still insufficiencies in the implementation of existing policies, the first step should be to improve implementation.
- Moreover, the mitigation objective could be a driver for stricter standards (e.g., for fertiliser use under the Nitrate Directive).

CROSS COMPLIANCE: LINKING AGRICULTURAL SUBSIDIES TO ENVIRONMENTAL SERVICES

Improving GAEC implementation, strengthening the protection of permanent grassland, and including mitigation objective in future baseline standards

Improving the implementation and enforcement of existing Good agricultural and environmental condition (GAEC) standards for soil protection would help to exploit their potential to support mitigation. More targeted provisions to maintain permanent pasture that include site-specific bans on the conversion of grassland in particular on carbon-rich soils should be considered.

In the current period (2007 – 2013), cross compliance provides limited scope to further address agricultural mitigation. However, cross compliance might develop into the environmental baseline of a future European agricultural or rural land use policy. It will then be important to include climate change mitigation as an explicit requirement of baseline standards, in order to ensure that mitigation occurs not only as a side-effect but that the measures also target emission reductions.

STRENGTHENING RURAL DEVELOPMENT POLICY

Increasing resources for rural development to support mitigation

Increased funding is needed for rural development measures that support agricultural practices with multiple environmental benefits, including GHG mitigation. Additional funding can also be targeted specifically at pilot mitigation projects that test innovative approaches to maximize GHG mitigation as part of an integrated approach to sustainable agriculture.

Integrating mitigation practices in rural development measures

A climate screening of rural development measures (in particular of agri-environment measures) can provide a first step to better integrate mitigation objectives.

Taking into account regional differences in mitigation potential and cost-effectiveness, agri-environment measures can be re-designed, or new measures can be introduced, to strengthen mitigation practices and support associated technical investments. The Commission could ask Member States to justify how the additional funding obtained from modulation is allocated, including for GHG mitigation purposes.

Organic farming should be further promoted in rural development policies, and appropriate funding should be ensured. Climate change mitigation should be set as a specific target in Art. 3 “Objectives and principles for organic production” of the Council Regulation (EC) No 834/2007. Further measures might be inserted into existing production standards (e.g. minimum tillage, improved manure storage and application techniques in organic farming) to strengthen the climate mitigation benefit of organic farming. Monitoring systems may have to be expanded.

Building knowledge and capacity for mitigation

Rural development funding can be used to increase knowledge and capacity for mitigation through agricultural techniques. Pilot mitigation projects can test different approaches (e.g. carbon offsets, results-oriented versus management prescription approaches, methods for measuring on-farm carbon balance; see below). Technical guidelines can be drafted on the basis of pilot project results.

Through rural development funds, additional support should be provided for awareness raising and capacity building related to climate change for farmers and farm advisors.

Integrated farm plans can provide an innovative delivery instrument to achieve multiple environmental objectives, including climate change mitigation.

FUTURE COMMON AGRICULTURAL POLICY (CAP)

Re-designing the CAP into an integrated land use policy

When implementing major CAP reforms, climate change mitigation needs to be a major consideration in designing the system. A system that merges the current cross compliance and rural development instruments can provide an opportunity to implement baseline measures and set more targeted incentives for more ambitious mitigation efforts.

Future CAP reforms will provide the opportunity to introduce more targeted action to support soil carbon management and maintain existing carbon sinks and carbon-rich soils. The concept of Ecological Priority Areas should be considered to protect soils with high carbon content (e.g. peatlands) or for general carbon sequestration purposes.

The economic vulnerability of small farms and farms in marginal areas should be considered, compensatory measures may be required.

ECONOMIC INSTRUMENTS

Exploring results-oriented approaches in pilot studies

Results-oriented approaches that reward farmers for achieving specific mitigation targets can be explored for their effectiveness and controllability, especially with regard to the maintenance of existing carbon stocks (peatlands and permanent grasslands). A results-oriented approach could also be used to address farm nitrogen surpluses. Pilot studies could test the feasibility of results-oriented approaches.

Results-oriented approaches could provide a methodological basis for carbon offsetting schemes.

Exploring benefits, costs and feasibility of carbon offsetting

The available evidence suggests that emission trading for the whole agricultural sector in Europe is not a feasible policy option in the near- to mid-term future.

Instead, the possibility of using voluntary project-based trading of carbon offsets in an EU context should be explored. Pilot-projects could provide a basis to assess the feasibility of such a scheme, develop accounting and monitoring methodologies, and assess the benefits (for mitigation) and costs (for farmers and administration) it would entail.

Considering taxes as an element of national integrated strategies for sustainable agriculture

Member States might consider taxes on nitrogen as an instrument to be used in national integrated strategies for sustainable agriculture and exploit their potential to reduce nitrogen loss, with benefits for water protection and N_2O emissions. Taxes are likely to be more effective if applied directly to environmental bads (e.g. nitrogen surplus) rather than on inputs (e.g. fertiliser). Careful design of taxing schemes is crucial to avoid adverse social effects. Recycling the revenues back to farmers, for instance in the form of agri-environment payments, may help to prevent income loss and reinforce environmental gains.

SUPPORTING MITIGATION THROUGH BETTER INFORMATION

Developing and promoting monitoring tools for farm sustainability

Monitoring tools for farm-level sustainability such as the Flemish MOTIFS or the French IDEA systems might be further developed, and the potential for using them across Europe could be explored. Monitoring tools should take account of the farm's greenhouse gas emissions.

Addressing consumption habits – promoting carbon labelling

Climate-friendly farming can improve the greenhouse gas balance of farming. However, to address the climate impact of food production more generally, consumption patterns have to change. In addition to information and awareness raising campaigns, product labels indicating the climate and environmental impacts of products can help to enable more climate-friendly consumer choices.

Integration of the climate mitigation aspect into existing labelling and certification systems could be a way to avoid the overburdening of products with many different labels, and to make sure that different environmental issues are taken into account. Organic farming standards and monitoring systems could provide a basis for the development of a label indicating an environmentally-friendly food-production.

Promoting exchange of experience between Member States

An exchange on national policies and programmes for climate-friendly agriculture could be organised at EU level, for instance through a pan-European survey in combination with a conference for national policy-makers. The rural development networks established under rural development programming can offer a medium for this exchange.

Developing measuring and accounting approaches for agricultural greenhouse gas emissions

Indicators or indicator systems can be developed that could be used across Europe, based on proxies for agricultural GHG emissions such as farm level nitrogen and carbon balances. These can be based on existing indicators such as those provided by the EEA.

The use of soil organic carbon maps could help to better target policies for mitigation. Remote sensing can be used for verifying the maintenance of carbon-rich ecosystems such as wetlands.

Table 1 Summary of PICCMAT mitigation practices

Management practices	Potential implement-tation cost	Probability of implementation	Global mitigation potential[1] (Smith et al., 2008)			EU27 mitigation potential (MITERRA-Europe results)				Description of costs	Co-benefits and trade-offs
			CO_2	N_2O	CH_4	CO_2	N_2O	CO_2	N_2O		
			(tCO_2 eq./ha/yr)			($MtCO_2$ eq./ year)		(tCO_2 eq./ ha/yr)			
Catch crops	Low	High	0.29 - 0.88	0.10	0.00	9.7	--3.8	0.31	-0.12	Cost of legume seed only	Benefits water quality, soil erosion, pest control, soil productivity
Reduced tillage	Low	Medium (low in some areas)	0.15 - 0.70	0.02	0.00					Capital cost of buying or hiring new equipment. Costs decrease as more people do it. Potential for opportunity cost of lost production in areas less suited to reduced tillage via yield penalty	Benefits water conservation, soil quality, biodiversity, energy conservation. May increase fungal problems (and reduce yield) and increase need for herbicides due to reduced mechanical weeding
a. reduced tillage						9.6	0.0	0.25	0.00		
b. zero tillage						19.9	-0.5	0.96	-0.02		
Residue management	Low	High	0.15 - 0.70	0.02	0.00					No cost unless residues can be sold for other use (but usually low value)	Benefits water conservation, soil quality, biodiversity, energy conservation. May conflict with efforts to use residues as biomass for energy production
a. no removal						8.5	-1.3	0.35	-0.04		
b. composting and returning						1.8	0.64	0.38	0.12		
Extensification	Medium	Low	1.69 - 3.04	2.30	0.02					Opportunity costs of lost production	Benefits: soil quality, biodiversity, water quality
Fertiliser application	No	Medium (already done in some areas)	0.26 - 0.55	0.07	0.00	0.0	4.2	0.00	0.21	Should lower costs	Benefits water quality, biodiversity
Fertiliser type	Low	Medium (already done in some areas)	0.26 - 0.55	0.07	0.00	0.0	2.3	0.00	0.06	Should lower costs unless fertilizer replacement type is more expensive	

[1] Smith et al. (2008) include mean estimates of mitigation potential for four climate zones (cool-dry, cool-moist, warm-dry, and warm-moist). The lower mean estimate for CO_2 normally refers to cool and warm dry zones and the higher estimate to cool and warm moist climate zones. In the case of N_2O, mitigation estimates are the same for all four climate zones. For CH_4 estimates, the only difference among climate zones relevant to PICCMAT practices occurs in relation to grazing and grassland renovation (0.02 t CO_2 eq./ha/yr for cool-dry climate and 0.00 tCO_2 eq./ha/yr for others). For details, please see Table 2 in Smith et al (2008) p. 795 – 796.

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			CO_2	N_2O	CH_4	CO_2	N_2O	CO_2	N_2O		
			(tCO_2 eq./ha/yr)			($MtCO_2$ eq./ year)		(tCO_2 eq./ ha/yr)			
Rotation species	No	Medium	0.29 - 0.88	0.10	0.00	7.7	0.27	0.35	0.01	Low cost unless lower production or low market value	Benefits in terms of reduced runoff and erosion, improved soil quality, higher yields, wildlife habitat
Adding legumes	Low	High	0.26 - 0.55	0.07	0.00	10.6	0.2	0.31	-0.00	Cost of legume seed only	Improves soil fertility, reduces fertiliser needs, helps to protect biodiversity and water
Permanent crops	Variable	Low (reduces flexibility)	1.69 - 3.04	2.30	0.02					Depends on the crops used. Can be no cost through to high depending on market value of the crop	Improves soil quality and water balance, could also improve biodiversity depending on crop used
Agroforestry	Medium	Low (reduces flexibility)	0.15 - 0.70	0.02	0.00	0.63	0.02	0.20	0.01	Opportunity cost of lost production; cost of trees	Could improve biodiversity, depending on the permanent crop used
Grass in orchards & vineyards	Medium/high	Low	1.69 - 3.04	2.30	0.02	1.8	0.3	0.48	0.01	No information on this	
Optimising grazing intensity	Low / medium	Medium (already done in some areas)	0.11 - 0.81	0.00	0.02 - 0.00					Low unless opportunity cost of less production per hectare of grass	Benefits for biodiversity, reduced soil erosion
Length and timing of grazing	Medium	Medium	0.11 - 0.81	0.00	0.02 - 0.00					Low unless opportunity cost of less production per hectare of grass	Benefits for biodiversity, reduced soil erosion
Grassland renovation	Low	High	0.11 - 0.81	0.00	0.02 - 0.00					Part of the normal cycle on many grasslands	Benefits for biodiversity, reduced soil erosion
Optimising manure storage	Medium / high	Medium								New storage equipment can have a large capital cost	Benefits for soil quality, air quality
Manure application techniques	Medium	Medium	1.54 - 2.79	0.00	0.00					New equipment for some techniques, e.g. direct injection	Possible trade offs with ammonia volatilisation (trans-boundary air pollution issues)
Application of manure to cropland versus grassland	Low	Medium	1.54 - 2.79	0.00	0.00					Only costs are need for additional transport from livestock to cropland on or off farm	
Organic soil restoration	Medium / high	Medium	36.67 – 73.33	0.16	-3.32					Opportunity cost of abandoning the land; small cost of drain blocking	Benefits for soil quality and erosion protection, biodiversity, air quality, aesthetic value