



Means for reducing greenhouse gases

The agricultural sector in Denmark has a number of options for reducing the emissions of greenhouse gases.

An analysis, dated December 2008 and commissioned by the Ministry of Food, Agriculture and Fisheries, studied 15 ways that agriculture could contribute to reductions in greenhouse gas emissions to determine how advantageous they would be from a socioeconomic point of view. The analysis concluded that four methods combine a considerable potential to reduce emissions with competitive costs for achieving the reductions:

- Using livestock manure for producing biogas
- Growing energy crops (willow) on marginal soil for bio-energy
- Using straw for producing power and heat in co-generating stations
- Making new wetlands

The four methods are estimated to have a reduction potential of 2.7 million tons of CO₂ equivalents a year. This equals almost 70% of the calculated reduction potential for all 15 methods studied. Three quarters of the 2.7 million tons are counted as a contribution to the production of renewable energy - in sectors covered by quotas. The rest - methane and laughing gas - is contributing to the reduction potential in the agricultural sector itself and amounts to 0.7 million tons. If storage of carbon in the soil is added, the figure rises to 0.9 million tons CO₂ equivalents.

Using livestock manure for producing biogas

In Denmark today, only about 4% of livestock manure is used for producing biogas. Treating 45% of the total amount of livestock manure in biogas installations by 2020 is seen as realistic. This gives a total reduction of 807,000 tons of CO₂ equivalents a year.

Using livestock manure for producing biogas has positive side-effects in the form of a reduction in obnoxious smells and a cut in nitrogen leaching.

Willow for bio-energy

The effect of cultivating bio-energy crops depends greatly on the crop chosen. The greatest reduction in green-house gas emissions is achieved by cultivating perennial bio-energy crops such as willow for fuel, in the form of chips, for combined heat and power generating stations. Economically, this method is primarily relevant on marginal soils without alternative agricultural uses. Converting 100,000 ha of predominantly marginal agricultural areas to cultivation of willow by 2020 is seen as realistic. The overall reduction of greenhouse gas emissions would be 1,270,000 tons of CO₂ equivalents a year.

At the same time, willow cultivation limits the use of pesticides and reduces nitrogen leaching.

Straw for power and heat generation

Today, 41% of grain straw and 15% of rapeseed straw are used for energy. Increasing the area of straw recovery by 150,000 ha by 2020 is considered as possible. With an average straw yield of 3.12 ton/ha, this gives a reduction in greenhouse gas emissions of 298,000 tons of CO₂ equivalents a year.

On the other hand, recovering the straw from the soil will mean that less nitrogen is stored in the soil. However, this can be balanced by cultivating second-harvest crops.

New wetlands

Stopping cultivation of agricultural soil in wetland areas is an interesting option as the yield potential for this soil is comparatively low and there are considerable environmental gains in the form of reduced nitrogen leaching and the possibility of increased bio-diversity – a richer bird and animal life. The total cultivated area in wetlands with a high content of carbon is about 83,000 ha.

Of this, about 55,000 ha are considered to be in rotational cultivation. Stopping cultivation on about half of this area by 2020 is seen as possible, which gives a reduction potential of about 295,000 tons of CO₂ equivalents a year. The reduction potential is predominantly in the form of increased carbon storage in the soil. The calculated reduction costs for society are very close to zero if the increased carbon storage is included in the calculations.

The EU's climate and energy initiative does not appear to allow changes in the carbon content of the soil to be included in the member states' CO₂ accounts. However, this method is economically interesting should a future international climate agreement include this greenhouse gas component.

Other ways of reducing emissions

Increased fat in feeds for dairy cattle also has a considerable reduction potential, but the costs are comparatively high. This method is interesting, however, as it is one of the few initiatives that dairy farming can use to limit methane emissions from livestock digestion.



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