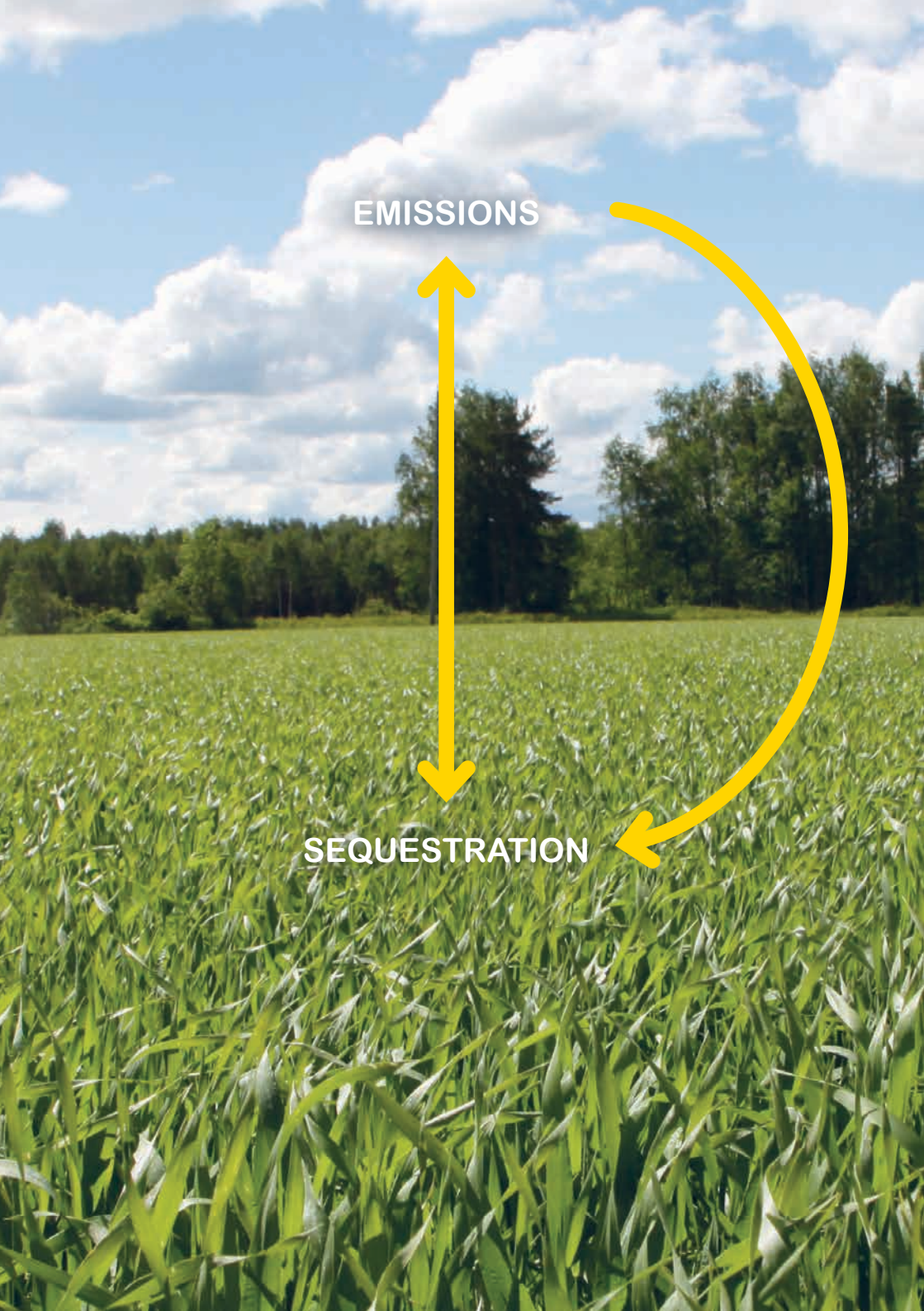
MTK

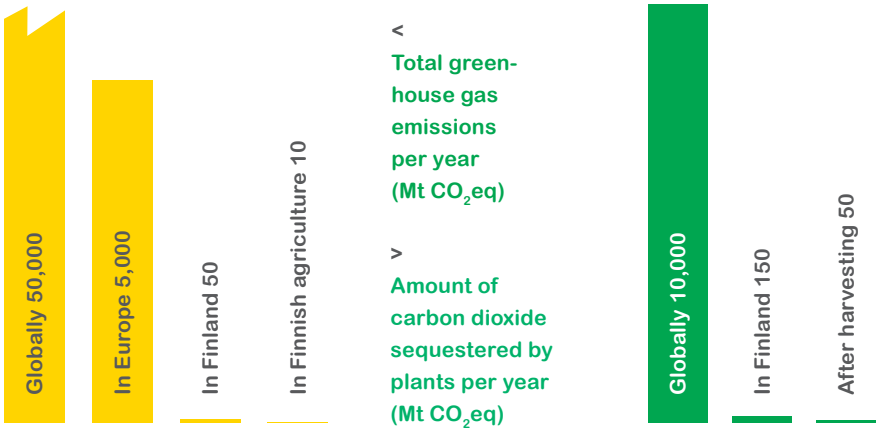
MTK's Climate Programme

Striving for carbon-neutral food and increasing forest carbon sinks


EMISSIONS
SEQUESTRATION

Climate change is a global problem. It has an impact on our environment, wellbeing and the preconditions for our economic activities. In order to avoid serious consequences, greenhouse gas emissions that cause global warming must be reduced. The objective set in the Paris Agreement in 2015 is to keep the temperature rise well below two degrees Celsius and to balance greenhouse gas emissions and removals. There is hope that the temperature rise can be limited to 1.5 degrees if emissions are reduced in an ambitious way and if goal-oriented measures are carried out to sequester carbon in plants and the soil.

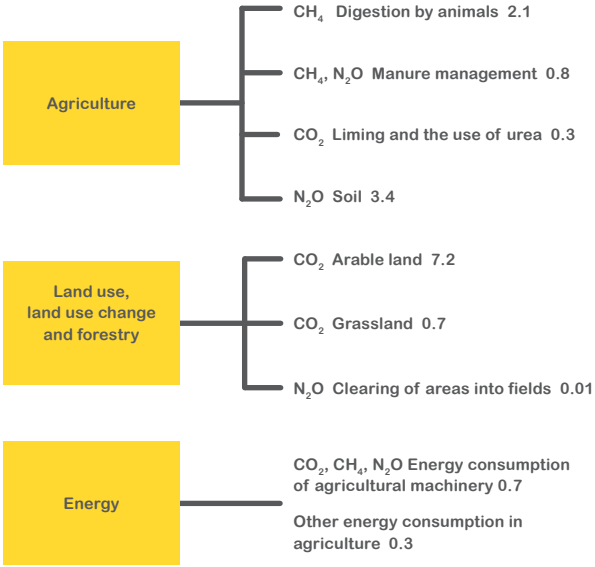
1. Emissions down
2. Sequestration up
3. Replaced by renewables
4. Adaptation is the key



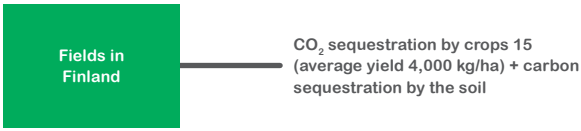
Agriculture and forestry hold the keys to resolving the problem of climate change. Forests and fields are the most significant carbon sequesters, while correspondingly energy and transport account for 70% of Finland's greenhouse gas emissions. According to Statistics Finland, forests and wood products sequester about half of the greenhouse gas emissions in our country. Carbon sequestration by plants and the soil can be boosted, greenhouse gas emissions can be reduced, and domestic food and wood production can be safeguarded with sustainable agricultural and forestry practices.

In Finland, the greatest impacts of climate change are felt in sectors that are based on renewable resources and biodiversity, i.e. on agriculture and forestry in particular. Therefore, our sector's ability to adapt to the impacts of climate change must be strengthened. Adaptation is also a precondition for sustainable measures to mitigate climate change.

> **Reporting of emissions from agriculture in compliance with the UN climate agreement, the figures are emissions in 2016 (Mt CO_2eq).**



> **Carbon sequestration by crops and the soil.**



Climate change is a serious threat to biodiversity. It is necessary to safeguard biodiversity to enable nature's adaptation to the changing climate and the consequences of this change.

Finland must pursue an ambitious climate policy on the international level. It is also necessary to make sure that all measures are cost-effective. Resource- and cost-effective operations must not take a back seat to the advantage of less effective action due to the climate policy. Finland must be active in encouraging measures to phase out the use of fossil energy sources. We must also safeguard our security of supply at the same time. We aim for carbon-neutral food by year 2030.

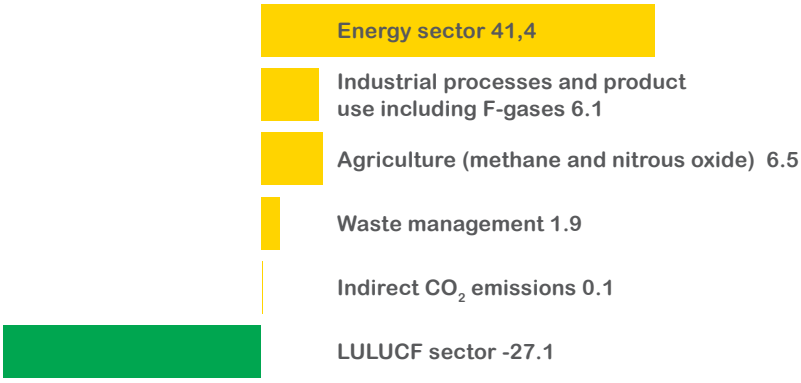
EMISSIONS DOWN

The energy sector is the biggest source of greenhouse gas emissions. Emissions from energy consumption in farms can be reduced especially by improving energy efficiency and by increasing the use of renewable energy.

In relation to energy solutions, the possibility of reducing greenhouse gas emissions in the agriculture sector, i.e. nitrous oxide and methane, is small. Nitrous oxide and methane account for 12% of Finland's total emissions.

The reduction of carbon dioxide has greater possibilities. In farming, priority should be given to methods where the tillage of soil is kept to a minimum and the land is kept covered with plants, taking into account the special requirements of the crops. This will reduce the decomposition of organic matter in the soil and the resulting carbon dioxide emissions. This is particularly important in peat soils where methane and nitrous oxide emissions are also reduced in addition to carbon dioxide. Although peat and other carbon-rich soils release more carbon dioxide than mineral soils, their nitrogen fertilisation need is only half as high as that of mineral soil, which reduces greenhouse gas emissions from the use of fertilisers.

> Finland's greenhouse gas emissions and carbon sequestration in the land use sector in 2017 (million tonnes of CO_2eq). Carbon sequestration by harvested crops and roots is not included in the statistics (Statistics Finland).



› Finland needs arable land on peat soils to safeguard crop certainty. Organic soils are drought-resistant and they produce high yields, i.e. they sequester a significant amount of carbon, even in dry summers.

- Research on emissions and on carbon sequestration that offsets them must be specified with respect to various soil classes before cultivation of organic soils is possibly restricted.

Just under half of gaseous emissions in the agricultural sector come from livestock production. These emissions can be reduced by increasing the efficiency of the storage and use of manure and by optimising livestock feeding. Animal health and breeding improve resource efficiency and reduce emissions. These Finnish livestock production measures will fine-tune about 5% of Finnish greenhouse gas emissions. Finnish meat production has a role to play, but it is balanced by the high carbon sequestration of grass-dominated feeding, which should be taken into account in the overall review of the climate impacts.

Grass is estimated to account for about half of the area farmed in peat soils. Grass production aiming for a high yield of silage utilises nutrients in an efficient way and reduces the greenhouse gas emissions of nitrogen fertilisation and the soil. Manure from livestock production is a valuable soil improver and source of nutrients, providing nutrients for plants and micro-organisms in the soil and maintaining the carbon content and erosion control of the soil.

The low profitability of agriculture slows down or may totally prevent necessary investments in terms of climate change and the utilisation of best technology. Therefore, new incentives must be created for farms to ensure that food needed by everyone will be produced in the most climate-sustainable way possible.

- Energy efficiency in farms is invested in. Energy audits and energy plans are carried out at farms, on the basis of which it will be possible to considerably increase the energy efficiency and energy saving of farms.
- Technological progress enables reduced fuel consumption, and this development should be accelerated.
- The use of manure in energy production and nutrient recycling is increased with anaerobic digestion to biogas.
- The need to clear new fields is reduced by developing feed trading between farms, by further encouraging manure reception, and with land exchange.
- Farms are encouraged to invest in technology that reduces greenhouse gas emissions in farming, e.g. precision farming technology.

- The use of especially imported protein in the livestock feeding is replaced with domestic by-products of food industry and recycled protein.
- Climate impacts are calculated per produced biomass unit. For example, per one kilo of cereal. In the same way as with the nutritional value of food. This will act as an incentive towards sustainable intensification and directs production towards lower emissions.
- At the farm level, production is directed to parcels with the highest yield, which reduces emissions per one kilo of produced crops.
- Improvement of parcel structures will shorten transport journeys, intensify cultivation and increase the possibility of afforestation of fields that have a low yield and are insignificant in terms of food production.
- Appreciation of domestic food is promoted through consumer communications, which will reduce food waste by households.
- Products are produced to the highest possible standards, favouring contract production in order to optimise the matching of supply and demand and to reduce waste.
- The energy use of peat is reduced in a controlled way. The use of horticultural and animal bedding peat will be continued, as horticultural peat is a natural substrate in gardens. Bedding peat is necessary for animal welfare and water management due to its excellent capacity to bind the nitrogen in urine.

Despite forest use and the diminishing forest area, Finland's forest resources have increased at an accelerated rate over several decades, and this growth is expected to continue. About one-fifth of the growth takes place in peat soils. The growth of trees in peatland forests sequesters carbon, but at the same time the peat layer of the soil may

Investment in energy saving and own renewable energy production play a key role in cutting emissions in farms. Profitable farms have better opportunities for investment than others. The government's investment aid programmes can support this development.

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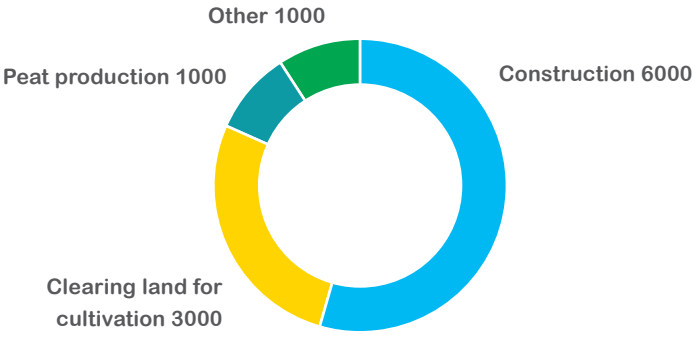
Changes in land use categories caused by deforestation (ha) in 2015.



act as a source of emissions. Emissions from drained peatland forests can be reduced with forest management and the controlled water management. Continuous cover forestry can be applied in areas where it provides the best result in terms of its impacts on the climate, waters and the economy. More information is needed on the impacts of the management, drainage maintenance and restoration of peatland forests on emissions and carbon sequestration. Active restoration is possible if it doesn't increase greenhouse gas emissions and its funding is safeguarded.

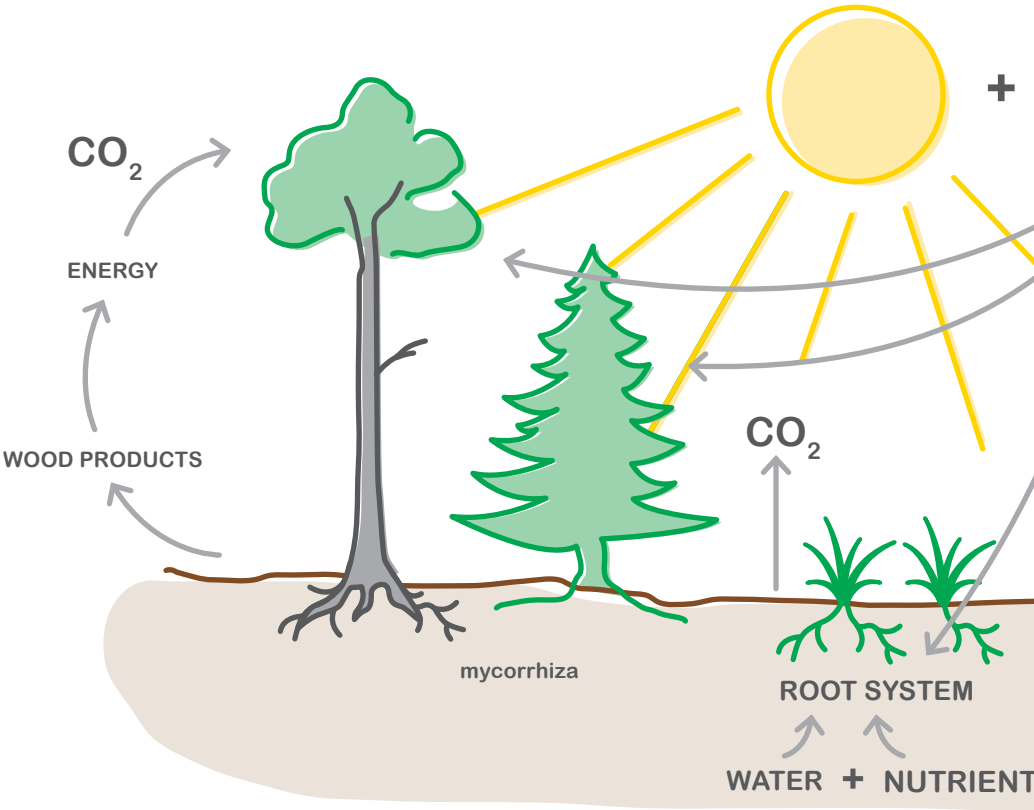
- Continuous cover forestry may be good alternative in the management of peatland forests.
- Old drainage areas with a low yield are left for restoration.
- Sufficient funding is safeguarded for long-term applied research.
- If peatland restoration measures are required, a funding mechanism must be created and sufficient funding must be safeguarded for them.
- Peatland forests should be preserved as forests. Other alternatives must be sought for clearing land for cultivation.

About 10,000 hectares of Finnish forests are lost each year. This is a challenge for the Finnish climate policy. The reduction of other carbon sequestration areas is also harmful in terms of the climate. As a solution to the problem, it is possible to develop a carbon sequestration obligation to offset measures that reduce carbon-sequestering forest or agricultural areas. MTK and its members must be closely involved with the Government in this preparation in order to be able to build a possible offset path.

The compensation obligation with carbon sequestration can be met either through reforestation or by paying an offset fee. The paid offset fees will be directed to climate work in agriculture and forestry, i.e. to measures that promote both emissions mitigation and the adaptation to climate change in farms. The offset obligation will encourage reforestation of fields that are poor in terms of their soil health or location.

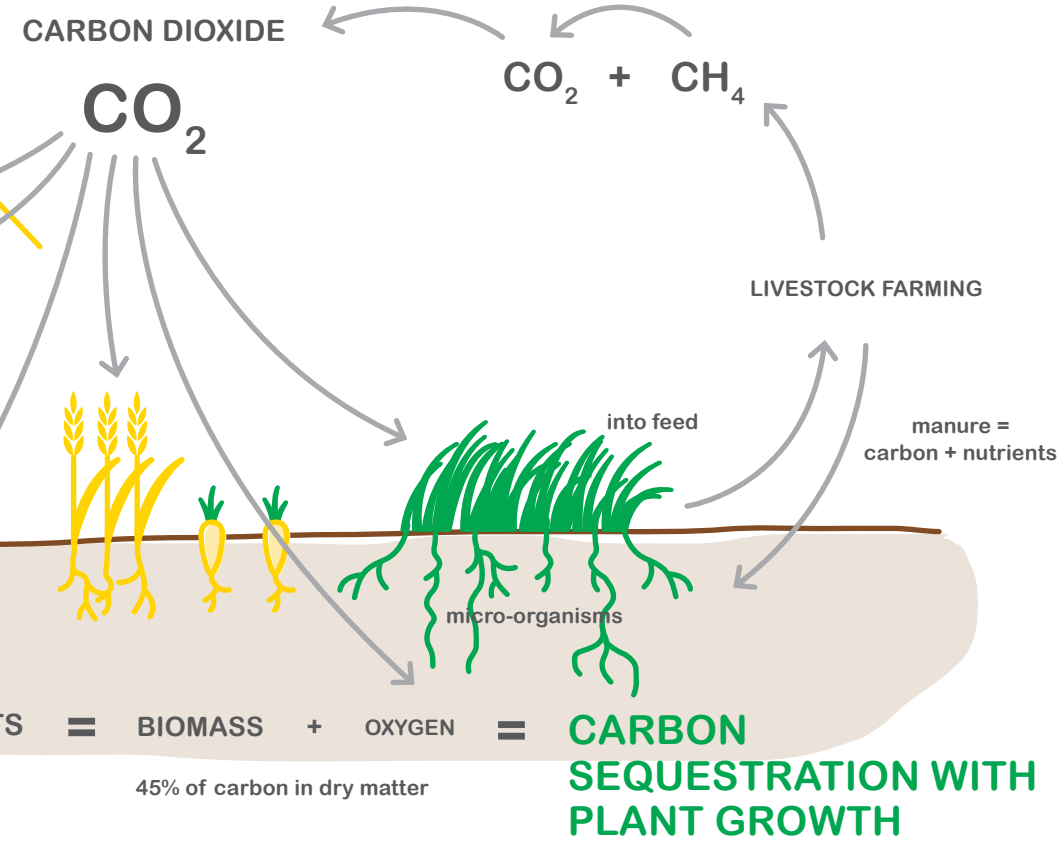
- A compensation obligation with carbon sequestration will be introduced to all changes in land use forms. The offset obligation will be staggered according to how much carbon sequestration is reduced. If a forest area is cleared into a field, which will still sequester carbon, the offset obligation is smaller than if a forest or farm land is permanently taken into use that does not sequester carbon, for example, it is turned into an industrial, road or residential area.
- In the reforestation of fields, its impacts on the parcel structure of the area must be investigated

- Clearing of land, which is a prerequisite for using the field parcels for cultivation and the improvement of the parcel structure, is offset directly by the increased carbon sequestration of the field and the reduced emissions from field and road traffic.
- The restrictions of using livestock manure will be re-evaluated so that the growth and carbon sequestration of plants will not be restricted, which will reduce the need to clear land for cultivation.
- The ambition of the emissions trading scheme will be increased by withdrawing extra emission allowances, by faster cutting of the number of allowances and by setting the minimum price of an emission allowance at 30 euros per tonne of CO_2.



› Shared use of machinery and equipment will be promoted with new applications and operating models. That way it will not be necessary to own the machines, and their utilisation rate increases. This will promote efficient use of equipment resources and enable acquisition of new machines with lower emissions. In addition, the pooling of goods and personal transportation in rural areas must be promoted with new models of sharing economy.

Carbon sequestration needs nutrients and a good yield.



SEQUESTRATION UP

Forestry and agriculture are currently the only industries that sequester carbon emissions. The carbon content of dry matter in both trees and field crops is 45%.

- Developing a model to offset carbon sequestration, based on a tonne of sequestered carbon dioxide. The development of the model needs a lot of research and analysis aiming for a criterion for offsetting a carbon sequestration measure.

In Finland, forests are currently growing at a rate of 107 million cubic metres of roundwood per year. Standing timber volume has multiplied by 1.7 since the 1920s. The increase of the carbon store and carbon sink of the forests is the result of investments made in forest management and growth. According to studies carried out by the Natural Resources Centre, the annual growth can be boosted to up to 150 million cubic metres with added investment, such as fertilisation. One cubic metre corresponds to about one tonne of carbon dioxide.

- Increasing carbon sequestration in forests requires sustainable intensification of timber production and supporting incentives for forest owners. The Government must commit itself to promoting resource-efficient and sustainable forest management in accordance with the National Forest Strategy.
- Incentives are provided for the reforestation of low-yield land, if it has no significance for agriculture or as an area that increases biodiversity.

In agriculture, an abundant yield level increases carbon sequestration by the soil and reduces emissions per kilo of crop yield when the growth factors of the soil are in balance. On the European scale, Finnish agricultural land is young on average, and therefore we have decomposing material in the soil. However, it is possible to reduce emissions with carbon dioxide sequestration, which is increased by soil growth potential management and good crop yields.

Soil structure and soil growth potential can be improved with good water economy of the soil, by increasing the carbon content of the mineral soils, and with sufficient and precision fertilisation, liming and plant protection. Plant breeding creates preconditions to adopt an increasingly diverse selection of crops that help to keep the fields covered by crops for the majority of the year.

If the crop yield is doubled, the carbon flow into the soil is also doubled because the higher the aboveground crops, the higher the biomass of the root system. At the same time, nutrient retention is improved, which reduces the amount of nutrients entering the waterways.

Especially perennial grassland is efficient in carbon sequestration because its root biomass decomposes more slowly than that of other crops. According to the latest studies, grass can permanently sequester more than 800 kg and cereals 100 kg of carbon dioxide per hectare in one year.

- Soil growth potential is improved and the productivity of soil is increased. The use of catch crops is expanded and intensified. The use of perennial deep-rooting plants is increased in crop rotations.
- Incentives to cultivate deep-rooting protein crops that increase the carbon contents of the soil will be created, which will also safeguard protein self-sufficiency.
- Organic material is added to the soil with organic fertilisers and soil improvers, as well as with perennial grassland.
- The use of forests must not be restricted with land use planning.
- Research to increase and measure carbon sequestration is intensified under practical conditions in different soil type and climate conditions.
- Climate impacts are assessed with natural criteria, taking into account the emissions and sequestration of the growing media: a carbon balance where the carbon dioxide sequestration of plants is reduced from greenhouse gas emissions per product or hectare is introduced.

REPLACED BY RENEWABLES

As three-quarters of Finland's emissions come from the energy sector, the energy efficiency must be improved and, in future, energy must be produced with renewables instead of fossil sources.

The reduction of transport emissions is the second most important issue in Finland, and in terms of transport we can move from fossil power to renewables.

In Finland, renewable transport fuel can be produced in many different ways. The use of bioenergy in electricity production provides opportunities for charging of electric vehicles, and fossil fuels can be directly replaced with biodiesel or ethanol. Biogas has the potential to meet the need to use up to hundreds of thousands of biogas-driven vehicles. Finland urgently needs an overall programme for biogas that promotes its supply and demand.

There is a lot of under-utilised biomass in Finland, such as grassland unfit for use as animal feed, which can be utilised in biogas production. A market must be created for the grass in order to be able to utilise it in carbon sequestration and as enhancers of soil health also in livestock-free areas. Together with manure, the anaerobic digestion of grass biomass to biogas is an excellent enhancer of nutrient recycling. In addition to generating energy, the process also produces nutrient-rich digestate, which can be used in the field as organic fertiliser. Farmers are willing to take part in renewable energy production if the barriers to its production and distribution are removed.

- The change to renewable energy production requires distributed energy production and improved energy efficiency.
- Barriers to market access by distributed energy production are removed.
- The capability of producing biogas, and using it in machinery and selling it as transport fuel shall be developed for farms. That way the use of nutrients in manure can also be intensified further.
- The position of farms shall be safeguarded in the development of energy communities. Electricity produced and consumed in a farm property can be utilised without electricity distribution fees and taxes. Building a power grid from the microgeneration unit to the consumption unit across the property bound-

ary shall be allowed without the permission of the distribution grid-operator and without an electricity grid-licence.

- Fossil fuels and raw materials are replaced with wood-based products. Especially plastics, synthetic fibres in the clothing industry, building materials, and fossil fuels can be replaced with wood. Wood products form a significant carbon store.
- The use of wood in construction is promoted, e.g. with awareness-raising and public procurement.

Farm buildings have a lot unutilised potential for solar panels. Geothermal heat, wood chip heating and other renewable energy forms are the preferred methods of heat production. The use of renewable fuels in tractors and work machinery can be introduced as long as cost-competitiveness is ensured. Agricultural production buildings shall be built from wood instead of concrete and steel.

ADAPTATION IS THE KEY

Before humankind will be able to adapt to climate change, all production activity and consumption must undergo a change where unprecedented improvement in productivity is implemented simultaneously with a reduction in the use of fossil raw materials and fuels.

Agriculture and forestry work together with nature and are the first in line to meet the challenges and extreme events of climate change, such as floods, torrential rain, frost-free winters, plant pests, and plant diseases. In order to prepare for climate risks, we need to develop risk management tools, such as insurance and funds, and improve the efficiency of flood protection and water management.

Roads must be managed more efficiently as climate change has a damaging effect on the roads. A good road network and infrastructure are essential for agriculture and forestry covering the entire country, which, in turn, are an integral part of our security of supply in an uncertain future.

In agriculture, heavy rains and frost-free winters increase erosion and diminish soil health as a result of long wet periods. Plant and animal breeding play a significant part in food production and the security of supply. Organic soils withstand drought and contribute to the adaption to climate change.

- The main part of adaptation involves measures to reduce the negative impacts of excessive moisture levels and drought in order to enable plants to grow, sequester carbon and produce biomass for a carbon-neutral society.
- National funding for plant breeding and genetic pools must be safeguarded.
- Our livestock production is based on the best available animal stock, which will enable the maintenance of the highest level of animal health and productivity in the world even in the future.

The changing climate provides good conditions for forest growth, but it also increases risks. In forestry, the significance of a good forest practice is emphasised in the preparation for climate change. Good forest practice means, for example, timely thinning and regeneration felling, as well as forest management suitable for the habitat. An increasing amount of research data about the impacts of climate change is constantly gathered. This puts pressure on the development of forestry and tree harvesting methods also in the future.

- The breeding of seedlings improves not only tree growth, but also adaptation to the changing climate and the resulting forest damage.
- Diversification of the population structure of tree species reduces the risk of damage. The possibilities of growing new tree species must be investigated.
- Plant breeding ensures the availability of species and varieties that are best suited for our conditions. It also safeguards increased efficiency of field production and the ability to respond to the changing growing conditions. The ability of agriculture and forestry to adapt to these conditions could be accelerated with the use of new breeding techniques.

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