REPORT

ON IMPLEMENTATION OF THE PROJECT

DEMONSTRATION OF CLIMATE CHANGE MITIGATION MEASURES IN NUTRIENTS RICH DRAINED ORGANIC SOILS IN BALTIC STATES AND FINLAND

WORK PACKAGE

STRATEGIES AND ACTION PLANS

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LIFE OrgBalt compiled the first regional Baltic/Finnish GHG emission factors for managed nutrient-rich organic soils (current and former peatlands), which have been made available for the customary scientific review and further verification for national GHG inventories in the hemiboreal region in Finland and the Baltic countries. While the project analysed selected CCM measures for drained organic soils in agriculture and forestry and developed spatial models and tools, it also identified remaining knowledge gaps. To bridge the remaining limitations and fill the gaps, it is essential to continue GHG measurements and model development, as well as to broaden and complete the scope of the evaluated CCM measures in the after-LIFE-project period, notably by including rewetting and restoration of peatlands that are currently considered to be among the most recommended CCM measures on drained peatlands in the EU. In addition, the developed Simulation and PPC models still include limited macroeconomic considerations and lack an assessment of all environmental impacts. For all these reasons, these models should be used carefully in CCM strategy development for the identification of gaps in climate neutrality transition policy and funding frameworks and need further optimization for broader applicability as decision-making tools.

SUMMARY

One of the LIFE OrgBalt project tasks were to create recommendations for implementing project results – CCM measures and new data obtained within the project, into policy. This report gives an overview of project results that have policy implementation potential and analyses existing policy measures and documents where organic soil measures should be considered.

Information on implementation of CCM measures in demo sites and obtained EFs as well as analysis of the socio-economic impact of proposed measures are aggregated in several reports under LIFE OrgBalt project:

- Report No 2021-C3/2 "Report on implementation of CCM measures in demo sites in Latvia" which summarizes applied and planned activities to implement CCM measures in selected demonstration sites and reference sites on nutrient-rich organic soils in forest land, cropland, and grassland in Latvia.
- Report No 2021-C3/1 "Report on implementation of CCM measures in demo sites in Finland" which summarized alternative forest management practices (rotational even-aged forestry and CCF), and activities aiming at climate change mitigation in site management and environment monitoring.
- Report No 2024-C5/6 "Simulation model with spreadsheet interface for single parcel-based calculations of business-as-usual scenario and different management options" analysed the resulting changes in land area, generated profit, provided employment, and GHG emissions after the implementation of each scenario.
- Report No 2024-C4/1 "Proposal for PPC model and adopting of the Project results in Rural Development Plan" which provides insights into the results of the PPC model calculations for the 15 organic soil management scenarios implemented in Latvia.
- Report No 2024-C1/2 "Catalogue of climate change mitigation actions" which is aimed to summarize the data obtained in the reference and demonstration sites within the scope of the LIFE OrgBalt projects and the research data acquired in temperate region including socio-economic impact assessment, GHG EFs and activity data elaborations within the project.
- Report No 2024-C1/6 "Improved methodologies for GHG inventory reporting and related national reports".

LIFE OrgBalt is one of the projects currently contributing to the demonstration of science-based and region-specific climate change mitigation (CCM) measures in nutrient-rich organic soils. In the project, the distinction of forest and agricultural areas is applied to design and analyse the most appropriate measures.

TABLE OF CONTENTS

ABBREVIATIONS

C	Carbon
CAP	Common agricultural policy
CCM	Climate change mitigation
CH_4	Methane
CO_2	Carbon dioxide
CRCF	Carbon Removal Certification Framework
EC	European Commission
EF	Emission factor
EU	European Union
ETS	EU Emission trading system
ETS2	EU Emission trading system for buildings, transport and other sectors
GAEC	Good agricultural and environmental conditions
GHG	Greenhouse gas
GWL	Groundwater level
GWT	Groundwater table
HWP	Harvested wood products
IPCC	Intergovernmental Panel on Climate Change
JTF	Just Transition Fund
LIFE OrgBalt	LIFE OrgBalt, LIFE18 CCM/LV/001158 "Demonstration of climate change mitigation potential of nutrient rich organic soils in Baltic States and Finland" project
LULUCF	Land use, land use change and forestry
NECP	National Energy and Climate Plan
N_2O	Nitrous oxide
PPC model	Public and private sector cooperation model
SOC	Soil organic carbon
SOM	Soil organic matter

INTRODUCTION

This report summarizes the climate change mitigation (CCM) measures analysed within the project as well as GHG emission factors (EFs) and looks at the implementation in policy in relevant project countries. As stated in previous deliverables, one of the main drivers to secure the long-term use of the outcomes from the LIFE OrgBalt project, is to integrate them in relevant policies, strategies, and action plans. It is important to note that the climate policy, on the EU and global scale, is ever changing, therefore, policy implementation must be well thought through with a vision for the future.

This report (Deliverable C4/5) is continuation of the previous report (Deliverable C4/3 "Interim draft report on proposals for improvement of sectoral strategies and action plans to reduce GHG emissions from organic soils"), which presented information about national policy planning documents and strategies relevant to organic soils in the LIFE OrgBalt partner countries and EU level policy planning documents that have been published up to the end of 2021. This report builds on the information provided in the interim report as well as provides an overview of project outcomes that could be implemented into policy.

One of the LIFE OrgBalt project objectives is to explore the potential of CCM practices and the application of CCM measures in the Baltic States that could contribute to a decrease of GHG emissions from drained nutrient-rich organic soils under agriculture or forest land, as well as demonstrate how these lands can be managed in a sustainable way. Organic soils form an important stock of carbon, and their drainage contributes to increased GHG emissions in situ and ex situ peatland ecosystem damage.

Organic soils cover around 7% of the EU area and the emissions from these lands are proportionally high. Taking this into account, developing knowledge and experience-based climate and land policy is crucial for CCM efforts.

This report gives an insight in possible policy documents where CCM measures for organic soils could be implemented as well as limitations and possibilities for including such actions. As the main climate policy action document at the time of writing this document is the National Energy and Climate Plan, most policy implementation can be planned in this document. However, this report also reviews changes in CAP, how it affects measures on organic soils. A review of existing and possible EU level climate legislation that could affect organic soil management is also included.

1. OVERVIEW OF RESULTS AND OUTCOMES

Organic soils are described by having a high carbon content of more than 20% of dry weight, which results in cover approximately 7% of the EU territory. These soils have high GHG emissions as well as carbon storage potential depending on the chosen management strategies. Most of these soils are situated in intact peatlands (mires) and in drained and degraded peatlands. Intact and rewetted peatlands provide a unique habitat for biodiversity and play a crucial role in water regulation and flood mitigation. The drainage of organic soils / peatlands across various land uses in the EU contributes to approximately 5% of the total GHG emissions in the EU.

Therefore, the main idea of LIFE OrgBalt project is to explore the CCM's that could potentially decrease greenhouse gas (GHG) emissions from drained nutrient-rich organic soils managed for agriculture or forestry purposes. The project results also try to demonstrate how these territories can be managed in a more sustainable way– finding a balance between economic, social, and environmental benefits.

<u>The main results of the project are:</u>

- Improved GHG calculations

One of the primary goals for the LIFE OrgBalt project throughout the implementation period has been filling the knowledge gaps for CCM measures and accounting. Therefore, developing regionally harmonized GHG and environmental data collection methodology has been an achievement for the project. Collected site- and site-type-specific activity data and first GHG EFs will support the improvement of GHG inventory, which is crucial for more precise GHG inventory calculations and GHG emission projections. Draft GHG EFs have been developed for cropland, grassland and forest land categories, activity data has been developed for organic soil. By developed modelling and machine-based learning a set of maps for organic soils has been developed from existing data sources in Lithuania, Latvia and Estonia to provide a practical tool for the planning of sustainable soil management activities for both agriculture and forestry sectors.

- CCM measures

CCM management practices were implemented in 17 demonstration sites on agriculture and forest lands – each having different characteristics but united by one – being nutrient rich organic soils. The key benefit and the unifying goal were to achieve reduction of GHG emissions from soils and increase CO_2 removals from the atmosphere. Management measures that were implemented in the demonstration sites consisted of – introduction of paludiculture, conversion of cropland to grassland, controlled drainage in agriculture, agroforestry, continuous cover forestry and wood ash application in forest. Over a two-year period, LIFE OrgBalt has carried out measurements of GHG fluxes and other environmental variables in agricultural and forest land with nutrient-rich drained organic soils. The data that has been collected at the demonstration sites, along with other parameters, including socio-economic parameters, has been analysed and applied in the modelling tools that were developed within the project for effective CCM practice implementation at various levels.

- Tools and guidance for evaluating the analysed CCMs on farm and national levels.

Two important tools have been developed within the LIFE OrgBalt project to provide landowners and institutions with a socio-economic analysis of the measures implemented. The two tools are based on data relating to potential implementation of CCM measures, however, the target audiences differ – the Simulation model is a tool for policy planning and decision-making at a regional and national level, whereas the PPC model provides site-specific calculations, and its main target audience is landowners. The models so far are limited in macroeconomic considerations and external environmental impacts. Therefore, they can be used carefully in CCM strategy development for identification of gaps in policy making and funding frameworks for facilitating climate neutrality transition. In the after-LIFE-period they can be optimised as decision-making tools when additional data and considerations are available.

The Simulation model is a decision support tool for policy planning that can provide projections of GHG emissions and socio-economic consequences of selected management options on organic soils for various land use types. The model is designed to reflect activity data, EFs and socio-economic estimates. It includes geospatial information layers with data on soil, water, and land use related indicators in all target countries. Simulation model can also demonstrate potential locations of the GHG emission reduction measures.

The public and private sector cooperation model (PPC model) is a functional land management model that can be used as a decision support tool for CCM and sustainable soil management. The aim of the model is to suggest innovative land management practices and it demonstrates how nutrient rich organic soils can be managed while ensuring economic, social and CCM benefits. The model was created to examine the benefits and costs of the proposed CCM measures, financing opportunities, institutional arrangements and enabling conditions that could motivate the implementation of CCM measures.

2. CLIMATE CHANGE MITIGATION MEASURES RESEARCHED WITHIN THE LIFE ORGBALT PROJECT

2.1. Measures on forest land on nutrient rich organic soils.

Monitoring in LIFE OrgBalt aimed to include sites located on nutrient-rich organic soils with a peat layer thickness of at least 30 cm, so all were peatland sites. Some of the measures are implemented in dryer conditions. In those cases, the water table (groundwater) level is at least 30 cm deep during the vegetation season. There are also measures implemented in wetter conditions. In these sites and their reference sites the water table is less than 30 cm below soil surface during the vegetation season. In peatland forests, tree growth is lower to drained and managed forests due to higher water table level. The conventional solution to this problem is to maintain sufficient drainage artificially by means of ditch network maintenance. Drainage is needed to maintain the stand growth only when the post-harvest basal area is smaller than 10 $m^2 \cdot ha^{-1}$. This, however, entails costs and causes negative environmental impacts such as the deterioration of water quality. Climate change mitigation measures in the forest sector aim at increasing carbon stocks in both – soil and biomass – by changing the forestry practice.

High ground water tables (GWT) are beneficial for maintaining the carbon stocks in organic soil. Drainage should always be avoided, and it should be realized that groundwater level (GWL) is dynamic and drops down in summer months due to evapotranspiration and infiltration. Although deepening the water table increases productivity, in Finland it is found that after the tree stand volume has exceeded 100–150 m^3 ha^{-1} forest can regulate GWL by itself (Sarkkola et al., 2010). After this threshold has been reached, the tree stand itself, through efficient transpiration, maintains sufficient drainage. Similar findings are published in Latvia demonstrating that restoration of drainage systems may not be necessary in healthy growing stands (Zālītis, 2008, 2012; Zālītis et al., 2010).

Drainage of organic forest soils leads to increase of carbon dioxide (CO_2) net emission from the soil and thus loss of organic layer. This soil C loss might be compensated by the increase in C allocated into tree growth in short- and medium-term. However, many drained peatlands have low tree growth due to nutrient limitations. Tree growth at these peatlands can be effectively increased by fertilization, but fertilization has been also found to increase decomposition rates and therefore GHG emissions. Ojanen et al. (2019) in the study in Finland concluded that fertilization of low-productive peatland forests has potential for CCM in the decadal time scale. The study revealed that the great increase in productivity due to fertilization leads to an increase in tree stand CO_2 sink that clearly exceeds the increase in soil CO_2 net emissions on short- to mid-term. The effect of fertilization on CH_4 emissions was generally negligible. CH_4 emissions from ditches would also be reduced if ditches were cleaned in addition to fertilization. While fertilization may increase N mineralization through enhanced decomposition, also net primary production increases leading to increased N demand. Thus, fertilization does not seem to induce a risk of N_2O emissions (Ojanen et al., 2019).

Another option currently considered and studied is replacing the maintenance of drainage systems with fertilization by wood ash. The idea behind this is that the reduced tree growth rate under moderate or shallow-drained GWT may rather be due to low nutrient availability in the limited soil oxic soil layer than the soil wetness as such. Wood ash increases tree stand carbon sequestration and tree litter inputs to the soil, both being beneficial for the system carbon balance. If simultaneously the decomposition processes in the soil are not accelerated to the relatively high GWT, CCM is achieved. This measure is also proved as being very efficient also in Latvia (Champion et al., 2022; Neimane et al., 2021; Petaja et al., 2019).

Forestry sector CCM measures:

- (LVC307) Application of wood ash in spruce stand;
- (LVC308) Continuous Forest cover as a forest regeneration method in spruce stand;
- (LVC309) Semi-natural regeneration with black alder without reconstruction of drainage systems;
- (LVC311) Riparian buffer zone in forest land planted with black alder;
- (LVC312) Forest regeneration (coniferous trees) without reconstruction of drainage systems;
- (LVC313) Strip harvesting in pine stand.
- (FIC101) Continuous cover forestry in drained, nutrient rich peatland spruce forest;
- (FIC102) Shifting to continuous cover forestry in a drained nutrient rich peatland site;
- (FIC103) Shifting to continuous cover forestry on drained, nutrient rich peatland;

2.2. Measures on agriculture land on nutrient rich organic soils

Paquel et al. (2017) concluded that the main option to reduce GHG emissions from organic soils in the Netherlands is to elevate the GWL to reduce the oxidation of the organic material. This can be done either by technical measures or through increasing the water level and extensification of the land use.

In their study conducted in Finland, Kekkonen et al. (2019) found that afforestation could be a suitable alternative for organic soils removed from agriculture, based on a life-cycle analysis perspective. However, they observed that the emissions of N_2O from these soils would persist at a similar rate to cultivated soils, except for emissions related to fertilization. Afforestation involves drainage as well, and if there is peat above the GWL it will be prone to decomposition. The most efficient mitigation measure in these cases can be rewetting. It runs the risk of high CH_4 emissions and potentially high initial nutrient losses to watercourses, but in some cases has been found to turn agricultural sites carbon neutral or to carbon sink. With the right crop selection, it may even be possible to continue cultivation in rewetted conditions (i.e. paludiculture).

In the EU, for cropland on organic soils a land use conversion to extensive grassland with higher water levels or other areas intended for biodiversity would be the most relevant option, as the cropland area on organic soils is relatively small, only about 1.3% of the total cropland area, whereas emissions from that land are very high. It is assumed that half of this land could be taken out of production or converted to more extensive grassland use with higher water levels. This could result in an emission reduction of about 12 mil. tons CO_2-eq yr^{-1} (assuming emissions are reduced by 75% after conversion). Several EU Member States consider or have already policies for the conversion of arable land on organic soils to nature or grassland, e.g. Denmark, Luxembourg, Latvia, and Germany. However, a quantification of the mitigation potential is mostly not provided. Latvia reported for instance that "conversion of 1 ha of cropland to grassland considering 5.2% share of organic soils [in Latvia] would reduce CO_2 emissions by 0.3 tonnes CO_2 ha^{-1} annually" (Paquel et al., 2017). It should be mentioned that there is no scientific approval for this assumption.

Combination of rewetting and paludiculture is pursued as a wider CO_2 mitigation option in drained organic soils. Paludiculture combines biomass production at higher water levels by using both lightweight harvesting machines and flood tolerant crop species (e.g. Typha, Azolla, Sphagnum, Phragmites, Salix and Alnus). Karki et al. (2014) investigated the GHG balance of peat grown with reed canary grass and rewetted to various extents in a mesocosm study. Raising the GWL to the surface decreased both the net ecosystem exchange of CO_2 and N_2O emissions whereas CH_4 emissions increased. Total cumulative GHG emissions (for 10 months) corresponded to 0.08, 0.13, 0.61, 0.68 and 0.98 kg CO_2 eq. m^{-2} from the GWL treatments at 0, -10, -20, -30 and -40 cm below the soil surface, respectively. The results showed that a reduction in total GHG emissions can be achieved without losing the productivity of newly established reed canary grass when GWL is maintained close to the surface (Karki et al., 2014).

In Sweden, Norberg (2017) evaluated GHG emissions from cultivated organic soils including effect of cropping system, soil type and drainage. The overall conclusion was that no specific crop can be considered to mitigate climate change by reducing GHG emissions from drained cultivated peat and carbon-rich soils during the growing season. Site-specific effects were a key factor for the GHG emissions rather than the cropping system. Furthermore, there was no difference in CO_2 emissions between a GWL at 50, 75 and 100 cm below the soil surface. Only CO_2 emissions at near water-saturated conditions deviated significantly. In most peat soils, maximum CO_2 emissions occurred already at low soil water suction (0.5 m water column).

In Finland, instead of intensive food or feed production, some cultivated peatlands are in extensive use despite of poor productivity or challenging cultivation conditions. Such low-yielding, thick layered peat soils in extensive use would be more useful to either be rewetted, restored or under paludiculture to meet the emission targets. Such areas in Finland can be found in about 23,000 ha, which is approximately 1% of the total cultivated area (Kekkonen et al., 2019). By rewetting, restoring, or transferring these fields to paludiculture, Finland could reduce about 10% of the emissions from cropland in the land use and land use change sector. In the long term, mire vegetation captures carbon and deposits part of it as litter into peat.

In agricultural land including on organic soils, change into agroforestry provides for greater C sequestration potential than conventional options alone while leaving the bulk of the land in agricultural production. In large parts of temperate and boreal Europe, implementation of agroforestry is still rather limited. Besides uncertainties on the legislative and economic level, this might result from a lack of actual quantification of the data provided and the lack of knowledge on implications of agroforestry on field management. Under temperate and boreal climatic conditions actual quantitative estimates of climate mitigation impact especially on organic soils remain extremely scarce. Thus, further research and quantification is needed. (Pardon et al., 2017; Schoeneberger et al., 2012).

Within the study in the Republic of Ireland Renou-Wilson et al. (2012, 2016) concluded that extensive grassland over organic soil is on average, an annual source of CO_2 when drained (138-232 g C m^{-2} yr^{-1}) and a sink when rewetted (-40 g C m^{-2} yr^{-1} in the ungrazed rewetted grassland). A wet organic soil under grassland displays high CH_4

emissions especially if the water is close to the surface. However, maintaining the water table at – 20 cm may be sufficient to reduce CO_2 losses from respiration while keeping CH_4 emissions low and therefore raising the water table could be used as a GHG mitigation tool in organic soils under grassland.

In Finland, as forage production as rotational grasses is classified as cropland in the GHG inventory, Finnish grasslands are mainly abandoned fields and thus there are limited possibilities to guide their management. Some abandoned fields have been successfully rewetted and restored to close to natural state.

In Latvia scientists observed that grasslands remain significant source of GHG emissions even if peat layer is less than 10 cm, which means that the emissions from grasslands, as well as the mitigation potential is underestimated (Purvina et al., 2023; Purviņa et al., 2024). It was also found that rewetting may not be associated with decrease of GHG emissions; however, these findings apply to nutrient-poor soils (Bārdule et al., 2023) and further studies are necessary in nutrient-rich soils.

Agricultural sector CCM measures:

- Measures involving change of crop type:
  - (LVC301) Conversion of cropland to grassland;
  - (LVC304) Introduction of legumes in crop rotation.
- Measures involving controlled water level:
  - (LVC305) Controlled drainage of grassland considering even GWL during the whole vegetation period.
- Measures involving complete or partial afforestation:
  - (LVC302) Conventional afforestation (spruce);
  - (LVC303) Paludiculture – afforestation of grassland with black alder and birch;
  - (LVC306) Agroforestry – fast growing trees and grass;
  - (LVC310) Fast growing species in riparian buffer zones.

2.3. Conclusions about project CCM measures on nutrient rich organic soils

Transformation of arable land with drained organic soil into grassland with higher water levels can significantly reduce GHG emissions and it is less costly measure; however, it's effect is significantly smaller than the mitigation effect of afforestation. It has also limited implementation potential since rather limited area of farmlands with organic soils are still used as cropland. This measure can be recommended for national climate policies, but more efficient measures should be considered instead.

Afforestation of organic soils in cropland and grassland with birch, spruce, pine, and black alder, and retaining of drainage systems could be included in climate plans if rewetting is not possible. High quality planting material should be used in forest regeneration to ensure continuous mitigation effect.

Afforestation of farmlands with organic soil with following rewetting is measure with significant mitigation, as well as the implementation potential. Remedial or temporal ditching is important during the afforestation stage to reduce this risk. This measure can be recommended for climate policies; however, the implementation risks should be considered.

Use of wood ash in forest stands with drained organic soil after thinning is efficient and fast acting measure ensuring significant additional CO_2 removals in living biomass. This measure is one of the few contributing to implementation of short term, as well as long term mitigation measures. This measure is recommended for implementation of the national climate targets.

Plantations of woody crops (short rotation forests) in arable land with drained organic soil for timber and biofuel production is acceptable mitigation measure; however, it is also the most expensive and associated with bigger risk of natural disturbances. Short rotation forests require protection and more attention during the regeneration stage than the afforestation related measures. The research should be continued to improve management methods, to select right breeds and to increase outputs of sawn materials.

Planting of fast-growing tree species in shelter belts around drainage systems in farmlands with organic soils have similar potential effect as short rotation forests; however, it can be even more expensive in the implementation stage. This measure can also be recommended for the national climate plans; however, it's implementation potential is limited due to possibility to afforest and to grow short rotation forests in organic soils.

Use of legumes in plant rotation in arable land with drained organic soil and controlled drainage in grassland with organic soil did not demonstrate significant mitigation potential in our studies. Similarly, there was no significant positive effect of strip felling in a pine stand.

Selective felling in spruce stands demonstrated positive effect on GHG emissions from soil; however, this effect can be neglected by the fact that logging area should be increased to acquire the same amount of wood. Additionally, selective felling is associated with the increased risk of natural disturbances, it makes artificial regeneration impossible, thus loosing breeding effect (15-20% of additional removals in living biomass) and it can contribute to negative selection by leaving weaker and removing stronger trees during felling. Strip- or spot- (spot also called as "small-gap") harvesting in spruce stands should be evaluated further to evaluate if the effect of the mitigation of emissions from soil is retained in the smaller, e.g. 0.5 ha, openings.

Artificial regeneration with black alder, birch, pine, or spruce stands in areas with naturally wet soils by planting trees on mounds and establishing network of furrows to remove exceeding water from topsoil layer seems to be promising solutions. Proper risk management is the key element for success during the implementation stage. Further observations are necessary to evaluate the effect on soil GHG fluxes after regeneration and the potential negative effect of natural disturbances and growth limiting factors. Additional efforts should be paid to elaborate spatial tool for selection of forest stands suitable for implementation of this measure and development of remedial drainage system and network of furrows.

Planting of black alder or birch shelter belts in alluvial zones in forested areas with organic soil seems to be efficient forestry measure; however, selection of suitable areas is more complicated than for other measures, particularly, because of management restrictions having potential negative effect on long term carbon storage in HWP and the substitution effect. This measure also requires further investigation to evaluate effect of the soil GHG fluxes. Combination of this measure and artificial regeneration of forests in areas with wet organic soils can be implemented in regeneration of wet forests by planting black alder or birch in terrain depressions, where probability of survival of coniferous trees is significantly smaller; thus, this measure would also contribute to increase of biodiversity.

3. EMISSION FACTORS FOR BALTIC STATES

Currently, country-specific and 2014 IPCC default (temperate zone) EFs are used for GHG emission reporting from drained nutrient-rich organic soils in forest land, cropland, and grassland in the National GHG Inventory in Latvia. To report GHG emissions in Lithuania, 2006 IPCC default (temperate zone) EFs are used, while, in Estonia, both 2006 and 2014 IPCC default (both temperate and boreal zone) EFs are used to report GHG emissions from drained nutrient-rich organic soils in forest land, cropland and grassland. Thus, reporting approaches and applied EFs differ among the Baltic States.

Potential impacts of re-calculations of on-site GHG emissions and removals from drained nutrient-rich organic soils in forest land, cropland and grassland in Latvia, Lithuania, and Estonia due to implementation of draft EFs obtained within the LIFE OrgBalt project were modelled and estimated. Results of modelling and estimation showed that re-calculations of GHG emissions due to implementation of region-specific GHG EFs for drained nutrient-rich organic soils could significantly affect total GHG emissions and removals from LULUCF and Agriculture sectors.

However, the results obtained from the LIFE OrgBalt are applicable for **compiling them with other existing research measurement raw data, thereby obtaining a broader data set for conducting meta-analysis.** Such analysis and synthesis would allow for even more effective use of information on soil GHG emissions and C input in soil to investigate variances in mutual relations, as well as searching, characterizing, and quantifying the overall relation of individual GHG emissions or soil carbon input and influencing factors.

4. GHG EMISSION REDUCTION AND SOCIO-ECONOMIC IMPACTS OF PROPOSED MEASURES

Two models were developed within the LIFE OrgBalt project – a simulation model, which is a tool for policy planning and a decision support tool for application at a regional or national level for projections of GHG emissions and socio-economic effect of the selected management options within the LIFE OrgBalt project. And a public-private cooperation (PPC) model, which is a microeconomic model that is developed for farm (land parcel) level as a business planning guidance tool.

In general, the results of the PPC model demonstrate the financial viability and potential environmental impact of the proposed CCM measures under present state economic frameworks. Additionally, they provide valuable insights for decision-making and investment strategies. There are a few things that should be taken into consideration when evaluating the CCM measure data provided by the model:

1. Almost each CCM measure in organic soils have different conditions, environmental and climate impacts. Therefore, further research of clear benefits and adverse effects is necessary. There are various studies shedding light on potential trade-offs and synergies, emphasizing importance of managing forests and agriculture land for multiple ecosystem services while considering trade-offs.
2. The models use present state economic and funding figures to assess economic viabilities of the analysed CCM on farm level. On larger societal scale they can support identification of funding gaps for CCMs that show high mitigation potential for environmental impacts.
3. The model can be further developed by integrating macroeconomic considerations and external environmental impact costs from conventional management or environmentally insufficient CCMs.
4. In the future, the PPC model could further on be enhanced by incorporating additional suitable CCM measures, thereby broadening the range of evaluation options for both farmers/foresters and policy planners.

The Simulation tool integrates various land use change and management scenarios for drained organic soils in the Baltic States, assessing their potential impact on socio-economic indicators and GHG emission reduction. By simulating different management strategies, such as restoration, conservation, afforestation or sustainable agricultural practices, the tool provides insights into how these changes may influence key socio-economic factors, including agricultural and forestry productivity, and employment. Additionally, the tool evaluates the effectiveness of these strategies in achieving GHG emissions reduction targets set in the Paris Agreement.

The assessment of the socio-economic impacts of the CCM measures implemented in the LIFE OrgBalt project is an important first step with limitations on the macroeconomic level to identify and value their results and their contribution in terms of GHG emissions reduction. It is also important to identify the expected impacts at social and economic level for landowners and stakeholders. Finally, the assessments of the results these tools provide important feedback for partners whose research on these topics will continue beyond the scope of the project, but also for policy makers who will be able to make better oriented and data-based decisions on future actions and policies.

It is important to highlight that the CCM measures' real impacts will be observable only in decades. The results of the implemented measures are therefore calculated as modelled impacts based both on the project data and on reference data where similar conditions have been in place for a considerable amount of time to consider the available data as reference results rather than expected impacts.

Both models offer an overview of the analysed CCM measures bring for the landowner or economy as a whole.

For future wider application as full decision support tools in decision and policy making in climate change mitigation strategies it is recommendable to include considerations on macroeconomy, external environmental impacts and a wider range of CCM measures including peatland rewetting.

5. LIMITATIONS AND OPPORTUNITIES OF INTEGRATION OF NEW ORGANIC SOIL RELATED MEASURES IN NATIONAL POLICY PLANNING DOCUMENTS (BALTIC STATES AND FINLAND AND GERMANY)

5.1 Implementation of GAEC 2 standard in LIFE OrgBalt project countries

One of the key policies for land use and agriculture in the EU is the Common Agricultural Policy (CAP). In 2021, the new legislative framework for the CAP funding period 2023- 27 was agreed upon[1].
All Member States must achieve the objective of protecting carbon-rich soils under the new enhanced conditionality framework by setting the standard for good agricultural and environmental condition (GAEC 2). This GAEC 2 applies to all eligible agricultural land and each country shall define and delineate the carbon-rich soils on agricultural land to ensure protection of wetlands and peatlands as they represent an important carbon store and potential carbon sink in Europe. This standard is applicable from year 2023 however Member States may postpone it as from year 2024 or 2025 due to delay that is necessary for delineation and the establishment of the appropriate management system.

Germany[2]:

Year of implementation: 2023
Wetlands and peatlands are to be designated as a site in accordance with the requirements set out in the national conditionality.

- Permanent grassland in wetlands and peatlands may not be converted or ploughed.
- Permanent crops in these areas may not be converted into arable land.
- No intervention in the soil profile with heavy machinery on agricultural land in wetlands and peatlands. It is also prohibited to plough the soil deeper than 30 cm (beyond the normal ploughing depth) as well as sanding up and over.
- The cultivation of paludicultures through site-adapted wet utilisation is possible in the GAEC 2 area. However, this does not apply for biodiversity protection, and this does not apply to permanent grassland in areas of permanent grassland worthy of protection.

Regarding the construction of new and the repair/renewal of existing drainage systems the following additional legal obligations apply:

- For the first-time drainage of an agriculturally utilised area in the above-mentioned area by means of drainage systems or ditches, the beneficiary must obtain authorisation from the competent authority in agreement with the competent nature conservation authority and the competent water authority.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1718348178906&uri=CELEX%3A32021R2115

[2] https://www.bmel.de/SharedDocs/Downloads/DE/_Landwirtschaft/EU-Agrarpolitik-Foerderung/gap-strategieplan-version-4-0.pdf?__blob=publicationFile&v=2 [3.10.1.2 GLÖZ 2: Schutz von Feuchtgebieten und Torfflächen; page 505]

- The repair and renewal of drainage systems or ditches for the drainage of agricultural land is permitted if this does not result in a lowering of the existing drainage level of the respective drainage system or ditch. In exceptional cases the competent authority may, with the consent of the environmental authorities (nature conservation and water authorities), lower the existing drainage level of system or ditch in question, if this is necessary to ensure the agricultural use of the area and this does not harm the nature or environment of the area.

Estonia[3]:

Year of implementation: 2024
In 2024, if at least 90% of a field is peat soil, it is considered to be peat-soil farmland. From 2025, a field with at least 65% of its area is peat soil shall be considered as agricultural land with peat soil.

In 2024, the following requirements apply:
Requirement 1: Ploughing and tillage shall not be allowed on agricultural land with peat soil, except for on peat soil cropland, ploughing and tillage are allowed once every three years.
Requirement 2: Undrained wetlands and peat soil agricultural land shall not be drained. Drained wetland and peatland agricultural land used for agricultural activities shall not be drained further. Drainage systems may only be reconstructed if solutions are used which do not increase the drainage capacity and GHG emissions and where this is necessary to maintain the drainage system in the mineral soil. This requirement does not apply where bilateral water regime regulation is applied on drained peat soils (set-back and rising water level).

Lithuania[4]:

Year of implementation: 2025
It is prohibited in designated wetland and peatland areas that fall within the applicant's declared area:

1. the installation of new drainage systems, but the repair and reconstruction of old systems is only allowed if it does not harm the environmental status of the peatland;
2. burning residues in peatland areas;
3. ploughing of peatland areas is prohibited.

To reduce the administrative burden on applicants and administering authorities, a minimum tolerance is foreseen, i.e. if the area of peatland in the field is less than 10 % but not more than 1 ha, the sanction does not apply.

Finland[5]:

Year of implementation: 2023/2025

[3] https://www.agri.ee/sites/default/files/documents/2024-04/%C3%BCpp-2023-tervikteks t-2024-01-01-v3-1-koos-I-muudatustega_1.pdf [3.10.1.2 HPK 2. Märg- ja turbaalade kaitse; page 330;]

[4] https://zum.lrv.lt/media/viesa/saugykla/2024/5/zTqgFQppY14.pdf [3.10.1.2. GAAB 2. Šlapynių ir durpynų apsauga; page 243]

[5] https://maaseutu.fi/wp-content/uploads/2023/11/Suomen-CAP-suunnitelma_31102023.pdf [3.10.1.2 GAEC-vaatimus 2: Kosteikkojen ja turvemaiden suojelu; page 222]

Requirement A) *(applicable from 2023)***:** After 2022, the area of peatland taken into agricultural use by clearing or other means must be permanent grassland. The grass cover may be renewed by direct sowing or with a light tillage. The new grass cover shall be sown immediately after the previous cover has been tilled. Ploughing is prohibited. This grassland requirement does not apply to new areas under specified farm management decisions or to specified parcel shape improvements.
Requirements applicable from 2025:
Requirement B): No conversion to agricultural land for land that is peatland.
Requirement C): No burning of agricultural residues or vegetation on peatland.
Requirement D): No new open ditches shall be constructed on agricultural land that is peatland, except where the construction of a new open ditch is associated with the establishment of a wetland to be constructed or with specified multiple landowner base drainage or farm management projects.
Requirement E): Permanent grassland located on peatland shall not be ploughed more than once in a four-year period. This requirement does not apply to areas covered by GAEC 9.

Latvia[6]:

Year of implementation: 2025
In the CAP Strategic plan 2023 – 2027, Latvia has included the following requirements for implementation of GAEC 2 standard "Protection of wetland and peatland":

1. In areas of wetlands and peatlands on agricultural land, used for agricultural activity, ploughing shall be carried out not more frequently than once in 5 years or ploughing is prohibited if other regulatory enactments, including those concerning ecologically sensitive permanent grasslands, provide such restrictions;
2. In wetland and peatland areas used for agricultural activities, the construction, reconstruction, or renovation of drainage systems shall not be permitted, with some exceptions implementing solutions that do not increase GHG emissions.

Considering that the ploughing ban under GAEC 2 will cover a significant area of agricultural land in Latvia, affecting a notable number of farmers and putting them at risk of financial difficulties and even bankruptcies, the Ministry of Agriculture has drafted amendments to GAEC 2. The amendments have been submitted to the European Commission for an approval process. Proposed amendments to GAEC 2 would limit ploughing ban only to permanent grassland areas located on wetlands and peatlands and only if ploughing is carried out deeper than 20 cm. Additionally, amendments would limit ban of construction only of new drainage systems in peatland and wetland areas with additional exceptions provided.

5.2. Implementation of the National energy and climate plans in the LIFE OrgBalt project countries

At the moment of writing this document, all EU Member States are updating their NECP's to include updated climate policy targets - both LULUCF and non-ETS targets have been changed since the first NECP in 2020 and to include the measures necessary

[6] https://www.zm.gov.lv/lv/media/5409/download?attachment [3.10.1.2. LLVS 2: Mitrāju un kūdrāju aizsardzība; page 261]

to reach these targets, the EC have requested the Member States to update their NECP's and submit them by the 30th of June 2024. The updated NECPs set out each EU country's roadmap to collectively meet the EU's legally binding target of 55% net GHG emission reductions by 2030.
It must be noted that most Member States did not submit their updated NECP's until the 30th of June 2024, therefore, the assessment made in this document will be mostly based on EC recommendations for draft NECP's handed in by Member States by the end of 2023. Latvia and Finland submitted updated NECP's in summer of 2024, therefore the assessment for those countries will be based both on the EC recommendations for the draft NECP's submitted by the end of 2023 and on the newest information – submitted NECP's in summer 2024. The assessment for Lithuania, Estonia and Germany will be from the EC recommendations for draft NECP's submitted by the end of 2023.

Latvia

The Commission in their assessment of Latvia's submitted draft NECP[7] states that the draft updated NECP does not reflect the higher target set in the LULUCF Regulation. The draft updated NECP fails to set any pathway to increase the contribution of Latvia's land sector to the EU's higher climate target. Latvia does not include any policies and measures and thus does not show how the LULUCF sector will contribute to the long-term transition to climate neutrality. The Commission recommends Latvia to: 1) set out a concrete pathway towards reaching the national LULUCF target; 2) include additional measures in the LULUCF sector, in particular on the promotion of sustainable forest management on degraded/unmanaged forest land, and peatland restoration and extraction, quantifying their expected impacts; 3) provide clear information on how financing (public and private) is consistently and effectively used to achieve the net removal national target; 4) provide information on the status and progress to be made in ensuring the enhancements to higher tier levels/geographically explicit datasets for monitoring, reporting and verification, in line with Part 3 of Annex V to Regulation (EU) 2018/1999[8].

In the updated NECP (2024)[9], Latvia envisages measures that could be aimed to organic soils or paludiculture products:

Measure	Quantity	GHG savings 2026-2030 (kt)	Investments (million EUR)
Soil enrichment/fertilization in nutrition poor organic soil forests using wood ash, kha	21,5	213,6	3
Restoration of wetland forest habitats in organic soils on agricultural lands (tree paludiculture), kha	40	892,3	259

7 Commission Recommendation, Assessment (SWD) and Factsheet of the draft updated National Energy and Climate Plan of Latvia - European Commission (europa.eu)
8 https://eur-lex.europa.eu/eli/reg/2018/1999/oj
9 https://commission.europa.eu/publications/latvia-final-updated-necp-2021-2030-submitted-2024_en

Afforestation of drained organic soils where rewetting isn't possible, kha	40	1087,6	99
Hedgerows, kha	22	752,8	38
Short rotation coppice willow, kha	15	772,3	41
Agroforestry - group of trees in pastures (10% of area with trees), pastures kha	150	65,5	37
Afforestation in the extracted peat fields, including restoration of wetland forest habitats (paludiculture), kha	6	133,8	15

Table Nr. 1. Organic soil measures in Latvia's NECP

Lithuania

For Lithuania, the information provided in the projections in the draft updated NECP indicates that the country will fall slightly short of the 2030 ambition[10]. The draft updated plan does recognize the increased climate targets included in the ESR and the LULUCF Regulation as part of the "Fit for 55" legislative package but only partially embeds them. The Commission points out that Lithuania's draft updated NECP does not clearly present how its policies and measures for the LULUCF sector will contribute to the country's long-term transition to climate neutrality by 2050, however, the plan does include a large set of restoration measures in climate relevant ecosystems like peatlands, wetlands, extensive grassland, or forests, as well as actions on soils and agroforestry.

It is noted that in the most recent years net GHG emissions in Lithuania have been rising, mainly due to significant decline in the LULUCF sink and increased emissions in the transport and building sectors. The submitted document did not fully reflect the increased ambition of the LULUCF Regulation. That concerns the 2030 national target requiring Lithuania to deliver the set amount of additional net removals.

In the national planning documents, Lithuania envisages measures that could be aimed at organic soils or paludiculture products:

Number	Title	Name at the operational level
Current policy		
L1-E	Restoration of peatlands (restoration of the hydrological regime on agricultural land (rewetting))	Restoration of wetlands in arable peatlands, protection of cover of perennial herbaceous plants and promotion of wetlands
L2-E	Conservation and restoration of grassland	Management of natural grasslands and habitats of species
		Maintenance of permanent grasslands
		Replacement of arable land with permanent grassland

[10] https://commission.europa.eu/publications/commission-recommendation-assessment-swd-and-factsheet-draft-updated-national-energy-and-climate-8_en

L6-E	Restoration of peatlands (meadow promotion)	Replacement of arable peatlands with meadows
L9-E	Afforestation	Afforestation on private land
L11-E	Development of agroforestry	Assessment and promotion of opportunities for the development of agroforestry on agricultural land
L14-E	Preservation of tree self-spreading	Preservation of tree self-spreading and inclusion in forest land accounting
L16-E	Determination of GHG EFs and indicators	Establishment of national GHG EF's and carbon stock change indicators
L19-E	Promotion of construction from organic materials	Ensure the implementation of projects for the renovation (modernization) of pilot buildings using standardized modular structures made of organic materials and, on their basis, develop recommendations for the mass application of these solutions. Support measures to encourage the deployment in Lithuania of standardized modular structures made of organic material production capacity necessary to achieve the objectives set out in the Long-Term Renovation Strategy
A4-E	Extensive grassland care	Extensive grassland care
A7-E	Development of no-till technologies	Development of no-till technologies
	Planned policy	
L1-P	Restoration of peatlands (restoration of the hydrological regime on agricultural land)	Restoration of wetlands in arable peatlands, protection of cover of perennial herbaceous plants and promotion of wetlands
L14-P	Preservation of tree self-spreading	Preservation of self-spreading and inclusion in forest land accounting
L15-P	Improving the quality of forests	Improving the quality of forests
L17-P	Promoting carbon storage farming (in forests)	Promotion of carbon farming in forests.
L18-P	Afforestation	Afforestation on state owned land
L19-P	Promotion of construction from organic materials	Renovation (modernization) of apartment buildings using standardized modular structures made of organic materials
L20-P	Restoration of peatlands (restoration of the hydrological regime (rewetting) in forests)	Redevelopment of forests in which it is appropriate to restore the hydrological regime

Table Nr. 2. Organic soil measures in Lithuania's NECP

Estonia

The Commission in their assessment of Estonia's submitted draft NECP[11] states that Estonia will fall short of the 2030 ambition and the draft did not clearly set out a pathway to increase the land sector's contribution to the EU's overall enhanced climate target. Furthermore, in recent years, net GHG emissions in Estonia have been increasing, mainly driven by a decline in emission removals from the LULUCF sectors. The plan does not fully reflect the increased ambition of the LULUCF Regulation and the 2030 national target – the scenario for LULUCF shows that projected removals are set to decrease from –2.8 to 3.6 Mt CO_2 eq. by 2030 compared to 2005 levels with existing measures. Forest age structure, felling rates and peat extraction are mentioned as the key factors contributing to these projections.

The plan does outline that the Ministry of Environment was, at the time of submitting the plan, assessing the impacts and volumes of the implementation of additional measures needed to restore the carbon sink function of the land sector and to enable compliance. Carbon sequestration by managed forest land will also be supported by measures in the draft Forest Development Plan 2021 – 2030.

Key actions included in Estonia's draft NECP:

AGRICULTURE: Organic farming; Environmentally friendly agricultural practices; Improving manure management; Investments in energy savings and renewable energy, including bioenergy; Maintaining or increasing carbon stocks in soils; Animal welfare; Business advice, knowledge transfer and information; Farm audits.

LULUCF: Renovation of private forests; Compensation for nature conservation restrictions in private forests; Ensuring the protection of biodiversity (including precious habitats); Protection of habitats and populations of common species in Estonia; Prevention of choke damage; Replacement afforestation.

For organic soils planned regional support for soil protection – the general objective is to ensure the sustainable use of eroded soils and organic soils and to minimize soil degradation by improving soil management and using other activities that improve cropland management. The measure concerns the conversion of land with eroded soils and organic soils into grassland.

Finland

The Commission in their assessment of Finland's submitted draft NECP[12] states that LULUCF net removals have, notably, been diminishing since 2015, culminating in net emissions in 2021, underscoring the pressing need for climate action. The draft plan does not clearly set out a pathway to increase the land sector's contribution to the EU's overall enhanced climate target. It does not provide a clear implementation timeframe nor quantification of the impacts of specific policies and measures. It also lacks information on the status and progress in ensuring higher tier levels of GHG emission

11 https://commission.europa.eu/publications/commission-recommendation-assessment-swd-and-factsheet-draft-updated-national-energy-and-climate-13_en

12 Commission Recommendation, Assessment (SWD) and Factsheet of the draft updated National Energy and Climate Plan of Finland - European Commission (europa.eu)

factors and geographically explicit datasets needed to ensure the robustness of net removal estimates.

In the national planning documents, which are included in updated NECP (2024)[13], Finland envisages measures that could be aimed at organic soils or paludiculture products:

Measure	Area	Climate impact in 2030, Mt CO_2 eq.	Climate impact in 2035, Mt CO_2 eq.
New ownership policy decisions concerning State Forests (Metsähallitus)	-	0,4	0,7-0,9
Preventing the conversion of forests into fields	About 1,700–1,900 ha per year	-	0,5
Act on fixed-term support for afforestation	3,000 ha per year, of which 40% in peat production areas	0,09	0,11
Afforestation of low-yield arable land	9,000 ha in 2024–2028	0,08	0,09
Raising the GWL in peaty agricultural lands (grasslands) -30 cm	2030: 20,000 ha 2035: 32,500 ha	0,132	0,215
Paludiculture, groundwater level -30 cm	2030: 5,000 ha 2035: 10,000 ha	0,046	0,093
Paludiculture, groundwater level -5 – -10 cm	2030: 2,500 ha 2035: 5,000 ha	0,052	0,105
Managed wetlands (no longer in agricultural use)	2030: 4,000 ha 2035: 7,500 ha	0,081	0,151
Perennial grasslands without tilling	2030: 40,000 ha 2035: 40,000 ha	0,081	0,081
Rewetting of low-yield, thick peaty arable land into wetlands	2030: 10,000 ha 2035: 10,000 ha	0,202	0,202
Comprehensive planning of peatland forest management (avoidance of remedial ditching)	-	-	-
Comprehensive planning of peatland forest management (continuous cover forestry)	6,000 ha per year	0,21	0,21
Ash fertilisation of peatland forests	26,000 ha per year	0,18	0,4

Table Nr. 3. Organic soil measures in Finland's NECP

Germany

13 https://commission.europa.eu/publications/finland-final-updated-necp-2021-2030-submitted-2024_en

The Commission in their assessment of Germany's submitted draft NECP[14] states that on the LULUCF target Germany is not reaching its target based on projections. However, there is a positive outlook based on revised inventory, as for the latest data Germany appears to be on track. The draft updated plan does not provide information on the status and the progress to be made in ensuring improved GHG monitoring and reporting. Overall, Germany does set out a pathway to increase the contribution of land sector to the overall EU's enhanced climate target but does not clearly describe or quantify the mitigation potential of the planned or additional measures. The Commission recommends Germany to: 1) set out a concrete pathway towards reaching the national LULUCF target; 2) clearly outline how the revised national GHG inventory is in line with the projections included in the plan; 3) provide additional detail on the planned measures, including quantifying their expected impact; 4) provide clear information on how financing (both public and private) are consistently and effectively used to achieve the net removal national target; 5) provide more detailed information on the status and progress to be made in ensuring the enhancements to higher tier levels/geographically explicit datasets for monitoring, reporting and verification, in line with Part 3 of Annex V to Regulation (EU) 2018/1999[15].

From Draft NECP Germany (2023) with relevance to org. soils[16]:

On 29 March 2023, the Federal Government adopted the Action Programme for Natural Climate Action. The aim is to protect, strengthen and restore ecosystems. The programme combines climate protection with nature protection and ensures that degraded ecosystems become healthy, resilient and diverse through a variety of actions. It includes, inter alia, the following measures:

Increasing forest cover for climate action and biodiversity: Through an exchange between the Federal Government and the Länder, opportunities are identified and implemented how to implement as much initial afforestation as possible on suitable areas, where appropriate in pilot regions, in accordance with, in particular, biodiversity-enhancing requirements. In return, the corresponding GAK funding area will be phased out in close consultation with the Länder.

Financial incentives for additional climate protection and biodiversity services in forests: In addition to the existing support programme 'Climate-adapted Forest management', which further accelerates forest conversion towards climate-adapted forests through the promotion of targeted measures, it is intended to develop a complementary funding instrument. This creates targeted financial incentives for achieving desirable conditions, such as additional structural diversity and biodiversity in forests that are closer to nature, and thus also aims at partly extensive forest management.

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14 Commission Recommendation, Assessment (SWD) and Factsheet of the draft updated National Energy and Climate Plan of Germany - European Commission (europa.eu)

15 https://eur-lex.europa.eu/eli/reg/2018/1999/oj

16 https://commission.europa.eu/document/download/c589deb5-9494-4984-9ef5-8e2ee711aaf2_en?filename=GERMANY-%20DRAFT%20UPDATED%20NECP%202021-2030%20EN.pdf

Climate Wildness: A programme to secure smaller wilderness areas in forests, peatlands, floodplains, coasts, mountains, former military training centres and post-mining landscapes will be relaunched.

Support for semi-natural areas: In the interests of natural climate protection, support for carbon storage measures in the agricultural landscape with a simultaneous positive impact on biodiversity, high permanence, good detectability, appropriate additionality and low leakage effects will continue to be provided under the Joint Scheme for Agricultural Structure and Coastal Protection, as well as under the Natural Climate Action Programme. This concerns, inter alia, the development of support for the creation of wooden strips, field copses, hedgerows, knocks and allies, e.g. with fruit trees, especially on field margins, and agroforestry systems. The creation of flower strips and flower areas and agroforestry will also be used, for example, under the organic schemes of the 1st. CAP pillar.

Accelerate peatland rewetting: In order to speed up the measures already adopted, the Federal Government will, in the short term, promote federal support measures for climate protection through bog soil protection. The Federal Government has adopted the National Peatland Protection Strategy and will rapidly start its implementation, enter into agreements with the Länder, as part of the acceleration of planning and approval, also conclude appropriate agreements with the Länder, review the instruments of planning law together with the Länder in order to give greater weight to moor protection in technical and territorial planning, create a right of pre-emption for public authorities to peatland soils and create a federal funding offer agreed with the Länder, to successfully establish alternative forms of farming on rewetted, previously drained peatlands, and also to improve the condition of unused and protected peat soils by means of restoration measures.

Developing a support programme for national restoration plans in line with the European Union nature restoration targets; the legal bases for soil protection are reviewed and federal soil protection law adapted to the challenges of climate protection, climate change adaptation and the preservation of biodiversity, considering the different uses;

Improved GHG monitoring and reporting: The accuracy and robustness of emission data and forecasting tools for reporting will be improved, including remote sensing systems where possible in the data collection. The power to regulate greenhouse gas emissions in the LULUCF sector is to be used to regulate the basis for recording and reporting greenhouse gas emissions in the LULUCF sector. The draft Regulation is due to be presented by the end of 2024.

Strengthening communication and outreach: All ongoing and new climate change mitigation activities in the LULUCF sector, in particular natural climate change mitigation, will be presented more widely and promoted through appropriate measures to further improve the acceptance and success of the measures.

Maintenance of permanent grassland: Grasslands hold high carbon stocks. Maintaining permanent grassland is therefore also an important climate measure. The continuation of the rules for the protection of permanent pasture in the common agricultural policy contributes to this.

6. IMPROVED SECTORAL POLICY DOCUMENTS BY IMPLEMENTATION OF THE PROJECT PROPOSALS

The main indicators of implementation should have been adopted in various documents that are not relevant at the present time anymore. At the time of writing the proposal the political and legislative indications and proposed strategic documents were different, therefore, the most appropriate documents to consider policy implementation are the NECP, CAP post-2027 and Nature restoration plans.

An analysis of the submitted updated NECPs leads to the conclusion that the countries involved in the project have already included several organic soil measures. It should be remembered that the NECP is a **living document**, and it is possible to review the measures contained therein as soon as additional information is obtained on the impact of new measures or measures already included.

On 17.06.2024. the Council formally adopted the regulation on nature restoration. Accordingly, to Article 11(4) of **Nature Restoration Law**[17]:

Member States shall put in place measures which shall aim to restore organic soils in agricultural use constituting drained peatlands. Those measures shall be in place on at least:

(a) 30 % of such areas by 2030, of which at least a quarter shall be rewetted;

(b) 40 % of such areas by 2040, of which at least a third shall be rewetted;

(c) 50 % of such areas by 2050, of which at least a third shall be rewetted.

Member States may put in place restoration measures, including rewetting, in areas of peat extraction sites and count those areas as contributing to meeting the respective targets referred to in the first subparagraph, points (a), (b) and (c).

In addition, Member States may put in place restoration measures to rewet organic soils that constitute drained peatlands under land uses other than agricultural use and peat extraction and count those rewetted areas as contributing, up to a maximum of 40 %, to meeting the targets referred to in the first subparagraph, points (a), (b) and (c).

Each Member State shall submit a draft of the national restoration plan within 2 years from the date of entry into force of the Regulation, which is the 18.8.2026.

When planning measures for the restoration of organic agricultural soils / peatlands, Member States may use the measures included in Annex VII of Nature Restoration Law. The EC considers that afforestation of organic soils while maintaining a drained state should not be considered as a viable organic soil restoration measure. This study is considered as the justification: Jurasinksi, G., et al. 2024. "Active afforestation of drained peatlands is not a viable option under the EU Nature Restoration Law".

The upcoming Carbon Removal Certification Framework (CRCF) Regulation foresees that measures for organic soils would have to include raising the water to be within the

17 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1991&qid=1722240349976

scope of the certification. This means that it will not be possible to use financing from the sale of carbon credits for measures that do not include raising the water table – for example, afforestation on drained organic soils. Voluntary carbon certification schemes also follow a similar approach.

The sale of carbon credits (where applicable), ETS and ETS2 revenues, JTF, CAP, private and national public financing should be considered as possible financing for CCM measures for organic soils.

What should be considered in the policy implementation scope is that rewetting was not considered as a form of CCM measure within the LIFE OrgBalt project. When implementing CCM measures in policy, we should consider rewetting as well, as it is one of the acknowledged CCM measures for organic soils, therefore, there should be a continuation of this type of project that continues exploring the potential of various CCM measures, this time, including rewetting of organic soils. Future research is needed:

1. Support for research to improve understanding of soil carbon dynamics and sustainable soil management practices to obtain robust data on finalisation of Tier 2 EFs for the national GHG inventories is needed. Continuous emission measurements at exemplary locations should be preferred.
2. Before the implementation of sustainable management practices on a large scale, support for research on evaluation of the impact of these practices on socio-economic indicators on a local and national scale is required.
3. Development of hydrological regime modelling tools should be supported to remotely assess areas suitable for growing forests with optimal moisture regimes and areas where rewetting can be performed without intentional tree planting.

The project consortium agreed to a disclaimer on this project to raise awareness on careful implementation of project results:

LIFE OrgBalt compiled the first regional Baltic/Finnish GHG emission factors for managed nutrient-rich organic soils (current and former peatlands), which have been made available for the customary scientific review and further verification for national GHG inventories in the hemiboreal region in Finland and the Baltic countries. While the project analysed selected CCMs for drained organic soils in agriculture and forestry and developed spatial models and tools, it also identified remaining knowledge gaps. A continuation of GHG measurements and model development, as well as a broadening of the evaluated CCM measures, is recommended to bridge the remaining limitations in the after-LIFE-project period. The developed Simulation and PPC models still include limited macroeconomic considerations and external environmental impacts. Therefore, they can be used carefully in CCM strategy development for identification of gaps in climate neutrality transition policy and funding frameworks and optimised as decision-making tools when additional data are available.

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