



How to save diminishing carbon sinks
of the EU?

Case Finland: State of carbon sinks and ways to enhance them in forests

Aleksi Lehtonen



State of play

- Forest reference level for 2021-25: without wood products - 23.5 Mt CO₂ (will change due to technical corrections)
- Climate neutral Finland - VNS 6/2022 based on the assumption that roundwood and woodchip imports from Russia will continue and forests grow as earlier
- Year 2021: growth estimate of Finnish forests reduced by 4,3 mill m³ per year (note: 8.6.2023 Luke reported increase in growth by 0.5 mill m³)
- According to GHG-inventory forest sink is -10.1 Mt CO₂ for 2022 (preliminary estimate 31.5.2023)
- Emissions from agricultural soils have remained, latest estimate for LULUCF for 2022 was 9.6 Mt CO₂
- Finland is C neutral by 2035 (climate law – additional measured needed if not in compliance)



Latest official NIR (15.4.2023), LULUCF sector is a source of emissions in Finland

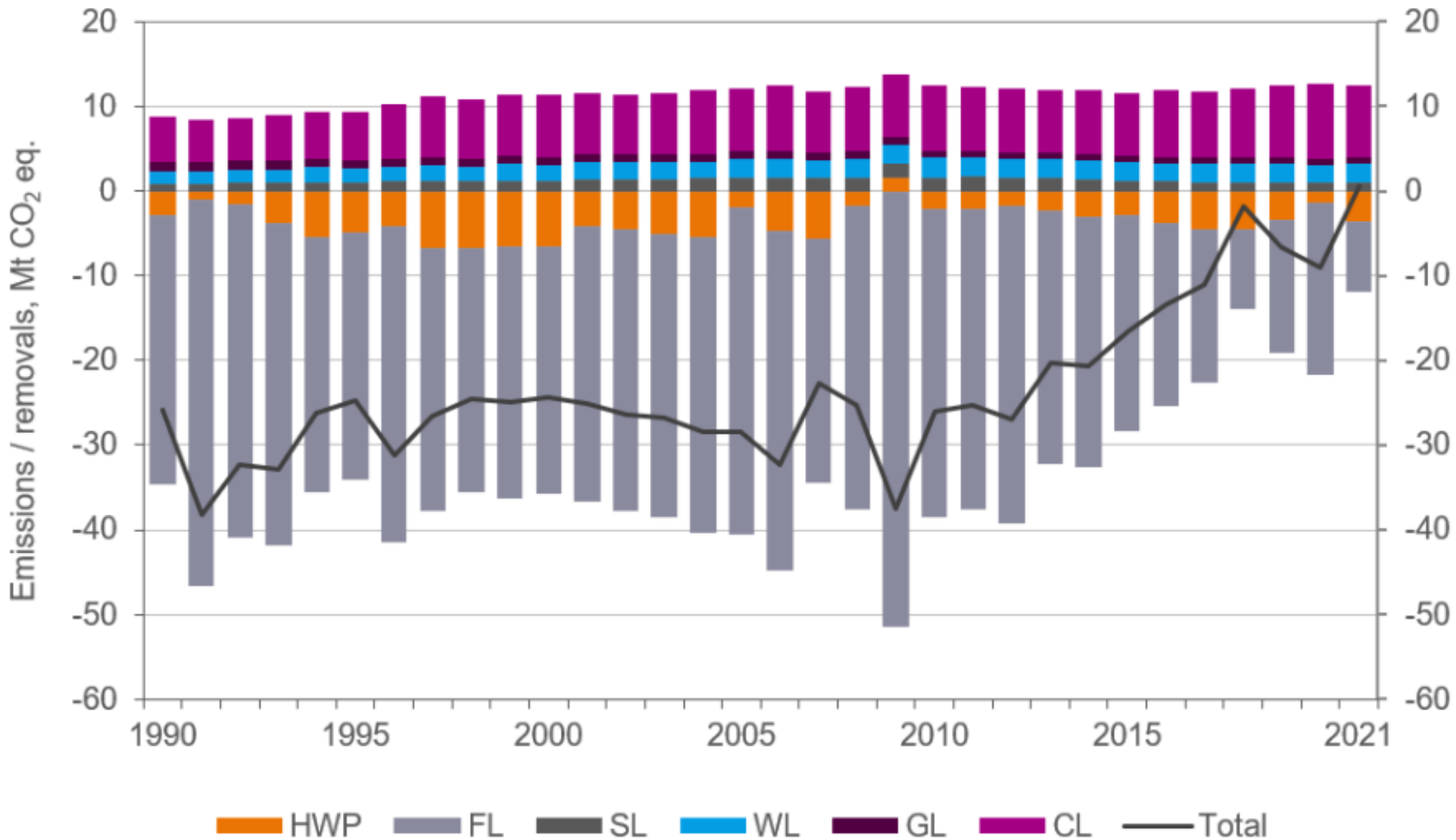


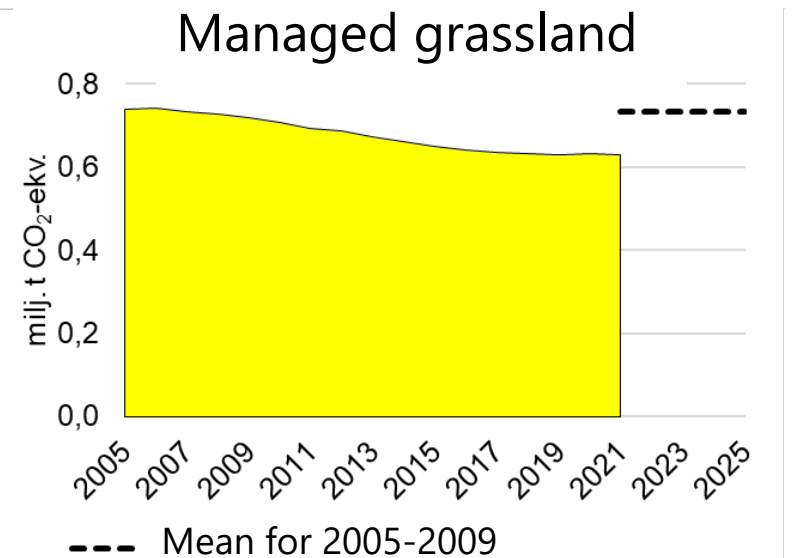
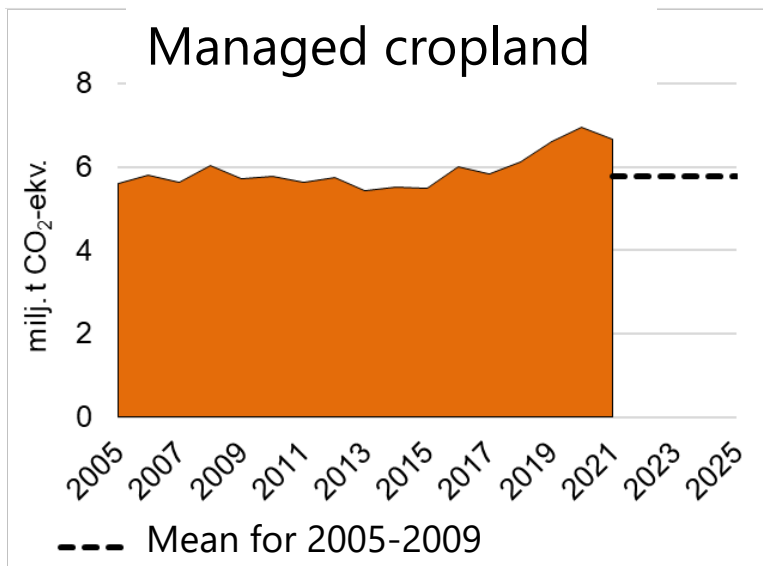
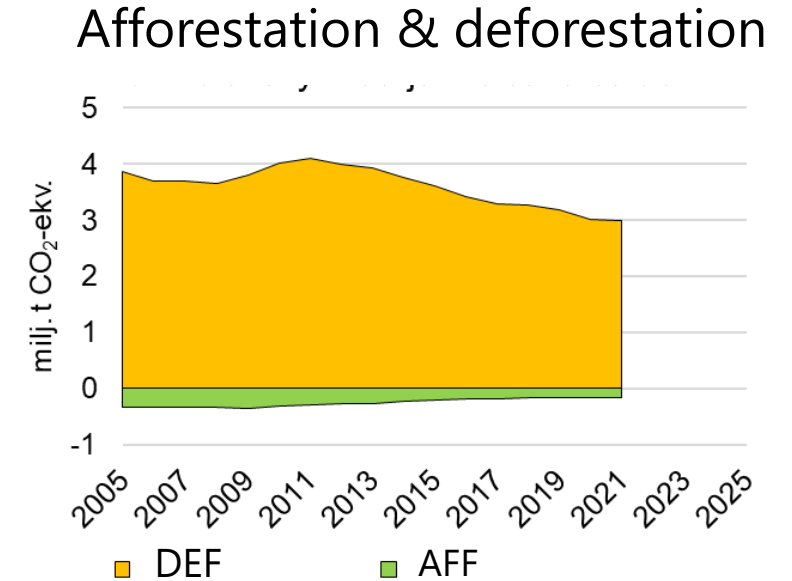
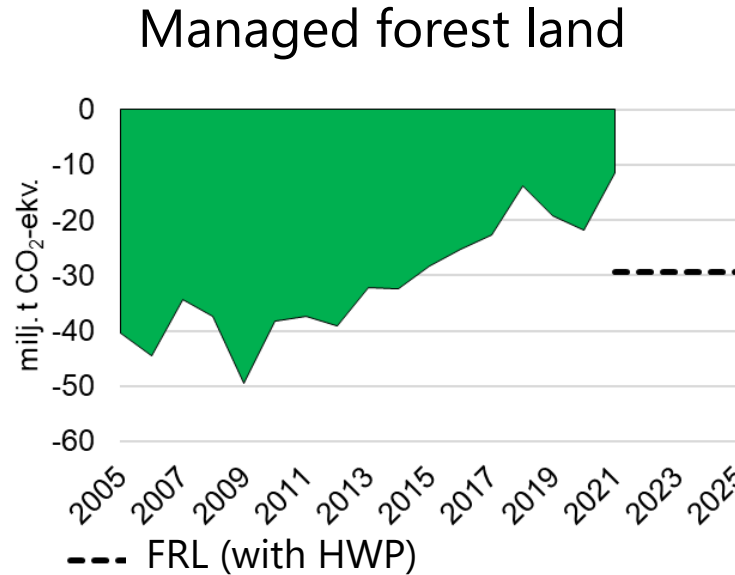
Figure 6.1-1 Net emissions and removals in the LULUCF sector by land-use category and harvested wood products, Mt CO₂ eq.

EU targets for 2021-25 are challenging for Finland

Based on data 12/2022.
Negative values are carbon sinks and positive values show emission sources.

Emissions from cropland have been increasing (mainly from organic soils) and forest sink has reduced

NOTE: y-axis scales vary



Source: https://www.luke.fi/sites/default/files/2022-12/Suomen_LULUCF-sektorin_2021-2025_velvoitteen_toteutuminen.pdf

Point of view: forest and climate neutral Finland by 2035

Finland can be C neutral if there is a sink -20,7 Mt CO₂ ekv. by 2035

- If we assume that growth remains that current level **(1)** 103 mill. m³ OR increases to **(2)** 110 mil.. m³ by 2035
- Results: amount of annual harvesting can be between 62-70 mill m³ per year

Assumptions:

- Level of growth holds (no massive disturbances)
- Distribution of harvests as earlier
- Emissions of organic croplands will be 50% from current by 2035 (8,5 → 4,25 Mt CO₂)
- Reduction of wetland emissions by 2035 (2,2 → 1,1 Mt CO₂)
- HWP sink as in 2021 (-3,1 Mt CO₂)
- Emissions from drained peatlands do not increase substantially
- NOTE: soil emissions after clear-cut have not been taken into account (Korkiakoski et al. 2023)
- NOTE: increase in the firewood consumption has not been taken into account



What we can do ?

ILMAVA-project

Mapping measures to mitigate climate change with land-use sector

Opportunities:

- Climate smart forest management of fertile drained peatlands (no clear-cuts)*
- Paludiculture (higher water table)
- Avoiding deforestation
- Forest fertilisation (ash & N)

<https://jukuri.luke.fi/handle/10024/547830>

Climate smart practises in land-use sector

| Measure | Land area by measure (kha/v) | Time period needed for effects | Emission reductions 2035 (Mt CO eq./v) |
|---------------------------|------------------------------|--------------------------------|--|
| Agriculture on peatland | 4 ■ | ● | 0,91 |
| Rewetting | 5,8 ■ | ● | 0,24 |
| Afforestation | 6 ■ | ● | 0,19 |
| Conservation areas | 6 ■ | ● | 0,17 |
| Deforestation | 6,5 ■ | ● | 0,68 |
| Upland soils | 15 ■ | ● | 0,22 |
| Seedling stands | 30 ■ | ● | 0,31 |
| Nitrogen fertilization | 50 ■ | ● | 0,62 |
| Drained peatland soils | 75 ■ | ● | 1,20 |
| Ash fertilization | 76,7 ■ | ● | 0,28 |
| Agricultural upland soils | 1 000 ■ | ● | 0,69 |
| Wood products | 22 000 ■ | * | 1,50 |
| Decaying wood | 22 000 ■ | ● | 1,26 |

*emissions reduction from wood products are driven by global demand.

● Fast effect ● Slow effect



What can be done in Europe?

Greatest potentials

Sweden, Finland, Spain, France, Poland and Germany

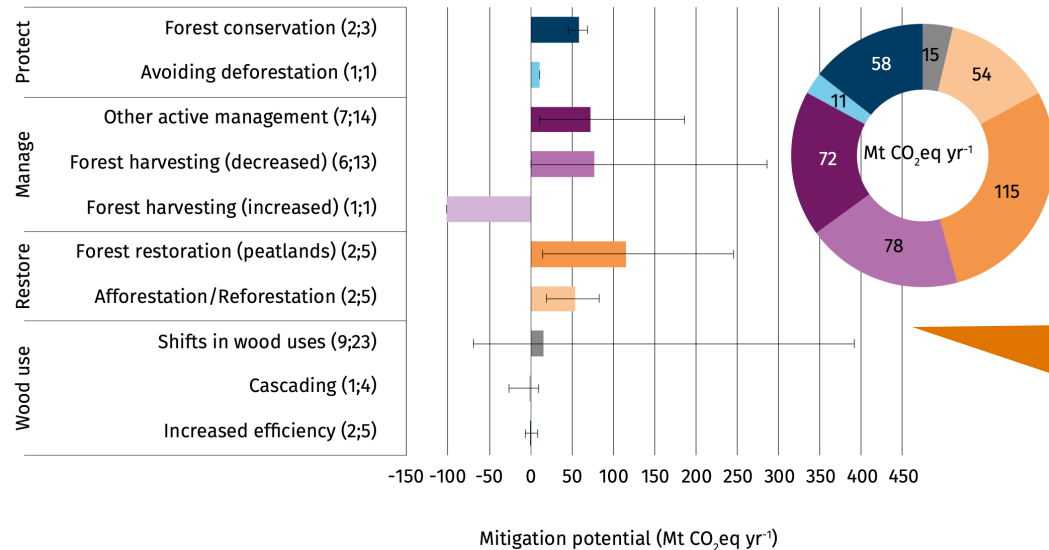


Figure 1. Forest-based mitigation potential by 2050 in the EU-27, Norway, Switzerland and the UK by mitigation activity type.

Source: https://efi.int/sites/default/files/files/publication-bank/2022/efi_fstp_14_2022.pdf

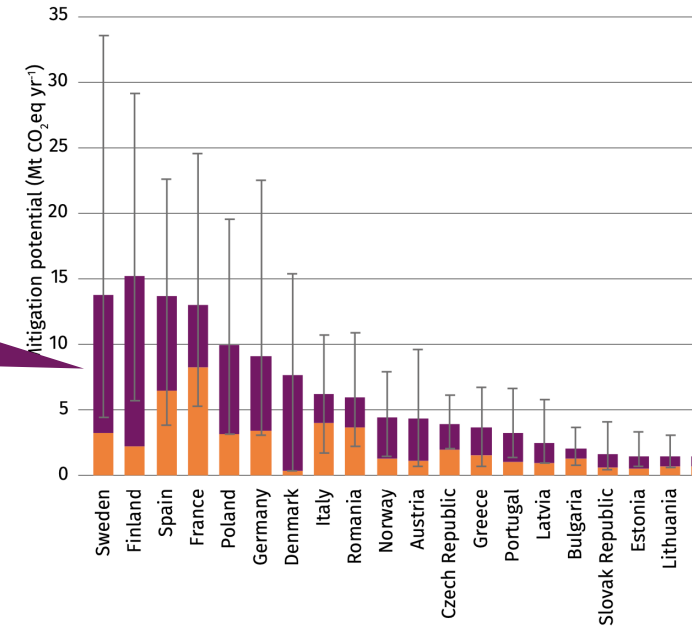


Figure 2. Forest-based mitigation potential by 2050 at the country level.

- Greatest climate benefits**
 - Forest protection
 - Forest management
 - Changes in the harvesting levels
 - Restoration
 - Afforestation
- Smaller climate benefits**
 - Avoiding deforestation
 - Changes in the use of wood

Conclusions:

Carbon neutrality can be achieved only with new additional measures also in the LULUCF sector

There are measures in the Finnish land-use sector:

- Agriculture on organic soils (paludiculture)
- Avoiding deforestation
- Ash fertilisation on peat soils
- Longer rotation periods (sites with low risks)
- Continuous cover forestry on drained peatlands
- Management of state forests



Conclusions II

Permanence of the land-based climate mitigation solutions are often challenged

- If post 2015 droughts are the new normal for Finland
 - Need to think more about adaptation instead of mitigation
 - Tree growth may reduce even more, even more challenges to achieve 2030 EU targets + 2035 climate neutrality



Shopping list

- Information on climate change mitigation measures and their contribution in land-use sector is known → political will is needed
- EU CAP and national subsidies should not prevent climate change mitigation measures (e.g. transfer to paludiculture)
- Subsidies on nutrient-rich drained forests lands should be supporting continuous cover forestry, not preventing it
- EU wide LUCAS soil inventory data is very important (and only soil C inventory) for many MS
 - Data quality for forests have improved starting 2022, please pay attention to that (increases data usability)



Kiitos! Thanks!

