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Paludiculture – research and implementation in the EU

Dr. Franziska Tanneberger, 08.09.2022

Intact mires:

- production > decomposition
- peat and C accumulate

peat = dead plants


bog


fen

Living mire: long term CO_2 sink

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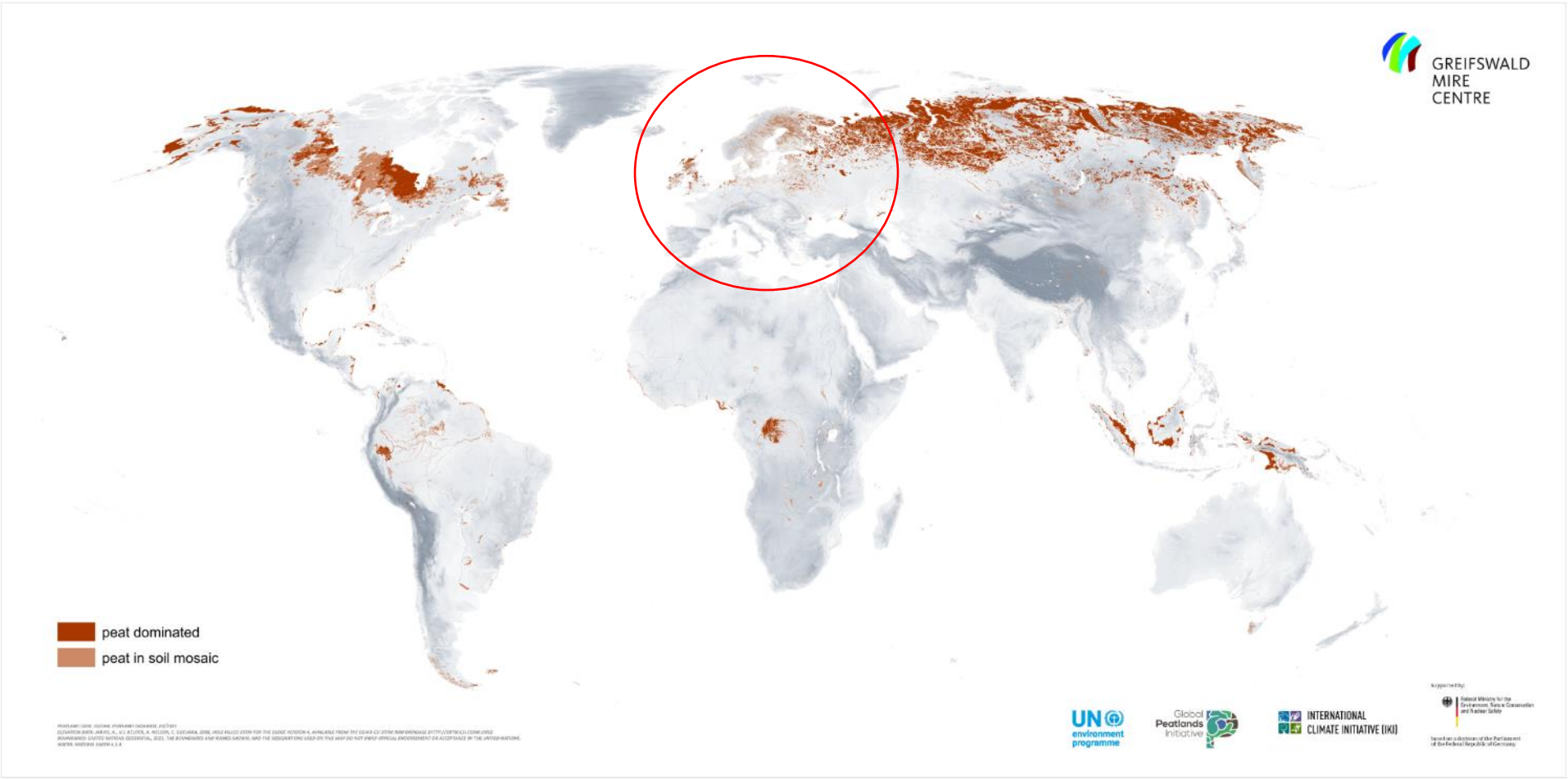
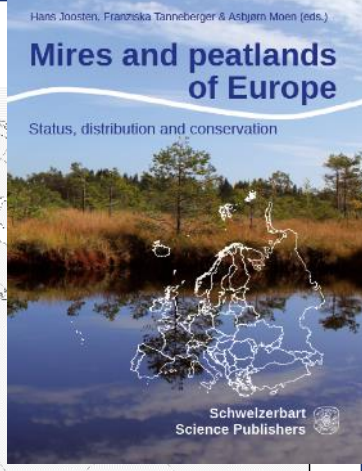
Europe has ~1 mio km² of the World‘s ~6 mio km² of peatland



The peatland map of Europe

F. Tanneberger[1], C. Tegetmeyer[1], S. Busse[1], A. Barthelmes[1], S. Shumka[2], A. Moles Mariné[3], K. Jenderedjian[4], G.M. Steiner[5], F. Essl[5], J. Etzold[1], C. Mendes[6], A. Kozulin[7], P. Frankard[8], Đ. Milanović[9], A. Ganeva[10], I. Apostolova[10], A. Alegro[11], P. Delipetrou[12], J. Navrátilová[13], M. Risager[14], A. Leivits[15], A.M. Fosaa[16], S. Tuominen[17], F. Muller[18], T. Bakuradze[19], M. Sommer[20], K. Christanis[21], E. Szurdoki[22], H. Oskarsson[23], S.H. Brink[23], J. Connolly[24], L. Bragazza[25], G. Martinelli[26], O. Aleksāns[27], A. Priede[28], D. Sungaila[29], L. Melovski[30], T. Belous[31], D. Saveljić[32], F. de Vries[33], A. Moen[34], V. Dembek[35], J. Mateus[36], J. Hanganu[37], A. Sirin[38], A. Markina[38], M. Napreenko[39], P. Lazarević[40], V. Šefferová Stanová[41], P. Skoberne[42], P. Heras Pérez[43], X. Pontevedra-Pombal[44], J. Lonnstad[45], M. Küchler[46], C. Wüst-Galley[47], S. Kirca[48], O. Mykytiuk[49], R. Lindsay[50] and H. Joosten[1]



http://mires-and-peat.net/pages/volumes/map19/map1922.php

Tanneberger et al. 2017

Europe has a high degree of peatland degradation

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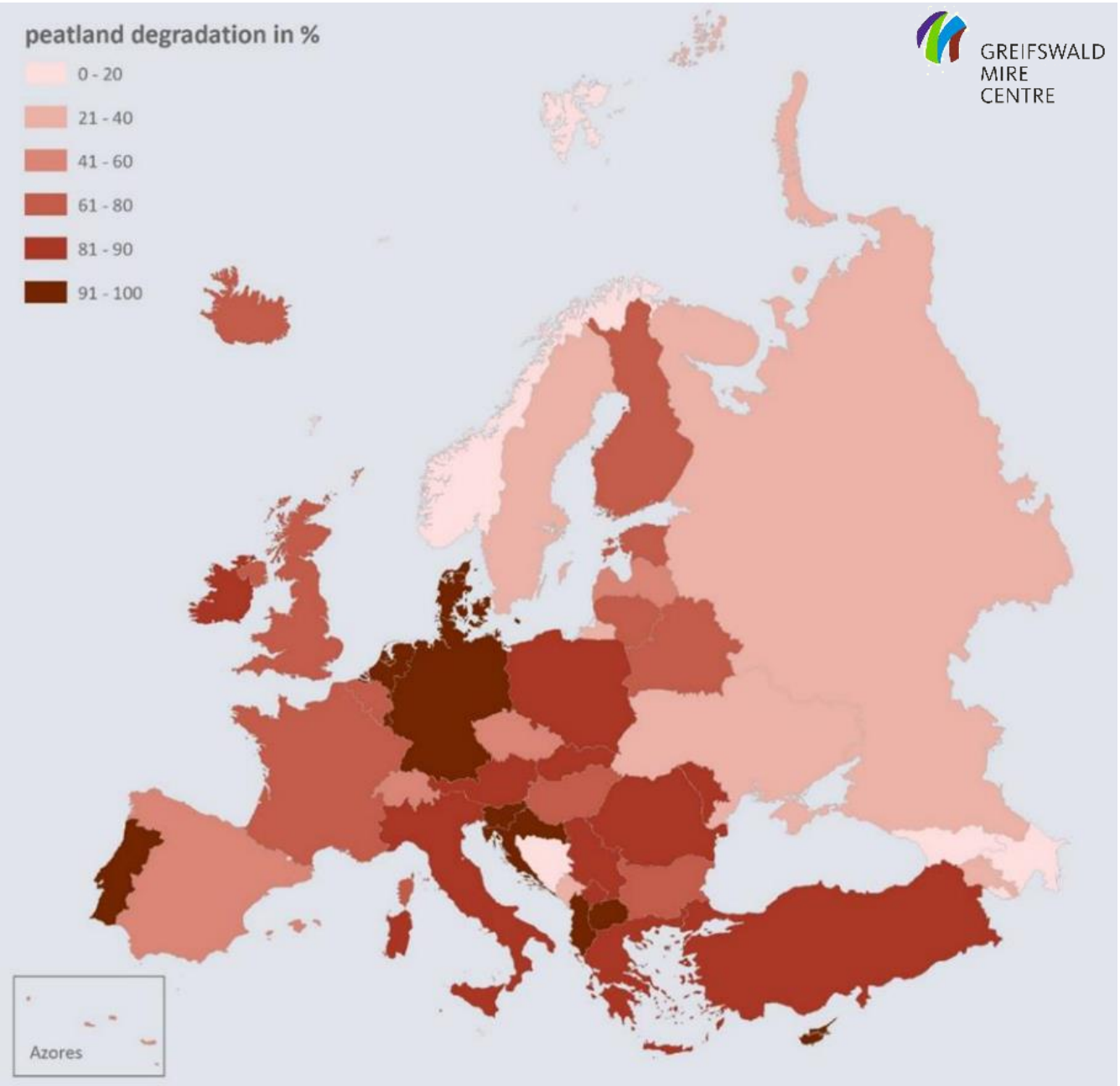


→ 25% of the total peatland area in Europe is degraded

→ in the EU, it is 50%

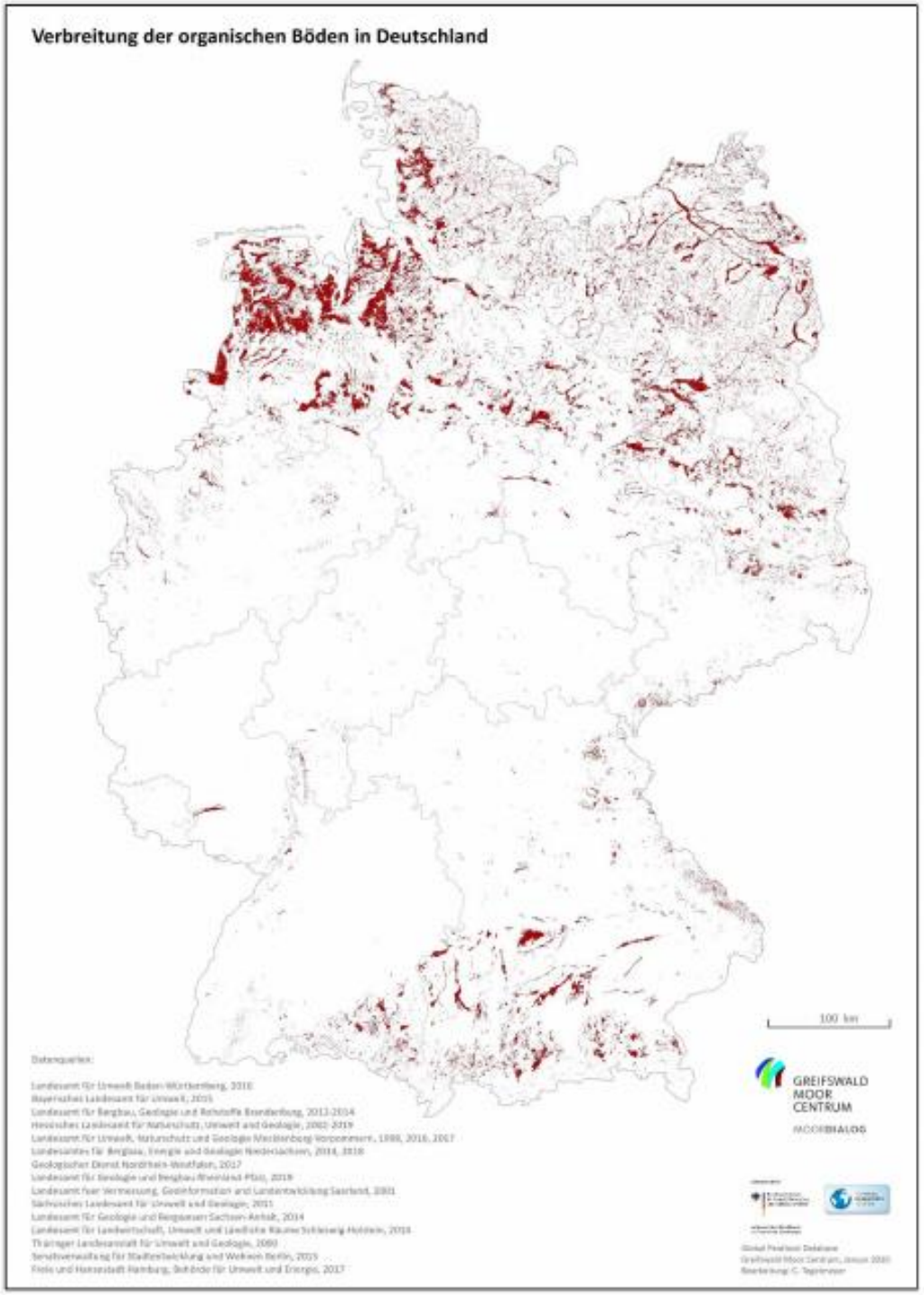
→ in several countries, more than 90%!

Organic (C-rich) soil in Germany

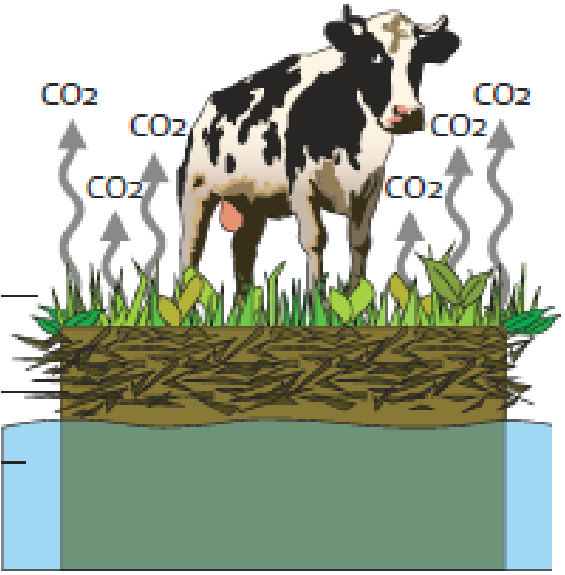
5,2% of land
= 1,8 Mio. ha

Of which only 2% are in natural wet condition

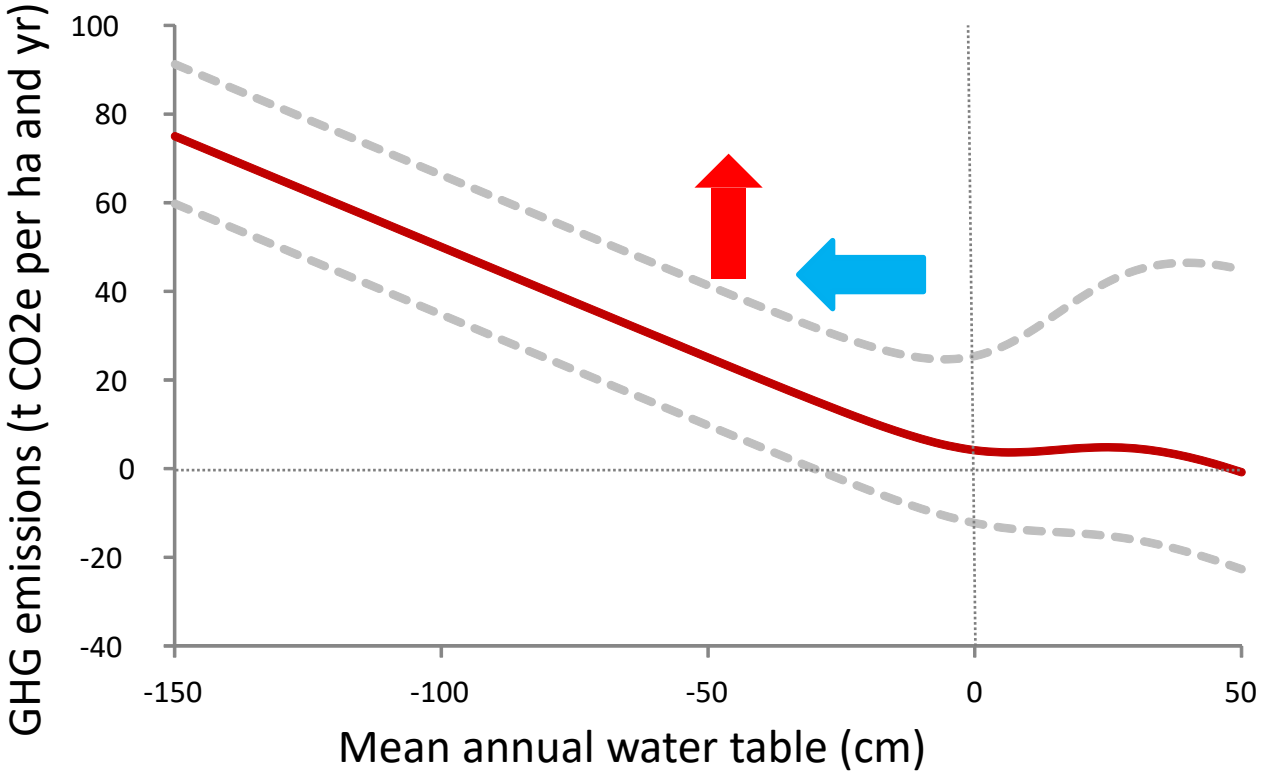
>95% are drained for agriculture, forestry, infrastructure, peat mining



Tegetmeyer et al. 2020



GHG emissions from peatlands → depend mainly on the mean water table



Meta-analysis for CO_2 (n=236) and CH_4 (n=339) emissions (Couwenberg et al. 2011; unpub.)

GHG emissions from peatlands

~30 t CO_2e per ha and year

Grassland on peatland

~40 t CO_2e per ha and year

Cropland on peatland

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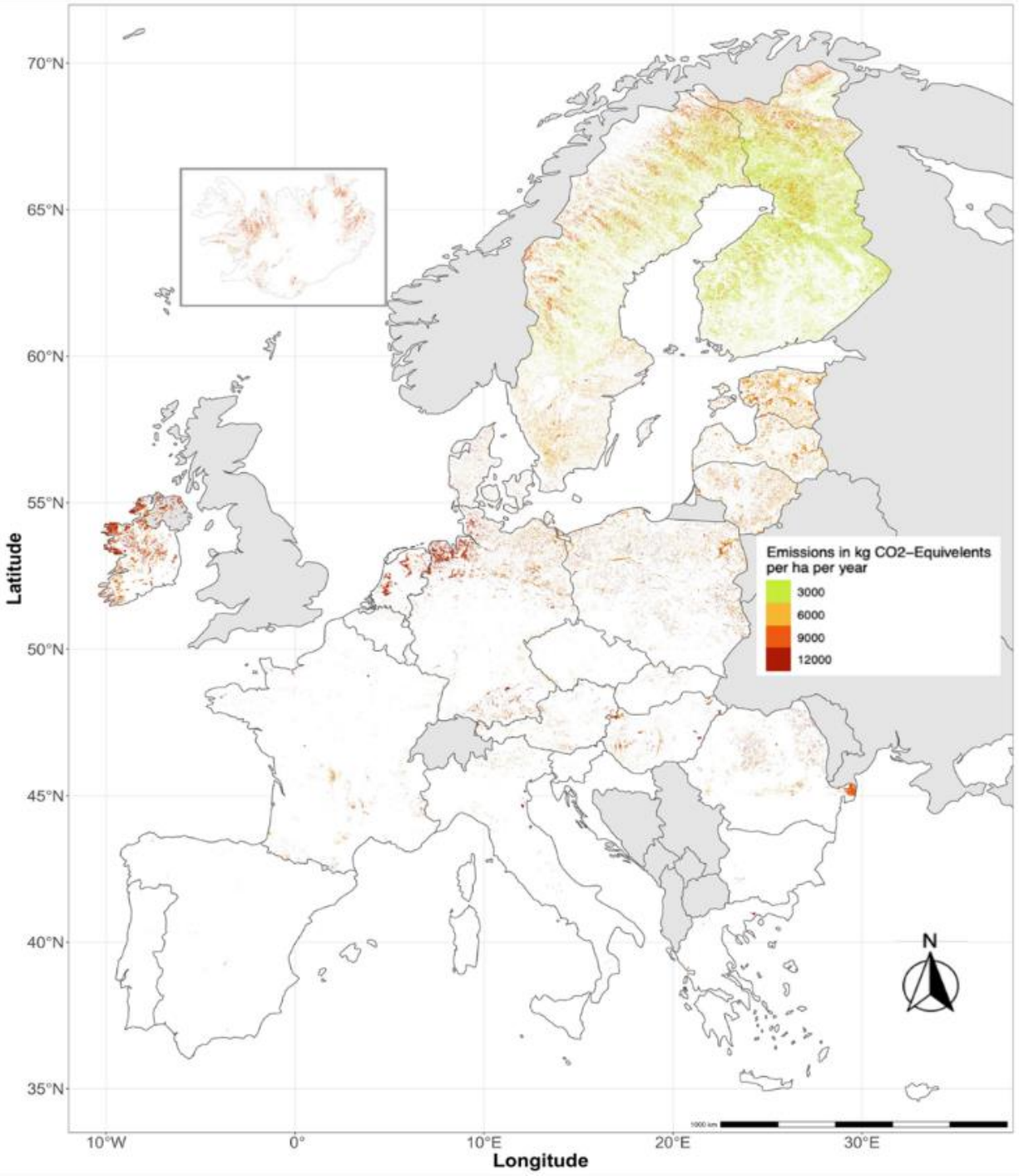
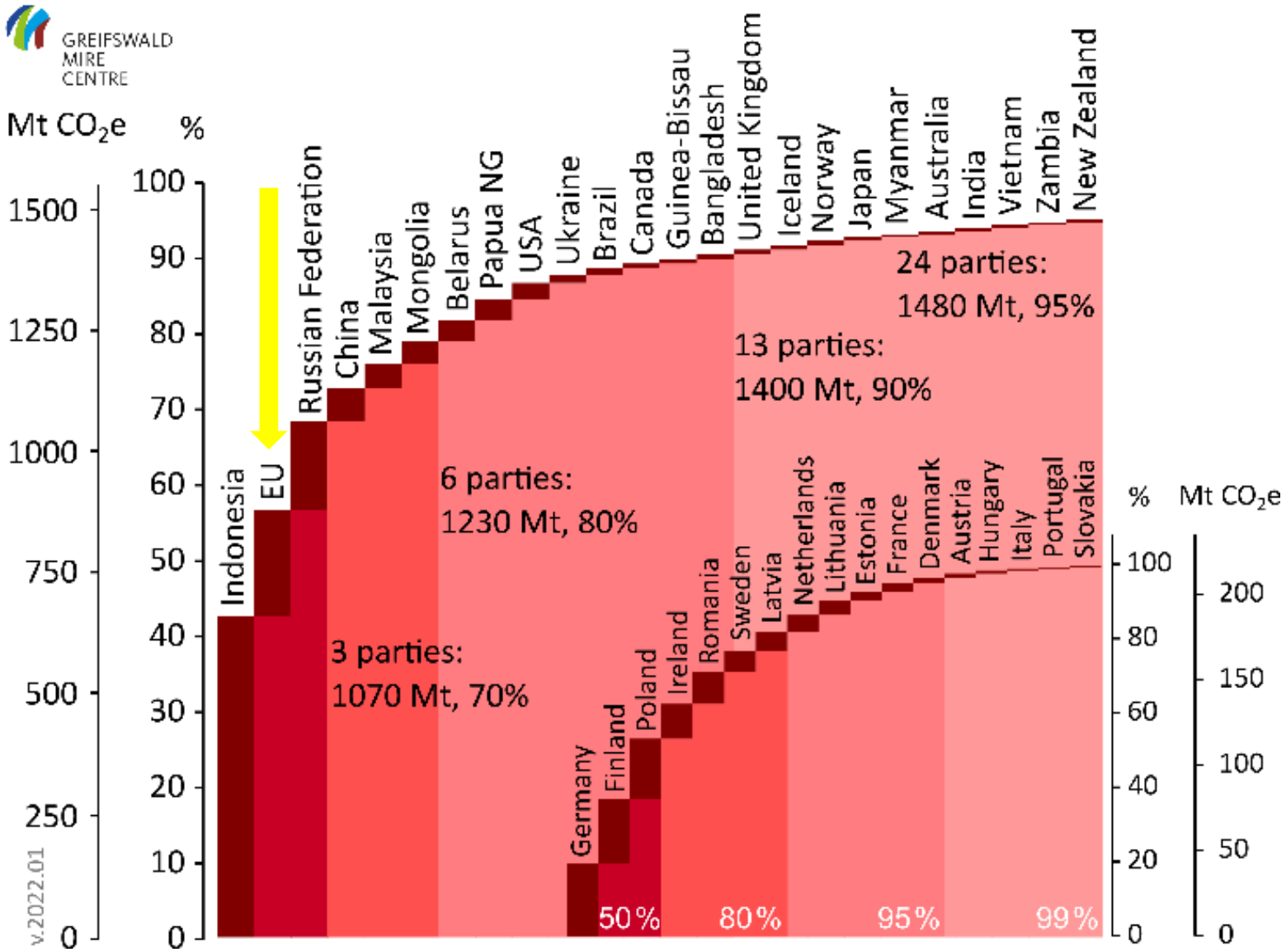


Our peatland area x emission factors → total GHG emissions from drained peatlands

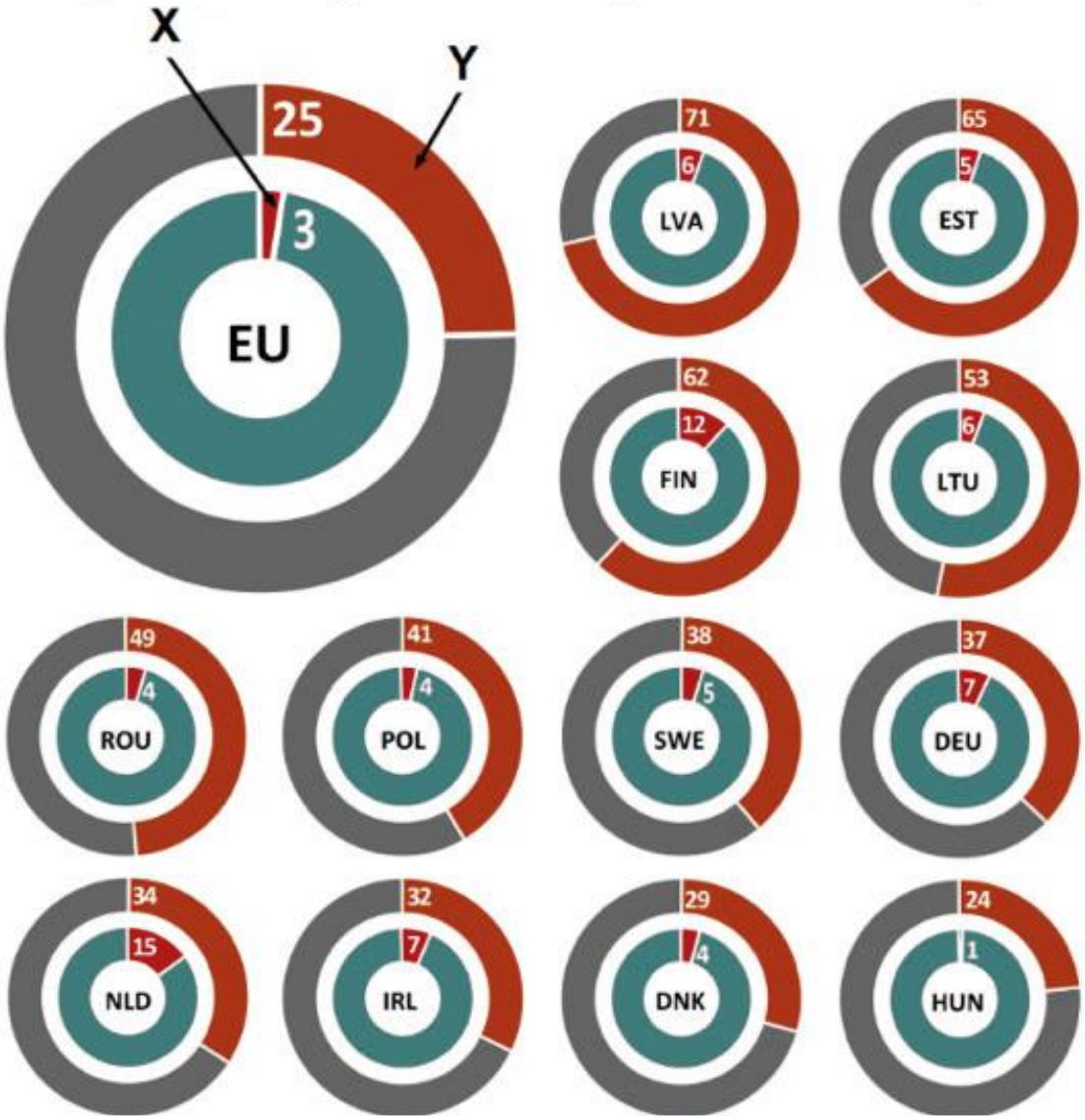
Van Giersbergen (2022)
WUR/LUKE/GMC

= 7 % of EU GHG emissions

EU = one of the two global peatland GHG emission hotspots



Small part of agricultural land = large potential for emission reduction!



A small part of the agricultural land (3%) causes a large part of the GHG emissions related to agriculture (25%)

Rewetting peatlands to **reduce** CO_2 source!

→ Adapt agriculture to wet soil conditions

Western Pomerania

Paludiculture = productive use of rewetted peatlands

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Setting up new utilisation chains for wetland plants:

- fens: grasses (sedges, reed canary grass, reed, cattail), wood (alder)
- bogs: peat moss, sundew

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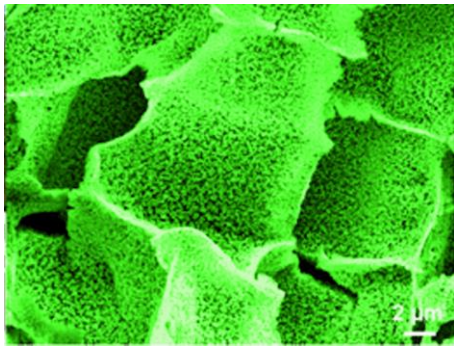
Characteristics of wetland plants

- High productivity
- Set of adaptations
  - Water absorption capacity
  - Strong structures
  - Aerenchym
  - Rotting protection (silicates!)



Use options for paludiculture biomass

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Insulation material from cattail


Reed for thatch


Furniture from alder wood


Combustion of grasses


Packaging material from grasses

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And somehow more sophisticated ☺

Liquor and lemonade with berries

Mozzarella from water buffalo milk

Horticultura substrate from peat moss and Cattail

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Fens: Cattail

Cultivation on rewetted fen
→ 10 ha pilot site in NE Germany

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Bogs: Sphagnum

Cultivation on rewetted bog
→ 17 ha pilot site in NW Germany

Foto: ASEA aerial 2020

New value chains for products with negative emissions

- Construction and insulation material
- Fibre for paper and moldings
- Bioenergy
- Biorefinery
- Potting soil and substrates (Torfausstieg)

Products are climate protective 3-fold:

a) Reduction of soil-borne emissions

b) Replacement of fossil ressources

c) Carbon sequestration in long-life products

d) Carbon sequestration through new peat formation

Paludiculture

lat. palus = swamp

Wet meadows

Cropping paludiculture

Planning needed – where to do what?

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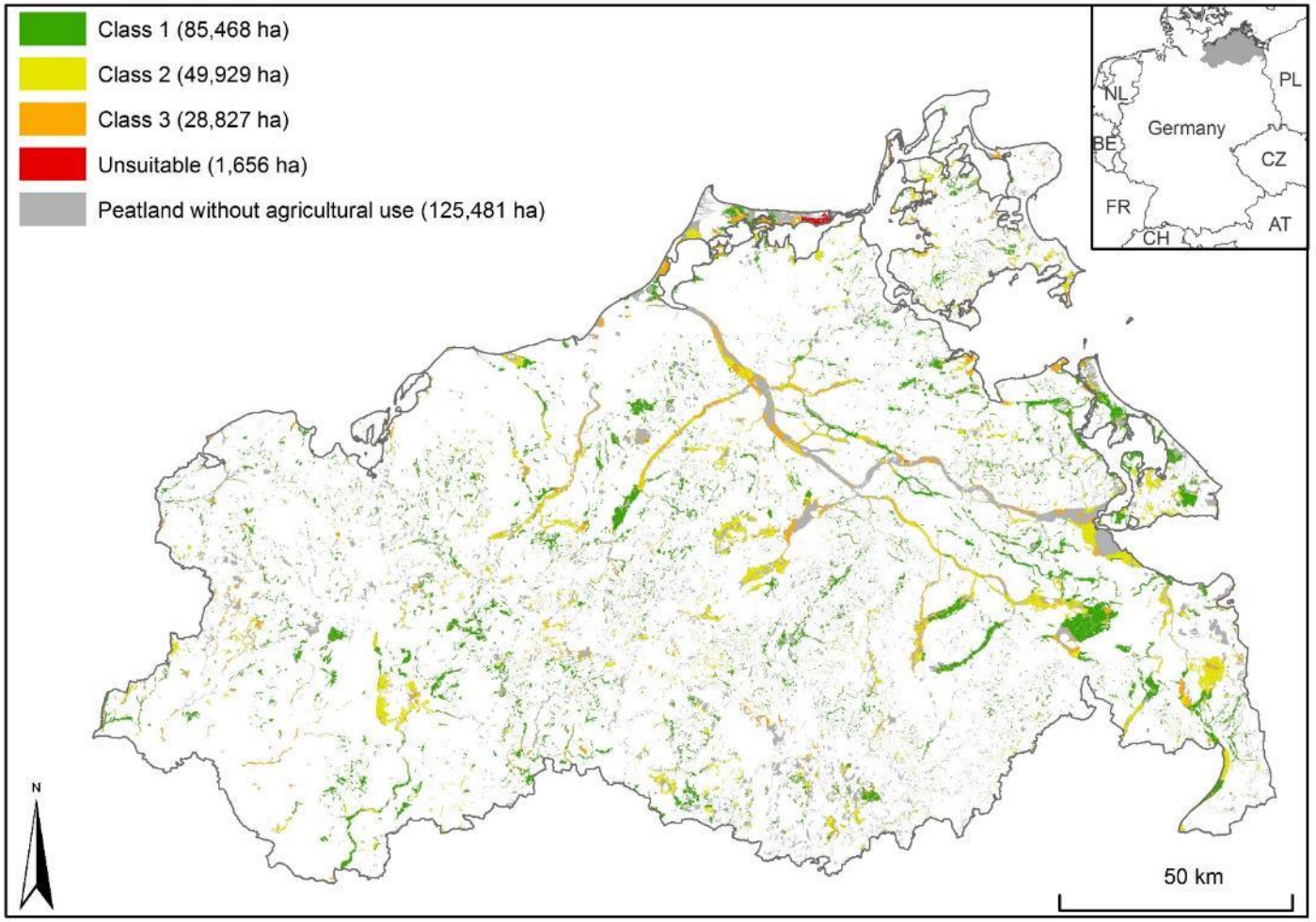
→ Spatial planning for wet grassland and cropping paludicultures based on nature conservation legislation



Tanneberger et al. (2020) Wetlands

Challenges

- Break with **traditions (except for reed cutting)**
- **Transform the business structure**
- **Collect experiences** with paludiculture
- **Build value chains**
- Remunerate climate protection
- **Land ownership**

→ but: no climate neutrality with drained peatlands!

→ agriculture has a strong innovation potential!

From wet islands in a drained landscape to peatland carbon farmers….

Thank your for your attention.

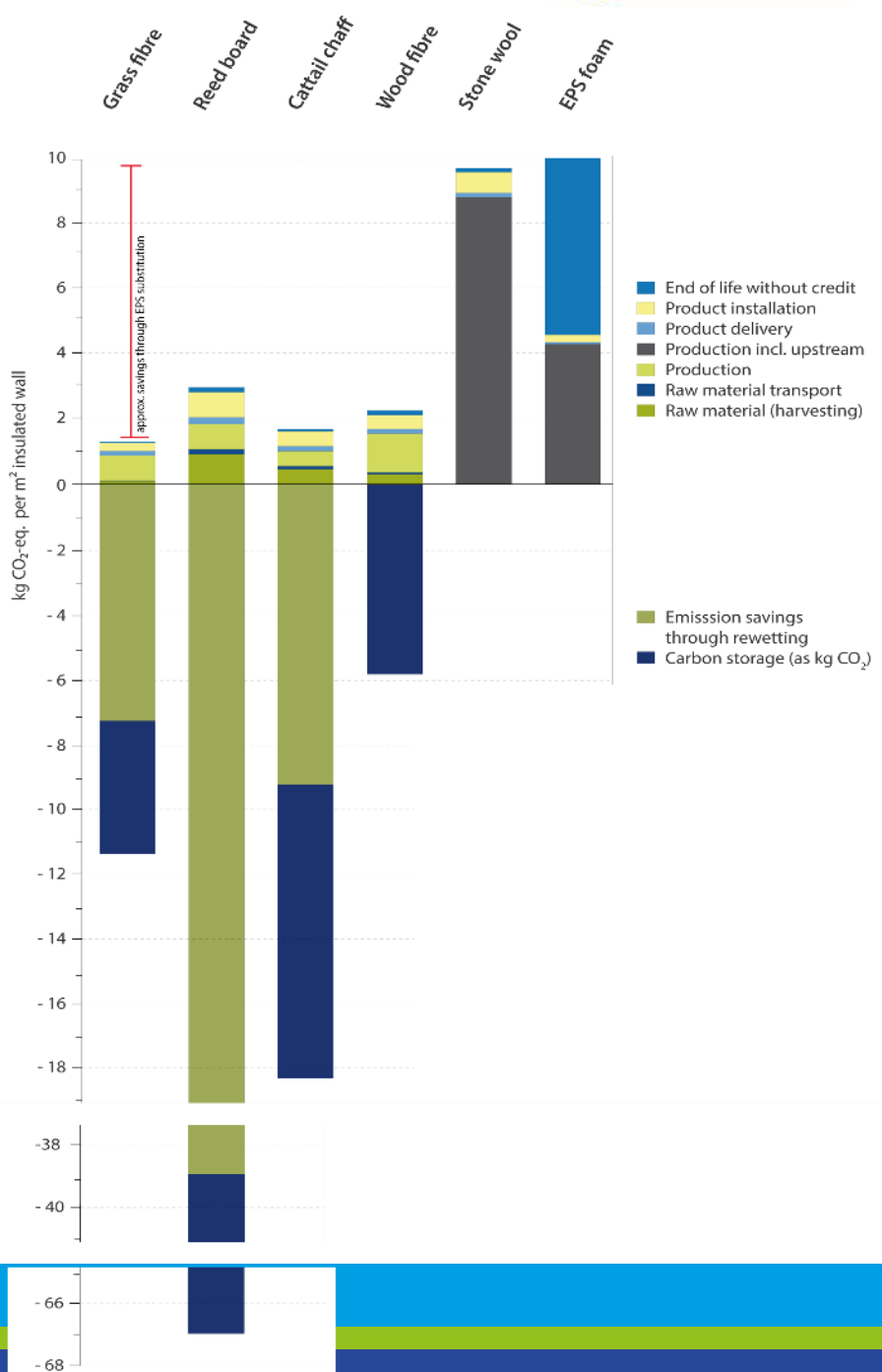
#peatlandsmatter

Insetting potential I: products from paludiculture with negative emissions

Carbon footprint of paludi insulation materials:

1. Emission reduction through peatland rewetting
2. Carbon storage in long life products
3. Substitution of fossil / energy intensive products

→Not included: potential new peat formation



Insetting potential II: Products from paludiculture with negative emissions

Heat production from paludiculture (heating plant Malchin, based on estimates)

- Reduction of soil borne emissions: ~10 t CO_2/ha*yr
- Substitution of natural gas: ~3 t CO_2/ha*yr

= CO_2-saving with „Paludi-heat“: ~0,95 t CO_2 per MWh