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Paludiculture: cultivation methods on rewetted peatlands and economic aspects

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Photo: S. Wichmann



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Paludiculture

„*palus*“ - swamp + „*cultura*“ - cultivation

→ **productive use of wet and rewetted peatlands**

Objectives

- Production → agricultural or silvicultural utilisation
- Maintain peat → stop subsidence and soil degradation
→ reduce GHG emissions
- Optional → other ecosystem services + biodiversity

Species adapted to wet conditions



Bog species

- Peat moss
- Sundew
- Berries



Fen species

- Reed
- Cattail
- Sedges
- Reed canary grass
- Alder
- Willow
- Herbs



Database of potential paludicultural plants (DPPP)

Selection criteria:

- Adapted to wet conditions
- Production of useful biomass in sufficient quantity and quality
- Enable the conservation of the peat soil

→ Currently: ~1130 entries

→ 469 species (38%): promising or with good potential



Harvesting machines adapted to wet conditions

→ Low ground pressure



Utilisation options adapted to biomass properties

- refining traditional biomass uses
 - developing innovative utilisation options
- Biobased-economy: new value chains
- transition from drainage-based to wet peatland use



Wet meadows

→ Sedges, reed canary grass, heterogeneous vegetation stands...

- a) Fibres, e.g. for biodegradable dishes, paper, panels
- b) Bedding material
- c) Fodder: low feeding value (e.g. horses)
- d) Energy: combustion, biogas



Foto: T. Dahms



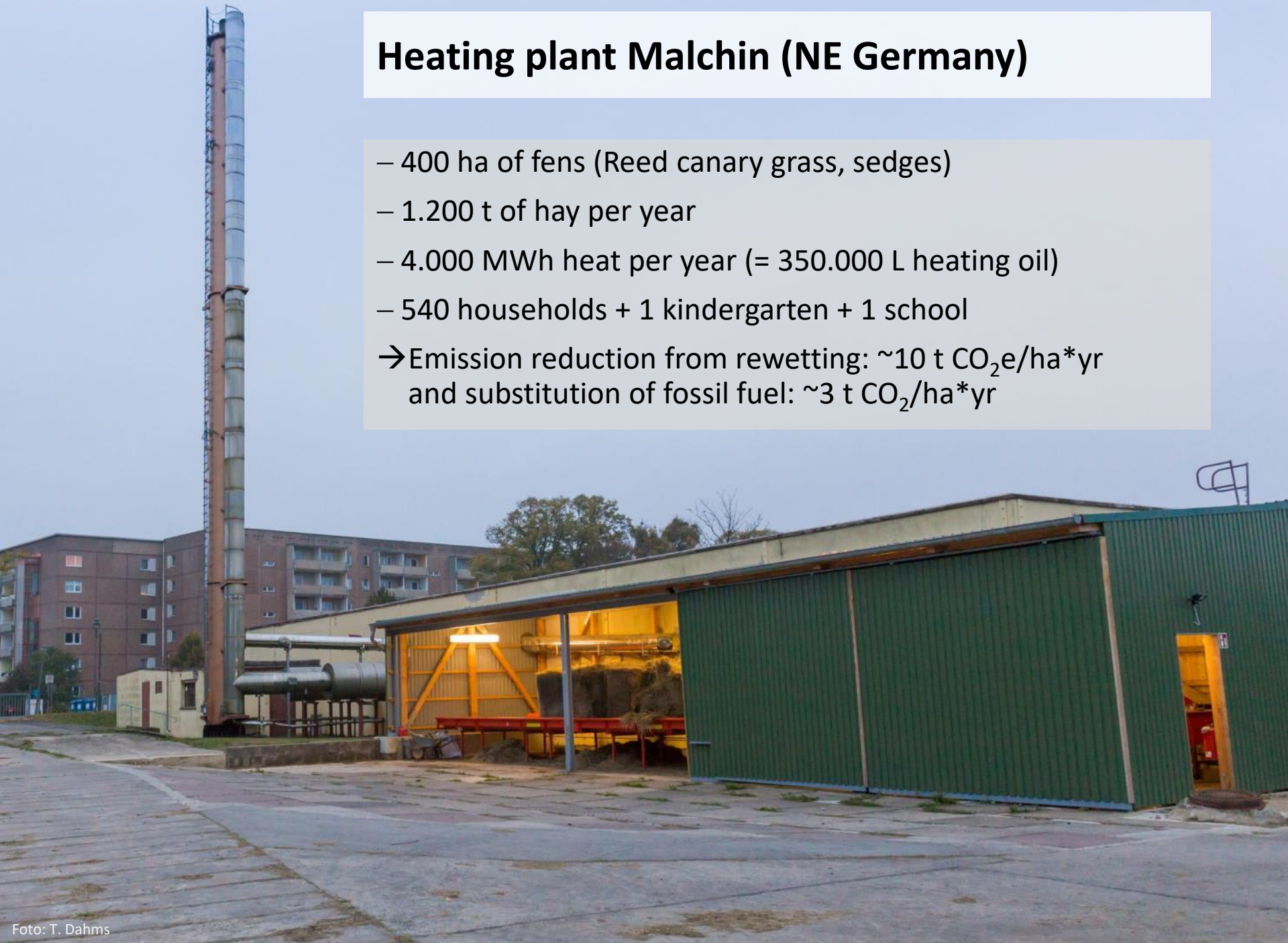
Photo: S. Wichmann



Photo: A. v. Weeren

Heating plant Malchin (NE Germany)

- 400 ha of fens (Reed canary grass, sedges)
- 1.200 t of hay per year
- 4.000 MWh heat per year (= 350.000 L heating oil)
- 540 households + 1 kindergarten + 1 school
- Emission reduction from rewetting: $\sim 10 \text{ t CO}_2\text{e/ha*yr}$
and substitution of fossil fuel: $\sim 3 \text{ t CO}_2\text{/ha*yr}$



Water buffalos (*Bubalus bubalis*): meat



Reed (*Phragmites australis*)

thatching, construction, insulation, paper, combustion, biogas...



Reed as traditional roofing material across Europe

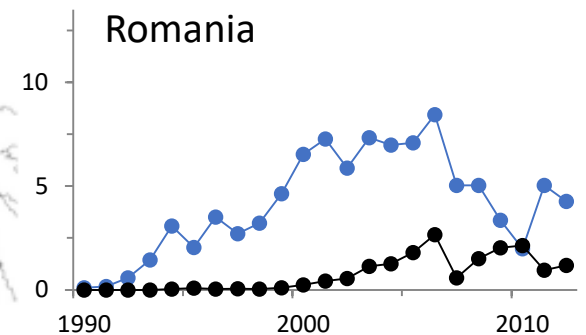
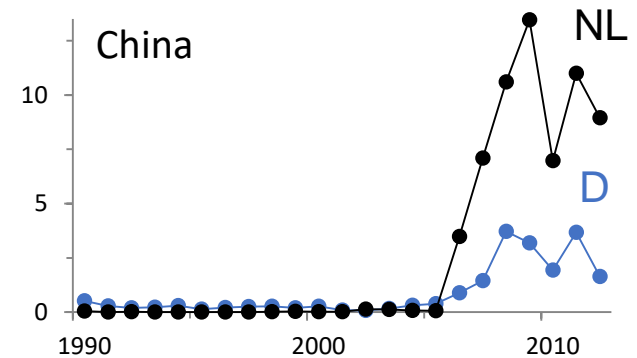
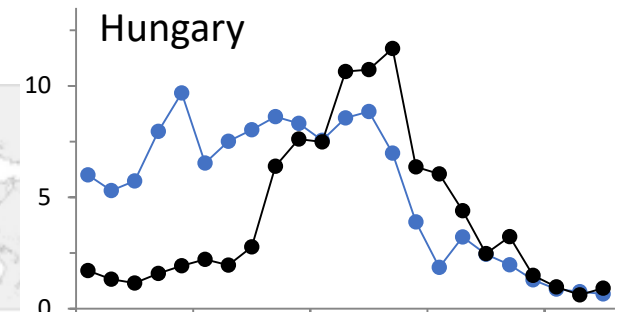


Reed market in Europe (1990–2012)

Wichmann & Köbbing 2015,
Ind. Crops and Products

Demand: ca. 15 Mio bundles / year

NL, D, UK, DK → **import rate: 75-85%**



Cattail: construction & insulation

- Spongy tissue → good insulation properties
 - Supporting tissue → load-bearing components
- marketable products + high demand



Foto: S. Wichmann



www.typhatechnik.com
www.naporo.com

Tiny house made from paludi-biomass

Mobile showroom:

- Cattail → construction board
- Reed → insulation panel
- Alder → interior wall covering
- Wet grassland → furniture

→ High value, renewable, low energy consumption, cascade utilisation



Sphagnum biomass: high-quality growing media constituent



Sphagnum farming on former bog grassland

Initial state → site preparation + seeding → established culture





Cultivated *Sphagnum* biomass:

- Profitable as diaspores and for orchid cultivation
- Competitive in quality with peat, but not in price
→ 10% top up for sustainable end product needed
- Rewetting: $\sim 15 \text{ t CO}_2/\text{ha} \cdot \text{yr}$ + peat replacement: $\sim 15 \text{ t CO}_2/\text{ha} \cdot \text{yr}$

Paludiculture: multi-fold climate benefits

- a) Climate smart agriculture
- b) Renewables replacing fossils (e.g. fuel, phasing out peat)
- c) Carbon capture + long-term storage (e.g. building material)

→ Why is there little large-scale implementation?



Paludiculture

= paradigm shift in peatland use

- 1) Raise **water level** instead of drainage
- 2) Use **crops and machines** adapted to high water levels
- 3) Develop innovative **utilisation options + new markets**
- 4) Comprehensive support for wet livelihoods needed:
 - Align **agricultural policy** to climate goals

EU CAP reform

= “window of opportunity”

EU level

- Conditionality: protection of carbon rich soils (GAEC 2)
- Pillar I: eligibility for agricultural payments (Article 4)
- Pillar I: eco-schemes

National strategic plans

- Pillar II: plenty of possibilities for tailor-made solutions!
Investment, advice, cooperation, AECM, ...
- Article 92: Increased ambition with regard to environmental- and climate-related objectives

→ Set the course today to make future peatland utilisation sustainable

Green deal requires a paradigm shift in peatland utilisation

No paradigm shift without ambitious CAP



Thank you for your attention!



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