Paludi heating plant Malchin

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Utilisation of biomass from wet fen meadows in a local heating plant

agrotherm GmbH

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Harvesting areas

The biomass fuel for the heating plant is produced on wet fen meadows at lake Kummerow, Mecklenburg-Vorpommern.

The fens had been drained for agriculture but were affected by the rewetting of the adjacent area and the changing vegetation was no longer suitable for suckler cow husbandry.

Fen meadows	vegetation stands dominated by reed canary grass and sedges
Yield (2013)	Ø 4.5 and. Ø 6 t DM per hectare and year
Area	ca. 300 ha fen meadows (harvestability depends on weather conditions)

The distance between the harvesting areas and the heating plant is approximately 12 km (see fig. 1).

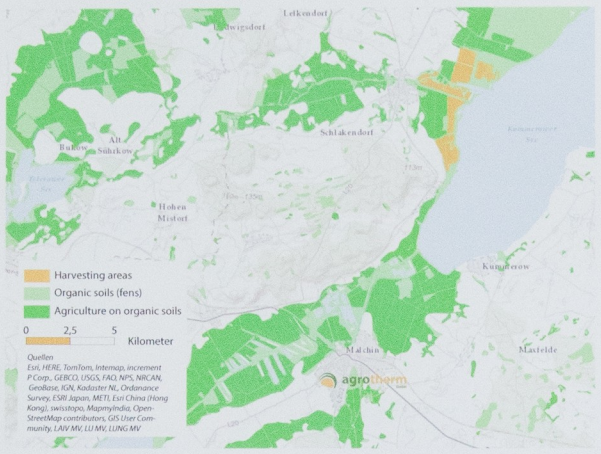

Fig. 1: Fen- and harvesting areas at lake Kummerow

Biomass harvest

The fen meadows are harvested once a year between June and September for hay (see fig. 2-4). Harvest depends on good weather conditions and is only possible during dry periods in the summer.

Machinery	Adapted grassland machinery: tractor with wide tires, light, fixed chamber round baler with tandem axle
Harvesting technique	Multi stage hay harvest: mowing, tedding, windrowing, baling, sin-gle/double bale retrieval
Round bales	Weight 185 to 200 kg DM, diameter 120 cm, mineral oil equivalent ca. 85 l
Biomass yield	about 800 – 1,200 t fuel (4,200 – 6,500 bales)
Energy yield	14.9 GJ per t FM (w 15 %), heat production 4,000 MWh per year, which equals 350,000 l heating oil

Fig. 2-4 Landscape protection area, mowing, round baler with tandem axle (lensescape.org)

The heating plant

Burning herbaceous biomass requires adapted boilers. Compared to wood, the high ash content and critical constituents (e.g. Cl, S, N) are a challenge which must be met with e.g. special corrosion protection, moving grids and filter systems (see fig. 5-7).

Boiler	Lin-Ka HE 800, modified
Rated power	800 kW
Heat production	>4,000 MWh per year (=350,000 l oil)
Fuel demand	1,600 t/6,500 round bales
Investment costs	640,000 €
State subsidy	182,000 € (EU-EFRE-Mittel, MLUV M-V)
Initial idea	in the year 2000
Planning time	6 years
Construction time	6 months
Opening	June 2014

Integrated in an existing heating grid in Malchin, the biomass boiler is providing heat for 540 households, a kindergarten, two schools and serveral office buildings.

The biomass boiler is providing heat for the basic and medium load while the existing natural gas boiler is buffering peak loads and down times.

Fig. 5-7: Discussion with minister Till Backhaus at the bale shredder, biomass boiler, ash inside the boiler (lensescape.org)

Paludiculture

Drained peatlands cause high greenhouse gas emissions and other negative impacts on the environment. These impacts can be reduced by rewetting.

The use of biomass from rewetted peatlands, so-called paludiculture (Latin 'palus' = swamp), combines the reduction of environmental impacts from peatland drainage with the benefits of replacing non-renewable fossil resources by renewable raw material and fuel.

Using biomass from reed, reed canary grass and sedge dominated stands as solid fuel (fig. 8-10) is reasonable due to high efficiency rates during combustion and an high demand for heat, which has a large share of our total energy demand.

Fig. 8-10: Sedge biomass used as solid fuel (lensescape.org)

Ecosystem services

The biomass heating plant Malchin combines peatland protection, sustainable energy provision, landscape protection and new perspectives for local added value in a unique way. It is creating several synergies:

Bioenergy	substitution of natural gas saves greenhouse gas emissions, approximately 850 t CO_2-eq. per year.
Climate protection	avoiding greenhouse gas emissions compared to drained peatlands (appr. 10 t CO_2-eq. per hectare)
Water protection	avoiding nutrient discharge and eutrophication compared to drained peatlands
Biodiversity	maintaining and creating habitats of rare species
Tourism	maintaining a diverse, open landscape (Fig. 11-13)

Fig. 11-13: Maintaining a diverse, open landscape *(lensescape.org)*

Local cooperation

The realization was made possible through a network of local stakeholders.

Plant operator	Agrotherm GmbH Schwinkendorf, managing director: Ludwig Bork
Biomass producer	Landwirtschaftsbetrieb Hans Voigt, Moorhof GmbH
Local energy supplier	Energicos Malchin GmbH
Heat consumer	Stadt Malchin, WOGEMA (540 households, a kindergarten, two schools, office buildings)
Scientific monitoring	University of Greifwald, DUENE e.V.,
Förderverein „Naturschutz im Peenetal" e.V.	

Awards

The exemplary implementation was awarded with the German local sustainability award (*Deutscher Lokaler Nachhaltigkeitspreis ZeitzeicheN*).

More information: **www.paludikultur.de** **www.niedermoor-nutzen.de**

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