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

Harvesting areas

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

The fen meadows were harvested once a year between June and September for hay. Harvest depends on good weather conditions and is only possible during dry periods in the summer.

Machinery
- Grassland machinery: tractor with wide tires, light, fixed chamber round baler with tandem axle

Harvesting technique
- Multi-stage hay harvesting: mowing, tedding, windrowing, baling, gin-gin-dinkle 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 DM (15%), heat production: 4,000 MWh per year, which equals: 350,000 l heating oil

The heating plant

Burning herbaceous biomass requires adapted boilers. Compared to wood, the high ash content and critical constituents (e.g., Ca, 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 (1,550,000 t oil)

Fuel demand
- 1,600 t/yr, 500 round bales

Investment costs
- 640,000 €

State subsidy
- 182,000 € (BDE-FFE-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 548 households, a kindergarten, two schools and several 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.

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.

Ecosystem services

The biometh 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:

- Biomass substitution of natural gas saves greenhouse gas emissions, approximately 85 t CO₂eq per year.
- Climate protection
  - avoiding greenhouse gas emissions (approx. 10 t CO₂eq 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)

Local cooperation

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

- Plant operator: Agrotherm GmbH Schwinkendorf
- Managing director: Ludwig Bork
- Landwirtschaftsbetrieb Hans Voigt, Moorhof GmbH
- Local energy supplier: Energicso Malchin GmbH
- Heat consumer: Stadt Malchin, WEGEMA (540 households, a kindergarten, two schools, office buildings)

Scientific monitoring: University of Greifswald, DÜNE e.V., Förderverein „Naturschutz im Peninaltal“ e.V.

Awards

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

More information: www.paludikultur.de

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