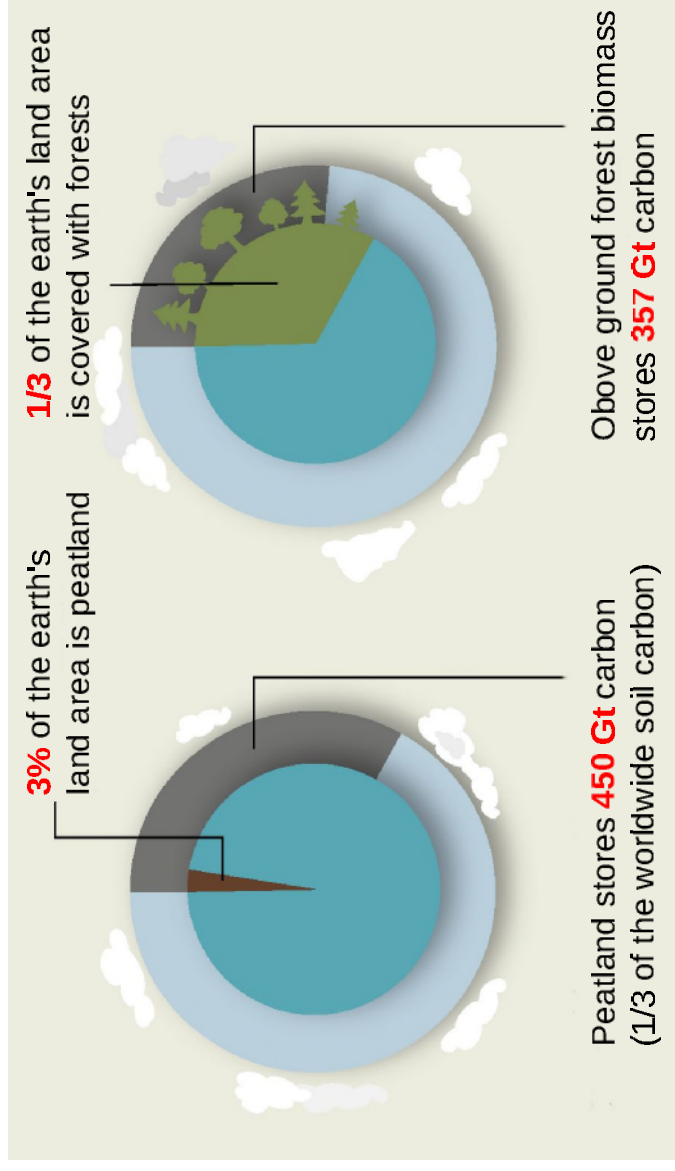
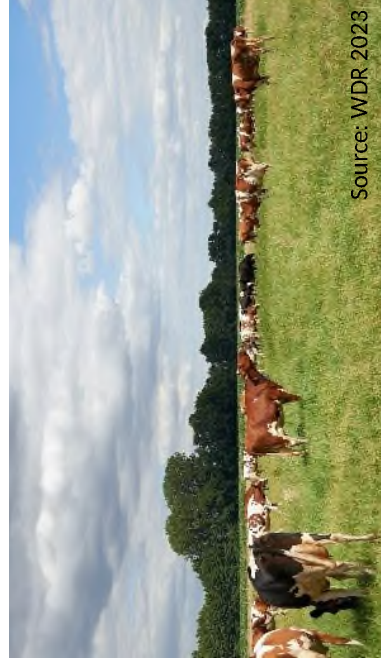


Biomass from Paludiculture for the Circular Bioeconomy

*R. Pecenka, C. Lühr, M. Heiermann, C.
Fiege, A. Marten, L. Landgraf*

Peatland

- Peatland (organic soils) are one of the most important carbon storages and very fertile soils
□ drained for agriculture (Europe: 60 M ha /Germany: 1.3 M ha)



Source: FNR 2022/ helengrubber.de

How rewetted peatland can be used for agriculture?



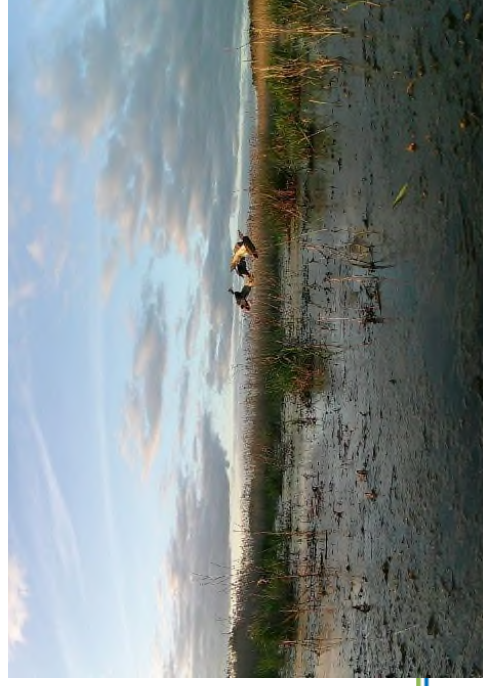
Crop production?

Wet soil conditions not suitable

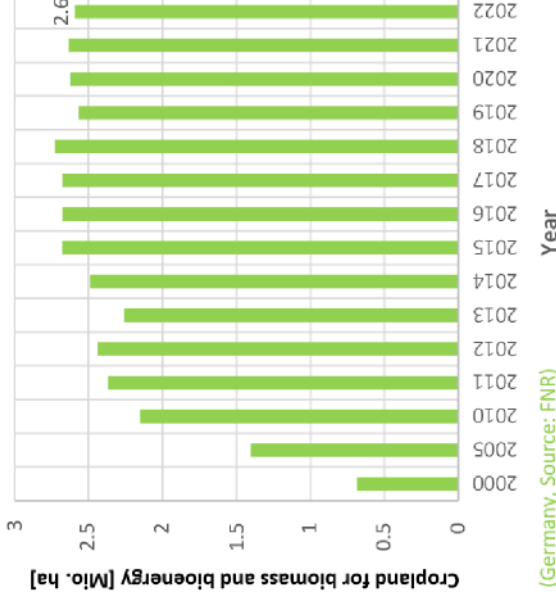
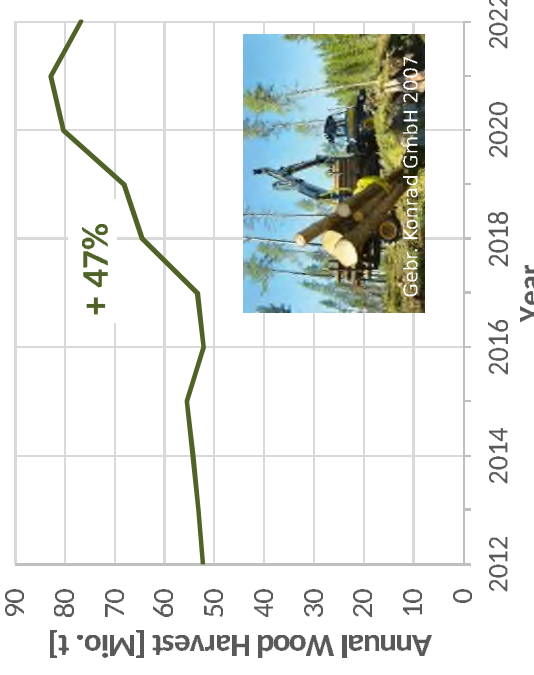
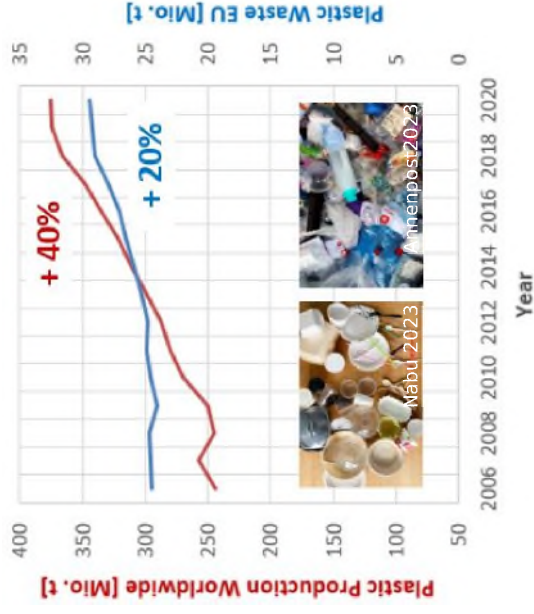
Livestock?

Grass species with low/no feeding value

What to do? Change 8% of Germany's agricultural land into natural reserves?



Growing raw material demand for bioeconomy



- Demand for raw materials is increasing
- Change from fossil to renewable resources to reduce GHG emissions
- Agricultural land and forests are limited



- Efficient land use and production
- Valorisation of residues
- Development of carbon cycles

How rewetted peatland can be used for agriculture?



Crop production?

Wet soil conditions not suitable

Livestock?

Grass species with low/no feeding value

How rewetted peatland can be used for agriculture?



Crop production?

Wet soil conditions not suitable

Livestock?

Grass species with low/no feeding value



Canary grass
(*Phalaris arundinacea*)



Common reed
(*Phragmites australis*)

Biomass
production? ✓

How rewetted peatland can be used for agriculture?



Crop production?

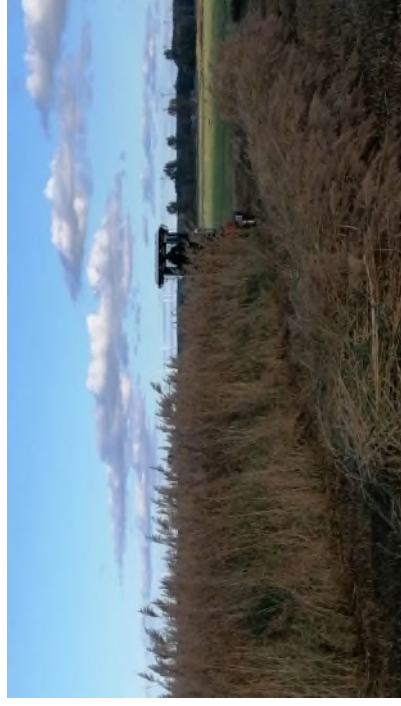
Wet soil conditions not suitable

Livestock?

Grass species with low/no feeding value



Canary grass
(*Phalaris arundinacea*)



Common reed
(*Phragmites australis*)

Biomass production? ✓

- High biomass yields (4 – 14 t_{DM} ha⁻¹)
- specialised equipment required

Diverse raw materials and logistics



Early harvest



Late harvest



Dry



Silage



Wet field conditions



“Dry” field conditions

- Biology
- Location
- Harvest time
- Harvest technology
- Storage
- Processing
- ...

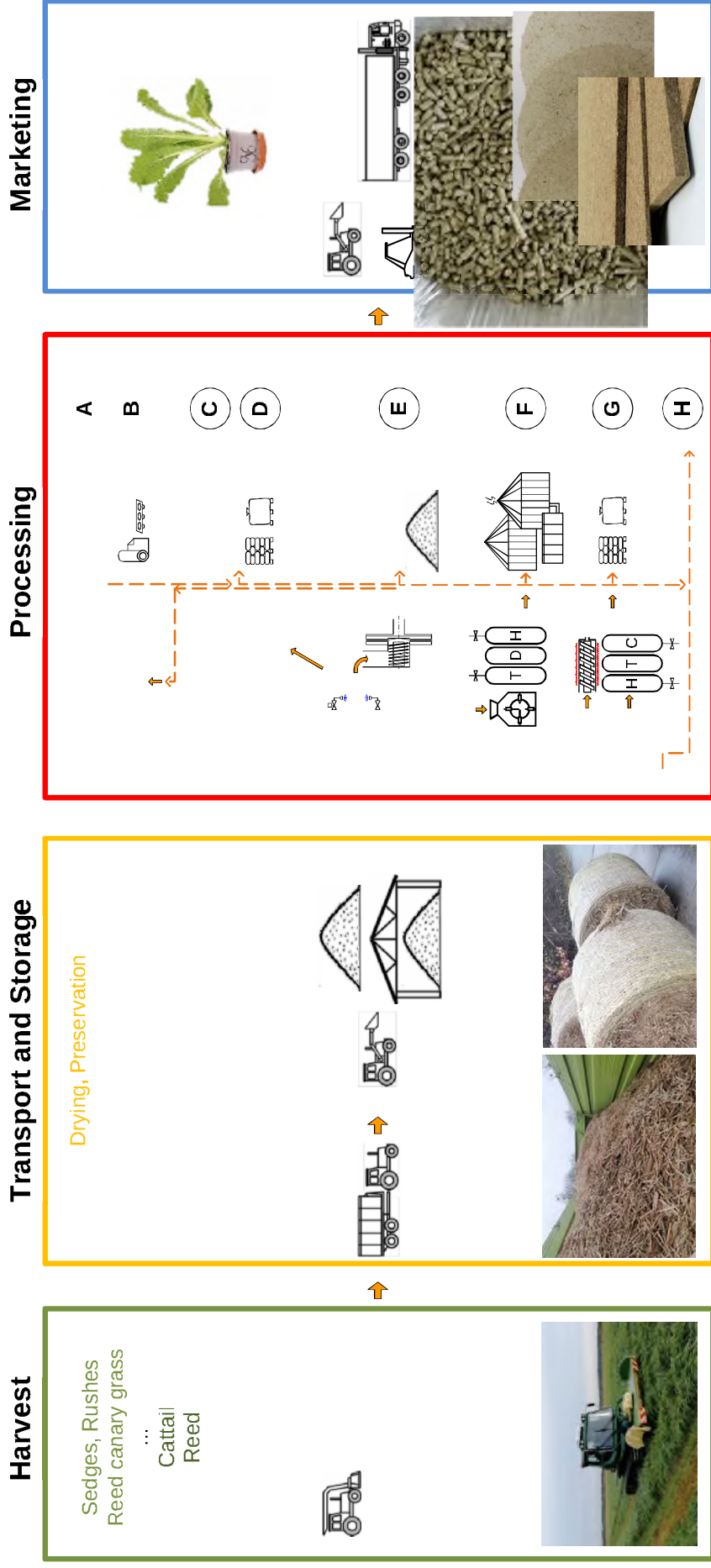
Development of adapted process lines



Fresh/green



Process lines for biomass from peatland

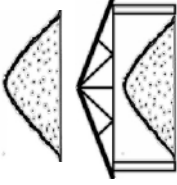


- A Fibre for boards and insulation materials
- B Cardboard, paper and molded pulp
- C Pellets and briquettes as fuel
- D Pellets as bedding e.g. for organic farming (poultry farming)
- E Fibres for peat substitutes
- F Residues, thermobarical hydrolysis products for biogas & lactic acid production
- G Biochar from pyrolysis, HTC & gasification technology
- H Co-combustion in biomass cogeneration plant

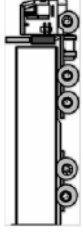
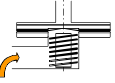
Process Lines - Challenges



Agricultural production



Industrial processing



- Technology availability
- Diversity / Field conditions
- Raw material type/quantities
- Raw material quality
- Transportability
- Costs, environment...
- Innovative products
- Year-round supply
- Consistent material quality
- Material quantities, logistics
- Value of environmental services
- Standards ...

Fibre production in a pilot plant at ATB



Defibration



Defibrillation



Drying



Fibre



Silage



Fibre properties (after extrusion)

	Biomass	Ash in %DM	Crude fibre in %DM	Hemicellulose in %DM (NDF-ADF)	Cellulose in %DM (ADF-ADL)	Lignin in %DM (ADL)	Holocellulose in %DM (NDF-ADL)
Hay	Sedges	9.53	28.32	25.72	25.23	18.04	50.94
	Cattail	5.23	29.83	30.63	30.90	18.22	61.53
	Rushes	6.31	26.21	32.28	31.87	6.98	64.15
Fresh	Reed canary grass	6.09	27.03	37.63	33.48	5.88	71.10
	Common reed	9.40	27.54	29.86	33.64	9.83	63.49
	Sedges	9.54	23.49	32.22	25.50	6.20	57.72
Silage	Reed canary grass	4.80	29.35	37.39	32.47	6.18	69.86
	Sedges	5.98	24.91	24.03	26.42	11.17	50.45

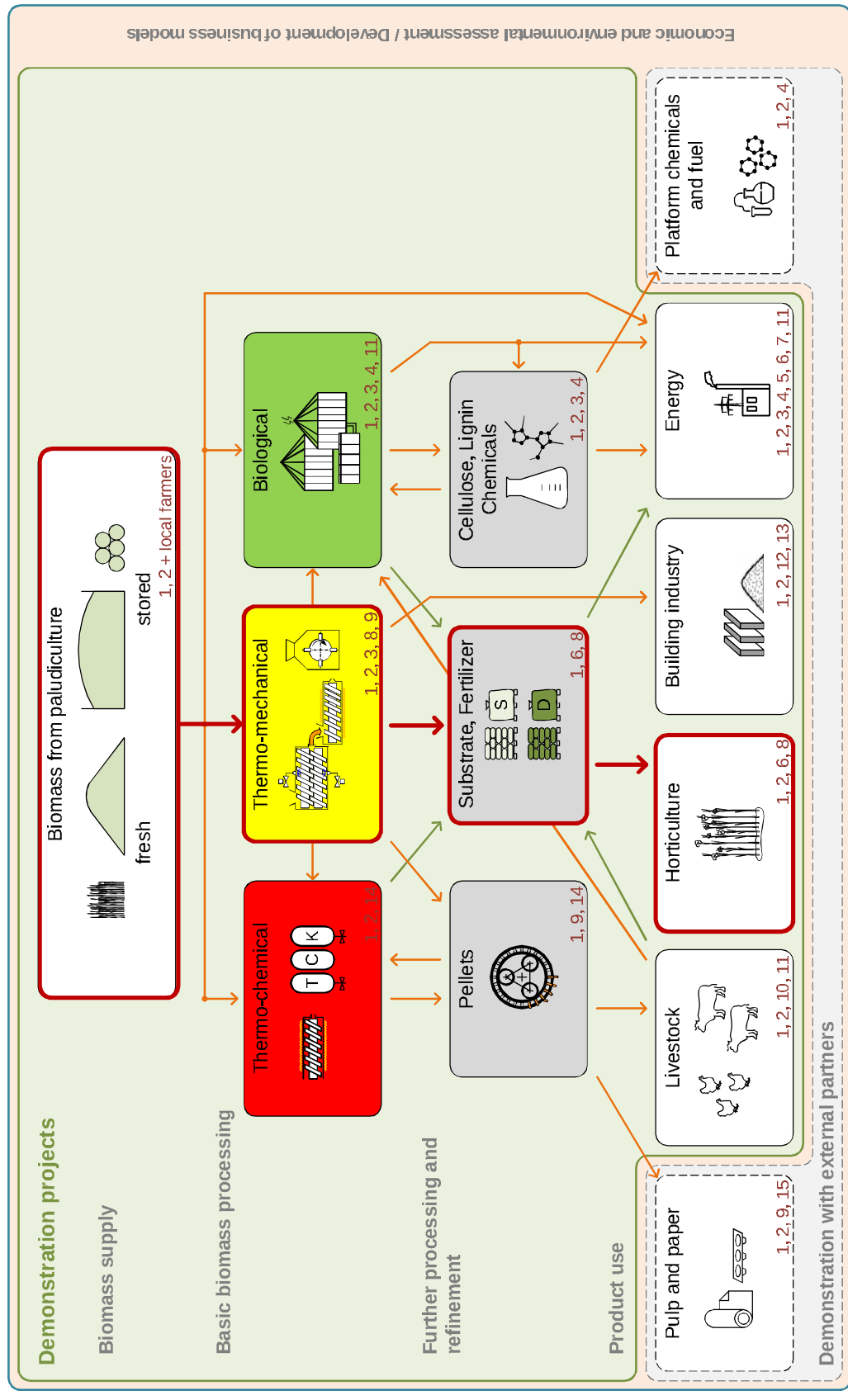
DM ... Dry Matter, NDF... Neutral Detergent Fibre, ADF... Acid Detergent Fibre, ADL... Acid Detergent Lignin
Sedges (*Carex*), Cattail (*Typha*), Rushes (*Jucus*), Reed canary grass (*Phragmites australis*)

Projects BLuMo, WetNetBB and PaludiKult



Fibre for peat replacement in horticulture

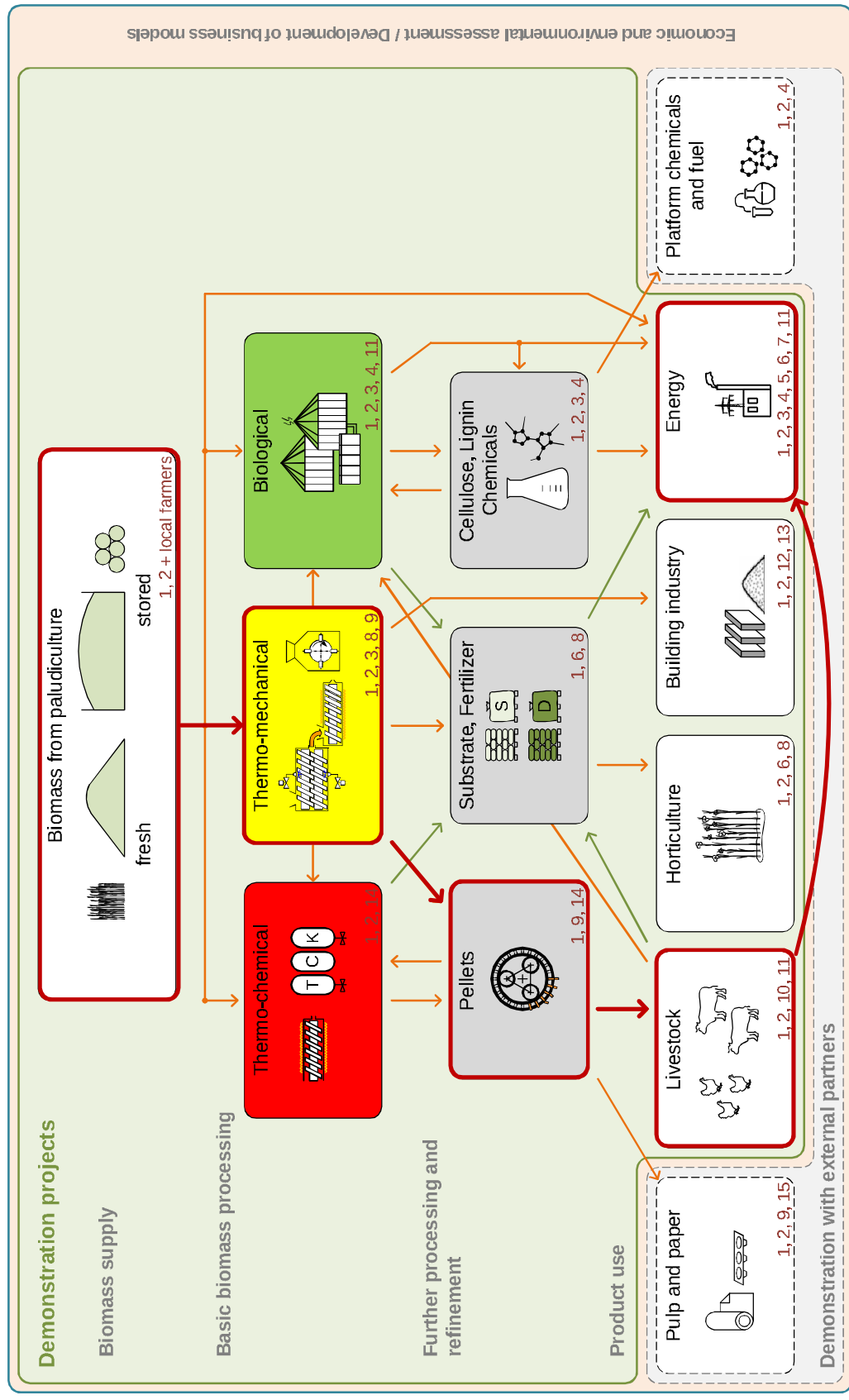
29.09.2023



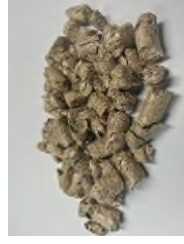
Projects BLuMo, WetNetBB and PaludiKult



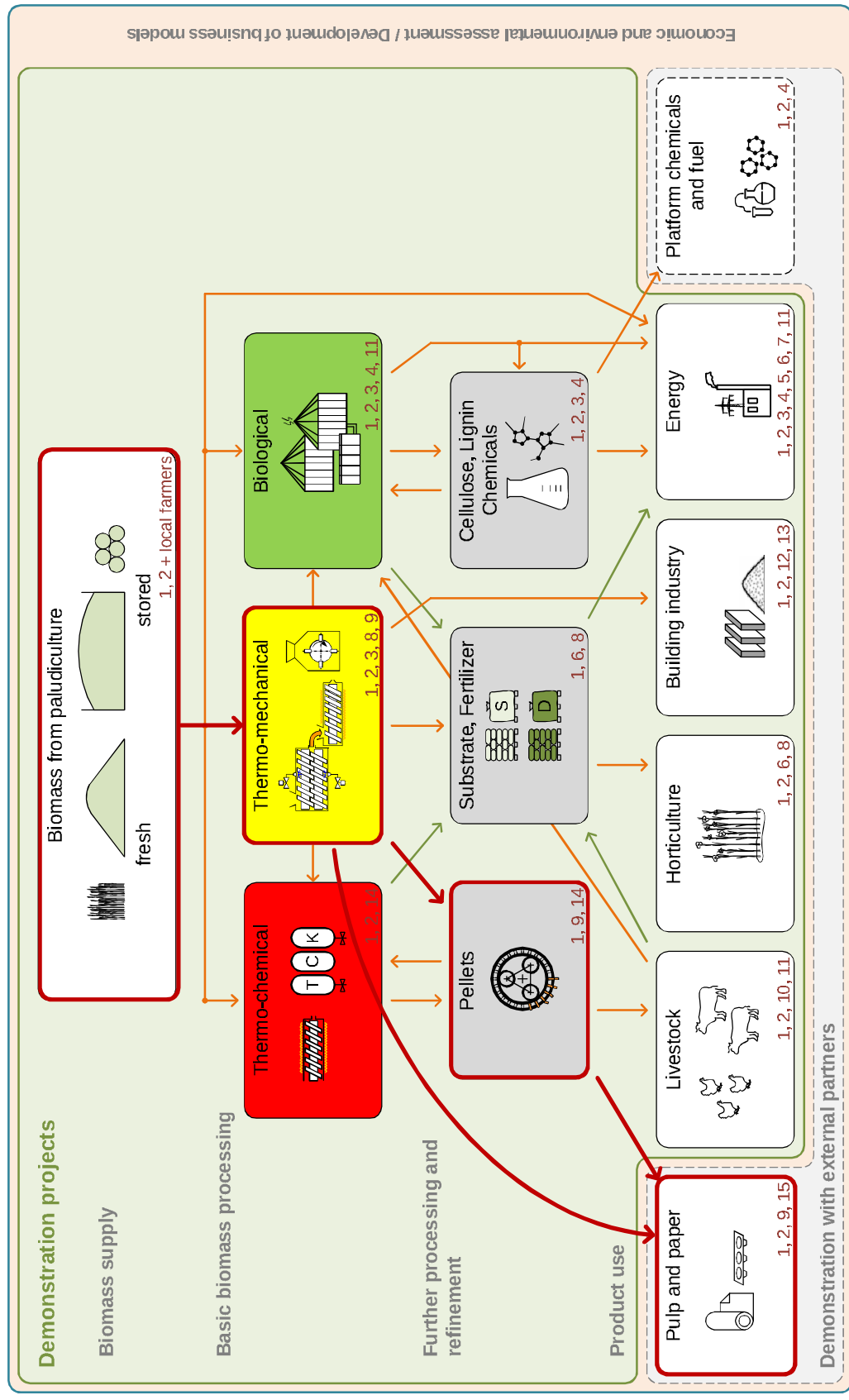
Absorption pellets for animal bedding



Projects BLuMo, WetNetBB and PaludiKult



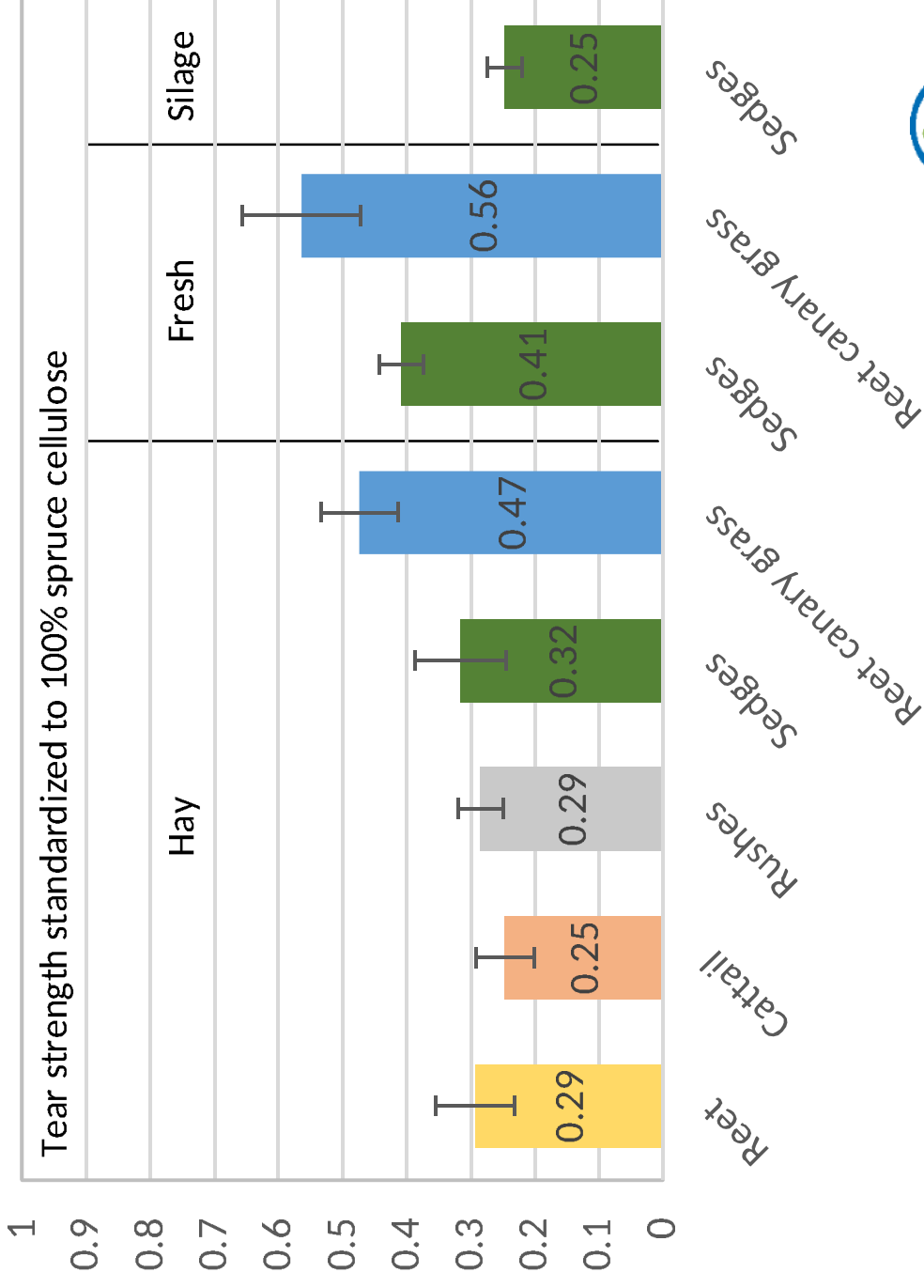
Paper and Moulded pulp



29.09.2023

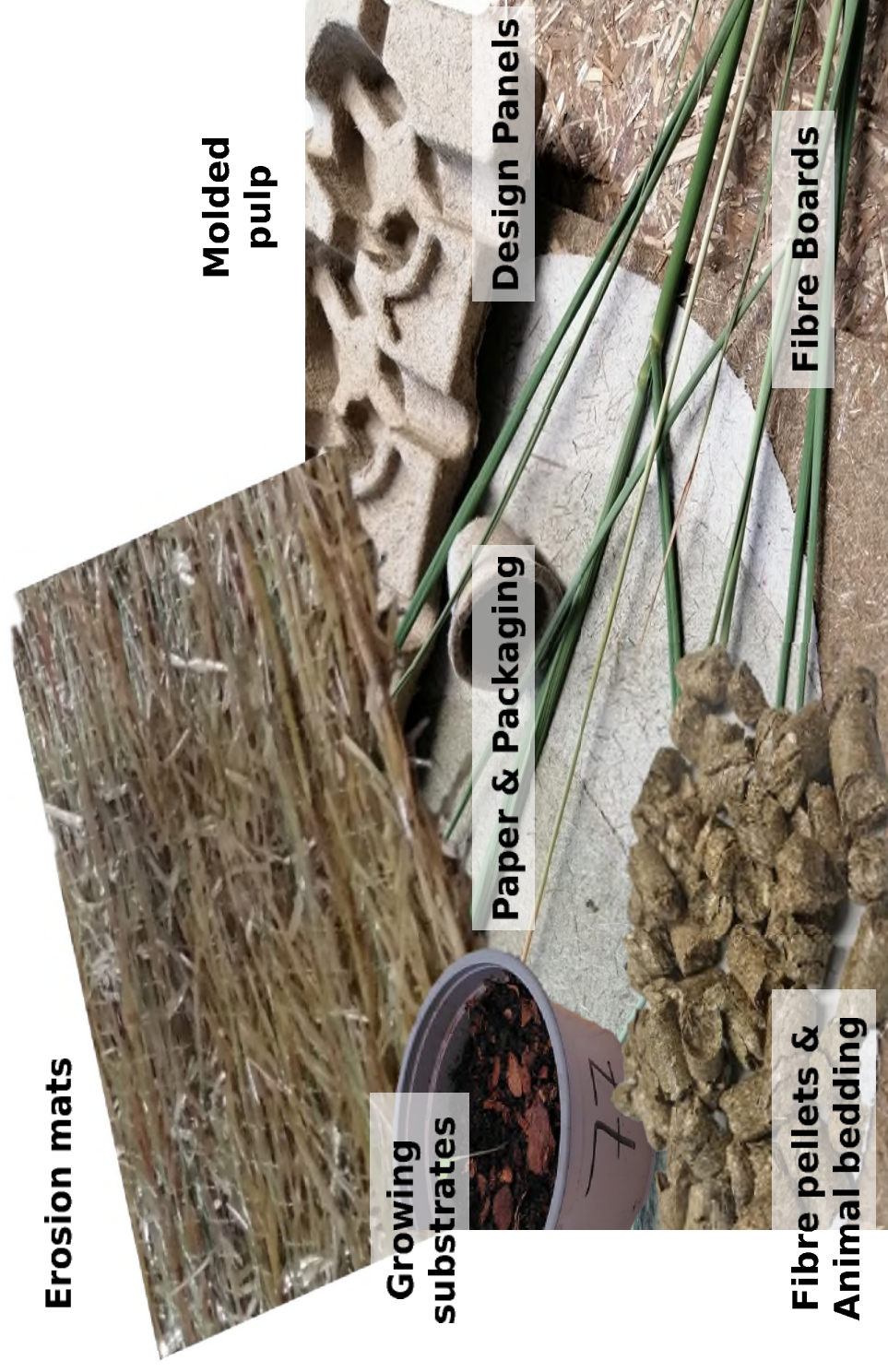
Results

Tensile strength of test sheets with 25% fibre from peatland biomass



Conclusions

- Preservation of peatland is of high importance for climate
- Biomass from peatland can be used for a broad variety of innovative products
- Adapted process lines from field to end products need to be developed
- Still at the beginning ...



Many thanks !

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