Biomass characteristics of wet fens in Belarus and the potential to substitute peat briquettes as a fuel

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for the Protection of Nature

Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

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UNIVERSITÄT GREIFSWALD

Institut für Botanik
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Michael Succow Foundation

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Peatlands in Belarus

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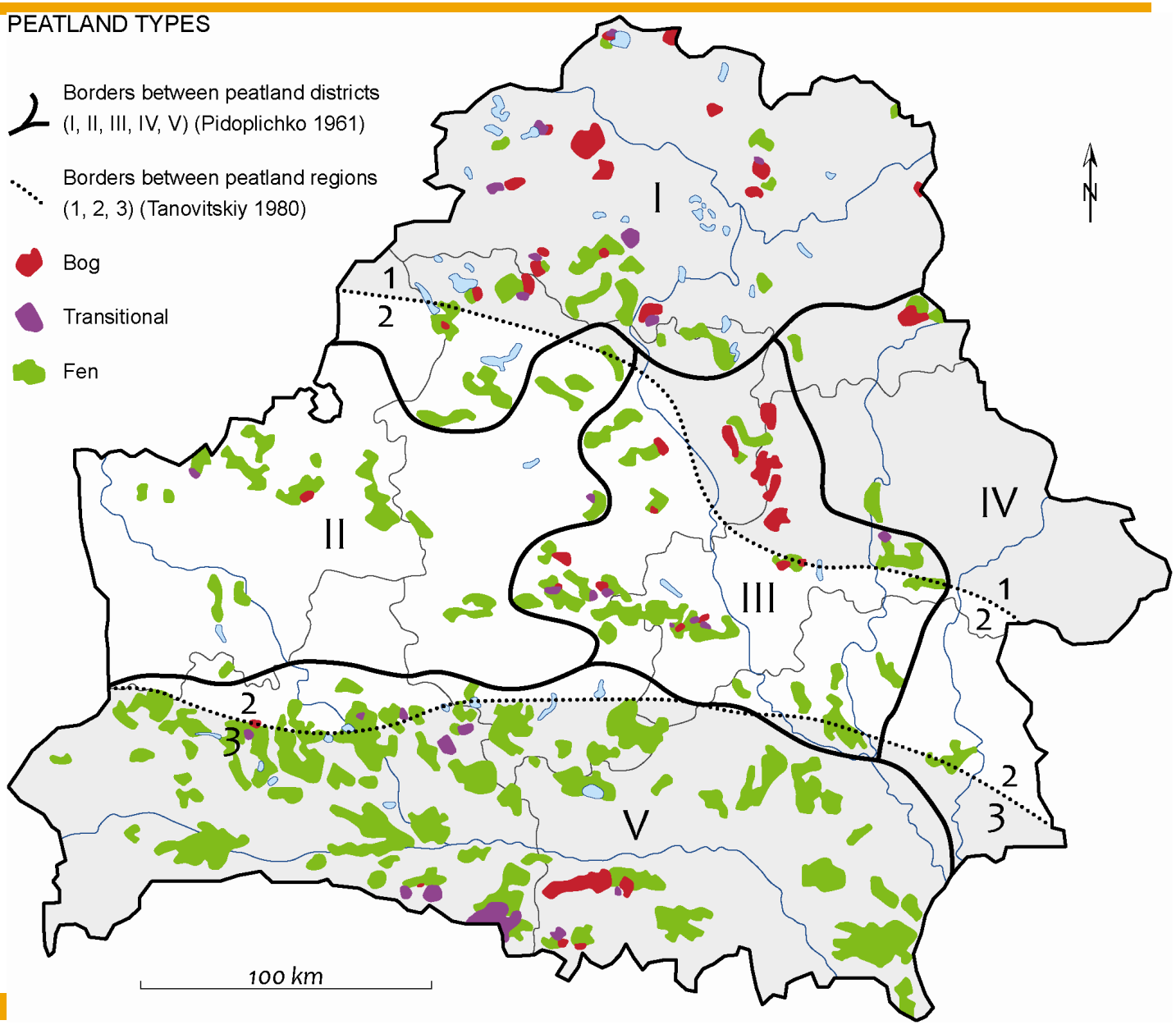

total:
~2.5 mio ha

presently undrained:
~1 mio ha

Drained for peat excavation

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drained peatlands in Belarus: ~1,505,000 mio ha (28 %)
drained for peat excavation: ~ 36,800 ha (0.7%)

Drained for arable landuse

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drained peatlands for agriculture: ~1,085,200 ha (20 %)

Drained for forestry

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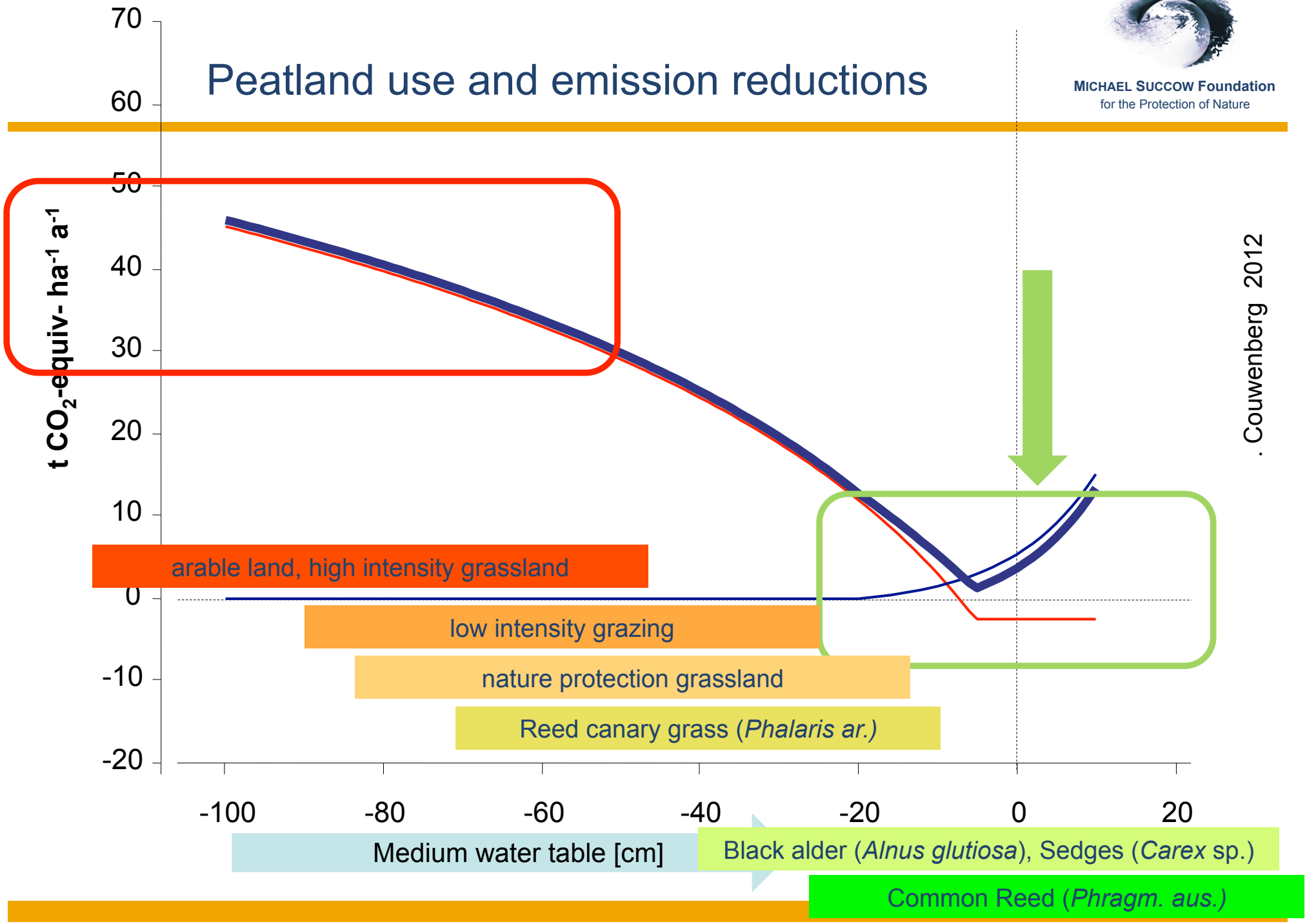
drained peatlands for forestry: ~0.4 mio ha (7.5 %)

Peatland use and emission reductions



The investigations aimed at two kinds of peatlands

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→ starting conditions

A.: Excavated, dry peatlands

B: Abandoned wet peatlands

Three pilot sites studied in Belarus

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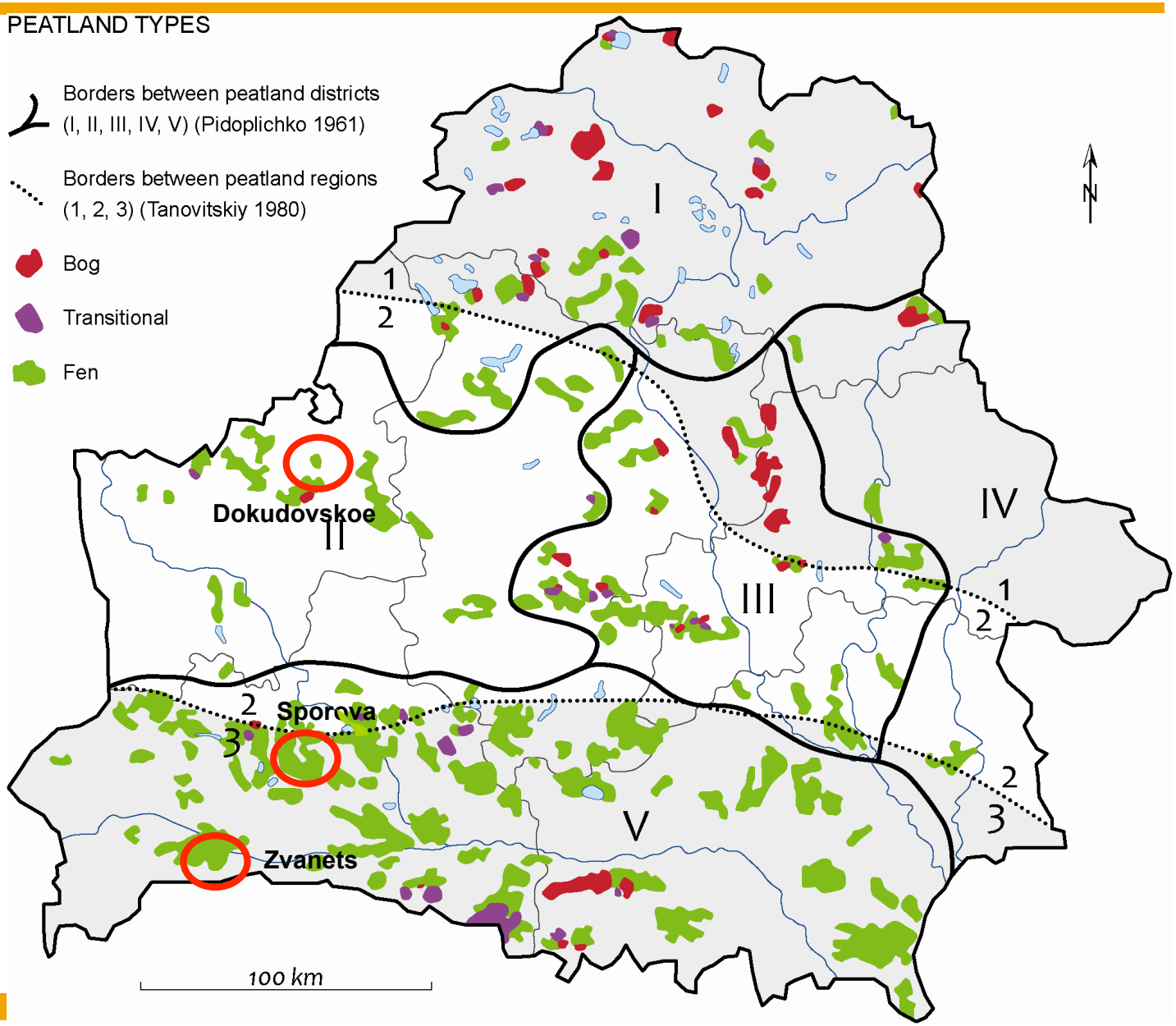

Pilot sites:

- Sporava
- Dokudovskoe
- Zvanets

A: Excavated peatlands (Dokudovskoe), main problems:

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- Development of excavated sites:
  - bare peat
  - dry forests
  - grasslands
  - arable lands
- fire risk,
  high GHG emissions
- no value for nature
- costs for community
  (fire control, health care,
  losses of values)

Burning excavated peatland near Dokudauskoe (photo: W: Wichtmann)

Excavated peatland Dokudauskoe (photo: Annett Thiele)

Peat extraction in Belarus

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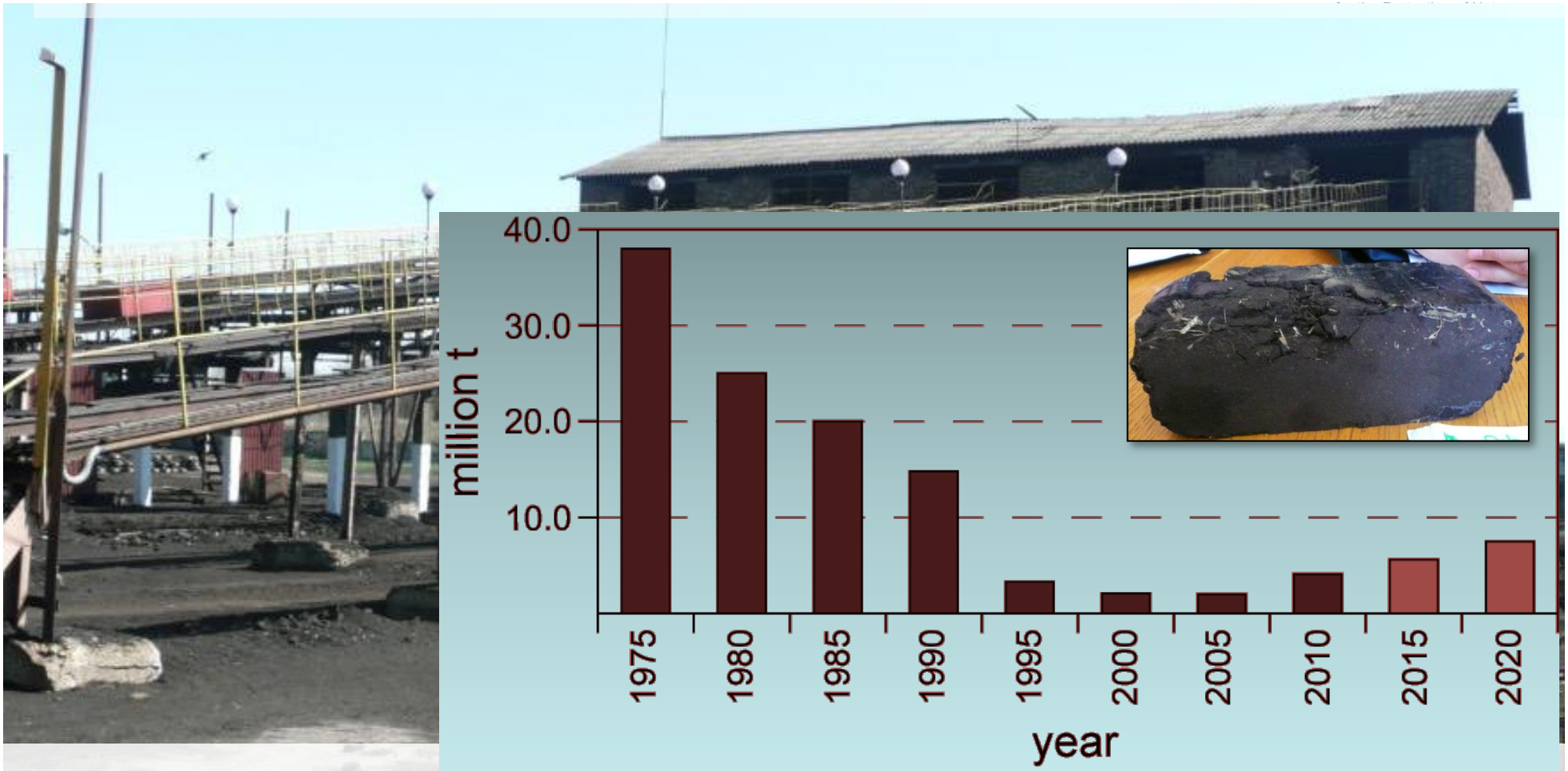

Annual peat excavation in Belarus since 1975 and forecasted until 2020. (Tanovitskaya 2011)

→ could be replaced by biomass from all agriculturally used peatlands after rewetting in Belarus (~1 mio hectares)

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B: Abandoned, semi-natural peatlands and their problems (Sporova, Zvaniets):

- Succession, bush encroachment → loss of biodiversity values
- some GHG emissions
- Costs for community (maintenance, fire control, health care)
- No income

Our vision for excavated and abandoned peatlands:

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- To treat peatlands in a sustainable way
  - reduce emissions
    →generate CO_2 credits
  - biodiversity management
  - agricultural production
    → generate income
    - Biomass production for energetic use
    - Replace peat by biomass

Two projects in Belarus

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I: BMU IKI Projekt: rewetting and sustainable management of peatlands

- Rewetting of ~20.000 ha peatlands
- „Production“ of CO_2 credits
- Management of abandoned peatlands
  - ➢ preserve aquatic warbler biotopes
  - ➢ giving economic perspectives
- Energetic utilisation of biomass

II: Wetland Energy, funded by the European Comission

- Energetic utilisation of biomass
  - ➢ produce briquettes
  - ➢ replace peat as a fuel
- keeping abandoned, semi-natural sites open
  - ➢ preserve aquatic warbler biotopes
- develop harvesting techniques

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АПБ

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ИНСТИТУТ ПРИРОДОПОЛЬЗОВАНИЯ НАН БЕЛАРУСИ

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ISEU

A: Excavated peatlands after rewetting

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Excavated, rewetted site with Common Reed stands Dokudovskoe 2009

B: new management of abandoned semi-natural peatlands

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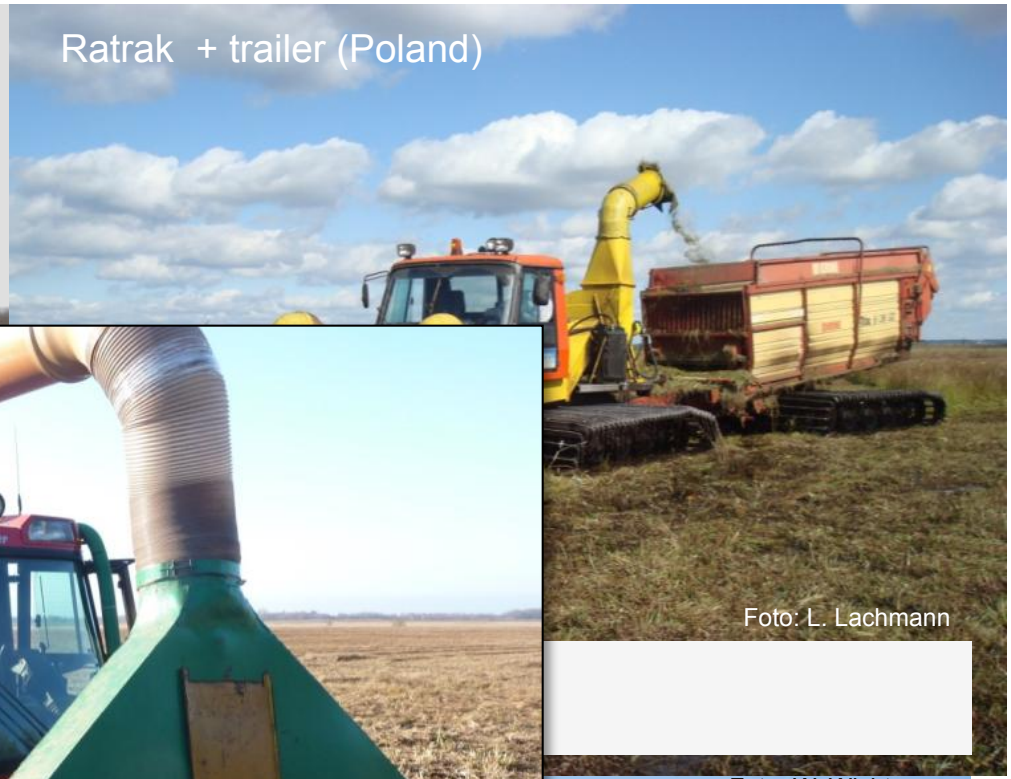
First harvest after years of abandonment: Sporava peatlands in the Yaselda floodplain

Quaxi : harvester (Austria)

Foto: S. Wichmann



Ratrak + trailer (Poland)

Foto: L. Lachmann

Foto: S. Wichmann

Adapted grassland management equipment (Germany)

Foto: W. Wichtmann

Modifiied Seiga (Poland)

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Dokudovskoe

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Reed		Yield (t DM/ha)
2009	Mean	11.7
	SD	5.9
2010	Mean	7.3
	SD	4.8

Year	S	Cl	Ash
2009	0.09	0.014	4.1
2010	0.1	0.034	4.4

Sporova

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Yield site		t DM/ha 2009/10	t DM/ha 2009/10
Phalaris	**Mean**	**9.6**	**7.3**
	SD	**1.94**	**4.8**
Sedge	**Mean**	**7.0**	**31.1**
	SD	**1.93**	**7.7**
Reed	**Mean**	**9.8**	**5.9**
	SD	**3.9**	**7.5**

Average values for 2009 and 2010 in %

Site	S	Cl	Ash
SP-Pa	0.13	0.023	3.7
SP-Se	0.11	0.020	5.4
SP-Re	0.10	0.048	5.1

Zvanets 2009

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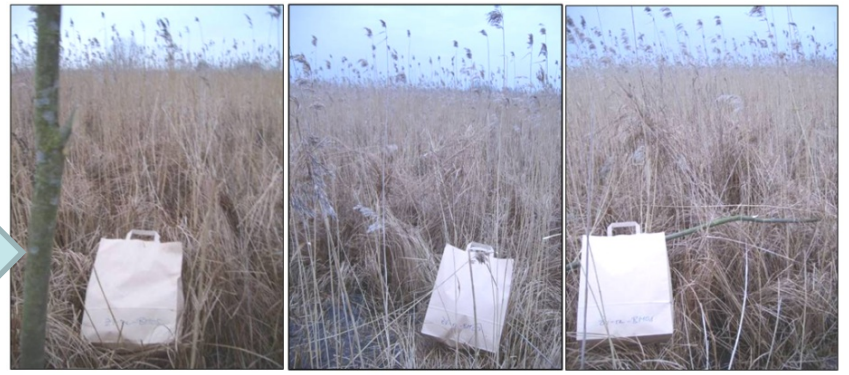
Site		Yield (t DM/ha)	Moisture content (%)
Reed	Mean	7.5	23.5
	SD	2.82	10.4
Sedge/	Mean	3.9	26.0
(Reed)	SD	1.16	13.4
Sedge/	Mean	3.5	35.1
Reed	SD	1.53	13.7



site	S	Cl	Ash
Reed	0.08	0.019	4.3
Sedge(Reed)	0.11	0.008	3.9
Sedge/Reed	0.08	0.011	5.1

Summarized results from biomass assessment

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Table: Mean biomass yields (t DM/ha) and standard deviation (SD), in Dokudovskoe (D) ,in Sporova (S) and Zvaniets (Z). Sampling in 2009 and 2010

Sample / Year	2009		2010	
	Mean	SD	Mean	SD
Reed (D)	11.7	5.9	7.3	4.8
Reed (Z)	7.5	2.8		
RCG (S)	9.6	1.9	3.8	4.0

Summarized results from biomass assessments

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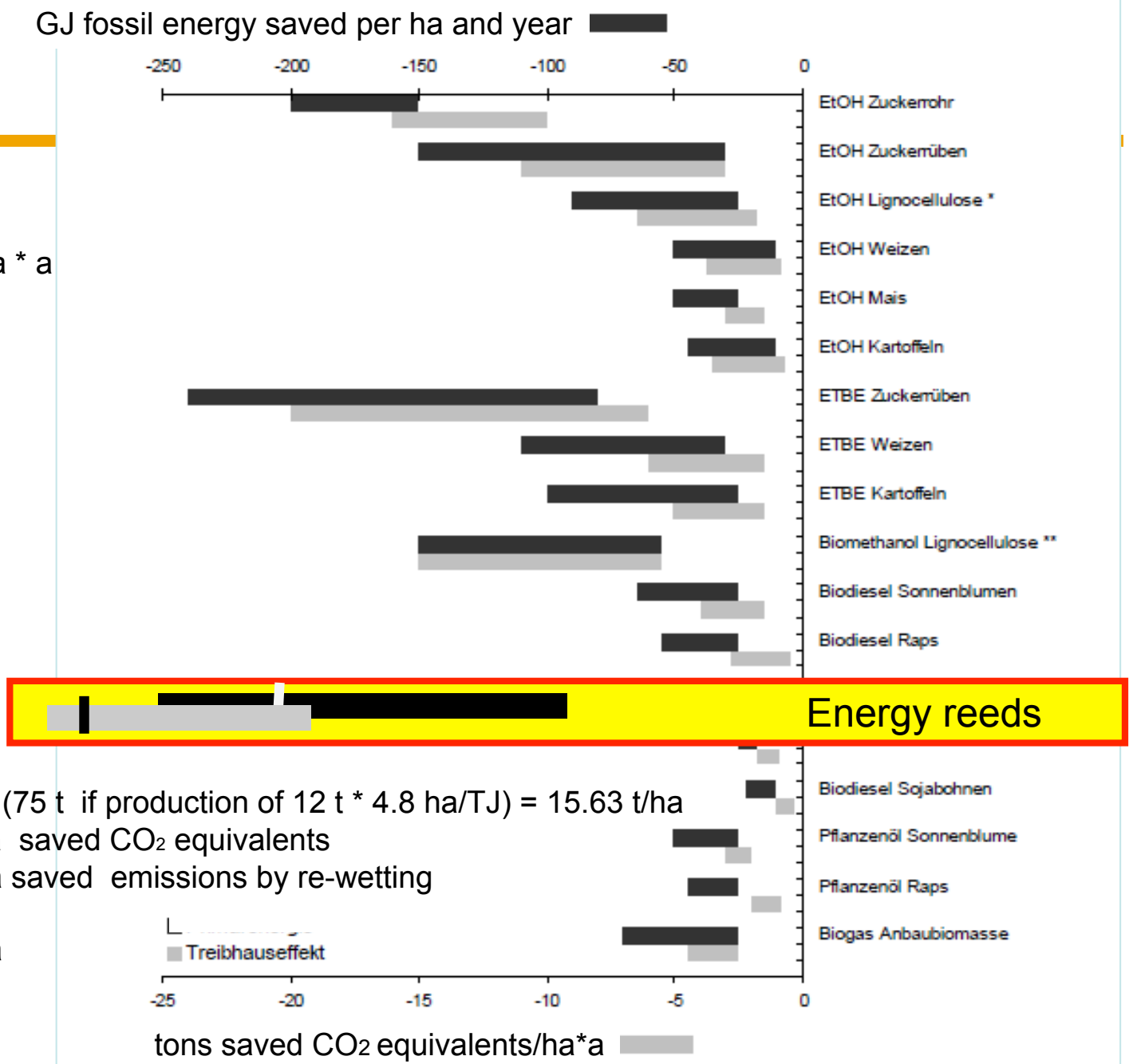
Table: concentration of different agents in mixed biomass samples (%) in Dokudovskoe (D) ,in Sporava (S) and Zvanets (Z).
Average values from 2009 and 2010 (* 2009 sampling only)

	S	Cl	Ash	HV
	%	%	%	MJ/kg
Reed (D)	0.09	0.024	4.3	
Reed (S)	0.10	0.048	5.1	17.5
Reed (Z)*	0.08	0.019	4.3	
RCG (S)	0.13	0.013	3.6	16.5
Sedges (S)	0,10	0.013	5.3	
Grain straw	0.13	0.35	8 - 9	18
Peat (D)			10 -18	16

Other renewables

(IFEU 2004: CO_2-study)

12 t/ha * 17.5 MJ/kg = 210 GJ/ha * a



By replacement of fossil energy (75 t if production of 12 t * 4.8 ha/TJ) = 15.63 t/ha

15.63 t CO_2 equivalents/ha*a saved CO_2 equivalents

+ 15 t CO_2 equivalents/ha*a saved emissions by re-wetting

~ 30.5 t CO_2 equivalents/ha*a

Outlook

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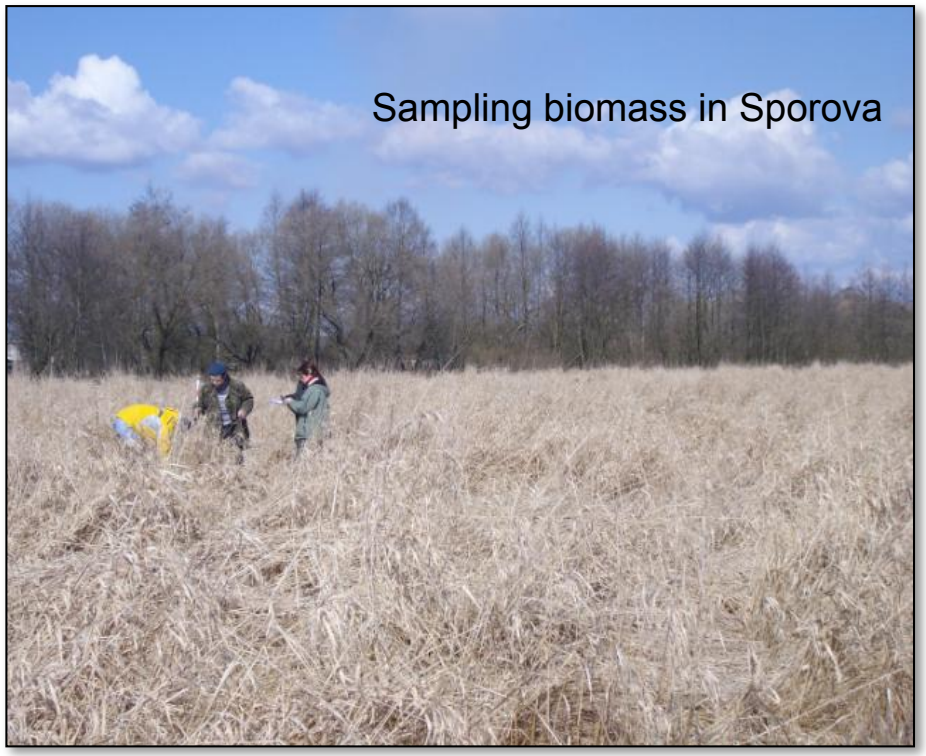
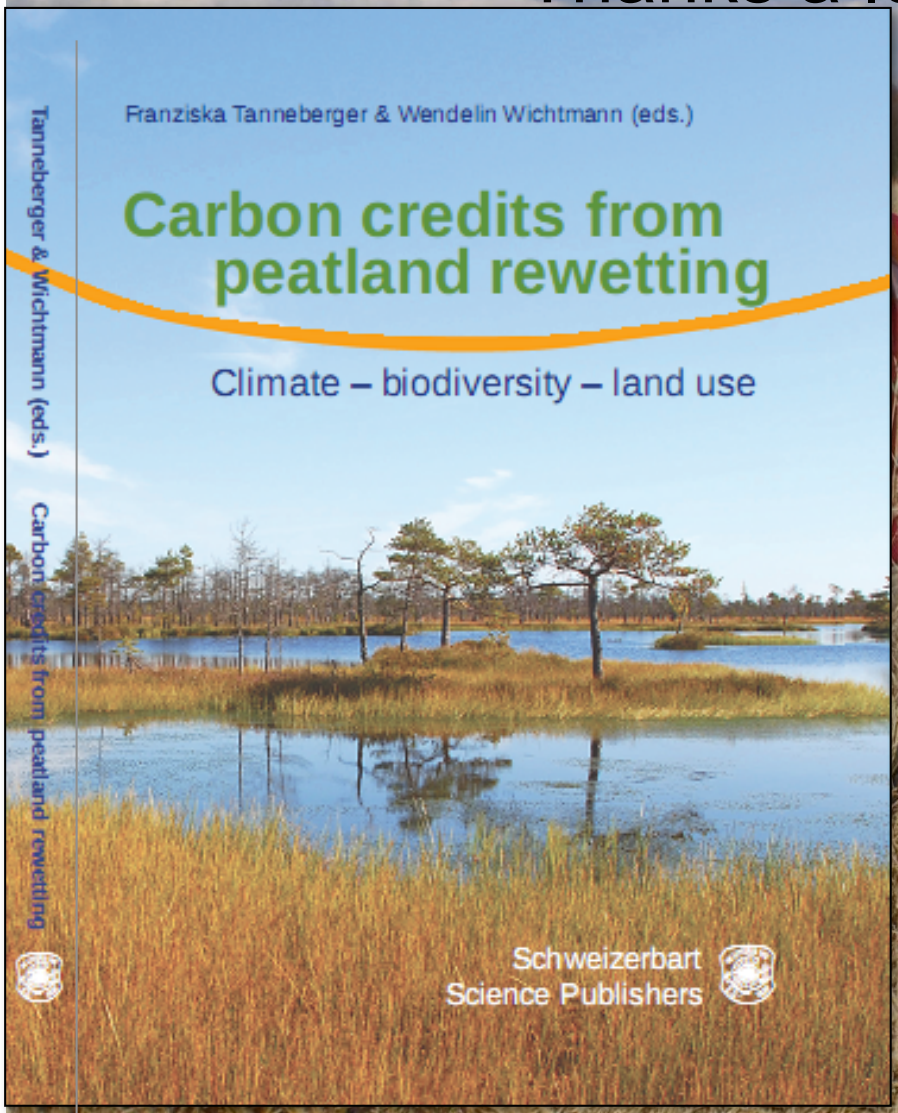
The EU-AID project „Wetland Energy“ will show that rewetting and use of biomass (paludiculture) is a good concept for

- using biomass from wet peatlands for fuel briquettes is a very good alternative to peat
  - → Cl and S ⇨
  - → ash content ⇩
  - →heating value ⇧
  - → economy ⇨
- Anyway it contributes to
  - ✓rural income generation
  - ✓ biodiversity maintenance
  - ✓ GHG emissions reduction
  - ✓ reduction of use of fossil fuels
  - ✓ peatland fire control
  - ✓ self sustaining of former peat factories



Thanks a lot for listening



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Sampling *Phalaris* biomass at Sporava peatland, Belarus, March 2009