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The Danube PES Project

Persina pilot: an example of market payments in support to wetland restoration

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Persina pilot site

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Profile of the site

Conservation values

- Nature park - **21 762 ha**, located in central north of Bulgaria
- Protected area on the Danube of inland marshes and flooded forests, including 24 islands, 3 reserves, 2 natural landmarks, 1 protected area – **Kaikusha Marsh**
- Natura 2000 site
- IBA (Ramsar Convention) – 170 bird sp. and 450 plant sp. 1/3 of them directly related to water ecosystems
- Rural area including 3 municipalities within approximately **27 000** residents

Why biomass from wetlands and farmland residues?

- Easy to connect to other WWF programs, projects and activities in the region; High value and available area; Climate change orientated solution, with potential for up-scaling
- Self-sustaining economic solution for wetland management and restoration that can also find political support
- Feasibilities studies show that in Bulgaria about **30% of straws, 65% of cornstalks and 80% of other solid agricultural waste** can be used for energy production, an estimated 800,000 tons annually
- Approximate biomass production from existing protected wetlands in BG (40,000 ha), respecting the biodiversity needs (**cut only 20% per year**) an estimated 24,000 tons annually in production of pallets and briquettes

Benefits from the Persina scheme
Environmental Benefits

Sustainable management and use of biomass from wetlands and farmlands in about of **7,100 ha** (incl. model area of 150 ha protected areas – Kaikusha marsh)

- Reduction of CO2 in the atmosphere associated with stubble burning and decomposition of biomass in the fields / wetlands
- Improvement of the water regime of Kaikusha marsh and restoration of its regulatory functions with respect to water, maintenance of fish stocks, fixation of CO2, maintenance of the biological diversity
- Improvement of soil fertility on more than 5,000 ha of agricultural land
- Improvement of water quality on more than 2,000 ha wetlands

Benefits from the scheme
Economic Benefits

• Creation of business interest in the use of biomass by generating revenue from the sale of pellets and briquettes

• Creation of economic opportunities for land users to utilize residues in farmlands as a source of additional income, also covering the costs of collection and transportation of residues

• Offering an alternative to the local population to shift from fossil fuels as coal and firewood consumption to pallets and briquettes and reduce the energy costs in the housholds by an average of 30%.

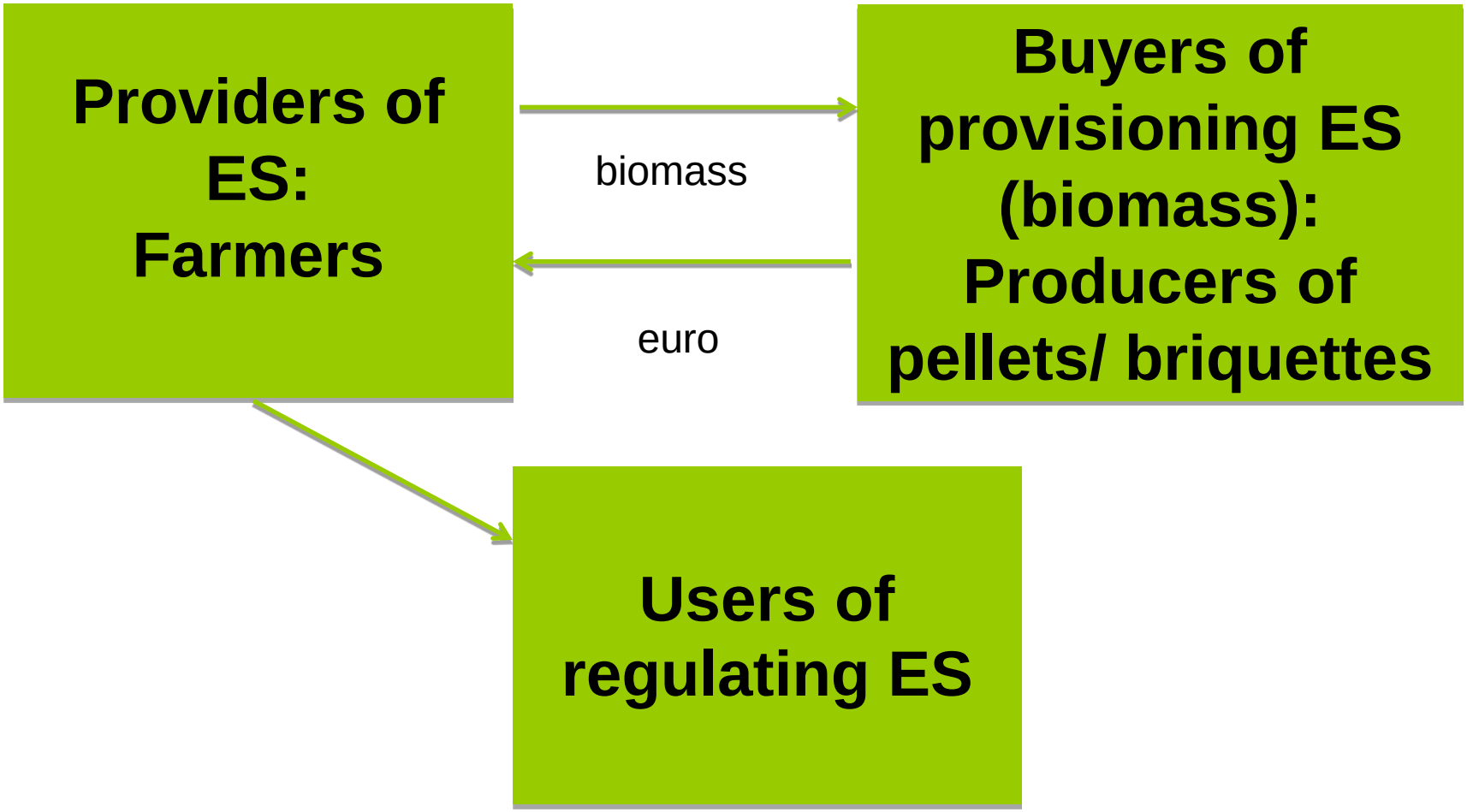
Benefits from the scheme

Social Benefits

• Green jobs – new employment opportunities for the local population by involving local people in the processes of extraction and processing of biomass

• Creation of jobs indirectly as an additional source of revenue for collection and transportation of raw materials

The Scheme


Providers of ES: Farmers
biomass
euro
Buyers of provisioning ES (biomass): Producers of pellets/ briquettes
Users of regulating ES

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Amount of biomass production by the most typical species (plants) in Kaikusha marsh per m2 = (150 ha)

	P g/m2/y	D g/m2/y	B g/m2/y	Area ha	Tons
Phragmites (reed)	802	521	280	120	336
Typha (bulrush)	955	620	334	21	70
Schoenoplectus (sedge)	890	578	311	9	28
Average grams per m2	~ 873	~ 563	~ 299		
Average tons per hectare	8,7	5,6	2,9	150 =	436 t

Production (P); Decomposition (D); Biomass accumulation (B)

Total average of 2,9 tones biomass per/ha/year = 436 tons per Kaikusha marsh

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Comparative financial value of biomass yield from Kaikusha marsh in two versions:

	option 1 Processing of 1 ton of biomass in the village Lesidren (150 km)	option 2 Processing of 1 ton of biomass in Belene town (20 km)
	Leva per ton	Leva per ton
Production of biomass	40,00 lv.	40,00 lv.
Primary processing (baling) and transport	120,00 lv.	30 lv.
Processing of biomass supply and delivery	200,00 lv.	200,00 lv.
Labor	100,00 lv.	100,00 lv.
Value of the pallets	460,00 lv.	370,00 lv.
Market value of conventional pellets	400,00 lv.	400,00 lv.
Reserve / Balance	+ 40,00 lv.	- 30,00 lv.
Cut only 20% of Kaikusha marsh biomass per year = 88 t	40,480 lv. ~ 20 000 EURO	32,560 lv. ~ 16 000 EURO

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Amount of sequestered carbon by the most typical species (plants) in Kaikusha marsh per m2 = (150 ha)

	P gC/m2/y	D gC/m2/y	RgC/m2/y	Area ha	Carbon "R" per ton per species
Phragmites (reed)	105	68	37	120	204
Typha (bulrush)	201	131	70	21	15
Schoenoplectus (sedge)	161	105	56	9	6
Total C	467	304	163	150	240

Production (P); Decomposition (D); Refractory carbon accumulation (R)

Total average of 1,6 tones /ha/year = 240 tons Carbon sequestration in Kaikusha marsh - 25 E per ton is additional 6000 Euro per ETS schemes per year

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Volumes of biomass derived from different farm lands in the pilot site area, incl. wetlands

•Type of culture	Sown area ha	Average yield per ha - ton	Overall biomass production - tons	Biomass average yield in sustainable nature way (by 30%, 65%, 80%, 20%)
Wheat and barley	1400	4	5600	1867 t
Corn	2650	7	18550	12057 t
Sunflower	1027	2,5	2567	2053 t
Reed	2000	2,9	5800	1160 t
Total of area and productions	**7077**		**32 517**	**17137 t**
Total market price of pallets 370 lv. per ton, per year				**6 340 690 lv. ~ 3 120 000 Euro**

Comparison table of prices of heat from different fuel types allows automation of the heating process

No	Type of the fuel	Calorific value	Efficiency	Price of the fuel (by 2010)	Price per 1 KW
1	**Diesel**	11,67 KW/liter	88%	2.07 lv/liter	**0.204**
2	**Electricity**	1 KW	100%	0.173lv/kw	**0.173**
3	**Nature gas**	9,89 KW/m^3	90%	0.9349lv/m3	**0.105**
4	**Wooden chips**	4.9/KW/kg	90%	0.36lv/kg	**0.081**
5	**Pallets from wetlands and agriculture waste**	5.16/KW/kg	90%	0.28lv/kg	**0.063**

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Test results of the Reed energy value - Independent laboratory analysis – Sofia

No	Name of indicators	Unit of quantity	Standardized methods, validated internally lab	Results form tasting	Norm DIN 51731
1.	**Moisture**	%	DIN 51718	**5,1** ±0,2	**12 max**
2.	**Specific heating value**	kcal/kg	DIN 51900	-	-
2.1	**Working fuel**	kcal/kg	DIN 51900	**4346** ±25	**4181- 4657**
2.2	**Working fuel**	KJ/kg	DIN 51900	**18196** ±90	**17500- 19500**
3.	**Sulfur content of dry mass**	%	DIN 51724	**0,056** ±0,003	**0,08 max**
4.	**Balance after incineration / ash / dry weight of**	%	DIN 51719	**5,5** ±0,1	**1,5 max**
5.	**Extraction of volatile substances on dry weight**	%	DIN 59700	**78,2** ±0,2	-

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Cost and benefit analysis and financial indicators show that the investment is effective and the idea could be realized in a big scale

- Net Present Value > 0
- Internal Rate of Return ~ 68%
- Profitability Index 6,3%
- Payback period – 2 years

Conclusion for wetlands

- The highest - productivity ecosystems
- Opportunities for additional income for local people
- Diverse benefits, including all
- Local energy source
- Decision to costly problems such as floods and construction of treatment plants for domestic wastewater in in small settlements
- Highest absorbability of C02

Lessons learnt

– Development of the scheme in a big scale requires double efforts because of the unknown and no popular topic

– Political goals and plans in Bulgaria do not focus on wetland restoration through well developed political and economic framework

– It is necessary to ensure multiple sources of income

– Carbon financing from the ETS could be additional profit but is not implemented for the moment in a small scale

– Support by national and local institutions is highly necessary!

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Thank you

- www.panda.org/dcpo