REPUBLIC OF SLOVENIA | MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING

Global Water Partnership Mediterranean

MIO-ECSDE

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Capacaty Building Workshop on
"Shared Groundwater Resources Management"

2 – 4 December 2008 / Postojna, Slovenia

Production Without Waste?!

Case study of Slovenian paper industry

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in cooperation with

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ICP

B&B PAPIRNICA VEVČE

DITP Društvo inženirjev in tehnikov papirništva Slovenije

EUWI MED EU WATER INITIATIVE

GEF

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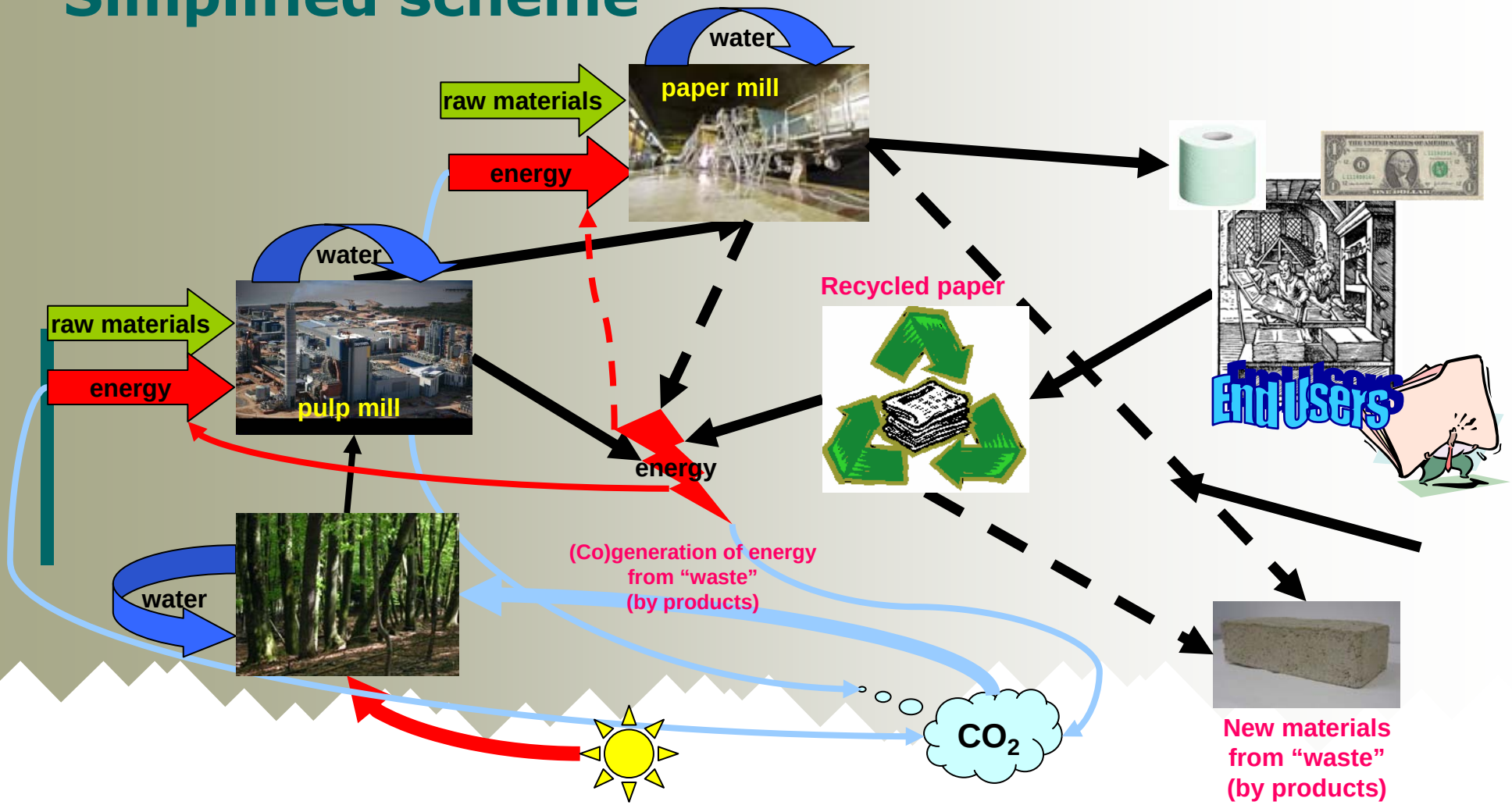
SAVA RIVER BASIN COMMISSION

Material streams in papermaking

Simplified scheme



Slovenian paper industry

Facts & figures:

- Eight paper and cardboard mills.
- No virgin cellulose pulp mills
- Two "deinking" plants:
  - One chemomechanical "deinking" plant (flotation),
  - One washing "deinking" plant.
- Two integrated mechanical pulp plants (groundwood pulp).
- 17 machines:
  - 5 cardboard machines,
  - 4 tissue / crepe machines,
  - 8 paper machines

Slovenian paper industry

Facts & figures:

Product type (tons)	2006	2007
Fibres	***216100***	***184400***
Coniferous mechanical pulp (groundwood pulp)	34800	39300
Deinking pulp	119600	145100
Non-bleached sulphite cellulose	10500	0
Bleached sulphite cellulose	51200	0
Paper and cardboard	***687500***	***725100***
Newsprint	116700	120200
Coated Paper	140800	150600
Printing and office paper	126000	140100
Packaging paper	1600	800
Tissue paper	68800	72900
Cardboard	233600	240500
Corrugated board	***82100***	***86800***
Corrugated board	82100	86800

The estimated Slovenian fibre and paper production in 2006 and 2007, specified by product type (*Papir*, **2006**, *34*, 12; GZS, big and medium size enterprises survey, 2007).

Slovenian paper industry

Environment-orientated investments:

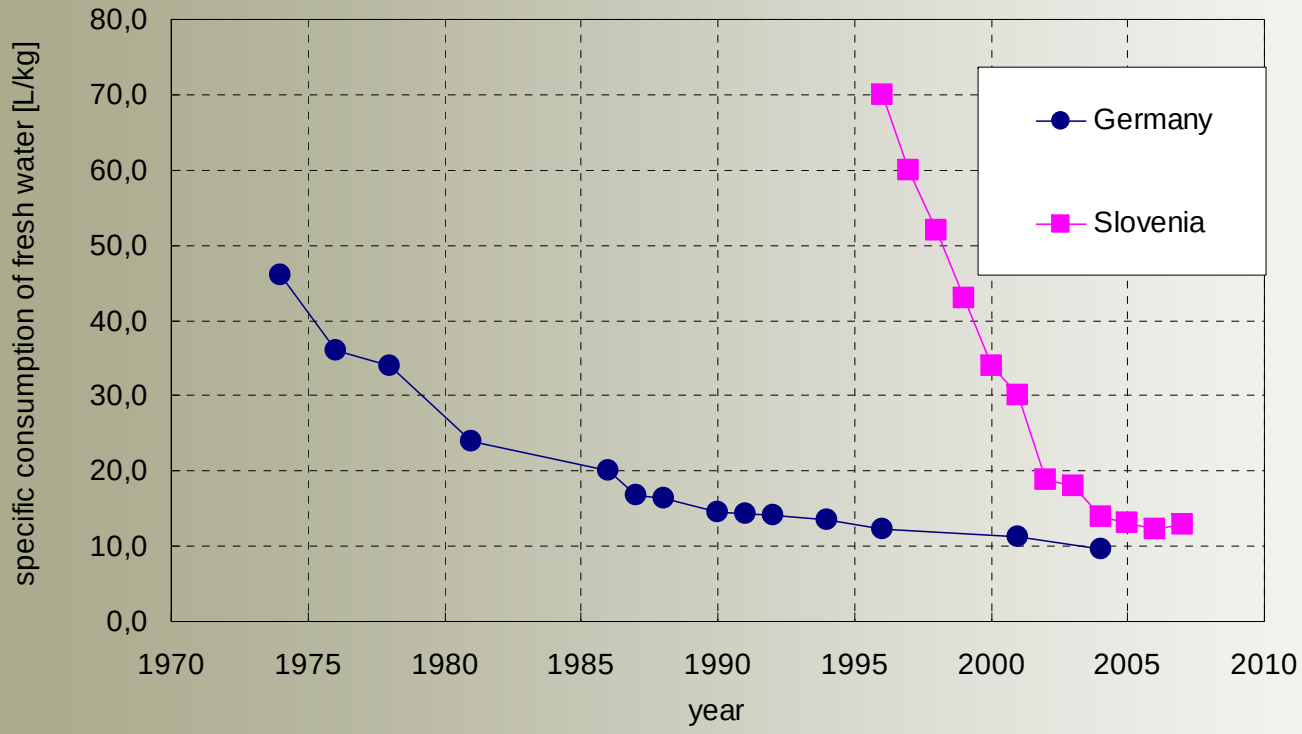
Field	Investment [mil. EUR]	Share
Water	98.6	77.4 %
Solid waist	8.7	6.8 %
Air	18.8	14.8%
Noise	1.3	1.0 %
Sum	**127.4**	**100 %**

Specified estimation of necessary environmental-orientated investment in P&P to comply with BREF. (DITP Symposium, Bled, 2000).

- Environmental investments in 2007: **13,2 MEUR**

Slovenian paper industry

Trends in specific water consumption

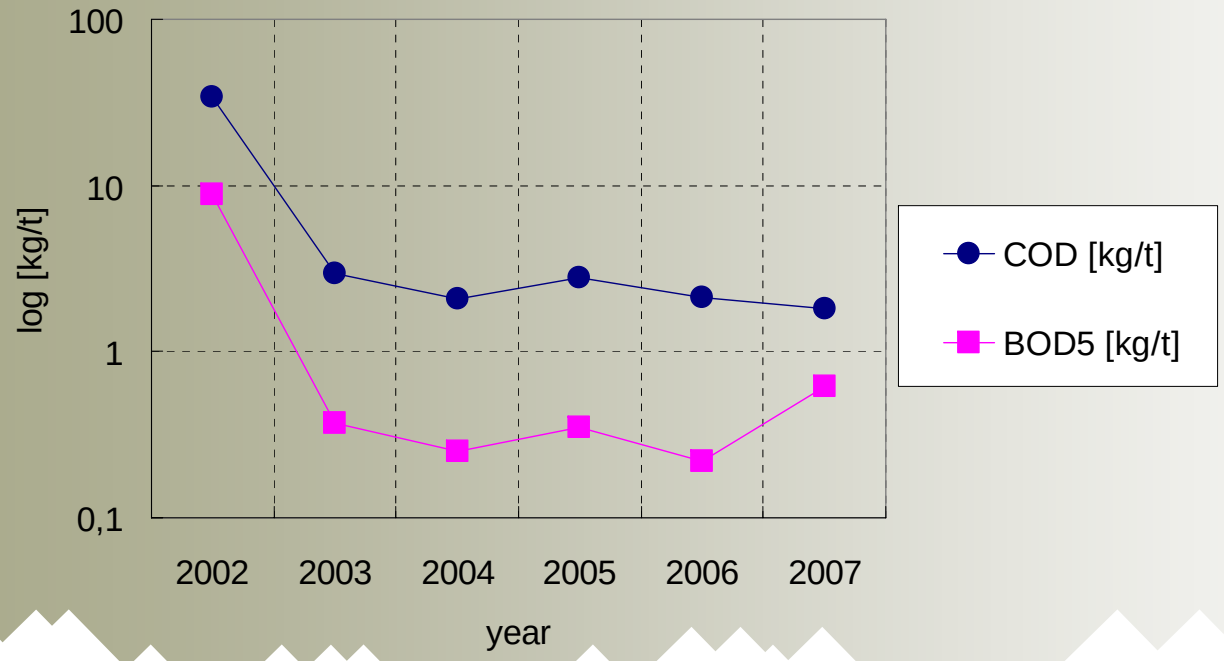


Reduction of specific fresh water consumption (L/kg) in Slovenian and German pulp and paper industry (PTS-MS 619, "Environmental report 2007").

Slovenian paper industry

Trends in specific emissions

Emission	2002	2003	2004	2005	2006	2007
COD [kg/t]	34.2	2.96	2.07	2.8	2.1	1.8
BOD_5 [kg/t]	8.8	0.37	0.25	0.35	0.22	0.62



Reduction of COD and BOD5 (kg/t) in Slovenian pulp and paper industry ("Environmental report 2006", Environmental report 2007").

Slovenian paper industry

Trends in specific emissions

Emission	2002	2003	2004	2005	2006	2007
Suspended solids [kg/t]	32.4	0.3	0.22	0.4	0.5	0.3
AOX [g Cl/t]	20	3	2.2	2	2	1
N [g N/t]	290	90	56	43	59	92
P [g P/t]	16	9	5.6	5	5	3.6

Reduction of emission parameters (kg/t) in Slovenian pulp and paper industry ("Environmental report 2006, Environmental report 2007").

Slovenian paper industry

GEP/GIP case-study: Količevo cardboard mill

Upgrading of existing aerobic wastewater treatment plant with an anaerobic reactor and biogas-driven electric generator.

The benefices:

– 50 % reduction of costs from environmental taxes,

– 66 % less biosludge from aerobic stage,

– cogeneration of "green" electricity and heat at 0.5 MW power plant.

–Production of "green" electricity: 2900 MWh/y

Slovenian paper industry

GEP/GIP case-study: Količevo cardboard mill

Anaerobic reactor and biogas reservoir at Količevo Karton wastewater treatment plant (donated by MM Količevo Katon, mag. Leon Kaluža).

Biogas powered motor with generator at Količevo Karton wastewater treatment plant (donated by MM Količevo Katon, mag. Leon Kaluža).

Slovenian paper industry

GEP/GIP case-study: VIPAP Krško paper mill

- Total amount of solid waste in VIPAP in 2007: 74400 t (as are, including moisture).
- Bark, sludge, and rejects represent 79 % of all solid waste.
- (Co)incineration of waste represents:
  - 100 % of fuel in boiler No.5
  - 24 % of fuel in boiler No.4
- Reduction of waste ammount by incineration:
  - Bark: 95 %,
  - Sludge: 70 %.

Slovenian paper industry

GEP/GIP case-study: VIPAP Krško paper mill

- Thermal energy acquired from waste (co)incineration:
  - Bark: 76 TJ (CO_2 emissions reduced by 6800 t/y),
  - Sludge: 229 TJ (CO_2 emissions reduced by 20500 t/y).
- If this waste was landfilled and entirely transformed to methane ti would generate 9900 t/y of methane (with a GWP of 208000 t equivalent of CO_2).
- Waste Framework Directive (2006/12/EC, with revisions from 2008) prefers energy production from waste in comparison with landfilling.

Slovenian paper industry

GEP/GIP case-study: VIPAP Krško paper mill

Boiler No.5 at VIPAP Videm Krško, 100 % fueled with waste (donated by VIPAP Videm Krško, Mrs. Aleksandra Račič Kozmus).

Sludge processing at VIPAP Videm Krško (donated by VIPAP Videm Krško, Mrs. Aleksandra Račič Kozmus).

Slovenian paper industry

GEP/GIP case-study: B&B Vevče paper mill

- Construction of new wastewater treatment plant (WWTP):
  - Capacity: 28000 PU
  - Frow: 3000 – 3500 m^3/day
- Reduction of Sava river basin water pollution:
  - COD: 250 mg/L => 60-80 mg/L (> 70 %);
  - BOD5: 120 mg/L => 3-7 mg/L (> 95 %).
  - Reduction of COD load/ year: > 160 t.
  - Reduction of BOD5 load/ year: > 100 t.

Slovenian paper industry

GEP/GIP case-study: B&B Vevče paper mill

WWTP (donated by Paper Mill Vevče, Mr. Marko Jagodič).

Slovenian paper industry & ICP

R&D case-study: line of projects with goal in production of new materials from "waste"

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Example:

By appropriate combinations of solid "waste" materials (i.e.: sludge, ash) which can not be deposited even at municipal landfills, it is possible to produce applicable materials which may be used among other also for landfill sanation.

ICP - short introduction

Bussines card:

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ICP - short introduction

Main activities:

- Research and development
- Consultancy.
- Training and education.
- Testing of products and raw materials.
- Monitoring of solid waste.
- Pilot plant trials and production.

ICP - short introduction

Main areas of research:

- Fiber properties.
- Deinking technologies.
- Paper surface characterization.
- Graphic processes.
- Modelling and simulation of paper production.
- Water loop closing and emissions.
- Efficient methods of water treatment.
- Solid waste and its reuse.

ICP - short introduction

Main professional challenges for the future:

- Use of nanomaterials and technologies in papermaking.
- Improved characteristics of paper surface.
- Clean technologies (reduced emissions and energy consumption).
- Reuse of solid wastes as secondary raw materials.
- Forest- and water-based biorafinery.

Co-financers of research activities in ICP