

TEMPUS PROJECT

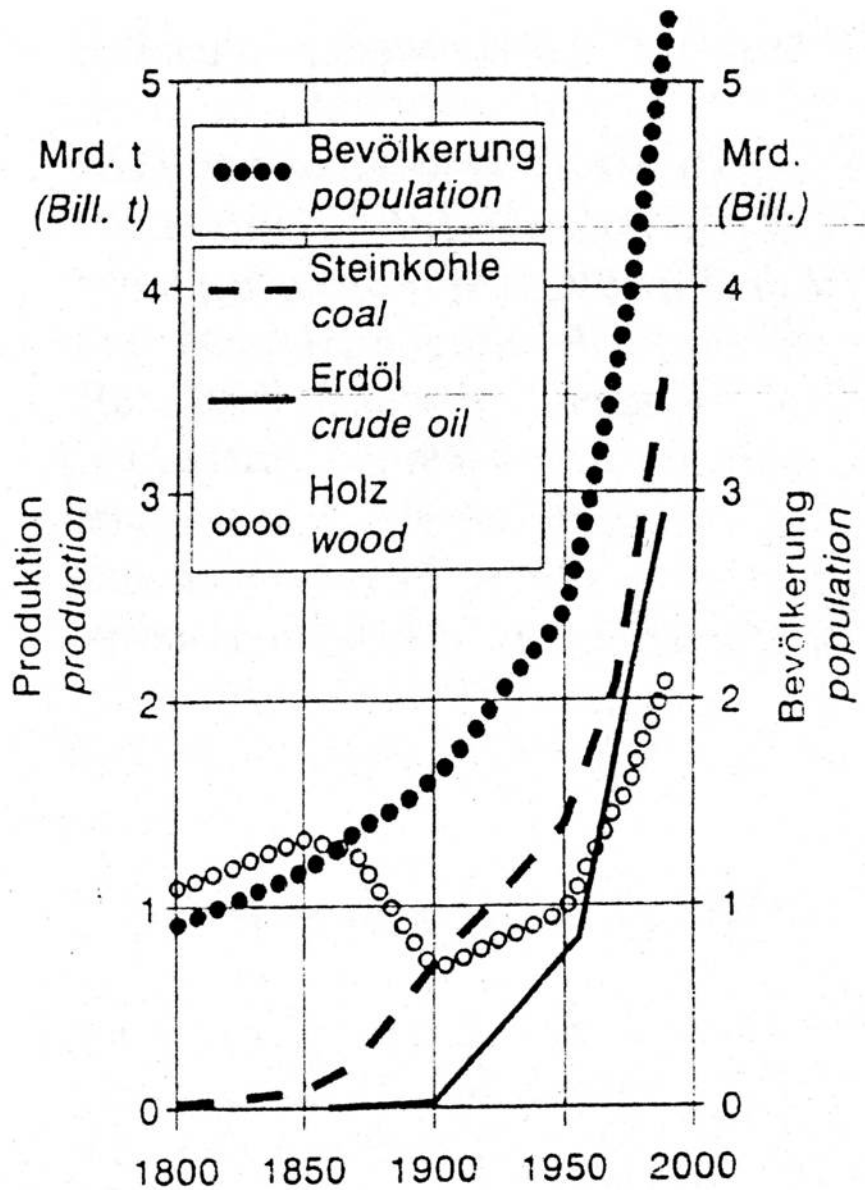
"Training, Networking and Capacity Building for Sustainable Forestry in Polvolgie"
Workshop Joshkar Ola, January 15 - 20, 2007

Werner G r o s s e

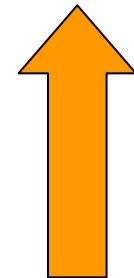
Fuelwood utilisation in Germany and options for extension of supply

Content

- 1 TOPICAL STRUCTURE OF ENERGY CONSUMPTION AND TENDENCIES RELATED TO POLITICAL OBJECTIVES
- 2 WOOD - POTENTIAL, TECHNOLOGIES OF SUPPLY AND MARKET PRICES
- 3 SHORT ROTATION TECHNOLOGY WITH FAST GROWING TREES ON FARMLAND
- 4 CONCLUSION



Gas and steam turbine fuel wood power station
2004



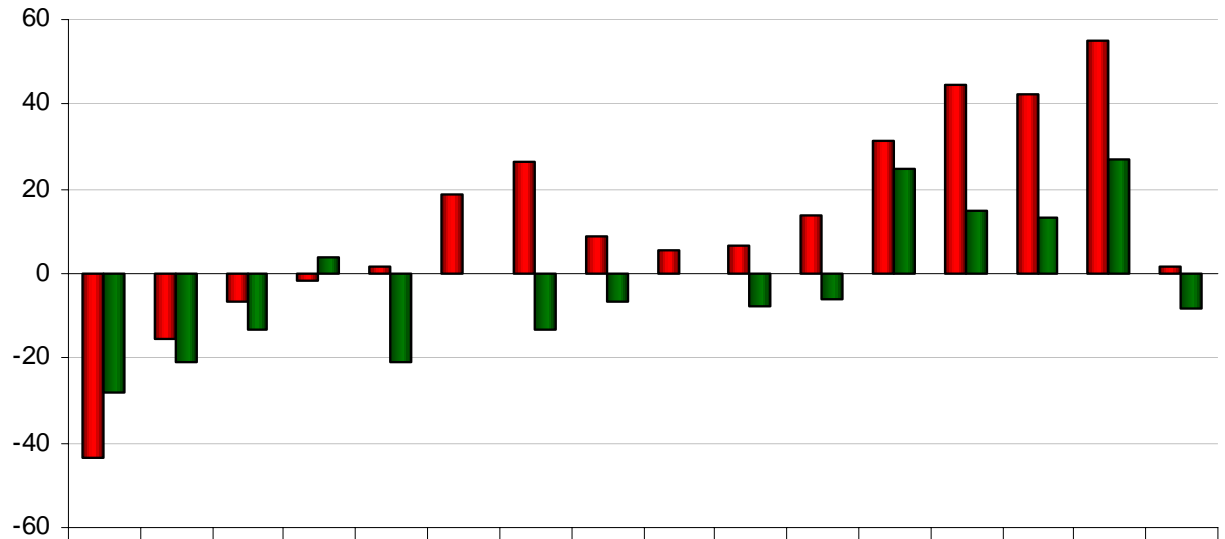
1766

Hamel du Monceau:
Charcoal kiln)

Increasing of the world population and consumption tendency of wood, oil and coal (SCHULZ, 1993)

1 TOPICAL STRUCTURE OF ENERGY CONSUMPTION AND TENDENCIES RELATED TO POLITICAL OBJECTIVES

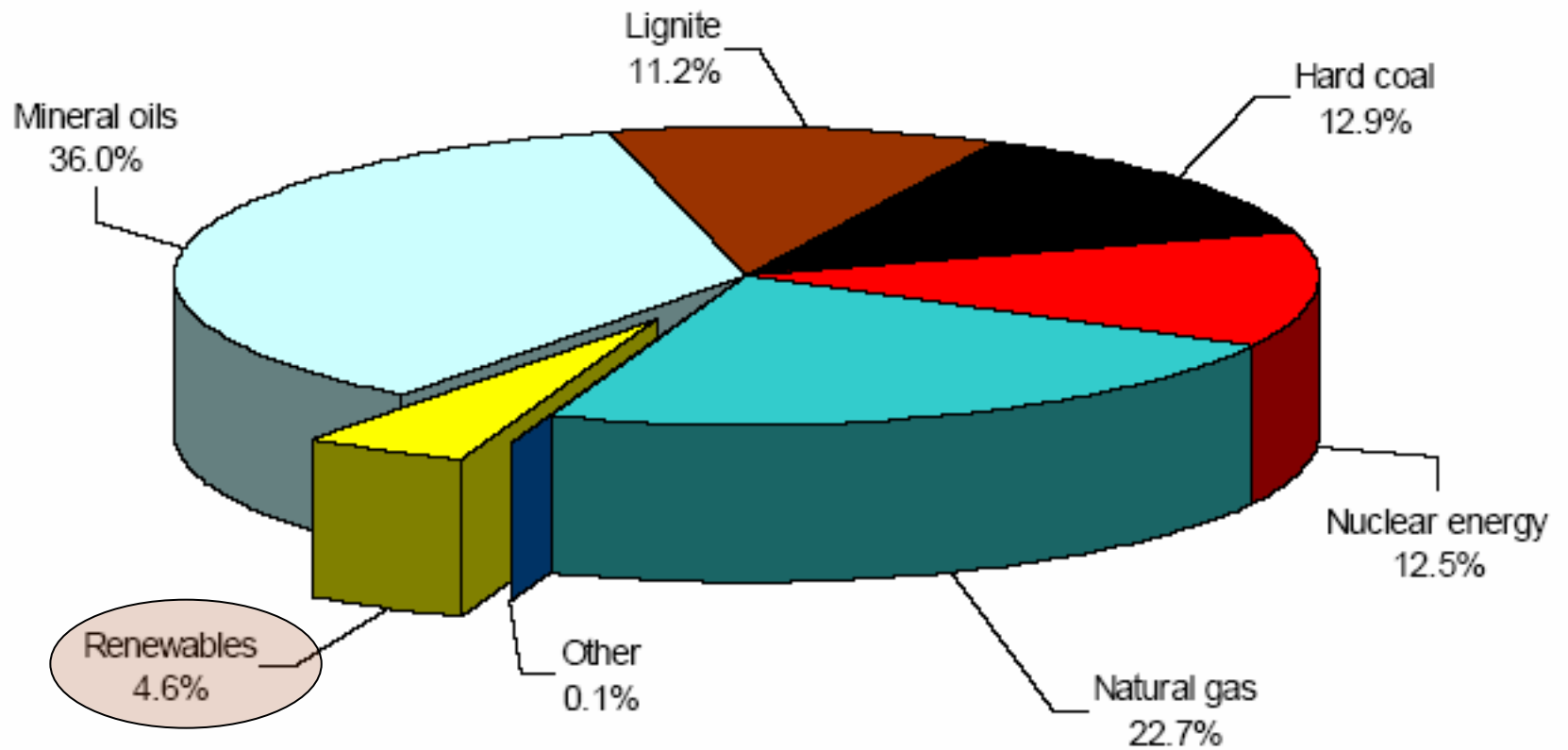
- Changing of energy relevant CO₂-emission between 1990 and 2002 in %
- Restriction of greenhouse gas reduction according "EU burden sharing" (2008-2012) in %



	LUX	D	GB	SWE	DK	FI	A	I	F	BE	NL	GR	ESP	IRL	P	EU
Changing of energy relevant CO ₂ -emission between 1990 and 2002 in %	-43,7	-15,5	-6,7	-1,9	1,7	18,6	26,2	8,7	5,4	6,7	13,7	31,2	44,4	42,6	55,1	1,9
Restriction of greenhouse gas reduction according EU burden sharing (2008-2012)	-28	-21	-13	4	-21	0	-13	-6,5	0	-7,5	-6	25	15	13	27	-8

Source: Ziesing (2003)

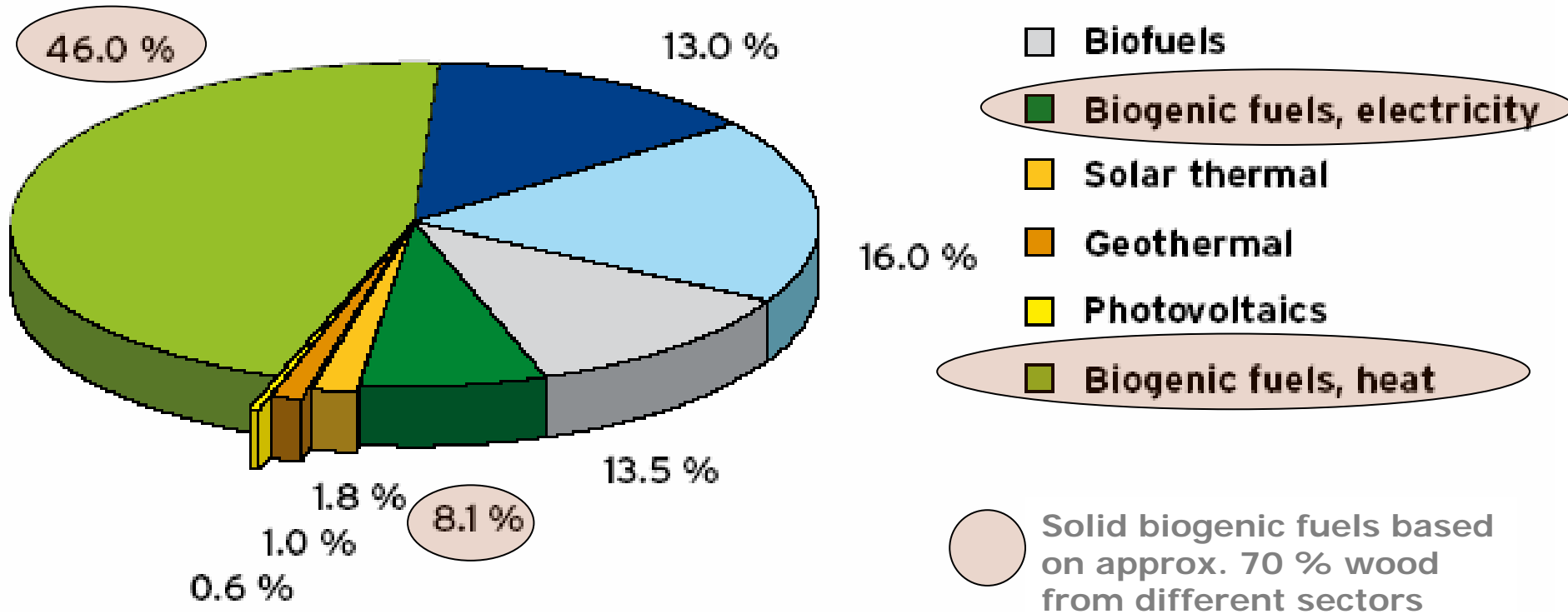
EU-programme for reduction of greenhouse-gas-emission (Burden-sharing-programme)



Structure of primary energy consumption in Germany in 2005 Total: 14,238 PJ (BMU, 2006)

Final energy: 165 TWh

(6.4 % share of total final energy consumption)



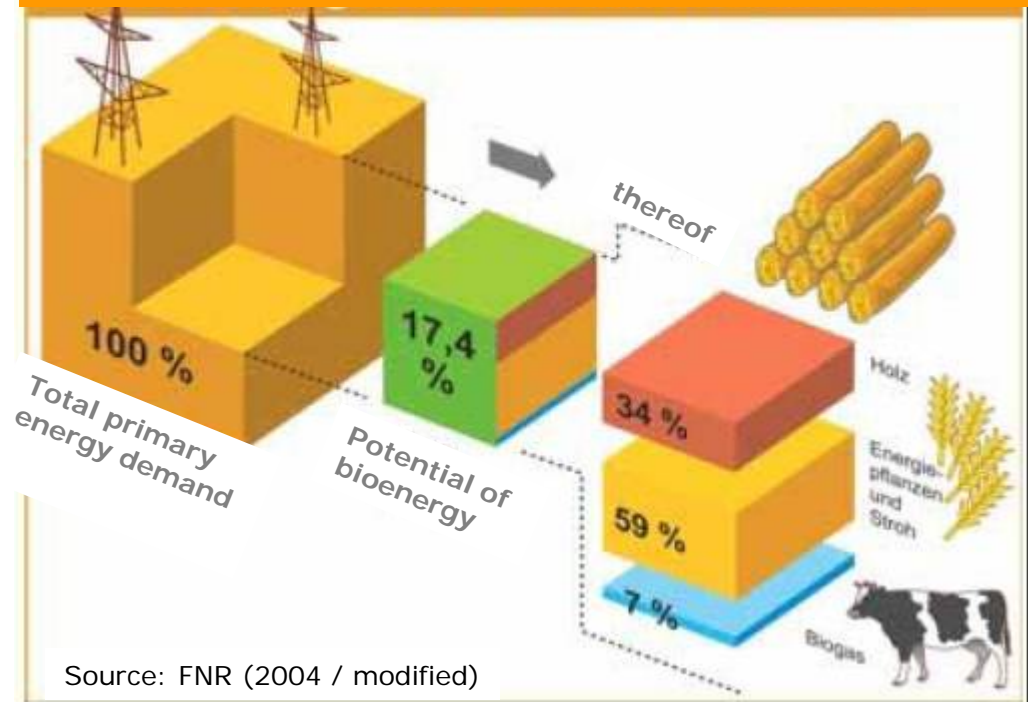
Structure of energy supply from renewable energy sources in Germany, 2005 (BMU, 2006)

Fuel wood of Forestry	424 *
Industrial rest wood	57 *
Other wood	10 *
Recycling/Waste wood	78 *
Straw	130
total	699
Energy plants (~ 2 Mio ha Farmland)	298 *
Biogenic fuel gas	220 ... 286
TOTAL	1,217 ... 1,283

Source:

KALTSCHMITT/HARTMANN (2002, modified)

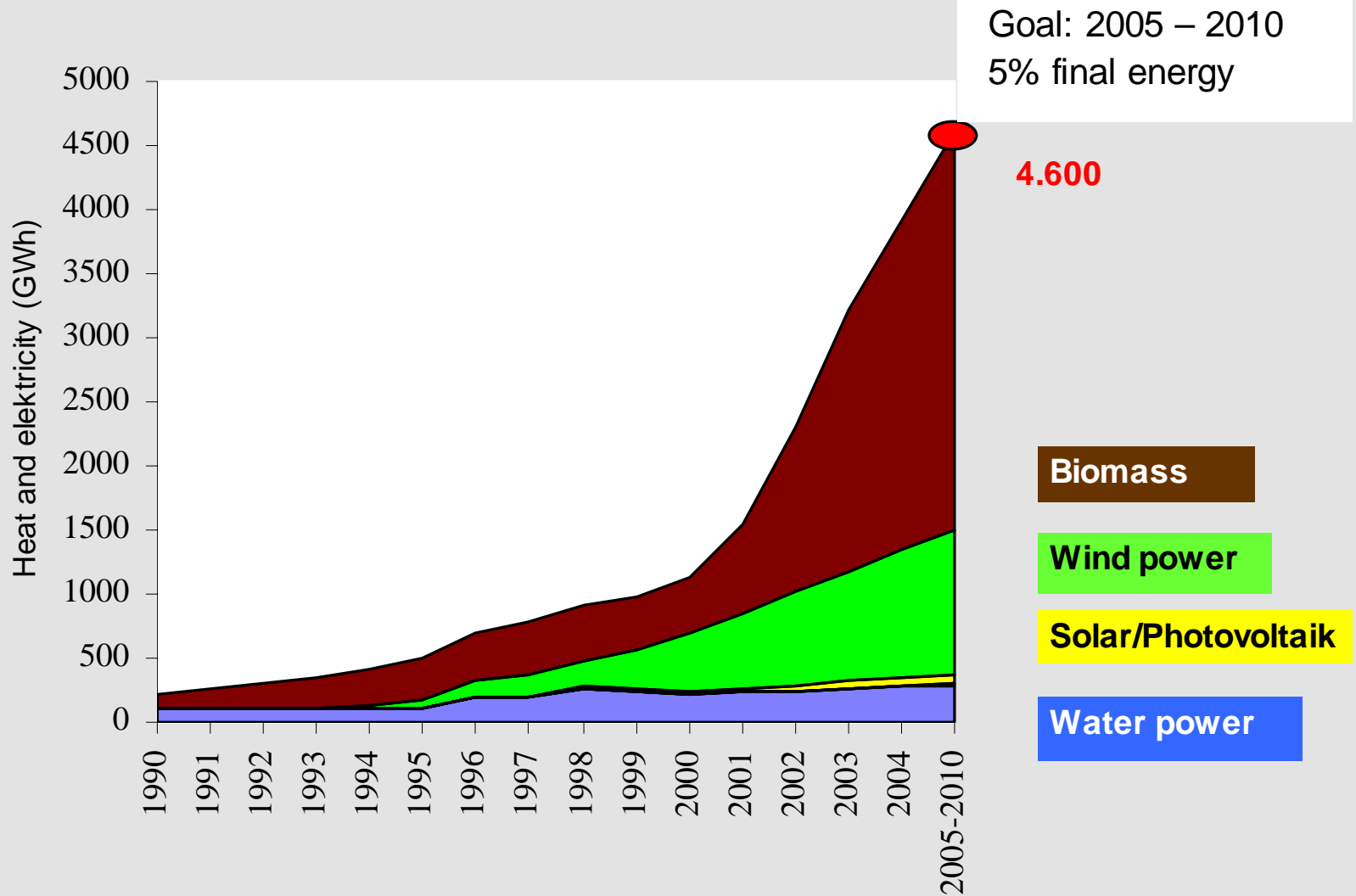
Bioenergy - the potentially part for national energy supply



RESUME:

Primary energy demand in Germany, 2005	14,238
thereof 17,4 %	2,477
therof 34 % fuelwood	842
>>Fuel wood and energy plants from farmland (*)	867

Potentials of biofuel in Germany (PJ/a)



State and objectives of using renewable energy in Saxony

(Source: KMS Sachsen (2001, modified))

Demand of biomass in Saxony

Basis point: Renewable energy sources (RES) in Saxony, total

state 2004

3,045 GWh



objective 2010

4,600 GWh

according to the
Saxon Climate Change
Programme (*)

needed increment :

1,555 GWh

thereof biomass
1,000 GWh

2 : 1
estimated
relation to (*)

other RES
555 GWh

500 GWh
Agriculture
(straw, liquid
manure)

1 : 1
estimated
relation to (*)

500 GWh
fuelwood



Fuelwood assortments

- fuelwood from forestry
- industrial rest wood
- recycling wood / waste wood

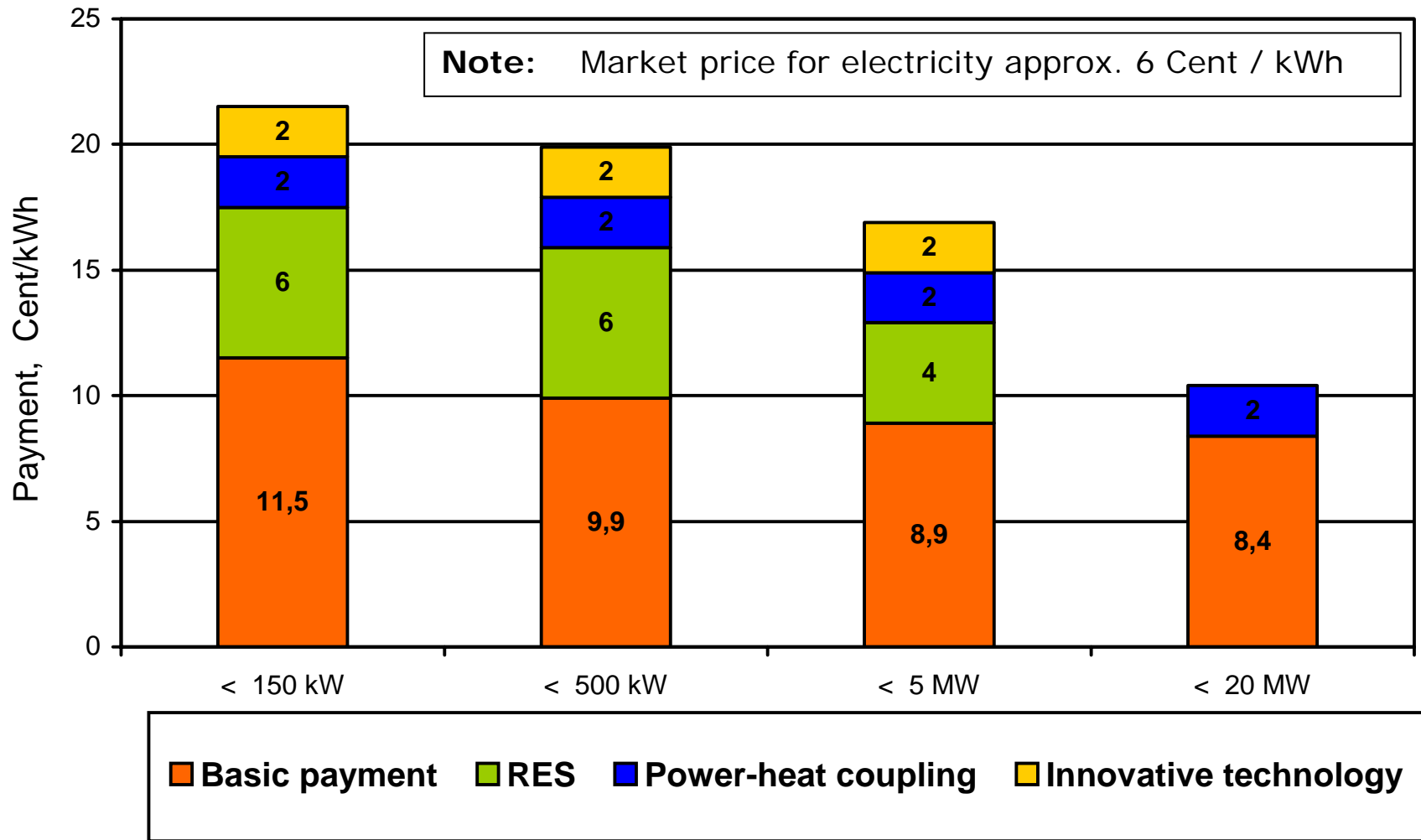
(Potential nearly all used)

1 : 4
estimated

400 GWh ???
(~ 80.000 t fuelwood)

100 GWh (~20.000 t)

(Note: 1,000 t wood comply ~ 5 GWh)



Payment for delivered electricity produced in Biomass-Power-Plants in Germany

(Erneuerbare-Energien-Gesetz, 2004)

Comment to the 1st part:

- Next the traditional form to use wood like a local resource for heat and material utilization fuel wood has got an important role in climate change activities.
- According the Kyoto-protocol and the deduced burden-sharing-programme of the EU every member state has to realise his Green-House-Gas-emission reduction; Germany has to fulfil a reduction rate of 21% related to 1990 and up to 2012 .
- National mechanism were created to accelerate the process of increasingly utilisation of renewable resources, e.g. the German EEG - a special law to regulate the transfer of produced electricity by renewable resources (RES) in the energy supply system.
- This law is next to the price explosion for oil and gas on the global market the main reason for the increasing speed-up of the share of RES in national energy supply structure.
- There is a gap between the appearance and the demand of fuelwood to realize the green-house -gas reduction aims. This gap is the reason for a increasingly and strong competition on the timber market, especially between the pulp- and particleboard industries and the fuelwood-power-stations.
- Wood production on set-aside of farmland could be a part of the solution to supply the missed abundance next other strategies.

2 WOOD - POTENTIAL, TECHNOLOGIES OF SUPPLY AND MARKET PRICES

Results of the 2nd German forest inventory (BWI) in 2002

Average increment

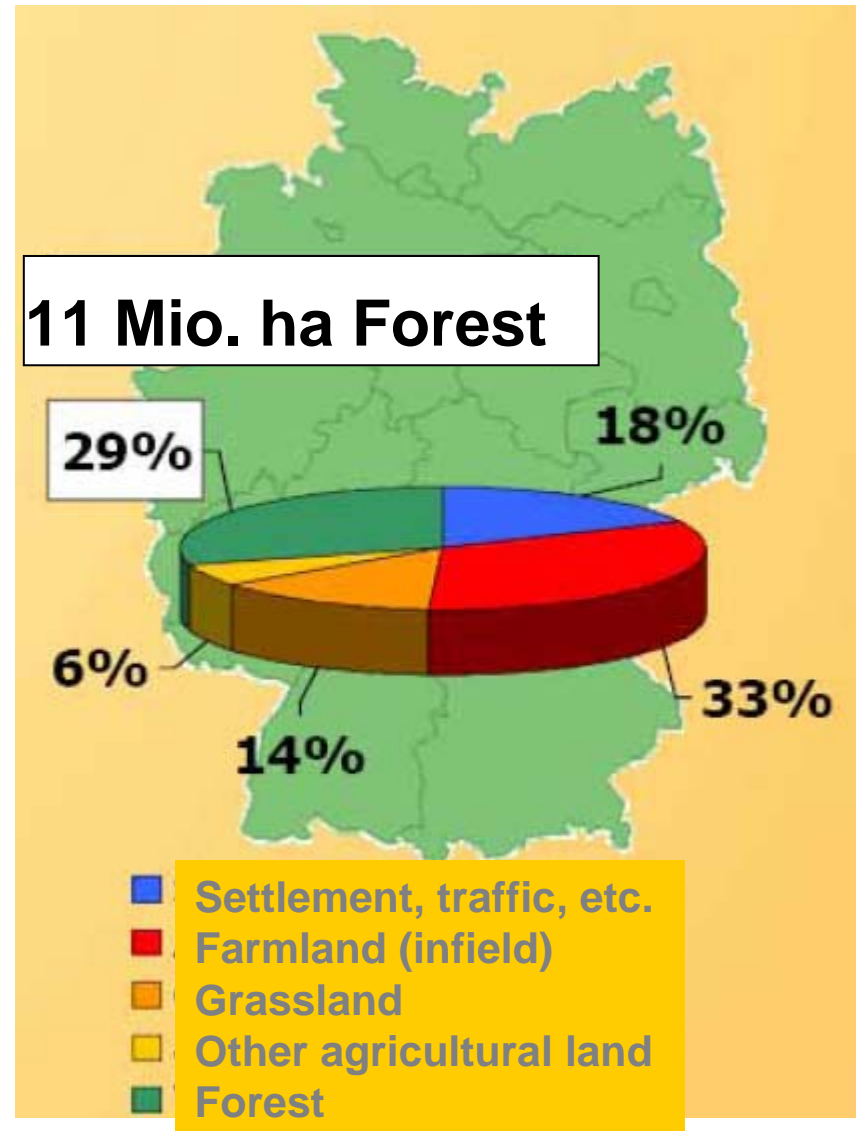
100 Mio. Vfm/a (for d1,3>7cm)

79 Mio. Efm/a (Vfm minus 20 % for bark and harvesting losses)

Average harvest

60 Mio. Efm/a (~75 % of the increment)

German forest area, annual increment and wood harvest

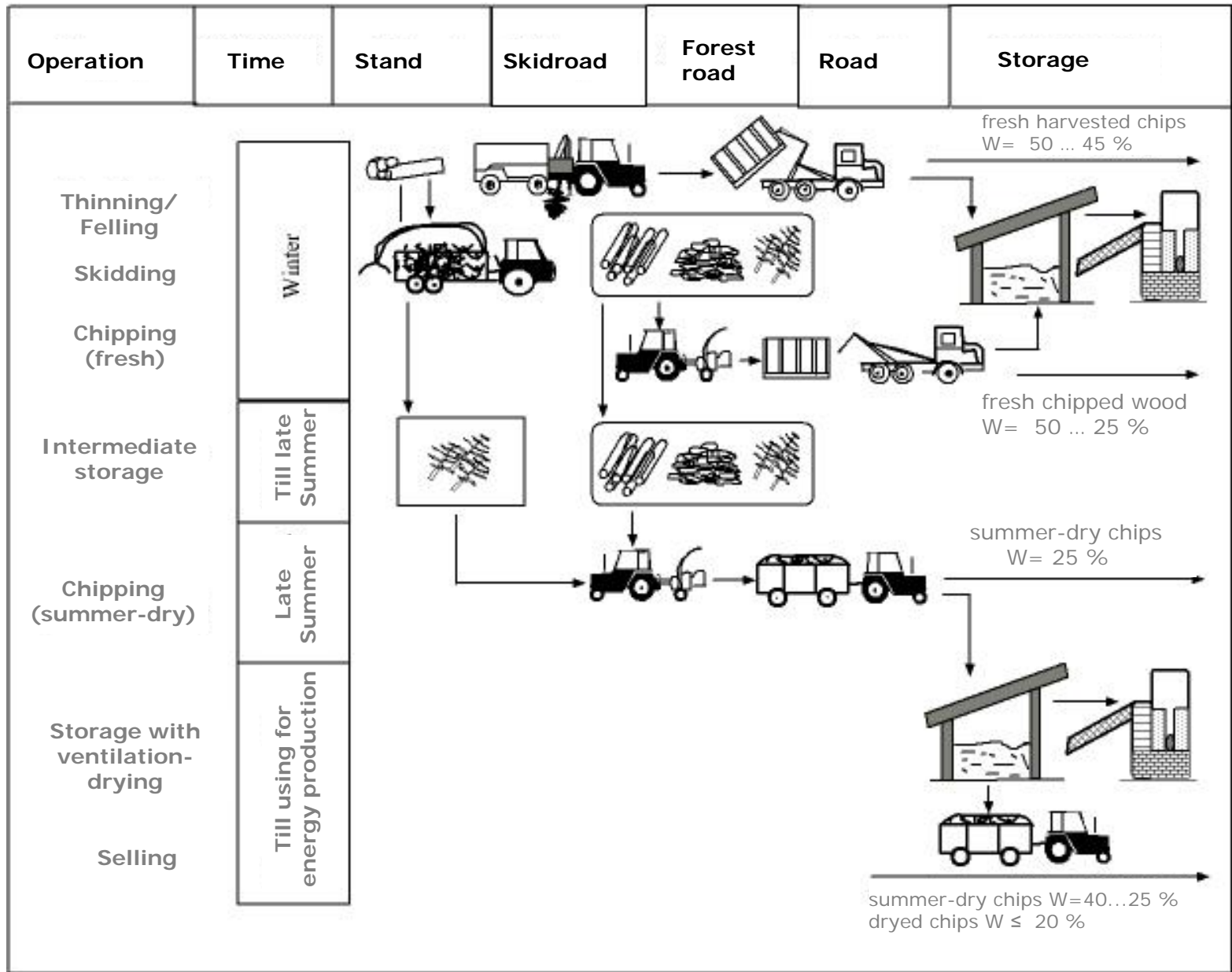


Source: FNR (2006); BWI 2004), ELTROP (2006); modified

National production	Mio. m ³	%	National use	Mio. m ³	%
Trunk wood	33,6	36,8	Pulp/groundwood pulp	8,5	9,3
Pulpwood/cord wood	21,0	23,0	Particle boards	19,4	21,2
Forest rest wood	7,1	7,8	Saw mill industry	33,6	36,7
Industrial rest wood	11,8	12,9	other material use	2,7	3,0
Bark	2,4	2,6	Fuelwood > 1 MW	11,3	12,4
Other industrial rest wood	4,1	4,5	Fuelwood < 1 MW	3,6	3,9
Recycling wood	11,0	12,0	Domestic fuelwood	12,3	13,5
Landscape conservation wood	0,3	0,4			
total	91,4	100	total	91,4	100

Wood raw material balance sheet 2004 (Mio. m³)

Source: MANTAU, U. / SOERGEL, C. v. (2006), modified

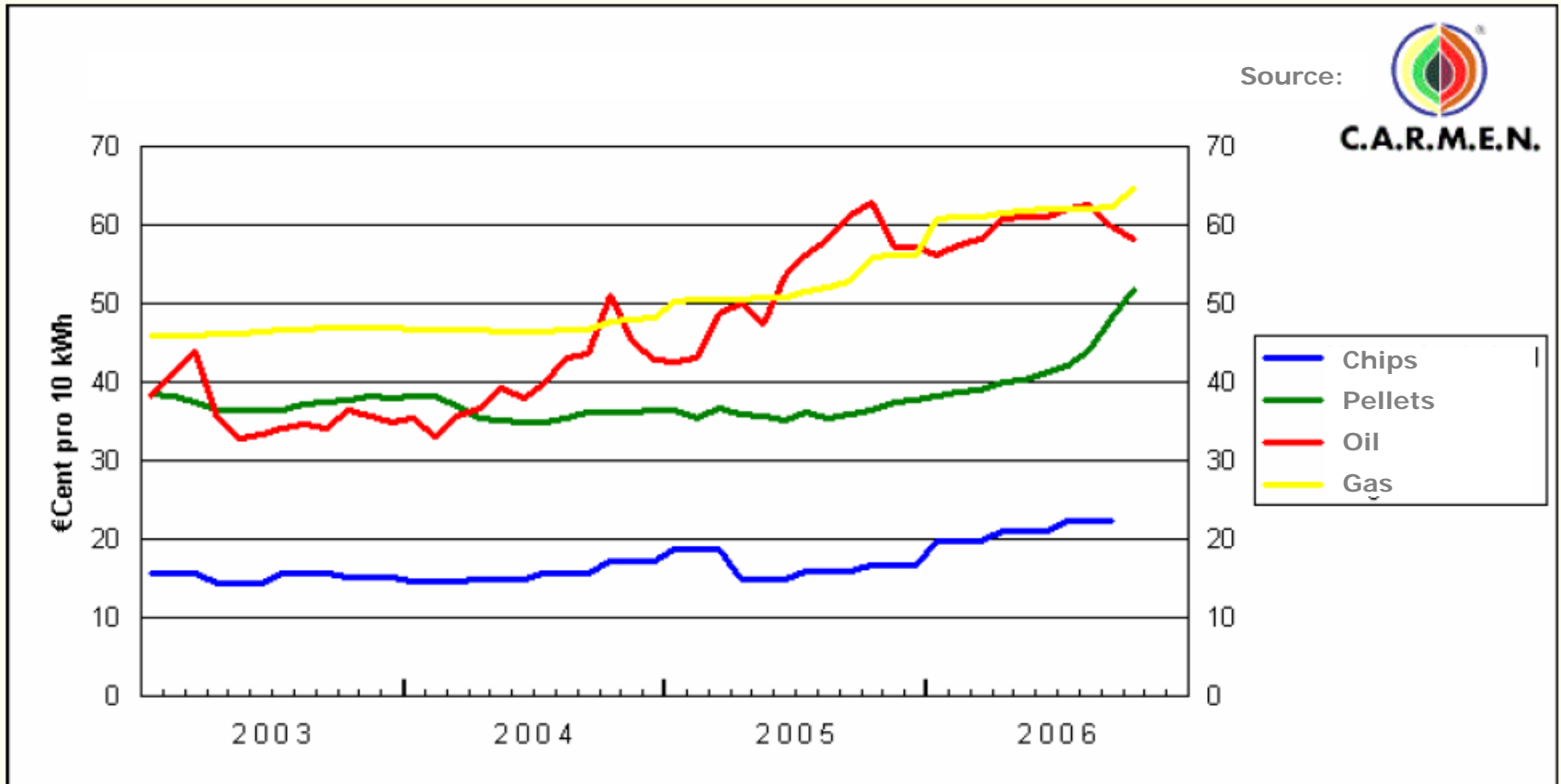


Versions of technologies for fuelwood production

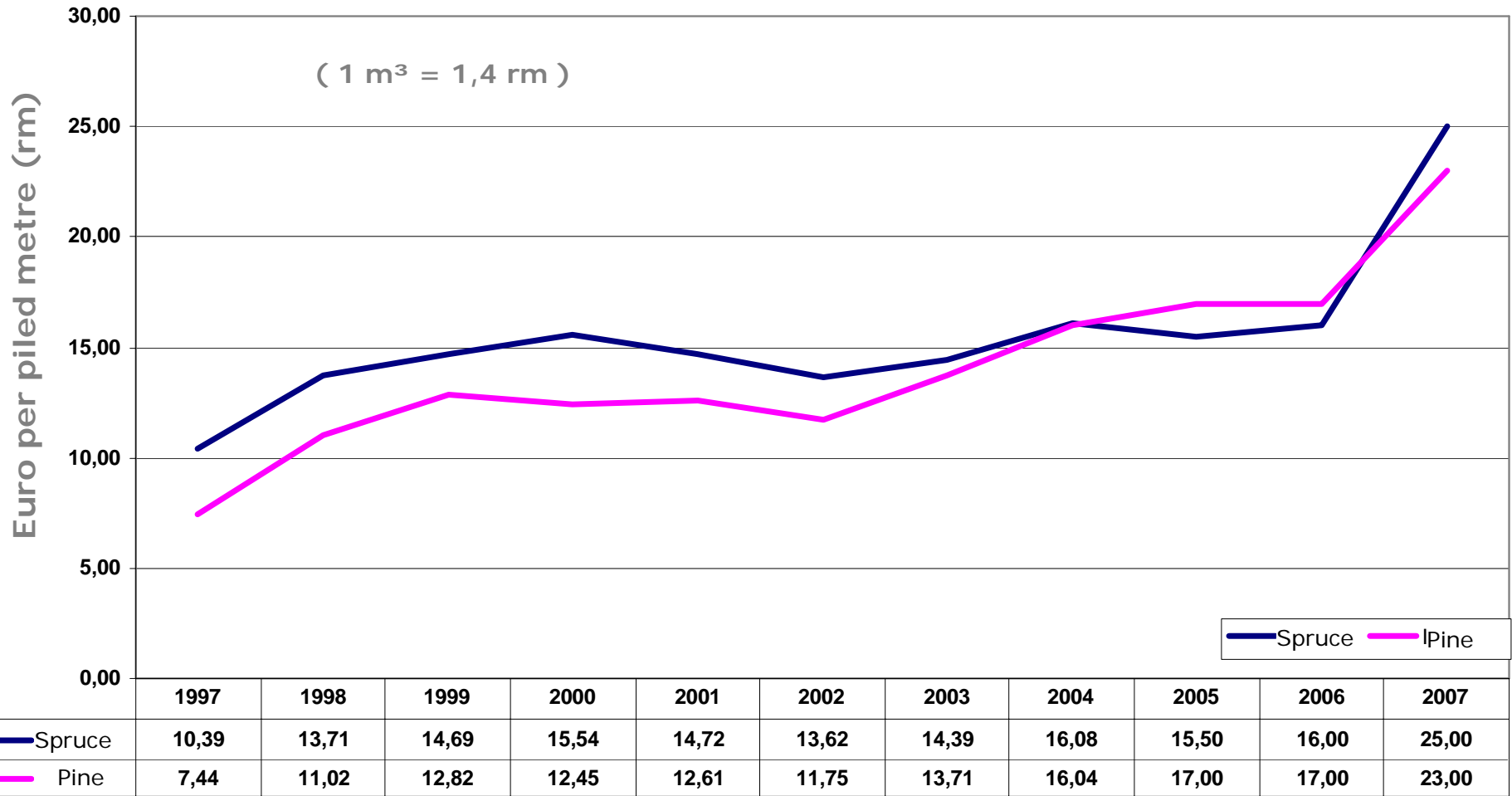
Sort	Attributes	Euro per trading unit	Euro per energy content (MWh)
Roundwood	free foerest road	30 ... 40 €/m ³	22 ... 25
Fuelwood	split	~ 50 €/m ³	~ 35
Split logs	air-dry, free trader	~ 75 €/m ³	~ 35
Packaged fireplace logs	small package to sell at hardware store	~ 150 €/m ³	~ 65
Chips	fresh, free forest road, mixed softwood/hardwood	30 ... 60 €/t	10 ... 20
Pellets	DIN-Standard, free home	~180 €/t	~35

Sources: - http://www.forstamt.freiburg.de/daten/8_service/holz.htm
- CARMEN (2005)
- GEROLD (2006)
- Market questioning 04/2006 Dresden / Chemnitz

Fuelwood market prices (State of April 2006)



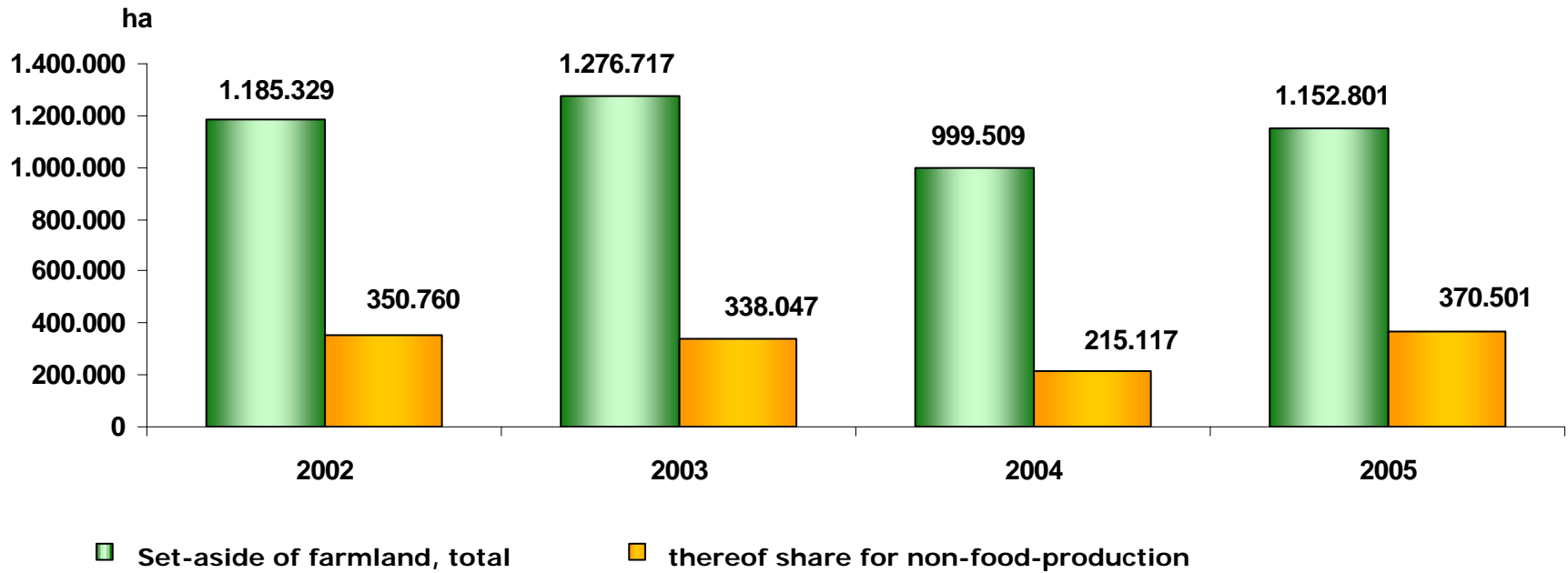
Price tendencies for fuel wood (chips/pellets), oil and gas



Price-development for cord wood at German timber market , 1997-2000

Source: CRAMER (2006)

3 SHORT ROTATION TECHNOLOGY WITH FAST GROWING TREES ON FARMLAND



Set-aside farmland in Germany and thereof used area for non-food-production

Source: Statistisches Bundesamt, 2005

Objectives of the short rotation technology

- Wood production on set-aside of farmland with yields of 8 ... 12 t_{atro}/ha·a; periodical harvest after 3 years earliest up to 20 years depended of the type of the follow use (fuelwood or pulpwood)
- Diversification of the agricultural production profile and hence increasing of the competitiveness of the enterprise
- Positive effect on employment in rural areas; improvement of regional infrastructure and chances for added value because of refinement, further processing or energy recovery of the produced wood
- Generation of small regional enclosed economic cycles



Planting

Harvesting
after 3... 10 years



Product:
Short -wood

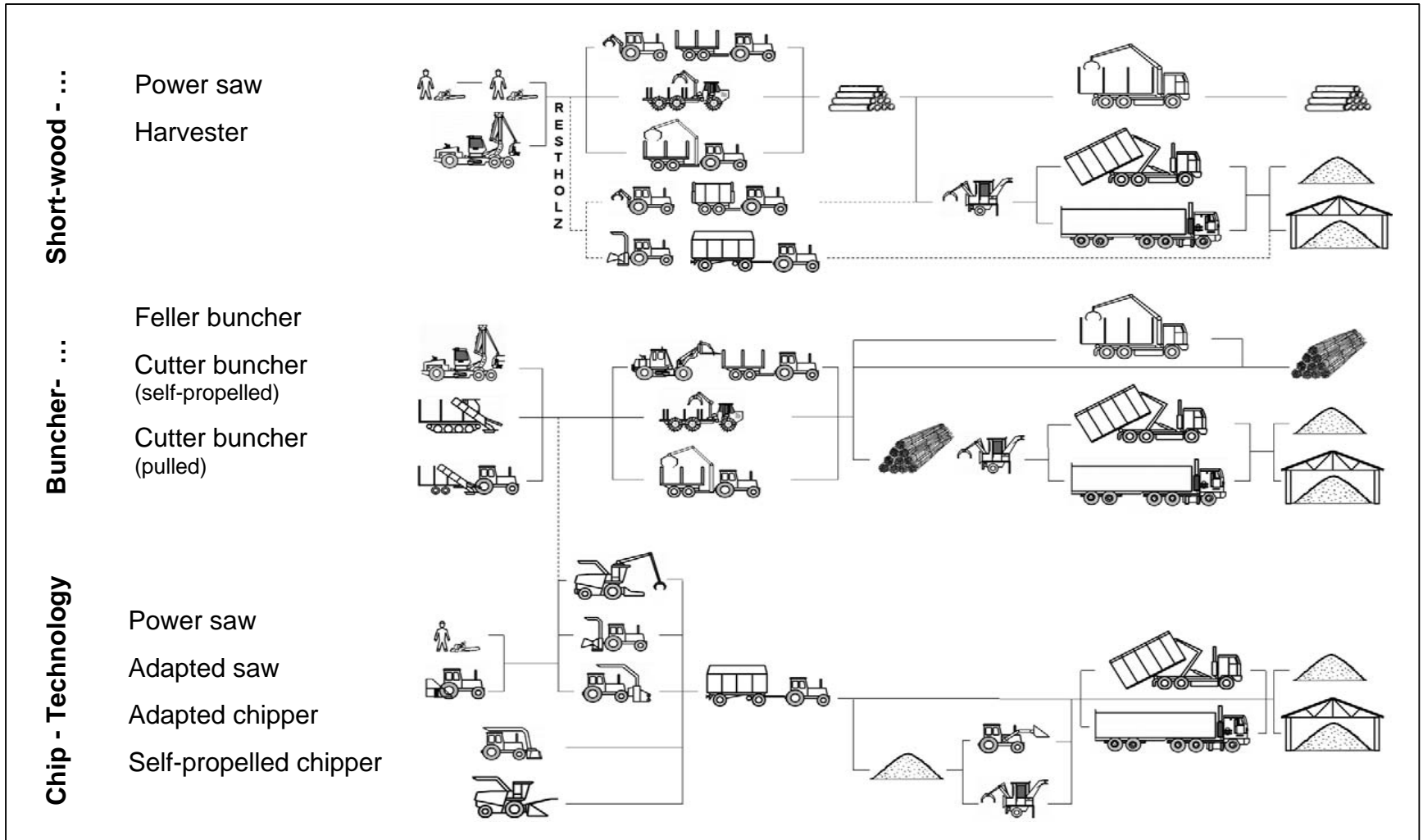


Recultivation
after >20 years



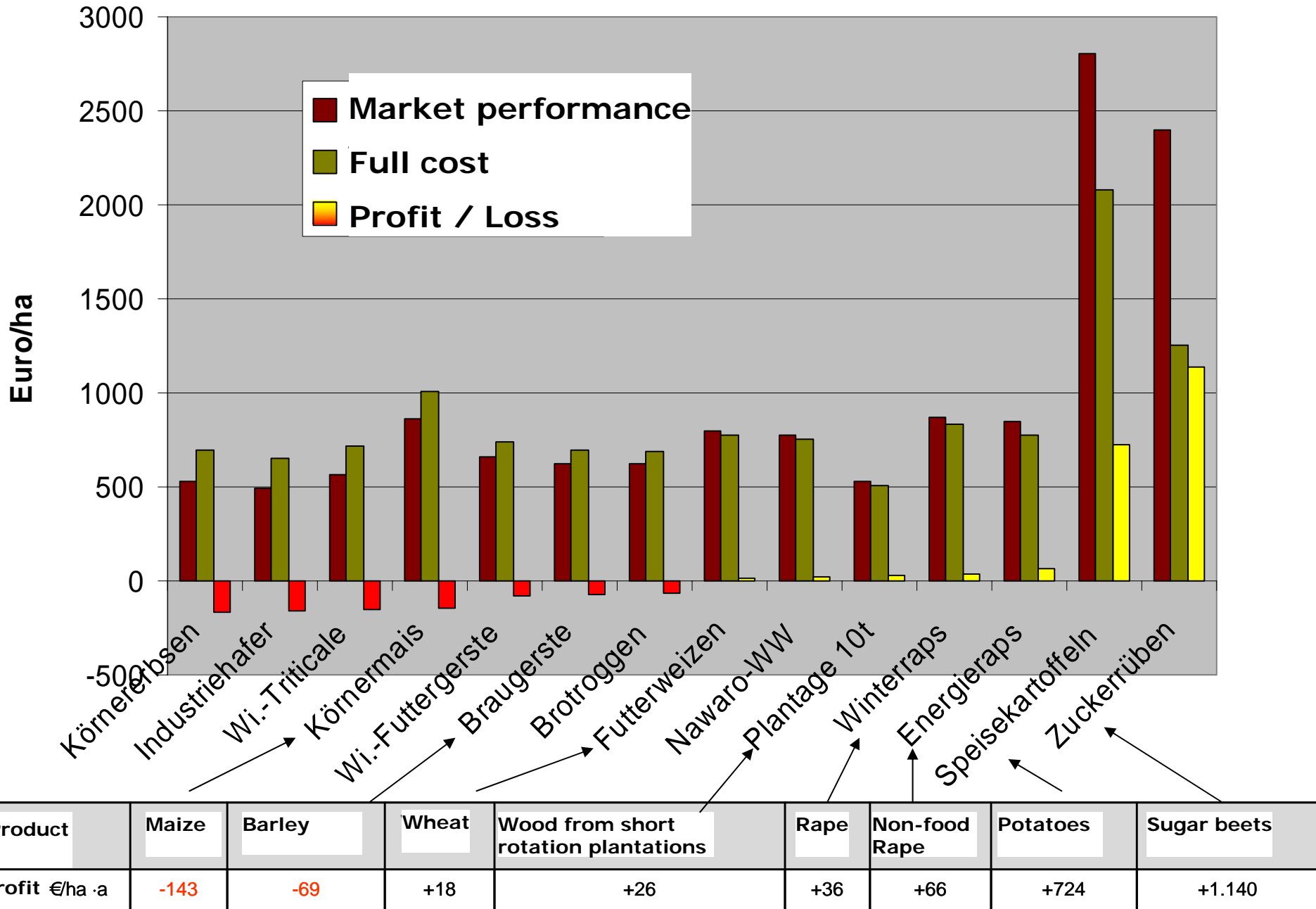
Product: chips





Technologies of harvesting in short rotation plantation

(according to SCHOLZ et al., 2006)



Comparison of different farm products with wood from short rotation

4 OUTLOOK

- Wood like a Renewable Energy Source (RES) has experienced a "renaissance" at present.
- Energy supply by renewable sources (RES) shows a strong growth up trend. The high price level for gas and oil and also the EU-Programmes with regards to climate change cause this increasing use of renewable energies. The outcome of this is an increasing competition between the timber industries and the fuelwood power plants to buy timber for processing and for energy recovery.
- The balance sheet according the political objectives in production and demand of wood shows a lack. The increasing share of fuelwood in the national energy supply leads to a particularly high increase in the demand of fuelwood exceptionally which cannot be satisfied by the produced wood in forests, timber industries and recycling industry alone.
- Hence the wood production on set-aside of farmland could be a an interesting long-term alternative. Beside an additionally wood production this way makes some advantages e.g. concerning rural infrastructure and competitiveness of the farm enterprises.



***Thank you for
attention!***