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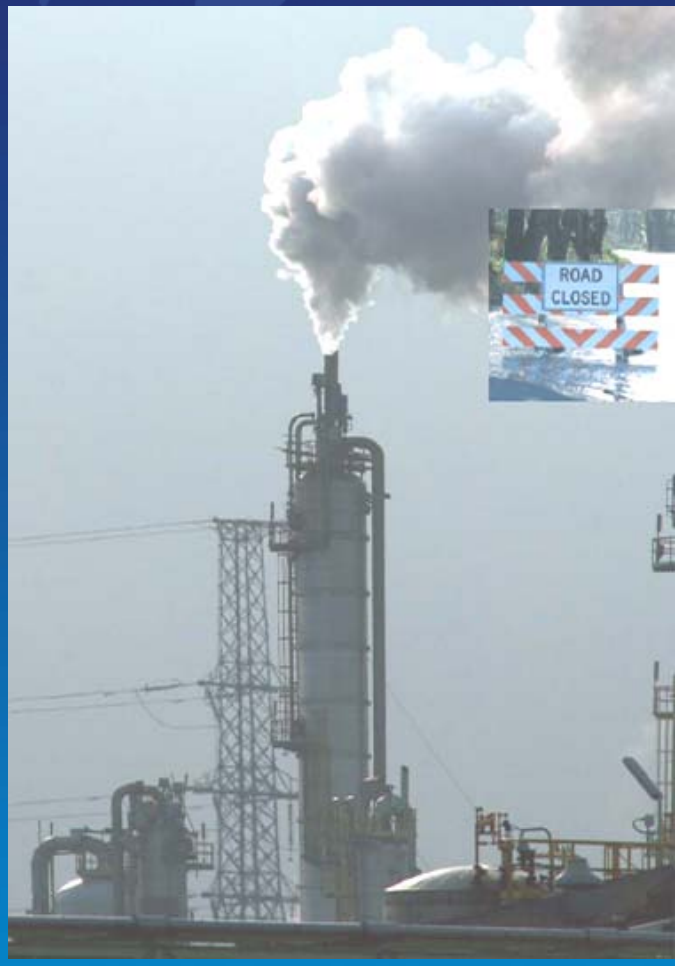
in der Helmholtz-Gemeinschaft

Bioenergy NoE

Status of Energy from Biomass/Waste and Alternatives to Grate Incineration in EU



presented at the

WIERT

Meeting 2008

Columbia University, New York
October 16th & 17th, 2008

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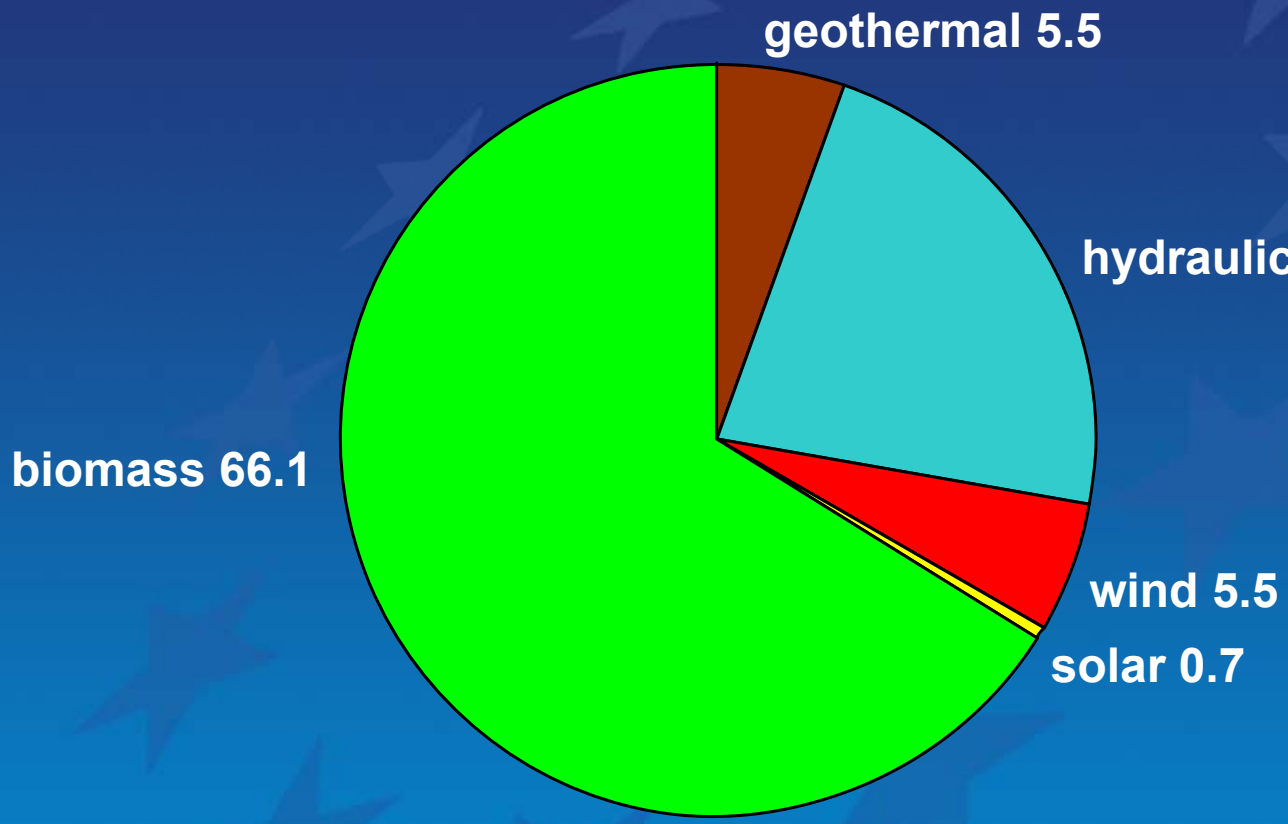
main political goals in EU‘s energy policy

development of renewable energy (wind, water, solar, biomass, waste) for

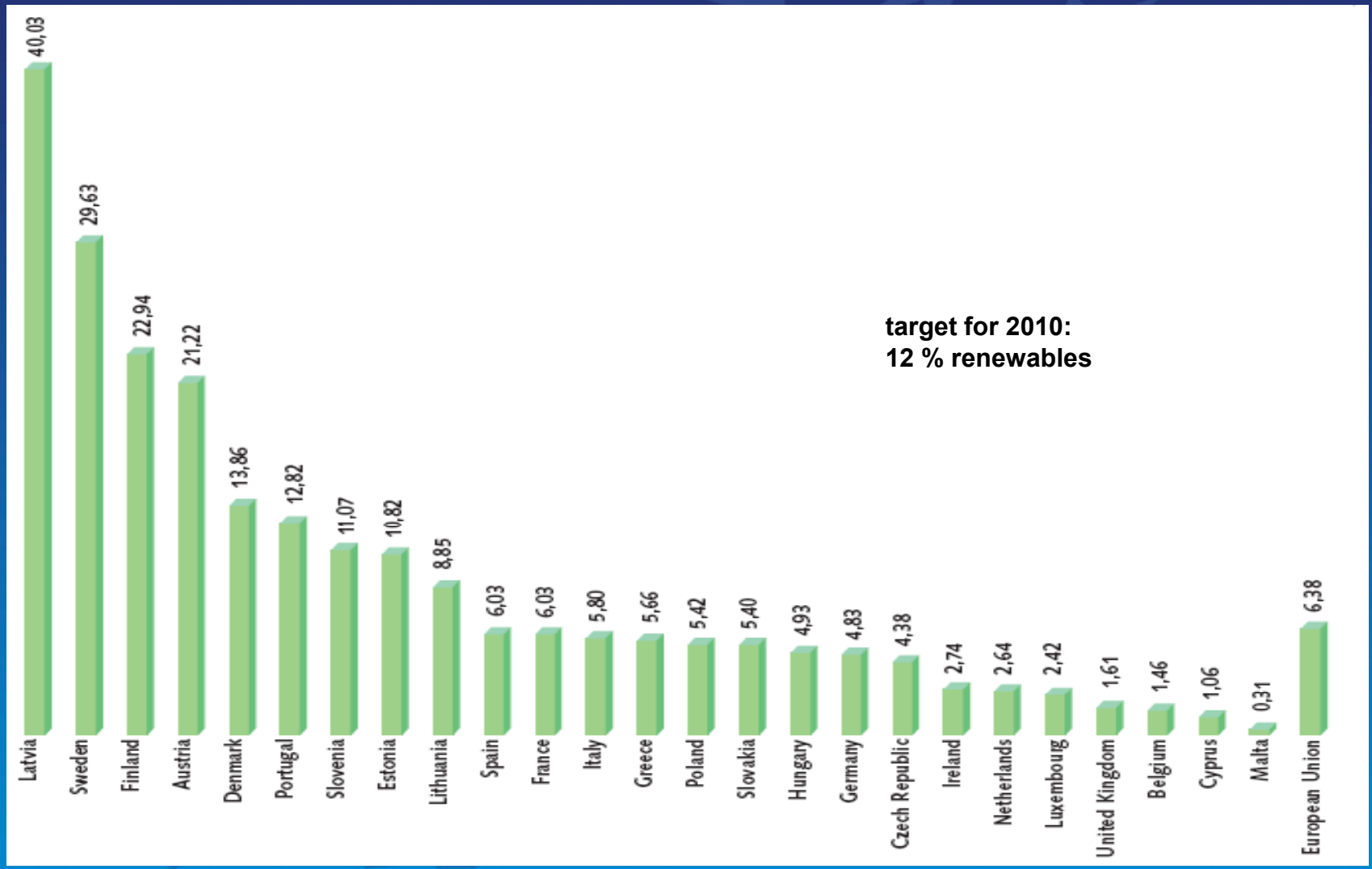
- reducing CO_2 emissions (Kyoto Protocol)
- enhancing sustainability
- improving security of energy supply
- expecting economical competitiveness in medium to long term

EU strategy for renewable energy promotion

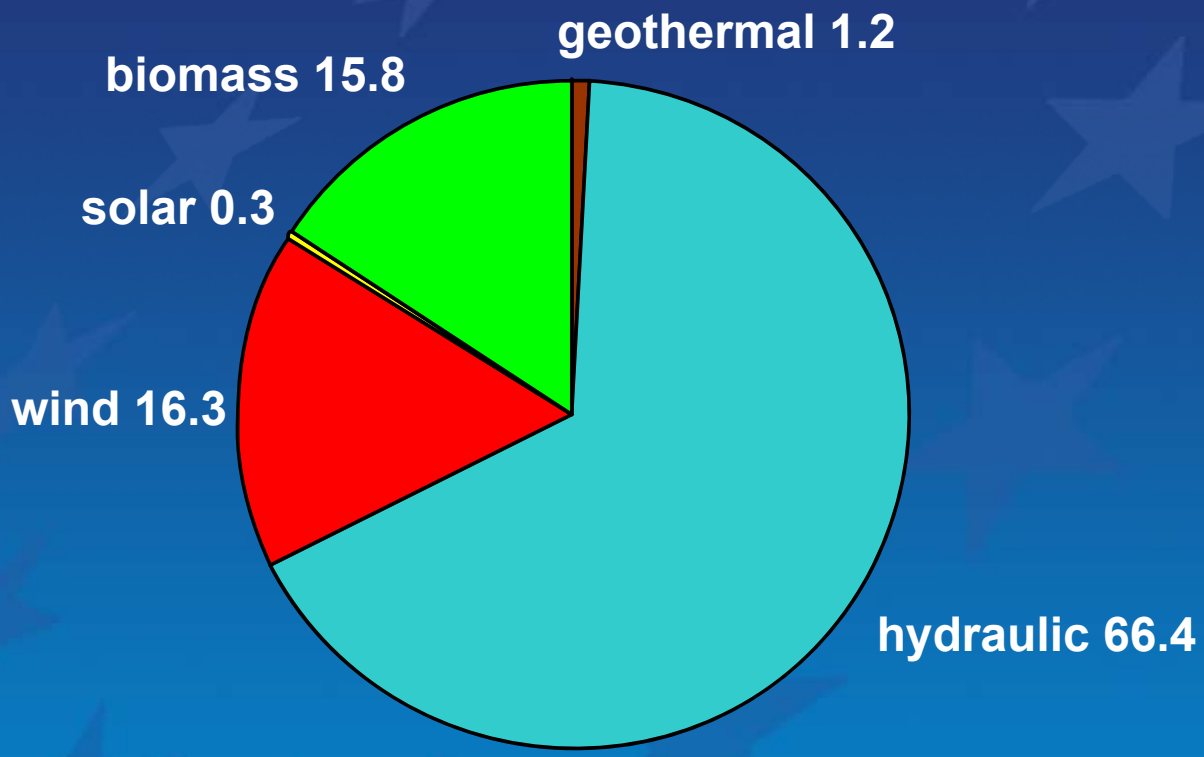
- **Green Paper on Security of Energy Supply** (11/2000)
  - **EU RES target 2010: 12 % of total energy**
- **RES-E Directive (2001/77/EC)**
  - **21 % in 2010**
- **Biomass Action Plan 2005: biomass targets for 2010**
  - **total energy 149 Mtoe (6 250 PJ)**
  - **heat 75 Mtoe (3 150 PJ)**
  - **power 55 Mtoe (2 300 PJ)**
  - **transport 19 Mtoe (800 PJ)**
- **Renewable Energy Road Map (COM(2006) 848, 1/2007)**
  - **20 % total RES, 10 % biofuel in 2020**
- **Landfill Directive (99/31/EC)**



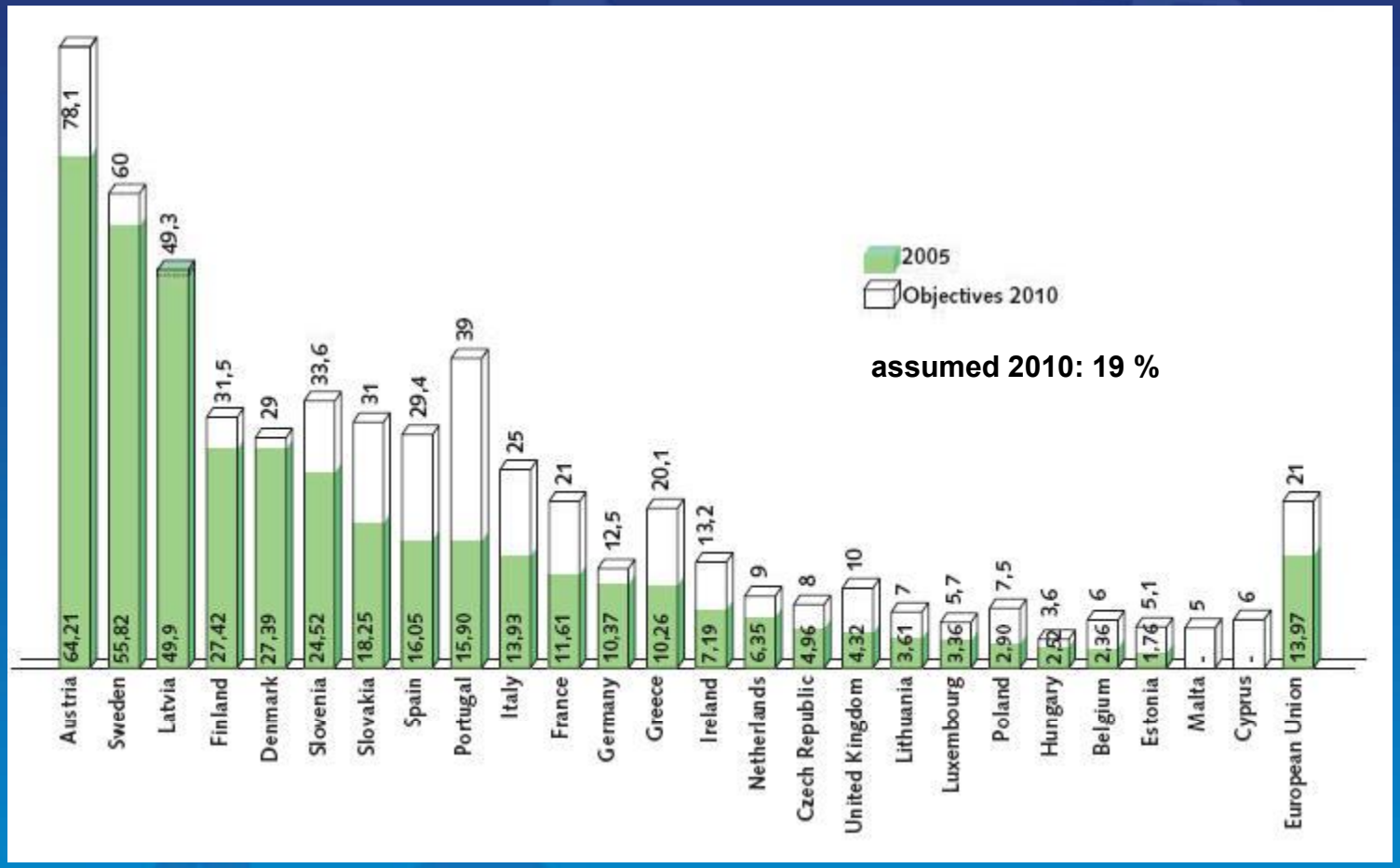
renewable energy mix in the EU in 2004 / 2005



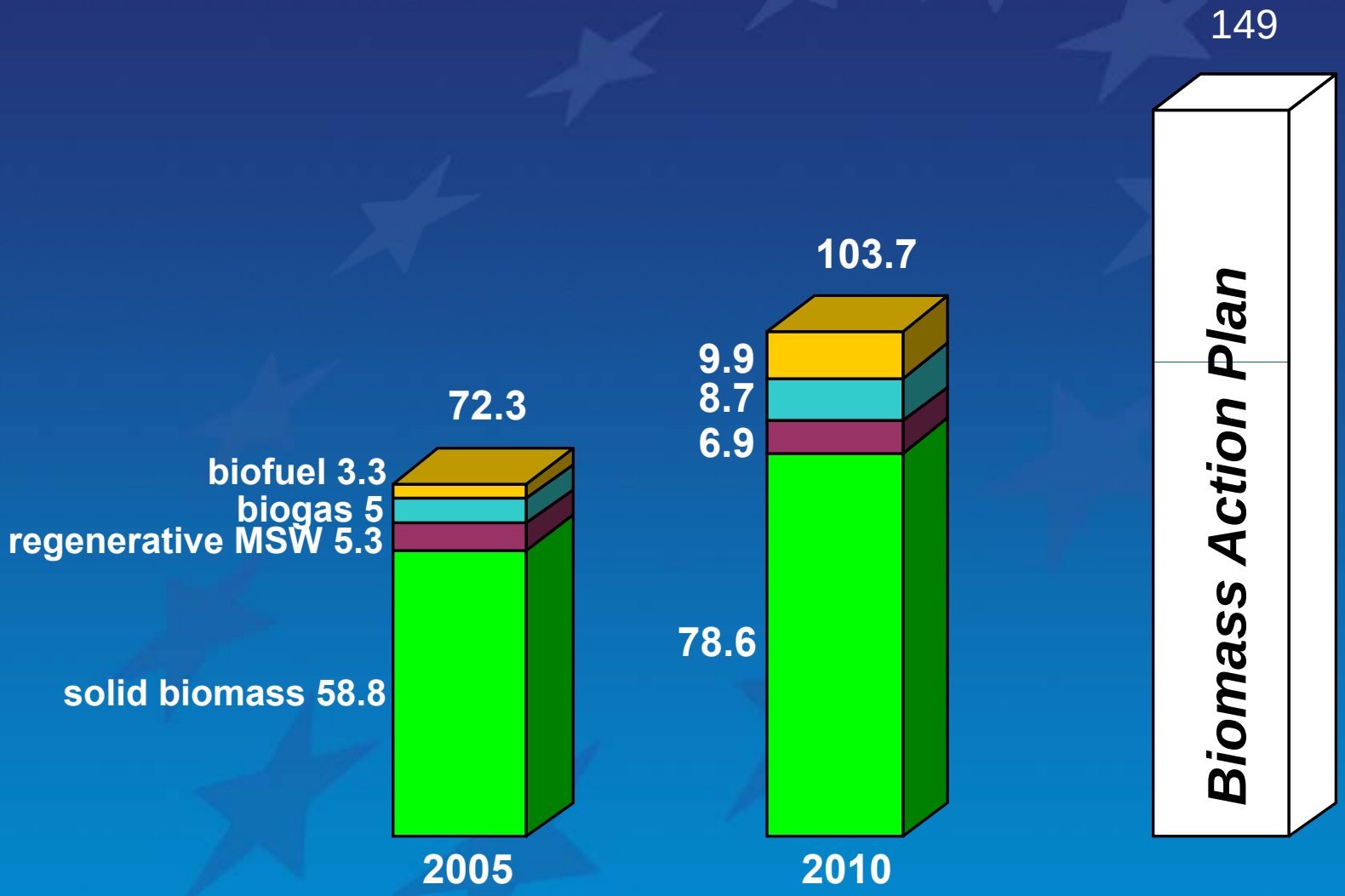
percent share of renewable energy in EU in 2005



RES-E mix in the EU in 2004 / 2005



percent share of RES-E in the EU in 2005



biomass development and forecast (Mtoe)

Waste Framework Directive 75/442/EEC

Landfill Directive 1999/31/EC

Waste Incineration Directive 2000/76/EC

main target of Landfill Directive

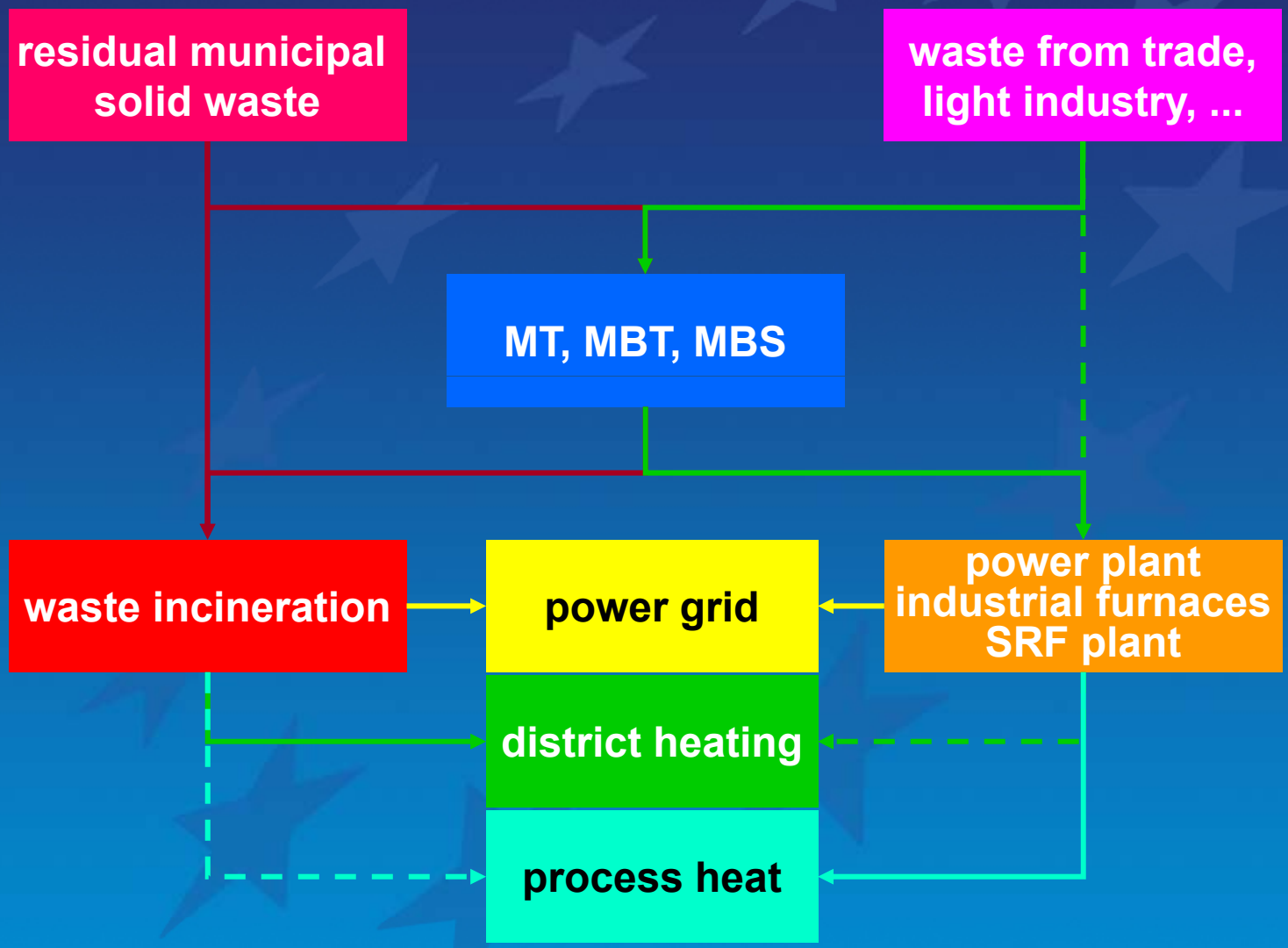
reduction of biodegradable waste disposal

- 25 % in 2006
- 50 % in 2009
- 65 % in 2016

} compared to 1995

⇒ **landfill ban in some countries**

EU legislative framework on waste



options for energy recovery from waste

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data for EU 25

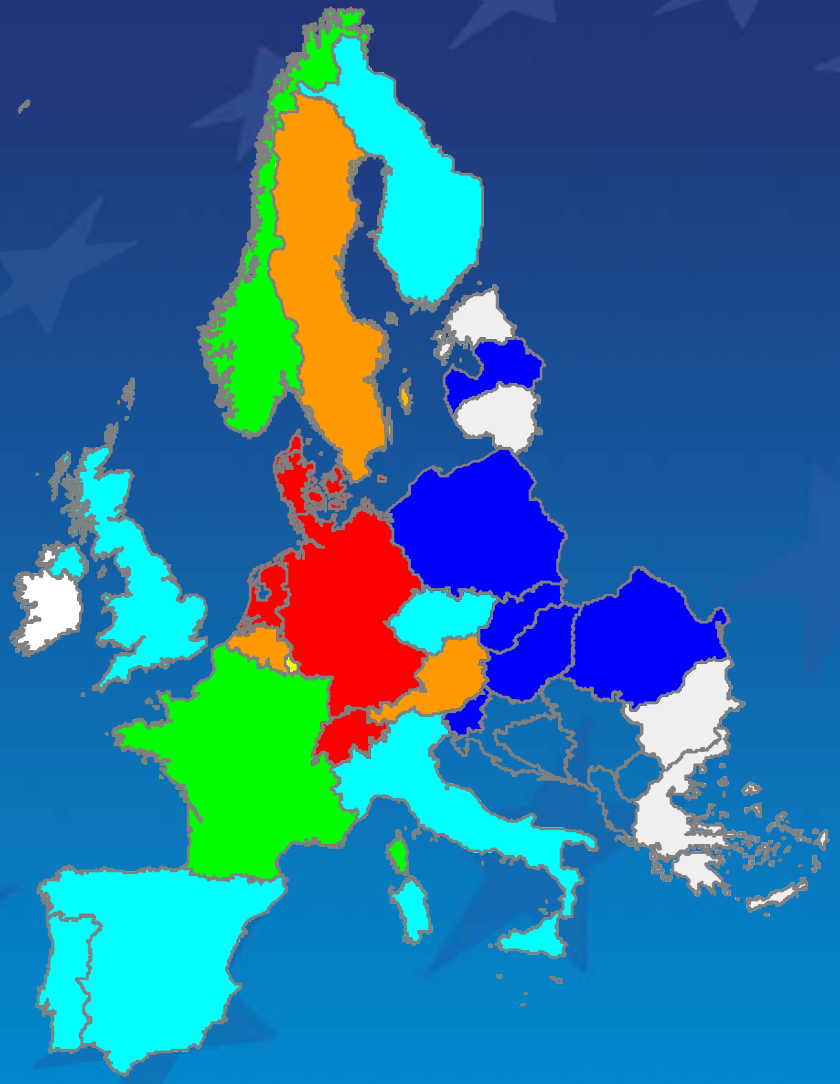
inhabitants:
460 mill.

MSW:
247 Tg

recycled:
90 Tg

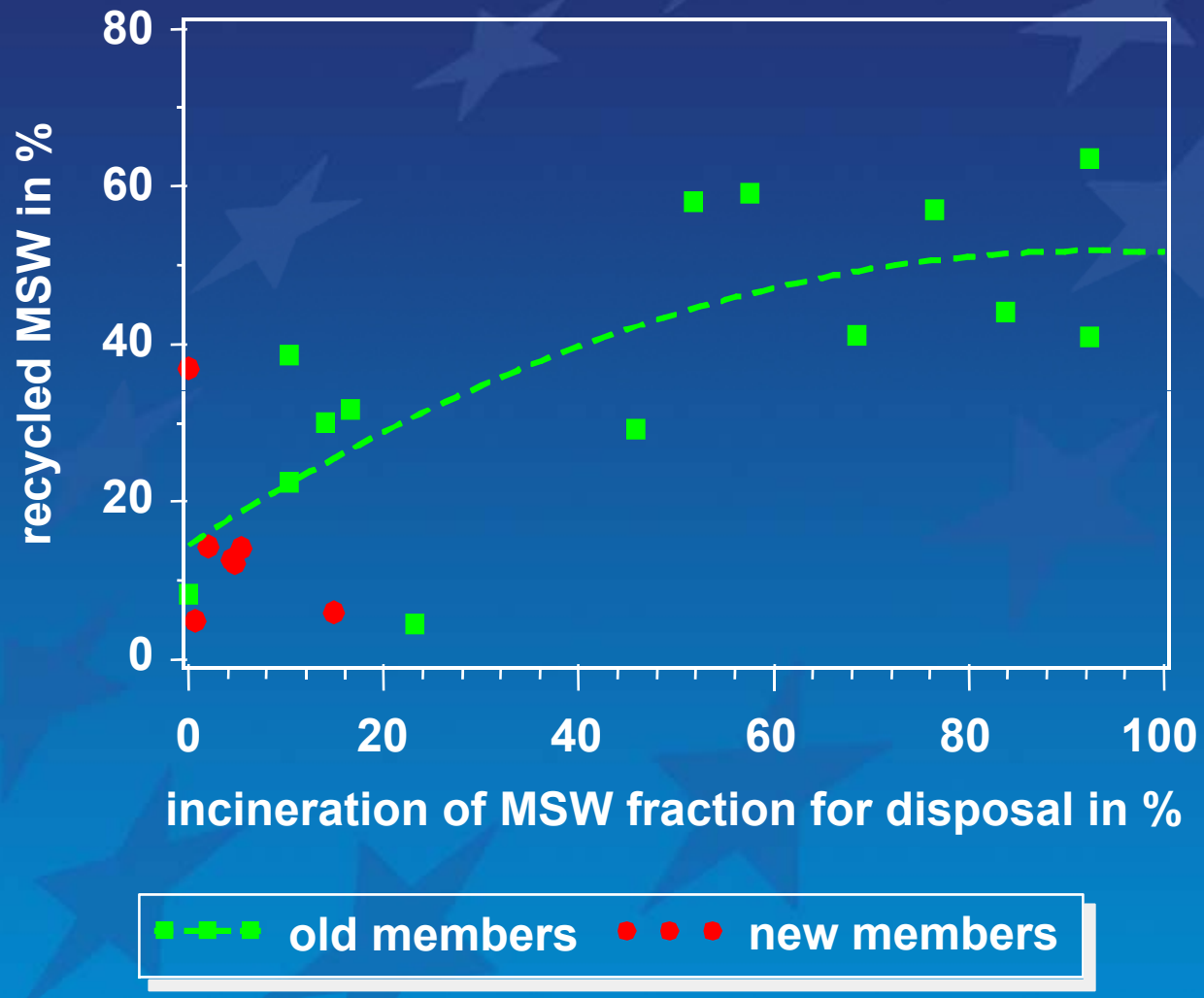
landfilled:
114 Tg

incinerated:
43 Tg



incineration of residual MSW in % (2006)

J. Vehlow, ITC-TAB (2008)



waste incineration and recycling in the EU

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primary energy
71 000 PJ

2005 from MSW
225 PJ

potential
1 065 PJ

<1
<1.5
<2
<2.5
>2.5

average 1.5

potential supply of primary energy by MSW incineration (%)

J. Vehlow, ITC-TAB (2008)

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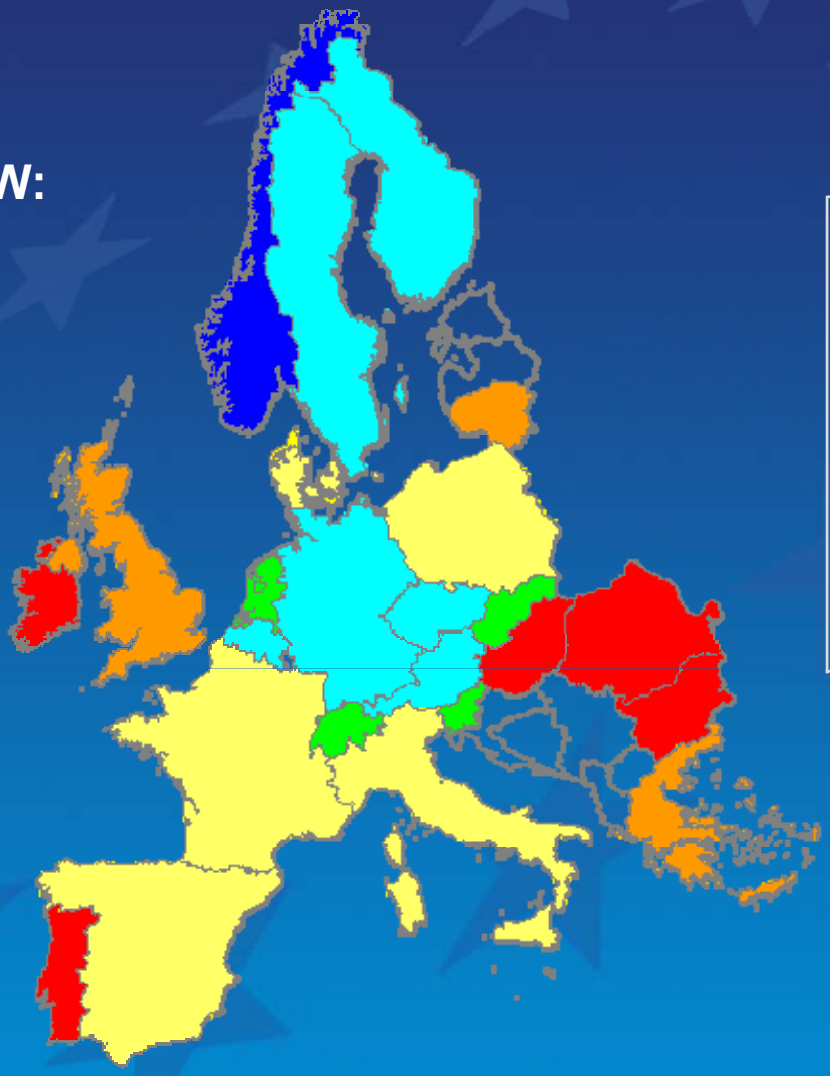
Bioenergy NoE

power:
9100 PJ

2005 from MSW:
38.5 PJ

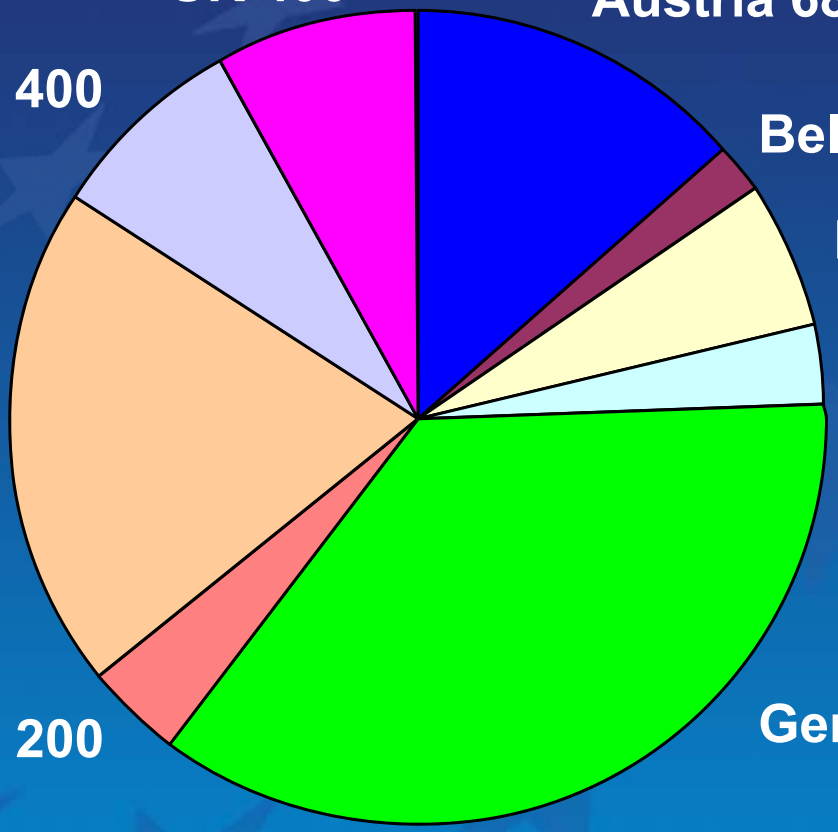
potential:
310 PJ



average: 3.4

potential power supply by MSW incineration (%)

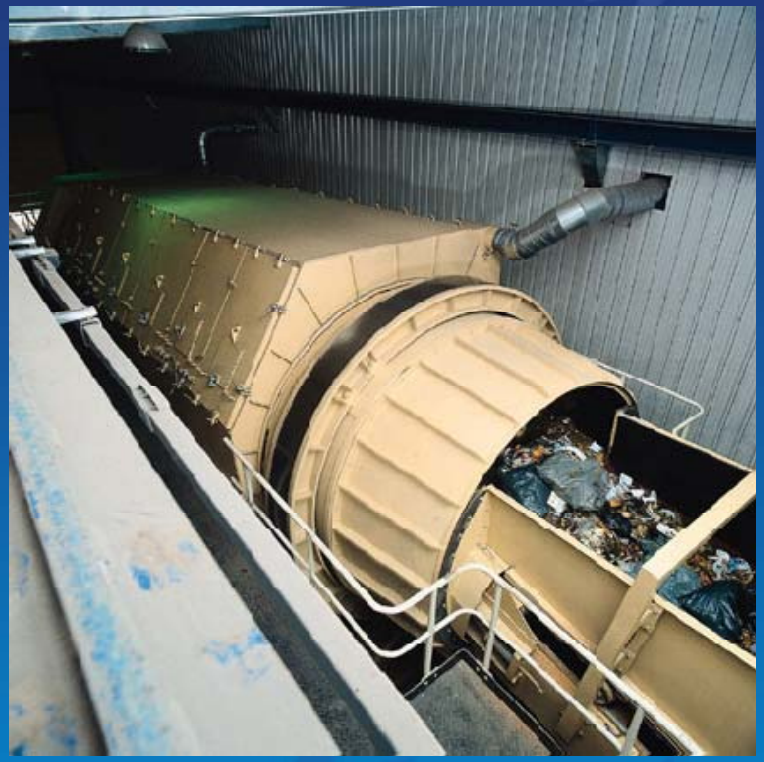
J. Vehlow, ITC-TAB (2008)



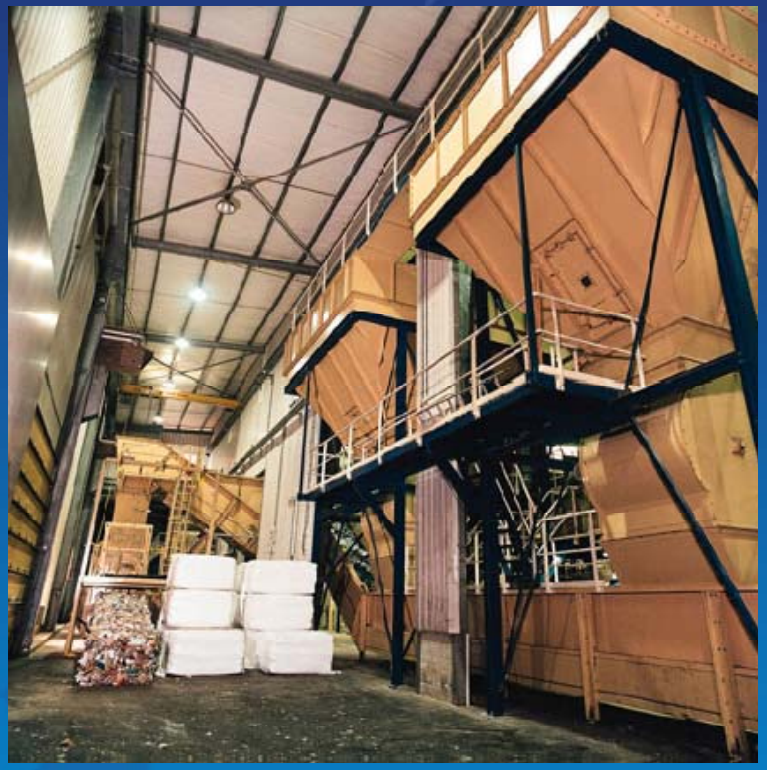
source: ERFO 2008

total: ≈ 5000

SRF production in the EU in 2005 (values in Tg/a)

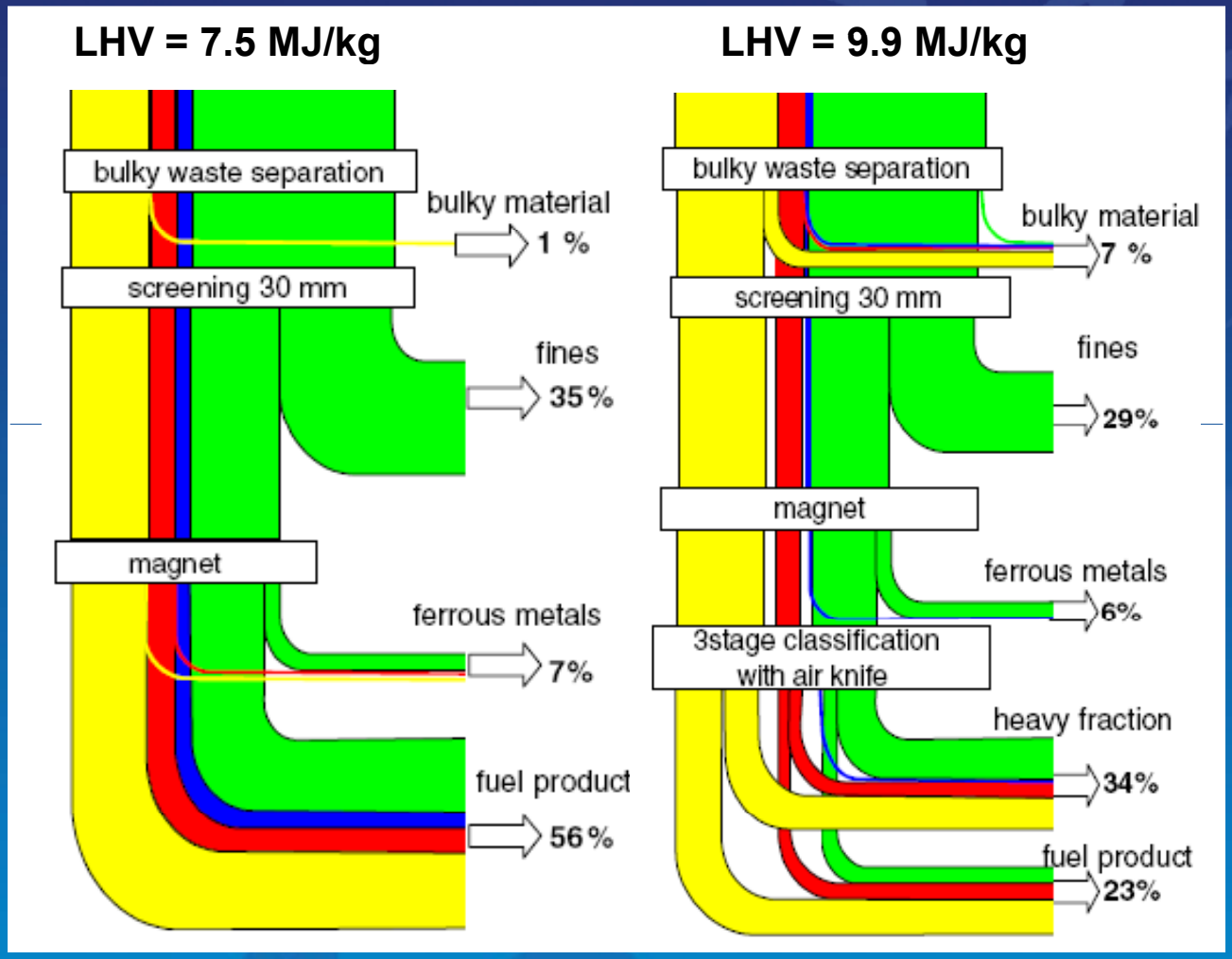


screening drum



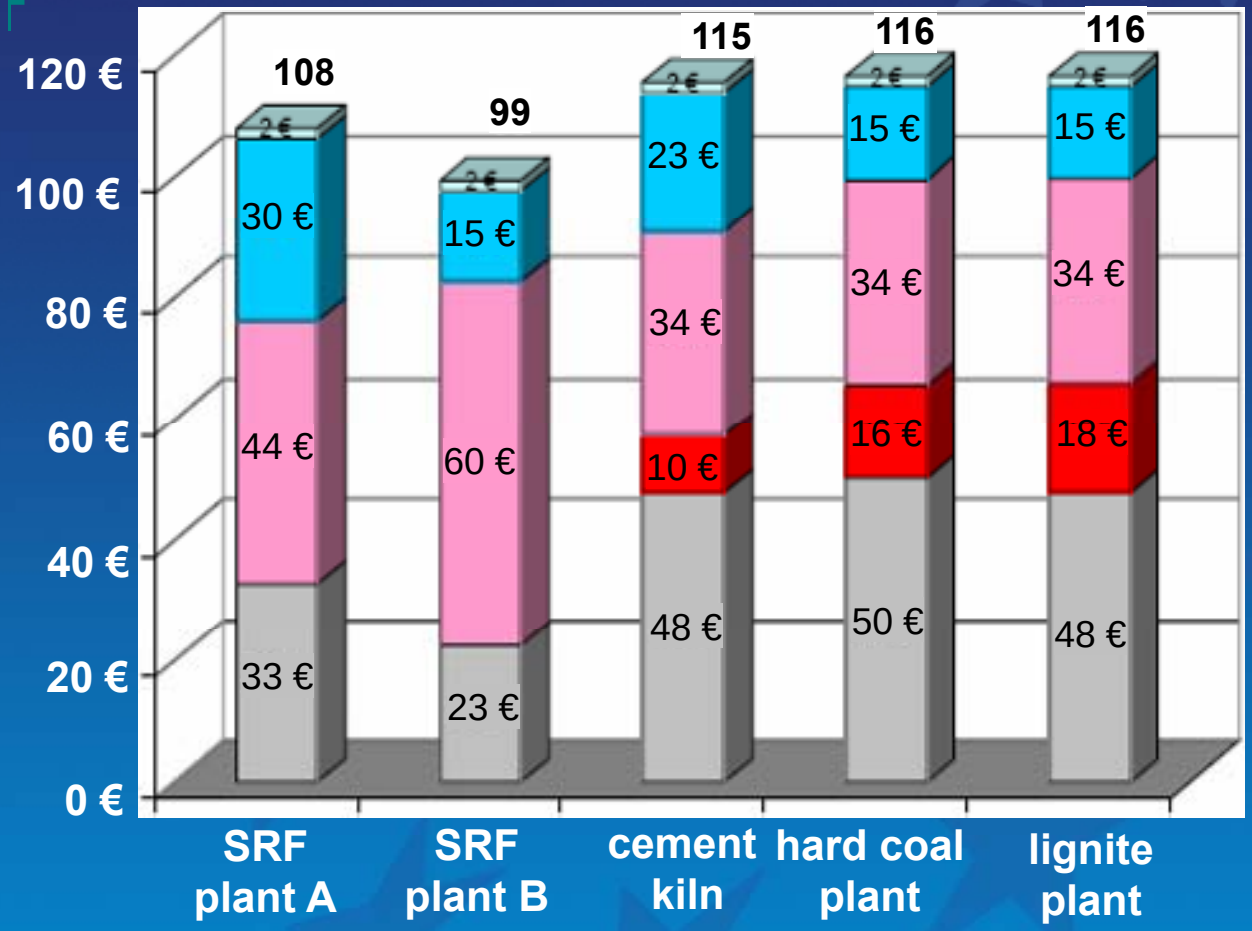
air classifier

SRF production



source: Rotter 2004

mass balances of production of two SRF types



landfilling of residues

residue treatment in MSWI

payment low calorific SRF

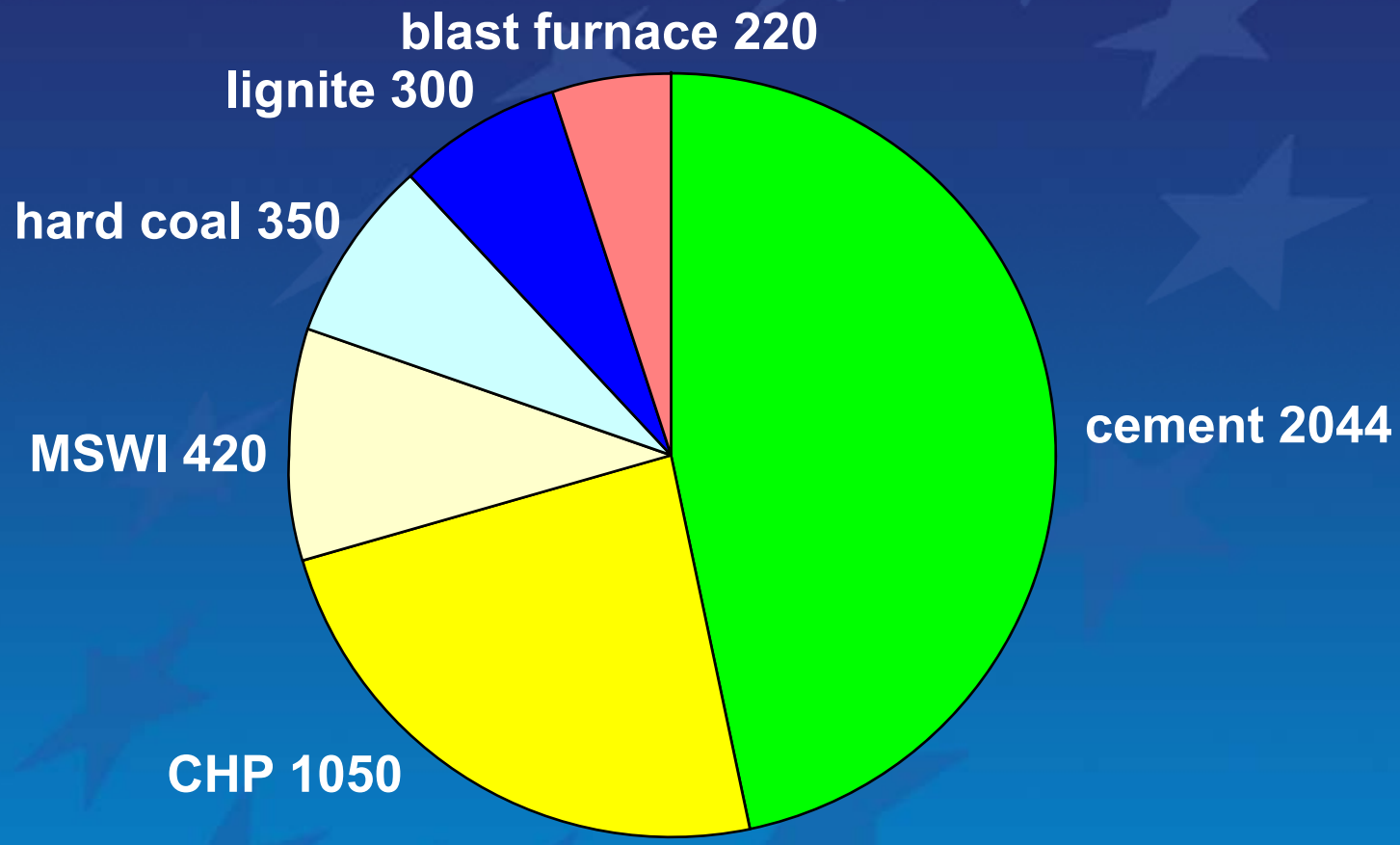
payment high calorific SRF

production

source: Prognos

MSWI costs: 85-200 €/Mg

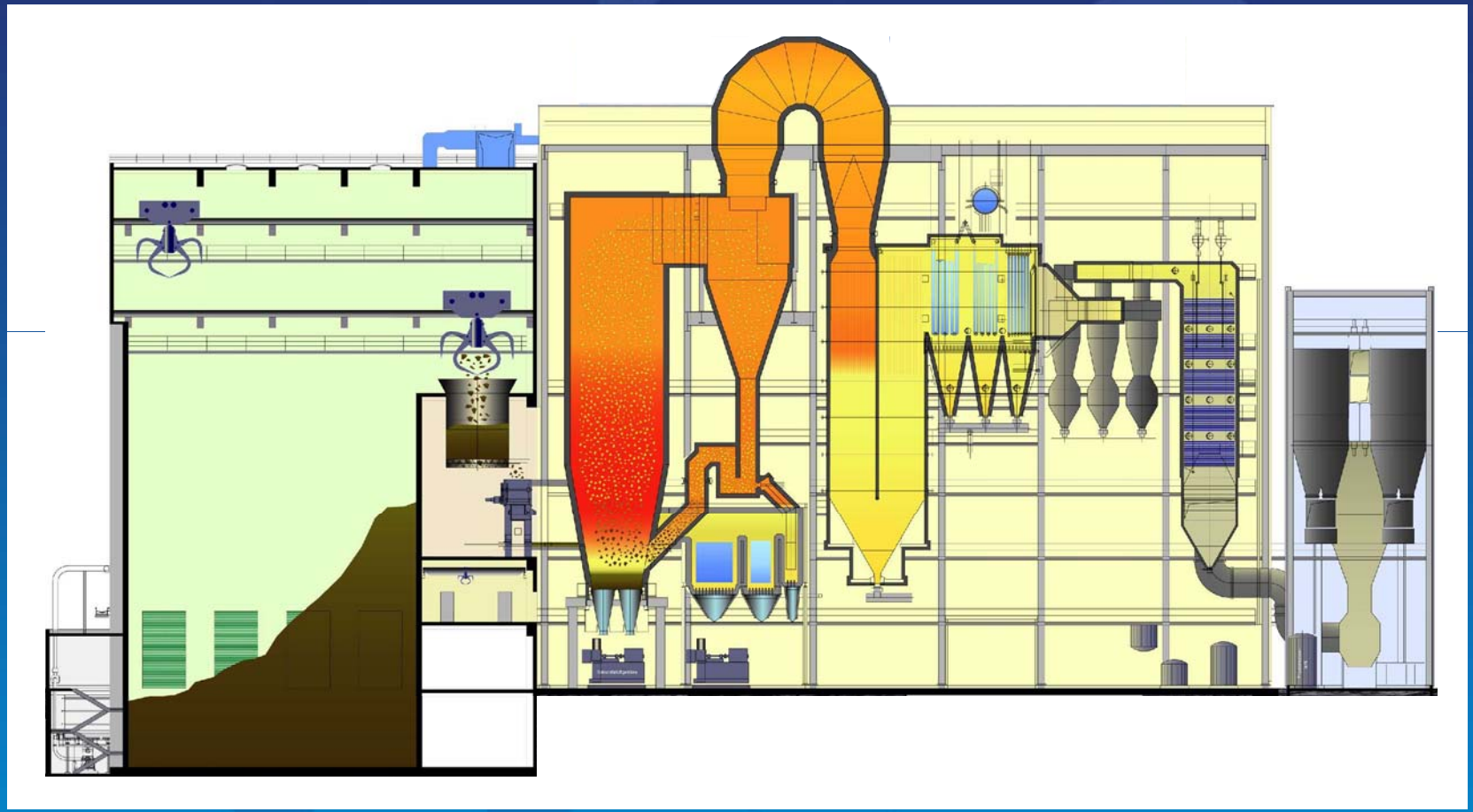
costs of production and utilisation of 1 Mg of SRF in 2006



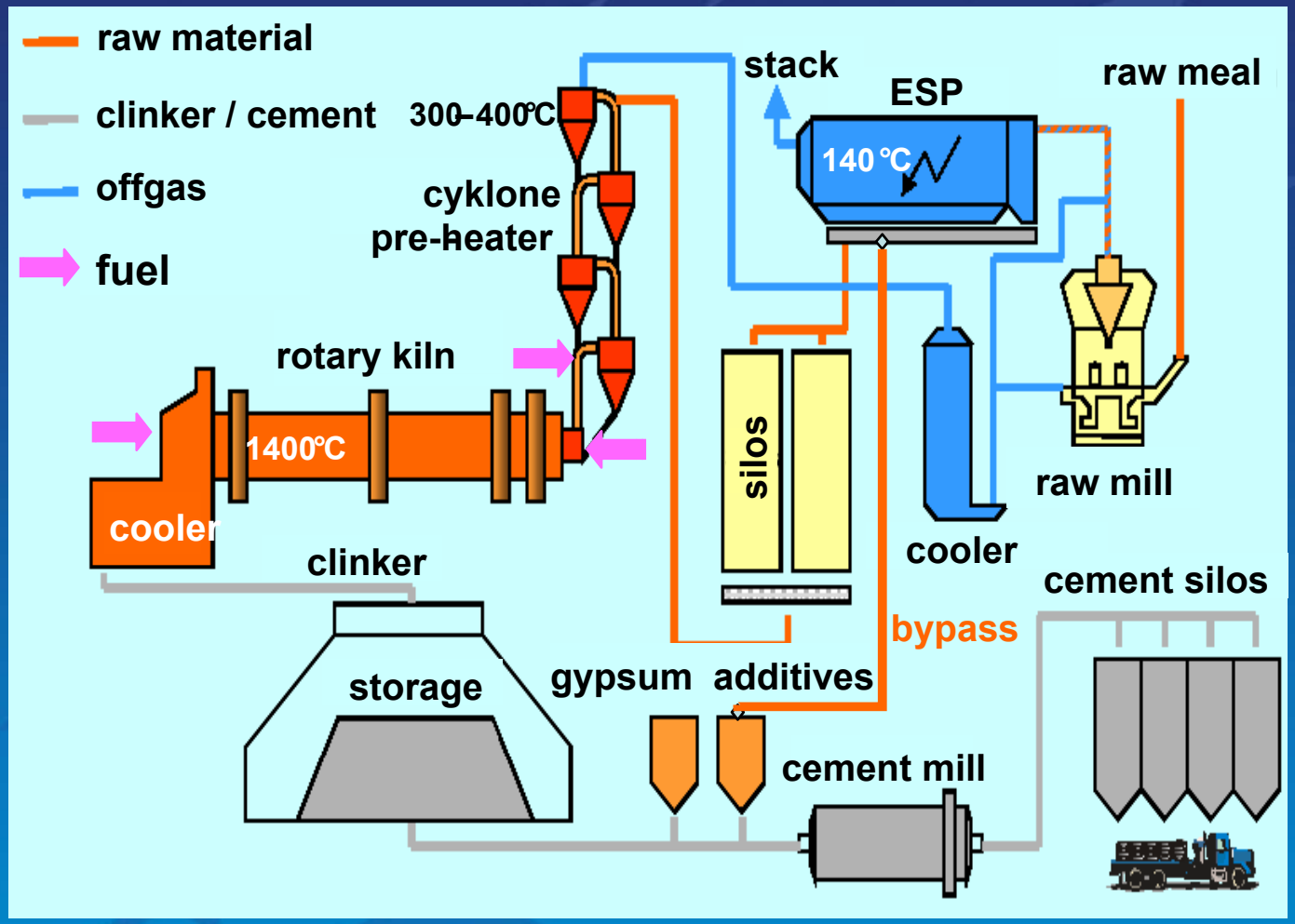
source: ERFO 2008

total: ≈ 4400

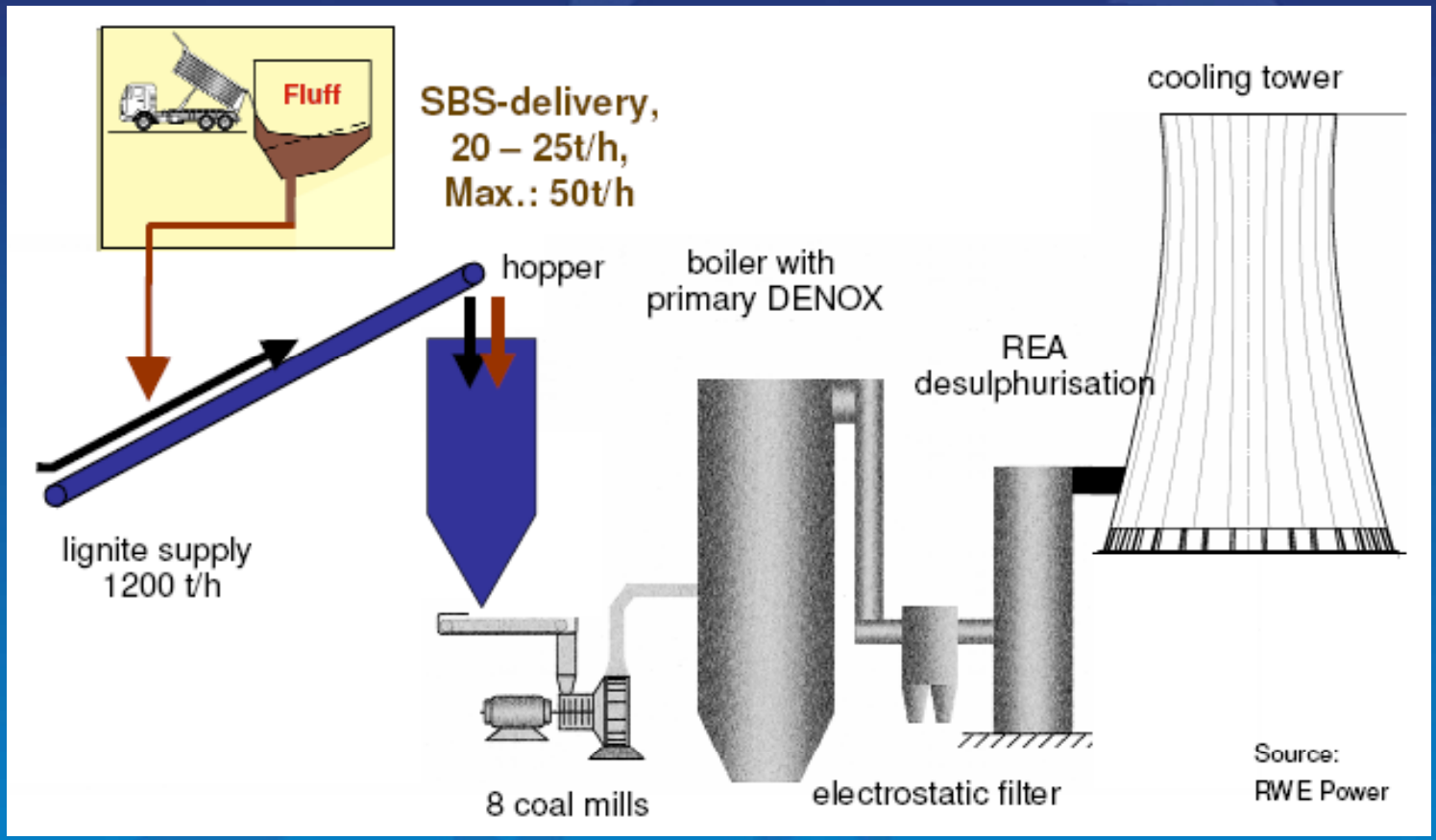
SRF consumption in the EU in 2005 (values in Tg/a)



SRF combustion plant with APC system



co-treatment in a cement kiln



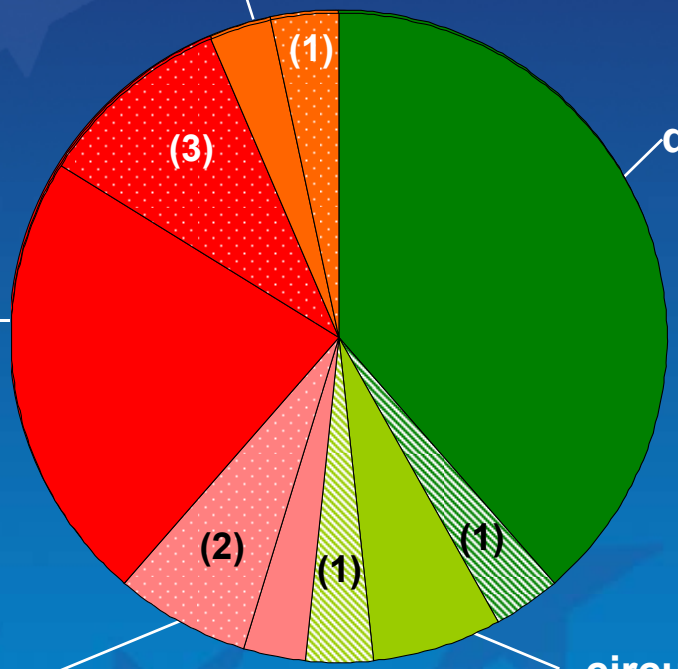
co-combustion of SRF in lignite PC boiler

hard coal boilers (15)

co-combustion in 2006 8
co-combustion in 2007 6

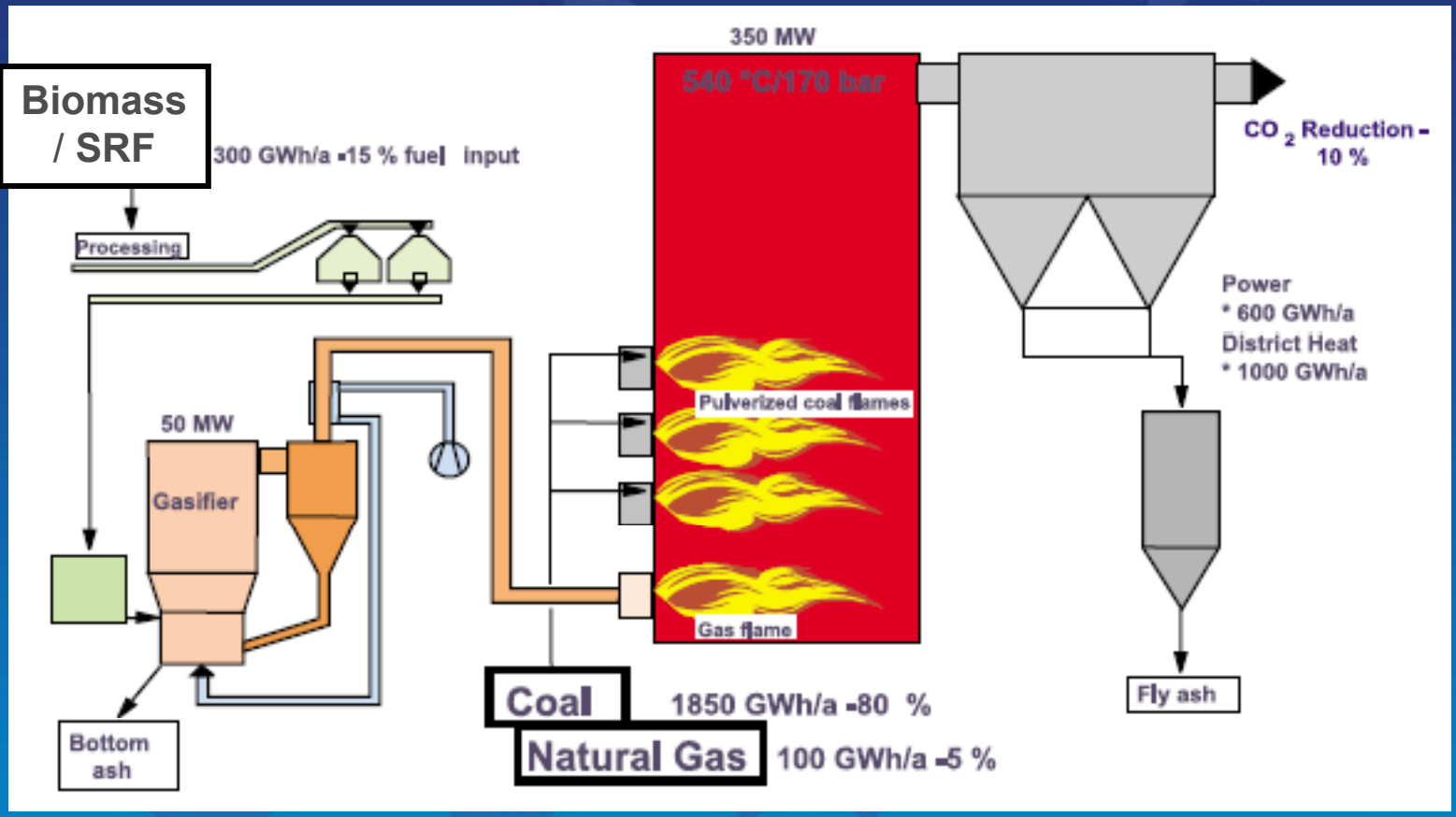
lignite boilers (16)

co-combustion in 2006 8
co-combustion in 2007 2



source: S. Thiel: Ersatzbrennstoffe in Kohlekraftwerken, TK-Verlag, Neuruppin 2007

German coal fired power plants co-firing SRF



source: Wilén 2005

SRF gasification in combination with power plant

market potential in EU15 (estimate ERFO)

(SRF derived from HCF of MSW, bulky waste, mixed commercial waste and from production specific wastes)

- **cement** (15-30% substitution) **3,5-7 mio t/a**
- **power** (2-4% substitution) **6,5-13 mio t/a**
- **CHP** (ind.boilers,12% of combustible waste)
  (ref. Germany, Netherlands): **17mio t/a**

- **total** **27-37 mio t/a**

conclusions and outlook

status quo

- EU policy increased the share of regenerative energy in the EU
- biomass important source in Nordic countries
- waste is used as energy resource in some countries (CH, D, NL, DK)
  - today mainly incineration on the grate
  - SRF is entering the market

future development

- biomass share will increase (debate on competition: food crops vs. energy crops)
- the resource waste will become more important (implementation of EU Landfill Directive)
- future of SRF co-combustion unclear

information partly elaborated by working groups of the

EU Network of Excellence (NoE) Bioenergy

contact

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