

Coal Combustion Products in Europe - Present situation and (near) future -

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1 Introduction – The role of coal in Europe

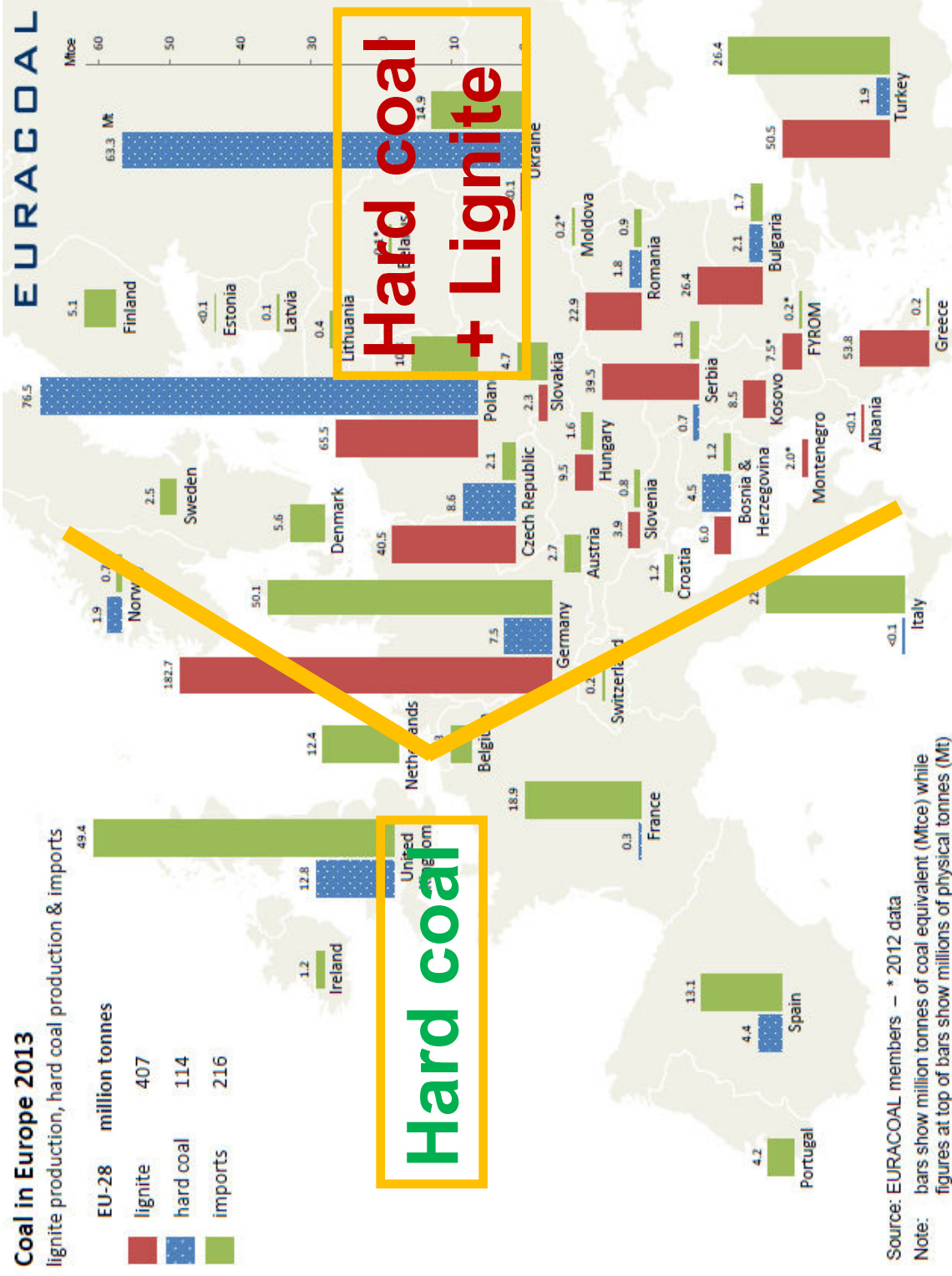


Coal in Europe 2013

lignite production, hard coal production & imports

EU-28 million tonnes

- lignite 407
- hard coal 114
- imports 216



Source: EURACOAL members – * 2012 data

Note: bars show million tonnes of coal equivalent (Mtce) while figures at top of bars show millions of physical tonnes (Mt)



1 Introduction – The role of coal in Europe



Production of energy and steam in European power plants under continuous pressure

- to comply with legal requirements for clean air
- to meet market requirements on availability and economic production

**Coal is still a major fuel for energy production
This results in ~ 145 million tonnes of Coal Combustion Products (CCPs) in Europe**

Utilisation of CCPs is well established in some European countries. Availability is becoming a major problem in some member states and the management of CCPs to meet market needs is a critical task for power producers and marketers

2 Impact of political decisions / EU Directives



The most important Directives are:

- **IPPC Directive - Integrated Pollution Prevention and Control**
(main principles for permitting and control of installations, integrated approach, application of Best Available Technique (BAT))
- **LCPD - Large Combustion Plant Directive**
(aims to reduce acidification, ground level ozone and particulates by controlling emissions of SO₃, NO_x and dust from large combustion power plants)
- **IED - Industrial Emission Directive**
(successor of IPPCD - aims in minimising pollution from various industrial sources, based on several principals: integrated approach, BAT, flexibility, inspections, public participation)

 **European Pollutant Release and Transfer Register (E-PRTR)**
(replaces and improves the previous European Pollutant Emissions Register)



2 Impact of political decisions / EU Directives



Further Directives impacting CCPs are:

- **Waste Directive**
The revised Waste Directive to avoid the disposal of the minerals and waste in power plants and to use them as valuable sources
- **BREF LCP**
The ongoing revision of the Reference Document on BAT for Large Combustion Plants (BREF LCP) with state-of-the-art technology and related emission limit values (ELV)



2 Impact of political decisions / Energy Plans



❖ Reduction of greenhouse gas emissions

Climate and Energy Package, (2008/2009), EU-20-20-20

- Reduction of at least 20 % below 1990 level, 2020

European Trade System

- Reduction of 30%

Present target

- Reduction of 40%

Long-term commitment

- Reduction of 80 to 95%, by 2050



2 Impact of political decisions / Energy Plans



❖ **Increasing the share of renewable energy**

Climate and Energy Package, (2008/2009), EU-20-20-20

- **Increasing the share of renewable energy to 20%**

Present target

- **27%, by 2030**

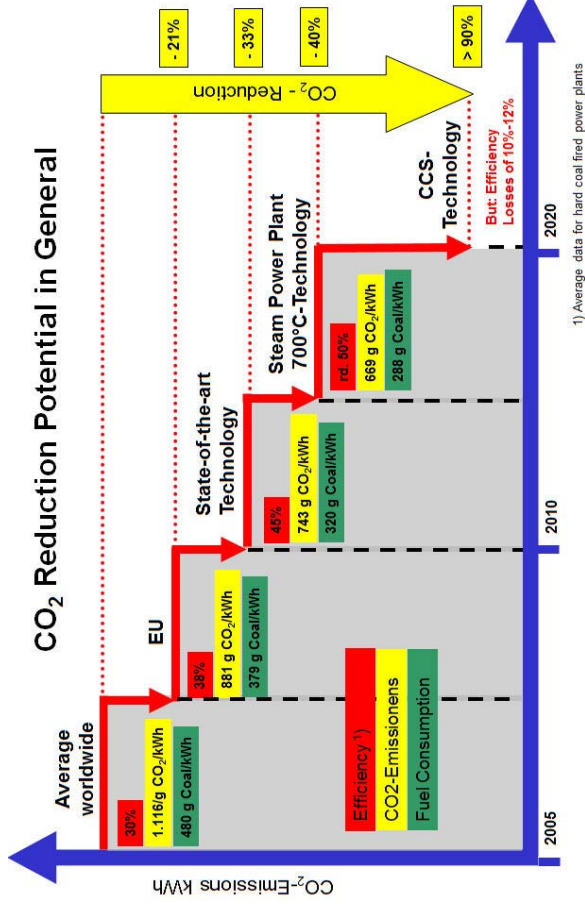
2 Impact of political decisions / Energy Plans



❖ Improving the EU's energy efficiency

Climate and Energy Package, (2008/2009), EU-20-20-20

- Improving the EU's energy efficiency by 20%



Power Plant efficiency and CO₂ reduction potential of the European Power Industry

Source VGB

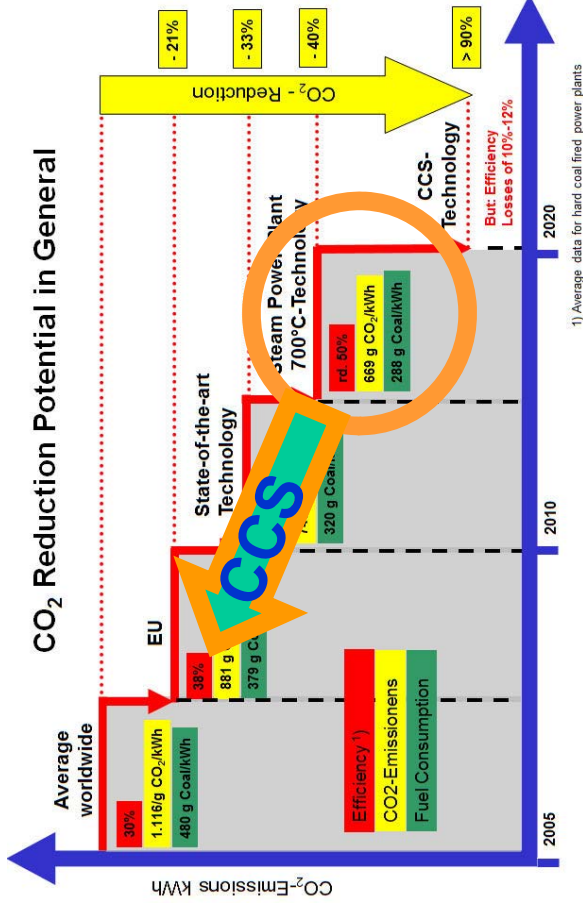
2 Impact of political decisions / Energy Plans



❖ Improving the EU's energy efficiency

Climate and Energy Package, (2008/2009), EU-20-20-20

- Improving the EU's energy efficiency by 20%



Power Plant efficiency and CO₂ reduction potential of the European Power Industry with CCS

Source VGB

2 Impact of political decisions / Energy Plans



New coal fired power plants will partly replace old power stations. They are designed to burn import coal as well as co-combustion of higher shares of co-combustion materials

Country	Name of Plant	Name of Company	Site of Plant	No. Units	Unit Cap. MW (gr.)	Tot. Cap. MW (el.)	Main Fuel	Project Start (Y)	Start up (Y)	Status
Germany	Datteln 4	EON	Datteln	1	1055,0	1.055,0	HC	2007	2013	UCON
Germany	Walsum 10	STEAG/Evonik	Duisburg-Walsum	1	725,0	725,0	HC	2005	2013	UCON
Germany	Moorburg 3-4	Vattenfall Europe	Hamburg-Moorburg	2	820,0	1.640,0	HC	2006	2014	UCON
Germany	Westfalen D-E	RWE Power	Hamm-Uentrop	2	800,0	1.600,0	HC	2008	2013	UCON
Germany	Rheinhafen RDK 8	EnBW	Karlsruhe	1	874,0	874,0	HC		2013	UCON
Germany	Lünen	Trianel Power	Lünen	1	750,0	750,0	HC	2007	2013	UCON
Germany	GKM 9	Grosskraftwerk Mannheim AG	Mannheim	1	912,0	912,0	HC		2015	UCON
Germany	Wilhelmshaven	GDF Suez, BKW Energie AG	Wilhelmshaven	1	800,0	800,0	HC		2013	UCON
Netherlands	Eernshaven	RWE Power	Eernshaven	1	1600,0	1.600,0	HC	2008	2014	UCON
Netherlands	Maasvlakte	Electrabel	Rotterdam	1	750,0	750,0	HC	2007	2012	UCON
Netherlands	Maasvlakte 3	EON Benelux	Maasvlakte	1	1100,0	1.100,0	HC	2006	2012	UCON
Czech Republic	Ledvice 4	CEZ AS	Ledvice	1	660,0	660,0	LIG		2013	UCON
Poland	Kozienice 11	Enea Wytwarzanie	Kozienice	1	1075,0	1.075,0	HC	2012	2017	UCON

The boilers and the process control devices are designed to produce fly ash for the use according EN 450-1 fly ash for concrete

Source VGB

Today, most of the plants are designed as CCS-ready

CCS requires a 3-step approach:

- **separation in the power plants,**
- **transport and**
- **storage**

Main types of technologies existing to separate the CO₂ from the fuel or the flue gas:

- **Post-combustion,**
- **Pre-combustion,**
- **Oxy-fuel**

Impacts of CCS on CCPs

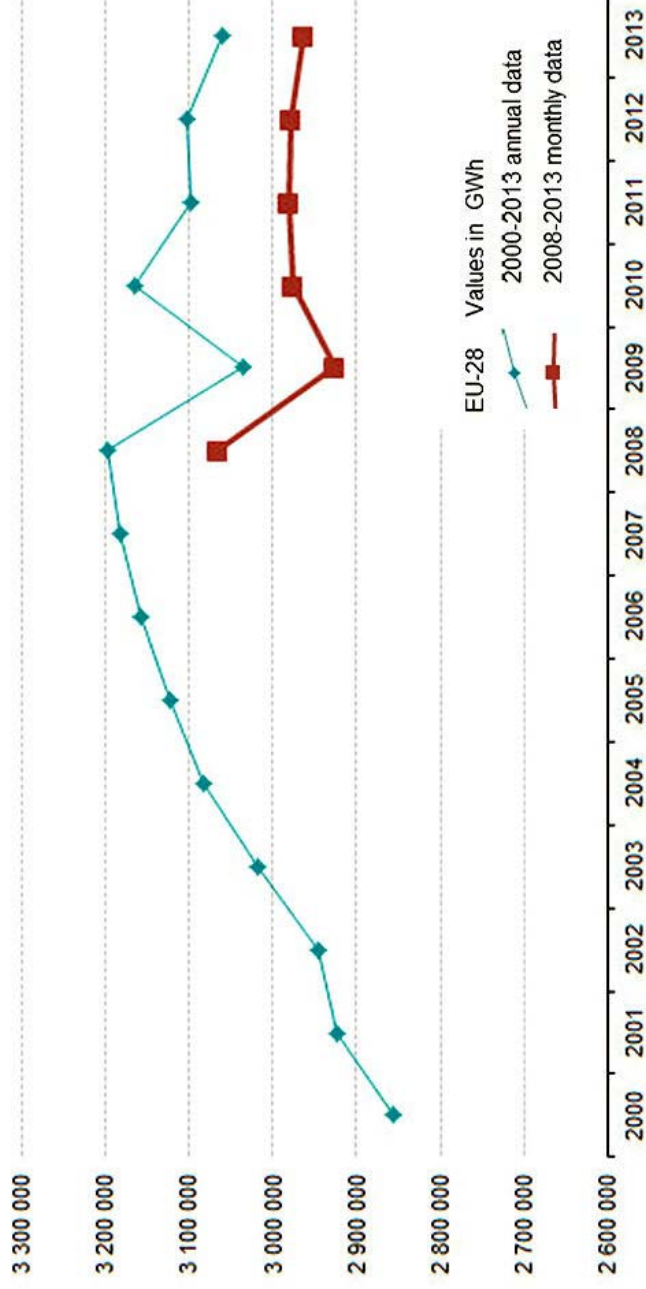
The new technologies for pre- and post-combustion will not have any impact on the resulting CCPs as there is no change in the coal combustion and the desulphurization process

Due to higher burning temperature in the oxy-fuel process however an impact on CCP quality is expected

3 Impact of economics and markets



Economic crisis started 2008 and is affecting industrial activities due to that the lower energy consumption



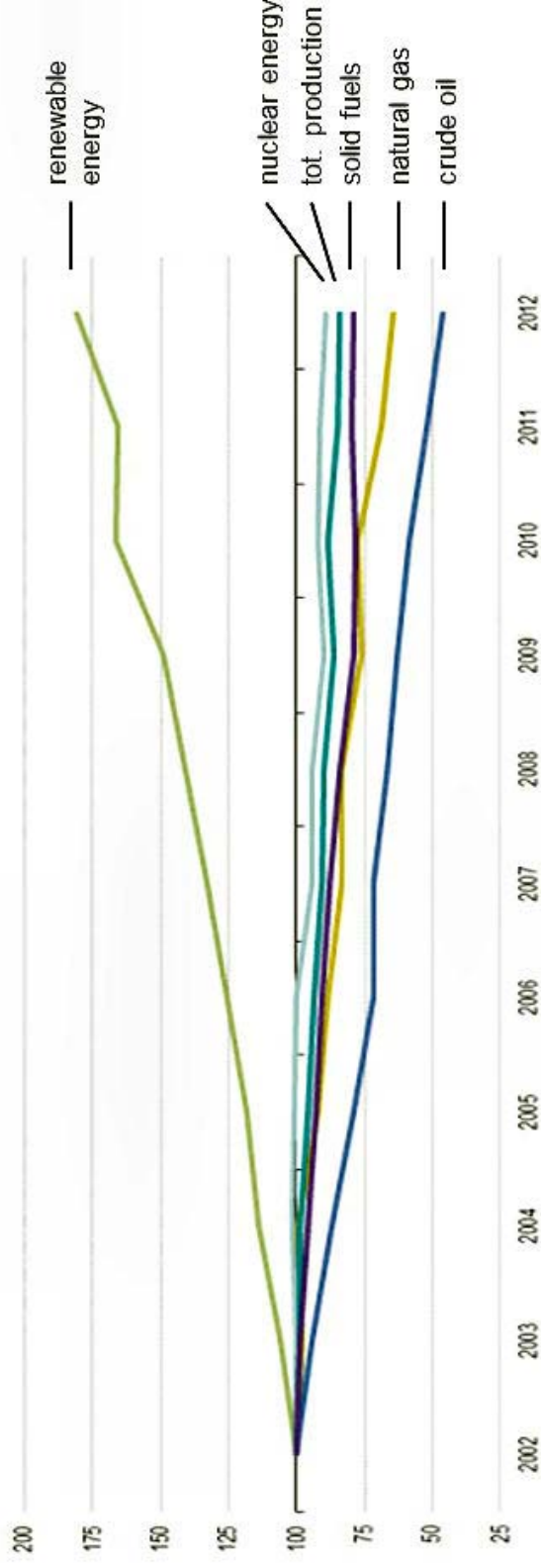
**EU-28 Evolution of electricity supplied (in GWh)
2000-2013 annual data; 2008-2013 monthly data**

Source EUROSTAT

3 Impact of economics and markets



Furthermore, the shift from fossil fuels to renewable energy sources, such as hydropower, solar energy, wind power and biofuels has an impact on quantity and quality of CCPs



Development of the production of primary energy (by fuel type), EU-28, 2002–12 (2002 = 100, based on tonnes of oil equivalent

Source [EUROSTAT](#)



3 Impact of economics and markets



Main factors decreasing coal utilisation for power production and thereby reducing CCPs production:

- **Lower amount of energy consumption**
- **CO₂ reduction targets**
- **Share of renewable generation**
- **Investment cost of CCS-ready facilities**
- **Efficiency of new CCS plants**



3 Impact of economics and markets



Main factors to increase coal utilisation for power production and by this also CCPs production:

- **Stabilization of energy consumption and expectations of growing with economy improvement**
- **Coal availability**
- **Generation price in present power plants**
- **Natural gas and oil prices compared with coal**

➤ CCPs management

4 Production and utilisation of CCPs



The result of politics and economics is reflected in production and utilisation of CCPs in Europe

	EU15	EU 28*	EU*
Production		[mill.t]	
CCPs total	54,644	>105	>145
ashes	42,915	>88	>124
desulph. products	11,729	>21	>21
utilisation rate			
construction ind.	51%	**	**
constr. + reclam.	87%	**	**

* Estimate based on coal consumption

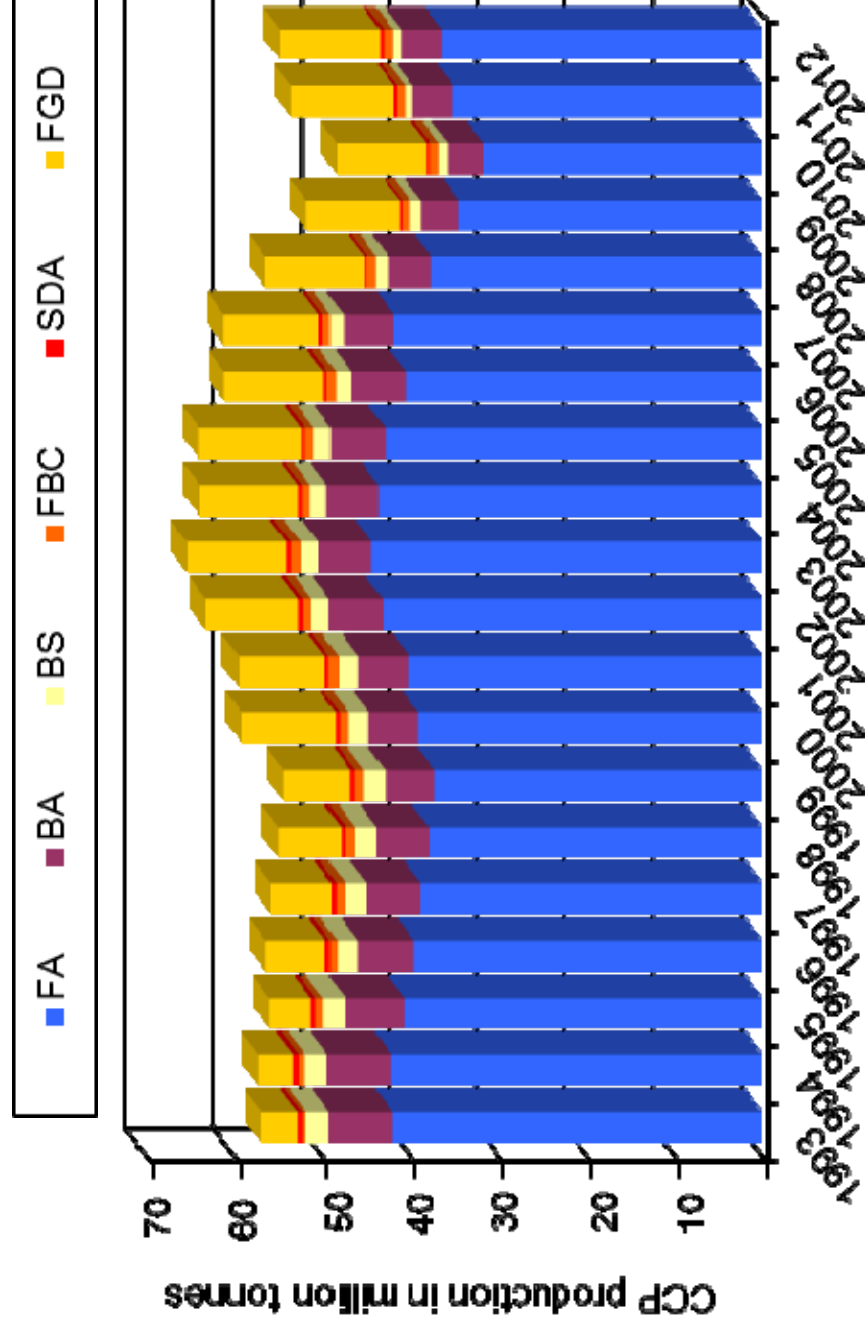
** Information on utilisation only partly available

Production and utilisation of CCPs in Europe (EU15, EU28, EU)

4 Production and utilisation of CCPs



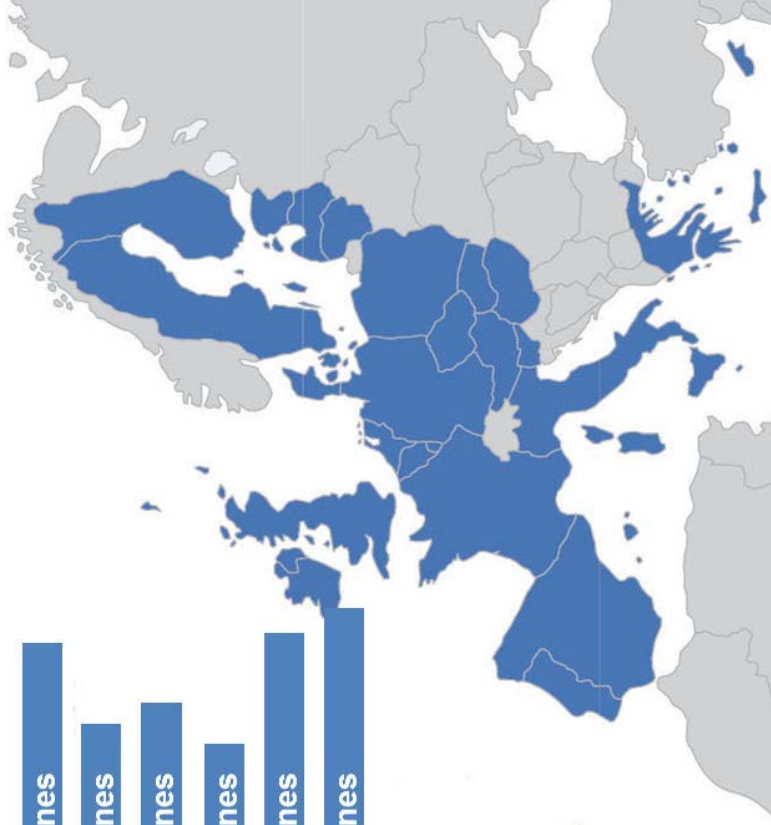
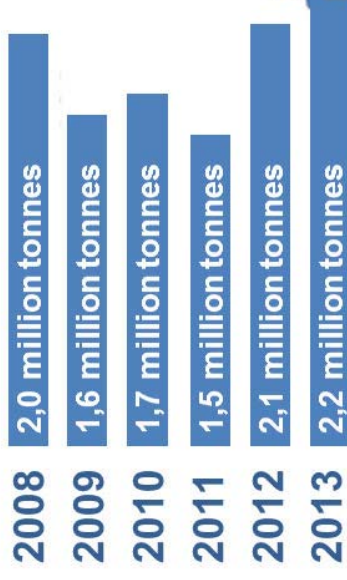
Development of the production of CCPs in Europe (EU15) from 1993 to 2012



4 Production and utilisation of CCPs



Cross border transport in Europe has been a solution to guarantee availability





5 Conclusions



Over recent years the forecast for coal-fired power production and therefore production of CCPs has been inadequate and did not follow the expected trend based on political decisions and energy plans.

Coal is still a major fuel for power production! Due to construction of new power plants and national coal resources this is still valid for the near future in most member states. However, there is still uncertainty in the market about coal-fired power stations and therefore concern about availability of CCPs.

For the market Quality and Availability are most important. The direct production at power plants, processing of ash from direct production, the utilisation of stockpiles and cross border trade have to be considered the tools for safeguarding availability.



6 Acknowledgement



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