



Challenges in CCP Management in Europe

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1 Introduction – Energy in Europe

The power industry in European power plants is under continuous pressure

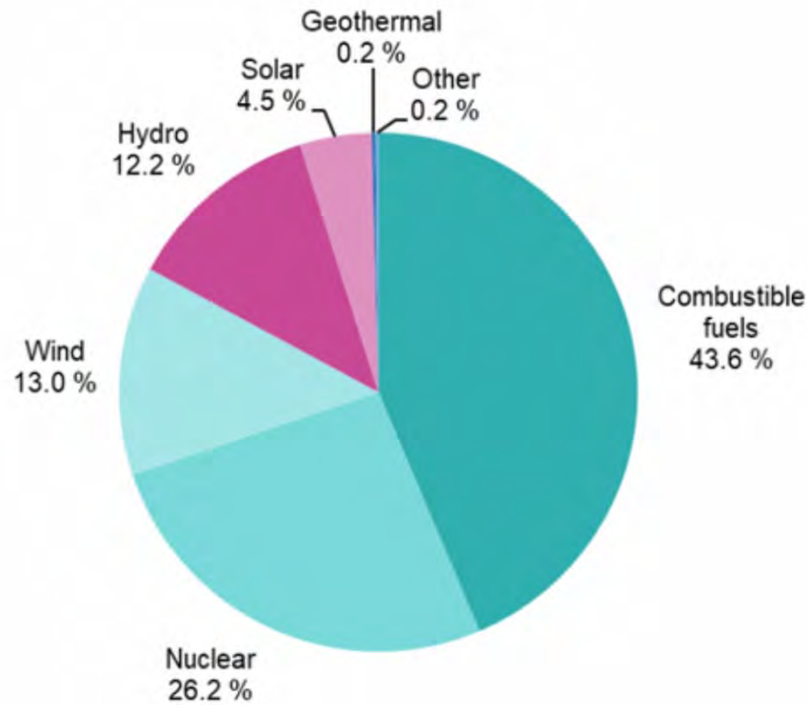
- to meet stricter Emission limits values (BREF/BAT)
- to accomplish with legal requirements for clean air and today especially for CO2 reduction and climate neutrality
- to meet market requirements on availability and economic production

Coal is still a major fuel for energy production with strong reduction in single member states. More than 123 million tonnes of Coal Combustion Products (CCPs) result in Europe

CCPs are used since decades as construction material and in constructions. They are not only essential for performance of building materials but also for their sustainability. Availability is becoming a major problem in some member states and re-use from stock or imports are a tool to serve.

1 Introduction – Energy in Europe

Net electricity generation in EU in 2019 (% based on GWh)



More than half (56.4 %) of the net electricity generated in the EU in 2019 came from non-combustible primary sources.

Less than half (43.6 %) came from combustible fuels (such as natural gas, coal and oil).

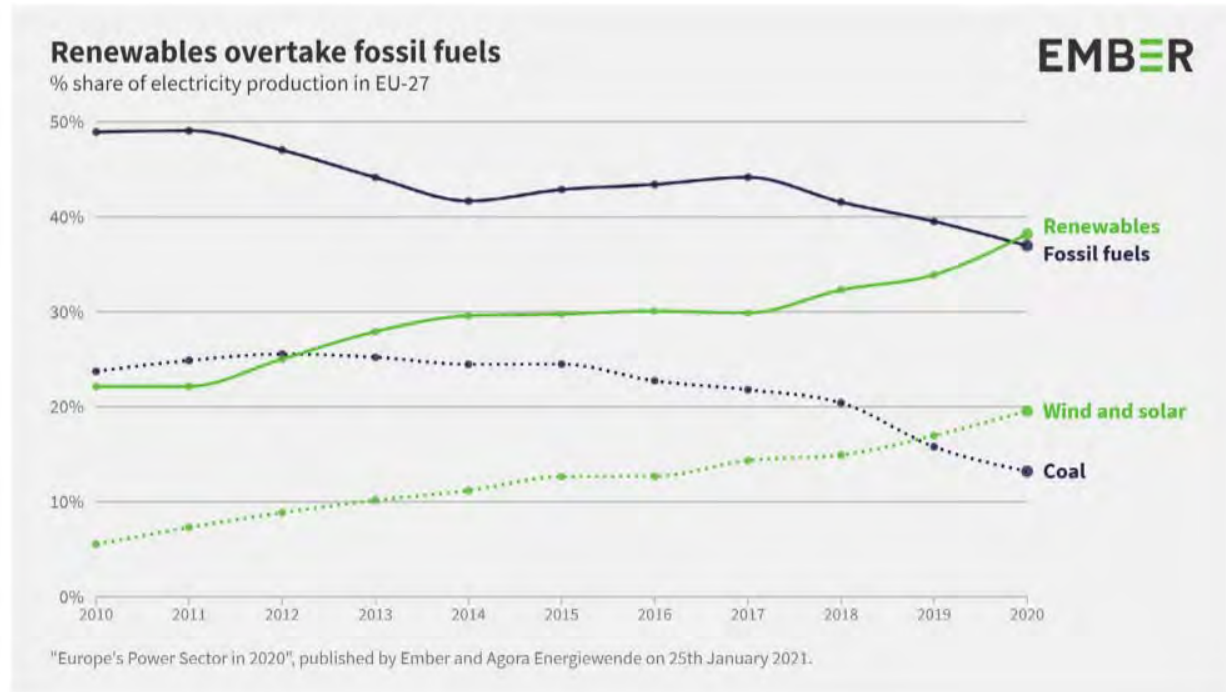
Among the renewable energy sources highest share was from wind turbines (13.0 %), followed by hydropower plants (12.2 %) and solar power (4.5 %).

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_production,_consumption_and_market_overview#Electricity_generation

Source: EUROSTAT

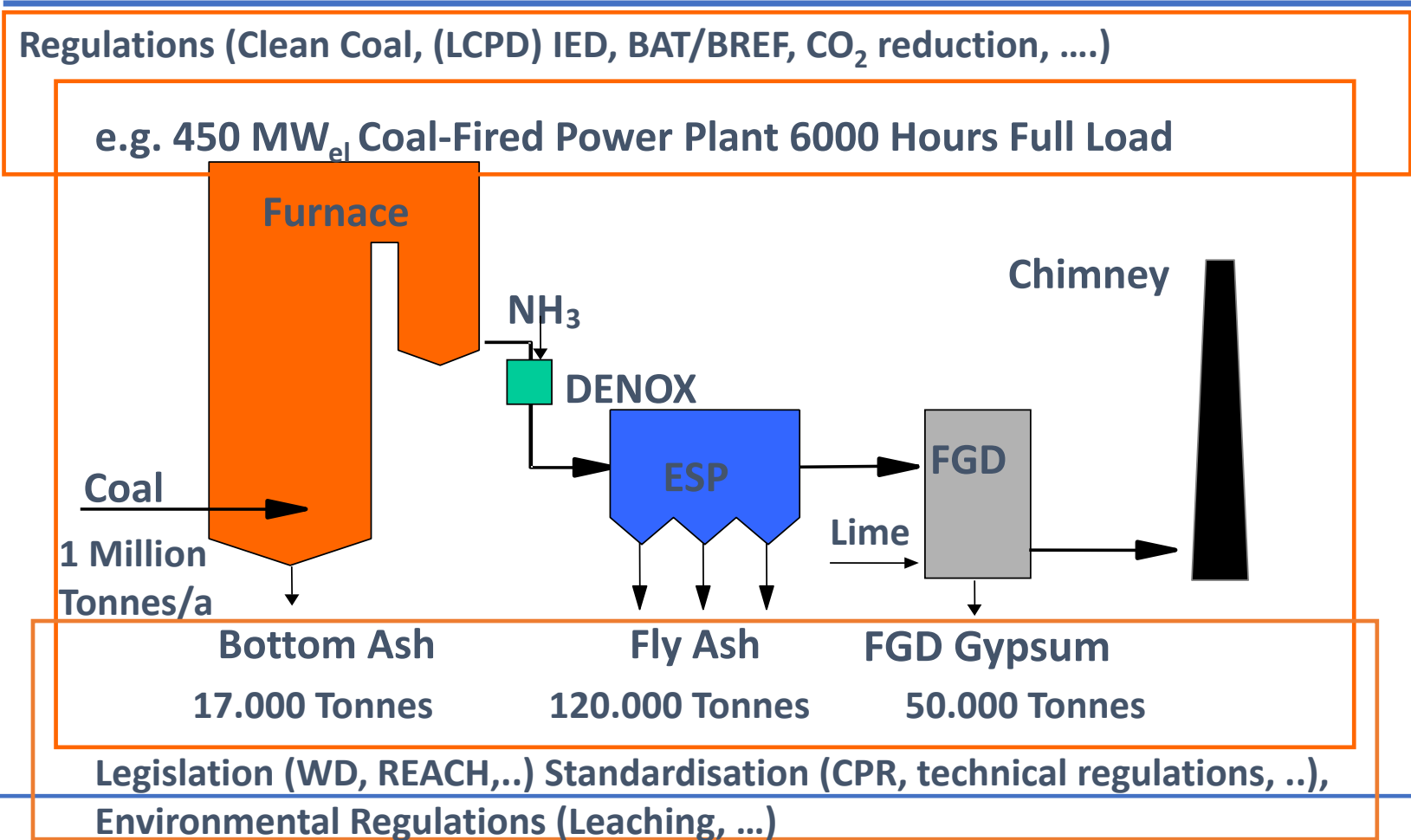
1 Introduction – Energy in Europe

In 2020, 38.2 % of renewable energy have been produced in Europe overtaking fossil-fired generation which fell to 37%.



https://static.agora-energiewende.de/fileadmin/Projekte/2021/2020_01_EU-Annual-Review_2020/A-EW_202_Report_European-Power-Sector-2020.pdf

1 Introduction – Regulatory frame



2 Energy Strategies and Fit-for-55

Climate and Energy Package

December 2008 - “**Climate and Energy Package**”, which entered into force in 2009.



The legislative package put in place what is collectively known as the

EU-20-20-20 targets

to be met by 2020:

- Reduction of **greenhouse gas emissions** of at least 20 % below 1990 level,
- Increasing the **share of renewable energy** to 20% , and
- Improving the **EU's energy efficiency** by 20%.

2 Energy Strategies and Fit-for-55

January 2014 - “**Climate and Energy Framework**”
(communication).



EU countries have further agreed to meet **by 2030**

- at least a **40% reduction in greenhouse gas emissions** (long term commitment of 80 to 95 % by 2050),
- a binding target of at least **32% of renewable energy** in the EU and
- an increase in **energy efficiency increase** of at least **32.5%**.

To reach this the completion of the internal energy market by reaching an **electricity interconnection target of 15%** between EU countries by 2030, and pushing forward important infrastructure projects have been agreed.

2 Energy Strategies and Fit-for-55

December 2019: The European Green Deal

The European Green Deal, presented in the communication (COM(2019)640) of 11 December 2019, sets out a detailed vision to make **Europe the first climate-neutral continent by 2050**, safeguard biodiversity, establish a circular economy and eliminate pollution, while boosting the competitiveness of European industry and ensuring a just transition for the regions and workers affected.

In the Commission work program for 2021, the revisions and initiatives linked to the **European Green Deal climate actions** and in particular the climate target plan's 55 % net reduction target are presented under the **Fit-for-55 package**.



2 Energy Strategies and Fit-for-55

Directives and Regulations published within the Clean Energy for all European Package

- **Energy Performance in Buildings Directive (EU) 2018/844** which sets specific provisions for better and more energy-efficient buildings
- **Renewable Energy Directive (EU) 2018/2001** which sets a binding target of 32% for **renewable energy** sources (RES) in the EU's energy mix by 2030
- **Energy Efficiency Directive (EU) 2018/2002** which sets a target of 32.5% for energy efficiency for 2030, compared to a baseline scenario established in 2007
- **Governance of the Energy Union Regulation (EU) 2018/1999** which sets a new governance system for the Energy Union. **Member States have to establish an integrated 10-year National Energy and Climate Plan (NECP) for 2021 to 2030**, with a longer-term view towards 2050
- **Electricity Regulation (EU) 2019/943** which sets principles for the internal EU electricity market. It focuses mainly on the wholesale market as well as network operation
- **Risk Preparedness Regulation (EU) 2019/941** which requires the Member States to prepare plans on how to deal with potential future electricity crises
- **ACER Regulation (EU) 2019/942** which updates the role and functioning of the European Union Agency for the Cooperation of Energy Regulators (ACER)

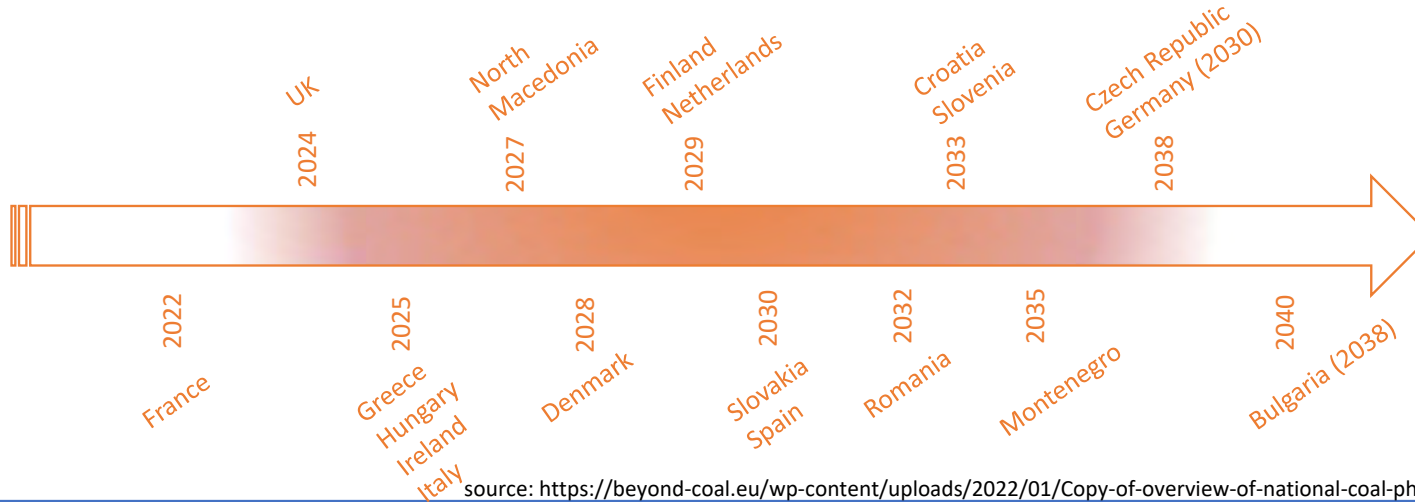
2 Energy Strategies and Fit-for-55

Coal Phase Out / Phase-out announcements (status 01.2022)

No coal in energy mix: Albania, Cyprus, Estonia (oil shale), Iceland, Latvia, Lithuania, Luxembourg, Malta, Norway, Switzerland

No phase out under discussion: Bosnia-Herzegovina, Kosovo, Poland, Serbia, Turkey

Phased out: 2016 Belgium; 2020 Austria, Sweden; 2021 Portugal



**2050
Europe
coal free**

source: <https://beyond-coal.eu/wp-content/uploads/2022/01/Copy-of-overview-of-national-coal-phase-out-commitments-13-January-2022.pdf>

3 Industrial Emission Directive

The Industrial Emission Directive (2010/75/EU) is based on several pillars, in particular an integrated approach, the use of best available techniques, flexibility, inspections and public participation.

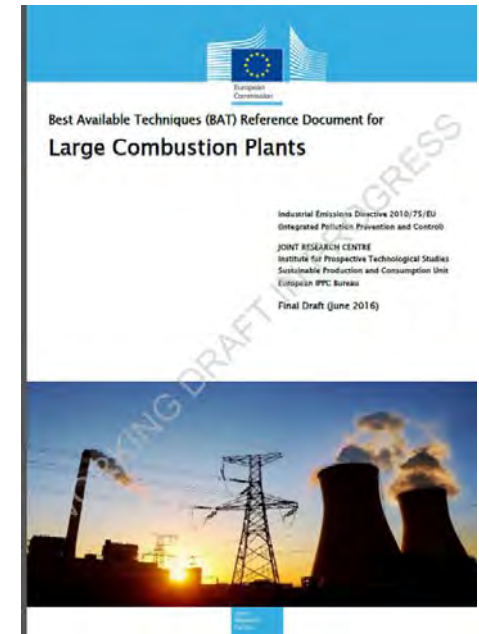
The **integrated approach** means that the **permits** must take into account the **whole environmental performance of the plant**, covering e.g. **emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure.**

To fulfill the approach also other Directives as the **Waste Directive** for utilisation of waste and **REACH Regulation** and several **product standards** and **requirements for the use as products** have to be considered.

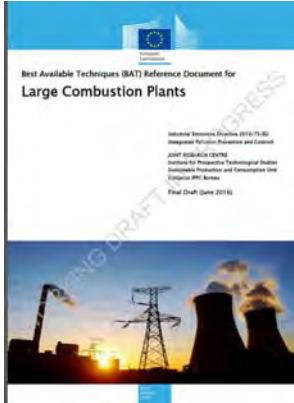
3 Industrial Emission Directive

BREF-BAT – new limits for operating PP

- The IED requires that these BAT conclusions are the reference for setting permit conditions.
- Since 2011, the The Best Available Techniques Reference Document for Large Combustion Plants (BREF LCP) was revised.
- In June 2016, the EIPPC has published the final draft of the BREF LCP. The conclusions will provide stricter emission limit values for e.g. Hg and NO_x.
- On 14th September 2017, the Conclusions were published in the Official Journal (EC/2017/1442). **Members states had to implement the conclusions within four years, e.g. by mid 2021!**
- Based on that **new emission limit values for dust, NO_x, SO_x and especially for Hg have to be met!**



3 Industrial Emission Directive



parameter	BAT to reach the level (depending on plant size) (excerpt BREF, BAT Conslucions – to be completed)
Dust	ESP; FF; ESP or FF in combination FGD (wet, sd or dsi) for PC ES or FF for FBC
SO ₂	Low sulphur fuel or/and FGD (dsi) or FGD (sds) or FGD (wet) (depending on the plant size). Seawater scrubbing. Combined techniques for the reduction of Nox and SO2. Limestone injection (FBC).
NOx	Pm; SCR/SNCR and combinations
Hg	Sorbents !! , fuel pretreatment, fuel, catalysts,
.....

ESP:	Electrostatic precipitator)	FF:	Fabric filter	FGD(wet):	Wet flue-gas desulphurisation
FBC:	Fluidised bed combustion)	sd:	semi	dsi:	dry sorbent injection
CFBC:	Circulating fluidised bed combustion	PFBC:	Pressurised fluidised bed combustion		
FGD(sds):	Flue-gas desulphurisation by using a spray dryer	FGD(dsi):	Flue-gas desulphurisation by dry sorbent injection		
Pm:	Primary measures				

4 Coal Combustion Products as Resources

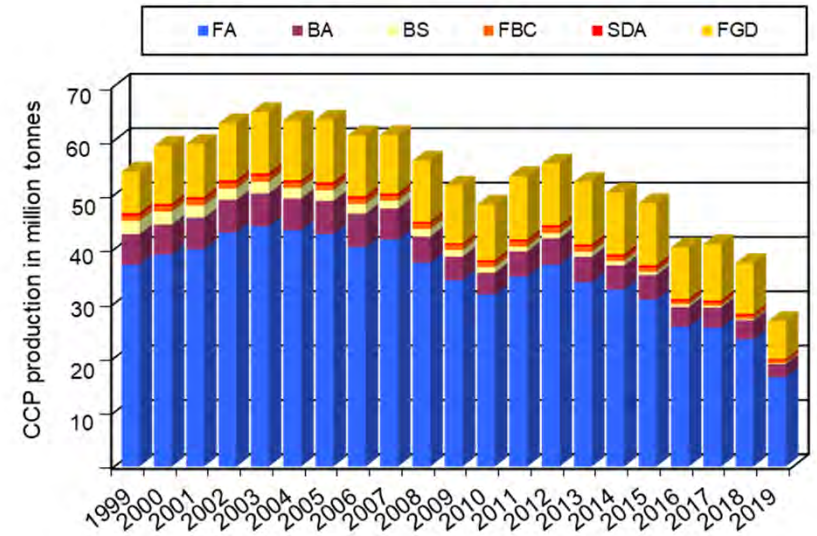
ECOBA statistics on production and use of CCPs (fresh production!)

Development of CCP production in Europe (EU 15) from 1999 to 2019

Statistics CCP production
EU15 / EU28 / EU*

	EU15	EU28*	EU*
Production (million t)			
CCPs total	~50	>80	>120
ashes	~35	>60	>100
steelmaking products	~15	>17	>18
Utilisation rate			
Construction ind.	50%	**	**
Const. + reclaim.	96%	**	**

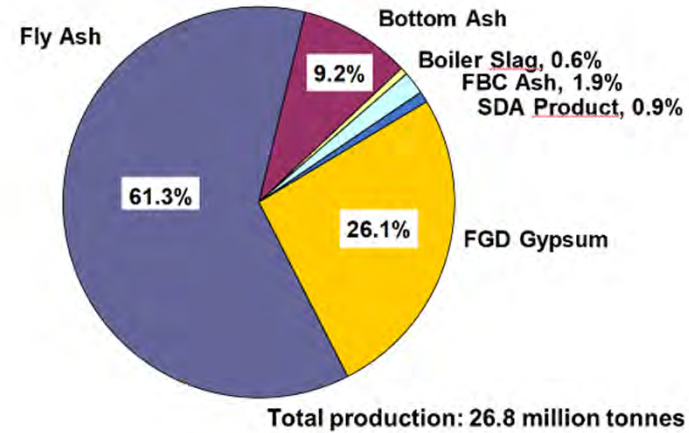
* data and calculation based on coal consumption
** information on uses only partly available



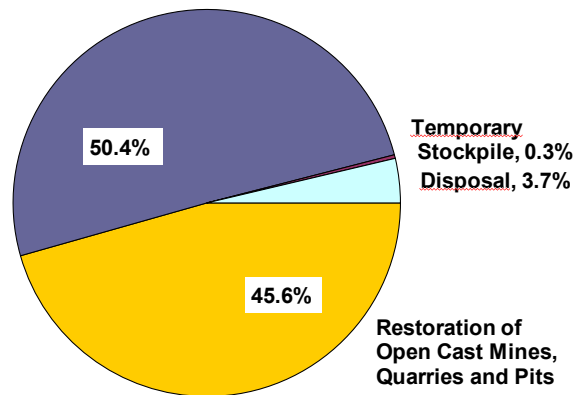
FA – fly ash; BA – bottom ash; BS – boiler slag; FBC – FBC ash;
SDA – SDA product; FGD – FGD gypsum

4 Coal Combustion Products as Resources

CCP production in Europe (EU15)



Utilisation in Construction Industry and Underground Mining



Utilisation and Disposal of CCPs in Europe (EU 15)

4 Coal Combustion Products as Resources

CCPs: Market needs

- In addition to **quality, availability** is important to serve construction projects especially in member states with existing markets. **Today it's also important for CO2 reduction of construction products and constructions!**
- **Forecasting** of production to serve market needs cause more efforts in CCP management.
- **Stock management**
 - whether in silo or on site as well as
 - beneficiation for fresh produced or stockpiled ashis being discussed together with
- **Cross border transport** as options for safeguarding availability of CCPs to specific markets.

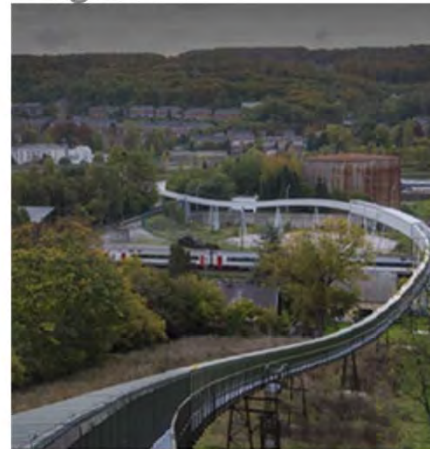
4 Coal Combustion Products as Resources

- **Re-use from stock is practised for more than 50 years in Europe** (30 year for also re-drying)
- Data for re-use from stock and/or import are covered by the ECOBA statistics. The figures from 2010 to 2019 range from 0.4 to 2.2 Mt with increasing tendency.
- Projects ongoing or newly started in different EU-countries

The Gale Common
Extraction Project/UK



The HENA Project
Belgium

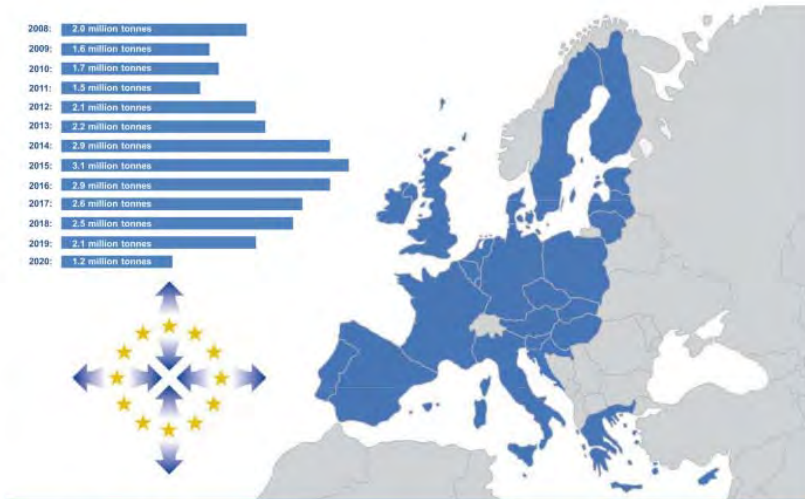


50 years re-use wet
30 years re-use dry, France

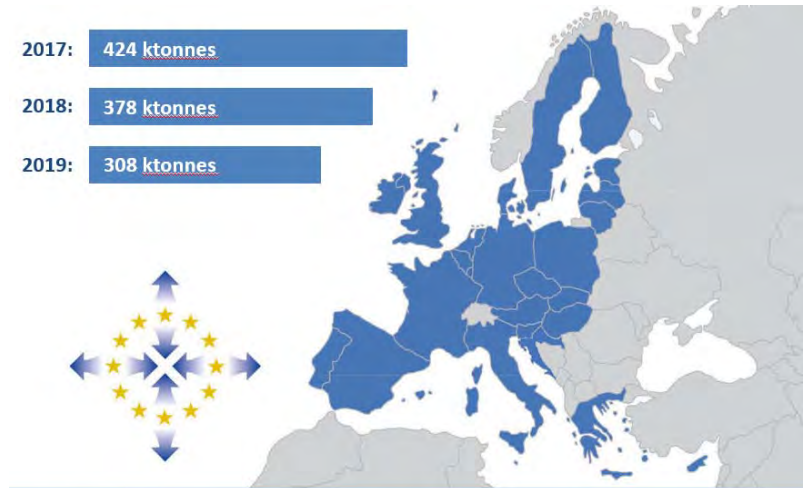


4 Coal Combustion Products as Resources

ECOBA Statistics- Cross Border Transport



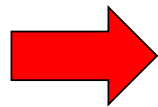

Cross border transport of ashes in Europe
 European Coal Combustion Products Association




Cross border transport of FGD gypsum in Europe
 European Coal Combustion Products Association

Summary / Outlook

- Environmental Strategies, Directives, Regulations and laws with strict aims for CO₂ reduction resulted in retrofits of coal-fired power plants, construction of new and more efficient power plants meeting new Emission Limit Values but also to closures of power plants due to economic consideration and phase-out decisions.
- CCP production is depending on energy production by coal. It's use as raw and construction material has to consider quality and availability for serving existing markets. They contribute to the sustainability of construction materials and constructions!
- Aside the direct production in power plants the processing of ash from direct production as well as from stockpile and cross border transport has to be considered for safeguarding availability.



The operation of coal-fired power plants and the utilisation of CCPs is a continuous challenge!



**Thank you for your
attention!**

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