

Thermal Power for Global Markets

Decarbonised energy supply and its challenges for industry

Prof. Emmanouil Kakaras
EPPSA President

EPPSA Technology Evening
25th January 2016, Brussels



The European Power Plant Suppliers Association

EPPSA is the voice, at European level, of companies supplying power plants, components and services.

EPPSA members, located throughout Europe, represent a leading sector of technology with more than 100 000 employees.

Virtually all thermal power plants in the EU are built by members of EPPSA or equipped with their components, and provide around 50% of Europe's electricity.

EPPSA members provide the most advanced thermal power technologies in the world.

Our Members

AC BOILERS S.p.A.
formerly Ansaldo Caldaie



ANDRITZ



BWE



FLUOR



RSTF S.p.A.



TLT-Turbo GmbH



In the EU, we support
>40% GHG reduction by 2030

At global level, we support
40–70% GHG reduction by 2050

European Excellence

Industry

Many global industry leaders have their hub and expertise in the EU

Research

Universities and Research Institutes are developing European excellence in the field of Thermal Power (e.g. UK, DE, FR and ES)

EU Funding

The EU is investing in Research and Projects Programmes through various funds (e.g.: Horizon2020) for highly efficient, flexible and clean thermal power plants

Environment

Europe is at the forefront of environmental legislation (e.g.: IED and its Large Combustion Plant BREF)

- **Best Available Techniques (BAT)*** – as already defined in Article 3 (10)2 of the Industrial Emissions Directive (2010/75/EU) – should be the **minimum ultimate reference as to what should or should not be deployed and financially supported worldwide.**
- 40% reduction of greenhouse gases in the EU should be accompanied with technological development and the resulting dissemination of **Best Available Technologies**

→ **BAT conformity** desirable when defining technical requirements for Export Credits

* ‘best available technique’ means the **most effective and advanced stage in the development of activities** and their methods of operation which indicates the **practical suitability of particular techniques** for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole

EPPSA focuses on technology deployment for clean and efficient thermal power towards a decarbonised energy future:

- Low hanging fruit: Efficiency improvements
- CCSU
- Biomass usage

Efficiency Improvements

Aging and less efficient coal plants worldwide

Table 3: World Coal-fired Power Station Fleet Age

	Total capacity (GW)	Average age (years)	Subcritical average age (years)	Supercritical average age (years)	Ultra-supercritical average age (years)
World	1,617	21	23	18	5

Table 4: World Coal-fired Power Station Fleet Performance

Share of Total Coal Power Stations that are...					
	Subcritical	Supercritical	Ultra-supercritical	Older than 35 years	Older than 35 years AND Subcritical
World	75%	22%	3%	23%	18%

Sources:

Stranded Assets and Subcritical Coal The Risk to Companies and Investors, University of Oxford, 2015;

CCS Retrofit: Analysis of the Globally Installed Coal-Fired Power Station Fleet. Paris, France, OECD/IEA 2012.

Efficiency Improvements

The European Example

Total Net capacity replaced	22,0 GW	495 GW installed
Investments from 2000 to 2015	27,4 billion €	
Saved fuel cost until 2030	29,1 billion €	
Saved CO ₂ emissions per year	57,37 million t/a	
Saved CO ₂ emissions until 2030	1,25 billion t	
Average saved fuel (meaning saved CO ₂ emissions)	32 %	
CO ₂ avoidance cost over 20 years	23,92 €/t	
Real Cost / saved ton of CO ₂ (Capex, Opex, saved fuel, saved allowances)	-19,58 €/t	Lowest Ever Recorded CO ₂ avoidance costs

CCS readiness or suitability?

- CCS is an efficient technology to reduce the CO₂ emissions of thermal power plants and industry substantially, even being able to go CO₂-negative when applying it to biomass
- CCS, even as a proven technology, is in the prospect of being demonstrated on large scale and is still evolving in order to get more efficient
- New market perspectives are identified:
 - CC in industry
 - Bio CCS (going CO₂ negative in the framework of the COP21)
 - CCU and its link to energy storage

Biomass

Carbon-neutral

Sustainably-harvested biomass is CO₂ neutral

Any fossil fuel replaced by such biomass is reducing the CO₂ emission/kWh produced by a power plant.



Cleaner:

Unlike smaller scale biomass power plants, for which EU-wide air pollution requirements are slowly being introduced, large scale power plants have sophisticated flue gas cleaning systems that are highly efficient and are comparatively cleaner.

More efficient:

Large scale thermal power plants have a higher efficiency than small scale thermal plants thanks to:

- high-pressure
- high-temperature steam-water cycle.

Using the highly efficient steam parameters of existing coal plants to generate electricity from renewable biomass will bring higher efficiencies.

If it is (co-)combusted in large plants, together with economies of scale, less biomass needs to be burnt to produce the same amount of renewable electricity (compared to smaller, less efficient plants)

Example: The Avedøre 2 power plant in Denmark is a multi-fuel system, able to combust natural gas, oil, straw and wood pellets with efficiencies that can reach up to 94%. The purely electrical efficiency is 49%.

Biomass

Fair treatment for biomass combustion

EPPSA calls on policy-makers to treat all sustainably harvested biomass as carbon-neutral and to support all biomass combustion the same way, whether it is burnt in a small or a large installation.

State-of-the-art flexible and efficient thermal power has a key role to play in enabling the transition to a low-carbon society



CO₂ Reductions and Emission Performance Standards

CO₂ emissions per kWh

- Use of locally available solid fuel is a right for every country wishing to do so
- CO₂ emissions are dependent on the composition (moisture, ash...) of this fuel, local parameters and the technology used
- Only the technology used can be influenced when defining a project (steam parameters)
- Limiting CO₂ /kWh will limit the use of local fuel
- **Technologies can be influenced, but not the fuel!**
No CO₂ /kWh reference

- **Without support from national agencies, European manufacturers will struggle to compete at global level and the technological leadership of European companies might be lost, leading to potentially sub-efficient technologies being used worldwide**

- **Dilemma:**

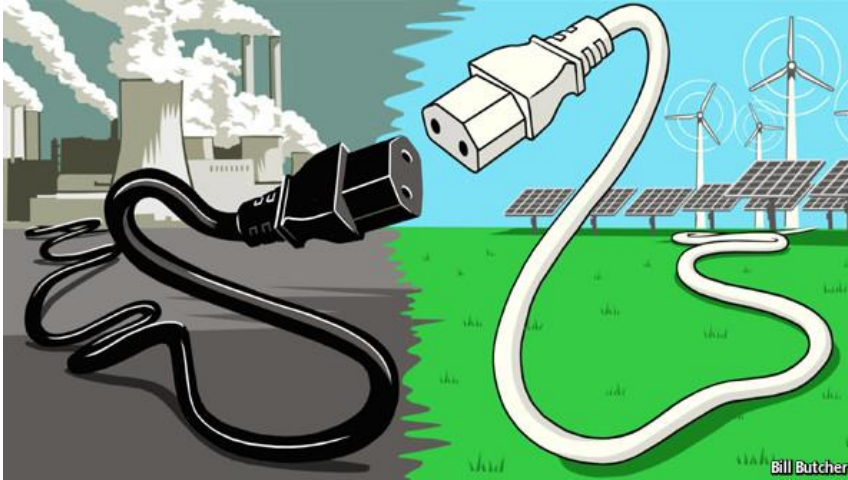
Refusal of granting export credits for Best Available Techniques, accepting the equivalent CO₂ emissions, and loss of European industrial competitiveness because of no level playing field, and potentially increase the global CO₂ emissions

VS.

Granting export credits for Best Available Technologies, and accepting the equivalent CO₂ emissions, but guaranteeing that the most efficient technology will be used and allowing for development of countries relaying on fossil fuels

Conclusions

- EPPSA advocates for increased support lengths and the respective technological requirements based on BAT
Low-hanging fruits: preservation of inefficient blocks undermines the most cost-efficient CO₂ avoidance
- CCSU RD&D should continue to be supported to allow for a successful market uptake
- EPPSA calls for all sustainably harvested biomass to be considered carbon-neutral and to support all biomass combustion the same way, whether it is burnt in a small or a large installation.
- EPPSA is against a CO₂/kWh reference when talking about CO₂ reductions, as this will limit – amongst others – the usage of local fuel
- EPPSA advocates export support for BATs, to limit CO₂ emissions and maintain European Competitiveness



Thank you
for your
attention

Prof Emmanouil Kakaras,
EPPSA President
info@eppsa.eu



Members

AC BOILERS S.p.A.
formerly Ansaldo Caldale

amec
foster
wheeler

ANDRITZ

BIFFINGER
POWER
SYSTEMS

BWE

CARMEUSE

**CLYDE
BERGEMANN**
Power Group

cmi ENERGY

DOOSAN

FLUOR



HAMON

MAGALDI
Dependable Technologies

MHI
MITSUBISHI HITACHI POWER SYSTEMS
EUROPE

STF S.p.A.

STORK
TECHNICAL SERVICES

TLT
TLT-Turbo GmbH

Valmet
FORWARD

Contact Details

EPPSA – European Power Plant Suppliers Association

Avenue Adolphe Lacomblé 59 | BE – 1030 Brussels

Tel: +32 2 743 2986

info@eppsa.eu

www.eppsa.eu

Secretary General: Patrick Clerens

p.clerens@eppsa.eu