European Economic and Social Committee

TEN/287
Power generation from fossil fuels

Brussels, 27 September 2007

OPINION

of the
European Economic and Social Committee
on the
Communication from the Commission to the Council and the European Parliament: Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal after 2020
COM(2006) 843 final

_____

99 rue Belliard - B-1040 Brussels - Tel. +32 (0)2 546 90 11 - Fax +32 (0)2 513 48 93 - Internet http://www.eesc.europa.eu

On 10 January 2007 the European Commission decided to consult the European Economic and Social Committee, under Article 262 of the Treaty establishing the European Community, on the

> *Communication from the Commission to the Council and the European Parliament: Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal after 2020*
> COM(2006) 843 final.

The Section for Transport, Energy, Infrastructure and the Information Society, which was responsible for preparing the Committee's work on the subject, adopted its opinion on 5 September 2007. The rapporteur was **Mr Zboril**.

At its 438th plenary session held on 26 and 27 September 2007 (meeting of 27 September 2007), the European Economic and Social Committee adopted the following opinion by 135 votes to 1 with 4 abstentions.

*

* *

1. Conclusions and recommendations

1.1 The EESC welcomes the Commission's communication and agrees with the analysis and description presented in the Commission document. Responding effectively to the risks of global climate change while continuing to meet the high energy demands is a significant international challenge.

1.2 Emissions of CO_2 from coal fired power plants in the EU make 24% of overall (EU) CO_2 emissions. Thus, such power plants are the most suitable sites for installation of CCS facilities. It means implementation of systems of capture and permanent storage of CO_2.

1.3 Most probably, coal would remain in the European energy mix in the decades to come. Coal's particular attributes - its availability, affordability and role in stabilising energy markets - will ensure that it continues to be a primary source of fuel for the economic generation of electricity. The coal reserves distribution is uneven in the world and in the EU. Coal-based technology has the potential to make significant CO_2 emissions reductions[1]. In the short to medium term, this requires market and regulatory frameworks that encourages investments in

1 IPCC, 2005: IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change [Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L. A. Meyer (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 442 pp.

the latest technologies that will improve the efficiency of coal-fired electricity generation and thus reduce specific CO_2 emissions.

1.4 Proven cost-effective commercial means for removing and sequestering most of the CO_2 emissions from coal-based power plants do not currently exist; it is still an emerging technology. However, the prospects for developing and commercialising such near-zero emission coal technologies (ZETs) over the next two decades are promising.

1.5 The EESC confirms its opinion that the scale of the emissions limitation challenge means that all potentially viable energy sources and technologies need to be developed to their practical and commercial potential. The transition to sustainable energy has a major role for coal, other fossil fuels, and nuclear as well as renewable technologies and energy conservation, with each contributing at a time and to an extent dictated by technical feasibility and affordability.

1.6 The EESC appreciates that in the long term, after 2020, CO_2 capture and storage would offer the potential for near-zero CO_2 emissions from coal-based power plants. There is a need for about 350 GW of new electricity generating capacity coal fired by 2020 and about 500 GW by 2030, the estimated investment costs amount EUR 600–800 billion. Delivery of this option requires coordinated research, development and demonstration (RD&D) now.

1.7 With continued efficiency enhancements in the power plant field and the development of near-zero emission technologies, coal will contribute to meeting the requirements of preventive climate protection. However the promising experiences CCS gives, it must not lead to the effect that already now energy policy strategies and targets are adopted as "a binding measure" on the basis of broad presence of the CCS technologies.

1.8 Simplification of licensing procedures as well as their gradual harmonisation through cooperation between national regulatory authorities is needed in order to cut down as far as possible the long lead times for construction projects, without compromising the observation of the highest safety standards.

1.9 The EESC also draws attention to the fact that though the most important fuel for electricity generation and a vital input into steel production and other industrial processes, coal will have a major role to play in meeting future energy needs assisting in transition towards hydrogen economy. Coal liquefaction allows coal to act as a substitute for crude oil; synthetic gas can also be produced from coal.

1.10 For extraction of indigenous lignite and hard coal, an appropriate political and economic framework remains necessary. The extraction of coal and transformation of energy can significantly contribute to local prosperity and employment. Maintaining the fossil fuel (coal based) power generation share at its current level is also extremely important in view of the social situation in the new Member States: out of 286 500 total manpower in the EU coal mining industry, the new MS coal mining industry employs 212 100 workers. Substantial

improvement of very hard working conditions of miners, their skills, labour safety and working environment must be in focus of the mine operators throughout the EU coal industry.

1.11 The EESC also expresses its thought that the Commission in this document and its time setting is optimistic on the CCS time-frame and its lead-in time requirements. The Commission should now focus on measures to help 10–12 demonstration plants to be operated in 2015 and to create a framework for CCS that covers the main risks, is reliable and, at the same time, not too restrictive. Intermediate stage of higher efficiency generation is highly desirable and any excessive haste and too restrictive regulatory framework could seriously damage this globally important concept.

1.12 The EESC also calls for intensive research and development as regards the renewable and alternative energy sources that should contribute towards a safe EU energy mix. Simultaneously, the integrated EU energy market should be fully brought into life without any excessive delay.

2. Introduction

2.1 The Committee has already dealt with fossil fuels issue in several of its other opinions, the most recently in the exploratory opinion "The energy supply of the EU: a strategy for an optimal energy mix"[2] which states that the EU should put serious efforts into clean coal technologies - improved power plant efficiency and commercial applications of carbon capture and storage. The use of gas has increased and still increases also driven by political choices. It is now obvious that the continuation of this trend is problematic. Gas can hardly continue to substitute coal, nor can gas substitute nuclear for reasons of emissions since it is a valuable raw material for high added industrial use, as is also oil.

2.2 The present draft Sustainable power generation from fossil fuels was published by the Commission in the context of the energy and climate package, "An Energy Policy for Europe – the need for action", on 10 January 2007.

2.3 The other parts of the package cover firstly a proposal for climate change targets of 30% reductions of greenhouse gases for the developed countries or in any case 20% for EU alone. The package further deals with the internal market of gas and electricity, interconnections in the electricity and gas networks, future role of nuclear energy in proposal of the Nuclear Illustrative Programme; a roadmap to promote renewables, notably biofuels for transport, and a future European Energy Strategic Technology Plan. The European Council on 9 March 2007 supported the targets and the main policy contents of the package.

---

2 OJ C 318, 23.12.2006, p. 185-194.

2.4 This Communication presents a global view of the actions needed for the continued contribution of fossil fuels and particularly coal to the security and diversification of energy supply for Europe and the world in a way compatible with the sustainable development strategy and climate change policy objectives. It takes account of the work done and opinions received during 2006 within the Second European Climate Change Programme (ECCPII), the High-level Group on Competitiveness, Energy and the Environment (HLG), the preparations for the 7th Framework Programme (FP7) for Research, and the Zero Emission Fossil Fuel Power Plant Technology Platform.

3. The Commission document

3.1 The Commission's document reviews the position of fossil fuels in the energy generation ands states that fossil fuels represent an important element of the energy mix in the European Union as well as in many other economies. They are of particular importance for the generation of electricity: over 50% of EU electricity currently comes from fossil fuels (mainly from coal and natural gas) in some countries their share amounts even 80% (Poland, Greece). Coal is a key contributor to the EU's security of energy supply and it will remain so. Coal represents the fossil fuel with by far the largest and most widely distributed global reserves, estimated to last for some 130 years for lignite and 200 years for hard coal.

3.2 However, coal can continue to make its valuable contribution to the security of energy supply and the economy of both the EU and the world as a whole only with technologies allowing for drastic reduction of the carbon footprint of its combustion. If such technologies are developed on a sufficient scale, they can also provide solutions for combustion processes using other fossil fuels, including gas-fired power generation. The EU therefore needs to develop technological solutions for sustainable use of coal not only to retain coal in the European energy mix but also to ensure that global growth in coal use will be possible without irrevocable damage to the global climate.

3.3 "Clean Coal" technologies have been developed and they are now widely used in the power generation sector, considerably reducing emissions of SO_2, NO_x, particulates and dust from coal-fired power plants. Clean Coal technologies have also brought about a steady increase in the energy efficiency of the conversion of coal into electricity. Such achievements are important steps for further progress towards novel technological solutions called "Sustainable Coal" technologies incorporating the concepts of CO_2 capture and storage (CCS) in coal-based power generation.

3.4 The Commission sees a fair chance of achieving the commercial viability of Sustainable Coal technologies in the next 10 to 15 years. This will, however, require bold industrial investments in a series of demonstration plants, both within and outside the EU, and related policy initiatives for a relatively extensive period of time, starting practically now and lasting possibly until 2020 or even beyond.

3.5 To facilitate such development the Commission will substantially increase the funding for R&D in the energy area, introducing the demonstration of Sustainable Fossil Fuels technologies amongst the priorities for 2007-2013. A European Strategic Energy Technology Plan will provide a suitable instrument for the overall coordination of such R&D and demonstration efforts and for the maximisation of synergies at both EU and national level. The Commission will determine, based on successful results of the R&D projects, the most suitable way to support the design, construction and operation of up to 12 large-scale demonstration units of Sustainable Fossil Fuels technologies in commercial power generation by 2015.

3.6 The Commission will assess on the basis of recent and planned investments whether new fossil fuels power plants built and to be built in the EU use best available technologies regarding efficiency and whether, if not equipped with CCS, new coal- and gas-fired installations are prepared for later addition of CCS technologies ("capture ready"). If this turns out not to be the case, the Commission will consider proposing legally binding instruments as soon as possible, after a proper impact assessment.

3.7 In 2007, the Commission will assess the potential risks from CCS and lay down requirements for the licensing of CCS activities and for adequately managing the risks and impacts identified. Once a sound management framework is developed, it can be combined with changes to the existing environmental regulatory framework at EU level so as to remove any unwarranted barriers to CCS technologies. The Commission will also assess whether to amend existing instruments (such as the Environmental Impact Assessment Directive or the Integrated Pollution Prevention and Control Directive) or propose a free-standing regulatory framework. It will assess which aspects of the regulatory framework are preferably addressed at EU level or, alternatively, at national level.

3.8 The Commission considers that a clear and predictable long-term framework is necessary to facilitate a smooth and rapid transition to a CCS-equipped power generation from coal. This is necessary to enable power businesses to undertake the required investments and research in the secure knowledge that their competitors will be following a similar course. On the basis of the information currently available, the Commission believes that from the year 2020 all new coal-fired power plants should be built with CCS facilities. Existing plants should then progressively follow the same approach. The Commission will evaluate what is the optimal retrofitting schedule for fossil fuels power plants for the period after the commercial viability of Sustainable Coal technologies is demonstrated.

3.9 Cost estimates for CO_2 capture from power generation and subsequent storage at the current level of technology development range up to EUR 70 per tonne of CO_2, rendering the large-scale use of these technologies prohibitively costly for the time being. Available models and studies with a medium- to long-term perspective thus estimate the costs of CCS by 2020 at about EUR 20-30/t CO_2. This translates in the models to costs of coal-fired power generation

with CCS by 2020 or soon afterwards at just 10% above or even on the par with the current levels.

3.10 The potential negative environmental impacts from sustained use of fossil fuels and the deployment of CCS stem mainly from potential leakage from CO_2 storage. The leakage impacts can be both local (on local biosphere) and global (on climate). However, the International Panel on Climate Change's report on the issue concludes that, based on existing experience, the fraction of CO_2 retained in well-selected and managed storage sites is very likely to exceed 99% over 100 years. Site selection and management are thus the key factors for minimising risk. The Commission impact assessment for enabling legal framework will identify all potential risks and will put forth appropriate safeguards.

3.11 Sustainable Fossil Fuels technologies, and particularly CCS, are expected to deliver significant positive results. They can effectively eliminate up to 90% of the carbon emissions from fossil fuels power plants. This could translate into an overall reduction in EU-27 CO_2 emissions of 25-30% by 2030 compared to 2000. An early involvement of third countries in the development and deployment of Sustainable Coal technologies and particularly the CCS component is essential for sustainable global economic development and for tackling climate change in a scenario with increasing global use of coal resources. The success of Sustainable Coal and particularly the commercialisation of CCS on a large scale will also offer better access to energy in the poorest parts of the world still deprived from the chance to use energy.

4. General remarks

4.1 The EESC welcomes the Commission's communication and agrees with the analysis and description presented in the Commission document. Responding effectively to the risks of global climate change while continuing to meet the high energy demands of mature economies and the rapidly increasing energy demands of developing economies, is a significant international challenge.

4.2 Emissions of CO_2 from coal fired power plants in the EU make 24% of overall (EU) CO_2 emissions. The emissions from power generation in plants fired by fossil fuels are highly concentrated due high consumption of fuels in large combustion units and thus, such power plants are the most suitable ones for installation of CCS facilities. It means implementation of systems of capture and permanent storage of CO_2. Such systems consist of three relative independent stages:

a. Capture and separation of CO_2 from flue gas in the place of occurrence (behind a boiler mostly)
b. Transport of CO_2 to the locality of its permanent storage (mostly by pipelines)
c. Final and permanent storage of CO_2 (in suitable geological formations or in seas observing the most stringent safety storage requirements).

4.3 Most probably, coal would remain in the European energy mix in the decades to come. Coal's particular attributes - its availability, affordability and role in stabilising energy markets - will ensure that it continues to be a primary source of fuel for the economic generation of electricity. The coal reserves distribution is uneven in the world and in the EU. Globally, it is encouraging that the largest coal reserves are found in the economically advanced and politically stabile countries. The reserves in developed EU countries have been largely depleted by long time mining activities in the recent period of time and several EU countries opted for gradual reduction and even cease of coal mining.

4.4 One third of the EU countries only can relay on indigenous coal deposits while the remaining two thirds of countries depend on imported hard coal mostly. Mining of hard coal in EU amounted 161.6 million tonnes in 2006 while 235.3 million tonnes was imported. Consumption of lignite reached 373.8 million tonnes in the same year and it was entirely covered by indigenous resources. Therefore, viable means for substantially reducing specific CO_2 emissions from coal-fired power generation need to be developed and widely adopted.

4.5 Coal-based technology has the potential to make significant CO_2 emissions reductions[3]. In the short to medium term, this requires market and regulatory frameworks that encourage investments in the latest technologies that will improve the efficiency of coal-fired electricity generation and thus reduce specific CO_2 emissions. Collaborative action by the Commission, MS governments and industry is also required now to encourage worldwide coordinated research, development and demonstration of clean coal technologies such as carbon capture and storage, which will in the longer term deliver near-zero CO_2 emissions from the use of coal.

4.6 Proven cost-effective means for removing and sequestering most of the CO_2 emissions from coal-based power plants do not currently exist; it is still an emerging technology. However, the prospects for developing and commercialising such near-zero emission coal technologies (ZETs) over the next two decades are promising. CCS installations in power plants are assumed to reduce the power generation efficiency because in their intrinsic power consumption. The overall efficiency differs by the used technology, the preferred OXYFUEL technology needs 8 to 10% of the generated power and the other technologies require even more power by themselves. It means that more fuel would be required per MWh of power supply in the grid and higher generating efficiency is essential. Future CCS retrofits would show even larger intrinsic consumption of power for their operation.

4.7 In the interim, improving the efficiency of existing and new coal-fired power plants is a cost-effective way to limit the growth of CO_2 emissions. The installation of best available commercial technology should be a focus of planners for the significant amount of new coal-

3 IPCC, 2005: IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change [Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L. A. Meyer (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 442 pp.

fired capacity that must be built in the near term. Where practical, it is highly desirable that these power units are designed to enable cost-effective CCS retrofitting when that technology becomes available for commercial application.

4.8 The EESC confirms its opinion that the scale of the emissions limitation challenge means that all potentially viable energy sources and technologies need to be developed to their practical and commercial potential. The transition to sustainable energy has a major role for coal, other fossil fuels, and nuclear as well as renewable technologies and energy conservation, with each contributing at a time and to an extent dictated by technical feasibility and affordability.

4.9 However promising the reasonable expectations CCS gives, it must not lead to the effect that already now energy policy strategies and targets are adopted as "a binding measure", as if on the basis of broad presence of the CCS technologies.

5. Specific comments

5.1 Coal plays a very important role in European electricity generation, but 70% of coal-fired electricity is generated in plants that are over 20 years old. Slight increases in power consumption and much of the existing power plant capacity reaching the end of its technical/economic life will create the need for about 350 GW of new electricity generating capacity by 2020 and about 500 GW by 2030. Calculating costs of the coal fired power plants with CCS in the EU is based on optimistic cost structure of a new, 300 MW rated, power plant amounting EUR 500 million (about EUR 1.7 million per MW installed). Retrofitting of a modern power plant built from now on until 2020) needs EUR 0.5–0.7 million per MW installed and cost of retrofitting of existing facilities reaches even higher sum of EUR 1 million per MW installed. If, by the year of 2030, 500 GW of generating capacity would be brought about to the most advanced state of technology with CCS, the estimated investment costs amount EUR 600–800 billion.

5.2 The EESC appreciates that in the long term, after 2020, CO_2 capture and storage would offer the potential for near-zero CO_2 emissions from coal-based power plants. Delivery of this option requires coordinated research, development and demonstration (RD&D) now.

5.2.1 In the next decade, cost-effective CO_2 emissions reductions can result from increased coal combustion efficiencies achieved through the more widespread use of state-of-the-art coal-fired power plant technology.

5.2.2 These strategies are complementary based on technical solutions that need to be proven: deployment of modern, efficient coal-fired electrical generation technologies in the short to medium term can enable carbon capture for less cost in the longer term, if those power units are designed to enable cost-effective carbon capture retrofitting when such technology becomes available for commercial application.

5.2.3 The Seventh Framework Programme foresees that radically transforming the energy system into a less- or non-CO_2-emitting, reliable, competitive and sustainable energy system requires new technologies and new materials with risks that are too high and profits too uncertain for private firms to provide all the investment needed for research, development, demonstration and deployment. CCS and Clean Coal are amongst the 7FP Energy budget amounting EUR 2350 mill. from 2007 till 2013.

5.2.4 "Capture-ready" concept needs to be properly defined. Successful implementation demands that regulators and industry work together – commercial markets will not deliver without appropriate and stable policy frameworks.

5.2.5 The EESC sees an urgent need for power plant capacity increase and modernisation. In view of a projected increase in reliance on imported energy which rises to 69% by 2030, a broadly diversified energy mix is indispensable for energy supply security reasons. Stabilising coal input to power generation can make a substantial contribution to securing the energy supply in the EU.

5.2.6 With continued efficiency enhancements in the power plant field and the development of near-zero emission technologies, coal will contribute to meeting the requirements of preventive climate protection. In setting rules for emissions trading in each EU Member State, the focus should be upon improving efficiency to achieve GHG reductions.

5.2.7 Simplification of licensing procedures as well as their gradual harmonisation through cooperation between national regulatory authorities is needed in order to cut down as far as possible the long lead times for construction projects, without compromising the observation of the highest safety standards.

5.3 The EESC also draws attention to the fact that though the most important fuel for electricity generation and a vital input into steel production and other industrial processes, coal will have a major role to play in meeting future energy needs assisting in transition towards hydrogen economy. Coal liquefaction allows coal to act as a substitute for crude oil; synthetic gas can also be produced from coal. Such technologies and applications would eventually play also a vital role in the sustainable energy mix. The Commission draft does not cover these important segments of coal present and future use.

5.4 The current intense discussion of the potential for coal utilisation in the next decades has led to the issues concerning coal extraction being driven to the background. However, for the extraction of indigenous lignite and hard coal, an appropriate political and economic framework remains necessary. The extraction and transformation of energy can significantly contribute to local prosperity and employment. When burning indigenous coal, the added value of extraction, transformation and distribution remains within the EU. If oil or gas are used, about 75% of the price are needed to cover import costs.

5.5 Maintaining the fossil fuel (coal based) power generation share at its current level is also extremely important in view of social situation in the new member states: out of 286 500 total manpower in the EU coal mining industry, the new MS coal mining industry employs 212 100 workers. Responsible care must be paid to very hard working conditions of miners throughout the EU.

5.6 Reductions of coal mining areas in the context of regional planning as well as over burdening by the environment protection regulations have in the past often resulted in unnecessary delays and additional burdens for the mines. The location of reserves and the mobility of the mining operation when extracting raw materials result in particular challenges in comparison with other industrial sectors. This special situation is to be taken into account especially when creating the legal framework on environmental issues, for instance waste legislation, soil protection legislation and water legislation.

5.7 The EESC also expresses a thought that the Commission in this document and its time setting is optimistic on the CCS time-frame and its lead-in time requirements. Although principles are known, a technology solution would require fairly longer time and no breakthrough achievement can be expected to offset steady and intensive work on the implementation of this concept. The Commission should now focus on measures to help 10–12 demonstration plants to be operated in 2015 and to create a framework for CCS that covers the main risks, is reliable and, at the same time, not too restrictive. Intermediate stage of higher efficiency generation is highly desirable and any excessive haste and too restrictive regulatory framework could seriously damage this important concept.

5.8 The EESC also calls for intensive research and development as regards the renewable and alternative energy sources that should contribute towards a safe EU energy mix. Simultaneously, the integrated EU energy market should be fully brought into life without any excessive delay.

Brussels, 27 September 2007.

The President of the European Economic and Social Committee	The Secretary-General of the European Economic and Social Committee
Dimitris Dimitriadis	Patrick Venturini