

EU'S INVOLVEMENT IN REDUCING GREENHOUSE GAS EMISSIONS GENERATED BY THE USE OF COAL

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Abstract:

An efficient management of the risks regarding the global climate changes, in parallel with satisfying the great energetic needs of developed economies and the continuously increasing demands of developing countries, represent a major international challenge.

In order that EU recognizes the present and future importance of coal among the resources necessary to ensure the supply of electricity at this level, in terms of the effect generated upon the global climate (due to the high level of green-gas emissions), it is also required that competent authorities should be immediately involved in the process of finding and implementing technologies which increase the efficiency of coal-fired power plants and reduce the characteristic CO₂ emissions, gather and store CO₂, as well as member states should be able to apply the European legislation.

Key words: climate changes, gas emissions, energy, coal, European Union

JEL classification: L72, Q52

Introduction

Coal is an important element for the combination of energy sources used in the European Union; over 30% of the EU's electricity is currently generated by this resource, while in some countries the percentage rises above 50% (Poland and Greece).

In the decades to come, coal will continue to hold its place in the mix of energy sources. The special features of coal (that it can be found in sufficient quantity¹ and that it is affordable, financially, as well as its role played in stabilizing energy markets) continue to make it one of the main fuels used for the production of cost-effective electricity. It should also be noted that although hundreds of countries export coal, there is no coal cartel, and thus price negotiation is possible.

Meanwhile, coal is seen as a energy resource with negative valences because of the impact the use of coal has over the environment; as compared to gas, coal generates roughly twice as many CO₂ emissions. While the traditional pollutants (NO_x, SO₂, gas and particulate matter) have made substantial improvements, the high carbon content of coal releases large amounts of carbon dioxide while burning².

The concerns for the impact it has on the environment (locally, in terms of the areas affected and globally in terms of high level of greenhouse gas emissions) are materialized by the EU's institutions, namely the European Council and the European Parliament resulting a number of initiatives which have as main objective the development of technologies that provide increased efficiency of coal-fueled power plants and reduced CO₂ emissions, the development of commercial applications for

¹ Coal is the fossil fuel with the largest and most widespread deposits in the world, estimating that they could last for some 130 years in the case of lignite and 200 years in the case of hard coal.

² In EU-27 about 950 million tons of CO₂ were release during energy production in 2005 alone. This constitutes 70% of total CO₂ emissions in Europe and 24% of EU's CO₂ emissions in all sectors. Latest global figures are harsh: nearly 8 billion tons of CO₂ released from coal-fired energy production, representing 76% of emissions from energy production and about 30% of global CO₂ emissions.

capturing and storing CO₂ and empower central authorities and local communities to implement the European legislation.

Effective management of risks associated with global climate change, together with meeting the energy needs of developed economies and the significant growing demands from developing countries are a major international challenge.

Brief coordinates of the Kyoto Protocol

Currently, The European Union has engaged in transforming Europe into a highly effective economy, while properly protecting the environment, as it is proven by the commitment to reduce greenhouse gas emissions under the Kyoto Protocol³ □

The Kyoto Protocol is an international agreement to the United Nations Framework Convention on Climate Change⁴. The main feature of the Kyoto Protocol is that it established a set of binding targets for 37 industrialized countries and for the European Community to reduce greenhouse emission by 5.2% in 2008-2012 as compared to the 1990 level.

Recognizing that developing countries are primarily responsible for the current level of greenhouse gas concentrations in the atmosphere as a result of more than 150 years of industrial activity, the Protocol imposes stricter rules under the principle of "common but differentiated responsibilities" from one country to another, without limiting the obligation to obey by it; it has been established a level of pollution allowed for each of the signatory states. For example, Brussels has approved in August 2008 the reduction of the level of CO₂ in Romania from 95.7 million tons to 75.9 - about 20.7%. Bulgaria's level was also reduced from 67.6 million tons to 42.3 - by 37.4%.

According to the Treaty, participating countries must meet their objectives mainly using national measures. However, the Kyoto Protocol provides an additional means to achieve these three goals using market mechanisms, such as:

- trading (gas) emissions - also known as the carbon market
- the clean development mechanism, nonpolluting
- joint implementation.

These mechanisms stimulate investments and help parties reach their quota of emissions in the most effective way.

The Kyoto Protocol is generally seen as an important first step towards a truly global reduction of greenhouse gas concentrations by providing essential information for any future international agreement on climate change.

Reducing greenhouse gas emissions by using technologies for capturing and storing CO₂

Coal plays an important part in the production of electricity within the European Union, but 70% of the coal production is carried out in plants older than 20 years in which the concern for environmental protection and pollution reduction is not very important. Based on a slight increase of consumption and on the fact that many of the existing plants will soon reach the end of their technical / economic existence, it is

³ The Protocol was negotiated in December 1997 by 160 countries, and in order to enter into force, it had to be ratified by at least 55 nations, producing 55% of the global emissions of carbon dioxide. This last condition was met in October 2004 when Russia (responsible for 17.4% of greenhouse gas emissions) ratified the Protocol, which led to achieving the quorum necessary for implementation in February 16th, 2005. To date the Treaty has been ratified by 180 states.

⁴ The biggest distinction between the Protocol and the Convention is that while the Convention has encouraged industrialized countries to stabilize emissions of greenhouse gases, the Protocol engages in the process to do.

considered necessary to increase the production capacity by about 350 GW until 2020 and by about 500 GW up to 2030⁵ □.

Increasing production capacity implies, at the same time, an increase in the emissions of greenhouse gases. CO₂ emissions generated by power plants operating on fossil fuels are highly concentrated as a result of a significant consumption of fuels in large combustion units, making these plants suitable to implement CCS equipment (ie the implementation of permanent CO₂ capture and storage systems).

Currently, there are no means for removing and separating CO₂ emissions coming from coal plants that have proved beneficial in terms of price-quality ratio, using early stage technology. For the time being, the estimated costs for capturing CO₂ from energy production and the costs for subsequent storage amount to 70 euros per ton of CO₂, making the use of these technologies very expensive. Available medium and long term models and studies estimate that by 2020, CCS costs will reach about 20-30 Euro / ton of CO₂. This means that due to the implementation of CCS, the cost of energy production will hardly exceed by 10% the current levels or they may equal them.

It is expected that sustainable fossil fuel technologies, notably CCS, will produce significant positive results in the future. These technologies are able to successfully contribute to the elimination of up to 90% of CO₂ emissions from power plants based on fossil fuels. This means that by the year 2030 there will have been an overall reduction by 25-30% against the levels of 2000 within the EU-27. Prospects for developing and commercializing CCS technologies to reduce emissions of coal-based plants to nearly zero in the next two decades (such as ZET - Zero Emission Technologies) are believed to be promising, since The European Union considers that a bid to reduce emissions is so important that all potential technologies and sustainable energy sources must be developed to their maximum capacity and commercial practice. On short and medium term, this requires an economic and a regulatory framework that encourages investments in the latest technologies, corroborated with actions of the EU forum and member state governments designed to ensure global coordination of the research, development and demonstrations of technologies applied to a "clean coal".

Focusing exclusively on the CSC, one can achieve the objective of near-zero emissions, but unless the efficiency is improved the competitiveness of producing energy from coal would be compromised. Beyond this competitive disadvantage, a CCS-oriented approach would require much larger quantities of coal to produce an equal amount of electricity, and it could accelerate the depletion of limited resources of coal and thus leading to additional constraints on the costs and on the security of energy supply.

Thus, the only long term option that could successfully reduce CO₂ emissions, while maintaining the competitiveness of coal, is an integrated technology solution (which uses the generic term "sustainable coal technologies") that combines the increasing efficiency during the conversion cycle of this source of energy (through implementation and improvement of existing "clean coal" technologies), with the implementation of CCS modules.

Thus, the EU needs to develop technological solutions for the sustainable use of coal, not only to maintain the coal in the European mix of energy sources, but also to ensure that, despite the global increase in the use of coal, there shall not be irreversible

⁵ The cost of EU's coal-fired power plants equipped with CCS technology is based on an optimistic assessment of the costs involved by a new plant with a capacity of 300 MW (the cost would amount to 500 million Euros, or about 1.7 million per MW installed). Retrofitting a modern plant built during the present period and 2020, will require between 0.5 and 0.7 million Euros per MW installed, while the cost of equipping existing plants will reach an even higher level, 1 million Euros per MW installed. If by 2030 a production capacity of 500 GW will have required the latest CCS technology, the investment may amount to 600-800 billion Euros.

damages caused to the world climate. Such an objective requires, however, bold industrial investments in a number of pilot plants, both within the EU and overseas, as well as energy policy initiatives supported in the long run and lasting until 2020 or further on.

Early involvement in the development and implementation of sustainable coal technologies, particularly of CCS, is essential for sustainable global economic development and for confronting climate change issues raised in the case of a continual increase in the use of coal resources worldwide. The success of sustainable coal, particularly the widespread marketing of CCS, will also provide a better access to energy of poor regions of the world, yet without the possibility of using these resources.

Prospects regarding the place of coal within the European energy balance

The latest events in the European energy industry show that reducing CO₂ emissions by improving the efficiency of converting coal is considered to be a more economical solution than shifting to natural gases, as far as the current ratio between the price of natural gas and that of coal is concerned and considering the existing level of restrictions on CO₂ emissions. Future relations between natural gas and coal prices and the price of CO₂ emission rights will be key factors for investments in new power generation based on coal, natural gas and renewable energy. Based on these fundamental market data, services will optimize their portfolio of electricity generation by choosing a combination between the minimum risk and the maximum return on investment. However, in the absence of a long-term and commercially viable perspective for coal, electricity operators could be reluctant to coal-based technologies in terms of replacing old coal plant; then, their decisions may affect the security of the EU's energy supply.

The transition to a sustainable energy provides a special place for coal and other fossil fuels and for nuclear energy, renewable energy and for energy conservation. Each of these elements, in turn, shall have a specific contribution which depends on the technical and financial feasibility.

Conclusions

Due to a forecast of increasing dependence on energy imports up to 70% by 2030, for reasons of security of energy supply, the existence of a combination of extremely diversified energy sources is essential. A stable use of coal in the production of electricity can contribute substantially to providing energy for the EU.

Nowadays the importance of coal as a primary resource in energy production is justified by a series of advantages such as:

- it is the only available source of fossil energy in the EU which limits the growing dependence on imported oil and gas from insecure countries, having thereby a strategic importance
- in many Member States, coal plays an important part in the combination of energy sources
- many EU countries have significant resources of coal, and their period of service is expected to cover much of the next century
- electricity production is dependent on coal in many growing economies in the world and political success of the climate in these regions is closely related to the use of coal with low emissions

The objective of the energy policy at European level should ensure, in short time, favorable conditions for development and widespread implementation of clean coal technologies. Researches on "clean coal" (operated by clean technologies) make considerable progress, which will be further accelerated in case we don't want the new

expansion of coal to worsen global warming. In order to facilitate this development, the funds for energy research and development have increased substantially (CCS and clean coal energy are included in the budget of the Seventh Framework Program amounting to 2350 billion for the period 2007-2013) making sustainable fossil fuel technology demonstrations a priority.

REFERENCES

1. www.ec.europa.eu
2. www.europarl.europa.eu
3. http://mmediu.ro/departament_mediu/schimbari_climatic/2_Pachet/2.4.doc
4. http://ec.europa/enterprise/environnement/hlg.doc_06/first_report_02_06_06.pdf
5. <http://www.ecomagazin.ro/emisiile-de-gaze-cu-efect-de-sera-au-atins-un-prag-periculos/>