

**FOR A FAIR
COAL – NATURAL GAS
COMPETITION**

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1 Purpose of the study

We propose a price setting geopolitics for CO₂ from coal combustion in order to establish a long-term competitive balance between natural gas (NG) and coal on the energy market.

2 Abstract

Coal and natural gas (NG) are both used for the production of electricity.

The kWh from coal combustion is more economic, but its CO₂ emissions are approximately twice as high.

The study evaluates CO₂ price setting, which would make the kWh-NG competitive with the kWh-coal, and proposes the contribution of the Coal Boards in the creation of an International Investment Fund. This Fund will have for mission to finance research and make investments intended to reduce the CO₂ emissions of thermal power plants.

Thus, we hope to be able to contribute to the implementation of a CO₂ price setting arrangement demanded from companies and banks by the World Bank within the scope of the Climate Summit of Mr Ban Ki-moon, United Nations' Secretary General.

3 Background

Like natural gas (NG), the coal used for the production of electricity releases approximately twice as much CO₂ into the atmosphere as NG. And, the lack of a geopolitics concerning the CO₂ price setting has only allowed its limited application.

In fact, applied initially only by some regions, it became untenable in view of the economic advantage gained by those who did not apply it.

An advantage resulted in favour of coal, which not only is clearly more competitive for many regions, but also clearly more polluting due to its higher CO₂ emissions.

How to establish a competition with equal chances for natural gas and coal is the issue raised by this study.

Before proposing an alternative to taxing, let us evaluate the CO₂ price setting which would allow a healthy competition between NG and coal.

4 Balanced competition between energy-coal and energy-NG

The study [1] of the International Energy Agency (IEA) mentions the cost of electricity produced from coal and NG. A cost bracket is given for both of these alternatives. The lowest costs are selected hereafter :

. for coal : \$0.0294/kWh in 2008

. for NG : \$0.0358/kWh in 2008

The difference of \$0.0064/kWh in 2008 in favour of coal is assumed to be the same *today*.

The *current* difference, varying from one region to another, is not evaluated by our study.

It can be priced based on the European Commission's study [2].

This cost difference can be reduced by taking into account the different emissions of both these energies.

The cost of the kWh-coal is currently lower than that of the kWh-NG. However, these emissions are higher. They represent a surplus. A price applied to this surplus of CO₂ emissions would allow obtaining for NG a cost for a kWh equal to that of coal.

What should this price be equal to ?

The cost difference of \$0.0064/kWh between the kWh-coal and the kWh-NG should be equal to the cost of the *surplus* of the CO₂ emissions resulting from coal.

According to the IEA [3], the CO₂ emissions are evaluated at :

0.92 kg CO₂/kWh for coal

0.40 kg CO₂/kWh for NG

The *surplus* of 0.52 kg.CO₂/kWh emitted by coal should be equal to \$0.0064/kWh for an equivalence of the cost for electricity produced by coal compared to that by natural gas. This leads to a cost for the CO₂ *surplus* from coal of \$12.30/t.

The *surplus* of the emissions from coal compared to those from NG is thus $0.52/0.92 \times 100$, that is, 56.5 % of the total emissions from coal.

A price setting of the emissions of the CO₂ *surplus* at \$12.30/t would thus lead to a competition of equal chances for NG and coal.

This price setting applied by *only one region* is untenable in view of the economic advantage gained by those who do not apply it. In this case, economy wins over ecology.

Could a price setting of \$12.30/t.CO₂ for the *surplus* of the emissions from coal be agreed to by *all the regions*?

Let us point out for this price setting that the application would be facilitated by conventional control and measurement means.

It should be noted that *at this stage* the study proposes only a *price setting for the surplus of the CO₂ emissions from coal compared to those from NG, with the exclusion of the others*.

This does not prevent the use of other forms of price setting or taxations aimed at promoting renewable energies, for example.

For the price setting to be acceptable to Coal Boards, it should provide for allocations to profitable research and investments intended mainly to reduce CO₂ emissions.

We think, first, of new thermal power plants incorporating CO₂ sequestration.

This price setting, which is often envisioned today in the form of a taxation, could in fact be replaced by a price setting which would allow the *contributions* of Coal Boards in an Investment Fund responsible for allocating them to these projects.

This would eliminate objections from the Coal Boards and would prove beneficial for all the regions and all the players.

In fact, everyone is concerned by the ecological problems linked to CO₂ emissions first in the atmosphere and then in the acidified oceans.

CO₂ sequestration implies for thermal power plants the *gasification* of coal rather than its *combustion*, which leads to a higher energy yield and a reduction of mainly dust emissions [4]. The control of the technology of gasification and sequestration would be an obvious additional economic asset for Coal Boards that would ensure the technology's profitability.

Natural gas would find its place on the market with equal chances like for coal.

Renewable energies should become more competitive.

Despite of the interest for all the regions, this contribution by the Coal Boards to an Investment Fund is not applied. Why not include this problem on the agenda of the World Conferences on Climate, Energy, Commerce?

But what would be likely to be proposed?

5 Application proposal - Test

Since an agreement should be obtained from *all the regions*, might it not be possible to imagine the Coal Boards paying to an International Bank Consortium (IBC) representative of all the regions their contributions to the Investment Fund on a pro rata basis of the coal placed on the market?

What would be the amount of these contributions?

- For
- an annual world market of 7.7 billion metric tonnes of coal/year [5] ;
 - an average content of 75% carbon in the coal ;
 - a ratio of molecular weight of CO₂/atomic weight of Carbon 44/12 ;
 - a surplus of CO₂ emissions from coal compared to those from NG of 56.5% of the coal weight ;
 - a contribution of \$12.3 \$/t.CO₂ in surplus.

The Investment Fund would collect

7 700 000 000 t x 0.75 x 44/12 x 0.565 x \$12.3/t.CO2/year, that is, **\$147 156 000 000/year.**

IBC would be in charge of the Investment Fund's management.

IBC would convert as a priority the Coal Board *contributions* into shares or bonds in the thermal power plants which incorporate CO2 sequestration.

References

- [1] International Energy Agency (IEA), Nuclear Energy Agency (NEA) - Projected Costs of Generating Electricity - 2010 Edition – Executive Summary
- [2] European Commission – Energy prices and costs report - 17.03.2014
- [3] International Energy Agency (IEA), CO2 emissions from fuel combustion, Highlights - 2010 Edition
- [4] U.S. Department of Energy (DOE) – Fossil Energy - How Gasification Power Plants Work - January 2010
- [5] OECD/IEA – Medium Term Coal Market Report 2013 – Executive Summary