

CARBON IS THE KEY

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Abstract. *In spite of fact that for some decades, more significantly beginning since 1972, as a result of publishing the Report to the Club of Rome so called the Limits to Growth, at least like a declamation, the ones with decision making from national, regional and global levels continuously taking action to reduce effects of greenhouse gas emissions, specially carbon dioxide, marsh gas and others alike, it amazingly comes out that carbon dioxide join marsh gas and other carbon - rich gases fundamentally contribute to global warming of climate of the Earth.*

The atmospheric concentration of carbon dioxide that was 280 ppmv (parts per million by volume) in the Pre-industrial Era (1750 - 1800) it has grown impermissibly much reaching 356 ppmv in 1993, and at present, between 2005 and 2008 it grows to 1,5 ppmv per year. This growing of atmospheric concentration of carbon dioxide is mainly due to permanent growing of anthropogenic emissions generated by fossil fuels combustion.

Keywords: carbon dioxide emissions, natural capital, environmental changes, planetary unbalances, pollution

1. Introduction

As part of more impressive research centers in the world, more and more interdisciplinary studies about the way in which would answer some energy requires without increasing of carbon dioxide emissions (CO₂) or other greenhouse gases are undertaken.

The purpose of these studies is to search the carbon part in a world in which the compulsions on carbon emissions are first adopted to stop the global warming, with all its disastrous results on the organized hierarchy so-called the environment and to direct with reasons both scientific and the market the energy production of the world.

The studies point out one the one hand on performance comparison and cost of different technologies of coal burning and the other hand on the pathways and modalities identification as clean as possible and as more integrated as possible of catching and trapping for CO₂, firstly, for free carbon, evidently.

It is through that also, for our country the carbon question has to be one in the first priorities both for government like a manager of territory and of all socio-economic system permanently found out in an intense relationship with natural capital.

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At the same time, the academic middle has to assume more the general course of all economic and social system and on this basis, scientifically motivated, has to mark the policies and sectorial development and the politics leaders and generally the decision factors must have knowledge the management and holistically and ungratefully tackling as technique, economical, environmental, political questions and other nature with a major objective to limit and decrease the green house to diminish the disastrous effects of environmental changes.

The major involving of university and academic environment is also required due to generating of renewable energy having like a base the energetic resources burning of the Earth that means the main cause of great planetary unbalances and pollution as environmental manifestations unfriendly are transboundary being clear that the nations which do not direction properly and motivated scientifically savings not only they will be bankrupt but also they will be more and more limited and even sanctioned in the terms more and more limited environmentally.

2. Content

Carbon is an important energy source in every imaginable scenario of future energy production.

Therefore, every study related to the future of carbon must estimated the double of its characteristic on the one hand as indispensable element in the future production of energy and the other hand like an undisputed leader of environmental crisis on which mankind have to tolerate them, due to accumulation of free carbon in all fundamental components of environment, but firstly in atmosphere. Therefore, the research and innovation and especially financial support of these have to concentrate on the identifying of priority actions necessary to decrease the emissions of CO₂.

Such research, integrated on the basis some interdisciplinary studies of analysis will stimulate a constructive dialog to consider how more complex the technical questions but the social and environmental ones with major impact both in the education and education field and the production.

It is though, firstly, it must not demonstrated any longer that the risks due to global warming are real and all governments might take actions to limit the emission of CO₂ and other greenhouse gases.

At the same time, it is appreciated that se secondary and no less important it is that the use afterwards of carbon will follow to produce still more time greenhouse gases emissions. Therefore, of course, a great challenge for governs and administrations from industry is to find a way by which the carbon emissions still use coal urgently to satisfy the energy necessary, especially in the developing country.

Our aim is to identify the measures that must be taken actions to ensure availability demonstrated technologically that should facilitate the objectives

achievements of decrease of carbon emissions, while the use of carbon to satisfy a part of needs of world energy keeping on to be found important.

Our aim of study have not analyzed the alternative of control policies of carbon emissions and therefore, the study does not make recommendations as regard what attenuation measure of carbon should be taken now day. However, our hope is that this study will contribute to adopt promptly a comprehensive policy by USA as regards the carbon emission. We think that the use of coal will increase in any predictable scenario because it is a cheap resource and relatively plentiful.

Coal can offer energy usable at a cost of \$ between 1 and 2 \$ per MMBtu comparatively with 2\$ to 12 \$ per MMBtu for oil and natural gas. More than, the coal resources are distributed in areas of the world, others than Persian Gulf, an unsure region that contents large quantities of oil.

- Today, fossil fuels as sources represent 80% from total request of energy: coal (25%), natural gas (21%), oil (34%), (6.5%) nuclear, hydro (2.2%) and biomass and waste (11%).

Only 0.4% from the energy request at global level is covered from geothermal sources, solar energy and wind. 1

-50% from electric energy produces in the United States of America is from burning coal. 2

- There are not power stations of more five hundred, 500 MW on coal in the United States of America in service on an average of 35 years. 2

- At present, China has two power stations of 500 MW on brown coal per week and capacity comparable to all power system of UK every year. 3

- From 500 MW produced from burning coal, the station produces about 3 million tonne/year of carbon dioxide (CO₂). 3

- the United States of America produce rough 1.5 billion tonne of CO₂ per year from burning coal in power stations.

- If CO₂ is carried for sequestration, quantity is equivalent to one third from natural gas volume yearly carried to USA by own system of gas lines.

- If 60% from CO₂ produced in USA, by coal burning for energy should be captured and compressed in liquid for the geologic sequestration, its volume should be equal to of oil consumed in USA, as namely of 20 million barrels per day.

- At present, the greatest project is sequestration, injecting of one million tonne/year of carbon dioxide (CO₂) from Sleipner gas an aquifer site under the North Sea. 3

Notes for sources:

1. AIE world key of statistics energetically (2006)

2. EIA 2005 yearly statistics (www.eia.doe.gov)

3. Derived from MIT of Study coal.

The scientific message on environmental changes on the score of concentration increase of anthropogenic greenhouse gases in the atmosphere is urgent.

Analyzing the previous year reports published by Group of Experts of The Intergovernmental Panel on Climate Change (GEIP), the conclusion is that people have created meaningful environmental changes. The results of research point out that there is a short time to avert disastrous risks.

Already, by massive clearing and taking the place of afforested lands and our irrationally use of fossil fuels, carbon dioxide reaching unknown levels from the beginning of the last glacial period 3 million years ago.

Talking of that, it seems that at least for a time the following glacial period is put off or cancelled owing to global warming. The worst thing is that the Earth goes to an atmosphere more and more warmly and the level of planetary ocean in an increase beyond example.

Climate changes incited unfortunately too late the attention on which they have been deserving and at present after that some programmes not so short in connection with carbon capture have been started, these are getting easier with decrease of oil cost. It seems that mankind expect again some natural disasters or other consequences that could weak up care and especially interest in the sequestration of free carbon.

It is very dangerous that many and very influential groups, especially from the industry area or generally among the great polluters, support that premises exist as in the following period about 10 – 12 years, the planet climate became cold and warming due to the increase of greenhouse emissions should be an exaggeration, in fact. To such theses launched, of course, by the supporters of economic increase have to receive scientific argues based on long – term measures which can demonstrate that a natural cycle of cooling in the following decay is possible to arise again and can hide the global warming during its period creating wrong illusion of safety.

If the logic is gone on with in the decay after the cold period, the natural cycle will strengthen the global warming and temperatures will take again the inexorable upward tendency due to the increase of greenhouse gas level in the atmosphere.

That in why, it is though that a colder decay should be well fructified by the ones preoccupied with the great questions of planetary equilibrium as to persuade

the decision politic factor to launch and support financially the green re-balance of the Earth, as namely restoring of forestry landscapes at the planetary scale.

It has not to demonstrated any longer that the carbon capture and sequestration by massive aforestations is only ecological way not only to recover the free carbon but also to restore the atmosphere composition and therefore to release a vast process of ecological rebuilding at the planetary scale. Since with the disforest and substitution of the word forests, not only carbon was released but also

the worst the Earth was missing of its vast reservoirs and mechanisms of biodiversity conservation and generating of assets and services of ecosystem that means sustainable bases, in fact.

Under the circumstances that both due to consumption increase of wood and due to so-called itinerate agriculture and industrial and urban ecosystems expansion such as of transport systems, surface covered with forests was continuously decreased, the people realized unfortunately very late that absence of forests means services disappearance and their replacement impossible.

It is absurd to find that under the circumstances in which the world forests surfaces was equalized to the planetary deserts surface and while the desert extends even to the detriment of forests, instead of looking for natural solutions that to allow at the same time the ecological rebuilding by afforestations or reforestations, recovering a whole area or region realities day after day demonstrate not only responsibilities missing but also major incendiary aggressions of green ecosystems that not only no capture carbon any longer but also they become great sources of carbon.

On the other hand, decarbonising of many countries has to go on with protocols and international conventions, as Kyoto and is good and at the beginning of the year 2009, the parties from the International Treaty for Climatic Changes where our country is a member and meet at Copenhagen that the governments to reach an agreement as regards their commitments to decrease greenhouse emissions after 2012.

This agreement has to deliver a strong and stable message of carbon price, trajectories included specifically from country to country. Research and innovation has to find solutions that should allow to the countries poorer to accomplish their needs of development, not only from marketing their rights of emissions.

Also, the scientific community is called to create a mechanism by which the development country to deliver assistance for the developing countries for both to allow them to adapt for the inevitable changes and to help them to implement from the beginning the technologies free of carbon, jumping over the carbon require of industrialized world.

The public opinion will be a strong conductor for achievement these desiderata and the academic and university environment has to improve young people's mind on the health of the Earth and responsibility for the environment protection. For example, the Australians voted dismissing of Prime Minister to refuse to pay attention climatic changes that are so clear everywhere, and in the United States citizens forced the three Presidential candidates 'hand to adopt a consistent appeal for the change of attitude on environment.

Perhaps even more important should be increase of awareness grade of governments as a result of civil society actions to anticipate the potential

damages create by the climatic disasters which should be much less full of risky and dangerous. To help this process, the scientific research and academic and university environment has to supply much more information as regards the probability of regional impact and on the way in which these regions can be adjusted to new conditions and can reduce the risks.

The private sector, also plays a vital part, for what all instruction environments have to improve people's mind to make account of enterprises and environment to the same extent.

In this respect, there are some positive signals, in the sense that, for example, the response of the cover market and merchandise of carbon was very strong in Europe about 50 billion Euros in the last year of transactions for the emissions rights.

By following the taxation as correct as possible and more realistic, the cover emission from country to country as the carbon price for the follow phase of European Scheme of Marketing has to find mechanisms that scientifically argued to develop the sophisticated processes that to go to the credit taxation of risk for example, for shares and transactions with customers that suppose credits for carbon.

At the same time, the national authorities in the energy field are called to find solutions and financial support for investments in the energy technology in the following 20 years and make in such way he companies can see these investments as some opportunities no as risks.

Innovation in technology will has to develop stocking mechanisms at the world level of free carbon, as close as possible to the natural ones and no sophisticated solutions that to carry out them firstly, they become emission sources and the infrastructure working supposed is a great energy consumer.

By coming out again of interest in the increase of nuclear power points the desire of the HiTech to keep on, as far as possible with expensive sources, even if the waste question generated of nuclear stations is still far to be solved. It is thought that also, the new generation of nuclear stations with their efficiency improved will reduce the waste and service safety and thus, will be able to be avoided many previous questions.

However, in the last 6 month it comes out also some steps back. For example, at the beginning of this year, the *United States Department of Energy* (DOE) took back from the private public partnership Future Green that was created to coordinate a vast process of green rebalance and using the plants energy to sequestration carbon dioxide and to settle down safely underground.

BP is in a similar scheme at Peterhead, Scotland, although have debates on projects in California and Abu Dhabi. At the same time, Shell just decided to cancel its *wind engine projects* in Kent, in south - east England.

Such regresses are disappointed and dishearten; in fact, they are being reflection of immense importance of a strong signal of carbon price.

Of course that always the carbon capture will be more expensive than releasing gas out in the worst conditions.

The message to decision factors has to be natural that all companies firstly to look for profit and therefore, technologies with low carbon emissions will not be ever profitable if a favorable price is not given to carbon sequestration.

It is thought that must be warned the companies that are involved in speculations that launches small investments harmful environment to gain image and to draw their clients and the co-workers reliance and first of all of public to act further on environment aggressively.

Necessity to decrease the carbon emissions must be incorporated every cells of company body. Until the energy consumption has been encouraged stimulating every citizen to consume as much as possible, from now on mankind must be awareness of emission decrease of carbon as more as possible and quickly.

The scientific community, the greatest scientists of the world agree that must be reduced the current emissions of greenhouse gas to 60-80% in a short time to avoid the worst effects of climatic changes globally.

A market based on emission rights and the commerce with these, expansion of production capacity of renewable energy and care for the use of energy efficiently from aggressive sources as against environment are all essential parts of strategy as regards the climatic changes, but really for the time being they can partially substitute our dependence on energy from the burning of carbon – based fusils.

Carbon that an offer, at present 50% from electricity of the United States is the most used carbon-based fossil fuel, evidently being a source of greenhouse gases.

More and more research studies suggest the capture and insulation of carbon that must begin from power stations and other large industrial sources then to be transported to locations adequately and inject deeply in the underground geologic formations long-term for sequestration.

The fact is the United States stand upon carbon to satisfy one half from their energetic needs represent a major challenge to reduce dramatically greenhouse emissions in the United States. As long as it is clear that “businesses” as usual “obstruct USA in a risky future climate and expensive, unsustainable and increasing, coal being cheap and plentiful and is to be expected to constitute still a substantial weight of mixed power energy from USA in the near future”.

Indeed, the carbon-based stations existing will operate for decades and new coal-based plants are built or are planned. Without the carbon capture and sequestration these plants will emit billion tonnes of CO₂ along their life and free of bridge between carbon-based present energy and a low level of carbon in the future, all demonstrations till now should be in vain.

The renewable energy will play clearly a decisive role in the general action to a future with low carbon emissions. But the challenge to reduce the emissions to 60 – 80 % in the following decades and simultaneous meeting of this reducing with the increase request of energy production is disheartening.

We must be realistic and point that, in spite of recent increase of productive capacity of energy from renewable sources as well the solar and eoliane energy however, in USA, for example, only 4% from power productive of USA is from renewable sources.

To be sure that the close future will make something for the ecosystems rebalance greatly responsible for the planet climate, it is thought that it is essential that the initiatives which promote use of renewable energy and energetic efficiency increase to be put in force as fast as possible because the coal current dependence of great economies as should be the ones of USA and China and many others in the developing countries constitutes a great and real threat on life of our planet.

It cannot be produced any longer free carbon, indifferently who is this producer. The great stationary sources from USA, for example, a recent study of the *United States Department of Energy* (DOE) points that there are large emitters and about from 1 to 4 trillion tonnes stocking capacity of carbon in the tanks of gas and oil, coal and aquifer or salt mines, namely it should be enough space for more decades of continuous injections.

Conclusions

Numerous research studies from North America, especially, point that the capture mechanism in the geological formations can be thought sure and sequestration

in such tanks should make for 4 million years. The research projects and pilot pointed that CO₂ is very probably to stay captured in site well chosen and administrate, and there where already made tanks and carbon was sequestered during one hundred years, the monitoring system did not observe no one leak.

Under this theme, most of experts think that the sequestration operation it is accurate made, such projects can perform risks comparable the ones from industry, as stocking of natural gas or oil and recovery of these hydrocarbons for use. These risks can be administrated and should be necessary and compared with the risks of great emissions of CO₂ further on in atmosphere without sequestration and fixing. To reduce risks, it needs suitable projects of regulation and supervising according to standards. Their long – term projects for the elaboration of injection, monitoring and maintenance procedures of man-made tanks of carbon are essential to security of these technologies in service.

What new policies must be promoted to make the carbon capture and sequestration some viable actions?

1) Demonstrative projects far reaching that inform to take economic decisions.

For example, there is not yet, anywhere in the world, a power station that can capture the emissions. Without demonstrative projects on a commercial scale to test the technologies range of capture and sequestration, it cannot be spoken about only stopping polluters because the monitoring carefully to understand as good as possible which happens with big volume of CO₂ for a long time, cannot replace carbon fixing.

2) A challenge for the power stations to sequester and fix the carbon issued

At present, taxes for the CO₂ emissions in atmosphere are too small. We need of market challenges and laborious policies of coal to hasten the private investments for the carbon capture and sequestration and use these technologies.

3) A regulating framework to be ensured that adopted technologies to provide work safely.

Regulating frameworks for CCS began to arise at both federal and state levels in USA and UK, in Europe and are some important steps from now on. But there are potential gaps or overlapping in these frameworks about property rights and long-term responsibility. The scientific research must to bring explains.

4) A permanent dialogue with civil society to be ensured the agreement of these practises

It was not undertaken for the time being the meaningful actions of public opinion sensitization about the carbon fixing and sequestration. A public good sensitization and participative dialogues about the carbon sequestration and fixing projects is important to get trust of public on these project.

The World Resources Institute gathered together a diverse group of countries interested in the carbon capture and sequestration (CCS) over 60 organizations and led the plans of groups interested in the formulation of directions firstly tested on the great support from industry, governments, NGOs and communities to ensure that CCS is made safely, evidently and efficiently. WRI also published a projects series about CCC that are found on websites' – www.wri.com.

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