THE GLOBAL WARMING'S STABILIZATION AS AN EFFECT OF ANTHROPIC ACTIVITIES – AN UNCERTAINTY

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Abstract

By analyzing de CO_2 concentration from the atmosphere in the three past decades, we ascertain that its values are bigger from one year to another, despite many documents and international debates and cautions from the scientific community. Likewise, it is admitted the fact that the expected effects of climate change will have a major impact on the environment, on human society and the anthropic activities, mainly the burning of fossil fuel is the main cause of global warming. Nevertheless, in the past years has been a significant accession of the consumption of all types of fossil fuel, scoring record levels. It is also important that from several reasons (population growth, economic boost, energy consumption, greenhouse gas emissions), states in course of development have a great responsibility regarding climate change, increasing the CO_2 emissions in the past years.

Keywords: *climate change, carbon dioxide, fossil combustible, Kyoto Protocol.*

1. Introduction

The problem of climate change as a result of human activity has been internationally acknowledged within the Rio de Janeiro Earth Summit (1992), United Nations Framework Convention on Climate Change (UNFCCC) adopted with this occassion. The major objective of this convention is to „*stabilize concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropic interference with the climate system*" (art.2). Likewise, all Parties to the Convention, taking into account their common but differentiated responsibilities, commit themselves to national or regional programs containing measures to mitigate climatic change (art.4).

According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) in 2014, the expected effects of climate change in this century will have a major impact on the environment and human society, human activities representing the main cause of global warming. Global warming and its impact on the climate system was unequivocal considered as

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being confirmed by an increase in global average temperature of about 0.9°C compared to pre-industrial average temperature era, accentuated in the last 50 years. The effects of climate change, widespread and significant, are already evident in the natural and human systems: rising level of the World Ocean, melting glaciers, ocean acidification, increased intensity and frequency of extreme weather events, etc. According to the report, to avoid serious effects on the environment and to achieve the internationally adopted goal of keeping global average temperature increase below 2°C compared to pre-industrial levels, urgent measures are needed to reduce emissions of greenhouse gas, current efforts and measures being insufficient.

According to IPCC (2014), without additional efforts, in 2100, the average global temperature could be 3.7°C – 4.8°C higher compared to pre-industrial levels. In these conditions, greenhouse emissions can reach in 2030 levels of 450 ppm CO_2 equivalent and in 2100 a level of 750-1300 ppm. At a concentration of over 1000 ppm CO_2 equivalent, in 2100 the temperature is expected to rise over 4°C compared to pre-industrial times. If greenhouse gas concentrations exceed 650 ppm until 2100, it is very unlikely that the rising limit will maintain at 2°C compared to pre-industrial times. The chances for this goal to be achieved are high only if in 2100 the concentration will be 450 ppm CO_2 equivalent. This, however, requires substantial reductions of greenhouse emissions and big changes in energy systems and land use. Thus, emissions in 2050 should be 40-70% lower than 2010 and 2100 levels of emissions to almost zero. There are several opinions that in order to normalize the climate, CO_2 emissions must be almost eliminated for a long time (Matthews and Caldeira, 2008).

Based on a fundamental analysis on paleoclimatic data, published in 2008, ten scientists, led by James Hansen, head of NASA's Goddard Institute for Space Studies, expressed his opinion that the higher level of safety for the carbon dioxide concentration in the atmosphere is 350 ppm (level already exceeded). Thereby, the substantial decrease in the concentration of CO_2 in the atmosphere is absolutely essential.

This article was written to illustrate that, although the impacts of climate change have been highlighted and concrete measures have been proposed to combat global warming, greenhouse gas emissions and fossil combustible consumption are still increasing. The study also aims to highlight the fact that the stabilization of global warming as a result of anthropogenic activities is uncertain and that the results of international efforts to combat the phenomenon are rather limited.

2. Methods

The present study is based on analysis and interpretation of data on the dynamics of emissions and CO_2 concentrations in the atmosphere, as well as the

evolution of fossil fuel consumption data from international sources and databases (WMO/GAW Greenhouse Gas Bulletin, National Oceanic and Atmospheric Administration, BP Statistical Review of World Energy, International Energy Agency, US Energy Information Administration, Intergovernmental Panel on Climate Change), but also on consulting a specilalized bibliography. Data for a period of at least twenty years (before and after the Kyoto Protocol) has been used, both for carbon dioxide emissions and concentrations and for the consumption of fossil fuels. To highlight the evolution of these indicators, graphical methods were used, which were later interpreted.

3. The evolution of greenhouse gas concentrations and emissions

In the last 800.000 years, the concentration of CO_2 in the atmosphere fluctuated between 180 ppm during ice ages and 280 ppm during interglacials. Before the Industrial Revolution, the average level of CO_2 in the atmosphere was 278 ppm (NOAA-ESRL, 2013). Evolution of CO_2 concentration in the atmosphere is well documented since 1958 when accurately measurements were made on Mauna Loa under the leadership of C.D. Keeling at Scripps Institution of Oceanography. National Oceanic and Atmospheric Administration (NOAA) began its own measurements of CO_2 in 1974. In 1959, the first year with complete data, CO_2 concentration in the atmosphere was 315.9 ppm. Since then, growth has been continuous, 350 ppm level was exceeded in 1988. In 1992, when the Earth Summit was held in Rio de Janeiro, the concentration of CO_2 was 356.3 ppm, and in 1997, the year of the Kyoto Protocol, reached 363.7 ppm (fig. 1). On 9 May 2013, the average concentration of CO_2 in the atmosphere at Mauna Loa, exceeded 400 ppm for the first time since the start of the measurements in 1958.

In 2017, according to NOAA-ESRL, the average concentration of atmospheric carbon dioxide recorded at Mauna Loa Observatory, Hawaii (3397 m) was 406.5 ppm, up 2.1% compared to 2016 (404.2 ppm). For the period 2010-2017, the average increase was 2.4 ppm/year, value higher than in 2000-2010, when it was 2 ppm/year. In the late 1950s, the growth rate was 0.7 ppm/year. In 2 March 2018, the Scripps Institution of Oceanography (Mauna Loa Observatory), the level of CO_2 in the atmosphere was 408.6 ppm.

Similar values are provided by the Greenhouse Gases World Data Centre (fig. 1). Thus, in 2016 the maximum values for greenhouse gases were: CO_2 (403.3 ± 0.1 ppm), CH_4 (1853 ± 2 ppb), N_2O (328.9 ± 0.1 ppb), these values representing 145%, 257% and 122% of pre-industrial levels (WMO Greenhouse Gas Bulletin No. 13, 2017).

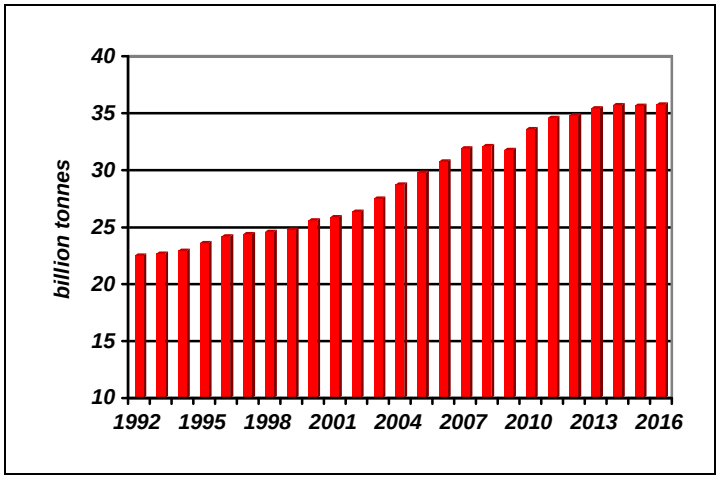

Fig. 1. The evolution of the concentration of carbon dioxide in the atmosphere in the period 1992-2017 (*Source:* WDCGG, NOAA-ESRL, 2018)

According to NOAA, the CO_2 from pre-industrial times (278 ppm) represents a balance of two annual flows, one between the atmosphere and oceans, 294 billion tonnes CO_2 per year, and another between the atmosphere and terrestrial biosphere, 440 billion tonnes CO_2 per year. The current level of anthropic carbon dioxide is due, mostly, to emissions from burning fossil fuels and cement production. The cement industry contributes about 4.7% to these emissions, but they are more than double compared to the level of the mid-1990s (Boden et al., 2012). A lower contribution, but not negligible, comes from CO_2 emissions from deforestation and other land use changes (about 3.6 ± 1.8 billion tonnes of CO_2).

According to the Fifth Assessment Report of the IPCC (2014), the annual CO_2 emissions from fossil fuel combustion and cement production were on average 30.4 billion tonnes of CO_2 annually in the period 2002-2011. In 2016, it was about 35.7 billion tonnes of CO_2, 56% more than in 1992 (fig. 2). Emissions of carbon dioxide from anthropic land use change were 3.3 billion tonnes per year on average in the period 2002-2011.

Starting from 1750 (pre-industrial), emissions of carbon dioxide in the atmosphere from burning fossil fuels and cement production were 1375 billion tonnes, while deforestation and other land use changes have issued 660 billion tonnes CO_2. In this way, the total emissions of anthropic carbon dioxide were 2035 billion tonnes, of which 880 billion tonnes have been accumulated in the atmosphere, 568 billion tonnes are absorbed by oceans, and 587 billion tonnes of CO_2 were accrued in natural terrestrial ecosystems.

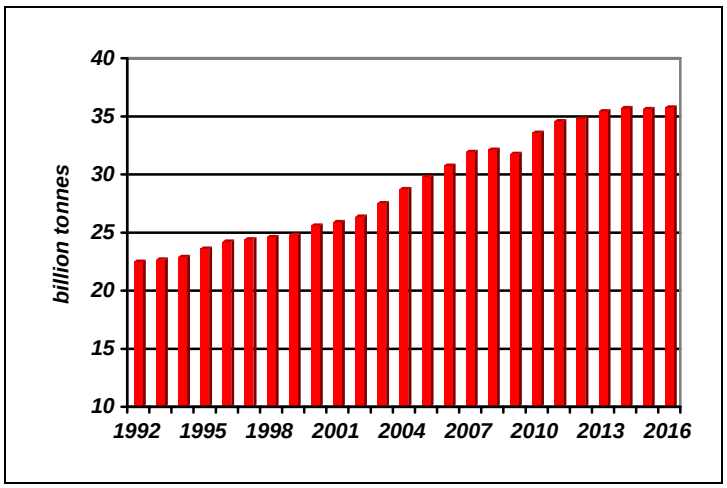

Fig. 2. Evolution of carbon dioxide emissions in the period 1992 to 2016
(*Source:* Olivier et al., 2017)

Anthropic CO_2 emissions, globally, were 35.76 billion tonnes in 2016, up to 3% compared to 2015 (Olivier et al., 2017). The growth rate of emissions from fossil fuels rose 1.5% annually in the period 1980-2000 and at 3% annually in the period 2000-2012 (Hansen et al., 2013), largely due to higher coal consumption. The average increase of CO_2 in the atmosphere, between 2003 and 2016, corresponds to 45% of the CO_2 emitted by human activities, the remaining 55% being consumed/removed by oceans and terrestrial biosphere.

Achieving the maximum heating target of 2°C requires that cumulated emissions in the period 2000 to 2050 do not exceed their 1000-1440 billion tonnes CO_2 (Meinshausen et al., 2009). If the global rate of CO_2 emissions growth of 2.9%, recorded until 2011, continues, cumulative emissions will surpass this level in the next two decades.

4. Regional dynamics of carbon dioxide emissions

From many points of view (greenhouse gas emissions, energy consumption, population growth), developing states, notably China and India, have a great responsibility on climate change, since their CO_2 emissions in recent years are increasing. As policies and measures to reduce emissions of greenhouse gases involves high economic and social costs (including the possibility of closing some production, reducing sales and increasing unemployment) with changing many aspects of production systems and existing consumption, there are many restraints concerning the adoption of ambitious targets for reducing emissions.

Another factor that must be considered is the demographic one, namely population growth in developing countries. These countries have made the greatest contribution to population growth after 1990, only China and India bringing an additional 580 million people (the population of China increased by more than 220 million and India with more than 360 million) (China Statistical Yearbook, 2016, India Statistical Yearbook, 2016). In 2050, when the population is expected to reach 9.5 billion inhabitants, population growth will come from developing countries. If these states have currently 5.9 billion inhabitants, there will be 8.2 billion in 2050 (India will have 1.6 billion, and China 1.38 billion). By contrast, developed regions will remain unchanged, with population of about 1.3 billion (UN Department of Economic and Social Affairs, 2015).

Industrialised states, which belong to the Organisation for Economic Co-operation and Development (OECD), experienced a small increase of emissions between 1992 and 2006, followed by a stabilization and then a reduction in 2007. The economic recession in 2008-2009 contributed to the reduction of emissions (fig. 3). If in 1990, OECD countries had a share of global CO_2 emissions by 54%, compared to 43% for developing countries (Non-OECD), in 2014, the situation reversed, 37% for industrialized countries and 60% for developing states (IEA, 2014 and 2016).

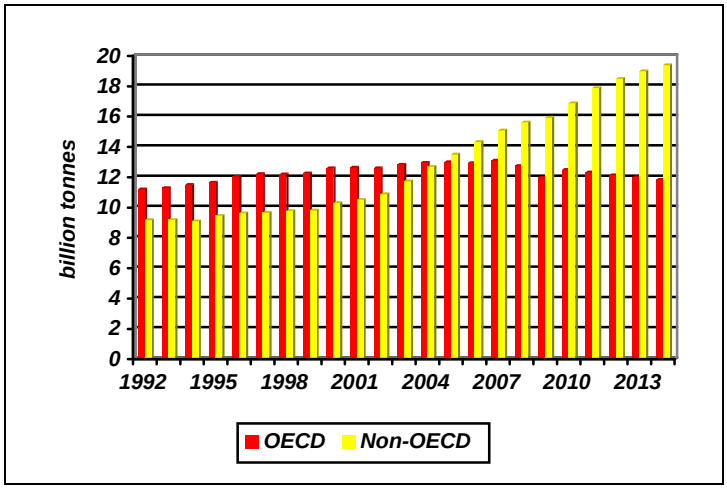

Fig. 3. CO_2 emissions from fossil fuels between 1992 and 2014
(*Source:* International Energy Agency, 2014 and 2016)

In 2016, China was the country with the highest CO_2 emissions of 10.48 billion tonnes, which means 29% of the world's total. The second place was occupied by the US with 5 billion tonnes of emissions (14% of the total), followed by India (2.5 billion tonnes), Russia (1.6 billion tonnes) and Japan (1.2 billion tonnes).

The increased CO_2 emissions of China were significant, emissions in 2016 were higher by 307% compared to 1992 (table 1), this country having a greater responsibility for global warming which could result in perspective, mainly because of higher coal consumption. Between 1990 and 2016, China has experienced a spectacular economic development, GDP (current US $) increased from USD 356 billion to USD 11199 billion (World Bank, 2018), with the average annual growth rate of around 10%. The changes in all areas of socio-economic life were significant and the demand for energy has been growing from year to year, especially in industry and transport. Thus, China has become the largest energy consumer in the world, the share of fossil fuels in total energy consumption in 2014 is 87%, 62% being represented by coal.

Between 1992 and 2012, China's coal consumption increased by almost 250% (fig. 4). It is now the largest consumer in the world with over 3.7 billion tonnes, meaning 50% of the world's total, and the largest importer (320 million tonnes). In 2013, coal consumption, which is responsible for three quarters of the carbon dioxide emissions from burning fossil fuels, increased by 3.7%. Oil consumption had a major increase as well, from 2.6 million barrels per day in 1992 to 12.3 million barrels per day in 2016 similar to the natural gases consumption (EIA, 2014, BP, 2017).

Table 1

The evolution of carbon dioxide emissions between 1992 and 2016 (*Source:* Olivier et al., 2017)

		1992 (billion tonnes CO_2)	1992 Share of total (%)	2016 (billion tonnes CO_2)	2016 Share of total (%)	Change 2016 over 1992 (%)
1.	China	2.57	11.7	10.48	29.3	307
2.	USA	4.99	22.1	5.01	14	0.4
3.	India	0.74	3.3	2.53	7	241
4.	Russia	2.16	9.6	1.66	4.6	–23
5.	Japan	1.17	5.2	1.24	3.4	5.9

China remained the world's largest energy consumer, accounting for 23% of global energy consumption and contributing 27% to global energy demand growth in 2016. Among the fossil fuels, consumption growth was led by natural gas (+7.7%) and oil (+2.7%), while coal use declined (–1.6%). All fossil fuels grew at rates below their 10-year averages (BP, 2017).

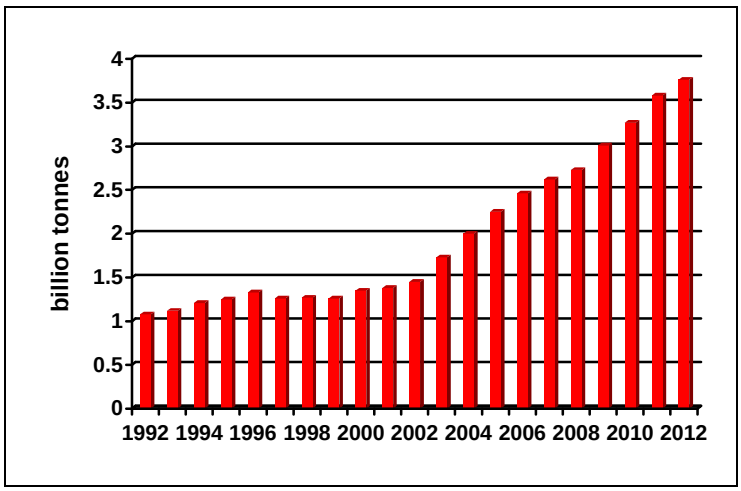

Fig. 4. The coal consumption of China in the period 1992-2012
(*Source:* US Energy Information Administration, 2014)

India is another developing country to be considered, especially because of its numerous population and socio-economic development needs. Compared with the situation in 1992, in 2016 India's CO_2 emissions were higher by 241% (table 1). In 2016, it contributed with 7% to the total CO_2 emissions, but the increases were significant, due in particular to increasing consumption of coal. India, Asia's second biggest energy consumer since 2009, had in 2015 overtaken Japan as the world's third largest oil consuming country behind the US and China.

In India, in 2013, to the total consumption of energy, fossil fuels accounted 73%, of which 44% coal. Alongside fossil fuels, 22% of consumption was made from biomass (EIA, 2014). Coal, used mostly in the production of electricity is the main source of energy, India is the third largest consumer in the world (675.3 million tonnes in 2012). In the period 1992-2016, in addition to the considerable increase of coal consumption, oil consumption had a significant increase from 1.2 million barrels per day to 4.4 million barrels per day (EIA, 2014, BP, 2017).

The European Union is the world's leader in fighting global warming. In 2009, the EU has promoted the legislative package Climate Change-Energy, establishing tools and concrete measures to reduce 20% of CO_2 emissions in the EU by 2020, and the increase in this period, up to 20% of it's renewable energy share in overall energy consumption and increase energy efficiency by 20%. The way of action of the EU, linked to emission reductions, is based on creating a market for emission allowances and relies on market pressure to implement measures to reduce emissions. In the EU, in 2016, the total CO_2 emissions were 3.43 billion tonnes (9,6% of the total), about 8% below the level from 2009.

Germany, the fourth world economic power, is the largest energy consumer in the European Union. Fossil energy still makes up more than 80% of German energy consumption. Oil is by far the biggest source of energy at more than a third, followed at some distance by natural gas at just below a quarter. Coal is the most abundant energy source in the country and represented 22,6% of primary energy consumption in 2016. Coal consumption growth increased after the Fukushima accident on March 2011, Germany using nuclear energy to replace coal in electricity production.

Generally in Germany, the coal consumption has decreased in the last quarter century, from 328.5 million tonnes in 1992 to 244.3 million tonnes in 2012 (EIA, 2014). In terms of oil consumption, it decreased to 2.8-2.9 million barrels per day in the period 1992-1998 to 2.39 million barrels per day in 2016. Reducing fossil fuel consumption in Germany was driven by massive investment in renewable energy, such as solar and wind power.

5. International efforts and results against global warming

In 1968, Carbon Cycle Group from Climate Monitoring and Diagnostics Laboratory, which is now part of NOAA's Earth System Research Laboratory (ESRL), established a global network of observation and began measurements of CO_2 in the atmosphere. Since 1989, the World Meteorological Organization (WMO) implemented the Global Atmosphere Watch program (GAW) to monitor global atmospheric environment. Currently, the GAW network is officially recognized as the main source of data on CO_2 and other greenhouse gases for the Global Climate Observing System, which conducts research and systematic observations under United Nations Framework Convention on Climate Change (UNFCCC). World Data Centre for Greenhouse Gases (WDCGG), founded in October 1990 in the Japan Meteorological Agency, under GAW, collects data about CO_2 and other greenhouse gases from measurement stations, then archives and disseminates these data. Some of the data, from 2006, is published in the Annual WMO Greenhouse Gas Bulletin. NOAA also publishes comprehensive analysis of CO_2 and other greenhouse gas emissions, using its network of observation which constitutes a major component of GAW network. The global average of CO_2 concentration calculated from WDCGG and NOAA shows a difference of 0.35 ppm in addition to NOAA, as a result of using different measuring stations (fig. 1).

A very important step in the fight against global warming was made with the adoption of the *United Nations Framework Convention on Climate Change* in 1992. This convention, which aims to stabilise concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous influence of human activities on the climate system, promoted the principle of *"common but*

differentiated responsibility" in this approach. The signatory states undertook to develop programmes to reduce greenhouse gas emissions and increase the natural absorption ability of CO_2 from the atmosphere and measures to facilitate adequate adaptation to climate change. The signatory states decided in March 1995, with the occasion of the first conference of the parties in Berlin, to negotiate a protocol containing concrete measures to reduce emissions of greenhouse gases. In this way, on 11 December 1997 the *Kyoto Protocol* was adopted, which entered into force on 16 February 2005. The Protocol was signed by 191 states and ratified already in most of them, except the US.

The Kyoto Protocol was considered one of the most important international legal instruments in the fight against climate change. According to this document, it was recognized that developed countries are primarily responsible for high levels of greenhouse gases in the atmosphere as a result of industrial activities in the past 150 years. The industrialized countries have committed to reduce total emissions of greenhouse gases responsible for global warming, by 5% in 2008-2012, compared with the level in 1990. In order to achieve this objective, several measures were proposed, including increasing energy efficiency, developing renewable energy and promoting sustainable forms of agriculture. The Kyoto Protocol also proposed specific management mechanisms for emission reductions: Joint Implementation, Clean Development Mechanism and Emission Trading.

Subsequently, at the Conferences of the Parties of the UNFCCC, other documents were adopted: The Action Plan from Bali (2007), The Copenhagen Agreement (2009), The Cancún Agreements (2010), The Platform from Durban (2011), The Doha Agreement (2012), The Warsaw International Mechanism for loss and damage (2013), but many issues remained unsolved.

The Kyoto Protocol was not a way to a global solution of climate change, since it contains only industrialized countries responsible for a portion of emissions, but it was the reason why, in December 2011 (shortly after an agreement on Climate Change was agreed at Durban), the Canadian government officially notified the UNFCCC that it exercises its legal right to withdraw from the Kyoto Protocol. According to Kyoto Protocol, Canada committed to reduce greenhouse gas emissions with 6% by 2012 compared to the level from 1990, but emissions increased during this period.

Looking forward to set a new overall agreement on the climate in the 2015 Paris Conference, an encouraging signal was received from the presidents of the US and China, Barack Obama and Xi Jinping, on reducing emissions of greenhouse gases, in November 2014, at the meeting of Asia-Pacific Economic Cooperation in Beijing. US President announced a reduction of emissions with about 26-28% by 2025 compared to 2005 levels, and reductions of 80% by 2050, while the Chinese president said that China's goal is to achieve an emissions peak carbon dioxide by around 2030, with the intent of achieving it

earlier and non-fossil energy share to increase to 20% by 2030. It is the first time that China is committed on an emissions peak, a year when the emissions will decrease (Deutsche Welle, 2014).

At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C.

6. The evolution of fossil combustibles consumption

According to the International Energy's Agency (2013) the energy request worldwide will grow with 30%, and the electricity one with 20% until 2035, especially as a result of consumption from the emergent countries, like China or India. The burning of fossil combustibles, mostly for the production of electric energy and heat, gives approximately 90% from the total amount of CO_2 emissions worldwide, exclusively the ones from wood fires and the usage of wood in the combustion (Oliver et al., 2014). In 2012, from the 31.7 billion tonnes of CO_2 emissions from fossil combustibles burning, 43.9% (13.9 billion tonnes) came from the burning of coal, 35.3% from oil burning, 20.3% from gas burning and 0.5% from other sources (IEA, 2013).

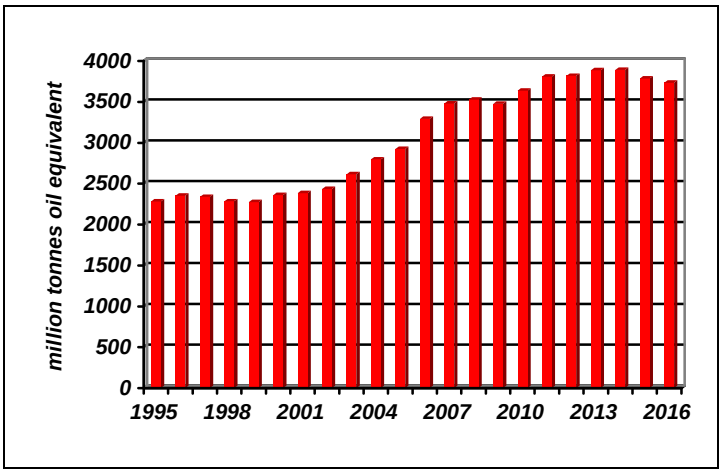

Fig. 6. Global consumption of coal between 1995 and 2016
(*Source:* BP, 2006 and 2017)

Between 1995 and 2013, it has been stated a significant growth of all fossil fuels, scoring record levels. The emergent economies ruled the global increase, ensuring the biggest part of this increase. In this interval, on the global

consumption of energy, the share of fossil fuels (coal, petrol, natural gases) reduced itself far too little 86.6% in 2013. In the same year, the global consumption of energy increased with 2.3% under the last ten years average (2.5%), with China being the biggest consumer (BP, 2014).

Between 1995 and 2013, the global consumption of coal increased notably, being in 2013 bigger with 68% comparatively with its value from 1995 (fig. 6). The states out of OECD, used 72.1% coal comparatively with 55.5% in 2003, the CO_2 emissions being also an evidence. In 2013, the consumption of coal in OECD states increased (1.4%), inclusively in US and Japan, after the reduction of 4% in 2012 (BP 2006 and 2014).

Although from 2013 the global consumption of coal decreased, between 2005 and 2015, the consumption of coal increased with 3.7%. Otherwise, China, which is the biggest worldwide producer (1685 million tonnes oil equivalent, namely 46%), consumed 50.6% from the total amount of coal worldwide (BP, 2017). For the sake of supporting the economic development, China became also the biggest coal importer. Coal is the second most important energy source, covering 30% of global primary energy consumption. Coal currently fuels 40% of the world's electricity and is forecasted to continue to supply a strategic share over the next three decades (World Energy Council, 2016).

Between 1995 and 2016, both global consumption of oil, and the consumption of natural gases had an important growth. In 2016, the oil consumption was bigger with approximately 36% and the natural gases one with 64.5% comparatively with its level from 1995 (fig. 8 and 9).

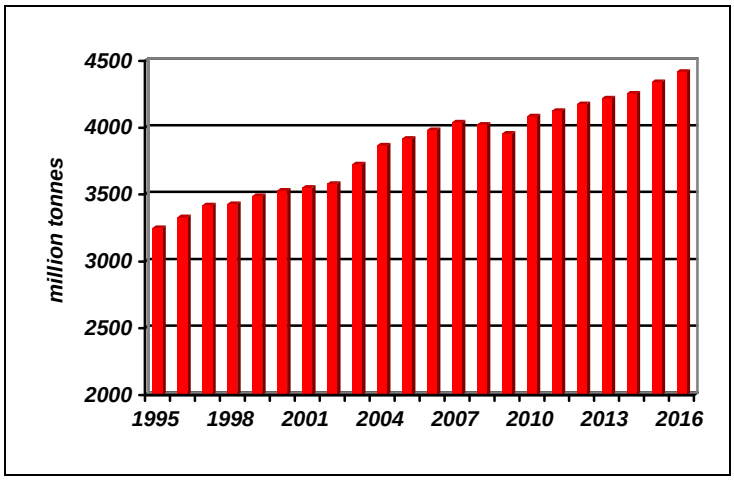

Fig. 8. Global consumption of oil between 1995 and 2016
(*Source:* BP, 2006 and 2017)

Global oil consumption increased with 1.5% in 2016, states out of OECD having a share of 52.8% from the total amount, a value superior to the one from 2003 (39.6%). China, the biggest consumer from this category, just between 2003 and 2016, had an increase of oil consumption of about 113%, from 271.7 million tonnes to 578.7 million tonnes. Significant increases were also registered by India (from 116.5 million tonnes to 212.7 million tonnes) or Brazil (from 88.7 million tonnes to 138.8 million tonnes).

The global consumption of natural gases increased in 2016 with 1.5%, under the historical average of 2.6%. States out of OECD consumed 53.6% from natural gases produced worldwide, more than in 2003 (46.3%). Regarding China, between 2003 and 2016, the consumption of natural gases increased significantly, from 33.9 billion m^3 to 210.3 billion m^3. In 2016 only, the increase scored 7.7%. Oil remains the world's dominant fuel, making up roughly a third of all energy consumed. Roughly 63% of oil consumption is from the transport sector (World Energy Council, 2016).

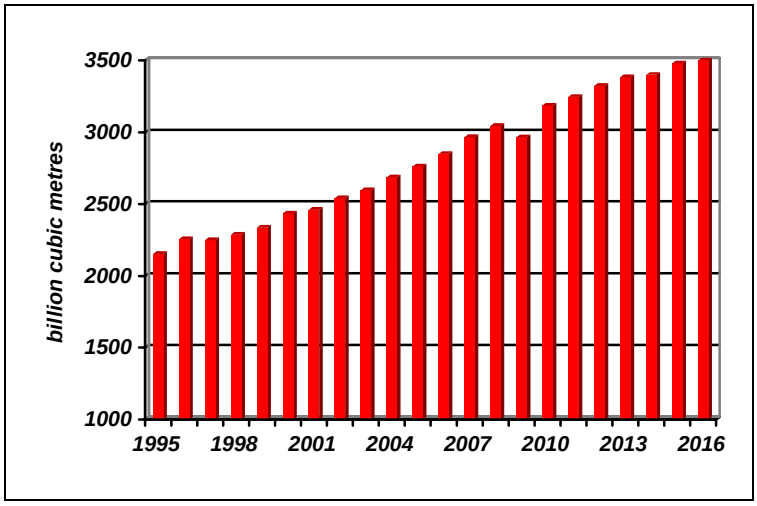

Fig. 9. Global consumption of natural gases between 1995 and 2016
(*Source:* BP, 2006 and 2017)

7. Conclusions

Although the climatic changes as a result of human activities problem was internationally acknowledged and the subscriber parts of UNFCCC made pledges to effect national programmes with precise measures in this direction, that the effects of climatic changes are already obvious and the ones advocated will have a major impact on natural and human systems, the stabilization of

global warming is not certain. Conversely, the concentration and emission of CO_2, as other greenhouse gases from the atmosphere had grown continuously after '90 (the time when UNFCCC and Kyoto Protocol were adopted), reaching today record medium values. Furthermore, neither documents, nor international conferences on climatic changes proved their efficiency and states with huge emissions of greenhouse gases didn't sign The Kyoto Protocol (US), withdrew themselves or placed the whole responsibility of this fight somewhere else (China). Last but not least, the reduction of fossil gases addiction proved itself very hard to apply. Conversely, in some of the states, like China or India, the consumption increased considerable. Thus, nowadays, a lot of questions do not get an explicit answer: will it be possible to stabilise the global warming?, will the international community succeed to adopt and implement a new protocol of fighting climatic changes?, will it be possible to have a significant reduction of fossil combustibles?, will the states in course of development, that fight the population growth and energy consumption, succeed to adopt efficient methods of cutting back the emission of greenhouse gases?

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