

# ENVIRONMENTAL IMPLICATIONS OF THE INCREASING DEMAND FOR ENERGY

**Perticaș Diana**

**Assistant, Phd. Student West University of Timisoara Faculty of Economics and Business Administration**

*During human society's development on large geographical areas, a series of cultural systems have appeared and have determined a certain approach concerning the environment and social relations. These systems of thought persist even today and they are strongly influenced by individuals' thinking and approaches in that society, thing that requires a specific approach for the implementation of these relatively new concepts (e.g. sustainable development, pollution, ecological approaches on social life). Furthermore, the continuous growth of the demand for energy in the world is seen as an alarm. Between 1970 and 1997 world energy consumption has almost doubled and it is projected to grow by about 57% during 2004-2030 and the thing which should be mentioned is that with the increasing energy demand, pollution levels will increase too. But we must not forget that electric and thermal power represent one of the basic needs of mankind, and when the fulfilment of this need started to affect the climate and implicitly human health this problem turned into a hardly manageable one. We must not forget that the world's population is growing rapidly and the level of pollution per capita increased we might even say in direct proportion. In many cases, increased pollution has its explanation in the growing number of individuals at global level and also the increasing needs, desires, aspirations, standard of living, of these.*

*This paper intends to objectively analyse the interconnections that arise between the environment and the growth of the demand for energy, emphasizing the devastating effects of pollution created by burning fossil fuels in order to obtain electric and thermal power as well as the current and future possibilities for the replacement of these energy reserves with renewable energy reserves. The whole analysis will be accompanied by case studies and will follow strictly imposed goals by sustainable development.*

*Key words: energy, environment, pollution, sustainable development, fossil fuels.*

*JEL codes: Q32, Q42, Q57*

"The control of nature" represents an expression full of arrogance born during the Neanderthal age when it was supposed that nature exists for human convenience. ". (John Barry, 2010:5) If those in the Neanderthal era believed that nature exists for human convenience, today it is clear that humans have for the first time the ability to destroy the planet as they wish: with a single action, or gradually, but is the first generation that can not consider nature as something given for free, which exists for its mere convenience and that will be in the same way forever. So therefore, the environment has become a topic increasingly debated in time, occupying a central place in the social theories and political practices.

Starting from the question "what is the connection between social theories and political practices", John Barry first defines environment as the place where he will age, where his children and grandchildren will be born and raised. He continues then the analysis of the medium in different stages: during his childhood, adolescence, the present and ending with an exercise of imagination on what his grandchildren and the generations to come will see.

Electric and thermal power represent one of the basic needs of mankind, and when the fulfilment of this need started to affect the climate and implicitly human health this problem turned into a hardly manageable one.

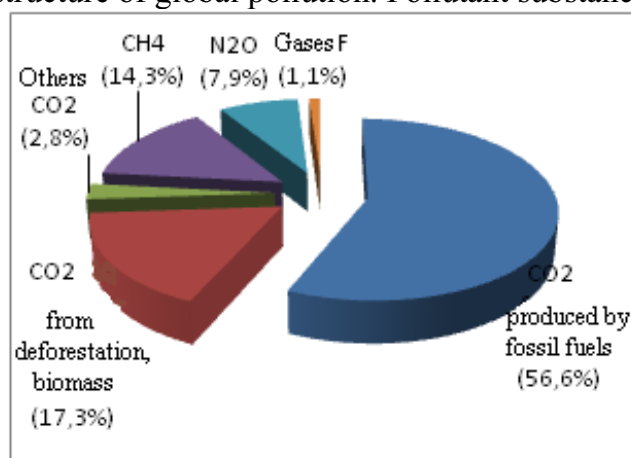
The continuous growth of the demand for energy in the world is seen as an alarm. Between 1970 and 1997 world energy consumption has almost doubled and it is projected to grow by about 57% during 2004-2030. The total worldwide energy consumption is projected to increase from 447 quadrillion Btu thermal units in 2004 to 702 quadrillion Btu in 2030. In less developed countries energy consumption is expected to grow three times, as fast as in OECD countries. Together with the increase of the consumption of energy pollution will increase too. United States for example, use approximately a quarter of the energy produced worldwide. (Hill K. Marquise, 2010:80)

An interesting thing to note is that about half of world's population does not purchase fossil fuels, or even if they do, the sums they are spending in this respect are very small, because poor people are part of "those who do not contributed to fossil fuel pollution", they use wood in the same manner as their ancestors, using it both for cooking and to provide light and heat. Even today over 60% of consumed wood in the world is used as fuel.

In China, people burn coal to ensure thermal and energetic comfort, but the quality of it is often poor and as consequence it is responsible for much of the recorded human poisonings and environmental diseases. In addition, mining and recovery operations and / or burning oil can have a disastrous impact on the local environment polluting it very much.

Coal is responsible for producing half of the required energy in the United States of America. In Europe, its large scale use began in the seventeenth century, when wood became less and less available. Coal use increased almost 500 times per year in the strongly industrialized Western economies. But the biggest problem encountered in using / burning of coal is that like most products it does not take into account the impact it has on the environment. In addition, due to the fact that coal is part of the exhaustible resources, and they will be exhausted in the not too distant future, under the action of the laws of supply and demand, its price is constantly rising. (Hill K. Marquez 2010:80)

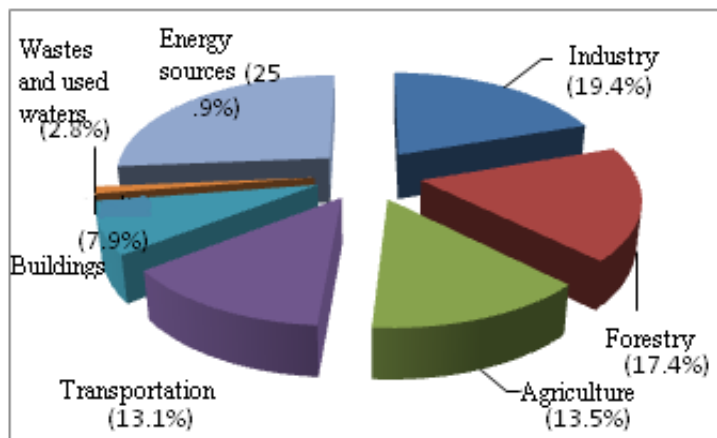
Figure no. 1 - The structure of global pollution. Pollutant substances and their weight



Source: Hill K. Marquez, *Understanding Environmental Pollution*, Third Edition, Published in the United States of America by Cambridge University Press, New York, 2010, pg 204

Increasing energy demand seems to be endless. For the first time in decades, energy demand has fallen, but as expected not by much, due to the recession of world economy. After the industrial revolution began, cities without precise limits started to emerge, cities with developed industrial areas in the suburbs and with a continuously growing population. Cities always adapt in order to cope with supply problems of the population (in those places self-consumption is fairly low) and industry, waste and industrial disposal, transportation, insuring of both electrical and thermal energy and thus start to appear more severe pollution problems.

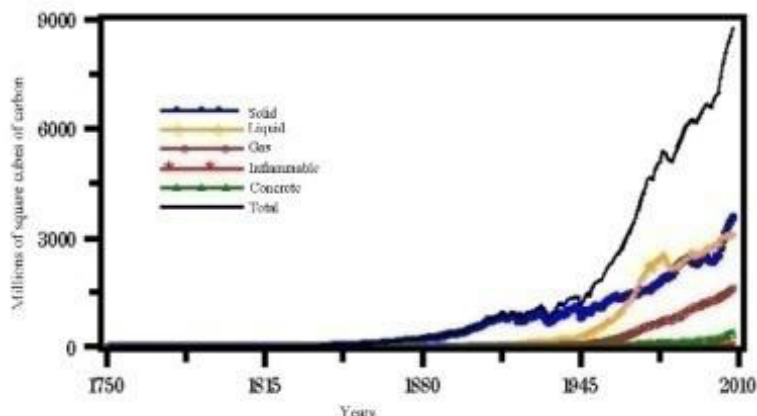
Figure no. 2. - The percentage of global emissions in various domains



Source: Hill K. Marquez, *Understanding the Environment Pollution, Third Edition*, Published in the United States of America by Cambridge University Press, New York, 2010, pg 205

The registration in the WHO Charter of such a goal is not a casual matter. Elementary logic leads anyone to conclude that between the economic development and environmental conditions on one hand, and human health, on the other hand, there is a strong interdependence relationship. An important aspect for our theme is for the economic development to be social and to positively influence the environment, and in this way, to provide support to human health. (Pohoata Ion, 2008:45)

Figure no. 3. - Carbon emission trends between 1750 and 2010



Source: *Carbon Dioxide Information Analyses Center*, available online at: <http://cdiac.ornl.gov/trends/emis/glo.html> accessed on 29.10.2011

As it can be observed from the presented graphic, the level of pollution rose constantly from 1880 to 2010. And during 1750-1880 pollution levels have had an upward trend but a smaller one than that corresponding to the last 50 years.

Even if world population is increasing continuously, we might even say that the level of pollution per capita increased in direct proportion with it. In many cases, increased pollution has its explanation in the growing number of individuals at global level and also the increasing needs, desires, aspirations, standard of living, of these.

Table no. 1. – The analysis of the carbon dioxide (CO<sub>2</sub>) concentration between 1751 and 2008

| Year | Total | Gas  | Liquids | Solids | Production of cement | Inflammable gas | / Capita |
|------|-------|------|---------|--------|----------------------|-----------------|----------|
| 1751 | 3     | 0    | 0       | 3      | 0                    | 0               |          |
| 1771 | 4     | 0    | 0       | 4      | 0                    | 0               |          |
| 1870 | 147   | 0    | 1       | 146    | 0                    | 0               |          |
| 1886 | 281   | 2    | 5       | 275    | 0                    | 0               |          |
| 1928 | 1065  | 23   | 143     | 890    | 10                   | 0               |          |
| 1951 | 1767  | 115  | 479     | 1129   | 20                   | 24              | 0.69     |
| 2000 | 6750  | 1288 | 2818    | 2370   | 226                  | 48              | 1.1      |
| 2001 | 6916  | 1311 | 2827    | 2494   | 237                  | 46              | 1.12     |
| 2004 | 7782  | 1431 | 3027    | 2971   | 298                  | 55              | 1.21     |
| 2005 | 8086  | 1473 | 3071    | 3162   | 320                  | 61              | 1.24     |
| 2006 | 8350  | 1519 | 3080    | 3333   | 355                  | 62              | 1.27     |
| 2007 | 8543  | 1551 | 3074    | 3468   | 382                  | 68              | 1.28     |
| 2008 | 8749  | 1616 | 3095    | 3578   | 386                  | 73              | 1.3      |

\* (All data are expressed in million metric tonnes of carbon. In order to convert them in tonnes of carbon dioxide you should be multiplied by 3.667)

Source: *Carbon Dioxide Information Analyses Center*, available online at: [http://cdiac.ornl.gov/ftp/ndp030/global.1751\\_2008.ems](http://cdiac.ornl.gov/ftp/ndp030/global.1751_2008.ems) accessed on 29.10.2011.

Before 1950 the calculation per capita of pollution could not be performed due to lack of information. Since 1751 approximately 347 million tonnes of carbon were released into the atmosphere from fossil fuels and cement. Half of these emissions were produced by mid 1970s and in 2008 emissions from burning fossil fuels were of about 8.749 billion metric tonnes of carbon, with 2.7% more than the amount released in 2007. (*Carbon Dioxide Information Analyses Center*)

Another effect of global warming is the increasing ocean temperatures. Described climate models indicate the fact that these will warm before the atmosphere. Previously there have been few measurements of the water temperature evolution of the oceans but the information provided by oceanographers found an increase in average temperature of the water in the Pacific, Atlantic and Indian Ocean both to north and south in the period 1955-1995 by 0.6 °C between the surface of the ocean and the depth of 1.86 miles (3000 meters). This difference seems to be small, but given the fact that the oceans play an important role in capturing sunlight, we can deduce that an increase in ocean water temperature would lead to a less solar radiation capture. (Marquise K. Hill, 2010:188)

In the American state of Alaska, the average temperature increased by 3 °C over the past 30 years, this increase being four times higher than the global average. This fact led to the melting of icebergs in the area much faster than was anticipated in previous years. The research team consisting of experts, professors and researchers from the University of Alaska conducted a series of measurements. Their conclusion was that the melting of the icebergs is faster than ever in that area in comparison to anyplace else, and thus contributing with at least 9% to the increase of Bering Sea level analysed in the twentieth century. (Marquise K. Hill, 2010:196)

The rapid increase of the temperature in Antarctica has affected human and animal life of the region. For example, the number of polar bears has dropped dramatically. That is the reason why

in May 2008, United States of America have taken the decision to protect polar bears under the "Endangered Species Act".

Measurements in respect to icebergs' melting began 30 years ago achieved by satellite. Since then, the arctic region has lost more than 20% of the ice. The loss rate began to accelerate in 2002 to the extent that, in the summer of 2007, the Canadian Northwest Passage became fully navigable. In the situation in which the annual growth rate of icebergs' melting continues to increase, studies show that the Antarctica by the summer of 2030 will be completely free of ice.

But not only the icebergs in Antarctica began to melt but those on mountain peaks too. For example, Kalis Peru Quori glacier in Peru decreased 33 times faster between 1998 and 2000 than it did between 1963 and 1978. In Nepal and Bhutan many lakes around glaciers are dangerously full. If they continue to rise they will flood nearby valleys causing much destruction especially among people living nearby.

Another worrying phenomenon is the rising sea levels. This accelerated growth rate caused the raising of the level of these by 20 inches in the last 100 years. The measurements made by the satellite called "Jason" especially built for this purpose, highlighted some of the negative consequences of this phenomenon. The biggest concern is in Bangladesh where a billion people could become homeless if the sea level would rise one meter. (Marquise K. Hill, 2010:196)

In regards to Romania's situation on the generation of wastes resulted from economic activity in 2008, this is the first among EU countries in this respect. In 2008 it produced an amount equal to 17031486 tonnes of waste arising largely from agriculture and deforestation. Whether this amount would be used as biomass, Romania's indicators such as: economic growth, dependence on imported energy, deforestation, and energy intensity would certainly achieve many more favourable results.

In a similar situation but not so disastrous is Spain which in 2008 produced an amount from economic activities of 11322154 tonnes of wastes, with almost 6 million tonnes less than Romania, given that this country is part of developed ones.

Table no. 2. Emissions of air pollutants per capita, kg, 2009.png

| Pollutant emissions per capita (kg) |            |                |             |                 |             |                 |             |
|-------------------------------------|------------|----------------|-------------|-----------------|-------------|-----------------|-------------|
| NH <sub>3</sub>                     |            | NMVOC          |             | NO <sub>x</sub> |             | SO <sub>x</sub> |             |
| Ireland                             | 24.2       | Estonia        | 27.1        | Luxembourg      | 38.5        | Bulgaria        | 86.5        |
| Denmark                             | 13.9       | Latvia         | 26.8        | Greece          | 38.3        | Estonia         | 40.9        |
| France                              | 11.6       | Finland        | 20.9        | Finland         | 28.7        | Greece          | 37.9        |
| Luxembourg                          | 9.0        | Lithuania      | 20.9        | Cyprus          | 24.4        | Poland          | 22.6        |
| <b>Romania</b>                      | <b>8.7</b> | <b>Romania</b> | <b>20.1</b> | Czech Rep.      | 24.0        | Cyprus          | 21.5        |
| Slovenia                            | 8.7        | Sweden         | 19.4        | Denmark         | 23.9        | <b>Romania</b>  | <b>21.4</b> |
| Lithuania                           | 8.5        | Bulgaria       | 19.3        | Spain           | 23.0        | Malta           | 18.0        |
| Spain                               | 7.8        | Greece         | 18.8        | Portugal        | 22.5        | Czech Rep.      | 16.6        |
| Netherlands                         | 7.6        | Italy          | 18.4        | Austria         | 22.4        | Slovakia        | 11.8        |
| Austria                             | 7.6        | Denmark        | 17.3        | Slovenia        | 22.2        | Finland         | 11.1        |
| <b>EU-27</b>                        | <b>7.6</b> | Portugal       | 16.9        | Bulgaria        | 21.7        | Lithuania       | 10.8        |
| Estonia                             | 7.3        | Poland         | 16.1        | Estonia         | 21.6        | <b>EU-27</b>    | <b>10.0</b> |
| Latvia                              | 7.3        | Germany        | 15.7        | Poland          | 21.5        | Spain           | 9.4         |
| Germany                             | 7.3        | <b>EU-27</b>   | <b>15.5</b> | Ireland         | 20.3        | Hungary         | 7.9         |
| Poland                              | 7.3        | Slovenia       | 15.3        | Belgium         | 19.8        | Ireland         | 7.3         |
| Czech Rep.                          | 7.0        | Spain          | 15.2        | Malta           | 19.6        | Portugal        | 7.2         |
| Finland                             | 6.9        | Austria        | 14.7        | Lithuania       | 19.4        | Belgium         | 7.1         |
| Hungary                             | 6.8        | Czech Rep.     | 14.4        | <b>EU-27</b>    | <b>18.8</b> | Great Britain   | 6.5         |
| Bulgaria                            | 6.7        | Cyprus         | 13.9        | Great Britain   | 17.6        | Luxembourg      | 6.3         |
| Cyprus                              | 6.5        | France         | 13.6        | France          | 17.3        | Slovenia        | 5.7         |
| Italy                               | 6.5        | Great Britain  | 13.4        | Netherlands     | 16.7        | Germany         | 5.5         |
| Belgium                             | 6.2        | Hungary        | 12.8        | Germany         | 16.7        | France          | 4.7         |
| Greece                              | 5.6        | Slovakia       | 12.1        | Hungary         | 16.6        | Italy           | 3.8         |
| Sweden                              | 5.2        | Ireland        | 11.7        | Italy           | 16.3        | Sweden          | 3.2         |
| Great Britain                       | 4.7        | Belgium        | 10.1        | Sweden          | 16.1        | Denmark         | 2.7         |
| Slovakia                            | 4.6        | Luxemburg      | 9.5         | Slovakia        | 15.8        | Austria         | 2.5         |
| Portugal                            | 4.5        | Netherlands    | 9.3         | Latvia          | 12.6        | Netherlands     | 2.3         |

|       |     |       |     |                |             |        |     |
|-------|-----|-------|-----|----------------|-------------|--------|-----|
| Malta | 3.7 | Malta | 5.4 | <b>Romania</b> | <b>11.5</b> | Latvia | 1.8 |
|-------|-----|-------|-----|----------------|-------------|--------|-----|

Source: Eurostat, available online at: [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php?title=File:Emissions of air pollutants per capita\\_kg\\_2009.png&filetimestamp=20111004100800](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Emissions_of_air_pollutants_per_capita_kg_2009.png&filetimestamp=20111004100800) on 21.10.2011

The above table represents a ranking made in 2009 in respect to the emissions of air pollutants calculated per capita of EU countries and the EU27 average. We can note with displeasure that Romania, in three out of four categories is in the top of the countries that are heavily polluted. For example, in terms of air pollution with ammonia (NH<sub>3</sub>) Romania ranks 5 among EU countries, with a value of 8.7 kg per capita compared with 7.6 as is the average EU-27 so it exceeds the average by more than 14 %. We have to mention that ammonia according to the Explanatory Dictionary of the Romanian Language is "a colourless gas with a pungent odour, stifling, obtained from combining hydrogen with nitrogen, and it is used in the manufacture of nitric acid, nitrogen fertilizers, of explosives etc." (the Explanatory Dictionary of the Romanian Language)

Current perspectives of environmental development whether it is maintained or increased the rate of current pollution are unimaginable. In order to flatten the ascending curve of the environmental destruction, currently it is resorted to a range of measures including the analysis in this paper is the reduction of fossil fuels to provide the required heat and electricity. If in the 1970s for mankind was questioned the replacement of fossil fuels for reasons related to depletion of these energy resources at present the situation is far more serious with a focus on reducing fossil fuels consumption for survival reasons. As an alternative would be to use nuclear energy but that has several disadvantages and more dangerous implications than current fuels.

From the environmental development current point of view the emphasis is put on the large scale use of renewable energy that has a low rate of pollution and restoration of large flora on the vast regions.

With all the energy resources disadvantages respectively geographical areas, season, ore, etc..., there can be addressed a global vision of a world energy system (solar panels in desert areas, hydro plants on major water courses, wind fields in areas with potential, geothermal plants in areas with considerable ores and the widespread use of heat pumps in order to capture and use of geothermal energy - geothermal energy that is stored by earth's crust as a follow up of the solar energy activity on the crust).

## References

1. Dobrescu Emilian (coordonator), *Energii regenerabile. Eficiența economică, socială și ecologică*, Editura Sigma 2009;
2. John Barry, *Environment and Social Theory*, published by Routledge, New York, 2010,
3. Hill K. Marquita, *Understanding Environmental Pollution, Third Edition*, Published in the United States of America by Cambridge University Press, New York, 2010;
4. Lund Henrick, *Renewable Energy System The Choice and Modeling of 100% Renewable Solutions*, Academic Press is an imprint of Elsevier, California, USA, 2010;
5. Nordhaus William, *A question of balance, weighing the option of global warming policies*, Yale University Press, 2010;
6. Pohoată Ioan, *Strategii și politici europene de dezvoltare durabilă*, disponibil on-line pe site-ul [http://www.cse.uaic.ro/fisiere/Documentare/Suporturi\\_curs/II\\_Strategii\\_si\\_politici\\_europene\\_de\\_dezvoltare\\_durabila.pdf](http://www.cse.uaic.ro/fisiere/Documentare/Suporturi_curs/II_Strategii_si_politici_europene_de_dezvoltare_durabila.pdf) accesat în data de 20.02.2011;
7. Carbon Dioxid Information Analyses Center, disponibil on-line pe site-ul <http://cdiac.ornl.gov/trends/emis/glo.html> accesat în data de 29.10.2011;

7.Eurostat, disponibil on-line pe site-ul  
<http://epp.eurostat.ec.europa.eu/tgm/graph.do?tab=graph&plugin=1&pcode=ten00107&language=en&toolbox=type>, accesat în data de 21.11.2011.