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Climate Changes- Challenge, But Also an Obligation for the Education

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Abstract

Is there a law on environment? Why hasn't this term been precisely defined yet? why is there no harmonized meaning neither in the general, nor in the language of law? Without any doubt, our environment is composed at least from earth, water and air. It is surrounded by living organisms comprising the flora and fauna. Therefore, the definition rises from the human demands and it is in this sense that we ask a few questions. Do men create the environment of national parks? Does cities and villages with their streets and buildings represent environment? What is the case with the very distant environments? Should the term environment be restricted only to planet earth?

The pollution and the soil and atmosphere degradation is dangerous for two reasons; the great speed in the case of disasters and the volume of pollution have global consequences.

The field of international law on environment comprises of three main topics are: air pollution, reduction of the ozone layer and climate changes.

While the politicians and economists are debating, the scientists are unanimous in how to stop the climate changes, because the warming of the planet must be stopped.

The main goal of the authors of this paper is how to create educational institutions that will generate experts in order to prevent: the planet earth to remain without the climate zones till 2100; to become a planet of hot poles; the plants and animals, and even humans to become endangered and extinct, enlarging of the tropical and subtropical zones by high temperatures; the developed countries of becoming the biggest polluters and the increase of CO2 emission in the air; China and India, as new development poles, to ask for permit to pollute the earth in the same amount as the USA and Europe without a drawback for the percent of poverty.

The authors seek for answers to these questions in the insufficient cooperation between the society and the higher education institutions. How can education make the entry in the economy, in the praxis, easier; can the severe reality of the praxis, of the economy of degradations and the earth pollution enrich the research knowledge? The economic, legal, ecological, as well as engineering and scientific workers cannot allow themselves to disregard the application of their work, according to their tasks in the industry and society. In addition, the other way around, the companies must integrate the new research findings in their work programs. Only those that increase their know-how remain constantly powerful in making decisions and implementing specific concepts.

The modern professor in the higher education must be familiar with the praxis, as user of the economy impulses.

The consciousness toward this mutual usefulness creates a need for securing constant growth, which in turn reveals the needs of today and gives the future generations a possibility to realize their goals and it should be a foundation for the Alliance of Central and Eastern European Universities, which will enable future staff that with their knowledge will create an economy that will not pollute and degrade the planet earth.

Keywords: climate changes, climate zones, developed countries, environment, global consequences, higher education, institutions, pollution.

JEL Classification: I15, I25, Q53, Q54.



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1. Introduction

Bargaining with the planet earth and not facing the changes and the sustainability of the economic development are unfortunately constantly present and a lesson yet not learned from the catastrophes in Ukraine, Japan, Russia, USA and other countries, which we persistently ignore at our own risk, at the risk of the humanity. When it comes to the planet earth, there is serious risk that is almost certain, the global warming and the climate changes. However, if there were other planets where we could move, but at what price, in the case of almost certain outcome predicted by the science that could confirm that kind of risk is worth taking. Are there such in the scientific world and could we think in that direction. Expanses for reducing the emissions are small in comparison to the possible risks that the world is facing. Are there inter-organizational relations in the organizational ecosystems, where are the competitors, are there changes in the management, is there an inter-organizational change in all this. How big is the dependency of assets, how is the resource strategy enforced, what is the strategy of power. Are there networks for collaboration, why collaboration, is there a chance to become partners instead of opponents? Is there ecology of population; are there organizational forms, processes of environmental changes, survival strategies? Is institutionalism necessary, are there institutional opinions, is there an institutional design and are there institutional systems?

2. Climate changes, global warming

The climate in the world has changed very little until the appearance of the industrial revolution. The temperature was stable in the XIX century; it increased a little in the XX century, with a small decrease in the 1950-1970s and then it starts rising again. Over the last 100 years the increase has been around $0.6^{\circ} C^1$. But what is the reason for panic? Not the increase itself, but the reasons for the increase in the temperature.

When the solar energy comes to the Earth, most of it returns back to the space. But, the carbon dioxide and 30 other greenhouse gases, such as methane, enable the creation of shell around the Earth, which “traps” part of the solar energy and with that it heats the Earth. Furthermore, because of the combustion of natural fuels, the level of carbon dioxide in the atmosphere has raised from 280 parts of the million in the time of industrialization, to 380 parts of the million today. With the current rate of increase of the level of carbon dioxide in the atmosphere until the end of this century it will reach 800 parts of the million¹. If the concentration of carbon dioxide reaches very high levels, the result would be a total change in the temperatures of air- global warming- change of the natural laws of climate.

¹ The Economist, THE HEAT IS ON, A Survey on Climate Change, September 2006, pg. 3



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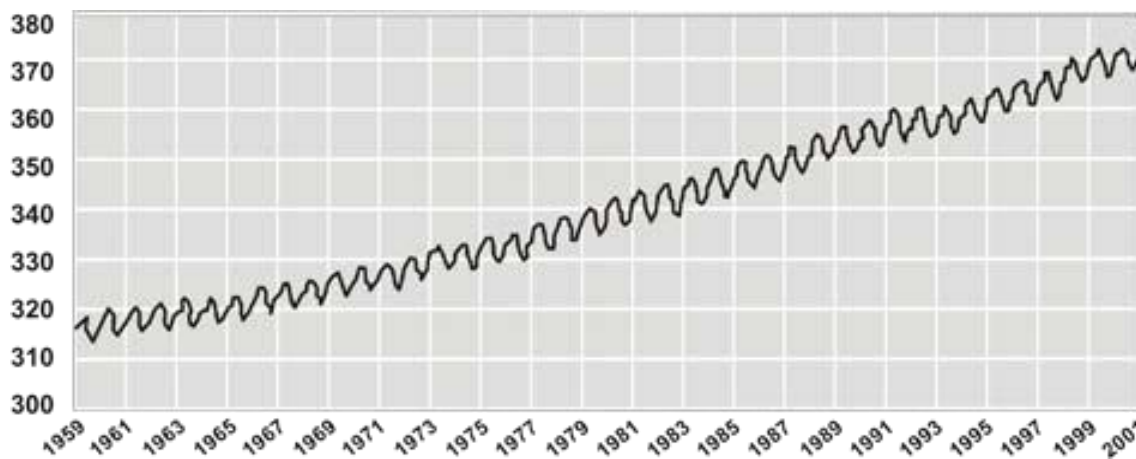
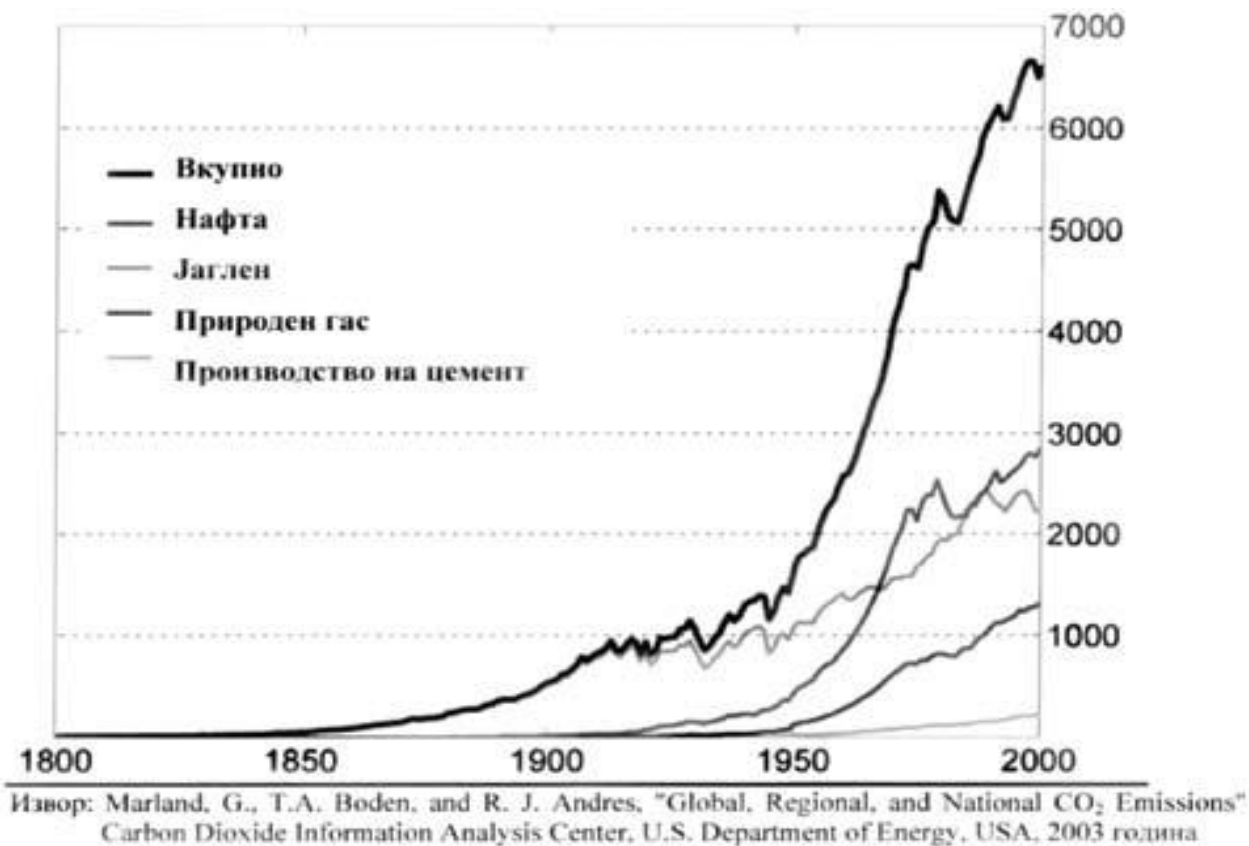


Fig. 1: The presence of carbon dioxide in the air, part of million (Source: *Caring for Climate, A guide to the Climate Change Convention and the Kyoto Protocol. UNFCCC, Bonn, 2005, pg. 2*)



Извор: Marland, G., T.A. Boden, and R. J. Andres, "Global, Regional, and National CO₂ Emissions" Carbon Dioxide Information Analysis Center, U.S. Department of Energy, USA, 2003 година

Fig. 2: Global emission of carbon dioxide per year in tones



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Table 1: Examples of climate changes and their influences

Expected changes	Expected influences
Higher maxim. temperatures, more warm days and heat waves through the whole planet	+Cases of death and serious illnesses in the case of adults and homeless
	+Risk of drought
	+The need for electric cooling
Prognoses:	
Most likely higher min. temperatures, more warm days and heat waves through the whole planet	+Confidence in the offer of electricity
	-Mortality connected with cold
	- Risk of crops damage
Prognoses:	
Most likely increased number of summer days in continental areas of the middle geodetic latitude and supporting risk of drought.	- Demand for heat energy
	+Damage on the construction fundaments because of accumulation of soil
	+ Risk of wildfire
Prognoses:	
Probably Increased intensity of the tropical cyclone winds	- Quality and the amount of water sources
	+Risks for the human lives, risks of epidemics of cyclone winds infective diseases
	+Erosion of the coastline
Prognosis:	
Probably, in some regions increased variability of the summer monsoon rains in Asia	+ Damage on the coastal ecosystems
	+The range of floods and droughts in Asia



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Prognosis:	
Probably, in some regions increased variability of the summer monsoon rains in Asia	+ Damage on the coastal ecosystems
	+The range of floods and droughts in Asia
Prognosis:	
Probably heavier rains	+ Floods, landslides, and damages from avalanches
Prognosis:	
Most likely, for many regions increased intensity in of storms in areas of middle geodetic latitude	+ Erosion of soil
	+Risks for the human lives and health
	+ Lost of property and infrastructure
Prognosis : Probably	+Damage on the coastal ecosystems

Symbols: + Increasing, -Decreasing, Source: Caring for Climate, A guide to the Climate Change Convention and the Kyoto Protocol, UNFCCC, Bonn, 2005, pg. 1

The scientists are warning about the environmental catastrophe on Earth, the world pays very little attention to these problems and the interactions between them and the social and economic systems, which could pose the biggest problems and surprises in the future. The economist, on the other hand, find it very difficult to predict how much carbon dioxide will be emitted in the world (which, on the other hand, depends on whether the governments shall pay any attention to the warnings from the scientists), how fast will the temperatures grow as a result of the increased concentrations of the carbon dioxide, what effect will the climate changes have on the economies (which depends on how fast and good will people adapt to them) etc.

Still, the effects of climate changes will not be considered bad everywhere. A few degrees higher temperature will not harm Northern Europe. Russia could benefit from a little warming: big parts of the state which are now unpopulated, can become comfortable enough for living. Around 25% of the undiscovered oil and gas reserves in the world, for which it is thought that they are in the Arctic, many of them in Russia will be easier to exploit. However, the whole world will lose, because Africa and India will decrease the rate of the global GDP. Africa and India, contrary to the rest of the world, are mostly dependent on agriculture, and this is more vulnerable by the climate changes, then the investment banking or production of cars.



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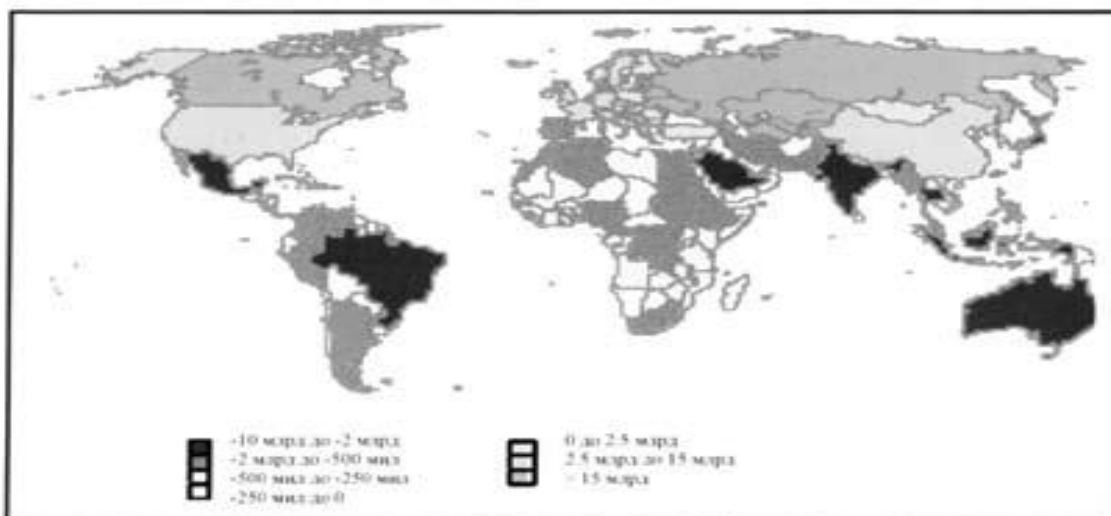
Слика 1: Влијанието на климатските промени врз земјите во светот изразено во проценти БДП (предвидување за 2010 година)



Извор: Robert Mendelsohn, "Dynamic Forecasts of the Sectoral Impacts of Climate Change", Yale University, 2004 година

Fig. 3: Dynamic Forecast of the Sectoral Impacts of Climate Change, Yale University, 2004

Слика 2: Влијанието на климатските промени врз земјите во светот изразено во САД долари (предвидување за покачување на температурите за 2°C во 2060 година)



Извор: Robert Mendelsohn, Country-Specific Market Impacts of Climate Change, Yale University, стр. 16

Fig. 4: Country Specific Market Impacts of Climate Change, Yale University



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3. The frame convention of the United Nations for climate changes and the Kyoto Protocol

The frame convention of the United Nations for climate changes since 1992 is just one of the agreements signed in recent times, and through which the countries in the world are joined in order to face this problem. This convention divides the countries in the world in three different groups with different responsibilities:

1. Industrialized countries, which in 1992 were members of the OECD plus the countries in transition from Central and Eastern Europe, including the Russian Federation and the Baltic states. Their responsibility is to adopt the measures and policies for climate changes, with the purpose of reducing their greenhouse gas emissions to the level of 1990 until 2002;

2. Member states of OECD, without the countries in transition (states from the former Soviet Union and Central and Eastern Europe). These countries should provide financial means that would help the developing countries to engage in activities according to the Convention and to help them in adjusting to the unpleasant impacts of the climate change; and

3. Developing countries, especially vulnerable to unpleasant impacts in the climate changes and which need the help in handling the climate changes². The Kyoto Protocol of 1997 supplements and strengthens the Convention by providing a frame for corrective and preventive measures for measures for fighting the unpleasant effects of the climate change. The protocol is focused on gases:

- Obligations, including the legally binding goals for the emissions;
- Implementation, including the state undertakings and the three mechanisms for implementation:
 - Exchange of emission between governments,
 - Mechanisms for clean development,
 - Joint implementation,
 - Minimizing the influence in the developing countries, including the utilization of the Fund for Adapting; Accounting and reporting; Fulfillment, including the Committee for assessment fulfillment and management of problems³.

The Kyoto Protocol also predicts possibilities for “trading” with greenhouse gas emissions. Trading with emissions of greenhouse gases is similar to most of the markets, where sellers and buyers meet. The buyers (countries from the first group, who find it hard to reduce the emissions) give offers for buying reductions or reduction options. The sellers (the countries from the first group, for which is easier to reduce the emissions) give an offer for selling of the reductions or reduction options. The buyers of emission reductions actually invest in the existing or proposed projects and business, for which expected to result in emission reduction.

² Caring for Climate, A guide to the Climate Change Convention and the Kyoto Protocol, UNFCCC, Bonn, 2005, pg. 9

³ Caring for Climate, A guide to the Climate Change Convention and the Kyoto Protocol. UNFCCC. Bonn. 2005 година, стр. 24



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This document⁴ was signed by 141 countries in the world, but is still not ratified, nor respected by the biggest “polluters”, among which: USA, Australia, Canada etc. USA as a military and economically most powerful country, that is the biggest advocate for globalization, hasn’t signed the Protocol, but is emitting around 1/3 of the greenhouse gases in the world.

4. Recommendations for the reduction of greenhouse gases emission

In the future it will be necessary a mechanism to be created that would stop countries such as USA or any other state, which refuses to implement the emission reductions and inflicts damage on others. The Maldives in 50 years will become Atlantis of the XXI century by disappearing under the ocean, the same will happen to one third of Bangladesh etc.

At the beginning the President Bush denied the existence of global warming. Some American politicians thought that the reduction of emissions will compromise the American standard of living, but the American emissions, a dollar per GDP, are twice as high as those of Japan. USA can allow itself to save more energy; it can even increase its energetic security. That will be good for their environment, as well as for the economy. Still, this would probably not be good for the oil companies, which have had a great prosperity with their administration⁵.

Likely, the frame for international trade was established which can be used to force the countries that are causing damages to other countries to behave better. The nonpayment of the costs of the damage on the environment is a subsidy, the same as the nonpayment of the workers’ loans. In most developed countries in the world today the companies pay for the costs of global environment pollution in the form of taxes on coal, oil and gas. Still, the American companies are subsidized, i.e. they don’t pay the total costs for production.

There is a simple cure: other countries should forbid the import of American goods produced with energy intensive technologies or at least to introduce high taxes for them, in order to reduce the subsidy they receive for them. Actually, the USA also acknowledges this principle. They prohibited the import of crabs from Thailand that were hunted with meshes for turtles that contribute to the unnecessary death of these endangered species. If the prohibition of the import of crabs in order to save the turtles is justified, then we should certainly justify the limitation of import of goods produced with technologies, which unnecessary pollute our atmosphere, in order to protect the priceless global atmosphere from which we all depend. Japan, EU and the rest of the signatories of the Kyoto Protocol should act immediately for the inadequate subsidies, for which the Busch administration and the oil companies would be worried. But, we must emphasize the obvious: the American companies have an unfair advantage, because of their cheap energy and while they receive the benefit, the world is paying the price of global warming.

⁴ www.ieta.org. International Emissions Trading Association, 2006 година

⁵ Joseph E. Stiglitz, A New Agenda for Global Warming, Economists’ Voice, The Berkeley Electronic Press, 2006, pg. 1



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The introduction of taxes on energy will bring the balance and at the same time will motivate USA to behave better⁶.

In some way the USA should salute the initiative, because they complained for a long time that the Kyoto Protocol does not have obligatory mechanism. They claimed that if they signed the Protocol, they will be obliged to the responsibilities, but the other countries (that have no knowledge, nor the technology for the reduction of emissions) will not respect it, which will put the USA in an unfair position. By establishing a strong mechanism for sanctions, all will be certain that finally in the world there is a flat “field for play”.

Table 2: The costs for the substitution of foreign technologies, with the purpose of reducing the emissions

New technology	Old technology	Cost/el. measure	The cost of the old technology	The cost for substitution	
				Short term	Long term
Nuclear energy	Gas power plant	USA cents/ kWh	3.5-4	6	5
Wind	Gas power plant	USA cents/ kWh	3.5-4	5	6
Solar energy	Electricity network	USA cents/ kWh	10	15	8
Bio-fuels	Petro	USA cents/ kWh	12	15	15

The table shows that the substitution of the old technologies for energy production is expensive and long process, which is the second problem of the Kyoto Protocol: where the developing countries are also involved. Namely, the Protocol is based on reduction of national emissions equal to the 1990 level. The developing countries are asking, why is it allowed for the developed countries to pollute more today, simply because they polluted more in the past? Actually, because the developed countries have so far contributed so much, they should be forced to make greater reductions. It seems that there is no solution for this problem: USA are refusing to join in until the developing countries are not involved; the developing countries see no reason why they shouldn't pollute as much as it is allowed for USA or Europe, nor they have the means to invest in new technologies, with the purpose of reducing the emissions.

The solution is introducing a joint (global) environmental tax on the emissions. There is a special cost for the emissions, and the joint environmental tax will simply make everyone pay the social cost. The tax, for example, can be set in a way that the level of (global) reductions is the set goal of the Kyoto Protocol. As the technologies are developing, the nature of the global warming threat will become clearer, and the tax rates can vary⁷.

⁶ Joseph E. Stiglitz, A New Agenda for Global Warming. Economists' Voice. The Berkeley Electronic Press, 2006, pg. 2

⁷ Joseph E. Stiglitz. A New Agenda for Global Warming, Economists' Voice, The Berkeley Electronic Press, 2006, pg. 3
15 Agenda for Climate Action, Pew Center on Global Change. 2006



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However, the remaining recommendations for the reduction of emissions of greenhouse gases are: Investing in science and technological researches; Establishing legal limitations for the emission of greenhouse gases; Stimulation of innovations in the main economy sectors (transport, production, agriculture); Increasing of the efficiency of the energy system, exploitation of energy sources, which do not contain large amounts of carbon;

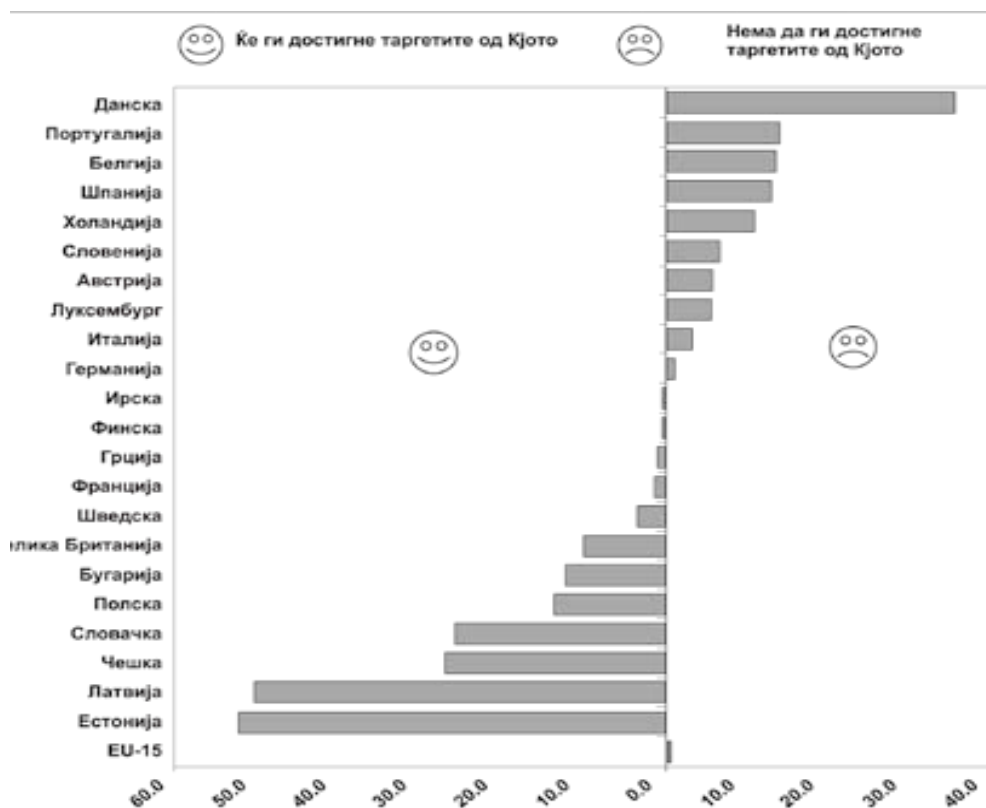


Fig. 5: The difference between planned greenhouse gas emissions and the goals of the Kyoto Protocol for 2010

The world invested a lot in the Kyoto Protocol, and the achieved success is significant. Still, no solution for the current problems is offered, and it is already time to look for alternatives. It is a matter of the wellbeing of the whole planet.



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5. Education in managing climate changes

The education about managing climate changes is same as the education about environment. Each deeper analytical question about the future shows as that only a thorough change in people's behavior toward the environment can give hope to the further progress of human society and the development of civilization⁸. In that context, including the educating about the environment, Feinstein says⁹: "We cannot solve any problem that we ourselves created". By analyzing the words of Feinstein, the creation of strategy for establishing a serious process for education of the environment, entails engagement whose basic goals would be: Educating about the environment that will last for a whole life and will be constantly upgraded; Creating a feeling of responsibility for the condition of the environment, going horizontally and vertically from the local plan and ending with the global plan; Providing to those interested a correct, full and timely information; Stimulating the principle of sustainable development; Promoting open partnership with all relevant actors, exploitation of all available resources; Investigating the most appropriate approach for educating about the environment and in the same time its change into a place of working and living.

Regarding the above stated determinations about the education, we create a feeling, securing and recognizing the problems, securing of every correct information, stimulation, promoting and researching of the most adequate approach, are all based on important programs and activities for the support of the knowledge and the skills about the protection and managing of the environment, such as: Visionary approach; Interdisciplinary approach; Problem approach; Researching approach; Activist approach; Business approach.

Each strategy for environment education entails knowledge, understanding, feelings and specific approach. That means establishing the basis for changes in the environment with personal changes of each citizen. Especially the part about quality education for the young population will influence the creation of new value systems, and thus will stimulate the shaping of attitudes that will lead to positive patterns of behavior and bringing responsible decisions. Consequently the education about environment will be more successful if it starts early in life. Considering the fact that in the realization of sustainable development problems and conflicts occur regularly is correct and then here is the author's problem, in the existence of different views on subjects with mutually interrelated interests, such as state organs, local self- government, entrepreneurs, scientists, foreign governmental organizations, schools, factories, means of public information, local population and the whole public regarding the issue of sustainable development¹⁰.

Regarding this issue we should build a relation on a positive approach, democratic dialog and open partnership, as basic prerequisites for a long-term advancement. Therefore, it is especially important and practical to build and stimulate, and in the same time expand, the mutual approach to quality information, as a unique and possible approach for implementing the sustainable development.

⁸ Muller, J. H. Methoden zur Regionalen Analyse und Prognose. Hanover, 1996.

⁹ Klepac, Ratimir. Osnove Ekologije. Zagreb: June NA, 1980.

¹⁰ UBA, Umweltbundestant, Environmental Targets in Europe Vancouver-Canda, 1996



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We can easily answer to this challenge if all citizens are capable and stimulated to cooperation in the decision making processes in all processes regarding the managing and economizing the environment. The educational public would know to ask from the state authority a real strategy for sustainable development, as the only acceptable developmental strategy which will stimulate with its financial instruments, favorable loans, appropriate policies, price policy etc¹¹. Such a development defines the ethics connected to appropriate responsibility for sustainable development in respecting the moral code of each individual, in the same time enabling the nongovernmental organizations and the open public for participation and co-acting in the making of development decisions, by building an information system for the environment, which would function as a database, all information would be able to the public and will establish a system for assessing the status of the environment, showing data of single interventions in the environment, establishes a system of standards and norms, defines the identification of situation in the environment, regularly implements recording for the situation and statistically processes the data. On the other hand, the educated citizen that comprises that public, such as the employees in the factories and the institutions, can have a quality contribution and participate in the decision making regarding the environment, inside, in their working environment. The vocational education in the field of managing climate change is very important. The area of climate change requires vocational education and qualification of the employees in fulfilling their everyday activities that the working process demands. Therefore, it is necessary that in the Republic of Macedonia a place would be opened and it would create qualified agreement in order to open a Center for education on environment protection and the process of managing climate change. The goal of opening a Center for training is the conducting of high educational process in environment protection, and with it other additional activities in managing climate change, the waste, selecting, recycling, biological decomposition, incineration etc.

The dedication of the Center, which will be aimed at environmental education, will explain and enlighten, practically and sophisticatedly, the development of the structure in environment. With this approach, we will practically start with the development of the environment structures, the climate change and the waste, as an applicable ecologically secondary raw material. This approach straightens the unpractical and substandard process of the junk collectors, traders with steel material, physical workers, and here starts the real development of this branch in the Republic of Macedonia.

The universities in the Republic of Macedonia are educating chemists and engineers in the field of environment. However, so far there was no training of technicians, ecologists, processors of waste, technicians that would manage waste and adequate experts that would be educated for BBC education environment and waste management. An adequate education for teaching, in the profile of professors is also necessary. Training of special vocational directions, such as managing waste material, water supply, protection of waters, air and soil, opens a broad space for action and gives space for hope that the training of specific vocations for the protection of the environment, demands establishing of an appropriate legal regulation, which is hesitantly introduced in the new legislative project. The gaining of knowledge in this area will open a broad space for establishing and furthering of the employees as the smallest measure of expertise in the managing of the environment.

¹¹ Kume, H. Management by Quality. Tokio, 1995.



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It is difficult to speak of appropriate expertise in the field that we are elaborating and to appropriately appoint services with appropriate expert workers, such as workers in a dumping plant or transporters of waste material, which were used to the activity without investing in the educational process. Today, the increased need for environment protection will legally demand trained and specialized workers, including academics in the field of waste. We think that the request for expertise in the work structure of every communal worker will be formed in the next period.

In the same time, the demand for establishing new techniques for handling with waste will grow with each year. The new technologies will demand specially trained workers, such as engineers, technicians, chemists, ecologists and other experts. The way of managing the new machines, such as compactors, bulldozers, transporting machines will demand electronic improvements, computer navigation, which is another problem requiring appropriate education, such as machines constructed in the sixties or the seventies of the last century, which are used the most in the Republic of Macedonia, were plainly constructed with a tank for handling waste, a pump, valve, all manual. However, today's equipment in the communal work mostly works with new technologies and computer aided systems. This kind of development is conditioned by a safety strategy and philosophy for managing the environment. The new constructions, the new computer navigation in the communal work in respect of processing and managing waste emphasize the issue about new service personnel with higher expertise. From the above stated crucial works one thing comes certain, the necessity of education in the field of managing environment.

Is handling with the amount of waste, the endangering of the environment, the unserious approach toward the issue of water, air and soil pollution an open issue because of the expert approach of the employees in this sector or the inadequate strategy for managing with the new models of living is such as a result of the unspecialized staff when it comes to this problematic where the specialized staff should show competence in solving all cases. Exactly these circumstances, together with the demand for new staff in managing the environment, make the issue of educating specialized staff even wider and full with new challenges. The employers in the public sector are expected not just to show appropriate political responsibility, but also knowledge in managing the environment. We would like to point out, for example, that even laboratory analysis published as the real picture must be read by environment experts, but also it must properly interpreted. With this type of demands we receive expert staff, which depending on the education will take the lead in the Republic of Macedonia, and which puts an accent or emphasizes the knowledge of the educational center for environment protection.

We can only assume what would the future of these environment experts look like, but it is certain that the intended future will become reality in the Republic of Macedonia. We hope for a turn in a positive direction in the field of environment, however so far only the negative activities in the field of environment protection are the ones giving an incentive, under pressure, for solving of the many problems regarding the inappropriate expert personnel in the field of environment protection. This is development that is not wished by the author, and which in the same time cannot be allowed.



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A realistic development in the communal field, additionally to the development of new technologies, buying new innovative technologies, also demands a more realistic process of educating professionals that will be capable of recognizing and applying the knowledge in techniques and global protection of the environment and in the implementation of the influences in their expert field. The producing of educated staff in the field of environment and workers' qualification for communal works represents a logical consequence of the intended development in this area in the Republic of Macedonia. With the establishing of this Center for education in environment protection we create a possibility for realistic presentation of the transparent and understandable strategies in process of managing the environment by expert staff. This gives a significant contribution to the companies and public enterprises, a possibility for mutual understanding of the environment protection, which will be achieved through quick and influential activities.

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