THE EFFECTS OF THE ENERGY TO ECOSYSTEM AND RISK MANAGEMENT SOLUTION FOR COVERING THE POTENTIAL LOSSES

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Abstract:" In this paper we analyse the influence on climate change by one of the most important factors: the energy production and consumption, who caused in the last decades important damages to the ecosystems. The available resources of energy production are quite limited, the main important ones are fossil and hydro. These two resources are limited or will be limited in the future, so the ecological production must be focused on wind and solar resources. Another aspect debated in this paper refers to the risk management process for the most used energy prducers – hydro power plants. The risk management process is a must and include risk controlling ant the financing process for the risks that can not be eliminated."

Keywords: energy, climate change, risk management, catastrophe, insurance

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1. Introduction

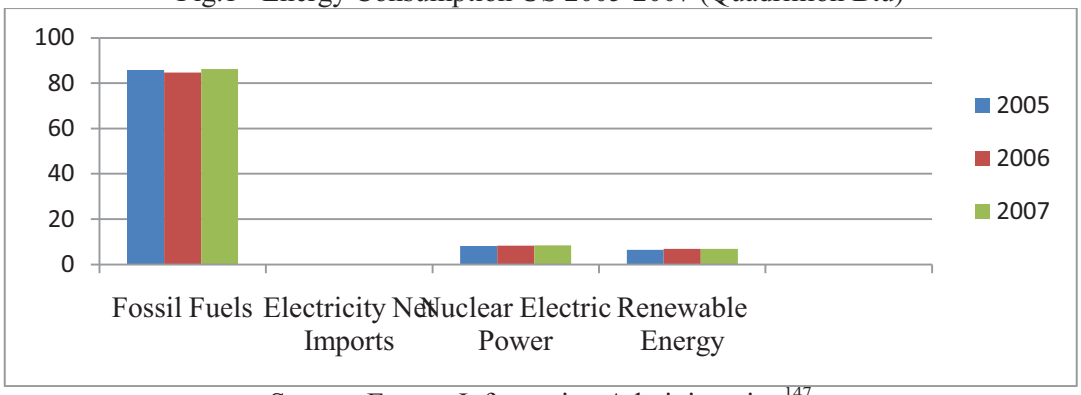
Nowadays, the global climate registers multiple changes caused by high concentrations of greenhouse gas emission from atmosphere.
To fight against the climate change, 150 countries who participate to the United Nations Conference on Environment and Development in June 1992 in Rio, settle the basis for the United Nations Framework Convention on Climate Change (UNFCCC).
In Romania, this was ratified with law 24/1994. It was considered that developed countries are more responsible for the greenhouse gases emission but on the other hand they are able to protect against the eventually climate change damage. Romania was included in the group of countries with transition economies, countries with limited gases emission but with probability of increase.
According with 4.2 articles Romania, in collaboration with other states can developed common projects. Through the years, Romania established international cooperation with Switzerland in 1999, Netherlands 2000, Norway 2001, Austria 2002, Denmark 2003, Sweden 2003, France 2004.
On 11 December 1997, was negotiated an agreement by the Kyoto Protocol. The Protocol entered into force on 16 February 2005 and until today, 183 countries adhere to them. According to this Protocol, Romania adopts Law 3/2001 and needs to reduce greenhouse gas emission with 8% since 2008-2012 compared with 1989.

2. General research

One of the most important factors who generate these global climate changes is the energy production and consumption, who caused in the last decades important damages to the ecosystems. In this case is very important for every country to establish national strategies in order to reduce the consumption and increase the renewable electric capacities.
Renewable energy is considerate the energy generated from natural resources as biomass, wind, solar/PV energy, geothermal, water (hydropower).
As we can see in the practical field to reduce, the consumption is an utopia. The global population is continuously growing, so the energy demand cannot even be kept at a constant level and the consumption is increasing constantly. In this case is necessary at the global level to be

created a competitive energy market in order to have a high quality service at a low price, to reduce the quantity of energy produced from nonrenewable sources in favor of renewable sources.
First, we will analyze the US consumption in order to realize the high volume needed for the most important consumer:

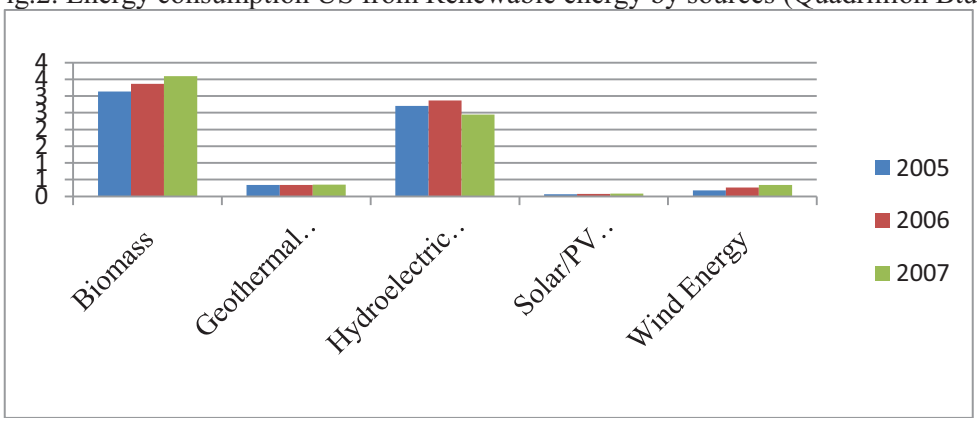
Fig.1 - Energy Consumption US 2005-2007 (Quadrillion Btu)



Source: Energy Information Administration[147]

From this graphic, it can be observed that the consumption of fossil fuels is at a very high level, and the ecological resources are at a very low level.
According with this reports offered by Energy Information Administration 7 percent from energy consumption was generated by renewable sources of energy in 2007.

Fig.2. Energy consumption US from Renewable energy by sources (Quadrillion Btu)

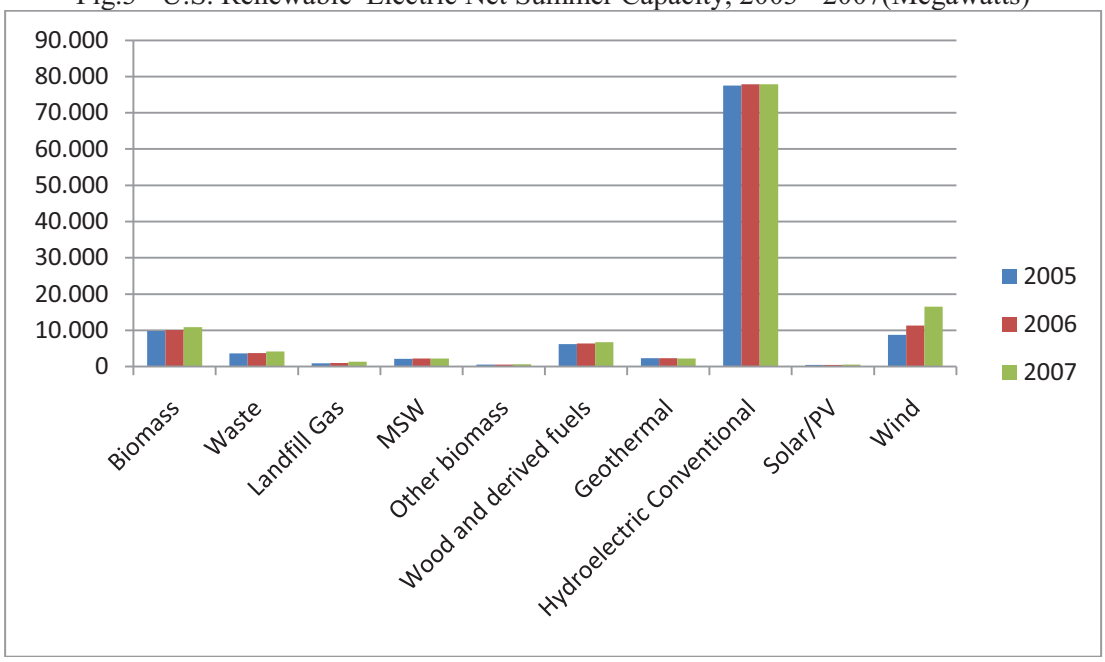


Source: Energy Information Administration

From this second graphic we mat conclude that biomasses and hydroelectrically sources are of huge importance and the producers must focused on them and also to increase the consumption of energy made by wind or solar resources.

147 www.eia.doe.gov

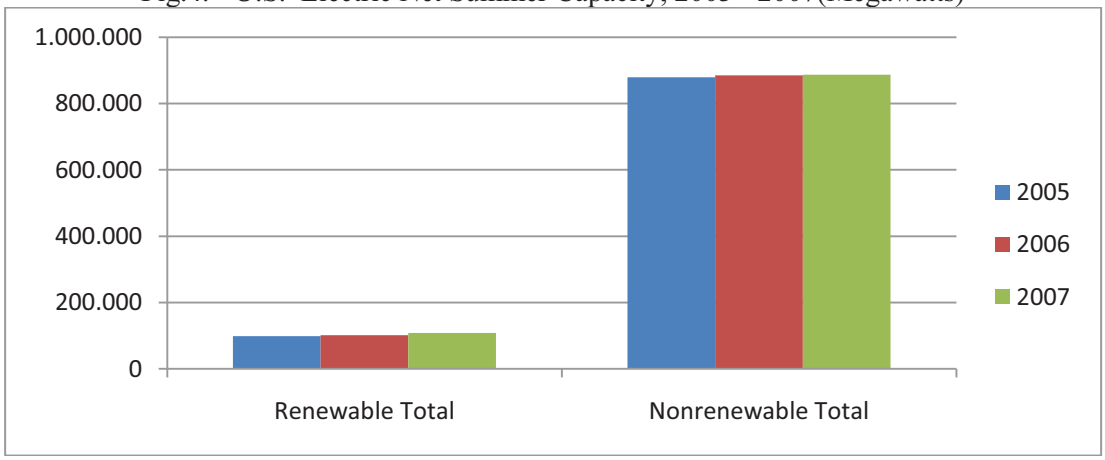
Fig.3 - U.S. Renewable Electric Net Summer Capacity, 2003 - 2007(Megawatts)



Source: Energy Information Administration

Continuing from the previous sections, we continue the analysis by studying the net summer capacity. Once again, hydroelectrically solutions are most used, but the distance to the others sources are of a high level. This fact may generate unpleasant situations, especially in the very warm summer when the water resources may decrease.

Fig.4. - U.S. Electric Net Summer Capacity, 2003 - 2007(Megawatts)



Source: Energy Information Administration

Unfortunately, as we observe from this graphic the majority of the electric summer capacities are nonrenewable, this fact is generate by the resources used in the production field.
Almost 20% from global energy is generated by hydropower[148]. The largest producer of hydropower electricity is Canada, followed by US and Brazil.

148 National Hydropower Association - Facts You Should Know About Hydropower, 1996

Canada has an installed capacity of over 70 858 megawatts (MW) in over 475 hydropower plants which generates an annual average of hydropower energy of 350 terawatt-hour (TWh)[149] with this production capacity, Canada can produce almost 13 percent from global hydropower energy.

In Romania, the energy sector is governed Hidroelectica detain 307 hydropower plants with an installed capacity of 6361,92 MW and generates an annual production of 17300 Gwh.(normal year of precipitation)[150].

The hydropower energy in Romania is very important, so we present the advantages and disadvantages of them. Advantages of hydropower energy are:

- Water used to produce energy is free
- Energy is generated with minimal pollution; there are no emissions in the atmosphere in the time of operation
- Relatively low cost of producing regarding nonrenewable energy capacities
- A flexible source an energy (a hydropower plant can operate as long as market energy is demanding energy regarding oil plant that is not so flexible in operation)
- In a hydropower plant electricity can be generated constantly

Disadvantages of hydropower energy are:

- Cost of investments is very high (hydropower plant and dam construction)
- The ecosystem around the area where the dam is supposed to be build is very affected (natural environment is destroyed in surrounded dams areas)
- The quantity of hydroelectricity is directly induced by the quantity of precipitation
- There is the peril of dam failure

In 2007, hydropower production was approximately 20% from the total of global electricity production with an installed capacity of 650,000 MW.

A very important aspect regarding hydro power plants refers to risk management process. This process is very delicate because of the huge impact of a potential loss. When a loss occurs to a hydro power plant, the effects may be at a catastrophic level.

Therefore, the risk management process may be start at the very beginning phase with the risk analysis.

In this stage, there are identified the risk that may appear in this industry:

- Accidental losses to the producing mechanism that may generate lack of energy providing
- Catastrophes – natural or technical, that may generate disastrous effects to the people in the river flow down area, and to the homeowners or commercial properties in the same are
- Losses to the natural ecosystem

It is obviously that all the risk exposures at a very huge level and in majority of the cases there are no similar losses caused in the past, in order to know exactly the expected frequency. The lack of data makes very important the stage of assuming the potential losses. There must take into account the value of the all exposed property in the valley and the "value" of the people. This last "value" is very hard to predict because the people may be injury, may record loss of the revenues during hospitalization or may die.

Once the risks are identify, the risk managers of the hydro power plants will start to the next phase - risk controlling.

The risk control has the main objectives[151]:

-to eliminate the potential losses and

-the decreasing of the losses once they occurs

149 www.ic.gc.ca

150 www.hidroelectrica.ro

151 Rejda G. – Principles of Risk Management and Insurance, Pearson Education, USA 2002

The elimination of such losses (as mentioned before) is quite impossible, so the second objective seems to be more realistic. In this case, the effective measures are referring to;
-an adequate own workers protection
-periodical analysis of the structure of the dam/or the hydro power plant
-periodical revising of the mega engines, and all the technical motors
-building of the different small dams down in the river flow
-continuously supervising of the water volume, and in cases there are an excess there must be different ways to fill out this excess
-existence of a specialized people to do training for evacuation and survival in extreme or catastrophic conditions, for all the exposed people

The practice and the theory of risk management demonstrate that with all the taken control measures, there is no guarantee that the risk will not occur. Therefore, risk managers must find solution for financing the risks; the most common technique is transferring the risks to a third party.
The simplest solution is to find an insurance company to accept these risks. In addition, this insurance company may be very hard to find, because the exposure of the hydro power plant company is very high. The insurance premium must be calculated using very accurate actuarial data. This is more possible to an insurance company that has an international frame. Sometime is very necessary to ask for further information of the insurance company:
-experience in the field
-the quality of the reinsurance process
If the insurance company has experience in this kind of insurance, there is sure that the insurance premium is correctly calculated and the exposures are well covered.
The second aspect is important especially in case of the loss. If the insurance company has no adequate reinsurance program, in case of a catastrophic loss the financial strength of the insurer is affected, and in this case, the loss adjustment process is suffering. The hydro power plant company has no financial resources to cover all the claims and the bankruptcy is inevitable. Otherwise, if the reinsurance program is very strong all the mentioned problems are avoided.
The last stage of the risk management process is to observe the ongoing control and transferring process, in order to make adjustments and improvements when is needed.
All the hydro power plants that take this active measure of risk management will be successful ones, because even if different types of losses occur, all the quantifiable effects are financed. This mention must be read as a technical solution, because no one desire to generate catastrophic losses, and further more in many cases lack of people are not quantifiable even if there is an amount as compensation.

3. Conclusions

Because the energy consumption is very high, and the ecosystem protection is very important, we conclude that in the future there must be used the new ways of energy production: wind and solar resources. This is a desiderate for the most energy producers because natural resources are infinite, despite the fossil ones that it will end in the future and water source that may generate very important losses.
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