

Data to the Circulation of Energy and Substance on the Earth Between 1850 and 2015

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Keywords

Bio-sphere, Closed System, Energies, Substances, Population, Ineffective Efforts

During the last decades the number of man kind and oxen, the quantity of energetic raw materials and energies used, that of the CO₂ and heat liberated from the raw materials and emitted by human beings and cows as well as the quantity of methane which partly originated from that animals, further the average temperature of our Earth and total concentration of CO₂ as well as methane in the atmosphere have increased. In the same time the territory of the forests has decreased. The data presented verify that the changes which are unpleasant for the biological life have gone on in a growing degree in the closed Bio-sphere. These events show that our actions to modify the dangerous processes have not been effective enough.

Introduction

The life of the living unit is a biological phenomenon. The living unit can only persist when the environmental circumstances are in accordance with its life conditions. The living unit reacts to the outside effects and in the same time has influenced on its environment, too. It seems that the biological life is only present in the Bio-sphere of our Earth which is a closed system for it. It is obligatory permanently to ensure the specific life conditions for a continuous biological life in a closed system.

Life Periods of the Earth

It is supposed that our Galaxy was formed 20 milliard years before and our Sun appeared 5-4,75 milliard years ago. It is not questionable that the Sun is the starting point of the earthly events. Our Earth is about 4,55 years old and has lived own life which has two fundamental periods. One of them is the period before the biological life and the other is which has existed after it. Both have different ages. These are the following: Glowing star like period; Formation of the new age atmosphere and appearance of water; Formation of organic substances among sterile conditions; Appearance of the biological life, starting of chemo-syntheses and disappearance of the sterile conditions; Appearance of the free O₂ and beginning of photo-syntheses; Formation of multicellular plants and animals; Developing of the warm-blooded animals; Appearance of human being; Fulfilling of human society from the industrial revolution. To know about these periods is necessary because each of them has a special material and energetic balance. Now we shall deal with only the latest period which has started in 1778. The data collected from that period of time are presented in Table 1. and the Figure 1.

Table 1. Data to the Circulation of Energy and CO₂ on the Earth

Specifications	Mass of Fuels, Their Average Thermal Values and the Quantity of CO ₂ Liberated from the Fuels; Other Energies; Number and Emission of Man Kind and Oxen					
	1860	1935 + 37	1958	1980	2000 + 05	2009 + 14
Oil x10 ⁶ t	1	279,5	809,8	3059	3590	4117
40,5 MJ/kg	4,05x10 ¹⁰	1,13x10 ¹³	3,27x10 ¹³	1,23x10 ¹⁴	1,45x10 ¹⁴	1,66x10 ¹⁴
CO ₂ m ³	3,17x10 ⁹	8,86x10 ¹¹	2,56x10 ¹²	9,69x10 ¹²	1,13x10 ¹³	1,3x10 ¹³
Coal x10 ⁶ t	136	1280	1762	2805	5878	7823
20,35 MJ/kg	2,76x10 ¹²	2,6x10 ¹³	3,58x10 ¹³	5,7x10 ¹³	1,18x10 ¹⁴	1,59x10 ¹⁴
CO ₂ m ³	3,12x10 ¹¹	2,92x10 ¹²	4,05x10 ¹²	6,45x10 ¹²	1,37x10 ¹³	1,72x10 ¹³
Gas x10 ⁹ m ³	a.n.	71	400	1531	2778	3479

Specifications	Mass of Fuels, Their Average Thermal Values and the Quantity of CO ₂ Liberated from the Fuels; Other Energies; Number and Emission of Man Kind and Oxen					
	1860	1935 + 37	1958	1980	2000 + 05	2009 + 14
37 MJ/kg	a.n.	2,62x10 ¹²	1,48x10 ¹³	5,66x10 ¹³	1,02x10 ¹⁴	1,28x10 ¹⁴
CO ₂ m ³	a.n.	1,37x10 ¹¹	7,72x10 ¹¹	2,95x10 ¹²	5,36x10 ¹²	6,72x10 ¹²
Total						
MJ/kg	2,8x10 ¹²	3,99x10 ¹³	8,33x10 ¹³	1,8x10 ¹⁴	3,66x10 ¹⁴	4,53x10 ¹⁴
CO ₂ m ³	3,15x10 ¹¹	3,94x10 ¹²	7,38x10 ¹²	1,9x10 ¹³	3,01x10 ¹³	3,69x10 ¹³
Energies	1866	1931	1954	1973	2005-2010	2012-2014
Water TWh	0	a.n,	a.n.	1296	3000	3756
Wind GW		0,3*****	a.n.	a.n.	59	318
Atomic TWh			5*****	203	2461	a.n.
Man Kind	1850	1937	1950	1980	a.n.	2014
milliard	1,17	2,1	2,5	4.4	a.n.	7,5
CO ₂ m ³ /year	3,2x10 ⁸ *	5,75x10 ⁸	6,85x10 ⁸	1,2x10 ⁹	a.n.	2,05x10 ⁹
Heat 25% of the metabolism W/year	9,39x10 ¹² **	1,68x10 ¹³	2,0x10 ¹³	3,53x10 ¹³	a.n.	6,02x10 ¹³
Oxen		1930-ties			1999-2000	
million		438,9			1351,4	
CO ₂ m ³ /year		4,98x10 ¹⁰ ***			1,53x10 ¹¹ ***	
Heat 50% of the metabolism W/year		3,29x10 ¹³ ****			1,01x10 ¹⁴ ****	
Methane l/year		4,38x10 ¹⁰ -			4,93x10 ¹¹ -	
		8,0x10 ¹³ *****			2,46x10 ¹⁴ *****	

Abbreviations:

a. n. = datum is unknown

* = in case of basic metabolism of a person: 270 l/day

** = in case of basic metabolism of a person: 88 W/day

*** = on the basis of an experimental datum of one calf of 75 kg-s: 311 l/day

**** = on the basis of an experimental datum of one calf of 75 kg-s: 89,16 W/day

***** = data of oxen: 100-500 l/day/animal

***** = MW

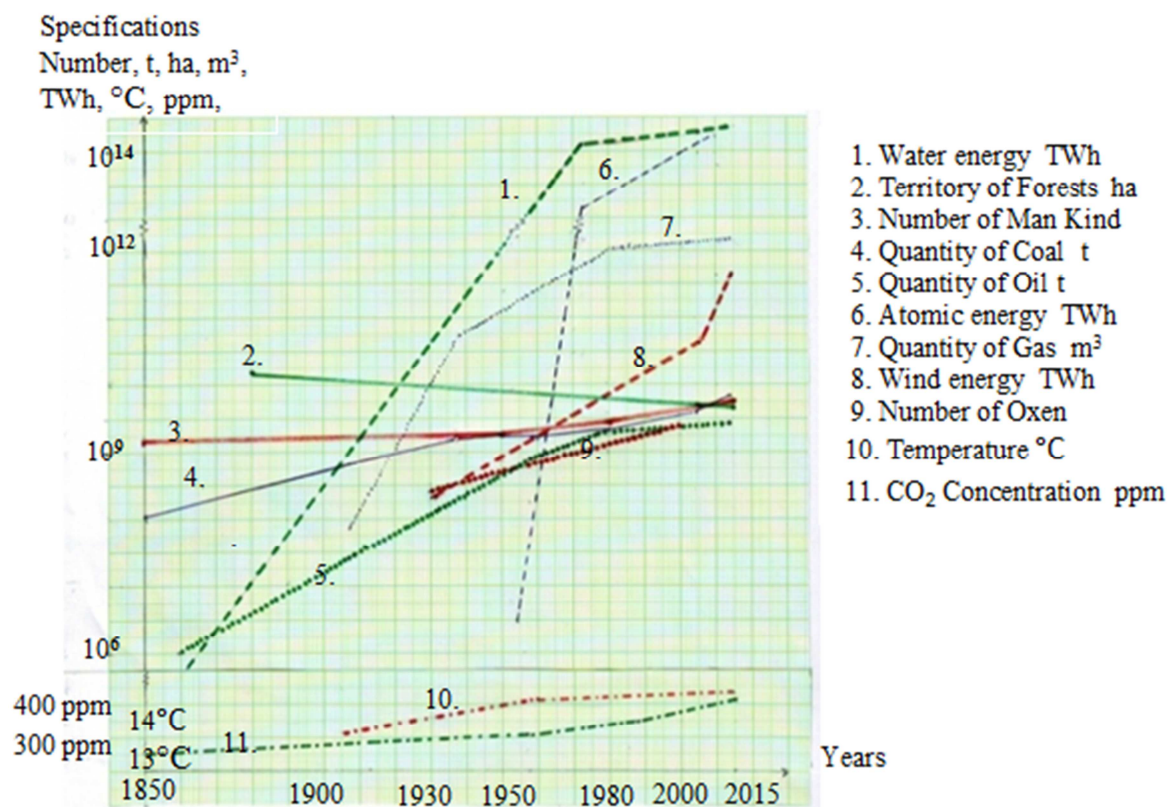


Figure 1. Number of Man Kind and Oxen; Quantity of Raw Materials and Energies; Dimension of Territory of Forests; Average Temperature of the Earth and CO₂ Concentration of the Atmosphere between 1850-2015.

Number of Man Kind and Oxen- Movements of Energy and Substance – Conclusion

At present in spite of fact that we do not have all data connected with the period of 1850-2015 the processes which have gone on in the Bio-sphere can be evaluated. The values of the measurable parameters which can be seen in the Table and on the Figure have changed/worsened. In consequence of these changes the material and energetic balance had formed on our Earth before 1850, after this has been influenced in a permanently and growing degree. The most dangerous consequences of that process are the growth of the average temperature of our Earth and that of the average concentration of CO₂ as well as methane which is not on the Figure but its values were in 1700: 1000 ppb; and in 1986: 1700 ppb in the atmosphere. The main influencing factors of the Bio-sphere among the others which are not listed here are: the increasing number of man kind and that of the farm animals (oxen are only an example here but there is a similar tendency in case of others except horses), the growing quantity of CO₂, heat and methane emitted, that of the energetic (and other) raw materials and energies used, finally the decrease of the territory of the forests together with all consequences of these main and other factors. These processes have gone on in a closed Bio-sphere in which conditions of the persistence of the biological life are determined and the sources are limited. ■



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