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World energy and environment

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ABSTRACT

Aim article is the statistical analysis of world energy over a period of time from 1971 to 2008 and impact of world energy on environment. The article proposes equations enabling subject to of carbon percentage in ton of fossil fuel to calculate amount of generated heat energy, amount of waste products as consequence of fossil fuel burning: waters, carbonic dioxides as well as of oxygen which get removed from the atmosphere to oxidize fossil fuel. The contribution of individual kinds of fuel to global warming and dynamics of it year by year is shown. Similarity of curves of global average temperatures data dependence of the United States National Climatic Data Center (NCDC) and estimated on the basis of heat production by world energy are show that for an explanation of global warming there is no need to attract representations about role of the carbon dioxide producible by world energy. It is shown, that ocean level rise only from 10 to 3 % is provided by the water synthesized at burning of fossil fuel. The rest is provided by global warming at the expense of thawing subpolar ices.

KEYWORDS

Global warming;
Heat;
Carbonic dioxide;
Water;
Ocean level.

INTRODUCTION

"The growth of well-being of human society, improvement of the quality of life, and the very existence of mankind are impossible without power consumption and, consequently, without consumption of fuel and fuel-energy resources "(FER)"[1]. This truth for a long time already became an axiom confirmed by experience millennia of humanity existence.

Laws of Thermodynamics have shorter history, but it does not mean that it is necessary to forget about them.

The "Zero" law of thermodynamics: The law of heat equilibrium[2]

J. Black (1728 – 1799) put forward the following wording of the Law: "All bodies freely communicating with one another and not subject to a non-equilibrium impact of the ambient conditions acquire one the same temperature, as determined with the thermometer. All bodies acquire the temperature of the environment."

Let us add to formulation of J. Black: the environment and all constituent elements of it making tend to thermal equilibrium by heat exchange. When the caveman which was accepting himself as an element of environment, kindled a fire, he was heating an environment.

The first law of thermodynamics

The First Law of Thermodynamics, also known as the Energy Conservation and Transformation Law, was formulated by G. Helmholtz (1847) as follows: "Energy is neither arises, nor destructed, but only gets transformed from one form to another"[2].

The Intergovernmental Panel on Climate Change (IPCC) in its 2007 Fourth Assessment (IPCC, 2007) stated that it had "very high confidence that the global average net effect of human activities since 1750 has been one of warming." The IPCC attributes humanity's global warming influence primarily to the increase in three key heat-trapping gases in the atmosphere: carbon dioxide, methane, and nitrous oxide.

The author of this article rely on Laws of Thermodynamics, asserts that since 1750 to the steady-state energy balance of the Earth began to join enhance the stream of heat energy. Mankind scooped thermal energy as FER from Earth interior in increasing quantities. As the statistical data on world energy since 1750 are inaccessible to us, let us execute the analysis of the statistical data production and consumption FER by world energy over a period of time from 1971 to 2008. In other words, let us estimate a stream of heat energy it's had joined during this period to usual energy balance of the Earth, and also a stream of waste products of power production.

In the beginning, let us examine quantitative methods of the analysis of power production and wastes of this manufacture.

THE THERMOCHEMICAL BASIC FOUNDATION OF THE FER COMSUMPTION ANALYSIS

Fuel of organic nature releases heat in the course of the oxidation reaction called burning. Quite another nature is possessed by nuclear fuel, the employment of which to produce heat and electric power was only mastered in the second half of the 20th century. Nuclear fuel releases heat as a result of fission of the nuclei of uranium-235, a uranium isotope.

Combustion of a carbon-containing fuel is a process of oxidizing the oxidizable components of the fuel by the atmospheric oxygen (23.2% by mass). The products of burning a carbon-containing fuel are carbon dioxide (CO_2), and water, when a hydrocarbon is burned. Oxidation of carbon and hydrogen is accompanied by generation of heat, qCO_2 and qH_2O. The heat released as a result of oxidizing (burning) 1 kilogram (kg) of fuel is called the specific heat of combustion (heating value).

Just for the release the heat fuel is usually burned. It generally forms[3] the reaction of oxidation of a hydrocarbon fuel, which can be presented as:

$$\mathbf{K\times[C_nH_m+(n+\frac{m}{4})\times O_2\rightarrow nCO_2\uparrow}$$
$$\mathbf{+nq_{CO_2}+\frac{m}{2}H_2O\uparrow+\frac{m}{2}qH_2O]} \quad (1)$$

where $n\geq1$ is the number of carbon atoms and $m\geq0$ is the number of hydrogen atoms contained in a molecule of the fossil fuel and entering into the oxidation reaction; and *K* is the coefficient taking only two values, 1 or 2.

When (n+m/4) is an integer, then the coefficient K = 1. When (n+m/4) is a fractional number, then the coefficient K = 2.

As is clear from Eq. (1) and the Law of Conservation of Mass, weight of the gaseous discharge from the engines of cars, aircrafts and ships, and from power-producing plants, especially from thermal power plants (TPP), exceeds the weight of the fuel-burned carbon. To calculate the mass of carbon dioxide and water discharged into the atmosphere when burning 1 ton (t) of fuel, as well as the mass of oxygen consumed from the air to oxidize 1 t of hydrocarbon fuel, we can use Eqs. (2), (3), and (4). The equations hold true within a sufficiently wide range of the fuel compositions burned, and represent regression models obtained by processing the data of stoichiometric calculation carried out by Eq. (1). In calculating, it was assumed that going out of the chemical reaction of the fuel oxidation amounts to 100%. In the case of coal being burned we shall assume that it is anthracite, which is practically one hundred percent carbon. It should be noted that the dependent variable is a dimensionless value since it defines the number of tons of the reaction product or reagent formed by burning a ton of fuel,

$$\mathbf{CO_2=0.03664\times C\%} \quad (2)$$

where $C_{\%}$ is the percent content of carbon in a ton of fuel. ($C_{\%}$ varies from 0 to 100%).

The multiple correlation coefficient[4] $R^2 = 1$; standard deviation[5] s = ±0.0001. Explanations of statistical terminology can be found in the literature.

The mass of water generated at oxidation a tonne of hydrocarbon fuel amounts to:

$$\mathbf{H_2O = 8.937 - 0.0894 \times C\%} \qquad \textbf{(3)}$$

$R^2 = 0.9999$; $s = 0.003$.

The mass of oxygen consumed to oxidize one ton of hydrocarbon fuel amounts to:

$$\mathbf{O_2 = 7.941 - 0.05278 \times C_{\%} - 4.5 \times 10^{-4}/H_{\%}} \qquad \textbf{(4.1)}$$

where $H_{\%}$ is the percent content of hydrogen in a ton of fuel. ($H_{\%}$ varies from 0.1 to 99.9%).

$R^2 = 0.9999$; $s = 0.001$.

If we agree that the hydrocarbon fuel contains only carbon and hydrogen, then the Eq. (4.1) can be simplified to:

$$\mathbf{O_2 = 7.941 - 0.05278 \times C_{\%} - 4.5 \times 10^{-4}/(100 - C_{\%})} \qquad \textbf{(4.2)}$$

($C_{\%}$ varies from 0.1 to 99.9%).

Since the air contains 23.2% oxygen by mass, the mass of air used to oxidize 1 ton of hydrocarbon fuel amounts to:

$$\mathbf{Air = 34.2 - 0.2276 \times C_{\%} - 1.94 \times 10^{-3}/H_{\%}} \qquad \textbf{(5.1)}$$

$H_{\%}$ varies from 0.1 to 99.9%. $R^2 = 0.9999$; $s = \pm 0.001$.

$$\mathbf{Air = 34.2 - 0.2276 \times C_{\%} - 1.94 \times 10^{-3}/(100 - C_{\%})} \qquad \textbf{(5.2)}$$

($C_{\%}$ varies from 0.1 to 99.9%).

And, finally, the main point: the amount of heat generated at burning one ton of hydrocarbon fuel.

Presented in the reference sources date on heating value[6] for just one kind of fuel differ from each other, and are sometimes given as ranges of experimentally established values. For methane, say, they give the value of 50100 - 55500 kJ/kg, and for anthracite, 26000 – 33000 kJ/kg. It is due to the heterogeneity of fossil fuel from different deposits. The derive equations for estimating the heating value of different fuels we can use the following reasoning. Since anthracite is, in fact, carbon and the "average value" of its heating value amounts to 29500 kJ/kg, heating value of 100% hydrogen amounts to 141790 kJ/kg, we can calculate the heating value of the hydrocarbon fuel using the following formula:

$$\mathbf{HV,\ kJ/kg = 295 \times C_{\%} + 1417.9 \times H_{\%}.} \qquad \textbf{(6)}$$

If we agree that the hydrocarbon fuel contains only carbon and hydrogen, then the Eq. (6) can be simplified to:

$$\mathbf{HV,\ kJ/kg = 295 \times C_{\%} + 1417.9 \times (100 - C_{\%}) = 1122.9 \times (126.3 - C_{\%})} \qquad \textbf{(7)}$$

For reference: heating value of natural uranium amounts to 500,000,000 kJ/kg (215,550,000 BTU/lb).

Since fossil fuel obtained different deposits has varying heating value, estimation of averaged characteristics of the fuel burnt by the world's power engineering can be facilitated by determining the carbon content by heating value of the fuel:

$$\mathbf{C_{\%} = 126.3 - 8.91 \times 10^{-4} \times HC, kJ/kg} \qquad \textbf{(8)}$$

QUANTITATIVE ESTIMATION OF FUEL CONSUMPTION BY WORLD ENERGY

In article the word combination «World Energy» is frequently used. The author means complex of extraction and consumption of fuel and fuel-energy resources. The article is devoted to statistics data[7,8] on extraction of coal, natural gas, and oil, as well as to production of electricity from nuclear and fossil fuels over period of time from 1971 to 2008.

Nuclear power plants

Let us consider, how many heat was produced by Nuclear Power Plants (NPP). To this end we shall to approximate the data[8] of nuclear electricity production over a period of time from 1971 to 2008.

$$\mathbf{(ElGen)_{NPP}, TWh = (2.96 \times 10^{8}/Yr) \times (1 - 1970.5/Yr)} \qquad \textbf{(9)}$$

where $(ElGen)_{NPP}$ is produce of nuclear power plants electricity, TWh; Yr is years from 1971 to 2008.

The multiple correlation coefficient $R^2 = 0.904$; standard deviation s = ± 323 TWt.

Thereto it was required heat subject to NPP efficiency 23.5 %[9]:

$$\mathbf{(Ht)_{NPP}, TJ = (4.9 \cdot 10^{12}/Yr) \times (1 - 1970.5/Yr)} \qquad \textbf{(10)}$$

Since heating value of natural uranium amounts 500,000,000 kJ/kg = 0.5 TJ/kg[6], world atomic energetics was needs of natural uranium per year (from 1971 to 2008):

$$\mathbf{(G_f)_u, tonne = (9.83 \cdot 10^{9}/Yr) \times (1 - 1970.5/Yr)} \qquad \textbf{(11)}$$

where $(G_f)_U$ is mass of natural uranium.

Nuclear power is the only large-scale energy-producing technology which takes full responsibility for all its wastes and fully costs this into the product[10]. The amount of radioactive wastes is very small relative to wastes produced by fossil fuel electricity generation. High level wastes (HLW) is produced by nuclear reactors. It contains fission products and transuranic elements generated in the reactor core. It is highly radioactive and often thermally hot. HLW accounts for over 95% of the total radioactivity produced in the process of nuclear electricity generation. The amount of HLW worldwide is currently increasing by about 12,000 metric tons every year. A 1000-MWe nuclear power plant produces about 27 tons of spent nuclear fuel (unreprocessed) every year[10]. Thus nuclear power plants produced HLW (unreprocessed) year by year from 1971 to 2008:

$$(G_f)_{HLW}, \text{tonne} = (1.30 \cdot 10^9/Yr) \times (1 - 1970.5/Yr) \qquad (12)$$

$(G_f)_{HLW}$ is mass of high level waste.

Figure 1 shows increase in natural uranium consumption and produced HLW (unreprocessed) year by year from 1971 to 2008. Graphs are based on equations (11) and (12).

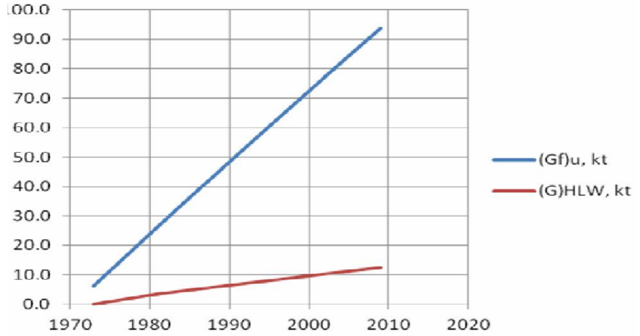

Figure 1 : The consumption of natural uranium and production HLW year by year from 1971 to 2008. $(G_f)u$ is mass of natural uranium; $(G)_{HLW}$ is mass of high level waste

Fossil fuel plants

Let us execute the similar analysis for power plants burning fossil fuel (FFP).

For calculations consumption of fossil fuel by World's Energy we shall use the data of British Petroleum Statistical Review[7] and IEA Key World Energy Statistics 2010[8].

(a) Coal

The mass of coal burnt by World's Energy year by year from 1973 to 2008, is described by regression model

$$(G_f)_{coal}, \text{Mt} = 1000/[4.167 - 0.538 \times \exp(0.001 \cdot Yr)], \qquad (13)$$

$R^2 = 0.9921$; $s = \pm 415$ Mt.

The heat released as a result of burning coal will be described subject to the Eqs. (6) or (7) amounts to:

$$(Ht)_{coal}, \text{TJ} = 29.5 \cdot 10^6/[4.167 - 0.538 \times \exp(0.001.Yr)], \qquad (14.1)$$

Since commercial solid fuels include about 85% of hard coal with heating value about 30,000 kJ/kg and 15% of brown coal with heating value about 15,000 kJ/kg, give a more precise to Eq. (14.1)

$$(Ht)_{coal}, \text{TJ} = 27.3 \cdot 10^6/[4.167 - 0.538 \times \exp(0.001.Yr)], \qquad (14.2)$$

The mass of carbon dioxide released as a result of coal burning will be described subject to Eqs. (2), (13) and comment to Eq. (14.2) amounts to:

$$(CO_2)_{coal}, \text{Mt} = 3.39 / [4.167 - 0.538 \times \exp(0.001 \cdot Yr)], \qquad (15)$$

Water as a result of coal burning is not generated.

The mass of oxygen consumed from the atmosphere for oxidation of coal will be described subject to the Eq. (4.1) amounts to:

$$(O_2)_{coal}, \text{Gt} = 3.05 / [4.167 - 0.538 \times \exp(0.001 \cdot Yr)], \qquad (16)$$

(b) Crude oil

The mass of oil burnt by World's Energy year by year from 1973 to 2008 and subject to let alone 84% by volume of the hydrocarbons present in petroleum is converted into energy-rich fuels (petroleum-based fuels), is described by the approximating equation:

$$(G_f)_{oil}, \text{Mt} = 840 / (3.595 - 0.448 \times \exp(0.001 \cdot Yr) \qquad (17)$$

$R^2 = 0.9967$; $s = \pm 122$ Mt.

At calculation the amount of heat released as a result the burning of oil (or oil products) we should take into consideration the following:

1. Petroleum is used mostly, by volume, for producing fuel oil and petrol, both important *"primary energy"* sources[8]. 84% by volume of the hydrocarbons present in petroleum is converted into energy-rich fuels (petroleum-based fuels), including petrol, diesel, jet, heating, and other fuel oils, and liquefied petroleum gas[11]. Petroleum is also the raw material for many chemical products, including pharmaceuticals, solvents, fertilizers, pesticides, and plastics; the 16% not used for energy production is converted into these other materials.
2. The exact molecular composition varies widely from formation to formation but the proportion of chemical elements vary over fairly narrow limits as follows[12], for example carbon by weight 83 – 87%.

The heat released as a result burning of oil products will be described to the Eq. (7) and remarks above amounts to:

$$(\mathbf{Ht})_{\mathbf{oil}},\mathbf{TJ} = 38.9\cdot10^{6} / (3.595 - 0.448 \times \exp(0.001.Yr)] \qquad (18)$$

The mass of carbon dioxide released as a result the burning of oil products will be described subject to Eq. (2) amounts to:

$$(CO_2)_{oil},Mt = 2.616 / (3.595 - 0.448 \times \exp(0.001\cdot Yr)] \qquad (19)$$

The mass of water released as a result the burning of oil products will be described subject to Eq. (3) amounts to:

$$(H_2O)_{oil},Gt = 1.124 / (3.595 - 0.448 \times \exp(0.001\cdot Yr)] \qquad (20)$$

The mass of oxygen consumed from the atmosphere for oxidation of oil products will be described subject to the Eq. (4.1) amounts to:

$$(O_2)_{oil},Gt = 2.90 / (3.595 - 0.448 \times \exp(0.001\cdot Yr)] \qquad (21)$$

(c) Natural gas

The volume of natural gas burnt by World's Energy year by year from 1970 to 2008 is described by the approximating equation:

$$V, Gm^3 = Yr\times[6.903\cdot10^{-6}\times\exp(3.170\cdot10^{-6}\cdot Yr^2) - 1] \qquad (22)$$

$R^2 = 0.9998$; $s = \pm 39\ Gm^3$.

Natural gas is a gas consisting primarily of methane ($d = 0.7169\ kg/m^3$), typically with from 0 to 20% higher hydrocarbons (primarily ethane, $d = 1.356\ kg/m^3$)[13]. In view of it the density of natural gas subject to aforesaid will be amount to: $(1.0 - 0.2)\times0.7169 + 0.2\times1.356 = 0.8447\ kg/m^3$.

The mass of natural gas burnt by World Energy from 1970 to 2008 subject to accepted density 0.8447 kg/m^3 will compose:

$$(G_f)_{gas}, Mt = 0.8447\cdot Yr\times[6.903\cdot10^{-6}\times\exp(3.170\cdot10^{-6}\cdot Yr^2) - 1] \qquad (23)$$

The heat released as a result of burning of natural gas will be described subject to the Eq. (7) amounts to:

$$(Ht)_{gas}, TJ = 3.915\cdot10^{4}\cdot Yr\times[6.903\cdot10^{-6}\times\exp(3.17\cdot10^{-6}\cdot Yr^2) - 1] \qquad (24)$$

The mass of carbon dioxide released as a result of burning of natural gas will be described subject to Eq. (2) amounts to:

$$(CO_2)_{gas}, Mt = 2.3483\cdot Yr\times[6.903\cdot10^{-6}\times\exp(3.17\cdot10^{-6}\cdot Yr^2) - 1] \qquad (25)$$

The mass of water released as a result of burning of natural gas will be described subject to Eq. (3) amounts to:

$$(H_2O)_{gas}, Mt = 1.819\cdot Yr\times[6.903\cdot10^{-6}\times\exp(3.17\cdot10^{-6}\times Yr^2) - 1] \qquad (26)$$

The mass of oxygen extracting from the atmosphere for oxidation of natural gas will be described subject to the Eq. (4.1) amounts to:

$$(O_2)_{gas}, Mt = 3.325\cdot Yr\times[6.903\cdot10^{-6}\cdot\exp(3.17\times10^{-6}\cdot Yr^2) - 1] \qquad (27)$$

Figure 2 shows increase in fossil fuel consumption (summarize Eqs. 13, 17, 23) and value of waste (carbonic dioxide: summarize Eqs. 15, 19, and 25; and water: Eqs. 20, 26) year by year from 1970 to 2009.

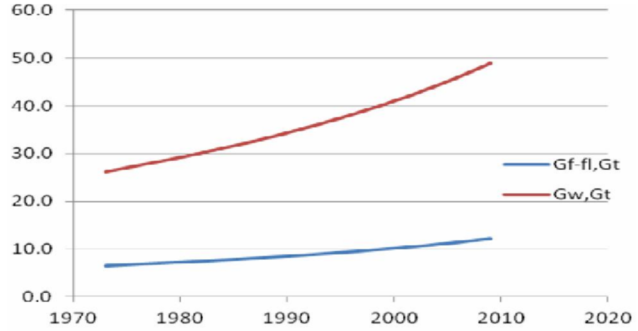

Figure 2 : The consumption of fossil fuel ($G_{fos\text{-}fuel}$) and produced of waste (G_w) that is H_2O and CO_2

Let us look how many heat delivered of separate fuels for heating an environment. Corresponding graphs are submitted in a Figure 3. Graphs are based on Eqs. (10), (14.2), (18), and (24).

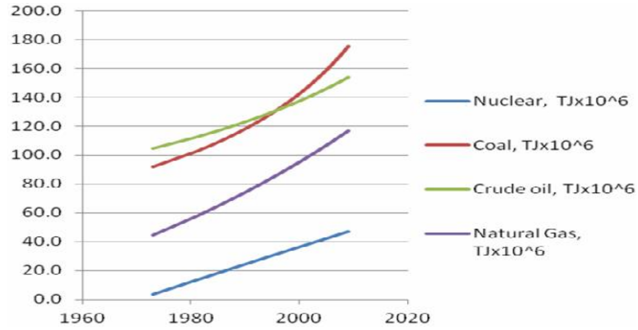

Figure 3 : Production of heat by separate fuels for the period of 1973 to 2009

Come to the front fact that a predominating source of heat since 1996 becomes combustion of coal, the fuel with minimal the heating value. Even so right coal is principal supplier of carbon dioxide into the atmosphere. At the Rio Summit in 1992, the United Nations Framework Convention on Climate Change was drawn up. By signing this treaty, the developed countries (which are responsible for approximately 60% of the world's annual carbon dioxide emissions) promised to reduce their greenhous gas emissions to their pre-1990 levels by 2010[14]. As these promises be satisfied illustrates Figure 3.

ELECTRICITY PRODUCTION

Electricity production by World Energy from 1973 to 2008 is described by approximation function of the statistical data[7,8].

$$\mathbf{ElGen, TWh = 10^4/[(20.7 - 2.71\times exp(0.001.Yr)]} \qquad (28)$$

$R^2 = 0.9999$; $s = \pm 133$ TWh.

Differentiation of the Eq. (28) makes it possible to estimate the average annual gain of World electricity production by nuclear and fossil fuel:

$$\mathbf{[d(ElGen)]/d(Yr), TWt/Year = 27.13\times exp\,(0.001\cdot Yr)]\,/\,[20.70 - 2.713\times exp(0.001\cdot Yr)]} \qquad (29)$$

Calculation shows, that the annual gain of World electricity production from 1973 to 2008 increased from 2 % to 4.5 %.

Share of the electricity generated by nuclear fuel in total electricity production we will estimate by division of the Eq. 9 to Eq. 28. The result division is submitted in a Figure 4.

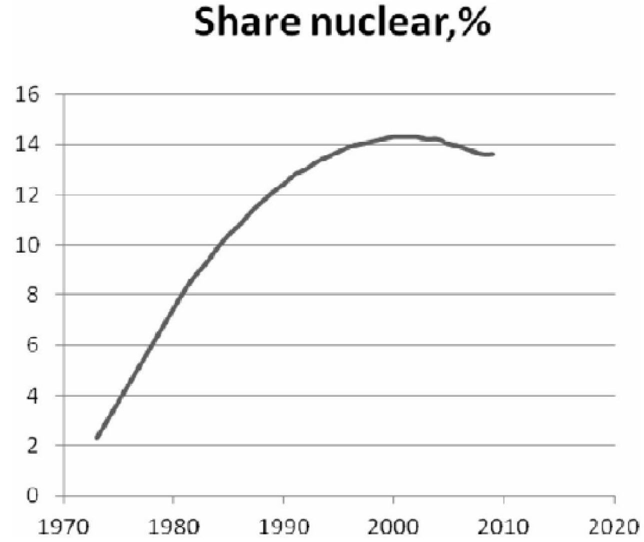

Figure 4 : Share of a nuclear electricity in World electricity generated by fuel

Quantity of electricity which is made of fossil fuel, we will estimate by subtraction Eq. 9 from Eq. 28 and by division of difference to Eq. 28. The share of heat for production of electricity from fossil fuel subject to increasing to 38%[7] of Fossil Fuel Plants efficiency is submitted Figure 5.

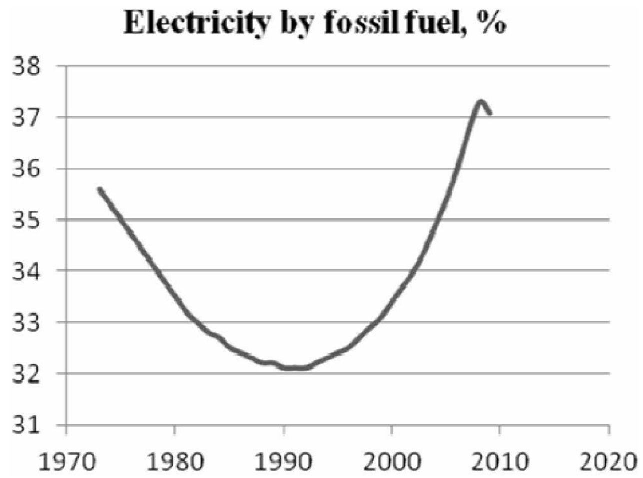

Figure 5 : Share of the electricity generated by fossil fuel

Thus, from 72 up to 63 % of fossil fuel it was spend on other aims, for example: automobiles, planes, locomotives and motor ships, iron and steel manufacture, chemical industry, municipal service system and etc. Respectively, the contribution of these consumers of fossil fuel to global warming and environmental pollution is even.

ECOLOGICAL CONSEQUENCE OF FUEL CONSUMPTION

Terajoules generated of heat and gigatonns of water in the heat energy production speak to human imagination too little. We shall try to make this quantity more obvious.

Global warming

Let us calculate, how many degrees will increase temperature of air by heat which generated World's Energy (we summarize the equations: Eq.10 - nuclear fuel; Eq.14.2 - coal; Eq.18 - oil; Eq.24 - natural gas). For this purpose it is used the transformed equation with which begin studying thermodynamics:

$$\Delta t = \frac{\sum_1^4 (Ht)i}{m \times C_v} \qquad (30)$$

where $(Ht)_i$ is the quantity of heat delivered by a tap of fuel; m is mass of warmed up air; C_v is isochoric heat capacity of air.

In Introduction J. Black's Zero law of thermodynamics was already mentioned, Law of Heat Equilibrium: "All bodies freely communicating with one another and not subject to a nonequilibrium impact of the ambient conditions acquire one the same temperature, as determined with the thermometer. All bodies acquire the temperature of the environment". According to subject of this article appropriate last phrase state so: "The environment acquire the temperature of bodies immersed in it".

Subject to the Law of Heat Equilibrium, at calculations of global scale it was necessary to take into account weight and heat capacity of all with warmed up by World Energy air is in contact. But it is completely impossible task. Therefore we will simplify its. Let us accept, that is heated up air only. Heat exchange among air and a surface of Globe (a land, the seas and oceans, woods, fields, mountains, glaciers, cities and villages and so on) do not happen.

In the Annual Report of the United States National Climatic Data Center (NCDC)[15] the data on global average temperatures from 1880 to 2006 are given. The analytical form of this dependence is submitted in article[3]. In the same source the equation for calculation of an annual increment of temperatures from1880 to 2006 is given. For calculation of an increment (increase) in global temperatures at the expense of heat generated by World Energy will be used the Eq. (30). Estimate of mass of the spherical layer of an atmosphere in the height of 17,700 m above surface of the Earth subject to pressure and temperatures is borrowed from article[3]. Isochoric heat capacity of air is $C_v = 0.720$ kJ/kg·K[16].

In Figure 6 the curves of annual increase of temperatures with respect to data of NCDC and calculated by Eq. 30 are submitted.

As follows from Figure 6, for an explanation of Global Warming is enough of heat generated by World Energy.

Let us remember wherein accuse greenhouse gases. The principal source of energy on a planet the Earth is the Sun. Albedo is known as surface reflectivity of sun's radiation. The term has its origins from a Latin word albus, meaning "white". It is quantified as the proportion, or percentage of solar radiation of all wavelengths reflected by a body or surface to the amount incident upon it. An ideal white body has an albedo of 100% and an ideal black body, 0%. Albedo values can range between 3% for water at small zenith angles to over 95% for fresh snow. On average the Earth and its atmosphere typically reflect about 4% and 26%, respectively, of the sun's incoming radiation back to space over the course of one year. As a result, the earth-atmosphere system has a combined albedo of about 30%, a number highly dependent on the local surface makeup, cover, and cloud distribution. As molecules of greenhouse gases have not mind and selectivity, they with the same success absorb and dissipate radiation from the Sun which in 3 - 4 times more intensively than albedo. Thus in the judgment of the author the function of greenhouse gases in Global warming is grossly exaggerated.

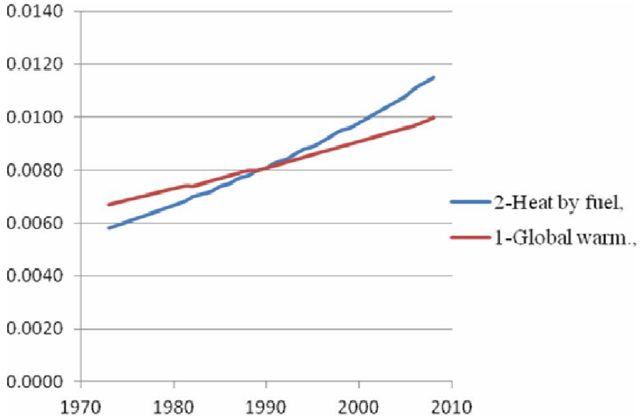

Figure 6 : An annual increment of temperatures ^{0}C: 1 – data of NCDS; 2 – due to heating by fuel

Global flood

Steam been generated by oxidation of fossil fuel easily gets condensed depending on its concentration in the atmosphere and on its temperature, and then in the form of rain or of snow fall out into the earth. But combustion of fossil fuel upsets the natural water rotation cycle in that it adds to the natural bulk of water that water that get formed due to oxidizing hydrogen atoms. It is impossible to say where on earth those endless tons of water or of snow have fallen out causing floods or heavy snowfalls. Amount of water that get formed year by year are calculated by summation of the Eqs. (20) and (26). Eventually all streams merge in Ocean. Approximately 70.8% of the Earth's surface (~3.61×10^8 km^2) is covered by ocean. After division of water volume generated at burning the fossil fuel (for condensed steam 1 m^3 = 1 ton) upon the quantity of a surface is easy to establish the increment of Ocean level rise which is described by stated below equation:

$$\Delta h, \text{mm} = 2.48 \cdot 10^{-16} \times \exp(0.0184 \times Yr) \qquad (31)$$

$R^2 = 0.9991$; $s = \pm 0.014$ mm.

Current Ocean level rise has occurred at a mean rate of 1.8 mm per year for the past century[17], and more recently, during the satellite altimetry era of sea level measurement, at rates in the range of 2.9-3.4 ± 0.4-0.6 mm per year from 1993-2010[18].

The curve of Ocean level rise on the published data[17,18] is described by the equation

$$\Delta h_{measur.}, \text{mm} = Yr \times [0.336 \times \exp(0.280 \cdot 10^{-6} \times Yr^2) - 1] \qquad (32)$$

$R^2 = 0.992$; $s = \pm 2.7$ mm.

In a Figure 7 curves calculated on the Eqs. (31) and (32) are submitted.

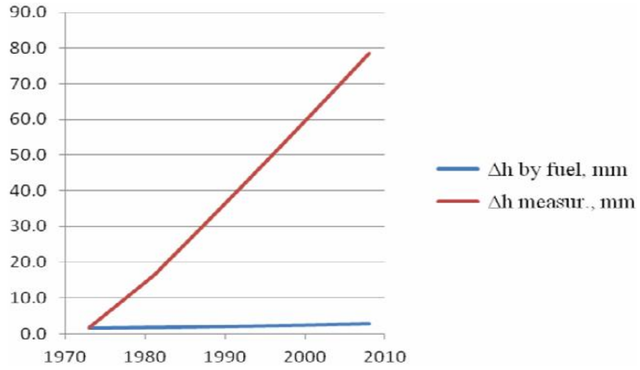

Figure 7 : Annual Ocean level rise: Δh by fuel - at the expense of water, generated as result of oxidizing hydrogen of fossil fuel; Δh measur. - on the data of annual measurements

As follows from Figure 7, Ocean level rise just partially is provided by the water, which generated by oxidation of fossil fuel. Obviously, everything else is provided by melting of subpolar ice at the expense of Global Warming. Share of "chemically synthesized" water in the rise of Ocean level we can to calculate by division Eq. (31) to Eq. (32). Share is constantly reduced year by year from 10 % up to 3 %.

CONCLUSIONS

1. Consequence of the Zero Law of Thermodynamics - the Law of Heat Equilibrium: Using the heat energy, humanity heats an environment. It was, it is, and it will be forever.
   Consequence of the First Law of Thermodynamics - the Energy Conservation and Transformation Law: Humanity, transforming fuel-energy resources in heat energy, permanently adds to steady-state energy balance of Earth the secondary flow of heat energy.
2. The set of the equations make possible to calculate generated value of heat, waters, and carbonic dioxide and also the mass of oxygen extracting from the atmosphere to oxidize one ton of fossil fuel. Thereto it is enough to know percentage of carbon in one ton of fossil fuel.
3. The article is devoted to statistics data on extraction of coal, natural gas, and oil, as well as to production of electricity from nuclear and fossil fuels over a period of time from 1971 to 2008. The derived by approximation equations make it possible to calculate value of heat and waste of heat energy production, generated for the stated period from various kinds of fuel. The analysis of results of heat energy production generated from various kinds of fuel is unexpected enough. Though of limitations bring to an end the Kyoto Protocol and constant requirements of ecologists on necessity decrease in manufacture of carbonic dioxide use of coal - the main source of carbonic dioxide discharge into the atmosphere - exceeds consumption of other kinds of fuel and constantly grows.
4. The annual gain of World electricity production from 1973 to 2008 increased from 2 % to 4.5 %.
5. The share of heat for production of electricity from fossil fuel, during the period since 1973 and up to 1990 permanently was reduced to 32%, but from the beginning of the '90s it evergrowing and exceeded 37% in 2008. Accordingly, the contribution to Global Warming and pollution of environment of other fossil fuel consumers: automobiles, planes, locomotives and motor ships, metallurgy, chemical industry, municipal services, etc. - has reached to 63 %.
6. Assessment of impact on global warming of heat produced by World Energy, well harmonizes with the data of the United States National Climatic Data Center (NCDC) on global average temperatures from 1880 to 2006 and does not require attracting the data on increase of carbon dioxide in atmosphere for this period.
7. The IPCC attributes humanity's global warming in-

fluence primarily to the increase in three key heat-trapping gases in the atmosphere: carbon dioxide, methane, and nitrous oxide. The earth-atmosphere system has a combined albedo of about 30%. Since molecules of heat-trapping gases do not be possessed of mind and selectivity, they can to trap infrared radiation from the Sun, which from 3 to 4 times more intensively than albedo, with equal success.

8. Ocean level rise just partially is provided by the water, which generated by oxidation of fossil fuel. Obviously, everything else is provided by melting of subpolar ice at the expense of Global Warming. Share of "chemically synthesized" water in the rise of Ocean level is constantly reduced year by year from 10 % up to 3 %.

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