The Possibility for Counteraction to Modern Ecological Risks

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Abstract: - One aspect of possible counteraction to the consequences of global change of climate is fragmentary considered in the paper. The offered measures based on the wide and skilled application of some inexhaustible mineral resources of the planet are discussed, which have the ecology-economical meaningfulness, as far as they pursue not only possibility for prevention of negative consequences of the anthropogenic activity in the world but also up to a large extent for help in solving the food production problem, in particular in the developing countries. An additional feature of such approach is prevention of massive migration of population from unfortunate regions!

Key words: mathematical model, particle of fuel, internal heating, non-linearity, computational experiment.

1 Vitality of the problem

At present time the reasonable anxiety is caused by broken ecology of habitat: muddiness of soils and waters in connection with atomic accidents and saturation of territories by ecologically harmful productions, transformed from just an ecological problem into the calamity of social and economical character.

In a number of regions there are rich deposits of oil, uranium, gold; the deserts offensive (Middle Asia, Africa, Arabia, Australia), erosion of soils take a place as the result of their development. Sterile lands and high density of population in many countries stipulated an existence of ecological problems. The solution of this problem requires the complex approach to protection of the environment and rehabilitation of the population's health.

Therefore, we consider that is expedient and timely not only to solve the urgent problems of harmonization of environmental and anthropogenic factors but also systematically implement the projects and/or their separate steps, providing the practical human life. This activity should be an ecologically clean, waste-free and fully self-contained, autonomous in terms of self-sufficiency with necessary food, energy and water resources, cost-recoverable and safe for the environment. Today, the Nature must be secured from the Man!

By the words of one of the most famous creators of science from Medieval Times Paracelsus: "… *In the moment of a man creation the primary world equilibrium was broken. Therefore since that time the destiny of man is renewal to primordial harmony…*"

2 Warning the world

In 2005 more than 1600 leading scientists from 71 countries had signed the document named "Warning of the World scientists to Humanity". It was the most anxious warning that was got by the world at any time from such powerful group of researchers: *"Human society and Nature got into the state of contradiction. Activity of humanity inflicts an enormous and frequently irreparable damage to the environment and vitally important resources"*.

In this document-warning the most critical situations have been enumerated: pollution of waters, oceans, soil, and atmosphere, extinction of plants and animals and overpopulation of planet. Today, the main part of the world already took this statement into account; however some politicians do not hurry to provide any unpopular measures. In the opinion of governments, if contamination will be stopped, an economy will suffer or even will collapse. This cynicism will cost for the Humanity very expensive!

Very solid position belongs to James Lovelock (he is confessed specialist in ecology of Mars, author of the theory of ozone holes, etc.). In the 60–

70-th of the last century he worked out the Gaia-hypothesis (Gay is the Greek goddess of Earth) that a life on a planet ought to be considered together with a complex of accompanying and providing material circumstances in a common integral object [1]. He investigated a number of models of life evolution that brought him to the conclusion about inevitability of catastrophic global warming in case if greenhouse gases will be thrown out in atmosphere by the former rates.

Today he already does not doubt that a catastrophe is inevitable and that it offensive can be only slowed but not prevented. Lovelock is the passionate defender of atomic energy because it does not give the carbon-dioxide extras. Unfortunately as shown by severe accidents on a few nuclear power stations (the most dangerous was Chernobyl catastrophe) they may be especially dangerous [2-4]. Under severe accident accompanied by break of the reactor vessel, the corium melt penetrates into containment, where the passive protection system must firmly retain it in controlled cooling state during the requested time of the accident's control. Presence of the reliable passive protection systems for the containment, which is the last safety barrier of nuclear power plant, must guarantee protection of the containment against destroying during the unlikely hypothetic severe accident. Therefore the third and fourth generation reactors must have such safe system, which is not an easy problem indeed especially due to so called human factor.

About the exigency of a decision on the discussed problems there are witnesses of the Resolution 58/211 of General Assembly accepted by UNO that, with reference to the fundamental documents, declared 2006 the International year of the deserts and desertization, offered to the entire countries to support the measures related to desertization, including degradation of soils, that must be organized by all affected countries.

3 Problems of global climate changes

Thus, the global climate changes put new risks in front of our civilization. How will it affect the productivity of agriculture in the different regions of the planet? What will be a reaction of the World Ocean on the global warming? Is Humanity capable with his present mentality and level of responsibility for resist to the approaching ecocatastrophe?

The authors of the work [5] analyzed evolution of the planet's climate and modern tendencies of its change, comprehended the problems caused by disharmony in Civilization-Nature interaction and offered some concrete measures for minimization of consequences on climate metamorphoses. They remi nded that the amount of catastrophic natural anomalies on the planet (snow-falls, thunder storms, droughts, hurricanes, earthquakes, tsunami, etc.) had grown minimal fourfold for the last 50 years. Thus, natural disasters did not pass any place of the Earth during the last years.

3.1 Crucial role of the climate problems

The problems of climate have got really crucial role purchased a determining value for civilization and require an urgent correction of the humanity-nature interaction, foresight of possible consequences of the marked dangerous changes in a natural vegetation and agro-ecosystems, in particular, for their productivity and biosphere role.

On opinion of [6], a climate is the characteristic for certain territory a long-term mode of weather, conditioned by a solar radiation, its transformations into the active layer of the Earth's surface and related circulation of the atmospheric and water masses, determined by the state of atmosphere, lithosphere, hydrosphere, cryosphere and biota.

In this small article we do not state the goal to analyze the role of all the above-mentioned tasks and their peculiarities in detail because their deep analysis has been done by specialists, including the authors of [5]; we like just underline some basic negative moments, without the account of which in vital functions, our civilization may stop its existence already in the nearest future.

3.2 The greenhouse effect and dramatic Earth population's growth

The main component of the greenhouse effect is the presence of huge amount of carbon dioxide in the atmosphere and the rate of its anthropogenic emissions (about 20 bn. tons per year).

For various reasons, its concentration in the air has increased by 30% compared to pre-industrial levels and continues to rise (it is believed that by 2060 the amount of CO_2 in the atmosphere will determine the increase in the average surface temperature of 1-3 °C [7]). The second most important greenhouse gas methane, as a natural component of life on the planet, provides 15% of global warming.

The ages of prolonged warming and icing of the Earth are quite natural for the life of the planet in the space. But it just happened so that a modern civilization living at the crossroads of epochs might suffer and even cease to exist without taking any measures to reduce at least the anthropogenic contribution to the possibility of their own death.

In fact, only during the recent years major environmental negatives began to show, and experts have started to comprehend the extent of their impact in the near future. The effect of global climate change of the planet was officially recognized as a scientific fact on Interstate Madrid Conference of the United Nations in 1995, when it became clear that if humanity cannot significantly slow the rate of warming in the next 15-20 years, a quarter of a century will have to quickly adapt to the completely new conditions of life (existence!).

Global warming is the most serious threat of all of the threats facing humanity for the whole period of its historical existence. It is estimated that up to 2065 the amount of damages incurred by the humanity from this disaster can exceed the gross world product and will result in the tough food shortages, especially in the current fantastic population growth rate (1% per year!).

3.2.1 Transparency of the atmosphere

Due to the ecological (anthropogenic) crisis and its impact on the transparency of the atmosphere of the planet in the infrared range of the spectrum now, in order to return to the previous temperature regime, the amount of solar radiation on the Earth urgently needs to be reduced by at least 1 % (we did not even mention the contribution of the World Ocean, in the waters which CO_2 is dissolved 60 times more than in the atmosphere).

Therefore, respectable international forums of the environmentalists and climatologists decided for such urgent and extraordinary measures as the release of the near-Earth space in the huge amount of confetti made of aluminum foil, which would reflect part of the solar radiation into the space. Another solution to this problem is to put on orbit a giant mirror film. We do consider even technically feasible "hang" solar sail over the problematic area (the ozone hole) for the controlled screening against solar radiation.

3.2.2 Defense of the glaciers

With a similar to above aim the experiments on local defense of one of glaciers in Switzerland by white polyethylene film (as a carpet) are conducted, that must prevent intensive melting, because the calculations show that 70% of glaciers of this country can disappear totally in 25 years.

Unfortunately it is impossible to perform solar reflection by such kind mirror on the greatest most ancient glacier of the North hemisphere on an island Greenland that occupies an area 1834 thousand km^2, which for example exceeds the territory of Ukraine three times. According to computer models, the irreversibility point of its melting (it is 2.5 million km^3 of ice) will be attained already in the middle of XXI century.

3.2.3 Deforestation for agriculture

It is supposed that a rise in temperature on the Earth conditioned not only by natural reasons began 8 thousand years ago as a result of massive removal of the forests for agriculture [8].

It resulted in breaking the natural processes of the carbon dioxide absorption by biota and in the gradual accumulation of CO_2 in atmosphere. 5 000 years ago the man-made bogs appeared for till of rice that were a reason for another greenhouse gas - methane - accumulated in the atmosphere.

As a result, during many millenniums there was a gradual warming-up of atmosphere and environment because of an additional greenhouse effect. And in the period of revolutionary industrial development a speed of carbon dioxide accumulation in an atmosphere grew substantially, as the "man-made volcanoes" began to throw out this gas in an environment considerably more than the natural volcanoes at any time before. Therefore in the last half of century the anomalous (on scales) warming-up of atmosphere and environment in general on 0.6-0.8 ^oC was happened on a planet, threatening to life of many types of vegetable and animal kingdom.

3.2.4 Withdrawal of soils from productive use

It is known that from 3.5 billion hectares of a fertile Earth's cover mastered by humanity for agricultural goals during many thousand years of its history, as a result of different ecological reasons already fully 2 milliard hectares became infertile.

In the last 50 years a withdrawal of the soils from productively used ones still remaining in a use was substantially accelerated, on the average we lose up to 15 million hectares of agricultural soils annually, i.e. in 3 years the humanity loses agricultural territory of biggest country of Europe - Ukraine.

Thus, in 50 years the half of present fields will be withdrawn from productive use; and forecasted on that period of time 9 milliards of people must be fed from only remaining 750 million hectares [9]. It is set that the increase of the average temperature on a planet only on 1 ^oC results in reduction of rice productivity, which is basic cereals of south hemisphere, on 10% (International institute of rice - IRRI); the indexes of loss of the productivity of soy and corn are similar.

Cruel droughts and total poor harvests in equatorial Africa in recent years already are ordinary phenomenon and a few ten millions of people are suffering. Soon two third of territory of Africa can become the naked stony deserts. A desertization threatens for many regions at other continents

because humidity circulation in every locality is provided only by vegetation peculiar to this locality. Thus, further increase of temperature in the nearest decades means insolvency of agriculture in general.

3.2.5 Factors influencing a climate change

The world meteorological organization, undertaking long-term studies, came to the conclusion that the anthropogenic part of the attained level of climate change on a planet makes no less than 50%.

The permanent industrial extras in the atmosphere in planetary scale of a number of originally anthropogenic gases during already two centuries successively - carbon dioxide (60% of the already attained additional "greenhouse effect"), methane (15%) and other compounds of carbon (8%), oxides of nitrogen (5%) and ozone (12%) led to the negative for humanity surplus in warming-up the atmosphere and general anomalous rise of temperature was.

These extras already notably changed the contents of indicated natural gases in the atmosphere of a planet. "Climatic stress" resulted in beginning of the thawing of enormous areas of permafrost in Siberia, because an average temperature in Arctic (as well as in Greenland) changes 2 times faster than in other regions of the planet and rose already by 3 ^{o}C. But enormous volumes of methane - up to 25000 billion m^3, or about 18 billion tons, are "celled" in Siberia, which already began gradually to pass in atmosphere.

At the end of XX century the Black sea – largest in the world water reservoir of methane already “burned" twice. On the bottom of the sea about 400-meter layer of heavy "warm ice", gas-hydrate, every cubic meter of which contains the 220 m^3 of dissolved methane appeared long time ago.

4 Prognoses for future climate changes

According to the above-described it may seem that some countries can avoid a sad fate. It would be desirable to caution the governments of such outwar dly "safe" countries, as, for example, Ukraine, Russia and others. Really, what can that threaten to Ukraine that was historically formed on a territory, where the natural ecosystems have been during millenniums in a state of dynamic equilibrium and saved a capacity for independent renewal? However, it is necessary to step back from politics of regional egoism and face the truth.

4.1 Ukrainian specific features

The experts estimated [10] that Ukraine is the "critical" regions of planet, where the considerable changes for temperature gradients may be expected in the nearest future. They forecasted anomalously cold winters with sharp over falls of temperatures and shortage of snow, and droughts expected in a summer periods. Ukraine is the traditionally "cereal" country.

By opinions of the prominent scientists and engineers we tried very shortly to light up only some ideas about the state of the Earth’s ecology from the point of view of prospects for our civilization. And we must note that we are unable to do any consoling conclusions. Humanity does not dig, it dug up a grave for itself and, whether or not a future will take a place now depends only on us altogether but today there seems to be no political force able to force such efforts for our common future.

4.2 What and how to do for improvement of the ecological situation?

Not expect an "apocalypse" submissively but make an effort by all forces to prevent it! We agree with specialists offering a set of measures directed to minimization of consequences of global greenhouse effect, actual, in opinion of the authors [5], for the national economy of the Ukraine, in particular: reduction the rate of atmosphere contamination, pollutions of soils and waters 5 times to 2050 year; renewal of natural biota on 2/3 territories of the Earth, expansion of areas of the forest planting and protected landscapes 5 times; stabilizing the Earth population at the level of 7-7.5 billions of people; reduction of the arable areas with the simultaneous increase of the agriculture productivity due to introduction of highly productive sorts, breeds of animals, modern technologies; substituting the out-of-date power and industrial technologies with the scientifically capacious, resource saving and ecologically clear ones.

A substantial role is going to the plant-breeding works by increase of productivity and adaptation to the expected climate changes. Biologists express that in the arsenal of methods for fighting against the global warming a leading role must belong to renewal of natural ecosystems – forest planting, bogs, meadows, marine and freshwater reservoirs, to reduction of arable areas, improvement of bio-agrotechnologies, search and selection of high-yield sorts for agriculture that differ in the considerable coefficients of assimilation of sunny energy and carbon dioxide.

Modern science has to develop the newest agrotechnologies, adopted to addition the humic compounds into soils. It will not just solve the problem of fertility-improving the soil but also will assist the reliable depositing surplus carbon in soil.

5 Our original scientific results for improvement of ecology

Taking into account the stated, the field of the authors' research and other activities embrace the questions of the environment protection against negative influence of technogenic factors using the natural minerals, namely their modified forms. In other words, we try to help the Nature in its auto rehabilitation with the use of its own resources.

The results of approbation of some stages of our project not only refute existing at administrative level in Ukraine an opinion about unprofitable financial means investment in implementation of works of the ecological orientation, but also prove separate stages of the project be reimbursed in 3–5 years. Probably the fate of Ukrainian nation will decide in the nearest years and to a great extent it depends on the state of ecology.

Degradation of all living standards in Ukraine during "independence" times - in politics, culture, economy and ecology resulted in the inevitable decrease of man's quality and continuous falling of the physical and spiritual levels of population and its elects is one of the reasons of non-recoverable destruction of ecological equilibrium.

It is necessary to substantially change the quality of life and do it from below, without expecting an order or help from the top managers! To the global climate catastrophe we are approaching in the terms of already almost ecological catastrophe.

5.1 Ukrainian specific features and Zeolite products for soil cleaning

In relation to Ukraine, the erosion of soils, degradation and considerable degree of the soil muddiness, not only in connection with Chernobyl accident on the nuclear power plant but also with the saturation of territory by ecologically harmful products, stipulated *an absolute necessity using of such facilities for soil treatment that provide terms an ecologically clean management even in muddy regions*.

5.1.1 Ukrainian Zeolite minerals

The bowels of country are rich on natural minerals, including Zeolite-containing minerals that would be able to provide ecologically clean management even in polluted regions and thus to create the conditions for making healthy nation, even for maintenance of its gene pool. The best deposits of natural Zeolites in the World (on quality) - Clinoptilolite and Mordenite (see in the table below) - there are in the West Ukraine (the supplies of Zeolites in Ukrainian Carpathians estimated in 4 billion tons).

Presence of Zeolite-containing natural minerals in the bowels of Ukraine is basis for development of selective sorbents and organo-mineral composites (OMC- fertilizers for bio-agriculture). It allows complex solving the discussed problems, using the results of our works [11-13]. Primary quality of such minerals, except presence of microelements, which are necessary for growing the vegetable and animal organisms, is an ability to "take in", to link the cations of metals (only univalent - natrium, caesium and other) by the internal structure, numerous pores, ramified zeolite channels.

The size of entrance windows of such channels is insufficient for penetration of two-valent cations (Ca^{2+}, Sr^{2+}) and all heavy metals (lead, cadmium, zinc) into the channels. Synthetic zeolites would solve this task but their price, absence of necessary raw material and technological base under condition of the degraded economy make impossible their production and application in any perceptible scales.

CHEMICAL COMPOSITE of the SOKIRNITSA CLINOPTILOLITE $Na_6[Al_6Si_{30}O_{72}]\,x\,20H_2O$

Compo-nent	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	P_2O_5	K_2O+ Na_2O	F	As	Pb	Cu
content,%	71,5	13,1	0,9	0,5	3,44	0,68	0,014	3,03	0,025	0,0015	0,002	0,02

Content of microelements, g/ton:
Mn-242, Zn-45, Ga-20, Th-12, Rb-110, Y-22, Zr-235, Nb22, Ba-232, Ce-52

Chemical characteristics

porosity - 44 %; density - 2,370 kg/dm3
specific surface – 50 -65 m2/g content of Clinoptilolite – 60-70%
capacity of cation change - 1,5 mg.eq./g thermal stability - up to 700 ^{0}C
humidity - up to 7% attrition value - up to 4%

Total specific activity of natural radionuclides -144,5 Bc/kg
Mechanical durability at compression - 200 kg/cm2

Ionchange characteristics

BASIC CATIONS, ABSORBING FROM SOLUTIONS

Os+, Pb+, K+, NH4+, Ag+, Cd2+, Pb2+, Zn2+, Cd2+, Hg2+, Ba2+, Sp2+, Ca2+, Mg2+, Fe3+, Co3+, Al3+, Cr3+

MAIN ABSORBING GASES

CO, CO2, SO2, H2, NH3, HCHO, Ar, O2N2, H2S, He, K

freon, formaldehyde , mercaptanes

5.1.2 Zeolite organo-mineral compositions

Taking into account the above-mentioned, jointly with the scientists of the NAS of Ukraine *the organo-mineral composites (OMC) on the modified zeolite basis, which contains 1-5 mass % sorbents of selective action,* were created. It *binds the cations of heavy metals and radioisotopes of strontium in a soil and in water solutions that prevents their passing to ground water and in a biomass of plants.*

It is known that among measures that bring down entering of radionuclides into plants, a substantial role belongs, for example, to removing the top 4-5 cm layer that decrease radioactive contamination

by one order of magnitude. But for this purpose it is needed to remove about 750 tons of soil from 1 hectare. Burying of such volumes of soil is unreal. The considerable losses of the soil fertility would take place.

OMC is prepared by soaking (saturation) of natural Zeolite (1-3 or 5 mm fractions) with solution containing mixture of humic acids and sodium humate. Also 1-5% modified Zeolite P is added to this treated Zeolite probe. Humic acid and its salts are obtained by hydrothermal treatment of lignite according to patented procedure. It has shown:

- transition coefficient of radioactivity in soil-plant system is reduced for the majority of cultures by 2 times,
- on the other hand high degree of radioactivity transition from soil into radish and rape plants provides a method for bioremediation of soils, for turf (peat) soils with increased acidity (pH 4.7-5.6) at contamination level 5 Ci/km^2 (185 kBq/m^2) and lower (below 2%), humic content is recommended to add 4 tons/ ha of OMC with 2% Zeolite P during the spring time main cultivation, at humic content >2%, the OMC dose can be reduced to 2 tons/ha,
- at contamination level > 5 Ci/km^2 (185 kBq/m^2), the dose of Zeolite in OMC should be increased from 2% to 5%.

5.1.3 Ukrainian technology of the soil cleaning

The technologies that envisage removing arable layer of muddy soil, its washing, drying, enriching and return on the fields need the expenses about 1-3 million USD/ha. Thus, as it is appropriately noted in the advertisement on the web-site of International firm "Terra Humana Clean Technology Engineering Ltd" (USA - Sweden - Hungary) that executes these works, the soil as a result of such washing becomes biologically dead. In "cleaning" by our technology there is no requirement for removing the muddy soil, for the process of "in situ" it is necessary on the average from 2 to 4 tons of Zeolite composites that can be evenly sent flying on an arable soil layer or brought in small holes under vegetable sprouts.

By the way, mixing the soil washed by technology of "Terra Humana" with OMC would be the mean for partial renewal of soil quality (anyway such soil needs to be enriched by black soil!).

5.1.4 Our experience in the soil cleaning

Beginning from 1994 the organo-mineral composites and selective sorbents have been created and tested for providing an ecologically clean management on muddy soils, including cleaning the soil in Budapest suburb polluted by the extras of storage-battery plant (1994). Numerous tests were done at the Institute of Phytophysiology and Genetics of NAS of Ukraine (1995), at Agrarian University in Godolle (Hungary, 1996), at Institute of agroindustrial production of Academy of agrarian sciences of Ukraine in Transcarpathia (1996-98).

In 1998 by order of the Ministry on emergencies of Ukraine a pilot project was successfully executed for rehabilitation of 100 hectares of the territories contaminated by radionuclide. Recommendations have been worked out for use of organo-mineral composites for the return of radioactive-muddy territories in productive land tenure [13].

The results of analysis of soil probes on the contents of heavy metal cations, mg/kg:

Results of analysis of ground probes on the contents of heavy metals cations, mg/kg

	Elements							
	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Before processing	89	7,4	6,7	960	<0,1	10	1790	1520
After processing	14	1,9	2,6	210	<0,1	4,7	578	369

The probes of soil polluted by waste of battery plant (Nagyteteny – a Budapest suburb) are subjected to processing. In the Table above the cations' content in soil probes during 8 hours after mixing with "Zeolite P" in ratio 10:1 a reduction of increase a crop capacity of agriculture due to using the organo-mineral composites is shown.

Name of culture:	(UzhSPE «OMC») Increase of harvest, centner/hectare
o Potatoes	*30-46*
o Cucumbers	*62-71*
o Cabbage	*9-12*
o Tomatoes	*8-12*
o Pepper sweet	*6-9*
o Eggplants	*28*

The tests were made on experimental base of Transcarpathian Institute of Agriindustrial complex AAS of Ukraine (Trop L.)

5.2 Selective sorbents on Zeolite basis

Selective sorbents on the natural basis (Zeolite P or A) intended for clearing of soils from heavy metal cations, radionuclides and ensuring the conditions of the ecologically clean husbandry.

5.2.1 Zeolite organo-mineral compositions

Organo-mineral composites on the base of modified Zeolite-containing minerals raise an effi-ciency of agricultural production on 25-60 %.

Treatment of soils contaminated by radio-nuclides nearly 100 ha of soil in Zhytomir province (Ukraine) polluted by 2-5 Ci/km^2 Cs137 and Sr90 was done by a mixture of organo-mineral composite (OMC) and Zeolite P (in ratio 1:10), which prevents

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the transition of toxic cations and radionuclides (strontium) into ground water and biomass by 3-4 times. In 1999 on the order of Ukrainian Research institute of agricultural radiology the parties of organo-mineral composites were made for the prolonged and selective action that was later on tested as means of decontamination in the conditions of field experiments.

5.2.2 Production of the organo-mineral compositions and selective sorbents

Block-diagram of the plant for production of the selective sorbent, OMC and fire-extinguishing powders is shown in Fig. 1:

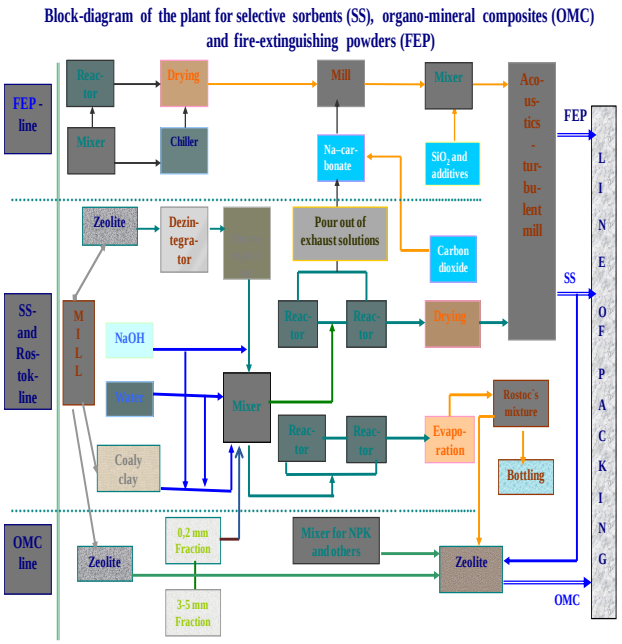

Fig. 1 Block-diagram for selective sorbent plant

In 1999-2002 an OMC was produced for common experiments with the Hungarian scientists (within framework of international cooperation by the grant of Ukrainian Department of education) and for continuation of the field researches. In this period on the soils with the different degree of muddiness the wide approbation of OMC was realized for the conduct of ecologically clean land-tenure and increases productivity.

The important role of OMC in the question of counteraction to a global warming consists of recultivation of bad soils, in planting of greenery of the deserted regions in particular. Taking into account the soil and climatic features of such territories, on the basis of modified natural zeolites the totally sufficient organo-mineral composite, which allows developing the sprouts of the plants without additional feed and watering during the long period is created [11].

Creation of an industrial production for the three mutually constrained technological lines for producing the selective sorbent, organo-mineral composites and even fire-extinguishing powders on the basis of zeolite, as raw material, and utilization of intermediate products, is planned. The chart of production makes fast reimbursement of the investment and the plant is fully zero-emission.

5.2.3 Non-waste production

The Great Russian chemist D. Mendelejev said that "there are no industrial wastes; there is only the badly processed raw material". In the indicated chart the wastes of one line are the raw material for other line, and working waters are corrected for obtaining the secondary products.

The scopes of this article do not allow to go into detail of the got results but, if shortly, the data of our works confidently confirmed a high efficiency of using an OMC and selective sorbents on the basis of modified natural zeolites (of Carpathian deposits) for binding the heavy metal cations and radionuclides into complexes that are not washed in a water environment, directly in a soil.

Strictly speaking, this recultivation technology is not only "cleaning" the muddy soil but, what is more, it makes "defence" of subsoil waters and biomass against penetration of toxic elements. The particles of fine-dispersed Zeolite-containing substances are concentrating the cations that become more accessible for the rootage of industrial crops (long-term herbares, lupin and other) on the next stages of crop rotation.

5.2.4 Future life on the Earth planet

For the sake of life on the Earth the humanity must do a lot and very fast. Exigent integration of all resources and facilities of planet, especially from developed, front-rank countries, for development and practical realization of technologies for survival, or simply speaking for renewal the green planet is needed urgently. Otherwise only the microorganisms - the first colonialists of planet - will survive.

We wish a health and progress to our great-grandchildren. For the moment a few ideas are discussed for elaboration and implementation, for example:

- to create and place on an orbit "sunny sail" for the managed screening of solar radiation over the problematic regions (with the presence of ozone holes),
- to plant trees and shrubs (but reasonably, taking into account an albedo) sterile territories and clear the sources of drinking-water;

- to begin realization an ideology of the "sunny Vegetariums" able to feed population by the products compactly grown including in the condition of territorial isolation, with simultaneous recultivation and preservation of the landed resources in behalf on subsequent generations;
- to put covering force on the way of thoughtless decision making of bowels of the Earth and to compel a petroleum mafia and petroleum lobby (including Parliament of Ukraine) to sponsor a development of alternative energy…

It is a minimal list of practical ecology tasks, and their solution will allow the modern Humanity expecting a survival and progress. Realization of intellectual part of these extraordinarily important tasks is fully feasible even by forces of the small Institute or scientific and production firm.

5.2.5 Our achievement in production of the new unique materials based on Zeolite

Our achievements in the area of development and production of the new materials and technologies for ecological orientation prepared a base for realization of idea on creation the fully reserved zero-emission chart of the autonomous vital functions and self-providing on the muddy, as well as sterile territories [15].

In particular, it was worked out the chart of an ecologically clear settlement for 5 thousand persons (1,5 thousand families) that even in sterile regions may fully provide themselves by ecologically clean foodstuffs (vegetable, meat and milk, mushrooms, phyto-preparations, even by high-protein meat of snails), by water and alternative energy-carriers due to functioning of helioglasshouses, adsorption-Na-cation system for water-treatment including the water demineralization solutions by the drinkable standards, pyrolysis system for complex processing of bio-wastes, etc.

Surpluses of products can be realized at the free market. In this connection, it would be worthwhile to remind that the well-known English science-fiction writer Arthur Clark predicted for 2045 the creation of dwelling of the fully closed cycle with complete self-providing and with processing of bio-waste (magazine "Universe, space, time", 2006, №5, p.6; in rus.).

The necessity of self-providing for habitants determines inevitability of people's activity in such socio-eco-settlements. I have to assist the increase of intellectual and productive culture that creates the backgrounds for development of creativity and initiative of population and is a necessity though not sufficient. And it is a condition for democratization of the community groups of population in the settlements.

6 Conclusions

We have to conclude that we believe it would possible in a way described here to support the ecology and help the Earth cope with ecological problems, which appeared during the last century and critically increased during a few last decades. The Humanity would get the guarantees due to such activity for further existence without all destroying cataclysms, for implementation and enriching of own energy-information space.

Thus, one aspect of possible counteraction of Humanity to the consequences of global climate change has been fragmentary considered. The offered measures are based on a wide and skilled application of inexhaustible mineral supplies of the planet and have an ecology-economical meaningfulness, as pursue not only possibility for prevention of the negative consequences of anthropogenic activity but also largely decisions a food problem, in particular in developing countries. An additional feature of such approach is prevention of mass migration of population from unhappy regions!

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