STRATEGY FOR DEVELOPING A GLOBAL ENERGY SYSTEM: PROTECTING THE BIO-ENVIRONMENT THROUGH PROFITABLE TECHNOLOGIES

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"Alphabet," an independent company, unites under its roof, scientists from Russia, the United States and other countries. It has set itself a goal to develop a unified approach to the global energy system, which must satisfy the following requirements:

- Safety. All elements of the energy system must have a demonstrable quality of inherent total safety, i.e. reasons for accidents are determinantly excluded. Unacceptable influence of the environment should be totally excluded when the system is impacted by any outside force (such as earthquake, explosion, submerging, fire, terrorist activity or operator error).
- Guaranteed Resources. The system must be provided with fuel and other resources in the quantity necessary to satisfy all human energy needs.
- Integrity. An energy system must be integral, i.e. it must include all stages of energy production: extraction and transportation of fuel, energy production, transmission and utilisation of energy and also waste elimination. The energy system itself is considered a waste after the end of its cycle.
- Efficiency. The differences between total amount of energy produced and energy expended (for fuel extraction, production, transmission and waste elimination) should be so great, that it would satisfy all human energy needs.
- Recirculation. The fuel should be repeatedly returned into the energy cycle for reuse to the point of total utilisation for the purpose of maximum possible extraction of energy from it.
- Non-waste. An energy system should function in a way that fuel extraction, production, transmission and utilisation of energy and waste processing does not lead to the accumulation of negative consequences for the environment, i.e. the system should not produce any waste.
- Operation Safety. Operation safety should be secured by sufficient simplicity of interaction between operator and energy system, which does not require a high level of personnel training.
- Bio-Neutrality. An energy system should not interfere with natural biological cycles which involve phosphorus, nitrogen, carbon, oxygen, etc. It should, also, not contribute to global warming. While researching whether or not existing energy systems satisfy these requirements, we excluded from consideration all energy systems whose technology is insufficiently developed today and therefore demand huge capital research development. As a result, the number of existing technologies taken into consideration for the energy development shrank to a few options which are analysed below.
- Fossil fuel. Energy production, based on the oxidation of fossil fuel (coal, natural gas and oil), does not have a future as a foundation for a global energy system. The reason for this is that energy released by one ton of fuel is fundamentally insufficient for the full energy cycle of this ton, i.e. to extract it, to produce it, to transfer it, to utilise it and to eliminate its waste. Therefore, this method of energy production inevitably leads to waste accumulation and consequently to the increasing pollution of the bio-environment.
- Nuclear Synthesis. There are two directions for the development of nuclear synthesis today. Expert research demonstrated that both existing directions are not realistic for wide scale energy production. The reason for the first one is that the quantity of energy to support nuclear synthesis is greater than the quantity of energy produced as a result of the synthesis. Another reason is the limited amount of energy of required raw materials in the earth's crust needed to produce fuel. Therefore, the hopes for the near future use of nuclear synthesis are not justified and the issue of its technical application must be returned back to the area of science.
- Renewable Energy Sources. Technologies which use renewable energy sources (sun, wind, tide, bio-energy, etc.) are developed quite well and satisfy the requirements listed above. However, the use of these technologies is effective only at installations with the range of power from 1 kWe to 1 MWe. It is practically impossible to create more powerful facilities because power concentration of these energy sources is limited. These kind of facilities are good to heat a house, but they are not sufficient to supply energy to an industrial plant.
- Hydroelectric Power. The use of hydroelectric power as a foundation for the global energy system leads to wide scale changes in biosystems (creation of new reservoirs, changing rivers' courses, etc.) and, as a result, to changes in natural cycles. The consequences of hydroelectric power development are unforeseeable and the cost of elimination of these consequences on the bio-environment, will be far greater than the energy produced by this system.
- Nuclear Energy. The technology that can satisfy the requirements for the global energy system is based on the use of energy released by nuclear fission. The amount of energy released by nuclear fission is more than enough to meet the energy expenditure for fuel extraction, production, transmission of energy and elimination of its own waste as well as the waste resulting from the use of other technologies. However, today's nuclear technology, as a whole, does not satisfy these safety and security requirements. This is the

result of inharmonious development under the pressure of military and political interests. Only now, the opportunity occurred to correct this situation and to use nuclear energy as the decisive means to solve all energy problems. From the full spectrum of nuclear technologies, we excluded all that harbour potential dangers for the bio-environment, even if they are widely used today in different countries. These for example, are power water, boiler water, sodium fast and uranium-graphite reactors. High pressure, temperature and chemical activity of materials in the cooling system make these reactors dangerous in a critical situation. The absence of inherent inner safety does not, definitely, exclude the probability of an accident, in spite of the huge sums spent for the operation and safety systems of the reactor. At this time, we chose one of the following options for building an energy system which satisfies all the requirements.

The Lead-Bismuth Reactor

As a source of energy, suitable for wide use, we chose a nuclear power installation with a cooling protective system made of a lead-bismuth alloy. Many countries, including Russia and the United States contributed to the development of these unique reactors. These types of reactors were produced for military purposes and they have accumulated more than seventy reactor years of non-accident exploitation, during the time of their operation.

The advantage of this type of installation is that the reactor's design totally excludes the possibility of nuclear danger and radiation contamination under any condition. Physical characteristics of the primary cooling circuit are such that, with any kind of accident, the facility preserves itself by hardening of the liquid lead-bismuth coolant into a metal monolith (melting point 125 degrees).

These reactors do not need special maintenance and can be used by any unsophisticated consumer. The installation is delivered by the producer as a ready-made block without external pipes and armature and is fully loaded with fuel for ten to fifteen years of continuous work. No maintenance or servicing is required by the consumer. When the fuel is spent, the whole installation can be exchanged for a new one.

The fuel, used in this reactor, can not be, under any condition, used for military purposes and, therefore, there are no obstacles for distribution of these reactors on a world market.

The size and the power of the installation is chosen to satisfy three conditions. First, the heat pollution is insignificant in comparison with other types of power plants. Secondly, these installations are easy to transport. Third, the use of these installations does not require high power lines to transfer electricity over long distances.

Electrical power market analysis demonstrated that there are practically no consumers who need installation more powerful than 50 MWe. The installations with the power of 1.5 and 50 MWe can satisfy the energy needs of the vast majority of consumers. If the energy need of the consumer is larger, or in-between, the proposed power range, the facility can be put together out of two or more installation blocks right at the site. The use of installations, at this range of power, allows to abandon the centralised system of energy supply. This increased the safety and security of the whole system, many times over, due to the dispersion of energy sources and the absence of requirements for complex systems of protection and control.

White Land

The network of power producing nuclear installations should be aided by the sum of technologies capable to produce and regenerate fuel and to utilise radioactive waste. The resolution of these issues in the world is very difficult due to the contradictions between military, political, business, environmental, scientific and consumer interests. The intercourse between these contradictions led to the implementation of technologies in the contemporary world which are most dangerous for the environment. One of the outrageous examples of the use of these technologies is the nuclear fuel regeneration method, which, reprocessing each cubic meter of material produces 5,000 cubic meters of highly active waste and 17,000,000 cubic meters of low active waste. Public opinion is very negative towards nuclear power. Governments are issuing laws prohibiting fuel regeneration, or any work with radio-active waste, except for its immediate deep burying. They do this in spite of the knowledge that they are burying one of the few opportunities to get abundant energy.

The high standards which we have established, as a basis for energy systems and the analysis of the current situation, convinced us that only an international organisation can unite the efforts of different countries in creating the effective, safe, non-waste power system. This organisation would accept full responsibility for handling radio-active materials all over the world and, by doing so, would relieve individual countries of this duty.

Russia, the United States and some other countries, have extensive experience in working with fissile materials at special facilities. These facilities can be concentrated on limited, closed territories and placed under strict international control. These territories, tentatively called "White Land," should have inter-national status and should be controlled by a special international organisation with the same name. Modern physics has already developed technologies, capable of resolving the problem of total nuclear power waste utilisation, as well as, utilisation of stored military materials (weapons grade plutonium and enriched uranium) and to produce power from this, practically, ready-made material.

White Land technology allows for the separation of waste into three fractions: fuel, long-lived and short-lived radio-active isotopes. The fuel fraction will be returned to the energy cycle in a form serviceable for military usage. Short-lived radio-active isotopes will be kept in storage until their full decay. Long-lived isotopes will be transmutated in the molten-salt burner reactor and turned into stable isotopes. Therefore, at White Land facilities, the full energy cycle, involving all types of radio-active waste, will be complete. Reprocessing of spent fuel will not use technology based on dissolution in water but, instead, will use technology based on dry methods which allow working with radio-active materials without any contact with the outside environment. This method does not allow the increase of the total volume of nuclear materials.

White Land is capable of utilising, not only, its own waste but, also, the radio-active waste of other energy systems that are still producing waste. The White Land programme, in essence, provides for the transformation of existing global energy systems, with the overall goal of securing abundant energy for the earth's consumers and to close the issue of radio-active waste forever.

Today, there is, basically, no physical or technological problem in creating a global energy system that satisfies our requirements. Obstacles for the realisations of this program, lie in the areas of politics, business, insurance, information, law, and education. At the same time, an integrated global energy system that satisfies all the requirements of bios is, by itself, a powerful stimulus for the development of this program.

We call on the Biopolitics International Organisation to start working towards the implementation of these complex projects, in accordance with the promotion of clean energy systems to help preserve the bio-environment for the future.

Boris Landa, a trained psychologist with Russian and American experience, showed an early interest in key factors affecting human well-being. In 1974, he became one of the eleven chapter members of the Amnesty International group in Moscow. He worked with Andrey Sakharov and Yri Orlov on human rights issues. Recently, he realised that it is necessary to broaden the concept of human rights and to make them an integral part of a larger system - the rights of Bios. As a result, he is now working on the development of a system of safe and secure energy and the global elimination of nuclear waste. Together with an international group he established a company dedicated to the promotion of the above mentioned goals. It is his firm belief that all the necessary technology to provide the world with safe, abundant energy, which eliminates its own waste, is practically already available, and the only thing required to make it a reality in the near future is hard work.