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ФАКУЛЬТЕТ ЛІНГВІСТИКИ

ЕКОЛОГІЧНІ ПИТАННЯ ТА СУЧАСНІ ШЛЯХИ ЇХ ВИРІШЕННЯ В УКРАЇНІ ТА СВІТІ

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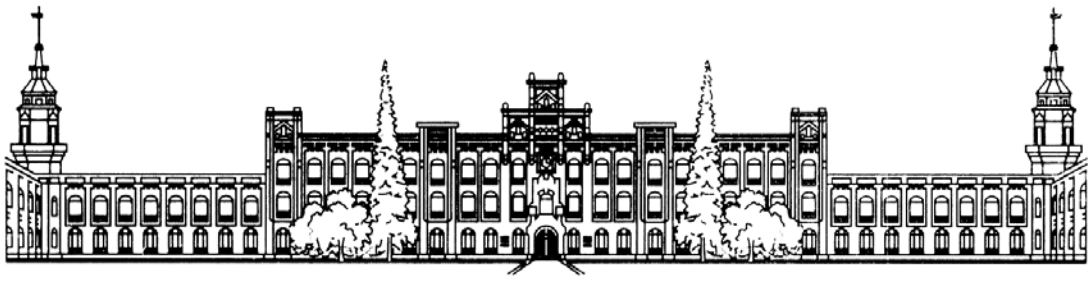

Організаційний комітет

Голова організаційного комітету:
Киричок П. О., д.т.н., проф., проректор з науково-педагогічної роботи НТУУ «КПІ» (навчально-виховний напрям)

Співголова організаційного комітету:
Саєнко Н. С., к.пед.н., професор, декан факультету лінгвістики, НТУУ «КПІ»

Члени оргкомітету:
Грищенко Я. С., к.філол.н., доцент кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Дичка Н. І., к.пед.н., старший викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Волкова О. А., старший викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Огієнко В. П., старший викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Аношкова Т. А., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Гордієнко Н. М., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Маслова Т. Б., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Сидоренко І. А., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Шевченко М. В., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Шиліна Л. І., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»
Шніп Ю. В., викладач кафедри АМТС №1, ФЛ, НТУУ «КПІ»

Екологічні питання та сучасні шляхи їх вирішення в Україні та світі : Матеріали Всеукраїнської студентської науково-практичної конференції, 16 листопада 2016 року [Електронне видання]. – Київ, 2016. – 80 с.

У збірнику представлено матеріали Всеукраїнської студентської науково-практичної конференції «Екологічні питання та сучасні шляхи їх вирішення в Україні та світі», яка відбулася у Києві 16 листопада 2016 року і була присвячена сучасним проблемам екології в Україні та світі. Матеріали конференції призначено для студентів, випускників ВНЗ та усіх, хто цікавиться актуальними питаннями сучасної науки та техніки.

Відповідальність за достовірність фактів, цитат, імен та інших відомостей несуть автори публікацій

USE OF BIOMATERIALS FOR WARMING OF HOUSES

M. Abdula

Institute of Physics and Technology,

National Technical University of Ukraine "KPI"

All people got used to living in comfortable conditions. All of them want their houses to be warm in winter, and to be cool in summer, but not all begin to think what is necessary to do for this purpose. In order to have comfort temperature in dwellings in winter, it is necessary not only constantly to heat a house that is now expensive enough but it is also necessary to warm houses correctly, in order not to allow a precious heat to abandon our house and heat a street wasting our money.

Our research aim was experimental verification of heat-conducting of natural materials that can be used in building; giving recommendations on warming of houses, questioning local population about their ways of warming dwellings now and in the past.

As in literature sources the dependence of coefficient of heat-conducting on humidity of substance is described, and the heat-conducting of charred materials is not mentioned, that is why we decided to check the heat-conducting of the most applied dry biomaterials, and in their charry state. The heat-conducting of biomaterials is also investigated in combination with a concrete.

In the process of the research we got the following results:

1. After questioning of Zgurivka inhabitants the next results were obtained:

− For warming of dwellings most of people use dry biomaterials, such as corn leaves, sunflower stems, clay with a straw, moss;

− Inhabitants use old methods of warming (among polled only 30 percent use biomaterials for this aim) and pass to drywall (20%) and foam (50%).

− At the absence of the proper ventilation the humidity increases in an apartment, and it results in mould formation.

2. It was proven that charring of biomaterials diminishes their heat-conducting.

3. There was the well-proven possibility to bring down the heat-conducting of concrete due to combination of it with biomaterials. An experiment showed that a standard from a dry concrete had a heat-conducting λ=1,62, if to take a concrete and dry biomaterials in even volumes then it is possible to bring down a heat-conducting in 3 times (a concrete with a nutshell is λ=a 0,66, concrete with a peanut shell is λ=a 0,55, concrete with the charred stem of sunflower λ=a 0,53, concrete with a straw is λ=a 0,51, concrete with a charring corn-stalk - λ=0,50)

4. It was shown that the cost of warming materials in mixture with biomaterials will go down by 30-50%.

In conclusion, it should be noted that natural materials can be a good alternative to modern expensive warming materials for warming windows, walls and roofs, and will provide good economy of energy resources that is quite important nowadays when gas is so expensive. By mixing dry biomaterials with concrete it is possible to decrease heat conducting of warming materials as well as to increase their resistance to fire and moisture.

LVIV IN GARBAGE

V. Alekseichuk

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

The problem of garbage glut is relevant nowadays for all countries. But Ukraine is one of the countries where the problem is experienced extremely badly. Ukraine is among the countries with the highest absolute amount of formation and accumulation of waste. Every year there form 700-720 million tons. The total mass of accumulated waste on the territory of Ukraine exceeds 26 billion tons; this is about 40 thousand tons per 1 sq km of area. During the life of one citizen one ton of waste is produced in Ukraine a year.

There are many examples to describe the problem. One of the most pressing problems is garbage of Lviv. Lviv is one of the largest cities in Ukraine that produce a lot of waste. Recently there has been a collapse on one of the biggest trash-dumps called “Hrybovytske”, which covers an area of 26 hectares, and has the garbage height of over 60 meters.

On May 30, a massive fire was eliminated at the Hrybovytske trash dump near Lviv. At the same time it was announced about the disappearance of three firefighters who had been covered under avalanche debris. The tragedy in Hrybovytske revealed the outraged actions of the mayor of Lviv, who has been blocking the construction of a waste recycling plant in every way for years, and thus has prevented the solution of this problem, which caused human losses. Finally, it was recognized that the trash dump was overloaded. After closing the dump there was no place to export trash. It was offered to build a garbage processing plant but the idea was rejected. Later, the garbage of Lviv began to appear in various regions of Ukraine. Wastes were taken up by such towns and cities as Zhytomyr, Lutsk, Kolomyia, Kalush, Rivne, and Kyiv. Often these wastes were exported illegally, which causes new environmental problems. Since the garbage is taken out illegally to the forbidden places, it is burnt, and it only worsens the ecological situation in the country. Dumps in Kiev and other cities of Ukraine have already been burning. The validity of Hrybovytske trash dump expired long ago, and if the government had tackled the problem in time, we would not have such serious consequences now. This trash dump has been working for over 60 years now.

While the situation is not developing in the direction of solving the problem of garbage, its amounts are growing every day. Now Lviv is producing 700 tons of garbage a day. The decisive actions of the authority are needed. With the current rate of pollution the waste will soon flood the whole territory of Ukraine. Of course, we need some investments from the government to solve this and other similar problems by safe storage, recycling, reuse of waste, which can significantly affect the degree of pollution of Ukraine in the future. Currently, the data on the amount of garbage are frightening. At the moment garbage occupies 5% of our country’s territory.

Thus, this situation clearly describes the ecological condition of Ukraine. This is just one of many examples; let’s not forget about other problems such as contamination with radioactive wastes and some others. All these issues altogether are of great danger.

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GREENHOUSE EFFECT

O. Byts

Faculty of Chemical Technology,

National Technical University of Ukraine “KPI”

The temperature of the atmosphere is one of the most significant criteria for the preservation of life. Greenhouse effect and solar emanation are the main factors to secure the stability of temperature on the Earth. The greenhouse effect is the phenomenon when the energy of sun rays, fending off the surface of the Earth, can't return to the space as these rays are retarded by the molecules of different gases [1].

We will illustrate the process of the greenhouse effect with the example of the greenhouse. A greenhouse is a glass building in which people grow different plants.

It is still warm inside during the year. Sunbeams shine and heat everything inside the house. But the warmth is surrounded by the walls and can't leave the greenhouse. So, during the day it gets hotter inside the greenhouse and it is warm at night too [2].

It must be admitted that the atmosphere of the Earth is similar to the hothouse. Gases in the environment (for example, CO_2) are like a greenhouse roof. Every day the Sun gleams through the air. The surface of the Earth heats up by the light. Every night land surface cools, releasing the heat back into the air atmosphere. But most of the warmth is enveloped by the greenhouse gases in the air. That is what makes our life on the Earth comfortable [2].

The greenhouse effect is a natural process, but this effect could be reinforced by the emission of different gases into the air as a result of human activity. We give examples of greenhouse gases [5]:

1. H2O (vapour) – is the main natural greenhouse gas which is responsible for more than 60% effect.
2. CO2 – human activity and living organisms are the sources of carbon dioxide in the air.
3. Methane (CH4) – a rice cultivation and biomass burning are the major sources of methane.
4. Ozone (O3).
5. Freons.
6. Oxides of nitrogen.

Many consequences of the greenhouse effect have been studied well. The real observations are coordinated with the proceeding predictions. The effects which may be predicted are [6]:

− more inundations and droughts: evaporation from the surface layer of the land and ocean intensifies when the sun heats more. In some parts of the Earth it can lead to famine and droughts.

− melting ice: ice appears to be melting faster than previously estimated. In territories that require water from the peaks of mountains it can be a cause of the drought.

− more dangerous weather phenomena: the warmer climate will evoke more intense heat, more heavy rainfall and also an increase in the number of storms.

− increasing sea level: sea level increases because of melting ice and because of the thermal expansion of the ocean. Territories that are just above sea level now may become dipped into the water.

Positive consequences of the greenhouse effect are the prolongation of the duration of the vegetative period in middle and high latitudes. Also the increase of concentration of carbon dioxide can accelerate photosynthesis are advantages of the greenhouse effect [4].

The solution of the problem of the greenhouse effect involves:

1. restoring of soil and vegetation covers with maximal stocks of organic matter;

2. replacing fossil fuels with other energy sources which are environmentally friendly and require no expenditure oxygen;

3. the use of the energy of hydrogen and wind;

4. the fight against the reduction of the vegetation cover of the Earth (as most plants clean the air from greenhouse gases).

The obvious conclusion to be drawn is that climate change doesn’t pass for ecosystem without leaving a trace. Global warming is not a new phenomenon for the ecosystem of the Earth. Temperature changes have been before, but they never were so fast. The main threat for humanity is unpredictable changes [3].

To sum it up, we are responsible for the increase in the natural greenhouse effect by a few degrees. Human activity is immense, it has reached a global scale. Up to now our main aim was to get from the nature as much as possible, and the search in this direction will be continued.

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SOLAR POWER STATIONS AS THE SOLUTION TO ENERGY PROBLEMS

A. Vysotska

Faculty of Heat and Power Engineering,
National Technical University of Ukraine “KPI”

Sun is a star which is an inexhaustible source of energy, its potential is invaluable. Ignoring the solar potential by humanity can lead to catastrophic consequences in the near future because all main sources on Earth are not inexhaustible. Sun energy is the kinetic energy of light emission (irradiation). The kinetic energy is produced by reactions inside the sun. Using sun light is one of the advanced methods of gathering energy.

Solar energy is used when the sunlight reaches the earth's surface, turning it into electrical energy. Getting energy from the sun is an alternative energy source. This method is safe for ecology and nature environment, because it doesn’t use raw materials, fuel and water resources. Solar energy uses a renewable energy source that does not produce hazardous wastes during the active phase of its usage.

Advantages:

- inexhaustible energy source;
- theoretically completely safe for the environment;
- solar power helps to slow/stop global warming;
- solar power provides energy independence.

Disadvantages:

- depending on weather conditions, day and night changing cycle;
- high value (price) of the devices (because of the use of rare materials during manufacture, such as In, Te etc.);
- the need for cleaning of absorbing surfaces from contamination periodically;
- heating of the atmosphere above the power station;
- the need for using large land areas.

Currently, the development of renewable energy in Ukraine is unsatisfactory, despite the fact that a number of laws and legal norms directed to expand the usage of alternative energy sources were accepted by the government.

Evaluating the development of alternative energy sources in Ukraine, including solar, the following conclusions can be made. There is land and scientific potential, some political and economic opportunities that will provide the development of solar energy production in the country. Attracting foreign investments is also available. Further development of solar energy will contribute to energy independence of our country and safety of the environment as well.

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ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

O. Vus

Faculty of Radio Engineering,

National Technical University of Ukraine "KPI"

Every year the issue of water world and its impact on human health becomes more urgent. Therefore, the problem of security of mankind with water is global; so, its solution requires cooperation and coordination of activities of all international organizations and states. Since water is the basis of life organisms and humans and a factor of the development of social production, every year a study of regional peculiarities of drinking water supply in Ukraine is carried out clarifying the role of the water factor in the formation of non-infectious morbidity which is relevant to each of us. Water resources are surface water and groundwater appropriate for use in the society and in the economy. There are about 73 thousand rivers, mostly small, only 125 of which have a length of more 100 km in Ukraine. On each square kilometre of the territory there are 250 m of rivers. The main water source of Ukraine is the Dnieper. It constituted 80% of all water resources of Ukraine. Average long-term volume of runoff in the estuary is 53 cubic km. In shallow rivers it is reduced to 43.5 cubic km, and in a very dry year it decreases to 30 cubic km. The Dnieper provides water supply not only within its pool, it is the main and sometimes the only source of water supply of large industrial centers of the South and Southern East of Ukraine.

There are many sources of water pollution, the main ones are:

- wastewater from industrial enterprises;
- domestic wastewater utilities;
- waste water agriculture;
- waste production in the extraction of different minerals;
- wood waste in the timber industry;
- discharges of water and rail transport.

The major pollutants of surface and ground waters are:

- chemical industry,
- ferrous metallurgy;
- non-ferrous metallurgy;
- coke;
- heavy, power and transport engineering;
- utilities and agriculture.

But the problem lies in the power plants, factories and factories that pollute water resources. It is, therefore, necessary to keep the water clean and drinkable. We can achieve this goal by cleaning water before discharge into rivers and sea, using a variety of filters and environmentally friendly ("green") technologies in production to improve water quality, prevent pollution and overheating; the possibility of positive changes in the environment, including alternative water supply options in water use depends on us.

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AVAILABLE ‘‘GREEN’’ PLASTIC FOR UKRAINIAN INDUSTRY

A. Hnidets

Faculty of Biotechnology and Biotechnics,

National Technical University of Ukraine “KPI”

Nowadays, plastic garbage dump is one of the problems of the grave concern. According to ecological organizations in Ukraine, the common volume of garbage is about 700 ton per person. About 80% of that garbage heap consists of non-recyclable

plastic, polyethylene, etc. There is still no sustainable and fast method of the utilization of those polymers invented. On the other hand, we are able to prevent the creation of the enormous trash ruins by replacement it with bioplastic production.

Bioplastic is a polymeric substance which is produced from organic compounds in a chemical or biotechnological way and decomposed up to 5 years.

One of the most perspective classes of such substances is polyhidroxyalkanoates (PHAs). Its composites are appropriate for industrial usage, for example, packaging and boxing. PHA-based blends stand against high temperatures, pressing and stretching.

The raw materials for PHA-production are different: sugars, organic acids, alcohols, products of plant's hydrolysis, industrial waste processing sugar. The use of waste food and agricultural industry ensures the recycling of organic wastes with high quality packaging products and compost.

Biotechnological synthesis process of bioplastic is cultivating the producer strain in a liquid nutrient medium at a constant aeration. Specific growth mode is unbalanced by the lack of carbon in the substrate. There are some bacteria used as producers: Ralstonia eutropha (oxidize hydrogen), Azotobacter vinelandii (nitrogen catches), Pseudomonas oleovorans and others.

Polihidroxybutyrate and other PHAs accumulate in the cell cytoplasm in the form of inclusions. The process of synthesis takes place in several stages of the interaction of PHA-polymerase with 3-oxybutyryl-CoA to form a stable polymer. The production results with excretion of PHB and used as the raw material for the technical packaging industry.

A variety of polymers depends on the substrate of cultivating of the microorganism and the source of carbon. These factors influence the price. The main way to reduce the price of the production is considered to be the use of biomass (waste production) as a source of carbon. As a result, we get expedited processing of organic waste and mineral compounds rich in compost. According to known manufacturers in the USA, production of 1 ton of biomass-based bioplastic costs

$8,000, which is certainly cheaper than the budget of yearly maintenance of the plastic landfills.

Thus, the bioplastic production from wastes can lead to improvement of environmental and economic situation in the country. It seems we can reduce the import of plastic products, recycle organic wastes and develop the scientific sector at the same time.

A good business decision is the placement of bioplastic laboratories directly by food and agricultural plants to organize the completely closed production cycle.

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FUTURE TRENDS IN DEVELOPMENT OF RENEWABLE AND ALTERNATIVE ENERGY SOURCES IN UKRAINE

O. Danylko

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

Renewable energy sources (RES) are used in both developed and developing countries. Great success in the development of RES has been reached by countries where renewable energy has received the comprehensive state economic and legal

support and the development of RES, including the advance of new technologies, has been invested heavily. It is important that the cost of many RES technologies and use of the derived energy has been steadily decreasing due to further improvements and enlarged economies of scale.

The total capacity of power plants in non-conventional renewable energy in the world is about 4% of the capacity of all power plants with the output of about 2% of electricity obtained. However, the share of renewable energy (including traditional hydropower) in the EU power industry increased by 22% in 2010, and it was primarily due to alternative energy sources. By 2020 the EU will increase energy consumption by non-conventional renewable energy to 20%. A major motivation for the development of RES for many countries, especially those dependent on imports of traditional energy, is energy security. Thus, within the period of 2010-2015 the growth of global installed capacity of electricity produced from RES annually was about 8% annually, rising from 1,348 GW to 1,985 GW. The output of renewable energy for the period increased at about the same pace.

It is not surprising that in 2013 the share of RES in the total energy supply in Ukraine was about 3%, and that in the electric power supply, primarily due to hydropower, it was about 7%. Traditionally, the most significant contribution to the production of clean renewable energy in Ukraine is made by wind power. For instance, in January and February 2016 wind power stations managed to generate 178 million kWh (63%) out of the total of 284 million kWh (cf. 200 million kWh for the same period of 2015), indicating a considerable potential of this type of RES in Ukraine, which that has not been always employed to its full. The potential of wind energy resources in Ukraine to have been used by 2030 is estimated to reach 16 GW, generating electricity of 25-30 TWh a year.

In conclusion, the use of RES is certainly a great step towards environmentally friendly future. They can fully replace traditional sources and significantly reduce the dependence on imported resources. We should give due consideration to financing production projects that use RES as they are designed for the long term and will help save traditional energy resources. RES are being successfully developed in the world,

and the progress in power industry will continue, resulting in RES becoming more and more competitive in the energy market. Development and implementation of RES-based projects will not only make a step towards the development of innovation, but also increase the level of environmental safety in the world.

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DEVELOPMENT OF SOLAR ENERGY IN THE WORLD

V. Zhyrnyi

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "KPI"

Because the world population is increasing, and because industry and technology are growing, additional supplies of energy are needed to support today's industrial civilization. Some energy sources, such as oil and gas, are hard to get and

expensive, however. The development of alternate sources of energy is an important goal of today’s scientists and technologists.

One alternative source of energy is the energy of sunlight. We can use it almost the whole year. Nowadays solar energy is widely used in places where other energy sources are unavailable or hard to get.

One square meter of the Earth's surface receives the amount of solar radiation, which is enough to get from 1 to 1.3 kWh of electricity per day [1]. But many places often have dark, cloudy weather. It is the main problem of solar energy.

The years passing by, solar cells are being replaced with heat-exchange elements with a selective light-absorbing coating. Substances in these elements are able to absorb almost all the energy which is directed at them, and this allows them to be heated up to high temperatures. This opens the possibility of creating steam boilers based on solar energy.

In most countries, solar energy is constantly developing. For example, in Germany people install solar cells or panels on the roofs of buildings. It allows providing your house with its own electricity or reducing the electricity bills.

The greatest solar power station in the world is located in California, USA. The station produces clean energy and works without burning any fuel. As a result, the number of harmful emissions in the USA has been decreased by 17% [2]. It allows generating electricity around the clock, as superheated fluid is stored in special reservoirs and at night is used for rotation the turbines. Californian government plans to generate one-third of all energy by using alternative sources. This is the so-called Revolutionary Plan of California [2].

Ukraine also has a large area that is suitable for solar energy generation. The most promising regions are steppe and the Crimean peninsula, where we have the greatest amount of solar radiation per year. In Ukraine there are more than 100 solar power projects which are at various stages of implementation in all regions of the country; their total capacity is of over 1,380 MW [3]. For the development of solar energy in Ukraine, we can use all south of the country. Also, it is worth investing in

the development of scientific technologies that will be economically beneficial for the use of solar energy.

As a result, today solar power is not an alternative source of energy; it is the foundation of the new economy.

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NANOTECHNOLOGIES IN THE ENVIRONMENTAL PROTECTION

E. Zhuk

Faculty of Electronics,

National Technical University of Ukraine "KPI"

Environmental protection is one of the primary human issues at the moment due to the fact that the Earth is our home and we have to take care of it. Air pollution, oil spills, radioactive waste and depletion of fields – it's only beginning of the list of ecological problems caused mostly by people. However, almost all of these troubles can be corrected with the help of nanotechnology.

But, firstly, we have to be knowledgeable what nanotechnology is and what we do mean when using this term. In fact, this is a huge area that can be divided into three parts: production of chips, nanoscale robots and engineering at the atomic level [1]. To take it more generally, we are talking about technologies based on the work with molecules and atoms.

It is not apparent immediately how particles which cannot be seen with the naked eye can save the entire planet from the environmental disaster. But this is the crux acting at the molecular level; we are able to analyze accurately the nature of the one or another problem, to see it fundamentally, thereby finding ways to solve it.

One of the most painful ecological issues in Ukraine is purification of the rivers from the radioactive waste. Now the work of scientists is focused on creating a nanotechnology solution which is based on absorbent performance of titanate nanofibers [2]. Due to their structure, they are excellent material for removing ions of radioactive cesium and iodine in water.

Although humanity has been extending away from the oil dependence and the alternative fuels have been becoming increasingly popular, the number of disasters which result in the oil spills is not being reduced.

The modern methods are not effective enough to virtual elimination of the consequences of this kind of pollution.

Despite the fact that the usage of nanomaterials in this area is in early stages, researchers are offering various cleaning methods: the usage of microorganisms to digest oil, the creation of different nano pumps and devices for removing the gasoline particles from the water, and the application of chemical agents for dissolving the oil.

Also, researchers have demonstrated that the use of silver nanoclusters as catalysts can significantly reduce the polluting by products generated in the process used to manufacture propylene oxide [3].

Nanotechnology is the realm of science that is only beginning to develop and the deeper we experience the molecular level of life, the more opportunities we have, and usage of this knowledge will help us to restore the Earth Eco-balance so that our children will be able to see the sky instead of the large cities’ smog.

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A NEW PHOTOVOLTAIC NANO-MATERIAL

I. Zakliuka

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

Today there are many different types of clean energy such as solar, wind, hydropower and others. These energy sources provide less than 10% of total power consumption worldwide. Humanity hopes that in the near future these energy sources will deliver significantly more energy for the world market.

As for solar power, it is currently generating twice as much as other renewable energy sources. But still 1 kW solar power is several times more expensive than 1 kW of energy from thermal power plants [1; 2].

Recently solar energy research firm WaSolar has announced the development of a new photovoltaic material called PmaxV. Like a thin polymer film, PmaxV uses quantum dots for better conversion of solar energy and higher cost efficiency. The production of PmaxV is similar to that of paper, which will significantly reduce the cost of solar electricity. Also, the material is highly effective, harnessing about 30% of solar energy, and the feasible efficiency to achieve in the further research is up to

50%. The mass production of PmaxV would make it possible to cover large areas. PmaxV quantum dots are made of nano-sized particles of semiconductors. By adjusting the composition and size of these particles we can control the zone of photon absorption and electron emission. In PmaxV, the quantum dots made of cadmium-selenium and tellurium-lead absorb photons of different wavelengths, minimizing the amount of heat lost through photons, and improving the movement of electrons [1].

Scientists believe that PmaxV could solve the problems of global warming, and reduce dependence on fossil fuels. However, multimillion investments are required to start the PmaxV production on a large scale in order to meet global energy needs. Also, some chemicals used in the PmaxV production can harm the environment and the people involved.

The research team of WaSolar understands that it will take many years and a lot of funding for the PmaxV project to be launched. WaSolar wants this technology to be introduced as soon as possible and used to combat global warming, but it also realizes that the new technology could create a potential hazard, so this project is now postponed, and requires further discussions. Still, if the PmaxV project is partially or fully implemented, it may fundamentally change the effectiveness of solar energy.

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GLOBAL WARMING

A. Zakharchenko

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "KPI"

What is global warming? Global warming is a slow increase of Earth surface temperature that is related to the greenhouse effect and results into climate change on a global scale. Currently, global warming is becoming a very big problem in the world. Some environmentalists think that global warming is a product of industrial global reform, and if it continues, it will kill civilization. Global warming is a problem, and we must make some steps to deal with it. [1]

Firstly, human activities have resulted in industrial growth that lead to the increase of the amount of greenhouse gases which, in its turn, has increased radiative influence of dioxide carbon. The dioxide carbon emissions still continue to increase due to burning of fossil fuels which influence greenhouse effect greatly as well, and, consequently, global warming too. The greenhouse effect is the absorption of energy radiated from the Earth's surface by carbon dioxide and other gases in the atmosphere that make atmosphere warmer. [1] One of the main problem is the global temperature increase, as it increases sea level. As a result, we may face natural disasters such as floods, droughts, hurricanes more often. On small islands flooding will be possible due to sea level rising, and it will impede local infrastructure development and settlements. It can also lead to homelessness in lowland such as Bangladesh and statelessness for people in countries such as the Maldives and Tuvalu.

Also, the consequences of climate change include adverse effects on indigenous peoples at high latitudes, and, in general, bad influence on people's health. During the 21st century, climate will be affecting millions of people adversely due to flooding of coastal places, reduced water supplies, rising malnutrition and increasing of bad health effects.

If we want to save our planet, we ought to do many small steps, which are very important. Next, I will list some steps to improve our planet.

Firstly, we must use renewable energy instead of using our limited resources of fossil fuels for our industrial facilities. Their using increase the level of carbon dioxide greatly, that, in its turn, makes atmosphere warmer.

Secondly, we must increase the number of trees on our planet; they have significant effect on level of carbon, because they absorb carbon dioxide. I think that every person may plant a few trees, this quantity will be better than nothing.

Thirdly, we need to use the cars on electric motors; thereby we will provide lower carbon dioxide emissions to the environment.

If we think about the future a little, and pay our attention to the matter, we can avoid the disasters and their consequences that were listed above. As one wise man said, “If you want to change the world, start with yourself.”

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RECYCLING BATTERIES IN UKRAINE

D. Ivashchyshyn

Military Institute

Taras Shevchenko National University of Kyiv

Introduction. The problem of recycling batteries is very relevant in Ukraine and all over the world. The aim of this paper is to describe the harm that batteries cause to the environment and human life and to suggest the ways to reduce the damage caused by the batteries.

Almost all areas of human life in some way are connected with the use of electronic devices that require independent power supplies such as batteries and accumulators. But the batteries are not lasting.

Our country is just beginning to create a system for disposing of used batteries, since almost all batteries are thrown in the trash. This is the point when the battery becomes dangerous. Heavy metals, that are used to make batteries, tend to accumulate in the human body. Even the small amounts of heavy metals are dangerous. For example, an integral component of batteries – cadmium affects the kidneys, liver, pancreas and it may also lead to lung cancer. Such component as lead accumulates mainly in the kidneys. It causes a brain disease and nerve disorders. Metallic mercury is a poison that affects the brain, nervous system, kidneys and liver. Also it causes nerve damage, impaired vision and hearing and diseases of the respiratory system.

Only one battery is capable to poison twenty cubic meters of soil or more than four liters of drinking water. If a fire occurs, all dangerous elements get in the air and poison the human body. Carelessly thrown battery reaches the landfill where each summer with other debris it releases clouds of dioxin. Even minimal doses of these toxic compounds (their performance is in 67 000 times stronger than cyanide) cause cancer, reproductive disorders, poisoning, slow development and affect children's health.

Under the current rules, dioxins must be disposed of in specially designated enterprises. But the recycling process is much more expensive than the income received from the raw materials. In Japan, for instance, the batteries are collected and they will be disposed when a new and cheaper method of disposal is invented.

The utilization of batteries compared to other waste management is much more difficult. Yet the solution exists. "The Ministry of Ecology and Natural Resources of Ukraine started the national program of collecting and recycling used batteries called "Recycle Them Right!". The ministry define companies that will store and recycle batteries and watch the duly organization of this process from collecting to recycling" [4].

Moreover, here are some tips to reduce the environmental damage caused by batteries:

1. It is recommended to use devices that do not require batteries.

2. It is better to buy “no cadmium” or “mercury-free” batteries, as well as rechargeable batteries.

3. It is forbidden to throw batteries in the trash. They should be stored for further recycling. Until batteries are carried to the collection points they should be stored in a plastic sealed container (preferably not in a house).

Conclusion. The batteries thrown in the trash become very dangerous to the environment. And besides, different metals such as mercury, nickel, cadmium, lead, lithium, manganese and zinc contained in the batteries are accumulated in human organisms and cause many diseases. To solve this problem Ukraine has already started the national program of collecting and recycling used batteries, but people’s initiative is even more important.

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UKRAINE OVERFLOWING WITH GARBAGE

S. Ikkes

Institute of Physics and Technology,

National Technical University of Ukraine "KPI"

Nowadays, the negative human impact on nature is undeniable. With fabricating a billion tons of products every year we pollute everything around us: from the highest reaches of the atmosphere to the ocean depths. Ukraine is not an exception. Enterprises in our country produce a huge amount of fabrication every year, mostly, foodstuff that is packed in bags made from synthetic materials such as polyethylene, PVC, nylon, etc. The average Ukrainian generates about 250 kilograms of solid waste annually, residents of large cities – over 350 kilograms. This means that the average man in our country generates such waste that exceeds his own weigh at least four times.

The most common method of recycling garbage in Ukraine is ground dumping, which, in fact, is not a real recycling. Landfills leach liquid wastes into nearby groundwater and erupt "landfill gas", the emission of decomposed waste, in the atmosphere. This dangerous gas is a major contributor to global climate change, but by means of utilization, we can get a lot of energy from it. Unfortunately, landfill gas utilization is not applicable in Ukraine.

More than 7 percent of Ukraine are landfills and most of them are illegal. There are no laws to regulate the environmental situation here, as a result, most of people have a low level of environmental consciousness. While, there is a penalty for each tonne of waste exported to landfill in countries that are more economically developed, illegal dumps in Ukraine are seven times greater than legal and exceed 35 thousands. Many Ukrainians still do not sort even plastics, cardboard and glass. Some of them throw garbage into waterways and forests and think that it's normal, – "everybody acts this way".

The packaging had become one of the largest and most rapidly growing categories of discards. More than 30 percent of municipal waste is packaging and 40 percent of that is plastics. On average, plastics can stay intact for hundreds or even thousand years and this is a real problem. The Pacific Ocean is now six times more contaminated with plastic waste than zooplankton.

As mentioned above, more than 7 percent of Ukraine is occupied by landfills and if the measures will not be taken, landfills will continue to grow and the life of our descendants will be full of difficulties that no one has ever seen.

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NANOTECHNOLOGIES IN THE ENVIRONMENTAL PROTECTION. COMPUTER SCIENCE'S TASKS

V. Kasiian

Faculty of Biomedical Engineering,

National Technical University of Ukraine "KPI"

The trend of integration of experience in the IT application in various disciplines and areas of human activity appears at the beginning of the XXI century with the development of information technology and improving software. And problems of the nanotechnologies in environmental protection are not an exception.

Thus, information technologies exist and improved due to nanotechnology, but also help to solve various problems of nanotechnologies including in the field of environmental protection.

One of the main tasks of Computer Science in the field of the using of nanotechnologies for environmental protection are:

1. Modelling and design of new nanomaterials with the required properties, one of which is to be safe for humans and the environment. The article [1] is one of the examples of this problem resolving. This article proposes a computational screening approach to design safer nanomaterials. The work is based on the calculation of key physicochemical properties of nanomaterials that are related to their safety, functionality and synthetic feasibility. These properties are then used to select a pool of promising structures for further experimental testing and development.

2. The theoretical computing analysis of capabilities of the existing nanomaterials and their models for using to solve environmental problems [2].

3. The analysis of nanomaterials influences on the ecological systems by using of mathematical and analytical modelling, statistical methods.

4. Mathematical analysis of actual using of nanomaterials for environmental improvement.

5. Search for and computer modelling of environmental problems that can be solved with existing nanomaterials.

6. The correct formulation of technical specifications and design of processes at different stages.

7. Improvement of mathematical tools in order to improve results of computer simulation the use of nanomaterials for environmental conservation.

8. The formalization of the existing complex environmental problems and develop new software to resolve them including the nanomaterials using.

And the main mission of Computer Science in the field of nanotechnologies for environmental protection is a method of computer modelling to minimize the use and utilization of nanomaterials risks to the environment, to increase the efficiency of

their implementing and using, to find new and more successful solutions to global and spot problems.

The use of nano-robots and artificial intelligence in the diagnosis and therapy of living organisms – Nanomedicine – is one of the brightest examples of this mission and as a consequence, it also poses new challenges for computer sciences including in the protection of all life on Earth.

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CORRECTIVE ACTIONS FOR THE NUCLEAR INDUSTRY IN TERMS OF KYSHTYM DISASTER

M. Korobko

Faculty of Electronics,

National Technical University of Ukraine "KPI"

Industrial or man-made disasters are increasingly shaking our life. Each emergency claims new innocent human life, although they are rarely caused by anything except negligence, lack of qualifications or accidents. Furthermore, since in our consumer society competition is unavoidable and often violent, safety precautions are

discarded when they entail profit losses. Nuclear reactor accidents and plutonium disasters have the most harmful ensuing consequences for the environment. In order to decrease ecological implications, it is important to focus on safety and security of nuclear power reactors and provide new corrective actions for this industry.

It was the autumn 1957 that a child called Gulnara was reaping the harvest in her village, Tatarskaia Karabolka, when she heard a blast so vast and encompassing that she and her classmates dove for the ground. She looked up to see a black cloud rise from the forest, spreading horizontally. It wasn't a new war as her parents thought; it was a radioactive contamination accident on the plutonium plant "Mayak". It had been kept in secret even when the Chernobyl disaster happened 29 years later.

About 5.5 hours after the event, the exposure rate was measured to be 18 R/h, however, the normal rate equals $20 \times 10^{-3} \mathrm{R/h}$. The villagers weren't evacuated; instead they were given the instructions to resume digging beets and potatoes as they had been doing before, with their shoes off and with no gloves. A few days later, only three of more than eighty villages, with alarmingly high rate of radiation, were mentioned in the order issued by Efim Slavskii as villages that must be relocated. The evacuation took over two weeks. It was evidently caused by an ordinate delay in reimbursements of expenses for the villagers' irradiated properties. Apparently the lack of financing also raised a question where to find liquidators. The children had once already helped by burning the crop and inhaling toxic smoke, so it was decided to exploit their labor again. Also, because of the expense in the rest of eighty villages, ministers set up a commission purchases system thereby public officials had managed to purchase and destroy products that were claimed as those with the radiation level exceeding the threshold. The water in the shaft was contaminated and claimed to be non-potable; most vulnerable animals were fed with contaminated fodder that concentrated radiation, their meat, as a result, considered to be inedible as well.

By the end of 1958, soldiers had relocated seven of eighty-seven villages where radiation rate went off scale. It cost astonishing two hundred million rubles. In spite of the fact that Tatarskaia Karabolka disappeared from local maps, and its collective farm was closed, its evacuation never occurred and people were left.

These days the information about “Mayak” incident, when 150 million curies of nuclear radiation were given off into the atmosphere, when 500,000 people were irradiated, and 267, 000 square kilometers of land were contaminated, is no longer a secret, and Russian government had to explain why people still live there and why the enterprise is still working. The Ministry of Health stated in 2000 that the radioactive background in Tatarskaia Karabolka had been less than 6 curies per square mile; thus, it had not exceeded the threshold, but it doesn’t correspond to what Soviet scientist had reported.

The story of one little village shows that corrective actions are far away from being proper and need improvements. Historians explain that these critical delays occur due to the lack of hands-on experience in dealing with nuclear disaster. But it was, at least, the second accident in Russia, and nowadays the situation hasn’t changed at all. Fukushima Daiichi nuclear disaster in 2011 followed the patterns established in the plutonium zone: flaw military project on the safety, accidents were followed by negations and downplaying the significance of damage, delays in evacuation to zones that had been contaminated as well, and the recruitment of short-term, minimally paid work force to do the dirtiest part of the actions. This is due to the fact that private corporations derive a profit from nuclear production and government gives them the warranty of being innocent in the case of nuclear accidents in every possible way. It means that corporations have insurance for loss or damage compensation and it is placed on the budget of the country.

New accident has already made Japan and German governments review their policies in the field of nuclear energy. There have been calls for abolishment of nuclear construction projects and reassessments of plant license extensions. But there are still many ideas that have to be provided in the future to maximize efficiency of all corrective actions. Massachusetts Institute proposed to transport a rapid-response team of essential workers, that obviously have to be trained beforehand, to irradiated plants in those cases when they cannot be staffed properly; report radiation risk to the public using a qualitative, intuitive scale instead of traditional measurements of radiation and radioactivity dose; choose sites remote from highly seismic areas and

coasts; greatly reduce (and perhaps eliminate) the possibility of damage due to massive earthquakes, tsunami and floods.

On the other hand, there is no need to close the plants all over the world and completely destroy existing orders. It is high time to make some regulatory changes, but first of all put behind some ignorance and poor judgment. Governments, presidents, heads of factories and plants must stop avoiding their responsibility and start being honest with people.

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HUMANITY AND ECOLOGY

D. Krutenchuk

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "KPI"

For many centuries our ancestors had lived in harmony with nature and were happy to live in such conditions. But then the situation changed. They tried to make

their life easier and more comfortable. They cut down trees, killed animals which had been living there for a long time and made first machines and instruments. They polluted the water, the air and the soil.

At present, large enterprises pollute the air people breathe with, the water they drink and the soil which gives them vegetables, fruits and bread. People are still keeping on cutting the trees down, not realizing that these green plants are in charge of oxygen precipitation and carbon-dioxide absorption. Have people ever thought about not having ability to breathe? I think, no. But one day it can become a cruel and tough reality as it is easy to cut down a tree but it takes much time to plant it and wait for its growth.

The world's filled with chemicals, nuclear wastes and poisonous industrial liquids. Unfortunately, Ukraine is not an exception in this issue. It is necessary to say that the Black Sea is currently in danger too. During the first international conference dedicated to the Black Sea and the Sea of Marmara, which took place in April, 2008 in Istanbul, the honorary chairman of the civil Turmepa movement in Turkey claimed that over the last 50 years the number of fish species in the Black Sea had fallen down. It can be the result of human activity and technological progress, in particular. Over 90% of all pollution is coming from the industrial wastes and household rubbish. The majority of all rubbish is going to the Black Sea from such rivers as the Dnipro, the Dnestr, the Danube and others. Europe is the one which is responsible for water pollution. But at the same time we should not forget that sewage disposals being bled off from Turkey cause damage to nature and people in its turn, too.

Now we live in the XXI century and people are going to become more interested and concerned in ecological problems. They seem to realize all danger. It seems to be potential and thinly-veiled now but in some period of time, let it be in some decades, it can become a crux of the matter which should be solved urgently and immediately.

It is horrible to imagine how the world can look like if we do not do a hand's turn. Just answer a question: do you want to breathe freely? Do you want to see both the sunrise and the sunset sitting under the tree? Are you already concerned about ecological problems? Then, make the planet where you live better!

How? Here are some solutions to these problems. It is necessary to take measures for abidance by ecological rules, which is standards of air purification, reservoirs, rational energy consumption, and improvement of the effectiveness of the energy systems. With this aim, taxation, depreciation, investment and other forms of policies should be performed. Moreover, creation and implementation of water purification set and gas treating systems should take place. If we want to help both our planet and us, we should think about purchasing the leading agriculture engineering machines and units. Furthermore, it would be a good idea to find and involve investors in agriculture as in Ukraine there are black soils which are considered to be the best of all for growing plants. If investors are interested in this field of business, Ukraine will be able to become one of the world's leading countries ever. Stopping cutting down the trees is also a crux of the matter at present. Besides, we should make organizations on providing the rational forest exploitation, according to which a number of plant trees should be higher than the number of cut ones. On a whole, I am of the opinion that the most important task is to develop people's awareness, perception of environment and sense of global consciousness with regard to political, juridical, social and ecological issues within the country and on the international level.

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ENERGY GENERATOR OF HEAT FLUX

V. Kurylenko

Faculty of Chemical Technology,

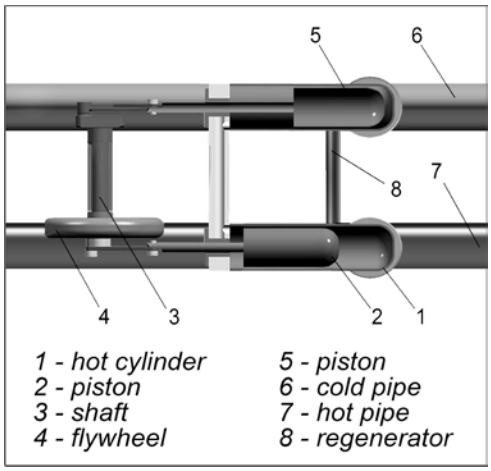
National Technical University of Ukraine "KPI"

Humanity is in need of ever-increasing amounts of electricity the receipt of which in most cases leads to global warming. In order to reduce carbon dioxide (CO_2)

emissions and save the ecology of the Earth it is necessary to provide energy-efficient devices.

The energy generator of heat flux converts the temperature difference of domestic hot and cold water system into mechanical energy by using Stirling engine. Mechanical energy is converted into electrical one by using electrogenerator and accumulators.

The essence of this invention is explained by the drawing, which shows a diagram of the heat flux used to generate electricity with the Stirling engine. The high thermal energy transmitter is attached to the hot pipe 7 and cold one – to low-temperature pipe 6. A hot chamber is attached to a cold regenerator 8, which is both a thermal battery and a cooler. The regenerator receives the heat of working fluid and transfers it to the cold working fluid. The pressure decreases by reducing the temperature.



Pic. 1 The draw of the generator

At the same time, the flywheel of shafts 4 and 3 rotates. The electric generator back-up power systems are set on the shaft 3. Thus, during the movement of the magnetic working pistons 2 and 5 with their magnetic field have the effect on the electric coil and the electric current.

The energy generator of the heat flux has a unitary construction and can be easily mounted to hot and cold water pipes of any diameter without changing domestic hot and cold water system. In such a way this device makes it possible to produce the ecosafe energy. This device was patented 25.12.2013, № 86257 «The method of using heat flow to generate energy».

To sum up, the proposed device is designed to produce ecosafe in-home energy for everybody converting non-usable heat emission. So this device allows us to produce energy absolutely free.

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OZONE LAYER

A.-M. Lazarevych

Faculty of Heat and Power Engineering,
National Technical University of Ukraine "KPI"

In the stratosphere, between 10 km to 50 km above the ground, the ozone layer is found where ozone, slightly bluish gas a pungent, makes up proportion of the air greater than at any other height in the earth's atmosphere [2].

The molecules are scattered so thinly through the stratosphere that if they were all collected together they would form a skin around the earth no thicker than the rind of an orange.

UVB can penetrate up to 20 metres down in clear water, and there is strong evidence to suggest that exposure to UVB is harmful to small creatures such as the larvae of fish, plankton, crab, and shrimp, and to plants essential to the marine food chain.

UVB radiation is also known to break down polymers which are used in buildings, paints, packaging, and in many other products.

In the stratosphere ozone is continually being formed and destroyed naturally. Ordinary oxygen molecules 0_2 are broken down into two oxygen atoms by the

ultraviolet radiation of the sun's rays. Such atoms then combine with other oxygen molecules to make ozone 0_3.

The action of sunlight on a mixture of pollutants, which are mainly emitted from motor vehicles, power stations and industry, produce the ground level of ozone.

The British Antarctic Survey team who had been measuring ozone levels over the Antarctic since 1957 reported in 1985 the first clear sign of damage to the ozone layer. They observed that in every southern hemisphere spring ozone was completely destroyed over the Antarctic, and it covered a region as big as the United States and as deep as Mount Everest [5, p. 11].

The Montreal Protocol was a landmark in environmental policy making because it was the first international measure designed to prevent – on the basis of scientific evidence – rather than cure a global environmental problem. Shortly after the Protocol was adopted, scientists established beyond reasonable doubt that CFCs and halons, together with the peculiar meteorological conditions that prevail over the Antarctic had led to the “hole” [3].

Under the revised Protocol, production and consumption of the controlled CFCs in developed countries must now be cut by 50% from the start of 1995, by 85% from the start of 1997, and phased out altogether by the year 2000.

CFCs and halons are “greenhouse” gases, which may contribute to the risk of global climate change. Greenhouse gases allow heat from the sun to reach the Earth’s surface but prevent some of the reflected infra-red or heat radiation escaping into space, thus causing global warming [1].

Various countries took steps to counter the threat to the ozone layer in the late 1970s and early 1980s. Some countries, such as the United States, banned the non-essential use of CFCs in aerosols.

As individuals we can do a number of things to help prevent further damage to the ozone layer.

Ozone depletion is a worldwide problem and it is vital that as many countries as possible take steps to protect the ozone layer. It is especially important to get as many developing countries as possible to join the Protocol since demand for the

goods which contain ozone depleting substances is on the increase in these countries.

In recognition of the special needs of developing countries the Montreal Protocol currently allows them a ten year “grace” period before they have to start following the phase out schedules set for controlled substances.

The European Community Regulation is quite simple. Limits are placed on the amount which each of the producers in the European Community can place on the EC market, and on the amount which can be imported into the Community from outside – imposed through import licensing [4].

It is very difficult to predict when the ozone layer might begin to recover. Ozone depleting substances take to drift up into the stratosphere and break down – up to ten years – so that depletion of the ozone layer is likely to become more severe. Scientific models predicted that chlorine loading in the atmosphere would reach a peak around 1997, and in the stratosphere about 2005. After then levels should begin to decline.

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URGENT PROBLEMS OF ECOLOGY IN UKRAINE

Yu. Mamchych

Faculty of Chemical Technology,

National Technical University of Ukraine "KPI"

Environmental protection and rational use of natural resources and environmental safety of human life are necessary conditions for sustainable economic and social development of Ukraine.

Everyone knows that the human body consists of water, so it plays an important role in the life of organisms. However, the ecological status of surface water is getting worse. Poor treatment of industrial water, insufficient wastewater treatment, and large organic saturation result in the third class contamination of all ponds in Ukraine.

Sewage treatment plants operating in the country are designed to deal with the first and the second class water pollution. Therefore, 80% of water samples taken in these waters do not meet state standards.

The problem of processing solid, household and industrial waste and its removal is most acute in cities and other settlements. Ukraine is the leader among European countries by the number of waste per capita. The problem of waste disposal remains unchanged.

Industrial waste is a great danger for the environment. The main source is the mining, industrial, chemical, metallurgical, machine-building, energy industries as well as agricultural and municipal services. In Donetsk and Dnipro regions the most dangerous and toxic wastes containing heavy metals, petroleum products, chemicals are accumulated [2]. Almost 20 thousand hectares of land are allocated for the storage of toxic waste, which cause water and air pollution.

The rational management of nature resources needs our government to spread the environmental information in order to increase knowledge of nature, and create

optimal social and economic conditions [2]. Therefore, environmental education must be a deliberate rather than formal act of knowledge accumulation.

To sum it up, the problem will exist as long as humanity does not consider it because this issue concerns future generations. Current environmental problems require urgent solutions. Therefore, let us cherish and appreciate nature!

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UKRAINE OVERFLOWING WITH GARBAGE

Ya. Mamchur

Institute of Physics and Technology,
National Technical University of Ukraine "KPI"

Nowadays Ukraine is facing many difficulties, caused by instability of economical situation and constantly changing political order. As a result, most of ecological problems faded into the background. However, they have not disappeared; on the contrary, some of them became even more serious. One of these problems is garbage overflow. In this thesis, we will regard some of the causes and effects of it and some possible solutions.

Firstly, we decided to answer the question: why garbage overflow occurs. The most apparent explanation hides in our wastes. Each year average Ukrainian throws away nearly 300 kg of domestic wastes and spends near 15 grn on its transporting. At the same time in Europe, this rate drops to 250 kg per year for one person. It is clearly seen that Ukrainians are wasting more.

Moreover, only 5% of recyclable garbage is in fact recycled in Ukraine. This is a terrifying number considering the fact that 80% are recycled in Sweden, Germany and Switzerland. Average percentage in Europe reaches 50%. Why is this matter so different? Because the most important steps of recycling, sorting of wastes, should be done by citizens themselves. That is a common thing in western society, while it is always considered as dirty work here.

In fact, the combination of big dispenses and small amount of recycling caused this summer an irreparable harm: 4 people died because of garbage dump overflow in Lviv region, on the biggest garbage dump in Europe. This situation forced local government to open a discussion of garbage disaster again. As a result, a big wave of domestic wastes came to garbage dumps all over the Ukraine in order to unload Lviv, and many hidden reefs came to surface.

One of the most prominent consequences of summer tragedy was the raise of Kyiv's dumps question. Now the city with more than 3 million of inhabitants stores all its waste in two dumps only: one is used mostly for organic waste, the other – for solid domestic waste. To illustrate problems of our capital we will use the second one, where the layer of garbage reaches 90 meters and its mass is estimated as heavy as 6.4 million of tones. Obviously, size of dumps that are used for storing waste from Kyiv is too small and their operation time expired a long time ago.

In addition, there is a sole waste burning plant near Kyiv – "Energia". It is using incineratable garbage to generate energy for 80 thousand of citizens. It could create positive effect on waste disaster if we omitted the fact that it only burns 20% of total waste and produces dangerous fumes. In addition, while recycling wet garbage, the plant uses additional energy in amounts that are close to the energy produced. So, it is not quite effective. There are some plans for the plant's reconstruction and raising its efficiency, but they will be turned to life not earlier than in 2018. By that time the amount of burned waste should be raised by 20%.

Considering shown examples, we realized that problem of garbage overflow is very complex and needs to be solved in a few steps.

Firstly, we need to modernize existing waste burning plants all over the Ukraine and to build new recycling plants, which will give us opportunities to reuse materials and not just burn organic waste, as it is now.

Secondly, no new garbage dumps should be allowed to be created by using existing Ukrainian technology. It should be clarified that existing technology is meant only for transporting our wastes to place in a few kilometers from the city and just leaving it there.

Thirdly, we need to rearrange existing garbage dumps to make them safer for stuff and minimize the amount of arriving garbage to lower the level of pollution of the territory. In addition, recultivational plan for ecosystems, which are damaged by dumps now, should be developed.

And lastly, Ukrainians should be taught to sort their wastes. Consciousness of citizens is one of the most important parts of progress in fight with the waste disaster.

All in all, the problem of garbage overflow in Ukraine should be considered by government as one of the most serious, because our country needs a solution now, or it will be too late.

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WATER AREAS OF CHORNOBYL NPP EXCLUSION ZONE: NEW WAYS OF RESEARCH

O. Makhnov

Faculty of Electronics,

National Technical University of Ukraine "KPI"

People in the world are all familiar with the Chernobyl Catastrophe, occurred in 1986. It was the worst nuclear disaster in human history in terms of causalities, costs and overall harm, leaving Ukraine, Belarus and Russia with the big ecological problem to solve. Whilst aspects of ground recuperation, reactor insulation, and flora and fauna protection are on the ear, the question of water resources is being somewhat left untouched [1, 2].

The number of different factors is obstructing full-on investigation and research of this problem, amongst which: bureaucracy reasons, lack of modern equipment and facilities to carry out work, but most importantly – an always-changing nature of the problem that requires fast measurement and processing capabilities [4].

Actual problem's nature is simple: radioisotopes are quite mobile in the water environment, resulting in a vast migration of isotopes over water-related ecosystems: fallen in from the atmosphere during actual catastrophe, isotopes form stains of pollution at the water area's bottom. After that, they can either go through the algae to fish, and, possibly, into human body or migrate into underground water resources. This results into the need for some kind of way to investigate bottom sediments to control and/or prevent spread of isotopes into environment [3].

Current way of investigation involves taking soil samples and lab processing, which can prove useful for research on depth distribution of isotopes, but requires quite some time, costs, laboratory and site work time to dispatch. Moreover, these methods require boats and, therefore, are only applicable for deep-water areas with bank/shore access.

In attempt to create new ways of radio-ecological control of water areas, we have developed a robotic system, which consists of self-propelled overwater platform with measurement equipment onboard and set of equipment needed to turn radiation control of the water areas into a fast and effective process [1, 4].

The robot is equipped with submersible gamma-ray spectrometer, which can tell us about the presence of radiation pollution and what kind of isotope is causing it. Moreover, there is a depth sensor onboard, that creates 3D maps of the water area's bed. This feature has proved its usefulness to find potential places to search for pollution, as isotopes tempt to migrate into deeper areas, and is also useful for those, which will carry out later full-scale research. Robot provides all the data: radiation measurements, GPS coordinates, depth data and other telemetry in real time, so the user receives radioactivity and depth maps immediately. This vastly increases time and cost effectiveness of work, making our system a right choice for many cases in radioecology of water areas [5].

On the early stages of development, specialists from Chernobyl Nuclear Power Plant helped us with information on possible improvements, after that we conducted a test for the robot near the Chernobyl Nuclear Power Station. In a while, we got kick-started by KPI-related projects: Stockholm Junior Water Prize, then Sikorsky Challenge [5]. Now with investments, we work on flushing out technologies and moving onto an improved mechanical platform, for which we require cooperation with semi-private or state institutes and organizations, like Chernobyl or Pridneprovsky Chemical Factory, which are already in touch with us, so there is a hope for a bright future of this project.

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PLASTIC CONTAMINATION

Ya. Muzyka

Faculty of Biomedical Engineering,
National Technical University of Ukraine "KPI"

Our nature suffers from different disasters such as acid rains, droughts, smogs, earthquakes, devastating hurricanes, floods and a lot of others. All these disasters are caused by different kinds of contamination. Water, air, radioactive pollutions are known for a long period of time. But today we face a new one and it is plastic contamination. It is one of the biggest threats to our water system and to its inhabitants.

Why is it so important to understand the danger of this type of pollution? It is because of the fact that nobody can live without water and it can be as dangerous as fire. This problem is the result of urbanization and development processes and of course it is more common to people living in big cities where population is increasing dramatically. So, the number of people who use such things is also increasing. And it is a pity is that our cities do not provide the satisfaction of living in because there are no factories which can recycle such kind of rubbish, and also we cannot be satisfied with the quality of water which we consume. And the main problem is that rubbish

releases harmful substances into the air and also covers our rivers, seas, oceans and other sources of water with dirt and dangerous substances.

Unlike other types of trash, plastic does not biodegrade; instead, it photo-degrades with sunlight, breaking down into smaller and smaller pieces, but they never really disappear. These plastic pieces are eaten by water inhabitants, washed up on beaches, or break down into microscopic plastic dust, attracting more debris.

There is no doubt, that this kind of pollution poisons us as it is coming into our organism with food and water, and also by radioactive waves which are coming as a result of interaction with sunlight. So, if we want to prevent ourselves from this type of contamination we should do something.

First of all, we should use things which are made of the materials which we would be able to renew and recycle; the second is to establish special factories which would be in charge of recycling the rubbish without giving a chance to spread and pollute our nature with harmful influence.

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SOLAR POWER STATIONS AS THE SOLUTION TO ENERGY PROBLEMS

O. Nosal

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "KPI"

Energy industry is a combination of branches of industries that study and use energy resources with the aim of production, transformation, transmission and distribution of power.

There are three main branches of energy industry:

1) oil and gas industry;

2) coal power;

3) energetics.

Power plants and nuclear stations produce electricity. Renewable energy includes: hydropower, solar power, wind power.

Solar power uses solar energy to produce electricity. Solar power uses renewable sources of energy and may become eco-clean without hazardous waste. Solar stations produce solar energy. They gather light with the help of photovoltaic elements [1]. They gather the solar energy and transform it into electricity [1]. Every solar station has its power [1]. The collectors of solar station gather, save and transmit heat. If we create ideal conditions for warming water in the collectors, this process will last endlessly [1]. So, solar stations are very perspective [1].

I think that using solar energy is the beginning of the development of renewable energy in our country. Ukraine is suitable for the development of heating by means of solar energy. The most promising regions for such development are the Crimea and Ukrainian steppe. Annual earning of solar radiation in Ukraine is the same as in Europe and in the world. I think that Ukraine can gradually move to the renewable resources of energy. In the beginning, we can create different models of solar collectors. Later, we can improve their productivity and set them in different organizations.

The benefit of solar energy is:

− accessibility and inexhaustible access to energy.

But there is some defect too:

− solar stations cannot work at night, at twilight and in bad weather.

Ecological problems are in using photocells that contain toxic elements: cadmium, gallium, arsenic, lead.

During the last five years solar energy in Ukraine has been developing very fast. Using solar batteries at home we should not trouble about quality of energy.

I think that using renewable resources is very expedient today because:

− It is free energy;
− It has a long period of exploitation (more than 20 years);
− Absence of regular servicing (only in winter we need to clean solar panels);
− continuous power supply.

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HEAVY METALS AS ENVIRONMENTAL POLLUTANTS

A. Ocherednyk
Faculty of Chemical Technology,
National Technical University of Ukraine "KPI"

An environmental problem arises whenever there is a change in the quality or quantity of any environmental factor which directly or indirectly affects health and well-being of human beings in an adverse manner. In this modern world we face serious environmental problems that need more attention to make the environment friendly to human.

One of big problems is pollution of water with heavy metals. The source of heavy metals in the environment comes from natural sources such as mining activities as well as industrial activities, agrochemicals, wastewater treatment system, etc. Heavy metals cause damage to human health. One of them is arsenic; it can damage skin, eye-sight, and liver. Cadmium provokes cancer, kidney damage, mucous membrane destruction, vomiting, diarrhea, bone destruction. Chromium leads to allergic skin reactions and cancer of gastrointestinal tract, lungs, headache, nausea, severe diarrhea, vomiting, hemorrhage, and has an adverse potential to

modify the DNA transcription processes. Cuprum can cause liver damage, Wilson's disease, insomnia, pancreatitis, and myocardial damage. Quicksilver causes damage to the nervous system, kidneys, and eye-sight, protoplasm poisoning. Manganese can lead to neurotoxicity, low hemoglobin levels, and gastrointestinal accumulation. Nickel causes diseases such as chronic asthma, coughing, weakness and dizziness. Lead causes anemia, damage to the kidneys, damage the ability to synthesize protein. Excess of zinc in water leads to the loss of appetite, depression, lethargy and increased thirst.

Facing all these dangers people should use absorbent. Clay minerals are one of the most abundant materials on the earth. For the environment protection, the clay minerals have been used in the disposal and storage of hazardous chemicals. Clay minerals have the catalytic capability to neutralize certain organic hazardous chemicals. One of the most important characteristics of clay minerals is adsorption capability.

Clay and clay minerals have also been explored as the absorbents for the removal of heavy metals from aqueous solution. The advantages of using clay minerals as the primary adsorbents for the removal of heavy metals are great. They have high ion sorption capacity, absorption ability, chemical and mechanical stability, and large surface area of absorption. Different types of clay minerals have been tested for the removal of heavy metal ions from water and wastewater. Consequently, using available materials as clay and clay minerals chemists can make a great contribution into the protection of the environment.

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GARBAGE: THE GLOBAL PROBLEM OF LOCAL AREAS

O. Petrenko

Faculty of Biomedical Engineering,

National Technical University of Ukraine "KPI"

Excess garbage problem rises sharply in the 21st century. Causes of escalation of the problem lie in the change of life style at the joint of 20-21 centuries. According to research by UN-Habitat III [1], it is expected that by 2050 70% of the world's population will be city inhabitants. Such rapid urbanization of the world has a huge impact on what will be the future of humanity. The UN report, presented to the participants of the session of the Preparatory Committee, reported that a hundred years ago only 20% of the world's population lived in urban areas. In the low-developed countries, the figure was much lower – 5%. Since then the world has become more urbanized: in 2008 for the first time the urban population surpassed the rural population.

Today more than half of humanity lives in cities. The number of urban population is increasing annually by almost 73 million. By itself, the ongoing urbanization trend brings economic benefits: people create demand for modern high-tech products and services, developing a culture of innovation. The flip side of urbanization is piles of garbage outside the city limits.

At the same time, highly developed countries have learned to relate to garbage as a resource for the production of many goods market. It also created and legislated responsibilities of citizens to sort their own garbage. The culture of environmentally responsible lifestyles in Western society is also created and developed.

Thus, the problem of garbage is the problem of countries with relatively low levels of economic development and low ecological culture. To put it simple, the garbage is the problem of third world countries. It is necessary to give some figures here. According to the International Solid Waste Association [2], in Ukraine every year there are more than 1 billion tons of municipal solid waste. 1,053 enterprises are

engaged in the export of 770 registered landfills, illegal dumps 3298 and 2 waste incineration plant. But the average level of utilization of solid household waste does not exceed 6%! At the same time, according to the International Association of Solid Waste (International Solid Waste Association), “the potential of the Ukrainian market of municipal solid waste is estimated at more than € 1 billion per year”. How to solve the problem of the growing debris in countries with low levels of economic development? From our point of view, the solution must be comprehensive:

− The creation of legislation and regulations for separate waste collection in accordance with the directions of its further processing into products needed by society. In particular, in Ukraine it is necessary to develop and implement a law similar to the existing law (Law “On the subject of cleanliness and order”, which took Poland into effect July 1, 2013 [3], put an end to illegal landfills and forced population to separately collect domestic waste.) in the EU;

− To intensify advocacy of environmentally responsible behavior of children. To do this, enter the special classes in kindergartens and schools;

− It is also important to carry out social advertising, promotions, instilling a culture of environmental to adult population. In developed countries, such advertising goes on the central TV channels.

Public funding of such propaganda is not enough in Ukraine and other countries, where the sharpness of the garbage problem is growing. To activate the process of creating a culture of environmentally responsible lifestyles sources of grant funding can be used in Ukraine, for example in the EU Eastern Partnership program [4].

Therefore, it is necessary to attract the money of the local businesses interested in the use of waste as a resource for their own businesses. It is important to reduce bureaucratic barriers to the use of waste as a resource, already accumulated in landfills all over Ukraine. Recycling waste is a highly profitable business in highly developed countries. In Ukraine, the cost of permits for the use of waste for recycling has high corruption This turns a simple garbage into gold resource, and deters

investors from the “garbage business”. Solving this problem is possible by solving the problem of corruption in Ukraine.

To sum it up, the author considers it necessary to emphasize that the way of Ukraine going to the civilized world, the community of developed countries, runs through the solution of the global problem of marine debris through its local area.

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GLOBAL WARMING

M. Poda

Faculty of Chemical Technology,

National Technical University of Ukraine “KPI”

Nowadays, environmental problems are in the spotlight. Many of them are caused by global warming. Scientists try to find the solution of the problem every day. Furthermore, environmental problems might become the starting point of the end of the world.

Firstly, the permanent increase of the surface temperature results in the big changes in the overall climatic environment (e.g. the average temperature of the Earth

is up by 1 degree for 100 years in a row). Scientists believe that global warming is one of the results of the industrial revolution. If this continues, it can lead to the destruction of human race. Air pollution is one of the most important causes of global warming. More and more plants disappear in various countries across the world. Pollution of the air with oil, coal, petrol, and natural gas leads to the fast increase of carbon dioxide concentration in the atmosphere. Besides that, cars also greatly affected our atmosphere by the combustion of large amounts of fuel and production of noxious gases that poison our atmosphere. As a result, the environmental problems appear and destroy our earth in a progressive way. Thus, all the aforesaid steps negatively affect the heat balance of the earth. Sea levels are ever increasing. Different plants and animals living in coastal areas run into danger. Weather changes from pole to pole. Floods, droughts and destructive storms appear as the result of such changes.

People in colder regions might be glad at a weather warming. However, the inhabitants of the hot countries could suffer from high blood pressure and other diseases. In addition, some species of birds and animals cannot survive because they do not have an opportunity to adapt to the new conditions. They have a need to migrate in the remote chance to find an appropriate place for living.

Global warming is already having a substantial impact on our world. The temperature is rising, the glaciers are melting, the Ocean level is rising, the forests are disappearing, and different species of animals are becoming extinct. Admittedly, we can ignore it until the time comes, but the problem exists and it is a challenging issue. As ordinary people, we believe that we are helpless to prevent global warming, but it is not the case. Practically all the products that we use every day can be recycled and that is one of the ways that can help in protection from global warming.

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NANOTECHNOLOGIES IN THE ENVIRONMENTAL PROTECTION

A. Puliaieva

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

Nowadays, pollution of the Earth has become a complicated and serious problem of mankind. It contains pollution of the air by transport, plants and factories, pollution of water and terrains by harmful chemicals and nuclear waste products etc. Nevertheless, there is a number of people and countries that provide modern ways of production, such as Green Nanotechnologies.

Nobel Laureate Richard Resin was an active supporter and researcher of alternative energy sources derived, in particular, on the basis of nanotechnology. He believed that the main sources of energy are: solar, nuclear interaction, subterranean waters and nanotechnology.

Today, virtually all sectors of human activity (including industry, chemistry, energy, electronics, agricultural sector, biology, medicine, pharmacy) are somehow related to nanoscale objects. Nanomaterials and nanotechnology are used to create new materials with amazing properties. For example, covering nanomaterials are used in various fields of technology, increasing the durability, reliability, efficiency of components by preventing corrosion, oxidation, overheating.

People are increasingly turning to hi-tech substances. While traditional materials are used everywhere, nanosystems are becoming more efficient and environmentally friendly. First of all, there are a number of available materials like nanocrystalline cellulose that can be used for different filters or pipes.

We can distinguish two main goals of Green nanotechnologies. The first objective is manufacturing of nanomaterials without harmful substances which are important for ecology and health of people. The second objective is producing nanoproducts that afford solutions to ecological problems.

As we know, Green Nanotechnologies make current products of manufacturing processes more environmentally friendly. To make nanoproducts without poisonous ingredients using less energy, methods of green chemistry are used. There are a number of researches in this way such as production of solar cells, practical fuel cells, and new kinds of batteries.

Nanoshells are a new type of nanoparticles with customized optical properties, which consist of a dielectric core and ultra-thin shell. Golden nanoshells have high optical absorption derived from active interaction of light and electrons of the metal. Nanoshell can be used for optical analysis of blood and other body fluids, targeted drug delivery to cell pathological processes, photothermal ablation of cancer cells as well as biological Nanosensors.

One of the most useful materials is system of nanoscale membranes that is used for separating desired products of chemical reactions from waste materials. Another way of using nanomaterials is production of sensors for process control systems.

Nanoproducts usually provide solutions to environmental problems. It is impossible to refuse from daily products that usually need a lot of materials and energy to be applied traditionally. Lightweight nanocomposites for automobiles, nanotechnology-enabled fuel cells, light-emitting diodes (LEDs) and water-treatment devices are made using green nanotechnological methods which minimize noxious impacts to the environment.

Nanomaterials can be used for the treatment of water. It is proposed to use nanomembranes in nanofiber filters, carbon nanotubes and various nanoparticles. Nowadays, water treatment systems are less efficient than 20 years ago. There are problems with pure water in different countries. It is the reason why new nanofilters are being demanded. There are a lot of scientific researches which are evidences of topicality of its development. Moreover, we can adapt organic materials to make

nanocomposites cheaper. It can be successful way for business all over the world. It is worth saying that Ukraine has a lot of waste organic products such as stem of grain that can be used for production of nanocrystalline cellulose.

Scientists work out other properties of nanomaterials we can use, but now they are very expensive. It is a reason for them to try to make nanosystems from more widespread materials. To my way of thinking, nanomaterials will become cheaper in the future and will be indispensable in the heavy industry.

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SOLID HOUSEHOLD WASTE MANAGEMENT IN UKRAINE

H. Slyvchak

Faculty of Chemical Technology,

National Technical University of Ukraine "KPI"

Problem of solid household waste is an actual problem for Ukrainian cities. Irrational waste causes a number of problems. Firstly, waste harms the environment in particular it aggravates quality of soil and water, some volatile waste can even pollute the air. Secondly, country loses an opportunity of making additional sources of obtaining energy and materials, decreasing costs of landfills maintenance.

Household waste – is a kind of waste generated in the course of a daily life and activities of people in residential and non-residential houses (excluding waste

connected with manufacturing activity of enterprises) which aren't used at the place of their accumulation. Solid waste remains of substances, manufactures, products which can't be reused [1]. Except solid, there is also liquid household waste.

Today solid household waste mainly consists of food waste, paper, cardboard, wood, scrap of black and color metals, glass, polymeric materials. Also it contains salts of mercury from battery, toxic chemicals, varnishes and aerosols which can be found in the dry waste. The amount of garbage depends on season, development of consumer goods, package. For example, in autumn the amount of wastes increases due to fallen foliage or the contents of the glass decreased in the waste and increased part of plastic over the last fifty years [2]. This fact is explained by change in packaging material.

Problem of solid household waste in Ukraine is connected with its accumulation and poor recycling system. Today the annual volume of waste is fifty five and half million tons or two hundred million cubic meters. Moreover, it tends to increase [2]. It leads to rise the amount of official rubbish dumps [5], landfills for solid household waste disposal, volume of the illegal storage of solid waste. The number of overloaded landfills is three hundred fourteen (7%) and eight hundred ninety seven (20%) rubbish dumps, which do not meet ecological safety [3].

Insufficient amount of solid household waste removal services and their quality, lack of modern effective technologies of recycling the waste can be selected as basic reasons of problem [3]. Also it's necessary to remind about passiveness and lack of awareness of the population on the issue of solid household waste management.

There are some ways to solve the problem of solid household waste:

− Implementation of sorting solid waste can prevent ingress of hazardous waste on the environment, reduct areas of refuse dumps.

− Partial rejection of using landfills and the introduction of more modern methods of its recycling and neutralization.

− Introduction of methods of producing energy from solid household waste using modern technologies and equipment. It can be such thermal technologies as

direct combustion, pyrolysis, conventional or plasma arc gasification. Also such non thermal technology as anaerobic digestion, reprocessing of landfill gas can be implemented as methods of producing energy from solid waste [4] or anaerobic fermentation.

− Improving technologies for disposal of waste that can't be recycled in order to reduce their damage to the environment.

− Revegetation of lands used as landfills for solid waste.

− Educating the public to improve their awareness of environmental issues [3] and active informing about problems of pollution.

In conclusion, the problem of the accumulation and utilization of solid waste is critical for Ukraine. Waste sorting, partial rejection of using landfills, introduction of modern methods of recycling the solid household waste is considerated to be one of the solutions. Also the improving existing technologies, revegetation of lands and working with public are worth developing. Attracting international investment and support from the government can accelerate solution of this issue. The result of solving this problem may be earnings for country and improving general level of environmental awareness of population.

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USING OF CERAMIC NANOFILTRATION MEMBRANES FOR WATER TREATMENT

I. Sokolova

Faculty of Chemical Technology,
National Technical University of Ukraine "KPI"

One of the oldest problems of humanity is receiving clean water. Many years ago water was mainly used for household needs but now it is widely used in agriculture, for producing medicine, food, fertilizers and chemicals. These industries need extremely high degree of water treatment. The wastewater of any manufacturing process can be a threat for environment if it is not treated sufficiently.

The water treatment on a molecular level has been an incredible dream for scientists for a long time. But the nanotechnology development has helped overcome this problem. Today there are many nanomembranes which are used for water purification.

The first thing that needs consideration is the advantage of using the ceramic membranes. Firstly, they are chemically inert even in the reactions with oxidizers. Secondly, membranes have high thermal resistance even to steam (it can withstand a temperature up to 600 degrees Celsius) and high resistance against microorganisms as well to abrasive media (it can be used in medium of pH from 1 to 14) [9]. Finally,

they are easy to be used and stored. There are wide varieties of membranes depending on their operating conditions. For example, they can be produced in different geometrical forms: flat, tubular, multi-channel or monolithic [11]. Also membranes can differ by pore size. Besides, the finished system must be constructed in a pressure range in conformity with working pressure.

We should also consider a basic method of producing ceramic membranes. The first step is covering a porous base by a layer of suspension. Titanium dioxide, zirconium oxide, aluminum oxide for covering are used. Then this workpiece is dried and burned at the temperature more than 1,600 degrees Celsius [3, 5]. This method allows us to get membranes which are able to catch many types of pollutions.

General working principle of membranes is creating a high pressure on one side of a membrane. As a result, molecules with low molecular weight flow through pores but macromolecules can move only along the membrane and cannot penetrate in permeate [4]. Due to this process we obtain clean water.

There are four main types of filtration for which we use ceramic membranes:

− Reverse Osmosis is a water treatment technology using semipermeable membranes. It allows removing particles smaller than 0.0001 microns. This method is used to obtain an extremely high purity of water. As a result, we get water which is purified of individual ions [2, c. 350]. Usually systems for reverse osmosis contain a number of previous filters which protect the membrane from mechanic impurity or strong oxidants.

− Nanofiltration is a filtration process in-between ultrafiltration and reverse osmosis. Compared with membranes for reverse osmosis, nanomembranes have lower selectivity, higher permeability and lower working pressure [6]. It can remove pollutants between 0,002 and 0,001 microns, in particular some molecules, viruses and multiple charged ions. Today this filtration type is applied for removing organic compounds, pesticides, water softening and wastewater reuse system.

− Ultra-filtration or capillary filtration. This method allows removing suspended solids, bacteria and viruses but retains the mineral composition of water. During the ultrafiltration process of the substances between 0,002 and 0,1 micron size

are being removed [8]. The most effective use of capillary membranes is the final stage of water purification. Ultrafiltration is widely used for wastewater treatment and preparation of drink water.

− Microfiltration is a method of mechanical filtering of fine and colloid nanoparticles of size between 0, 1 and 1 micron. Microtiters allow removing sand, clay, algae, some parasites and single-celled organisms [10]. The real purpose of microfiltration is not to prepare water for use but a preliminary preparation of water for the next filtering stage.

During the transition from microfiltration to reverse osmosis, resistance which membrane exerts on water is increased because of decreasing membrane pore size. As a result, the working pressure which is necessary to make the filtering process is also increased. For example, the necessary pressure for reverse osmosis system is about 0,3 megapascal and for the microfiltration process we need only about 0,05 megapascal [1].

Therefore, due to its properties and features, typical applications for ceramic membranes are: separation of pharmaceutics wastewater, oil water separation, retention of germs and virus, filtration of organic solvents, dye separation, filtration of acids and caustics [9]. Today the most popular are organic membranes, especially polymer membranes, which occupy 80% of the world market. The general share of inorganic membranes is about 15%. [7, c. 348] It is clear from these figures that the inorganic membranes are hardly ever used. Nevertheless, one should accept that it is a promising direction of development of water treatment and sewage purification.

Furthermore, one should not forget that chemical industrial wastewater may contain very dangerous substances such as ions of hexavalent chromium, lead, cadmium, selenium and various nitrites. Thus, using nanofiltration membranes has become an urgent need of achievement a sufficient purity level of water.

To draw the conclusion, we can distinguish some pros and cons of using ceramic membranes. They have high thermal and chemical resistance so membranes will have a long service life. We can use them on any step of water treatment – from the simple mechanic purification to the final nanofiltration step. Thus, membranes are

widely used. But we cannot deny that they are quite expensive. From the presented facts, one may conclude that ceramic membranes are ones of the best in their category. Therefore, their application may be promoted to increase the quality of drinking water and help reduce a contamination of hydrosphere, not only in Ukraine but all over the world.

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ENVIRONMENTAL PROBLEMS OF UKRAINE

A. Stelmakh

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

A growing population of our planet requires a corresponding increase in the extraction and production of vital resources to ensure its stability. The consequences of our impact on the environment are both sad and disturbing. Violated natural formations and landscape, pollution of the atmosphere and surface waters, depletion of topsoil, shrinking forests and the resulting negative rate of speciation, chemical compounds circulating in the biosphere, each of these are harmful the health of human being and all living organisms. As researchers have found, the greatest harms to the environment are from agriculture, energy, transportation, and heavy industry. This is why the issue and introduction of energy saving technologies in these spheres of life are very important and are quite serious.

Until the present time, issues of environmental safety in Ukraine are often considered, but not really resolved. One striking example of this is the current state of the Dnipro river in the vicinity of the place of residence of people. The river has been turned into a swamp. The accumulation of environmental problems in Ukraine is admitted even by the government, but the government operates from the standpoint

of a lack of funds to confront the problem. The environmental situation in Ukraine deteriorated significantly after the accident at Chernobyl in April 1986. This event led to a sharp deterioration in the health of many Ukrainians and as well others.

The primary polluter of air, water, and soil is the transportation industry. At present, the problem of recycling and disposal of waste resulting from the operation of vehicles is very serious. Combustion exhaust gases from transportation operations contain more than 210 chemical compounds, most of which are toxic.

Another factor which is bad for the environment is industrial waste. In Ukraine, the main sources of industrial waste are mining, chemical-metallurgical engineering, energy production, construction, agro-industrial complexes, and utilities. Among them are wastes containing heavy metals, petroleum products, unused pesticides, the bulk of which are generated in Donetsk and Dnipro regions. The storage of toxic wastes consumes almost 20 thousand hectares of land. It is garbage dumped in landfills, much of which is a source of intensive water and air pollution.

Statistics indicate that approximately 80% of all harmful compounds in the air are a consequence of energy processes (the extraction, processing, and use of energy). Particularly harmful are emissions of sulfur compounds from metallurgical plants. Combined with water vapor in the atmosphere, sulfur trioxide forms sulfuric acid, which is very dangerous. The emissions from CHP are also quite dangerous, including heavy metal oxides, fluorides, and benzopiren related to carcinogenic substances. Nuclear power plants together with electrical systems produce large amounts of extremely hazardous substances.

The main negative effects of agricultural activity on people come from the impoverishment and depletion of Ukraine's fertile black soil, industrial soil pollution, the intensive development of native lands, the spread of monocultures, and the over-use of nitric and mineral fertilizers.

To sum up, all the above factors adversely affect the problematic ecological situation in Ukraine, and cause negative consequences such as the greenhouse effect, acid rain, and depletion of the ozone layer. If Ukraine does nothing to correct its environmental problems, then it risks slipping into an ecological nightmare, as seen

in many African countries. Therefore, the main task of activists, environmental organizations, and the public is to keep these environmental problems on the focus of public attention in order to achieve from our leadership and state real improvements in environmental protection.

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GLOBAL WARMING

D. Trachuk

Faculty of Chemical Technology,
National Technical University of Ukraine "KPI"

In our time people say and write a lot about global warming. Almost every day new hypotheses are suggested and the old ones are refuted. We are constantly afraid of what awaits us in the future. Scientists have presented the information that changes in climate can lead to the rise in global temperature. This rise can have some negative effects on the environment and our life. To successfully solve the problem of global warming we should consider its present and future possible harmful effects on the environment.

What are the effects of global warming?

The increase in average annual temperature of the surface layer of the atmosphere will be more perceptible over the continents than over the oceans, which in the future will cause the radical restructuring of the natural areas of the continents.

Taiga zone is shifting to the north by 500-600 km and is being reduced in size by almost a third, deciduous forest area will increase by 3-5 times and will occupy the territory from the Baltic to the Pacific Ocean.

Global warming will also affect the habitats of animals. Animals have appeared in various places where they have not existed before. For example, starlings and swallows have appeared in subarctic Iceland, a white heron has appeared in Britain. The effects of warming are especially noticeable in the Arctic Ocean waters. Nowadays a lot of commercial species of fish are found in waters, where they have not existed before. In the waters of Greenland cod and herring have appeared, and in the waters of the United Kingdom red trout and big-headed turtle have been found. The natural habitat of brown bears in North America has moved north to the point that hybrids of white and brown bears have begun to appear, and in the southern part of their habitat brown bears stop to hibernate.

One of the serious factors that influence global warming is radiation. We know that it negatively affects human health. For example, the accident at the Chernobyl power station made the ecological situation much worse. Scientists need to be more careful with radioactive substances, because they can destroy our nature.

Another serious factor that causes global warming is air pollution. The air in big cities, where there are many cars and stressful traffic of public transport, is very dirty and many people suffer from illnesses.

All these activities have dramatically changed the Earth's heat balance. The ground has become very dry, a lot of rivers and lakes have dried up, the forests have started burning, people and animals have started to die out.

Scientists do everything possible to solve the problem of global warming. They offer different original ways of its prevention, such as the development of new plants and breeds of trees, painting roofs white, installing mirrors in the Earth orbit and shelters from the sun and glaciers. They also suggest using non-traditional sources of energy such as the heat of human bodies for space heating, the sunlight to prevent the formation of ice on the roads, etc.

To sum up, I think we must solve problems on Earth first. To my mind, people can do without satellite television, but they will hardly be able to live without food, clean drinking water and fresh air.

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HISTORY OF SURGE ARRESTERS

H. Filipp

Faculty of Electric Power Engineering and Automatics,
National Technical University of Ukraine "KPI"

Lightning protection of structures began with the invention of the lightning rod in the 1750s and lightning protection of electrical systems has been introduced in the 1850s. The first telegraph system arrived about 1837, and in the following years the first devices for lightning protection were invented and installed on telegraph lines. This gapped device was then for the first time called arrester. Surge arresters for the protection against over voltages of power systems were first developed and installed in the 1880s. Since then there were several steps in technology and design. In 1970s the first gapless metal oxide surge arresters (MO arresters) appeared on the market, and in 1990s the first completely molded polymer housed surge arrester for application in high voltage systems.

The international organizations like Cigre started to collect the experience with the new products and give advice for standardization with the development of the arresters and application in the various electrical systems investigations. In recent years working groups in Cigre performed basic research work on the quality and performance of the todays MO resistors. Cigre TB 544 [1] summarizes the results of the performed research on energy withstand capability of MO resistors and gives an overview about today's surge arrester designs and tests. The discussions in the Cigre working group leaded to a critical review of the existing test standards for MO surge arresters and influenced strongly the new Edition 3.0 of IEC 60099-4.

The Cigre Technical Brochure TB 60 [3] was published in 1991 describing effects on gapless metal oxide surge arresters (MO arresters) from various electrical stresses encountered in 3-phase AC systems. Since then, continued improvements in equipment technologies coupled with de-regulated power industry interest in maximizing utilization of existing infrastructure have revolutionized MO arrester applications and their expected performances in a more stressful environment.

Today's proven confidence in the reliability and capability of modern MO arresters offer new possibilities of overvoltage protection and improved management of power system disturbances. Besides the above mentioned TB 60 and TB 544, surge arresters deal with various aspects of low voltage, medium voltage, and high voltage systems, including UHV systems.

A surge arrester is a protective device connected in parallel with system equipment. The device has a ceramic material (ZnO) disk enclosed in a porcelain housing with the bottom and the top cap. Some arrestors have several disks. Then silicone rubber is used to keep the disks in place and to enhance the device's heat transfer characteristics. The primary function of a surge arrester is to limit the over voltages that the equipment may experience, conducting the energy to the ground. This results in lower insulation requirements for the equipment. Ideally, an arrester begins conduction when the overvoltage in the system or equipment exceeds its protective level. It keeps this protective level over a wide range of current magnitudes. This is achieved because of the highly non-linear voltage-current

characteristics of the device. When a high voltage appears at its terminals, the arrester exhibits a low conjunction with the line surge impedance forms a voltage divider. While the arrester is conducting, the energy absorbed increases the temperature of the ZnO disk used in its manufacturing. The heat energy is dissipated to the porcelain housing and the environment. Determining the temperatures in the different elements of the arrester is very important since any excessive temperature may result in damage or failure of the device.

To analyze the performance of a ZnO arrester, knowledge of the voltage current (V-I) or the voltage stress-current density curve characteristic is needed. In a typical curve, we can distinguish three important regions.

1. *Low-current linear region:* the V-I characteristic is ohmic in this region and is defined as the pre-breakdown region.

2. *Intermediate nonlinear region:* this is the most important one in which the device conducts an increasingly large amount of current for a small increase in voltage.

3. *High current upturn region:* the curve is again linear but, in this case, the voltage rises faster than the current.

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DO THE ALWAYS "GREEN" TECHNOLOGIES OF POWER PRODUCTION ARE EXPEDIENT FOR GREENHOUSE GASES EMISSION REDUCING?

N. Khliiev

Institute of Physics and Technology,
National Technical University of Ukraine "KPI"

Recently, the technological development of industry all over the world has become oriented to the implementation of such legal acts as the Kyoto protocol (its continuation is the United National Climate Change Conference in Paris 2015) and laws those oriented on energy resources saving.

The Kyoto Protocol has regulated the anthropogenic emissions of greenhouse gases: CO2, CH4, N2O and other. The CO2 is the main gas among them. The main anthropogenic sources of greenhouse gases are:

1. Burning of fossil fuels (primarily CO2 emission at the thermal and electric power production and in various technological processes);

2. Production, transportation and storage of hydrocarbon fuel (in this processes methane and other hydrocarbons, which are greenhouse gases, emitted into the atmosphere);

3. Agriculture (methane emitted into atmosphere at animal husbandry and rice farming; methane emission in agriculture is "natural", but it has proportional relationship with Earth population);

4. Chemical industry (few greenhouse gases are substances which have never been in the atmosphere earlier, such gases, for example, are fluorocarbon refrigerants).

Each greenhouse gas has different “effect” on global warming. The effect of carbon dioxide (CO2) contribution in global warming has been accepted as etalon (global warming potential for CO2: GWP=1 kg CO2/kg greenhouse gas). For example, methane “effect” to global warming is 21 times more than that of CO2 (GWP=21 kg CO2/kg CH4).

It is known that burning of fossil fuels is cause of the main contribution to the total greenhouse gases emissions (two thirds of total anthropogenic emission). Therefore, the implementation of the Kyoto Protocol and oriented on energy resources saving laws are interrelated. Reducing the power consumption in different industries will promote to reduce the emissions of the main greenhouse gas – CO2.

In connection with the requirement of reducing the greenhouse gas emissions it is increasingly attended the necessity of application the “green” technologies of power production. For example, it is can be using the photoelectric cells, wind power, tidal energy for electricity production (generation). There are another perspective technology both for electric energy and heat power production. It seems that power generation by using “green” technology does not lead to the emission of greenhouse gases (mainly CO2), because there is no burning of fuel. But it is not correct.

The central problem at the implementation of “green” technologies is the fact that these technologies often demand more energy resources during the manufacturing of equipment than traditional ones. Therefore, for “green” technologies greenhouse gas emission does not occur at the stage of the equipment operation, but it occurs at the stage of equipment creation. As a result, such “green” technologies are not always ecologically cleaner than traditional systems.

Therefore, every “green” technology of heat and electrical power production should be carefully studied at all stages of its using, that is at its life cycle. Life cycle of power production is: stage of equipment manufacturing (for example, solar cells or wind turbines), stage of exploitation and utilization (recycling of equipment can be were power intensity process and therefore environmentally non-friendly technology).

The main aim of industry development is the greenhouse gas emissions reducing, so in this case, “green” technologies should be analyzed with calculation of

the value of total equivalent greenhouse gas emissions during the life cycle of the technology. Direct and indirect greenhouse gas emissions should be taken into account. For example, the direct emission of methane into the atmosphere is occurred during the mining of fossil fuel. The indirect emissions are associated with emissions of CO2 at electricity power generation on fuel-burning power plants. This electricity power can be used at technological process of equipment production. Only according to the value of the specific greenhouse gas emissions per unit of "green" electricity power one can draw the conclusion about the feasibility of using the concrete power production technology. Such methods are already available, but not always used in practice.

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THE IMPORTANCE OF BLUE CARBON

A. Shmykova

Faculty of Chemical Technology,

National Technical University of Ukraine "KPI"

The problem of global warming is rather relevant. It is a very difficult question nowadays. There is no doubt that global warming may cause unexpected changes in the environment. The population of the Earth and most of its ecosystems can also

suffer from it. This phenomenon leads to the extinction of more than one million species of plants and animals. Scientists concluded that the average global surface temperature will increase by 3-7 degrees Celsius.

One of the critical causes of climate change is increasing concentration of greenhouse gases such as carbon dioxide (CO2). They absorb thermal radiation from the Earth and as a result of it the energy balance of the planet changes and the climate becomes warmer [1]. Therefore, it is necessary to reduce the concentration of carbon dioxide.

The atmosphere is replenished by carbon dioxide due to the processes of decomposition of organic matter, carbonates, and as a result of the industrial activity. Till now scientists cannot say what is certainly causing the climate change. There are the main reasons of changes in solar activity, in axial tilt of the Earth, volcanic and human activities [4]. The experts emphasise that 20 percent of CO2 emissions are from manufacturing [4].

The binding of carbon has the great importance. Plants can absorb it in the course of photosynthesis. Scientists called it the green carbon. Carbon dioxide (called the blue carbon) can be absorbed by the living organisms in the ocean. The blue carbon occupies 55% of all captured carbon in the world [3]. It is accumulated and stored in coastal ecosystems such as mangrove forests, seagrass meadows or intertidal saltmarshes. It does not remain stored for decades or centuries but rather for millennia [5]. A huge amount of carbonic acid is inhibited in the form of limestone and other rocks.

Oceans play a significant role in the carbon cycle. There is a dynamic equilibrium between carbon dioxide in the atmosphere and the ocean [2]. Shellfish and coral reefs are active in CO2 sequestration which is included in the construction of the shells. But now we have a tendency of destroying the marine ecosystems. The speed of loss of these water ecosystems is much higher than any other ecosystem on the planet. This process is very rapid.

The loss of these carbon sinks plays a key role in managing climate, health, food security and economic development of the coastal zones. Aquatic ecosystems provide important barriers against pollution and protect them from extreme weather

events. They protect population from coastal erosion, storms and floods. Also they improve the quality of water, because they catch nutrients and sediments [2]. Reducing their number we can create a new carbon source.

To draw the conclusion, the climate change is a very important and topical problem. There are many ways of managing climate. Green plants are good absorbers of carbon dioxide but blue carbon sinks have a great potential in mitigating of the climate change. The loss of carbon sinks effects on the storing of carbon dioxide, health, food security and economic development in the coastal zones. Therefore, it is necessary to protect aquatic ecosystems.

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ВІДОМОСТІ ПРО АВТОРІВ

ПІБ студента	ВНЗ	Факультет	Група	Викладач англійської мови
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Куриленко Віктор Сергійович	НТУУ «КПІ»	ХТФ	ХН-51	Шніп Ю. В.
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Махньов Олександр Ігорович	НТУУ «КПІ»	ФЕЛ	ДК-51	Павленко О. В.
Музика Ярина Василівна	НТУУ «КПІ»	ФБМІ	БС-62	Компанець Н. М.

Носаль Олександр Юрійович	НТУУ «КПІ»	ТЕФ	ТС-51	Бойко І. В.
Очередник Андрій Васильович	НТУУ «КПІ»	ХТФ	ХМ-51	Бобровник С. М.
Петренко Ольга Володимирівна	НТУУ «КПІ»	ФБМІ	БС-62	Компанець Н. М.
Пода Марія Юріївна	НТУУ «КПІ»	ХТФ	ХН-51	Грищенко Я. С.
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Сливчак Гліб Олегович	НТУУ «КПІ»	ХТФ	ХД-51	Шніп Ю. В.
Соколова Інна Михайлівна	НТУУ «КПІ»	ХТФ	ХД-51	Шніп Ю. В.
Стельмах Адам Віталійович	НТУУ «КПІ»	ФЕА	ЕТ-с51	Аношкова Т.А.
Трачук Дар'я Дмитрівна	НТУУ «КПІ»	ХТФ	ХМ-61	Волкова О. А.
Філіпп Гліб Дмитрович	НТУУ «КПІ»	ФЕА	ЕВ-31	Ахмад І. М.
Хлієв Нікіта Олександрович	НТУУ «КПІ»	ФТІ	ФФ-62	Гавриленко К. М.
Шмикова Анастасія Андріївна	НТУУ «КПІ»	ХТФ	ХД-51	Шніп Ю. В.

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