

РОЗДІЛ 5

Наукові повідомлення

Economics for Ecology: Perspectives and Challenges*

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The paper analyzes the main perspectives and challenges of sustainable development implementing and green economy forming, with special attention being paid to such problems as climate change, pollution, depletion of non-renewable resources, wastes, threat to environmental health. The paper studies economic damages and opportunity costs caused by environmental degradation. It highlights environmental problems caused by trade and social unfairness. The paper also suggests the directions for successful realization of green economy concept among which eco-innovations, environmental services, alternative energy resources, recycling, eco-efficiency increase. The paper tackles corporate environmental responsibility as a strategic intangible asset and a source of competitive advantage.

Keywords: green economics, pollution, eco-innovations, alternative energy, recycling, sustainable development.

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Introduction. On May 6 – May 9, 2014 in Sumy State University the Twentieth International Scientific Conference of Students and Young Scientists «Economics for Ecology» was held. For the third year the conference got the support of the UN Development Program in Ukraine. Thus, this year conference «Economics for Ecology» brought together about 90 participants from more than 12 countries such as Poland, Israel, Canada, Hungary, Nigeria, Belorussia, Eritrea, Ethiopia etc.

The goals of the conference were to analyze perspectives and challenges in information society with students and young researches, to discover new student environmental organizations and try to suggest economic solutions for environmental problems. Conference directions were different, including informational economics, formation of environmental services market, regional ecology, rational economics and saving technologies, environmental management of NGO's toward sustainable development and others. The main idea coming through the ISCS'2014 was the necessity to intensify preconditions of sustainable development implementation and foster the information society forming.

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Innovative solutions and problems connected with implementation of sustainable development and formation of information society were actively discussed during the conference.

**The analysis of social and economic challenges
of sustainable development implementation and green economy forming**

Climate change. Climate change is one of the most serious environmental threats facing mankind worldwide. It has the following effects: increase in temperature; changing in landscape; rising of the sea level; increase of drought, fire and floods; change of ecosystems; seawater is becoming more acidic; effects on human health; crops are withering.

There are three basic ways to prevent the further climate change: 1) To reduce emissions through efficiency. That means to use less of the things that contribute the emission of greenhouse gases (e.g. using fuels that emit less CO₂ than fuels currently being used, using biofuels, hydrogen; using electricity from renewable sources, such as wind and solar); 2) To reduce emissions through substitution. That means to use something else which is less harmful to the environment (e.g. using bicycles instead of cars; using solar energy); 3) To reduce emission through sequestration. That means to use something to capture and store emissions (e.g. using new combustion system to prevent emissions of greenhouse gases from the industries; using more advanced methods of waste disposal).

Water pollution. The problem of water pollution is urgent and can be caused by such activities as urbanization, industries and agricultural practices. In particular, water pollution by oil and oil products is an additional source in stress to aquatic organism and it has a great impact on wetlands. Oil pollution of water resources has transformed today into a problem of global proportions. Pollutants such as oil are the greatest dangers because it doing a toxic effect on organisms of neuston, pleuston, plankton and benthos. Nearly 40% of oil products that fall into the water form a stable oil emulsion. Covering the surface of the water, oil, particularly heavy fraction and emulsion, prevent movement, breathing and nutrition of small aquatic organisms. Oil can stick to the shells of aquatic animals, algae.

Energy resources. The problem of development of the energy markets is very important in the world and require the innovative solutions. It should be noted that the energy monopolists (USA, Russia) argue that the traditional energy resources (oil and gas) will account for the largest share of the world energy consumption next 50 years.

However in Germany the electricity is mostly produced from wind energy, solar energy and biogas. In Poland it is solid biomass, hydropower and wind energy. In Ukraine it is hydropower and wind energy. It should be noted that the effectiveness of alternative energy sources is largely dependent on climatic conditions of the natural environment. So, unfortunately, it is impossible to get solar energy at the surface of the Earth around-the-clock at any time of year, especially in temperate latitudes. The strength of winds can be not enough for powerful wind turbine.

In Ukraine hydroelectric power plant is more prevalent. However, the increase in the share of electricity generated by hydropower plants is accompanied by raising the eco-destructive impacts on the environment.

It is also urgent today to assess the ecological and economic risks that occur in shale gas production. The method of hydraulic fracturing that uses in shale gas productions is a threat of serious, unintended consequences of the negative impact on the quality of surface waters. The chemical mixture that is pumped into the wells consists of 596 chemicals, 96 of which are either completely unknown (SAS, TKN, MBAS). Introducing such water into the human body can cause extremely dangerous diseases such as pancreatic cancer, destruction of red blood

cells, abnormalities in the bone marrow, mutation in embryos and various neurological diseases.

Waste. Plastic bags and plastic material waste have been a considerable threat toward environment protection. Everyday, tons of plastic waste in the form of water bottles and plastic packages are dumped in roadside drains or burned in landfill sites or on vacant land. The impact of plastic waste on communities and the environment is significant and far-reaching. Plastic waste clogging drains and waterways can lead to flooding and the pooling of stagnant water, which reduces water quality and provides a breeding ground for epidemic diseases. In addition, the burning of plastic waste at dumpsites occurs at a low temperature, which releases plumes of toxic smoke and creates hazardous ash that contaminates the surrounding environment.

Environmental health. According to the World Health Organization «Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, biological, social and psychological factors in the environment». It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments.

Health quality is on 50% determined by the way life (nutrition, work and household condition, sports etc.); 20% are attributed to the quality of the environment and climate factors; 20% are due the genetic endowments and the rest 10% are attributed to the quality of healthcare system. In other words, all but genetic endowments are directly or indirectly related to economic factors.

Economic damages. The environmental degradation causes loses in agricultural and forest industries; causes corrosion of industrial equipment; stipulates loses related to the worsening of workers health status, and higher mortality rates. Overall bad environmental quality stipulates such expenditures as additional expenditures on conditioners, filters in order to protect people from dangerous chemical substances; additional expenses to protect equipment (the use of anticorrosion metals); selection of more resistible agricultural plants.

It is also necessary to mention that opportunity costs are rarely taken into consideration. Due to degradation of the environment some sensitive production should be reduced (usually agricultural products and some manufacturing products). In fact, the highest opportunity costs arise due to closing of such industries as recreation and tourism.

Trade and foreign investment. Pollution in different countries increases with the expansion of the economy. Many of developing countries have experienced rapid industry growth during the period of economic reforms like in China and India. While this growth has increased incomes and reduced overall poverty levels, it has been accompanied by serious environmental damage. Industries are primary sources of the environmental problems since they are the sources of the most dangerous gases such as Sulfur dioxide SO₂, Carbon Monoxide CO, Nitrous oxide and Carbon dioxide.

Released industrial waste, for example from mining, metal and oil refining activities through streams and rivers may make its way into the ocean. A variety of toxic metals can affect aquatic and marine life and may accumulate in the food chain, posing a threat to humans. Another major source of water pollution is fertilizers, which can be washed into rivers and lakes from farmland, causing a phenomenon known as eutrophication. Nitrates and phosphates, present in fertilizers, can promote uncontrolled multiplication of algae in lakes, reducing water quality and oxygen levels, and destroy aquatic life. Gases emitted from heavy industries are source of acid rain, which react in the atmosphere, resulting to acid rain that kill plants, fish and destroying old buildings, which are for most important heritage for tourism business.

The perspectives of green economy forming

Green economy. According to the UNEP report, green economy is – low-carbon economy which efficiently uses resources and meets the interests of the entire society. As well known, green growth – is the main driving tool of green economy in manufacturing, agriculture, construction, energy, transport, tourism, finance, in the waste management sector and ecosystem services.

The "greening" of the economy implies a targeted process of economic transformation aimed at reduction of ecological impact on the environment. The concept of greening is realized through a system of organized measures, innovations, restructuring, technological transformations, and environmental policy activities at macro- and micro levels. Special attentions in greening the economy is devoted to the environmental innovations, as they are both profitable and environmentally friendly.

Based on the production-consumption cycle, it is easy to define that to reduce environmental press can bring the refusal of the most damage intensity consumer products (those that have the most ecodestructive chains), shortening of the chain (replacement of primary natural resources on those that waste recycled), production efficiency (increasing the depth of use of material and energy resources) and, finally, the overall reduction of material and energy consumption of commodities.

Eco-innovations. Sustainable development is the basis of effective environmental and economic activity due to the development of innovative techniques and technology. These days, eco-innovation presents interesting growth perspectives for an ever greater number of businesses thanks to a wide variety of niche market opportunities. Eco-innovation covers a wide range of activities including areas such as: alternative energy, including energy storage and supply infrastructure, energy savings; consultancy and innovative project/business engineering and finance services; environmental damage remediation, including brown field rehabilitation; transport; recycling; eco-innovative product engineering, i.e. factoring recycling from development; new ways of leveraging natural resources; construction, eco-construction and urban regeneration; new products, processes and business models and even possibly new uses and adaptations of existing products and materials (eco-design and ecoproducts), as well as new materials; environment-friendly agriculture, including production and breeding of natural organisms; spatial planning, zero-energy housing, intelligent water management housing and housing built with sustainable construction products; the wellness industry, which in some regions can also include the development and processing of organic products, eco-tourism and therapeutic tourism as well as preventive medicine and medical care for the elderly.

Environmental services are type of specialized services in the field of environmental protection, environmental management and environmental safety. These technologies, products and services are used for measuring, preventing, limiting, minimizing or neutralizing the harmful environmental effects on the environment, as well as for reducing the risk of inappropriate use of natural resources.

The economic sphere providing environmental services is the most important at the present stage of development of Ukraine. The market of environmental services is the most significant and represents one of the priorities of the Ukrainian economy. It is now represented by such areas as: exchange of resource-saving technologies; trade of pollution licenses; the services of environmental management, auditing, marketing, environmental education; environmental banking and insurance services and more.

Alternative energy resources. According to optimistic forecasts of leading scientists, by

2020 the share of the alternative energy should increase to 12.9% in the world energy balance. The world leaders' are increasing the share of the renewable energy in the total energy consumption. They create the favorable conditions for the development, financing and implementing the ecological projects for using alternative energy sources. For an example UK energy suppliers have a target to source 15.4% of its energy from renewable sources by 2016.

The leaders in the renewable energy sources in Europe are Germany, Denmark and Sweden. In these countries, the level of renewable energy sources development is very high. Aiming to the development, it is good to have as examples the best possible technological solutions and draw on the knowledge of more experienced countries.

Thus, most of Ukraine's primary energy consumption is fueled by natural gas (about 40%), coal (about 28%), and nuclear (about 18%). Only a relatively small portion of the country's total energy consumption is accounted for by petroleum and other liquid fuels and renewable energy sources. In Poland the share of coal consumption in the energy balance was 55%. But after Poland joined the European Union (2005) the share of using the renewable energy in the energy balance have begun to decrease. However, it should be noted that the costs of alternative energy sources are high. Therefore, further research needs to find modern environmental and economic mechanisms that ensure a reduction of the cost of using alternative energy sources.

Recycling. Plastic recycling technology enables the process of recovering scrap or waste plastic and reprocessing the material into useful products, sometimes completely different in form from their original state. For instance, this could mean melting down soft drink bottles and then casting them as plastic chairs and tables. Plastics are also recycled/reprocessed during the manufacturing process of plastic goods such as polyethylene film and bags. A percentage of the recycled pellets are then re-introduced into the main production operation.

In Tanzania, since 2001 several companies and local industries engaged in the use of plastic recycling technology. The process starts from collection of plastic materials from streets, mainly PET plastic materials, hard plastic materials, clean & unclean plastic packaging. Then these materials will be processed for resell in manufacturing companies/industry. In addition to significantly reducing their own ecological footprint, recycling provided an income by paying rebates to economically disadvantaged local people who collect and deposit recyclable plastics to one of the collection points. This technology lead to a significant reduction in the amount of waste plastic littering urban areas and also provided basic and easily accessible economic opportunities for thousands of people.

Corporate environmental responsibility is known as the environmental perspective of corporate social responsibility. Corporate environmental responsibility is defined as practices that benefit the environment (or mitigate the adverse impact of business on the environment) that go beyond that which companies are legally obliged to do. Recent research has examined the adoption of environmental management practices by organizations indicating that companies are increasingly paying attention to their impact on the environment and adopting management practices to ameliorate or reduce their negative impact on the environment. In recent years the environment has been one of the factors of the greatest interest in terms of the market's attitude towards corporate social responsibility. Practicing corporate social responsibility with the environmental protection and sustainable development perspective can become the strategic decision that influences the internal development of the firms, the relationship among stakeholders, organizations, and governments. Corporate responsibility can be used as the strategic intangible assets, which can be a source of competitive advantage.

Forests. Sumy region with its area of 23,800 km² is rich in forests. They occupied 17% of

its territory. In northern part of the region there are dominated mixed forests (pine, birch, oak), in the central and southern parts – island forests (mainly maple, ash, oak groves). Therefore rational use of forest resources by applying the concept of woodlot management is actual for Sumy region.

Woodlot management is the important component of the regional system of Integrated Resource Management (IRM). IRM is a means of realizing many benefits from a forest or other natural area, and making sure the renewable benefits for future generations. It examines the relationship between various types of resource use and the effects that one resource has on other resources. With IRM all resource values are considered when making decisions. IRM does not necessarily mean more wood, more wildlife or more money, but it does help keep these things in proper balance.

Ecotourism industry – one of the fastest growing and profitable sectors of the world economy. This is due to the continuing increase in demand for travel and the relatively high level of profitability. In developed countries, tourists every year more and more eager for this form of travel that would allow them to be alone with nature, breathe fresh air, change (at least temporarily) the stereotypes of urban life. The global deterioration of the environment leads to an increase in the importance of green (environmental) tourism among other services, the field of recreation and entertainment.

Eco-labeling. One of environmental tools is an effective environmental labeling of products (services), which is fairly common in the industrial policy and the consumption of economically developed countries. The purpose of eco-labeling is bringing to consumers information about the possible negative impact of products on the health of the individual and the environment in general.

Urgent tasks of the national economy in adopting eco-labeling today are to implement effective practical tools of economic incentives in the manufacturing sector; expanding educational opportunities and information to support ecolabeling among consumers (population); growing environmental consciousness of consumers; improve quality of life; economic support of environmentally oriented producers and consumers; improving the legislative and legal support of ecolabeling procedures.

Conclusions. According to green economics paradigm the economic system is considered as a part of socio-economic system which is also a part of bigger environmental system.

The most important challenges of sustainable development implementing and green economy forming include climate change, air, water and soil pollution, depletion of non-renewable resources, industrial and consumption wastes, threat of environmental health, economic damages and opportunity costs, environmental damages and social unfairness.

The most crucial perspectives of green economy forming can be achieved by the next directions as development of innovative techniques and technology in environmental field, environmental services in the field of environmental protection, management and safety, increasing of share of alternative energy resources in energy balances, recycling, ecotourism, eco-labeling etc. Corporate environmental responsibility can be used as the strategic intangible assets, which can be a source of competitive advantage.

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Економіка для екології: перспективи і виклики

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В статті аналізуються основні перспективи і проблеми реалізації стратегій
устойчивого розвитку і формування «зеленої» економіки, при цьому особе увагу
уділяється таким проблемам, як зміна клімату, забруднення, вичерпання
невозобновляемих ресурсів, формування відходів, загрози здоров'ю населення.
Розглядаються також економічні збитки і витрати, викликані погіршенням
стану навколишнього середовища. Розглядаються також економічні збитки і
витрати, викликані торгівлею і соціальною несправедливістю. А також
предложено напрями для успішної реалізації концепції «зеленої» економіки,
серед яких інновації, екологічні послуги, альтернативні джерела енергії,
рециклінг, підвищення ефективності. Розглядаються і питання
корпоративної екологічної відповідальності як стратегічного нематеріального
актива і джерела конкурентних переваг.

Ключові слова: зелена економіка, забруднення навколишнього середовища,
інновації, альтернативні джерела енергії, рециклінг, устойчиве розвиток.

Економіка для екології: перспективи та виклики

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У роботі аналізуються основні напрямки впровадження концепції сталого розвитку та формування «зеленої» економіки, які обговорювалися під час проведення Двадцятої Міжнародної наукової конференції в м. Суми «Економіка для екології», що відбулася на базі Сумського державного університету з 6 по 9 травня 2014 року. Проведено аналіз екологічних проблем, які виникають на різних рівнях функціонування соціально-економічних систем. Приділено увагу проблемі зміни клімату як одній з найбільш глобальних проблем людства на сучасному етапі. Наслідки кліматичних змін полягають у здійсненні певного впливу на рівень температури, рівень моря, збільшення площ пустинних територій, виникнення пожеж та повенів. Масштаби утворення парникових газів призводить до зменшення озонного шару Землі, що у свою чергу також викликає велику кількість проблем зі здоров'ям населення. У роботі виділено декілька шляхів попередження подальших змін у кліматі, до яких віднесено можливість зменшення викидів парникових газів шляхом заміни засобів та предметів виробництва на більш екологічно сприятливі, проведення екологічної модернізації виробництв на базі еко-інновацій.

У статті приділена увага проблемі забруднення водних ресурсів нафтопродуктами та продуктами їх переробки. Зокрема, зазначено про значний токсичний ефект, якого зазнають водні організми та негативний вплив на болотисті місцевості. Останнім часом проблема набуває більш глобальних масштабів. Значну увагу приділено небезпечним наслідкам, які можуть виникати у навколишньому природному середовищі внаслідок виробництва енергетичних ресурсів. Також наголошено на залежності рівня ефективності використання альтернативних джерел енергії від кліматичних умов. Окрема увага приділена тим екологічним та економічним ризикам, які пов'язані з видобутком сланцевого газу. Існуючі технології видобутку справляють негативний вплив на якість поверхневих водних ресурсів, що в результаті може спричинити ризики для здоров'я населення.

У роботі знайшли відображення підходи до економічної оцінки екологічних втрат у результаті деградації довкілля. Екологічна деградація спричиняє втрати у сільському господарстві та лісництві, корозію виробничого обладнання, зниження продуктивності використання трудових ресурсів. Низька екологічна якість сприяє виникненню додаткових витрат на захист населення та виробничих факторів від негативного впливу шкідливих речовин та створення більш стійких сільськогосподарських культур. Важливим напрямком є також врахування втрачених можливостей від згорання найбільш чутливих галузей, таких як рекреація й туризм.

Магістральним напрямом має стати реалізація політики «зеленої» економіки. Особливий акцент у цьому напрямі має бути зроблено на впровадженні еко-інновацій, які є одночасно прибутковими та екологічно спрямованими. Еко-інновації також характеризуються конкурентними перевагами через створення додаткових ринкових ніш. Основними сферами запровадження еко-інновацій є альтернативна енергетика, енергозбереження, екоінжиніринг та фінансові послуги, транспорт, рециклінг, екодизайн, органічне землеробство, екологічне будівництво, екотуризм тощо. Особлива увага в стратегіях сталого розвитку має бути приділена екологічним послугам, таким як обмін ресурсозберігаючими технологіями, торгівля ліцензіями на забруднення, екологічний менеджмент, аудит, маркетинг, екологічна освіта, страхування, які створюють передумови та стимули для подальшого розвитку екологічного підприємництва.

Упровадження концепції «зеленої» економіки вимагає здійснення поступового переходу до альтернативних джерел енергії. Відповідно до оптимістичних прогнозів науковців до 2020 року частка альтернативної енергії повинна зрости до 12,9% у світовому енергетичному балансі. Це вимагає створення сприятливих умов, зокрема фінансування та впровадження екологічних проєктів із використання альтернативних енергетичних джерел. В Україні частка використання альтернативних джерел енергії в загальному обсязі енергоспоживання залишається вкрай недостатньою. Високий рівень витрат на виробництво енергії з альтернативних джерел вимагає розроблення технічних рішень та економічних механізмів зі зменшення собівартості її виробництва.

Розглянуто концепцію корпоративної екологічної відповідальності як різновиду корпоративної соціальної відповідальності. Цей напрям може використовуватися на підприємствах як нематеріальний актив та виступати в якості джерела формування додаткових конкурентних переваг. У статті також приділено увагу рециклінгу, використанню лісових ресурсів, екотуризму та екомаркуванню продукції.

Ключові слова: зелена економіка, забруднення навколишнього природного середовища, еко-інновації, альтернативні джерела енергії, рециклінг, сталий розвиток.