

**Ministry of Education and Science of Ukraine  
Sumy State University  
Economics and Management Department  
Sumy Local Youth NGO «Foundation of Regional  
Initiatives»  
Economic Research Centre  
Youth Scientific Community of Sumy State University**

15<sup>th</sup> International Scientific Conference

***"Economics for Ecology"  
ISCS'2009***



XV Міжнародна наукова конференція

***"Економіка для екології"***

**м. Суми, Україна,  
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15<sup>th</sup> INTERNATIONAL SCIENTIFIC  
CONFERENCE  
"ECONOMICS FOR ECOLOGY"  
(ISCS'2009)

April 29 – May 2, 2009, Sumy, Ukraine

**The conference  
organizers:**

- Sumy State University (Economic and Management Department)
- Sumy Local Youth NGO «Foundation of Regional Initiatives»
- Economic Research Centre
- Youth Scientific Community of Sumy State University
- Viktor Bobyrenko, Head of the Department of Family, Youth and Sports

**Support**

**The topics of the  
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- State Environmental Policy
- Problems of Education, Ecological Education
- Rational Economics and Saving Technologies
- Informational Economics
- Greening Economy, Greening People
- The Mechanisms to Reach Sustainable Development
- Regional Ecology
- Ecological Economics and Marketing in the Context of Globalization
- Interrelation of Economy and Culture
- The Role of NGOs on the Way towards Sustainable Development

**The conference is  
directed to:**

students, young researchers, representatives of youth organisations and NGOs

**Conference  
languages:**

the official conference language is **English**

**Conference place:** Sumy State University

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## Program of the 15<sup>th</sup> International scientific conference "Economics for ecology" (ISCS 2009)

<b>Wednesday, April 29</b>	Arrivals
08:00 – 11:45	Registration of the participants
12:00 – 13:30	Official conference opening
13:30 - 14:00	Lunch
14:30 – 17:45	Plenary session
18:00 - 19:00	Departure to the recreation center for settlement
19:00 – 19:30	Accommodation
19:30 – 20:30	Dinner
20:30 – ...	Ukrainian party
<b>Thursday, April 30</b>	Conference Working Day
09:00 – 09:45	Breakfast
10:00 – 11:45	Workshops
11:45 – 12:00	Coffee Break
12:00 – 14:00	Workshops
14:00 – 14:45	Lunch
15:00 – 17:00	Debates
17:00 – 17:15	Coffee Break
17:15 – 19:00	Conclusions of the workshops
19:00 – 20:00	Dinner
20:00 – ...	International party
<b>Friday, May 1</b>	Excursion Day
09:00 – 09:45	Breakfast
10:00 – 17:00	Excursion (Sumy region)
17:00 – 17:45	Dinner
18:00 – ...	Farewell party
<b>Saturday, May 2</b>	Departure
08:00 – 09:00	Breakfast
09:30	Departure to Sumy



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# **CLIMATE CHANGE INCLUSION IN RESOURCE MANAGEMENT STRATEGIES TOWARDS ENVIRONMENTAL CONSERVATION**

***Sommer Laila Abdel-Fattah, PhD student***

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Protecting natural resources is an urgent area that requires attention. Ecosystems have been profoundly shaped by unusually rapid climate change effects largely driven by human activities that release heat-trapping greenhouse gases into the atmosphere. Climate change has a particularly strong effect on decreasing water levels. The goal of this research is to develop a strategy to measure the direct effects of climate change on the value of natural resources, particularly water resources; and how humans manage these resources through management decisions. This base will assist in developing and supplying the tools and information necessary for decision-making in light of industry and human dimensions information to influence stakeholder management techniques that foster environmental conservation. By providing an understanding of the role of the economic, institutional and socio-cultural components within the ecosystem approach to management to examine some potential methods this may facilitate enhancements and thus policy revision.

Canada's ecosystems make significant contributions to the national economy, thus valuing the economic benefits can help set priorities and allocate spending on conservation initiatives

This research will incorporate climate modeling, environmental monitoring and water resource management principles to provide industry and government with management techniques that will analyze the direct impacts on nature to generate strategies for decision making and policy revision.

## **ACTORS' ATTITUDES AND ECONOMIC BEHAVIOR CONCERNING FOREST ECOSYSTEM SERVICES**

***Tetyana Bas, Lyudmyla Zahvoyska***

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More than four hundred million people live in or around forests, more than 60 million of them are Indigenous People, whose culture, spirituality and subsistence are indissolubly and intricately intertwined with the land they inhabit (Patosaar, 2006). They benefit and enjoy from forest goods and ecosystems services. So, the one of the forest decision-making priority is meeting demands of

all stakeholders with paying attention to the improvement the livelihoods of forest-dependent people as a precondition to achieving Millennium Development Goals of alleviating poverty and ensuring sustainable development.

Ecosystems as natural systems that include all variety of interactions between living organisms and the components of non-living environment within which the organisms are found, are highly complex and dynamic entities. They envelop and sustain economic systems, providing them with renewable resources, the elements of ecosystem structure, and ecosystem services, which can be defined as ‘the ecosystem functions of value to humans and generated as emergent phenomena by the interacting elements of ecosystem structure’ (Daly and Farley, 2004). Daly and J. Farley give a comprehensive list of relevant examples of services provided by forest ecosystems) - from environmental quality to human safety and cultural needs like gas, climate water and disturbance regulation, water supply, waste absorption, erosion control, soil formation, nutrient cycling, pollination, biological control, refugia, genetic resources, recreation and cultural values (Daly and Farley, 2004, Table 6.1). Most of them are vital and nonsubstitutable. And the question we discuss here is how people feel, identify and accept them, because this insight, implicit but persistent drives forest resource use in a quite explicit way.

According to ecological economics paradigm, all resources can be classified as excludable or nonexcludable; rival or nonrival (Daly and Farley, 2004). Significant part of forest ecosystem services (FES), such as climate regulation, waste absorption capacity, and landscape beauty are nonexcludable but rival. And this is a reason of excessive consumption.

To identify values, which stakeholders (actors) associate with forest ecosystem services (FES) we applied social choice approach and specifically the technique known as a Conceptual Content Cognitive Mapping (3CM) (Kearney and Kaplan, 1997, Kant and Lee, 2004, Загвойська і Бас, 2007). Non-parametric statistics techniques like the sign-test and Freedman-test were used to develop statistically significant cognitive maps of stakeholders' preferences. The investigation was done in the west region of Ukraine in 2007. The developed integrated cognitive map of stakeholders' preferences regarding forest (FES) is presented in Table 1.

Explanation to data in cells:

- a numerator: individuals' / groups' ranking;
- a denominator: opinion of other stakeholders regarding appropriate group's ranking, namely:
  - Local population: Forest industry, City inhabitants, Environmental NGO;
  - Forest industry: Local population, City inhabitants, Environmental NGO;
  - City inhabitants: Local population, Forest industry, Environmental NGO;
  - Environmental NGO: Local population, Forest industry, City inhabitants.

**Table 1 – Cognitive map of preferences regarding FES\***

<b>Themes</b> <b>Groups of stakeholders</b>	<i>Environmental</i>	<b>Recreational</b>	<b>Economic</b>	Local values	<b>Educational</b>	<b>Health care</b>	<b>Tourism</b>	Aesthetic	<b>Cultural and Emotional</b>
Local population	<u>1/4</u> 3, 4, 3	<u>2/4</u> 5, 4, 3	<u>2/2</u> 2, 2, 2	<u>1/1</u> 1, 1, 1	<u>5/6</u> 6, 6, 7	<u>4/4</u> 6, 5, 6	<u>5/5</u> 6, 5, 6	<u>4/3</u> 4, 3, 4	<u>3/3</u> 4, 3, 4
Forest industry	<u>1/3</u> 3, 2, 4	<u>2/1</u> 2, 2, 3	<u>3/1</u> 1, 1, 1	<u>5/6</u> 6, 6, 6	<u>5/5</u> 6, 5, 5	<u>3/3</u> 5, 3, 4	<u>5/4</u> 2, 3, 3	<u>5/6</u> 4, 4, 2	<u>4/2</u> 4, 4, 2
City inhabitants	<u>1/1</u> 1, 2, 1	<u>1/2</u> 1, 1, 3	<u>4/4</u> 4, 4, 5	<u>6/6</u> 6, 6, 6	<u>4/5</u> 5, 6, 6	<u>2/1</u> 2, 1, 2	<u>5/3</u> 4, 5, 5	<u>3/3</u> 3, 3, 2	<u>1/2</u> 2, 3, 2
Environmental NGO	<u>1/1</u> 1, 1, 1	<u>1/2</u> 3, 3, 3	<u>2/4</u> 2, 4, 2	<u>5/6</u> 5, 6, 6	<u>3/4</u> 1, 1, 1	<u>4/3</u> 3, 3, 3	<u>6/5</u> 4, 5, 4	<u>4/1</u> 1, 2, 2	<u>2/2</u> 3, 2, 2

\*5% significance level.

As one can see from Table 1, each group of stakeholders has its own system of values regarding FES. These differences are statistically significant at 5% significance level. Individuals' attitudes are homogeneous and obvious: Environmental services are the most important for all actors, Recreational values and Cultural and Emotional were set on the second and third places accordingly, Economic values follow them. Groups' preferences are not so homogeneous as individuals' ones. In all five maps Local values look as the most misunderstandable and contradictive theme: for local population they are the most important but other stakeholders set them on the last place. The highest number of misunderstandings features Forest industry group.

Topics for possible conflicts and options for their solutions are pointed out in the cognitive maps. To avoid destructive resource use and to turn to sustainable natural resource use we have to understand inherent motives drive different stakeholders to particular model of consumption behavior. These results of our investigations provide us realistic view of people's choices and economic behavior. Revealed values and attitudes create strong background for planning and decision-making process and for resources consumption toward sustainable use of FES. Such investigation provides society with an important message about the genuine breadth of actors' values concerning FES. Developed set of cognitive maps is delivered to society to make a way to sustainability a bit easier.

## **References**

1. Загвойська Л., Бас Т. Уподобання львів'ян щодо послуг лісових екосистем // Науковий вісник Національного лісотехнічного університету України: Зб. наук.-техн. праць. – Львів: НЛТУУ. – 2007. – Вип. 1.7. – С. 96-104.
2. Daly, H. and Farley, J., 2004. Ecological Economics. Principles and applications. Island Press, Washington.
3. Kant, S., Lee, S., 2004. A social choice approach to sustainable forest management: an analysis of multiple forest values in Northwestern Ontario. Forest Policy and Economics 6 (3-4) 215-227.
4. Kearney, A., Kaplan, R., 1997. Toward a methodology for the measurement of knowledge structures of ordinary people. The conceptual content cognitive map. Environment and Behavior 29(5) 579-671.
5. Patosaary, P., 2006. Foreword. In: Parotta, J., Agnoletti, M., Johann, E. (Eds.), Cultural Heritage and Sustainable Forest Management: the role of traditional knowledge. Proc. of the Conference held on 8-11 June 2006, Florence, Italy. Vol. 1, pp. 11-12.

## **PROBLEMS OF INTRODUCTION OF TECHNOLOGIES OF PROCESSING DOMESTIC WASTES IN SUMY AREA**

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Nowadays defense of environment became the world's problem number one. People with their daily actions pollute earth, water and air. It is known that pollutions take beginning from the time when people began to occupy the same locality for a long period. But pollution was not a serious problem, while there was enough space, accessible for every individual or group. With development of technologies, rapid distribution of industrialization and increase of population, pollution became the universal problem. The cost of rapid industrial growth is very high: natural resources are exhausted, ecological balance of planet is broken.

Today Sumy area is included in ten of the most ecologically favorable areas of Ukraine. In spite of it, pollutions because of surge of domestic garbage is a big problem for this region as well. Therefore a problem of introduction of technologies on processing of garbage at the nowadays level of industrialization is very actual.

Now there are technologies that allow to process domestic wastes effectively. For example:



- processes for the microbial converting the rests of processing food products into organic acids and other nourishing ingredients (natural flavours, pigments and dietary fibres);

- receipt of energy from wastes by the selection of power carrier which is possible to store and transport or incineration of wastes for the receipt of heat and making of electricity;

- methane fermentation - a method is based on the use of activity of microbes, extracting from organic wastes combustible gas, containing 60% methane with calorie content 5-6 thousands of kkal/m<sup>3</sup>.

- twocistern method - 2 colonies of bacteria are used – for oxidization (liquefaction) and for methane fermentation (gasification). Application of two colonies of bacteria that work separately in the most favorable terms increases speed of gasification. At this method from 1 kg of organic wastes we can get 300 l of methane (at onecistern method 200-250 l/kg);

- processing of wastes into a hard fuel consists in crushing and pulverizing of wastes.

Low-caloric wastes interfuse with high-calorie for the increase of homogeneity.

Innovative projects like that are very scientifically based and capital-intensive. Technical and technological barriers for introduction of foregoing technologies in Sumy area are practically absent, that is why the attraction of investment facilities is a main problem for their realization. An unfavorable financial situation in our country is not the only reason for that. Absence of tangible income during realization of investment projects like that affects the choice of investors of capital investment objects. At making decision about investing in one or another projects, modern top managers still do not take into account the ecological and economical estimations of effects from introduction and also damage to the economy prevented by it.

It can be explained by difficulties of psychological perception by Ukrainian businessmen of necessity and expedience of introduction of technologies on processing domestic wastes. Also there can be other obstacles of introduction of technologies such as: unfavorable investment climate (high inflation; political instability and vagueness; high level of external debt); insufficient developed of the credit-financial providing, shortage of trust of creditors and responsibility of recipients of credits (enterprises, municipalities and other potential recipients of credits, do not yet have solid credit histories; shortage of available facilities; shortage of credit guarantees).

New scientific developments that will diminish capital-intensity of technologies of processing domestic wastes can be the decision of this problem. Also this problem can be solved by development of the special legislative base which will obligate the businessmen of the region to do certain investments for introduction of foregoing technologies, or give them different privileges for that, what is straightly depends on state and local legislative departments.

Zero Waste Business Principles can help enterprises to reduce the cost of introduction of new technologies. For example:

- commitment to the triple bottom line (inform workers, customers and the community about environmental impacts of our production, products or services);
- zero Waste to landfill or incineration (more than 90% of the solid wastes are generated from Landfill and Incineration from all of our facilities);
- responsibility: takeback products & packaging (taking financial and/or physical responsibility for all the products and packaging that are produced and/or market under our brand(s), and requiring suppliers to do so as well);
- buy reused, recycled & composted (use recycled content and compost products in all aspects of our operations, including production facilities, offices and in the construction of new facilities);
- prevent pollution and reduce waste (redesign supply, production and distribution systems to reduce the use of natural resources and eliminate waste; prevent pollution and the waste of materials by continual assessment of our systems and revising procedures, policies and payment policies);
- highest and best use;
- use economic incentives for customers, workers and suppliers (encourage customers, workers and suppliers to eliminate waste and maximize the reuse, recycling and composting of discarded materials through economic incentives and a holistic systems analysis);
- use non-toxic production, reuse and recycling processes.

Due to introduction of technologies of processing wastes it is possible not only to facilitate ecological stresses but also produce products which will bring a certain income. Processing of metallic, paper, glass, plastic and organic wastes diminishes requirements in energy and raw material. This fact can be confirmed comparing charges on utilization of garbage and its simple burial place that indicates the predominance of the second above the first.

## **ECOLOGY AND BUSINESS**

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Human life and industrial activity entail great amounts of organic wastes which can be found in dumps around big cities taking up huge areas. All these wastes are greatly responsible for contamination of natural environment (land, water and air). Nevertheless technologies that allow turning ordinary garbage into source of energy, make useful secondary materials from it such as glass, metals etc are already developed. So it is possible to apply these technologies and make money from waste utilization.

Due to different governmental programs aimed at gradual reduction of garbage dumps and increased investments in recycling of waste materials have created the situation where business is getting more and more interested in waste utilization.

Nowadays there are two main generally accepted business schemes to dispose and recycle waste materials in the world: American and European. In the USA "waste producers" have to make a separate payment for waste collecting themselves, while in Europe this sum is already included in the product's price. These two schemes have a different impact on companies which produce packages. The American system has a mere influence, because those are consumers who are to pay this tax. The European system especially German "Green Dot" acts differently. It prompts companies reduce their package volumes, because money allocations (licenses), which are included in the product's prime cost are to be paid by companies. Consequently they are interested to reduce volume of packaging materials.

Owing to governmental support, activities with solid wastes in EU is rather profitable. For example, 2/3 of the price for waste disposal in landfills is covered by the local waste disposal tax and 1/3 is paid by goods producers. Waste recycling is a less profitable business. Its costs are covered by producers and consumers. Garbage incineration in Europe is extremely expensive and not profitable business because of strict limitation rules set by governments. Especially they concern emission of carbon dioxide and heavy metals which are emitted in the course of incineration.

Unfortunately out of all elements of garbage utilization business only waste collection with further burial in landfills are extensively used in Ukraine. Currently there are two acting waste incinerating plants and one waste sorting factory in our country. Financial problems are inherent to almost all enterprises of this sphere.

## **THE ROLE OF THE NON-GOVERNMENTAL ORGANIZATIONS IN THE PROCESS OF ESTABLISHING SUSTAINABLE DEVELOPMENT ON THE NATIONAL LEVEL**

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Increasing demand on goods and services, growing number of people on the planet and further development of the world economy led to creation of a new consumer behavior versus nature. Such attitude attracted attention of the scientists and non-government organizations in the 1960-1970s forming a new concept –the concept of sustainable development.

Since introduction of sustainable development to the world it has become the focal issue for the number of international and local non-governmental organizations. These organizations represent the main force towards implementing sustainable development strategies on the state level. As the result of discussions and promotion sustainable development according to United Nations Commission on Sustainable Development 82 states members of the United Nations have reported the implementation of national sustainable development strategy in 2007. This corresponds to 43 per cent of all countries, and 79 percent of all countries for which information is available. Unfortunately, Ukraine is not one of them. Currently, there is only one law regulating sustainable development in the country. However, besides this law any other steps towards implementing sustainable development strategy have not been taken by the government.

While Ukrainian government is keeping silence concerning performance of the sustainable development strategy, international and local non-governmental organizations following experience of the foreign partners took initiative in their hands.

Thus, as the example two main projects implementing currently sustainable development in Ukraine should be highlighted. They are the Community Based Approach to Local Development Project and more domestic - TACIS Project Sustainable Local Development in Ukraine

The first project launched its activities in September 2007, funded by the European Commission within the framework of Tacis technical assistance Program and is co-financed and implemented by the United Nations Development Program.

The Project aims to create enabling environment for long-term self-sustaining community development at local level by promoting local self-governance and community-based initiatives throughout Ukraine.

A total of 200 districts were selected based on the level of socio-economic hardship facing them and their willingness to support local development with community participation.

The project provides small grant to community organizations to implement their priorities on a self-help basis and within the framework of public-private partnership, whereby each partner shares a portion of the development cost. According to the conditions of the project half of the budget must be financed with contributions of local community members (not less than 5%), the private sector, and the central and local budgets while the project will contribute up to remaining half of the cost. The community takes responsibility to maintain, with support from the local authorities, the resulting output and reap benefit from it on a sustained basis.

Knowledge gained from the project implementation is expected to be utilized to make policy recommendation to enable community-financing within the framework of local sustainable development in Ukraine.

The second project - TACIS Project Sustainable Local Development in Ukraine aimed to improve quality, access and sustainability of essential services in selected municipalities and to pave the way for sustainable local development.

It is expected that, by the end of the project in 2010 in four medium sized cities - Izyum (Kharkiv oblast), Romny (Sumy oblast), Sverdlovsk (Lugansk oblast) and Pryluky (Chernihiv oblast) a significant part of essential municipal services infrastructure (such as water supply and wastewater networks) will be renovated. Also sustainable local development initiatives should be launched with various co-coordinated actions with projects in the areas of co-operation of the TACIS Indicative Program, such as education and training, local financing, energy, public health and social sectors. Management tools for efficient municipal services delivery and socio-economic development should be operational. The essential outcome of the project expected to be development of a model for the sustainable local development in Ukraine.

Hence, the projects depicted above are the biggest two within Ukraine which proves the vital role of non-governmental organizations and local communities in the country. While government is still working on development of the national sustainable strategy non-governmental organizations with support of local government and financial support of international institutions are already promoting sustainable development and implementing locally sustainable development strategies.

Such experience should be taken into account and considered by the government as an effective mechanism of development and further implementation of the national sustainable development strategy.

## **SOCIAL SYSTEM OF TRANSITION SOCIETY THEORETICAL SCHEME: ECONOMY, CULTURE AND ECOLOGY INTERRELATIONS**

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**Thesis structure is built by the following scheme:**

1. Every society can be analyzed as a system. (Lensky, Sanderson etc.)
2. Social system can be researched by structural and functional approach
3. It is proposed to look at the social system from the point of T.Parsons' view.
4. T.Parsons divided social system into 4 functional structures:

AGIL:

- **Adaptation** of the society to new conditions (human basic needs - Economy)
- **Goal-streaming** of the society to achieve next stage of human needs (Maslow) – security and popularity. It is Politics
- **Integration** of achieved aims and needs into some codex or laws – It is Judicial Subsystem if society
- **Latent pattern** maintenance – through moral rules, tradition creature – that is Culture!

5. Every transition society start its transformation process from damaging the Old, destructive and socially ineffective Latent pattern (Soviet culture one, for instance); and start from economic adaptation to new without-cultural conditions. It is the process of wild gathering the first capitals (cawboys in perria, or post-soviet reket and mafia). In 1991-1996 Ukraine it was characterized by shadow privatization after prices liberalization (IMF shock-therapy model).

6. In 1996 Ukrainian Constitution was proclaimed, so the process of Adaptation became less important (inflation slowed down, Ukrainian Hryvnia was functioning etc.) than Political Goal-Streaming one. A lot of political parties became very active. And it was the process of Financial Industrial Groups crystallization, such as Industrial Union of Donbas, System Capital Management, Privat Group etc. And economic stakeholders started to fight for Parliament lobby of their business interests.

7. In 2004, this process led to the start of social Integration period, which began from Orange Revolution, when Ukrainian society showed its democratic character, gathered together to avoid coming back to soviet authoritarian (or one group monopoly) regime.

8. But to finish the transition process it is not enough to change economic, political and legal structures, it is very important to find out deeper routs and to crystallize modern Culture – Latent pattern, without which the process of integration of Ukrainian society will not be completed.

9. This latent pattern is seen inside new global structure of independent European nations, some of which went through the same AGIL way from Soviet to European society and Sustainable development goal.

10. But the process of Ukraine integrating into European circle should be AGIL-scheme based, too.

11. First stage – economic integration (in 2008 Ukraine entered WTO)

12. Second stage – political integration (there are some European parties in Ukraine already, NATO integration etc.)

13. The third stage – legal integration – when Ukraine will join the EU countries judicially.

14. And the last stage – internal European cultural integration and crystallization of new European nations' latent pattern – European culture!

15. So the economic and cultural social subsystems are the most important ones as “alpha and omega” of every society.

16. Social system is open one and that means the exchange of energy and mass flows between it and the external environment. It could be important to analyze society in its interrelation with other system – Environmental one.

17. It is proposed to study the influence of both system on each other from the point of 4 functions of social system. On the economic level (A) the main common thing is resources. Economic theory widely uses the rule of unrestricted human needs and limited natural resources. Social adaptation would be impossible without using those elements of ecological system. On “G-level” of society (politics) we can notice the struggle of the strongest stakeholders for resources including natural ones. Social Integration also includes such institutions as environment protection institute, controlling of the environment pollution etc. On cultural level of social system, it is very important to understand that ecological system is our home and so the latent pattern of society is impossible without ecological culture.

18. In general, every society starts with economy (A) and ends with culture (L), or vice versa – starts with culture and ends with economy. Ecology for society is most important in 2 aspects – 1) natural resources exploring – level of economy; 2) environment is “home for society” - level of culture. So cultural subsystem of society control economic one in its clever usage of home resources. That must be the main scheme of interrelation between economy, culture and ecology. And transitional societies should take into deep consideration the importance of ecological component of their development.

### **References**

1. Lensky G. Human societies: introduction to macrosociology. 7th rev. ed. / Revised by P.Nolan. London: McGraw. Hill, 1994.
2. Parsons T. About Social Systems / under V.F.Chesnokova, S.A. Belanovsky edition. – Moskow: Academic Project, 2002 (in Russian).

## **JI INVESTMENTS OPPORTUNITIES IN UKRAINE: BENEFITS AND RISKS**

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Joint implementation (JI) is one of three flexibility mechanisms set forth in the Kyoto Protocol to help countries with binding greenhouse gas emissions targets (so-called Annex I countries) meet their obligations. JI is set forth in Article 6 of the Kyoto Protocol. Under Article 6, any Annex I country can invest in emission reduction projects (referred to as "Joint Implementation Projects") in any other

Annex I country as an alternative to reducing emissions domestically. In this way countries can lower the costs of complying with their Kyoto targets by investing in greenhouse gas reductions in an Annex I country where reductions are cheaper, and then applying the credit for those reductions towards their commitment goal.

A JI project might involve, for example, replacing a coal-fired power plant with a more efficient combined heat and power plant. Most JI projects are expected to take place in so-called "economies in transition," noted in Annex B of the Kyoto Protocol. Currently Ukraine is slated to host the greatest number of JI projects.

The process of receiving credit for JI projects is somewhat complex. Emission reductions are awarded credits called Emission Reduction Units (ERUs), where one ERU represents an emission reduction equaling one tonne of CO<sub>2</sub> equivalent. The ERUs come from the host country's pool of assigned emissions credits, known as Assigned Amount Units, or AAUs. Each Annex I party has a predetermined amount of AAUs, calculated on the basis of its 1990 greenhouse gas emission levels. By requiring JI credits to come from a host country's pool of AAUs, the Kyoto Protocol ensures that the total amount of emissions credits among Annex I parties does not change for the duration of the Kyoto Protocol's first commitment period.

Unlike the case of the Clean Development Mechanism (CDM), the JI has caused less concern of spurious emission reductions, as the JI, unlike the CDM, takes place in countries which have an emission reduction requirement.

Scientists estimate that the risk-weighted potential of Emission Reduction Units (ERUs) likely to be generated in Ukraine in 2008–2012 is around 50 MtCO<sub>2</sub>e per year.

**Priority sectors for JI activities in Ukraine: non-traditional and renewable energy and energy efficiency:**

- Coal bed methane
- Landfill gas recovery
- Renewable energy
- Municipal district heating and water utilities
- Natural gas transportation and distribution systems
- Waste fuel and heat in metallurgy
- Coal and natural gas combustion systems

The most promising Ukrainian industry sectors are petrochemical, iron and steel, construction, and glass.

JI activity is aimed at the attraction of the external investments into economically viable GHG reduction projects, which can not be implemented in the current conditions due to low return on investments, high risks or regulatory barriers.

**JI projects should:**

- Contribute to national economic development
- Raise general technological level



- Improve local environmental conditions.

### **Main risks of JI activities for Ukraine:**

1. Risk of financial losses of the state
  - caused by possible future necessity to purchase AAUs in the amount of previously sold ERUs to meet country's commitments on GHG emission reduction;
  - caused by assumed rise in price for all types of GHG emission reductions in the future.
2. Risk of compensation claims to Ukrainian government in case when the JI project fails to produce the contracted ERUs.

There are many benefits for investors in joint implementation projects, but some risks also exist.

### **Benefits for JI project investors in Ukraine:**

- The potential for JI projects is large due to energy intensive economy, obsolete equipment, limited financing availability
- There are possibilities to find significant amount of medium and large scale JI projects and thus reduce transaction cost
- Good prospects for quick projects approval (practically all procedures developed and are to be confirmed soon)
- Existing wide infrastructure of scientific research and design organizations can provide high quality projects and thus mitigate non-registration risks
- Ukraine as Annex I Party is interested in the projects that really are additional, thus lowering non-registration risk
- Ukraine will not become a member of the EU anytime soon that otherwise could reduce the additionally of a large number of potential JI projects.

### **Risks for JI project investors in Ukraine:**

- JI project rejection risk
- Non-registration risk
- In case of project delays the risk of profit losses due to rising ERU prices
- Non-performance (non-delivery) risks.

# BASIC METHODS OF EXPERT ESTIMATION OF LOSSES FROM ORIGIN OF EXTRAORDINARY SITUATIONS AND THEIR PROGNOSTIGATION

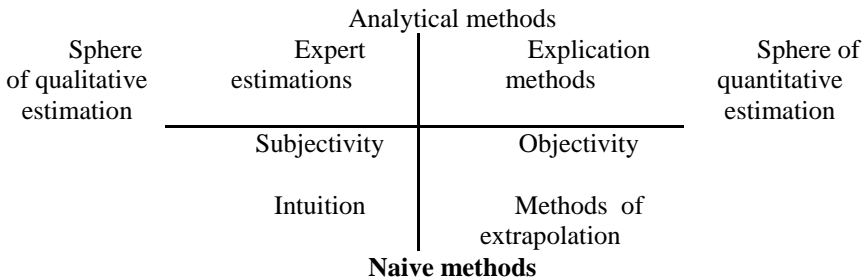
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It is possible to estimate the prospects of the environment by means of prognostication methods. Two criteria are distinguished for classification of these methods: level of objectivity of prognostication (subjective and objective methods) and level of analytics of this process (naive and cause-and-effect methods). Subjective methods are based on the position of a certain expert as for the processes which are not shown obviously, but lie in the basis of the prognosis development. Application of the objective methods provides clearly formulated processes which can be reproduced by other persons, that is, there is a great probability of formulation of the same prognosis by them. It is considered that contrasting of quantitative methods to qualitative in which intuition prevails can be seen here.

The reason to consider the methods to be naive is that a prognosis is based on the supervisions of the past tendencies of variable (for example the level of primary service) without the substantial account of basic motive factors. Cause-and-effect (casual) methods are applied when the factors are identified and their credible future values are predicted that enables to form the credible value of the index on condition of realization of the acceptable scenario. Combination of these

two approaches to classification facilitates the formation of four types of methods of prognostication (scheme 1).



**Scheme 1 – Classification of basic methods of prognostication**

Basic methods of prognostications include methods of expert estimations, methods of extrapolation and explanatory models.

Methods of expert estimations for making prognosis, as well as during conducting the analysis of the environment are based on the intuitively-logic analysis of the problem, quantitative estimation of judgments and formalized processing of the results. Obviously, application of these methods has certain subjectivism because expert's intuition, experience and knowledge are of great value.

Methods of extrapolation are applied if an analytical basis of the prognosis is weak but it is based on objective information.

Simple methods which foresee the analysis of the process and making prognosis by extrapolation of the past tendencies are used. Statistical supervisions of the dynamics of the certain index, determination of its progress trend and "continuation" of this tendency for the future period are the basis of trends extrapolation methods. Obviously by means of trends extrapolation methods appropriateness of the past development of that or other object of research (phenomenon, situation, process etc.) is carried on the future. Mainly the methods of extrapolation of trends are applied during a short-term (not more than one year) period of prognostication when there are insignificant changes in the environment.

The formalized methods of prognostication can be divided into hardly determined and stochastic.

Methods of middle sliding and exponential smoothing are popular among the determined ones. The method of middle sliding provides that the index which is next on a time interval in size is equal to its mean value calculated for a certain period. The method of the exponential smoothing represents the prognosis of the index for the future as the sum of the actual index and prognosis for a certain period calculated by special coefficients.

Stochastic models are realized within the limits of simple dynamic and multifactor regressive analysis, analysis by autoregressive dependences.

Explanatory (explication) methods are based on creation of mathematical models which enable to imitate situations within the limits of alternative scenarios.

The Delphy's Method was developed for solving knotty strategic problems with the purpose of getting information about the future, maximum diminishment of the subjective factor influence, stimulation of the ways of specialists' thinking by creation of the informative system with the feed-backs, removal of obstacles in exchange of information between specialists, pressure of the authority and other forms of pressure, providing the increase of authenticity of prognoses by special procedures of quantitative evaluation of experts' opinions and their working.

Development of method of choice of the concrete method of prognostication for estimation of the losses related to the origin of extraordinary situations is the prospect of subsequent researches depending on the changes of external environment.

# THE ENVIRONMENTAL IMPACTS OF LOGISTICS SYSTEMS

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In recent decades the environmental effects of transportation has become a topic of increasing importance around the world. As a result studies have been conducted to increase our understanding of pollutant emissions along with their consequences, and to develop schemes for impact reduction. Some researchers have also made efforts to define the long-term direction for future transportation and environmental research from a broader perspective. These analyses provide a general framework for the concept of sustainability, defining the purpose of studying transportation and the environment, which encompasses logistics systems and their impacts. In addition, research has been conducted for the purpose of including sustainability in a general framework to guide future logistics planning. As a result industry has begun to respond and make adaptations to the growing need for sustainable activities.

Accordingly, consideration for the long-term effects of transportation activities should strongly influence policy decisions. Many transportation agencies have formulated their own definitions of sustainability, with consideration for these underlying concepts. Three recurring considerations are found to be especially important:

1. economic development
2. environmental preservation
3. social development

In the case of logistics systems, economic development can be thought of as relating to the profits and in turn the benefits to the employees of logistics companies and the indirect effects on the economy. Second, environmental preservation considers ecological impacts which can range from effects on local wildlife to those of global warming depending on analysis boundaries. Finally, social development accounts for the effects of logistics activities on human society, including the detrimental impact that pollution can have on the public. Most all studies pertaining to logistics and the environment have long-term implications based on one or more of these three considerations.

In the past, planning and research related to freight logistics systems has primarily been focused towards the objective of increasing the efficiency of industry activities with respect to timing and profits. However, within the last 15 years growing concern over environmental impacts has spawned the concept of Green Logistics as a stimulus for developing methods which can reduce the environmental impacts of freight transportation. As a result researchers and industry have begun assessing mitigation options for planning freight transportation with consideration for environmental externalities.

Green Logistics can be thought of as an approach for planning freight logistics systems that incorporates sustainability goals with a primary focus on the reduction of environmental externalities. In accordance with this description, various studies provide some background on the current state of Green Logistics practices.

Although governments and the general public influence corporate policy, logistics companies make the final decisions which directly affect pollutant releases within their market context. Accordingly, when developing Green Logistics solutions for reducing environmental externalities, the industry perspective must be considered. Unfortunately, the goals of logistics providers often conflict with the aims of Green Logistics. Freight logistics systems are commonly thought to be an indispensable component of modern societies. Accordingly, they are not only necessary in today's world, but can also provide many non-essential benefits to citizenry.

However, as with most mechanized transportation modes, freight logistics systems also generate negative externalities. The concept of externalities allows for the characterization of the indirect effects of logistics activities on society as a whole. Economic principles are well-suited for describing this concept and Harvey Rosen provides a useful definition of externalities: "When the activity of one entity (a person or a firm) directly affects the welfare of another in a way that is outside the market mechanism, that effect is called an externality."

By this definition, externalities occur outside the typical market process, and therefore cause a form of market failure, since actors in the market do not incur the full costs of production and consumption. As a result members of the society may be negatively impacted by the activities for which the full social cost is not incurred. Of note is that the concept of externalities can also be applied to beneficial impacts; however in the case of transportation many of the significant externalities are negative.

Logistics providers are not typically forced to pay the full social cost of their activities, which includes the costs of the above listed externalities. Inefficiency results and the public is negatively impacted.

The number of studies estimating the impacts of freight transportation on the environment continues to grow, revealing in greater detail the negative impacts which are occurring. A fairly large body of data has been produced by various organizations, showing that freight logistics carriers are a significant source of pollutants causing environmental impacts. Some studies have analyzed the problem at the small-scale by generating data for individual vehicles, whereas others have focused on the net impacts of freight transport at national and international levels. From an even broader perspective, other researchers have assessed the long-term trends regarding the growth of demand and emissions from freight logistics networks.

# ECOLOGICAL-ECONOMIC SYSTEMS EFFICIENCY

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For efficiency increase in ecological-economic systems synergetic effects must be incorporated. This incorporation increases the systems efficiency. For this we need different assessment criteria. Assessment of production cycles has two main aspect: on the one hand, the integral costs of the whole production and consumption cycle (including environmental protection) should be calculated, on the other hand, aggregate human activities including negative environmental impact should be considered. Eco-efficiency indicators are most useful in this respect. To estimate eco-efficiency two equitable indicators – the ratio *produced goods over environmental impact* and the *environmental impact over the produced goods* can be used. These are called the reverse indicators.

An increase in eco-efficiency refers to an increase of economic value at unchanged (or decreased) environmental impact. As indicated in table 1, four variants of increased eco-efficiency indicators (environmental versus economic result) can be defined.

- *An increase in eco-productivity* (i.e. efficiency of environmental impact);
- *A decrease of nature intensity* (i.e. a decrease of costs of natural factors);
- *An increase in the efficiency of environmental costs* (i.e. better state of the environment per unit of environmental cost);
- *A decrease in environmental specific costs* (i.e. costs per unit of environmental state improvement)

**Table 1 – Four types of eco-efficiency**

Ratio	Goal	
	Productivity increase	Environmental state improvement
Economic versus environmental indicators	Total production per unit of aggregate environmental impact costs or <i>environmental productivity</i>	Sum of costs incurred per unit of environmental state improvement indicator (averted damage) or costs of environmental state improvement
Environmental versus economic indicators	Environmental impact indicators (ecological-economic damage) per unit of production or <i>environmental intensity</i>	Improvement of environmental state per unit of costs or <i>environmental cost-effectiveness</i>

The increase in efficiency is one of the key success components in business. Enterprises constantly seek ways to improve their efficiency. In modern conditions this

can be done within clusters. The growing number of people involved in economic-development activities. The decentralization of decision-making processes to the regional and city levels and the renewed importance of international organizations have left many new policy planners with the need to find new tools to define their policies:

a) use of increasingly frustrating traditional industry policies such as providing subsidies for uncompetitive industries, attempting to build new industries from scratch and trying to attract incompatible foreign investments are unproductive; b) the globalisation of international markets. With the reduction in the number of barriers trade, producers can compete freely in any economy at the global level. Given this, regions realize that they must compete internationally in the industries in which they enjoy an advantage. Globalization is thus leading to a specialization of regional economies. Clusters support this trend by building on local differences, seeking an endogenous growth of regional economies, reinforcing the assets already present in the local economies.

Some authors [3] offer the following scenarios for cluster creation and financing: " top-down", i.e. with prime formation of consultative coordination and monitoring bodies, with definition of cluster strategy as a whole and its resource support; " down-up ", i.e. forming of separate projects and programs which integrate potential cluster participants; the mixed variant when both approaches are united.

As a rule, clusters are directed at the achievement of the following purposes [3]: competitiveness increase of clusters participants due to introduction of new technologies; decrease (reduction) of expenses and improvement of quality of the appropriate high technology services due to synergy effect and unification of approaches to quality, logistics, engineering, information technologies etc.; maintenance of employment in conditions of reforming of big enterprises and outsourcing; consolidated lobbying of clusters participants interests in different authorities.

Ecological clusters have reliable potential for investment. In our opinion ecological clusters give an opportunity for grouping geographically close ecologically safe productions which have constant interrelations with scientific research institutes, laboratories, and business structures, public institutes, whose strategy and tactics are maintenance and increase of sustainability and efficiency of a region. About 80 % of all economic actives of a region should be concentrated in an ecological cluster, which basic purpose is maintenance of sustainable social, economic and ecological development.

## ***References***

1. Porter M.E., On Competition, HBS Press, 1998
2. Porter M.E., Clusters of innovation initiative: San Diego, New York 2001
3. Khasaev G.P., Mikheev Y.V. Clusters – modern instruments for region's competitiveness increase (through partnership to future). <http://www.compass-r.ru/index.htm>.

## **SOCIAL CAPITAL INTELLECTUALIZATION ON THE WAY TOWARDS KNOWLEDGE ECONOMY**

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In the age of frequent innovation and global changes the main competitive advantage is related to knowledge creation, distribution and implementation (or intellectual activity). More and more scientists mention such level of world development as Knowledge Society. So we may state that conditions of human life and activity changed crucially. In economic sphere the main source of both innovation ideas and comprehensive practical experience for successful implementation of changes is the so called knowledge worker. Creative personnel (knowledge carriers, who provide innovations in the sphere of organizational, scientific and technical, social and ecological culture) become more and more important. Revaluation of human factor in economic, social and environmental life takes place. It is no longer enough to define personal returns from education and professional skills estimated in wages growth. Organization's ability to create, accumulate, distribute and implement specific professional knowledge becomes crucial factor of its sustainable development. The same is true for the society in general. The social capital development problem has three main levels:

*Macro-level:* International and state institutions work on stimulation of knowledge-based production with corresponding substitution of nature exploitation. Society development conditions for every citizen.

*Micro-level:* Knowledge systems of enterprise supporting the adaptation to the frequently changeable market situation as well as long-term organization development.

*Personal-level:* Self-explorations with intellectual and health improvement according to life goals, professional field and individual tastes.

Theoretical background of given work starts from Vladimir Vernadsky's theory of noosphere (1944) which states that in the area of society and nature interaction the reasonable (intelligent) human activity becomes the determining factor of development. This concept in its further development became more concrete with new related terms and definitions. In economic sphere the "knowledge worker" according to Peter Drucker's definition (1959) is the one who works primarily with information or the one who develops and uses knowledge in the workplace. The following researches paid more attention to interpersonal interactions development potential. In his studying of society development Pierre Bourdieu (1983) distinguishes three forms of capital: economic, cultural and social. A little different view on social capital and its definition showed Coleman and Becker in their works related to social networks influence on state performance (Coleman, 1988; Becker 1996) Particularly in the field of intellectualization of social capital Vladimir Inozemtsev's concept of post-economic society and intellectuals' elite (1998) should be mentioned. As far as



social and economic conditions for society of knowledge in Ukraine is concerned, work of prof. V.M. Heyets represents a valuable overview (Heyets, 2005)

Human activity takes place in three main areas: economy, society and environment. Therefore, we may offer the following model of estimation for the intellectualization aspect of social capital. It takes into account three main dimensions:

*Economic:* life-long education possibilities, private business possibilities;

*Social:* Information Communication Technology availability, cultural institutions;

*Environmental:* health care and sports (plus promotion of the life stile without smoking and alcohol), recreational sphere etc.

So, we may use the relation:

$$ISC = f(S, Ec, Eco),$$

where ISC is indicator of social capital intellectualization; S – aggregate social factors; Ec – aggregate economic factors; Eco – aggregate ecological factors.

All this may be found (directly or in closely related indicators in state and international statistics). We may also mention negative factors such as unemployment, poverty, mental diseases accordingly. All these factors and their groups should be taken into account with corresponding weight coefficient. Regression analysis of state level and international data may be used here. Main data sources at state and international level would be State Statistics Committee of Ukraine, World Health Organization, World Bank etc. So, the main task now is to define the main factors of social capital intellectualization and verify their influence on sustainable development of society at state or at regional level or a particular business organization.

## **References**

1. V.I. Vernadsky A Few Words About Noosphere // Modern Biology Achievements – 1944, - №18, vol. 2, - pp. 113-120.
2. Drucker, Peter F, 1973. Management: Tasks, Responsibilities, Practices. Harper & Row, New York. 839 p.
3. Bourdieu, Pierre. (1983). "Ökonomisches Kapital, kulturelles Kapital, soziales Kapital" in Soziale Ungleichheiten (Soziale Welt, Sonderheft 2), edited by Reinhard Kreckel. Goettingen: Otto Schartz & Co. pp. 249.
4. Coleman, James S. (1988). "Social Capital in the Creation of Human Capital", American Journal of Sociology. 94 Supplement: (pp. S95-S-120)
5. Becker, Gary S. (1996). Accounting for Tastes. Part I: Personal Capital; Part II: Social Capital. Cambridge, MA: Harvard University Press.
6. V.L. Inozemtsev The Constitution of the Post-Economic State. Post-Industrial Theories and Post-Economic Trends in the Contemporary World: Aldershot – London, 1998.
7. V.M. Heyets Information Society as the Society of Knowledge // Social and Economic Problems of Information Society (edited by Prof., Dr. Leonid Melnik): Sumy, "University Book", 2005.

## RESOURCES CONSTRAINTS INDICATORS

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The thesis focuses on scientific and methodical approaches to analysis and estimation of the influence level of different resources constraints by their action character and origin on efficiency of enterprise's economic activity. The existing approaches to resources provision for enterprise's economic activity are analyzed. The economic essence of such terms as "resource" and "constraints" is improved. The author suggests definitions and extends the list of classification characteristics on the base of the suggested definitions. The author suggests using internal constraints index for determination the influence level of resources constraints factor. For efficiency analysis of limited resources use by enterprises the author developed the efficiency dynamics index that is based on the principle of comparison of effect changes and resources costs on different time scale. The author analyzes and improves economic approaches to procedures of economic strategy development for enterprises.

Case studies of the leading machine building and chemical enterprises show how the developed economic efficiency estimation indexes in condition of resources constraints are implemented.

Limitations (constraints) are one of the key problems which the systems in the process of its functioning faced on, on this stage of socio-economic development. Limitations are the obstacles (phenomena, actions, factors, descriptions, signs, qualities) in the system or in a its environment, in case of occurring of which the system slows, halts, stops or changes the parameters of the development.

In the case of origin of any type of limitations the system reacts on them definitely. On the degree of surmountable we will divide limitations on adaptation limitations (surmountable) and bifurcation limitations (insuperable).

Adaptation (surmountable) limitations are limitations, running into which system is able to develop in future expending it and/or external (additional) energy, saving the basic parameters of functioning inherent to it. Bifurcation (insuperable) limitations are limitations, running into which system is not able to develop in future even expending it and/or external (additional) energy without violation (rebuilding) of basic parameters of the functioning (homeostasis).

Studying of limitations influence on the sustainable development processes is an important aspect of study and analysis of limitations influence. Influence of limitations on sustainable development can be positive and negative simultaneous. Such dualistic character of limitation factor action is important as for economic subjects, as for society at all. Limitation factor enables to estimate its influence on the processes of sustainable development. In obedience to limitations classification we can define positive and negative directions of limitations influencing on the processes of sustainable development.

# **REACH (Registration, Evaluation, Authorization and Restriction of Chemicals)**

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**Registration, Evaluation, Authorization and restriction of Chemicals (REACH)** is a European Union Regulation of 18 December 2006. REACH addresses the production and use of chemical substances, and their potential impacts on both human health and the environment. Its 849 pages took seven years to pass, and it has been described as the most complex legislation in the Union's history and the most important in 20 years. It is the strictest law to date regulating chemical substances and will impact industries throughout the world. REACH entered into force in June 2007, with a phased implementation over the next decade.

REACH is a new European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the **Registration, Evaluation, Authorisation and Restriction of Chemical substances**. The new law entered into force on 1 June 2007.

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, innovative capability and competitiveness of the EU chemicals industry should be enhanced. The benefits of the REACH system will come gradually, as more and more substances are phased into REACH.

The REACH Regulation gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA) in Helsinki. The Regulation also calls for the progressive substitution of the most dangerous chemicals when suitable alternatives have been identified.

**History.** REACH is the product of a wide-ranging overhaul of EU chemical policy. It passed the first reading in the European Parliament on 17 November 2005, and the Council of Ministers reached a political agreement for a common position on 13 December 2005. The European Parliament approved REACH on 13 December 2006 and the Council of Ministers formally adopted it on 18 December 2006. Weighing up expenditure versus profit has always been a significant issue, with the estimated cost of compliance being around 5 billion euro over 11 years, and the assumed health benefits of saved billions of euro in healthcare costs. However, there have been different studies on the estimated cost which vary considerably in the outcome.

A separate regulation – the CLP Regulation (for "Classification, Labelling, Packaging") – implements the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and will steadily replace the previous Dangerous Substances Directive and Dangerous Preparations Directive. It came into force on 20 January 2009, and will be fully implemented by 2015.

**Overview.** When REACH is fully in force, it will require all companies manufacturing or importing chemical substances into the European Union in quantities of one tone or more per year to register these substances with a new European Chemicals Agency in Helsinki, Finland. Because REACH applies to some substances that are contained in objects ('articles' in REACH terminology), any company importing goods into Europe could be affected.

About 143,000 chemical substances marketed in the European Union were pre-registered by the 1 December 2008 deadline. Although pre-registering was not mandatory, it allows potential registrants much more time before they have to fully register. Supply of substances to the European market which have not been pre-registered or registered is illegal (known in REACH as "no data, no market").

REACH also addresses the continued use of chemical 'Substances of Very High Concern' (SVHC) because of their potential negative impacts on human health or the environment. From 1 June 2011, the European Chemicals Agency must be notified of the presence of SVHCs in articles if the total quantity used is more than one tone per year and the SVHC is present at more than 0.1% of the mass of the object. Some uses of SVHCs may be subject to prior authorization from the European Chemicals Agency, and applicants for authorization will have to include plans to replace the use of the SVHC with a safer alternative (or, if no safer alternative exists, the applicant must work to find one) - known as 'substitution'. As of March 2009, there are fifteen SVHCs.

REACH applies to all chemicals imported or produced in the EU, in contrast to the US Toxic Substances Control Act which only applies to chemicals newly coming into use. The European Chemicals Agency will manage the technical, scientific and administrative aspects of the REACH system.

The European Commission supports businesses affected by REACH by handing out - free of charge - a software application (IUCLID), which simplifies capturing, managing and submitting of data on chemical properties and effects.

## **ALTERNATIVES TO STEEL PIPES WITHIN NATURAL GAS DISTRIBUTION NETWORKS**

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Canada has an extensive natural gas distribution networks in place and is actively expanding, with domestic sales increasing by 10% between 2005 and 2007. The aim of this project is to demonstrate the economic and ecological benefits of using alternatives to steel pipe within natural gas distribution systems.

Over 50% of natural gas sold by distribution companies in Canada is sold to high volume clients: power generation, industry and commercial enterprises. Traditional polyethylene pipe is used at pressures under 400 kPa, which is unable to facilitate the pressures required to deliver gas to these clients. Steel pipe is currently used instead, but requires regular maintenance and service work to keep the line operating safely. Alternatives to steel piping require minimal post-installation maintenance while upholding the safety standards and quality of gas delivered.

Alternatives to steel pipe for gas distribution systems are analyzed for suitability, taking into account maintenance, installation, joining, cost, corrosion and ecological impacts. These include high-pressure polyethylene and nylon pipe, both of which can accommodate pressures up to 1000 kPa or more, but have limited use within Canada. Experimental data, government regulations and precedents set by other countries are investigated to provide a complete picture of these alternatives. The next step is to further develop how alternatives to steel pipe are used in the production and long-range transportation of natural gas.

## **FACTORS OF FORMATION OF INNOVATIVE POTENTIAL OF THE ENTERPRISES**

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The decision of tasks of constant economic development of the country is directly connected with development of innovative activity which should provide strengthening of competitiveness of domestic subjects of economic activities. One of prominent aspects thus is the interrelation of innovative activity with the environment. As without doubts influence of results of innovative activity on an ecological condition is one of defining parameters of the further manufacture of innovative products. Under such circumstances there is a necessary efficient control of innovative activity with a view of ecological aspect.

At the same time, the basis of efficient control development of the domestic enterprises often lies in management of their potential which defines a level of competitiveness of the enterprise. Thus one of the major aspects of strengthening of positions of the enterprise in the market is their choice of innovative type of development. The enterprise more perceives market opportunities which are open before it if it has the corresponding innovative potential. Therefore, within the limits of the general potential a special place is taken by innovative potential of the enterprise.

The innovative potential is initial base at complex monitoring of innovative activity of the enterprise. However, existing theoretical and methodical approaches to an estimation level of innovative potential, efficiency of its influence on the further innovative activity of the enterprise specify need for detailed studying of components of innovative potential and their interrelation with other elements of innovative activity.

With the purpose of a methodical substantiation of levers of efficiency of influence of components of innovative potential on other elements of innovative activity of the enterprise it is offered to consider these concepts from the point of view of the system approach, as most convenient generalizing principle of cognitive and practical activities. Thus as the object of the system analysis, it is considered the methodology of monitoring of innovative activity. Within the limits of this analysis the separate, scientifically-significant part is allocation of the methodical approach to an estimation of management efficiency by components of innovative potential.

For realization of such purpose it is necessary to substantiate of components of innovative potential which influence manufacturing of an innovation. Many proceedings are devoted to allocation of such components. However, according to practice of the enterprises, all approaches to formation of components of innovative potential almost always demand qualitative specification. Even very often the positive estimation according to these components does not mean positive result from innovative activity as a whole. First of all it concerns parameters of intellectual component (research activity, nonproduction and scientific maintenance, the interface component, etc.) The same complexities may occur at an interface estimation, research components, etc. For example, a plenty of workers with higher education that corresponds to a structure of activity of firm does not always mean, that they are capable of submission of innovative decisions and on the contrary, some parameters are tendentious.

The important point, in our opinion, thus is accentuation on an ecological component. The correct account and a substantiation of the ecological factor under an estimation of innovative potential will enable liquidation negative changes and increase of influence of positive changes in the environment in time.

The essence of the approach offered by us lies in formation of dependences between separate parameters of innovative potential and corresponding parameters of innovative activity of the enterprise. It enables to form a tree of decisions for

different situations in management of innovative activity of the enterprise. The use of such approach helps the formation of correcting ways at separate stages of innovative activity of the enterprises, depending on the revealed features of their innovative potential. The approach will help to understand character of promotion of an innovation, objectively define priorities in distribution of innovative resources.

The result of monitoring of innovative potential should display conclusions about expediency of manufacturing of an innovative product. Besides the account of the ecological factor will mark zones of risk in this process, will help to avoid not simple negative displays of an innovation, and to make its further promotion safe and optimized.

On the basis of the received results of consideration of innovative potential in a system of monitoring of the innovative activity, the subsequent fulfillment of regressive synthesis of subsystems of this system and transformation to real object macro or a micro level is necessary.

## **THE ROLE OF INSTITUTIONAL COMPONENT TO INCREASE COMPETITIVENESS OF A COUNTRY ON THE WAY TO SUSTAINABLE DEVELOPMENT**

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Sustainable development is the basic direction of human development in XXI age. There is no alternative as the other way will result in a world ecological catastrophe.

Conception of sustainable development determines the integral system of social, economic and ecological development of the country. One of the directions to reach sustainable development is organize competitive market economy.

In general, competitiveness of a country means its ability to compete with other countries. That is a set of institutes, strategies and factors which determine the level of the productivity of a country.

A wide index to estimate national competitiveness is Global competitiveness index (GCI). It takes into account microeconomic and macroeconomic bases of national competitiveness.

Thus, the analysis of prospects of competitiveness growth of Ukraine is offered in the paper. The factors which influence competitive advantages and also disadvantages on the way to increase competitiveness are determined in the paper.

Nowadays Ukraine takes the 72<sup>th</sup> place in the general rating of 134 countries for GCI in 2008 year. These are not really good results as for competitiveness of the country.

Also Environmental Sustainability Index (ESI) was taken into account to analyze the possibilities to reach sustainable development in different countries. Ukraine was on the 108<sup>th</sup> place out of 146 countries for ESI in 2005 year.

While analyzing influence of components of GCI on the components of ESI (please see Table 1, Table 2) it is possible to see substantial connection of the Social and Institutional Capacity<sup>1</sup> (component of ESI) and GCI.

**Table 1 - Correlation between the components of GCI and ESI (107 analyzed countries)**

	Technology Index	Public Institutions Index	Macroeconomic Environmental Index
Environmental systems	0,0084	0,0902	0,0028
Reducing environmental stresses	-0,6236	-0,5888	-0,6012
Reducing Human Vulnerability	0,5831	0,6099	0,6024
Social and Institutional Capacity	0,8062	0,7782	0,6698
Global stewardship	-0,0186	0,0065	-0,0885

**Table 2 - Correlation between the components of GCI and ESI (9 analyzed\* countries and Ukraine)**

	Technology Index	Public Institutions Index	Macroeconomic Environmental Index
Environmental systems	0,2790	0,0278	0,2683
Reducing environmental stresses	-0,2096	-0,3713	-0,2267
Reducing Human Vulnerability	0,0550	0,1069	0,4548
Social and Institutional Capacity	0,8455	0,9667	0,8203
Global stewardship	0,5349	0,7010	0,5047

\*9 countries were analyzed with the greatest index of GCI in 2008

Social and Institutional capacity is very important for competitiveness and growth of a country. Institutions are composed of formal rules (statute law, common law, regulations), informal constraints (conventions, norms of behavior, and self imposed codes of conduct), and the enforcement characteristics of both.

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<sup>1</sup> Social and Institutional Capacity includes the following indicators: Science/Technology, Capacity for Debate, Regulation and Management, Private Sector Responsiveness, Environmental Information, Eco-Efficiency, Reducing Public Choice Distortions.



Institutions create basic structures using which people decrease the level of the uncertainty.

State organizations, public and private establishments are the weak point in the competitiveness of Ukraine. They are to be the priority direction of reforms in this sphere. Effective activity of state authorities is a major problem for Ukrainian development. The state and public controls are non-transparent and ineffective. A corruption and favoritism dominates among them. There is no effective system of the legislative adjusting. Also among the most serious weak sides of Ukrainian competitiveness are not enough developed private organizations. And the question of low standards of corporate management is one of the most urgent. These problems undermine the trust of investors.

Another important problem is that the judicial power of the country remains dependent upon the political influence. It reduces stimulus for investment and business activity. In addition, the organized crime results in the considerable charges of business which is another barrier for economic competitiveness of Ukraine.

Thus, the improvement of social institutions is the main direction the Ukrainian government must pay special attention on to increase the competitiveness of our country and to reach sustainable development.

## **ECONOMICAL ESTIMATION OF THE ECOLOGICAL DEBT IN CONTEXT OF SUSTAINABLE DEVELOPMENT**

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The Concept of the ecological debt was designed in the end of XX century, became the result of studies about the problems of the interaction between nature and economics. It was the attempt to unite the longings a mankind to permanent economic development with the principles of sustainable development. During this period great number of ecological debt definition was developed, but hitherto competent definition is still absent. Given definitions takes into account variety of factor: accumulated in the past and current debt from natures components quality deterioration quality; the destructions, havocs, irrational usage of ecosystems; the debt for natural resources exploitation; use biotechnology, GMO and etc. We offer the following determination of the ecological debt – it is conditionally evaluated level of surrounding natural ambience condition changes, caused by ecologically destructive activity of economic subject on territory of the certain country, which must be liquidated (compensated) for achievement of sustainable development objectives.

Scientist most often use such factors for the numerical measurement of the ecological debt in natural form: ecological footprint and ecological space, material

flow amounts, etc. Besides, non-dimensional (the indicators and indexes) and economical values of the ecological debt are used.

The Development methodological principals for estimation of the economic damage has been leading since 60-h years of XX century by scientist from many institutes, including Ukrainian scientist from Kiev, Sumy, Odessa, Lugansk, Lvyv, Donetsk, etc. For this time was accumulated huge information base, allowing suitable for valuation of the damages from ecologically destructive activity. So economic damage from the natural ambience components quality deterioration (the ecologically-economic damage) can be a factor, which allows estimating the size of the ecological debt in the most precisions way, since given type of the damage practically is an economical indicator of natural factors value, which define the damage from ecologically destructive activity, as well as expenses on compensation of the damage.

Whereas, evaluation of the ecological debt is exceedingly difficult problem, which requires perfect methodological base, enormous array to information, we offer not to calculate the magnitude of the debt, but its change in the course of developments of production power in different periods of time. In such case increase ecological debt is characterized by increase ecologically-economic damage, and can be defined as follows:

$$\frac{\Delta Y}{Y} = \frac{\Delta Q}{Q} + \frac{\Delta(Y/Q)}{(Y/Q)},$$

where  $\Delta Y/Y$  – growth rate of the damage,  $\Delta Q/Q$  – growth rate of the output in economic system,  $\Delta(Y/Q)/(Y/Q)$  – growth rate of damage capacity (the magnitude of the damage, caused by unit of the output). The value of damage capacity is growing with the increasing of output scale. On the other hand, if the value of damage capacity changes, damage growth also changes. Calculated growth rate of ecological debt in this way shows the necessity of joint economical development and modification of quality production power, and the transition from extensive to intensive way of the development for the achievement of sustainable development objectives and decreasing the value of ecological debt.

# PROTEIN FOODS AND SUSTAINABLE FOOD PRODUCTION

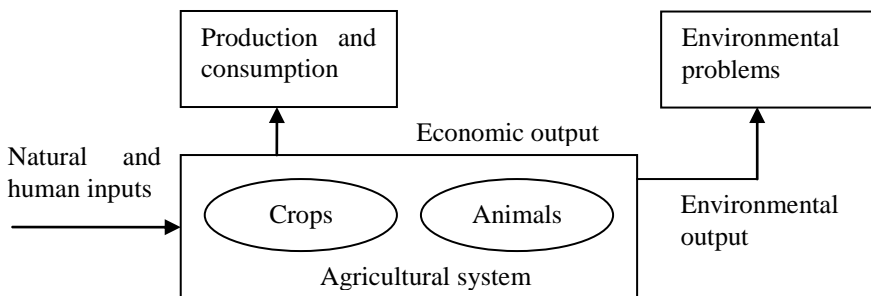
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The current way of production and consumption food has a considerable impact on the environment. This impact is expected to increase in the future due to population and the consumption of animal product growth. This requires an increased production of food and feed, and a competitive use of available cropland. In addition, the conversion of plant protein to animal protein is rather efficient way of production in compare with direct consumption. Increasing of plant protein consumption is suggested as one of the most considerable ways to reduce negative pressure on environmental system by food production.

Novel Protein Food was selected as an alternative option for meat and its ingredients. It is the plant-protein-based food product developed with modern technologies, including biotechnology, and designed to possess desirable flavour and texture. It can be made of peas, soybeans, other crops and even grass. NPF was developed to make food production more sustainable.

Today scientists all over the world studies the current meat-based protein chains in human ration and try to replace meat with plant protein food. Researches are focused on two references: production and consumption effects. Meat production causes large environmental impact both in developing and developed countries. Crops for protein food are the suitable protein source for people and can be grown in most places of Earth.

Food production and consumption impose considerable pressure on the environment, but environmental impact analysis of food has mainly focused on only a few stages of the chain, particularly the agricultural stage or on specific environmental impacts. Further studies are needed to understand the environmental impacts of an entire protein chain, from the primary production to distribution and consumption.



**Figure 1 – Environmental problems in the agricultural system**

Environmental life-cycle assessment helps to analyze and assess the environmental impacts of a material, product, process or service throughout its entire life-cycle. It is an increasingly important tool for supporting choices at both the policy and industry levels. The results of environmental life-cycle assessment have a comparative significance rather than providing absolute values on the environmental impact related to the product. The assessment usually consists of four phases: goal and scope definition, inventory of environmental inputs and outputs, impact assessment and lastly interpretation.

Using complex systems of economical, ecological and social indicators today scientist try to define economically efficient, environmentally friendly and socially desirable food chains. Replacing animal protein by plant protein is promising in reducing environmental pressure, especially acidification. Redesigning the food chains can achieve lower environmental pressure and impacts. Through chain management, economic and environmental efficiency of the chains can be improved.

## **MODERN MARKET ESTIMATION OF LANDS**

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Land is one of the most universal natural resources and national riches. The general landed fund of Ukraine makes about 603,6 thousand of sa.km, from which 71,2% make agricultural land, mainly agricultural land lands which occupy almost 70% territories of Ukraine. They are concentrated on territory unevenly. On arable lands (plough-land) in the structure of agricultural land lands is about 76% that testifies a high ploughing of territory of Ukraine. After this index Ukraine takes first seat in Europe. The varieties of the black-lands prevail in the structure of the ground cover of Ukraine. 25% of the world lands are black. In Ukraine the index of material well-being of agricultural lands makes 0,8 ga on one habitant, from them 0,65 g is plough-land. The landed reform was expediently conducted. According to it there was an allotment of agricultural lands. So the lands become private.

That is why the landed question is actual now, such for a long time most Ukrainian lands of were not necessary for people and did not have to 1995 money estimation, but today, when a price grew on them, demand was accordingly multiplied. Now a moratorium operates on the sale of land, it he does not lock the transactions of shadows with land. There is change of purposely setting which allows the sale of land for uncompleted and unfair price. Now near 20% of arable lands of Ukraine polluted by heavy metals, over 4, 6 me.ga of agricultural lands tested influencing of accident of one of the most powerful nuclear station. Also soil annually is contaminated by pesticides and by other toxic matters that worsens the ecological state of agricultural lands and hinders in a receiving ecologically clean

and high-quality raw material, for the production of child's and dietary food stuffs. That is why it is necessary to save land from pollution, change of a special purpose setting, not sanctioned privatization and illegal sale which after removal moratoriums will cause demand for foreign buyers. This time the sale of land is which easier it was agricultural, but now it can be used under building or industry. According to the Landed Code of Ukraine land can change its use from agricultural land in industry or under building in case when she is exhausted and can't be used for planting (In obedience to 20 Low of Ukraine). The principle of the landed legislation is providing of the rational use and saving of the land.

There is a question : why in our the countries purposely use of land changes very quickly and land is considered exhausted, when it could be used for growing agricultural crops, but not to use it as in the article 23 said, that agricultural land is considered to be of higher priority than other and is not used for other usage.

A necessity in the estimation of the land resources arose up with beginning of agrarian reform in Ukraine. Existing to that moment the indexes of economic evaluation of land (bonitet and economic) stopped to satisfy a modern market. Due to their help it is impossible to decide the question of taxation of land users, cost of sale of land, size of rent, etc. That is why there was a money and market estimation of land. Money estimation is the basis for determination of land-tax and rent for land, market is a market price, for agricultural land she is absent, but for changed it has its own purposely set. In July 1995 the money estimation of agricultural lands of Ukraine was carried out, in accordance with the developed method of money estimation (ratified by the decision of Cabinet Ukraine on March, 23, 1995 № 213)

**Table 1 - Money estimation of agricultural lands of natural areas of Ukraine, UAH / ga \***

Zone	agricultural lands	Plough-land	Zone	agricultural lands	Plough-land
Steppe	3592	3761	Sumy regions	3126	3494
Dnepropetrovsk regions	3514	3862	Polissya	2848	3065
Forest-steppe	3799	3977	Ukraine	3543	3734

\*In accordance with the decision of Cabinet Ministry of Ukraine May, 12 in 2000 №783 from and January of 2000 the money estimation of agricultural lands, resulted in table1, is indexed on the coefficient of 01.01.2009 3,022.

There is a market estimation of land, which it's changed purposely set. Due this change the market value of land accounts after Low of Ukraine «About the estimation of lands» by three methods.

Lands of not agricultural land use have a far higher price than the cost of allotment. That is why there is a necessity in the calculation of economic difference between these two estimations of the same land.

This difference is the loss of agricultural society and proprietors of allotments, it makes

$L = P1 - P2$ , where

L-the loss to the proprietor of allotment after a change of a special purposeset,P1-money estimation of this allotment (table 1),P2-market price of this allotment with the changed purposely set.

As an example let's look at the lands of Sumy Regions(Possibly,that100\$=770 UAH):

$P1 = 3126 * 3,022 = 9446,772$  of thousand UAH

$P2 = 111,111$  pressed.\$=85554,7 thousand UAH

<http://www.sumi.etag.com.ua/kup-4.html>)

$L = 9446 - 85554,7 = -76108,7$  thousand UAH

Calculating the loss we see that the proprietor of allotment loses the a lot of money, which he could get. That is why there is a necessity in the improvement of the Land Code of Ukraine and legislative base, with clear explanation, what types of purposely set exist, and due to which circumstances it changes. Also it necessary to strengthen control after the market of non agricultural land, tracing in what way land as a good gets there and what principles it is sale and what was the previous use. To improve the system of estimation of lands, that the proprietors of land couldn't have economic losses. But indeed to main principle of the land legislation: providing of the follow saving of land.

## **ECONOMICS IN TRANSITION: THE "TRIPLE-BOTTOM LINE" OF FINANCIAL, SOCIAL BENEFIT, AND ENVIRONMENTAL BENEFITS**

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Outline:

1. A brief history of economic thinking over the past 90 years
2. Recent trends in new economic thinking
3. The 'Bottom Line', the 'Double Bottom Line' and the 'Triple Bottom Line'
4. Social aspects of emerging economics thinking
5. Environmental aspects of emerging economic thinking
6. Global warming, indicating the dangers of environmental neglect in prior economic thinking
7. Global dimming, indicating the danger of drastically speeding up global warming by removing atmospheric pollution that was largely ignored in previous economic thinking

8. At issue: how can we create an economy based on people, to achieve financial profit, social benefit, and a safer, cleaner environment.
9. What would such an economy look like? How can it work? What can be done in Ukraine to achieve it?

This presentation will discuss the various forms of predominant economics thinking over the past century and put into context how we are where we are today. In that context, new economics thinking will be presented not merely as advancing economic theory, but as stark reality with life and death at stake for millions of people.

At first glance, it might seem redundant to emphasize people as the central focus of economics. After all, isn't the purpose of economics, as well as business, people? Aren't people automatically the central focus of business and economic activities? Yes and no.

The prevailing economics systems in the twentieth century were capitalism and communism. Both systems were hypothetically aimed at creating a means of providing people with comfortable, safe and secure life.

Along the way, in the process of attempting different forms of economics from capitalism to communism, we have managed to pollute and contaminate our own environment to the extent of causing environmental change to the point of quite possible catastrophe for people around the world. Neither the capitalist system nor the communist system – nor the various fascist systems attempted in such as Germany, Spain and Italy – lived up to their promises. Communist and fascist systems became infamous for mass murder. The Western capitalist was less murderous. Overall, capitalism was able to produce a much larger middle class of people between rich and poor, and has gained precedence due to making safe and secure life possible for more people. But, its various methods over the past 100 years left millions of people to suffer and die more indirectly than outright murder. Those people were dismissed as relatively unimportant, mostly left to die from deprivation rather than outright execution. In all systems, some rationale was created to either dismiss people and leave them to die, or, kill people outright. In the end, for the victims, the result was identical.

In that context of disposing of people, by all economic systems, and with capitalism having become predominant, financial profit came to rule the day. Profit, the bottom line, was master of all else. People and the environment we live in were secondary considerations. The vehicle of Western capitalism was, and is, corporations.

Corporations are legal structures created as legal entities to carry out the business – financial – objectives. Under US law, corporations are a legal person. What sort of person? According the psychological assessment measures in the *Diagnostic and Statistical Manual, Fourth Edition (DSM-IV)* used for personality assessment, corporations meet the strict clinical definition of a psychopath. “Psychopath” is another word for lunatic, or, someone who is legally, criminally insane.

This is where we find ourselves today. Ignoring the fact that millions of people were left to perish if necessary in the name of financial profit included ignoring the environment in the name of short-term profits. During the past two decades, profit has therefore come to be seen as not simply 'bottom line' profits, increase in cash and wealth at any cost. Balancing social benefits and outcomes worked its way into economics thinking. That is 'the double bottom line.' Additionally, it has become inescapably evident that the environment that every person on earth must live in, the global environment, has to be taken into account lest we risk mass extermination of the human species regardless of what we might prefer to think about economics, theories, and debates. Environmental impact has therefore become the third part of 'the triple bottom line.'

It is now widely accepted scientifically that global warming poses such a threat as to put at risk the survival of the human species. Greenhouse gases, primarily in the form of carbon dioxide emissions produced by burning hydrocarbons for energy supplies, are causing global warming. Logically, it seems that reducing these emissions and developing alternative energy sources that do not require burning hydrocarbons will reduce the 'greenhouse effect', or global warming. However, in doing that, we also reduce atmospheric pollution. On its face, that sounds good since atmospheric pollution is also a direct hazard to human health.

Global warming models have mostly been based on predictions of a gradual but steady warming such that a one degree centigrade increase by around 2040 or so will produce catastrophic environmental changes. On September 11, 2001, America was attacked and grounded all aircraft for three days. That removed most of the normal atmospheric pollution over the US for those three days. The sky was clear and unusually blue. Routine temperature measurements were continued, as they had been for half a century, without interruption. And we saw some unexpected and startling data: during those three days, temperature measurements increased by one degree centigrade. In three days, the dreaded one degree centigrade occurred, rather than several decades. The date was examined closely, around the world. It turned out that the increase was due to decreased atmospheric pollution that had been acting as a shield, an umbrella, in blocking solar thermal radiation. After US air flights were resumed and atmospheric pollution was restored to normal levels, the temperature receded.

Evidently, we are caught in a seemingly impossible dilemma. If we reduce hydrocarbon emissions for the purpose of human health and safety with the purpose of decreasing global warming, we also remove the shield, the umbrella, that protects us from far faster global warming.

Thus the issue of ecology economics is not only 'the third bottom line', it might be more aptly renamed the economics of survival of the human species. That includes everyone, regardless of one or another economic hypothesis or theory they might prefer. We can endlessly debate and discuss von Mises/von Hayek free market economics/capitalism which proved successful except for the



times it failed, and then study why it failed – repeatedly, the most recent failure in September 2008. We can endlessly debate and discuss opposing Keynesian government interventionist economics/capitalism, which proved successful except for the times it failed. That has been an alternating pattern for the past eighty years in Western capitalism. We can discuss the successes and failures of various flavors of communism and fascism. At this point, the simple fact is that regarding economic theory, no one knows what to do next. Possibly this has escaped immediate attention in Ukraine, but, economists in the US as of the end of 2008 openly confessed that they do not know what to do. So, we invented three trillion dollars, lent it to ourselves, and are trying to salvage a broken system so far by reestablishing the broken system with imaginary money.

Now there are, honestly, no answers. It is all just guesswork, and not more than that. What is not guesswork is that the broken – again – capitalist system, be it traditional economics theories in the West or hybrid communism/capitalism in China, is sitting in a world where the existence of human beings is at grave risk, and it's no longer alarmist to say so.

The question at hand is what to do next, and how to do it. We all get to invent whatever new economics system that comes next, because we must.

### ***References***

1. Commanding Heights  
[http://www.pbs.org/wgbh/commandingheights/lo/story/ch\\_menu.html](http://www.pbs.org/wgbh/commandingheights/lo/story/ch_menu.html)
2. The Corporation  
<http://www.youtube.com/watch?v=Pin8fbdGV9Y>
3. Global Dimming  
<http://video.google.com/videoplay?docid=-2058273530743771382>

# KNOWLEDGE AND INFORMATION ECONOMY, WELFARE AND GOVERNANCE: THE ECONOMIC NATURE OF INTELLECTUAL PROPERTY RIGHTS

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This paper intends to study the analytical relationship between the Intellectual Property Rights (IPR) economic nature and the concrete governance modalities used to manage these IPR. This problematic may be extended to the economic analyze of Property Rights (PR) in general, and is related to various social fields: the environmental components, the cultural goods and services, the knowledge production and the digital economy, for example.

*In a first part*, from stylized facts, I will show how the market private logic translates high transaction costs, i.e. transaction costs generally higher than the ones produced by other governance mechanisms. In regard to hold-up strategies and collective welfare, I will underline the intrinsic market failures related with a private logic. Then, I will examine the implications in terms of market structures, firms strategies and PR economic nature. I will show why, in regard to the modifications of the goods and services economic nature, new forms of collective PR appear.

Then, from the opposition between Pigou and Coase, I will study the different conceptions of the PR economic nature, and of the market regulations recommended. I will analyze this opposition in regard to the following points: the externalities economic nature, the nature of the contracts and the criterion used to evaluate the social welfare. *I will show why Coase maintains the main neoclassical hypotheses*, i.e. the absence of uncertainty and the microeconomic substantive rationality.

*In a second part*, I will point out, in regard to the goods and services *complexity*, the private negotiation limits, i.e. the coasian approach limits. This complexity may be defined (i) by the uncertainty, (ii) by the fact that more part of these goods and services are experience goods, and (iii) by the existence of opportunist behaviors. The first characteristic means that the microeconomic rationality is bounded and that agents' decisions are irreversible. The second one, that the price system is a "noisy" signal and that it is impossible to anticipate the goods and services utility. From the third characteristic, we can deduce that the contracts are incomplete, by nature.

In this perspective, I will use amply Williamson's theoretical instrumental to demonstrate that the market logic translates a high level transaction costs. The concept of complexity may be complemented by the concept of specificities, in the way it is defined by Williamson; the more complex and specific are the goods and the assets, the higher are the transaction costs related to a market logic . The implications are the following ones: first, the private logic and/or the market aren't, systematically, the most efficient social instance, in the way that these private logics don't minimize the transaction cost. Secondly, the transaction costs are a way to minimize the uncertainty. Third, other governance modalities (institutional, public or hybrid ones) may be more efficient than the private ones.

Then, I will formalize some of the main economic mechanisms: I will show the principal differences between the paretien maximization criterion used by the pigouvian approach and the Kaldor-Hicks criterion which corresponds to the coasian analysis. Then, I will demonstrate why, in regard to the economic specificities, it is impossible to maximize microeconomic production and consumption function. Finally, I will analyze the hold-up mechanism: I will demonstrate why, in situations in which the PR are fragmented between various firms, the price of the technology is higher than it would be if only one agent had the totality of PR.

Finally, I will demonstrate why, when opportunist behaviors appear, a pigouvian tax is necessary to turn the private negotiation efficient in a social way: in other words, the market efficiency cannot be implemented without an institutional intervention.

***In conclusion***, it is possible to affirm the necessity of an institutional component, to regulate the market activities, and to specify what is the most efficient governance modality to be adopted. From an institutional perspective, and more specifically from the "old institutional" approach, this means that the market, i.e the IPR private negotiation modalities, can't be conceived as an optimal mechanism and as an auto-regulatory instance; *institutional components are necessary for the market work "normally"*.

**Key words:** transaction costs- Intellectual Property Rights- Governance- Welfare

**JEL Classification:** L86, D23, O 34, D6

### **References**

1. Akerlof, G. , (1970), "The Market for "Lemons": Qualitative Uncertainty and the Market Mechanism", *Quartely Journal of Economics*, Aug.1970, 89.
2. Berg, Roger van der, 2003, Property Rights and the Creation of Wealth, *American Law and Economics Review*, V. 5 N1 2003.
3. Coase, R. H.1960, The Problem of Social Cost, in *Journal of Law and Economics*, 3, The New Institutionnal Economics, *The American Economic Review*;88,2.

4. Coriat Benjamin (2002), Le nouveau régime américain de la propriété intellectuelle- Contours et caractéristiques clés, in *Revue d'Economie Industrielle* n.99, 2ème trimestre 2002, Paris.
5. Heller M. and Eisenberg R, 1998, Can Patent Deter Inoation? The Anticommons Trajdy in Biomedical Resaerch, in *Science*, Vol. 29.
6. Herscovici, Alain, 2007, Information, qualité et prix : une analyse économique de l'internet et des réseaux d'échange d'archives. Congrès International *Online services ADIS/Université de Paris Sud*, Paris, décembre 2007, *Direitos de Propriedade intelectual, novas formas concorrenciais e externalidades de redes. Uma análise a partir da contribuição de Williamson*, Seminário de Pesquisa, IE/UFRJ, Rio de Janeiro.
7. Kirat, Thierry, 1999, *Économie du droit*, La Découverte, Paris.
8. Nelson R., 2003, *Markets and the Scientific Commons*, WP, Columbia University.
9. Rosenkranz S., Schmitz P.W., 2006, *Can Coasean bargaining justify Pigouvian taxation?*, Bonn Econ Discussion Paper, Discussion Paper 7/2006, Bonn, February 2006.
10. Williamson, Oliver E, 2000, The New Institutionnal Economics: Taking Stock, Looking Ahead, *Journal of Economic Litterature*, Vol. XXXVIII (September 2000), The Theory of the Firm as Governance Structure: From Choice to Contract, *Journal of Economic Prospectives* – Volume 16, Number 3 - Summer 2002.

## **ECOLOGICAL PROBLEMS IN DEVELOPED AND DEVELOPING COUNTRIES**

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Ecological problem is one of the biggest challenges facing the world today. In today's world, preservation of the environment is very important for the future civilization of all human beings, because ecological problems have brought many effects to the environment, living organisms as well as human beings living in it.

Ecological problems may be caused by both developed and developing countries due to different factors which in one way or another affects our land, pollute the air we are breathing, pollute the water sources we are using which is the most important for human survival and also it causes different health problems for human beings.

The causes of ecological problems in both developed and developing countries differ but also relate at the same time. In my thesis I will shortly but

clearly explain the major causes of these ecological problems in both developed and developing countries and at last suggest solutions that may be taken to overcome these problems.

In developed countries, industrial revolution is one of the main factor which cause ecological problems in the world. Heavily developed industrial countries contribute to the great deal in polluting the environment especially air pollution due to the dominant use of fossil fuels as a source of power in many industries, also water pollution have become a big problem caused by these heavily developed industrial countries as a result of dumping waste materials from the industries which contaminate with water sources and thus endanger it's usage.

The use of oil in different means of transport in both developed and developing countries has seriously contributed to air pollution. A great number of people are now affected by air pollution and a lot more have lost their lives due to air pollution, a good example is in china where by, millions of people have been affected due to air pollution.

Farther more, developed countries often take advantage of the problems in third world countries by dumping hazardous waste which even themselves can't take a risk to dump in their own countries, these hazardous waste materials contaminate with water sources and there for cause water pollution as well as environmental pollution. More over, transnational companies which produce chemicals that would be considered far too dangerous for use in their own countries find a market for their products in developing countries and affects and endanger lives of millions of people in developing countries.

As in developing countries, land erosion, degradation and land desertification is one among the main ecological problems facing almost all developing countries. Soil erosion and degradation is mainly cause by poor methods of farming, overgrazing and small scale mining, while desertification is mostly caused cutting down trees for charcoal, which is the main source of energy in many developing countries.

Lastly, over dumping of rubbish and waste materials in many developing countries causes land pollution in many areas as well as pollute water sources which are very important for the survival of the human race.

Different methods and solutions can be used in tackling different ecological problems in both developed and developing countries as follows:

1. Firstly, developed countries should start investing in green energy sources which do not harm the environment like wind and solar energy, and also should start investing in alternative sources of energy in developing countries that don't have enough capital to invest in these new sources of energy.
2. Developed countries should stop dumping hazardous wastes in developing countries and should stop importing products which seems to be dangerous for use.

3. More over, developed countries should also heavily invest in producing hybrid cars which do not pollute environment and thus decrease the problem of air pollution.
4. Further more, creation of ecological market, in which products which are more harmful to the environment or which are produced by using technology with a harmful impact on the environment do not have any competitive advantages due to lower price or taken out of the market.
5. People in developing countries should be educated about safe and good methods of farming, and prevention of small scale mining in order to reduce soil erosion and degradation, also people should stop cutting down trees so that to minimize land desertification, and lastly, people should understand that life and water are two sides of the same coin and should stop to pollute water resources.

## **INTEGRATION OF RISK ASSESSMENT IN OIL AND GAS PROJECT**

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### **Introduction**

Oil and Gas project is a high-risk venture. Geologically it involves the concepts of uncertainty with respect to structure, reservoir seal, and hydrocarbon charge. On the other hand, there are some uncertainties related to economic evaluation due to costs, probability of discovering and producing economically viable reservoirs and oil price. Even at the development and production stage the engineering parameters embody a high level of uncertainties in relation to their critical variables (infrastructure, production schedule, quality of oil, operational costs, reservoir characteristics, etc.). These uncertainties originated from geological models and coupled with economic and engineering models involve high-risk decision scenarios, with no guarantee of successfully discovering and developing hydrocarbons. In the oil and gas industry, managers are continuously facing important decisions regarding the allocation of scarce resources among investments that are characterized by substantial geological and financial risk and uncertainty thereby increasingly using decision analytic techniques to aid in making these decisions. The future trends in oil resources availability will depend largely on the balance between the outcomes of the cost increasing effects of depletion and the cost reducing effects of the new technology.

### **Risk assessment: field appraisal and development**

The understanding of these concepts is important to correctly investigate the best way to perform risk mitigation and to add value to exploration and

production in oil and gas project. Therefore, risk analysis applied to the appraisal and development phase is a complex issue and it is no longer sufficient to quantify risk. Techniques today are pointing to

(1) quantification of value of information and flexibility, (2) optimization of production under uncertainty, (3) mitigation of risk and (4) treatment of risk as opportunity. All these issues are becoming possible due to hardware and software advances, allowing an increasing number of simulation runs of reservoir models with higher complexity (Gorell and Bassett, 2001).

### **Decision-making process, value of information and flexibility**

Making important decisions in the petroleum industry requires incorporation of major uncertainties, long time horizons, multiple alternatives, and complex value issues into the decision model. Decision analysis can be defined on different and embedded levels in oil and gas exploration and production stages. The value of information depends on both the amount of uncertainty (or the prior knowledge available) and payoffs involved in the petroleum exploration and production projects. As the level of information increases, the decision making process becomes more complex because of the necessity of (1) more accurate prediction of field performance and (2) integration with production strategy.

### **Portfolio management and the real options valuations**

Asset managers in the oil and gas industry are looking to new techniques such as portfolio management to determine the optimum diversified portfolio that will increase company value and reduce risk. A portfolio is said to be efficient if no other portfolio has more value while having less or equal risk, and if no other portfolio has less risk while having equal or greater value. The original idea states that a portfolio can be worth more or less than the sum of its component projects and there is not one best portfolio, but a collection of optimal portfolios that achieve a balance between risk and value.

### **Discussion and implications**

Decisions related to oil and gas exploration and productions are still very complex because of the high number of issues involved in the process. However, concepts of risk analysis applied to exploration, appraisal and development phases are becoming more popular as new hardware and software advances appear. New methodologies are being developed to help to mitigate risk, and this special issue is dedicated to contribute to this process.

Despite these limitations and difficulties, risk analysis has several major strengths and achievements in oil and gas exploration and production, as stated earlier. First, risk analysis provides a means for handling highly complex decisions characterized by multiple objectives and high degrees of uncertainty in diverse stages of petroleum upstream. Second, risk analysis provides an approach for dealing with complex value tradeoff and preferences of the stakeholders in the decision process in oil exploration and production. Third, risk analysis provides a systematic and comprehensive way for considering all relevant factors in a decision in the exploration and production process.

# **INTERRELATIONSHIP OF ECONOMIC GROWTH AND REGIONAL RELIGIOUS PROPERTIES**

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The link between economics and culture are not new. In the early stages economics serves culture, which subsequently moves on to a view where culture is at the service of economic development. Today however, the relationship between economics and culture needs to be approached through a more complex analysis, which goes beyond but also incorporates both visions. Economics and culture are two fields with many (and increasing more) valuable common characteristics. In a society in which intangible aspects and people are becoming increasingly relevant, the divide between the world of economics and business on the one hand, and culture on the other, is diminishing.

During the past few years, empirical economic growth modeling has emerged by constructing and testing numerous model and explanatory variable alternatives. One of the most promising recent idea consists that also religious aspects should be included as explanatory variables into economic growth models, therefore capturing influences of culture, moral and ethics. Moral institutions and ethics affect the economic development, as for example, trust and honesty are essential requirements for emerging economic activity.

In this article, analysis of economic growth extends from international to regional level. Religious activities and beliefs are documented over a long time period in many Western economies, making quantitative empirical time series data available. Firstly, following the idea and argumentation by Barro and Mc Cleary, “religious production efficiency” measure is constructed and used in economic growth regressions for 8 OECD countries, proxying quantifiable dimensions of culture. By using panel estimation methods and additionally time-series estimations for each country, rather than usual cross-country regressions, more information is gained concerning the country specific growth and religion characteristics. Empirical evidence from the panel data estimations seems to suggest that religious beliefs attain more relevance than religious attendance.

Religious production efficiency, containing both belief and activity aspects, was not found statistically significant with panel data or with individual 8 OECD countries growth model, except for Finland. Significant coefficient for Finland can be explained by referring to Finland’s unique religious market properties, as the level of religious beliefs have historically been unusually high, and continue to be, in Finland. Secondly, interrelationship of Finland’s religious and economic variables are analyzed in regional level. Three small Finnish cities, all with strong religious Christian revival background, gain positive and significant coefficients when consumer income growth is regressed by religious activity.



Nevertheless, more exact understanding on the links between these concepts are essentially needed to better model the economic consequences of cultural, religious and moral variables. Therefore, several suggestions are presented to gain better growth information in the future empirical growth modeling, including better theoretical background, more robust estimation techniques and longer data.

## **THE NEW WORLD IN THE WORLD'S CAR INDUSTRY**

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Seventy-eight percent of commuters drive 40 miles or less to and from work. If we could change the technology behind these daily drives, imagine how much gasoline and money we could save while helping reduce emissions. It might be possible with a vehicle capable of running on electricity, E85, and gasoline fuels.

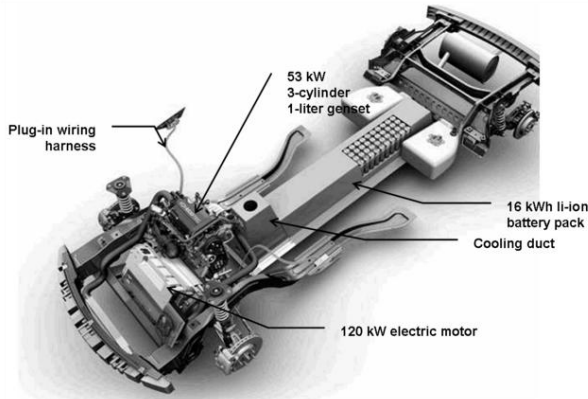
The E-Flex is a new propulsion system introduced by General Motors (GM). The "E" in the E-Flex stands for "electricity" and "Flex" stands for "Flexibility".

The beauty of this electric based system is that fuel comes in 4 different varieties: electric, E85, biodiesel or worst case scenario regular gas. The real issue at hand here is not creating the power to propel a car, it is storing the power. Anyone who has owned an iPod or similar device utilizing Lithium Ion batteries can attest to fact the battery life degrades after every charge. This single issue is what is holding most car manufacturers from going from paper to production.

This term sums up in essence that the vehicle propulsion system will produce electricity, and that its platform is also flexible, a unique feature that will make it a groundbreaking achievement if it can be successfully translated into production.

The first application of this concept has been made in the Chevrolet Volt, a concept car unveiled last year.

The vehicles using this technology will be all electricity-driven. But the beauty of the E-flex systems lies in the fact that electricity will not only be produced from regenerative braking and other mechanical means, but through the use of different types of fuels. These fuels would be used to generate electricity which would charge a Lithium battery pack that would help run the car on electricity.



**Figure 1 – Powertrain of the Chevy Volt E-Flex Concept**

The emissions from a car using an E-Flex system will be drastically reduced, which will be good for the environment. GM will be able to introduce multiple propulsion systems in a common chassis capable of running on different fuels to generate electricity. The electricity finally provides the motive force for the car.

Another feature that recommends the E-Flex platform is that it is adaptable to a wide diversity of automobile types and sizes and fuel sources. This means that a variety of energy sources can be easily exploited, leading to a win-win situation for everyone.

The most important link in the system is the Lithium battery which enables the car using the E-Flex system to be charged from an electrical source as well, giving more mileage to the car using less fuel.

But while this has made the system more flexible, there is a problem in engineering a battery that is powerful enough to propel a car but affordable enough to go into mass production. Following the implementation in the cars, the E-Flex system has raised a lot of expectations in the automotive industry.

Instead of a petrol or diesel engine, E-Flex has, at its heart, a 161bhp electric motor and a 150kg, 16 kilowatt-hour lithium-ion battery. You charge this battery from the mains, or by regenerative braking, and once it's totally spent, it will have taken you around 40 miles.

What happens once the batteries have run out is just as interesting. GM is developing three different versions of the E-Flex car, each with a different crutch for its electrical propulsion system. The Volt used a turbocharged, 1.0-litre petrol engine capable of running on normal petrol, E85 bioethanol or even E100 pure ethanol. However, there is also an E-Flex chassis in the works with a hydrogen fuel cell, and one we're about to be shown, which uses GM's 1.3-litre turbodiesel engine.

In every case, the combustion engine or fuel cell serves only as a power generator; they're not attached to the wheels at all. However, they'll allow GM's new breed of EVs to go beyond commuter range; to forge up and down the interstates, autobahns and motorways of the wider world. And that, together with GM's experimental battery technology, should make them as acceptable to the masses as piston-engined cars ever were.

## **ECONOMIC EVALUATION OF ECOLOGICAL LOSSES AS A RESULT OF OIL EXTRACTION**

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A man always has necessities that he tries to satisfy with help of using of natural resources which are limited and non-renewable. In 50-60 years XX century oil and gas appeared on the first plan among combustibile minerals.

The negative sides of the use of natural resources are: extraction and exhaustion of natural supplies. The feature of oil extraction is complete extraction of its use in future. However the process of oil extraction itself influences negatively on the ecological network of territory. Chemical ecological contamination by gases, which can be found in mixture of primary oil, as well as change of locality's relief and negative influence on geosystem is going on now.

Apart from environment, the negative influence is felt by man. Although this contamination refers to the agents of indirect influence on a man, it leads to deterioration of his life conditions and activity, which predetermine the processes of metabolism in the man's organism. Change of one of thousands of human organism's parameters (chemical, physical, mechanical, biological), that by the way are linked closely to each other, is sufficient to worsen seriously the man's physiological functions. Three basic methods are used for the quantitative estimation of an economic loss : direct account, analytical method and empiric method. We'll show the method of direct accounts, which consists in index comparison of muddy and practically clean (base) districts. We'll choose the Okhtirskiy district of the Sumy area first, and we'll take the Kroleveckiy district, which identical in descriptions, as a standard (the same squire (1,3 thousands of km<sup>2</sup>), population (48853 and 41598, respectively), identical climatic and geographical belt). The Okhtirskiy district is known for oil extraction and processing, and the Kroleveckiy district – for wood processing and producing of flour. This means that both districts are economic developed enough. For more exact result we'll compare the average month salary of worker of extractive industry in the Okhtirskiy district and worker of processing industry in the Kroleveckiy district: 2742 – 1144 = 1598 uah – conditional benefit from the oil extraction. However if determination of the separate local losses are recount

indexes by the method of direct account, we'll define that the deterioration of population health of the Okhtirskiy district will be 43-45% from a complex loss, in agriculture 5-6%, in forestry 5-6%, in industry 10-12%.

In the economic evaluation of oil extraction in the Okhtirskiy district the man's payments for medical service and treatment, as well as other types of activity are the «criterion» of ecological loss in a money form. It will enable the man to understand that the oil extraction brings both a good profit and perceptible losses; difference of these sums will be a clean description of person's living level in locality which is specialized on extractive industry.

## **RENEWABLE ENERGY SOURCES IN UKRAINE**

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At present Ukraine is developing as an independent state and defining its position in geopolitical system. Topical issue is Ukraine's integration into the world economy that will give advantages coming from participation in the world division of labour. Further development of international economic collaboration of Ukraine requires carrying out an energy policy coherent to the policy of leading world countries, first of all European Union. Discrepancy between energy policy and practical actions of Ukraine in this field may put us in discriminating position.

EU countries' goal is transition to sustainable development. In energy field they make great efforts to improve energy security, to increase the use of own renewable energy resources, to reduce negative influence of energetics upon environment. For the period till 2010 EU countries plan to raise the share of renewables up to 14.6% of the total primary energy consumption. Realisation of these plans and achieved big technological progress, particularly in wind energy and biomass utilisation, inspire them with more ambitious plans.

There are different scenarios of energy supply in Ukraine. I would like to draw attention to possibilities in enlargement of renewable energy utilization in Ukraine, to show real resources and to avoid extremes in prediction of utilization of some types of renewables.

Wind energy. Ukraine has favourable conditions for the development of wind energy. In many regions average annual wind velocity is 5-5.5 m/sec at a standardized height of 10 m above ground level.

It is considered that installed capacity of wind power plant (WPP) that can be achieved as a part of centralised energy system of Ukraine may come up to 16000 MW, and power generation may come up to 25-30 TWh/year. This figure is often accepted as a potential of wind power. The area necessary for the

construction of such a WPP capacity is 2500-3000 km<sup>2</sup> that is quite real taking into account shoal of the Azov Sea and the Black Sea [1].

Solar heat energy. Existing programmes for energy development envisages increasing use of solar energy mainly for local hot water supply in summer season. Potential of solar energy for heat production is estimated at about 32 TWh [1].

In present investigation rate for the installation of solar collectors for the period till 2030 is accepted in accordance with [1] accelerating rate in 2030-2050. It may be assumed that by 2050 solar collectors will produce about 23 TWh/year.

The use of firewood and wood residues. In Ukraine forests cover only 15.6% of the territory, at that nearly half of them have environmental value. The country lacks for merchantable wood that is why timber is imported. The main forest areas are located in the Carpathians and Polissia (Forest Land) were more than 90% of wood is harvested. According to estimations [3, 4] wood potentially available for energy production makes up 1.6 mill m<sup>3</sup>/yr of felling residues, 2.1 mill m<sup>3</sup>/yr of wood processing waste, 3.8 mill m<sup>3</sup>/yr of firewood that in sum is equivalent to 16 TWh/yr.

The use of agriculture residues. Ukraine has good prospects to revive highly efficient agriculture, which is able to satisfy domestic needs in foodstuff and feedstock and also produce products for export. The big part of the territory is steppe. It is characterised by low atmospheric precipitation, frequent draughts and other unfavourable phenomena.

In Ukraine some people have doubts as to possibility to use straw and stems for energy purposes. It can be explained by insufficient productivity of agriculture, big losses and burning of straw on fields, absence of stems storing.

In accordance with the prognosis for the development of bioenergy in Ukraine [4] the use of straw and stems for energy purposes will be equivalent to 23 TWh in 2030. Further increase to 50 TWh/yr in 2050 may be assumed that will require up to 60% of technically available potential.

The use of biogas. According to estimations [3, 4] technical potential of biogas available for energy production consists of the biogas from manure (animal husbandry and poultry farming) - 2308 mill m<sup>3</sup>, the biogas from sewage sludge - 334 mill m<sup>3</sup>, and landfill gas - 2300 mill m<sup>3</sup>. In sum it is equivalent to 28.2 TWh.

Formerly in Ukraine biogas was widely produced at wastewater treatment plants, total volume of installed digesters was 162000 m<sup>3</sup>. Now biogas production in many cases is stopped because of bad technical condition of digesters, and because the state does not stimulate this activity. In 2000 the use of biogas was equivalent to 0.02 TWh.

The "Energy Strategy of Ukraine till 2030" is under development by a group of Ukrainian energy experts on the decree of President of Ukraine. According to draft version targeted utilization of RES is 6.6 mtoe (4.7% of Primary Energy Consumption (PEC)) in 2010 and 21.8 mtoe (17% of PEC) in 2030.

Enlarged use of RES would allow solving a number of existing problems connected with environmental pollution and global warming; it would also reduce danger of energy and economy crisis.

### **References**

1. Project "Energy strategy of Ukraine for the period till 2030 and further prospect (general provisions) / The Ministry of Fuel and Energy of Ukraine, the National Academy of Sciences of Ukraine, - 2002.
2. Draft Law of Ukraine "On corrective action to the Law of Ukraine "On power energy" (registration N 3504 of 16.05.2003).
3. Zhovmir M.M., Shul'ga S.V. On expediency to build wind power stations in Ukraine // Energetics and electrification. - 2000. - 4.- p. 36-40.
4. A solar thermal strategy. Sun in Action II / Renewable Energy World. - 2003, V.6, N4, p. 200-209.

## **MODELING THE SUSTAINABLE DEVELOPMENT WITH THE ECOLOGICAL KUZNETS CURVE**

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Influence of per capita income on pollution is modeled with the help of the Environmental Kuznets Curve (EKC). The EKC pattern suggests an inverted U–shape relationship between per capita income and pollution. The main findings is that Ukraine follows the EKC pattern for some pollutants such as SO<sub>2</sub>, NO<sub>2</sub>, IZA while there is an increasing pattern for other pollutants such as dust, CO<sub>2</sub>.

The description of the modelling for Ukraine includes two sets of results: (i) the one associated with pollution expressed as concentrations (a city level analysis), and (ii) another one associated with pollution in terms of emissions (a regional level analysis). First, we run linear regressions and show that the linear model is misspecified. Second, we provide the description of the basic model that contains only income as a major explanatory variable and pollution in terms of concentrations. After that, we test the hypothesis of the EKC on the basis of simultaneous equations model. In the latter, *income* is influenced by the key factors such as assets per capita, the VCV and pollutants; in turn, pollution is determined by the VCV and income. Finally, we discuss the obtained results in terms of break point analysis.

The pollution-income relationship was specified in the usual way as quadratic and logarithmic relationship. Both representations were estimated, but only linear relationship showed the EKC pattern (logarithmic model did not support the EKC hypothesis). Inclusion of the Vector of Climate Variables (VCV)

into the model did not change much the value of coefficients associated with income. For models exhibiting the inverted U-shape relationship we have estimated break points, and they appeared to be in the range \$2000-\$5000 in 2007 prices. Our findings are comparable with the earlier studies that estimated break points at \$1000-\$80000US. For example, Feng and Show (2004) estimated break point for CO in Taiwan at \$6000. According to Egli Hannes (2004), the break point for NO<sub>x</sub> in Germany was estimated at US\$14750 (in 1985 prices), break point for NH<sub>3</sub> was at US\$17000 (in 1985 prices). List, Millimet al., (2003) performed the EKC modelling for the US, and the estimated break points were at US\$5000-20000 (in 1987 prices).

The crucial question that may arise is: Why Ukraine has such small value of break points in comparison with other countries? One possible answer is that oil and natural gas prices are constantly increasing in Ukraine, and Ukrainian businesses are forced to use more energy effective technology which is also more environmentally friendly. Below we provide examples of the largest Ukrainian corporations that started to implement more energy effective equipment according to Rozhin (2007). “Thus “Mariupol Illich Steelworks” in June 2006 started to introduce pulverized coal injection on its blast furnaces. “Yenakievskiy Steelworks” is building coal-dust complex. “Mittal Steel Kryvyi Rih” switches its blast furnaces from gas to coke of higher quality. According to the steel plant announcement it is going to invest 325 million in modernization. It will lead to economy of about 190 thousand cubic meters annually. “Donetsk Steelworks” completely switched from gas to coal-dust fuel. “Alchevsk Steelworks” is going totally invest 1.4 billion dollars over the period of 2007-2010. It is going to decrease gas consumption by 80 percent. “Azot Cherkasy” is investing 400-600 million dollars during the period 2007-2010. The main aim of the program is to cut high energy costs.”

Found values of the break points in Ukraine on the basis of the EKC are smaller than those in developed countries, which may suggest that Ukraine follows its own pattern in economic development.

Our assumption about the omitted variable bias failed to be supported by Ukrainian data on pollution (in terms of concentration). The difference in break points with and without VCV disappears in one or two years.

However, the VCV happened to be important in GLS estimation of the EKC: Wind, smog, and precipitations showed expected results. Random effect showed insignificant influence of the VCV.

The main prediction of our findings based on the EKC is that pollution by SO<sub>2</sub> and NO<sub>2</sub> should start to decrease in the nearest future, while pollution by CO<sub>2</sub> and DUST is going to increase. There is a specific case with dust which failed to support the EKC hypothesis under usual assumption (pollution does not influence per capita income), but showed the inverted U-shape relationship under the instrumental variable approach (break point was at the level of UAN 22433).

The overall emission pattern did not decrease during the 1998-2006; on the contrary the emissions were increasing, which may suggest about the development of new chemical and metallurgical industries. We assume that economic recuperation of Ukraine starting from 1999 increased pollution in terms of one pollutants (CO<sub>2</sub>, dust, CO and some others), and possibly slow down the in terms of others (SO<sub>2</sub>, dust, NO<sub>2</sub>). Actually it's very difficult to compare the concentrations and emissions, because data for the concentrations is measured exactly in the cities, while emissions are from firms that belong to some specific city, but they are not necessary to be within the city (usually outside).

The emission data set failed to support the EKC, showed a sustainable plateau in pollution in the range of UAN 1000-15000 (in 2007 prices). It suggests that the automobile pollution should start to decline in Ukraine beyond income level of UAH 15000.

## **STRATEGIC DIRECTIONS OF SUSTAINABLE DEVELOPMENT ON THE REGIONAL LEVEL**

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The conception of sustainable development was accepted in 1992 on Conference of Environment and Development. Definition of sustainable development is built on co-ordination of interests between people and nature. The strategies for sustainable development called for at Rio are foreseen as highly participatory instruments intended "to ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations". Hence a new conception has united the three main components, such as economic, ecological, social.

### **The economic sphere**

1. *Economic prosperity.* The traditional measures of economic activity include gross domestic product (GDP), net domestic product (NDP), and the unemployment rate. These measures, however, do not take into account negative environmental impacts of production and consumption or gauge the incidence of poverty.

2. *Consumption and production patterns.* The Ecological Footprint is a measure of the demand human activity puts on the biosphere. More precisely, it measures the amount of biologically productive land and water area required to produce all the resources an individual, population, or activity consumes, and to absorb the waste they generate, given prevailing technology and resource management practices. The consumption footprint of a country measures the biocapacity demanded by the final consumption of all the residents of the nation.



This includes their household consumption as well as their collective consumption, such as schools, roads, fire brigades, etc., which serve the household, but may not be directly paid for by the households. Very often with ecofootprint calculate biocapacity, as a total amount of bioproductive land available. Difference between ecofootprint and biocapacity is define type of country (ecological debtor or ecological creditor)

3. *Energy efficiency*. There is a need for developing countries in the region to include a goal such as “enhanced energy independence” in their infrastructure development plans so that local and renewable energy resources may be used to generate power for buildings and fuel for transportation. Two key components are the need to diversify energy supplies so that one source does not dominate and hence control the market demands. The other is to start investing in development of renewable and sustainable energy resources now rather than later.

The economic component of the concept consists of optimizing the use of limited resources and the management of material and energy saving technologies. Such management would create a stream of cumulative income, which would preserve—and not reduce—the cumulative capital (physical, natural and human) employed in the creation of this cumulative income.

### **The social sphere**

1. *Demographic*. Creation and realization efficient state policy for the increase of life expectancy and Ukrainian population stabilization, to give the comprehensive support to young families.

2. *Sustainable tourism (ecotourism)*. Increase in urban green space, park space, and recreational areas.

The social component is oriented to human development, preserved stability of public and cultural systems, and the reduction of the amount of societal conflict. The human being should not be viewed as an object, but rather the subject of development. People should take part in the formation of their own life, making and executing decisions, and exercising control over their implementation. An important part in creating these conditions belongs to the pluralism of opinions and tolerance for relations between people, the preservation of cultural capital and its varieties, and the fair distribution of benefits amongst people

### **The ecological (environment) sphere**

1. *Atmosphere* (clean water, air). There is a need to apply eco-efficiency concept into water infrastructure development. Not only efficiency of infrastructure investment but also eco-efficiency of operation and maintenance of water infrastructure need to be improved. Opportunities for improving eco-efficiency in water infrastructure include reducing water demand by increase public awareness, applying integrated water resource management, increasing water recycling, and minimizing water loss.

2. *Biodiversity*. Biodiversity Convention is legal document which indicate necessity conservation and renewal of biological potential. For that purpose, it is

necessary to create a protective territory such as reserves, national parks, where a favourable conditions for residence biological species.

3. *Climate change*. Reason of climate change is accumulation CO<sub>2</sub> in atmosphere, which produce from burning fossil fuels. Hence, in order to avoid carbon accumulation in the atmosphere, the goal of the United Nations Framework Convention on Climate Change, two options exist: human technological sequestration, such as deep well injection; or natural sequestration.

From an ecological perspective, sustainable development provides for the integrity of both natural biological and physical systems and ensures their viability. The global stability of the biosphere depends upon it. Special significance is attached to the ability of such systems to self reproduce and adapt to various changes, as opposed to being preserved in a static condition within a vacuum or deteriorating and losing its biological variety.

## **STATE ENVIRONMENTAL REGULATION OF INDUSTRY ENTERPRISES**

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The regulation of the human environment has been a preoccupation of urban planners from the earliest civilized times. Starting in the 1800s, industrialization made matters infinitely more difficult. Modern environmental regulators work primarily for government, and implement environmental policies, through environmental laws, developing actual regulations, which are, in other words, the rules by which environmental laws are applied. That rules become captured by industry is axiomatic in policy analysis of regulation. But that regulation does work despite all this is indicated by the relative absence of burning rivers, or exploding nuclear plants, at least in recent decades. Instead, as industry constantly outpaces regulation, we get novel problems such as toxic waste, smog, etc.

The forthcoming accession of Ukraine to the World Trade Organization brings stronger ecological priorities in the state activities. But the main task of the state to achieve this is to improve environment safety and increase capitalization by taking an integrated approach to the use of water and other natural resources, and providing environmentally safe generation, transportation and distribution of energy.

The fundamental principles of the ecological policy are:

- energy saving and sustainable use of natural and energy resources in the production of electrical and heat energy;
- scientific validation of environmental policy and promotion of environmental protection research in electricity industry;

- prioritizing adoption of best available technologies over employment of measures to minimize environmental damage from working equipment (on the basis of a feasibility study);

- environmentally safe treatment and reduction of industrial waste.

To set it up, the following provisions should be met:

1) regular environmental audits of working enterprises of the electrical energy sector;

assessment of industrial and environmental risks, development and implementation of risk mitigating measures, and compensation for losses;

2) adoption of measures for prevention and response to accidents negatively impacting the environment;

3) operational planning based on environmental target performance indicators, monitoring and evaluation;

4) ecological monitoring, setting up ecological record keeping;

5) environmental risk management, development and adoption of mitigating measures, and compensation for losses incurred;

6) development and implementation of economic incentives to encourage efforts to reduce pollutant emissions into the environment.

Implementation of this policy will allow cut down the negative impact on the environment, raise the competitiveness of electrical power on the foreign and domestic markets, raise social responsibility.

## **ENVIRONMENTAL LEGISLATIVE WORK IN CHINA**

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China pays great attention to environmental legislative work and has now established an environmental statutory framework that takes the Constitution of the People's Republic of China as the foundation and the Environmental Protection Law of the People's Republic of China as the main body.

The Constitution of the People's Republic of China stipulates, "The state protects and improves the living environment and the ecological environment, and prevents and remedies pollution and other public hazards," and "The state ensures the rational use of natural resources and protects rare animals and plants. The appropriation or damage of natural resources by any organization or individual by whatever means is prohibited."

The Environmental Protection Law of the People's Republic of China is the cardinal law for environmental protection in China. The law has established the basic principle for coordinated development between economic construction, social progress and environmental protection, and defined the rights and duties of

governments at all levels, all units and individuals as regards environmental protection.

China has enacted and promulgated many special laws on environmental protection as well as laws on natural resources related to environmental protection. They include the Law on the Prevention and Control of Water Pollution, Law on the Prevention and Control of Air Pollution, Law on the Prevention and Control of Environmental Pollution by Solid Wastes, Marine Environment Protection Law, Forestry Law, Grassland Law, Fisheries Law, Mineral Resources Law, Land Administration Law, Water Resources Law, Law on the Protection of Wild Animals, Law on Water and Soil Conservation, and Agriculture Law.

The Chinese government has also enacted more than 30 administrative decrees regarding environmental protection, including the Regulations for the Prevention and Control of Noise Pollution, Regulations on Nature Reserves, Regulations on the Prevention of and Protection Against Radiation from Radio Isotopes and Radioactive Device, Regulations on the Safe Administration of Chemicals and Other Dangerous Materials, Provisional Regulations on the Prevention and Control of Water Pollution in the Huaihe River Drainage Area, Regulations Governing Environmental Protection Administration in Offshore Oil Exploration and Development, Regulations on the Control of Marine Wastes Dumping, Regulations for the Implementation of the Protection of Terrestrial Wildlife, Provisional Regulations on the Administration of National Parks, Regulations on the Protection of Basic Farmland, and Regulations on Urban Afforestation. In addition, departments concerned have also issued a number of administrative rules and decrees on environmental protection.

To implement the state's environmental protection laws and regulations, people's congresses and people's governments at local levels, proceeding from specific conditions in their own areas, have enacted and promulgated more than 600 local laws on environmental protection.

Environmental standards are an important component of China's environmental statutory framework. They include environmental quality standards, pollutant discharge or emission standards, basic environmental criteria, criteria for samples, and criteria for methodology. The environmental quality standards and pollutant discharge or emission standards are divided into state standards and local standards. By the end of 1995, China had promulgated state environmental standards on 364 items. As stipulated in Chinese law, the environmental quality standards and pollutant discharge standards are compulsory standards, and those who violate these compulsory environmental standards must bear the corresponding legal responsibility.

In the process of establishing and improving the environmental statutory framework, China attaches equal importance to environmental law enforcement and environmental legislation. For four years in a row, China has conducted nationwide checks on the enforcement of environmental legislation to seriously deal with acts of polluting and damaging the environment and severely punish

environmental law violations. China pays great attention to supervision exercised by the people and media over law-breaking activities regarding the environment -- it has opened channels for the masses of people to report on environmental problems and adopted measures for the media to expose environmental law-breaking activities.

But it should be pointed out that China's environmental legislative work needs to be further improved. For instance, some areas still remain uncovered, some contents are yet to be amended or revised and there are still the phenomena of not fully observing or enforcing laws. Therefore, to make continuous efforts to strengthen environmental legislative work remains an important strategic task.

China attaches equal importance to the establishment of an environmental administrative system. It has established a system in which the National People's Congress enacts the laws, governments at different levels take responsibility for their enforcement, the administrative departments in charge of environmental protection exercise overall supervision and administration and the various departments concerned exercise supervision and administration according to the stipulations of the law.

The National People's Congress has established an Environment and Resources Protection Committee, whose work it is to organize the formulation and examination of drafted laws related to environmental and resources protection and prepare the necessary reports, exercise supervision over the enforcement of laws governing environmental and resources protection, put forward motions related to the issue of environmental and resources protection, and conduct exchanges with parliaments in other countries in the field of environmental and resources protection. The people's congresses of some provinces and cities have also established corresponding environmental and resources protection organizations.

The Environmental Protection Committee under the State Council is made up of leaders of various related ministries under the State Council. It is the State Council's consultancy and coordination agency for environmental protection work. Its major tasks are studying and examining the principles, policies and measures relating to coordinative development of the country's economy and environmental protection, giving guidance to and coordinating efforts in tackling major environmental problems, exercising supervision over and conducting checks on the implementation of the environmental protection laws and regulations by various localities and departments, and promoting the development of environmental protection undertakings throughout the country. The people's governments at the provincial, city and county levels have also established corresponding environmental protection committees.

The National Environmental Protection Agency is the competent environmental protection administration agency under the State Council, whose task it is to exercise overall supervision and administration over the country's environmental protection work. The people's governments at the provincial, city and county levels have also successively established environmental protection

administration departments to carry out overall supervision and administration of the environmental protection work in their localities. At present, there are nationwide more than 2,500 environmental protection administration departments above the county level with a total staff of 88,000 engaged in environmental administration, monitoring, inspection and control, statistics collection, scientific research, publicity and education.

Environmental protection organizations have also been established in comprehensive administration departments, resources administration departments and industrial departments under governments at various levels to take charge of related environmental and resources protection work. Most of China's large and medium-sized enterprises have also set up environmental protection organizations responsible for their own anti-pollution work and the promotion of cleaner production. At present, the total number of various types of environmental protection workers employed by the various departments and enterprises exceeds 200,000.

## **HUMAN POPULATION CRISIS**

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If you were to take a standard sheet of writing paper 1mm thick and cut it into two sheets, placing one atop the other, it would then be 2mm thick. Then, cutting the stack of two and making a stack of 4 sheets, it would then be 4mm thick. Believe it or not, if you continued to do this just one hundred times, doubling the size of the stack each time, the thickness of the stack would be  $1.334 \times 10^{11}$  light-years. This is an example of exponential growth, where the rate of growth is always proportional to its present size. Exponential growth also applies to the human population.

Overpopulation is a condition where an organism's numbers exceed the carrying capacity of its habitat. In common parlance, the term usually refers to the relationship between the human population and its environment, the Earth. The resources to be considered when evaluating whether an ecological niche is overpopulated include clean water, clean air, food, shelter, warmth, and other resources necessary to sustain life. If the quality of human life is addressed, there may be additional resources considered, such as medical care, education, proper sewage treatment and waste disposal. Overpopulation places competitive stress on the basic life sustaining resources, leading to a diminished quality of life.

Overpopulation does not depend only on the size or density of the population, but on the ratio of population to available sustainable resources, and on the means of resource use and distribution used by that population.

However, when we compare lifestyles of the rich countries vs. the poor countries, the rich countries are a much greater problem. Just as much as the population size, we need to consider the resources consumed by each person, and the damage done by technologies used to supply them.

Overpopulation has greatly impacted the environment of Earth starting at least as early as the 20th century. According to the UN by 2050 the world population will reach a staggering 10 billion people. There are indirect economic consequences of this environmental degradation in the form of ecosystem services attrition. Beyond the scientifically verifiable harm to the environment, some assert the moral right of other species to simply exist rather than become extinct. Says environmental author Jeremy Rifkin, "our burgeoning population and urban way of life have been purchased at the expense of vast ecosystems and habitats. ... It's no accident that as we celebrate the urbanization of the world, we are quickly approaching another historic watershed: the disappearance of the wild."

Says Peter Raven, former President of the American Association for the Advancement of Science (AAAS) in their seminal work AAAS Atlas of Population & Environment: "Where do we stand in our efforts to achieve a sustainable world? Clearly, the past half century has been a traumatic one, as the collective impact of human numbers, affluence (consumption per individual) and our choices of technology continue to exploit rapidly an increasing proportion of the world's resources at an unsustainable rate. ... During a remarkably short period of time, we have lost a quarter of the world's topsoil and a fifth of its agricultural land, altered the composition of the atmosphere profoundly, and destroyed a major proportion of our forests and other natural habitats without replacing them. Worst of all, we have driven the rate of biological extinction, the permanent loss of species, up several hundred times beyond its historical levels, and are threatened with the loss of a majority of all species by the end of the 21st century."

A 2001 United Nations report has postulated that, although human activity can be blamed for much of the environmental degradation in the last century, overpopulation is not a major cause, but rising per-capita production and consumption and the use of particular technologies used in such production are more likely major factors. Further, even in countries which have both large population growth and major ecological problems, it is not necessarily true that curbing the population growth will make a major contribution towards resolving all environmental problems. However, as developing countries with high populations become more industrialized, pollution and consumption will invariably increase.

As a result of overpopulation we meet certain effects: inadequate fresh water, depletion of natural resources, Deforestation and loss of ecosystems, increased levels of air pollution, water pollution, soil contamination and noise pollution, changes in atmospheric composition and consequent global warming.

In spite of the great achievements that China has achieved in the recent years, country is still a developing country, which is facing many serious social

problems. The most serious of all is overpopulation, for it has a passive influence on the national economy, education and environment.

First and foremost, overpopulation is the main obstacle of the economic development in China. The limited natural resources in China can hardly support the excessively large population. Developing of national economy, especially industry, needs great amount of natural resources, such as land, water, oil, coal, gas and iron. However, the natural resources are limited and decline very quickly when a large population exploits them everyday. Taking fresh water as an example, in 1990, 58% of Chinese cities were suffered from the insufficiency of water. It not only brings great disadvantages to people's daily life, but also has a passive influence on the economic development.

One thing which must be taken into consideration is the amount of time, money, and effort we have spent toward saving and extending lives. Billions of dollars have been spent in this field, and successfully. However, something that we also must look at is the effect this has had on our own number. How much have we contributed to birth control, family planning, and preservation of the environment? Nature is a balance of existence. In order to coincide with nature, we must balance the saving and extending of lives with controlling the number of lives which we produce. We mustn't use resources any faster than they can be reproduced. We need to respect ourselves by learning to respect the environment which we depend on for our own existence. If not, we will cease to exist.

## **HUMAN ECOSYSTEMS**

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Human ecosystems are complex cybernetic systems that are increasingly being used by ecological anthropologists and other scholars to examine the ecological aspects of human communities in a way that integrates multiple factors as economics, socio-political organization, psychological factors, and physical factors related to the environment.

The term ecosystem was coined in the 1930s by Roy Clapham, to denote the physical and biological components of an environment considered in relation to each other as a unit. British ecologist Arthur Tansley later refined the term, describing it as the interactive system established between biocoenosis (a group of living creatures) and their biotope (the environment in which they live).

Central to the ecosystem concept is the idea that living organisms are continually engaged in a set of relationships with every other element constituting the environment in which they exist. The human ecosystem concept is then grounded in the deconstruction of the human/nature dichotomy, and the emergent premise that all species are ecologically integrated with each other, as well as with



the abiotic constituents of their biotope. Ecosystems can be bounded and discussed with tremendous variety of scope, and describe any situation where there is relationship between organisms and their environment.

A system as small as a household or university, or as large as a nation state, may then be suitably discussed as a human ecosystem. While they may be bounded and individually discussed, human ecosystems do not exist independently, but interact in a complex web of human and ecological relationships connecting all human ecosystems to make up the biosphere. As virtually no surface of the earth today is free of human contact, all ecosystems can be more accurately considered as human ecosystems.

The human ecosystem concept draws from disciplines such as ecology, anthropology, sociology, philosophy, political science, cybernetics, and psychology, seeking to understand the complex system of relationships in which humans interact. These relationships exist within nested hierarchies of context with which individuals and human aggregates interact with differentially. Most analysis of human ecosystems focuses on particular contexts of relationship, such as biological, individual, socio-cultural, environmental et cetera.

World Systems Theory, as proposed by Immanuel Wallerstein, is an example of a systemic analysis of the socio-political and economic dimensions of the global network of human ecosystems. The human ecosystem unit of analysis is perhaps most often used by ecological anthropologists, and is apparent in the work of scholars such as Roy Rappaport, who has explored ritual cycles and communication within human ecosystems. Gregory Bateson, E.N. Anderson, Mary Douglas, Keith Basso, and Paul Nadasdy are some other anthropologists who have employed the human ecosystem as a unit of analyses.

The transmission and transformation of information is central to the inquiry of human ecosystems. As scholars such as E.N. Anderson illustrate, humans certainly appear to be specialized information processors. In the context of human ecosystems, information is viewed as a type of input to or output from an organism or designed device. This idea stems from information theory, the foundations of which were laid by Claude Shannon, who published an influential paper titled "A Mathematical Theory of Communication" in 1948. Throughout the 1940s and 1950s cognitive psychology became concerned with information processing, in attempt to understanding human thinking. This approach considers cognition as being essentially computational. During this time cybernetics was emerging, also concerned with the nature and transmission of information.

Information processing is generally considered as the changing (processing) of information in any manner detectable by the observer. It can be described as either sequential or parallel, both of which can be either centralized or decentralized (distributed). Cyberneticians have argued that it is a process which describes everything that happens (changes) in the universe, from the falling of a rock (a change in position) to the printing of a text file from a digital computer

system. In the 1960s and 1970s cybernetic theory began to permeate anthropology, through the work of Roy Rappaport and Gregory Bateson in particular.

Work by scholars such as Roy Rappaport, Gregory Bateson, and E.N Anderson has focused on transfer and transformation of information in human ecosystems. Inquiries as such have focused on the ecological and informational aspects of relationships in human ecosystems. In *Steps to an Ecology of Mind* Bateson discusses information as pattern and difference within complex cybernetic systems.

In the 1990s Edwin Hutchins developed a school of psychology known as distributed cognition, which draws heavily from anthropology and sociology, emphasizing the social aspects of cognition. Distributed cognition is directly applicable to studies of human ecosystems, considering systems as sets of representations, and modeling the interchange of information between these representations. These representations can be either in the mental space of the participants or external representations available in the environment. In *Cognition in the Wild* Hutchins considers information processing within a bounded human ecosystem in a discussion of distributed cognition on board a naval vessel.

Human ecosystems are remarkable in terms of their informational qualities. Belief systems tend to exclude feedback from multiple environments, making human ecosystems difficult to change. The remarkable properties that nurture this tendency are not presented to serve as interesting snippets of the human experience but rather as heuristic devices that may stimulate creative exploration toward a more integrated ecology. The impact of remarkable properties on sustainability is still largely unknown because a framework does not exist in which to consider the long-term viability of human ecosystems. Nonetheless, our discussion points to some tendencies of human behavior that contribute to a seeming inability to recognize or adequately respond to the ecological context that we live in.

## **ECOLOGICAL AUDIT OF RECREACION AREAS**

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Ukraine possesses considerable recreation and touristic potential the competent use of which can become one of factors of improvement of the economic state of the state. Realization of this potential requires the use of different economic and administrative instruments. One of such instruments, finding all of greater application in practice of the developed countries, there is an ecological audit. A primary objective of which is prevention and reduction of negative influence of economic activity on an environment.

An ecological audit in Ukraine is regulated the law of Ukraine «About ecological audit» from 24.06.2004, which determines legal and organizational

frameworks of ecological audit. In obedience to Law, the «Ecological audit is the documentarily designed system independent task of evaluation of object of ecological audit which includes collection and objective evaluation of proofs of audit for establishment of accordance of certain kinds economic activity to the requirements of legislation of Ukraine about the guard of natural environment and other criteria».

A law determines that one of basic tasks of ecological audit is establishment of accordance of objects of ecological audit to the requirements of legislation about the guard of environment and other criteria of ecological audit.

The purpose of this work is an analysis of existing in Ukraine normatively-legal base in a sphere, recreation activity from positions of ecological audit.

A concept «Recreation area» is fastened in the current legislation of Ukraine. To determination, to resulted in an item 63 the Law «About the guard of natural environment» from 25.06.1991 1264-XII, the «Recreation areas are areas of dry land and water space, intended for the organized mass rest of population and tourism».

Recreation areas can be examined as objects of ecological audit, as recreation activity which on them is carried out has influence on a natural environment. By the specific of these areas as an object of ecological audit there is that besides affecting of recreation area environment, takes a place and influence of environment on a recreation area. It shows up in:

- 1) Environmental physical-geographical conditions which can hinder the normal functioning of recreation areas;
- 2) Presence of outsourcings of contamination (factories, enterprises) not far away from recreation areas, which have the ecological aspects, rendering the negative affecting quality of natural resources of them.

Purpose of ecological audit – to analyse ecological aspects as it applies to the different objects of audit. It can be done by collection of information about the object of audit and by the estimation of influence of his ecological aspects in obedience to legislative requirements, if such are present.

For this purpose the analysis of legislative base of Ukraine was conducted in the field of recreation land-using.

It is possible to mark that to the legal mode of recreation areas characteristically: presence of the general and special legal adjusting of the use recreation areas; orientation on renewal of life-breaths and health of man; prohibition of actions, defiat public recreation interests; national character of property on them.

The analysis of normatively-legal base of Ukraine rotined in the field of ecological audit, that to date methodological base of ecological audit of recreation areas and territories it is not developed.

Thus, recreation areas as objects of ecological audit are considered. The basic ecological aspects of recreation areas are certain. The current legislation of Ukraine is analyzed as it applies to the examined object of audit. It is exposed, that to date is not developed methodological base of ecological audit for recreation areas. Consequently, the done work can serve as basis for development of method of ecological audit for recreation areas.

## **References**

1. Мироненко Н. С. «Рекреационная география» - издательство МГУ, 1981 г
2. Бобкова А. Г. «Правовое обеспечение рекреационной деятельности» - издательство ДонНТУ, 2000 г.
3. Закон Украины «Об экологическом аудите» от 24.06.2004 г
4. Закон Украины «Об охране окружающей среды» от 25.06.1991 г № 1264-ХІІ

## **ENVIRONMENTAL AND ECONOMIC BASES OF CROSS-BORDER MECHANISMS CREATION**

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Transitions in Central and Eastern Europe that we can observe in past years require essential changes in the political, economical and social systems of their countries. As many economists and politicians said the future level of economic and social life of European countries depends on their regional development. Cross-border cooperation is defined in modern economy as effective tool for regional policy formation and realization. Certainly, West European countries have rather good experience in regional and interregional cooperation, known as euro-regions creation and development. Ukrainian government as well as governments of other Eastern European countries defines such priority directions of national and international policy development as euro-regions creation and cross-border cooperation development. But unfortunately there is still no created effective mechanism of cross-border cooperation development in Ukraine, taking into consideration peculiarities of our legislative base and level of economic, social and environmental development. It should be said that environmental problems are substantial for cross-border cooperation between Ukrainian regions and regions of bordering countries. And this aspect of cross-border cooperation is also not yet solved. So, coming from the mentioned problems I consider the topic I am going to research rather actual in modern society.

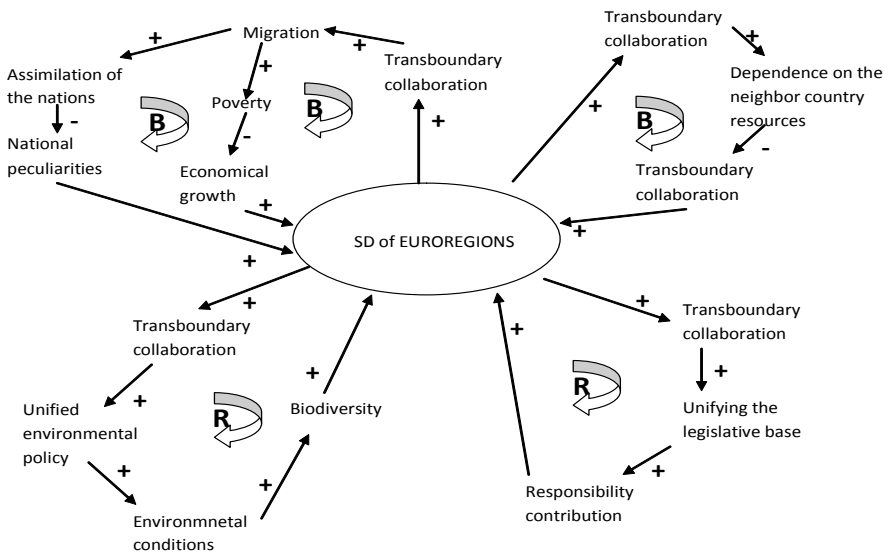
Thus, environmental, economic, scientific and methodical bases for cross-border mechanisms formation, that create preconditions for adaptation of cross-border conception to the system of territory environmental and economic safety are offered and grounded in the thesis. On the basis of foreign trade cooperation analysis strategic cross-border directions are determined. The research systematizes regional environmental problems and reveals their connections with economic and environmental territory safety. It is suggested our original definition for “environmental and economic component of cross-border cooperation” and further develops theoretical approaches to grounding the system of cross-border territories development management instruments based on the use of analytical

scheme “perspectives – obstacles”. Scientific and methodical principles for creation of logic-structural framework for implementation mechanism of cross-border cooperation are developed. Environmental and economic tools for its implementation in the decision making processes are suggested. Theoretical bases for complex analysis of regional development directions that allow foreseeing potential environmental and economic consequences are improved and methodical approaches to cross-border environmental-economic efficiency estimation based on the integral environmental impact damage index are suggested. Improved methodical approaches to the formation of the system of indexes and criteria allowed incorporating environmental component for grounding managerial decisions in the sphere of cross-border cooperation. Based on the calculation results of the suggested environmental and economic cross-border efficiency indexes strategies for increase of environmental and economic efficiency of cross-border mechanisms implementation in conditions of sustainable social, environmental and economic development are elaborated.

The complex analysis of the potential directions of regional development was made using Causal Loop Diagram Method (CLD analysis) (see figure 1).

As any activity is considered non-effective if it’s not sustainable, then we try to create a concept of sustainable development of transboundary regions.

Description & Solutions. As the problem of research was defined as sustainable development of the euroregion, then we put it at to the central part of CLD. It was suggested solutions to solve this problem connected with different areas (political, economical, social, environmental).



**Figure 1 - Causal Loop Diagram of Euroregion Sustainable Development**

Possibilities & Constrains. As for implementation of the mentioned sustainable development concept of euroregion the common economical, ecological and social problems at bordered countries can make it more understandable and easier. And constrains that should be mentioned are the difference in legislative base (and may be in mentality of people).

Stakeholders & Drivers. Municipal government of both countries; NGOs of both countries; local community in both countries; (partly national government of both countries).

Geographical & Time Scale. Geographical area to be considered is the 2 bordering regions of Ukraine and Russian Federation. Time scale is 3-7 years.

Novelties. To our mind the system analyze using the CLD approach is rather effective instrument to take decisions, solve conflicts, find the dependences and to see the total results. You can rather easy create the loop to make decision process more understandable and to find what is the absent element in your system.

## **ACCOUNTING OF ECOLOGICAL RENT UNDER PROCESSING OF WASTES**

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Natural resources are an aggregate of natural bodies and phenomena of nature, which are utilized by a man in the activity which is directed in support the existence.

Electing the variants of projects and directions of ecologization of economy, it is necessary to have a criterion, to choose a correct and the best variant. It follows to realize a project, if it is economically effective. An economic evaluation of ecological functions is extraordinarily difficult business and that is why it is more frequent necessary to do the limited choice between the large number of variants of decision of problem.

Comparison of charges and results in a money equivalent or determination of ecology-economical efficiency of project serves as a mechanism of such choice in an economy.

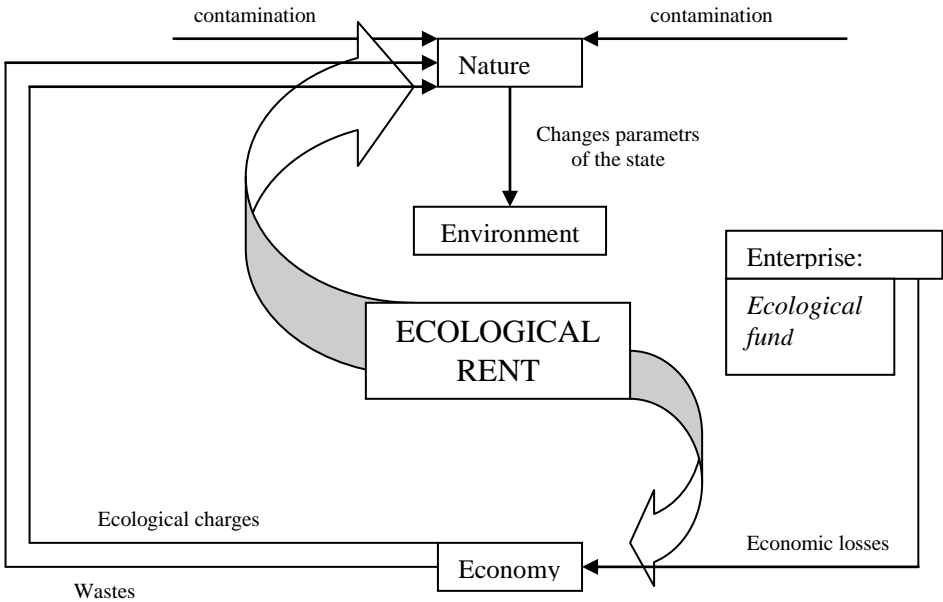
One of strategic tasks of more effective development of production potential it is a structural reorganization. It can be carried out, from one hand, by the effective policy of restructuring and treatment of potentially competitive enterprises, and from other hand is - through liquidation of unprofitable and bankrupted enterprises.

A problem of wastes is a problem of cities, and when is city bigger, it is harder to resolve this problem.

There are a great number of technologies which allow to divide wastes and utility waste. The most expensive and most difficult from them is drawing out of utility waste from the general stream of wastes, that already were formed, on the special enterprises. More simple technologies of bishing out those or other components from the stream of condition wastes can and must be used, for example, enriching of TPV with the purpose of increasing of its power value and removal of undesirable elements before burning down of wastes. The system of handling wastes can foresee recycling. Recycling is the repeated utilization of wastes in quality of raw material. This process has a double positive effect. From one side the recycling enables to decrease contamination of environment, from other – to shorten the volumes of getting of natural resources. Having regard to that the unprecedented volume of industrial and domestic wastes is accumulated in an environment, in interests of society and state to get ecological incomes from industry, for example as rent.

The recycling of profits means that the government decreases old taxes gradually, and will say, a profit from new receipts will reserve for coverage of the accepted item of expenses of budget. For example, taxes from contamination can be a having a special purpose rank invested in cleansing buildings and so on.

In this case, it is offered an enterprise of processing of wastes defrayed costs as ecological rent.



**Figure 1 – Accounting of ecological rent under processing of wastes**

For example, that ecological rent is advance payment of all of charges, caused the wastes of production, consumption of material welfares which are created due to processing of wastes. It is suggested to examine as facilities on indemnification of nature protection charges and economic loss in the process of remaning the rent profits, and more precisely ecological rent.

According to contamination, the chart of forming of economic loss following: at first contamination influences on an environment and changes the parameters of its state, then the already changed environment influences on recipients during processing, and it leads to economical losses.

Our task is to sending of ecological rent on purpose, for example in an ecological fund.

An ecological rent enterprises-utilizators will welcome such approach because, a necessity is inlayed from them now the facilities in nature protection measures and pay inflicted a production on processing economic loss will be taken off. They will get on it facilities from an ecological fund, as already brought in sufficient for this purpose payment for it.

For example, processing of wastes (possibly plastic bottles), at first, does not enable to contaminate an environment, unlike utilization, where some types of wastes are laid out centuries, secondly, a clean economic effect goes, as products are getted in the process of processing, are suitable for the use on purpose again.

In order that rent was indeed outlaid on purpose, the mechanism of transmission of rent is needed from a private sector to the special fund of facilities for nature protection activity and proceeding in naturally resourcing potential. In addition, the mechanism of distributing of facilities of such ecological fund is needed between all of participants of nature protection activity and all of recipients of ecological violations. Presently such participants are enterprises, which carry out nature protection activity due to the personal funds which plug the proper charges in an unit which is produced cost price, and also and nature protection organs which carry out the activity due to the government's budget.

## **EUROPEAN AIR QUALITY MANAGEMENT: CO-PRODUCTION OF SCIENCE AND POLICY**

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The Convention on Long-range Transboundary Air Pollution (CLRTAP) is one of the central means for protecting European area. It has, over the years, served as a bridge between different political systems and as a factor of stability in years of political change. Besides, it has substantially contributed to the development of international environmental law and has created the essential framework for



controlling and reducing the damage to human health and the environment caused by transboundary air pollution.

CLRTAP is a successful example of what can be achieved through intergovernmental cooperation where science and policy come together. In fact, realization of CLRTAP needs systematic scientific approach to the solution of such extremely important theoretical tasks, as:

- formalization and investigation of atmospheric air utility function;
- aggregation of individual indifference curves within the frames of «air quality - consumption» system;
- formalization of model for social optimum of air quality and determination of its «shadow» price;
- research of the «price of air quality» category and its determinative factors;
- substantiation of effective and adequate ecological and economic air quality management instruments at a state level.

All the points mentioned above establish a broad framework for co-operative action on reducing the impact of air pollution and set up a process for negotiating concrete measures to control emissions of air pollutants through legally binding protocols. In this process, the main objective of the programmes under CLRTAP is to regularly provide governments with qualified scientific information to support the development and further evaluation of the international protocols on emission reductions negotiated within the Convention.

European Monitoring and Evaluation Programme – EMEP – deserves special attention. The EMEP programme provides scientific support to the Convention on:

- atmospheric monitoring and modelling;
- emission inventories and emission projections;
- integrated assessment modelling.

The EMEP programme is carried out in collaboration with a broad network of scientists and national experts that contribute to the systematic collection, analysis and reporting of emission data, measurement data and integrated assessment results.

Hope, Ukraine will find it useful to share scientific European experience and join international co-operation to solve transboundary air pollution problems.

# GUIDELINES FOR BIOREMEDIATION

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Bioremediation is the use of microorganisms for the degradation of hazardous chemicals in soil, sediments, water, or other contaminated materials. Often the microorganisms metabolize the chemicals to produce carbon dioxide or methane, water and biomass. Alternatively, the contaminants may be enzymatically transformed to metabolites that are less toxic or innocuous. It should be noted that in some instances, the metabolites formed are more toxic than the parent compound.

There are at least five critical factors that should be considered when evaluating the use of bioremediation for site clean up. These factors are:

1. Magnitude, toxicity, and mobility of contaminants.

It is imperative that the site be properly investigated and characterized to determine the (a) horizontal and vertical extent of contamination; (b) the kinds and concentrations of contaminants at the site; (c) the likely mobility of contaminants in the future, which depends in part on the geological characteristics of the site.

2. Proximity of human and environmental receptors.

Whether bioremediation is the appropriate cleanup remedy for a site is dependent on whether the rate and extent of contaminant degradation is sufficient to maintain low risks to human or environmental receptors.

3. Degradability of contaminants.

The biodegradability of a compound is generally high if the compound occurs naturally in the environment (e.g., petroleum hydrocarbons). Often, compounds with a high molecular weight, particularly those with complex ring structures and halogen substituents, degrade more slowly than simpler straight chain hydrocarbons or low molecular weight compounds. Whether synthetic compounds are metabolized by microorganisms is largely determined by whether the compound has structural features similar to naturally occurring compounds. The rate and extent to which the compound is metabolized in the environment is often determined by the availability of electron acceptors and other nutrients.

4. Planned site use.

A critical factor in deciding whether bioremediation is the appropriate cleanup remedy for a site is whether the rate and extent of contaminant degradation is sufficient to reduce risks to acceptable levels.

5. Ability to properly monitor.

There are inherent uncertainties in the use of bioremediation for contaminated soils and aquifers due to physical, chemical and biological heterogeneities of the contaminated matrix. It is important to recognize that

biological processes are dynamic and, given current knowledge, often lack the predictability of more conventional remediation technologies.

Bioremediation can be used as a cleanup method for contaminated soil and water. Bioremediation applications fall into two broad categories: *in situ* or *ex situ*. In situ bioremediation treats the contaminated soil or groundwater in the location in which it was found. Ex situ bioremediation processes require excavation of contaminated soil or pumping of groundwater before they can be treated.

***In Situ Bioremediation of Soil:*** In situ techniques do not require excavation of the contaminated soils so may be less expensive, create less dust, and cause less release of contaminants than ex situ techniques. Also, it is possible to treat a large volume of soil at once. In situ techniques, however, may be slower than ex situ techniques, may be difficult to manage, and are most effective at sites with *permeable* (sandy or uncompacted) soil.

The goal of aerobic in situ bioremediation is to supply oxygen and nutrients to the microorganisms in the soil. Aerobic in situ techniques can vary in the way they supply oxygen to the organisms that degrade the contaminants. Two such methods are **bioventing** and **injection of hydrogen peroxide**. Oxygen can be provided by pumping air into the soil above the water table (bioventing) or by delivering the oxygen in liquid form as hydrogen peroxide. In situ bioremediation may not work well in clays or in highly layered subsurface environments because oxygen cannot be evenly distributed throughout the treatment area. In situ remediation often requires years to reach cleanup goals, depending mainly on how biodegradable specific contaminants are. Less time may be required with easily degraded contaminants.

***Bioventing.*** Bioventing systems deliver air from the atmosphere into the soil above the water table through injection wells placed in the ground where the contamination exists. The number, location, and depth of the wells depend on many geological factors and engineering considerations.

An air blower may be used to push or pull air into the soil through the injection wells. Air flows through the soil and the oxygen in it is used by the microorganisms. Nutrients may be pumped into the soil through the injection wells. Nitrogen and phosphorous may be added to increase the growth rate of the microorganisms.

***Injection of Hydrogen Peroxide.*** This process delivers oxygen to stimulate the activity of naturally occurring microorganisms by circulating hydrogen peroxide through contaminated soils to speed the bioremediation of organic contaminants. Since it involves putting a chemical (hydrogen peroxide) into the ground (which may eventually seep into the groundwater), this process is used only at sites where the groundwater is already contaminated. A system of pipes or a sprinkler system is typically used to deliver hydrogen peroxide to shallow contaminated soils. Injection wells are used for deeper contaminated soils.

***In Situ Bioremediation of Groundwater:*** In situ bioremediation of groundwater speeds the natural biodegradation processes that take place in the

water-soaked underground region that lies below the water table. For sites at which both the soil and groundwater are contaminated, this single technology is effective at treating both.

Generally, an in situ groundwater bioremediation system consists of an extraction well to remove groundwater from the ground, an above-ground water treatment system where nutrients and an oxygen source may be added to the contaminated groundwater, and injection wells to return the "conditioned" groundwater to the subsurface where the microorganisms degrade the contaminants.

One limitation of this technology is that differences in underground soil layering and density may cause reinjected conditioned groundwater to follow certain preferred flow paths. Consequently, the conditioned water may not reach some areas of contamination.

Another frequently used method of in situ groundwater treatment is *air sparging*, which means pumping air into the groundwater to help flush out contaminants. Air sparging is used in conjunction with a technology called soil vapor extraction.

***Ex Situ Bioremediation of Soil*** : Ex situ techniques can be faster, easier to control, and used to treat a wider range of contaminants and soil types than in situ techniques. However, they require excavation and treatment of the contaminated soil before and, sometimes, after the actual bioremediation step. Ex situ techniques include slurry-phase bioremediation and solid-phase bioremediation.

***Slurry-phase bioremediation.*** Contaminated soil is combined with water and other additives in a large tank called a "bioreactor" and mixed to keep the microorganisms -- which are already present in the soil -- in contact with the contaminants in the soil. Nutrients and oxygen are added, and conditions in the bioreactor are controlled to create the optimum environment for the microorganisms to degrade the contaminants. Upon completion of the treatment, the water is removed from the solids, which are disposed of or treated further if they still contain pollutants.

Slurry-phase biological treatment can be a relatively rapid process compared to other biological treatment processes, particularly for contaminated clays. The success of the process is highly dependent on the specific soil and chemical properties of the contaminated material. This technology is particularly useful where rapid remediation is a high priority

***Solid-phase bioremediation.*** Solid-phase bioremediation is a process that treats soils in above-ground treatment areas equipped with collection systems to prevent any contaminant from escaping the treatment. Moisture, heat, nutrients, or oxygen are controlled to enhance biodegradation for the application of this treatment. Solid-phase systems are relatively simple to operate and maintain, require a large amount of space, and cleanups require more time to complete than with slurry-phase processes. Solid-phase soil treatment processes include *landfarming*, *soil biopiles*, and *composting*.

*Landfarming.* In this relatively simple treatment method, contaminated soils are excavated and spread on a pad with a built-in system to collect any "leachate" or contaminated liquids that seep out of contaminant soaked soil. The soils are periodically turned over to mix air into the waste. Moisture and nutrients are controlled to enhance bioremediation. The length of time for bioremediation to occur will be longer if nutrients, oxygen or temperature are not properly controlled. In some cases, reduction of contaminant concentrations actually may be attributed more to volatilization than biodegradation. When the process is conducted in enclosures controlling escaping volatile contaminants, volatilization losses are minimized.

*Soil biopiles.* Contaminated soil is piled in heaps several meters high over an air distribution system. Aeration is provided by pulling air through the heap with a vacuum pump. Moisture and nutrient levels are maintained at levels that maximize bioremediation. The soil heaps can be placed in enclosures. Volatile contaminants are easily controlled since they are usually part of the air stream being pulled through the pile.

*Composting.* Biodegradable waste is mixed with a bulking agent such as straw, hay, or corn cobs to make it easier to deliver the optimum levels of air and water to the microorganisms. Three common designs are *static pile composting* (compost is formed into piles and aerated with blowers or vacuum pumps), *mechanically agitated in-vessel composting* (compost is placed in a treatment vessel where it is mixed and aerated), and *windrow composting* (compost is placed in long piles known as windrows and periodically mixed by tractors or similar equipment).

**Table 1 – Potential Advantages and Disadvantages of Bioremediation Technologies**

Advantages	Disadvantages
Lower cost than conventional technologies.	May be difficult to control.
Contaminants usually converted to innocuous products.	Amendments introduced into the environment to enhance bioremediation may cause other contamination problems.
Contaminants are destroyed, not simply transferred to different environmental media.	May not reduce concentration of contaminants to required levels.
Nonintrusive, potentially allowing for continued site use.	Requires more time.
Relative ease of implementation.	May require more extensive monitoring.
	Lack of (hydraulic) control.
	Dynamic process, difficult to predict future effectiveness.

# GENETICALLY MODIFIED FOOD

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Genes are the fundamental chemical codes that determine the physical nature of all living things, from the tiniest single-celled organism to human beings. Genes make up DNA, which determines how the organism is going to develop in all ways that are not environmentally influenced.

Genetic engineering is sometimes also called bioengineering or biotechnology. All these terms refer to making artificial changes in the genes of the DNA of a living thing.

Genetic engineering of foods involves the insertion of genes from plants, bacteria, insects, fish, animals or humans into the DNA of another plant, fish, or animal to create a new variety. GE makes it possible to break through the species barrier and to shuffle information between completely unrelated species; for example, to splice the anti-freeze gene from flounder into tomatoes or strawberries.

The first genetically engineered product—a tomato—went on the market in 1994. By 1998, transgenic crops covered 27.8 million hectares worldwide.

Among transnational corporations, which spend millions on the production of genetically modified ingredients, are Dow Chemical, Aventis, Monsanto, Johnson & Johnson and DuPont. The distribution of genetically modified products mostly occurs in developing or underdeveloped countries.

Some nations have strong disagreements over GM products. Since 2002, in accordance with the European Union Resolution, European countries have established labeling and trace ability standards for GM food products. The United States claims that such measures violate the agreements about free trade between countries.



Attitudes toward genetically modified products differ.

Genetically modified crops can produce larger harvests than traditionally cultivated ones. Another argument in favor is that such crops can insure feeding of the increasing population of the world and help the struggle with famine in underdeveloped countries.

Another pro-GM argument is connected with treatment of certain infections and diseases. For example in India, where due to the lack of Vitamin A, children came down with blindness. So Vitamin A was added to rice.

However, there are indirect benefits from GMO: GM crops have shown to contribute to significantly reduced greenhouse gas emission from agricultural practices.

One concern about genetic engineering is that scientists might unknowingly create or enhance a food allergen. Experts estimate that 8 percent of children 6

years old and younger and 1 to 2 percent of adults have food allergies, which can cause severe, and sometimes life-threatening, reactions. For example, there are up to 15 different proteins in soybeans that people are allergic to and the major one, P34, is responsible for 75 percent of the allergic reactions.

The risk is that the consumption of GM products leads to the possibility of formation of cancer neoplasm in intestines.

The main environmental problem with genetically engineered food plants and animals is that, when they escape into the wild, they permanently disrupt ecosystems which are the products of billions of years of evolution. Another potential problem area is viruses. By their very nature, viruses invade the genetic material of their hosts and often break apart and recombine using part of the host's genetic material to create new viruses. The viruses will then spread and, because

they could not have been naturally produced, there may be no natural defenses against them and they may cause widespread death of certain plants or animals, or even of humans.



Genetically engineered foods create specific ethical problems for those of various faiths. For example, religious vegetarians, such as Hindus and Buddhists, want to be able to avoid fruits and vegetables with insect, animal or humans genes in them.

Because almost all genetically engineered foods are not labeled, most people are not aware that they are probably already consuming them.

So labeling should be a right of citizens in a free society. But the decree on compulsory labeling of food products will be approved by the Cabinet of Ministers only this year. The Cabinet of Ministers approved state registration of production containing genetically modified organisms (GMO). If food products have GMP exceeding 0,9 percent, import will be prohibited to Ukraine.

What can we do? We can educate ourselves, our families, friends and community about current and potential problems with genetically engineered foods. On the local level, we can talk to the grocers and store managers where we shop. Most of them have little awareness of the issues involved. On the national level we can let our elected representatives know that we want both stricter government oversight of research and development and also required labeling.



Local officials should enact legislation both to require stores that sell genetically engineered food to post signs to that effect and to recommend strongly that those stores make information available to their customers about which foods are genetically engineered.

Genetically modified food products generate many questions and controversy among consumers.

# **NECESSITY OF IMPLEMENTATION SYSTEM ELECTRONIC DOCUMENT CIRCULATION IN ECOLOGICAL ACTIVITIES**

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Ukraine and different foreign institutions have been paying much attention to development of information technologies in recent time. This is evidenced by preparation of the “Electronic Ukraine” project by our government, adoption of the decision to grant USD 5 millions for financing the “Ukraine – Development Through Internet” project by the Board of the World Bank, and numerous grants from foreign non-profit organizations for implementation of IT projects[1].

Already in 1998, the National Informatization Program was adopted, in which it is stated: “Now the development of world’s economy is significantly influenced by the informatization process, which not just rebuilds the economy, but also accelerates its growth and determines the social transformation of the society. Education and personal information security have gained significant social importance; information and knowledge have become key factors of production, and the sphere of IT and communications has become an important instrument providing the states with the opportunity to prevent finding themselves driven outside of the social progress track”[2].

Ukraine, as a Party to the Aarhus Convention “On Access to Information, Public Participation in Decision-Making and Access to Justice Regarding Environmental Matters”, has undertaken relevant obligations before the international community. In order to secure the effective performance of such obligations, it is necessary, in particular, to develop the means of electronic access to the environmental information. The informatization of ecological issues and use of natural resources requires the creation of informational resources and intellectual information technologies for modeling and forecasting the ecological state of territories, environmental pollution and other consequences of the impact of technology and natural disasters, as well as for optimal use of natural resources[2].

Electronic document circulation has an important role in informatization of environmental issues.

Electronic document circulation includes: creation of documents, processing of documents, transmission of documents, saving of documents, display of the information which circulates in the organization.

The throughout automated control of documents at all stages of work dramatically increases the quality of performers’ work, makes the time needed for documents processing more predictable and manageable. The shared use of electronic document processing systems and data storages allows systemizing and consolidating information, which simplifies analysis of the information and



preparation of reports. More effective decisions and actions based on relevant technologies for obtaining information from data may be used for search of concealed regularities in large data arrays. All that is possible only in a management system built on the basis of fully electronic document circulation.

The world's electronic document circulation systems' market has been developing for over 20 years. It is very fragmented because both world-wide known multi-sector IT corporations, as well as relatively little known (or known only in its market sector) companies, are present at this market.

The most popular systems of the Electronic Document Circulation are "Справа" (produced by company "Електронні офісні системи"), DocsVision 2.0 "Архів-Діловодство" (produced by company "Digital Design"), OPTiMA-WorkFlow (produced by company "OPTiMA"), Documentum 4i (produced by company "Documentum"), Lotus Notes (produced by company "Lotus").

According to different estimations, at present there several hundreds applications existing in the world which may be classified as Electronic Document Circulation software, which differ both by their functions and by implemented technological solutions, and are used almost everywhere. Such wide spread of Electronic Document Circulation evidence their efficiency and significance and once again proves the necessity of implementation of Electronic Document Circulation in environmental organizations, which will improve the productivity of their personnel by 20-25% [3].

Today in Ukraine there is already existing number of laws defining baseline organizational („About electronic documents and electronic document circulation”, „About the electronic digital signature”, „About the National program of informatization”, „ About national system of confidential communication”) and legal grounds of electronic documents' circulation and use[4].

But, it should be mentioned that despite of the fact that the term “document circulation” is used in the description of almost every information system and of the existence of a variety of systems for recording facts and Electronic Document Circulation's in different sectors of national economy, today no wide implementation of Electronic Document Circulation in environmental protection authorities may be observed in Ukraine.

It should be realized that Electronic Document Circulation is the very solution providing for the opportunity to significantly improve the work of state environmental protection inspections and departments which are responsible for exercising ecological supervision and assessment.

## **References**

1. <http://www.rainbow.gov.ua/news/174.html>
2. <http://www.icyb.kiev.ua/index2.htm>
3. [http://www.greenparty.ua/news/greenparty/green-party\\_21244.html](http://www.greenparty.ua/news/greenparty/green-party_21244.html)
4. <http://zakon.rada.gov.ua>

# SYNERGETIC EFFECTS OF ECOLOGICAL-ECONOMIC SYSTEMS

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Modern character of ecological-economic relations needs new approaches to long-term and short-term strategies of territorial development. For ecological-economic efficiency we need to incorporate not only internal results of economic subjects, but also external results, that appear as a result of economic subject's activity in other spheres.

Integrally these two kinds of effects – internal and external form the integral synergetic effects of ecological-economic systems functioning. External effects can be both positive and negative.

In case of positive effects thanks to the activity of a given subject in other spheres of economic activity we have the increase of results with the same costs.

In case of negative external effects efficiency of economic activity in other spheres decreases. This can cause due to environmental pollution. Modern assessment of external effects allows correcting economic mechanism, and increasing the number of subjects with positive externalities. This leads to efficiency increase and helps to develop territorial attractiveness of the region. This is one of the ways to reach sustainable development.

For assessment of synergetic effects we need correcting coefficients [1]: increasing and decreasing. Increasing coefficients (according to kinds of economic activity) are:

- forestry – 5,0–6,0;
- land reclamation through forest planting – 3,5–4,5;
- conservation of natural lands (protected areas creation) – 1,7–3,2;
- recreation – 1,3–1,5;
- beekeeping – 12,0–16,0;
- resource and energy-saving – 4,0–5,0.

Decreasing coefficients are:

- metallurgy and metal processing – 0,8–0,9;
- machine and equipment production – 0,9–1,0;
- coke and raw oil processing – 0,8–0,9;
- chemical, rubber and plastic production – 0,8–0,9;
- non-energetic materials extracting – 0,7–0,8;
- electrical engineering, gas, heat and water delivery – 0,6–0,7.

The use of these coefficients increases the efficiency of economic decision making and development of national ecological-economic relations on regional and national levels.

For example, expansion of specially protected lands and territories might lead to region's ecological attractiveness increase. In such a case there is a real possibility to get SE that can substantially grow.

In particular, a trans-border conserved (protected) natural territory "Bryansky and Starogutsky Forests" can further be given the status of a biosphere reserve. It can become one of the directions for getting SE in Sumy region (Ukraine). Such activity is conducted in the framework of Russian-Ukraine nature protection cooperation and trans-border ecological net creation in the Desna River basin. This task can be realized due to unique natural resources of Desnyansko-Starogutsky National Natural Park, which territory is more than 16,000 ha. Realization of such project can increase external effects from environmental functions – air sustainability, water protection, regulation and cleaning functions, land protection functions, resource reserving, biodiversity preserving functions; scientific – research conduction; recreation functions – rest, fishing, hunting; aesthetic – moral satisfaction from enjoying ecologically clean territory. As a result, SE will increase.

We can suggest assessment of ecological territory attractiveness; assessment of ecosystems ecological functions; distinguishing and development of economic activities that produce positive external effects; development of investment projects, that will increase territories ecological rating; development of instruments stimulating environmentally safe economic activity; creation of environmentally sound and human friendly infrastructure; increase of ecological thinking for the sake of synergetic effects realization.

SE and ecological attractiveness of a region increase as a result of the mentioned measures (directions). Consequently, environmental conditions of regional natural systems become better and economic outputs increase.

### **References**

1. Мельник Л.Г., Дегтярьова І.Б. Врахування екстернальних ефектів в управлінні розвитком продуктивних сил України / Л.Г. Мельник, І.Б. Дегтярьова // Розвиток продуктивних сил України: від В.І. Вернадського до сьогодні : матеріали ювіл. міжн. наук. конф., м. Київ, 20 березня, 2009р.: У 3-х частинах / РВПС України НАН України. — К.: РВПС України НАН України, 2009. — Ч. 1. — С. 95—97.

# **ECOLOGICAL INSURANCE AS A NEW ECOLOGICAL-ECONOMICAL INSTRUMENT FOR ENVIRONMENTAL PROTECTION IN CHINA**

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The China today entered into the new path of economic development, which is associated with huge pollution of surrounding environment. Currently the economic consequence of pollution (economic damage) is estimated at 120 billions yuan, which is approximately \$17, 14 billions. The main bulk of the pollution is compensated by government and polluters. Out of 7555 large chemical enterprises 81% are located in the river basins or in highly populated regions; in addition to that, about half of the chemical firms are high risk enterprises. For example, the China had 108 serious pollution accidents in 2007, and the affected organisations (people) could not receive compensation in proper time. That situation was not acceptable and some proper changes were needed.

At the end of the last century some insurance companies in China started to implement the system of “green insurance”. First steps on implementing “green insurance” were done in city Dalian (the city introduced the system of pollution liability insurance); later on other cities (Shenyang, Changchun and Jilin) started introduce different types of these insurances. Actually first experiments did not have much support, because many enterprises considered this type of insurance to be not economically sound due to the high insurance charges low rates of compensations. On those days the level of compensation was about 5.7%, which is much less than in other kind of insurance. On average the rate of compensation in China was about 50% and similar rates in other countries were about 70-80%. On the other hand the insurance contributions were 8% of possible economic damage. Having this information in mind it is possible to claim that low rates of compensation and high insurance fee negatively affected the development of green insurance in China. The legislative system of surrounding environment protection was not sound yet, and compliance of the laws was not good enough.

Some positive changes happened in 2007, when China State committee on Natural protection and State Committee on Industrial insurance proposed “Recommendations on how to insurance the pollution damages”. The above mentioned document started the development of Chinas “green insurances”. According to the “Recommendations on how to insurance the pollution damages” it was necessary to create the pollution liability system during the elevens 5-year plan (2006-2010).

Having accepted the new program of ecological insurances in China the provinces of Hunan, Hubei, and cities of Shenyang, Changchun and Ningbo were chosen for approbation the program. The received results were more than economically sound. Thus, in Hunan 7 out of 18 experimental enterprises are using

the system of green insurance, the other firms are actively planning the implementation of ecological insurance program. There also was a situation when one firm producing chemical fertilizers released HCl and poisoned the agricultural lands nearby. The insurance company "Wealth" was able to pay 120 farmers compensation for pollution and ecological damage. In such a way the economic conflicts were solved and social misunderstandings dismissed.

The State Department on Environmental Protection has a plan of how to improve current system of ecological insurance in China up to 2015. The new system of "Green insurance" should include methodological approaches on how to deal with pollution risk assessments, ecological liability and damage compensation scheme.

## **BUDGETING AS AN EFFECTIVE TOOL TO ACHIEVE STRATEGIC OF THE ENTERPRISE**

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Budgeting is a very popular management technology in Ukraine: more and more concerns would like to describe their financial future systematically. The main instrument of this description is the budget (more precisely - the budgets) of the company.

Budget - is the plan for a certain period in the quantitative (usually monetary) indicators compiled for the purpose of achieving the strategic targets effectively.

Budgeting - is an ongoing process of the preparation and execution of budgets.

There are basic principles to be taken up the company, look forward to the successful implementation of budgeting.

Like any procedure, budgeting should be done on predefined rules. First it is necessary to formulate and adopt common rules on the basis of which budgeting system will be based: methodology, design of tabular form, financial structure, etc. It should make those rules work. And here the important role is played by «human factor».

Rules of budgeting, the budget itself, and the system of motivation - all these you need to confirm by intercompany orders for disregard with which the staff should be punished. The second part of the budget - is the organizational arrangements. The third key to success - automation of the entire process of budgeting. At large companies the amount of information is enormous, but no matter how significant it is, it must be processed in time. In today's business yesterday's data will not need them. There should be an analysis of current

performance and forecast for tomorrow, after tomorrow, one month in advance, etc. Automation of budgeting - it is primarily the automation of the planning procedures that are itemized in the rules for budgeting.

Implementation of budgeting helps to create a coherent and effective system of governance. The best budgeting system helps not only to meet the challenges of operational management, but also to achieve strategic objectives guide the company.

Establish budgeting system to enable management to plan the financial and economic activities with a view to achieving certain financial results, so define objectives clearly and set measurable targets of activity. In addition, it will be possible to send all units to achieve the goal of financial results, highlighting the responsibilities and functions of aligning the financial management of managers. Improve information exchange and interaction between the structural units.

Budgeting will help to optimize the financial flows, to determine critical periods in the company and the need for external financing. With budgeting, you can detect the "narrow" places in the management and the time to take the necessary management decisions.

This technology aims to use the analysis of deviations "plan - a fact for correction of the activity. To examine all possible options for the future, perhaps a scenario analysis of "what will be if?".

The successful staging of budgeting should take into account a number of points.

Budgeting is part of the management accounts (MAs). Budgeting for the projections used by management information. Data for the analysis of deviations "plan - a fact" comes from the MAs. Budgeting is linked closely to the financial structure of the company, which is based on the principles of decentralized management, which are the basis for a system of management accounting.

Budgeting is closely linked with the system of cost management, which is also part of MAs. It helps set limits on the cost of resources and profitability rates for certain types of goods and services, projects, lines of business and the company entity.

To introduce a system of budgeting it is necessary to implement certain preliminary steps, namely, to conduct business-diagnosis (a kind of "inventory") of the company.

Many companies have learned well the analysis of various information related to their business, be analytical reporting plan. A sufficiently large number of companies are (or at least attempt to do so) the major financial budgets - the budget cash flow and budget revenues and expenditures.

Major companies working in the Soviet time, usually distinguished by strong planning and economic departments, which previously flowed all the information about financial and economic activity and where there was established a system of planning and reporting. Such a management framework simplifies the process of setting budgeting system.

One of the main difficulties faced in the implementation of budgeting - the lack of a standard budget form, which must be strictly adhered to.

The budgeting is based on the total budget, which is a coordinated across all units or functions of a work plan for the company as a whole. It consists of the operating and financial budgets, which the company defines itself.

For commercial organizations (CO) of the master budget will be different. Here's one of his options.

Operating budget for the following:

Budget sales budget process; trade balance, budget commercial cost budget management costs, projected income statement.

The financial budget that:

Budget cash flow, credit plan, projected balance sheet.

Communications between budgets need to be reflected in the flowchart. These links will then be used in completing the budget.

When building core budget should be determined with the method of filling. There are two ways of building: Budgeting "top-down and bottom up."

Under budgeting "top down" refers to the definition of senior management of a strategic target, which provides a system of budgets.

Based on the values of this indicator at the lower levels is defined need initial conditions of business (some figures of costs) to achieve the desired size of the strategic target. If it is clear that under current conditions it is impossible to achieve the desired value, it could be reconsidered. Is the adjustment necessary to ensure that budgets were achievable. The development of strategic performance requires formalization of the strategy of the company, which is to build a strategic map and balanced system of performance indicators (Balanced Scorecards).

As strategic financial goals, you can choose various financial performance of the company, such as indicators of profitability - net profit or earnings per share, etc.

Budgeting "bottom up" involves building of budgeting system, beginning with the budget sales. Based on projected sales and the related costs, certain financial data of the company are obtained.

If top management does not like these values, the budget, members of the operating budget is up for review.

Main problem in the development budget is forecasting their sales volumes. Forecast sales volume turns to the sales, if managers believe that the anticipated volume of sales can be achieved.

In preparing the budget of selling it is necessary to take into account the levels of sales of prior periods and to analyze a number of macroeconomic factors, each of which may have a significant impact on sales volume and its dependence on the profitability of production.

At stage of the core budget price and credit policy, strategy management are analyzed and refined, risks are identified and likely consequences of management decisions are assessed.

Organization of budgeting should be begun with creating the financial structure - the center of financial responsibility (CFA).

To obtain a comprehensive evaluation of the centers of responsibility targets of industrial and economic activity are imposed (Balanced Scorecard). The effectiveness of the centers of responsibility is determined by comparing planned and actual values of these indicators. Based on the comparison of data of targets the manager of the Center of responsibility expeditiously takes steps to achieve their values, improve the efficiency of the center of responsibility. The financial structure of the company is issued the Regulation of the financial structure.

After decentralization of management, managers have the right without the consent of the leadership to take prompt action on certain issues, to a certain amount of money. There is a division of responsibility between managers of planning, cost control and performance units.

It is important to define clearly the circumstances of what should take the data for budgeting. One should also identify the relationship of indicators in all the budget forms and paperwork in planning process. It should be borne in mind that the budget uses data from the accounting service companies.

Successful implementation is impossible without automation. There is already a market for automation systems of budgeting, in which there are many proposals. Therefore, the system need to be chosen on the basis of the characteristics of business and software used in the company.

There are a range of methodological, and IT requirements, under which you can choose the system.

## **GLOBAL ECOLOGICAL PROBLEMS**

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An **ecological crisis** occurs when the environment of a species or a population changes in a way that destabilizes its continued survival. There are many possible causes of such crises:

- It may be that the environment quality degrades compared to the species' needs, after a change of a biotic ecological factor (for example, an increase of temperature, less significant rainfalls).
- It may be that the environment becomes unfavorable for the survival of a species (or a population) due to an increased pressure of predation.
- Lastly, it may be that the situation becomes unfavorable to the quality of life of the species (or the population) due to raise in the number of individuals (overpopulation).



**The abiotic factors.** With global temperature rising, there is a decrease in snow-fall, and sea levels are rising. Polar bears are being threatened. They need ice for hunting seals, their primary prey.

**Biodiversity extinction.** Every year between 17,000 and 100,000 species vanish from the planet. The speed in which species are becoming extinct is much faster than in the past. The loss of new species in an ecosystem will eventually affect all living creatures. In the U.S. and Canada, there was a dramatic reduction of shark population along the U.S. east coast. Since then, there has been an increase in population of rays and skates, which in turn has decimated the population of shellfish.

**Overpopulation.** In the wilderness, the problem of animal overpopulation is solved by predators. Predators tend to look for signs of weakness in their prey, and therefore usually first eat the old or sick animals. In the absence of predators, animal species are bound by the resources they can find in their environment, but this does not necessarily control overpopulation. In this case, starvation, thirst, and sometimes violent competition for scarce resources may effect a sharp reduction in population.

*Examples:*

- Deforestation and desertification, with disappearance of many species.
- Volcanic eruptions such as Mount St. Helens and the Tunguska and other impact events.
- The nuclear meltdown at Chernobyl in 1986 caused the death of many people and animals from cancer.

## **GENETIC MODIFIED FOODS: ADVANTAGES AND DISADVANTAGES**

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***What are genetically-modified foods?***

"Genetically modified foods" is the term most commonly used to refer to crop plants created for human or animal consumption, which have been modified in the laboratory to enhance desired traits or improved nutritional content. The enhancement of desired traits has traditionally been undertaken through breeding, but conventional plant breeding methods can be very time consuming and are often not very accurate. Genetic engineering, on the other hand, can create plants with the exact desired trait very rapidly and with great accuracy.

### ***Development.***

GM foods were first put on the market in the early 1990s. Typically, genetically modified foods are plant products: soybean, corn, canola, and cotton seed oil, but animal products have been proposed.

The first commercially grown genetically modified whole food crop was the tomato puree (called FlavrSavr), which was made more resistant to rotting by Californian company Calgene. Currently, there are a number of foods of which a genetically modified version exists.

### ***What plants are involved?***

Some foods have been modified to make them resistant to insects and viruses and more able to tolerate herbicides. Crops that have been modified for these purposes, with approval from the relevant authorities, in a number of countries, include: maize, soybean, oilseed rape (canola), chicory, squash, potato.

### ***Some of the advantages of GM foods:***

There is a need to produce inexpensive, safe and nutritious foods to help feed the world's growing population. Genetic modification may provide:

- Better quality food.
- Higher nutritional yields.
- Inexpensive and nutritious food, like carrots with more antioxidants.
- Foods with a greater shelf life, like tomatoes that taste better and last longer.
- Food with medicinal benefits, such as edible vaccines - for example, bananas with bacterial or rotavirus antigens.
- Crops and produce that require less chemical application, such as herbicide resistant canola.

### ***Some of the disadvantages of GM foods:***

Food regulatory authorities require that GM foods receive individual pre-market safety assessments. Also, the principle of 'substantial equivalence' is used. This means that an existing food is compared with its genetically modified counterpart to find any differences between the existing food and the new product. The assessment investigates:

- Toxicity (using similar methods to those used for conventional foods).
- Tendency to provoke any allergic reaction.
- Stability of the inserted gene.
- Whether there is any nutritional deficit or change in the GM food.
- Any other unintended effects of the gene insertion.

### ***Economic concerns:***

Bringing a GM food to market is a lengthy and costly process, and of course agri-biotech companies wish to ensure a profitable return on their investment. Many new plant genetic engineering technologies and GM plants have been patented, and patent infringement is a big concern of agribusiness. Yet consumer advocates are worried that patenting these new plant varieties will raise the price of seeds so high that small farmers and third world countries will not be able to afford seeds for GM crops, thus widening the gap between the wealthy and the poor.

One way to combat possible patent infringement is to introduce a "suicide gene" into GM plants. These plants would be viable for only one growing season and would produce sterile seeds that do not germinate. Farmers would need to buy a fresh supply of seeds each year. However, this would be financially disastrous for farmers in third world countries who cannot afford to buy seed each year and traditionally set aside a portion of their harvest to plant in the next growing season.

***How are GM foods labeled?***

Labeling of GM foods and food products is also a contentious issue. On the whole, agribusiness industries believe that labeling should be voluntary and influenced by the demands of the free market. If consumers show preference for labeled foods over non-labeled foods, then industry will have the incentive to regulate itself or risk alienating the customer.

There are many questions that must be answered if labeling of GM foods becomes mandatory such as; are consumers willing to absorb the cost of such an initiative? If the food production industry is required to label GM foods, factories will need to construct two separate processing streams and monitor the production lines accordingly. Farmers must be able to keep GM crops and non-GM crops from mixing during planting, harvesting and shipping. It is almost assured that industry will pass along these additional costs to consumers in the form of higher prices.

Food labels must be designed to clearly convey accurate information about the product in simple language that everyone can understand.

**Conclusion:**

Genetically-modified foods have the potential to solve many of the world's hunger and malnutrition problems, and to help protect and preserve the environment by increasing yield and reducing reliance upon chemical pesticides and herbicides. However, we must proceed with caution to avoid causing unintended harm to human health and the environment as a result of our enthusiasm for this powerful technology.

**TOOLS FOR ANALYSIS ECOLOGICAL CONDITIONS OF A  
GROUND AREA OF SETTLEMENT AND DEFINITION THE  
BEST MODE OF ITS USAGE**

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Nowadays the habitat in Ukraine undergoes a constantly increasing technogenic loading. However the further development of economy leads new and strengthens available anthropogenous influences on an environment, including natural resources. Based on this, one of the most difficult problems at the present

stage of development is radical ecological reconstruction of all economic activities of our country, maintenance of constant development of an economic complex.

One of displays of an urbanization is a wide development of the technogenic environment which interaction with the geographical environment and collects new forms and, as a rule, occurrence of not return processes in the nature. Finally, this is negatively displayed on the person leads to an ecological disbalance between the nature and a society. The concentration of sources of harmful emissions within the city influences negatively not only on environment, but also on health and normal ability to live of city dwellers.

Nevertheless urbanistic concentration of the population and manufacture makes the city grounds as a unique resource. Occupying only 2 % of a total territory of Ukraine, they concentrate from above two thirds of population, 75 % of the basic industrially-production assets, near 95 % of financial-credit and research establishments; the cores social, industrial, information and administrative communications. It creates exclusively favorable conditions of managing and business for users of the city grounds. This is a reason of the cities appeal. First of all big cities which have powerful multipurpose industrial, scientific and cultural potentials. So, in economically developed countries, as a rule, the payment for the ground in cities makes 15-30 % from all receipts in the city budget.

The necessary condition of increase of efficiency of the city existence is its territorial organization, i.e. the most rational distribution of intercity territories behind their functional purpose. How basic elements of the city settlement are placed, how much they are close to optimum territorial organization depend on conditions of a life of the population of the given city. The estimation of the ground enables institutions of local government to realize the regulative powers by creation the economic conditions and stimulus for rational use of the city grounds, formation the financial and economic base of city due to a payment for the ground.

$$Pr = \frac{B \times Rp}{Rc} \times Cf \times Cl \quad (1)$$

The monetary estimation of the grounds of settlements is defined under the formula (1) [1], where: Pr - a monetary estimation of square meter of the ground area, (in grivnas); B - the specification of expenses for development and arrangement of territory counting upon 1 square meter (in grivnas); Rp - rate of profit (6 %); Rc - rate of capitalization (3 %); Cf - coefficient which characterizes functional use of the ground area (under inhabited and public building, for the industry, etc.); Cl – coefficient which characterizes the location of the ground area.

As Ukraine only begins a way of formation of the market of the ground very important there is a duly creation transparent, working in a mode of real time of systems of the analysis, an estimation and definition of an optimum mode of use of the ground areas. Users of such systems can be as the state structures of land management, estimator the grounds, and citizens who face with questions of purchasing/sale of the ground areas. Such systems should contain the informative block, where legal aspects of the given question and the general principles of an

estimation of the ground area will be displayed, the block of the analysis of entrance parameters (a site, natural and economic characteristics, engineering-building conditions), tools of an economic estimation of the ground area [2] and definition of an optimum mode use.

### ***References***

1. Kuhtin P.V. Management of ground recourses: Educational manual – Piter, 2005. P. 315-322.

## **MODELLING OF ECOLOGY-ECONOMIC SYSTEMS**

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Mathematical modelling of ecology-economic systems belongs to the area of research of dynamic systems and occurs in the conditions of uncertainty and purposeful influence. The behaviour of such models can be studied using analytical methods, but it is necessary to resort to the help of computer facilities is more often. Usage of computers, allows to apply a modern mathematical means and to process a considerable quantity of the initial information.

Let's select following stages of modelling: definition of the purposes and problems; the analysis of system and construction of its model; compilation and model structurization; program realisation; the analysis and model updating; planning and carrying out of experiments; processing and the analysis of results; introduction and accompaniment of results. One of the important positions of systems analysis that is impossible to study difficult system as a whole. Learning is always directed on the certain problem, connected with complete system. The research objective is external in relation to considered system. Research objectives can be carried out in following directions: descriptions of functioning of system; the forecast functioning at various influences; search of the best variant of functioning. In rare instances it is possible to be limited to the unique purpose. As a result of the detailed analysis of ecology-economic system some purposes which are necessary for solving always come to light. These purposes are: reception of the greatest profit; to achieve performance of conditions of nature protection character with the least expenses; optimum output taking into account ecological norms etc.

Gang of values precisely known to the contributor (inner actions) and external actions is named the scenario. The flock of all considered scenarios organise input datas for the prognosis. Each scenario generates the trajectory and a corresponding final condition of system. Objects in view in ecology-economic system, ensure a solution of optimum problems taking into account various limitations. These limitations can concern to various spheres of activity of a society: social, financial,

ecological and others. The research objective at unique criterion of an optimality is the determination of flock of managing actions at which the criterion reaches extreme value. If it is several criteria, it is necessary to define, that is understood as an optimum solution (a problem of a principle of an optimality).

Adequacy of the received model is characterised also by its sensitivity under the ration to changeable parametres and initial values of a vector of a condition. If outcomes of research by means of model essentially vary at small perturbations of parametres and entry conditions, i.e. the model is not stable, and it is impossible to consider such model adequate. The requirement of a stability the more important, than model parametres can be less precisely specific.

The real ecology-economic system should be considered in dynamics. Dynamic problems are the most probable, but application enough a complicated mathematical means demand. The real solution of a specific problem can be reduced to a solution of some consecutive problems in various instants.

The means of mathematical modelling is used in various spheres of activity of the human. But ecologists widely apply also «biological models» that is ecosystems created in laboratory using the natural organisms. Such biological models are rather useful and represent plant intermediate between mathematical models and genuine ecosystems. Mathematical and biological models supplement each other. For lack of biological models the mathematical approach becomes more and more distracted and general, and its application thereby is at a loss. At lack of the mathematical approach is difficultly to see the general sense of this or that concrete biological model.

The principal problem which should be solved at the analysis of any complicated system, is a choice of essential variables. One of such variables can be the energy of the given ecosystem. The given approach allows the contributor to work in area of "ecological power". It is new area of research which gives representation not only about amounts of energy, which are in plants during each given moment, vegetarian animals, organisms and so on, but also about intensity of energy streams between the specified levels. For the present these data have not poured out in the harmonous dynamic theory. To create such theory, the corresponding equations are necessary.

One of approaches at research of complicated system is accepting for an essential variable of frequency of genes within an aspect that is to choose the same variables which underlie the evolutionary theory. In practice it is obviously possible to introduce similar evolutionary limitations into the ecological theory.

Scientific researches in the field of ecology inseparably linked with an economic component. Financial possibilities limit equipment use, volume of experiments and observation, an amount of experts and support personnel.

Thus, research of ecology-economic systems is necessary for spending in aggregate, taking into account all components. The choice of the optimum received solution is carried out by means of a modern mathematical apparatus with attraction of computer technics.

## **ECOLOGICAL AND ECONOMIC SANCTIONS IN THE SYSTEM OF CRISIS MANAGEMENT**

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Environmental situation in Ukraine can be described as unsatisfactory. Technological environmental impact significantly exceeds similar figures in the developed countries.

One of the biggest sources of pollution is the environmentally unfriendly enterprises, activity of which, due to technological cycle of production, is objectively associated with damage to the environment. Based on the above, a legislator establishes the fees for the environmental pollution within legal established limits, and pollution charges for above-limit emissions. Thus, the legislator establishes legal liability of enterprises for violations in Ecology (ecological and economic sanctions).

Economic sanctions application makes both positive and negative impact on economic development of the state and its territory, and meanwhile, an interaction in the economy of Ukraine of a number of destabilizing factors determines a tendency of negative impact increase.

Failure to pay ecological and economic sanctions adversely affects the economic development of land area. As you know, certain funds investing in environmental measures can avoid infliction of economic damage, the value of which will be greater by several digits. Thus, for a very low cost to eliminate waste one can prevent economic damage that enormously exceeds the value of these costs. Consequently, underfunding of such measures over a definite period can cause economic damage, elimination of which will require great investment.

Amid the economic crisis the ecologically unfriendly enterprises are facing the problem of financial solvency. The sharp increase of bankruptcy amplifies the importance of problem solution associated with the procedure of bankruptcy to the environmentally unfriendly enterprises.

After application of a legal procedure of bankruptcy to the enterprise (which, due to the existing practice, may take years) a borrower uses a number of advantages, established by law, including a moratorium on payment of arrears to the creditors. However, bankruptcy does not stop production activity of a debtor, in other words, the environmentally unfriendly enterprises continue to function and implement technological pressure on the territory. But, at the same time, they do not pay charges for natural resources, environmental damage fees.

Renewal of enterprise solvency, which is involved in the procedure of bankruptcy, can arise from restructuring, debt forgiveness, including environmental charges. Besides, taking into account the importance of a number of

economic enterprises, the legislator may impose a ban on payment of their debt (as expected, in particular, by the Law of Ukraine «On measures aimed at ensuring the sustainable operation of the fuel and energy complex» dated 23d of June, 2005).

It should be noted that in the crisis, the above-stated factors may significantly reduce the income to fund of the environmental purposes. Moreover, the deficit of investment and working capital causes expenses reduction of the environmentally unfriendly enterprises for modernization of production assets, deterioration of which has reached critical levels. This situation stimulates further escalation of wear of main enterprise production assets and the deterioration of their technical-economic indicators, resulting in increasing of technological impact on the environment.

Therefore, in the coming years the ecological situation in Ukraine is going to be marked by decrease in revenues to fund of environmental protection, with simultaneous cost reduction of the environmentally unfriendly enterprises in modernization of production assets. These issues require immediate action, which is impossible without government intervention and an appropriate legal settlement. Under these conditions, the role of state in solving the above-mentioned problems is of great importance. The state should assume the cost for implementation of the environmental activities.

In respect that only a small portion of funds of Conservation Foundation is directed for its own environmental measures (according to the calculations [4] in 2002 - 2004 years less than 10% of national and local environmental funds were actually used for environmental activities), there arises a problem to find money for environmental activities. Thus, in conditions of the economic crisis the burning issue is determination of the priority areas for the usage of environmental funds and increase of control over their targeted usage.

Consequently, in conditions of the economic crisis the solution of problems regarding the application of ecological and economic sanctions against the environmentally unfriendly enterprises is an urgent matter. These issues should be a subject of the relevant scientific research.

### ***References***

1. Karaeva N.V., Omelchenko O.S. The problem analysis and practice of sanctions application against the environmentally unfriendly enterprises under the present conditions of the economy of Ukraine. // The scientific news of the National Technical University of Ukraine «KPI». – Kiev, 2007. - № 4(56). – pages 5-15.



## **ECOLOGICAL IMAGE OF THE COUNTRY AS THE BASIS FOR NATIONAL GOODWILL CREATION**

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Each country works out certain strategy and positions itself in the external environment both purposefully and mediately. Mediated position appears as far as in any case there is certain generalised perception of the country in the world. There is a country brand, which is connected with certain high-quality production or general characteristic of goods made in the country. It means that the country has certain intangible asset, or to be more exact national goodwill.

The image of any country can be formed under the influence of three basic factors. *The first* one is the vital activity of its citizens and the inheritance that was left by the generations of citizens' ancestors. *The second* factor is the purposeful image policy of the state and of all interested institutes. *The third* factor is external information influence. The realization of effective external informational policy plays an important role in the creation of country positive image. Internationally in addition to diplomatic and political functions the external informational policy can be considered as the "informational marketing" for an export, as the advertisement for cultural extra charge to consumer cost of the goods.

The countries, which have proper image (national brand), not only draws tourists' attention, but become similar to corporations more and more. The countries, as well as corporations, compete for foreign investments, for attention of world media, of tourists, and for the markets of goods and services.

Of course, the country brand can not be formed within one minute. It is the result of long-term historical, cultural, political and economic development of the country. For example, in Finland even dishes in a restaurant menu are marked with signs which specify in the Finnish origin of the goods in the case when the menu includes dishes prepared not with local products.

To create country goodwill it is necessary both to development the brands of the certain enterprises, and to allocate special component at the legislative level. This component should be taken into consideration during the enterprise foundation and within the process of its further development. Ecological component can become such special component for Ukraine. It is possible to allocate ecological component at two levels. The first one is the level of economy in a whole. Such characteristic as "Ukrainian product is an ecologically pure product" should be associated with the country as a whole. The ecologically pure product means that the product was produced with the observance of manufacture ecological standards, with the least environmental pollution. The second level is the level of agriculture, where cultivation of crops without genetically modified organisms, but only with the use of mineral fertilizers is a priority direction. The creation of ecological brand can contribute not only to the development of stable

economy, but also to the formation of Ukrainian national identity, a common feeling of the purpose and national pride. All it will help to unite Ukraine through common national idea of economic development.

## **GROUNDING OF ECOLOGICAL AND ECONOMICAL OPERATING EFFICIENCY OF HYDROELECTRIC POWER PLANT**

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*“Word lives and respire and we can perceive this breathing!”*

***M. Fichino***

Hydroenergetics is power engineering industry which has minimum affect on environment using water as resource. However, it has also negative affect; namely, flooding of areas, siltation of water resources, reformation of banks and bottoms, change of biological life in the area of water storage ponds, mass destruction of plankton, people disease incidence as a consequence of poor quality water using.

Most of power-producing facilities have complex application, also ensuring water supply, irrigation, improvement of navigation conditions, flood protection, needs in fishing industry, recreation, etc. Therefore, complex character of facilities is taken into consideration when grounding the economic efficiency.

In order to prove effectiveness of hydroelectric power plant calculations were done. Kyiv hydroelectric power plant located on the Dnypro River was taken as test object. Based on plant and similar structures data, ecological, economical effect and effectiveness of its functioning was calculated.

Specified investments were defined as per rated power and annual average power generation:

$$K_N^{\text{пит}} = \frac{K_3}{N_{\text{вст}}} \quad \text{and} \quad K_3^{\text{пит}} = \frac{K_3}{3},$$

where  $K_N^{\text{пит}}$  - specified investments;

$K_3^{\text{пит}}$  - general investments expended for power engineering;

$N_{\text{вст}}$  - rated power, kW (Kyiv hydroelectric power plant is equipped with horizontal submerged hydroelectric units: 4 hydroelectric units with power 16,3 MW, three of them have power 22 MW after updating, and 16 hydroelectric units

have single-unit power 18, 5 MW, three of them have power 22 MW after updating. Thus, total power of Kyiv hydroelectric power plant is 388 MW);

○ - annual average power generation, kJ · year (for Kyiv hydroelectric power plant it makes 797 millions kW · year with heads 7,7 – 9,3 m).

Specified capital investment has been calculated on the basis of construction of similar hydroelectric power plant in China taking into account heads and power of this structure. Expenses estimate for plant construction amounted 6,74 billion USD (capacity is 12,6 GW), so expenses estimate for our facility is 0,2 billion USD.

Specified capital investment for Kyiv hydroelectric power plant is 2,45 copecks for 1 kW/h, while population pay 24,36 copecks for 1 kW/h. Not only capital investment pertain to sum of investment but expenses for construction of bank reinforcement dam of approximately 3 million 331,9 thousands UAH and budgeted cost for providing excavation and replanting of rare breeds of plants for creation of preserved coastal area of 22 million UAH.

According to calculations sales revenue of Kyiv hydroelectric power makes 23,848 billion UAH per year, expenditures make 7,226 billion UAH. Average annual effect of hydroelectric power plant functioning is 87 billion UAH.

Efficiency of hydroelectric power plant functioning exceeds class one proving high ecological and economic efficiency of Kyiv hydroelectric power plant functioning.

## **POLITICAL ECOLOGY: SECURITY STUDIES APPROACH**

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*Nature does nothing uselessly.*

***Aristotle (384-322 BC)***

**Intro.** Concerns about the environment have been rising steadily since the 1970s, when a larger Western public became aware of the threats posed by environmental degradation and pollution. The growing importance of environmental issues on political agendas and in the media has been accompanied by a dramatic increase of research on the environment in developing and Western countries. Scholars of development studies, security studies or conflict studies have focused on the environment trying to understand and conceptualise its effects on human life and vice versa. But how should one assess environmental changes and their effects on society? This preoccupation with human-nature interaction resulted in a variety of new approaches within different disciplines, each producing

very different research results and, ultimately, policy recommendations. Even though environmental change has been discussed in academic and policy circles for about thirty years now, it has not yet brought about anything close to a theoretical consensus. The multitude of different and often contradictory theories on human-environment interactions call for a critical review of the current state of the art in order to facilitate future research on sustainable development, natural resource management and resource conflicts. One of the approaches that has emerged as most promising is political ecology, which stands at the centre of these thesis.

**Political ecology** is a relatively new field of research that has been widely discussed and much used in recent analyses of interactions between humans and the environment. However, despite its prominence key concepts of political ecology remain ambiguous. It is an area of research where social scientists with ecological concerns and natural scientists looking at the 'human factor' take into account ideas of social security and political economy. Among the security questions that political ecology deals with are: (1) how both nature and societal structures determine each other and shape access to natural resources, (2) how constructed concepts of society and nature determine human-environment security interactions, (3) the connections between the access to, and control over, resources and environmental change, and (4) the social outcomes of environmental change.

**One of the characteristics** of political ecology is that it is not a coherent 'grand' theory, but rather a specific lens through which one can examine the interactions between the environment safety and social security. Scholars do so from different viewpoints and relying on very different disciplinary backgrounds (geography, anthropology, sociology, political science, economics, history and management). Very often diametrically opposed paradigms and theories (for instance, neo-liberal vs. neo-Marxist) are brought forward by researchers who deal with a similar field of scientific inquiry, i.e. human-nature interactions and the mutual effects engendered. Political ecology seemingly provides conceptual tools for security analysis rather than an encompassing theory of human-environment relations. Moreover, as most works in the field of political ecology are distinct case studies of different, local security problems, it is difficult to identify specific and coherent theories of political ecology that scholars base their research upon. Despite the growing importance of political ecology as an analytical and practical approach to how environmental changes impact on the security behaviour of people affected by them, the theoretical work has just begun. There is still much work to be done to shape a comprehensive theory of political ecology that will be able to serve as a solid foundation for scientific research within security studies.

**Being an interdisciplinary approach** political ecology is still in its formative phase. The concepts of scholars vary greatly and their respective perspectives on political ecology are often subject to harsh criticism by their peers. To this day the majority of political ecology research consists of analyses of local environmental changes, which are related to broader social and political security

structures. For security-orientated political ecologists the challenge is to circumvent the 'ideographic trap' – i.e. to avoid research findings valid only for a specific and spatially limited area. There is a need to elevate research results from their original unit of analysis onto a more general level if one seeks to contribute to the mitigation of syndromes of global environmental change. But more often, and arguably rightly so, the goal of regional political ecology is to explicitly avoid generalisations and to do justice to local realities.

**Central to political ecology** is the in-depth examination of social-political security structures in their global and historical contexts to explain environmental change and the analysis of the various involved actors, their interests, actions and discourses. Two main branches of research stand out in this regard. There is the more conflict-orientated approach that looks at environmentally induced conflicts, political conflicts between stakeholders at different levels of administration as well as violent conflicts.

**Conclusion.** A political ecology approach to security issues is used to provide a conceptual framework for an understanding of the relations between social and environmental dimensions of security. In this approach the politicized social structures and land capabilities are construed as those influencing the proximate determinants of both the social-political processes and the possible processes of environment degradation. The objective is to show that interlacing qualities of socialpolitical life and economic-political "development" determine the degree of environment degradation. The qualities of environment are argued to be grounded in the web of social relations and it is stressed that affiliations to different socio-economic groups also determine whether the economic actors has to overexploit the environment. In a situation in which the environment capability cannot satisfy the needs of the user, new survival strategies have to be found. These can either be adaptation to the new socio-economic and socio-political situation like the "multi-active ecopolitical strategy", or disclaiming from the contemporary situation like the "secluded-group strategy". The ecological consequences of the new survival strategies are still to be assessed.

## **ECOFEMINISM AS A GENERATING ELEMENT IN ENVIRONMENTAL AND HUMANITARIAN STUDIES**

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The UNO document *Millennium Development Goals* (2000) proclaims the priority of human rights and environmental protection as main aims that international and national policies should concentrate on. The connection of

democratic processes and environmental protection is realized through the civilization development and tendencies of growing global interdependence of disciplines. According to this a new branch of interdisciplinary studies called environmental feminism or ecofeminism found its place in the international science.

The theoretical subground for ecofeminism was made in the 70s of the XX century together with the term that was introduced by Françoise d'Eaubonne in the 80s. The theory of ecofeminism is based on the philosophical analysis of connections between gender interdependence and parallels with industrial influence on environment and on the philosophical idea of Nature.

Nature is associated with the main source – the Great Mother what is interpreted as female roots of the world. Pollution and negative influence of ‘male’ industrial culture are considered to be an opposition to Nature and therefore discrimination. The essence of this discrimination is thought to be of the same kind as gender discrimination.

The social understanding of ecofeminism is based on the history of women movements and strikes for better conditions and standards of life. Social-political activity of women gave a push to development of other half-radical and radical movements. Child-oriented nature of women makes them focus on real problems. That’s why environmental protection is especially important for women.

Ecofeminists insist that it’s impossible to understand environmental protection without attempts concentrated on the status of a woman in modern society. Feminism helps to understand the role of women in family life and their role in economics as women do a lot of hard work at home. That’s why ecofeminism thinks of women as of mothers called to take care of their families, home and our planet.

Ecofeminism has a lot of variants of interpretation. Two opposite are given just above. The last one is considered to be more discriminating although it belongs to the branch of feminism that proclaims freedom from stereotypical understanding of a woman as a mother and a house-wife although in the theory of ecofeminism it’s supposed to show woman’s nature as a better alternative and the essence that has protection and care in its roots and biology. Such philosophical-biological understanding of a woman is discriminating because it shows a woman out of the social-cultural and political context although it brought feminism and ecofeminism to the science and it’s the very condition that made feminism possible. Feminism and idea of gender equality are possible only in the civilized society that is the very reason for the tense situation with the environment.

Although ecological problems reflect on all the people of any gender and nationality, it’s especially important to point out how they influence women, especially their reproductive function and biological role.

Thinking out of the context of general ecological problems (such as pollution, holes in the ozone layer, acid rains, lack of fresh water etc) we can observe such crucial points as genetically modified products and radiation.

Genetically modified (GM) products are economically profitable but their influence on human's organism is not clear till now. Genetic modifications can cause changes in human genes what is a serious challenge to a woman as a symbolic realization of Nature.

Next to the problem of GM products is radiation that can also cause changes on the genetic level causing genetic illnesses and spoiling the code of the whole humanity.

Experiments in the field of genetic engineering are also a great problem nowadays as they negate the role of a woman as a mother. Besides their positive influence presents a real question today as they are still experiments without any concrete forecast.

All kinds of environmental crisis reflect on the reproductive function, first of all. It means that ecological problems are a challenge to woman's health what stresses the peculiarity of a woman as a symbol of Nature.

The specific point connecting feminism with ecology is that health and further development of humanity depend on it. And the continuation of human history depends on biological and social role of a woman.

Attention of ecofeminists is also focused now on negative results of emancipation that caused the increase of such problems as smoking and drinking.

According to V.Shiva lack of attention to peculiarities of women nature and their transformation into stereotypes seems to be one of the reasons for environmental crisis. Appealing to morality of the mother we get a natural scheme of social regulation and formation of respect to natural resources and environment in children.

All the specialties of different branches of ecofeminism are brought together with the help of their attention to such problems as surviving, right for work in healthy environment, reproductive function of a woman and health protection.

In terms of globalization we observe a phenomenon of joining of all branches of science through different interdisciplinary studies and ecofeminism is one of them. Being based on the ground of philosophy ecofeministic studies also involve environmental and humanitarian sciences as results of ecological situation are social and economic, means of regulation – political and ways of understanding and analyzing – philosophical.

Ecofeminism shows us that only in terms of integration of all theoretical and practical achievements of science and civilization we can find a solution of our ecological problems that affect all spheres of human life and knowledge.

## THE ACHIEVEMENT OF POSITIVE ECOLOGICAL EFFECT BY INCREASE OF LEVEL OF ECOLOGICAL ETHICS

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*“Ethics is boundless responsibility for everything that lives”*

***Albert Shveicer***

Today all thinking people feel and understand that we are going to eco-technological apocalypse by the road of the technical and genetic civilization.

What can we do? What have we done? We should analyze and consider ecological values because they are fundamentally important for society development. The ethnic of wildlife management (ecological ethnics) is the set of the moral and legal standards which are directed for preservation of biosphere and a human civilization.

The question about the ecological ethnics is very difficult. Nevertheless, it is possible to select one important problem which can be decided by ecological ethnics. Moreover I can say that this problem is: “Which of alternatives can give the biggest sum as the result?”

Let's consider market relations and an ecological component in it. As we see, from the one side the exponent of social ecological ethnics is business, from the another side – is a customer. As we know business-sector has the negative influence for environment. However don't forget, that business instead of customers. So, we come to questions: How can we consolidate efforts of both sides for achievement of the maximum positive influence on environment?

As we know, the ecological ethnics demands business investments. So, the businessman is interested in an economic gain. If he could get some money, he will be interested to be the social ecological responsible.

Let's analyze the research, which were organized by the international research company NIELSEN. 28250 persons from 51 countries (including Russia) took part in this research. We think that situation in Ukraine the same as in Russia, so we can use the statistics of this research.

“Level of ecological and social consciousness of customers has grown in times. Thanks to globalization, development of various mass media and the Internet buyers demand to take responsibility and to bring the contribution to improvement of a life of a society from business,” — Duajt Watson, the general director “Nielsen” said.

Let's compare the results of research of Russia and Mexico. 87% of Mexicans have informed that they are interested to take part in ecological and social initiatives by means of purchase of the ecological goods. There were 62% of interested persons in Russia.



54% of Mexicans think that it's very important when business take part in ecological and social projects. And only 15 % of Russians think so.

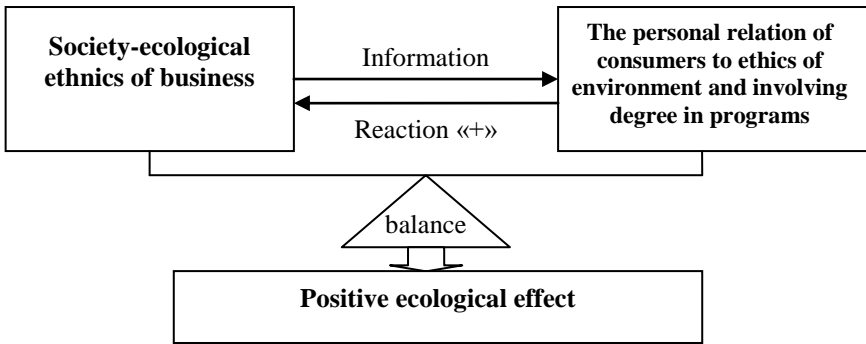
We have tried to allocate the basic problems of low consumer's interest in socially-ecological programs of business:

- 1) Low level of information in society.
- 2) Corporate Social Responsibility (CSR) programs aren't regular, so it can't be marketing strategy.
- 3) Customers often don't feel their participation in CSR-programs.

So, how can we increase the level of environment's ethics in Ukraine?

The companies will carry out ecological actions and to aspire to ecological responsibility when they will see real benefit and the income of it. For example, in Latin America the companies use the information of the social activity in advertising as the tool of marketing to create the company's image. Marketing of the "ethical" goods can be a profit source, but only if the consumer will have high level of ecological culture.

So, we proposed the model of the balance between Society-ecological business's ethnics and the personal relation of consumers to ethics of environment and involving degree in programs (fig. 1).



**Figure 1 - The model of the balance between Society-ecological business's ethnics and the personal relation of consumers to ethics of environment and involving degree in programs**

If we used the experience of the advanced countries and potential of Ukraine, we can say about following actions to reach desirable effect:

- Business sectors should:
  - 1) systematize CSR-programs, include them in marketing strategy of the company;
  - 2) to adjust the inform-system of consumers, to create feedback system;
- The consumers should:

- 1) to increase ecological culture and ethics, to improve ecological education;
- 2) to increase the requirements of ecological programs to companies.

We sure that we can reach good result if the government will stimulate the businessmen, and also the third sector will inform the consumers and will provide the programs to develop the level of ecological culture and ethics among a society.

Together we can reach the prime goal of environment savings.

## **MULTI-CRITERIA DECISION MAKING: DO ECONOMIC AND ENVIRONMENTAL OBJECTIVES CONFLICT?**

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Every person, business, organization and government faces a complex problem of planning for the sustainable future. On one side, we are experiencing highly unpredictable environmental changes due to human-related activity and those changes should be minimized. On the other side, we live in the world of limited resources and the need for economic development. Those two needs seem to conflict with one another. For example, if we would like to have clean air to breathe, but also want to use cars for transportation, our needs might conflict. Which would we choose and how would we make our decision? The goal of sustainable development assumes that meeting the needs of the future depends on how well we balance economic and environmental objectives – or needs – when making decisions today.

It is widely accepted that we are facing with a massive decision-making optimization problem in order to ensure sustainable development. The single old-fashion objective of every business that is maximizing profit (or minimizing costs) is becoming obsolete. Now, we have at least two conflicting objectives in our decision making and those are minimizing environmental impact and maximizing expected profits. Moreover, the problem of minimizing environmental impact is complex by itself as it consists of minimizing use of fossil fuel, maximizing carbon sequestration, optimizing our use of energy, etc. Due to these facts mathematical modeling and operations research techniques are required to tackle these decision-making multi-objective optimization problems.

Mathematical modeling and optimization techniques are utilized in many areas of engineering and science to improve performance. The main challenge of practical models is minimizing different risks in the presence of uncertainty and it requires optimizing over a number of conflicting objectives. In this study, we show examples of practical management problems that demonstrate how mathematical modeling combined with optimization algorithms that we developed is used to find better solutions and improve decision-making.

The common feature of management and technological models is presence of multiple performance indicators (profit, cost, return on investment, environmental impact) and risk measures (risk of flooding, risk of water supply deficit, volatility of project costs, etc.). Due to that all these models are multi-objective problems. The solution of a multi-objective optimization problem is a set of Pareto efficient points, known as Pareto efficient trade-off frontier. We present our methodology that allows computing Pareto efficient frontiers efficiently.

One of the risk management problems that we use to illustrate our computational algorithms is management of the water resources of a lake. Exploitation of water resources inevitably produces conflict among different objectives. In order to arrive at an acceptable compromise, the decision-makers should seek an optimal trade-off between conflicting objectives that reflect the priorities of various decision-makers. Those objectives include minimizing flood damage, minimizing water supply deficit, minimizing project cost, minimizing environmental risk and minimizing financial risk of the project among others. In this study, we demonstrate our algorithmic approach to computing Pareto efficient trade-offs for this multi-objective optimization problem, where economic benefits should be balanced with associated negative environmental impacts. We show a practical example demonstrating computation of the 3D efficient trade-off frontier when multiple objectives include minimizing flood damage, minimizing water supply deficit and minimizing project cost.

Another our case study involving multi-criteria decision-making describes modeling improved store design to help meeting greener goals at newly planned locations. A fast-food restaurant chain wants to reduce the environmental impact of their business while maintaining the company's high level of customer service. Resulting designs are ranked based on customer service level and environmental impact (defined as the average quantity of emissions produced by customer vehicles using parking lot and drive-through lane). The simulation model that we developed computes multi-objective optimal solution trade-off to meet these goals.

There are some cases when economic objectives do not conflict with environmental needs. One such problem is minimizing border crossing delays for commercial trucks. Border delays lead to increases in shipping cost and increase in the environmental impact caused by emissions from the vehicles at the border. Using historical data on truck arrivals, processing times, staffing patterns, etc., we developed a simulation model of the border, identified the problems and their sources, and proposed a solution to the border congestion problem providing the largest improvement (including environmental benefits) for the least cost. Another management problem where environmental and economic objectives coincide is optimizing supply chain. Minimizing delivery time objective leads to minimizing environmental impact (due to minimizing greenhouse gas emissions caused by transporting goods).

Our computational results demonstrate relative performance of multi-objective optimization formulations for a number of practical problems. We briefly

discuss performance of our optimization formulations with respect to different factors. Presented models and problem formulations were developed by McMaster University and other academic researchers in co-operation with business partners and are aimed for practical implementation and use by risk and environmental managers at different institutions and industrial enterprises. A number of software tools combined with optimization solvers are used for modeling and computations.

In conclusion, innovation, technological advances and modern information technology including operations research and optimization will be the leading forces driving sustainable development and rational use of natural resources.

## **POSITIONING OF THE MODERN STATE OF UKRAINE ON THE WAY OF REALIZATION OF THE CONCEPTION OF SUSTAINABLE DEVELOPMENT**

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Based on the global value of the state of natural environment in Rio de Janeiro it was accepted the decision about creation at Economic Advice of UNO of functional commission of sustainable development for the concerted development of global strategy of maintenance of nature, providing of terms of life on a planet on next ages, for activation of intergovernmental collaboration in industry of study and decision of questions of the state of environment and development, assistance and control after implementation of Agenda on XXI age at intergovernmental and national levels. Ukraine entered in the complement of this commission and actually under its pressure and the obligations slowly enough works above the substantive provisions of its possible transition to sustainable development.

But most of population of Ukraine in the modern terms of economy in general abandons the ecological state of components of nature out of eyeshot. Other his part is under the act of existing ideologies in relation to adequacy of natural resources and their practical inexhaustibility, taking into account the resources of ocean and other planets. The third group of people, which is moderato multiplied on the quantity, violation understands in a natural environment, does not see an exit from a crisis situation and actually gets used to the idea about death of humanity.

Ukraine began to work on positions of transition model of the sustainable development very late. At the state level it began to find the embodiment at the end of 90th, when National Commission of sustainable development of Ukraine was created at the Ministry of Ukraine (1997), developed Conception of the sustainable development of Ukraine (1997). Signing the documents of Rio-92, representatives

of imperious structures of the state spared more attention to the economic and political processes in Ukraine, not to organization of works on working of model of the sustainable development.

Ukraine goes out from a deep and system socio-economic crisis too slowly. In many industries of its economy and spheres of public life still take place destabilizing processes and negative phenomena. Next to it, almost all of its territory, basic natural resources and ecosystem is overcome by a sharp ecological crisis, as a result it continues to test the severe economic, social and ecological losses and damage.

Such structure of economy not decides properly social tasks, but vice versa, inflicts irreparable harm to the health of population of country and blows up its gene pool. Consequently, development of productive forces of society without the obligatory observance of requirements of ecological safety in the end makes the serious threat to existence of human civilization. The future of the last will depend on that, how every country cares of guard and maintenance in the cleanness of environment, recreation of his resources and also providing of resource-ecological safety of vital functions of society.

Thus it should be noted that most industries of Ukrainian industry presently based on an extremely backward in a large measure physically and morally threadbare material and technical base, imperfect, nature-destructive, waste and ecology unsafe technologies. To industrial potential of Ukraine still inherent pre-industrial organizationally-economic methods manage and character of production infrastructure. In addition, the existent forms of organization of financial production, methods and economic mechanisms of manage, not are practically inferior to the effective decision of recourse-ecological problems, tasks of providing of high ecological strength security in all spheres of life and activity of society.

Examining a problem of society and environment, it is impossible to pay not attention to one important moment. A situation with the decision of problem of resource-ecological safety of development of society and economy is too complicated to those, that Ukraine practically kept oneself aloof from a world innovative process. And actually last, which by high rates engulfs all more spheres of production and unproductive activity in many countries, is by fundamental basis of steady, ecology unsafe and socially directed development of national economies. In Ukraine an innovative sphere is in a deep crisis and it did not become the priority of public socio-economic policy.

On the whole transition strategy of sustainable development has based on the analysis of those disbalances which exist in economic, social and ecological spheres and on subsequent determination of ways of overcoming of these disbalances in the direction of achievement of the balanced development. It follows to convert general principles of Rio into the sequence of concrete administrative steps what would allow to correct existent disbalances. Simple declaration and reiteration in the national documents of principles of Rio will not give the desired results. Only removal of disbalances in ecological, economic and, as a result, social spheres can pawn

foundation for the balanced development of Ukraine, renewal of quality of environment and maintenance of biodiversity.

For Ukraine, that is on the stage of socio-economic transformations, realization of basic principles of sustainable development will allow to create such foundation for alteration of the state, which considers national values and world progress trends.

This multistaging process of achievement of balanced between socio-economic progress and necessities of environmental preservation, related to the problems of long-term development of country, successive practical introduction of principles of sustainable development, questions of change of pattern of consumption, maintenance, unexhausting use and recreation of natural resources, economic and ecological safety social, scientific and technical regional policy, and also foreign-policy aspects.

## **PRICING AT POWER ENGINEERING AS A GEAR OF SUSTAINABLE DEVELOPMENT ENSURING**

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1. Ever more frequently in scientific, educational, journalistic and other editions is raised a problem, or more precisely, range of problems concerning "sustainable development" (SD) of the world, society, countries, areas etc. The core point of SD consists in providing of balanced and harmonious advance of humanity in three directions: economic, environmental, and social. The idea of SD spreads nowadays in international legal and contractual documents, framework agreements, and occurs in the legislative acts of Ukraine. Such interest to relatively "new" vision of development of the world, however founded yet in papers of the world-known Ukrainian scientists V. I. Vernadskiy at the beginning of 20<sup>th</sup> century, first of all is connected with unfavorable long-term forecasts of humanity evolution in relation to the normal supply of energy resources, potable water, other natural resources, food; "sustainable worsening" instead of "sustainable improvement" of environmental conditions; expected growth of socio-economic, demographic, intercultural, religious problems and crisis phenomena in a world. The foresaid specifies about 1) complexity, 2) global character, and 3) dynamism of subject matter of SD and consequently about the necessity of system approach to its solving.

2. Considerable part in a system of SD occupies an energy sector, in particular, power engineering (PEN). Its progress correlates with all of the three constituents of SD, and especially closely with economic and environmental ones. The PEN therewith acts simultaneously as a factor of influence, and as a function

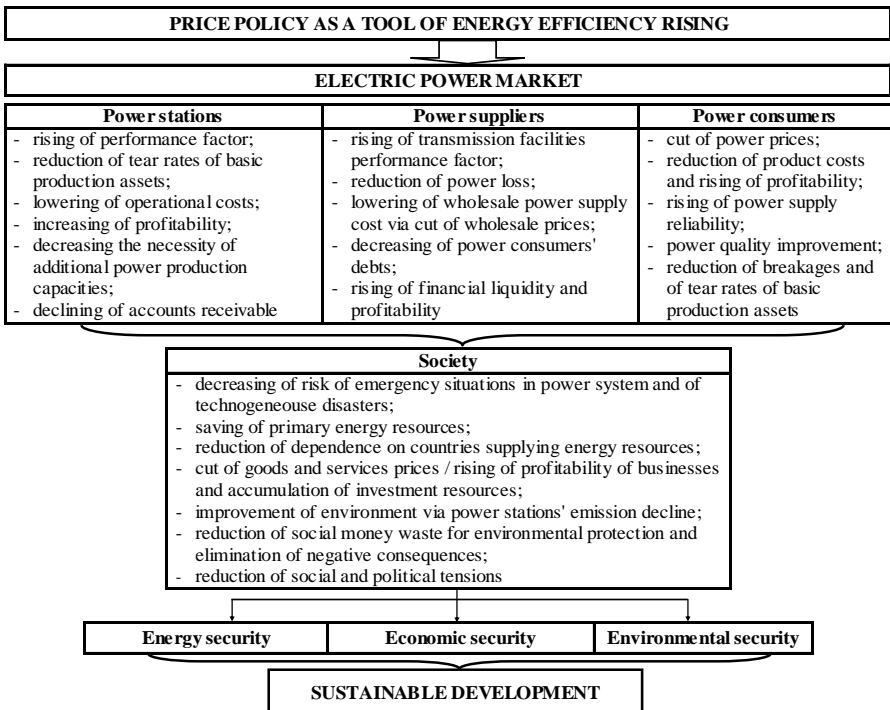
of given constituents changing. From one side, growth of technological level of energy sector, structural changes in energy-producing (by types of power stations and primary energy resources), increase of energy efficiency (EEF) influence on financial and economic indices and tendencies of national economy, environmental conditions. From the other side, the rates of economy growing, changes of branch-wise structure of GDP, poor provision with domestic energy resources, international cooperation, socio-economic and environmental policies of Ukraine determine directions and scales of PEN development. Under such conditions the key task of PEN within SD framework is permanent increase of EEF that is to be concretized in a system of proper technical, economic, and environmental performance indicators.

3. Among a kit of possible tools of influence on economic players of power market in order to increase their EEF a price policy (PPL) could be marked out as one of an effective and efficient gear. The key direction of PPL at PEN is differentiation of prices that is expedient to realize mainly for industrial enterprises (by time mode of energy consumption (ENC)) and households (by volume and mode of ENC). It is accounted for the biggest part of ENC of these groups of users (circa 55% and 18% respectively) and considerable possibility of optimizing the volumes and modes of their ENC. Then retail prices differentiation should be the basis for differentiation of wholesale prices of electric power.

4. The main expected first level results of PPL influence on the entities of PEN is diminishing of specific volumes and optimizing the modes of their ENC. A system of probable positive effects of demand-side management carried out by industrial enterprises and households under PPL impact presented at fig. 1.

Fig. 1 shows that appropriate positive effects could be got by all economic players of PEN and society on the whole. Further it is worth to make a quantitative estimation and analysis of stated effects in order to identify and formalize feedbacks between managerial influences on an ENC processes, in particular through the PPL, and background and proper indicators of SD.

5. PPL can not be the unique tool of adjusting the processes in PEN. In order to realize a systems approach in management pointed at SD achievement it is expedient to use the complex toolkit of influence on the subjects of PEN taking into account proper advantages and disadvantages, optimal terms of different tools application, interrelations between tools, synergetic effects and integral influencing on SD of country or its areas.



**Figure 1 – System of probable positive effects of ENC optimizing**

## **SAVING OF POWER RESOURCES AS A WAY FROM “TRANSITIONAL” ECONOMY TO SUSTAINABLE DEVELOPMENT**

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Energy problems of the countries with transitive economy, like Ukraine, differ radically from the analogous problems of high-developed countries. The Ukraine consumption of power bearers both the own and imported ones is very huge capacity. But if to compare the power consumption of other European countries and Ukraine, we'll see a very alarming picture. Really, Ukraine occupies “honorary” 5-6<sup>th</sup> place in the world on the quantity of the consumed power (of all types), but it stays in the end of the 1<sup>st</sup> one hundred of countries on the values of the home gross out-put per head produced per annum. See the table 1 (data for 1999)



Table 1- Power consumption of Ukraine comparing to other countries

Country	Population, millions	Home gross out-put per head per annum	Gas consumption, milliards m <sup>3</sup> in a year	Gas consumption for	
				1 person, m <sup>3</sup>	\$1 home gross out-put, m <sup>3</sup>
1	2	3	4	5	6
Ukraine	~50	\$600	78 (from them ~9 are for municipal economy)	1560	2.6
France	~56	\$20000	35	625	0.03
Poland	~38	\$4200	11	290	0.07

It's seen from the table 1 that Poland consumes gas 7 times less than Ukraine, for all this it has the home gross out-put per head 7 times more. If to count a difference in gas consumption per \$1 of the home gross out-put we'll receive a result  $2.6 : 0.07$  (these are the figures from 6<sup>th</sup> column of the table) = 37 times! It turns out that Ukrainian economy is 37 times more gas capacious than the Polish one (and 87 times more than the French one). It is characteristic also that the municipal economy of Ukraine which produces only 5-10% of scanty without that home gross out-put consumes gas almost so much (~9 milliards m<sup>3</sup>) as the WHOLE POLAND considerably more high productive (11 milliards m<sup>3</sup>). For all this 50 millions tons of energy coal and near 10 tons of black oil are burnt out in Ukraine. It's connected first of all with incredibly high power capacity and material capacity of Ukrainian heavy industry. Thus, on the estimation of European experts an average power capacity of 1 ton of industrial production is 1.9 tons of "conditional fuel", while this index for the Western Europe is equal to only 0.2 tons, i.e. almost 10 times less (for Poland 3-4 times). The same 1 ton of the Ukrainian "heavy" production gives 9 tons of not utilized wastes (on all chain – from mining of raw material and energy production till final product in packing), while for Western Europe the amount of such wastes is equal only 0.5 tons, i.e. 18 times less. One more example: the energy part occupies till 50% (sometimes even more) in the cost price of 1 ton of the coal, i.e. having mined 1 ton of such coal, we burn out a half of 1 ton at once to mine a next ton.

Since the Ukrainian economy cannot be 37 times more energy capacious than Polish one, another bad conclusion follows from data of the table 2. If our Ukrainian economy is in general 4-5 times more energy capacious than the Polish

one, then Ukraine needs gas 4-5 times more than Poland, i.e.  $11 \times 4,5 = 49,5$  milliard  $m^3$ /year. But Ukraine has already so much gas, namely:

**18 (output in Ukraine) + 31 ( for Russian transit) = 49 milliard  $m^3$ /year.**

And it means that Ukraine need to buy NOT ONE CUBIC METRE OF GAS in Russia or Turkmenistan. More probably that “extra” 30 milliard  $m^3$ , which are bought and paid with such a great effort, serve directly (or indirectly) the “shadow” economy of Ukraine.

It's necessary to note that those branches (the coal, “heat electrical”, metallurgical), which bring in “the contribution” in the ecological problems of Ukraine, are the low profitable or hopelessly unprofitable ones and cannot liquidate ecological problems “at own expense”. The trouble is also that a share of these super energy capacious, low profitable or unprofitable, ecologically "dirty" branches in the home gross out-put of Ukraine grows continuously and already has achieved 60 %.

It's necessary also to take into account that the total efficiency of each Ukrainian coal thermoelectric power station does not exceed 35%; the efficiency of gas boilers is not more than 60%; losses of the heat in the heating main (in tubes with hot water or with steam) is near 30-35%.

That's why the questions of the economy of power resource have to be considered as the most important not only economical, but also ecological problems of all countries like Ukraine. For such countries there must be 6 principal ways of the power economy:

- 1) reduction of the power capacity of produced articles at the working enterprises at the expense of the modernization of the technologies.
- 2) raising of the efficiency of boilers and reducing of losses of electricity supply networks and heating systems during the production and transportation of electric and thermal energy, and also in dwelling houses.
- 3) utilization of wastes contained energy.
- 4) introduction of alternative (without fuel) ecologically pure sources of energy.
- 5) gradual conversion of motor transport on electric (or gas-electric) motors.
- 6) gradual conversation of the economy on “intellectual” technologies (of computer, telecommunication, biogenetic and others) as considerably more less energy capacious, and also more profitable and ecologically pure.

# ENVIRONMENTAL TAX REFORM IN THE CZECH REPUBLIC

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## 1. Introduction

The principle of environmental tax reform is becoming well known not only in theory but also in practice. It consists in implementation of excise duties for scarce goods damaging the environment (in practice mostly on solid fuels, electricity, mineral fuels). Because the environmental tax reform is based on fiscal neutrality, the increased tax burden is compensated through lowering of direct labour taxes or social security contributions.

The concept of the environmental tax reform has been adopted in practice first in the first part of 1990s by Sweden, Denmark, Norway, Finland and the Netherlands and in the second part of 1990s by United Kingdom and Germany. Later they were followed by some other countries, including those from Central and Easter Europe. For more details about introducing environmental tax reform in Europe see EEA (1996), Speck (2007), COMETR (2007), DRESNER et al 2006), DUHA (2008). Introducing the environmental tax reform in the Czech Republic is discussed in this paper. The special focus is put on its historical consequences and its impacts on the current development. For this reason it is being discussed together with other economic tools of environmental policy, namely environmental charges. It also presents results of the qualitative research conducted within the project „Resource productivity, environmental tax reform and sustainable growth in Europe“ (PETRe) supported by the Anglo – German Foundation.

## 2. Facts of environmental taxes and environmental tax reform in the Czech Republic

Using economic instruments of environmental policy has had a long tradition in the Czech Republic. Pollution charges have been gradually introduced since the 1960s. Air emission charges were levied first in 1967. Charges for effluent wastewater into surface waters were instituted in 1979. Both internalization of external economic damage from environmental degradation and the trial-and-error idea were considered as theoretical bases for setting the rates of the charges. However, in the centrally planned economy they could play only a less important role in the decision-making process of the key economic subjects.

The current system of the environmental policy instruments was introduced in the early 1990s during the process of establishing the new national environmental policy and legislation. The system of environmental charges consists of air emission charges, sewage charges, water pollution charges, charges

on municipal waste, charges on solid waste disposal, water extraction charges, charges for dispossession of agricultural and forest land, and mining charges.

Environmental taxes started to be discussed in the first half of the 1990s. It was within the process of transition to a market economy, when the changes to the entire tax system provided space for introducing new kind of taxes. The act on public finance reform, which entered into force in 1993, provided a concrete scope for environmental taxes introduction – a specific paragraph was introduced to the tax act, but was not used in practice.

The latter half of the 1990s was characterized by the intellectual shift from environmental taxes to environmental tax reform. The concept of the environmental taxes started to be perceived in a context of labour taxation lowering. This stage of the environmental tax reform preparation in the Czech Republic is connected with first calculation studies of potential environmental tax reform impacts. In those days, environmental tax reform became – with a certain degree of generalization – regarded as a really strong instrument in the environmental field especially among politicians and experts, namely those from the Ministry of the Environment. From the theoretical point of view, this period of the environmental tax reform debate was mostly based on the idea of the Pigouvian taxation and internalization of externalities, but the potential for revenue generation was also discussed.

The practical concepts (i.e. concrete policy drafts) on the environmental tax reform were developed several times since the year 2000. It mostly did not pass the political process and no one was implemented in practice. Only the Public Finance Reform in 2006 has introduced a significant increase in excise duty rates on motor fuels (e.g., 0.42 - 0.49 Euro/l for petrol, 0.14 Euro/l for diesel oil, and 0.12 Euro/l for LPG) and simultaneously a decrease in income tax from 31% to 24%.

The latest events on environmental tax reform implementation in the Czech Republic have been driven by the EC Directive No. 2003/96, because the exemption for the Czech Republic expired at the end of 2007. This was the main reason for the necessity to implement it at least at its minimal rates since January 1, 2008. This implementation is called “Phase I of environmental tax reform”. Phase II is currently being prepared and is supposed to be introduced since 2010. Phase III is planned to be introduced since 2012.

According to the Phase I, solid fossil fuels are charged 0.3 Euro/GJ. This will trigger a rise in the price of solid fuels for households by approximately 10%. Natural gas is taxed by 1.1 Euro/MWh. Electricity is taxed by 1 Euro/MWh, which is supposed to cause approximately 1% increase in the household electricity prices. Electricity generated from renewable sources is exempted from the taxation. There are several other exceptions from the taxing: household heating with natural gas, district heating, if the heat is generated from combined heat and power technology, power and heat from renewable energy sources, methane and nitrogen fuel cells, compressed natural gas in vehicles, electricity used in rail and traffic, and coal used for production of electricity.

Originally, the Czech environmental tax reform introduced in January 2008 aimed to be revenue-neutral as the social security contributions should have been lowered. It was planned that the government would decide in mid 2008 on how much lower the social contribution should be in connection to the environmental taxes revenues. However, the fiscal neutrality was declared by the government to be implemented already in the environmental taxes introduction phase, when the income tax was lowered and VAT was increased by the same law and at the same time that the environmental taxes was introduced. In the second stage, the overall social contribution paid by employers and employees has been 1.5% lower since 2009, which causes a decrease in the governmental revenues of CZK 11 billion. The overall revenues from the 2008 environmental taxes are less than CZK 3 billion.

### **3. Results of the qualitative research**

The methodology of the qualitative research was used for the analysis of the environmental tax reform preparation and implementation in the Czech Republic. The aim of the study was to come up with the explanation of the behaviour of the particular stakeholders in the environmental taxes and environmental tax reform agenda. Thus the study simultaneously focused on various aspects of environmental tax reform besides them identification of the practical barriers and obstacles to environmental tax reform implementation in the Czech Republic.

The questionnaires were designed for semi-structured interviews with opened questions and it was progressively amended, based on the previous interviews. Interviews were conducted with a total of 25 subjects. Six of them were government representatives; six were representatives of key relevant businesses; other six were from SME, three were NGOs representatives; one was a representative of labour unions; and two were academic consultants. Some of the key stakeholders were interviewed several times in longer time horizon and thus in different political constancy and different environmental tax reform implementation stages, so that the mental shift could be reflected in the research results.

The environmental tax reform is being introduced in the Czech Republic within the long historic tradition of application of economic and other environmental policy tools. In particular, the pollution charges and subsidies from the State Environmental Fund have to be taken into account in this respect.

The principle of the real environmental tax reform is virtually not known to the Czech stakeholders. The exceptions are those who take part in its preparation. The NGO Hnutí Duha is virtually the only one to publicly promote the real vision of the environmental tax reform: among other things, they have developed a comprehensible booklet distributed among the expert public, in which its suggestions for an environmental tax reform go way beyond the official materials developed by the relevant ministries (DUHA 2008). Virtually all stakeholders (including the state administration) thus continue to understand the environmental

tax reform as introduction of (additional) environmental taxes or charges with the purpose of obtaining additional revenues to fund environmental improvement measures. That idea has wider support by most stakeholders than recycling the revenues in the form of reduced tax burden on labour. Even after they learnt about the double dividend hypothesis during the interviews, the respondents largely failed to identify with it. Instead, they were considering various models for recycling the environmental taxes revenues to promote environmental protection. Some stakeholders understand the point of the environmental tax reform to be an attempt to motivate the affected entities (taxpayers) to conserve energies, but that understanding is rather rare.

The key to understand the position of the state administration is the issue of differential distribution of revenues from pollution charges and from environmental taxes. The charge revenues go in part to the State Environmental Fund (SEF) under the jurisdiction of the MoE, intended to fund environmental protection projects, while environmental tax revenues go to the state budget under the Ministry of Finance. This fact is crucial for understanding the acting of the MoE, which is in charge of the environmental tax reform development and design.

The threat of the SEF losing incomes results in the MoE shifting from the initially declared support to the environmental tax reform towards advocating the previous system of charges going to the SEF, used among other things to co-fund EU environmental protection projects.

These facts provide a nearly perfect explanation for the design of the currently partly implemented Phase II, where the initially planned transformation of air emission charges into environmental (carbon) taxes was totally abandoned. The MoE policy, currently referred to as Phase II, concentrates on two areas that are the main sources of air quality problems in the Czech Republic. These are the preparation of the new Air Protection Act (Czech Republic exceeds standards of the NO<sub>x</sub>, SO<sub>2</sub>, VOC, particulates on the majority of its territory and for this reason propose increase of the emission charges e.g. for NO<sub>x</sub> nearly 100 times), and a mix of instruments aimed at regulation in transportation. Phase II does not include augmented taxes for fossil fuel use. The greenhouse gas area is largely understood in a way that it covers major polluters with EU ETS and expects an incentive from the EU for minor ones (amended Regulation 2003/96EC, where the MoE expects higher charges). Not increasing the CO<sub>2</sub> emission tax rate in MoE's own initiative is one of the few areas where there is an agreement in interests with the other stakeholders concerning the environmental tax reform.

The focus of Phase II on local priorities in air protection in the Czech Republic receives more understanding among businesses (than merely charging CO<sub>2</sub>); environmental groups see it as insufficient. Generally, stakeholders interviewed show scepticism towards the MoE policy and lack of trust in the environmental taxes revenues being recycled in the form of reduced other taxes (despite the fact that this has essentially happened). It is clear from these expressed opinions that the entities do not perceive the introduction on new environmental

taxes and reduced income tax (along with higher VAT) as a tax-neutral change. The same very probably also applies to the second stage of the recycling – the reduced social contribution by 1.5% as of January 2009. These findings confirm our previous findings: the stakeholders' generally very low level of information about the MoE intentions and implemented measures, or a generally inadequate communication of the environmental tax reform to the stakeholders. Generally speaking, the MoE policy aimed at the country's environmental problems is perceived better than its policy aimed at regulation of greenhouse gas emissions.

The term environmental tax reform itself seems inadequate for the understanding of the concept; there was a problem with the term 'environmental tax reform' as such, as it does not quite capture the essence of the changes in the Czech Republic.

Businesses frequently mentioned benchmarking – let ones who pollute less pay less – and the necessity to consider innovation cycles (in the power industry particularly). It shows that businesses are well aware of the potential impacts of the environmental tax reform on themselves. At the same time, the interviews show that sectors most affected by the environmental tax reform (in case exemptions are cancelled, e.g. power industry and metallurgy) have a relative low proportion of labour costs to energy consumption, so that the environmental tax reform would not be cost-neutral to them. It also shows that the industry rather accepts administrative tools, which do not take resources away from the companies, thus making room for generating cash reserves for future innovation.

Based on the findings, we can also say that there is room in the Czech Republic for developing voluntary agreements on environmental protection, where industries offer to implement innovations leading to improved energy balance and thus reduced pollution in return for less tax/charge burden. As part of the interviews, the businesses discussed various tax suspension concepts in the event of innovation, tax distribution to state-run funds for subsequent corporate investment, etc. These concepts are currently partially applied in the amended Air Protection Act, whereby companies may report tax allowances if they invest in the environment. The MoE is not against discussion leading to voluntary agreements on environmental protection.

It has also been shown that the low environmental taxes practically does not stimulate businesses to environmental innovation, or at least not so in the short run. Based on the survey, we can formulate a hypothesis that if the environmental tax reform has a potential to affect the regulated entities in a desirable way, then it is via expectations of charges being increased rather than the existing charges as such ("soft effects"). The businesses said that their big uncertainty about future prices of energy sources leads to the temporizing of the costly innovations.

The various stakeholders also showed concerns about the competitiveness of the European economy burdened – in the international context – with excessive environmental regulation.

An environmental tax reform imposed from outside (the EU) contributes to the death (subduing) of original ideas developed in the Czech Republic in the 1990s. It is a question with no reliable answers whether the Czech environmental tax reform would have been introduced in a more ambitious form or not at all. The fact remains that for stakeholders who do not want an environmental tax reform, the existing environmental tax reform with next-to-zero charges is as argument against further MoE ambitions in the environmental tax reform field. Theoretically, it does not prevent more ambitious designs, but the analysis of positions of the various key stakeholders shows that the existing environmental tax reform is a strong counter-argument for the opponents. The environmental tax reform, arriving from the EU (and concerning exclusively CO<sub>2</sub>) thus essentially precludes the comprehensive environmental policy that has been developing so far.

#### **4. Conclusions**

To sum up the findings about the Czech environmental tax reform, it can be said that its concept is not very well known even to its principal stakeholders. The reason is the little promotion: the absence of explanatory campaigns.

The support to dealing only with existing local environmental problems and the opposition to introducing an environmental tax reform aimed at combating climate change connected with consistent revenue recycling points at a certain short-sightedness, cause probably largely by the lack of awareness of the risks as well as advantages of the environmental tax reform approach where the revenues are fully recycled. It is here that foreign experience in terms of evaluating the environmental tax reform impacts on economies and environment may play a key role in the promotion and implementation of the Czech environmental tax reform.

And also, further increases of the CO<sub>2</sub> tax rates in the Czech Republic should be preceded by a quantification of its impacts on the Czech economy using e.g. CGE or the E3ME model, or other techniques.

#### **References**

1. Beneš, M. et al (2006): Analýza koncepce ekologické daňové reformy, research study, ELEKTRA CVUT FEL/Národohospodářská fakulta VŠE, Prague.
2. COMETR (2007): Policy brief (a summary of COMETR findings), on-line: [http://www2.dmu.dk/cometr/Partner%20only/Brussels/policy%20brief/COMETR\\_Policy\\_Brief\\_Mar\\_2007.pdf](http://www2.dmu.dk/cometr/Partner%20only/Brussels/policy%20brief/COMETR_Policy_Brief_Mar_2007.pdf), [08-04-2009].
3. Dresner, S., L. Dunne, and T. Jackson (editors, 2006): Special issue: Social and political responses to ecological tax reform in Europe. *Energy Policy* 34 (8).
4. DUHA (2008): Ekologická daňová reforma, Hnutí DUHA/Ministerstvo životního prostředí ČR, Brno.



5. EEA (1996): Environmental Taxes - Implementation and Environmental Effectiveness, European Environmental Agency, Copenhagen.
6. IEA (2008): CO<sub>2</sub> Emissions from Combustion 2008. International Energy Agency. OECD Publishing.
7. MPO (2004): National Energy Policy of the Czech Republic, adopted by Government Resolution no. 211 on 10 March 2004, Ministry of Trade and Industry, Prague.
8. MŽP (2004): National Environmental Policy of the Czech Republic, adopted by Government Resolution no. 235 on 17 March 2004, Ministry of the Environment, Prague.
9. MŽP (2005): Draft Environmental Tax Reform, Ministry of the Environment working material, October 2005, Prague.
10. ŠAUER, P., VOJÁČEK, O., KLUSÁK, J., ZIMMERMANNOVÁ, J. (2009): Environmental Tax Reform: Case of the Czech Republic, Department of Environmental Economics, University of Economics, Prague.
11. Šcasný, M. Brůha, J. (2007): Predikce sociálních a ekonomických dopadů návrhu první fáze ekologické daňové reformy České republiky; Charles University Environment Center, Prague.
12. Šcasný, M. et al (2005): Externí náklady výroby elektřiny a tepla v podmínkách ČR a metody jejich internalizace, final report of MoE R&D project no. 320/1/03, Charles University Environment Center, Prague.
13. Speck, S. (2007): What we already know and what we need to learn about the environmental tax reform, in: Sauer, P. (editor; 2009): Environmental economics, policy and international relations, Nakladatelství a vydavatelství litomyšlského semináře, Prague, pp. 7-15.
14. Zimmermannová. J. (2007): Energy taxation and its cross-sectoral impacts – I/O methodology, in: Šauer, P., (editor, 2007): Environmental economics, policy and international relations, Nakladatelství a vydavatelství litomyšlského semináře, Prague.
15. Zimmermannová. J. (2008): Dopady zdanění elektřiny, zemního plynu a pevných paliv na odvětví výroby a spotřeby v České republice, Dept. of Environmental Economics, University of Economics, Prague.

## **NEGATIVE TENDENCIES OF UKRAINE ECONOMY SYSTEM IN CONTEXT OF INDUSTRIAL WASTE FORMATION**

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The reason of formation and accumulation of considerable quantity of industrial wastes including toxic ones is a number of negative tendencies and features of the modern economic system of Ukraine.

The first tendency shows up in prevailing in the pattern of production of resource-intensive industrial enterprises. Branching of co-operative connections between the countries of the near abroad was the reason of that in opinion of Kovalevskiy only 34% of production-technological cycles are completed and other ones are interrupted. It is important to mark that remaining 66% interrupted technological chains are formed by the enterprises of mainly extractive and processing industries of national economy of Ukraine. These industries are at the beginning of technological chain of final product production and are characterized by the considerable level of contamination and formation of wastes as compared to the subsequent links of production-technological cycle.

The second tendency consists in functioning in the production system of depreciated equipment and using of out-of-date technologies. In some industries of production the degree of capital assets depreciation reach 75%, that leads to considerable losses of unrenovable resources.

The third tendency consists in concentrating on territory of Ukraine of mainly raw material intensive and power-consuming industries. Lately production volume of this products is increased and there is increasing of production capacities. Operation of these industries is conducted by formation of considerable volume of industrial wastes.

A negative feature of this is concentrating on territory of Ukraine of plenty of chemical enterprises, which appear to produce fair quantity of toxic wastes.

Consequence of these tendencies and features are losses of unrenovable resources, their superexploitation and intensive contamination of natural environment. In this connection there is a necessity of formation of the ecologically balanced socio-economic development in Ukraine.

In the context of wastes handling maximally possible recycling of resources in economic system by means of providing of recurrence of their use, economic feasibility and financial viability of processing of industrial wastes must become the starting point of such development.

# GLOBAL ECOLOGICAL PROBLEMS IN UKRAINE

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Fifty years ago hardly anybody was concerned about environmental problems. Industrial and economic development, progress and profit were more important. Now, more and more people are aware of environmental problems such as the pollution of the air, the exhaust fumes and factory chimneys, global warming, the pollution of the ocean and many others. Environmental protection has become a global concern.

Pollution is the contamination of the environment, including air, water and land with undesirable amounts of material or energy. Air pollution is especially severe in many of the heavily industrialized cities and towns of southeastern Ukraine, notably in Kharkiv, Luhansk, Donetsk. Coal-using industries such as metallurgical coke-chemical plants, still mills and thermal power plants are major sources of high levels of uncontrolled emissions of sulfur dioxide, dust.

Almost all surface waters of Ukraine belong to the Black Sea and Sea of Azov basins. The high population density, heavy industrial development and relatively low freshwater endowment of those basins and the low governmental priority placed upon environmental protection until very recently have given rise to chronic and serious levels of water pollution throughout Ukraine.

Greenhouse effect is the phenomenon of the Earth's atmosphere by which solar radiation trapped by the Earth and re-emitted from the surface is prevented from escaping by various gases in the air. The result is a rise in the Earth's temperature. The main greenhouse gases are carbon dioxide, methane, and chlorofluorocarbons. The concentration of carbon dioxide in the atmosphere is estimated to have risen by 25% since industrial revolution. Chlorofluorocarbon levels are rising by 5% a year.

Acid rain is an acidic precipitation thought to be caused principally by the release into the atmosphere of sulfur dioxide and oxides of nitrogen. Acid deposition occurs not only as wet precipitation. It also comes out of the atmosphere as dry particles is absorbed directly by lakes plants and masonry as gases. Acidic gases can travel over 500 km a day. Acid rain is linked with damage to and health of forests and lake organisms. It also results in damage to buildings and statues.

The main affect of acid rains is to damage the chemical balance of soil. Plants living in such soil suffer from mineral loss. Lakes and rivers suffer more direct damage as well because they become acidified by rainfall draining directly from their catchments. 22

We must take care of our nature. That's why we must not drop litter in street, we must improve traffic transport, use bicycles, create more parks. Also we should clean the air, we should protect animals, we must change people's attitude towards the environment.

## COAL ENERGY: ECONOMY AND ENVIRONMENT

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Coal energy has some advantages and disadvantages. Among positive aspects of coal energy it is necessary to mention the next ones:

- 1) availability;
- 2) cheapness: to make electricity out of coal is cheaper than from oil or natural gas;
- 3) coal converted into a coke remains a substantial initial material in the production of iron.

There are the next disadvantages of coal energy:

- 1) unrenewableness;
- 2) environmental pollution;
- 3) problems of wastes' storage (slag, coke);
- 4) the high level of disease of miners;
- 5) frequent failures on mines;
- 6) huge expenses for fuel transportation for thermal stations.

The coal industry has found several ways to reduce sulfur, nitrogen oxides, and other impurities from coal. They have found more effective ways of cleaning coal before it leaves the mine, and coal companies look for low-sulfur coal to mine. Power plants use "scrubbers" to clean sulfur from the smoke before it leaves their smokestacks. In addition, industry and government have cooperated to develop "clean coal technologies" that either remove sulfur and nitrogen oxides from coal, or convert coal to a gas or liquid fuel.

CO<sub>2</sub> capture and storage (CCS) is the critical enabling technology that would reduce CO<sub>2</sub> emissions significantly while also allowing coal to meet the world's pressing energy needs.

Today, and independent of whatever carbon constraints may be chosen, the priority objective with respect to coal should be the successful large-scale demonstration of the technical, economic, and environmental performance of the technologies that make up all of the major components of a large-scale integrated CCS system — capture, transportation and storage.

Global consumption of energy raises a number of environmental concerns. For coal, the release of pollutants, such as oxides of sulphur and nitrogen (SO<sub>x</sub> and NO<sub>x</sub>), and particulate and trace elements, such as mercury, have been a challenge. Technologies have been developed and deployed to minimise these emissions.

Thus, environmental laws and modern technologies can greatly reduce coal's impact on the environment.

## A NEW WORLD ECONOMY

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World Bank forecasts notwithstanding, global stagnation is likely to prove harder to shake than most would like to believe. Aside from protectionism pressures, a series of corporate developments has stunted demand globally, leaving increasing numbers of people at the margins of market activity. Prominent among these developments are the commercial banks' handling of the Third World debt crisis, corporate substitution for Third World raw materials, and labor-saving technological innovations in the development world.

The debt crisis arose inevitable from the export-oriented development strategies, which depended on heavy borrowing for infrastructure and many countries fed corruption and capital flight.

Technological breakthroughs in substitutes for Third World raw materials also hurt growth performance in the developing world. A single anecdote typifies the impact of longer-term corporate development on commodity markets.

Advances in plastics, synthetic fibers, food chemistry, and biotechnology are bringing similar far-reaching changes to other raw material and commodity markets. Cumulatively these substitutions have pushed tens of millions of Third World workers into the margins of the marketplace, further curbing global demand.

The result of these three changes is that all over the world industry is turning out more than consumers can buy. The new global glut economy coexists with billions of people with enormous needs and wants but with little ability to buy.

If economies can no longer be pulled along primarily by external growth, stronger internal buying power must be generated. The great challenge is to transform crushing social needs into effective demand and then to meet that demand by turning first to domestically produced goods and services, next to the region, and only after that to the wider world market.

In most developing countries this development framework implies vast internal adjustment quite different from the World Bank's brand of structural adjustment. Most of the Third World's people cannot afford to purchase many goods and services. Wages are locked into rock-bottom subsistence rates; wealth and income are heavily skewed toward a relatively small, wealthy elite. As a result, spreading income more evenly requires, for a start, extensive land reform, progressive taxation policies, and guarantees of worker rights.

Agrarian reform remains the major means of redistributing wealth and income and thereby increasing the effective purchasing power of the rural population. The people in Third World rural areas are largely either poor tenants or agricultural workers who earn only subsistence wages. They have meager recourses to consume in the marketplace.

Only through agrarian reform can this population begin to produce a surplus that can be translated into consumption. In economic term, small farmers have a higher “marginal propensity” to consume than larger ones, and much of their consumption could be satisfied by locally produced products.

From this starting point, industrialization based on maximizing industrial linkages with agriculture makes great sense. In particular, three strands of industry could be encouraged:

*Agricultural inputs.* An agricultural *sector* with rising productivity will need locally produced fertilizer, pesticides, water pumps, and a wide range of tools, from plows to tractors.

*Processing farm products.* From cocoa and coffee to sugar and cotton, increased domestic processing offers more foodstuffs for local consumption and increases the value added of export...

The cycle of agriculture-linked industrialization does not stop there. As industry grows, the increased buying power of industrial workers provides an expanding market for farm goods from rural areas. Agriculture and industry would grow in tandem.

Beyond domestic market policies in agriculture and industry, development strategies should seek to curtail the wasteful economic activities that are rampant in some countries. These range from large, unproductive landholdings and these practices is a monumental political task, threatening as it does entrenched groups of speculators, moneylenders, and landlords and bloated militaries.

Development strategies also must pay closer attention to the pressing need to maintain fragile natural resources bases around the world. The disappearance of rain forests, plant and animal species, clean rivers, and clean air has become the dominant trend in too many countries.

Most observers continue to view the Asian NICs as role models. And they offer glowing imagery in support of their view: Asian NICs have “already taken off”, and the rest of the noncommunist Southeast Asian countries are “on the runway revving” up to follow, as former Japanese Foreign Minister Saburo Okita has described it.

The would-be NICs haven fallen for such prophecies for nearly a decade. Now is the time to demand not imagery but a realistic assessment of options. The debate on adjustment and development should be reopened; strategies that proclaim that the only option is greater dependence on an increasingly hostile and turbulent world economy need to be challenged. It is time to ask whether any more developing countries can really hope to become the South Korea or the Hong Kong of the early 1990s.

# **EMPIRICAL ANALYSIS OF ENVIRONMENTAL AND ECONOMIC DETERMINANTS OF MORBIDITY**

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Recent studies on morbidity and mortality effects of air pollution are extensive but not very interesting in terms of operated methodology, because it's homogeneous and economic determinants are basically excluded from explanatory variables. Mostly authors get into micro data on concentration that structures daily and long term (sometimes panel). They try to find so-called dose-response function. And attempts give results.

Cropper [1] found that air pollution causes mortality in Delhi. SO<sub>2</sub>, NO<sub>x</sub> mortality responses were studied based on micro data.

Yang [2] used macroeconomic data (1970-2000) based on concentrations in cities (OZONE, SO<sub>2</sub>). Vehicular air pollution has a short splash effect on health and vague results in the long run.

Loewenstein [3] collected continuous daily data of air pollution in Paris - he finds a positive effect of pollution on death for very old population. Climatic factors were also significant and had positive effect.

A lot of statistical evidences for mortality were found in Asia. PAPA studies confirm this fact [4]. Morbidity related to pollution was found in Europe with particular defining the dose response functions for air pollutants.

Hirshchberg finds positive mortality response on pollution generated by electric plants. SO<sub>2</sub> has the strongest effect on overall mortality [5]. In general soil contamination in polluted areas not only affects children risk exposure directly, but also lowering food quality that directly affects health and economic outcomes. Positive effect of infant mortality owing to CO pollution was found in US by Curi.

Interesting results were found in the most polluted American states. Author included unemployment as the economic determinant of mortality as well as air pollution. He argues that decrease in unemployment increases mortality, especially of older population [6].

Generally rise of economic growth is accompanied by increased death rates. This result is also interesting because G. Kassian from NES found opposite results declaring that pollution is a factor of mortality for non-professionals. Controversial results according to socioeconomic characteristic were obtained in Canada by Michael Jerett [7]. Using panel data on polluted Canadian regions author finds that pollution associated with regional effect has a positive effect on health especially for workers employed in industries which generate toxic substances. Generally regions with higher social economic characteristics have lower effect on health but no conclusions for the marginal value and signs of proxies were given.

Due to literature reviewed we conclude:

- 1) There is no consent on the effect of variables on mortality;

2) Concentrations are preferred for emissions, but there is no study comparing results;

3) Oldest (pensioners) and eldest population (children aged < 1) are more exposed to pollution and this results complicated economic value of death because these groups of individuals are set off production processes and labor markets;

4) Researchers have defined statistically significant outcomes of pollution: acute mortality, chronic mortality and chronic sleekness. Mortality and sleekness may be environmentally caused.

The goals of environmental analysis and policy should encompass the following: 1) to define the most effective priorities of environmental-economic policy with appropriate specification by major pollutants; 2) to define the share of emissions, which can be eliminated in the short run (i.e. now), without any losses in the level of economic development (providing that society will be better of for sure). Sites of ecological disaster in Ukraine should be geographical focus of the policy study. The following major questions should be answered: 1) What economic factors have an effect on emissions and what is the nature of the effect? 2) Does the level of emissions (pollution) effect life expectancy? 3) What priorities should be assigned to Ukrainian environmental-economic policy based on the factors defined?

The scientific importance of the mentioned issues is to explain how environmental imperatives and economic goals can be harmonized. Providing the manner of this harmonization and relevant policy recommendations will enhance human well-being, especially in the sites of ecological disasters.

### ***References***

1. Cropper M. The health effects of air pollution in Delhi, India/ The World Deployment Group, 1997. – WPS 1860. – 46 P.
2. Yang T., et. al. Air pollution health effects: toward an integrated assessment/ MIT Report No. 113, 2004. – 30 P.
3. Loewenstein J. et.al. Effect of atmospheric pollution (SO<sub>2</sub>--dust) and meteorological conditions on mortality in Paris between 1969 and 1976/ Rev Epidemiol Sante Publique. – 1983, 31(2). – p.143-61.
4. O'Keefe R. Air pollution and health in Asia. Current status and emerging issues. The PAPA studies/ CSE conference on health and environment, 2006. – 51 P.
5. Hirshberg S., Socrates K. The China energy technology program methodology and conclusion/ Technical paper presented at IEA and AIE Conference. – Taipei, 2005. – 39 P.
6. Rhum C. The Effect of Air Pollution on Infant Health. NBER Working Paper No. 12102.
7. Jerrett M. Air Pollution, Environmental Equity and Health: a Spatiotemporal Analysis. – Science and research report of Health Canada, Executive Summary, 2002.



# **"MEDOBORY" NATURE RESERVE AS THE CENTRE OF LANDSCAPE AND BIOLOGICAL VARIETY PRESERVATION, HISTORICAL AND CULTURAL HERITAGE IN WESTERN PODILLIA**

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Among nature protection establishments in Ukraine reserves are the only ones where planned long-term observations on dynamics of natural resources, rare species in their natural growing conditions and development of scientific basis for their preservation become possible. Such center and the main testing area for long-term monitoring investigations in Ternopil region is "Medobory" nature reserve that was founded in 1990 with the aim to preserve unique nature complexes of Podillia Tovtry, genofund of plant and animal world, their use for scientific purposes and nature-protecting work, and the most valuable lands of Kremenetski mountains in the north of the region were determined as the filial branch of the reserve.

Tovtry range is a unique monument of nature and geological past that is found nowhere else in Europe. Its formation took place 15-20 million years ago in the coastal waters of warm Sarmatian Sea. The main building material for reef formation served dead remains of organisms with calciferous skeletons: alga, mollusks, and other colonial organisms that developed on the elevated areas of the ocean floor and nowadays can be found preserved in limestone in their former lifetime look.

Orographically one can separate our main ridge in the Tovtry range, formed by a chain of hills, and the side ridge and groups of tovtry, edging it. The relative range height is 50-60m, and over the Zbruch valley - up to 100m. On the tops of the range there are many rocks, stone fields, made by numerous kinds of limestone with remains of various sea organisms. Mighty limestone favorably influenced the development of different karst terrain, including "Perlyna", "Khrystynka" caves.

Medobory play an important role in the formation of microclimate of the adjoining territories. Among soils there prevail gray forest clay soils on loess, loess clays and alluvium of limestone.

91 % of the reserve is covered by forest. Timber stand is of natural origin, generally, mixed, consisting of 2-3-4 species. The foliate species composition is the same. Oak-hornbeam, hornbeam-oak and oak-hornbeam-ash, oak-beech plantations are aboriginal for the reserve territory. They are preserved fragmentarily.

Favorable geomorphological, edaphic, micro- and macro-climatic conditions caused the development of variable and floristically rich vegetation, a number of

valuable, endemic, relic and boundary-areal species. At present time the territory of the reserve amounts 44 species of alga, 359 - fungi, 123 - lichen, more than 9000 species of higher vascular plants. Totally, more than 130 species are considered rare in the region, 35 are registered in the Red book of Ukraine.

*Galanthus nivalis* L. and *Allium ursinum* L. are numerous in forest tracts of the reserve, their populations occupy big areas, *Lunaria rediviva* L., and *Scopolia carniolica* Jacq. Are typical for the tops and slopes of forest tovtvy. Rarer are *Astrantia major* L., *Lilium martagon* L., *Cypripedium calceolus* L., *Cephalanthera damasonium* (Mill.) Druce, *C. ribra* (L.) Rich., *C. longifolia* (L.) Fritsch., *Platanthera bifolia* (L.) Rich., *P. chlorantha* (Cusl.) Reichcnb., *Epipactis helleborine* (L.) Crantz, *E. purpurata* Smith, *E. palustris* (L.) Crantz, *Neottia nidus-avis* (L.) Rich., *Listera ovata* (L.)R. Br., *Dactylorhiza majalis* (Reichenb.) P.F.Hunt et Summerhayes, *Crocus heuffelianus* Herb., that can found on the verge of the area. One can come across many rare in the region species such as: *Polystichum aculeatum* (L.) Roth, *P. braunii* (Spenn) Fee, *Phyllitis scolopendrium* (L.) Newm., *Cimicifuga europaea* Schipcz., *Symphytum besseri* Zaverucha, *Melittis sarmatica* Klovov, *Physalis alkekengi* L., *Veronica montana* L. and others.

A curiosity of nature presents the lands with steppe, meadow-steppe and rock-steppe vegetation with rare formations of *Carex humilis* Leys, *Stipa pennata* L., *S. capillata* L. Here, besides the characteristic steppe species, there grow many Volyn-Podillia endemic and boundary-areal ones: *Salvia cremenecensis* Besser, *Schivereckia podolica* Andr. ex DC, *Dracocephalum austriacum* L., *Aconitum eulophum* Reichenb., *A. lasiostomum* Reichenb., *Dictamnus albus* L., *Stipa pennata* L., *S. capillata* L., *Helictotrichon desertorum* (Less.) Nevski, *Clematis integrifolia* L., *Iris hungarica* Waldst.et Kit., *Allium podolicum* (Aschers.et Graebn.) Blocki ex Racib, *Euphorbia volhynica* Besser ex Szaf., Kulcz. et Pawl., *Chamaecytisus albus* (Hacq.) Rothm., *Ch. podolicus* (Blocki) Klaskova, *Ch. blockianus* (Pawl.) Klaskova, *Carlina cirsioides* Klok.

Faunistic complex of "Medobory" Reserve was formed under specific conditions of Tovtry ridge. Trees stand of various age, high amount of woodland on the slopes, alternation with steppe areas, covered by motley grass and islands of berry bushes, create favorable conditions for animal's settlement that form typical forest-steppe group. All the background species of Podillia-Prydnistrovya zoological district are presented in the reserve.

More than 1200 insect's species are found on the protected area, 15 of them are registered in the Red book of Ukraine: *Papilio machaon*, *Parnassius mnemosyne*, *Apatura iris*, *Osmoderma eremita*, *Lucanus cervus*, *Aglia tau*, *Xylocopa valga*, *Aromia moschata*.

Other class species found in the reserve include 9 fish class species, 11 amphibians, and 6 species - of reptiles. Ornitofauna of the reserve amounts 182 species, 14 of them are registered in the Red book of Ukraine, and some of them are found only during nesting period: *Aquila pomarina*, *Circus cyaneus*, *Bubo bubo*, *Hieraaetus pennatus*. Sometimes *Lanius excubitor* flies for winter time.

The class of mammals of the reserve comprises 44 species, 6 of them are found in the Red book: Chiroptera - *Rhinolophus hipposideros*, *Nyctalus leisleri*, *Myotis bechsteine*, *Myotis dasygeneme*; Carnivora - *Meles meles* and *Mustela erminea*.

The reserve territory is rich in historical monuments. During investigations the archeologists found the XI-XIII century's pagan sanctuaries: Zvenyhorod, Bokhit, Hovda -that according to B.O. Tymoshchuk data present a united archeological complex "Zbrutskyi cult center". On Bohit, the highest mount of Medobory and round its foot there is a whole complex of eastern Slavonic monuments of X-XIII centuries with a site of ancient settlement and sanctuary on the top, where according to scientists assertions, in X-XIII (here was the world-known Zbruchanskyi Sviatovyd - deity of eastern Slavs-pagans.

## **THE ADOPTION OF AN ENVIRONMENTAL MANAGEMENT SYSTEM IN SMES**

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Small and mid-sized enterprises (SMEs) are increasingly regarded as an important target group of urban environmental policies as their cumulative contribution to pollution is not underestimated by policy makers any more. Although the production of these companies generates relatively small amounts of waste, one has to pay special attention to these undertakings as they use many different hazardous and toxic substances in their production processes. However, from the municipal authority point of view there is only a limited scope of action to influence SMEs to change production methods as well as to force them to replace end-of-the-pipe-technology.

SMEs are important sources of economic growth and employment, but at the same time, collectively they exert quite significant pressures on the environment. Their adoption of an EMS (environmental management system) can help address these pressures. In addition, an EMS can also have a positive impact on these companies' economic viability.

Environmental management systems – are amongst the most well-known and most important voluntary tools used by enterprises to improve their environmental performance, and help ensure compliance with environmental legislation. Examples of other instruments in this area are eco-labels, life-cycle-assessment tools, environmental reports and benchmarking initiatives [1].

EMSs can take many different forms. They often appear in their internationally recognized, formal nature, but they can also take a number of less formal, "adapted" forms [1]. Some of less formal EMSs are based on the

attribution of alternative, environment related labels according to the specific requirements of the scheme in question. Example of such “alternative” EMSs is Eco-profit. It is an ongoing project which in the first place is aiming to tear down the information barrier and to introduce integrated environmental management practices in SMEs. The program recruits companies on a voluntary basis and facilitates access to technical assistance in order to help companies to identify and implement cleaner production technologies and process changes. Eco-profit uses emission standards contained in legislation enacted as part of the Austrian National Clean Air Act and Clean Water Acts.

An overall goal of each project was the identification of measures which would lead to the minimization of waste and emission through increased efficiency. The following principles were used as guidelines [2]:

- anything that leaves the production process should be considered as a product or raw material that can be used directly, or after processing, as an input for another production process;
- every product is optimized regarding repair ability and recyclability;
- production is based on renewable sources of energy and substances as far as possible, or is based on recycled materials;
- the producer is responsible for the whole life cycle of his product, including energy consumption and emissions during the use of the products, its repair ability and ability to be recycled or disposed of;
- the producer chooses material from renewable resources and releases wastes in a way that does not diminish nature;
- the producer minimizes the energy demand to a level that can be covered from renewable energy sources.

The activities of the Eco-profit projects are steering the companies` policy in two directions. Firstly, the production process and all other activities of the business get an environmental check-up on the use of materials and energy. This also includes the administrative department. Secondly, an individual company concept should enable the management to implement future environment-related measures on its own.

A typical proceeding of an Eco-profit project would cover the following areas: qualitative analysis of used materials and substances (especially hazardous substances); stock-taking of all relevant environmental legislation; waste management concept; energy saving concept; environment management concept; environmental ratio analysis; preparation for the award as environmentally friendly business [2].

The Eco-profit label improves the public image of the individual company as well as the region as a whole. Companies which achieve the environmental standards of the program (significant reduction of pollution and implementation of environmental management) are awarded the Eco-profit label. They can use the label for marketing purposes for one year. The label is granted to the company and not on its products, i.e. it is a certificate which is giving information on how the

business is run, not on what it produces. After one year, companies will have to continue to participate in the on-going activities of the program and will have to implement further waste minimization and pollution prevention measures in order to gain re-authorization to continue to use the label [2].

So an EMS helps companies integrate environmental considerations into their overall activities, and make progress towards more sustainable production patterns in a systematic way.

### ***References***

1. Public Policy Initiatives to Promote the Uptake of Environmental Management Systems in Small and Medium-sized Enterprises [Electronic resource] — Mode of access: <http://www.ecoprofit.com/upload/documents/>.

2. Graz: The Cleaner production programme ECOPROFIT [Electronic resource] — Mode of access: <http://www.eaue.de/winuwd/52.htm>.

## **PLANNING AND AUTOMATIZATION OF REGARDING PRODUCTION SYSTEM AS A PART OF ECOLOGICAL MANAGEMENT**

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Different organizations are more interested in determination and announcement of their ecological characteristics by means of controlling the influence of their activities, products or services on the environment according to their ecological policy and purposes. International standards of ISO 14000 series from ecological management provide organizations with elements of effective ecological management system, which have to be a one unit with other management requirements, so organizations can reach their ecological and economical goals [1, p. 195].

Successful implementation of ecological management system requires the participation of all employees of the organization in it. Therefore, responsibilities for environmental protection shouldn't be considered if they limit ecological aspects, because they can be related to other areas of the organization.

The Level of detailed elaboration of documentation should be enough in order to describe the most important elements of ecological management and interaction between them and also in order to provide possibility of management with more detailed information about functioning of specific parts of ecological management system [1, p. 210].

Managers and employees of all such companies are interested in getting information about products, their condition and other quickly. Also their interest is increasing in reaching ecologically clean production. In accounting ready - maid products should be estimated by actual cost, which can be determined only after gathering all costs and calculating. However, there is a need in the daily regard of the presence and movement of ready - maid products and determining their cost characteristics.

They are interested in simplifying and automating process of management and regarding products and also fast acquisition of all necessary data about the product and its components, their properties and possible influence on the environment. Ecological and economic indicators of enterprise functioning are becoming more important for internal and external interested parties.

This system is designed for realization of automatization of management and regarding production. Inclusion of ecological management elements in similar systems can provide getting economic benefits. Also this will help to balance and integrate economic and ecological interests. With using similar systems companies can reach important competitive benefits.

Planning and automatization of regarding production system is a software application for company database managing, therefore its algorithms will be built on the permanent communication with database.

The main and essential databases features are:

- A minimum surplus is allowed for the data, which contribute to their optimal use in one or more applications;
- Independence of data from application;
- Using common mechanisms for searching and updating data;
- As a rule, there are special tools in database for supporting its integrity and protecting from unauthorized access.

Unlike file systems, database is oriented on supporting data for a few applications.

We suggest choosing database management system Microsoft SQL Server for database development, because it is not inferior to analogical developments of Oracle, Informix, Sybase and IBM. A lot of corporations and independent softwear vendors, who create applications for business, chose Microsoft SQL Server as it is one of the best database management systems for Windows NT. Users' needs and requirements are determined significant recovery of products in terms of simplicity of using, scalability and reliability, and also data storage support.

Database of this system has to be designed in such way that it is not adapted only for one specific type of products. That is why proposed system can be used in any manufacturing company, no matter which type of products this company produces. It provides flexibility and universality of this system.

Data processing will be realized by means of programming envelope Delphi 7 (Object Pascal). The main reason for choosing Delphi is that it has excellent tools for work with local and remote databases. Delphi provides ability to create and

support local and client-server applications, and also development of applications for work with any type of database management systems.

Development of the proposed software system will help to manage and control production, simplify processes of product regarding and management on enterprises, and also will be able to work with all kinds of products. Therefore, we can make a conclusion that, this problem solution will make work of production companies easier.

### **References**

1. Екологічний аудит виробництва і території: Навч. посіб. / Г. М. Єлізаренко, І. В. Недін, Р. В. Синявський та ін.; За ред. І. В. Недіна. – К.: ІВЦ «Видавництво «Політехніка»», 2002. – 296 с.

## **THE REVIEW OF SOFTWARE FOR ECOLOGICAL AND ECONOMICAL ANALYSE OF ECONOMIC ACTIVITY**

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Basic works of governmental politic of Ukraine in the environment sphere, utilization of the nature resources and guaranteeing the ecological safety were worked out accordingly to the item 16 in the Constitution of Ukraine, which determinate, that guaranteeing the ecological safety and maintenance of ecological balance on the territory of Ukraine, overcoming the Chernobyl catastrophe results- the world scale catastrophe, conservation of Ukrainian genophode is the governmental responsibility.

Contemporaneous (modern) approach to raise ecological safety of economic activity has to be based on the operative recourses management methods with using the information technologies. Complex number and using the information allow to create necessary analysis data base, forecasting and planning economical and ecological activity of enterprise, raise the basing of the creating strategies, gives the ability for modern correction of plans and budget of the enterprise.

Nowadays utilization of the information leads to cutting down the expenses and raise the production quality and effectiveness. For example, the valuation inculcation allow to cut down the expenses for the projects – from 10 to 30%; to short the time for introduction new products in the market – from 25 to 75%; to cut down the expenses for preparing technical documents – to 40%.

According to the technology they can be divided to: program packages for statistic data processing, program packages for economical analysis, program

packages for formalistic primary information which is need for further leading ecological and economical evaluation and analysis managing the enterprise (table 1).

Choosing the statistic package for data analysis and taking the necessary calculation deepens from the problems character, size of the data, which are processed, necessary equipment and user qualification.

Most of the statistic analysis can be very effective in solving with using the program processing the electronic spreadsheet Microsoft Excel. Specter of the possible statistic functions of the latest MS Excel almost don't give up the specialize programs of statistic data processing (more than 70 functions).

**Table 1 – Functional possibility program products for analysis of economic activity**

Type of the program product	Newest specimens of program product	Program product possibilities
Program packages for statistic data processing	BMDP, STATGRAPHICS, SAS, SPSS, E.Views, RATS, MikroTSP, Minitab, STADIA, SYSTAT, MEZOZAVR, EBPICTA	Business graphic; parametrical tests; non parametrical tests ; categorical analysis; dispersive analysis; regressive analysis ; time line analysis ; multivariate methods
Program packages of economical analysis	ATM Technologies, BS Integrator, IBM Informix, FinExpert, Symantec, Antaris	Complex system of managing the enterprise; business-attachments for financial automation the enterprise, staff management; financial and governmental program products.
Program packages in ecological tendency	«Ecol-Gas», “Tandem”, “Inventarisat ion”, “NEORIST”, “NO RMA6XML”, “EOL”	Program calculation of atmosphere pollution; Calculation of gross ejections pollution substances from unorganized sources atmosphere pollution etc.

But we must to admit, that the main component of ecological and economical analysis is a complex valuation of condition and effectiveness of natural using and securing of the environment in a different economical sectors and on the all levels – from the exact enterprise to the separate regions and the all country in common, including utilization the exact nature resources an ecological interindustry base. Today in Ukraine were exploit not so many program



resources, which helps to process information necessary for ecological and economical analysis of economic activity. In this situation there is a necessities for exploit a specialized program needs ecological and economical valuation and analysis of economic activity.

### **References**

1. Shehovceva L.S. Methodology design for strategy of development suburb region of the country in conditions OEZ: Interhigh school. Scient. b./Kaliningrad university //Revision with professor Ivchenko V.V. - Kaliningrad, 2000. pages 20-32.

## **THREATS TO INFORMATION SECURITY OF THE ENTERPRISE**

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Inalienable part of the new economy is information technologies (IT) introduction and application in the all spheres of human activity.

The permanent improvement of present information-communication technologies (ICT) and their application expansion are the part of strategic decisions and operative tasks for enterprises. But every decision-making about the ICT improvement necessity runs into questions about the necessary and sufficient level of improvement, about the financing of this level, about IT-decisions optimization and co-ordination, about defense facilities application of enterprise information base, about necessary and sufficient level of the information safety system expenses. Thus, every company faced such problems as: information safety threats estimation, sooner or later, determination of ICT optimization directions and information system efficiency increasing.

For the picture of possible harm which is inflicted normal activity of the unguarded information system of enterprise, let's consider every threat factor and possible losses which it brings an enterprise. In the general view of threat reliability appear under the action of two kinds of factors: Hardware-factor and human factor.

*Hardware-factor.* Factor is related to the equipment malfunction. Some time is expended on the error removal: for diagnostics of derangement, block replacement or repairing, new block options and tuning, renewal of user data and settings. I.e. expenses on capacity renewal present the payment for this time and cost of necessary repairing parts.

In respect of human factor, its influence can be related to the intentional and unintentional harm.

*Unintentional harm.* This factor is related to human influence on the automated system, which can inflict harm an enterprise. Wrong use, non-

fulfillment of equipment exploitation rules, employees incompetence, and also other actions, which negatively influence the work of ICT, can result in the temporal incapacity of the enterprise information system. The removal expenses will be required on failure diagnostics, information base renewal, if it is necessary, and employee teaching for prevention of failure reiteration.

The intentional harm is divided by a few types of information safety threats:

1. *Piracy*. This factor threatens only to those enterprises which activity is connected with the software production and sale, as an independent product, or as inalienable part of the product (for example, the device control program). Inflicted loss will be expressed in the lost profit from the unrealized units of production. Basic estimation complication of loss consists of determining the amount of the unsold copies.

2. *Virus danger*. Viruses can violate work of the separate programs, destroy user files or databases, change or delete system files that will result in the loss of the system capacity and the separate types of viruses can put an equipment out of action. There are not the anti-virus systems, capable on 100% to protect a computer. In the case of defeat, harm can be different – from facetious reports, appearing on the screen of monitor, to the physical damage of equipment because of the devices parameters changing. Also viruses create a threat confidentiality of information on occasion, getting access to the files stored on a computer.

In the case of defeat the virus of the information system of enterprise, it is necessary to expend time on a search and delete the virus, renewal the information, software and operating system. At the first case of defeat it is necessary to study the virus action for the analysis of all the possible consequences of virus defeat or threats. It is also necessary to expend time on diagnostics and treatment other computers of enterprise intranet, as a virus could spread on them.

3. *Spam*. This factor is related to undesirable, publicity or carrying knavish character distribution on information channels. More frequent than all it touches an e-mail. Electronic addresses, indicated in advertising of enterprise, and also addresses which are actively used for a long time, are especially subject to the problem of spam. The use of antispam-filters does not decide a problem completely, and often results in the useful correspondence loss. Thus, it is necessary to expend time for filtration of mail.

Harm from a spam consists of time, expended an employee (if handling of incoming mail is included in their duties) on spam-letters viewing and deleting. The change of electronic address can be required on some cases that will bear additional expenses. Also a spam strengthens a virus danger, as considerable part of spam-letters contains viruses. For more exact estimation of this factor it is necessary to conduct additional research including questioning of employees for determination, whether there is a problem of spam on an enterprise or not, how many employees does it affect and what harm inflicts. It will demand additional temporal expenses, which must be counted for the efficiency estimation of the ICT-using on the enterprise, actively using electronic channels (for example, e-

mail) for data transfer and communication.

4. Espionage. This factor is bound by the possible information loss and by its subsequent use, which can result in unfavorable and unforeseeable consequences for the enterprise. Therefore while strategy development of the information system defense it is necessary to foresee expenses on setting of individual passwords for entrance and database access for every employee, control systems for actions and changes in the information base of enterprise etc.

Enterprises must spare enough attention for all aspects of the ICT-use, in order to know about the threats information safety in time. Insufficient attention to this problem often creates barriers for the effective development of the whole business and information infrastructure work in particular.

## **OPTIMIZATION OF THE ENTERPRISE INNOVATIVE STRATEGY**

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Development of enterprise, foremost, depends on present resources and changeability, which means the current state, strategy of actions and ability to follow the chosen strategy. A term «potential» is widely used in a modern economic theory. Potential of the enterprise is understood as the complex of its resources and its ability to use them effectively. The grounded analysis of the enterprise potential forms basis for the strategic direction choosing of development and mortgage of its successful inheritance.

Term «potential» originates from the Latin word of *potentia*, that means some force, possibility. Potential is examined as an aggregate of facilities, terms, necessary to conduct, maintenance, save something. In economic science it means the aggregate of capital and proper organizational conditions for conducting, maintenance or achieving of certain enterprise activity efficiency.

**Innovative potential** is a complex of intellectual, material, technical, organizational, information resources of enterprises, which in the system are able to create, inculcate and diffuse innovations for the enterprise goal achievement (increasing of production efficiency, expansions of market share, protracted survival and sustainable development of enterprise at the market etc.).

Except inner enterprise possibilities, the type of the chosen innovative project considerably influences the efficiency of innovative measures. Passing to the choice of projects, it is needed to remember about investment practice, where some researches show that profit on 94 % depends on the choice of investment instrument type (shares, bills of exchange, bonds, and other), on 4 % - on the concrete security choice of this kind, and only on 2 % - on the estimation of securities purchasing moment.

Coming back to the enterprise innovative projects, it is possible to compare them to the types of investment activity:

1. The most risky and profitable – organizational changes (shares).
2. With the middle level of risk and profitability – technological innovations (credits).
3. The least risky and profitable – product innovations (bonds).

It is expedient to divide innovations by 3 groups for choosing the optimum innovative strategy. Innovation from the various groups differs a few descriptions: scope, profitability, risk level, cost.

In the Information Economy, winning competitive activity is possible only if the company is constantly realizing innovations. It must provide the regular internal and external information updating of enterprise products and services, as eventual result of its activity which is interesting for its consumer.

Under information updating we understand information changing about consumer properties of product. This change can be not supported by its physical essence changing. So, for example, the producers of food and consumer goods change original appearance of commodity every a few years (it is ordinary from 1 to 3 years): packing of chocolate sticks, form and label of sauce jar, original appearance of shampoo packing etc. Thus these changes are quite unnecessarily supported the changes of physical properties of commodity, and called to satisfy the only one necessity of buyer – their interest to the novelties.

And certainly, any product or technological innovation necessarily appears as additional advantage of the product, it is one of the ingredients replacement by «more useful» and «ecologically clean», or replacement of out-of-date production equipment by modern, that makes the product cheaper, high-quality, ecologically clean.

If an enterprise is not renewed the products assortment, its consumers early or late will lose interest to them. I.e. the products of enterprise will appear uncompetitive comparing to others, the sales volume will go down, and consequently its market share will do the same, that will result in the company loss of its market positions. Thus, it is possible to talk that an enterprise also will appear uncompetitive comparing to other market subjects.

Income maximization in a long-term prospect is one of base aims of enterprise activity, which must be taken into account when its development strategy is chosen. So, innovative strategy must provide optimum correlation of indexes of profitability, risk and cost of the measures carried out. For the estimation and choosing innovative projects the enterprise can use the indexes of net present value, payback period, internal ratio of revenues and other, which are widely applied in an investment analysis But for the innovative activity specific, it is necessary to take into account also such factors as:

- 1) what is the technological mode of the innovation project inculcated;
- 2) what degree of newness is the mastered innovation characterized by (new for an enterprise, for a market, for industry, for a country, for the world).

It is necessary to give preference to the innovative project, which is related to the latest technological mode and has the most degree of newness while other characteristics are equal.

Enterprises which regularly conduct the objective estimation of their innovative potential and choose innovative projects conformably in order to optimize the innovative development strategy, as a result will be able to take the leading places in a global competition of the Information Economy.

## **THE ANALYSIS OF UKRAINIAN STATE BUDGET CHARGES ON ECOLOGY**

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Maintenance of ecological safety on the territory of Ukraine and overcoming of Chernobyl catastrophe consequences is a constitutional duty of our government. The central body of executive power which provides implementation of this duty is the Ministry of Natural Environment Protection (MNEP) of Ukraine. That is the MNEP who must provide realization of public policy in the field of environmental protection, rational use and reproduction of natural resources, handling wastes and hazardous chemical substances. MNEP must provide the development of the reserved territories and forming, maintenance and use of ecological network.

In June, 1992 Ukraine has signed “Agenda for XXI Century” as the result of the UNO conference dedicated to environment protection. Doing that Ukraine was obliged to support high quality of environment for the people. Ukraine took a course on sustainable development. Sustainable development means the process of changes where using resources, direction of investments, orientation of scientific and technical development are co-ordinated with each other. From the ecological point of view, sustainable development must provide integrity of the biological and physical natural systems.

Taking into account the analysis made by Mykhaylo Zgurovskyy in 2006 Ukraine occupies a very bad place by the Index of Sustainable Development (see Table 1).

Nowadays in our country a little attention is paid on environmental protection in comparison with highly developed countries (see Table 2).

Since 1992 according to the law of Ukraine “About the Environmental Protection” the system of funds operates on the state and local levels. These funds are formed out of:

1. Payments for environmental pollution;
2. Voluntarily payments of enterprises, establishments, organizations or citizens (charity);

3. Monetary penalties for infringement of environmental protection legislation as a result of economic or other activity.

Thus, the policy is not effective. In fact nowadays in Ukraine allocation of state charges on ecology goes on the residual principle.

**Table 1 - Index of Sustainable Development and its components**

Rating	Country	GDP per capita by the parity of purchasing capacity (thous. \$ USA)	Index of Sustainable Development	Index of the Economic Dimension	Index of the Ecological Dimension	Index of the Social and Institutional Dimension
1	Finland	29,650	0,786	0,567	0,751	0,802
2	Iceland	33,560	0,778	0,561	0,708	0,839
3	Sweden	30,590	0,776	0,537	0,717	0,839
4	Norway	39,590	0,753	0,488	0,734	0,829
5	Switzerland	33,580	0,735	0,537	0,637	0,820
6	Luxemburg	54,690	0,735	0,557	0,618	0,815
7	Denmark	32,490	0,729	0,563	0,582	0,828
8	Canada	34,150	0,719	0,525	0,644	0,777
9	Ireland	36,790	0,716	0,559	0,592	0,779
10	Australia	31,010	0,714	0,532	0,610	0,791
Average value for 10 leaders			0,744	0,542	0,659	0,811
88	Ukraine	6,500	0,508	0,319	0,477	0,554

**Table 2 - Charges of state budgets on ecology**

Year	Ukraine	Finland	Sweden	Denmark	Norway
1998	0,29	1,93	1,7	0,6	1
1999	0,15	1,89	-	-	0,9
2000	1,71	1,88	-	-	0,9
2001	2,29	1,74	2,3	0,64	-
2002	1,09	1,76	-	0,45	0,6
2003	0,8	1,79	0,47	0,46	-
2004	0,3	1,82	0,51	-	-
2005	0,17	1,82	-	-	-

Only after realizing the importance of environmental protection and health of the nation, the government will be able to distribute the charges correctly and rationally and to pay proper attention to the ecology expenses.

According to the concept of sustainable development Economics alone can't increase the level of well-being of the nation and the quality of life. Ecological problems which result in decreasing of health of the nation and future generations are to be taken into account.

## **STRUCTURAL CHANGES IN ENERGY AS A FACTOR OF PROVIDING ECOLOGICAL SAFETY**

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Present ecological situation in Ukraine can be described as critical, formed during a long period of time by ignoring the objective laws of development and reproducing of natural-resource complex of Ukraine. In Decision of Supreme Council of Ukraine «About basic directions of public policy of Ukraine in branch of guarding environment, use of natural resources and providing of ecological safety» [1], among main reasons which resulted in the unsatisfactory state of environment, are marked the unfavorable pattern of industrial production with a high concentration of ecologically dangerous productions and absence of the proper nature protection systems, low level of exploitation of existing nature protection objects. Also according to Conception of national ecological policy of Ukraine on a period to 2020 year (further Conception) [2], among the basic tasks of national ecological policy is ecologization of industry, which foresees introduction of ecologically effective methods of production organization, principles of corporate social responsibility, more clean production, with the purpose of diminishing of volumes of the troop landings and upcasts of minimization of formation of wastes and complex use of raw material resources, including secondary.

Energy is one of the major elements of the economic system of the state, but at the same time is one of the most active elements of contamination of environment. Within the framework of task of ecologization of energy, Conception foresees the necessity to increase the energy efficiency of production, development of alternative energy, minimization of the negative influence on an environment and introduction of modern technologies and innovative projects. One of priority directions of minimization of accumulation of industrial wastes is returning them in a production with the purpose of exception of valuable components and use of them as the secondary resources. Source of such wastes can be wastes of coal-

cleaning in a fuel and energy complex. According to Conception it follows to examine the problem of wastes within the framework of the unique fitting to socially ecological and resource-technological aspects which aggregate three components (problem aspects):

- resource (development of second resource usage);
- ecological (achievement of ecological safety);
- methodological and organizational (scientifically methodical, analytical, legal providing of decision and adjusting).

Wastes can replace primary resource sources, thus diminishing common resource usage. Therefore the block of aims of resource aspect foresees the economic ground of directions and ways of utilization of wastes and creation of closed-circuit resource systems of territorial-production connections on the basis of interindustry co-operation, cascade planning of production.

The purpose of resource and ecological aspects of problem is creation ecologically safe, resource saving, low-waste and nonwaste productions and territorial-production complexes of different levels ( industrial area, city, district and others), where wastes of one productions fully or partly will be raw material for other, that cascade chart of production. The decision of problem of wastes must be examined from positions of the so-called industrial metabolism, according to which an economy, pattern of production and consumption and also quality of life is a unique system and respectively unique socio-economic problem.

One of possible ways of decision of this question is creation of vertically or horizontally integrated fuel and energy associations (IFEA) with including of enterprises-utilizers.

In the case of including the enterprises-utilizers to the IFEA, which are oriented to power utilization of industrial wastes, it is possible to decide several tasks:

- bringing in to fuel and energy balance of territory an additional fuel and energy resource such as synthesis gas [3];
- diminishing of external charges of ecological origin due to unloading of territory from ecologically dangerous hard industrial wastes;
- diminishing the cost of basic product of IFEA due to the usage of cheap synthesis gas;
- an increase of profitability of enterprises-utilizers due to the advantages of working in association;
- diminishing of the anthropogenic pressure on a natural environment.

Therefore the exit from an ecological crisis for industrial complex must be carried out by development and implementation of the program of structural and technological alteration of industry, first of all in power industry, and programs introducing the high-efficient systems of cleaning and decision a problem of redoing industrial wastes.



## **References**

1. Decision of Supreme Council of Ukraine «About basic directions of public policy of Ukraine in branch of guarding of environment, use of natural resources and providing of ecological safety» // List of Verkhovna Rada of Ukraine, from 13.10.1998
2. Conception of national ecological policy of Ukraine on a period to 2020 //Official announcer of Ukraine from 29.10.2007 <sup>1</sup> 79, ñîð.170
3. Korpan r.V., Kotsko t.A. Integration of enterprises of fuel and energy complex as factor of increasing their ecological and economical efficiency// The Scientific news of NTUU “KPI”. - 2004. -# 4. – p. 5-13.

## **RENEWABLE ENERGY SOURCES**

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Integration of renewable energy sources involves integrating in a system any energy resource that naturally regenerates over a short period of time. This time scale is derived directly from the sun (such as for thermal, photochemical, and photoelectric energy), indirectly from the sun (such as for wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of environment (such as for geothermal and tidal energy). A renewable energy source cannot run out and causes so little damage to the environment that its use does not need to be restricted.

Today, the world’s energy supply is based largely on fossil fuels and nuclear power. These sources of energy will not last forever and have proved to be a major cause of environmental problems. In less than three centuries since the industrial revolution, humankind has burned away roughly half of the fossil fuels accumulated under Earth’s surface during hundreds of millions years. Now as fossil fuels become more expensive and less abundant, and concerning increase of the dangerous influence of their products, alternative sources are more attractive.

The technology for diversified energy has long been available, but the rising costs and decreasing supplies of fossil fuels and concerns about man's role in climate change, environmental degradation have made renewable sources of energy more economically and ecologically viable.

Reducing dependence on fossil fuels can not only significantly stem the global climate distress, it will also act as an agent of recovery for an ailing global economy. Rebuilding the global energy system has the potential to create thousands of new businesses and millions of new jobs, starting immediately.

Adoption of alternative energy technologies requires several key steps: the accelerated deployment of solar, wind, and biomass power plants; integrating

variable power sources with digital smart grids that are more flexible in their ability to balance demand and supply; developing the capacity to store energy economically; and selectively adding a new generation of efficient micro power plants that provide heat as well as reliable electricity when it is needed.

Hydropower is one of most established true renewable energy source. This is the utilization of the potential energy caused by a height different in two levels of electricity. Originally this was used in old fashioned water mills, however in the first half of the 20th century more modern devices using turbines to generate electricity were used.

Wind power depends on utilizing the wind to generate electricity or carry out some other activity, such as pumping water. As with many other natural energy sources it has a history going back quite centuries. Windmills were used to help grind corn, and wind power was used to pump water. In many areas of the world wind power is now able to compete with all other forms of generation even without any form of government assistance, and so this is at present the renewable energy source which is adding most capacity each year.

Solar electric relies on the power of the sun to generate “clean” electricity through a variety of mediums. There are a series of ways of converting a solar energy resource into electricity including photovoltaics, solar chimneys and concentrated solar power.

Biomass, generally in the form of wood and charcoal for heating, was used as the major primary source for the vast majority of human history. However, in the 19th and 20th centuries fossil fuels generally started to take over so that in most developed countries biomass became a contributor to the total energy mix. There has recently been increased interest in biomass as an energy source in the more developed countries for environmental reasons.

Tidal energy is a renewable energy source which utilizes the power of the tides. Tides are caused by the gravitational pull of the moon, and to a lesser extent the sun upon the earth's oceans. The tidal motions follow a cyclical pattern, and so unlike other forms of renewable energy such as wind and waves it is possible to predict with great accuracy the power output of a tidal energy device well in advance of it being placed within the water, which is a great bonus.

Ocean thermal energy conversion for short is a theoretical way of getting renewable energy out of the sea, by taking advantage of the temperature difference between surface seawater and deep seawater.

Geothermal are renewable energy sources which utilize the heat within the earth to create either a source of renewable heat or renewable electricity.

It is possible to get renewable energy from the waves, using a series of devices. Up until recently these devices were still at the prototype stage, but recently the first commercial wave energy devices have been deployed to usher in a new type of renewable energy technology. Most wave energy devices are used to generate renewable electricity, but there have been plans to use the energy to pump water.

The immediate challenge for the world's governments is to maintain the extraordinary momentum of the past few years in the face of a financial crisis that has affected all forms of energy investment. The new industries, which are dominated by small, under-capitalized companies, are particularly vulnerable. Their success will depend on targeted and flexible policy design in the future.

### ***References***

1. EREC (Integration of Renewable Energy Sources), Workshop on Renewable Energy Market Development Status and Prospects, April-May 2004.
2. F. A. Farret, M. Gody Simoes, Integration of alternative sources of energy, IEEE press, pp. 1-27, 2006

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