

Mechanisms for implementation of the environmental policy in Ukraine

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Abstract. The ways and problems of transition from the practice of conservation measures for environmental policy in Ukraine. Based on the analysis the strategic priorities of public policy and economic mechanisms for its implementation.

Keywords: environmental policy, environmental measures

Introduction

The process of Ukraine's transition from implementation of environmental measures to ecological policy is underway. The most notable latest steps in this way include adoption in December 2010 of the Law of Ukraine On Fundamental principles (strategy of the state ecological policy of Ukraine for the period until 2020“, and on May 20, 2011 – National action plan for environmental protection of Ukraine for the period from 2011 till 2015 with the amount of financing reaching UAH 4,2 billion.

There comes up a question of where to allocate the people's money – to fill the gaps produced by environmentally abusive activity of the old enterprises, or invest in the green industries?

The following sectors and trends remain a priority:

- transport (it is recommended to apply economic instruments of ecological policy more extensively);
- Agriculture (it is recommended to encourage farmers to apply environmentally friendly technologies);
- energy (subsidies still remain one of the major problems);
- management and environmental control of chemicals;
- water resources (especially regarding their contamination with heavy metals and chemicals)
- soils which keep degrading;
- preservation of biological and landscape diversity.

The concept of the national policy is based on the principles of:

- equality of three components of state development (economic, ecological and social) which drives focusing on the priorities of sustainable development, factoring-in of ecological consequences when making economic decisions;
- ecological responsibility which calls for introduction of liability for any violation of the laws on environmental protection;
- prevention which involves risk analysis and forecast based on the findings of state ecologic expertise, as well as state monitoring of the environment;
- integration of environmental issues and rational use of natural resources (environmental goals) in the sectoral policy at the same level with economic and social goals;
- “contaminator and user pay full price” which involves introduction for the contaminator of stimuli regarding reduction of negative impact on the environment and user's full responsibility for the condition of natural resources provided him for use, and

reduction of impact from his activity (absence of activity) in respect of condition of the environment;

- intersectoral partnership and involvement in policy implementation of all parties concerned, which underlines, that only mutual solving of acute problems may ensure successful implementation of environmental policy.

Therefore it is necessary to ensure implementation of geoeconomic advantages of Ukraine, the major one of which is the availability of the rich natural and resource potential. Only due to rational use thereof one can expect GDP growth. It is sustained by significant reserve: the scope of influx of resources is pitiful while the load on environment in Ukraine is 4-5 times higher than the same indicators in other countries. And in terms of degradation and contamination of the environment Ukraine is one of the leaders in the ex-USSR territory. With the specific weight of the country's territory of 2,7%, the emission of hazardous substances in the atmosphere reached 18%; waste water dumping in the surface reservoirs – 12%; annual waste stockpiling – 19% of the all-USSR data.

Studying of key figures of waste production and management has shown that the country reduced the volume of produced waste more than twice as compared to 1995. Similarly reduces the volume of disposed (processed) waste. Over the abovementioned period the volume of waste moved to the specially designated places and facilities was reduced. The volume of waste moved to the places of unorganized storage is insignificant. Presence at the yearend in the specially designated waste disposal locations and in the territories of enterprises is ore than twice exceeding the 1995 performance and has been tending to decrease since 2000.

Table 1. Key Performance of Waste Production and Handling, thousand tons [1]

Indices	1995	2000	2005	2007	2008	2009	2010	
							1-4 hazard class	1-3 hazard class
Produced	3562.9	2613.2	2411.8	2585.2	2301.2	1230.3	419191.8	1659.8
Received from third parties	28.1	56.4	172.3	129.9	204.6	64.9	30019.2	259.6
Including from other countries	-	-	6.3	1.3	1.5	0.5	4.1	0
Disposed (processed)	1915.7	13762	863.4	10312	918.9	825.9	145710.7	642.4
Burned	-	-	71.4	39.6	32.2	15.8	1058.6	16.5
Including in order to produce energy	-	-	-	-	-	-	840.3	6.2
Moved to specially designated locations and facilities	1232.3	760.6	948.5	990.6	1066.3	333.2	336955.1	306.3
Given out to third parties	973.9	646.2	2382	1329.3	648.4	557.6	42104.2	1011.8
Including to other countries	-	-	32.3	20	5.9	4.1	281.3	26.6
Removed from the unorganized storage	2484	13.2	1.8	1.4	4.8	0.8	860.9	0.4
Waste removed for other reasons including specification of hazard class	-	-	6273.5	476.5	169	23.9	1768	5203
Including as a result of leakage, evaporation, fire and theft	-	-	106.6	24.2	0.5	0.5	1367.6	188.2
Presence at the yearend in the specially designated waste disposal locations and in the territories of enterprises	54841	26244	21674	21132	210172	20852.3	13267455	20587.8

Tons per 1 m2 of the country's territory	90.9	43.5	35.9	33.4	34.8	34.6	21984.2	34.1
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Green Economy

Green policy becomes the major mechanism for implementation of the environmental policy. According to the development plan for Ukraine till 2020 energy efficiency must increase 50% to the level of 2010 due to introduction of resource saving in the energy sector and in the industries which consume energy and energy carriers. According to the plan, the use of renewable and alternative energy sources will increase 55% as compare to 2010. Increase up to 7% the share of lands used in organic agriculture (as compared to 2010).

As defined by United Nations Environmental Programme, green economy is the economy with low emission of carbon compound which efficiently uses resources and meets the interests of the society.

The goal of the green growth policy:

- creation of higher value with less damages for the environment;
- conditions for innovations and investments capable of engaging new economic growth sources.

Green growth policy involves [2]:

- eco-tax reform (real assessment of natural capital);
- development of environmentally efficient infrastructure;
- “greening” of the industry;
- formation of sustainable consumption.

Green industry – a sectoral strategy of green economy implementation involves:

- implementation of the resource efficient and clean production technologies;
- higher energy efficiency, development of renewable energy sources, introduction of energy standards (50001);
- creation of favorable regulative environment for green business;
- investing in research, development and introduction of new industries, infrastructure renewal;
- facilitation of ecological innovations;
- improvement of production process and business organization in order to spare material resources (non-technological innovations);
- commercialization and entering the clean technology markets (technological);
- development of the services sector for green economy.

“Green” growth means introduction of measures for stimulation of economic growth and development provided that natural assets keep providing resources and environmental services on which our welfare depends. Therefore, green growth must become the activator of investments and innovations which will form the basis of sustainable growth and lead to formation of new economic opportunities.

Green economy as the mechanism of environmental policy for realization of sustainable development principles can be implemented in several patterns:

1) Inexhaustible resource pattern:

- renewable energy resources;
- material recycling;
- organic agriculture which consumers minimum energy, does not apply artificial protection means or fertilizers, or GMOs.

2) Optimization pattern:

- energy efficiency of production and accommodation;
- using less vehicles;
- lower energy value of food;
- lower water consumption rate;
- recovery of forests and conservation areas.

3) Social pattern:

- family planning and bringing of birth rate to the reproduction level;
- principle of equality in distribution of limited resources;
- addressing the matters of land distribution and land utilization planning;
- introduction of new agricultural technologies;
- financial regulation system which guarantees satisfaction of basic needs of the majority of people.

4) Managerial pattern:

- change of the indicator of countries' welfare and success: GDP must be complemented with the indicators of natural services and preservation of biodiversity;
- imposition of tax on carbon gas at import of products;
- global security system interfering in the affairs of the "failed states";
- investments in the institutionalism, optimization of the administration and decision making system.

Green economy is efficient for the development of agricultural tourism for which there are internal resources and investment opportunities in Ukraine.

Agricultural lands used during twenty years in violation of crop rotation and chemical adding requirements with intensive agricultural production on the industrial economy principles. This mode requires huge investments, while the alternative way of green economy calls for conditions for the development of small and medium organic agricultural production.

Organic agriculture is a production system which supports the health of soils, ecosystems and people. It depends on ecological processes, biological diversity and natural cycles typical for local conditions. It does not use hazardous resources causing ill effects. Organic agriculture combines traditions, innovations and science in order to improve the environment and support fair relations and decent living standards with due regard for the abovementioned.

Certainly, renewable or sustainable energy sector will not replace five nuclear power plants in the near future. The alternative is to develop local green energy which enables satisfaction of needs of the "non-industrial" economy in the agriculture, green tourism in natural reserves and other spheres of green economy at the expense of own renewable energy sources.

Mastering of unconventional and renewable energy sources must be regarded as an important factor of increase in the energy security level and reduction of anthropogenic effect of the energy sector on the environment. Massive use of the unconventional and renewable energy sources in Ukraine is not only is internal but also of international significance as a weighty argument of countering the global climate changes, improvement of the energy security in Europe as a whole. Therefore the ways and lines of strategic development of unconventional and renewable energy source in the country must facilitate joint efforts of the European community in the energy sphere and correspond to the

fundamental principles of the Green Book (European Strategy for sustainable, competitive and safe energy”.

In 2010, the number of produced waste per 1000 hryvnya of GDP was 3,6 kg., which is almost three times less than in 1995, and 58% less than in 2000. But note that despite positive dynamics, the level of waste produced is yet insignificant.

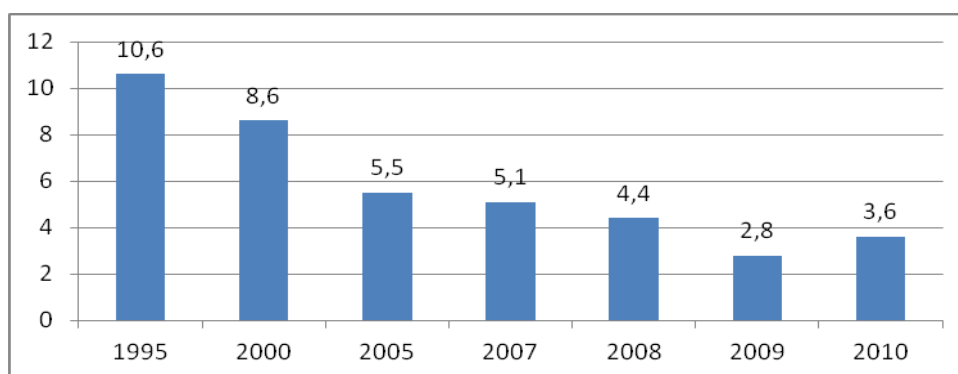


Fig. 1. Waste produced per GDP item, kg/1000 hryvnya [1]

Low level of the economy’s environmental component in Ukraine is confirmed by the respective rating of international institutes. Thus, in 2001, in the meaning of ecological sustainability index which aggregates 22 complex indicators by 67 parameters, which make it possible to evaluate the progress of countries on their way to environmentally safe development, Ukraine ranked 110 among 122 countries; in 2002 it ranked 137 among 142 states, and in 2009 – 85 among 182.

Major components of environmental policy in Ukraine include:

- the efficient system of state administration in the sphere of protection, rational use and recovery of natural resources, which calls for engagement of the public;
- state and public monitoring of compliance with the existing environmental protection laws and international commitments of the country;
- information policy in the sphere of ecology;
- ecological examination of technogenic hazardous projects;
- education and awareness raising in the sphere of ecology.

According to the political decisions and legal acts, stabilization of ecological situation and lower growth rate of anthropogenic impact on the environment are expected by 2015. By that time conditions must be created for higher environmental safety level of the population and public activity in the sphere of environmental protection. It is planned to initiate by 2015 the transition to the nature protection standards of the EU and adopt the respective legislative base.

For the period until 2020 emissions in the atmosphere should be significantly reduced, as well as discharges into the water. The plan for reduction by 2020 of emissions and discharges to the 2010 level provides for cutting of emissions and discharges from stationary pollution sources by 25%, setting of normative for pollutant content in the used gas of moving sources Euro-5.

There is also a plan to increase 20 % the level of use of the energy sources with low CO² emission. First of all, in 2020 the level of organic water pollution with nitrogen and phosphor compounds will be reduced 15 % together with 20% reduction of discharge of untreated waste water.

Besides, for the period until 2020 it is planned to increase 17% the area of forestation and reclaim the lands in the area of at least 4,3 thousand hectares. The volumes of production, disposal and use of waste as recycling material must increase 1,5 times, while volumes of biologically degradable household waste storage should be reduced 15 %.

As compared to 1995, presence of waste at waste disposal locations and in the territories of enterprises at the yearend sorted by classes 1,2 and 3 reduced significantly and keeps declining. The biggest share in this group belongs to the 3rd hazard class waste (89% in 2010). The hazard class of waste is set depending on the content of highly toxic substances by the method of calculation or in accordance with the list of waste in the State waste classifier. All waste types receive technical passport in accordance with Interstate standard DSTU-2195-93 which applies to 10 CIS countries. The waste is divided into the following classes:

- *First* — extremely hazardous;
- *Second* — highly hazardous;
- *Third* — medium hazard;
- *Fourth* — low hazard.

The 2010 statistical data demonstrate already the 4th class waste.

Table 2. Availability of Waste in Managed Dump-Sites and on the Territory of Enterprises by Hazard Classes, at the end of the year, thousand tons [1]

Waste	1995	2000	2005	2007	2008	2009	2010
Total	54841	26244	21674	20132	21017	20852.3	20587.8
Including:							
1 hazard class	28.9	149.1	386	36.2	34.7	35.5	25.8
2 hazard class	16499	1685.2	1846.9	2108.7	2164.8	2289.5	2270.7
3 hazard class	38313	24410	19789	17986	18817	18527.3	18291.3

Increasingly more waste is produced by the country's enterprises. It should be noted however, that the volume of extremely hazardous waste has significantly reduced. Thus, y 2010 five thousand tons of 1st hazard class waste have been produces, which is almost 5 times less than in 1995, 2,8 times less than in 2000 and 2 time less than in 2008.

The volume of 2nd hazard class waste in 2010 was 506.5 thousand tons have been produced which is 3,5% less than in 1995 but 2,9 times more than in 2000.

The volume of 3rd hazard class waste in 2010 was 1148,3 thousand tons, which is 2,6 times less than in 1995 and almost 2 times less than in 2000.

Table 3. Production of Waste at the Enterprises of the Country by Hazard Classes, thousand tons [1]

Hazard classes	1995	2000	2005	2007	2008	2009	2010
Total	3562.9	2613.2	2411.8	2585.2	2301.2	1230.3	419191.8
Including:							
1 hazard class	25.5	13.8	12.6	12.8	10.7	3.8	5
2 hazard class	524.7	176	3208	4307	367.2	299.1	506.5

Per one square kilometer of territory, tons	5.9	4.3	4	4.3	3.8	2	694.6	2.8
per capita, kg	69.2	53.1	51.2	55.6	49.7	26.7	9138.6	362

National environmental partnership is a practical method of organization of implementation and support of environmental policy which provides for involvement in the process of decisions of the interested civil circles; national and local governments; manufacturers and entrepreneurs; scientists and educators; public organizations prepared to undertake voluntarily the implementation of strategic solutions.

UN millennium declaration recognizes respect for nature as one of the fundamental values. Lack of immateriality, environmental culture is perhaps the most important factor holding back the transition to sustainable development and solving of most acute environmental problems.

Financial preconditions for realization of the environmental policy's strategy are:

- state budget of Ukraine – general fund (nature-oriented programs);
- state environmental protection foundation;
- agreement between the government of Ukraine and EU on funding of Program titled “Support of realization of the Strategy of national environmental policy of Ukraine. Agreement between the government of Ukraine and EU on financing of Program “Support of Implementation of the Strategy of National Environmental Policy of Ukraine” [4].

Costs which can be referred to the category of expenses on ecological policy in the 2011 budget were equal almost to three billion hryvnya, including:

- measures to create and preserve natural reserve fund, keeping of wildlife and flora inventories; Red Book – UAH 81565,0 thousand;
- overall management and administration in the sphere of ecology and natural resources – UAH 70513,1 thousand;
- management and administration in the sphere of environmental control – UAH 86383,9 thousand;
- comprehensive implementation of state ecological policy, taking of environmental protection measures – UAH 257115,6 thousand;

National action plan for environmental protection of Ukraine for the period of 2011 though 2015 provides for 4.2 billion hryvnya as financing for the plan.

Capital investments and current expenditures on environmental protection in 2010 amounted to UAH 13128 million. It is 4 times more than in 2000 and this showing tends to grow. The share of expenditures on environmental protection at the expense of the state budget in 2010 was only 8,7% in capital investments and 2,7% in current expenses.

Table 5. Capital investments in and current expenses on environmental protection [1]

Indices	1996	2000	2005	2006	2007	2008	2009	2010
Capital investments and current expenses, UAH million	2698.5	3224.3	7089.2	7366.6	9691	12176	11073.5	13128
Including:								
Capital investments	520.6	605.9	1775.6	2194.2	3080.7	3731.4	3040.7	2761.5
of which:								
Capital repair of environmental protection means	232	233.3	32.3	354.7	517	809.4	554.2	498

Current expenses	2177.9	2618.4	5313.6	5172.4	6610.3	8444.6	8032.8	10366.6
Index of environmental protection spending, % to previous year	-	119.5	18.4	103.9	131.6	125.6	90.9	118.6
Share of expenditures on environmental protection at the expense of state budget, %								
in capital investments	7.5	7.9	8.5	10.3	9.7	19	20.5	8.7
In current expenses	1.3	1.3	2.1	1.8	2.2	2.4	4.1	2.7

Every year, normative fees for environmental pollution will be increased by the consumer price index (inflation index) of the previous years, i.e., in line with inflation processes. Thus, the mechanism proposed by this program gives the payers of the fee an opportunity to adjust promptly its norms to the level of general price increase by way of annual indexing.

Higher revenues of environmental protection funds due to indexing of fees will facilitate implementation of urgent environmental protection measures and have positive impact on the ecological situation in the country. Analysts think that coping with negative environmental trends and gradual transition to the sustainable development model requires allocating of 2-3% of GDP to the protection and recovery of environment. This is, however, an average normative for the countries with huge GDP. For Ukraine whose territories are often referred to as the natural disaster zones the share must be significantly higher.

Industrial companies have started to elaborate and implement their own environmental policies. They focus on lower pollutant emission, reduction of waste volumes and energy and resource consumption. Voluntary environmental audit has become widespread.

International industrial organizations have elaborated voluntary codes of conduct regarding environmental protection and rational nature management.

Table 6. Environmental Payments, UAH million [1]

Type of payments	1996	2000	2005	2006	2007	2008	2009	2010
Charges imposed on organizations, enterprises, institutions for pollution of the environment	340.5	228.8	374.6	863.5	955.7	1065.3	1198.7	1361.2
Including:								
For emissions of contaminants by stationary sources into the atmospheric air;	264.9	12.8	189.3	453.5	501.5	563.1	634.6	716.8
For emissions of contaminants by mobile sources into the atmospheric air;	2.3	12.5	23.9	48.4	57.2	64	67.6	79.1
For discharge of contaminants directly into the water objects;	30.8	29.9	38.4	69.8	75	69.7	88	93.7
For waste placement	42.5	73.6	123	291.8	322	368.5	408.5	471.6
Lawsuits for damages caused to the nature, and penalties charged for violation of environmental protection laws	12.7	5.6	5.2	7.9	24.6	6.1	10.9	147.5
Share of actually paid environmental fees in the total amount charges, %	18.3	36.2	97.6	85.4	102.7	97.8	92.4	90.3

Economic instruments of environmental policy is a system of general and specific organizational and administrative, monetary, fiscal and other means and ways of administration in the sphere of environmental assessment and productive forces

placement, aimed at the efficient combination of stimulation and forcing in respect of observance of nature-oriented legislation and ensuring of country's ecological safety.

Strategic tasks regarding improvement of efficiency of the economic instruments of implementation of the national environmental policy in line with Law of Ukraine "On fundamental principles (strategy) of the state environmental policy of Ukraine for the period until 2020" of December 21, 2010 No.2818-VI) include [3]:

- improvement of economic performance of nature management as regulator of environmental activity of commodity producers and consumers, and more efficient implementation of the principle "the contaminator and the consumer pay full price";

- improvement of economic and financial mechanisms of ecological management to ensure encouragement of producers to introduce ecological management systems; application of environmentally safe and resource and energy preserving technologies, manufacturing of products which in the process of their lifecycle are minimally dangerous for the environment;

- introduction of stimulating and compensative nature management regulators;

- creation of the financial mechanism for the attraction of private capital in the environmental protection activity, creation of tax and loan conditions for its implementation;

- improvement of the regulatory legal base regarding state support for environmental protection activity including application of market mechanisms in this sphere;

- stronger influence of economic instruments of ecological regulation on the processes of improvement of national nature management system, state administration in the sphere of protection and stable reproduction of natural resources, and environmental enhancement.

Primary measures to improve viability of economic instruments in the sphere of environmental policy are:

- higher fees for special use of natural resources; for environmental pollution; amounts of damages caused to the state as a results of violation of environmental protection laws;

- improvement of the normative base of payment for the use of free goods based on the unbiased rental evaluation of resources and differentiation of respective payments by qualitative and dimensional signs, as well as mechanisms for regulation of rental income in the sphere of nature management; transformation of the system of payment rationing for environmental pollution; change of the procedure of environmental tax administrations providing for establishment of its rate in proportion to the volumes of pollutant emission subject to the principle of dependence on the average marginal spending of commodity producers on pollution reduction. Introduction of coefficient for the adjustment of the environmental tax amount depending on the expansion or weakening of the concentration of toxic substances in the taxable products (establishment of the progressive or regressive environmental taxation);

- reformation of the system of issuance of pollution permits; legislative determination of mandatory annual (automatic) indexing of payment rates for pollution adjusted for inflation, etc.;

- improvement of the normative and estimate base and the order of payment of tax on environmentally unsound product factoring-in the drawbacks and in accordance with the "contaminator pays" principle;

- reformation of the method of compensation for the damages caused and calculation of penalties according to their economic nature as a preventive instrument in respect of irrational nature management;

- enhancement of taxation base for pollutants and environmentally hazardous products considering the experience of EU/OECD member states;

- enabling of mechanisms of stimulation of economic entities to implements ecologically constructive measures. Introduction of the reduction factors for pollution payments for enterprises which take energy saving measures and implement existing environmentally safe technologies;

- introduction of target re-financing of raised funds for polluting commodity producers in order to support concrete ecological programs (legislative determination of targeting of environmental revenues);

- stepping up of formation of the system for stimulation of national and foreign investments in the environmental protection in the following manner: creation of the system of soft financing of commercial banks in case they provide preferential credits for implementation of the projects for development and introduction of high-tech equipment and other innovative products; enhancing the practice of preferential credits for environmental protection and technical-and technological measures charged upon property of economic entities, instrument of implementation of the national environmental policy in accordance with Law of Ukraine “On Fundamental Principles (strategy) of state environmental policy of Ukraine for the period until 2020” of December 21, 2010, No. 2818-VI)12.

Basic measures regarding transition to “green industry” must help enterprises in solving of commercial problems when entering the global market and consolidating their positions in it amid new ecological standards. Those standards require that enterprises change the end product and processes in order to meet the requirements of international consumers of those countries to which they wish to export their product. In other words, they must be able to:

- change the product so that it meets the existing ecological standards;

- rearrange the production processes in accordance with environmental friendly technological standards (technology and management);

- prove that the product and production processes meet the given standards.

Implementation by enterprises of the certified management systems will help significantly in meeting of the standards. It refers, in particular, to the cases when enterprises must meet the production standards. Thus, compliance with the general management system standard, e.g., ISO 14000 or (in future) ISO 26000, may be conditioned by the requirements of consumers. But management systems can also be extremely useful for bringing of the product quality in conformity with product standards, for example, ISO 9000.

One of the components of environmental policy is greening of the economy, regulated by requirement criteria of the European Union:

- ISO 14031 – assessment of ecological efficiency (performance) of the organization;

- ISO 14040 – assessment of the product’s lifecycle;

- ISO 14020 – eco-labeling and declarations;

- ISO 14051 – method of assessment of production system efficiency.

Enterprises were reluctant to implement ecological management and eco-labeling. Ukraine has 1630 which obtained quality management certificates of which only 55 included ecological management systems. ISO 14000 ecological certificates were issued only for 256 types of products of 27 producers.

Economic situation can improve due to implementation of innovations. The level of innovative development in the country directly influences the level of technical and technological condition of the enterprises. The innovative development level in the country is low. It is explained by lack of financing, motivation, poor innovation culture and acceptance by enterprises of innovative activity.

Thus, in 2010 as many as 1217 implemented innovations, which is 11,5% of the total number of industrial enterprises, and 18,4% less than in 2000, though more than in 2005 and 2009.

The number of enterprises which implemented new or improved methods of product processing or manufacturing grew gradually during the period of 2000 through 2010, and in 2010 was 25,5% higher than in 2000, including the number of enterprises which implemented low-waste, resource saving and non-waste technologies with their number reduced in 2010. Low-waste, resource saving and non-waste technologies form the basis of ecological development of the enterprises whereas they facilitate reduction of produced waste and saving of country's energy resources. In 2010, only 1,9% of all enterprises implemented such technologies.

Table 7. Number of industrial enterprises which implemented innovations [1]

Indices	2000		2005		2009		2010	
	Total	% of the total number of industrial enterprises	Total	% of the total number of industrial enterprises	Total	% of the total number of industrial enterprises	Total	% of the total number of industrial enterprises
Total	1492	14.8	810	8.2	1180	10.7	1217	11.5
Including:								
Implemented new or improved methods of product processing or manufacture	416	4.1	402	4.1	452	4.1	522	4.9
of which:								
Low-waste, resource saving and non-waste technologies	172	1.7	208	2.1	215	2	203	1.9
Mastered the production of innovative product types	1372	13.7	630	6.4	614	5.6	615	5.8
of which:								
new machinery types	202	2	156	1.6	188	1.7	194	1.8

The mere number of technological processes implemented is small, but the dynamics is positive: in 2010 they were 2043, which is 46% more than in 2000. In 2010,

the number of low-waste, resource saving and non-waste technologies amounted to 479, which is 11.4% more than in 2000. The overall rate of increase in the number of implemented new technological processes is lower than the growth rate of low-waste and resource saving technologies.

The specific gravity of realized innovative product in the volume of industrial product in 2010 was 3,8% vs. 6,8% in 2001. This is low ratio which tends to decline. An innovative enterprise is the enterprise whose share of innovative products amounts to 70%. Consequently, the level of innovation component in Ukrainian economy is low.

Table 8. Introduction of innovations at the industrial enterprises [1]

Years	Specific weight of enterprises which introduced innovations, %	New technological processes introduced	Including, low-waste and energy saving processes	Mastered innovative production, articles	Of them new machinery types	Specific weight of realized innovated products in the volume of industrial products, %
2000	14,8	1403	430	15323	631	-
2001	14,3	1421	469	19484	610	6.8
2002	14,6	1142	430	22847	520	7
2003	11,5	1482	606	7416	710	5.6
2004	10	1727	645	3978	769	5.8
2005	8,2	1808	690	3152	657	6.5
2006	10	1145	424	2408	786	6.7
2007	11,5	1419	634	2526	881	6.7
2008	10,8	1647	680	2446	758	5.9
2009	10,7	1893	753	2685	641	4.8
2010	11,5	2043	479	2408	663	3.8

Assessment of ecological efficiency is the instrument of economic policy which allows assessment of the level of environmental impact of the production system's lifecycle.

Major components of the natural capital are ecosystem services. For example, ecosystems render such services as: recreation opportunities; water regime regulation; carbon storage.

Biological diversity also forms a part of natural capital and provides such goods and services as food, tissue and fuel; designer inspiration; plant fertilization.

Genes (diversity and population) also belong to the natural capital. The examples of ecosystem services they render are resistance to illnesses; adaptability;

Environmentally friendly ways of production optimization include:

Definition of the new concept, opting for more environmentally friendly materials, optimization of production technologies, etc.

1) the new concept includes waste reduction, integration of functions and transition from the product to service.

2) the choice of more environmentally friendly materials is based on the use of less hazardous materials; recycled materials; biologically degradable materials and materials produced using less energy.

3) saving of materials is one of optimization ways realized through higher product output from a raw materials unit; change of composition and recipes, logistical improvements (transport and production).

4) optimization of production technology consists in reduction of the production process duration; lower waste volumes; lower rate of initial material use; higher energy efficiency of production.

Natural capital plays an important role in the opportunities for the greening of economy.

5) introduction of the efficient distribution channels through improvement of advanced packing materials; substantiation of logistical decisions when choosing the transport.

6) reduction of product-related environmental impact by way of greening of packing, lower energy consumption, and reduction of toxic waste.

7) improved use of goods: optimization of the product lifecycle through higher reliability and longer useful life; simplification of service and maintenance; introduction of module based structures; ensuring accessibility of information about performance characteristics of the product.

8) product use: cleaner production; recycling opportunities (reusable packaging); and waste disposal.

Proceeding from the set goal of the national ecological policy the following goals have been stipulated:

Goal 1. Increase public ecological awareness;

Goal 2. Improve environmental situation and increase the level of ecological safety;

Goal 3. Attain safe-health level of the environment;

Goal 4. Integrate ecological policy and improve the integrated ecological management system;

Goal 5. Stop losses of biological and landscape diversity and form ecological network;

Goal 6. Ensure environmentally balanced nature management;

Goal 7. Improve regional environmental policy.

Development of ecological policy enhanced the list of available means and instruments of environmental protection. They include:

- agreement on environmental protection: improvement of ecological aspects of enterprises' activity and implementation of methods of sustainable production by way of encouragement of voluntary measures and agreements on environmental protection;

- ecological duties and taxes: furtherance of application of fiscal instruments to improve ecological policy efficiency and ensure application of ecological duties and taxes in accordance with the law;

- strategy for consolidation and change of environmental policy direction related to the production in order to facilitate the development of environmentally friendly product market and as a result stimulation of public discussion of the respective matters;

- provision of persons responsible for making of political decisions, and public with reliable and true information about environmental condition;

- eco-labeling aims at advertising of products with reduced negative impact on the environment (as compared to other products from the same group);

- the system of ecological management and ecological audit aimed at ensuring constant perfection and improvement of the efficiency of ecological activity of European organizations, and provision of the relevant information to the public and parties involved;
- assessment of environmental impact of certain state-run and private projects;
- assessment of ecological consequences of implementation of plans and programs: to be conducted in order to facilitate inclusion of ecological components at the stages of elaboration and approval of plans and programs;
- ecological inspections of compliance with minimal criteria: ensuring higher compliance level and more substantiation of application and implementation of the law in environmental protection by way of provision of minimal criteria to the organization, post control and publishing of ecological inspection findings;
- improvement of public access to information about environmental condition, assistance in prevention and reduction of contamination in the longer term.

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