

REGULATION OF THE SOLID HOUSEHOLD WASTES GENERATION AND TREATMENT IN UKRAINE: GUIDELINES AND PRIORITIES

Alongside with the creation of important material objects, spiritual and cultural values development of the human society is accompanied by the generation of wastes.

Accumulated industrial and household wastes as well as their growth rates became a serious threat, causing the raise of deep concerns among population. World's waste stream amounts to 11,2 bln tons annually [1, p. 290], 1,3 bln tons of which (approximately 438 kg per capita) fall at solid household wastes (SHW)¹ [2, p. 11].

An important role in the generation and treatment of SHW plays industry as a whole despite the facts that SHW is a result of the final consumption of goods and industrial enterprises are usually omitted when regulation of SHW is executed. This role could be described from several points. First, industrial enterprises produce goods for consumption. If environmental

reasons were not considered at all stages of the life cycle of these products, industry would impose an excessive burden on environment in the form of wastes and an overuse of natural resources. In the second place, industry may influence the stream of SHW by creating durable or recyclable packaging that would also have positive impact on the raw resources use. Thirdly, wide-scale recycling must be done by enterprises, which, in turn, could represent a whole branch of industry. In such a way recycling industry creates jobs, builds more competitive manufacturing industries and adds significantly to a country's economy. For example, in the 27 countries of European Union (EU-27) recycling industry recorded turnover of Euro 232 bln in 2004 and Euro 319 bln in 2008 (at current prices) [3, p.12].

As it became evident from experience, amounts of SHW are in close correlation with the level of countries' economic welfare (and the level of industrial activity in some respect). "The leader" in this sphere with more than 942 kg of SHW per capita generated annually is USA [2, p. 98].

In the EU-27 annual generation of SHW is about 520 kg per capita ranging from 831 kg per capita in Denmark² to 361 kg per capita in Czech Republic³ [4].

In countries which are traditionally considered to be leaders in the field of environmental protection (Sweden, Germany and Japan) each year forms 475, 570 and 461 kg of SHW per capita respectively [2, p. 97; 4]. So it is evident that the problem of waste generation in these countries is also exists.

As for Ukraine it should be noted that in spite of the comparatively low to the above

¹ Hereinafter the author of the paper offers to interpret the term "solid household wastes" wastes that are mainly in a solid state (not liquid or gaseous), which originate in the vital processes of humans in residences and non-residential spaces in the form of residuals of materials, objects, wares, commodities, products, that can no longer be used as intended in the places of their accumulation and are not connected with production activity of enterprises.

This definition differs from the fixed in Ukrainian legal acts term "household wastes" by: 1) specification of the wastes state (solid); 2) inclusion all of the possible solid household wastes "producers" in it.

It differs from the worldwide known term "municipal solid wastes" in the part that excludes constructive and medical wastes as long as the latter requires special treatment due to their classes of danger. Besides municipal solid wastes belong to municipal authorities (or are collected through municipal services and programs), while solid household waste does not have such attributes.

² Data refers to year 2009.

³ Data refers to year 2009.

mentioned countries level of the economic welfare, SHW generation in it is close to the one of world leaders. Every year occurs near 12 bln tons (270 kg per capita) of SHW in Ukraine [5].

During the last 30 years leading countries of the world are undertaking active measures on diminishing of SHW volumes and weight. They also improve methods of SHW treatment due to switch from incineration and landfilling to recycling, reuse and recovery as well as development of alternative waste treatment technologies [4, 6]. In other hand, the problem of waste generation and treatment was not resolved in Ukraine. It is evident from the fact that only 3% of SHW was recycled in 2012, more than 90% – was landfilled or discarded and 4% – was incinerated [7].

At the same time Ukrainian incineration plants do not correspond to the requirements of environmental safety, 17% of landfills are overloaded, 80% of them are build without proper account of the ecological safety requirements in regard to groundwaters and air pollution. In addition about 35 thousand of unauthorized dumps appear every year [5].

All of the above mentioned enhance the risk of natural resources pollution which in turn can have negative impact on a health of country's population. Taking into account the price of life in Ukraine [8, p. 308-311] economic damage from water pollution by leachate on life and health of country's population may constitute about \$32,2 bln or about 20% of GDP of Ukraine.

Other factor of environmental and economic risks from SHW treatment in Ukraine is landfill gas. Its emissions are comparable with the emissions of methane (the main compound of a landfill gas) from coal mines. The damage from the landfill gas emissions in the air in Ukraine calculated on the basis of Tax code rates [9, article 243.1] is about 73 mln UAH annually.

As long as contained in the landfill gas methane is one of greenhouse gases, its emissions in Ukraine can result in violation of international agreements and obligations for the reduction of greenhouse gases (Kyoto protocol for example) taken by country. In turn this may de-

teriorate the relationships of the country with its foreign partners.

The situation around SHW in Ukraine depicted earlier in this paper allows to insist on the relevance and importance of the regulation of SHW generation and treatment.

In the world researches on the regulation of SHW generation and treatment are conducted by international organizations, government agencies as well as scientists. For example, staff of the USA Agency on environmental protection regularly conducts monitoring in this field, develops methods, programs and recommendations on improvement of the regulation in this sphere [10, 11, 12]. Problems of SHW treatment are among the main tasks on the agenda for the specialists of Organization of economic cooperation and development [13]. Costs and benefits, related to separate waste collection as well as further recycling and reuse of wastes are investigated by D. Aadland [14], D.K. Benjamin [15], J. Dewey [16], T.C.Kinnaman, D. Fullerton [17].

In Ukraine scientific researches on regulating the sphere of SHW treatment are also conducted. For example, at legislative level the Law of Ukraine "On wastes" [18] was enacted alongside with some other decisions and orders [19, 20], which set legislative background in this sphere and are directed on a bigger role of separate wastes collection and recycling of SHW in the country.

Problems of wastes classification by the types of danger and possibilities of separate wastes collection and wastes treatment are reflected in the works of I.Kh. Osmanov and M.V. Abramova [21], V.S. Mischenko and A.P. Vygovskaya [7, 22].

At the same time problems of the choice of measures directed on a slowdown of SHW generation and most appropriate way of SHW treatment still remain unsolved in Ukraine. Also there is no clear and consistent nationwide program within the framework of which there would be settled main directions of the SHW generation and treatment regulation as well as timelines for specific measures, authorities, obligations and penalties for violations in this sphere.

As long as Ukraine faces such wide spectrum of questions which is necessary to solve as quick as possible it would be appropriate to analyze the experience of leading countries in the field of SHW regulation.

Thus, *the objective of the study* is to develop recommendations on the improvement of the regulation of SHW treatment in Ukraine on the basis of analysis of foreign experience in this field and estimations of its positive and negative sides in respect to Ukrainian realities.

Analysis of the foreign experience would be conducted on the example of Germany. This appears to be useful to Ukraine on two reasons. First, Germany is a world leader in the sphere of the regulation of SHW generation and treatment [23] and has long history of such regulation. For example, measures on SHW regulation are undertaken in this country from 1975. Since that time the wide-scale informational programs, directed on stimulation of separate wastes collection by population, were conducted [24].

Secondly, in Germany industrial enterprises are directly engaged in the process of diminishing volumes of SHW and their further recycling. This is particularly important as long as these economic agents usually are not taken into account (or even are forgotten to be taken into account) when analyzing possible methods of solving the problem of SHW generation and treatment.

Initially in Germany substantial attention was addressed to the treatment of packaging. Government made such decision due to the fact that packaging makes up to 50% on volume and 30% on weight of the SHW generated in the country [25, p. 14].

In fact governmental regulation in this field began in 1991, when Germany established "The Ordinance on the Avoidance of Packaging Waste" (Packaging Ordinance). In accordance with this Packaging Ordinance producers and distributors of the final products¹ were obliged to take back from end-consumers used transport packaging free of charge and to recycle (or organize further recycling) these materials.

¹ In this case and further in this paper by final product author means product that is made for sale or distribution to the end-consumer.

In 1992 and 1993 Packaging Ordinance was amended to broaden its action on all types of packing used for the transportation and storage of goods from the place of their production to the place of their final consumption. Accordingly within the framework of this Packaging Ordinance manufacturers, distributors, and retailers were required to take back and recycle these materials from consumers free of charge as well [23].

An implementation of these requirements by the state was directed on realization of "producers' responsibility" concept in the country. In turn it means that every company that places packaging at the market is obliged to take care of their reuse or recycling. The main goal of such concept is to decrease SHW volumes (packaging in particular) on landfills and in such a manner to achieve economy of natural resources and to improve quality of environment [26].

Besides these legislative limitations in regard to packaging there was implemented deposit-refund system by the state that was operated from January, 1993. In line with this system all producers and distributors had to pay to the budget (and, accordingly, to include in the price of the produced products) a certain sum depending on the type of a packaging material. Eventually part of this sum was supposed to be paid to end-consumers in the case of returning of the packaging. It was done with the aim of stimulating consumers to collect their wastes separately. After collection these materials had to be recycled. Remains of the deposited sum had to be transferred to SHW recycling enterprises to cover their costs on recycling [25, p. 13-15].

Such strict measures of regulation undertaken by the state, just as additional administrative interference in the business activity of an industry resulted in establishment in 1990 Dual System of Germany (Duales System Deutschland – DSD).

Initially DSD was founded as nonprofit organization, which had to collect, sort and recycle residuals from consumption in this country.

To date DSD is a head organization. Its functions are co-ordination of DSD programs implementation (there are 9 of them in Germa-

ny), establishing the order of recycling packaging marked with the special mark – "Green point" (Green dot). The whole activity of DSD is carried out under firm control of the government with accordance to the German legislation. As for the sorting and recycling enterprises, they are not the property of DSD but its partners. There are about 400 such partners in the field of SHW treatment in Germany [23].

Results of DSD programs are carefully documented by the DSD staff and then are examined by the state officials according to the stringent legislation in this sphere.

The participant of the DSD programs (producer of the packed goods) can mark its packaging with "Green point". This sign is a signal for an end-consumer to collect such packaging separately with the aim of its further recycling within the DSD programs instead of returning it to the producer or distributor (as requires the legislation of the country).

Packaging, made from the different types of raw materials, must be collected in different ways. Germans have to sort out packing made from metals, plastic and mixed materials (for example – such type of beverage packing as "tetrapack") and put them in the special "yellow" containers or garbage plastic bags which should be placed along the sides of a street roads (curbside recycling programs – CRP). A glass package must be gathered by the population and brought to the special containers, set in the residential area (but not near every house). The same is true for the residues made of paper and

cardboard, but containers in this case would be marked for this type of wastes.

Such way of sorting and collecting wastes as was depicted for the glass and paper is usually called bring system.

As for the kitchen scraps and garden wastes they must be composted. The rest of the throw-outs not included in the above mentioned groups must be placed in grey bins which are also removed from cities within the framework of the municipal but not DSD's curbside recycling programs. In the last case city authorities are charging population for that and further treatment of such garbage [26].

The sorted by the population SHW are additionally sorted on recycling enterprises-partners of the DSD.

Costs on collection, transporting, sorting and recycling of packaging, carried out within the framework of DSD programs, are covered with the so-called license fee paid by producers and suppliers of packed goods.

A license fee is estimated on the basis of weight and surface area of package, and also depends on the type of the materials (Table 1). This means that license fees reflect costs of sorting and recycling proportionally. If these costs drop, the license fees are reduced accordingly [23]. Thus, the DSD creates incentives for producers and distributors of packed goods to diminish their weight and volume as well as to use more environmentally safe materials while making package. As a result it may stimulate innovative activity in the sphere of package production.

Table 1

License fee in the DSD according to materials¹

Packaging material	License fee, (Euro cents per kg)
Plastic	113,64
Other composites	84,65
Composite cartons with special acceptance and recycling guarantee	62,78
Aluminum, other metals	61,24
Tinplate	22,68
Paper, board, cardboard	16,69
Natural materials	8,26
Glass	6,16

¹ Licence fee valid from 01 January 2005.

In the first years of DSD existence costs of package collection and recycling within the framework of its programs were extraordinarily high – up to 2005 they were approximately 2 bln Euros a year [27]. However development of the recycling technologies and growth of the number of DSD partners resulted in the reduction of these costs which in 2010 constituted less than 1 bln Euros [27].

As for the efficiency of the DSD programs as a means of influence on the volumes of package recycling it should be noted that less than in 15 years of their action levels of recycling within the DSD exceeded the targets set in accordance with the Packaging Ordinance (Table 2) [23].

From the data presented in table 2 it is possible to conclude that from 2000 to 2003 recycled materials by weight stayed almost at the same level. However it is necessary to take into account that there were improvements of the recycling and package production technologies during this period. Packing materials could become lighter in spite of the fact that quantity of wrapped goods sold in that time did not decline.

As for the volumes of the recycled within the framework of DSD packages exceeding the mark of 100% it bears mentioning in this respect that such surplus was due to recycling of imported packages (in case of agreements between foreign producers and DSD), of untreated earlier packaging as well as other recyclable materials (not package).

Table 2

DSD packaging recycling data

Type of waste	Quantities passed on for recycling, mln tons				Packaging Ordinance target, %	DSD recycling target achieved in 2003
	2000	2001	2002	2003		
Glass	2,67	2,5	2,51	2,27	75	99
Paper, cardboard	1,51	1,48	1,44	1,41	70	161
Plastic	0,57	0,59	0,64	0,6	60	97
Tinplate	0,32	0,31	0,31	0,33	70	74
Aluminum	0,04	0,04	0,04	0,04	60	121
Compounds	0,38	0,37	0,38	0,3	60	128

Recycling within the framework of DSD allows preserving natural resources. In this matter it is important to point that recycling of 589 000 tons of the plastic containers in 2000 saved approximately 20 bln MJ of energy produced from natural resources. That energy in turn made it possible to provide electricity and heat during 130 days in all residences of Berlin [23].

In addition, researches and data analysis on DSD activity from the moment of its establishment till 2010 has proved, that recycling in Germany (package in particular) is more environmental friendly way of SHW treatment, than incineration with the subsequent generation of heat ("waste-to-energy") [23]. Besides as long as lesser amounts of SHW were landfilled during this period, it led to diminishing of the pressure on landfills and therefore – environmental pollution by landfill gas and leachate.

Nevertheless compared to the strategy of waste avoidance recycling seems to be not so

appealing way of SHW treatment. The main reason in this matter is that DSD programs are oriented on recycling, but not diminishing wastes or avoidance of their generation. In fact, DSD rather stimulates production and consumption of packed goods in Germany, than serves as an instrument of SHW reduction. In this respect and taking into account that this aspect of DSD contradicts German legislation, DSD is exposed to criticism from the side of environmentalists [28]. They also often claim their disapproval of DSD on the grounds that in spite of declared economy of energy and natural resources attained by virtue of SHW recycling; strategy of waste avoidance would allow to preserve more energy and natural resources as long as they won't be wasted on eventually needless things.

These lacks of the DSD is caused mainly by the absence of the environmentalists among those, who develop environmental legislation of the country and DSD programs [28].

This could be solved (at least partially) by taking into account more environmental parameters while deciding upon DSD license fee. In particular it is important to reflect the necessity of declining carbon dioxide emissions caused by package recycling [23].

In conclusion it may be noted that DSD is in the picture of "hybrid approach" to environmental regulation. That is elements of voluntarily agreements (R. Coase), market-based and command and control approaches were implemented in this instrument of the regulation of SHW treatment. In other words, under the influence of strict German legislation and the threat of employment of harsh financial measures by the state industry came to an arrangement on the most economically reasonable way of solving the problem with SHW treatment that would also hedge enterprises from the redundant control of authorities.

However in the last few years the wave of criticism arise around DSD due to the fact that originally nonprofit organization begins to make financial reasons the corner-stone of its activity. As a result of it quality and amount of packaging recycling falls, while license fee comes up. Accordingly this situation leads to the disaffection amongst enterprises-participants of the DSD as well as authorities [29].

However in spite of this fact DSD, as originally framed, appears to be such an appealing way of SHW treatment that in other EU member-countries are created similar systems of SHW treatment under the support of DSD staff and licenses on the use of the "Green point" mark are bought in Germany. That is European countries follow the German way of SHW treatment [23].

As for the possibility of the adoption the German practice on SHW treatment in Ukraine it is necessary to make several remarks.

1. By the time of creation of DSD in Germany there were held wide-scale informational programs on the stimulation of the separate wastes collection and recycling for more than 15 years. And even in spite of the reputation of Germans as extremely disciplined and responsible nation, it took 30 years to ensure that the major part of the country's population (90%) is carried out separate waste collection [24].

Ukrainians do not have a reputation of as disciplined and responsible nation as Germans do. In addition there were no informational programs on separate waste collection or stimulation of the SHW recycling similar to foreign ones in Ukraine. From this point the possibility of the separate SHW collection by the population of Ukraine remains quite low.

Due to the above mentioned it seems that increase of the volumes of the SHW recycling in Ukraine would require organization and carrying-out waste sorting by the specialized sorting enterprises or organizational unit of the SHW recycling firms in this transitional to the separate waste collection period of time. On top of that population can be stimulated to separate waste collection by the increasing of the number of scrap-yard facilities in the country as was done in the USSR.

This recommendation appears to be especially interesting considering the fact that there are already more than 1500 such scrap-yard facilities in Ukraine. Nevertheless their number is still very low compared to member-countries of EU, where more than 1,5 mln employees are involved in the recycling industry. The annual turnover of this industry reaches more than 100 bln euros in EU [3, p. 12; 7].

In any case, each of the above offered ways of organizing the separate SHW collection in Ukraine requires the investment of time and financial resources. But their exact amount has to be defined after thoroughly conducted scientific estimations.

2. By the time of DSD creation there were clear legal frameworks in the field of packaging treatment in Germany.

In Ukraine there are also legal acts on the regulation of SHW generation and treatment. The main of these documents is The Law of Ukraine "On wastes" [18].

However in spite of the positive meaning of this law as an instrument of the regulation of wastes treatment sphere there is still no definition of the term "solid household wastes". The list of wastes treatment presented there is far not complete, and the levels of development of technology, science in this field as well as foreign achievements are not reflected in it as well. The latter is subjected to the sorting as long as it is described in the law as exceptionally mechan-

ic process while such methods of sorting as hydroseparation, metal fractions grading, chemical sorting etc. are left aside. Such a narrow interpretation of sorting methods can born possibilities of levying extra fines by Ukrainian authorities on enterprises and population due to the peculiarities of institutional environment in the country.

Besides that, article 35-1 of the Law of Ukraine "On wastes" though is in accordance with the up-to-date world tendencies in the field of SHW treatment (namely priority is given to the recycling), but in fact is nothing but the declaration of intentions. This comes from the fact that there are no ratified methods of separate SHW collection in Ukraine, prescribed by this article. One of a few attempts to develop such method on a period 2011-2015 was undertaken in Simferopol, but for now was not implemented in practice [30].

On top of that there are no financial levers of influence on SHW "producers", which would stimulate them to decrease the SHW volumes or treat these wastes in the most environment-friendly way voluntarily, in the Ukrainian statutory.

Environmental tax on placing the wastes in the specialized places or objects, set in the Tax code of Ukraine [9, article 246]), can't be considered as such a lever as long as it concerns industrial wastes and their placing basically. Hence this tax has no impact on the SHW generation or a choice of SHW treatment method.

Taking this into account there are a certain "detachment" and fragmentariness of Ukrainian legislation in the sphere of SHW generation and treatment.

It is believed that regulation of the SHW generation and treatment must be carried out on the basis of some nationwide program, which would comprise economic, social and ecological aspects. There must be included development of legislation on performing activity in this field.

Such programs were implemented in Ukraine. For example, there was "A program on SHW treatment" (2004) that served as a basis for "The National strategy on SHW treatment" and project of The Law of Ukraine "On household wastes" [22, p. 23-24]. However they were valid until 2009. After that any of the planned

programs on this matter (with time horizon till 2020) were not implemented or even created.

In the acts on the main directions of development of Ukraine and its security enforcement (for example, Strategy on the national security of Ukraine, Conception of residential areas' sustainable development) environmental protection as a whole and regulation of the SHW in particular are just declared without any refinement about who, when and what suppose to do in this respect [31, sub-article 3.2.6; 32].

That is the task of development of national concept (strategies, programs) on regulation of the SHW generation and treatment on a period after 2013 is still pressing.

3. In 2012 only 3% SHW (about 1 mln tons) were recycled in Ukraine. That is extremely low compared not only to the world leading countries (Germany in particular), but even to Brazil, where the level of SHW recycling exceeds 90% in some cities [33, p. 27].

In the meantime even existing recycling enterprises of Ukraine do not work on full industrial capacity. That is due among other things to the insufficient level of provision of the recyclable materials in a country.

For example, more than 110 thousand tons of paper wastes are recycled on the Kiev (Obukhov) paper-cardboard plant annually that makes only 50% of its capacity. Approximately 70 thousand tons of paper wastes are supplied there by the specialized corporation "Ukrvtorma", whilst the rest of the paper wastes (40 thousands tons) are imported at \$70 per ton. That price exceeds the cost of domestic paper wastes. On some estimations an increase of domestic paper wastes provision would allow Kiev (Obukhov) paper-cardboard plant to gain about 0,5 mln UAH of profit alongside with the saving 4-4,5 mln UAH as a consequence of import substitution [22, p. 190].

However even in the case of the organization of paper wastes provision and sorting in Ukraine it would take development of economically grounded tariffs (or a license fee in an event of implementation of a German experience with DSD) on recycling. The latter, for example, is determined by the fact that established by the Ukrainian legislation tariffs on collection, provision and recycling of packaging for the "Ukrekomresursy" [20, article 2] do not

stimulate this and other similar firms to increase the volumes of recycling in the country. Compared to the license fee within the DSD framework (table 1) the above mentioned tariffs has to be increased for at least in a 5 times to induce recycling in Ukraine.

Beyond that, as was already noted in this paper, organizing of the SHW treatment on the DSD principles boosts their recycling only. In a meantime it may happen that waste avoidance (due to more rational use of raw materials, changes of products and packaging design), composting, incineration with the energy generation (waste-to-energy) etc. would be more suitable and appropriate ways of SHW treatment in Ukraine

That is, it seems reasonable to assess as wide as possible spectrum of solving the problem of SHW generation and treatment prior to concentrating on some particular way of SHW treatment or copying the experience of some other country (let it even be a world leader) without proper account of the institutional environment and existing ecological problems in Ukraine.

4. While implementing the regulation of SHW sphere in Ukraine the question of financing remains.

Managing the SHW sphere in the conditions of undeveloped SHW treatment infrastructure and straighten circumstances, when substantial part of population and enterprises are on a verge of survival, is extremely problematic.

At the same time on the estimations of Ministry of the regional development, construction, housing and public services it would cost for approximately 160 bln UAH to create the SHW treatment infrastructure (60 wastes-sorting plants, 30 plants on bio-mechanical processing, 30 recycling plants and many other objects) on the national level [7].

Financing the SHW treatment sphere with the environmental tax revenues is extremely scarce. This is due to low rates of such taxes in Ukraine (even after the Tax Code implementation) that does not correspond with the ecological situation in the country and rates of environmental taxes in the leading countries of the world. Besides during the time of independence of Ukraine even these revenues practically never entered budget in full partly by virtue of lack of

attention of authorities to violations in this field [34].

The situation with the environmental tax for the wastes placing is even worse: at first, there is only about 40% of the tax accrued enters budget. Secondly, the tax is oriented on the storage of industrial wastes, thus it doesn't encourage reduction of SHW. As a consequence this results in a lack of resources on the performing of SHW treatment programs. Hence these programs are funded on 23% at the best [22, p. 139, 156-161].

To provide funds for solving the SHW problem is possible by increasing the rates of environmental tax in Ukraine and (or) augmenting the number of economic instruments of SHW regulation. However these measures should be done with respect of least negative impact on SHW "producers" (for example, shutdowns of plants).

Besides fundraising for the SHW treatment in Ukraine can be carried out due to national and foreign investors, grants etc. For example it could be done within the framework of the emission trading schemes. At the same time an implementation of this suggestion requires an improvement of environmental situation in Ukraine as a result of reduction of industrial emissions in the first place (as long as industry is the largest polluter). Aside from the above mentioned it is necessary to improve economic situation in the country as well as to develop more clear and transparent legislation and to take measures on the decline of the level of corruption.

In general, to implement an economic regulation of the SHW generation and treatment in Ukraine it would take a development of a financial mechanism, comprising all aspects of this problem.

On the basis of the above mentioned, it is possible to draw some conclusions.

A problem of the regulation of SHW generation and treatment is really pressing in Ukraine. However population's mentality, economic and institutional peculiarities, undeveloped infrastructure in the field SHW treatment impedes to adopt in full extend German experience in the implementation of DSD in a short-run.

To change this situation in Ukraine it is necessary to do the forthcoming.

1. In a short-run interested environmental groups, departments of the Ministry of ecology and natural resources of Ukraine, wastes sorting and recycling enterprises, authorities in collaboration with each other should run a campaign on informing population about the necessity of diminishing the volumes of SHW and separate waste collection. As it became evident in Germany, such campaigns are essential part of the measures on regulating the SHW sphere.

2. In medium and long-run authorities with the assistance of members of environmental groups and scientists have to:

- develop the national strategy (program) of SHW treatment;

- implement (improve) Ukrainian legislation in the field of SHW treatment within the framework of this strategy, concerning separate waste collection and its recycling, ecological and sanitary requirements to the landfills and incineration plants;

- create methods and mechanisms of separate SHW collection by the local authorities as it is foreseen in the Cabinet of Ministries of Ukraine's Act "On the introduction of the collection, provision and treatment of wastes system as reusable resource" (№ 915, 26 July, 2001) and article 35-1 of the Law of Ukraine "On wastes";

- elaborate legal acts on the polluters' financial responsibility for separate wastes collection and recycling that would define amenable authorities in this field as well as their competence.

With the aim of SHW minimization and stimulation of more environment-friendly ways of SHW treatment it is necessary to use more widely economic instruments of environmental regulation (taxes, deposit-refund systems, etc.) to influence the SHW "producers" in a more flexible manner in Ukraine. Thus a preference must be given to instruments that would stimulate waste avoidance. It is due to the fact that prevention of a SHW generation "at a source" is easier and cheaper than their further treatment and storage.

However, taking into account the lack of information on the possibilities of the implementation of these instruments in Ukraine, their

study and scientific rational must be held prior the introduction of such instruments.

It is necessary to ensure that such instruments would be used not as a separate, isolated measure of regulation of the SHW treatment sphere, but along with other measures. For example, this could be done within the framework of mechanism of the financial regulation of the SHW sphere. In such case it would contribute a solution to this problem.

These directions of regulation the SHW sphere by means of economic instruments are seen as a further direction of scientific researches.

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Received on 24.02.2014