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HISTORY OF HOUSEHOLD WASTE MANAGEMENT: COMPARISON OF UKRAINE AND THE CZECH REPUBLIC AFTER 1990

The paper compares the history of household waste management in Ukraine and in Czech Republic since the political changes after 1990. The comparison has shown that both countries have experienced the disintegration of the existing household waste treatment systems in their transition to market economy. Czech Republic has managed to tackle the problem relatively fast (legislation, education, motivation and awareness raising among population, building household waste collection and processing systems), whereas a considerable part of the process is still ahead for Ukraine.
Keywords: environmental history; environmental protection; household wastes.

Альона Хадрабова, Олександра О. Білопільська, Пётр Шауер УПРАВЛІННЯ ТВЕРДИМИ ПОБУТОВИМИ ВІДХОДАМИ: ПОРІВНЯННЯ УКРАЇНИ І ЧЕХІЇ ПІСЛЯ 1990 РОКУ

У статті проведено порівняння історії розвитку управління твердими побутовими відходами в Україні та Чеській Республіці у період з початку політичних змін у 1990 році. Порівняння розвитку двох країн показало, що обидві країни пережили розпад існуючих систем утилізації твердих побутових відходів в процесі переходу до ринкової економіки. Чеська Республіка змогла вирішити цю проблему відносно швидко (законодавство, освіта, підвищення мотивації та обізнаності серед населення, запровадження систем збору та переробки твердих побутових відходів), у той час як значна частина цього процесу для України ще попереду.

Ключові слова: історія навколишнього середовища; охорона навколишнього середовища; тверді побутові відходи.

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В статье проведено сравнение истории развития управления твердыми бытовыми отходами в Украине и Чешской Республике в период с начала политических изменений 1990 года. Сравнение двух стран показало, что обе пережили распад существующих систем управления твердыми бытовыми отходами в процессе перехода к рыночной экономике. Чешская Республика смогла решить проблему относительно быстро (законодательство, образование, повышение мотивации и осведомленности среди населения, создание систем сбора и переработки твердых бытовых отходов), в то время как значительная часть этого процесса для Украины еще впереди.

Ключевые слова: история окружающей среды; охрана окружающей среды; твердые бытовые отходы.

Introduction. After the disintegration of the Eastern Block and of the Soviet Union new countries started their transition to market economy, therefore, the system for collecting, sorting, reusing and disposal of household waste⁴ had to be

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⁴ Terminology note: household waste is understood here as wastes generated by people in their apartments and family houses and also by some small business, if the contents of their waste is the same to households and if they join the system; municipality waste is household waste + other wastes (like waste collected from waste bins at streets, in parks etc.).

redesigned under new circumstances. This process could make use of some tested elements from the previous period, notably the sorting of secondary raw materials in households. However, the household waste required a new approach comprehensively, including for those waste types that are not secondary raw materials.

In this period, construction and gradual improvement of the new household waste handling systems made a more extensive use of experience from advanced countries. There is a large body of scholarly literature on this topic: OECD (2004), Pearce (2004), Husaini et al. (2007), Salhofer (2008), Johnstone and Labonne (2008), OECD (2007), EEA (2007), EEA (2013), among many others.

This paper continues to compare the history of household waste management in Ukraine and Czech Republic⁵. Political changes of 1990 made Ukraine an independent country. Czechoslovakia split in 1993 and Czech Republic started its independent policy, approaching the West rather than the East. What was happening with household waste management in these two countries after independence in the field of environmental protection and policy? Czech Republic entered the European Union in 2004. During the process of preparation for the entry as well as after it, the environmental protection legislation had to be harmonised with that of the EU. What could be the lessons for Ukraine when working on the effort to join the European Union?

The amount of waste produced per capita grows in time. In Czech Republic, whereas it was 260 kg per capita in 1989 (Statistical Environmental Yearbook, Academia Praha 1990), it reached 420 kg per capita in 1999 (Statistical Environmental Yearbook of the Czech Republic, 2000).

In Ukraine, where the characteristic feature of the economy's structure in the past was a large proportion of the fuel and energy sector, metallurgy and chemical industry (coal extraction and metallurgy account for about 90% of the total waste generation), in 1989 the absolute volumes of all types of waste reached 1.8–1.9 bln tonnes, which is 36,538 kg per capita (National Economy of the Ukrainian SSR in 1989, Statistical Yearbook, 1990), while it was 14,000 kg per capita in 1999 (Statistical Yearbook of Ukraine, 2000). As for recycling as the desirable method of handling generated waste, Czech Republic showed repurchases of secondary raw materials of 0.9 mln tonnes in 1989 (without detailed specification of their origin) (Statistical Environmental Yearbook, 1990). In 1999, the total amount of municipal waste reported as reusable secondary raw materials was 314 kg per capita (Statistical Environmental Yearbook of Czech Republic, 2000). In Ukraine, the total amount of municipal waste was 83.95 kg per capita in 1989 (National Economy of the Ukrainian SSR in 1989, Statistical Yearbook, 1990), and 219 kg per capita in 1999 (Statistical Yearbook of Ukraine, 2000).

Decision on the form of waste handling is an important component of every country's environmental policy. It depends on numerous factors: traditions in the area, the current economic situation, political climate etc. These factors differ across countries and historic epochs. Differences in both formulation and practical implementation of environmental policy therefore occur among countries.

Household waste management developments in Ukraine after 1990. Under centrally-planned economy of the former Soviet Union, waste management did not sit

⁵ first part of this research was published by the authors in APE (Hadrabova et al., 2015: ??–??).

high on the agenda. The Soviet Union generated large amounts of waste but failed to manage them in an appropriate manner. Significant amounts of radioactive waste, chemical weapons, toxic missile fuel and other hazardous waste were stored in mines and at industrial and military facilities. Almost all municipal waste was disposed at poorly managed landfills or in city dumps which lacked basic sanitary and environmental provisions. Public awareness of the waste issues was low (EEA, 2007).

In Ukraine, the old methods of management have stopped working during the transition to market since 1991. However, encouragement to collect and recycle secondary raw materials was not present. Specialised enterprises, engaged in processing of recycled materials, have commercialised and partially shifted to other activities, thus leading to a sharp decrease in the collection and reuse of secondary raw materials. In Ukraine no investment has been made since 1990 in upgrading municipal waste management systems.

Since independence, in Ukraine the volume of secondary resources collection has decreased four fold, communal problems with removal of household waste from cities has begun and a huge number of illegal dumps appeared.

The Law Ukraine "On Waste" (5.03.1998, #187/98-VR) defines the area of competence and responsibilities of central and local government bodies in waste management. The National Toxic Waste Management Programme (Law Ukraine, 14.09.2000, #1947-III) and the Programme for Recycling and Reuse of Production and Consumption Waste (CoM Resolution, 28.06/1997, #668) as well other legal acts in the area of waste management include the division of responsibilities between different institutions involved in waste management. Since the adoption of the Law on Waste in 1998, a number of legal acts, including 5 laws and 23 Resolutions of the Cabinet of Ministers have been adopted to make this law operational (UNECE, 2009). At the regional and local levels, legislation on waste is supplemented by local and regional waste management schemes and decisions of city authorities, containing provisions on waste collection, treatment and disposal.

Strategic programmes on waste management have been adopted at the national level, but little action has been taken to enforce them at the municipal level. Legislation and municipal programmes lack the initiatives to promote further activities. The analysis of waste management in Ukraine shows that regional system has not been developed, resulting in inefficient utilisation of secondary raw materials from both economic and an environmental points of view.

The Law Ukraine "On Waste" #187/98-VR and by-laws contain a number of measures and requirements are aimed at reuse and recycling. However, Ukrainian legislation does not reflect any of the specific targets for recycling or volume reduction as defined in the European Parliament and Council Directive 94/62/EC as of 20 December 1994 on packaging and packaging waste, waste electrical and electronic equipment, and waste disposal. Ukraine does not enshrine in law the utilisation of certain types of wastes such as electronics, fluorescent lamps, batteries etc. At present, even environmentally aware citizens experience problems with the recycle of hazardous waste due to a lack of special collection points in many cities.

Throughout Ukraine, household waste is collected by municipal utilities and private utility companies, to be later removed to dumps and landfills for disposal. In big cities, household waste collection has become a profitable business and both domes-

tic and foreign entrepreneurs show interest in it. Under the condition of timely payments, a company removing household waste to landfills has 10–12% or more profitability. Today, an Austrian company engaged in the removal of household waste works in Western Ukraine. All commercial companies tend to use obsolete, but powerful and reliable trucks of foreign provenance, capable of transporting much larger volumes of waste, than Soviet and domestic trucks; this, as well as efficient organisation of cheap labour has led to their economic success.

Funding for the waste management system is that population pays for waste disposal at landfills included into municipal payments. The costs of landfill reclamation are covered by local budgets of cities. One of the reasons for the poor-development of waste recycling is that investors are not interested in investing in recycling due to low payments for utilities. Ukrainians pay 50 times less for waste services than population in Europe.

In Ukraine today, there are two directions in the system of secondary raw materials collection. The first direction is carried out largely with the help of population itself, which delivers waste to collection points. Another direction – separate procurement – is provided through contracts with companies whose production cycles form large waste streams.

Very limited progress has been made in the reuse or recovery of resources in municipal waste over the last 10 years. The volume of collected secondary raw materials in the country is constantly decreasing. The main problem of using unsorted secondary raw materials is its separation from the mass of waste, because together it is practically unusable for processing. In the absence of possibility for full technical sorting of household waste, separate collection at the stage of occurrence is in priority. The country did not use economic stimuli, legal action, or at least awareness among campaigns population for this purpose in the 1990s–2000s.

The collection of recyclable materials is carried out by the industrial environmental association "Ukrvtorma". Its effectiveness can be measured by the following data: in 1990, Ukraine collected 731 ths tonnes of secondary raw materials, including 416 ths tonnes of waste paper. In 1998, the volume of collected recyclables was 27% of the level of 1990, the collection of waste paper decreased by 75%, and polymer raw materials by 80% (Trofymchuk et al., 2013).

Collection points are organised by private enterprises and individuals entrepreneurs. Usually they collect waste paper and glass bottles; collection of plastic waste is not so common, although there have been precedents of buying plastic waste.

There are few companies in Ukraine engaged in recycling. Generally, they do not have the Western-type plants with complex processing of several types of waste to obtain different products (e.g., unsorted waste at the entrance, scrap metal, polymer beads, waste paper, ground glass and compost as the output). Recycling of some municipal waste streams, such as plastics and electric and electronic equipment, as well as incineration with energy recovery, require quite advanced technical capacity and considerable financial resources. Overall, however, the lack of recycling of municipal waste does not seem to be primarily caused by the lack of recycling capacity, shortages are caused by limited domestic supply.

Before independence, Ukraine built 4 waste incineration plants, which do not work at full capacity, are worn and obsolete. Authorities have officially recognised the

dangerousness of these plants and their closure is only considered a matter of time; lack of funds for alternative methods of waste management is the reason why these incinerators are still working.

Landfill is by far the most common method of municipal waste disposal. In Ukraine there are more than 770 official landfills and about a thousand unauthorized and uncontrolled waste placements. Total area they occupy amounts to about 3000 ha (Statistical Yearbook, 2013). However, almost all landfills are outdated and do not conform to current standards. Inspections have shown that 92% of the approved municipal waste landfills do not meet the sanitary norms. Collection and management of landfill gases, which also contain the potent greenhouse gas methane, is rare, leading to a high risk of fires and explosions. Moreover, growth in municipal waste generation is expected to cause a substantial rise in greenhouse gas emissions in the coming years because of the significant share of organic share in municipal waste. Finally, leachate is generally not collected, nor treated, posing a constant risk of pollution of soil and water sources, including drinking water. New legislation has been introduced which requires permits for landfilling of municipal solid waste. However, older landfills, established in the Soviet time, are normally exempt from environmental permits (EEA, 2007).

The main focus of any waste management system should be to work with population. Environmental awareness among Ukrainian citizens is very low. In general, the collection rate of municipal waste is also low. Moreover, most rural areas do not have waste collection at all, and as these areas are often depopulated, it is relatively expensive to introduce waste collection schemes.

The whole system of household waste management in Ukraine is characterized by negative features:

- continuing process of waste accumulation in the domestic sector negatively affects the state of the environment and human health;
- using household waste as secondary raw materials has little real opportunities because there are no developed organizational and economic foundations for such production;
- outdated technologies in the key sectors of the economy, lack of control over the material balance of production, ignoring the key challenges to resource management;
- lack of monitoring and control over household wastes;
- inconsistency of the state policy in dealing with the problem of waste, lack of government initiatives on the development of appropriate legislation and formation of favorable business environment.

Household waste management developments in Czech Republic after 1990.

Changes in social circumstances and the transition towards market in Czech Republic after 1989 meant a new impulse for defining municipal waste management. Appropriate legislation had to be amended, and above all, rights and obligations of all parties had to be redefined.

The first Act no. 238/1991 Coll., on waste defined the term "waste originator" and specified for originators how they were to handle waste and how they could dispose it legally. Municipality as a self-governing unit was defined as the originator of municipal waste (including household waste). However, municipalities were given no

legal power to impose obligations on households in terms of waste handling, meaning they could not theoretically fully meet their obligations as originators. In practice, however, no problems occurred because thanks to long previous tradition, households accepted the requirements of their municipalities and did not think whether municipalities had any legal power to do that.

This situation was remedied by the second Act no. 125/1997 Coll., on waste, which instituted the municipal right to issue a generally binding ordinance on the methods of handling municipal waste within a municipality. Municipalities are now able to impose obligations on individual citizens and enforce their fulfilment. At the same time, municipalities were ordered to specify locations where households could deposit their waste, including hazardous one. The majority of municipalities have gradually built the systems for separation of selected types of waste that can be reused as secondary raw materials (paper, glass, plastics, metals, organic waste, textiles). Waste sorting is done either via special colour-coded containers and dustbins in public places where sorted waste components can be deposited free of charge, or colour-coded plastic bags distributed to households free of charge, or collection yards where households can deposit their waste free of charge, or via other methods. Unsorted, mixed waste that remains is deposited by households in specified containers (dustbins) for a payment, the amount of which the municipality also has the power to set.

Handling municipal waste is defined identically by the Waste Act currently in force (Act no. 185/2001 Coll.). A new major aspect of household waste handling was the introduction of collection obligation for selected used products after the end of their service life. First, this obligation covered packaging, then other products were added (electrical appliances, fluorescent and discharge tubes, mineral oils and tyres). The collection obligation also covers certain other products, such as batteries, and this list continues expanding. This obligation applies to manufacturers and importers, but may be carried out by the so-called collective systems of payment (companies selected by the State that perform the collection obligation on behalf of manufacturers and importers). The work of companies that provide the collective systems for selected used products is financed by the so-called recycling fees, paid to them by manufacturers or importers on every product marketed. Municipalities cooperate with these collective systems and integrate their collection points into their municipal waste handling systems. For example, households can hand over used electrical appliances to a municipal collection yard free of charge, where the company specified as the collective system operator collects them. Likewise, colour-coded containers or bags are used for the collection of used packaging. Sometimes businesses can participate in the system if they produce waste similar to household waste that originates from non-production activity (e.g., shops, restaurants, hotels). For these businesses, this is a considerable facilitation of their waste handling obligations. They have to conclude a written agreement on it with municipality to agree on the fee amount.

Financing of the municipal waste disposal system, including household waste within the municipal territory, is arranged so that the municipality covers all the costs of the system from its budget. It uses the following incomes to cover these costs:

a) household payments (plus potential payments by businesses) for waste collection, where municipalities as self-governing units can choose from 3 options:

i) the local waste fee, defined as a fixed amount pursuant to the Act on Local Fees and levied from each person with permanent residence in municipality. The advantage of this method is its administrative ease. The disadvantage is that the fee cannot be valorised without amending the Act, and it cannot be levied from individuals without permanent residence although they live in the municipality and produce waste there;

ii) the municipal waste fee set by the municipality according to real costs of the system and paid by building owners for all the persons living in a building. The advantage is the municipality's increased the capacity for adjusting the fee based on real costs and levying it from everyone who is living in the place and produces waste. The disadvantage is that it is difficult to check whether everyone really pays;

iii) payment for mixed waste collection (known as PAYT) is based on the price determined by the collection company directly from citizens when they hand over their waste for collection to a landfill or incinerator. This system maximises the stimulus to separate waste and reduce its quantity, as the payment is not an annual lump sum but only for the actual amount. The disadvantage is that it may motivate irresponsible citizens to dispose their waste illegally (dumping in the wild, incineration at home etc.). Another source of municipal income is payments from companies operating the collective systems, which leave part of the recycling fees collected to the municipalities in exchange for providing the collection points for them;

b) incomes from the sale of secondary raw materials that the municipality has collected from citizens. Since these incomes are sometimes insufficient to cover the whole system, municipalities will add other municipal incomes;

c) contributions from Eco-Kom (an institution where producers of packages and packages materials contribute a fee to the system instead of treating waste individually; the revenue is distributed to municipalities based on the volume of separated waste).

Citizens have the option, if they do not hand over their separated secondary raw materials to the municipality free of charge, to sell them to companies that do commercial collection and waste repurchase (primarily metals, possibly also paper and other materials as decided by repurchasers). For some population groups, this is a way to increase their income (pensioner households, children). However, the opportunity to sell back metals, above all else, increases the crime rates, leading to frequent theft of functional metal objects (sewer lids, railway overhead lines etc.). Often, civic safety is compromised in this way. Another problem is theft from municipal containers where citizens have deposited their waste free of charge, thus the municipality has become its owner and could have sold it (typically paper).

For more analyses concerning payments and financing the household waste treatment system, see (Sauer et al., 2008; Slavik and Pavel. 2013; Soukopova et al., 2013). For the illegal landfilling problem in Czech Republic, see (Kubasek and Hrebicek, 2014).

Discussion and conclusions. Comparing Ukraine and Czech Republic in this period, we can conclude that changes in household waste handling after the disintegration of the socialist planned economies and during the transition to market were very similar in these two countries at the initial stage. There occurred a partial dismantling of the systems for collection and processing of secondary raw materials con-

tained in the household waste streams, which had been functional until 1990. In both countries, the collection of municipal waste in cities and villages became commercialised rapidly with the involvement of foreign companies, landfills and dumps expanded uncontrollably, and the amounts of secondary raw materials sorted and reused decreased. This was related to problems with existing processing facilities (some ceased to function as a consequence of privatisation, others shifted to more profitable commercial activities, their technical equipment became obsolete and there were insufficient funds for upgrade).

Ukraine is struggling with the implications of this process to this day, manifested by the following:

i) legislation on waste management does not handle the issue with adequate strictness;

ii) volumes of secondary raw materials recovered has been steadily decreasing since the end of directive enforcement of waste sorting, and there is a lack of funds for upgrading and increasing the capacity of processing facilities. At the same time, the amounts of sorted secondary raw materials imported from abroad is growing; they are processed in non-compliant facilities in Ukraine, thus burdening the environment more than would be permissible in an EU country;

iii) citizens' attitudes, the willingness to take personal responsibility for environmentally friendly behaviour and potential economic engagement in the area of household waste treatment is very low. If citizens wish to contribute to tackling this problem, they mostly have no way to do it (insufficient offer of alternatives to dustbins that are used for disposal of unsorted, mixed waste);

iv) local authorities (municipalities) focus on solving the collection of waste from households, mostly in cities. Rural municipalities often do not do that. Larger part of waste is deposited in landfills, which do not comply with the current EU standards. Regional and national authorities do not deal with long-term conceptual issues of household waste treatment, and there is also a lack of funds for upgrading and building a functioning system.

In contrast, Czech Republic has managed to tackle the initially adverse trend relatively quickly. The major factors for this success are as follows:

i) legislation was addressed immediately after 1990. Legal standards have been improved over time, and they were developed from the very start to comply with the EU legal standards and requirements on waste treatment in general;

ii) population's willingness to sort waste and continue handing over potential secondary raw materials only wavered for a very short period. Not only economic, but chiefly moral motivation for the desired behaviour remained. In order for this favourable state not to change for worse, there is a constant pressure of combined action of various tools (education at school, media attention, economic involvement of citizens, municipalities and companies in environmentally friendly behaviour etc.). Correct treatment of household waste is perceived as socially desirable; contrary behaviour is met with community disapproval and condemnation. Although this is not an absolute rule and some citizens do not accept it, it is the case for larger part of population;

iii) authorities (local, regional, national) apply continuous and honest efforts to deal with household waste treatment, building a functioning system for sorting, col-

lection, processing and environmentally friendly disposal of waste. In part, it is a matter of legal obligation, but in part it is a result of the positive effect of social climate, which influence the authorities' conduct. At present, a system for sorting, collection, processing and environmentally friendly disposal of household waste exists throughout the country, including the smallest settlements, and its use comfort is improving to attract even households which have not used it adequately so far;

iv) Czech Republic began to adapt to the EU requirements long before the accession, because it was a known fact that some behavioural standards are the basic precondition for joining the EU. As a member state, Czech Republic is currently bound by a number of European legal standards and other rules that it has to observe. At the same time, Czech Republic benefits from such behaviour, both economically and environmentally;

v) Support to research has also helped advancing in the field. For future developments in the area, see (Kalina et al., 2014); Horsak and Hrebicek (2014) for the research into the new area of biodegradable waste.

The above comparison yields one crucial conclusion that in the area of household waste treatment, sorting, reuse and environmentally friendly disposal, Ukraine is currently in a stage that has ended and been overcome in Czech Republic. The preparation for EU accession and the subsequent EU membership has been a very strong positive incentive for Czech Republic and very noticeable help with designing its waste management system. Ukraine as a country is much larger, with different history and a number of other problems it has to tackle. It is therefore a question how much importance the country sees in household waste treatment within its hierarchy of current problems, and when and how it can use it to get closer to European standards.

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