

Dariusz STARKOWSKI • Paweł BARDZIŃSKI

MUNICIPAL WASTE TRANSPORT PROCESS ANALYSIS. PRINCIPLES OF WASTE MANAGEMENT, PACKAGING, RULES OF REGISTRATION, STORAGE AND FINES FOR IRREGULARITIES AND INFRINGEMENTS WITHIN THE SCOPE OF MUNICIPAL WASTE MANAGEMENT

Dariusz **Starkowski**, PhD Eng. – *Poznan School of Logistics*

Paweł **Bardziński**, MSc Eng. – *Altwater Piła Sp. z o.o., ENERIS Ochrona Środowiska*

Correspondence address:

Estkowskiego street 6, Poznań, 61-755, Poland

e mail: dariusz.starkowski@poczta.onet.pl

ABSTRACT: The article discussed the process of road transport operation planning connected with municipal waste transport and the organization of mixed waste collection on the example of shipping routes analysis carried out by means of transport of a service company in Wałcz commune in West Pomeranian voivodeship. The article consists of seven parts, all of which present elements of a planning and transport process connected with municipal waste in road transport from legal, technical and economic perspective. Legal information concerning a road transport of goods was provided along with conditions that have to be met in order to perform this kind of transport and business activity. Moreover, technical and legal aspects of municipal waste transport vehicles were approached. The article covered as well the characteristics of: transport process, transport technologies, transport systems, the analysis of work capacity on the basis of drivers' working time and a description of optimal routes for providing services in the commune taking into consideration a technological process of municipal waste transport step by step. The aim of the article is to present the rules of municipal waste: management, storage, segregation, keeping appropriate records of waste in municipal enterprises.

KEY WORDS: road transport, municipal waste, provisions of law, transport centre, transport operation

Introduction

Municipal waste management has become a challenge for local government authorities both in small communes and larger municipalities. Pursuant to revised national legislative provisions, communes are obliged to manage waste. Currently, waste storage is the most popular way of its dealing in Poland. According to data provided by the National Waste Management Plan, there is no sufficient amount of recovery and disposal facilities outside storage places (educational and advertising materials of Altwater Piła Group Eneris). Due to that, not enough waste undergoes biological and thermal treatment. When it comes to household waste treatment, it's the local government authorities that are held responsible for waste collection, keeping records, and lawful management. The article indicates basic types of documents which relate to waste management records that business entities deal with and requirements that need to be met.

Materials

Principles of waste management

Generally, waste management plans are planning and economic documents designed for a specific part of municipal waste management. Act of 12 December 2012 on Waste introduces many changes in ways of waste management. The basic change is creating the hierarchy of waste management, that consists in keeping a precisely determined sequence of waste treatment from waste prevention to its disposal (figure 1) (Starkowski, Bardziński, 2017).

Currently the following rules of waste management shall apply (Kisperska-Moroń, Krzyżaniak, 2009):

1. Principle of waste prevention is connected with the scope of responsibilities for waste generation. Everyone who undertakes actions that cause or may cause waste creation, should plan and conduct such activities as to:
 - prevent the creation of waste or limit waste and its negative impact on the environment during the creation of products, during and after their use,
 - provide a re-use in a manner compatible with protection or improvement of the quality of the environment,
 - provide waste disposal compatible with the environment protection in case where waste creation and re-use could not have been prevented.The she said principle particularly applies in case of business entities (communes, entrepreneurs, property owners). A commune as business

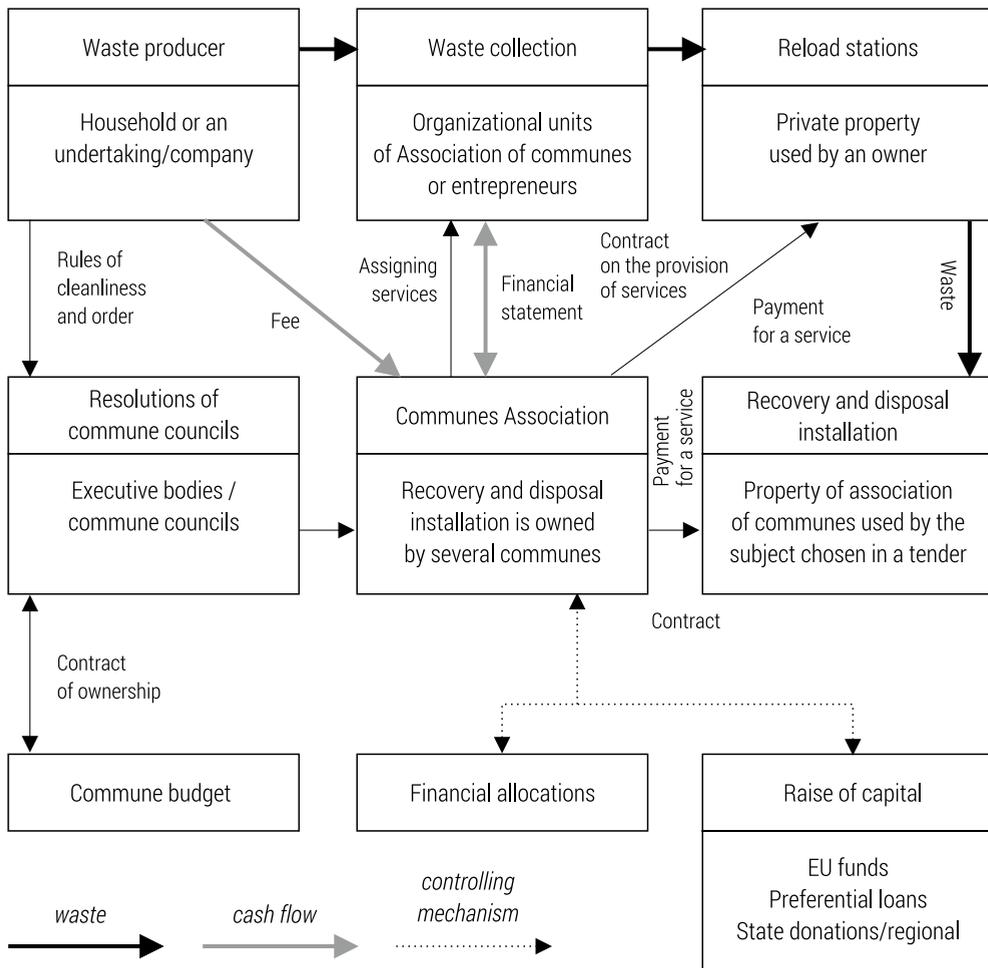


Figure 1. Scheme of responsibility and waste treatment hierarchy

Source: author's own work.

entity may introduce actions that result in waste creation. If however the commune acts as a property owner, all duties for property owners apply. Entrepreneurs – waste producers and other property owners need to abide by the mentioned regulation just as in case of a commune, which is treated as a civil legal entity. The regulation does not apply to entrepreneurs that deal with waste collection (including transport). In situation where an activity results indirectly in waste creation other than the one

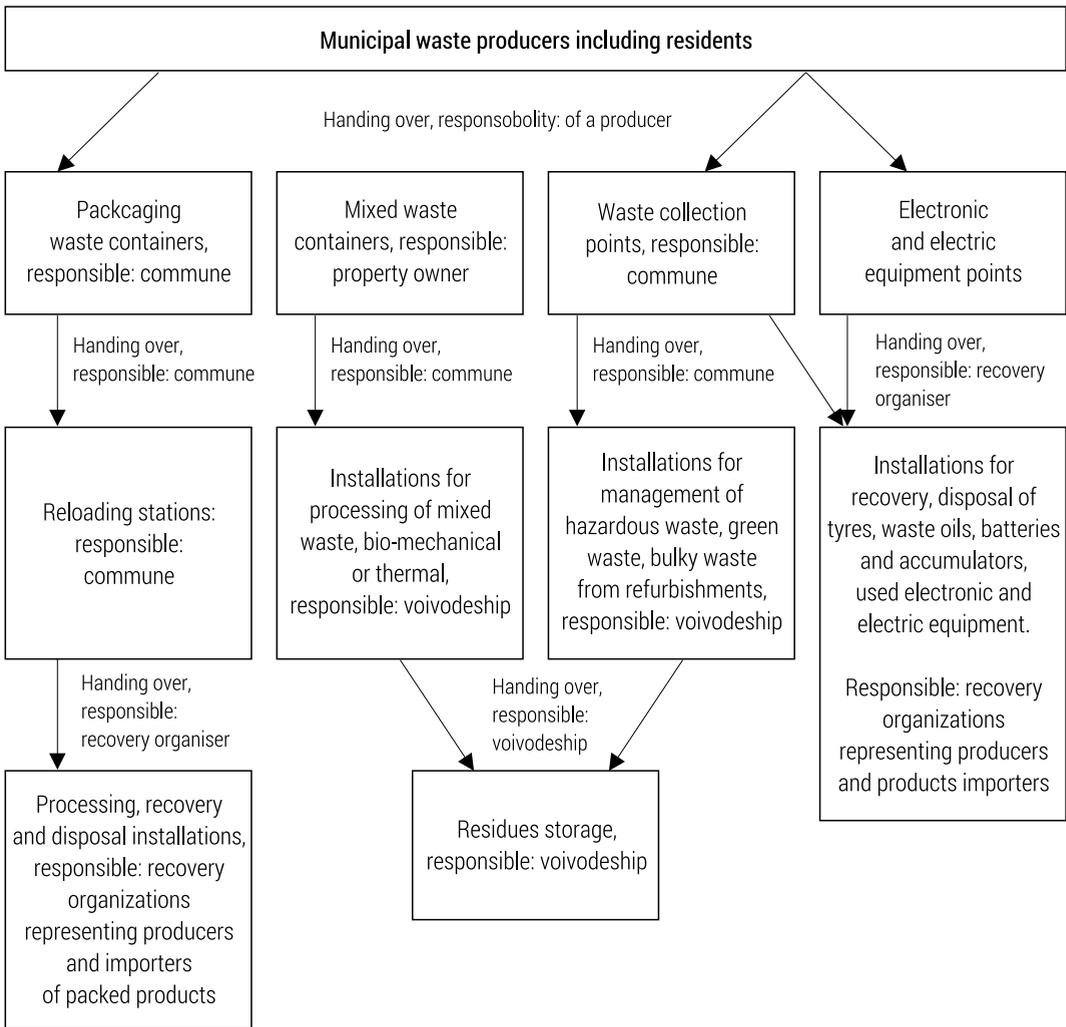


Figure 2. Waste creation responsibility principle

Source: author's own work.

that is collected and transported the said rule applies (figure 2) (Starkowski, Bardziński, 2017).

This information doesn't relate to entrepreneurs that deal with waste disposal and recovery. Basically, the rule applies to waste producers as its main aim is to reduce the amount of produced waste which also made it important for local authorities.

Every property owner, irrespective of the legal form including entrepreneur and commune may be waste producer.

2. Priority of waste recovery principle. The principle refers to communes, entrepreneurs and property owners. Waste holder, which is a commune as a civil legal entity, entrepreneur and an owner of a property, is obliged to deal with waste in a way that conforms to the principles of waste management, environmental protection requirements and waste management plans. First, it is required that waste recovery takes place and if due to technological reasons it's not possible or unjustified ecologically, waste should be disposed of in accordance with environment protection requirements and waste management plans. Where it was not possible to recycle waste it should be disposed of in a way that enables warehousing of waste that couldn't be disposed of in other manner due to technological reasons, or it was either ecologically or economically unjustified. Pursuant to the principle, a commune which a civil law relation subject, needs to abide by the regulations set forth by its authorities and a commune waste management plan. In case of property owner (individual or aggregate) should sort and recover waste and only when these actions are not possible shall he dispose of it. The same rule applies to entrepreneurs (Srokosz et al., 2011).
3. Principle of waste recovery and disposal at the place of its production (Franczyk et al., 2005). Waste should firstly undergo recovery after its sorting, and then may be disposed of at the place of its production. Waste that can't be recovered or disposed of at the place of production, should be transmitted to the nearest waste management facilities that can deal with its recovery or disposal. Mixed municipal waste, residues of municipal waste sorting and sewage sludge may undergo recovery or disposal in other municipality if a distance between the place of waste production and recovery or disposal facilities which fulfill technological standards, is smaller than a distance to waste management facility within the boundaries of the same municipality.
4. Proximity principle expressed in subjecting waste to recovery or disposal first, at the place of its production or transmitting waste to the nearest plants that provide recovery or disposal at high technological level, according to Environmental Protection Law of 27 April 2001 (Journal of Laws of 2208 No. 25 item 150 as amended).
Waste producer may manage it using own means or transmit it to other holder as long as the other producer or waste holder meets formal requirements (obtained waste management permit or is released from the obligation to obtain such permit).
Waste producer or subsequent waste holder is responsible for appropriate waste management as long as it is authorized to perform waste man-

- agement or is entered into a register of subjects exempted from authorizations kept by a district mayor.
5. Polluter pays principle – costs of waste management are incurred by primary waste producer, current or previous waste holder. Member states may stipulate that costs of waste management are in whole or in part assigned to goods producer or products dealers.
 6. The principle of proximity and self-sufficiency. The relevant local legal act within the territory of commune is rules of cleanliness and order that determines detailed principles of keeping a commune clean and tidy. It is a general act, passed compulsory by a Commune Council, referring to duties of the commune and all subjects performing activities within the commune boundaries. Basic issue that rules of cleanliness and order relates to is defining the scope of selective collection and pick up of municipal waste. Member States shall take appropriate measures (alternatively in cooperation with other Member States) to establish an integrated and adequate network of waste disposal installations that will deal with mixed waste recovery. Network should be designed in a way that would allow the European Union as a whole to become self-sufficient and Member States to reach the same goal gradually. Network needs to enable mixed municipal waste recovery or disposal in the nearest waste management installation by means of the most appropriate methods and technologies in order to ensure a high level of protection for the environment and public health (Srokosz et al., 2011).
 7. Principle of selective collection and waste pick up. A legal basis for the said principle is article 4a of the amended Act on Maintaining Cleanliness and Order in Communes of 1 February 2015. The regulation introduced an optional delegation for the Minister of the Environment to set out in a regulation (Starkowski, Bardziński, 2017):
 - detailed manner of selective collection of waste fractions and determining when a requirement of selective collection is met,
 - municipal waste subject to selective collection among the depicted one in the article 3b paragraph 1 and article 3c paragraph 1. Ministry of the Environment introduced a provision in regulation that sets out in what situations an obligation of selective municipal waste collection is fulfilled. The decisive criteria in this case would be weight of separately collected waste in a month. If such waste constitutes at least 50% of total waste weight, then the said obligation is treated as fulfilled. A legal basis of this principle which is an article 4a of the amended Regulation, excludes any possibility of municipal waste collection at source in a double container system (broken down into “wet” and “dry” fractions). A duty of selective waste collection is met by communes that provide for a duty of separat-

ing the following types of waste from total waste weight in rules of cleanliness and order:

- paper, cardboard and paper, cardboard packaging,
- metals and metal packaging,
- plastic and plastic packaging,
- multi-material packaging,
- glass and glass packaging,
- biodegradable municipal waste including biodegradable packaging and greek waste,
- overdue medicines and chemicals,
- used electronic and electric equipment,
- waste batteries and accumulators
- furniture and other bulky waste,
- used tyres,
- construction and demolition waste which is municipal waste.

Currently there are three models of selective waste collection “at source”, among which commune may choose one (Starkowski et al., 2012):

1) **Model I** – collecting the following waste fractions on separate bags and containers:

- paper,
- metals,
- plastic (including multi-material packaging),
- glass.

2) **Model II** – collecting the following waste fractions on separate bags and containers:

- paper,
- metals,
- plastic (including multi-material packaging),
- glass,
- biodegradable vegetable waste.

3) **Model III** – collecting the following waste fractions on separate bags and containers:

- paper,
- metals,
- plastic (including multi-material packaging),
- glass,
- biodegradable vegetable waste,
- ash from households.

Due to that, glass-cardboard, glass-plastic and glass-metal are excluded from an aggregate collection. Paper and glass waste should be collected separately as the Ministry informs. As a consequence every property owner has

4 types of waste collected from: mixed, paper, glass, plastic with metal and multi-material packaging. In case of Model II and Model III the Ministry allows collecting ash from households only during heating season. At the same time, separate ash collection is suggested by the department. Prior to being placed in a container or a bag, packaging waste should be empty but not necessarily cleaned.

Colors of bags and containers

Pursuant to the Regulation, colors of containers and bags intended for selective waste collection are determined (figure 3) (Starkowski et al., 2011):

- BLUE containers and bags labeled: "PAPER AND CARDBOARD",
- GREEN containers and bags labeled "GLASS" – if glass is collected in aggregate,
- GREEN containers and bags labeled "COLORED GLASS" – if collected glass is divided into white and colored,
- WHITE containers and bags labeled "WHITE GLASS if collected glass is divided into white and colored,
- YELLOW containers and bags labeled "METALS" or "PLASTIC" or "MULTI-MATERIAL WASTE" or "DRY WASTE",
- BROWN containers and bags labeled "BIODEGRADABLE VEGETAL WASTE",
- BLACK containers and bags labeled "MIXED WASTE".

Simultaneously, the Regulation allows the Commune Council to introduce additional colored containers intended for collecting other municipal waste fractions" (Rosik-Dulewska, 2010). In municipal waste management the most often used containers are the ones of a capacity 120, 240 and 1100 liters (Starkowski et al., 2012).

Rules of storage (warehousing) and waste sorting

Act of 14 December 2012 on Waste, determines waste storage that is compliant with environment protection and human health safety. The storage of waste in repositories is being gradually replaced with various methods of waste disposal. This transformation is important in order to keep sustainability of waste management. In a short perspective, there are plans of closing all waste landfills, reducing the amount of waste that needs to be stored and increasing scale of waste disposal. Finding a proper location for a landfill is difficult due to the presence of outbuildings. People tend to be scared for their health and the condition of land and soil around. Choosing a location needs to be supported by appropriate economic, operational and environ-

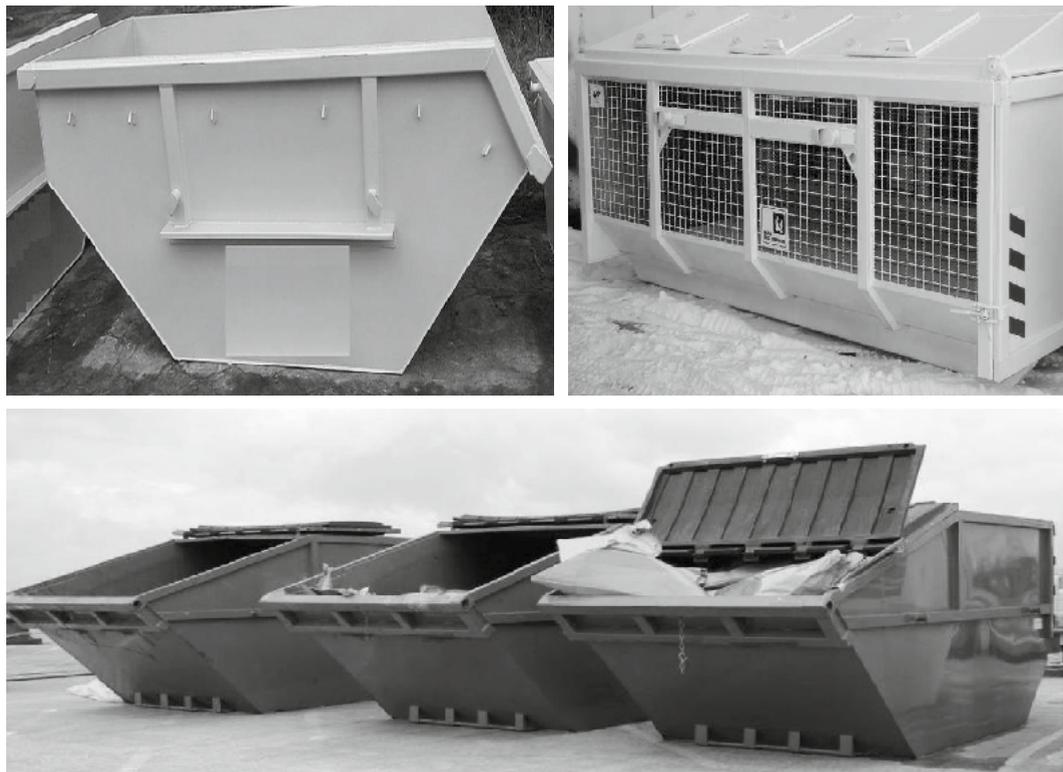


Figure 3. Containers used for selective waste collection

Source: author's own work.

ment protection criteria (Rosik-Dulewska, 2010). Storage has to be carried out in a selective way, however in certain cases there is a possibility of storing waste in a non-selective manner, which is regulated by the legal act (Ordinance of the Minister of Economy on types of waste not subject to selective storage in landfills). Environment protection regulations determine requirements that are to be met in connection with waste storage. The process should be carried out in accordance with environment protection and human health protection rules, in particular in a way that accounts for physical and chemical properties of waste (i.e. physical state, qualities that make waste hazardous and possible treats it may cause). Proper storage has to protect environment from penetration of contamination to water and soil (liquid waste is particularly dangerous).

Penalties for infringements and irregularities in waste management

The State Inspection of Environmental Protection is a basic institution that controls the issues connected with waste management. Activities undertaken by the inspector of SIEP are twofold. It may take place as a planned audit with prior notification of the undertaking or non-scheduled audit performed by the inspector. Pre-audit notification results from provisions of article 79 paragraph 1 of Act on freedom of economic activity of 2 July 2004 (Journal of Laws of 2015 item. 584) and pertains solely to scheduled and non-scheduled audits other than interventions. In case of a scheduled audit (notification sent through registered letter accompanied by an acknowledgment of receipt) an inspector may initiate an audit no sooner than 7 days and not later than 30 days from the receipt of the notice. The said provision can be found in article 79 paragraph 4 of the above mentioned Act. The Inspected Entity is obliged to indicate in writing a person authorized to represent the undertaking, especially in the absence of the controlled party (art. 80 par. 3). The audit focuses on complying with provisions and administrative decisions in the scope of environment protection. On the day of an audit the inspector submits a permission to carry out an audit and makes an entry in a control book of an undertaking. The situation looks different in case of an intervention control. It is carried out without notification due to direct life, health or environment threatening or may be indispensable to prevent environmental offences. The audit covers complying with the regulations and administrative decisions in the scope of environmental protection. The inspector of the State Inspection of Environmental Protection makes an entry in a control book of an undertaking and submits the permission to carry out an audit within 3 days.

A period of 5 years may be subject to an audit which checks as well the scope of use of the environment. It refers to waste production, keeping waste records, waste storage, delivery of waste to receivers, collection and transport of waste, waste recovery, possession of procedural legal regulation in the range of waste generation, waste management, extraction of surface and groundwater, sewage disposal, procedural legal regulations of gas and dust emission, noise emission in the environment, dealing with genetically modified organisms, packaging and packaging waste, product fees, dealing with ozone-depleting substances, recycling of end-of-life vehicles, used electronic and electric equipment, using natural fertilizers, timely and reliable submission of data on type and amount of produced waste and list of the environmental use. The findings observed during the inspection are recorded in a protocol. Every act connected with environmental protection provides for

fines. Criminal sanctions may take a form of a custody or a fine or an administrative financial sanction which seems to be the most severe one. A penalty notice is given to an undertaking representative – an owner or an appointed person. Administrative financial sanction is used on the basis of administrative proceeding. The inspector is authorized to impose fines by way of a penalty notice for serious environmental offences. A detailed list of offences that are covered by Inspection is included in the Regulation of the President of the Council of Ministers of 13 September 2002 on awarding authority to impose fines by way of penalty notice by inspectors (Journal of Laws No. 151 item. 1253 as amended) (Regulation of the Minister of Economy on types of waste not subject to selective storage in landfills). It is worth noticing that if waste carrier has a permission to transport waste, collection and storage in order to have a full load is impossible. If an undertaking wishes to have waste reload and storage base, it is an obligation to obtain a permission to deal with waste which is waste collection authorization. Ignorance of an entrepreneur may be severely punished and unawareness of provisions does not relieve from the responsibility. In case when an entrepreneur produced waste in a year but did not submit a yearly report on type and amount of waste and methods of waste management, did that in untimely (after 15 March for a previous reporting year) or incorrect manner, the provincial environmental protection inspector levies a financial penalty of 500 PLN. In case where an entrepreneur does not submit a missing yearly report, in spite of being given post-inspection recommendations issued by the State Inspection of Environmental Protection, another fine of 2000 PLN will be imposed. Administrative penalty may be imposed numerous times, however a yearly total amount of fines cannot exceed 8 500 PLN. Data mentioned before indicate how many subjects are given administrative pecuniary sanctions for violations of conditions of the use of the environment.

Conclusions

Currently, the legislator introduced an obligation for the communes to organize waste management and collection from every property owner. Due to that, communes are equipped with legal instruments compliant with the Act of 2012 that enable them to perform the tasks.

Among the instruments, local legal acts are particularly significant, as their aim is to determine principles of waste collection in the commune. Commune residents may use administrative legal instruments and the relation between the commune and an entrepreneur that collect waste is regulated (with inclusion of its civil-legal personality) by an agreement on waste

collection. Provisions concerning waste management in Poland have been binding for a few years so far, however many problematic issues in relation between the commune and municipal company still arise. Another parts of the article will focus on this matter.

The contribution of the authors

Dariusz Starkowski – 50%

Paweł Bardziński – 50%

Literature

- Act of 14 December 2013 on waste (Journal of Laws of 2015 item. 87)
- Altwater Piła Grupa EnerisSurowce (2017), *Materiały reklamowo-szkoleniowe przedsiębiorstwa*
- Bilitewski B., Wagner J., Reichenbach J. (2010), *Sprawdzone metody gospodarowania odpadami komunalnymi*, Opole
- Franczyk J. et al. (2005), *Gospodarowanie odpadami i substancjami niebezpiecznymi. Tom 1. Ustawodawstwo, składowanie odpadów, transport towarów niebezpiecznych, dokumentacja*, Kraków
- Jerzmański B., (2012), *Gospodarka odpadami komunalnymi – nowe zasady*, „Przegląd Komunalny” No. 9
- Kisperska-Moroń D., Krzyżaniak S. (2009), *Logistyka*, Poznań
- Notice of the Marshal of the Sejm of the Republic of Poland on 7 November 2016 on announcing a consolidated text of an Act on waste Journal of Laws of 2016 item. 1987
- Regulation of the Minister of Economy on types of waste not subject to selective storage in landfills of 16 January 2015 (Journal of Laws 2015 item. 110)
- Regulation of the Minister of Health on detailed manner of medical waste treatment of 30 June 2010 (Journal of Laws 2010)
- Regulation of the Minister of the Environment of 12 December 2014 on types of waste and quantities of waste for which no obligation to keep waste records (Journal of Laws 2014 item. 1974)
- Rosik-Dulewska C. (2010), *Podstawy gospodarki odpadami*, Warszawa
- Srokosz T. et al. (2011), *Gospodarka odpadami komunalnymi Raport*, Katowice
- Stanisławska I., Bardziński P., Kalka J. (2015), *Od umowy do utylizacji, czyli kompleksowa gospodarka odpadami komunalnymi po nowelizacji ustawy o utrzymaniu czystości i porządku w gminach*, Poznań
- Starkowski D., Bardziński P. (2017), *Analiza procesu przewozowego odpadów komunalnych. Część pierwsza – Międzynarodowe przepisy prawne*. „Czasopismo Ochrona Środowiska i Zasobów Naturalnych” No. 1(71) Vol. 28, p. 1-8
- Starkowski D., Bardziński P. (2017), *Analiza procesu przewozowego odpadów komunalnych. Część druga – Krajowe przepisy prawne*. „Czasopismo Ochrona Środowiska i Zasobów Naturalnych” No. 1(71) Vol. 28, p. 1-5

- Starkowski D., Bardziński P. (2017), *Formal and legal conditions of municipal waste transport planning*, „Inżynieria i Ochrona Środowiska” No. 3, p. 399-420
- Starkowski D., Bardziński P. (2017), *Zasady gospodarki odpadami na przykładzie przedsiębiorstwa Altvater Piła Group Eneris*, „Inżynieria i Ochrona Środowiska” No. 20(4), p. 473-495
- Starkowski D., Bieńczak K., Zwierzycki W. (2011), *Samochodowy transport krajowy i międzynarodowy. Środowisko pracy kierowcy i logistyka*, Poznań
- Starkowski D., Bieńczak K., Zwierzycki W. (2011), *Samochodowy transport krajowy i międzynarodowy. Przepisy w transporcie drogowym*, Poznań
- Starkowski D., Bieńczak K., Zwierzycki W. (2011), *Samochodowy transport krajowy i międzynarodowy. Przepisy prawne*, Poznań
- Starkowski D., Bieńczak K., Zwierzycki W. (2012), *Samochodowy transport krajowy i międzynarodowy. Transport kołowo – drogowy*, Poznań