

Sectoral Qualifications Framework for Waste Management



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Author of Part I:

Dawid Dymkowski

Authors of Part II:

Anna Araminowicz, Anna Czechowska, Jacek Dach, Dawid Dymkowski, Ryszard Gola-Sienkiewicz, Damian Kuznowicz, Paweł Lachowicz, Dominik Macioł, Mateusz Panowicz, Wiesław Pasierbek, Jacek Połomka, Mateusz Przywara, Ewa Rakowska, Magdalena Słocińska, Daniel Stawecki, Elżbieta Streker-Dembińska, Piotr Szewczyk, Waldemar Szygenda, Tomasz Szymkowiak, Włodzimierz Urbaniak, Robert Wawrzonek, Jacek Wodzisławski, Jerzy Zając

Consulting experts:

Monika Drzymulska-Derda, Katarzyna Trawińska-Konador, Andrzej Żurawski

Editing and proofreading:

Elżbieta Łanik

English translation:

Barbara Przybylska

Cover photo:

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Cover and layout design:

Wojciech Maciejczyk

Layout:

Marcin Broniszewski

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Introduction

Reducing the effects of environmental degradation and combatting the negative consequences of climate change are extremely important issues today in the policies of individual countries as well as constituting an important subject of scientific research. They also play a significant role in the lives of individuals, even determining their lifestyle (the trend of being environmentally-friendly). The public has been expressing increasing interest in environmental issues. Growing awareness of environmental degradation in many countries is accompanied by a bitter reflection: the responsibility for this state of affairs lies with the actions of people. Fortunately, the drive to halt the current degradation of the natural environment has become so important that, in some respects, the 21st century may become known as “the century of environmental protection”. Its first twenty years have resulted in a number of legislative initiatives in the field of environmental protection.

One important measure to prevent environmental destruction is waste management. Attitudes on this issue have evolved over the centuries. The first initiatives for the planned cleaning of cities of what was no longer useful can be traced back in Europe to antiquity. In the Middle Ages, the fear of future epidemics led to a series of debates on fundamental sanitary issues that had yet to be solved. As a result, special units were introduced in some countries to collect and dispose of waste. Over the following centuries, industrial revolutions resulted in the rapid growth of cities in Europe and, with this, the production of enormous quantities of waste. Today, we better understand that unrestricted human consumer and industrial activities generate a linear increase in waste. Thus, the modern approach to waste management implies a transition to a circular economy.

The transformation of national economies towards a circular economy is a prerequisite to maintaining modern environmental standards. Closing the loop takes place by minimising waste generation and treating it as secondary raw materials, to be used again in production. The basic strategic document in Poland concerning the handling of waste is “The Roadmap for Transformation Towards a Circular Economy” (2019). This document addresses various sectors of the economy, but primarily waste management. Implementation of its premises is connected with the need to prepare qualified personnel. Implementing the current objectives defined in the document impel us to take urgent actions in education and development to transform the labour market as well as formal and non-formal education in this sector.

In order to meet these challenges, we must first identify and organise the workforce competences that are required in the waste management sector. For this purpose, the Sectoral Qualifications Framework for Waste Management (hereinafter SQF WM) was developed. The Sectoral Qualifications Framework is one of the solutions offered by the Integrated Qualifications System (hereinafter IQS), implemented in Poland under the Act of 22 December 2015 on the Integrated Qualifications System (Journal of Laws of 2020, item 226). The sectoral framework is a description of competences functioning in a given sector and relevant to a given industry. The main concept adopted in developing a framework is to work with representatives of the sector – the framework is to be created “by the sector for the sector”, that is, for all the entities connected with it. This means, that the process of framework development involves a wide group of employees and representatives of the sector, who become both the creators and addressees of the developed provisions of the framework. These include: businesses, trade unions, industry chambers and professional organisations, representatives of vocational and higher education as well as regulatory institutions. Working on the framework is an opportunity to discuss the competences and qualifications needed in the sector and enables information to be exchanged between its representatives. A draft SQF is developed by a team of experts from the given sector and then consulted with its representatives. One of the most important elements of the work on the SQF is the definition of sectoral determinants, which group competences in the key areas of the sector’s activity. They also help to organise the descriptions of competences at individual SQF levels. The SQF levels must correspond to the levels of the Polish Qualifications Framework, but should reflect the specificity of the sector. Although theoretically a sectoral framework can reflect all levels of the PQF, the work done so far shows that the target number of described levels depends on the industry and is decided by its representatives. By the end of 2021, seventeen sectoral qualifications frameworks were established in Poland, among which five have been formally incorporated into the IQS. These are the SQFs for sport, tourism, construction, development services and trade.

This publication presents the activities undertaken to develop the Sectoral Qualifications Framework for Waste Management. The first chapter describes the characteristics of the waste management sector, the premises of the project constructing the sectoral framework and the people involved in its development. The second chapter is a brief description of the activities conducted. It contains information on the changes made to the definition of the sector and its scope, as well as on the tasks performed in the individual stages of work on the framework. The following chapter shows how the framework itself

was constructed, discussing its individual components – from level descriptors to competence series. The fourth chapter provides recommendations on the implementation and use of SQF WM.

The following are definitions of some of the terms used in this publication (based on Sławiński, 2017; Szymczak, Trawińska-Konador, Żurawski, 2020):

SQF level descriptors – a set of general statements describing the knowledge, skills and social competence required for qualifications at a given SQF level.

Learning outcomes – the knowledge, skills and social competences acquired in the learning process. This concept can be explained as follows: learning outcomes consist of what a person knows and understands, is able to do, as well as the commitments a person is prepared to fulfil. Individual learning outcomes can be specific to a given qualification or universal; they can, for example, refer to what are known as key competences or to general professional competences.

Qualification – a set of learning outcomes encompassing knowledge, skills and social competence acquired in formal and non-formal education as well as through informal learning, meeting the requirements determined for the given qualification. Attainment of the required learning outcomes for a given qualification is assessed through validation and formally confirmed by an awarding body.

Polish Qualifications Framework (PQF) – description of eight levels of qualifications distinguished in Poland, which correspond to the specific levels of the European Qualifications Framework. The descriptions present the general characteristics (known as “descriptors”) of the learning outcomes assigned to each level in the categories of knowledge, skills and social competence.

Polish Qualifications Framework level – the scope and complexity of the learning outcomes required for a qualification, to which a given PQF level is attributed, formulated with the use of the general characteristics (known as “descriptors”) of learning outcomes.

Sectoral qualifications framework – description of the levels of qualifications functioning in a given sector or industry; sectoral qualifications framework levels correspond to the relevant levels of the Polish Qualifications Framework.

Competence series – a series of descriptors from different SQF levels that relate to the same determinant and are in the same category of learning outcomes (e.g., knowledge).

Sectoral determinants – key competence areas in a given sector.

Integrated Qualifications System (IQS) – a national system of required standards and principles defined in the IQS Act on: describing qualifications, assigning Polish Qualifications Framework levels to qualifications, the principles of including qualifications in the system and making information about qualifications available in the Integrated Qualifications Register (IQR), as well as the principles and standards of awarding qualifications and their quality assurance.

Part I

Developing the Sectoral Qualifications Framework for Waste Management (SQF WM)



1. The context of developing SQF WM

1.1. Characteristics of the waste management sector

1.1.1. Organisational structure of waste management in Poland

The structure of the waste management sector in Poland is formed by the entities operating in it and their interactions. Government institutions regulating the activities and relations between the entities in the sector include: the Ministry of Climate and Environment, the Ministry of Development and Technology, the National Fund for Environmental Protection and the Chief Inspectorate of Environmental Protection (Klaster Gospodarki Odpadowej i Recyklingu, 2020). Factors influencing the waste management system in our country include: the tax system, lobbyists representing the interests of various groups, as well as functioning health and safety regulations (Klaster Gospodarki Odpadowej i Recyklingu, 2020). Polish legislation distinguishes four types of entities involved in waste management: the producer, the holder, the seller and the waste broker (Zębek, 2018).

Current laws maintain that the waste holder has the main responsibility for proper waste management. Its tasks include keeping quantitative and qualitative records of waste on an ongoing basis. The waste producer can manage its own waste or can be exempted from this obligation (this occurs when the waste producer contracts out waste management to another authorised entity). The seller of waste and the intermediary in waste trade are not responsible for waste management if they are not waste holders.

1.1.2. Structure of the companies in the sector

A total of 8,865 businesses are registered in the waste management sector (Sector Skills Council for Materials Recovery, 2019). Among them, 4,512 were active in the materials recovery sector in 2018, while a year later, this figure was 4,738, including 298 public sector enterprises and 4,440 private sector firms (Główny Urząd Statystyczny, 2020). The sector is dominated by medium-sized companies with 50 to 249 employees, accounting for almost 50% of all such enterprises (Polska Agencja Rozwoju Przedsiębiorczości, 2020). The highest activity of firms is seen in the Mazowieckie, Śląskie and Wielkopolskie Voivodeships (Sector Skills Council for Materials Recovery, 2019). The value of the total production of all companies in the sector in Poland in 2018 was estimated at 26.8 billion PLN (Polska Agencja Rozwoju Przedsiębiorczości, 2020).

1.1.3. Structure of waste in Poland

In 2018, 128 million tonnes of waste were generated, of which 12.4 million tonnes were municipal waste (Główny Urząd Statystyczny, 2019). More than 80% of the municipal waste was generated by households. The remaining percentage came from trade, small businesses, offices and institutions. Selectively collected waste accounted for about 28% of all municipal waste (Moskwik, Krupa, Roszkowski, 2020). The rate of waste generated per capita in 2018 was 325 kg; the highest rate was recorded in the Dolnośląskie Voivodeship (Główny Urząd Statystyczny, 2019). About 57% of all municipal waste was earmarked for recovery. The remainder was designated for disposal, of which less than half (42%) was sent to landfills (Główny Urząd Statystyczny, 2019). Municipal waste is handled by about 700 entities, including local government and private companies with domestic and foreign capital. About 300 of these firms are involved in waste management, 200 are regional facilities (Regionalne Instalacje Przetwarzania Odpadów Komunalnych [Regional Municipal Waste Processing Facilities]), 100 entities are sorting plants and 6 are incineration plants (Sector Skills Council for Materials Recovery, 2019).

Industrial waste (115.5 million tonnes) originates from various economic activities. In 2018, as in previous years, the main sources of industrial waste were mining and extraction (53.2%), industrial processing (22.6%) as well as manufacturing and supplying electricity, gas, steam and hot water (15.9%) (Główny Urząd Statystyczny, 2019). Similarly, the largest part of this waste was generated in the voivodeships where the mining industry is located – Dolnośląskie and Śląskie. Slightly more than half (51%) of the industrial waste generated in 2018 was recovered, 43% was landfilled and the rest was disposed of in some other way (Główny Urząd Statystyczny, 2019). Construction and industrial processing recorded the highest percentage of recovered industrial waste. Landfilling, on the other hand, was most common for waste from mining and extraction and from the electricity, gas and heat industry (Moskwik, Krupa, Roszkowski, 2020). More than 5,000 entities handle industrial waste, some of which also manage municipal waste (Sector Skills Council for Materials Recovery, 2019). Over half transfer their generated waste to external entities for management; the remaining part of the waste is subject to internal recovery processes at the production plant (Moskwik, Krupa, Roszkowski, 2020).

1.2. Identifying competences and qualifications for SQF WM

In 2018, the waste management sector employed 70,700 people (Polska Agencja Rozwoju Przedsiębiorczości, 2020). Data from recent years indicate that the level of employment in the sector has increased annually by 2,000 – 3,000 workers. It is estimated that the sector will employ about 73,000 people in 2025 (Sector Skills Council for Materials Recovery, 2019). The data obtained from the study “Analysis of competences and qualifications in the materials recovery sector” showed that the competence threshold for entering the sector is low, and new employees often are lacking the knowledge and skills of the sector. They acquire them only while performing their jobs, drawing on the experience of their colleagues, or they find the necessary information for their work on their own. Some newly recruited employees also have the opportunity to broaden their competences through participation in training or courses paid for by their employers. It should be emphasised that the sectoral framework includes specialised competences relating to the operation of the machinery and equipment used for waste treatment. Some of these machines and equipment are strictly sectoral, e.g., separators used in waste sorting. There are also proprietary devices, specially designed and built by a given entity for its own purposes and intended for processing only a specific type of waste. Important competences also include communication skills, both in terms of working in a team and with external customers, as well as those relating to maintaining safety.

SQF WM is envisioned as a tool enabling the comparison of qualifications in the sector, as well as for:

- 1) identifying key competence areas relevant to the current and future labour market for waste management;
- 2) developing education and training programmes meeting the current needs of the labour market;
- 3) creating a positive image of the sector in society, including among learners and those planning their professional path;
- 4) establishing competence standards in the sector;
- 5) improving recruitment by hiring appropriately qualified employees;
- 6) designing career paths for the sector’s employees and managing the development of their competences in the industry.

1.3. Premises and aim of SQF WM

The main objective of developing the SQF for Waste Management was to develop a universal, simple tool that would clearly indicate the competences needed to perform tasks in planning, organising, implementing and supervising processes relating to waste management and waste prevention, as well as to conduct educational activities in this area.

SQF WM meets the requirements set forth in the IQS Act – above all, this means that it is consistent with the premises of the Polish Qualifications Framework and of the Integrated Qualifications System (IQS) in the following ways:

- SQF WM descriptors further develop the stage 2 level descriptors typical of vocational qualifications and are formulated in the language of learning outcomes, organised in the categories of knowledge, skills and social competence.
- SQF WM descriptors describe the progression of requirements in knowledge, skills and social competence that are key for the waste management sector.
- Individual components of the level descriptors are constructed in such a way as to define the minimum level of required competences, contain only descriptions of those competences whose acquisition can be confirmed, and are indispensable to the performance of tasks essential to the sector at the described degree of difficulty.

SQF WM, in accordance with the conditions defined in the IQS Act, takes into account the needs of the waste management sector, and has been developed by its representatives and industry experts. This means that:

- The team of experts developing the framework has expertise in the waste management sector and knows how to develop qualifications and education and training programmes in response to the needs of the sector.
- Work on SQF WM was performed with the participation of representatives of key groups from the sector, including, among others, entrepreneurs, employees, representatives of industry organisations, training institutions, trade unions, etc. The initial draft of SQF WM was reviewed by the industry's community.
- SQF WM level descriptors take into account key competences in the sector and the specificity of the waste management sector served as the context for their development.

1.4. Entities and people responsible for developing SQF WM

A consortium consisting of EPRD Biuro Polityki Gospodarczej i Rozwoju Regionalnego Sp. z o.o. [EPRD Policy & Development Ltd.] (Leader), Abrys Ltd. (Partner) and MABEA Ltd. (Partner) worked on developing SQF WM.

1.4.1. EPRD Policy & Development Ltd.

EPRD Policy & Development Ltd. is a consulting company, working for over 25 years with experts from various industries, providing advisory and training services to the public sector, international corporations, small and medium-sized enterprises and non-governmental organisations. It works on the development of broadly-understood entrepreneurship in Poland and abroad. EPRD led the development of four sectoral qualifications frameworks: for agriculture, the chemical industry, energy and the real estate sector; it also participated in preparing the descriptions of ten market qualifications for the chemical industry.

1.4.2. Abrys Ltd.

Abrys Ltd. has been supporting public and private sector entities in the fields of environmental protection, climate and rational resource management since 1988. It organises international and national conferences on environmental protection and municipal management, including the International Environmental Protection Congress ENVICON. It also organises training, study tours, conferences and webinars, as well as debates with industry experts on environmental protection. It publishes four industry magazines: "Przegląd Komunalny", "Energia i Recykling", "Wodociągi-Kanalizacja" and "Zieleń Miejska" and operates its own website www.portalkomunalny.pl. Abrys also implements national educational projects and competitions. It provides environmental consulting and advisory services.

1.4.3. MABEA Ltd.

MABEA Ltd. is involved in various activities relating to the development of the qualifications system. MABEA's team has experience in conducting sectoral competence analyses, and has participated in developing Sectoral Qualifications Frameworks for the fashion industry, agriculture, the chemical industry, energy and real estate. They also prepared descriptions of market-based qualifications, e.g., in the fields of environmental protection, the chemical industry, sales and customer service, administration and management.

1.4.4. Members of the expert team

SQF WM was developed by a team of experts specialising in the waste management sector, as well as in the development of qualifications, education and training programmes for waste management in Poland and abroad. They also have basic knowledge about the PQF and IQS principles in Poland. The work of the expert team was led by Piotr Szewczyk, Director of the “Orli Staw” Municipal Waste Neutralisation Plant, Chairman of the Council of Representatives of Regional Municipal Waste Processing Facilities and member of the Sector Skills Council for Materials Recovery. As the project’s substantive director, he was responsible for monitoring work progress, moderating expert discussions, determining the need to collect additional opinions and providing the final acceptance of the results of the work. Mr. Szewczyk was also responsible for ensuring that the material developed for SQF WM was correct for the waste management sector and that the expert team worked effectively.

When assembling the team of experts, particular attention was paid to ensuring that the persons invited to participate represented different segments of the sector: waste collection, processing and disposal. Care was taken to include persons specialising in various processes, e.g., dismantling electrical equipment, conducting biological waste treatment processes or energy recovery. The team included representatives of companies operating in the waste management area, institutions involved in education for the sector, as well as industry associations. A representative of a local authority responsible for organising the waste management process was also invited to join the expert group.

Experts specialising in issues relating to the implementation of the IQS, particularly with experience in developing Sectoral Qualifications Frameworks, were also involved. Their task was to develop materials on the premises of the PQF and SQF for expert team members and to introduce these concepts to them. They were also responsible for using the correct methodology in the work performed and providing experts with the required methodological support during the development of the sectoral qualifications framework.

Below is a table with the names of the sector’s representatives who took part in developing SQF WM as expert team members.

Table 1. Members of the expert team developing the proposed SQF for Waste Management

REPRESENTING:	No.	FIRST AND LAST NAMES
Entities operating in areas connected with and for the benefit of the waste management sector	1.	Daniel Stawecki
	2.	Wiesław Pasierbek
	3.	Elżbieta Streker-Dembińska
	4.	Robert Wawrzonek
	5.	Jacek Połomka
Organisations active in and on behalf of the waste management sector	6.	Jacek Wodzisławski
	7.	Ewa Rakowska
	8.	Jerzy Zając
	9.	Waldemar Szygenda
Institutions providing formal education relating to the sector	10.	Ryszard Gola-Sienkiewicz
	11.	Jacek Dach
	12.	Włodzimierz Urbaniak
Institution providing non-formal education in the field of waste management	13.	Tomasz Szymkowiak
A local government responsible for organising waste management	14.	Paweł Lachowicz
Environmental Protection Inspector specialising in waste management	15.	Dominik Macioł
Experts with knowledge and experience in implementing the IQS	16.	Magdalena Słocińska
	17.	Anna Araminowicz

Source: Own work based on: Araminowicz, Kuznowicz, Słocińska, 2022, pp. 12–13.

Additionally, Anna Czechowska, representing the Sector Skills Council for Materials Recovery was also involved in the work of the expert team.

2. The course of the work on the framework

2.1. Definition of the sector

After obtaining the opinions of those involved in the initial market consultations during the preparatory stage, it was determined that the name of the sector should relate to the name of the industry's sector skills council. Therefore, the definition of the sector and its scope initially referred to materials recovery. The following definition was proposed as a starting point:

The materials recovery sector is part of the circular economy, which includes organising the collection, partial dismantling of used and end-of-life materials, the separation, sorting and processing of reusable materials and the storage and disposal of the remaining materials.

The following elaboration on the definition above was prepared:

The materials recovery sector is part of the circular economy, which includes the dismantling of used products, made up of the dismantling of all types of end-of-life products and equipment, and the recovery of materials from segregated waste, consisting of the processing of metallic and non-metallic waste into secondary raw materials through mechanical or chemical treatment; the separation and sorting of recyclable materials from non-hazardous waste; or the separation and sorting of a variety of materials into different categories, such as paper, plastics, textiles, beverage cans and metal, suitable for recycling and recovery.

Even before the analyses began, the expert team sought to establish mutually understood meanings of the terms used in the two proposals of the sector's definition cited above. The specification of the stages and processes occurring in waste management was key for further work on the framework. The discussions resulted, among other things, in the inclusion of waste transport in the sector. A major challenge was clarifying the meaning of the word "waste". There were doubts as to whether bio-waste should be included and whether hazardous, medical or veterinary waste should be dealt with. In the end, it was decided that all these elements should be included. It was also agreed that education and awareness-raising

on proper waste management is an important aspect of the sector. According to the experts, this element should already be present in the very definition of the sector.

Comments relating to the very name of the sector were also important. As a result of the discussion, experts agreed that the sectoral qualifications framework should cover a broader scope than just materials recovery. Among the expert opinions cited were:

- “Under Polish law, waste management includes waste generation and waste management, so it is a broader concept. Recovery, on the other hand, is a narrower concept and does not include many of the activities included in our operations.”
- “The current name suggests that we are only involved in recycling. However, the issue is much broader.”
- “The sectoral qualifications framework must be consistent with the scope in question, which includes the collection, transport and treatment of waste as well as other activities set forth in the definition of waste management in the Waste Act.”
- “The sectoral qualifications framework for the materials recovery sector should perhaps be part of a broader framework covering waste management as a whole.”
- “The very name ‘materials recovery’ limits the conceptual field and may impose a very narrow understanding of the subject in the qualifications framework”.

In the end, the experts unanimously decided to extend the scope of the framework and change its name. Further comments were made at the stage of consultations with sector representatives, which were also accepted by the expert panel. These included adding issues relating to waste prevention, highlighting the concept of the circular economy and dropping detailed processes implemented in the sector. Ultimately, the name of the framework, its definition and scope were described as follows:

Sectoral Qualifications Framework for the Waste Management Sector (SQF WM)

includes competences required to plan, organise, perform and supervise processes relating to waste management and the prevention of waste generation, to conduct reporting activities, as well as to educate and raise the awareness of residents, entrepreneurs, producers and representatives of state and local government institutions about the circular economy.

2.2. Stages of work on SQF WM

2.2.1. Stage I – the draft framework

The first stage involved the work of the team of experts. Its task was to develop a preliminary draft of the framework. The inaugural event of the team's work was an informational seminar on sectoral qualifications frameworks for representatives of the materials recovery sector in Poland, held on October 1, 2021. During the seminar, experts learned about the substantive issues relating to the Integrated Qualifications System, Polish Qualifications Framework and sectoral qualifications frameworks. They were presented with the methodology of work on the framework, the schedule of activities and guidelines on how the expert team was to operate. It was also an opportunity to exchange first conclusions on the adopted definition and scope of the framework. On the following days, the experts participated in workshops where they analysed preliminary sectoral determinants and discussed the processes implemented in the sector from the perspective of their professional experience. As a result of this work, a preliminary draft of SQF WM was developed.

The next step was to verify the level of detail in the framework's entries. The experts worked to ensure that the descriptors had a similar level of detail, did not exclude or marginalise any area of the sector, and described the competences of all employees in the sector, regardless of the size or legal form of the entity employing people with these competences.

The following stage verified how the individual entries were grouped into competence series. The identified series were analysed in terms of similarities to other series and how they related to one another. Their completeness and level of detail were also assessed.

At each stage of formulating the descriptors of the developed framework, it was crucial to relate individual entries to those of the PQF. Each description of competences in a particular series was referenced to a selected entry from the second stage PQF descriptors typical for vocational qualifications, indicating its compatibility with the PQF. After this, the consistency of the descriptors and their agreement with the premises of the PQF was checked many times.

2.2.2. Stage II – consultations

The aim of the next stage was to consult the solutions adopted in the preliminary SQF WM draft with the industry's community, especially with regard to the adequacy of the sectoral determinants, SQF WM level descriptors and their agreement with the expectations of the sector's stakeholders. The draft SQF WM was also checked in terms of the

language used, terminology, clarity and comprehensibility of the individual entries. Consultation seminars were conducted in the form of webinars, individual interviews were performed using remote communication tools, and an online survey was conducted. In total, more than one hundred people took part in the consultations of the initial SQF WM draft. The schedule of the consultations and number of participants are presented in the table below.

Table 2. Schedule of industry consultations on the SQF WM preliminary draft

Type of Consultation	Date	Number of Participants
webinar consultation no. 1	07.12.2021	9
webinar consultation no. 2	09.12.2021	10
webinar consultation no. 3	14.12.2021	10
webinar consultation no. 4	16.12.2021	11
individual interviews	21–31.12.2021	12
questionnaire survey	14–31.12.2021	54

Source: own work based on Araminowicz, Kuznowicz, Słocińska, 2022, p. 39.

As a result of the comments made by consultation participants, SQF WM descriptors were further modified. The changes introduced at this stage concerned, among others, linguistic and terminological correctness and consistency, as well as supplementing the draft SQF WM with additional competences. The experts formulated new entries or modified existing ones accordingly, verified the coherence of a given series, the completeness of the inclusion of knowledge, skills and social competence, the correctness of the assigned PQF level, and references to PQF codes. The vast majority of participants concluded that the draft SQF WM was complete and reflected the competences of the sector. Moreover, the structure of the framework was considered clear and understandable; the names and descriptions of the determinants were deemed adequate. Areas that the respondents believed required further development related to energy generation/recovery from waste, the operation of biogas plants, as well as gas and energy recovery from landfills. The participants of the consultations also highlighted the need to emphasise issues pertaining to the circular economy and activities promoting knowledge on this topic, e.g., to reduce the amount of produced waste.

2.2.3. Stage III – final version of the framework

The comments collected during the consultations were structured and referenced to different parts of the draft SQF WM. Finally, competences relating to energy recovery and management of other effects of waste management processes were added. The draft was also supplemented with a series of competences entitled “circular economy” and the description of the scope of SQF WM was modified accordingly. As a result of the consultations, only a few modifications were made to the names of some series or descriptions of determinants. The final point of the work on SQF WM was a concluding seminar held during the 13th Conference on “Selective Collection, Segregation and Recycling of Waste” (<https://selektywna.abrys.pl/>). The conference was attended by representatives of local government, state administration, environmental inspectorates and companies involved in the collection, management and recycling of different types of waste.

3. The structure of SQF WM

3.1. Level descriptors

The Sectoral Qualifications Framework for Waste Management contains 7 levels of competences, corresponding to levels 2 to 8 of the Polish Qualifications Framework. The descriptors of the SQF WM levels were developed in such a way that the entries, categorised by knowledge, skills and social competence, do not repeat the same information, but complement each other. In this way, the framework covers the whole spectrum of specific competences required for the key processes in the sector. In order to organise the descriptions of the competences, the level descriptors are presented in series, which are then arranged by sectoral determinants.

3.2. Sectoral determinants

The purpose of the sectoral determinants is to describe the key areas of the sector's activities. The selection of descriptors that best describe the waste management sector was based on a thorough analysis of the sector's competences. The following sectoral determinants were formulated in the categories of knowledge and skills:

- 1) Entities and the market
- 2) Environment (surroundings)
- 3) Technology
- 4) Safety
- 5) Organising the processes implemented in the sector.

Social competence, which is cross-cutting and universal for all areas of the waste management sector, is treated separately. The following determinants were identified for social competence:

- 1) Communication
- 2) Promoting attitudes of environmental protection
- 3) Responsibility.

The **waste, materials and products** determinant covers issues relating to waste, the materials recovered from waste, and products made from waste. It groups and describes the competences relating to knowledge and skills associated with the types of waste, the identification, classification and handling of different types of waste and their treatment

options. This determinant also includes detailed descriptions of the required knowledge and skills relating to the chemicals contained in waste, as well as the properties of waste, materials recovered from waste and products made from waste.

The **technology** determinant describes competences relating to the methods, techniques and procedures used in the sector as well as those associated with the handling and operation of tools, machinery, equipment, process lines and means of transport.

The **safety** determinant groups and describes competences relating to safety, including the hazards arising from the specific nature of waste. The determinant includes descriptions of knowledge and skills required for applying measures to reduce the risk of hazards.

Entities and the market is a determinant containing descriptions of competences relating to the actors involved in waste management, market conditions associated with waste management processes and the competences of monitoring legislative changes and shaping waste management policies. The determinant includes both competences relating to entities conducting waste management processes and the recipients of materials and products generated from waste. The determinant also includes descriptions of competences relating to information and education in the field of conscientious waste management.

The **environment (surroundings)** indicator groups and describes competences relating to the environment, in particular the natural environment, as well as to the impact of the waste management sector on its surroundings. The determinant includes the range of knowledge and skills relating to environmental impact and reducing the sector's negative impact on the environment.

Organising the processes implemented in the sector includes competences relating to the organisation and logistics of activities conducted in the sector and analysing effectiveness. Competences relating to work organisation and activity management are also included in this determinant.

Communication groups and describes competences relating to the readiness to communicate, as well as to establishing and maintaining relations with customers, external entities, representatives of waste management entities, local authorities and legislators.

Promoting attitudes of environmental protection determinant describes competences relating to the readiness to promote attitudes and raise awareness on effective waste management and the prevention of waste generation.

The determinant **responsibility** contains descriptions of competences relating to the readiness to make decisions and assume responsibility for safety, property and the environment. In addition, this area includes competences relating to the promotion of a culture of quality in terms of safety, the environment and operational reliability, among others.

The sectoral determinants ensure the coherence and completeness of the sectoral qualifications framework. They group and describe competences in a given area, which makes it easier to find them in the framework. As a result, the document is easier to use and needed entries can be found more quickly.

3.3. Competence series

SQF WM groups the competences of individual sectoral determinants into series. Each series describes thematically related competences, forming a logical sequence of increasing complexity and difficulty. Competences belonging to one series are always on the same row in the framework, making it possible to trace the progression of requirements. Examples of competence series from SQF WM are shown below.

Figure 1. Examples of competence series included in SQF WM

<p>KNOWLEDGE (KNOWS AND UNDERSTANDS)</p> <p>SERIES NAME: segregating waste</p>	LEVEL 3	LEVEL 4	LEVEL 5	
	the principles of municipal waste segregation	the standards of waste segregation for individual types of materials recovery	the regulations on waste segregation	
<p>SKILLS (IS ABLE TO)</p> <p>SERIES NAME: supervising and assessing the course of waste management processes</p>	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
	sample, measure and record the parameters of waste management processes	monitor the course and assess the correctness of waste management processes	identify irregularities in waste management processes	analyse the causes and effects of irregularities in waste management processes
<p>SOCIAL COMPETENCE (IS READY TO)</p> <p>SERIES NAME: communicating with waste producers (residents, businesses) and external entities</p>	LEVEL 4	LEVEL 5	LEVEL 6	
	communicate with residents and business owners about the waste they generate, adapt the form and content of the message to the recipient	maintain relations with external entities, including subcontractors, research units, media and public services (e.g., police, fire brigade, sanitary and epidemiological inspection)	implement activities that build a positive image of the waste management sector and its entities among customers, contractors, employees, residents and learners	

Source: own work

The arrangement of the competence descriptions forming the SQF WM level descriptors in series and determinants facilitates the use of the framework and ensures its utility and functionality.

4. Recommendations for using SQF WM

SQF WM is a tool that can be used to:

1. Assign a PQF level to a qualification from the waste management sector;
2. Group competences from the waste management sector.

Assigning an appropriate PQF level to a qualification is necessary for its inclusion in the IQS. According to article 21 of the IQS Act, assigning a PQF level consists of comparing the learning outcomes required for a given qualification with the PQF level descriptors.

By adapting its entries to the specificity of the sector, SQF WM is a tool enabling the grouping of competences that can be used to:

1. Describe market qualifications – SQF WM allows sets of competences to be grouped, which can serve to develop the learning outcomes required for a given qualification;
2. Describe job positions – SQF WM enables the identification of the knowledge, skills and social competences required to perform specific tasks, which can constitute the requirements for a given job position; a competence-based job description can be useful in many activities in human resources management, such as recruitment, skills audit, planning career paths;
3. Develop curricula for training, apprenticeships and internships – based on the SQF WM entries, it is possible to develop a training, apprenticeship or internship programme described in the language of learning outcomes;
4. Develop programmes and tools for diagnosing, verifying and assessing competences.

The following are the most important benefits of using the SQF by various groups of framework users, i.e., entrepreneurs (employers), employees and job seekers, representatives of the central administration, local governments and educational institutions.

The implementation of SQF WM can benefit waste management sector employers by:

1. Simplifying and standardising recruitment procedures;
2. Providing the ability to identify key competences needed for particular jobs in the sector; enabling the more efficient preparation of job descriptions and work station instructions;
3. Enabling the delivery of relevant and market-driven apprenticeship programmes, developed on the basis of framework entries;
4. Facilitating the preparation of training plans for employees and employee career paths – with reference to framework entries;

5. Identifying job requirements in line with the sector's standards and preparing clear job offers;
6. Using SQF WM as the basis for developing a competence matrix in the processes of ISO systems implementation;
7. Making it possible to evaluate employees and develop a remuneration system in accordance with the standards of the sector.

Among the benefits to workers and job seekers in the sector are:

1. Facilitating career paths in the industry through the clearly described competence requirements in the framework;
2. Making it possible to determine the level of one's competences on the basis of SQF WM entries;
3. Identifying one's own educational and professional development needs more easily thanks to the clear descriptions of competences.

Central or local government authorities can use SQF WM to:

1. Develop the scope of required training for specific jobs in the sector and the criteria for their financing (e.g., by a ministry);
2. Establish the minimum requirements for the competences of employees in entities conducting a given activity.

The benefits to educational institutions of using SQF WM include:

1. Updating educational services and developing training programmes adapted to the needs of the labour market in the waste management sector and other related industries;
2. Obtaining a tool to facilitate the description of the qualifications that are in demand in the sector;
3. Making it easier to find appropriately qualified training staff;
4. Facilitating the development of recommendations and priority directions for funding and the support of training by the Sector Skills Council for Materials Recovery based on the analysis of competence gaps in the sector's labour market.

The recommendations also include ways of promoting and implementing SQF WM in the sector, such as:

1. Developing examples of the practical use of SQF WM in specific activities and providing such information to individual businesses or institutions;

2. Preparing and publishing (Internet, print) short, concise brochures and informational materials, containing, e.g., examples of using SQF WM in practice: by entrepreneurs, higher education institutions, vocational schools;
3. Directly providing schools and universities responsible for education in the field with the publication of SQF WM;
4. Promoting the SQF among consulting companies and firms implementing integrated quality management systems in companies;
5. Preparing a report on SQF WM or a press publication and presenting the material during a conference with the participation of ministers;
6. Using the portals of the sector, websites of organisations and associations operating in the sector to disseminate information about the framework;
7. Promoting the framework in social media, creating a website dedicated to SQF WM.

Representatives of the sector unanimously recommended that a condition for the usefulness of SQF WM is the periodic updating of its entries, taking into account amended legal standards, technological developments and the opinions of framework users. It is also necessary to monitor how the SQF is functioning and, consequently, how it should be modified to maintain its usefulness. The most common recommendation was to update SQF WM every two years.

5. Instructions for using SQF WM

The proposed SQF WM is a structured set of descriptions of specific and key competences for the waste management sector categorised by knowledge, skills and social competence. The descriptions of competences are grouped thematically and arranged by the complexity and difficulty of the requirements.

Searching for competences in SQF WM

Step 1. Check the scope of SQF WM

The scope of SQF WM indicates the main areas of competence in the waste management sector. An analysis of the very definition of the sector allows for an initial orientation as to whether the sought-after competence is included in this sectoral qualifications framework. In accordance with the principles of developing sectoral qualifications frameworks, SQF WM includes only descriptions of those competences that are specific to the waste management sector. If a given competence is not found among those described in SQF WM, reference should be made to other sectoral qualifications frameworks developed to date, including the SQFs for the chemical industry, agriculture, and the energy sector.

Step 2. Determine the category of the competence

The next step is to specify the category to which the competence being searched belongs. According to the IQS, competences included in sectoral qualifications frameworks are divided into three categories: **KNOWLEDGE (knows and understands)**, **SKILLS (is able to)** and **SOCIAL COMPETENCE (is ready to)**. The Sectoral Qualifications Framework for Waste Management uses the same colour codes as the Polish Qualifications Framework, corresponding as follows: **knowledge – blue, skills – green, social competence – orange**.

Step 3. Choose the sectoral determinant

The descriptions of competences in the framework are arranged by sectoral determinants – the main areas of the sector's activities. Determinants organising competences for knowledge and skills and separate determinants for social competence are distinguished. The description of the determinants enables a framework user to quickly find the competences they are looking for. The sectoral determinants distinguished for SQF WM together with their descriptions are presented in Chapter 3.

Step 4. Select the competence series

Competences within the sectoral determinants are grouped into series. A competence series is a thematically linked set of competence descriptions, forming a logical sequence of entries with increasing levels of required complexity and difficulty. Competences belonging to one series are always on the same row in the framework, which makes it possible to trace the progression of requirements. Each SQF WM series in has a name indicating the thematic scope of the competences. Their names are part of the structure of the framework to facilitate the search for competences. Examples of SQF WM competence series are presented in Chapter 3.

Step 5. Finding the competence

Competence series consist of descriptions of competences ordered by specific PQF levels. Competences are described in SQF WM in accordance with the corresponding levels of Polish Qualifications Framework levels 2–8. However, individual series may not have descriptions of competences at all those levels. If, at a given level, no description of competences was included in the series, it means that the key competences for the sector that could be assigned to this level have not been identified, or descriptions of transversal competences have been defined. The descriptors of each level then need to be reviewed, enabling a description of competences to be chosen that best fits the assumptions made.

Step 6. Further specifying the competence

The descriptors have been formulated in a general way, allowing them to be reflected in the framework of competence requirements for the whole sector. This means that in order to use the competence descriptions from SQF WM in job descriptions, training programmes, qualifications, etc., they should be written with greater precision. Examples of specifying competences are presented in the table below.

Table 3. Examples of how selected SQF WM competences can be further specified

Competence entry in SQF WM	The further specification of the competence
<i>(knows and understands)</i> the regulations specifying the requirements for storing waste, including hazardous waste	<i>(knows and understands)</i> the Regulation of the Minister of Climate of 11 September 2020 on the specific requirements for waste storage
<i>(is able to)</i> monitor the course and assess the correctness of waste management processes	<i>(is able to)</i> assess that the manual sorting of waste on a sorting line is performed correctly

Source: Araminowicz, Kuznowicz, Słocińska, 2022, p. 15.

In order to develop a set of competences, the above steps should be repeated until the set is complete. Note that one set of competences may include those assigned to different determinants and series or correspond to different PQF levels. In addition, a set of competences may also have competences that are not included in SQF WM.

Part II

The Sectoral Qualifications Framework for Waste Management



SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		WASTE, MATERIALS, PRODUCTS	KNOWLEDGE: knows and understands	types of waste	the types of waste, distinguished by, e.g., the sources of their generation, properties, usefulness, degree of nuisance, risks to human health or life, property, environment, etc.	data on waste generated in the economy, e.g., statistical data, research data, publications, reports	the factors influencing the type, composition and structure of generated waste	the theories on the relationship between the type, composition and structure of waste streams and the type of entity, local conditions and other factors	the mechanisms shaping generated waste streams in terms of their qualitative, economic and environmental aspects
properties of waste	the parameters characterising waste and waste streams (e.g., moisture content, composition)			the properties of waste, including physicochemical, biological, energy	the factors influencing the qualitative parameters and economic properties of waste	the standards defining the qualitative parameters of waste and waste streams; the requirements for the qualitative parameters of waste and waste streams			
testing waste				the aim and types of waste testing, the parameters of the waste to be tested	the principles of testing waste, including the requirements of laboratories performing tests; the methods and technologies used to test waste and determine its parameters	the legal regulations on testing waste			
classifying waste					the principles and criteria for classifying waste	the legal regulations on classifying waste			
segregating waste				the principles of municipal waste segregation	the standards of waste segregation for individual types of materials recovery	the legal regulations on waste segregation			
materials recovered and products made from waste	the basic groups of materials found in waste (e.g., glass, metal, plastics)			the types of products made from waste and resulting from waste management processes	the types of materials commonly found in waste	the structure of the materials recovered from a given type of waste	the types of rare materials, including critical materials and the possibilities of their recovery through, e.g., urban mining		
potential for waste utilisation					the uses of the materials recovered and products made from waste	the possibilities for effectively using waste; the possibilities of using the results of waste management processes (e.g., gases, energy, ash, slag, water)	the possibilities of using new types of waste	the directions of development in the field of waste utilisation	the latest achievements in the field of waste use, effective recycling

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	
WASTE, MATERIALS, PRODUCTS	KNOWLEDGE: knows and understands	quality of the materials recovered and products made from waste		the parameters characterising the materials recovered and products made from waste	the factors influencing the qualitative parameters of the materials recovered and products made from waste	the standards specifying the qualitative parameters of the materials recovered and products made from waste; the requirements of the qualitative parameters of the materials recovered and products made from waste				
		principles of handling waste	the procedures and instructions for handling municipal waste	the principles of handling specific types of non-hazardous waste, including the principles of packaging, market preparation and transport	the principles of handling hazardous waste, including the principles of packaging, market preparation and transport	the legal regulations on the methods of handling waste, including hazardous waste	the principles of handling unusual, rarely encountered, new types of waste, including waste from modern technologies			
		chemical substances	the proper names, trade names and principles of labelling the chemical substances present in waste	the basic chemical substances contained in waste, including persistent organic pollutants	the properties of the chemical substances present in waste, including persistent organic pollutants, the norms and concentration limits for the chemical substances present in waste	the chemical composition of waste; the impact of chemical substances present in waste on the properties of waste				
	SKILLS: is able to	analysing waste and waste streams	distinguish types of waste	organoleptically assess that the received waste is prepared correctly; recognise irregularities in the preparation and segregation of waste	classify waste intended for treatment; assess the compliance of the waste with the declared code; understand and interpret the results of laboratory tests on waste	define the structure and qualitative parameters of the waste stream	analyse the type, morphology and qualitative parameters of collected waste	develop and implement activities to modify waste streams and improve the quality of collected waste		
		assessing the potential for waste utilisation			assess the suitability of a given type of waste or waste stream for treatment with a given method	identify potential uses of a given type of waste	identify new possibilities for utilising waste	develop waste utilisation strategies	develop multi-variant strategic scenarios and directions of change in waste treatment and utilisation	
		recognising the chemical composition of waste		understand information on the chemical substances contained in waste provided by labels, safety data sheets and technical documentation	recognise waste containing specific chemical substances (e.g., chlorine)	identify the chemical substances contained in waste; determine the concentration of chemical substances contained in waste	assess the effect of the chemical substances contained in waste on the properties of waste			

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		TECHNOLOGY	KNOWLEDGE: knows and understands	waste management	the nomenclature relating to waste management	the concepts and terminology used in waste management processes; types of processes conducted as part of waste management	the stages and course of waste management processes	the links between specific stages of waste management processes	the mechanisms and criteria for optimising the course of waste management processes
principles of operating machines and vehicles for waste collection and transport	the types of machines and vehicles used for waste collection and transport			the principles of the ongoing maintenance and operation of machines and vehicles for waste collection and transport, including the principles of placing, loading and unloading waste as well as securing waste during transport	the principles of operating the machines and vehicles used for waste collection and transport	the construction and operation of machines and vehicles used for waste collection and transport	the mechanisms and criteria for the technical and economic optimisation of operating machines and vehicles used for waste collection and transport	the directions of development of the machines, vehicles and other technologies used for waste collection and transport	the latest achievements in the machines, vehicles and other technologies used for waste collection and transport
principles of operating facilities and equipment for waste treatment processes	the types of facilities and equipment used in waste treatment processes			the principles of the ongoing operation and maintenance of facilities and equipment used in waste treatment processes	the parameters, application and principles of operating facilities and equipment used in waste treatment processes	the principles of operating and selecting/configuring/programming facilities and equipment used in waste treatment processes	the principles of designing facilities used in waste treatment processes; the mechanisms and criteria for the technical and economic optimisation of operating facilities and equipment used in waste treatment processes	the directions of development of facilities and equipment used in waste treatment processes, including the use of the following technologies: the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and other innovative technologies	the latest achievements in facilities and equipment used in waste treatment processes, including solutions using the following technologies: the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR) , augmented reality (AR) and other innovative technologies
principles of operating tools and equipment used in disassembly	the types of tools and equipment used in disassembly			the principles of the ongoing operation and maintenance of tools and equipment used in disassembly	the parameters, application and principles of operating tools and equipment used in disassembly	the principles of operating and selecting tools and equipment used in disassembly			
disassembly process	the aims and principles of disassembling individual elements			the principles of prioritising individual elements in the disassembly process; the principles of handling disassembled parts, the principles of trading disassembled parts	the methods used in disassembly	the legal regulations on the methods and conditions of disassembly and the requirements for disassembly stations	advanced waste disassembly methods based on intelligent technologies	the directions of development of the methods, technologies and disassembly systems used	the latest achievements in the technologies and disassembly systems used

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		TECHNOLOGY	KNOWLEDGE: knows and understands	waste storage	the internal regulations and company procedures for storing waste	the principles, conditions and limits for storing non-hazardous and inert waste	the principles, conditions and limits for storing inert and hazardous waste	the legal regulations specifying the requirements for storing waste, including hazardous waste	the principles of optimising the use of space for storing waste
waste disposal				the acceptance criteria, principles, conditions, limits and fees for the disposal of other than hazardous and inert waste	the acceptance criteria, principles, conditions, limits and fees for the disposal of inert and hazardous waste	the legal regulations specifying the requirements for the disposal of waste, including hazardous waste	the principles for developing and optimising the use of space for the disposal of waste		
information technologies				the principles of operating simple applications to report performed activities, including recording waste, delivery notifications and monitoring waste collection from the sites of its generation	the IT tools supporting technical operations, including the documentation of inspections and repairs of facilities and their elements; the IT tools supporting the planning and organisation of activities in the processes of waste collection and transport	specialised process control applications, recording process parameters and monitoring emission levels	the applications used in waste management processes based on such technologies as the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and other innovative technologies	the directions of development in the use of applications in waste management processes based on such technologies as the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and other innovative technologies	the latest achievements in the use of applications based on such technologies as the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and other innovative technologies
chemical processes				the types and course of chemical waste treatment processes; the parameters characterising chemical waste treatment processes	the types of chemical reactions occurring in waste treatment processes (e.g., incineration, landfilling)	the factors influencing the course of chemical reactions occurring in waste treatment processes; the principles of selecting the parameters of the course of chemical processes	the course of chemical reactions taking place in waste treatment processes	the trends in using chemical waste treatment processes	
biological waste treatment				the types and stages of biological waste treatment processes; the parameters characterising biological waste treatment processes	the types of biochemical reactions occurring in biological waste treatment processes (e.g., composting, fermentation)	the factors influencing the course of the biochemical reactions occurring in biological waste treatment processes; the principles of selecting the parameters of the course of biological waste treatment processes	the course of biochemical reactions taking place in biological waste treatment processes	the trends in using biological waste treatment processes	

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
TECHNOLOGY	KNOWLEDGE: knows and understands	mechanical waste treatment		the types of operations and individual processes occurring in mechanical waste treatment; the parameters characterising the operations and individual processes occurring in mechanical waste treatment	the course and manner of implementing the operations and individual processes in mechanical waste treatment	the factors affecting the course of operations and individual processes occurring in mechanical waste treatment			
	KNOWLEDGE: knows and understands	methods and technologies used in waste treatment processes		the types of methods and technologies used in waste treatment processes	the methods and technologies used in waste treatment processes; the methods and technologies relating to the generation/recovery of energy from waste and processing the results of waste management processes (e.g., gases, energy, ashes, slag, water)	the criteria for selecting and applying waste treatment methods and technologies; the requirements for waste treatment processes resulting in special purpose materials and products, e.g., having contact with food	waste treatment processes based on new technologies, high-efficiency and maximally selective methods; the principles of designing waste treatment technologies (e.g., the sequence of operations and individual processes, parameters), including high-performance and maximally selective technologies	the directions of development in waste treatment methods and technologies	the latest waste treatment methods and technologies
	SKILLS: is able to	operating machines and devices	operate manual and power tools used for performing simple professional tasks, including minor repairs, as well as activities to maintain and keep waste containers and bins clean	perform simple activities to operate the equipment used in waste management processes (preparation, start up, adjusting, setting parameters in accordance with instructions, shutting down, securing the machines/equipment after finishing work)	perform tasks to operate the machines, technological lines and assemblies of equipment used in waste management processes under predictable conditions (preparation, start up, adjusting, setting parameters in accordance with instructions, monitoring parameters, shutting down, maintaining and securing them after finishing work)	perform tasks to operate the machines, technological lines, equipment and their assemblies under variable and not fully predictable conditions (monitoring the operation, correcting parameters depending on the course of the process)	program machines, technology lines and computer-controlled sets of devices	modify and optimise the software controlling the operation of machines, technological lines, equipment and their assemblies	

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	
TECHNOLOGY	SKILLS: is able to	operating vehicles	undertake activities to perform the ongoing maintenance of vehicles used to transport waste	perform activities to operate the vehicles used to transport waste (i.e., prepare for transport, mount waste containers and bins, operate the mechanisms, operate hook lifts, operate hydraulic truck cranes, provide ongoing operating maintenance)	control and assess the technical condition of vehicles used to transport waste	plan maintenance operations, including the procurement of spare parts and consumables				
		using and developing infrastructure	perform ongoing maintenance activities and the sanitary and fire prevention maintenance protocol of machinery and equipment	perform activities to maintain the technical condition of machinery and equipment (including ongoing maintenance and minor repairs); use the technical documentation of machinery and equipment	perform periodic technical inspections of machines, technological lines, equipment and their assemblies	plan operational activities, including the procurement of spare parts and consumables; develop plans for inspections, repairs and the modernisation of machinery and equipment	identify investment needs for machinery, equipment and infrastructure	formulate conclusions and recommendations for the modification and modernisation of machines, equipment and technological lines and the development of infrastructure		
		diagnosing malfunctions and irregularities		recognise irregularities in the operation of machines, technological lines, equipment and their assemblies	diagnose malfunctions and irregularities in the operation of machines, technological lines, equipment and their assemblies					
		manually performing activities in waste management processes	perform activities in waste management processes in accordance with instructions or under supervision, e.g., move containers, sprinkle compost piles, turn over compost	perform activities in waste management processes under conditions requiring consideration of the specificity of waste, e.g., manually sort waste, unload waste, prepare waste for the technological process, package waste, perform residential waste collection activities						

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
TECHNOLOGY	SKILLS: is able to	using IT tools		enter, search for data, generate data sets using simple applications to report performed activities, record waste, monitor the waste collected from its production source	use IT tools to keep records of inspections, repairs and other activities relating to the technical operation of machines, equipment and technological lines as well as waste management documentation; use IT tools to plan and organise activities in waste collection and transport processes	perform tasks to operate specialised applications to control processes, record process parameters and monitor emission levels	cooperate with software programmers in the development and implementation of software supporting waste management processes	perform tasks to operate applications used in waste management, based on such technologies as the Internet of things (IoT), machine learning (ML), artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and other innovative technologies	
		selecting and monitoring waste storage conditions		understand the conditions and limits of waste storage from the documentation	select storage conditions for non-hazardous waste; monitor the parameters of waste storage, monitor the state of stored waste	define the conditions for storing untypical waste as well as hazardous, medical and veterinary waste			
		determining the conditions for waste disposal		understand the conditions and limits of waste disposal from the documentation	select the conditions for the disposal of typical waste, taking into account the type, amount and location of the disposal site	specify the conditions for the disposal of untypical waste, taking into account the type, size and location of the disposal site; develop procedures and instructions for the disposal of waste	design the method of waste disposal, optimise the use of the disposal site area		
		selecting and monitoring the quantity and parameters of waste		understand the quantity, type and parameters of waste required in a given treatment process from the technological documentation	perform measurements, analytical tests and technological calculations on the quantity and qualitative parameters of waste for the needs of waste treatment processes	select the quantity, type and qualitative parameters of waste depending on the adopted aim of waste treatment as well as the requirements and technical capabilities of a given facility			

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		TECHNOLOGY	SKILLS: is able to	selecting and monitoring the parameters of technological processes		understand the parameters of the technological processes of waste management from the documentation	monitor the parameters of waste management processes	select methods and technologies for waste treatment; select and modify the parameters of typical (mechanical) technological processes of waste management (e.g., sorting, mechanical recycling)	select and modify the parameters of variable (biological, chemical) technological processes of waste management (e.g., composting, thermal treatment, chemical recycling)
supervising and assessing the course of waste management processes				sample, measure and record the parameters of waste management processes	monitor the course and assess the correctness of waste management processes	identify irregularities in waste management processes	analyse the causes and effects of irregularities in waste management processes		
SAFETY	KNOWLEDGE: knows and understands	risks associated with waste management technologies		the risks of the applied technological processes occurring at one's work station and in the facility implementing waste management processes	the causes and types of risks to the safety of persons, property and the environment in waste management processes; the risks of fire and other hazards due to the presence of chemicals in waste, the risks of hazardous substance leaks	the impact of the occurrence of risks in waste management processes (e.g., fire, hazardous substance leaks, technological line stoppages) on the course of the technological process, the surroundings or the environment	the long-term effects of the risks in waste management processes on the surroundings or the environment		
		risk of having contact with waste		the risks of having contact with waste (e.g., poisoning, puncture wounds, contamination)	the direct effects on health or life resulting from having contact with hazardous waste	the long-term effects on health or life resulting from having contact with hazardous waste			
		risk management procedures and assessment		the procedures to be followed in cases of contact with waste posing a threat to health, life, property or the environment	the agents posing a threat, including pathogens and fire hazards (e.g., sources of fire, agents causing spontaneous combustion) in waste treatment processes	the methodology for risk assessment in waste management processes; the technologies supporting risk assessment	innovative technologies supporting risk assessment, including the use of artificial intelligence (AI)		
		safety measures	the safety measures to be taken during the performance of professional tasks, including operating procedures, personal protective equipment, vaccination	how to secure vehicles, machinery and equipment to prevent situations causing risks to health, life, property or the environment	how to secure vehicles, machinery and equipment in the event of breakdowns or disruptions in work causing risks to health, life, property or the environment	the safety instrumented systems (SIS) of waste management processes	the safety measures for treating waste that is particularly hazardous, new, having unknown or non-standard properties	the directions of development in the field of applied methods, technologies and systems ensuring safety in waste management processes	the latest achievements in the use of methods, technologies and systems ensuring safety in waste management processes

SECTORAL DETERMINANTS	SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	
	KNOWLEDGE	principles of applying safety measures		the principles and procedures of applying measures to ensure safety during the performance of professional tasks and limiting risks	the principles of selecting measures to limit the risk of hazards and emergencies	the principles for designing measures to limit the risk of hazards and emergencies			
SAFETY	SKILLS: is able to	assessing the risks posed by waste	identify wastes posing a risk to health, life, property or the environment based on their physical characteristics	identify waste containing chemicals posing a risk to health, life, property or the environment	assess the risk of hazards occurring caused by waste	analyse the causes and effects of hazards resulting from various types of waste			
		handling waste that poses risks	implement procedures and instructions for handling frequently occurring waste that has been identified as posing a risk to health, life, property or the environment	implement procedures and instructions for handling untypical waste that has been detected as a possible risk to health, life, property or the environment	secure, in accordance with procedures, hazardous, medical, veterinary and radioactive waste	neutralise waste, including hazardous, medical and veterinary waste			
		developing procedures and instructions for handling waste			develop instructions and catalogues to facilitate the identification of wastes posing a risk to health, life, property or the environment	develop procedures and instructions to ensure safety during the occurrence of threats involving waste posing a risk to health, life, property or the environment			
		implementing and developing safety procedures	implement procedures to ensure safety during the performance of professional tasks in the workplace	implement procedures and operating instructions in emergency situations, including those posing a risk of environmental contamination, to health and life (e.g., puncture wounds, abrasions, contact with pathogens)	develop procedures and instructions to ensure safety during the performance of professional tasks at the work station	develop procedures and instructions to ensure safety during emergencies	develop plans in the event of a threat to health, life, property or the environment		
		applying safety measures	use personal protective equipment to ensure safety during the performance of professional tasks	select personal protective equipment to ensure safety during the performance of professional tasks	supervise the use of safety measures during the performance of professional tasks, including personal protective equipment	choose solutions to ensure the safety of the waste management processes being conducted	adapt and implement solutions to improve safety in waste management processes	analyse the effectiveness and improve solutions to increase safety in waste management processes	develop new solutions to improve safety in waste management processes
		providing job induction and safety instruction		provide information on safety in waste management processes, including safety in the facility implementing waste management processes	provide instruction on occupational safety and on the recognition and handling of waste that may pose a threat to health, life, property or the environment	provide job induction for newly hired employees on waste management processes	conduct training and verify competences relating to the implementation of activities ensuring the safety of employees, bystanders, property and the environment		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		ENTITIES AND THE MARKET	KNOWLEDGE: knows and understands	entities involved in waste management	the types of entities involved in waste management and the scope of the services they provide	the principles of cooperation among entities implementing waste management processes	the needs and expectations of waste management entities; the structure of waste management entities in a given area	the models and good practices of cooperation among waste management entities, including within the framework of industrial symbiosis	the mechanisms shaping the needs and expectations of waste management entities
the market of the materials recovered and products made from waste					the prices and data on the supply and demand for the materials recovered and products made from waste	the determinants of the domestic and global markets for recovered materials and recycled products from waste (customer groups, export opportunities, competition, prices)	the mechanisms shaping the conditions of the domestic and global markets for recovered materials and recycled products from waste (customer groups, export opportunities, competition, prices)	the development trends in the domestic and global markets for recovered materials and recycled products from waste	
recipients of the materials recovered and products made from waste	the types of entities that are the recipients of the materials recovered and products made from waste			the principles of cooperation with the recipients of the materials recovered and products made from waste	the needs and expectations of the recipients of the materials recovered and products made from waste	the socio-economic factors shaping the needs and expectations of the recipients of the materials recovered and products made from waste	the mechanisms shaping the needs and expectations of the recipients of the materials recovered and products made from waste	the development trends relating to the needs of entities receiving the materials recovered and products made from waste	
social aspects of waste generation	the types of entities that generate waste			the principles of conduct and good practices influencing the reduction of generating waste	the social phenomena influencing waste generation (e.g., movements and ideas promoting environmental protection, consumer trends)	the socio-economic determinants influencing the formation of environmental protection attitudes in society and increasing awareness of responsible waste management	the mechanisms shaping the consumption choices of society influencing waste generation	the forecasts of the social and economic effects on waste generation, resulting from the implementation of mechanisms shaping society's consumer choices	
responsibility for placing products on the market				the principles of applying extended producer responsibility	the fees and obligations incumbent on entities placing products on the market relating to waste management	the legal regulations on the responsibility of producers for products placed on the market, among others, resulting from the extended producer responsibility system			

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		ENTITIES AND THE MARKET	KNOWLEDGE	waste generation and acquisition		the sources of waste acquisition	the principles and costs of acquiring various types of waste, the principles of cooperating with waste producers; data on generating and acquiring a specific type of waste	the socio-economic factors influencing the generation and possible acquisition of a specific type of waste	the market mechanisms influencing the generation and acquisition of various types of waste
principles of customer service				the principles of individual and institutional customer service	the good practices of customer service and building relationships with individual and institutional clients	the principles of conduct with customers in difficult and conflict situations			
SKILLS: is able to	researching the needs of entities involved in waste management				identify the needs of waste recipients, waste processors, recipients of the materials recovered and products made from waste in terms of the quantity, type and qualitative parameters of delivered waste and recovered materials	analyse the factors influencing the demand of waste recipients, waste processors, recipients of the materials recovered and products made from waste in terms of the quantity, type and qualitative parameters of delivered waste and recovered materials	diagnose the needs of waste recipients, waste processors, recipients of the materials recovered and products made from waste in terms of the quantity, type and qualitative parameters of delivered waste and recovered materials	forecast market trends in the waste management sector based on legal and market changes	
	negotiating the terms of cooperation				establish the principles of cooperation in waste management processes	determine the terms of transactions in waste management, including setting prices and the terms of cooperation	negotiate short and long-term delivery terms, prices, terms of cooperation with suppliers and recipients of waste and recovered materials	develop sales strategies based on market changes in the supply, demand and prices of recovered materials, products and waste	
	cooperation with customers and cooperants				develop specifications for deliveries and services relating to waste management	prepare the documentation for cooperation with customers or cooperants, e.g., contracts, offers, orders	secure new customers and cooperants; establish and maintain relationships with customers, cooperants, including as part of industrial symbiosis and cooperation with other sectors of the economy		
	handling conflict situations				perform tasks relating to complaints about improper qualitative parameters or irregularities in the structure of the waste or the method of its preparation	resolve disputes relating to waste management, e.g., resulting from improper qualitative parameters or irregularities in the structure of the waste or the method of its preparation	mediate the resolution of conflicts involving the local community relating to waste management		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
ENTITIES AND THE MARKET	SKILLS: is able to	monitoring and shaping waste management policies			monitor changes in permits, approvals and other administrative decisions influencing the waste management processes conducted by a given entity; analyse the activities conducted in the context of compliance with the law on waste management as well as the permits, approvals and other administrative decisions held by a given entity	monitor changes in the legal regulations governing waste management; manage the circulation of information on legal regulations, including developing and providing colleagues and contractors with information on changes in legal regulations and monitoring their implementation	analyse the effects of legislative changes in waste management policies	develop recommendations for legislative changes relating to waste management	formulate guidelines for changes in national and international strategies and policies relating to the circular economy
		supporting measures for conscientious waste management		provide information on the possibility of transferring waste for processing and its preparation	explain the principles of transferring waste for processing and the methods of its preparation for processing (e.g., guidelines for sorting waste in the municipality)	develop information and communications, including marketing and media messages, on the principles of waste management and to raise awareness about waste management	conduct marketing and media activities to raise awareness about waste management and to build a positive image of the waste management sector as well as the people and entities operating in it	develop and promote solutions supporting the circular economy by popularising the concepts of less waste and zero waste, e.g., solutions facilitating the exchange of objects, reuse, extending the life and usefulness of a product	
		educating in the field of responsible waste management				formulate information and communications, including those addressed to the local community, decision-makers, representatives of entities implementing waste management processes and business partners about the ways of implementing waste management processes in a given area	conduct training, information and educational activities about responsible waste management, e.g., develop nature trails, organise open days	implement educational and training programmes to increase awareness about waste management	develop and implement education and training programmes to raise awareness about waste management

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
ENVIRONMENT (SURROUNDINGS)	KNOWLEDGE: knows and understands	impact of waste management on the environment		how waste management affects the environment	the parameters characterising the effects of waste management on the environment	the limits and thresholds of the effects of waste management on the environment; the methods of testing the level of the effects of waste management on the environment, including methods for calculating the environmental footprint (PEF), carbon footprint, life cycle assessment (LCA)	the impact of waste management on the environment		
		circular economy		the concepts of the circular economy, waste hierarchy, product life cycle (LCA)	the assumptions and principles of the circular economy	the impact of waste management on the use of natural resources	the conditions for and benefits of implementing the circular economy	the directions of development of the circular economy	
		emission of hazardous, harmful and nuisance agents		the types and sources of emissions of hazardous, harmful or nuisance agents and other environmental hazards occurring in waste management processes	the amount of emissions of hazardous, harmful or nuisance agents in waste management processes	the conditions influencing the amount of emissions of hazardous, harmful or nuisance agents and the occurrence of other risks to the environment in waste management processes	the long-term effects of harmful and nuisance factors released to the environment in waste management processes		
		limiting negative impacts		the principles and operating procedures during the performance of professional tasks for limiting a negative impact on the environment	the methods and operating procedures for changing the emission parameters of waste management processes	the methods of limiting the negative impact of waste management processes on the environment	the methods and organisational solutions limiting the impact of the waste management sector on the environment	the directions of development in the field of technologies limiting the negative impact of waste management processes on the environment	the latest technologies limiting the impact of waste management processes on the environment
		legal regulations		the content of administrative decisions on the emission parameters for a given facility	the obligations, fees and penalties relating to the impact of waste management processes on the environment	the legal regulations defining environmental protection requirements and the impact of waste generation and waste management processes on the environment	the current determinants of national, European and global environmental policies on waste generation and waste management processes	the directions of change in national, European and global environmental policies on waste management	
		improper handling of waste		the sanctions for illegal or improper waste management	the illegal and improper ways of handling waste that negatively impact the environment (e.g., illegal dumping, household trash incineration)	the risks to the environment of illegally or improperly handling waste	the organisational methods and solutions for limiting the illegal or improper ways of handling waste and minimising their impact on the environment		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
ENVIRONMENT (SURROUNDINGS)	SKILLS: is able to	testing environmental impact		obtain and collect data necessary for studying and analysing environmental impact	measure emission amounts and the impact on the environment of hazardous, harmful and nuisance factors occurring in waste management processes	study the environmental nuisance level of waste management processes; study the environmental footprint (PEF), including the carbon footprint, conduct a life cycle assessment (LCA)	analyse and assess the impact of waste management processes on the environment; assess the risk to the environment of the impact of waste management processes	forecast the long-term impact of waste management processes on the environment	
		limiting the handling of waste that negatively impacts the environment		implement procedures and instructions to limit negative impacts on the environment	implement activities, projects and programmes to limit the handling of waste that negatively impacts the environment	select methods and organisational solutions to limit the handling of waste that negatively impacts the environment	design activities and organisational solutions to limit the handling of waste that negatively impacts the environment	conduct activities to introduce legislative changes limiting the handling of waste that negatively impacts the environment	
		implementing technologies that limit the impact of waste management processes on the environment			perform environmental inspections; detect and diagnose the causes of the negative impact of waste management processes on the environment	coordinate the performance of environmental inspections; select technologies and organisational solutions that minimise the negative impact of waste management processes on the environment	adapt and implement technologies and organisational solutions that minimise the negative impact of waste management processes on the environment	modify waste treatment technologies to minimise the impact of waste management processes on the environment	develop new technological solutions that minimise the negative impact of waste management processes on the environment
		preparing environmental documentation		obtain and collect the data needed to conduct environmental reporting	process and compile data, including environmental impact assessment data, required for permits, approvals and other administrative decisions, as well as data relating to environmental reporting	develop the documentation required to obtain permits, approvals and other administrative decisions as well as the documentation relating to environmental reporting	analyse environmental reports and draw conclusions about environmental impact based on the obtained results		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
		ORGANISING THE PROCESSES IMPLEMENTED IN THE SECTOR KNOWLEDGE: knows and understands	effectiveness of waste management – principles		good waste management practices in households	good waste management practices in businesses; good eco-design practices	good practices and organisational solutions increasing the effectiveness of waste management on the scale of one or more municipalities acting jointly to implement waste management activities	good practices and organisational solutions that increase the effectiveness of waste management on a national scale	good practices and organisational solutions that increase the effectiveness of waste management on an international scale
effectiveness of waste management – benefits				the benefits of effective waste management	the impact on the environment of applying solutions and technologies that increase the effectiveness of waste management	the long-term results of introducing and applying solutions and technologies that increase the effectiveness of waste management			
principles and determinants of waste collection	waste collection methods; the types and capacity of bins and containers used for waste collection; the procedures and instructions for waste collection, including what to do if the waste is not properly prepared for collection		the principles of situating and maintaining waste collection sites; the principles of operating selective collection points for municipal waste; the principles of collecting specific types of waste (e.g., large bulk, medical, hazardous)	local determinants and waste management systems; the principles of responsibility relating to waste collection (e.g., principles of the responsibility for loading)	the legal regulations on waste collection, including those on maintaining cleanliness and order in municipalities				
determinants of waste transport	data on the tonnage and payload of waste transport vehicles		the sources of data on the topography of the area, the organisation of traffic in a given area, restrictions on the movement of certain types of vehicles	the principles, local conditions and restrictions (e.g., road capacity, congestion) relating to the movement of waste transport vehicles on roads	the legal regulations, including local regulations, on the movement of waste transport vehicles				
principles of waste transport			the procedures for transporting non-hazardous waste	the procedures for transporting hazardous waste	the legal regulations on waste transport and specifying the requirements for machines and vehicles used for waste transport; the legal regulations on the transboundary movement of waste				

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
ORGANISING THE PROCESSES IMPLEMENTED IN THE SECTOR	KNOWLEDGE: knows and understands	principles of conducting activities in the sector		the authorisations required to perform and supervise professional tasks in waste management processes	the principles of conducting waste management activities, including procedures for receiving waste, treating waste, operating disposal areas, waste incinerators and other waste treatment facilities	the legal regulations on conducting waste management activities, including those defining criteria, procedures, obligations and fees	the mechanisms supporting activities in the waste management sector, e.g., subsidies, funds, abatements	the policies and directions of change in the economy influencing the conditions for conducting business in the waste management sector	
		principles of preparing and maintaining documentation			the principles of keeping records and reporting, operating the Database on products and packaging and on waste management (BDO) as well as other databases maintained for the needs of waste management processes	the legal regulations on keeping records and reporting			
		principles of obtaining permits, approvals and other administrative decisions			the procedures for obtaining permits, approvals and other administrative decisions relating to waste management	the legal regulations on obtaining permits, approvals and other administrative decisions relating to waste management			
	SKILLS: is able to	organising work			organise the work of teams, conduct activities increasing the effectiveness of the activities of teams performing monotonous work; adapt the task execution plan to ensure maximum motivation and effectiveness of the work of teams performing tasks in waste management processes	perform employee induction, organise and supervise the work of people with special needs, e.g., people with disabilities, prisoners; adapt the work plan to the specific requirements of persons performing tasks in waste management processes	organise the work of teams under changing conditions resulting from the diversity and variability of waste streams; revise the team's action plan in response to changing conditions resulting from the diversity and variability of waste streams	develop and implement organisational solutions increasing the effectiveness of the activities of teams, including those performing monotonous work or working under variable and unpredictable conditions	
		ensuring business continuity in waste management processes		conduct activities resulting from procedures ensuring business continuity in waste management processes	implement business continuity plans in situations of planned inspections, repairs, maintenance, equipment and facility modernisation as well as planned changes in the structure and quantity of the waste	implement business continuity plans in emergency situations, situations of unplanned changes in the structure and quantity of the waste and other emergency situations causing disruptions in the waste management process (e.g., an accident at work, biological contamination)	supervise the implementation of business continuity plans, including in emergencies, situations of unplanned changes in the structure and quantity of waste and when other disruptions occur in the waste management process		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
ORGANISING THE PROCESSES IMPLEMENTED IN THE SECTOR	SKILLS: is able to	preparing instructions and plans			develop instructions and operating procedures to handle situations of downtime and business continuity disruptions resulting from planned inspections, repairs, maintenance, equipment and facility modernisation as well as planned changes in the quantity and structure of waste	develop business continuity plans in situations of planned inspections, repairs, maintenance, equipment and facility modernisation and in situations of planned changes in the quantity and structure of waste	develop plans for handling emergency situations, unplanned changes in the quantity and structure of waste and other emergencies disrupting the waste management process (e.g., accidents at work, biological contamination)	develop business continuity plans and strategies, taking into account the risk of emergencies, unplanned changes in the quantity and structure of waste and other disruptions in the waste management process	
		planning the collection, receipt and transport of waste			organise one-time activities relating to the collection, receipt, shipment or transport of waste, including the planning of dates, resources, routes and selecting the means of transport	plan and optimise permanent/cyclical activities relating to the collection, receipt, shipment or transport of waste, including the planning of dates, resources, routes, selecting the means of transport, scheduling waste collections	plan and optimise activities relating to the collection, receipt, shipment or transport of waste, plan dates, resources, routes in unusual situations, e.g., resulting from local and seasonal specificities, traffic problems, changes in the quantity and structure of waste		
		analysing effectiveness		identify the factors influencing the effectiveness of waste management processes	analyse the parameters influencing the effectiveness of waste management processes	analyse the effectiveness of waste management processes	establish the criteria for optimising waste management effectiveness, including economic and environmental criteria; analyse the effectiveness of waste management on the scale of a municipality or an inter-municipal association, region or country	forecast the effectiveness of waste management processes, taking into account the scenarios of technological and organisational development in the waste management sector	produce development strategies to increase the effectiveness of regional and national waste management
		preparing and maintaining documentation	complete documentation on waste collection and receipt, follow procedures to document the receipt of waste	understand data on waste and enter it into the Database on products and packaging and on waste management (BDO) as well as other databases maintained for the needs of waste management processes	maintain documentation on waste management, including records and reports in the Database on products and packaging and on waste management (BDO); control the correctness of waste management documentation	prepare the documentation for obtaining permits, approvals and other administrative decisions relating to waste management and the registration of waste management activities	obtain financing from external funding sources (national funds for environmental protection, Norway Grants and other funds) for implementing investments in waste management processes		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
COMMUNICATION	SOCIAL COMPETENCE: is ready to	communicating with waste producers (residents, entrepreneurs) and external entities			communicate with residents and business owners about the waste they generate, adapt the form and content of the message to the recipient	maintain relations with external entities, including subcontractors, research units, media and public services (e.g., police, fire brigade, sanitary and epidemiological inspectorates)	implement activities that build a positive image of the waste management sector and its entities among customers, contractors, employees, residents and learners		
		communicating with representatives of waste management entities			communicate with suppliers, recipients and other entities performing activities in waste management processes	maintain relations with suppliers, recipients and other entities performing activities in waste management processes	maintain relations with organisations associating individuals and entities operating in and for the waste management sector	establish and shape conditions for cooperation among persons and entities operating in and on behalf of the waste management sector, including establishing and developing cooperation within the framework of industrial symbiosis	establish and shape conditions for cooperation with international organisations and entities acting on behalf of the waste management sector, including establishing and developing cooperation within the framework of industrial symbiosis
		communicating with local government representatives and legislators			communicate about waste management with representatives of local authorities in a given area (e.g., a municipality, inter-municipal association, region)	maintain relations with representatives of local authorities in a given area (e.g., a municipality, inter-municipal association, region) in connection with waste management	establish and maintain relations with legislative representatives in connection with actions to improve waste management effectiveness	develop and shape the conditions for cooperation to implement solutions and legislative changes that would improve waste management effectiveness	develop and shape the conditions for establishing international cooperation to implement solutions and legislative changes that would improve waste management effectiveness
PROMOTING ATTITUDES OF ENVIRONMENTAL PROTECTION		promoting attitudes of environmental protection among producers				promote the principles of responsible design to increase the effectiveness of the circular economy, e.g., eco-design, ensuring the possibility of recycling packaging, reducing the amount of generated waste	promote attitudes on environmental protection relating to eco-design and reducing the waste generated by producers	undertake activities encouraging manufacturers to implement eco-design principles and the premises of the circular economy	develop and promote best practices in eco-design and in implementing the premises of the circular economy
		shaping awareness about waste management			inform about the principles of the proper segregation and treatment of waste generated in households and companies	promote the principles of the proper segregation and treatment of waste generated by households and companies	promote attitudes of environmental protection relating to proper waste management by residents, company owners and representatives of local authorities	undertake activities to increase awareness of waste management among residents, company owners and representatives of local authorities	shape the attitudes of residents, company owners and representatives of local authorities in conscientious waste management

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
			shaping attitudes aimed at limiting waste generation by residents			apply the principles of reducing waste generation, e.g., in accordance with the concept of less waste	promote the principles of reducing waste generation, e.g., in accordance with the concept of less waste	promote the attitudes and concepts of reducing waste generation, including the concepts of less waste and zero waste	undertake activities to popularise the concepts of reducing waste generation, including the concepts of less waste and zero waste
RESPONSIBILITY	SOCIAL COMPETENCE: is ready to	workplace safety	act in accordance with instructions and regulations on work safety in a given job position	comply with safety principles and regulations	ensure one's own safety and that of co-workers and bystanders	take into account the risk of situations occurring that threaten the safety of persons and property during the implementation and planning of activities in waste management processes	undertake activities to increase safety in waste management processes	promote solutions to increase safety in waste management processes	
		environment	act in accordance with instructions and regulations on environmental protection	comply with the principles and regulations on environmental protection in waste management processes	perform professional tasks, taking into account their impact on the environment and taking care to protect the environment	undertake activities to limit the negative impact of waste management on the environment	promote solutions aimed at limiting the negative impact of waste management on the environment		
		openness to change			adapt to changes in the work environment relating to fluctuations in the organisation of work as well as the types and morphology of treated waste	be open to changes in the work environment and industry relating to the implementation of new technical and organisational solutions in waste management			
		reliability		take into account the impact of the reliability and accuracy of one's own work on the waste management process	take into account the impact of one's own activities and decisions as well as those of a subordinate team on the effectiveness of the waste management process	take into account the social and economic benefits of reliably and accurately implementing waste management processes	undertake activities to promote standards and principles of reliability and accuracy in performing tasks in waste management processes	promote the principles of maintaining high reliability and accuracy in performing tasks in waste management processes	shape the standards and principles of maintaining high reliability and accuracy in performing tasks in waste management processes
		responsibility for property		implement activities, taking into account their impact on property and the course of the professional tasks being performed	take responsibility for entrusted property and the proper course of the professional tasks being performed	take responsibility for planning and supervising the activities conducted by teams in waste management processes, including those ensuring business continuity in waste treatment processes	make decisions under time pressure and in difficult situations relating to the occurrence of disruptions in waste management processes		

SECTORAL DETERMINANTS		SERIES	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
RESPONSIBILITY	SOCIAL COMPETENCE: is ready to	responsibility for workplace safety		take into account the impact of performed activities on one's own safety and that of one's co-workers	take responsibility for one's own safety and that of one's co-workers	take responsibility for planning and supervising the activities conducted by teams in waste management processes, including those ensuring the safety of people, property and the environment	make decisions under time pressure and in difficult situations relating to the occurrence of disruptions in waste management processes and accidents threatening the safety of people, property and the environment	make decisions in high-risk situations relating to an immediate threat to human life and health or the possibility of environmental contamination	
		acting autonomously		act and make decisions partially autonomously on the manner of performing professional tasks relating to the collection, assessment, classification and treatment of waste	perform professional tasks in waste treatment processes under variable conditions, time pressure and in situations of possible contact with waste posing a risk to people, property or the environment	perform professional tasks in waste treatment processes in situations posing a specific risk to people, property or the environment			

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“The framework developed by the team, with the support of experts, will be a useful tool for managers and executives. It will facilitate the planning of recruitment, training and employee development paths. It will also allow vacancies to be filled in a systematic and standardised way. The standardisation of the terminology in this field is also an invaluable element.”

Piotr Szewczyk, Director of Substantive Issues for the SQF WM project

The Sectoral Qualifications Framework for Waste Management (SQF WM) is a tool to support employers and employees of the waste management sector in the development of competences. It provides a structured set of competences relating to the main areas of activity and business operations of the sector.

SQF WM can be used in companies in the waste management sector to improve HR processes and to facilitate the ability of employees to independently determine their career paths and further education. It can also be a helpful tool for education and training institutions in the preparation of training programmes.

The publication contains information on the development of the Sectoral Qualifications Framework for Waste Management, including a description of the project and the methods used to perform the work, a discussion of the framework's structure, as well as recommendations on the implementation and use of SQF WM in Poland. Its most important part are the tables of SQF WM level descriptors, i.e. organised sets of general statements describing the knowledge, skills and social competences required of people involved in the sector, arranged in accordance with the levels of the Polish Qualifications Framework.

Instytut Badań Edukacyjnych/Educational Research Institute

ul. Górczewska 8

01-180 Warsaw, Poland

tel. + 48 22 241 71 00

www.ibe.edu.pl

www.kwalifikacje.edu.p

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