PARP
PFR Group

Branżowy Bilans
Kapitału Ludzkiego II

Sectoral Human Capital Study II

Water and wastewater management and reclamation sector

Results from the 2nd edition of the study

European Funds
Knowledge Education Development

Republic of Poland

European Union
European Social Fund

PARP PFR Group

Branżowy Bilans Kapitału Ludzkiego II

About the study

Project name

Sectoral Human Capital Study II

Water and wastewater management and reclamation sector – 2nd edition*

Study objective

To increase the knowledge about the current and future demand for skills in the water and wastewater management and reclamation sector

Research dates

2nd edition of the study:
March 2022 – April 2023,
including quantitative research:
November 2022 – January 2023

* The first edition of the survey was implemented in September 2020 – May 2021. The report from the first edition is available on the PARP website

About the sector

Water and wastewater management and reclamation sector covers (WWMR)

water abstraction, treatment, and supply

activities related to reclamation and other services related to waste management

sewage disposal and treatment

Water and wastewater management and reclamation sector

5601
businesses

86927
employees
(Statistics Poland, data for 2022)

Business processes

WATER AND WASTEWATER SECTOR

Key business processes

- abstraction, treatment, and supply of water
- collection and treatment of sewage

supporting business processes

- customer service
- strategic management
- marketing

RECLAMATION SECTOR

Key business processes

- remediation/ reclamation
- identification of an environmental problem and identification of its technological and economic solutions

supporting business processes

- waste management
- strategic management
- monitoring the effectiveness and sustainability of reclamation activities

Key business processes and key positions

Water and wastewater management

water abstraction, treatment, and distribution → water technologist

water abstraction, treatment, and distribution → water intake treatment plant operator

automation technician

water and sewerage system fitter

electrician

collection and treatment of sewage → wastewater technologist

Reclamation

remediation/reclamation → designer/architect

remediation/reclamation → technologist/biotechnologist

remediation/reclamation → environmental engineer

Identification of environmental problems and indication of technical and economic solutions → technical director/ project manager

Technology trends in the water and wastewater management and reclamation sector

Area I: Efficient management of water resources for consumption and commercial purposes
Development and increased application of innovative methods and materials in the equipment and system solutions used in the process of treatment and distribution of water for consumption and commercial purposes
Development and increased application of IT systems for status control and water quality monitoring, including the development of water quality measurement methods to better identify micropollutants
Development and increased application of technologies and solutions: for reducing losses in water production and distribution systems; for closing and integrating water circuits and returning process water in municipal and industrial systems within the framework of industrial symbiosis
Area II: Efficient wastewater treatment, energy recovery, and energy usage: use of other resources from water and wastewater
Development and increased application of methods and technologies to improve the efficiency of the wastewater treatment process, taking into account the recovery and usage of energy from wastewater in combined energy systems and other resources from wastewater
Area III: Reclamation/remediation of degraded and devastated land and water
Development and increased application of solutions, methods, and technologies to support the reclamation/remediation of degraded, contaminated land and water

Business trends in the in the water and wastewater management and reclamation sector

Growing interdisciplinarity of the sector and complexity of technological processes, resulting in the need for entities cooperation in interrelated fields

Growing tendency for companies operating in the field to go beyond their „core business" and enter the RES sector

Increasing tendency to aggregate within a cluster to interact with others

Increasing fragmentation of the sector (a trend opposite to vertical integration, i.e. a company combining more links in the value chain)

Increasing likelihood of market niches formation as a result of changes in legislation aimed at implementing the principles of circular economy

Factors strongly affecting the sector

Volatility related to the unstable economic situation caused by the war in Ukraine

Increased expenditures and the need to implement solutions to maintain system and process security

Growth of the water and wastewater management sector as a strategic branch of the national economy

Growing needs and increasing costs of infrastructure maintenance and upgrades with limited ability to afford investments of this type

Lack of regulation and legal definition of WTZs, i.e. Large-scale Degraded Areas (colloquially: „ecological bombs”)

Continued low interest in learning professions relevant to the sector and, later, working in the sector

The sector in the face of trends and challenges

» **In 2022, more than half of the companies (58%) introduced changes regarding new or improved services, products, work organization methods, technology, and equipment**

To address the challenges, the companies are planning changes in their operating models over the next 3 years:

» **47%** Increase in the average sales margin

» **29%** Increased investment in innovation

» **26%** Automation of selected processes in the company

» **25%** Investment or increased investment in employee skill development

» **24%** Investment or increased investment in new production technologies, modern machinery, and software

» **20%** Development of new services/products

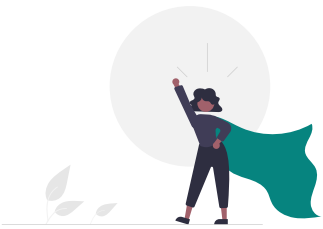
» **17%** Starting or intensifying R&D works in the company, independently or in cooperation with scientific centers

» **16%** Involvement or increased involvement of the company in cooperation with schools or universities to educate and acquire future employees

Future scenarios

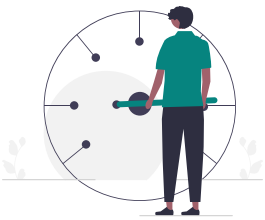
New Golden Age – Leaders in the effective use of technologies that are environment-, safety- and human health-friendly

HIGH level of integration of services/products, complexity of solutions, and cooperation of companies; **HIGH** level of new technologies usage, high resource efficiency and adaptability to changes



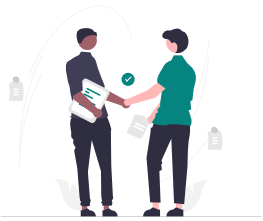
Technologically advanced enclaves – an industry of varying speeds

LOW level of integration of services/products, complexity of solutions, and cooperation of companies; **HIGH** level of new technologies usage, high resource efficiency and adaptability to changes



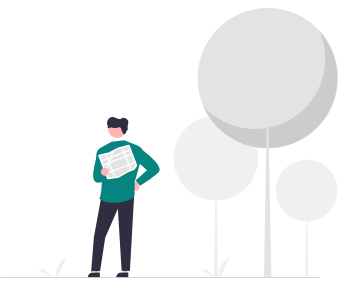
Cooperative for sustainability and adaptability

HIGH level of integration of services/products, complexity of solutions, and cooperation of companies; **LOW** level of new technologies usage, low resource efficiency and adaptability to changes



Time of inertia

LOW level of integration of services/products, complexity of solutions, and cooperation of companies; **LOW** level of use of new technologies usage, low resource efficiency and adaptability to changes



Future scenarios

New Golden Age – Leaders in the effective use of technologies that are environment-, safety- and human health-friendly

The water and wastewater management and reclamation sector is able to meet the challenges of legislation and public policy guidelines responding to climate and environmental change, and the country's unstable economic situation related to the war in Ukraine (e.g., rising energy prices, chemical and biological threats, cyber threats, water supply disruptions).

As an important element of the country's so-called critical infrastructure, additionally aiming to implement the circular economy model and cope with threats, the companies operate on the basis of **high technologies and solutions for greater efficiency and resource efficiency, and integrate services and products. This is possible through interaction with other entities**.

In this scenario, the sector undergoes an evolution toward high levels of **automation and robotization**. Investments are made in the **development of** employees' **competencies** and qualifications, enabling them to adapt their knowledge and skills to the requirements of the modern automated and robotic workplace. The implementation of modern technologies, increasing the companies adaptability to change and the guidelines of public policies is possible primarily through public funds.

Cooperative for sustainable development and adaptability

As the Polish economy needs to be transformed into a low-carbon, circular economy, companies from the water and wastewater management and reclamation sector are forced to **integrate various services and products and offer comprehensive solutions for water circulation, wastewater, waste treatment, and rainwater management**.

In order to achieve the goals of European climate and energy policies and increase adaptability to change, companies are consolidating and/or permanently **cooperating** with other entities from related fields, in various capacities (sharing knowledge, implementing projects focused on innovation). Cooperation, consolidation, and integration of products and services are means to achieve the goals primarily related to necessary infrastructure investments, acquisition of know-how, modernization and maintenance of infrastructure, especially if public funds are insufficient.

The role and importance of clusters is growing – companies **are** eagerly **forming clusters to interact with one another**, raise funds for projects, carry out PR (image-related) and, above all, lobbying activities (e.g. regarding legislation, or investment plans).

Technologically advanced enclaves – a sector of varying speeds

Mainly **large and medium-sized enterprises have undergone transformation towards advanced automation and robotization of** core business processes. **Small businesses lack support**, also within the sector. They do not cope with the processes of adaptation to change, and experience increasing development barriers (lack of staff, competence, and resources needed to afford new solutions, maintenance, and modernization of infrastructure).

The sector **has not developed mechanisms and practices for good cooperation**. Companies are reluctant to share knowledge, or consolidate. Consolidation processes are not supported by the regulator or public institutions. There is a lack of role models and proven examples of effective consolidation and cooperation.

Implementation of new technological solutions provides large and medium-sized enterprises not only with greater efficiency in the execution of core business processes, but also with the ability to expand and take over the market – recipients of services provided by small entities.

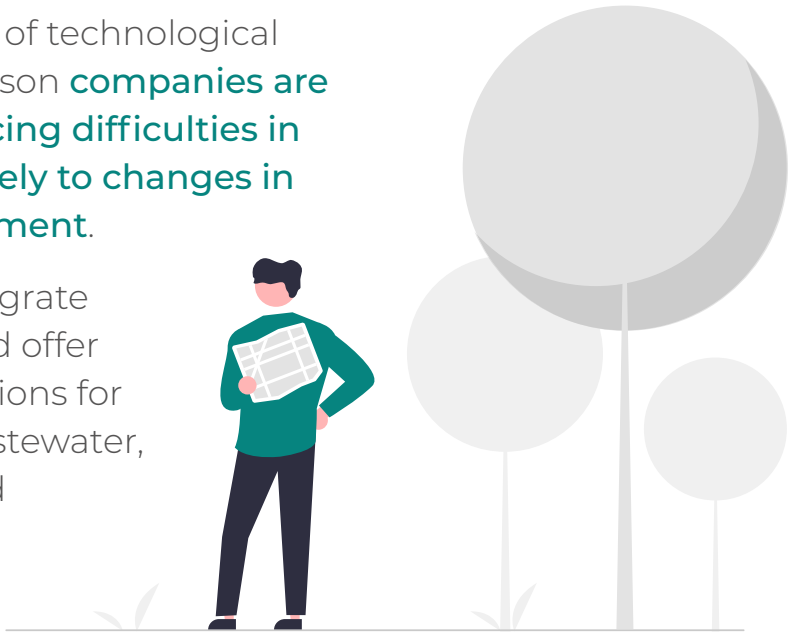
Time of inertia

The execution of core business processes has little added value for their recipient. The **cost of doing business plays a key role, while the future of the industry is fraught with the risk of stagnation**.

The processes of adapting competencies to the requirements of jobs and those resulting from the Sector Qualification Framework established for the sector are carried out on an ad hoc basis – depending on the capabilities of individual companies and the necessary, immediate needs for updating competencies.

There is a shortage of funds for new investments and implementation of technological solutions. For this reason **companies are constantly experiencing difficulties in responding adequately to changes in the external environment**.

Opportunities to integrate services/products and offer comprehensive solutions for water circulation, wastewater, waste treatment, and water management are very limited.



For the water and wastewater management and reclamation sector in Poland, the most favorable development would be the New Golden Age scenario.

However, this is a long-term outlook for the development of companies in this sector (covering an uncertain period of several decades)

Future skills

Learn, unlearn, and relearn

Future skills will be driven by the need to update and continuously improve the knowledge, skills, and social competencies already present in the sector.

Future jobs

Related to:

- Increasing automation, robotization of processes, moving toward remote process management,
- Technological development of the company's infrastructure and ensuring the security of digitized processes, systems, and data,
- Automation and process optimization, e.g., renewable energy extraction specialist, process optimization specialist
- Marketing and sales of services/products
- Relations with the company's environment
- Carrying out simple works

New and growing positions in the sector

Positions:

» Assembler, electrician, environmental auditor, circular economy specialist, technologist, biotechnologist, environmental engineer, technical project manager

Growing importance of interdisciplinarity

» Hybrid positions will be created (combining tasks and competencies from different disciplines, e.g., environmental and legal)

Growing importance of specialization

» Positions characteristic to the entity's growing (relatively narrow) specialization, e.g., those related to reclamation/remediation of flowing waters, remediation of large-scale degraded areas, remediation of brownfield sites

Employment in the sector

One in five employers sought employees in 2022

34% of employers who were looking for employees faced some difficulty in recruitment, especially when looking for people for the following positions:

» water and sewerage system fitter

» electrician

» water intake treatment plant operator

N=165

Reasons behind recruitment difficulties

» Little interest in job opportunities

» Candidates who met the expectations did not meet the terms of employment

» Candidates who applied did not meet the expectations

Most wanted employees (January 2022-January 2023)*

Water and wastewater management

water and sewerage system fitter: **40%**

electrician: **31%**

water intake treatment plant operator: **22%**

* Answers of employers who looked for employees (N=100)

Reclamation

manual worker: **30%**

designer/architect: **22%**

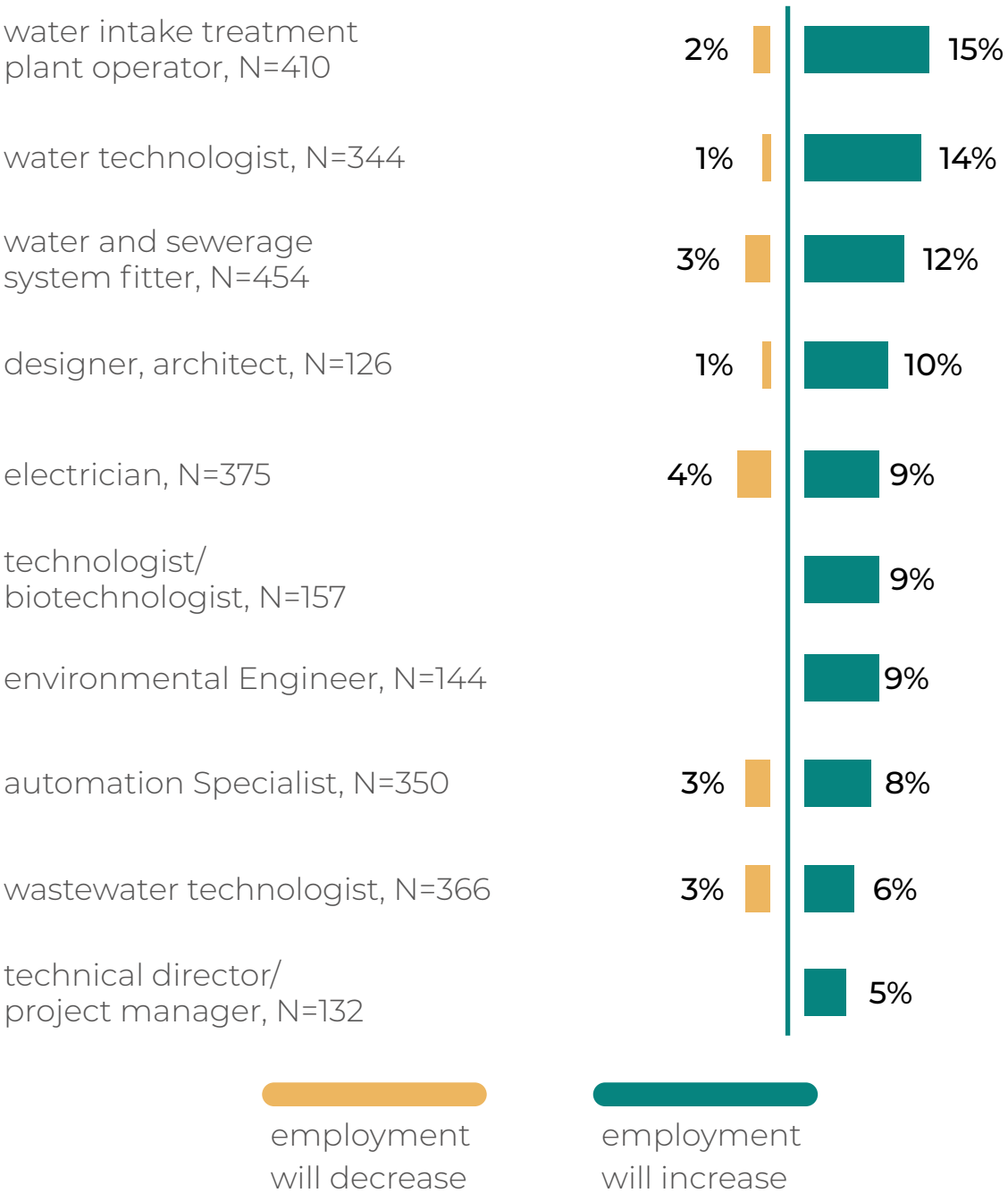
environmental engineer: **15%**

* Answers of employers who looked for employees (N=65)

Expected changes in employment

Over the next 3 years, **8%** of employers expect to increase employment in thesector

Expected changes in employment on key positions in the next 3 years



Foreigners

One in ten companies from the sector employs foreigners, mainly for simple jobs that do not require highly specialized skills/qualifications.

Foreigners were most likely to be hired for the following positions:

- water and sewerage system fitter (35%)
- electrician (35%)
- water intake treatment plant operator (13%)
- automation specialist (13%

According to data obtained from employers, the vast majority of foreigners employed come from Ukraine. In companies where foreigners are employed:

85% **of foreigners are from Ukraine**

- **21%** are from European countries other than Ukraine and Belarus
- **10%** are from Belarus
- **4%** are from Asia countries

48% **foreigners stay employed for about 3 years or longer**

- **22%** foreigners stay employed for about 2 years
- **27%** foreigners stay employed for about a year or less

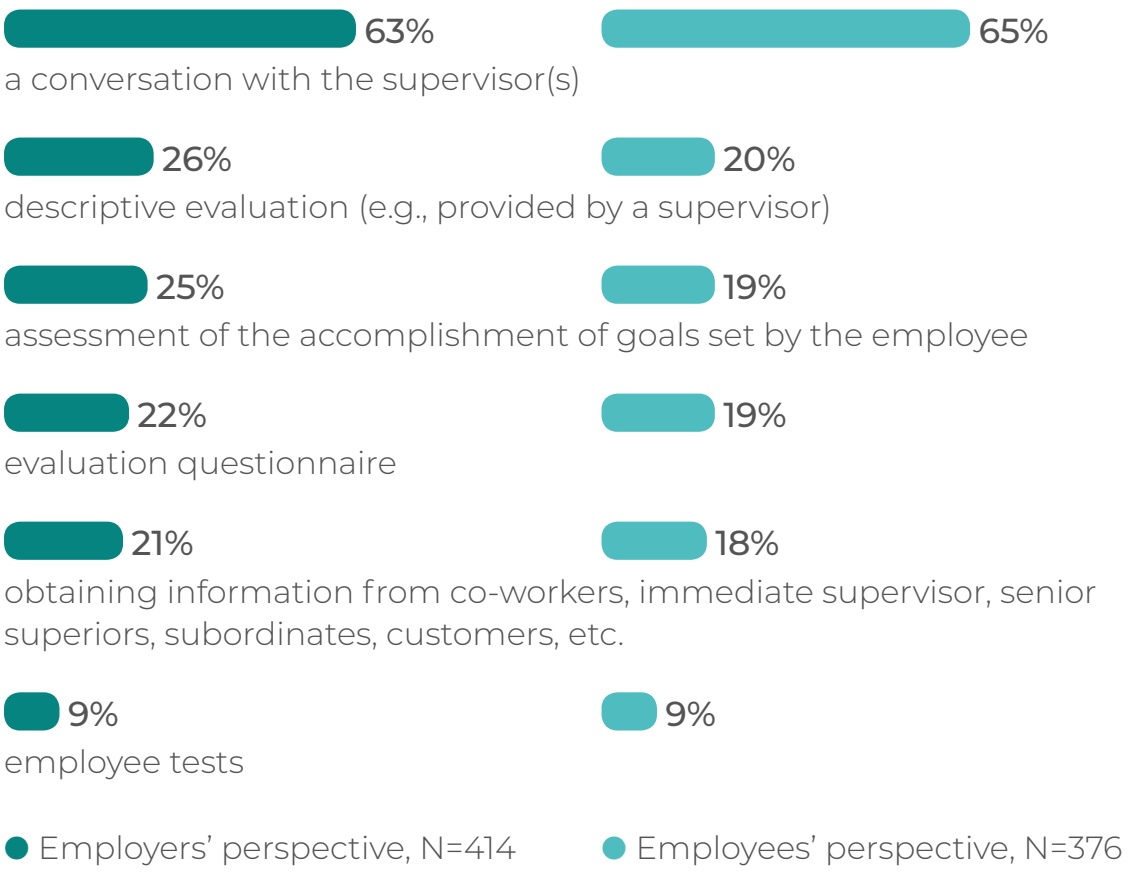
According to the majority of entrepreneurs (59%) who employ foreigners, the number of foreigners employed by the company has not changed compared to 2021.

Answers of employers who employed foreigners (N=91)

Assessing the skills of employees

55% of companies assess the skills of their employees, with 39% conducting assessments systematically (at least once a year)

Methods used to asses employees' skills in 2022



Employers' action strategies in the face of competence skills

71% the skills of their employees are fully satisfactory

27% of employers recognize the need to develop employee skills

But what when certain skills are missing?

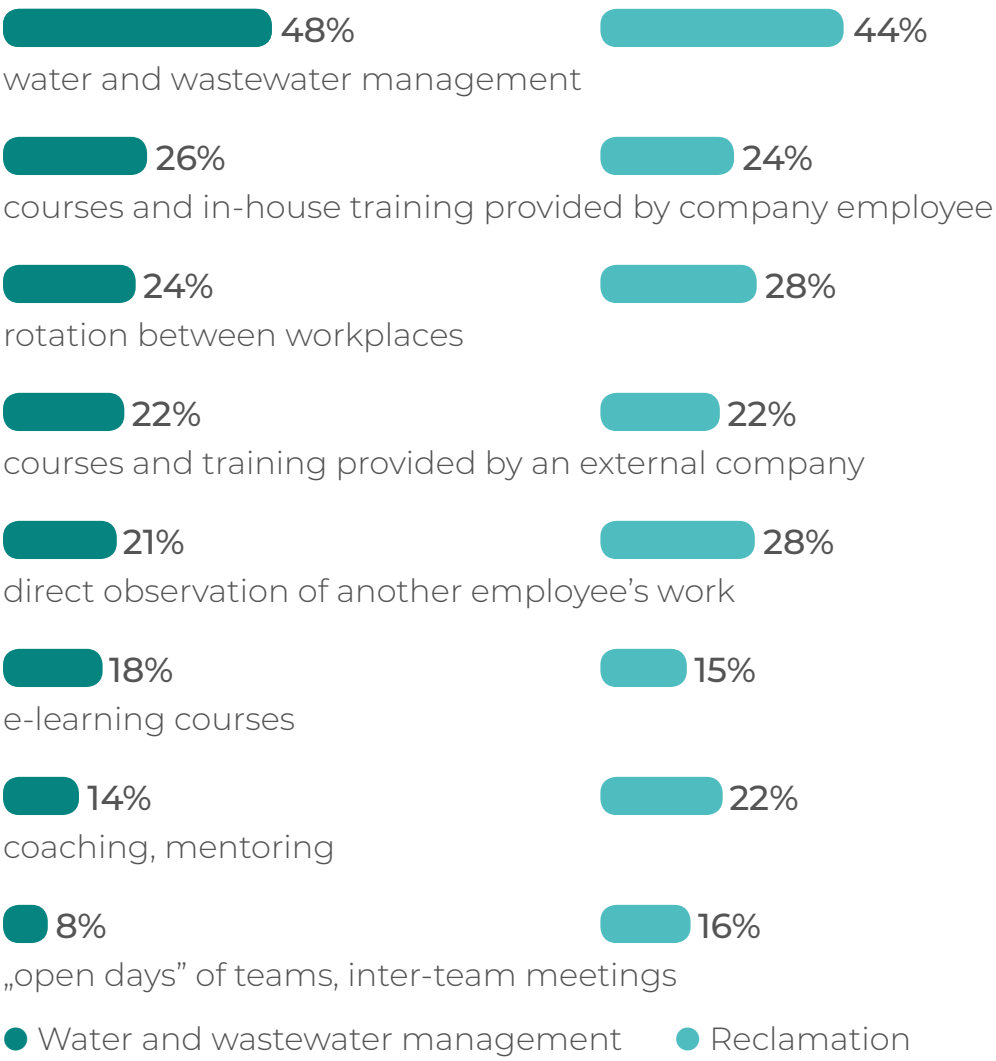
N=810

Methods of developing employees' skills in the workplace

67% development activity rate

In the last 12 months, two-thirds of WWMR companies offered their employees at least one form of skills' development (on- or off-the-job).

Methods of developing employee skills in the workplace in the last 12 months – answers from employers



Balance of skills

Skills balance – a compilation of assessments of key competencies for individual positions in the water and wastewater management and reclamation sector from the perspective of employers and employees, in order to better balance the labor market in terms of the supply of and the demand for workers with relevant skills.

Employers confirm the importance of the identified skills for all of the key positions (whether it is knowledge, skills, or social competencies). Also, the overall self-assessment of these competencies in employees on key positions is high.

The skills that are already growing in importance, or are likely to grow in the future, include: industry knowledge, knowledge of regulations, standards and laws, and job-defining competencies.

Attention should be given to social skills, which are universal and relatively important to employers, and include (regardless of the position):

- Compliance with OHS regulations, fire protection regulations, ergonomics regulations, and environmental protection regulations,
- Communicating in a way that ensures effective cooperation,
- Accepting responsibility for one's work,
- Ensuring and controlling quality of the work performed,
- Demnstrating a proactive attitude and commitment to finding sources for self-development,
- Adhering to the rules of the sector, consistent with professional ethics.

Regardless of the position, skills that are difficult to find were most likely to be those needed to perform the tasks required on the particular positions[1]. Employers point out that the number of hard-to-find skills is particularly high in the case of environmental engineers (34 out of 38 skills are hard-to-find).

The same applies to water technologists (32 out of 47), **technical directors** (30 out of 45), **and wastewater technologists** (30 out of 49). The position of environmental engineer is also characterized by the highest number of skills whose importance is expected to increase in the next 3 years. On top of that, employees currently hired as engineers want to develop 33 of the profile's 38 skills first.

‚When comparing employees' **desire to develop skills against employers' perception of skills that are hard-to-obtain, attention should be paid to the position of technical director**. The surveyed technical directors want to develop all the profile's skills first.

The vast **majority of hot skills, i.e., skills whose importance is already growing rapidly or will soon increase, are skills related to job-related' tasks**. The highest number of hot skills was recorded for the designer/architect profile (11 out of 34 skills in the profile).

When compared against the total of skills required by the profile, the largest share of skills whose importance will grow in the future was observed for the enironmental engineer[2].

1 Hard-to-find skills are those that at least 50% of employers perceive as difficult to obtain on the market.

2 Skills that at least 20% of employers believe will increase in importance in the next 3 years.

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Full survey results are
discussed in the study:

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Water and wastewater managemenet
and reclamation sector
Results from the second edition
of the survey (in Polish):

https://www.parp.gov.pl/component/site/site/bilans-kapitalu-ludzkiego#wynikibadanbranzowych

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