INTEGRATED QUALIFICATIONS SYSTEM

UPDATED SECTORAL QUALIFICATIONS FRAMEWORK FOR THE ENERGY INDUSTRY (SQF EN)

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1. Definition of the sector

Energy is a branch of the economy encompassing all activities relating to the processes of the production, transformation, storage and supply of energy, as well as its accounting, in accordance with the principles of sustainable development.

2. Practical application of the Sectoral Qualifications Framework for the Energy Industry

The Sectoral Qualifications Framework for the Energy Industry (SQF EN) is a universal tool for managing the competences in the energy sector. Due to the fact that the structure of SQF EN does not impose specific business solutions, it can be used in any number of ways by many different audiences.

Employers

With the help of SQF EN, employers can take a broader view of the industry competences present in their business environment, enabling them to manage their human resources more efficiently and compete more effectively in the labour market. The main advantages of using this tool include support in analysing competence gaps in the industry or company, planning human resource development and the salary grid of job positions, as well as gaining help with recruitment and the selection of personnel.

The table of competences allowed me to determine the criteria for recruiting staff based on the key competences in the industry, as well as to prepare job descriptions.

After identifying the main competence gaps in the industry, we launched an apprenticeship programme to prepare our students to successfully enter the labour market.

Schools and educational institutions

On the basis of SQF EN, schools and educational institutions can adapt the curricula they offer to the current and real needs of the labour market. This means that the table of competences supports these institutions in expanding and modifying their teaching programmes and filling in the competence gaps of students, for example, those relating to practical or soft skills. Additionally, it can be a useful tool in career counselling for students or in monitoring the success of school leavers.

Higher education institutions

SQF EN is a tool that supports higher education in aligning their study programmes with current trends in industry development. This enables students to be better prepared to enter the labour market and achieve career success. The table of competences also makes it possible to monitor students' progress and evaluate the effectiveness of study programmes.

We used SQF EN to analyse students' level of skills against those needed by the energy industry and the effectiveness of our study programmes.

By better matching the needs of our customers, we have become more competitive in the training market.

Training companies

By using SQF EN, training companies can effectively design specialised courses, enabling them to prepare a tailor-made offer for a specific sector and to meet the expectations of their clients. With the help of the sectoral qualifications framework, they can select individual competences and match them to the outcomes of a given training programme. They can also prepare exams to assess knowledge, skills and social competences. The gradation of the complexity of competences in SQF EN also makes it easier to prepare training offers at various levels of proficiency.

IQS stakeholders

Among the broad audience of IQS users, the groups most likely to benefit from the SQF EN are primarily industry organisations and those describing market or sectoral qualifications. Among others, industry organisations are tasked with establishing educational agreements that strengthen cooperation between schools and employers, as well as providing information on the demand for sectoral competences to educational institutions and labour market institutions. In turn, persons describing market or sectoral qualifications can use the framework to more easily define sets of learning outcomes.

Other entities

SQF EN can be used for many other purposes depending on the current needs of the industry. In the energy sector, it can be used as a supplementary tool to prepare methods for assessing the knowledge of a company's employees on safety, since every employee is exposed to accidents in the workplace today. Verifying employees' basic competences for the sector can protect the company from negative consequences in the future.

Moreover, the energy sector is currently facing a shortage of skilled workers. The Sectoral Qualifications Framework for the Energy Industry can be used to retrain and launch the professional careers of people from related sectors.

As an occupational health and safety specialist, I often use the SQF EN. Analysing the 'Occupational Safety' determinant allowed me to quickly identify the competences I should be developing among energy industry employees in my training courses.

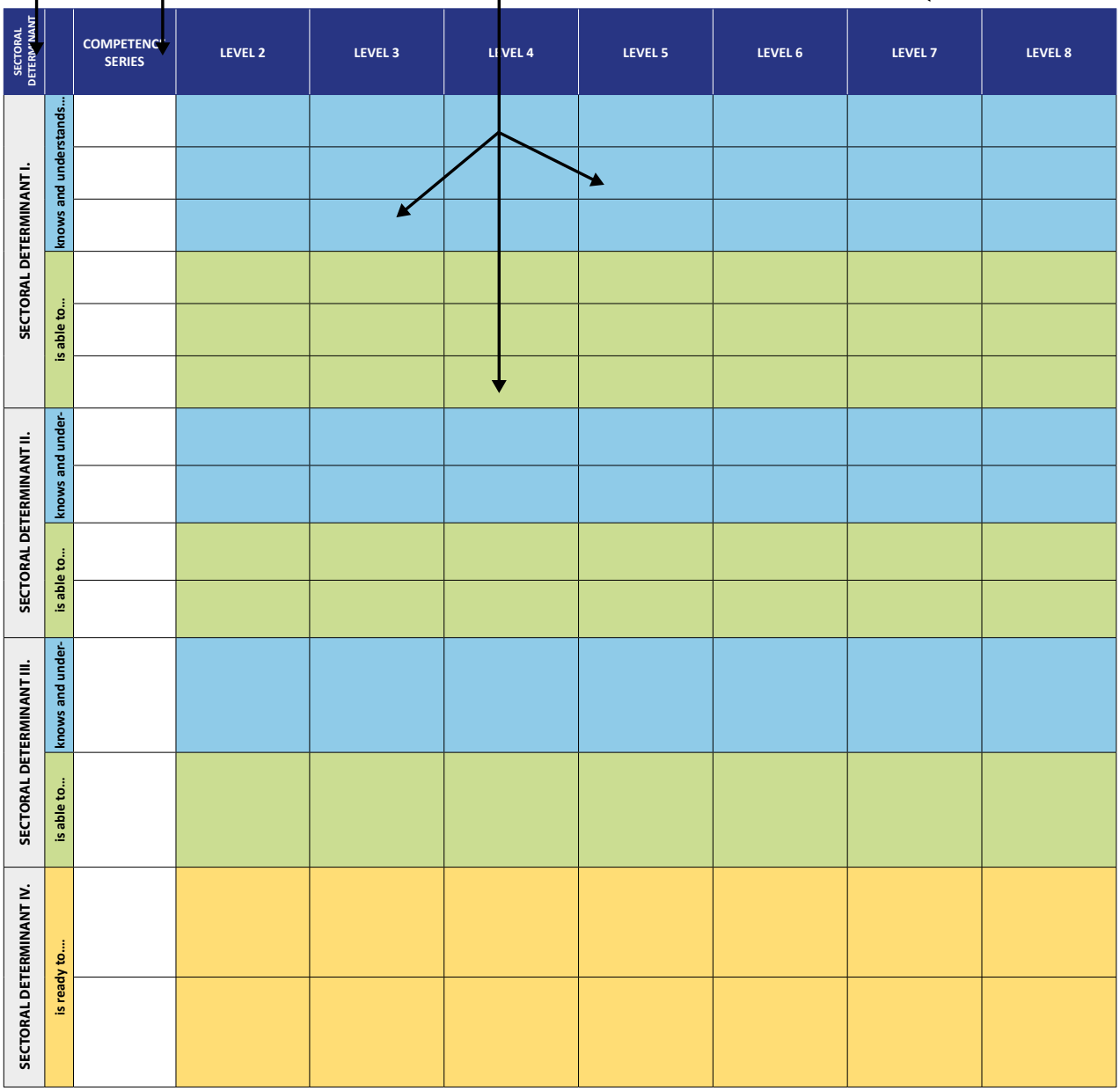
3. Instructions for using the Sectoral Qualifications Framework for the Energy Industry

1 Familiarise yourself with the sectoral determinants, as they indicate the main areas of the sector's activities.

2 Familiarise yourself with the competence series, as they further describe each sectoral determinant.

3 Familiarise yourself with the competences in a given series.

The competences in the SQF at particular levels correspond to second stage Polish Qualifications Framework levels for vocational education and training



Competences are grouped into their appropriate categories by colour:

knowledge (knows and understands...),

skills (is able to...),

social competence (is ready to...).

Important!
A specific process can often be fully described only by combining competence series from the categories of **knowledge** and **skills**.

Remember!
Green competences are designated in bold and indicated as **(GC)** in front of the description.

4. Updated Sectoral Qualifications Framework for the Energy Industry indicating the green competences identified in the sector

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Design and planning	knows and understands...	Design regulations	(GC) the principles of selecting equipment, installations and power grids	(GC) the legal regulations on designing energy equipment and installations	(GC) the legal regulations on designing power grids			
		Design and prototyping methods	(GC) the methods of planning and selecting energy equipment and installations	(GC) the methods of designing and prototyping individual energy equipment, installations and power grids	(GC) the methods of designing and prototyping assemblies of energy equipment, installations and power grids	(GC) the methods of designing and prototyping complex assemblies of energy equipment, installations and power grids	(GC) the development trends in the methods of designing and prototyping energy equipment, installations and power grids	(GC) the latest methods of designing and prototyping energy equipment, installations and power grids
		Energy materials, equipment, installations and power grids	(GC) physical phenomena and processes; (GC) the symbols and terminology pertaining to energy materials, equipment, installations and power grids	(GC) the classification and designation of energy materials, equipment, installations and power grids	(GC) the construction and operation of typical energy equipment and installations as well as individual installations included in power grids	(GC) the construction and operation of non-standard energy equipment, installations and power grids as well as complex installations forming parts of power grids	(GC) the development trends and ongoing research into new energy materials, equipment, installations and power grids	(GC) the latest developments in energy materials, equipment, installations and power grids
		Automation and security	the symbols and terminology pertaining to the basics of automation and security	(GC) the principles of the operation and application of automatic control and security equipment	(GC) the construction and operation of individual automation and security components	(GC) the construction and operation of control and security systems	(GC) the development trends in the construction, operating principles and maintenance of specialised automation and security systems	(GC) the latest automation and security systems
		Energy-dedicated communications and information technology (ICT)		the interaction between energy equipment and ICT infrastructures	the design of dedicated systems and the architecture of ICT networks in the energy industry			
		Network management and energy balancing		(GC) the methods and procedures of energy balancing relating to energy equipment, installations and industrial processes	(GC) the methods and procedures of energy balancing relating to local power grids	(GC) the principles of managing the operation and balancing of power grids on a national scale	(GC) the development trends in the methods of managing the operation and balancing of power grids	(GC) the latest strategic planning principles of operating cross-border power grids and balancing within the energy market

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Design and planning	knows...	**Computer-aided design software in the energy industry**		the principles of the operation and use of computer software for typical calculations and documentation	the principles of the operation and use of computer software for planning and design	the principles of the operation and use of computer software for simulating existing system models	the principles of the operation and use of computer software for developing new system models and validating the results of simulation calculations	
	is able to...	**Designing and selecting energy equipment and installations, including RES and energy storage**	**(GC) identify energy needs;** **(GC) identify the parameters of energy equipment**	**(GC) select energy equipment to the required parameters from among those available on the market**	**(GC) identify the type and parameters of energy equipment and installations and formulate design assumptions**	**(GC) design energy equipment and installations**	**(GC) design advanced energy equipment and installations**	**(GC) develop new solutions to improve the efficiency and safety of energy equipment and installations**
		Designing power grids			**(GC) design installations that are part of power grids**	**(GC) design power grids**	**(GC) design advanced power grids and energy systems**	**(GC) develop new solutions to improve the efficiency and safety of power grids and energy systems**
		Designing automation and security			**(GC) select automation and security settings and equipment**	**(GC) design automation and security systems**	**(GC) design advanced automation and security systems**	**(GC) develop new solutions for automation and security systems**
		Designing communications and data communications systems			select ICT solutions for energy systems	design and implement systems for communications, remote management of energy equipment, installations and power grids		
		Selecting materials and components	-	**(GC) select materials and components for the construction and assembly of general energy equipment and installations**	**(GC) select materials and components for the construction and assembly of industrial energy equipment and installations**	**(GC) select materials and components for the construction and assembly of industrial energy equipment and installations operating under special conditions, e.g., in an aquatic environment**	**(GC) design components for energy equipment and installations;** **(GC) develop materials for the construction and assembly of energy installations**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Design and planning	is able to...	**Selecting the conditions and technologies of assembly and construction**			**(GC) determine the conditions and technology of assembling energy equipment and installations;** **(GC) determine the conditions and technology of constructing distribution power grids**	**(GC) determine the conditions and technology of assembling non-standard energy equipment and installations;** **(GC) determine the conditions and technology of constructing transmission power grids**	**(GC) modify the technologies of assembling and constructing equipment, installations and power grids**	**(GC) develop new technologies of assembling and constructing energy equipment, installations and power grids**
		Start-up procedures, managing power grids, controlling and supervising			develop plans and procedures for energy production, storage and supply, including grid interconnection plans	develop plans to ensure the continuity of energy production and supply in situations of the planned overhaul, repair, maintenance, modernisation of energy equipment and installations	develop and validate plans and procedures to ensure the continuity of energy production and supply in emergency situations	
		Preparing technical documentation		make diagrams of energy equipment and installations	produce technical drawings of energy equipment and installations and other technical documentation of energy equipment, installations and power grids	verify the accuracy of the completed technical documentation of energy equipment, installations and power grids		
		Producing non-technical documentation	maintain inventory records	maintain documentation of the activities performed in energy production, transformation, storage and supply processes; develop worksite instructions and reporting documentation	develop company regulations on implementing energy production, transformation, storage and supply processes	elaborate guidelines for national regulations on implementing energy production, transformation, storage and supply processes; provide an opinion on national regulations in the energy industry		
		Using computer-aided design software in the energy industry		use computer software to perform typical calculations and documentation	use computer software for planning and design	use computer software to simulate existing system models	use computer software to develop new system models; validate the results of simulation calculations	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Design and planning	is able to...	**Developing and configuring software**		configure equipment and systems that control the operation of energy equipment and installations	implement the operating algorithms of building automation systems	program the operation of automation systems controlling and monitoring the work of equipment, installations and power grids		
		Designing equipment prototypes			**(GC) make prototypes of energy equipment and installations in accordance with the design;** **(GC) develop test procedures for prototypes and perform them**	**(GC) develop the assumptions for making energy equipment and installation prototypes;** **(GC) elaborate the criteria for performing test runs of energy equipment and installation prototypes;** **(GC) analyse the results of test runs of energy equipment and installation prototypes with regard to the criteria adopted**	**(GC) design the process of developing energy equipment and installation prototypes**	
II. Infrastructure construction and maintenance	knows and understands...	**Regulations on infrastructure construction and maintenance**	**(GC) the principles of overhaul management and the rules resulting from legal regulations on the operation of energy equipment, installations and power grids**	**(GC) the legal regulations on the assembly and disassembly of energy equipment and installations as well as on the operation of energy equipment, installations and power grids**	**(GC) the legal regulations on the construction of energy installations and power grids as well as on the operation of the energy system;** **(GC) the planned changes in legal regulations on the construction, assembly, disassembly and operation of energy equipment, installations and power grids as well as on the operation of the energy system**			

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Infrastructure construction and maintenance	knows and understands...	**Theoretical issues pertaining to infrastructure construction and maintenance**	**(GC) the terminology of energy transformation**	**(GC) the general theoretical foundations of energy transformation and the fundamentals of thermodynamics, electronics, electrical engineering and automation to the extent necessary for the assembly, start up, disassembly and maintenance of typical energy equipment, installations and power grids**	**(GC) issues in the fields of, for example, thermodynamics, fluid mechanics, electronics, electrical engineering and automation to the extent necessary for the assembly, start up, disassembly and maintenance of industrial energy equipment, installations and power grids**	**(GC) issues in the fields of, for example, thermodynamics, electronics, electrical engineering and automation, enabling the theoretical description of physical phenomena and the construction and operating principles of industrial systems to the extent necessary for the assembly, start up, disassembly and maintenance of energy equipment, installations and power grids operating under special conditions, e.g., in an aquatic environment**	**(GC) the development trends, for example, in thermodynamics, electronics, electrical engineering and automation affecting the energy industry in the area of infrastructure construction and maintenance**	**(GC) the latest developments, for example, in thermodynamics, electronics, electrical engineering and automation that can be implemented and used in infrastructure construction and maintenance**
		The principles of the how tools work and are used	the principles of how tools work and are used for overhauling and maintaining the operation of energy equipment, installations and power grids	the principles of how construction and assembly machinery work and are used for overhauling and maintaining the operation of energy equipment, installations and power grids	the principles of how specialised tools work and are used for overhauling and maintaining the operation of energy equipment, installations and power grids			
		Diagnostic computer software		the principles of the operation and use of computer software for overhauling and maintaining energy equipment, installations and power grids	the principles of the operation and use of advanced computer software for overhauling and maintaining the operation of energy equipment, installations and power grids			
		Methods and technologies of assembly, start up and disassembly	**(GC) the basic methods, technologies and conditions for the assembly, start up and disassembly of energy equipment and installations**	**(GC) the methods, technologies and conditions for the assembly, start up and disassembly of commonly used energy equipment and installations**	**(GC) the methods, technologies and conditions for the assembly, start up and disassembly of industrial energy equipment, installations and power grids**	**(GC) the methods, technologies and conditions for the assembly, start up and disassembly of energy equipment, installations and power grids operating under special conditions, e.g., in an aquatic environment**	**(GC) the development trends in the methods and technologies for the assembly, start up and disassembly of energy equipment, installations and power grids**	**(GC) the new methods and technologies for the assembly, start up and disassembly of energy equipment, installations and power grids**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Infrastructure construction and maintenance	knows...	**Predicting and preventing breakdowns**	breakdown data collection methods	breakdown data analysis methods	the methods of preventing breakdowns diagnosed from the statistical data provided by energy equipment, installations and power grids	the methods of addressing undiagnosed breakdowns in energy equipment, installations and power grids		
	is able to...	**Assembling and disassembling energy equipment and installations**	**(GC) perform assembly and disassembly tasks on commonly used energy equipment and installations**	**(GC) start up commonly used energy equipment and installations;** **(GC) perform assembly and disassembly tasks on industrial energy equipment and installations**	**(GC) assemble, start up and disassemble commonly used industrial energy equipment and installations under non-routine or particularly hazardous conditions;** **(GC) start up industrial energy equipment and installations**	**(GC) assemble, start up and disassemble industrial energy equipment and installations under non-routine or particularly hazardous conditions**		
		Maintenance, overhaul, repair and modernisation	**(GC) perform the day-to-day maintenance of energy equipment, installations and power grids;** **(GC) perform simple repairs and overhauls of energy equipment, installations and power grids**	**perform repairs and overhauls of equipment, installations and power grids**	**(GC) perform complex repairs and overhauls of energy equipment, installations and power grids under unpredictable conditions**	**(GC) perform complex repairs and overhauls of energy equipment, installations and power grids under particularly hazardous conditions**	**(GC) modernise energy equipment, installations and power grids, including the application of RES solutions**	
		Diagnostics	perform activities to assess the correct functioning of energy equipment, installations and power grids using the senses (e.g., vision, hearing); obtain data on the breakdowns and disruptions to the operation of energy equipment, installations and power grids	locate breakdowns and disruptions in the operation of energy equipment, installations and power grids based on data from monitoring equipment and systems	diagnose the causes of malfunctions, breakdowns and disruptions in the operation of energy equipment, installations and power grids based on transmitted data; determine how to repair energy equipment, installations and power grids	diagnose the causes of malfunctions, breakdowns and disruptions in the operation of energy equipment, installations and power grids without clear data indicating them		
		Using diagnostic computer software		use typical computer software supporting overhauls and maintaining the operation of energy equipment, installations and power grids	use advanced computer software supporting overhauls and maintaining the operation of energy equipment, installations and power grids	formulate guidelines for adapting IT solutions supporting overhauls and maintaining the operation of energy equipment, installations and power grids		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Infrastructure construction and maintenance	is able to...	**Planning inspections, overhauls, repairs and modernisation**		**(GC) plan the work of inspections, overhauls, repairs and modernisations of energy equipment and installations**	**(GC) plan the work of inspections, overhauls, repairs and modernisations of distribution power grids**	**(GC) plan the work of overhauls, repairs and modernisations of transmission power grids**	**(GC) prepare development plans for power grids**	
		Developing methods and technologies				verify the correctness of the work being performed and assess the methods used to assemble, start up, disassemble and maintain energy equipment, installations and power grids	**(GC) implement new methods and technologies to assemble, start up, disassemble, diagnose and maintain energy equipment, installations and power grids**	**(GC) develop new methods and technologies to assemble, start up, disassemble, diagnose and maintain energy equipment, installations and power grids**
III. Energy production, transformation, storage and supply	knows and understands...	**Theoretical issues pertaining to energy production, transformation, storage and supply**	**(GC) the terminology pertaining to electrical power engineering, heat engineering, heating and gas engineering, energy equipment and installations**	**(GC) the fundamentals of thermodynamics, electrical engineering, electronics and automation;** **(GC) the basic principles of energy transformation;** **(GC) the characteristics of typical energy sources, e.g., renewable and fossil fuels**	**(GC) issues of fluid thermo-mechanics, energy balancing and the efficiency of energy processes;** **(GC) issues relating to electrical energy transformation and transmission as well as the methods of protecting against overloads and short circuits;** **(GC) issues relating to control and measurement systems**	**(GC) issues relating to entropy, exergy and heat transfer;** **(GC) issues relating to the principles of the operation of transformers, voltage conversion systems, as well as microprocessor converters and controllers in power engineering**	**(GC) the development directions in thermo-mechanics, electrical engineering, electronics, automation, RES and other fields in the context of energy production, transformation, storage and supply**	**(GC) the latest solutions in thermo-mechanics, electrical engineering, electronics, automation, RES and other fields used in the context of energy production, transformation, storage and supply**
		Measuring instruments and energy equipment, installations and power grids	the principles of the operation and use of measuring instruments used in energy production, transformation, storage and supply processes	the principles of the operation of measuring systems; the principles of the operation, use and ongoing maintenance of routine energy equipment and installations	the principles of the operation, use and ongoing maintenance of non-routine energy equipment, installations and power grids			
		Energy production methods and technologies	**(GC) the basic methods and technologies of energy production;** **(GC) the construction and operating principles of the equipment that is part of energy production technologies**	**(GC) the parameters affecting the operation of energy production methods and technologies**	**(GC) the structure of the components and breakdown of the processes in energy production methods and technologies**	**(GC) complex energy production systems**	**(GC) the development trends in energy production systems**	**(GC) the latest developments in energy production systems**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Energy production, transformation, storage and supply	knows and understands...	**Energy transformation methods and technologies**	**(GC) the basic methods and technologies of energy transformation;** **(GC) the construction and operating principles of the equipment that is part of energy transformation technologies**	**(GC) the parameters affecting the operation of energy transformation methods and technologies**	**(GC) the structure of the components and breakdown of the processes in energy transformation methods and technologies**	**(GC) complex energy transformation systems**	**(GC) the development trends in energy transformation systems**	**(GC) the latest developments in energy transformation systems**
		Energy storage methods and technologies	**(GC) basic energy storage methods and technologies;** **(GC) the construction and operating principles of the equipment that is part of energy storage technologies**	**(GC) the parameters affecting the operation of energy storage methods and technologies**	**(GC) the structure of the components and breakdown of the processes in energy storage methods and technologies**	**(GC) complex energy storage systems**	**(GC) the development trends in energy storage systems**	**(GC) the latest developments in energy storage systems**
		Energy supply methods and technologies	**(GC) basic energy supply methods and technologies;** **(GC) the construction and operating principles of the equipment that is part of energy supply technologies**	**(GC) the parameters affecting the operation of energy supply methods and technologies**	**(GC) the structure of the components and breakdown of the processes in energy supply methods and technologies**	**(GC) complex energy supply systems**	**(GC) the development trends in energy supply systems**	**(GC) the latest developments in energy supply systems**
		IT solutions	the principles of using software to document, control and monitor the operation of energy equipment	the principles of the operation and use of computer software in energy production, transformation, storage and supply processes	the principles of the operation and use of specialised computer software and IT infrastructure in energy production, transformation, storage and supply processes			
	is able to...	**Procedures and plans**	conduct procedures relating to energy production, transformation, storage and supply	execute plans to ensure the continuity of energy production, transformation, storage and supply in situations of planned overhauls, repairs, maintenance, modernisation of energy equipment and installations	implement plans to ensure the continuity of energy production, transformation, storage and supply in emergency situations	verify the correctness of the work performed in relation to energy production, transformation, storage and supply	**(GC) modify plans and procedures to ensure the continuity of energy production, transformation, storage and supply**	**(GC) develop plans and procedures to ensure the continuity of energy production, transformation, storage and supply**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Energy production, transformation, storage and supply	is able to...	**Operating energy equipment and installations**	conduct activities relating to the operation of individual components of energy equipment (preparing for operation, start up, adjustment, setting parameters in accordance with instructions, monitoring parameters, shutting down, securing after finishing operations)	**(GC) perform tasks associated with supervising the operation of individual energy equipment components (monitoring parameters, adjusting parameters depending on the course of energy production, transformation, storage and supply processes, implementing remedial actions in emergency situations)**	**(GC) perform moderately complex tasks associated with operating installations and assemblies of energy equipment (preparing for operation, start up, adjusting, setting parameters in accordance with instructions, monitoring parameters, shutting down, securing after finishing operations)**	**(GC) perform complex tasks associated with the supervising the operation of installations and assemblies of energy equipment (monitoring parameters, adjusting parameters depending on the course of energy production, transformation, storage and supply processes, implementing remedial actions based on established procedures in emergency situations)**	**(GC) perform complex and non-routine tasks associated with supervising the operation of installations and assemblies of energy equipment (implementing remedial actions without established procedures in emergency situations)**	
		Monitoring the processes of energy production, transformation, storage and supply	measure and record the parameters of the energy produced, transformed, stored and supplied, including with the use of telemetric systems	monitor the course of the energy produced, transformed and supplied as well as analyse the parameters of the energy produced, transformed, stored and supplied	**(GC) identify anomalies in energy production, transformation, storage and supply processes**	**(GC) analyse and optimise energy production, transformation, storage and supply processes**		
		IT solutions, including telemetric systems, for operating energy equipment, systems, installations and power grids	operate telemetric systems for the remote monitoring and management of the operating parameters of energy equipment, systems, installations and power grids	use telemetric systems to operate energy equipment, systems, installations and power grids	configure the computer software and IT infrastructure used in energy production, transformation, storage and supply processes	formulate guidelines for the adaptation of the computer software and IT infrastructure used in energy production, transformation, storage and supply processes		
		Using databases	use databases, maps and satellite images to retrieve, read and update the information necessary to perform professional tasks in energy production, transformation, storage and supply processes	generate statements and reports from databases necessary to perform professional tasks in energy production, transformation, storage and supply processes	select sources and types of data necessary to perform professional tasks in energy production, transformation, storage and supply processes			

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. The energy market	knows and understands...	**The functioning of energy markets**	**(GC) the terminology associated with the functioning of energy markets**	**(GC) the mechanisms of the functioning of the energy market**	**(GC) the principles of the functioning of the national energy market**	**(GC) the principles of the functioning of European and global energy markets**	**(GC) the development trends in energy markets**	
		The structure of energy production, storage, balancing and supply		the types of actors in local and regional energy markets and their roles	**(GC) the structure of energy production, storage, balancing and supply at the regional scale**	**(GC) the structure of national energy production, storage, balancing and supply**	**(GC) the development trends in the structure of energy production, storage, balancing and supply**	
		Energy demand and balancing energy supply and demand	the main factors influencing the energy demand of buildings	the factors affecting the energy demand of buildings and industrial processes	**(GC) the regulations affecting energy demand;** the methods of balancing supply and demand using energy storage and market mechanisms	**(GC) the factors affecting regional and national energy demand**	**(GC) long-term global socio-economic trends affecting energy demand**	
		Methods of estimating energy demand while taking RES into account	**(GC) the basic methods of estimating the energy demand of buildings**	**(GC) the methods of estimating the energy demand of public buildings**	**(GC) complex methods of estimating the energy demand of public buildings and industrial processes**	**(GC) the methods of estimating the energy demand of a region and a country**	**(GC) the methods of long-term regional, national and EU energy demand forecasting**	
		Principles and legal regulations concerning tariffs	**(GC) the differences between regulated and free market services**	**(GC) the types of tariffs;** **(GC) the tasks of the authority approving tariffs;** **(GC) the tasks of energy companies applying for tariff approval;** **(GC) the main areas of licensing and tariffs**	**(GC) tariff regulations and the impact of factors affecting cost and the market;** **(GC) licensing and tariffing procedures;** the principles of setting tariffs and price lists	**(GC) the mechanisms of selling energy from RES to different groups of producers**	**(GC) the rules impacting national and European Union energy policies on the principles of setting tariffs**	
		Principles and legal regulations concerning energy sales	the types and tasks of the authorities supervising energy production, storage, distribution and trading	**(GC) the principles of selling energy to consumers and business customers;** the principles of selling energy to power grids, including group purchasing, PPA and RES	**(GC) the legal regulations on the production, storage, distribution and trade of energy, including from renewable sources**	**(GC) the principles of preparing contracts for various complex forms of energy sales**	**(GC) the complex organisational and legal solutions affecting energy and fuel market actors**	**(GC) national and European Union policies on the energy and fuels market**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. The energy market		Ecosystems and energy valleys	(GC) the terminology pertaining to energy ecosystems, energy valleys, energy sovereignty and autonomy	(GC) the benefits and risks of establishing independent and semi-independent energy ecosystems; (GC) local and national programmes supporting the operation of closed ecosystems and energy valleys	(GC) national regulations supporting the functioning of closed ecosystems and energy valleys; (GC) the structure and components of independent and semi-independent energy ecosystems; (GC) the elements of the energy value chain in an ecosystem or energy valley; (GC) the constraints of independent and semi-independent energy ecosystems and how to address them; (GC) good practices at the national and international level in establishing ecosystems and energy valleys; (GC) international programmes supporting the operation of closed ecosystems and energy valleys	(GC) international regulations supporting the functioning of closed ecosystems and energy valleys	(GC) the development trends in the functioning of independent and semi-independent energy ecosystems	
IV. The energy market	is able to...	Estimating energy demand			(GC) estimate the current regional energy demand	(GC) estimate the current national energy demand	(GC) forecast the cross-border energy demand	
IV. The energy market	is able to...	The needs of energy consumers and producers	(GC) collect the necessary input data for energy analyses based on the design data of buildings	(GC) perform energy balance calculations for buildings using computer software	(GC) perform process balance calculations using computer software	(GC) analyse the correctness of algorithms and the results of energy demand calculations using computer software	(GC) develop energy management concepts taking into account sustainable development principles	(GC) develop new solutions to meet the needs of energy consumers and producers taking into account the principles of sustainable development

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. The energy market	is able to...	Informing and educating about the energy market	(GC) provide the customer with information on energy equipment and installations, the parameters and sources of produced, stored and supplied energy, as well as the rules of connecting to the grid and settling energy consumption accounts	(GC) instruct the customer on the safe and effective operation and ongoing maintenance of energy equipment and installations, as well as explain to the customer the environmental impact of energy production, transformation, storage and supply processes, including green energy	(GC) provide information on the medium and long-term prospects of the energy market	(GC) educate energy consumers on pollution reduction solutions, climate change mitigation and efficient energy management, taking into account the principles of the circular economy		
		Preparing an energy sales offer	(GC) prepare an energy sales offer for individual consumers based on calculated demand	(GC) prepare an energy sales offer for industrial customers based on calculated demand	prepare tariffs and price lists for individual and industrial customers taking into account green energy	(GC) develop commercial strategies for selling energy and ancillary services with an estimation of the risks arising from the regulation of the green energy market		
		Accounting for energy costs for private customers and licensed entities	-	(GC) read, calculate, process and document the costs of produced and consumed energy, including green energy	(GC) analyse and account for energy costs over a specified time period, including green energy	(GC) negotiate and settle the accounts between national distribution and transmission system operators	(GC) plan energy costs taking into account long-term sustainable development principles; (GC) perform complex settlements between the operators of cross-border distribution and transmission systems	
		Developing an energy policy in accordance with the principles of sustainable development			(GC) analyse and assess the implementation of the energy policy of an enterprise	(GC) analyse the effects of legislative changes on national energy policy	(GC) forecast the interaction between national and world energy policies	(GC) formulate guidelines for legislative changes in the field of international energy policy

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
V. Energy carriers and working fluids	knows and understands...	**Legal and market issues**		**(GC) the principles of handling hazardous, harmful and nuisance agents occurring in energy production, storage and supply processes;** **(GC) the market mechanisms for energy carriers and working fluids and their availability and use on the regional and national scales**	**(GC) the principles of organising the supervision of a team's work with energy carriers and working fluids given their availability and utilisation on a global scale;** **(GC) the legal regulations on energy carriers;** **(GC) the conditions affecting the functioning and availability of local markets for energy carriers and working fluids**	**(GC) the factors affecting the functioning of and accessibility to the global market of energy carriers and working fluids**		
		Energy carriers, working fluids and their parameters	**(GC) the terminology pertaining to energy carriers and working fluids;** **(GC) the types and distribution of energy carriers and working fluids**	**(GC) the ways of obtaining and using energy carriers, including renewable energy sources, as well as working fluids;** **(GC) the parameters characterising energy carriers and working fluids and their variability**	**(GC) the influence of the parameters of energy carriers and working fluids on the efficiency of energy production, storage and supply processes**			
		Principles of handling energy carriers and working fluids	**(GC) the principles and conditions of the storage, transport and handling of energy carriers and working fluids**	the methods of testing the parameters of energy carriers and working fluids	**(GC) the methods and technologies of preparing energy carriers and working fluids for commonly used energy equipment and installations**	**(GC) the methods and technologies of preparing energy carriers and working fluids for industrial energy equipment and installations**	**(GC) the development trends in the methods and technologies of preparing energy carriers and working fluids**	**(GC) the latest methods and technologies of preparing energy carriers and working fluids**
	is able to...	**Determining the properties of energy carriers and working fluids**	read the required parameters of energy carriers and working fluids from the instructions and documentation of production equipment	perform measurements of energy carriers and working fluid parameters	**(GC) select the parameters for energy carriers and working fluids;** **(GC) test the impact of the parameters of energy carriers and working fluids on the efficiency of energy production, storage and supply processes**	**(GC) interpret the results of tests on the impact of the parameters of energy carriers and working fluids on energy production, storage and supply processes**	assess the methods of testing the parameters of energy carriers and working fluids	**(GC) develop new methods of testing the parameters of energy carriers and working fluids**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
V. Energy carriers and working fluids	is able to...	**Preparing energy carriers and working fluids**	read the documentation to determine the parameters and methods of preparing energy carriers and working fluids for energy production, storage and supply processes	**(GC) prepare energy carriers and working fluids for energy production, storage and supply processes**	**(GC) select the technologies of preparing energy carriers and working fluids intended for energy production, storage and supply processes**	**(GC) adapt the methods of preparing energy carriers and working fluids for energy production, storage and supply processes**	**(GC) modify the methods of preparing energy carriers and working fluids to improve the efficiency of energy production, storage and supply processes**	**(GC) develop new methods of preparing energy carriers and working fluids**
		Handling energy carriers and working fluids	-	**(GC) perform activities to store, record, transport and determine the dose of energy carriers and working fluids**	**(GC) in accordance with procedures, select the conditions and methods of storing, transporting and determining the dose of energy carriers and working fluids;** **(GC) implement guidelines for storing and transporting energy carriers and working fluids based on the defined conditions for their storage and transport**	**(GC) formulate guidelines for storing and transporting energy carriers and working fluids based on the defined conditions for their storage and transport**		
VI. Sustainable development	knows and...	**Environmental regulations**		**(GC) the basic principles of environmental documentation and the procedures for verifying its compliance with regulations;** the basic principles of sustainable development reporting	**(GC) regulations on energy transition in the context of sustainable development;** **(GC) the principles of supervising the management of waste and emissions**	**(GC) the assumptions of national environmental policy, including measures for sustainable development**	**(GC) the mechanisms for assessing the potential impacts of implementing regulations on sustainable development and the energy transition**	
		Energy efficiency	**(GC) the basic areas and methods of increasing energy efficiency**	**(GC) the methods of monitoring key energy efficiency indicators**	**(GC) the analytical methods used to determine energy efficiency;** energy audit recommendations	**(GC) energy management systems**	**(GC) the development trends in the methods of improving energy efficiency, energy transport and new fuels**	**(GC) the latest methods of improving energy efficiency**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VI. Sustainable development	knows and understands...	The effects of energy processes on ecosystems	(GC) the types and sources of emissions of hazardous, harmful or noxious agents and other environmental hazards resulting from energy production, transformation, storage and supply processes	(GC) the permissible levels of emissions of hazardous, harmful or nuisance agents resulting from energy production, transformation, storage and supply processes; (GC) the impact of radioactive substances resulting from nuclear power generation	(GC) the determinants of the effects of hazardous, harmful, radioactive or nuisance emissions and the occurrence of other environmental hazards resulting from energy production, transformation, storage and supply processes; (GC) the methods of investigating and assessing the effects of hazardous, harmful and nuisance agents on the environment	(GC) the impact of energy production, transformation, storage and supply processes on the climate; (GC) the long-term effects of harmful, radioactive and nuisance factors on ecosystems	(GC) the methods of forecasting the impact of energy production, transformation, storage and supply processes on ecosystems; (GC) the methods of reducing the negative impact on ecosystems of energy production, transformation, storage and supply processes	(GC) the latest achievements in modelling energy production, transformation, storage and supply processes to reduce their impact on ecosystems
		The impact of managing or disposing of disassembled energy equipment and installations on ecosystems	(GC) the basic hazards associated with waste and working fluids; (GC) the hierarchy of waste and working fluids management practices	(GC) the impact of the risks associated with waste and working fluids on ecosystems	(GC) the principles and methods of mitigating the impact of waste and working fluids on ecosystems			
		Emissions abatement	(GC) the types of emissions and basic methods of reducing them	(GC) the technologies and equipment for emissions abatement resulting from energy production, transformation, storage and supply processes	(GC) the methods and technologies of emissions abatement, including pollutants and greenhouse gases, resulting from energy production, transformation, storage and supply processes	(GC) the principles of designing and implementing emissions abatement programmes, including decarbonisation programmes in energy production, transformation, storage and supply processes	(GC) the development trends in the emissions abatement technologies of energy production, transformation, storage and supply processes	(GC) the latest emissions abatement technologies of energy production, transformation, storage and supply processes
		Energy recovery systems		(GC) basic energy recovery systems	(GC) energy recovery systems and the benefits of their use; (GC) the methods of managing recovered energy	(GC) the technologies and solutions used to recover energy in industrial processes and their impact on the environment	(GC) the development trends in the field of energy recovery technologies and the long-term results of their implementation and use	(GC) the latest technologies of energy recovery and its subsequent transformation

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VI. Sustainable development	knows and...	Natural resources management	(GC) the terminology pertaining to the activities of the circular economy in energy production, transformation, storage and supply processes	(GC) the general theoretical foundations of circular economy methods and solutions as applied to energy production, transformation, storage and supply processes	(GC) the methods and technologies of the circular economy pertaining to waste minimisation and the efficient use of natural resources in energy production, transformation, storage and supply processes	(GC) complex circular economy methods and technologies pertaining to decarbonisation in energy production, transformation, storage and supply processes		
	is able to...	Analysing energy efficiency	(GC) monitor basic energy efficiency indicators	(GC) perform measurements to determine energy efficiency	(GC) analyse the parameters that influence energy efficiency	(GC) analyse the energy efficiency of specific technologies for generating energy from renewable energy sources; (GC) perform energy efficiency audits	(GC) develop plans and strategies to improve energy efficiency using the latest solutions	
		Using energy efficiently, including energy from renewable sources			(GC) optimise the use of energy produced from renewable and non-renewable sources in the energy installations of public buildings	(GC) optimise the consumption of energy produced from renewable and non-renewable sources in industrial processes	(GC) develop plans and strategies to increase and implement the share of energy produced from renewable sources on a regional scale	(GC) develop plans and strategies to increase and implement the share of energy produced from renewable sources in the national energy production mix
		Managing natural resources			(GC) select energy carriers for energy production processes in accordance with the principles of environmental protection and sustainable development	(GC) plan the use of natural resources in energy equipment, installations and power grids in accordance with the circular economy model	(GC) develop programmes to minimise waste and efficiently use natural resources, including critical raw materials, in energy production, transformation, storage and supply processes	(GC) develop long-term strategies for the management of natural resources used in energy production, transformation, storage and supply processes
		Impact reduction technologies	-	-	(GC) select energy supply technologies, equipment operating parameters, installations and power grids in such a way as to minimise the negative impact of the processes of energy production, transformation, storage and supply on the environment	(GC) implement technologies minimising the negative impact of energy production, transformation, storage and supply processes on the environment	(GC) modify technologies that minimise the negative impact of energy production, transformation, storage and supply processes on the environment	(GC) develop advanced technological solutions to minimise the negative impact of energy production, transformation, storage and supply processes

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VI. Sustainable development	is able to...	**Assessing the impact of energy production, transformation, storage and supply processes on ecosystems**	-	**(GC) perform measurements of pollutant emissions;** **(GC) test the level of the environmental nuisance resulting from energy production, transformation, storage and supply processes**	**(GC) analyse and assess the impact of energy production, transformation, storage and supply processes on ecosystems**	**(GC) prepare multi-faceted analyses and reports on the impact of energy production, transformation, storage and supply processes on ecosystems**	**(GC) prepare plans to reduce the long-term effects of harmful and radioactive agents on ecosystems**	**(GC) develop the latest methods and tools to reduce the impact of energy processes on ecosystems**
		Handling waste and working fluids	**(GC) identify the main hazards associated with waste and working fluids**	**(GC) identify and analyse the problems relating to waste and working fluids and propose solutions;** **(GC) use disassembled equipment and components of energy installations in repairs and upgrades;** **(GC) document and report data on waste and the consumption of working fluids**	**(GC) supervise and coordinate the activities of managing waste and working fluids**	**(GC) formulate guidelines for handling waste and working fluids containing environmentally hazardous substances**	**(GC) analyse and assess the environmental impact of managing waste and working fluids and propose long-term solutions**	
		Energy recovery		**(GC) implement a basic energy recovery system**	**(GC) implement and operate energy recovery systems in public buildings**	**(GC) implement and operate energy recovery systems in industrial processes**	**(GC) design energy recovery systems**	**(GC) develop new energy recovery solutions and technologies**
VII. Occupational safety	knows and understands...	**Occupational health and safety regulations**	occupational health and safety procedures, including the safe organisation of work with energy equipment and installations, fire prevention, ergonomics and environmental protection in relation to the professional tasks being performed	the legal regulations on conferring the authorisation to perform and supervise professional tasks in safe energy production, storage, transformation and supply processes; emergency procedures in situations posing a threat to human health and life	the legal regulations and process safety requirements for energy production, transformation, storage and supply			

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VII. Occupational safety	knows and understands...	**Principles and legal regulations on providing first aid**	the principles of providing first aid for persons injured in accidents involving energy equipment		the principles and legal regulations pertaining to the evacuation of persons injured in accidents occurring in energy production, transformation, storage and supply processes			
		Risk analysis	the types of hazards associated with the performance of professional tasks	the risks associated with the implementation of energy production, transformation, storage and supply processes; the factors and situations affecting the possibility of hazards occurring in energy production, transformation, storage and supply processes	the effects of emergency situations in energy production, transformation, storage and supply processes			
		Personal and collective protective equipment	the types, purpose and principles of using basic safety equipment during the performance of professional tasks	the principles of operating and selecting protective measures, including the technical protection of energy equipment, installations and power grids, in the event of breakdowns or disruptions at work	the principles of operating complex protection systems for energy equipment, installations and power grids	the principles of designing protective measures for work zones in energy production, transformation, storage and supply processes		
	is able to...	**Technical and technological documentation**	use work instructions, technical documentation and other documentation to obtain the information needed to perform one's professional tasks in energy production, transformation, storage and supply processes	use workstation instructions, technical and technological documentation as well as other documentation needed to perform and supervise tasks in energy production, transformation, storage and supply processes	develop and modify job instructions, technical and process documentation as well as other documentation for energy production, transformation, storage and supply processes			

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VII. Occupational safety	is able to...	**Risk analysis**	Identify anomalies that threaten process safety in energy production, storage and supply processes	**(GC) identify possible risks in energy production, transformation, storage and supply processes**	**(GC) assess the risk of emergency situations in energy production, transformation, storage and supply processes;** **(GC) assess the degree of risk and implement remedial measures in emergency situations not covered by existing procedures**			
		Safety systems	apply measures to reduce the risk of emergencies in energy production, transformation, storage and supply processes	select measures to reduce the risk of emergencies in energy production, transformation, storage and supply processes; develop measures to reduce the risk of emergencies in energy supply processes and develop emergency procedures and contingency plans in the event of a threat to people, property or the environment	implement technologies to improve safety in energy production, transformation, storage and supply processes	adapt new technological solutions to improve safety in energy production, transformation, storage and supply processes		
		Rescue operations	provide first aid to casualties, including those electrocuted, during the performance of energy production, transformation, storage and supply tasks	conduct activities to evacuate persons from the scene of a breakdown not posing a particular threat to human health or life	conduct activities to evacuate persons from the scene of a breakdown posing a particular threat to human health or life, as well as from places difficult to access	direct activities to evacuate persons from places where a breakdown has occurred that poses a particular threat to human health or life	coordinate the actions of many teams in situations of particular risk to human health or life	
		Training others		provide instruction on occupational safety, the topography of the workplace and the procedures in force	integrate newly hired employees into the work of energy production, transformation, storage and supply processes	provide training on the competences of implementing activities to ensure the safety of workers, bystanders and property; verify the competences of implementing activities to ensure the safety of workers, bystanders and property		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VII. Energy security	knows and understands...	**Threats to energy security**	the typical local, natural threats to the energy industry	the threats caused by human factors in the energy industry	the operational threats to the energy industry	the trans-regional, natural threats to the energy industry	the geopolitical threats to the energy industry	
		Critical infrastructure	the locations of energy sources and energy supply chains	the prioritisation of transmission grids and energy consumers and the methods and tools of their protection	the weak links in the energy system and the backbone network and their vulnerability to breakdowns and attacks	the complex methods of protecting critical energy industry infrastructure from breakdowns and attacks	the development trends in the methods of increasing the resilience of critical energy industry infrastructure against breakdowns and attacks	
		Energy supply continuity	the typical causes of disruptions to the processes ensuring energy supply continuity; the basic indicators of energy supply continuity; the basic methods of ensuring energy supply continuity; the types and availability of raw materials (including stocks) and infrastructures required for energy production	the effects of physical limitations on the methods and directions of energy transport; the interruption and breakdown rates in energy production	the impact of factors on energy supply continuity, e.g., different types of customers, energy flow directions, RES sources	the complex methods of maintaining energy supply continuity	**(GC) the development trends in the methods of increasing the resilience of the energy system against energy supply interruptions**	**(GC) the latest methods of modelling threats to energy supply continuity and minimising their impact**
		Energy supply quality	the parameters of energy supply quality	the conditions of energy system stability; the methods of counteracting intrinsic technical disruptions; the regulations defining the quality parameters of the energy supply	the effects of various factors on energy supply quality, including unintentional human interference	the complex methods of maintaining energy supply quality	**(GC) the development trends in the methods of increasing the resilience of the energy system in response to supply stability and loss of energy supply quality**	**(GC) the latest methods of modelling the threats to energy supply quality and minimising their impact**
		Information and communications security in the energy industry	the types of typical information and communications technology breakdowns in the energy industry	the methods of counteracting information and communications technology threats in the energy industry	the methods of identifying and analysing critical points in information and communications systems	the complex methods of protecting energy systems against ICT attacks	the development trends in the methods of improving the resistance of energy systems against ICT attacks	the latest methods and tools to improve the security of energy systems against ICT attacks

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VIII. Energy security	is able to...	**Energy infrastructure**	distinguish energy sources as well as transmission and distribution power grids	identify strategic sources (including energy storage facilities), energy supply chains and critical customers	assess the reliability of the critical infrastructure, the risk of its breakdown or attacks on it	develop procedures to protect the energy infrastructure	forecast potential threats and develop plans to ensure the security of the energy infrastructure	**(GC) develop long-term strategies and plans to ensure national energy security**
		Ensuring the continuity and quality of the energy supply	identify the indicators that provide information about threats to the continuity and quality of the energy supply and the supply and demand balance	diagnose disruptions to the continuity and quality of the energy supply and react in accordance with procedures	analyse the continuity and quality of the energy supply and react appropriately in non-routine situations	develop procedures to ensure the continuity and quality of the energy supply in emergency situations; develop procedures for non-market redispatching	forecast potential risks and develop plans to ensure the continuity and quality of the energy supply	**(GC) develop long-term strategies and plans to ensure the continuity and quality of the energy supply using cross-border energy systems**
		Distributed energy	**(GC) make an initial estimate of the energy potential in a given location**	**(GC) perform a partial parameterisation of energy sources and assess the appropriateness of the use of the energy potential in a given location**	**(GC) develop an outline of the architecture to diversify energy sources, storage and supply chains**	**(GC) perform a complete parameterisation of energy sources;** **(GC) analyse the integration of distributed energy sources into the existing energy system and end consumers, as well as determine the variability of their parameters over time;** perform an economic, environmental and technical assessment of the planned energy system	**(GC) plan the self-sufficiency and autonomy of the energy in a given location**	**(GC) develop new methods and tools to improve the resilience of the energy system against disruptions, attacks and other threats**
		Protecting ICT solutions used in the energy industry		apply the typical principles of protecting the ICT solutions of energy systems	identify and analyse the critical points of energy systems in the context of disruptions, attacks and other threats to the ICT solutions; support the physical protection of the ICT solutions of energy systems	support the cyber protection of the ICT solutions of energy systems		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IX. Communication and cooperation	is ready to...	**Communication**	communicate and collaborate in small teams, using technical language and energy terminology	**(GC) communicate with colleagues and superiors in work teams and with other teams, using technical language and energy terminology**	**(GC) ensure the accuracy of the technical language;** **(GC) communicate with energy consumers, tailoring the message to them**	**(GC) communicate in professional and media environments, including about energy security and sustainable development**	**(GC) communicate in an academic environment (also in a foreign language)**	**(GC) communicate in international scientific and research and development environments**
		Cooperation	cooperate in a team	cooperate with different teams in a company	**(GC) cooperate with other enterprises and customers;** **(GC) cooperate with rescue services;** **(GC) cooperate in the work environment, including with the industry and local communities**	**(GC) cooperate in interdisciplinary teams**	**(GC) shape the conditions supporting cooperation among companies within capital groups, including the promotion of the circular economy;** **(GC) cooperate with the scientific community**	**(GC) cooperate in the implementation of cross-border energy transmission, promoting a culture of cooperation in the European energy market**
X. Ethics		**Legal compliance and protection of rights**	**(GC) act in accordance with the legal regulations on energy, construction and labour**	**(GC) control the compliance with legal regulations on energy, construction and labour**	**(GC) report cases of irregularities and protect whistleblowers in the energy industry**			
		Ethical principles and social responsibility	**(GC) act in accordance with the principles of honesty, integrity, impartiality and confidentiality in the performance of professional tasks in the energy industry**	**(GC) control conduct in accordance with the principles of honesty, integrity, impartiality and confidentiality in the performance of professional tasks in the energy industry**	**(GC) promote and incorporate the principles of ethical, responsible, reliable and honest conduct in the performance of professional tasks in the energy industry**	**(GC) promote the principles of ethical and responsible conduct of scientific, research and implementation activities in a green, efficient energy industry taking into account the principles of sustainable development;** **(GC) participate in the public debate on the ethical aspects of energy and their development**	**(GC) require oneself and others to observe professional secrecy, the principles of intellectual property protection and the culture of cooperation and competition in the energy industry**	**(GC) develop models of ethical behaviour in respecting intellectual property, a culture of cooperation and competition in the energy industry**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
XI. Decision-making	is ready to...	**Decision-making**	act partly autonomously in the performance of professional tasks in the energy industry; demonstrate a pragmatic approach in team tasks	act autonomously in the performance of professional tasks in the energy industry	perform professional tasks in the energy industry under changing conditions and time pressure; **(GC) perform professional tasks in the energy industry in situations posing a specific risk to human health or life, property and the environment**	make decisions in the energy industry under changing conditions and time pressure	**(GC) make decisions in the energy industry under time pressure and in situations posing a specific risk to human health or life, property and the environment**	
		Adapting to and initiating change	**(GC) adapt to changes in the work environment relating to the implementation of new technical and organisational solutions in the energy industry**	**(GC) supervise changes in the work environment relating to the implementation of new technical and organisational solutions in the energy industry**	**(GC) supervise changes in the work environment relating to the implementation of new technical and organisational solutions in the energy industry**	**(GC) initiate changes in the workplace relating to the implementation of new technical and organisational solutions in the energy industry**	**(GC) initiate changes in the energy industry relating to the implementation of new technical and organisational solutions in the energy industry**	
XII. Responsibility for quality and safety		**Ensuring safety at work**	comply with regulations on work safety and ergonomics in the energy industry; use personal and collective protection measures for work performed under routine conditions	be attentive to the health and safety of oneself, co-workers and subordinate employees while performing tasks in the energy industry; apply personal and collective protection measures in the case of work performed under conditions posing a particular risk to human health or life	undertake activities to ensure the safety of workers, bystanders and property in the event of a breakdown posing no particular risk to human health or life	undertake activities in one's work environment to increase safety in the performance of tasks in the energy industry	undertake activities in the professional community to improve safety and the quality of work and tasks in the energy industry; undertake activities to ensure the safety of employees, bystanders and property in the event of emergencies that pose a particular threat to human health or life	develop and implement best practices, the organisational culture and safety standards in the professional community when working in the energy industry
		Managing quality and effectiveness	perform professional tasks reliably and accurately	be attentive to the quality of one's work and that of the team one is leading; **(GC) assess the quality and accuracy of performed work, as well as its impact on the efficiency of energy processes, the safety of consumers and the environment**	critically assess the effects of one's own work and that of the teams as well as anticipate the consequences of undertaken activities; **(GC) take responsibility for the activities one is leading in the energy industry, including safety and the consequences for the environment**	promote the performance of professional tasks in the workplace in a manner that ensures the high quality of manufactured products and provided services	promote a culture of quality in the energy industry; take responsibility for activities aimed at ensuring the energy security of the country; undertake activities to improve the quality of the products manufactured and services provided in the energy industry	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
XIII. Responsibility for the environment	is ready to...	The safety of users and the public		(GC) be attentive to the safety of energy consumers and users	(GC) cooperate with energy users and consumers to improve safety			
		Sustainable development and the circular economy	(GC) comply with the legal regulation on environmental protection; (GC) implement professional tasks with respect for natural resources and care for the environment	(GC) optimise energy consumption; (GC) observe the principles of waste separation and resource conservation in energy processes	(GC) cooperate with energy users and consumers with the aim of acting in accordance with sustainable development principles			

5. Glossary of terms used in the updated Sectoral Qualifications Framework for the Energy Industry

Term	Definition
Automation	Devices and systems that use the monitoring of specific parameters to quickly and autonomously control various processes in accordance with predefined rules, thereby improving safety, reliability and efficiency.
Component	An intrinsic element of an energy system, understood as a single part of it or a set of parts performing a specific function.
Continuity of the energy supply	The ability of the energy system to meet the needs of electricity, heat and gas consumers without interruption, regardless of technical, weather or emergency conditions. It includes both the reliability of the infrastructure and the effectiveness of emergency management.
Critical infrastructure	Facilities, installations, equipment, systems and services necessary for the security and basic needs of society and the smooth functioning of the economy and the state, including the energy sector. Includes, among others, power plants, transmission and distribution grids, energy storage systems, control centres and management systems. Disruptions to this infrastructure can seriously threaten energy security and the stability of the state.
Disassembly	The comprehensive, planned process of permanently decommissioning energy infrastructure, involving the safe removal of its components, waste management and, where appropriate, site reclamation, while complying with legal, safety and environmental standards.
Distributed energy	A model of an energy system in which the various (generally small) sources of electricity, heat or cooling generation are located close to end-use consumers, and not in large, central generating sources.
Ecosystems and energy valleys	Individual energy systems or those linked by a common concept to groups of actors or initiatives of an independent (closed) or semi-independent (open) nature, for example, off-grid installations, autonomous energy systems, energy clusters, hydrogen valleys.

Emissions	The release of substances into the atmosphere resulting from energy generation, conversion and use processes. They may include greenhouse gases, air pollutants, particulate matter and volatile chemical compounds responsible for odour emissions.
Energy	A physical term that describes the ability of a body or system to do work or provide heat. It is a scalar quantity that can exist in different forms and be transformed from one form to another, in accordance with the law of the conservation of energy.
Energy audit	A detailed analysis of the energy consumption of a building, business or process to find ways to reduce energy consumption and lower costs while maintaining or improving comfort and efficiency. The audit identifies specific solutions and determines the savings that they can achieve. Examples of audits: energy audit of a company, energy efficiency audit, energy audit of a building, energy audit of a heat source.
Energy carriers	A material, substance or system that has the capacity to store, carry or deliver energy in various forms. Energy carriers enable energy to be used to perform work, generate heat or other useful processes. We distinguish between primary and secondary renewable and non-renewable energy carriers. Energy carriers can also take a chemical form (e.g., batteries), a mechanical form (e.g., springs) or a thermal form (e.g., heat stored in materials). Due to their chemical, physical or toxic properties, some energy carriers may be classified as hazardous substances.
Energy efficiency	The degree of efficiency in the use of energy in relation to the achievement of the intended effect. High energy efficiency means achieving the desired results (e.g., heating, lighting, industrial processes) with minimum energy consumption. In practice, this involves optimising the use of energy resources to maximise utility effects while reducing energy losses and costs.
Energy equipment	Equipment and machinery that produces, stores or transforms energy or that is part of an installation/grid and metering equipment used in the energy industry.
Energy equipment/ installations for general use	Energy equipment/installations intended for the individual needs of the population or used in households.

Energy infrastructure	All systems responsible for producing, transforming, storing and supplying energy, including, for example, fuel installations, power plants, heating plants, combined heating and power plants, power lines, district heating power grids, industrial power grids, gas pipelines, storage facilities to meet the energy needs of buildings and industrial processes.
Energy installation	An assembly of interconnected power equipment, buildings and structures, together with control, protection and interconnection systems, designed to produce, transform, transmit, distribute or store energy for a specific purpose. An example would be a power plant consisting of a number of pieces of equipment (turbines, generators, transformers, boilers, etc.) connected to produce electricity.
Energy management system (EMS)	The way in which organisations plan, monitor and optimise energy consumption in order to operate more efficiently and consciously. This includes, but is not limited to, setting energy saving targets, tracking consumption, implementing improvements and ensuring continuous improvement in energy management methods. Examples of EMSs include: SEP (Superior Energy Performance), EMAS (Eco-Management and Audit Scheme), ISO 50001.
Energy market	A set of rules, mechanisms and platforms that enable transactions for the sale, purchase, supply and balancing of energy, while maintaining equilibrium between demand and supply and ensuring the reliability and efficient operation of the energy system.
Energy production	The process of transforming available renewable, non-renewable or artificial natural resources into usable energy, taking into account the minimisation of negative effects on the environment.
Energy recovery systems	A technology or engineering solution for reusing energy lost in an industrial process, construction or transport. The overarching aim of such systems is to improve energy efficiency and reduce the consumption of primary energy sources.
Energy security	A state of the economy that ensures the continuity and reliability of the energy supply in a technically and economically viable manner, while maintaining environmental protection requirements and the resilience of the system in the face of internal and external threats.

Energy sources	Natural resources or processes used to produce electricity, heat or mechanical energy. They are divided into renewable energy sources (RES), such as the sun, wind, biomass, water, geothermal energy, and non-renewable energy sources, for example, coal, natural gas, oil, uranium.
Energy storage	Processes relating to the storage of energy in energy storage facilities (i.e., dedicated equipment or assemblies of equipment for storing energy in any form).
Energy supply	Processes relating to the transmission, distribution and trading of energy (electricity, heat and gas), including system services.
Energy system	All installations and equipment used to produce, transform, store and deliver different types of energy.
Energy transformation	The conversion (transformation) of one form of energy into another form of energy. For the purposes of the SQF EN, the term energy transformation is used, while the sector also uses a more physical term – energy conversion.
Environmental awareness	Understanding and actively working to protect the environment with a view to meeting the energy needs of the Earth's inhabitants. It involves the conscious selection of technologies, energy carriers and operating factors that have a potentially low negative impact on the environment.
Green energy	Energy that comes from sources recognised by relevant legislation as not having a harmful impact on the environment (also green energy sources), including in particular energy from sources legally recognised as renewable.
Green energy market actors	Entities involved in the production, trade and use of green energy, including in particular those defined in the Act of 20 February 2015 on Renewable Energy Sources (Journal of Laws 2015, item 478 as amended) and the Act of 10 April 1997 – Energy Law (Journal of Laws 1997, item 348 as amended): renewable energy prosumers, renewable energy virtual prosumers, renewable energy collective prosumers, prosumer representatives, energy clusters, energy cooperatives, civic energy communities.
Green-like energy	Energy for which there is a substantive basis and a high probability of its legal classification as green energy in the future.

Hazardous substances	Materials or chemical compounds which, due to their chemical, physical or toxic properties, may pose a risk to human health, the environment or process safety. Under certain conditions of use (e.g., high temperature, pressure), they may also include substances generally regarded as safe.
ICT in energy	The combination and cooperation of telecommunications and IT solutions (hardware and software) for the transmission, processing and storage of information. ICT in energy includes teletransmission, communications, telemechanics, including in particular telemetry, remote sensing, signalling and telecontrol.
Industrial energy equipment/ installations	Energy equipment/installations used in the commercial power industry, including those that are part of power grids.
Maintenance	Activities relating to the upkeep of energy equipment, installations and power grids, such as inspection, preservation, repair, overhaul, modernisation of energy equipment, installations and power grids.
Material	Liquids, gases and solids of homogeneous or mixed composition and desired structure, used to build components.
Non-standard energy equipment/ installations	Energy equipment/installations that are individually manufactured, customised or based on new or previously unused technological solutions.
Overhaul	A set of activities aimed at restoring the original condition, not constituting ongoing maintenance or modernisation.
Power grid	Interconnected and cooperative installations for the transmission or distribution of energy.
Preservation	A set of activities performed to maintain the serviceability of a piece of technical equipment, conducted in accordance with operating instructions, which are not repairs to the equipment.

Public building	A building designated for the purposes of public administration, justice, culture, worship, education, higher education, science, upbringing, health, social or welfare services, banking services, commerce, catering, postal or telecommunications services, tourism, sports, passenger services in rail, road, air, sea or inland waterway transport, and other buildings designed to perform similar functions; an office or social building is also considered a public building.
Quality of the energy supply	A set of technical and organisational parameters that determine the stability, reliability and compliance of supplied energy with established standards (e.g., voltage, frequency, continuity of supply). It also includes the level of customer service and emergency response times. High quality of supply means meeting technical requirements with minimal disruptions and interruptions.
Recipient	Anyone who receives or consumes energy on the basis of a contract with an energy company.
Regulations	Normative acts of general application, established by authorised state bodies or international organisations (to the extent allowed by national laws). In Poland, sources of universally binding law, in accordance with the Constitution of the Republic of Poland, include: the Constitution of the Republic of Poland, statutes, ratified international agreements, regulations with the force of law (to a limited extent), regulations issued on the basis of statutes and within their boundaries, acts of local law. In the SQF EN, regulations are also understood as industry norms, guidelines, manuals and instructions, articles, studies, opinions, records of judicial decisions, both of domestic and foreign origin, not referred to in legal regulations.
Renewable energy sources (RES)	Earth's natural resources that use energy from continuous or repeated natural processes (such as solar radiation, wind, water movement, Earth's heat and biomass) to produce various forms of energy (electrical, thermal, mechanical). They are characterised by the fact that they renew themselves over a relatively short period of time at a natural rate, so that on the scale of human life, they are considered sustainable and virtually inexhaustible. The use of RES is usually associated with a lower negative impact on the environment.

Repair	A set of operations to restore the serviceability of technical equipment, including those performed by chemical methods, without altering its design or technical parameters.
Specialised	Dedicated, specific to the energy sector, in line with industry standards.
Sustainable development	A process of development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs, which respects the environment and minimises the use of the earth's resources.
Typical energy equipment/ installations	Mass-produced or commonly used energy equipment/installations comprising the characteristic technological solutions currently applied.
Upgrading	A series of operations, other than the manufacture of new technical equipment, which change the characteristics of the technical equipment, in particular: its design, the materials used, technical parameters, safety automation or subassemblies, without substantially altering its characteristics or intended use and without resulting in an increase in the hazards associated with its operation.
Working fluids	Substances or mixtures of substances with specific physical and chemical parameters required for energy processes and equipment. They include, among others, refrigeration or thermal working fluids, steam, low-boiling substances. Due to the possible hazards caused by their misuse, they may require specific storage, transport and operating procedures.