

Emerging Job Profiles for ECOSLIGHT Professionals related to lighting design and lighting technologies

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Deliverable Title	Emerging Job Profiles for ECOSLIGHT Professionals related to lighting design and lighting technologies
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Short Description	<p>The objective of this deliverable is to establish the "ideal" job profiles for Lighting Professionals. The emerging job role profiles will be formed by synthesizing the necessary competences that resulted from the analysis conducted under the ECOSLIGHT project.</p> <p>To achieve this objective critical analysis of information collected on various job descriptions for Lighting Professionals combined with the data obtained through the ECOSLIGHT quantitative survey and the ECOSLIGHT Interviews has been conducted.</p> <p>This report details the used methodology for establishing the job profiles and the separate emerging job role profiles. Moreover, it contains the mapping of profiles to ESCO-ISCO08 and the EQF.</p>
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1 Introduction

This report presents the key findings – Job Role Profiles identified under the research activities conducted through the *ECOSLIGHT: Environmentally Conscious Smart Lighting* Project, took place during the second semester of 2020 and the first of 2021 in France, Germany, Greece and Italy. The research was funded by the Erasmus + Programme Sector Skills Alliance of the EU.

The ECOSLIGHT consortium aimed to identify the emerging Job Role Profiles for Lighting Professionals and the subsequent skills and competences required for them so as to operate effectively and efficiently in the lighting sector. These competences include job specific competences, digital (basic and advanced) competences, green competences, entrepreneurship competences and additional horizontal (life) competences. Based on their expertise and their extensive knowledge related to the professional needs of the sector, the consortium has identified early enough a set of role profiles that appeared as emerging; the Light Pollution Specialist, the Human-Centric Lighting Specialist, and the Road Lighting Safety and Security Specialist. These profiles were studied during the ECOSLIGHT research and lead eventually to the proposed ECOSLIGHT Role Profiles that the reader may find in this report. This report must be read together with the *R2.1 Mapping the skills supply and demand of the lighting-related construction sector*, where the complete analysis is presented.

The first part of this report (Chapter 2) describes the methodology used for the identification of the emerging job role profiles. It details the trends in the sector, affecting also the human capital market, the “way” of describing job role profiles, and the skills that are needed and will be used for this description.

The second part (Chapter 3) presents roughly the results of the two surveys conducted under the ECOSLIGHT project and is presented in detail in *R2.1 Mapping the skills supply and demand of the lighting-related construction sector*. In order to understand the human capital lighting sector market, a quantitative analysis was conducted, accompanied with a set of interviews with key stakeholders in the four project countries (France, Germany, Greece and Italy).

The third part (Chapter 4) details the six emerging job role profiles for the lighting sector, the mapping to frameworks, and the final selection of ECOSLIGHT to develop VET curricula for some of them according to particular criteria.

2 Methodology

2.1 The Lighting Professional and its mission

Defining a “Lighting Professional” is a challenging task, because the profile is so versatile and cross-discipline skills are necessary. Based on ECOSLIGHT interviews with senior professionals of the sector we could collect some definitions, the most pertinent to our eyes are:

- “Lighting professionals are expected to be well-educated individuals that acquire a concrete knowledge of the technical requirements related to the lighting field while using the latest technology products and software that facilitates and enhances the lighting design”.
- “A lighting professional is an individual expert that operates in developing the lighting design of an ambient from a technical and decorative point of view”.
- “A lighting professional is a specialist in lighting design able to tackle different kind of contexts, from internal solutions (houses, farms, gym) to public spaces (squares, streets...)”.
- “A lighting professional is a technical figure specialised in proving innovative lighting solutions”.
- “A lighting professional is a person trained in lighting, with a permanent upgrade, respectful of standards and awards. But also, a spokesperson for end-users”.
- “A lighting professional is someone who masters the technical, aesthetic and environmental aspects of light, who has a very broad knowledge of the field of light”.¹

The quantitative study conducted under the ECOSLIGHT project and the interviews revealed the changing landscape for the human capital of the sector; new roles emerge so as to satisfy the market demand, the proliferation and the exploitation of new technologies, together with the new types of projects and collaboration forms. Overall, the emerging Lighting Professional should be able to accomplish the following missions and tasks:

- Serve each project's technical requirements effectively.
- Deeply comprehend human-centric and energy efficiency needs.
- Exploit the potential of modern ICT technologies.
- Accomplish an efficient combination of technical capacity and cost-efficiency.
- Incorporate energy efficiency principals and "green" ideas.
- Apply techniques and methods of high aesthetic criteria.
- Pursue on-going learning and keeping up with emerging trends and practices.
- Prompt and timely delivery of consistently high-quality products and services.
- Customer-oriented: It is necessary to be very attentive to the client, to know what the problems are, his needs so as to advise him well.
- Accompany and support policy changes.

¹ The same interviewee pointed-out, in opposition of a good lighting professional, “...a bad professional is someone who is too technical, a vision too biased, and an approach that is too quantitative/normative and that prevails over the qualitative”.

Following Bayor University (Bayor University 2020), there is a difference between a **job profile (or job role profile)** and a **job description**. While these terms are often used interchangeably and some employers may post both job profiles and job descriptions on their websites², they have different meanings:

- A **job (role) profile** is an outline, a high-level overview of a position. It provides only general information about a particular position. It summarizes the key characteristics of a given role, including the educational requirements, duties and pay rates. These are the key components that the employee will accomplish. In a straight-forward, actionable format, the job profile presents a picture of an employee's key job duties.
- A **job description**, is a written statement which includes the working conditions, scope, purpose, duties and responsibilities of a job along with the title of the individual to whom the position reports. It will go into detail so that candidates know what to expect.

Organizations draft **job profiles** to streamline recruiting, bring employees on-board, support performance appraisals and other internal processes. In a straight-forward, actionable format, the job profile presents a picture of an employee's key job duties. For instance, the job profile may summarize an area of responsibility in one paragraph. A job profile is an internal document that outlines the key characteristics of a given role. If it is used appropriately and effectively, the job profile is another useful tool in the Human Resources toolbox: it is used often to recruit employees, define jobs, and provide direction for employees. It can be also used to assign specific pay ranges to employees with similar job profiles. On the other side, a job profile contains information that allows potential candidates to present compelling competences that reflect company's expectations.

A **Job description** serves as a guide for recruiting, staff planning, coaching, salary administration, performance appraisal and legal compliance. It allows a company to articulate its labour needs in detail. In contrast, a job profile is a brief outline. The job description provides a comprehensive list of the background, skills, experience, education and duties required for the position, whereas the profile is a synopsis. If formalized accordingly, the Job descriptions are used in the EU by the National Organizations for the Certification of Qualifications, so as to support the regulation of the human capital market of the sector, assuring professional rights, minimum wages, etc.

All-in-all, while the **job profile** helps employers envision their manpower needs, the **job description** helps a hiring authority to match a tangible candidate to the employment opportunity. The job seeker uses the description to determine whether he wishes to pursue the position. Job descriptions enable a business to plan its growth while sorting out work flow, tasks and accountability.

ECOSLIGHT limited its ambition to prepare “ideal” job profiles corresponding to EQF 5 level that serve as basis for (1) developing job descriptions by companies in the future and (2) define the training skills expected by the profession. This decision was made early enough in the project idea conception, and was justified by the research conducted for two reasons:

1. Currently, many training programs offered from the market fold either below the EQF level 6 – mostly in the form of seminars – or above it. The last are typically provided by universities, but are not able to support the market demand for lighting professionals.
2. The lighting sub-sector of the Construction industry faces a lack of professionals and a lack of training programs. Given the automation of the sector, there are groups of tasks that can be

² This is not common practice

implemented from EQF level 5 professionals, retaining the EQF level 6 and above professionals for higher or managerial jobs. Therefore, the ECOSLIGHT Job Role Profiles are established on EQF level 5, a level characterizing the type of jobs / tasks required to be conducted, and not the professionals conducting them.

2.2 The job role profile framework

In order to identify the complete job role profiles and the subsequent competence in a systematic and coherent way, so as to formalize the respective VET curricula, a job role profile template was created by the ECOSLIGHT project. From the outset of the project, the partners shared a common research framework in order to collect comparable data across the four countries (France, Germany, Greece, Italy) and beyond. Given this fact, a qualitative approach was seen as the most appropriate in order to provide rich insights into which job role profiles related competences need to be developed for lighting professionals. Though, although some general remarks may be applied to the lighting sub-sector of the Construction sector in Europe, one should be sceptical when attempting to generalize the findings of the research, because they refer to the specific contexts of the four different countries analysed, and, in parallel, because the competence needs involved are constantly changing, which leads to ever-new training needs. And this due to the proliferation of ICT technologies, the new demands for environment sustainability, etc.

In principle, a complete job profile should include the minimum qualifications that candidates need to possess. It must use action words to describe what the position is expected to deliver and to whom it's accountable. At the very least, a job profile should describe the educational background, skills and abilities required for the job. They may also include a list of behavioural competencies that the applicant needs to be successful, such as business acumen, integrity, empathy and attention to detail. Finally, this document may provide a summary of the working conditions, department or function and level of responsibility, as well as and pay rates. Of course, as ECOSLIGHT is not an organisation looking for future employees and the last-listed information is strongly dependant on companies and countries, we will not include that the "ideal" job profiles.

In this regard, the following template was developed to support the research.

Job Role Profile main characteristics			
Job Title:			
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • • • • • • • 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • • 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • • 			
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • • 			
Green Competences [Please use list D]			
<ul style="list-style-type: none"> • • 			
Life Competences [Please use list E]			
<ul style="list-style-type: none"> • • 			

Job description:
Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • •

Table 1: ECOSLIGHT Job Role Profile template

This template includes all the critical information that must be collected in order to identify the currently offered – in the market – job role profiles. The first part entitled “Job Role Profile characteristics” include the job title, the job level (manager, senior professional, junior professional, technician), the location of the work (indoor or office, outdoor, both), and the requirement for travelling. The second part entitled “Qualifications and Educational requirements” includes the expected EQF level of a professional working in this role (ranging from EQF4 to EQF 8), and the educational and training required. The third part, entitled “Technical / preferred skill requirements” includes the set of skills and competences a professional must have in order to accomplish the job role tasks effectively and efficiently; these skills are categorized into five (5) categories, as follows:

- **Lighting competences / knowledge:** selected from a list including all the lighting competences required to conduct various lighting-related jobs and tasks.
- **Digital competences:** selected from two lists; one originating from the DigComp 2.1 corresponding to basic digital competences, and one originating from the e-CF 3.0 corresponding to advanced digital competences.
- **Entrepreneurial competences:** selected from a list, originating from the EntreComp framework.
- **Green competences:** these originate mainly from the European Construction Sector Observatory (ECSO) analytical reports, the Lighting Europe Strategic Roadmap 2025 of the European Lighting Industry, the Lighting Europe Position Paper on the Roadmap on a Circular Economy Action Plan (January 2020), and the Cedefop’s report on Skills for Green Jobs (2018).
- **Life competences:** selected from a list, originating from the LifeComp framework.

The last part of the template entitled “Job description” includes the key tasks and responsibilities of a professional working under this role, and the key performance indicators.

Methodologically, the ECOSLIGHT project decided to explore the market to identify the current trends in lighting-related areas and the currently demanded jobs / job roles / occupations, etc.

2.3 Trends related to lighting job role profiles

The research revealed recent trends, initiatives and some EU-funded project and activities in the wider lighting sector related to the human capital of it. These trends, etc., may not necessarily lead to the need for new job role profiles to serve them, but some of them have particular dynamic. In this regard, these trends can be considered either as emerging job role profiles, or areas of tasks that the emerging lighting professionals should be able to accomplish (at least some of them). Further research may reveal whether the lighting market is ready or mature enough for new and standalone job role profiles.

2.3.1 Light Pollution Specialist

The [Loss of Night Network \(LoNNE\) - COST action ES1204](#) project was implemented between 10/2021 and 10/2016. LoNNe was able to give new impetus for innovations in technology and policy addressing the impact of artificial lighting on biodiversity, ecosystems, star visibility, human health and society, and to identify potential corrective measures. Among other findings, LoNNe stressed the importance of light pollution and its effects in the environment. Based on the project and other sources (e.g. Schulte-Römer et al., 2019), light pollution experts focus to the unwanted side effects of artificial illumination by producing, exchanging and publicizing information and knowledge through various means. They also actively propose new strategies, planning and policy recommendations based on well-known and established light practices and reasons for illuminating public spaces, buildings, signs, landscapes, etc. Light pollution experts have a common part of orientation with lighting professionals (both accept light as pollution), while the former define light pollution in more absolute terms, focus more on natural darkness and the night sky as a reason for reducing light pollution, while lighting professionals find energy saving more important, etc. Overall, light pollution is not yet a mainstreaming topic for the human capital of the sector (as standalone professionals in order to be advanced to a job description, but has a dynamic and creates awareness.

2.3.2 The environmental impact of lighting

The “Improving energy and resource efficiency” report (2018) of the European Construction Sector Observatory, the “stringent energy efficiency targets and the increasing demand for sustainable construction solutions are expected to necessitate a transformation of the skills required during all stages of the building process, from planning to design, production, maintenance and renovation, and finally demolition”. Many workers are expected to be needed to increase their skills in relation to energy efficiency and renewable energy systems the following years. This of course will affect lighting professionals as well. LED lighting, Energy Labeling Schemes, Ecodesign regulation guidelines, the adoption of circular economy to the lighting sector and many other create particular needs for the sector, that – as they expand – create particular employment needs.

2.3.3 Human-Centric Lighting Specialist

The LightingEurope 2013 Press release on [Human-Centric Lighting](#) and the respective [leaflet](#) produced in the 2017 stress the importance of human centric lighting in respect to the promotion of person’s well-being, mood and health. Human centric lighting may improve concentration, safety and efficiency in workplaces or educational environments. Its proliferation is also supported by the transition from conventional light sources to the LEDs. According to [memoori](#) (2019), the “HCL has demonstrated its ability to make workers more productive, to help patients heal faster, and enhance student learning, simply by tuning into our evolutionary link to the natural rhythms of sunlight”. Human centric lighting appears to be a part of a wider human-centric trend / movement in the construction industry, supported by the proliferation of contemporary technologies in sensing and connectivity, big data processing and data analytics. Last, it is estimated that “A global market worth \$849m USD in 2019 has developed around this

technology and we expect it to reach \$3.5 billion by 2024, a 32.75% CAGR over the 5 years". These findings set the route towards the need for experts or specialists in human centric lighting.

2.3.4 Road Lighting Safety and Lighting Security Specialist

Road lighting safety and Lighting Security Specialist profiles emerges from the need of increasing the road and pedestrian safety in Europe, as well particular compliance needs (e.g. Green Public Procurement criteria for street lighting & traffic signals). According to the JRC report (2017) on the Revision of the EU Green Public Procurement Criteria for Lighting and Traffic Signals, lighting is used on more than 2.4 million kilometres in the EU-28, accounting for more than 35 TWh of electricity consumption, creating a cost to public authorities around €4000 million per year. The report explored the current market situation and the ways to reduce the environmental impact and electricity costs, assessing the significance of latest developments, e.g. LEDs. The use of LED technology may contribute to the reduce of energy consumption, and the reduce of costs.

Moreover, according to the EU Mobility and Transport on Road Safety, the 21% of all traffic fatalities in the EU are [pedestrians](#), with the proper street lighting being one among the five proposals so as to reduce crashes involving pedestrians. There are EU-funded projects orienting mostly to sensors on cars so as to avoid pedestrians, as well as a lot of market solutions already employed to cars at the moment. The European Road Safety Observatory on its [Road Safety Thematic Report on Pedestrians](#) (2020) proposes the use of lighting and reflecting devices so as to increase visibility. Apart from that, the [EU GPP criteria for Street Lighting & Traffic Signals](#), based on EN 13201 standard, identifies particular criteria and priorities that should be used, affecting the work of lighting professionals that work on road lighting in terms of safety.

Lighting Security Specialists focus also to the outdoor and outside the roads, contributing to the crime prevention, helping people feel more comfortable outside, and decrease the number of dark spaces outside.

2.3.5 Smart and Internet of Things professionals

Smart technologies and IoT technologies in general, have proliferated in the lighting area. Smart lighting enables the Lighting 4.0 era, found in smart buildings, smart grids and smart cities, all of them enabled by the Internet of Things. Sensors, circuits, LEDs, produce at any moment the right light, where is needed and when it is necessary. Smart lighting functions

- Adapt dynamically the light quantity, light distribution in space and light quality (CCT, IRC, spectrum...) to optimize visual performance and respect any normative requirements.
- Support avoiding any visual disturbance (glare, light flicker, strobe effects, shadows...) that can compromise end-user's security and well-being at any moment.
- Always reduce energy consumption of the installation without compromising the above conditions.
- Actively limit the effects of light pollution on the eco-system and biotope, respecting that new sky-protection legislations/standards.
- If necessary, relay information via VLC methods (e.g. provide globalization reference).

Modern Lighting professionals exploit the potential of IoT and smart technologies in many cases, in order to provide the services requested by the market. The related tasks necessitate knowledge, skills and competences related to these technologies.

There are some EU-funded projects that have produced VET curricula for IoT and / or smart professionals. The [Construction Blueprint project](#) is a Blueprint Sector Skills Alliance project running between 2019 and

2023, develops a new sectoral strategic approach to cooperate on skills on the construction industry. It aims to support the better matching between the skills needs of companies and the skills provided by the VET providers. The new curricula that will be delivered in September 2021, will be in the fields of Energy efficiency, Circular economy, and Digitization. The [DEVOPS](#) project (DEVOPS competences for Smart Cities) is a Sector Skills Alliance project running between 2018 and 2021. It aims to close the gap between today's and future's skills demands of municipal workforce by emphasizing on the exploitation of emerging employment paradigms such as DevOps. DEVOPS has implemented a MOOC, and currently implement specialization courses on the following specializations: (a) Smart City Planner, (b) Smart City IT Manager, and (c) Smart City IT Officer. [SenDing](#) is also a Sector Skills Alliance Project ran between 2017 and 2021. It designed and implemented a MOOC and two VET programs, one for Data Science and one for IoT professionals.

2.4 Market job role profiles

Research was conducted in various websites and sources related to job postings for lighting-related professionals. Indicatively, these include the [International Association for Lighting Designers](#), [CareerOneStop](#), [mySkills myFuture](#), [Glassdoor](#), [O*NET](#), local job brokering portals in the countries of interest, etc. The jobs posted by market companies are presented in detail in the Appendix II. In short, the following jobs were identified:

#	Job Title	Job Level	Location	EQF level
1	Architectural lighting project manager / Lighting engineer	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 7 (= Masters)
2	Street lighting business manager	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 7 (= Masters)
3	Lighting project manager	<input checked="" type="checkbox"/> Manager	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 7 (= Masters)
4	Assistant building work manager	<input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 6 (=BSc)
5	Compliance engineer	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Office	<input checked="" type="checkbox"/> EQF 6 (=BSc)
6	Street lighting engineer	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 7 (= Masters) <input checked="" type="checkbox"/> EQF 8 (= PhD)
7	Lighting designer	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters)
8	Product development engineer	<input checked="" type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Indoor / Office	<input checked="" type="checkbox"/> EQF 6 (=BSc)
9	Commissioning engineer	<input checked="" type="checkbox"/> Junior Professional	<input checked="" type="checkbox"/> Outdoor	<input checked="" type="checkbox"/> EQF 6 (=BSc)
10	Lighting technician	<input checked="" type="checkbox"/> Technician	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 5 (=Diploma of HE)
11	Street lighting study leader	<input checked="" type="checkbox"/> Junior Professional	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 7 (= Masters)
12	Street lighting technician	<input checked="" type="checkbox"/> Technician	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> EQF 5 (=Diploma of HE)
13	Theatre lighting technician	<input checked="" type="checkbox"/> Technician	<input checked="" type="checkbox"/> Indoor / Outdoor	<input checked="" type="checkbox"/> Not applicable

Table 2: Market demanded jobs for lighting professionals

As we see in this table, only two jobs (Lighting technicians and Street lighting technicians) are demanded in the EQF level 5. The rest are above. But this is not related with the level of tasks the professionals are called to implement; the sector of lighting is dominated mostly by engineers, architects and related professionals that have conducted lighting specific additional training and probably has some years of experience on the sector. As analysed in *R2.1 Mapping the skills supply and demand of the lighting-related construction sector*, there is a need for professionals in the sector and the currently available training programs do not cover the need to provide the required human capital development activities. Therefore, it is a challenge for the ECOSLIGHT project to create training opportunities for EQF level 5 professionals in order to be able to be employed in the sector.

2.5 Skills for lighting professionals

Additionally, the ECOSLIGHT project reviewed the literature for skills and competences that could be demanded for lighting professionals. These skills and competences were separated in five broad categories; (a) lighting related competence, (b) digital competences, (c) entrepreneurial competences, (d) life competences, and (e) green competences.

2.5.1 Lighting competences

The ECOSLIGHT partners, with the expertise on the lighting sector, identified the following lighting-related competences as demanded from lighting professionals in general.

- Lighting Design & solving technical problems
- Indoor Lighting for Buildings & Artificial Lighting / Daylight integration
- Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security
- Lighting system and components technologies including smart Lighting (indoor & outdoor): Light source, drives, fixtures, sensors, controls and metering
- Light influence on human health, well-being and working performances (Lighting Ergonomics)
- Energy Efficiency & Lighting performance
- Lighting policy, regulation, energy labelling, procurement, incentives and planning
- Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service)
- End-user's behavior studies (satisfaction, acceptability, needs...)
- Environmental impact of lighting (ecosystem, recycling, life cycle assessment)

These competences originate from the state-of-the-art, identified from various studies and stakeholders of the sector, and consider the actual competences required for the implementation of various tasks in the lighting area.

2.5.2 Digital competences

The proliferation of contemporary ICT technologies in various domains, including the lighting sector, the environmental sector, and other, create particular skills needs for the professionals. These skills, or competences, are generally categorized into two groups; the basic and the advanced.

The EC has established the DigComp framework, i.e. the European Digital Competence Framework for Citizens that consists a tool to improve digital competences. The latest version, DigComp 2.1 was established in 2017. It includes 21 digital competences grouped into 5 areas, accompanied with proficiency levels.

Area 1: Information and digital literacy	
1.1 Browsing, searching and filtering data, information and digital content	
1.2 Evaluating data, information and digital content	
1.3 Managing data, information and digital content	
Area 2: Communication and collaboration	
2.1 Interacting through digital technologies	
2.2 Sharing through digital technologies	
2.3 Engaging in citizenship through digital technologies	
2.4 Collaborating through digital technologies	
2.5 Netiquette	
2.6 Managing digital identity	
Area 3: Digital content creation	
3.1 Developing digital content	
3.2 Integrating and re-elaborating digital content	
3.3 Copyright and licenses	
3.4 Programming	
	Area 4: Safety
	4.1 Protecting devices
	4.2 Protecting personal data and privacy
	4.3 Protecting health and well-being
	4.4 Protecting the environment
	Area 5: Problem solving
	5.1 Solving technical problems
	5.2 Identifying needs and technological responses
	5.3 Creatively using digital technologies
	5.4 Identifying digital competence gaps

Table 3: Basic digital competences (DigComp 2.1)

The proficiency levels are used to support the development of learning and training materials, as well as assessment materials. They are based in the principle of “learning outcomes”, following the Blooms taxonomy, and are inspired by the structure and vocabulary of the European Qualifications Framework (EQF). Each level includes knowledge, skills and attitudes.

Levels in DigComp 1.0	Levels in DigComp 2.1	Complexity of tasks	Autonomy	Cognitive domain
Foundation	1	Simple tasks	With guidance	Remembering
	2	Simple tasks	Autonomy and with guidance where needed	Remembering
Intermediate	3	Well-defined and routine tasks, and straightforward problems	On my own	Understanding
	4	Tasks, and well-defined and non-routine problems	Independent and according to my needs	Understanding
Advanced	5	Different tasks and problems	Guiding others	Applying
	6	Most appropriate tasks	Able to adapt to others in a complex context	Evaluating
Highly specialised	7	Resolve complex problems with limited solutions	Integrate to contribute to the professional practice and to guide others	Creating
	8	Resolve complex problems with many interacting factors	Propose new ideas and processes to the field	Creating

Figure 1: Main keywords that feature the proficiency levels

(Source: Carretero et al., 2017)

The DigComp has been used by various countries, initiatives and projects in the EU (Kluzer and Priego, 2018) to plan and design training offers for the digital competences uptake of the citizens. Although it focuses to the citizens, it is the only available tool / framework that is useful for professionals that conduct a simple use of ICT technologies.

ICT professionals have greater demands in digital competence needs. CEN has produced the e-CF 3.0, the European e-Competence Framework, a common European framework for ICT professionals in all industry sectors. It includes 41 competences categorized into five areas. It was established as a tool to support mutual understanding and to provide transparency of language through the articulation of competences required and deployed by ICT professionals (including both practitioners and managers). The framework has proficiency levels as well, aligned with the EQF (e-1 to e-5, relate to EQF 3-8) (Figure 2).

The e-CF framework is supported by the long term e-skills agenda “e-skills for the 21st Century” and the “Grand Coalition for Digital Jobs”, of the EU.

Both frameworks, the DigComp and the e-CF, will be used in ECOSLIGHT for the definition and selection of digital competences of the lighting professionals.

Dimension 1 5 e-CF areas	Dimension 2 41 e-Competences identified	Dimension 3 5 e-Competence proficiency levels				
		e-1	e-2	e-3	e-4	e-5
A. PLAN	A.1. Information Systems and Business Strategy Alignment					
	A.2. Service Level Management					
	A.3. Business Plan Development					
	A.4. Product/Service Planning					
	A.5. Architecture Design					
	A.6. Application Design					
	A.7. Technology Trend Monitoring					
	A.8. Sustainability Management					
	A.9. Innovating					
	A.10. User Experience					
B. BUILD	B.1. Application Development					
	B.2. Component Integration					
	B.3. Testing					
	B.4. Solution Deployment					
	B.5. Documentation Production					
	B.6. ICT Systems Engineering					
C. RUN	C.1. User Support					
	C.2. Change Support					
	C.3. Service Delivery					
	C.4. Problem Management					
	C.5. Systems Management					
D. ENABLE	D.1. Information Security Strategy Development					
	D.2. ICT Quality Strategy Development					
	D.3. Education and Training Provision					
	D.4. Purchasing					
	D.5. Sales Development					
	D.6. Digital Marketing					
	D.7. Data Science and Analytics					
	D.8. Contract Management					
	D.9. Personnel Development					
	D.10. Information and Knowledge Management					
	D.11. Needs Identification					
E. MANAGE	E.1. Forecast Development					
	E.2. Project and Portfolio Management					
	E.3. Risk Management					
	E.4. Relationship Management					
	E.5. Process Improvement					
	E.6. ICT Quality Management					
	E.7. Business Change Management					
	E.8. Information Security Management					
	E.9. Information Systems Governance					

Figure 2: Advanced digital competences (e-CF 3.0)

(Source: CEN, the e-Competence Framework)

2.5.3 Entrepreneurial competences

In line with the EU “A New Skills Agenda for Europe”, the Joint Research Centre (JRC) of the European Commission on behalf of the Directorate General for Employment, Social Affairs and Inclusion (DG EMPL) has developed the EntreComp: Entrepreneurship Competence Framework in 2016 (Bacigalupo et al., 2016). The framework aims to build consensus around a common understanding of entrepreneurship competence by defining 3 competence areas, a list of 15 competences, 442 learning outcomes and 8 proficiency levels, which current and future initiatives can refer to.

The framework describes entrepreneurship as a transversal competence, which can be applied by citizens to all spheres of life from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures (cultural, social or commercial). EntreComp can be used as a reference for the design of curricula in the formal education and training sector. It can also be used for activities and programmes in non-formal learning contexts (for instance, to foster intrapreneurship with existing organizations). It aims to establish a bridge between the worlds of education and work regarding entrepreneurship as a competence.

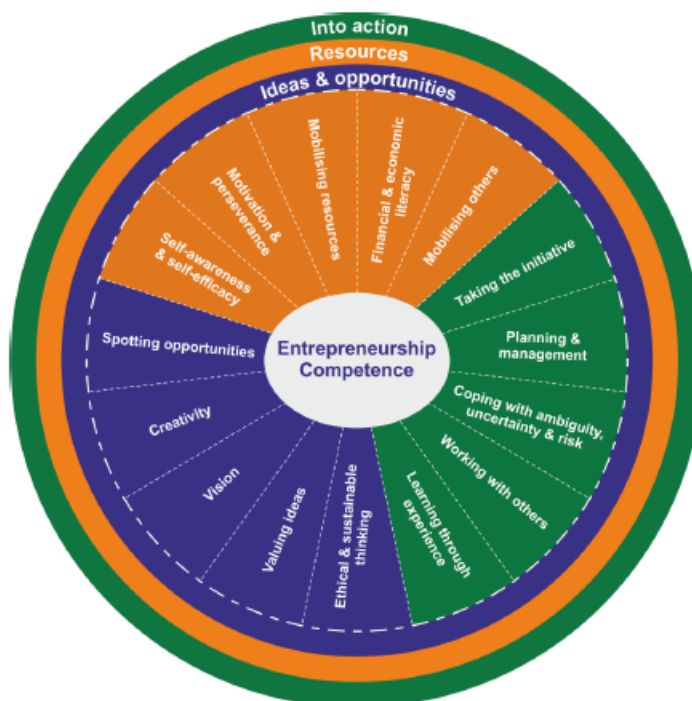


Figure 3: Areas and competences of the EntreComp conceptual model
(Source: Bacigalupo et al., 2016)

2.5.4 Life competences

The 2018 updated Recommendation on Key Competences for Lifelong Learning³, includes the core set of skills necessary to work and live in the 21st century. The aim is that everybody should have the essential set of competences needed for personal development, social inclusion, active citizenship, and employment. The updated Recommendation defines eight key competences for lifelong learning: Literacy, Multilingual, Mathematical competence and competence in science, technology and engineering, Digital, Personal, Social, and Learning to Learn Citizenship, Entrepreneurship, and Cultural awareness and expression.

Based on that, the Joint Research Center (JRC) in collaboration with the DG EAC of the EU, developed the LifeComp framework, which is a conceptual framework for the “Personal, Social and Learning to Learn” key competences. *LifeComp* (Sala et al., 2020) is made up of three intertwined competence areas: ‘Personal’, ‘Social’, and ‘Learning to Learn’. Each area includes three competences: Self-regulation, Flexibility, Wellbeing (Personal Area), Empathy, Communication, Collaboration (Social Area), Growth mindset, Critical thinking, and Managing learning (Learning to learn Area). Each competence has, in turn, three descriptors which generally correspond to the ‘awareness, understanding, action’ model. *LifeComp* regards “Personal, Social, and Learning to Learn” competences as ones which apply to all spheres of life, and which can be acquired through formal, informal, and non-formal education.

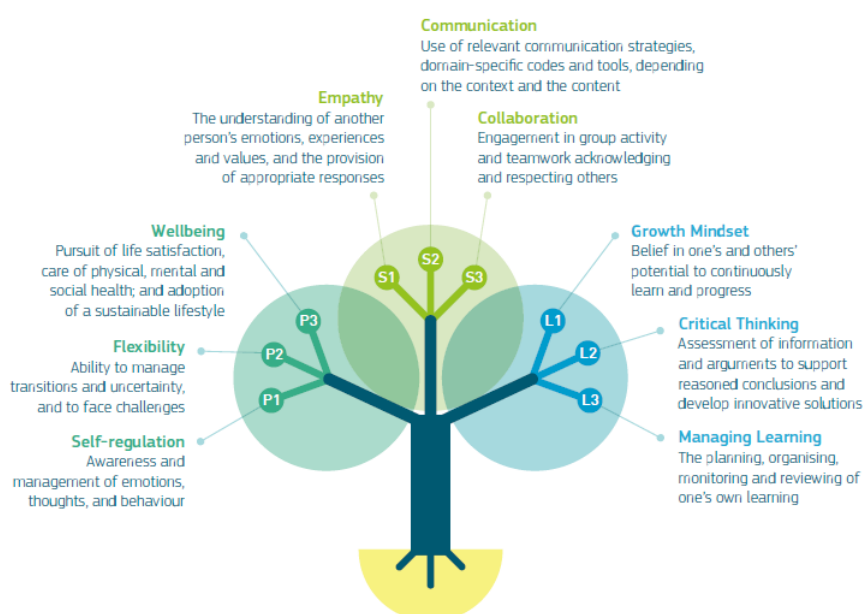


Figure 4: LifeComp at a glance
(Source: Sala et al., 2020)

³ https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

2.5.5 Green competences

Green competences are a great part of the modern lighting professionals' skills portfolio, due to the close connection of the lighting / construction and the environmental sector. Although there is not an EU-originated and widely accepted green skills framework, the research revealed various initiatives from the domain related to green skills, and in some cases, in relation to the lighting sector. These originate mainly from the European Construction Sector Observatory (ECSO) analytical reports, the Lighting Europe Strategic Roadmap 2025 of the European Lighting Industry, the Lighting Europe Position Paper on the Roadmap on a Circular Economy Action Plan (January 2020), and the Cedefop's report on Skills for Green Jobs (2018).

In this context, the following green competences were identified, in relation to the lighting professionals:

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labeling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

3 The ECOSLIGHT surveys and results

Based on the aforementioned data and methodology, the ECOSLIGHT implemented a quantitative survey and a series of interviews with key stakeholders in the four project countries (France, Germany, Greece and Italy). One of the objectives was to identify the emerging Job Profiles for ECOSLIGHT Professionals related to lighting design and lighting technologies and the accompanying competences for each one.

3.1 The ECOSLIGHT quantitative survey

The ECOSLIGHT quantitative survey was conducted orienting to various stakeholders of the sector. In order to elicit better the needs and understand the different viewpoints, four questionnaires were developed and delivered online through Limesurvey. The questionnaires were available in English, French, German, Greek and Italian. The following versions of the questionnaire were delivered orienting different target groups:

1. Individual professionals
2. Companies
3. Municipalities, Local collectivities, City councils, Policy makers, Governmental organizations
4. Social partners, Non-governmental organizations, International organizations, Associations or similar bodies, Private organizations with public interest.

The complete results of the survey can be found in the deliverable R2.1 Mapping the skills supply and demand of the lighting-related construction sector. In this report, we present only a part of the results that we need for the identification of the ideal emerging Job Role Profiles for lighting professionals. The purpose was the collection of additional data for analysing needs regarding Technical Training in order to create modular VET curricula (EQF 5) based on the learning outcomes approach and the adult learning principles in order to develop lighting design skills that bring together lighting design and smart technologies, as well as skills that take into account ecological and human-centric issues on lighting systems in the connected world.

3.1.1 Basic survey data

The questionnaires were accessible via the web for a period of 6 months (June 2020 to December 2020). Totally 438 answers have been collected. After a data clearance, **342 questionnaires were considered valid** (filled in adequately) and analysed. Among those 342 questionnaires, 246 (71,9%) were submitted by individual professionals, 66 (19.3%) from companies, 11 (3.2%) from Municipalities, Local Collectivities, City Councils, Policy Makers, or Government Organizations, 6 (1.8%) from Social Partners, NGOs, or Internationals Organization, whereas 13 (3.8%) did not declare their professional identity (Figure 5).

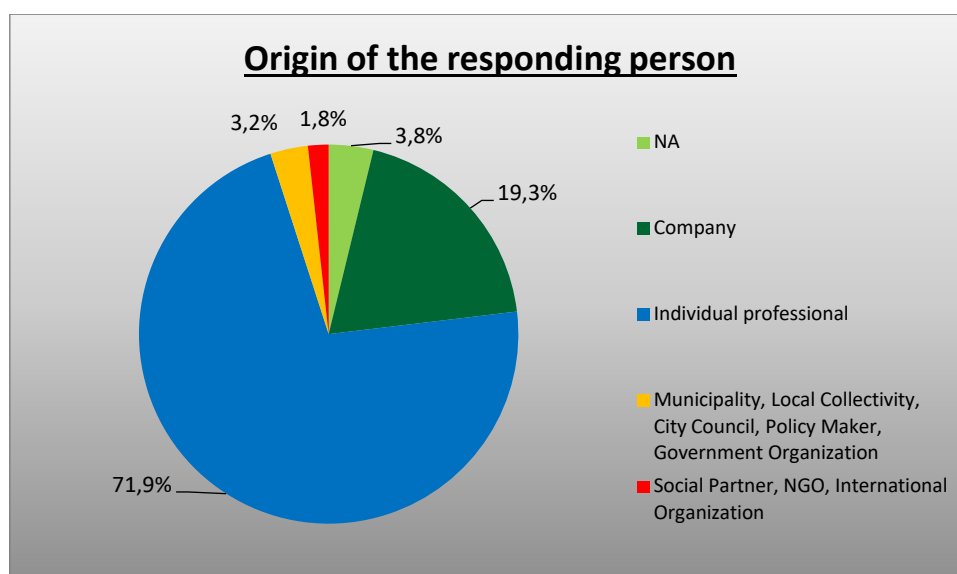


Figure 5: Typology of responding persons to the survey

All types of organizations participated to the survey (companies, governmental and non-governmental organizations) and individual professionals were also asked to declare their related economic activities based on the ESCO classification.

Economic activity	Percentage
Agriculture, Forestry, Fishery	3.5 %
Arts, entertainment and recreation	18.1 %
Hospitality and Tourism	11.4 %
Human health and social services activities	5.6 %
ICT service activities	5.8 %
Manufacturing of food, beverages and tobacco	1.5 %
Manufacturing of textile, apparel, leather, footwear, and related products	2.6 %
Mining and heavy industry	1.8 %
Transportation and storage	5.3 %
Retail and repair activities, renting and leasing	5.8 %

Economic activity	Percentage
Education	19.6 %
Energy and water supply, sewerage and waste management	8.8 %
Finance, insurance and real estate	1.5 %
Manufacturing of electrical equipment, computer, electronic and optical products	10.5 %
Manufacturing of transport equipment (cars, trains, ships, aircrafts)	1.2 %
Media	3.2 %
Scientific and technical activities	21.3 %
Manufacturing of lighting systems, lighting system's parts (lamps, fixtures, ballasts/drives, lighting poles, etc.)	22.5 %
Consulting Activities & Engineering Services	34.8 %
Museum, Exposition, Convention center, Stadium/Gymnasium, Library/Media Center.	8.2 %

Business administration	3.2 %	Public Administration/collectivity	9.1 %
Chemical industry	1.8 %	Other	7.0 %
Construction (including Painting and Decoration activities)	24.6 %		

Table 4: Economic Sector of the responders to ECOSLIGHT Questionnaire

The vast majority of the respondents hold a master's degree (40.6%) followed by the bachelors' holders (28.1%).

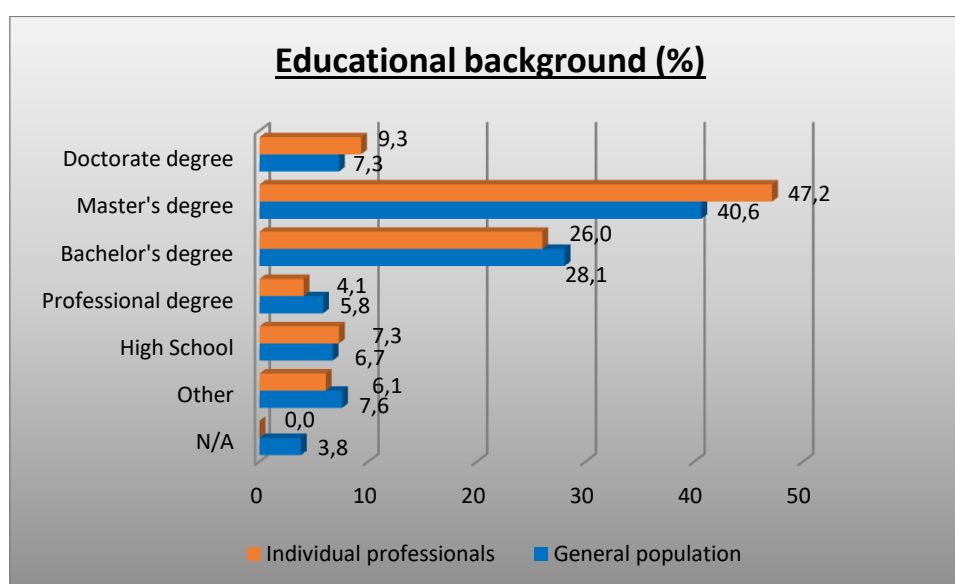


Figure 6: Educational background of all participants and individual professionals

Concerning the individual professionals that participated to the survey, we see that the group 25 – 44 years old includes the 67.5 % of the participants (166 people), therefore we understand that **the sector employs mainly young people, less than 50 years old, who face the challenge of career advancement, and according to their age they will be more open and volunteer to participate to professional development activities.**

The survey explored also the size of companies participated to that, separating them into three categories. The Very Small Businesses (less than 50 employees), the Small and medium-sized businesses (SMEs) with 50 – 249 employees⁴, and the Large companies with more than 250 employees. Results indicate that the **63 % of the participating companies are SMEs** (Figure 7). The latest Eurostat data indicate that in 2018, the EU-27 included 3.283.211 enterprises in the Construction sector, out of which, the 3.264.291 had less than 50 employees (99.4 %). The 17.000 of them had 50 – 249 employees (0.52%), and the rest employed more than 250 persons. **Interestingly, we understand that the lighting sector is dominated by quite larger companies (mainly SMEs) than the rest of the sector in Europe.**

⁴ SMEs are defined by the European Commission as having less than 250 persons employed. They should also have an annual turnover of up to EUR 50 million, or a balance sheet total of no more than EUR 43 million (Commission Recommendation of 6 May 2003).

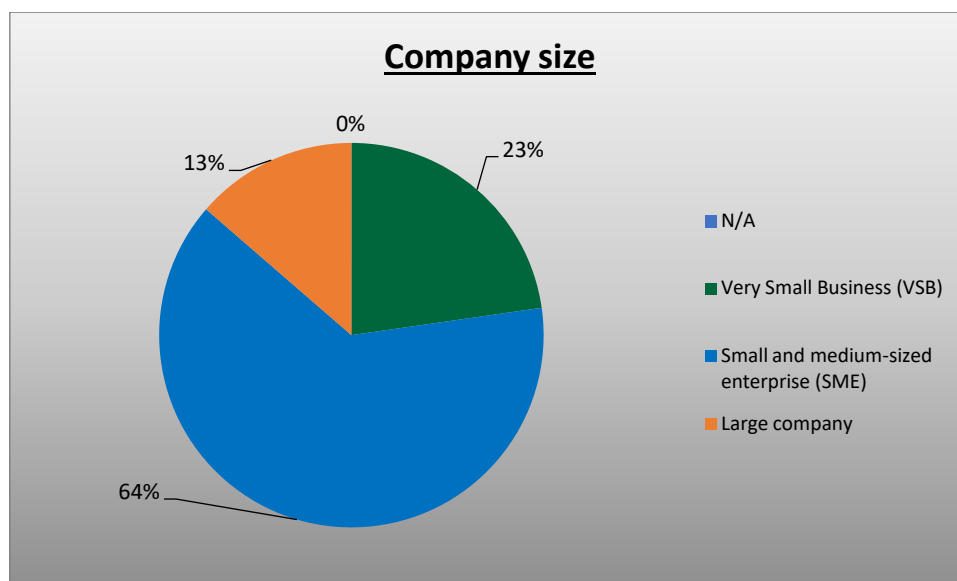


Figure 7: Size of companies participated to the survey

It also explored the type of companies, i.e whether they manufacture products or provide services (Figure 8). It was found that that the percentages are almost equal between the two different types, with a 22.7 % of the participating companies having manufacturing facilities and providing services in parallel. The companies that selected the “other” option fold mainly between the two aforementioned categories. The majority of SMEs that seem to dominate the sector, have manufacturing facilities, whereas the companies that provide services or both, are estimated at the same percentage. Therefore, it is obvious that **the professionals will be called to work mainly in Small and medium enterprises with manufacturing facilities.**

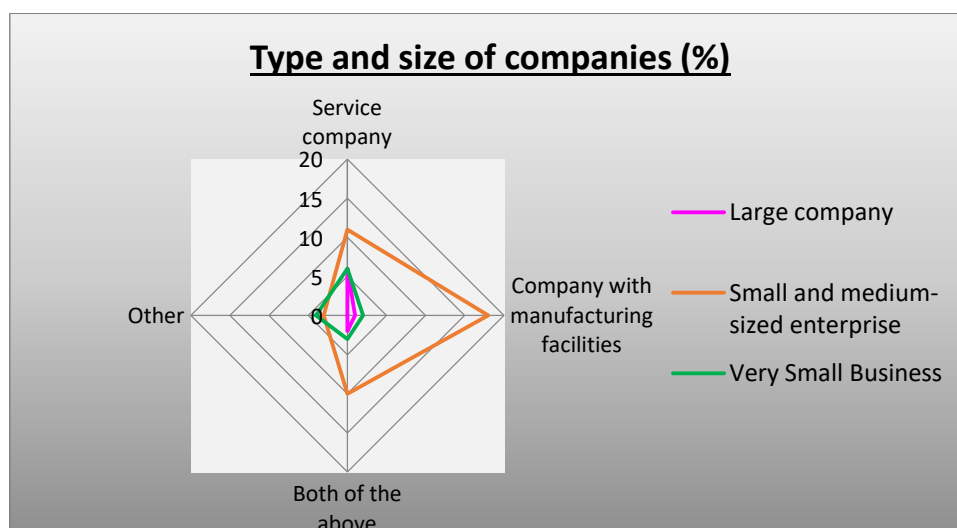


Figure 8: Type and size of companies

The respondents were also asked to self-assess their competence levels in particular scientific areas related to the skills uptake of the professionals of the sector, and their ecological engagement.

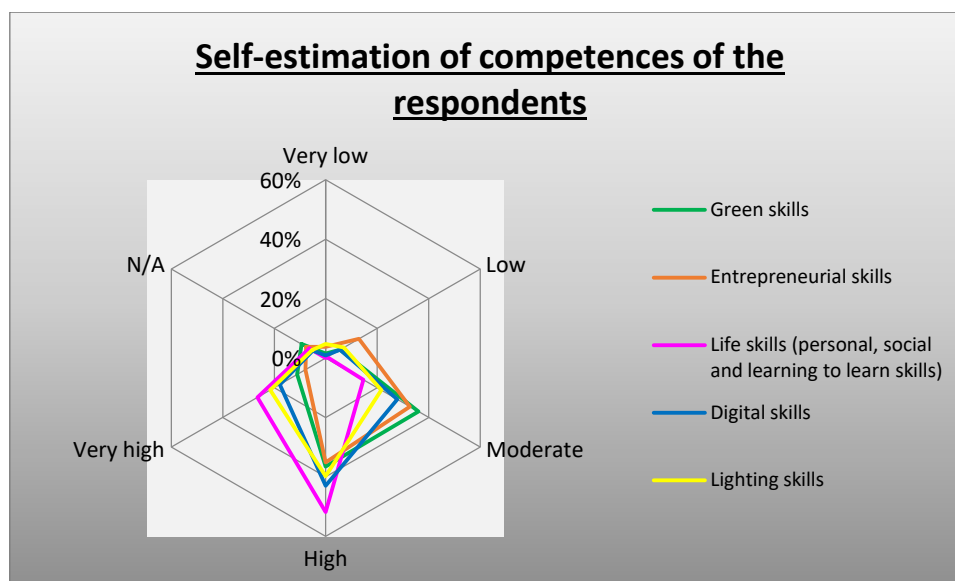


Figure 9: Self-estimation of competence levels of the respondents in various domains

In general, all respondents declare moderate to very high in all areas of skills, i.e. lighting related skills, digital skills, life skills, entrepreneurial skills and green skills. Thus, the particular group of respondents has knowledge in the particular areas and is able to provide rich insights towards the definition of the ECOSLIGHT VET curricula.

Concerning the **Ecological engagement** of governmental (municipalities, etc), non-governmental (social partners, etc) and companies, the respondents were asked to estimate the how strong they tend to consider the respective attitude of their organization. Results indicate (Figure 10) that they consider it seriously (high to strong) in a degree of near 70%.

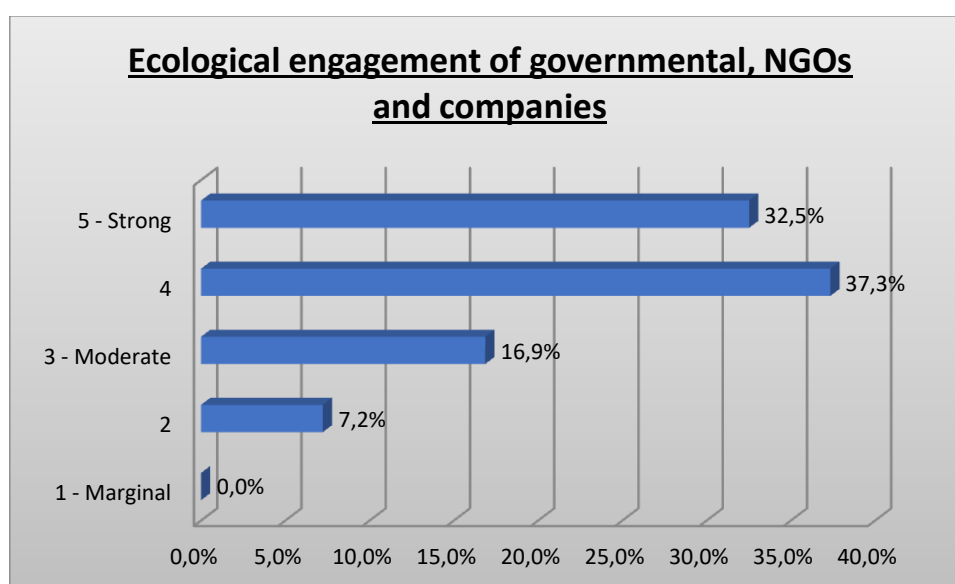


Figure 10: Ecological engagement of governmental, non-governmental organizations, and companies

Concerning the individual professionals that provided data for the survey, results (Figure 11) indicate that the vast majority of them, i.e. the 65.9% present high (4) to strong (5) attitudes.

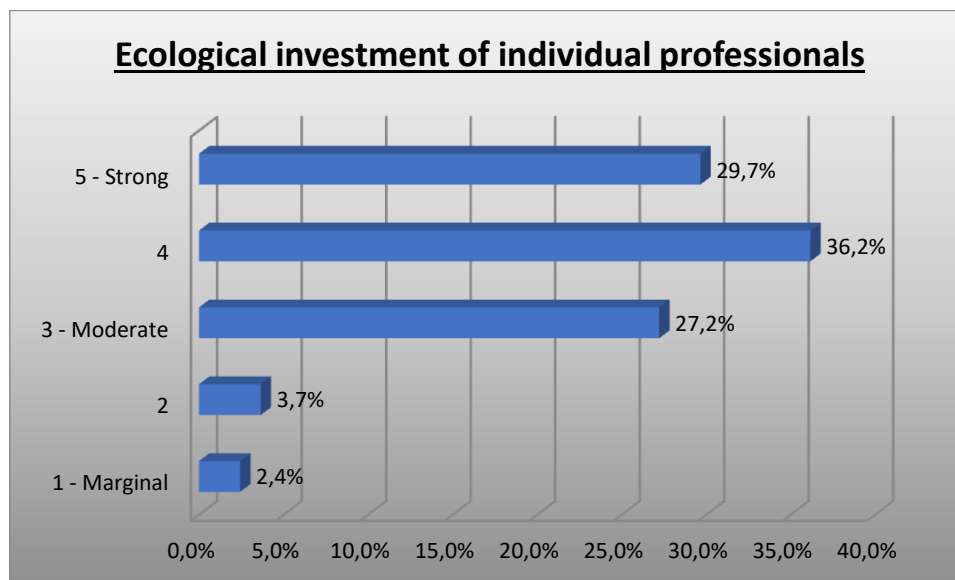


Figure 11: Ecological investment of individual professionals

3.1.2 The human capital of the sector

The survey examined also various issues relate to the human capital of the sector. In general, the following issues emerged:

- New training programs are required for the professionals of the lighting sector, adapted to their scholar level, and oriented to the current and emerging needs of the lighting sector activities.
- The 47.1% of the participants believe that it is difficult to very difficult to find suitable trained staff for the lighting sector. This happens due to the lack of required skills (53.1 %) and the decreased availability of the respective professionals (36.3 %).

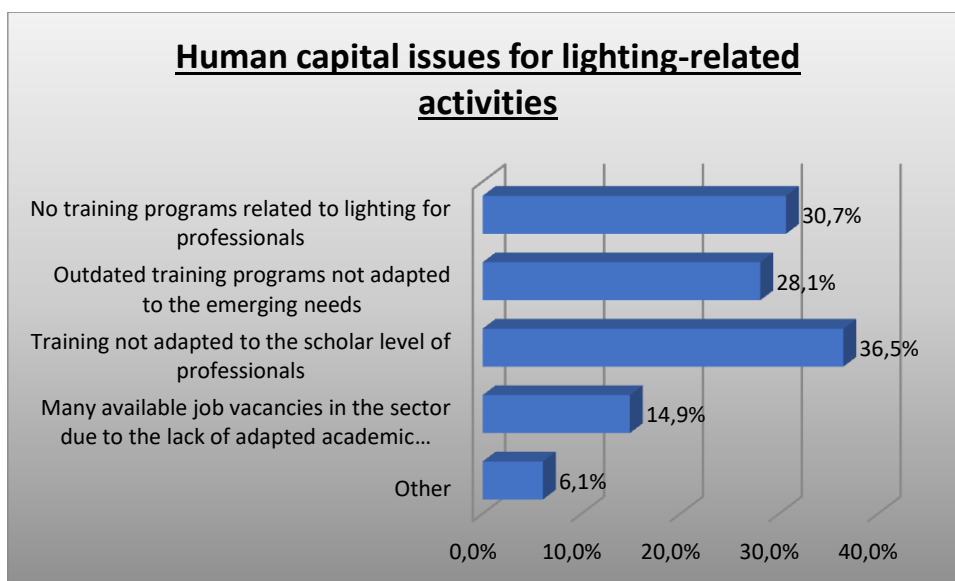


Figure 12: Issues organizations face in respect to the human capital for lighting-related activities

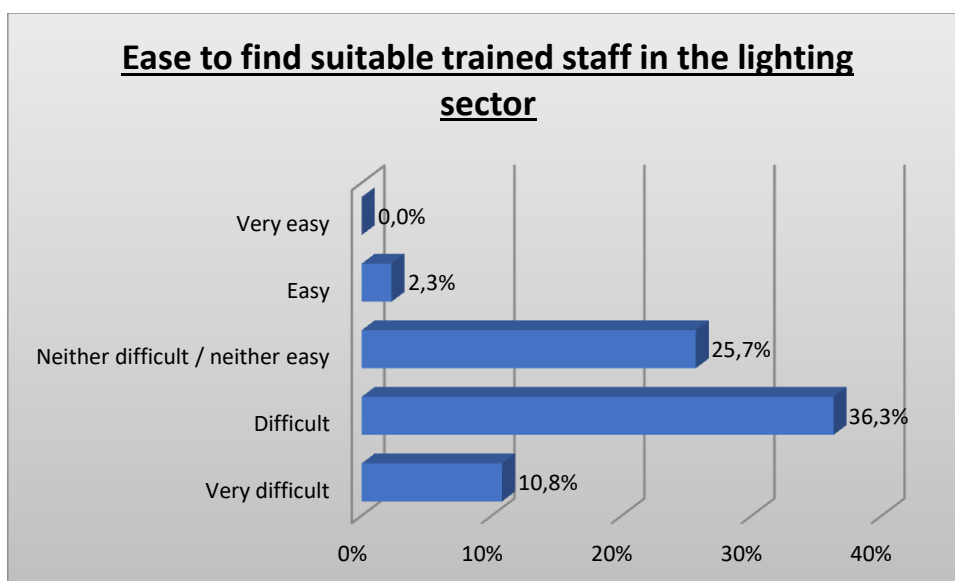


Figure 13: How easy it is for an organization in your country to find suitable trained staff in the lighting sector



Figure 14: Reason of difficulty to find the suitable trained staff for the lighting activities

The survey explored also the staff demand and the respective skills demand.

	N/A	1-Most likely	2-Likely	3-Possible	4-Unlikely	5-Most unlikely	(1 –2)
Managers	39.8 %	5.0 %	14.9 %	24.6 %	11.4 %	4.4 %	19.9 %
R&D engineers / scientists (MSC-level and above)	33.6 %	22.5 %	19.0 %	20.8 %	1.5 %	2.6 %	41.5 %
Lighting professionals (Engineering background)	27.5 %	33.9 %	20.5 %	14.6 %	0.9 %	2.6 %	54.4 %
Lighting designers (Artistic background)	30.1 %	21.1 %	21.1 %	20.8 %	5.6 %	1.5 %	42.2 %
Lighting technicians, installers and associate professionals	29.2 %	27.2 %	19.0 %	20.2 %	1.5 %	2.9 %	46.2 %
Technical-commercial staff	31.9 %	11.7 %	19.0 %	27.5 %	7.6 %	2.3 %	30.7 %
Other	95.3 %	1.5 %	1.2 %	0.9 %	0.3 %	0.9 %	2.7 %

Table 5: Demand for staff in the next five years

From the survey it is possible to identify what will be the Lighting sector needs for professionals in this domain within the next five years. As Table 5 shows lighting sectors will need “most likely” any type of lighting professionals, but with clear preference to people with

- EQF 6-7 level, i.e. Lighting professionals (engineering background)
- EQF 5-6 level. i.e. Lighting technicians, installers and associated professions.
- Professionals with higher EQF levels like managers are more unlikely to be among the top priorities. Further, Technical-commercial profiles seem not to be so popular.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Shortage of engineering or technical skills	26.0 %	9.9 %	12.3 %	29.5 %	19.0 %	24.3 %
Shortage of lighting related skills	26.0 %	17.0 %	13.5 %	14.0 %	22.5 %	31.6 %
Shortage of digital skills	19.9 %	6.7 %	12.0 %	14.0 %	27.8 %	22.8 %
Shortage of eco-responsibility consciousness and green skills	29.2 %	11.4 %	18.1 %	19.6 %	31.9 %	29.2 %
Shortage of entrepreneurial skills	6.4 %	23.4 %	19.9 %	21.3 %	20.2 %	15.8 %
Shortage of life skills (personal, social and learning to learn skills)	12.0 %	12.9 %	11.7 %	7.3 %	19.9 %	14.9 %
Insufficient of artistic skills	25.7 %	31.6 %	28.4 %	5.0 %	32.5 %	31.0 %
Insufficient workplace experience	14.0 %	25.7 %	21.6 %	24.6 %	14.3 %	16.7 %

Table 6: Shortage of skills per staff roles

Clearly, in Table 6⁵ we see that,

- **Managers** face a shortage mostly in eco-responsibility consciousness and green skills (29.2 %), in engineering or technical skills (26.0 %) and lighting related skills (26.0 %).
- **R&D engineers / scientists (MSc-level)** and **Lighting professionals with engineering background** face a shortage firstly in artistic skills, and secondarily in entrepreneurial skills and insufficient workplace experience.
- **Lighting designers with an artistic background** face a shortage of insufficient workplace experience (24.6 %) and entrepreneurial skills (21.3 %).
- **Lighting Technicians, Installers and Associate Professionals** face a shortage mainly in artistic skills (32.5 %), followed by eco-responsibility consciousness and green skills (31.9 %) and digital skills (27.8 %).
- **Technical-commercial staff** faces a shortage of lighting related skills (31.6 %), followed by the insufficient artistic skills (31.0 %) and eco-responsibility consciousness and green skills (29.2 %)

Based on the methodology and trends described in the previous chapter, the survey identified particular indicative job role profiles. We remind the reader that these profiles are identified mainly from the trends

⁵ With dark orange we have marked percentages > 30.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

and cannot yet be considered as the ideal and finally selected ECOSLIGHT job role profiles. Therefore, they can be considered – at least at this phase – as groups of tasks. These are the following:

- Light pollution and environmental impact of lighting specialists
- Human-centric lighting specialists
- Road lighting safety and lighting security specialists
- Smart lighting system specialists
- Lighting designers

The results are as follows.

	N/A	1-Low demand	2	3-Moderate demand	4	5-High demand	(3 –5)	(4 –5)
Light pollution and environmental impact of lighting specialists	27.5 %	3.5 %	5.6 %	18.4 %	21.6 %	23.4 %	63.4 %	45.0 %
Human-centric lighting specialists	31.3 %	2.6 %	8.2 %	17.5 %	20.5 %	19.9 %	57.9 %	40.4 %
Road lighting safety and lighting security specialists	28.9 %	1.5 %	4.1 %	19.9 %	25.4 %	20.2 %	65.5 %	45.6 %
Smart lighting system specialists	28.1 %	1.5 %	0.3 %	8.8 %	17.0 %	44.4 %	70.2 %	61.4 %
Lighting designers	28.9 %	0.9 %	4.4 %	23.4 %	24.0 %	18.4 %	65.8 %	42.4 %
Other	96.5 %	0.0 %	0.0 %	0.9 %	1.2 %	1.5 %	3.6 %	2.7 %

Table 7: Demand for job role profiles in the next five years

If we exclude the N/A option, the results are as follows:

ECOSLIGHT Job Role Profile	Moderate to high demand (3-5) (excluding the N/A option)
Light pollution and environmental impact of lighting specialists	83.8 %
Human-centric lighting specialists	76.5 %
Road lighting safety and lighting security specialists	86.5 %
Smart lighting system specialists	92.7 %
Lighting designers	86.9 %

Table 8: Demand for job role profiles in the next five years (excluding the N/A option)

Overall, we see that in the next five years, **there will be a high demand for Smart Lighting System Specialists, followed by Road Lighting Safety and Lighting Security Specialists, Light Pollution and Environmental Impact of Lighting Specialists, and Lighting Designers. The Human Centric Lighting Specialists are rated last among the pre-selected profiles;** therefore it may be merged with another profile, e.g. the Smart lighting system specialists.

Per project country, the results are as follows (not based on excluding the N/A option)

	France, Germany, Greece, Italy	France	Germany	Greece	Italy	Other countries	N/A
Light pollution and environmental impact of lighting specialists	47.1 %	46.5 %	63.6 %	46.2 %	47.7 %	40.0 %	0.0 %
Human-centric lighting specialists	41.1 %	23.9 %	63.6 %	46.2 %	43.2 %	45.7 %	0.0 %
Road lighting safety and lighting security specialists	48.8 %	33.8 %	54.5 %	52.6 %	56.8 %	31.4 %	0.0 %
Smart lighting system specialists	64.6 %	54.9 %	72.7 %	67.8 %	65.9 %	51.4 %	0.0 %
Lighting designers	43.8 %	26.8 %	63.6 %	47.4 %	52.3 %	42.9 %	0.0 %

Table 9: Demand for job role profiles in the next five years per country (4-5)

On the country level (Table 9) we see that:

- Smart lighting systems specialists will be the most demand in all four project countries.
- In France, the Smart lighting system specialists are followed by Light pollution and environmental impact of lighting specialists.
- In Germany⁶, the Smart lighting system specialists are followed by Light pollution and environmental impact of lighting specialists, human-centric lighting specialists, and Lighting designers.
- In Greece and Italy, they are followed by Road lighting safety and lighting security specialists.

Additionally, the study explored the sub-sectors of the lighting market that will face a great demand of trained staff (on each one of the aforementioned job role profiles (i.e. groups of tasks) in the next five years.

	Light pollution and environmental impact of lighting specialists	Human- centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Lighting system manufacturing	37.4 %	27.5 %	26.9 %	40.6 %	21.9 %
Lighting installations	28.4 %	21.6 %	35.4 %	45.3 %	22.8 %
Lighting operation and maintenance	21.9 %	19.3 %	37.1 %	43.6 %	14.3 %
Policy and regulatory framework design	42.7 %	31.3 %	29.2 %	20.5 %	22.8 %
Consultancy, lighting studies, etc.	38.3 %	36.3 %	27.5 %	38.0 %	40.6 %

Table 10: Lighting sub-sectors and job role profiles

In Table 10⁷ we see that,

⁶ The reader should have in mind that only 11 people from Germany provided valid results, so the findings are not representative for this country.

- Light pollution and environmental impact lighting specialists will be needed more in the sub-sector of policy regulatory framework design, in consultancy, lighting studies, and lighting system manufacturing.
- Human-centric lighting specialists will be demanded most in consultancy, policy regulatory framework design and lighting system manufacturing.
- Road lighting safety and Lighting security specialists will be needed mostly in lighting operation and maintenance, and lighting installations.
- Smart lighting system specialists will be needed mostly in consultancy, lighting studies, etc.

3.1.3 Skills needs

The survey delved into the skills demanded from the lighting sector. In order to gain rich insights in the skills needs, these were grouped into five main categories, as described in the previous chapter. The first category includes the **“lighting”**-related competences, i.e. competences oriented to pure lighting related activities. The second includes **digital competences**. These are grouped into basic and advanced, originating from the two European frameworks (DigComp 2.1, e-CF 3.0). The third category considers the **green competences**, originating as described in the previous chapter. The fourth category refers to the **entrepreneurship competences**, that originate from the EntreComp framework. Last, the required **“horizontal” or “transversal” competences** originate from the LifeComp European framework. The results are as follows.

⁷ With purple with have marked percentages > 40.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

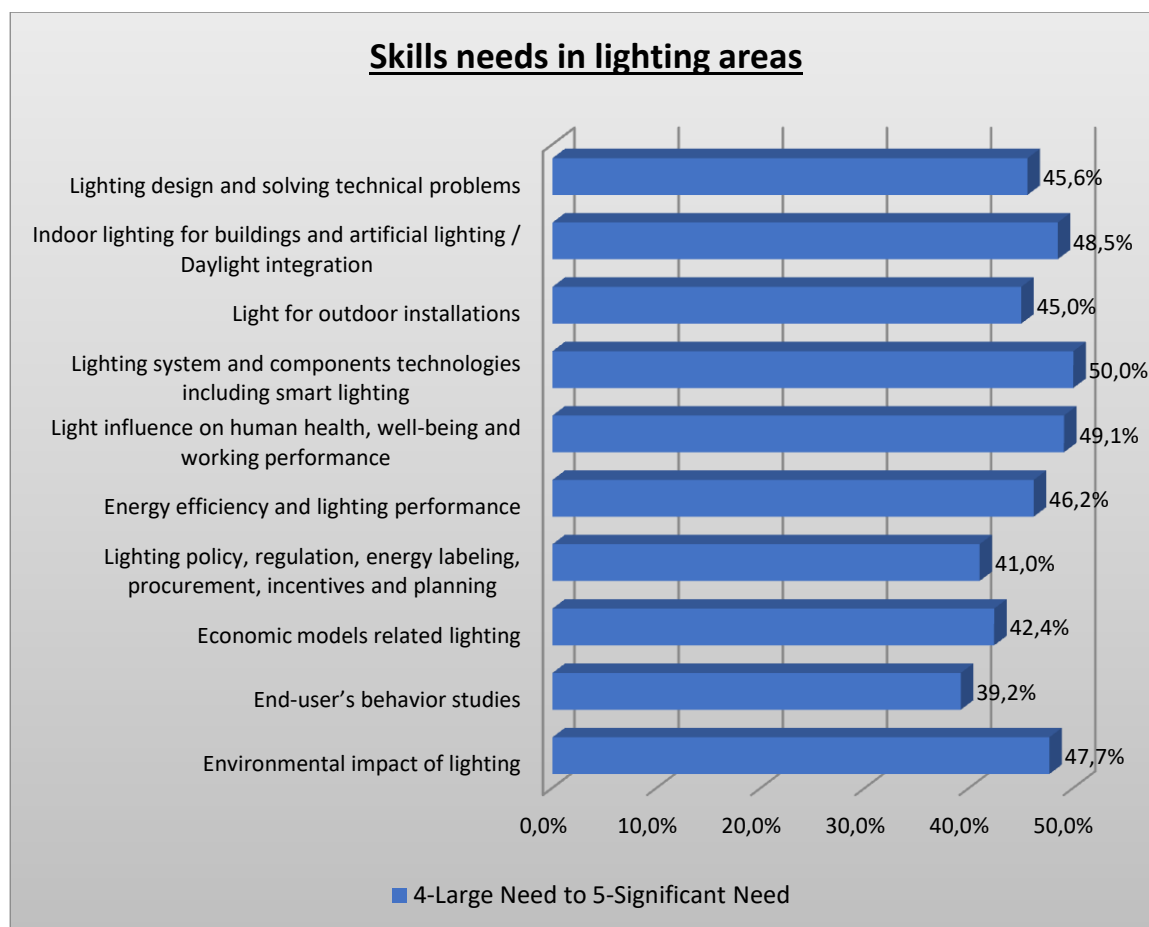


Figure 15: Skills needs in lighting areas (large to significant need)

In Figure 15 we see that the following areas appear to be the most popular for skills uptake of the professionals working to the sector:

- a) Lighting system and components technologies including smart lighting (indoor and outdoor): Light source, drives, fixtures, sensors, controls and metering
- b) Light influence on human health, well-being and working performance (lighting ergonomics)
- c) Indoor lighting for buildings and artificial lighting / Daylight integration
- d) Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
- e) Energy efficiency and lighting performance
- f) Lighting design and solving technical problems

	1- No need at all	2	3- Moderate need	4	5- Significant need	No answer	4-Large need to 5-Significant need
Information and data literacy	0.6%	3.8%	14.3%	17.0%	24.3%	40.0%	41.3%
Communication and collaboration	0.3%	2.0%	16.4%	19.6%	21.6%	40.0%	41.2%
Digital content creation	0.9%	3.8%	16.7%	19.0%	18.4%	41.2%	37.4%
Safety	0.3%	3.5%	12.6%	18.4%	25.1%	40.0%	43.5%
Problem solving	0.3%	1.2%	9.9%	21.1%	26.9%	40.6%	48.0%

Table 11: Basic digital competences areas needs (DigComp 2.1)

In Table 11 we see that the sector needs mostly basic digital competences from the **Area 5: Problem solving**, followed by the **Area 4: Safety**. In detail, according to the needs expressed by the individual professionals,

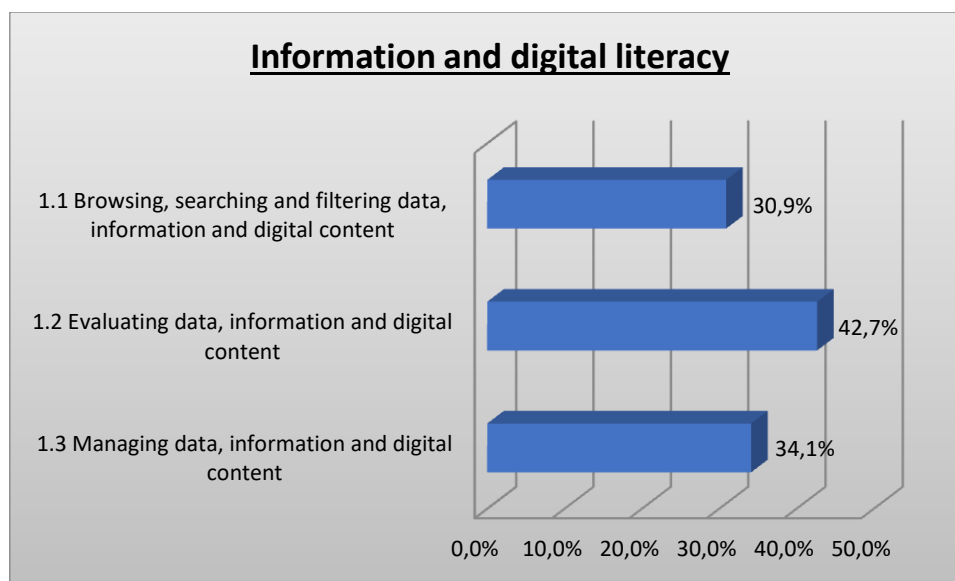


Figure 16: Information and data literacy competences needs

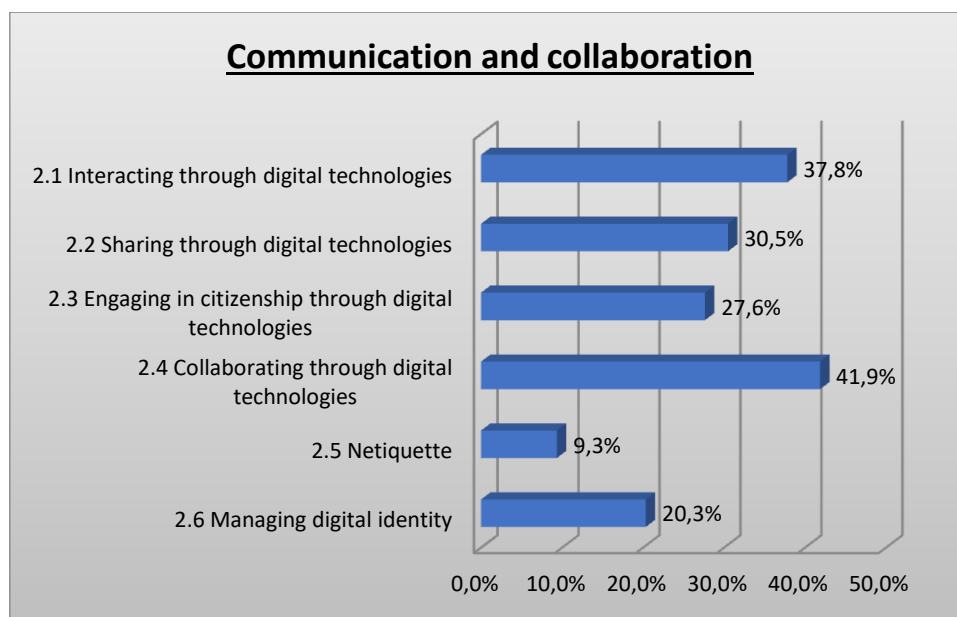


Figure 17: Communication and collaboration competences needs

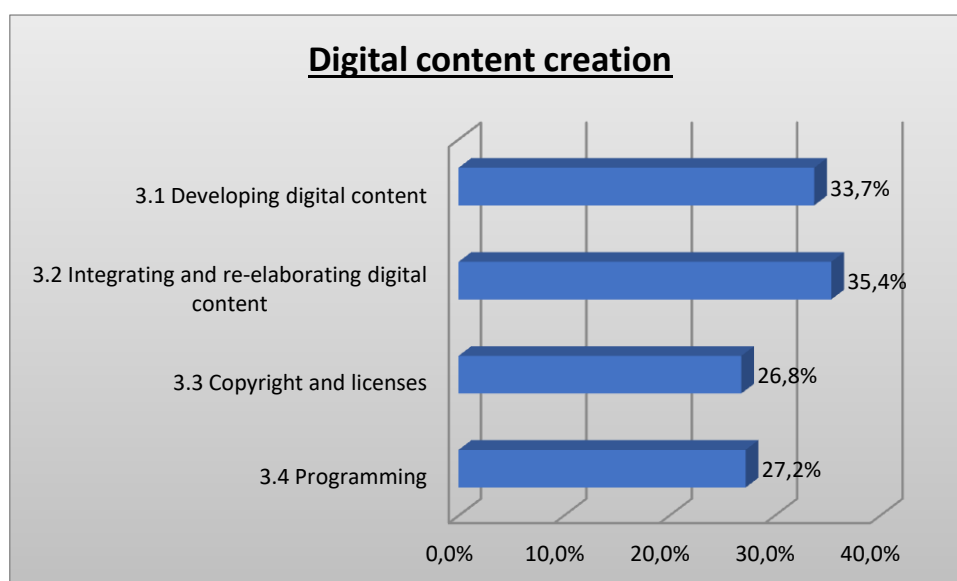


Figure 18: Digital content creation competences needs

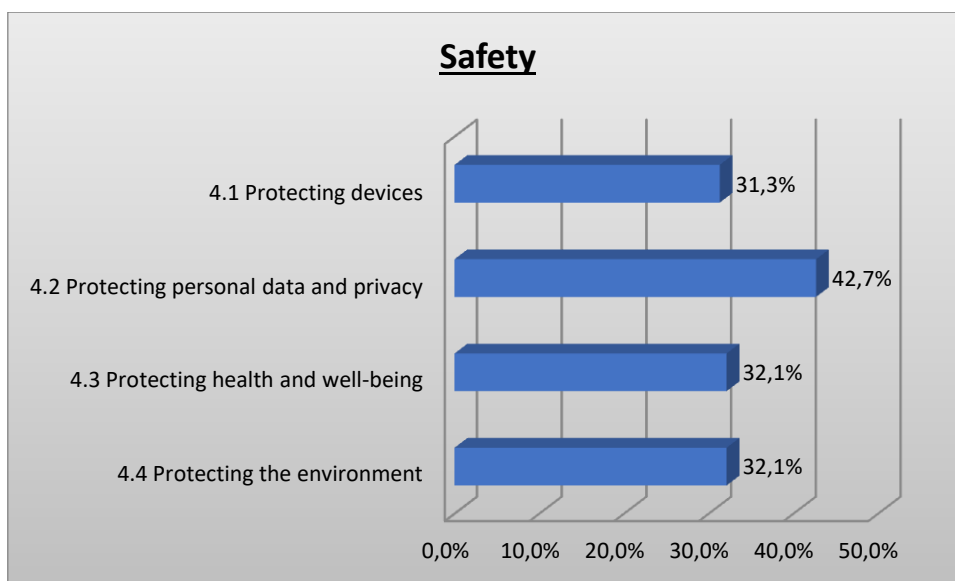


Figure 19: Safety competences needs

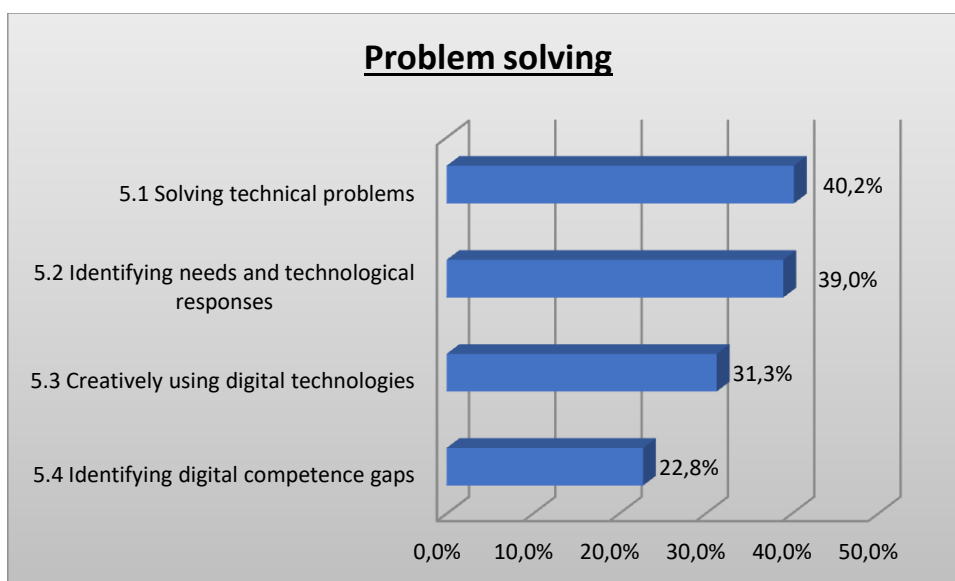


Figure 20: Problem solving competences needs

Overall, we see that,

- In the first area (Information and data literacy), *1.2 Evaluating data, information and digital content* is the most demanded competence.
- In the second area (Communication and collaboration), *2.4 Collaborating through digital technologies* and *2.1 Interacting through digital technologies* are the most demanded competences.
- In the third area of basic digital competences (Digital content creation), *3.2 Integrating and re-elaborating digital content* is the most demanded competence.

- In the fourth area (Safety), *4.2 Protecting personal data and privacy* is the most demanded competence.
- In the fifth area (Problem solving), *5.1 Solving technical problems* and *5.2 Identifying needs and technological responses* are the most demanded competences.

As far as it concerns the advanced digital competences areas, results (Table 12) indicate the need mostly for B. Build ICT, E. Manage ICT and A. Plan ICT competences.

	1- No need at all	2	3- Moderate need	4	5- Significant need	No answer	4-Large need to 5-Significant need
A. Plan ICT	0.3%	2.9%	13.5%	19.3%	19.9%	44.2%	39.2%
B. Build ICT	0.0%	3.8%	12.0%	20.2%	19.9%	44.2%	40.1%
C. Run ICT	0.0%	3.2%	16.4%	18.1%	19.3%	43.0%	37.4%
D. Enable ICT	0.3%	2.6%	14.6%	20.8%	18.1%	43.6%	38.9%
E. Manage ICT	0.6%	2.9%	12.9%	17.5%	22.2%	43.9%	39.7%

Table 12: Advanced digital competences areas needs (e-CF 3.0)

The individual professionals were requested to assess their detailed needs in particular competences of each advanced area, that are related mostly with the lighting area. The results are as follows:

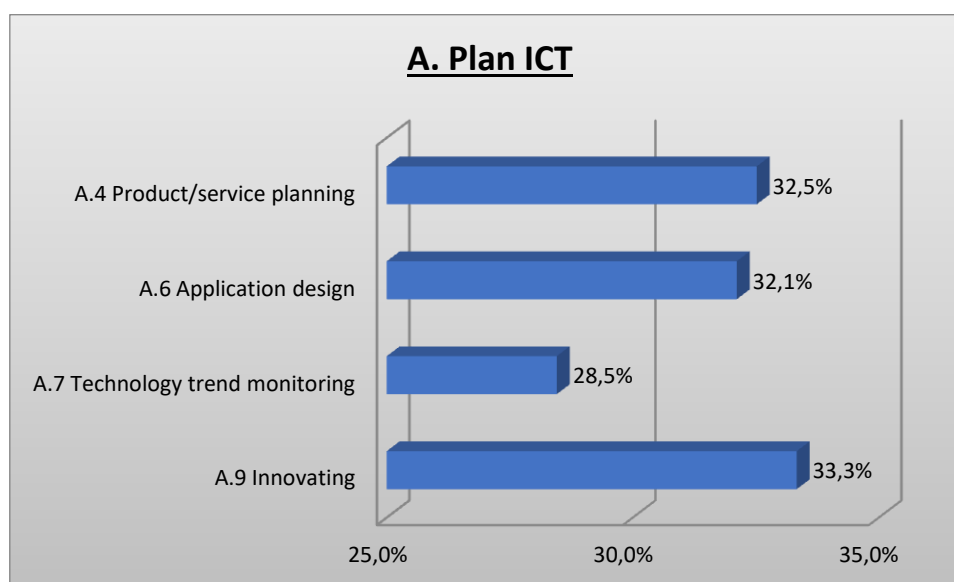


Figure 21: Plan ICT competences needs

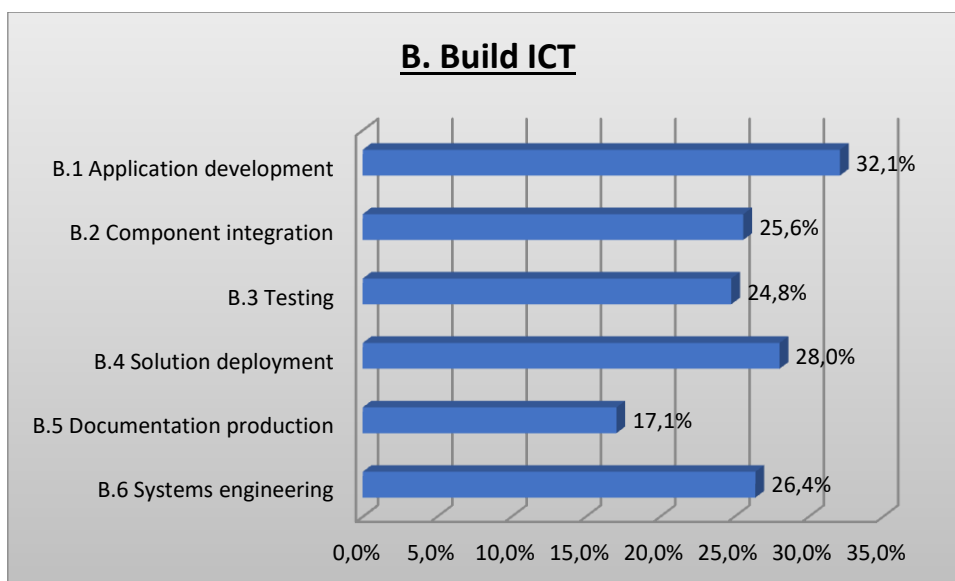


Figure 22: Build ICT competences needs

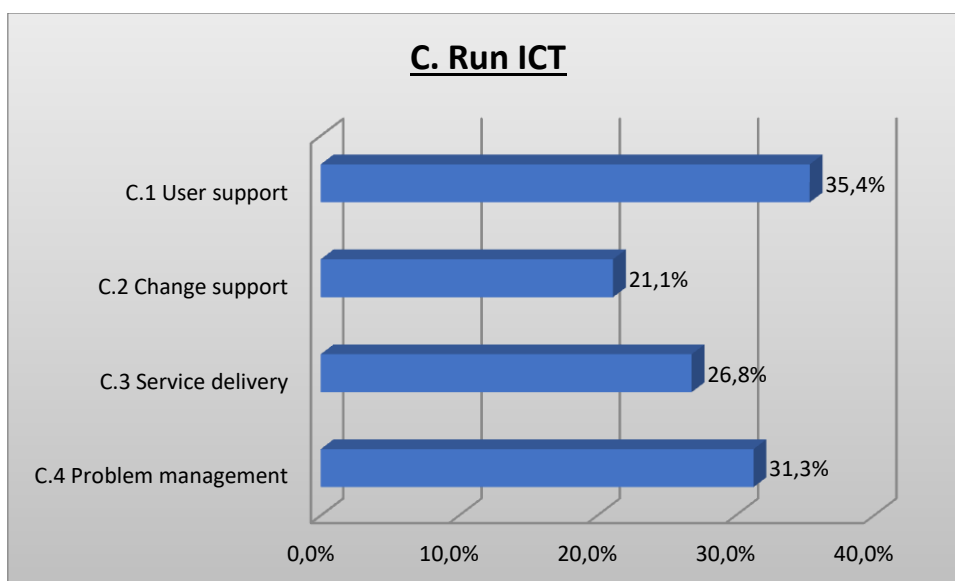


Figure 23: Run ICT competences needs

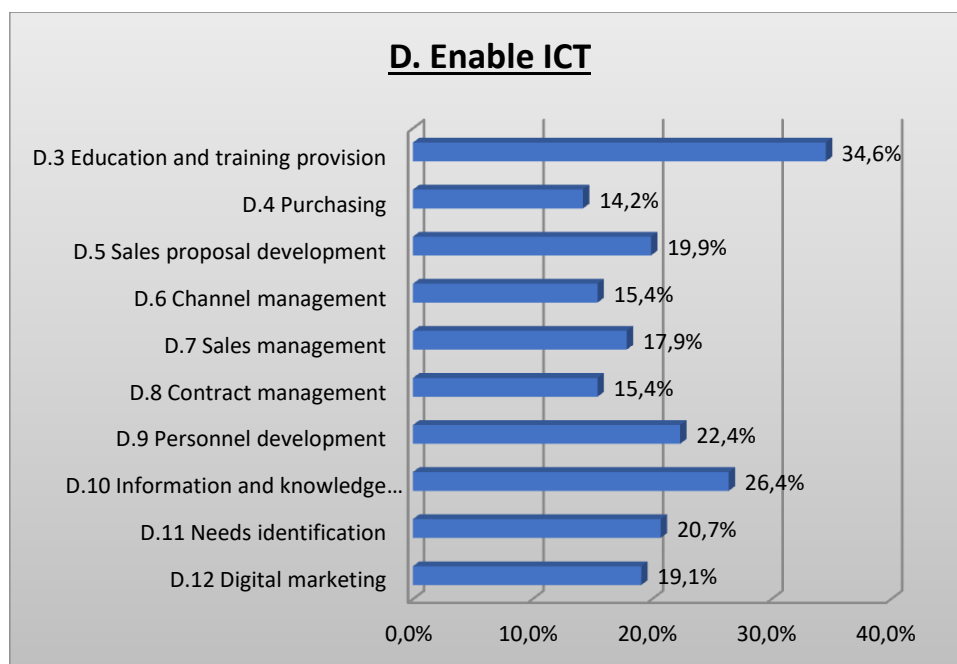


Figure 24: Enable ICT competences needs

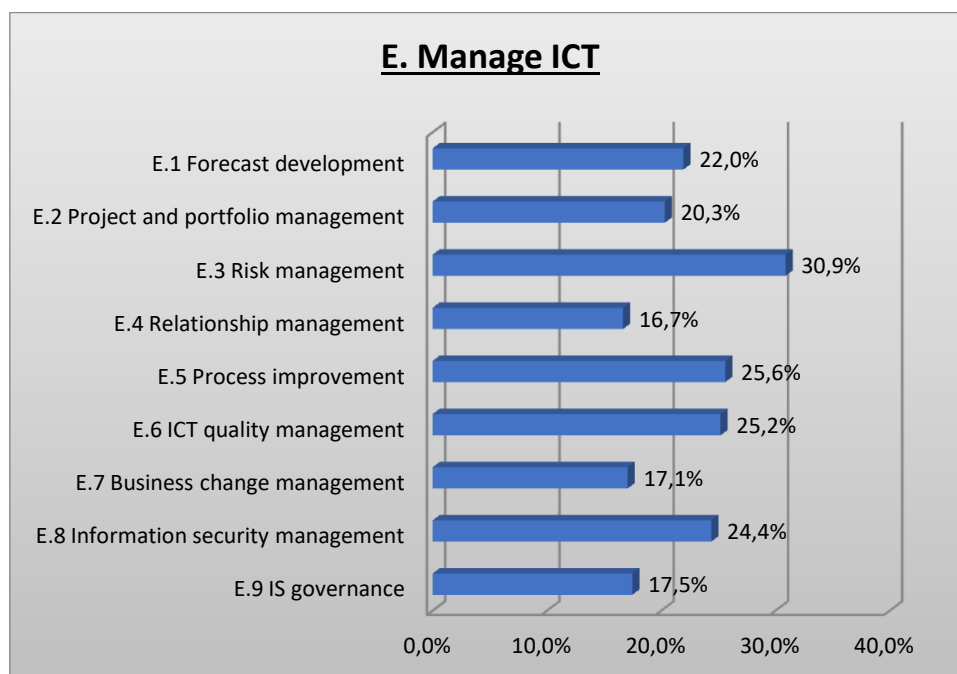


Figure 25: Manage ICT competences needs

Overall, we see that,

- In the first area (A. Plan ICT), *A.9 Innovating* is the most demanded competence, followed by *A.4 Product/service planning* and *A.6 Application design*.
- In the second area (B. Build ICT), *B.1 Application development* is the most demanded competence, followed by *B.4 Solution deployment* and *B.6 Systems engineering*.
- In the third area (C. Run ICT), *C.1 User support* is the most demanded competence, followed by *C.4 Problem management*.
- In the fourth area (D. Enable ICT), *D.3 Education and training provision* is the most demanded competence, followed by *D.10 Information and knowledge management*.
- In the fifth area (E. Manage ICT), *E.3 Risk management* is the most demanded competence followed by *E.5 Process improvement*, *E.6 ICT quality management* and *E.8 Information security management*.

Green competence needs were examined in the survey in the context of the lighting-sector needs.

	1- No need at all	2	3- Moderate need	4	5- Significant need	No answer	4-Large need to 5-Significant need
Understand and promote the value of sustainable lighting	0.3 %	1.5 %	7.6 %	17.8 %	31.3 %	1.5 %	49.1 %
Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	0.0 %	2.0 %	8.5 %	19.3 %	28.7 %	1.5 %	48.0 %
Understand the new sustainable lighting techniques applied to sustainable lighting	0.0 %	0.3 %	8.8 %	19.6 %	29.5 %	1.8 %	49.1 %
Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies	0.0 %	2.9 %	14.6 %	19.0 %	21.6 %	1.8 %	40.6 %
Understand sustainable building certification systems in the lighting sector	0.3 %	2.0 %	15.5 %	18.4 %	21.6 %	2.0 %	40.0 %
Understand the use of Environmental and Energy Labelling	0.6 %	2.6 %	14.6 %	19.3 %	21.3 %	1.5 %	40.6 %
Understand the Environmental Product Declaration Schemes (EPDs)	0.0 %	3.5 %	14.6 %	21.1 %	17.0 %	3.2 %	38.1 %
Understand the selection criteria of lighting services / systems and products in terms of sustainability	0.3 %	2.9 %	9.9 %	22.5 %	21.6 %	2.6 %	44.1 %
Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	0.3 %	2.3 %	8.5 %	17.3 %	29.2 %	2.3 %	46.5 %

Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases	0.0 %	2.6 %	14.0 %	16.1 %	24.0 %	3.2 %	40.1 %
Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	0.3 %	1.5 %	14.9 %	17.0 %	23.4 %	2.9 %	40.4 %
Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	0.3 %	0.6 %	10.8 %	16.7 %	28.7 %	2.9 %	45.4 %

Table 13: Green competences for the lighting sector

As we see, the most needed green competences in the lighting sector are the following:

- Understand and promote the value of sustainable lighting
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

The survey also explored the competences needs required from modern professionals that work or would like to work in the lighting sector, related to **Entrepreneurship**. These needs are based on the EntreComp – Entrepreneurship Competence Framework, and categorized into three areas

- Ideas and opportunities: Spotting opportunities, Creativity, Vision, Valuing ideas, Ethical and sustainable thinking.
- Resources: Self-awareness and self-efficacy, Motivation and perseverance, Mobilizing resources, Financial and Economic literacy, Mobilizing others.
- Into action: Taking the initiative, Planning and management, Coping with uncertainty, ambiguity and risk, Working with others, Learning through experience.

	1- No need at all	2	3- Moderate need	4	5- Significant need	No answer	4-Large need to 5-Significant need
Ideas and opportunities	0.9%	0.6%	9.6%	16.1%	30.7%	42.1%	46.8%
Resources	0.0%	0.9%	13.5%	22.2%	20.2%	43.2%	42.4%
Into action	0.3%	1.5%	8.5%	17.3%	30.4%	42.0%	47.7%

Table 14: Entrepreneurship competences needs (EntreComp)

In Table 14 we see that most respondents selected the *Into action* type of competences, followed by the *Ideas and opportunities*.

Next, the study explored the competences needs required from modern professionals that work or would like to work in the lighting sector, related to human qualities. These needs are based on the LifeComp framework, and categorized into three areas

- A. Personal competences: Self-regulation, Adaptability, Wellbeing
- B. Social competences: Empathy, Communication, Collaboration
- C. Learning to learn competences: Growth mindset, Critical thinking, Managing learning

	1- No need at all	2	3- Moderate need	4	5- Significant need	No answer	4-Large need to 5-Significant need
Personal	0.3%	2.0%	14.0%	16.7%	26.3%	40.7%	43.0%
Social	0.3%	2.3%	12.3%	16.4%	27.8%	40.9%	44.2%
Learning to learn	0.0%	0.0%	5.0%	14.0%	40.1%	40.9%	54.1%

Table 15: Human qualities competences needs (LifeComp)

In Table 15 we see that most respondents selected the *Learning to learn* type of competences, which include *Growth mindset*, *Critical thinking*, and *Managing learning*.

Additional analyses were conducted in relation to the separate skills needs and the job role profiles⁸. The percentages are estimated taking into account only the respondents that selected 4 to 5 (serious to significant need in both dimensions)

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Lighting Design & solving technical problems	39.9 %	39.6 %	41.6%	53.7 %	39.5 %
Indoor Lighting for Buildings & Artificial Lighting / Daylight integration	43.1 %	42.6 %	42.0 %	57.7 %	41.6 %
Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security	40.3 %	37.4 %	41.2 %	54.9 %	40.7 %
Lighting system and components technologies including smart Lighting (indoor & outdoor)	44.0 %	40.9 %	43.6 %	59.8 %	42.0 %
Light influence on human health, well-being and working performances (Lighting Ergonomics)	44.8 %	41.7 %	40.7 %	58.5 %	44.4 %
Energy Efficiency & Lighting performance	42.7 %	38.3 %	42.4 %	55.7 %	46.1 %

⁸ These analyses are not presented under the R2.1 Mapping the skills supply and demand of the lighting-related construction sector

Lighting policy, regulation, energy labelling, procurement, incentives and planning	38.3 %	36.6 %	37.0 %	49.2 %	38.3 %
Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service)	39.1 %	36.6 %	38.3 %	50.4 %	37.9 %
End-user's behavior studies (satisfaction, acceptability, needs...)	37.5 %	36.2 %	36.2 %	46.7 %	36.2 %
Environmental impact of lighting (ecosystem, recycling, life cycle assessment)	44.4 %	42.1 %	42.4 %	56.9 %	41.6 %

Table 16: Lighting skills needs per job role profile

In Table 16⁹ we see that all different job role profiles are of high need / significant demand (not selected even one option in a profile excluded) of all lighting competences, with the Smart lighting system specialists presenting much higher demand level in all the competences identified.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Lighting Design & solving technical problems	18.9 %	40.5 %	46.8 %	38.1 %	40.9 %	28.3 %
Indoor Lighting for Buildings & Artificial Lighting / Daylight integration	18.9 %	40.5 %	49.2 %	41.0 %	41.3 %	30.0 %
Light for Outdoor installations	18.4 %	37.9 %	47.6 %	39.7 %	41.3 %	28.3 %
Lighting system and components technologies including smart Lighting (indoor & outdoor)	23.8 %	44.5 %	52.8 %	43.5 %	45.5 %	33.0 %
Light influence on human health, well-being and working performances (Lighting Ergonomics)	22.3 %	41.9 %	49.6 %	43.9 %	42.1 %	30.0 %
Energy Efficiency & Lighting performance	20.4 %	40.5 %	46.8 %	41.0 %	40.1 %	27.9 %

⁹ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

Lighting policy, regulation, energy labelling, procurement, incentives and planning	20.4 %	37.4 %	41.5 %	36.0 %	37.2 %	27.9 %
Economic models related lighting	18.9 %	39.2 %	44.8 %	38.5 %	37.2 %	26.2 %
End-user's behavior studies	18.4 %	33.0 %	38.7 %	33.9 %	33.5 %	22.7 %
Environmental impact of lighting	20.4 %	42.7 %	49.6 %	41.8 %	43.0 %	29.6 %

Table 17: Lighting skills needs per type of professional

In Table 17¹⁰ we see that all different types of professionals are of high need / significant demand (not selected even one option in a profile excluded) of all lighting competences, except from managers, and partially the technical – commercial staff.

Next, we explore the cross-tabulation between the job roles and the types of professionals, and the five areas of the basic digital competences, according to the DigComp framework.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
1. Information and data literacy	36.7 %	36.6 %	39.1 %	49.6 %	36.6 %
2. Communication and collaboration	38.3 %	36.2 %	38.7 %	50.4 %	37.0 %
3. Digital content creation	35.5 %	34.0 %	35.4 %	44.7 %	35.8 %
4. Safety	38.3 %	37.4 %	41.2 %	50.4 %	39.5 %
5. Problem solving	43.5 %	41.3 %	44.0 %	57.3 %	41.2 %

Table 18: Areas of basic digital competence needs (DigComp) per job role profile

In Table 18 we see that all different job role profiles are of high need / significant demand (not selected even one option in a profile excluded) of all basic digital competences areas, with the Smart lighting system specialists presenting much higher demand level in all areas, and the Problem solving being of high demand for all job roles.

The study delved into the separate basic digital competences, as they were assessed only from individual professionals. The results are as follows.

¹⁰ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

ENVIRONMENTALLY CONSCIOUS SMART LIGHTING

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
1.1 Browsing, searching and filtering data, information and digital content	32.7 %	30.0 %	35.3 %	43.3 %	32.0 %
1.2 Evaluating data, information and digital content	46.7 %	38.7 %	36.7 %	60.7 %	40.7 %
1.3 Managing data, information and digital content	34.7 %	34.0 %	35.3 %	49.3 %	34.7 %
2.1 Interacting through digital technologies	39.7 %	33.1 %	36.4 %	52.3 %	37.7 %
2.2 Sharing through digital technologies	33.1 %	27.8 %	31.1 %	43.7 %	31.8 %
2.3 Engaging in citizenship through digital technologies	29.1 %	27.8 %	32.5 %	37.7 %	31.1 %
2.4 Collaborating through digital technologies	43.7 %	41.7 %	42.4 %	59.6 %	41.7 %
2.5 Netiquette	11.3 %	9.3 %	12.6 %	13.9 %	11.3 %
2.6 Managing digital identity	22.1 %	21.2 %	21.9 %	27.8 %	19.2 %
3.1 Developing digital content	37.6 %	34.9 %	37.6 %	45.6 %	34.9 %
3.2 Integrating and re-elaborating digital content	36.9 %	33.6 %	36.9 %	51.0 %	38.3 %
3.3 Copyright and licenses	26.8 %	22.8 %	24.8 %	37.6 %	23.5 %
3.4 Programming	28.9 %	24.8 %	30.2 %	38.3 %	25.5 %
4.1 Protecting devices	30.7 %	26.7 %	32.0 %	42.7 %	28.0 %
4.2 Protecting personal data and privacy	43.3 %	39.3 %	44.7 %	58.0 %	42.0 %
4.3 Protecting health and well-being	33.3 %	28.0 %	33.3 %	45.3 %	33.3 %
4.4 Protecting the environment	32.7 %	28.7 %	33.3 %	45.3 %	35.3 %
5.1 Solving technical problems	41.6 %	37.6 %	43.6 %	55.7 %	39.6 %
5.2 Identifying needs and technological responses	38.3 %	33.6 %	40.3 %	53.0 %	38.9 %
5.3 Creatively using digital technologies	32.2 %	29.5 %	30.9 %	43.6 %	32.9 %
5.4 Identifying digital competence gaps	21.5 %	20.1 %	25.5 %	31.5 %	24.8 %

Table 19: Separate basic digital competence needs (DigComp) per job role profile

In Table 19¹¹ we see the results of the separate basic digital competences (according to the DigComp) per job role profile. There are two digital competences, the 2.5 *Netiquette* and the 2.6 *Managing digital identity* that seem to be out of interest. The need for the rest varies according to the profile, with the 2.4 *Collaborating through digital technologies*, the 4.2 *Protecting personal data and privacy* and the 5.1 *Solving technical problems* being of highest demand.

The cross-tabulation between the areas of basic digital competences and the different types of professionals is presented to the following table.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Information and data literacy	20.9 %	36.6 %	40.7 %	34.7 %	36.4 %	25.8 %
Communication and collaboration	19.4 %	37.0 %	41.1 %	35.6 %	36.8 %	24.9 %
Digital content creation	18.0 %	34.8 %	38.7 %	33.5 %	35.5 %	23.6 %
Safety	20.4 %	37.9 %	45.6 %	37.7 %	38.8 %	26.6 %
Problem solving	21.4 %	43.2 %	50.4 %	43.9 %	45.9 %	32.6 %

Table 20: Areas of basic digital competence needs (DigComp) per type of professional

In Table 20 we see that all different types of professionals, apart from managers and partially the technical-commercial staff, are of high need / significant demand (not selected even one option in a profile excluded) in all areas of basic digital competences, with the problem solving being in front again.

Next, the study delved into the separate basic digital competences, as they were assessed only from individual professionals.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
1.1 Browsing, searching and filtering data, information and digital content	12.7 %	31.3 %	36.7 %	33.3 %	32.0 %	24.7 %
1.2 Evaluating data, information and digital content	18.0 %	42.7 %	54.0 %	45.3 %	42.7 %	28.0 %
1.3 Managing data, information and digital content	14.7 %	34.0 %	43.3 %	36.0 %	36.0 %	28.7 %

¹¹ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

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2.1 Interacting through digital technologies	17.9 %	37.7 %	45.0 %	41.1 %	39.1 %	28.5 %
2.2 Sharing through digital technologies	10.6 %	29.8 %	36.4 %	30.5 %	30.5 %	22.5 %
2.3 Engaging in citizenship through digital technologies	15.2 %	26.5 %	33.8 %	28.5 %	29.1 %	21.2 %
2.4 Collaborating through digital technologies	17.9 %	40.4 %	51.7 %	45.0 %	40.4 %	29.8 %
2.5 Netiquette	4.6 %	9.9 %	11.9 %	9.9 %	10.6 %	7.9 %
2.6 Managing digital identity	7.9 %	17.9 %	22.5 %	21.2 %	17.9 %	11.9 %
3.1 Developing digital content	11.4 %	35.6 %	43.6 %	35.6 %	38.3 %	26.8 %
3.2 Integrating and re-elaborating digital content	18.8 %	32.2 %	39.6 %	37.6 %	34.2 %	25.5 %
3.3 Copyright and licenses	12.8 %	26.2 %	30.9 %	25.5 %	26.2 %	18.8 %
3.4 Programming	11.4 %	26.2 %	33.6 %	28.9 %	30.2 %	22.1 %
4.1 Protecting devices	12.0 %	30.0 %	34.7 %	30.0 %	32.0 %	19.3 %
4.2 Protecting personal data and privacy	19.3 %	40.7 %	52.7 %	44.7 %	44.0 %	32.7 %
4.3 Protecting health and well-being	13.3 %	30.7 %	37.3 %	35.3 %	32.7 %	20.0 %
4.4 Protecting the environment	15.3 %	30.0 %	37.3 %	37.3 %	34.0 %	23.3 %
5.1 Solving technical problems	16.8 %	35.6 %	47.0 %	42.3 %	43.0 %	30.2 %
5.2 Identifying needs and technological responses	16.8 %	36.2 %	47.7 %	41.6 %	40.9 %	28.9 %
5.3 Creatively using digital technologies	16.1 %	31.5 %	38.3 %	34.2 %	32.2 %	22.1 %
5.4 Identifying digital competence gaps	12.8 %	22.1 %	27.5 %	22.8 %	24.8 %	18.8 %

Table 21: Separate basic digital competence needs (DigComp) per type of professional

In Table 21¹² we see the results of the separate basic digital competences (according to the DigComp) per type of professional. Again, there are two digital competences, the 2.5 *Netiquette* and the 2.6 *Managing digital identity* that seem to be out of interest (especially the first). The need for the rest varies according to the profile, with the 1.2 *Evaluating data, information and digital content*, the 2.4 *Collaborating through digital technologies*, the 4.2 *Protecting personal data and privacy*, the 5.1 *Solving technical problems* and the 5.2 *Identifying needs and technological responses* being of highest demand.

Next, the analysis proceeds with the **advanced digital competences** needs, as they are defined in the e-CF 3.0 framework. As previous, it conducted at the level of job role profile and the type of professional. The results are presented in the following tables. Particular competences were omitted from the study, as they were considered irrelevant with the sub-sector of lighting.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
A. Plan ICT	37.5 %	37.4 %	37.4 %	48.0 %	36.6 %
B. Build ICT	37.1 %	34.5 %	38.3 %	48.8 %	36.6 %
C. Run ICT	34.7 %	34.0 %	34.6 %	45.5 %	33.7 %
D. Enable ICT	35.5 %	35.7 %	36.6 %	47.2 %	35.8 %
E. Manage ICT	37.1 %	35.7 %	38.7 %	49.2 %	36.2 %

Table 22: Areas of advanced digital competence needs (e-CF 3.0) per job role profile

In Table 22 we see that all different job role profiles are of high need / significant demand (not selected even one option in a profile excluded) in all areas of the advanced digital competences, with the Smart lighting system specialists presenting much higher demand in all areas.

The study delved into the separate advanced digital competences, as they were assessed only from individual professionals. Particular competences were omitted from the study as irrelevant. The results are as follows.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
A.4 Product/service planning	35.4 %	32.6 %	39.6 %	47.9 %	30.6 %
A.6 Application design	31.9 %	29.9 %	38.9 %	46.5 %	32.6 %
A.7 Technology trend monitoring	34.7 %	29.2 %	33.3 %	45.1 %	30.6 %
A.9 Innovating	36.8 %	33.3 %	36.1 %	50.0 %	35.4 %
B.1 Application development	35.0 %	31.5 %	41.3 %	45.5 %	34.3 %
B.2 Component integration	28.0 %	24.5 %	31.5 %	38.5 %	26.6 %

¹² With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

B.3 Testing	26.6 %	23.1 %	28.7 %	37.8 %	25.2 %
B.4 Solution deployment	31.5 %	25.9 %	34.3 %	44.8 %	28.0 %
B.5 Documentation production	19.6 %	18.9 %	19.6 %	25.9 %	18.9 %
B.6 Systems engineering	28.7 %	27.3 %	30.8 %	39.2 %	30.1 %
C.1 User support	36.6 %	32.4 %	37.9 %	52.4 %	36.6 %
C.2 Change support	23.4 %	19.3 %	22.8 %	30.3 %	22.1 %
C.3 Service delivery	29.7 %	24.8 %	30.3 %	38.6 %	26.2 %
C.4 Problem management	29.0 %	29.0 %	37.2 %	44.1 %	29.0 %
D.3 Education and training provision	37.2 %	31.7 %	39.3 %	51.7 %	33.1 %
D.4 Purchasing	13.1 %	13.1 %	15.2 %	17.9 %	13.1 %
D.5 Sales proposal development	20.0 %	20.0 %	24.1 %	28.3 %	22.1 %
D.6 Channel management	17.2 %	15.9 %	17.9 %	21.4 %	19.3 %
D.7 Sales management	19.3 %	17.9 %	20.7 %	26.2 %	19.3 %
D.8 Contract management	15.9 %	15.9 %	17.2 %	20.7 %	19.3 %
D.9 Personnel development	23.4 %	20.7 %	28.3 %	32.4 %	24.1 %
D.10 Information and knowledge management	30.3 %	17.9 %	28.3 %	40.7 %	24.1 %
D.11 Needs identification	24.1 %	21.4 %	23.4 %	31.0 %	20.7 %
D.12 Digital marketing	18.6 %	19.3 %	21.4 %	25.5 %	17.9 %
E.1 Forecast development	22.9 %	22.2 %	25.0 %	31.3 %	24.3 %
E.2 Project and portfolio management	21.5 %	18.8 %	25.0 %	31.3 %	22.2 %
E.3 Risk management	29.9 %	30.6 %	33.3 %	43.8 %	30.6 %
E.4 Relationship management	18.8 %	18.8 %	21.5 %	25.0 %	18.8 %
E.5 Process improvement	27.8 %	24.3 %	33.3 %	38.2 %	27.8 %
E.6 ICT quality management	28.5 %	24.3 %	30.6 %	38.2 %	25.7 %
E.7 Business change management	18.1 %	16.7 %	18.1 %	25.7 %	18.1 %
E.8 Information security management	27.1 %	25.0 %	30.6 %	36.1 %	23.6 %
E.9 IS governance	17.4 %	19.4 %	18.8 %	24.3 %	16.0 %

Table 23: Separate advanced digital competence needs (e-CF 3.0) per job role profile

In Table 23¹³ we see the results of the separate advanced digital competences (according to the e-CF 3.0 framework) per job role profile. Interestingly, as we advance to the higher levels of the framework, the need seems to decrease.

The same analyses were also conducted on the level of the type of professional.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
A. Plan ICT	19.4 %	34.8 %	39.9 %	35.6 %	34.3 %	24.9 %
B. Build ICT	20.4 %	36.1 %	41.5 %	35.1 %	34.7 %	25.8 %
C. Run ICT	20.4 %	33.5 %	37.5 %	32.6 %	34.7 %	23.2 %
D. Enable ICT	19.4 %	35.7 %	39.5 %	35.1 %	35.1 %	24.5 %
E. Manage ICT	22.3 %	35.7 %	42.3 %	36.0 %	35.1 %	25.8 %

Table 24: Areas of advanced digital competence needs (e-CF 3.0) per type of professional

In Table 24 we see that all different types of professionals, apart from managers and partially the technical-commercial staff, are of high need / significant demand (not selected even one option in a profile excluded) in all areas of basic digital competences, with the problem solving being in front again.

Next, the study delved into the separate basic digital competences, as they were assessed only from individual professionals.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
A.4 Product/service planning	13.9 %	34.0 %	41.0 %	36.1 %	34.0 %	24.3 %
A.6 Application design	14.6 %	30.6 %	40.3 %	36.1 %	34.0 %	24.3 %
A.7 Technology trend monitoring	12.5 %	28.5 %	35.4 %	29.9 %	29.2 %	20.8 %
A.9 Innovating	16.7 %	34.0 %	43.1 %	40.3 %	33.3 %	25.0 %
B.1 Application development	15.4 %	36.4 %	43.4 %	35.7 %	34.3 %	27.3 %
B.2 Component integration	11.2 %	25.9 %	31.5 %	24.5 %	25.2 %	20.3 %
B.3 Testing	11.9 %	25.9 %	32.2 %	28.0 %	27.3 %	18.2 %
B.4 Solution deployment	14.7 %	30.1 %	35.7 %	30.1 %	30.8 %	21.0 %

¹³ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

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B.5 Documentation production	6.3 %	17.5 %	21.0 %	17.5 %	16.1 %	11.2 %
B.6 Systems engineering	14.0 %	28.0 %	34.3 %	32.2 %	28.7 %	22.4 %
C.1 User support	15.2 %	34.5 %	42.8 %	37.9 %	35.9 %	24.8 %
C.2 Change support	11.0 %	21.4 %	26.9 %	23.4 %	20.7 %	16.6 %
C.3 Service delivery	12.4 %	25.5 %	31.7 %	28.3 %	29.7 %	22.8 %
C.4 Problem management	13.8 %	31.0 %	37.9 %	32.4 %	32.4 %	22.1 %
D.3 Education and training provision	15.9 %	35.9 %	42.8 %	37.2 %	38.6 %	26.9 %
D.4 Purchasing	6.9 %	13.8 %	17.9 %	15.2 %	15.2 %	11.7 %
D.5 Sales proposal development	8.3 %	20.7 %	26.9 %	22.1 %	24.1 %	18.6 %
D.6 Channel management	7.6 %	16.6 %	20.0 %	17.9 %	16.6 %	11.7 %
D.7 Sales management	6.9 %	18.6 %	22.8 %	19.3 %	17.9 %	13.1 %
D.8 Contract management	8.3 %	16.6 %	19.3 %	17.2 %	18.6 %	13.1 %
D.9 Personnel development	8.3 %	22.1 %	29.0 %	26.9 %	26.2 %	17.2 %
D.10 Information and knowledge management	14.5 %	28.3 %	32.4 %	26.2 %	24.8 %	15.2 %
D.11 Needs identification	11.7 %	22.8 %	26.2 %	22.1 %	22.1 %	16.6 %
D.12 Digital marketing	7.6 %	20.7 %	24.8 %	17.2 %	19.3 %	16.6 %
E.1 Forecast development	11.1 %	21.5 %	27.1 %	25.0 %	25.0 %	18.8 %
E.2 Project and portfolio management	9.7 %	22.9 %	25.7 %	23.6 %	21.5 %	17.4 %
E.3 Risk management	13.2 %	29.9 %	41.0 %	32.6 %	31.3 %	23.6 %
E.4 Relationship management	6.9 %	20.1 %	22.2 %	19.4 %	18.1 %	13.2 %
E.5 Process improvement	11.1 %	25.0 %	33.3 %	27.8 %	27.1 %	20.1 %
E.6 ICT quality management	13.9 %	27.1 %	32.6 %	26.4 %	27.1 %	20.8 %
E.7 Business change management	7.6 %	17.4 %	20.1 %	18.8 %	19.4 %	13.9 %

E.8 Information security management	11.8 %	20.8 %	29.2 %	23.6 %	27.1 %	18.1 %
E.9 IS governance	10.4 %	19.4 %	21.5 %	18.8 %	19.4 %	13.9 %

Table 25: Separate advanced digital competence needs (e-CF 3.0) per type of professional

In Table 25¹⁴ we see the results of the separate advanced digital competences (according to the e-CF 3.0) per type of professional. Interestingly, we observe the very limited needs for the Managers; R&D Engineers/Scientists, Lighting Professionals (engineering background), Lighting Designers (artistic background) and Lighting Technicians, Installers and Associate Professionals have particular (advanced) digital competence needs, higher in the three first areas of e-CF, decreasing as we progress higher. The results of technical – commercial prove the limited needs for them.

Next, the analysis proceeds with the demand for **green competences** per job role profile and type of professional.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Understand and promote the value of sustainable lighting	46.0 %	43.8 %	44.9 %	61.4 %	42.8 %
Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	44.4 %	42.6 %	43.2 %	59.3 %	44.9 %
Understand the new sustainable lighting techniques applied to sustainable lighting	46.0 %	42.6 %	43.6 %	59.8 %	43.6 %
Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies	38.7 %	37.0 %	38.3 %	50.4 %	37.9 %
Understand sustainable building certification systems in the lighting sector	38.3 %	37.0 %	38.3 %	50.0 %	37.4 %
Understand the use of Environmental and Energy Labelling	37.9 %	36.2 %	38.7 %	49.6 %	36.6 %
Understand the Environmental Product Declaration Schemes (EPDs)	34.7 %	34.9 %	36.2 %	46.7 %	36.6 %
Understand the selection criteria of lighting services / systems and products in terms	40.3 %	38.7 %	41.2 %	54.5 %	40.7 %

¹⁴ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

of sustainability					
Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	41.9 %	39.6 %	40.7 %	56.9 %	42.8 %
Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases	38.7 %	37.0 %	38.3 %	51.2 %	37.0 %
Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	39.1 %	36.6 %	39.9 %	51.2 %	37.4 %
Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	42.3 %	39.6 %	41.2 %	54.5 %	40.3 %

Table 26: Green competence needs per job role profile

In Table 26¹⁵ we see that all the different job role profiles have increased needs in respect to the green competences. Especially the Smart lighting system specialist; concerning the different green competences, the needed most are the *Understand and promote the value of sustainable lighting*, the *Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards*, the *Understand the new sustainable lighting techniques applied to sustainable lighting*, followed by the *Understand the selection criteria of lighting services / systems and products in terms of sustainability*, the *Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes*, and the *Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process*.

¹⁵ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

Concerning the different types of professionals, the results are as follows:

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Understand and promote the value of sustainable lighting	23.3 %	43.6 %	51.6 %	43.1 %	43.8 %	31.3 %
Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	25.2 %	33.5 %	49.2 %	42.7 %	42.6 %	32.6 %
Understand the new sustainable lighting techniques applied to sustainable lighting	19.4 %	42.3 %	50.0 %	44.4 %	43.0 %	31.8 %
Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies	15.0 %	37.4 %	41.9 %	36.0 %	36.4 %	25.3 %
Understand sustainable building certification systems in the lighting sector	16.0 %	37.9 %	42.3 %	35.1 %	36.0 %	26.6 %
Understand the use of Environmental and Energy Labelling	18.9 %	37.4 %	41.9 %	35.6 %	36.4 %	26.2 %
Understand the Environmental Product Declaration Schemes (EPDs)	18.0 %	33.0 %	39.5 %	33.1 %	33.5 %	26.2 %
Understand the selection criteria of lighting services / systems and products in terms of sustainability	22.8 %	41.0 %	46.8 %	40.2 %	41.3 %	30.9 %
Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture –	21.8 %	41.9 %	48.0 %	41.0 %	41.7 %	32.2 %

recycle processes						
Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases	18.9 %	37.4 %	42.7 %	35.6 %	38.4 %	28.3 %
Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	18.4 %	36.1 %	41.9 %	36.0 %	38.4 %	27.5 %
Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	21.8 %	41.9 %	46.0 %	44.4 %	40.9 %	29.2 %

Table 27: Green competence needs per type of professional

In Table 27¹⁶ we see the results of the green competence needs per type of professional. Interestingly, we observe the limited needs for the Managers, and the almost serious needs of the Lighting Professionals (engineering background).

Next, the study explored the **entrepreneurship competence** needs per job role profile and per type of professional. The results are presented in the following tables.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Ideas and opportunities (e.g. Spotting opportunities, Creativity, Vision, Valuing ideas, Ethical and sustainable thinking)	43.5 %	42.6 %	42.8 %	57.7 %	42.0 %
Resources (e.g. Self-awareness and self-efficacy, Motivation and perseverance, Mobilizing resources, Financial and Economic literacy, Mobilizing others)	37.9 %	38.7 %	38.3 %	52.0 %	37.9 %

¹⁶ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

Into action (e.g. Taking the initiative, Planning and management, Coping with uncertainty, ambiguity and risk, Working with others, Learning through experience)	44.0 %	41.3 %	42.8 %	59.3 %	43.2 %
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Table 28: Entrepreneurship competence needs per job role profile

In Table 28¹⁷ we see that all the different job role profiles have increased needs in respect to the entrepreneurship competences, with the highest observed in the Smart lighting system specialists; In terms of groups of competences, those fold under *Ideas and opportunities* and *Into action* are ranked higher than the *Resources*.

Concerning the different types of professionals, the results are as follows:

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Ideas and opportunities (e.g. Spotting opportunities, Creativity, Vision, Valuing ideas, Ethical and sustainable thinking)	22.3 %	41.0 %	46.4 %	41.0 %	40.1 %	29.6 %
Resources (e.g. Self-awareness and self-efficacy, Motivation and perseverance, Mobilizing resources, Financial and Economic literacy, Mobilizing others)	19.4 %	37.4 %	42.3 %	35.6 %	37.6 %	27.0 %
Into action (e.g. Taking the initiative, Planning and management, Coping with uncertainty, ambiguity and risk, Working with others, Learning through experience)	22.3 %	41.4 %	48.4 %	41.8 %	42.6 %	30.5 %

Table 29: Entrepreneurship competence needs per type of professional

¹⁷ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

In Table 29¹⁸ we see the results of the entrepreneurship competence needs per type of professional. R&D engineers / scientists, Lighting professionals (with engineering or artistic background) and Lighting technicians, installers and associate professionals seem to have the greater needs.

And last, the study explored the **Life competences** (LifeComp compliant) needs per job role and type of professional.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Personal competences (e.g. self-regulation, adaptability, well-being)	38.3 %	36.6 %	37.9 %	51.6 %	36.6 %
Social competences (e.g. Empathy, Communication, Collaboration)	40.3 %	38.3 %	38.7 %	53.7 %	38.7 %
Learning to learn competences (e.g. Growth mindset, Critical thinking, Managing learning)	47.6 %	44.3 %	47.7 %	66.3 %	45.7 %

Table 30: Entrepreneurship competence needs per job role profile

In Table 30 we see that all the different job role profiles have increased needs in respect to the life competences, with the highest observed in the Smart lighting system specialists; In terms of groups of competences, those folding under *Learning to learn* are ranked higher than the others.

¹⁸ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

Concerning the different types of professionals, the results are as follows:

	Managers	R&D Engineers / Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Personal competences (e.g. self-regulation, adaptability, well-being)	18.9 %	38.8 %	44.4 %	37.2 %	39.3 %	29.2 %
Social competences (e.g. Empathy, Communication, Collaboration)	19.4 %	39.6 %	45.6 %	37.7 %	40.1 %	28.8 %
Learning to learn competences (e.g. Growth mindset, Critical thinking, Managing learning)	24.8 %	47.6 %	55.2 %	46.9 %	48.8 %	34.8 %

Table 31: Entrepreneurship competence needs per type of professional

In Table 31¹⁹ we see the results of the life competence needs per type of professional. Again, here R&D engineers / scientists, Lighting professionals (with engineering or artistic background) and Lighting technicians, installers and associate professionals seem to have the greater needs. The highest among them are presented under the Lighting professionals with engineering background.

Overall in all competences, we see that the highest competence needs appear for Smart Lighting System specialists, and for R&D engineers / scientists, Lighting professionals (with engineering or artistic background) and Lighting technicians, installers and associate professionals.

¹⁹ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

3.2 The ECOSLIGHT interviews

Further to the quantitative survey, the ECOSLIGHT Partners conducted Interviews with representatives of the key stakeholders, i.e. Municipalities, Local collectivities, City Councils, Policy making bodies, Government organizations, Social partners, NGOs, International organizations, Associations, and Companies, or even with individual professionals on the sector of lighting design, aiming to identify (a) the key characteristics of lighting professionals, (b) the demand for job role profiles in the sector, and (c) the skills, training and qualifications required for those professionals.

Totally, the ECOSLIGHT project partners conducted 40 interviews with key stakeholders in France (8), Germany (10), Greece (10) and Italy (12), during the spring of 2021. Most of the interviews were conducted online due to the pandemic. The detailed results are presented in *R2.1 Mapping the skills supply and demand of the lighting-related construction sector*.

Concerning the **key characteristics of the lighting professionals**, the interviews underlined that the contemporary lighting professionals must have extensive knowledge and understanding of the market and the customers' needs. They must also have knowledge of software tools, the technical requirements of lighting, the environmental aspects, and the aesthetics. Over and above, the lighting professionals' tasks agenda is expanding to multiple domains creating particular demands from them. Some additional elements that originate from the findings of the ECOSLIGHT Interviews are the following:

- A lighting professional should be acquainted with all aspects of lighting and should cover different areas of expertise.
- A lighting professional knows the dynamics of the light and uses them to the different needs of the users.
- A lighting professional shall know the effects of light in various environments.
- A lighting professional shall have solid theoretical background.
- A lighting professional shall have high aesthetic criteria.
- A lighting professional shall have the capacity to assimilate new technologies.
- A lighting professional shall have environmental awareness.

In general, **the tasks and missions a lighting professional should be able to accomplish** vary a lot, as there are many emerging roles of lighting professionals, depending on the area / level they provide their services. Among the most crucial is their role in the identification of the needs of the customer, taking into account the lighting regulations, the environment, the needs and the characteristics of the people and the ambience. Overall, lighting professionals should be able to provide / support the provision of optimal and professional lighting solutions, effectively and efficiently, respecting regulations, budgeting and the maximizing energy efficiency.

The **market demands for lighting professionals** that are able to collaborate with other professionals (outside from the sector), knowledgeable on standards and regulations, and engaged to the projects early enough so as to advice customers on the available products and solutions. A mix of skills is required. Professionals should have digital and green skills, aesthetics and environmental awareness.

Concerning the **job role profiles**, the interviews underlined the need mainly for *Smart Lighting system Specialists, Light Pollution & environmental impact of Lighting Specialists*, confirming the results – even partially – of the quantitative survey.

The typical lighting professional has a **university degree (EQF 6)** in a relevant field (e.g. engineering, architecture), plus some **specialization through training and / or practical experience**. Overall, the professionals, and the respective **training**, should orient to (a) higher level professionals (e.g. managers) and (b) technicians. Skills related to digital and green technologies, lighting skills, human aspects of lighting and on standards and regulations is required. Eventually, all these trainings must be accompanied with certification. The required **qualifications** for lighting professionals required typically vary from EQF 4 to EQF 7, in various domains related to lighting. Further (specialization) training is also required. In all cases, practical experience is essential. As the quantitative survey underlined, again here the need for training adapted to the level of the professionals, related to their interest, was identified.

Concerning the need for **digital skills and competences**, all countries recognized it for both, accompanying it with the knowledge of lighting related software. The need for **horizontal skills** for lighting professionals was also identified in all project countries, including mainly lighting related (technical) skills, commercial skills, audience and community analysis and development, communication and collaboration. Concerning the last two, it is necessary to present effective communication and teamwork skills as they constitute an integral part of a team consisting of different specialists, from architects to interior designers and engineers. Lastly, professional lighting designers bring solid technical acumen and sensitive design technique to architectural and landscape projects by applying energy - efficiency trends and sustainability ideas.

Overall, the results of the interviews confirm the results of the quantitative survey, providing rich insights in particular topics.

4 The ECOSLIGHT emerging Job Role Profiles

In principle, a complete job profile should include the minimum qualifications that candidates need to possess. It must use action words to describe what the position is expected to deliver and to whom it's accountable. At the very least, job profile should describe the educational background, skills and abilities required for the job. They may also include a list of behavioural competencies that the applicant needs to be successful, such as business acumen, integrity, empathy and attention to detail. This document may provide also a summary of the working conditions, department or function and level of responsibility, as well as and pay rates. Of course, as ECOSLIGHT is not an organisation looking for future employees and the last-listed information is strongly dependant on companies and countries, therefore we shall not include that to the ECOSLIGHT “ideal” job profiles.

As described in the previous chapters, in the next five years there will be a need for particular types of professionals and job role profiles; while the latter are not established officially, and correspond more to roles (groups of tasks) operated in the sector, the former are – at least in a degree – related to the ESCO. Of course, one person may implement more than one of these roles in a company.

In respect to the type of professionals currently demanded in the sector, it was defined that in the next five years (Table 5) there will be an increased demand for Lighting professionals (Engineering background) (54.4 %), Lighting technicians, installers and associate professionals (46.2%), Lighting designers (Artistic background) (42.2 %) and R&D engineers / scientists (MSC-level and above) (41.5 %). Apart from the technicians that correspond to EQF 5-6, the rest fold mainly under EQF 6 - 7. The demand for Technical-commercial staff will be decreased (30.7 %) and for Managers quite decreased (19.9 %).

The qualitative survey indicated that the education level of the current professionals folds mainly under EQF 6 (university degree in a relevant field) and above, plus some specialization through training or practical experience. The interviews also underlined that the required qualifications for lighting professionals typically vary from EQF 4 to EQF 7, in various domains related to lighting. Further (specialization) training is also required, with practical experience being essential. **In this regard, and given the serious automation of the sector, ECOSLIGHT will try to support the demand for lighting professionals providing training in the EQF 5 level, accompanied with specialization and work-based learning. This approach totally fits to the demands of the sector, as it is identified through the quantitative and the qualitative survey.**

Concerning the job role profiles (i.e. groups of tasks) (Table 8), there will be a high demand for Smart lighting system specialists (92.7 %), followed by the need for Lighting designers (86.9 %), Road lighting safety and lighting security specialists (86.5 %), and Light pollution and environmental impact of lighting specialists (83.8 %). The need for Human-centric lighting specialists is decreased (76.5 %), therefore this group of tasks could be merged with another profile, e.g. the Smart lighting system specialist.

A cross-tabulation between the types of professionals and the job role profiles (groups of tasks) was also conducted.

	Managers	R&D Engineers /Scientists	Lighting Professionals (engineering background)	Lighting Designers (artistic background)	Lighting Technicians, Installers and Associate Professionals	Technical-Commercial Staff
Light pollution and environmental impact of lighting specialists	21.4 %	42.7 %	48.0 %	39.7 %	43.0 %	28.8 %
Human-centric lighting specialists	13.6 %	36.6 %	41.1 %	36.0 %	36.4 %	25.8 %
Road lighting safety and lighting security specialists	21.8 %	42.3 %	49.6 %	39.7 %	45.0 %	30.5 %
Smart lighting system specialists	26.7 %	54.2 %	64.9 %	53.1 %	58.3 %	40.3 %
Lighting designers	20.9 %	37.9 %	44.8 %	45.6 %	39.7 %	30.9 %

Table 32: Relation between types of professionals and job role profiles

Additional cross-tabulations were conducted between the job role profiles (groups of tasks) and lighting sub-sectors²⁰.

	Light pollution and environmental impact of lighting specialists	Human-centric lighting specialists	Road lighting safety and Lighting security specialists	Smart lighting system specialists	Lighting designers
Lighting system manufacturing	37.4 %	27.5 %	26.9 %	40.6 %	21.9 %
Lighting installations	28.4 %	21.6 %	35.4 %	45.3 %	22.8 %
Lighting operation and maintenance	21.9 %	19.3 %	37.1 %	43.6 %	14.3 %
Policy and regulatory framework design	42.7 %	31.3 %	29.2 %	20.5 %	22.8 %
Consultancy, lighting studies, etc.	38.3 %	36.3 %	27.5 %	38.0 %	40.6 %

Table 33: Relation between Lighting sub-sectors and job role profiles

In this regard, the ECOSLIGHT project will try to merge the above mentioned findings, identifying the “ideal” job role profiles for the lighting sector, and will select some of them to establish the respective VET curricula and provide training and work-based learning.

Based on the results of the quantitative survey and the interviews, as well as the currently demanded roles as they are identified in the respective templates in the Annex II, the ECOSLIGHT project identified the following “ideal” job role profiles.

²⁰ With cyan we have marked percentages > 50.0 %, with purple percentages between 40.0 and 50.0 %, with dark orange percentages between 30.0 and 40.0 %, with light orange percentages between 25.0 and 30.0 %, with blue percentages between 20.0 and 25.0 %, and with light green percentages between 15.0 and 20.0 %.

4.1 Mapping to frameworks

The construction sector encompasses a variety of occupations, some of which may seem irrelevant to the purposes of the ECOSLIGHT project, which focuses primarily on lighting professionals. These occupations involve tasks and duties undertaken:

- Lighting systems manufacturing
- Lighting installations
- Lighting operations and maintenance
- Policy and regulation framework design
- Consultancy, lighting studies, etc.

So when it comes to economic sectors (described by NACE classification), lighting employment relates to activities such as:

- C27.4 - Manufacture of electric lighting equipment
- F41 - Construction of buildings
- F41.1 - Development of building projects
- F42.1 - Construction of roads and railways
- F43.2 - Electrical, plumbing and other construction installation activities
- G46.4.7 - Wholesale of furniture, carpets and lighting equipment
- G47.5.9 - Retail sale of furniture, lighting equipment and other household articles in specialised stores
- M71.1 - Architectural and engineering activities and related technical consultancy

In terms of the mapping exercise for the following job profiles, it can be said that an EQF level 4 degree is the minimum entry level qualification for the majority of lighting professions, but an EQF level 5 is preferable (described also in terms of learning outcomes). Currently, the ECOSLIGHT research has identified that the majority of professional working in the lighting sector have an EQF level 6 degree, and some at level 5. The levels in all four countries, as identified by the ECOSLIGHT interviews, coincide with EQF leveling and the level descriptors are almost similar to the ones used in the EQF framework.

The diversity of the lighting sector, as presented above, makes the mapping exercise to other European tools (especially ESCO) a very challenging attempt. It is therefore crucial here to try to identify the problems and limitations and also to present future challenges.

Several issues should be taken under consideration. The need to develop lighting statistics is profound, as there are not available studies; the ECOSLIGHT survey is among the pioneers. As identified in the survey, the lighting sector is related to various economic activities and diversified occupations, not only in terms of their “thematic” conception but also in terms of classifying an occupation to the construction sector per se. An argument in favor of this point could be the example of a manager; it can be argued that his duties and activities have to do with management of lighting projects. Another problem is the constant evolution of the lighting field, evolution showcased somewhat by the identification of the emerging job role profiles (groups of tasks), which were presented earlier. Last but not least, the diversity of occupational structures amongst countries and/or classification systems/taxonomies and the “depth” of analysis between countries

poses another challenge. However, it is not the purpose of this chapter to deeply analyse all limitations, problems, challenges of the mapping exercise to ESCO (but also to other classifications as ESCO has a basis in ISCO that cannot be considered a EU classification) but rather to point out methodological issues underpinning the ECOSLIGHT project and “fulfil” in a way an “ambitious” agenda of the project, in terms of the potential benefits for the end users of this project.

In order to proceed to the mapping exercise to ESCO it's essential a) to explain briefly the pillars of this tool and point out where applicable its relationship with other classifications, the most important one being ISCO-08; b) to point out similarities or differences in terminology, pillars used by ESCO/ ECOSLIGHT and try to reach a common usage of terms.

ESCO comprises of three pillars:

- **The Occupations pillar:** It draws on the ISCO-08 work, namely including the classification and coding of major, sub-major, minor and unit groups, but takes this work further by assigning its occupations to an ISCO unit group²¹. Each occupation relates to an occupational profile.

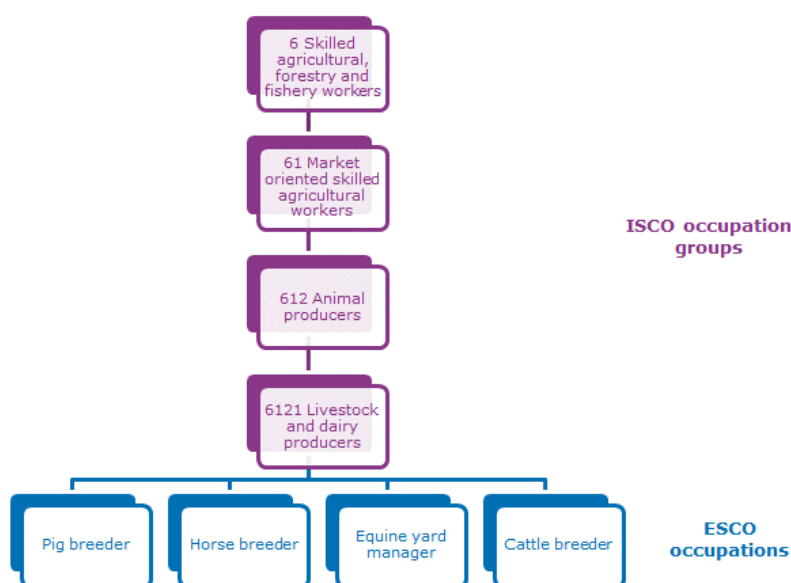


Figure 26: Relation of ISCO occupation groups and ESCO occupations

- **The knowledge, skills and competences pillar:** The knowledge, skills and competences pillar, also referred to as the “skills pillar”, provides a comprehensive list of skills that are relevant for the European labour market. ESCO v1 contains 13 485 skills / competences.

²¹ In order to avoid confusion it is important to provide the definitions of occupation and jobs, and also explain how the ISCO grouping corresponds not only to ESCO occupations but also to other similar terms. Occupation: a ‘set of jobs whose main tasks and duties are characterised by a high degree of similarity’ Sometimes the term profession is also used

Job: a ‘set of tasks and duties carried out, or meant to be carried out, by one person for a particular employer, including self-employment’. Sometimes the term Occupational Unit may also be used.

The current document contains the terminology used widely in the ESCO knowledge, skills and competences pillar and the templates draw to a great extent from ESCO and Cedefop's proposed dimensions (with minor different usage). It is important though to point out that the DigComp and e-CF frameworks are also taken into account (extremely thorough approach), the EntreComp and LifeComp, as well groups of lighting and green competences originating from various frameworks and the state of the art, which also play a vital role in the job profiles descriptions. It is anticipated that the future planning will take this common approach to a step further.

- **Qualifications pillar:** The qualifications pillar aims to collect existing information on qualifications. The final objective of the pillar is to provide a comprehensive list of qualifications relevant for the European labor market. The ECOSLIGHT project has also mapped training provisions and qualifications from the partner countries in order to ensure that the proposed job role profiles (and the future steps regarding the training) are taken into account.

One can safely **conclude** that methodological tools, surveys and guidelines relevant to overarching European tools for VET were considered for this study. As far as it concerns the mapping exercise (particularly for ESCO), the ECOSLIGHT consortium would roughly propose the creation of new unit groups as follows.

- Lighting engineers
- Lighting designers
- Lighting technicians

Further development of ESCO and full mapping of the sector by national authorities, through a close cooperation of relevant working cross-sectoral groups are strongly recommended not only for preventing delays in the evolution of lighting professions but also for reliable data collection, training provision and enhanced mobility for the entire lighting or even the construction economic and occupational sector.

This mapping exercise therefore attempts to “merge” major, sub-major, minor and unit groups (where applicable of course) in order to produce the proposed job profiles mentioned above.

Another clarification deemed necessary is that the term occupation means a group of jobs, a clarification that is important also in terms of the mapping exercise attempted here. Mapping should not be identified with referencing by all means, as referencing is a completely different procedure, however the job profiles identified as emerging focus on individual jobs.

A review of the occupations currently available at the ESCO revealed the following directly related occupations (in parentheses the ESCO or ISCO-08 code):

- Lighting director (2166.4.4)
- Lighting technician (3435.12)
- Ground lighting officer (7412.4)
- Electromechanical engineer (2151.1.3)
- Electrical engineer (2151.1)
- Photonics engineer (2149.10.1)
- Design engineer (2149.2.4)
- Street lighting electrician (7413.1.3)

- Intelligent lighting engineer (3435.12.1)
- Lighting designer (3435.11)
- Landscape architect (2162)
- Theatre technician (3435.23)
- Technical director (2166.4.7)
- Interior designer (3432.1)
- Information and communication technology professionals (25)
- ICT consultant (2511.9)
- ICT technician (3512.4)

Additionally, a review of the ISCO-08 database revealed the following:

- Electrician, neon-lighting (7411)
- Technician, lighting (3435)
- Designer, scenery (3432)

Therefore, before establishing a new / emerging job role profile, these occupations should be taken into account.

4.2 Lighting Designer

Lighting Designers²² design and plan lighting and electrical systems. They work in collaboration with a variety of professionals, including interior designers, engineers and architects. The lighting design can be for residential, commercial or industrial spaces. The application of the discipline may be part art, part science, but industry advocates regard the field as all art.

The International Association of Lighting Designers (IALD s.d.) sets the tone by offering a description not of “light” but of “illumination” as follows “Illumination is the ephemeral partner of architecture. Light is invisible until it strikes an object or surface. And it is controlling this difficult, transitory medium that gives the lighting 'artist' the ability to create hierarchies, dynamics and mood.”

A Lighting Designer usually works under limited supervision, but as a member of a collaborative team. They usually work for lighting companies, architecture or interior design firms and service clients, but sometimes they work for a large venue and are in charge of designing lighting for the venue’s events.

In order to design the lighting in a given space, a Lighting Designer performs many different tasks:

- Design all lighting projects with help of specialized computer software.
- Coordinate with customers for all development processes for various commercial accounts and manage all communication with vendors to facilitate appropriate pricing for all design applications.
- Assist Outside sales team to design all material quotations for various projects.
- Collaborate with project coordinator to gather all pricing information and assist to make all calculations to save energy from various lighting arrangements.
- Design various lighting layouts and specifications for all lighting fixtures.
- Prepare and execute all calculations and design all lighting mock ups.
- Evaluate and implement all store lighting systems to ensure customer satisfaction.
- Analyse all requirements and assist to shift emphasis from one area to other if required.

From ECOSLIGHT Interviews we can list some characteristics of good Lighting Designer:

“A lighting designer must be passionate, live light as a life experience, because light is all that surrounds us, light is safety, light is life, so (s)he must live this experience with maximum enthusiasm, emotion”.

ECOSLIGHT quantitative survey shown also that beyond learning on the fundamentals of illumination for indoor lighting, a Lighting designer needs to be trained in Smart Lighting and Speciality Lighting. Moreover, the respondents to the interviews indicated that a Lighting Designer must recall and use (according to the Bloom’s taxonomy) the principles in the lighting domains presented in the following figure.

²² Here the definition of Lighting Designer excludes the Stage (theatre of cinema/TV) light designer or director

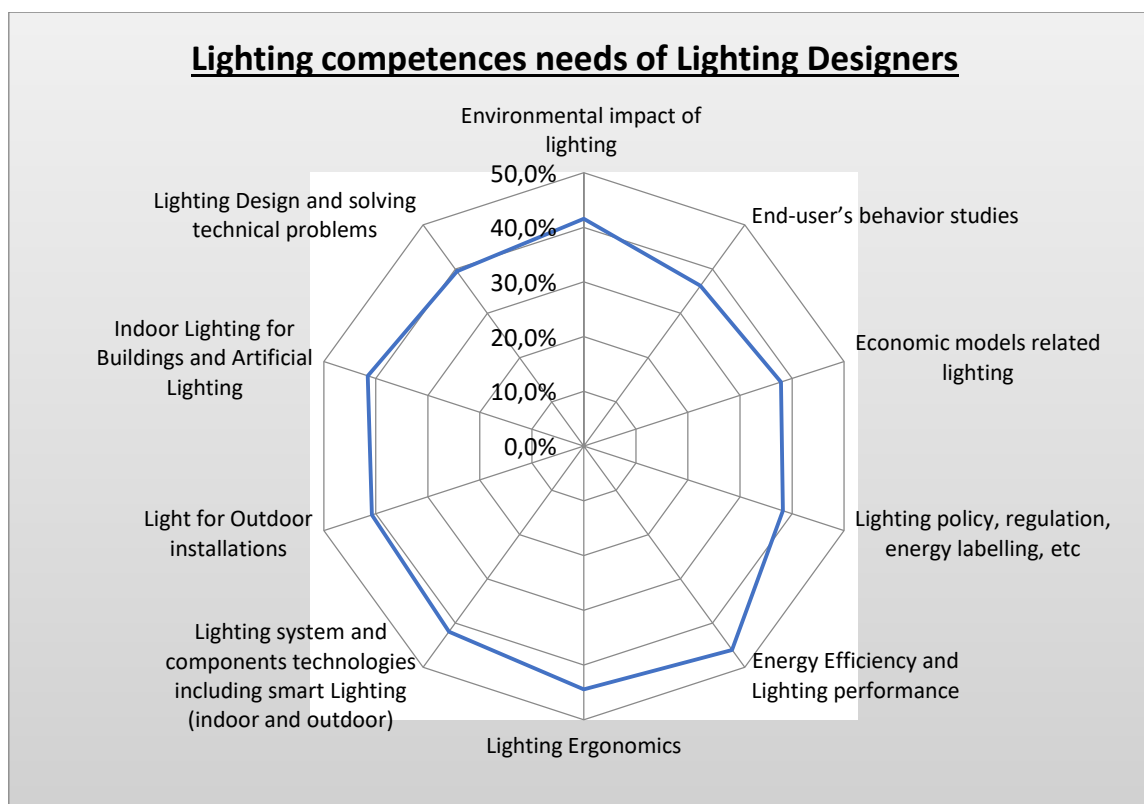


Figure 27: Lighting competence needs of Lighting Designers

The Lighting Designers have also particular needs for basic and advanced digital competences.

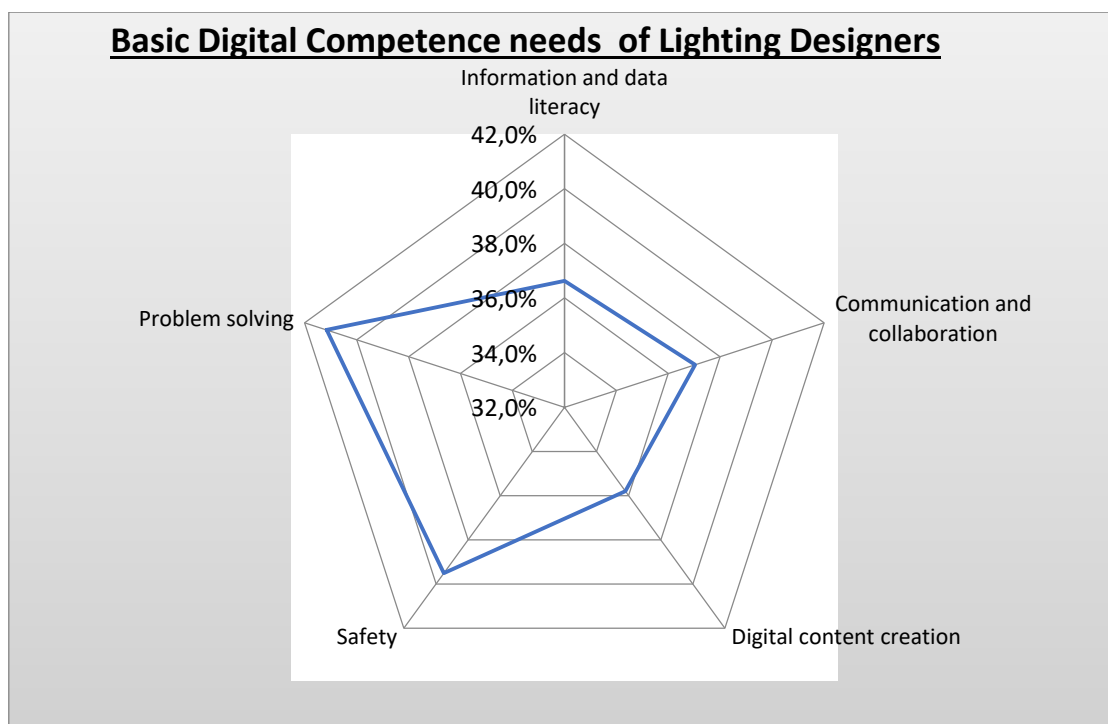


Figure 28: Areas of basic digital competences (DigComp) needs of Lighting Designers

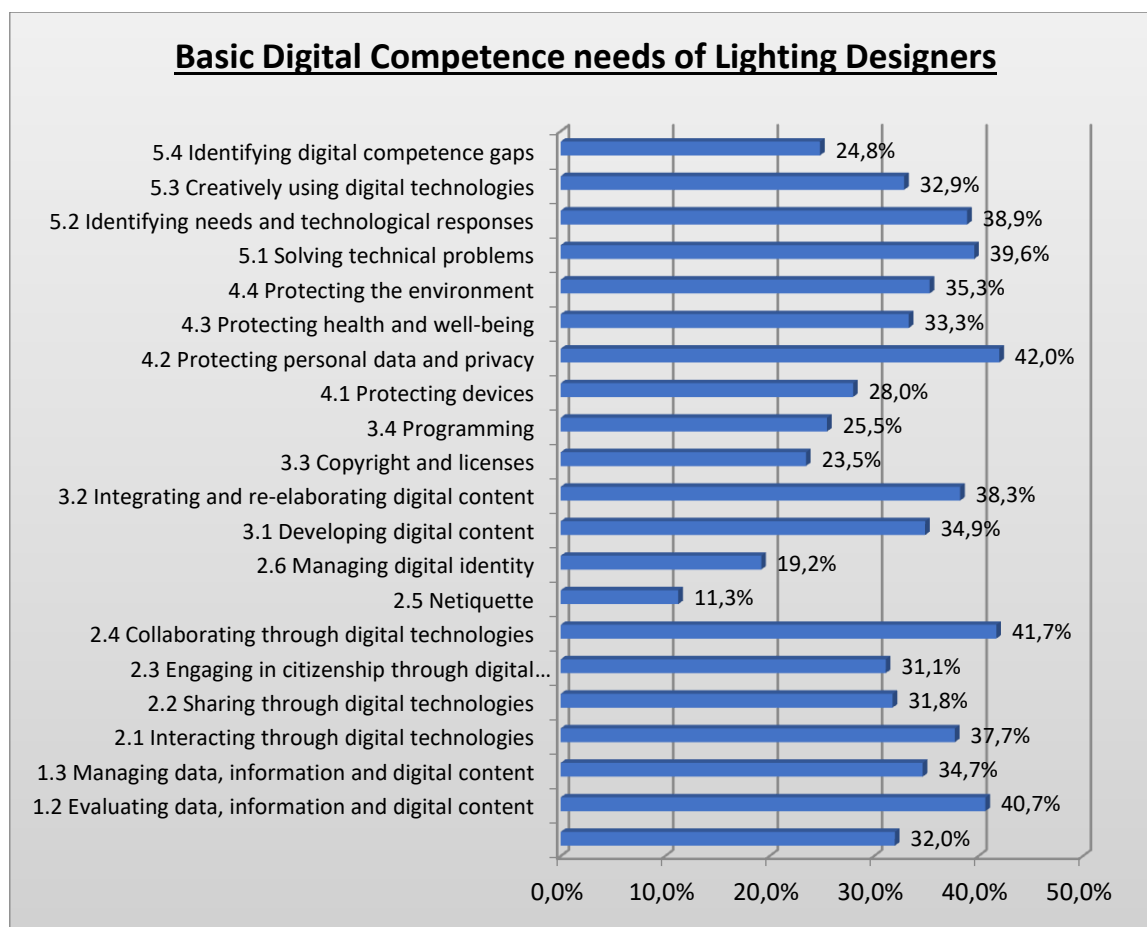


Figure 29: Basic digital competences (DigComp) needs of Lighting Designers

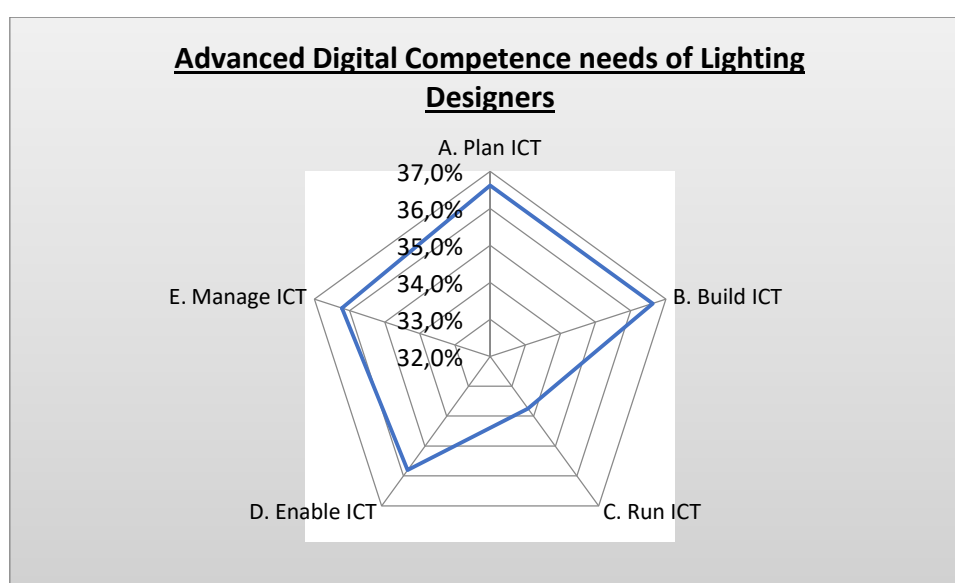


Figure 30: Areas of advanced digital competences (e-CF) needs of Lighting Designers

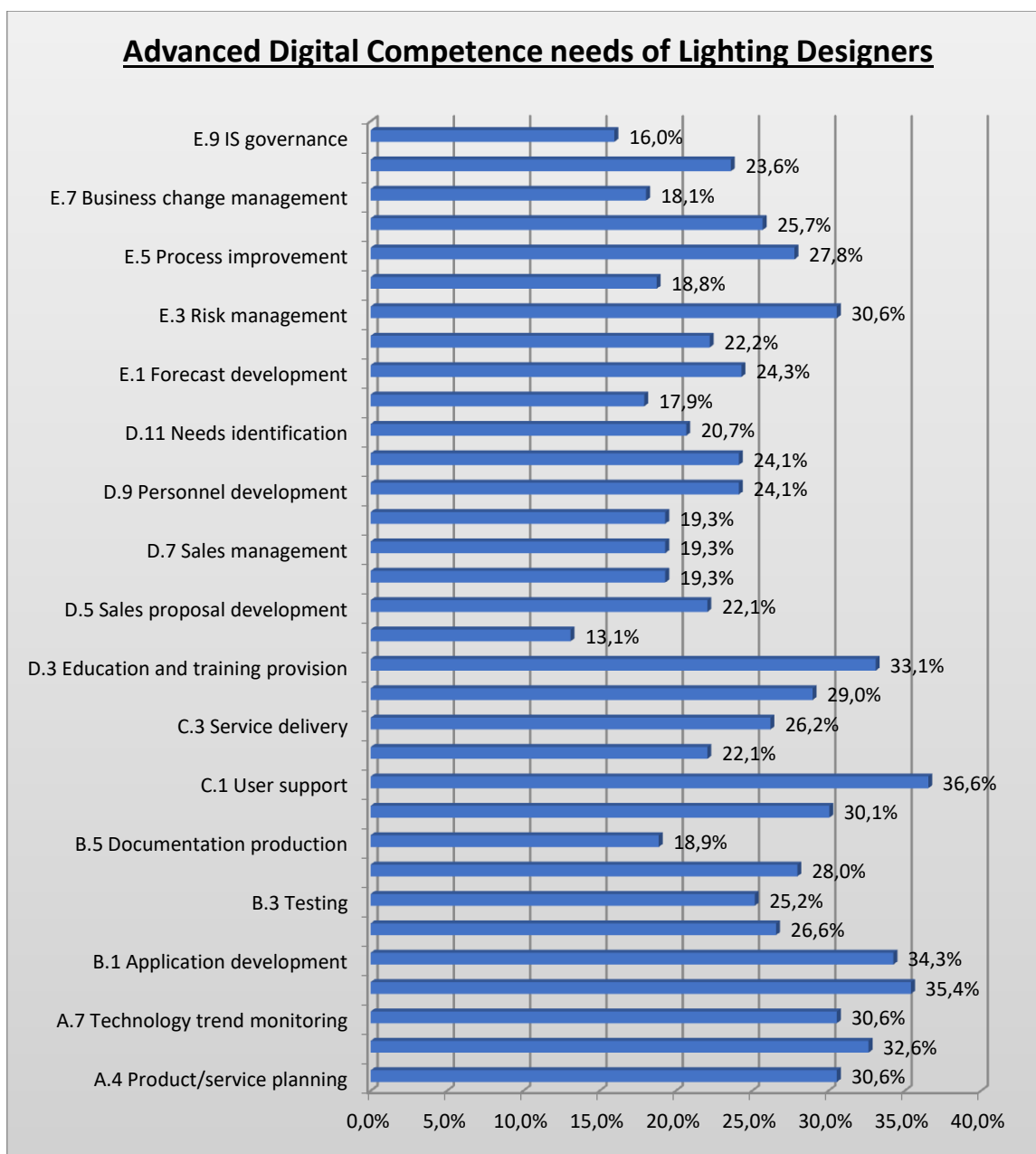


Figure 31: Advanced digital competences (e-CF) needs of Lighting Designers

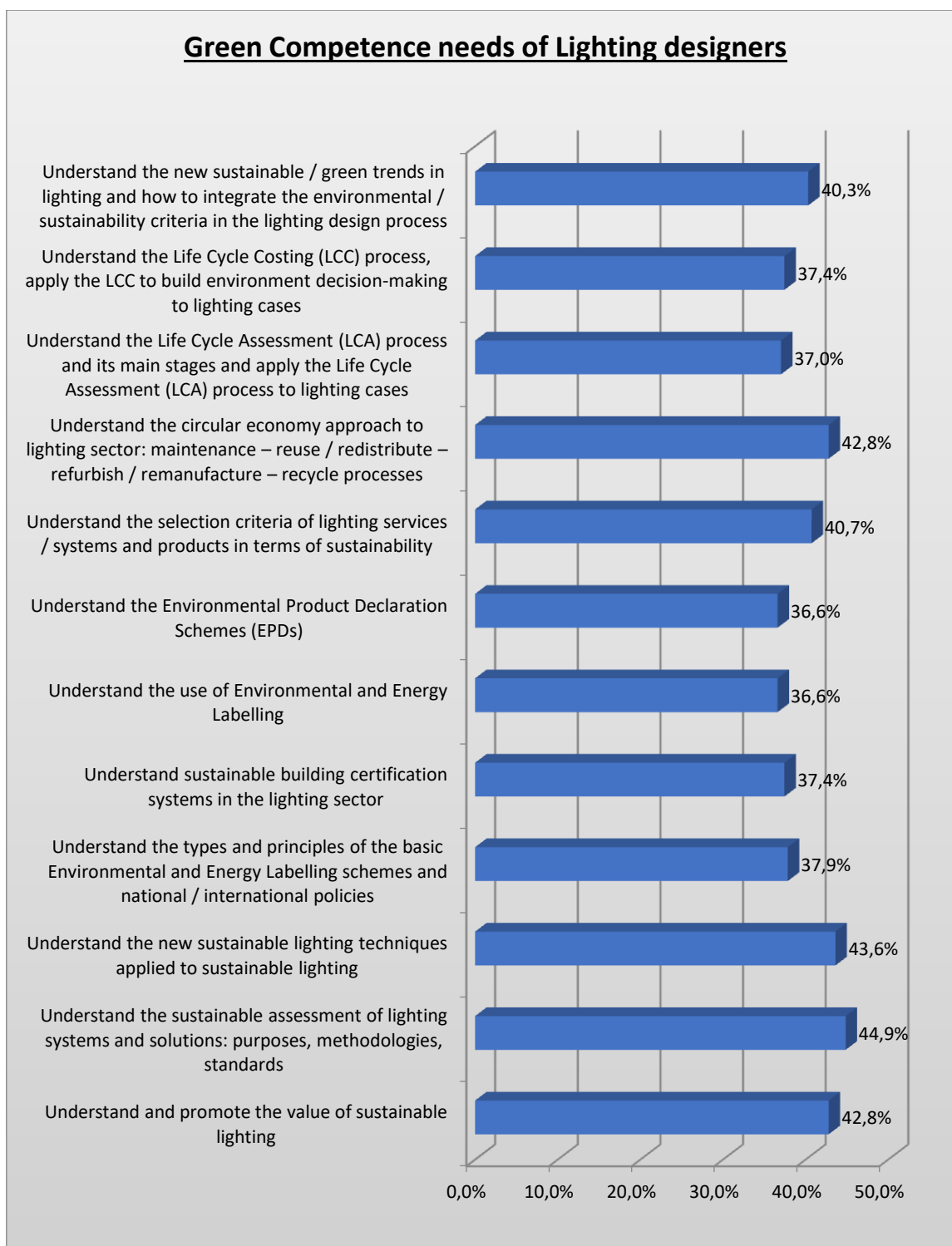


Figure 32: Green competence needs of Lighting Designers

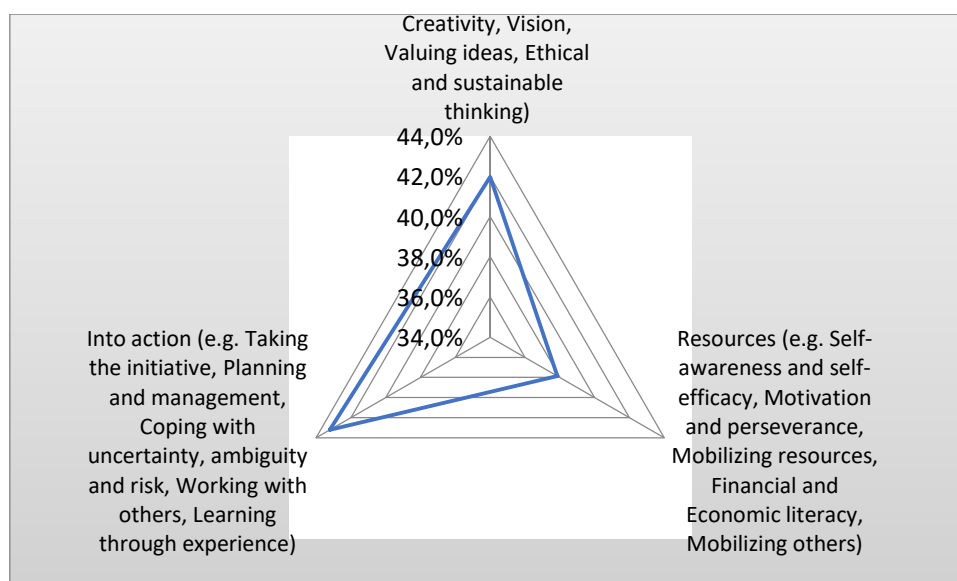


Figure 33: Entrepreneurship competence needs (EntreComp) of Lighting Designers

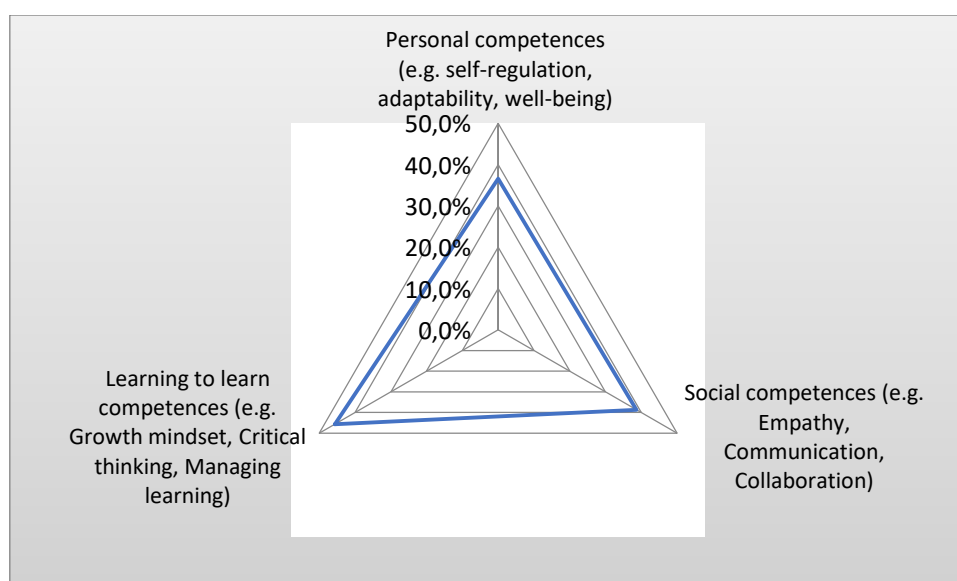


Figure 34: Life competence needs (LifeComp) of Lighting Designers

Overall, the Job Role profile of the Lighting Designers is as follows;

Job Role Profile main characteristics			
Job Title:	LIGHTING DESIGNER		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input checked="" type="checkbox"/> Lighting professionals (engineering background)	<input checked="" type="checkbox"/> Lighting designers (artistic background) <input type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff	
Related profiles / groups of tasks	<input type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists	<input type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input checked="" type="checkbox"/> Lighting designers	
ESCO related profiles	<input checked="" type="checkbox"/> Lighting director (2166.4.4) <input type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4)	<input checked="" type="checkbox"/> Lighting designer (3435.11) <input checked="" type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input checked="" type="checkbox"/> Interior designer (3432.1) <input type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input type="checkbox"/> ICT technician (3512.4)	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having an EQF 5 degree (at least), preferably a Bachelor's degree in a technical field, i.e. in Architecture, Interior Design, Electrical Engineering or related field and a Master's degree in Lighting • Possessing experience in lighting sector/electrical services • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the physiology and psychology of the human visual system • Understanding of energy efficient & sustainable lighting design • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in computer-aided design software, e.g. AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, Revit etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. • Knowledge of Adobe Creative Suite • Familiarity with customer relationship management software • Being proficient in Microsoft Office 		

	<ul style="list-style-type: none"> • Showing an understanding of lighting design • Proficiency in Adobe Creative Suite • Energy efficient design experience • Experience with CRM software
Technical/Preferred Skill Requirements:	
Lighting Competences/Knowledge	
[Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.3 Engaging in citizenship through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.7 Technology trend monitoring • A.9 Innovating • B.1 Application development • B.6 Systems engineering • C.1 User support • D.3 Education and training provision • E.3 Risk management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources 	

- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labelling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

Lighting Designers design and plan lighting and electrical systems. They work in collaboration with a variety of professionals, including interior designers, engineers and architects. The lighting design can be for residential, commercial or industrial spaces. The application of the discipline may be part art, part science, but industry advocates regard the field as all art.

A Lighting Designer usually works under limited supervision, but as a member of a collaborative team. They usually work for lighting companies, architecture or interior design firms and service clients, but sometimes they work for a large venue and are in charge of designing lighting for the venue's events.

Key Tasks and Responsibilities

- In order to design the lighting in a given space, a Lighting Designer performs many different tasks:
- Design all lighting projects with help of specialized computer software.

- Coordinate with customers for all development processes for various commercial accounts and manage all communication with vendors to facilitate appropriate pricing for all design applications.
- Assist Outside sales team to design all material quotations for various projects.
- Collaborate with project coordinator to gather all pricing information and assist to make all calculations to save energy from various lighting arrangements.
- Design various lighting layouts and specifications for all lighting fixtures.
- Prepare and execute all calculations and design all lighting mock ups.
- Evaluate and implement all store lighting systems to ensure customer satisfaction.
- Analyse all requirements and assist to shift emphasis from one area to other if required.

Collaboration with other professionals: A lighting designer must collaborate closely with other designers, engineers and members of the project team. He/She must also constantly confer with the Project Manager for the successful coordination of the project. He/She participates in the quality control review of fellow designers and engineers. He needs to maintain an active communication with lighting representatives so as to be constantly informed about existing and emerging lighting products, industry trends, etc.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of successfully completed lighting projects within a certain timeline
- Positive review of the projects by the Project Manager and the clients

Additional information

- Not regulated profession according to the Directive 2005/36/EC²³

²³ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.3 Lighting Systems Engineers and Assistant Engineers

A Lighting Systems Engineer works on the optimization of complex processes, systems, or organizations by developing, improving and implementing integrated systems of people, money, knowledge, information and equipment applied to Lighting Systems and its components. He / she contributes to the fast realization of prototypes as well as effective product development, by applying deep engineering knowledge of the most relevant coding platforms and standards, in combination with proven Agile collaboration methods and test-driven development.

The job of Lighting Systems Engineer is versatile and strongly depends on the company that will employ such professional. He / she can be found as:

- Assistant Research Engineer (EQF 5)
- Product Development Engineer (EQF 6 – or professional experience and Life-long training)
- Senior Research and Development Engineer (EQF6 and higher and professional experience)

In all the above cases, required skills and training level (from Master degree and above) are similar, but the main difference is the required relevant experience that could from 3 years for a Product Development Engineer to up 10+ for a Senior System Engineer.

A Lighting Systems Engineer should demonstrate a system approach to design and development with the desire and curiosity to strive for continuous improvement. He/she needs a deep understanding of the first principles/engineering fundamentals that drive the requirements of lighting systems. Additionally to these expectations, a detailed understanding of the manufacturing, materials and processes utilized to produce your components as well as commercial and financial awareness

The main tasks that a Systems Engineer deals with are:

- Developing and testing lighting components and modules for any kind of lighting
- Developing new product concepts / improve existing test procedures
- Developing dedicated testing setups
- Supporting the Development of functional requirements and specifications
- Preparing prototypes of the new product concepts
- Preparing reports with test summary analyses
- Leading projects to release to production new/changed products, components and processes.
- Keeping abreast of technical developments in own field through literature, technical contacts, and industry competition analyses
- Working closely with support functions such as studio and supply chain
- Working within a matrix organization whilst delivering towards project-based goals set by the program management team

Very often, companies are looking for forward-thinking innovators with a passion for sustainability. The candidates must demonstrate eagerness to work cross-functionally in a dynamic environment as part of a team – working outside commodity and sharing models as required to support the changing needs of an evolving environment.

Delving into the quantitative study, as well as the role – as mentioned earlier – of the Lighting Systems Engineer and Associate Engineer, we can assume their relations respectively to R & D Engineers / Scientists and the Lighting Technicians, Installers and Associate Professionals. Therefore, the skills' needs of these two professionals are as follows:

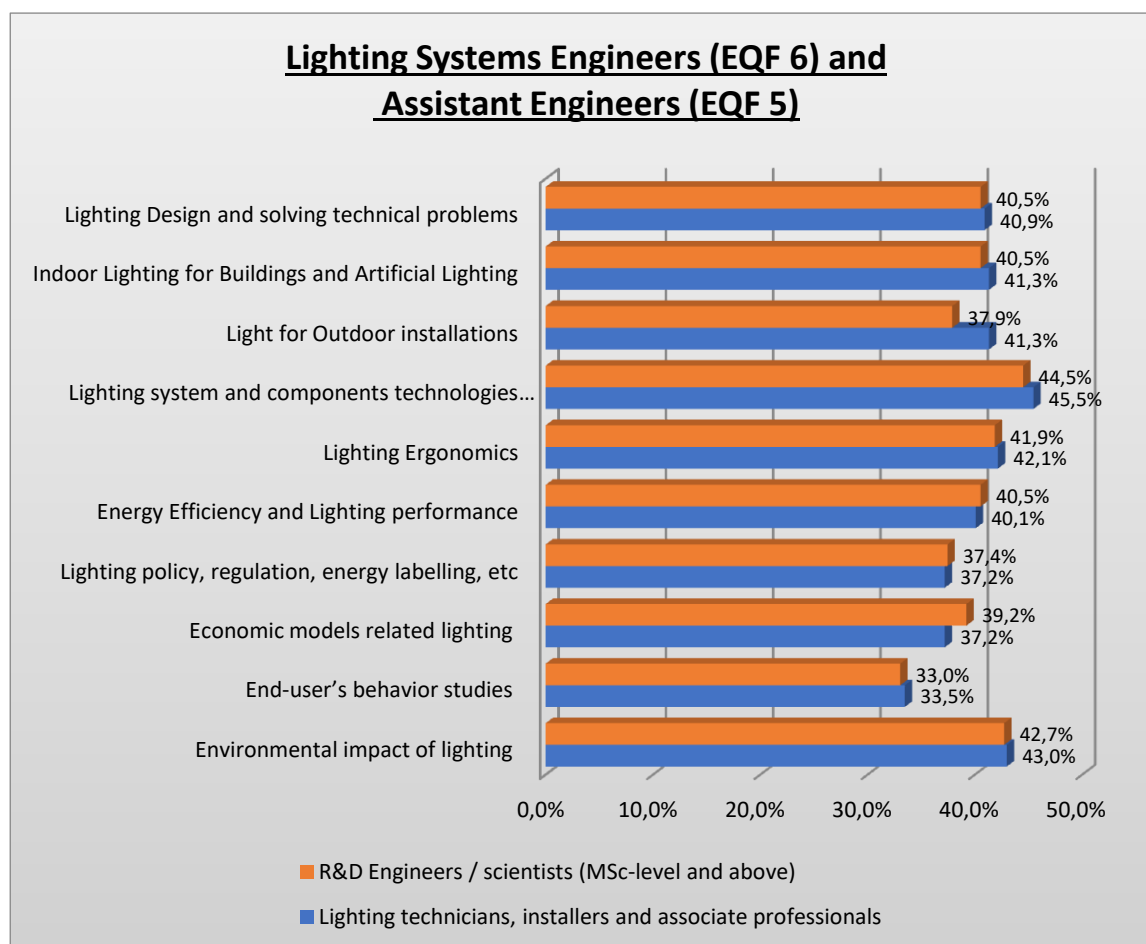


Figure 35: Lighting competence needs of Lighting Systems Engineers and Assistant Engineers

Concerning their basic and advanced digital competence needs, their green competence needs, and their entrepreneurship and life competence needs, the results are as follows.

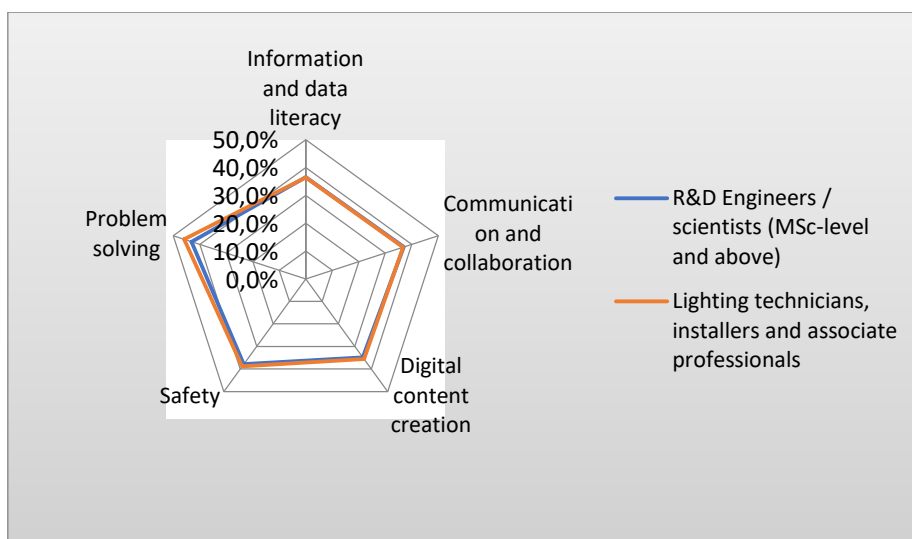


Figure 36: Areas of basic digital competence needs (DigComp) for Lighting Systems Engineers and Assistant Engineers

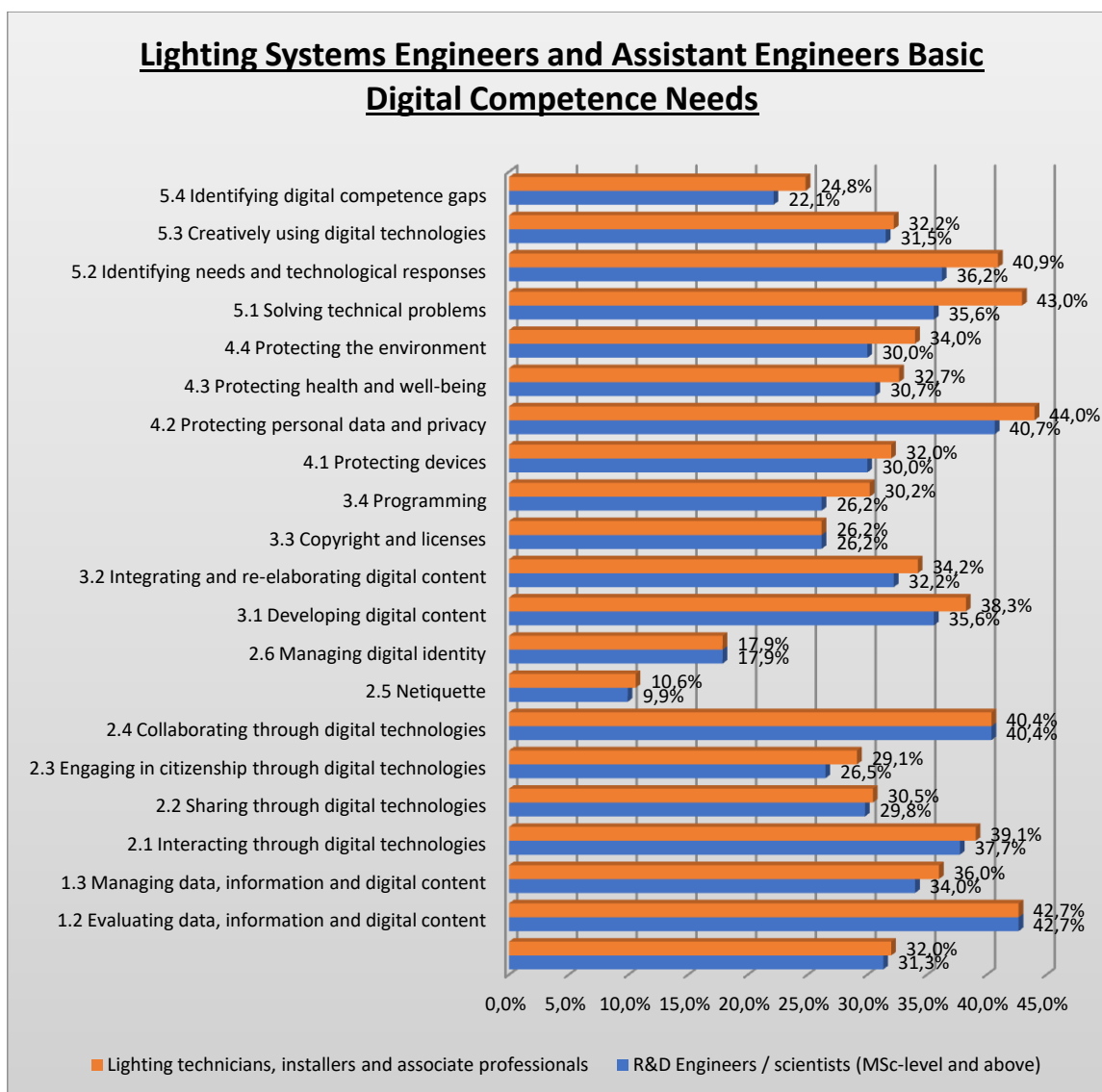


Figure 37: Basic Digital Competence needs (DigComp) for Lighting Systems Engineers and Assistant Engineers

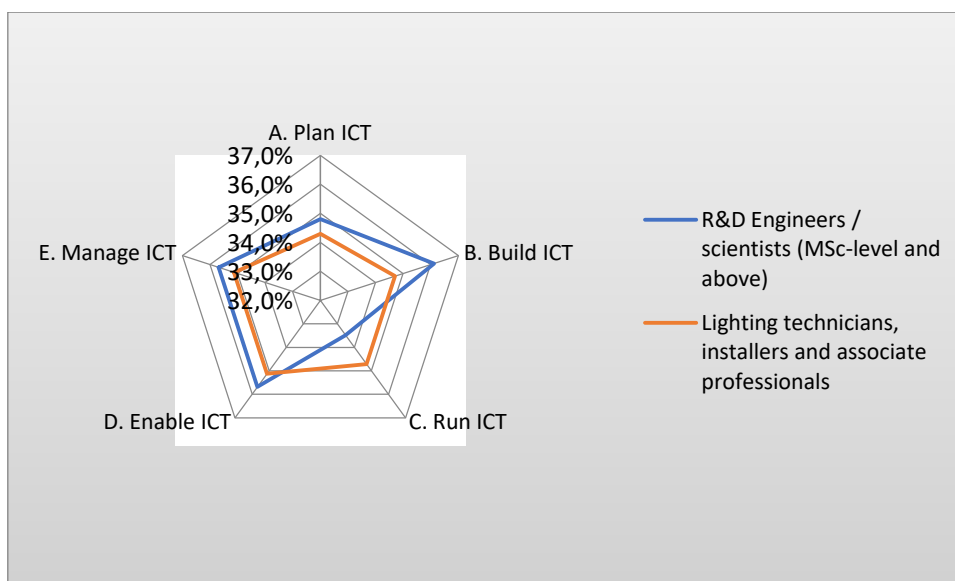


Figure 38: Areas of advanced digital competence needs (e-CF) for Lighting Systems Engineers and Assistant Engineers

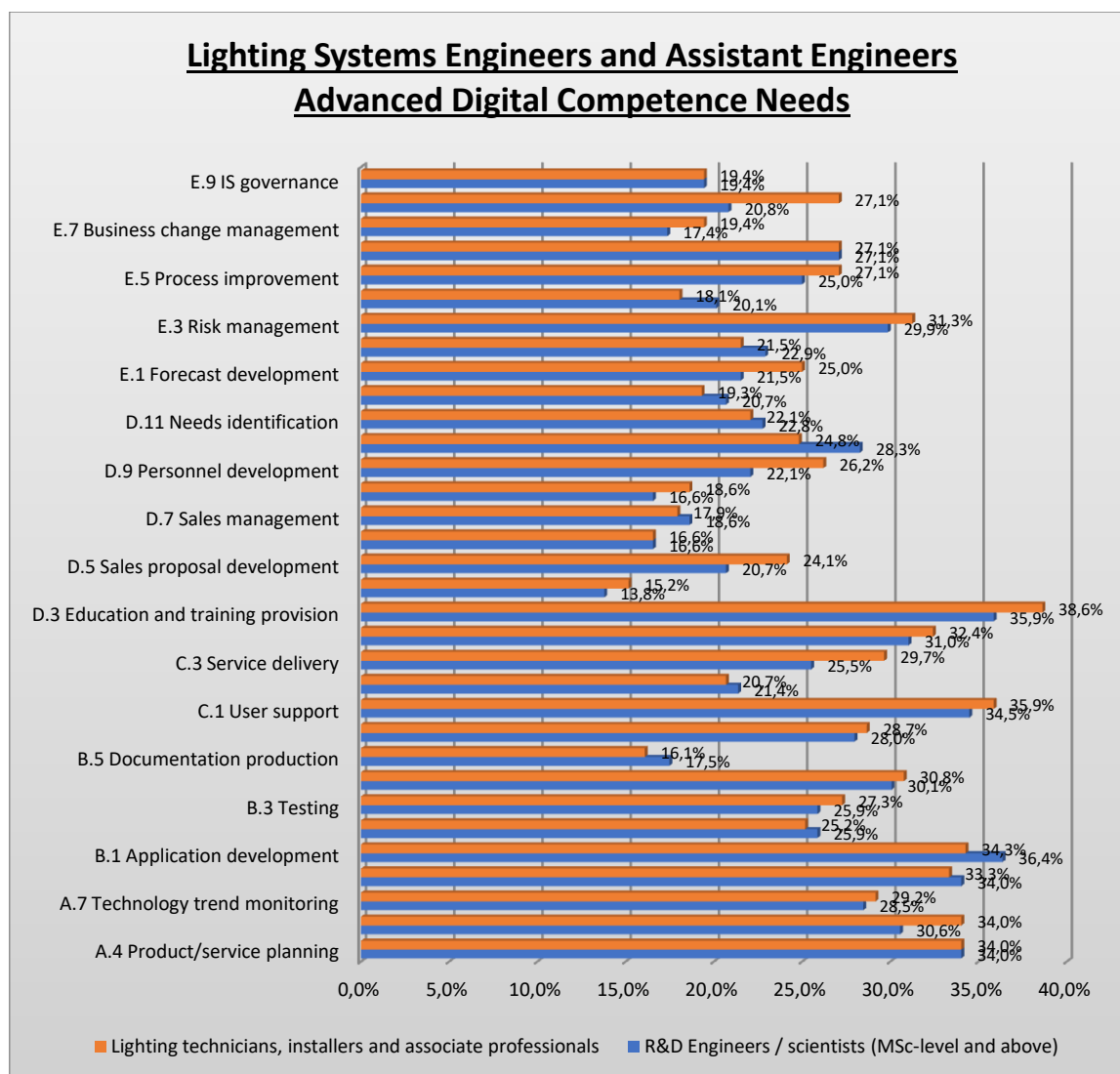


Figure 39: Advanced digital competences (e-CF) for Lighting Systems Engineers and Assistant Engineers

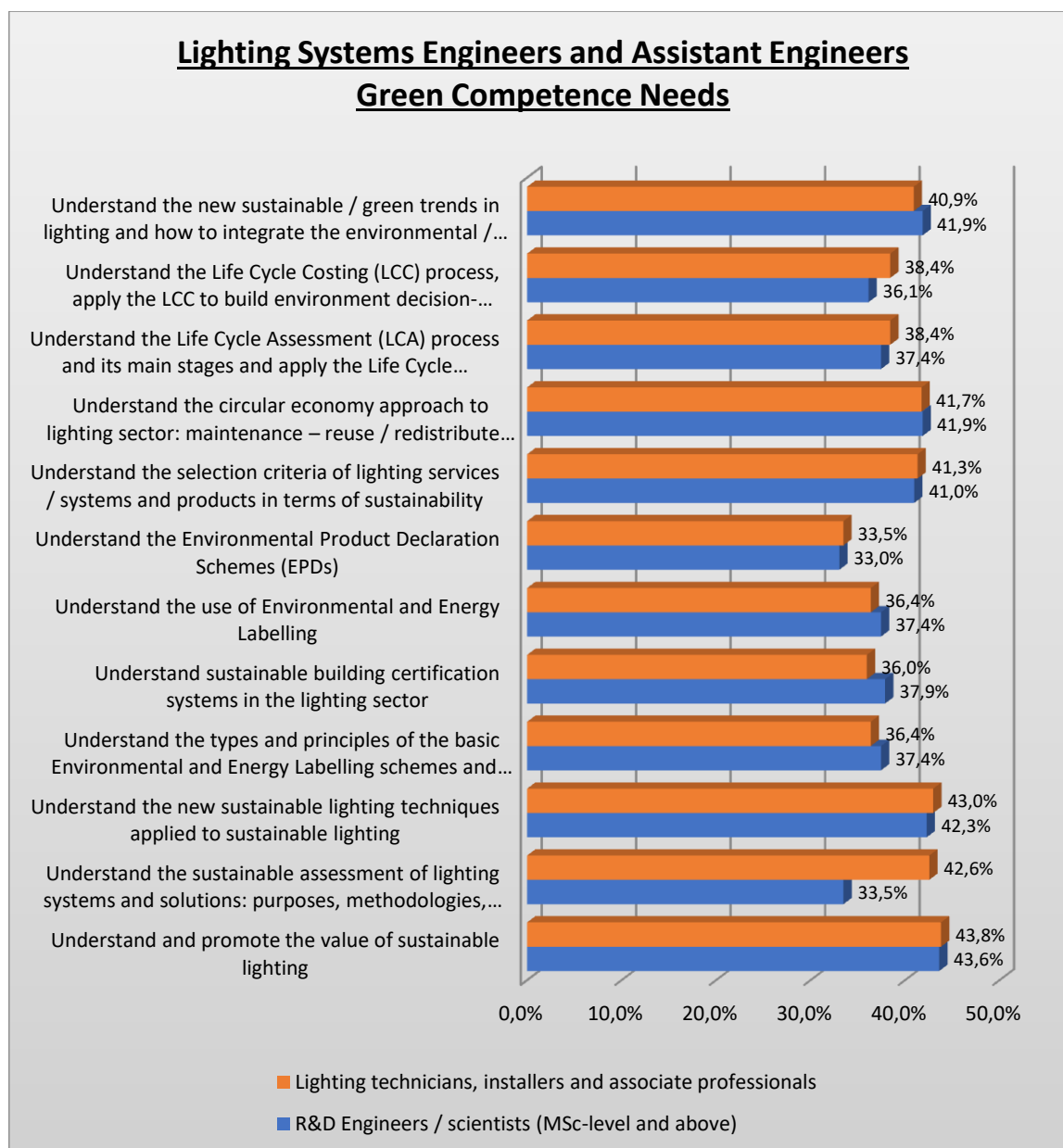


Figure 40: Green competence needs of Lighting Systems Engineers and Assistant Engineers

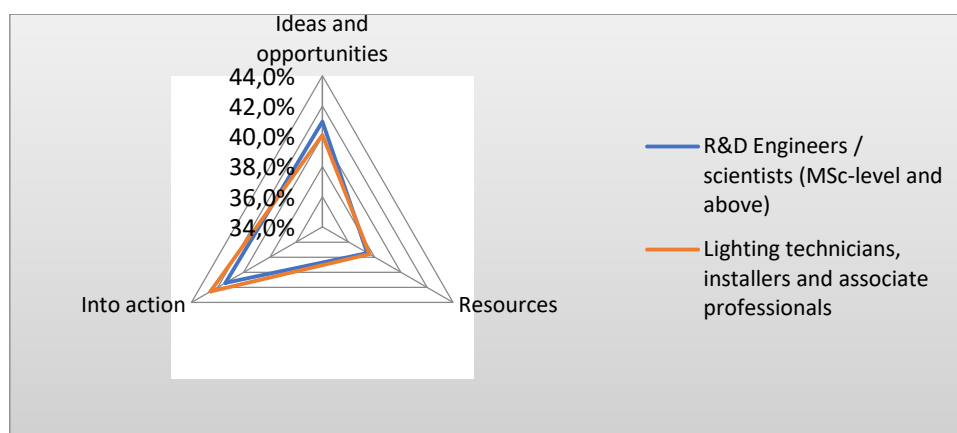


Figure 41: Entrepreneurship competence needs (EntreComp) of Lighting Systems Engineers and Assistant Engineers

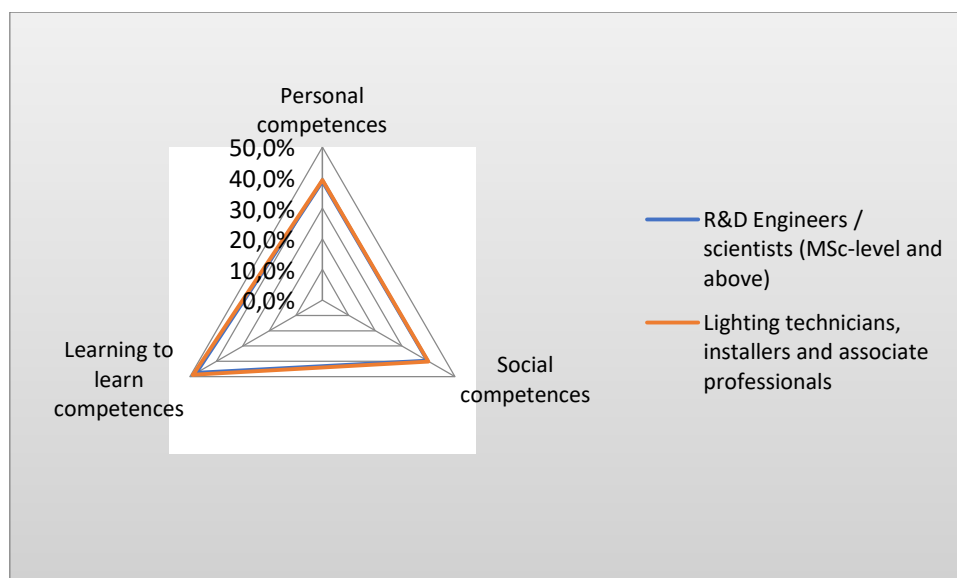


Figure 42: Life competence needs (LifeComp) of Lighting Systems Engineers and Assistant Engineers

Overall, the Job Role profile of the Lighting Systems Engineer and the Lighting Systems Assistant Engineer are as follows;

Job Role Profile main characteristics			
Job Title:	LIGHTING SYSTEMS ENGINEER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Type of Professional	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background)	<input type="checkbox"/> Lighting designers (artistic background) <input type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff	
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists	<input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers	
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input checked="" type="checkbox"/> Ground lighting officer (7412.4) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input checked="" type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input checked="" type="checkbox"/> Electromechanical engineer (2151.1.3) <input checked="" type="checkbox"/> Electrical engineer (2151.1) <input checked="" type="checkbox"/> Photonics engineer (2149.10.1) <input checked="" type="checkbox"/> Design engineer (2149.2.4)	<input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input type="checkbox"/> ICT technician (3512.4)	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Skills and knowledge required: • Photometric knowledge (lux, lumens, candela, ...) • Project management • Basic knowledge of electricity, electronics, and optics • Knowledge of Autocad, Dialux, Photoshop software • Management of standards related to lighting and fixtures • It is also necessary to be patient, to be able to show good judgment and logic, and to be able to work in a team in order to exchange views and experiences as much as possible. 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) 			

<ul style="list-style-type: none"> • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.9 Innovating • B.1 Application development • B.4 Solution deployment • C.1 User support • C.4 Problem management • D.3 Education and training provision
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.4 Financial and economic literacy • 2.5 Mobilizing others • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 	
Green Competences [Please use list D]	
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labelling 	

- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Lighting Systems Engineer is concerned with the optimization of complex processes, systems, or organizations by developing, improving and implementing integrated systems of people, money, knowledge, information and equipment applied to Lighting Systems and its components. They contribute to fast realization of prototypes as well as effective product development, by applying deep engineering knowledge of the most relevant coding platforms and standards, in combination with proven Agile collaboration methods and test-driven development.

The job of Lighting System Engineers is versatile and strongly depends on the company that will employ such professional. It can be found as:

- Product Development Engineer (EQF 6 – or professional experience and Life-long training)
- Senior Research and Development Engineer (EQF6 and higher + professional experience)

If all above cases, required skills and training level (from Master degree and above) are similar, but the main difference is the required relevant experience that could range from 3 years for a Product Development Engineer to up to 10+ for a Senior System Engineer.

A Lighting System Engineer should demonstrate a system approach to design and development with the desire and curiosity to strive for continuous improvement. He/she needs a deep understanding of the first principles/engineering fundamentals that drive the requirements of lighting systems. Add to these expectations, a detailed understanding of the manufacturing, materials and processes utilized to produce your components as well as commercial and financial awareness.

The main tasks that a System engineer is dealing are:

- Developing and testing lighting components and modules for any kind of lighting
- Developing new product concepts / improve existing test procedures
- Developing dedicated testing setups
- Supporting the Development of functional requirements and specifications
- Preparing prototypes of the new product concepts
- Preparing reports with test summary analyses
- Leading projects to release to production new/changed products, components and processes.
- Keeping abreast of technical developments in own field through literature, technical contacts, and industry

<p>competition analyses</p> <ul style="list-style-type: none"> • Working closely with support functions such as studio and supply chain • Working within a matrix organization whilst delivering towards project-based goals set by the program management team
<p>Key Performance Indicators (KPIs):</p> <p>[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]</p>
<ul style="list-style-type: none"> • Number of successfully completed lighting projects within a certain timeline • Positive review of the projects by the Project Manager and the clients
<p>Additional information</p>
<ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC²⁴

²⁴ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

Job Role Profile main characteristics			
Job Title:	LIGHTING SYSTEMS ASSISTANT ENGINEER		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists <input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input checked="" type="checkbox"/> Ground lighting officer (7412.4) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input checked="" type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input checked="" type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	Skills and knowledge required: <ul style="list-style-type: none"> • Photometric knowledge (lux, lumens, candela, ...) • Project management • Basic knowledge of electricity, electronics, and optics • Knowledge of Autocad, Dialux, Photoshop software • Management of standards related to lighting and fixtures • It is also necessary to be patient, to be able to show good judgment and logic, and to be able to work in a team in order to exchange views and experiences as much as possible. • Knowledge of the different types of lighting, light sources, optics, electrical connections ... • Staff management, site costs, completion time for the various works (mast installation, connection, adjustment, junction box, connection of a cabinet, etc.), the necessary equipment • Qualities : Organized, open to discussion, know how to make decisions 		
Technical/Preferred Skill Requirements:			

Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 3.4 Programming • 4.1 Protecting devices • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.9 Innovating • B.1 Application development • B.4 Solution deployment • C.1 User support • C.4 Problem management • D.3 Education and training provision • E.3 Risk management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.4 Financial and economic literacy • 2.5 Mobilizing others • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk 	

- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labelling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

An Assistant Lighting Systems Engineer is concerned with the optimization of complex processes, systems, or organizations by developing, improving and implementing integrated systems of people, money, knowledge, information and equipment applied to Lighting Systems and its components, supporting the work of the Lighting Systems Engineer. He/she contributes to fast realization of prototypes as well as effective product development, by applying deep engineering knowledge of the most relevant coding platforms and standards, in combination with proven Agile collaboration methods and test-driven development.

The job of the Assistant Lighting System Engineers is versatile and strongly depends on the company that will employ such professional. It can be found as:

- Assistant Research Engineer (EQF 5)

In all above cases, required skills and training level (from EQF level 5 and above degree) are similar, but the main difference is the required relevant experience.

An Assistant Lighting System Engineer should demonstrate a system approach to design and develop with the desire and curiosity to strive for continuous improvement. He/she needs a deep understanding of the first principles/engineering fundamentals that drive the requirements of lighting systems. Add to these expectations, a detailed understanding of the manufacturing, materials and processes utilized to produce your components as well as commercial and financial awareness

<p>The main tasks that an Assistant Lighting Systems Engineer is dealing are:</p> <ul style="list-style-type: none"> • Developing and testing lighting components and modules for any kind of lighting • Supporting the Development of functional requirements and specifications • Supporting the preparation of prototypes of the new product concepts • Preparing reports with test summary analyses • Supporting the implementation of projects to release to production new/changed products, components and processes. • Keeping abreast of technical developments in own field through literature, technical contacts, and industry competition analyses • Working closely with support functions and the Lighting Systems Engineer • Working within a matrix organization whilst delivering towards project-based goals set by the program management team
<p>Key Performance Indicators (KPIs):</p> <p>[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]</p> <ul style="list-style-type: none"> • Number of successfully completed lighting projects within a certain timeline • Positive review of the projects by the Project Manager and the clients
<p>Additional information</p> <ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC²⁵

²⁵ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.4 Lighting Consultants

A lighting consultant, crafts ideas, creates designs and then transforms them into real-life solutions with a successful blend of creativity and pragmatism. For this type of professionals it is essential to closely collaborate hand-in-hand with architects, designers and creative teams. Some of the main missions of a lighting consultant are to,

- Provide expert advice and solutions for beautiful and functional lighting indoor or outdoor
- Recommend sustainable lighting options that will create pleasant effects in every space
- Convert lighting needs into a clear design with everything required for purchasing and installation
- Design light that is functional, dynamic and enhances living spaces
- Work in close collaboration with customers.

From ECOSLIGHT Interviews we can say that a Lighting consultant knows how to respond to the market demand thanks to his/her (or its, in case of a company) technical, artistic, normative competences and know-how, as well as the ability to listen to the needs of customers, offering assistance with willingness, dedication and sensitivity.

As it is shown in Table 33, the Lighting Consultant is related mainly with the *Light pollution and environmental impact of lighting specialist role*, the *Human-centric lighting specialist role*, and the *Smart lighting system specialist role*. Moreover, as he is oriented to the EQF level 5, it can be assumed also that this professional belongs to the type of *Lighting technician, installer and associate professional*. Therefore, his / her competence needs are as follows.

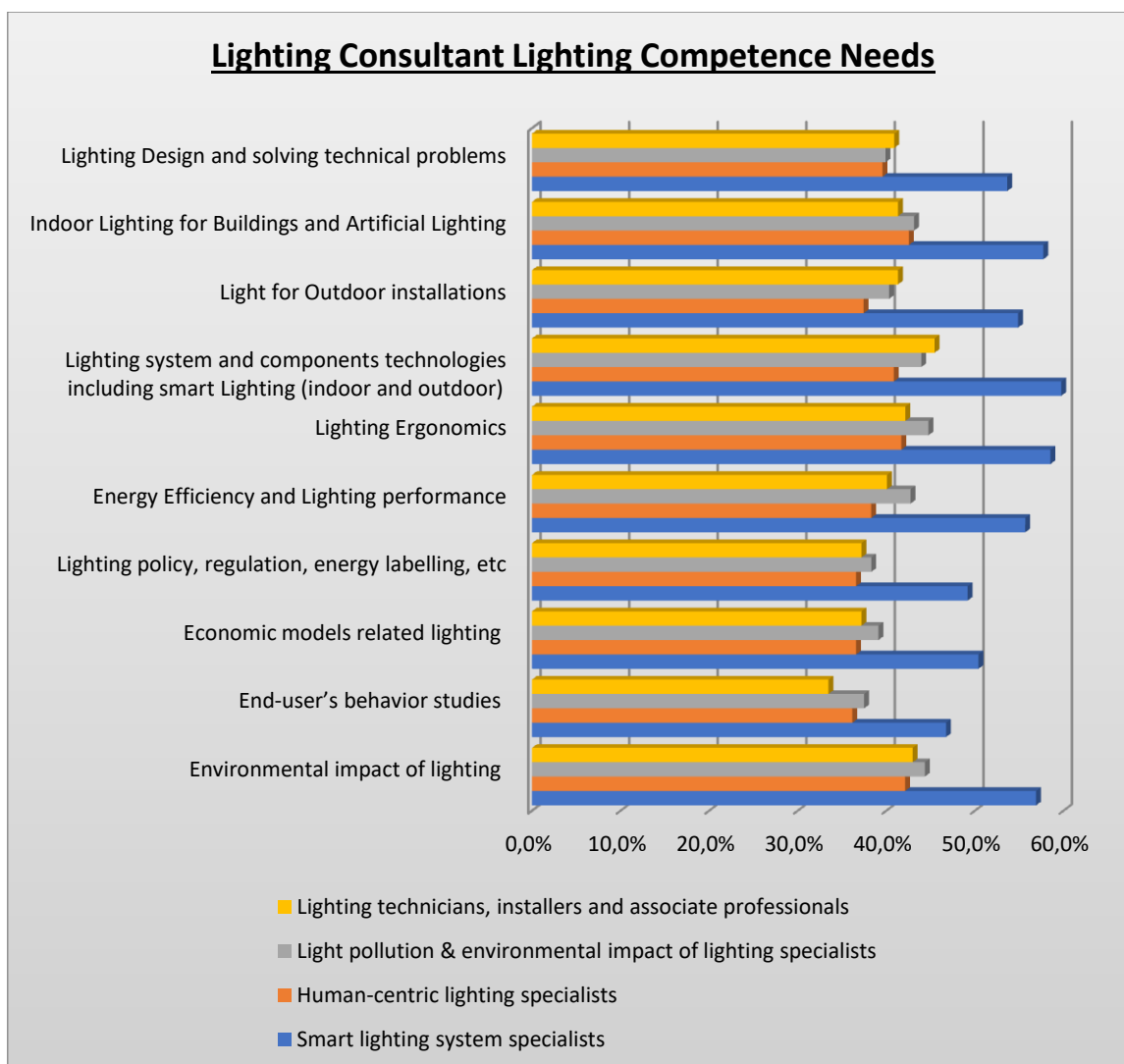


Figure 43: Lighting competence needs of Lighting Consultants

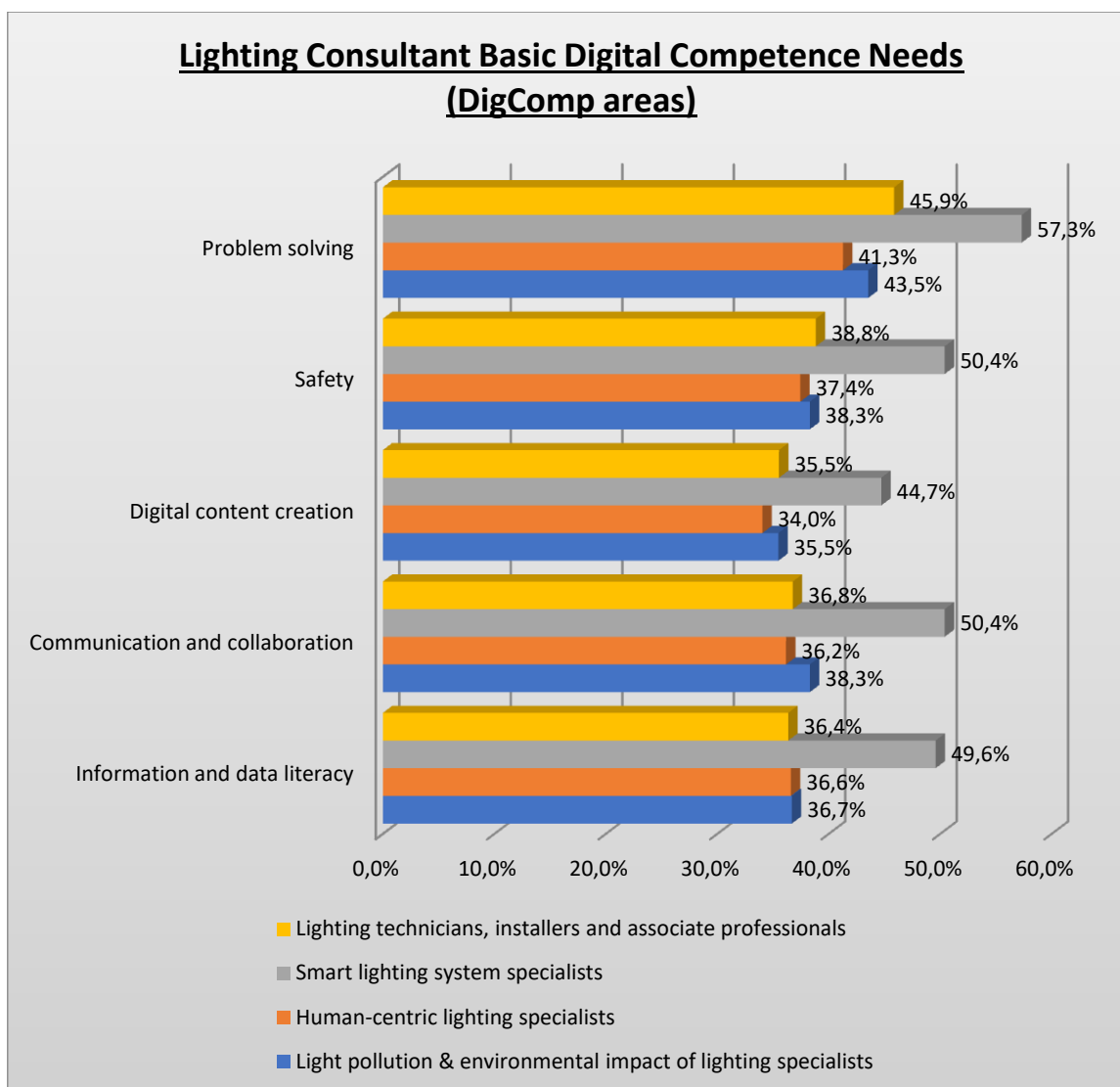


Figure 44: Lighting Consultant basic competence needs (DigComp areas)

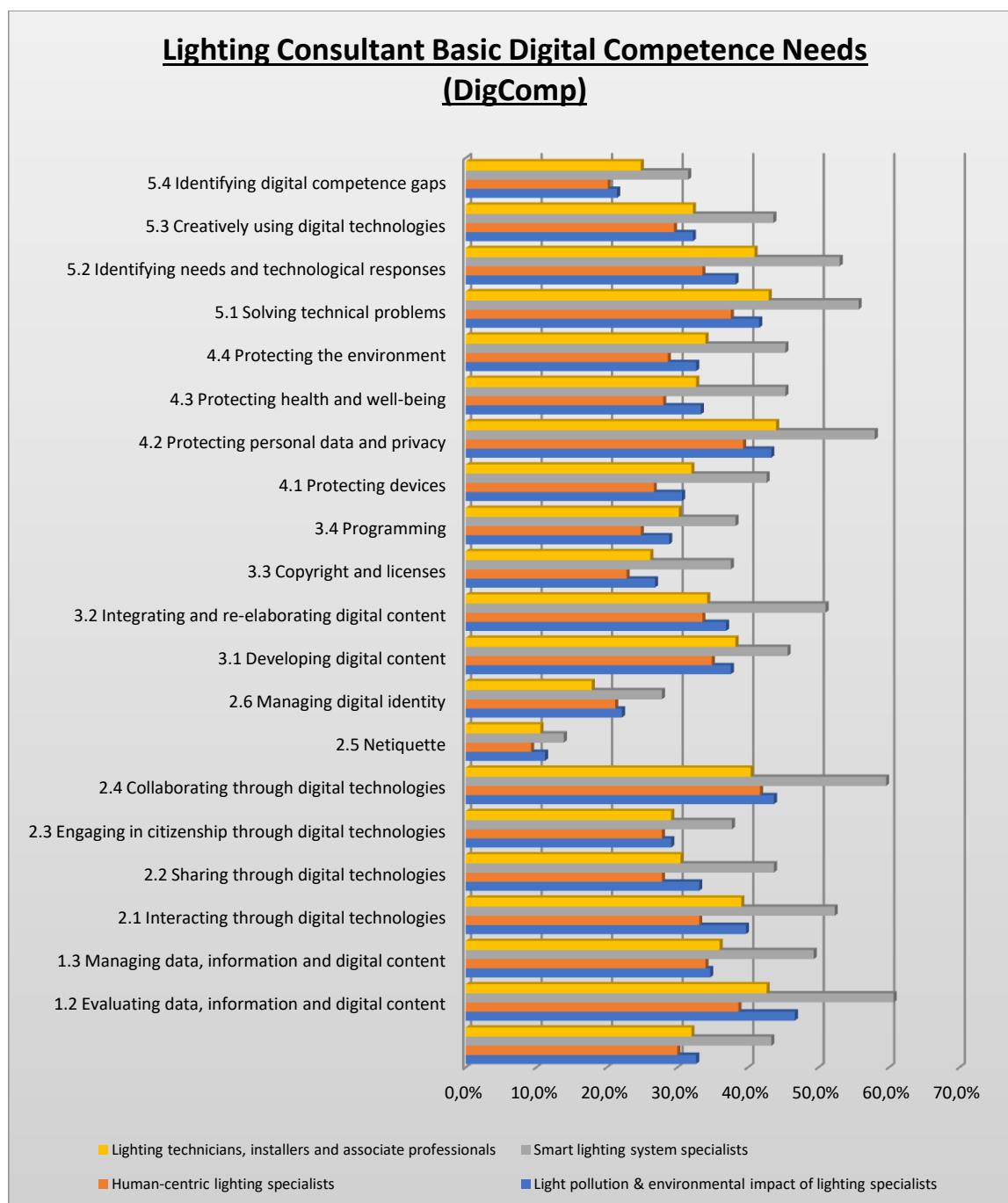


Figure 45: Lighting consultant basic digital competence needs (DigComp)

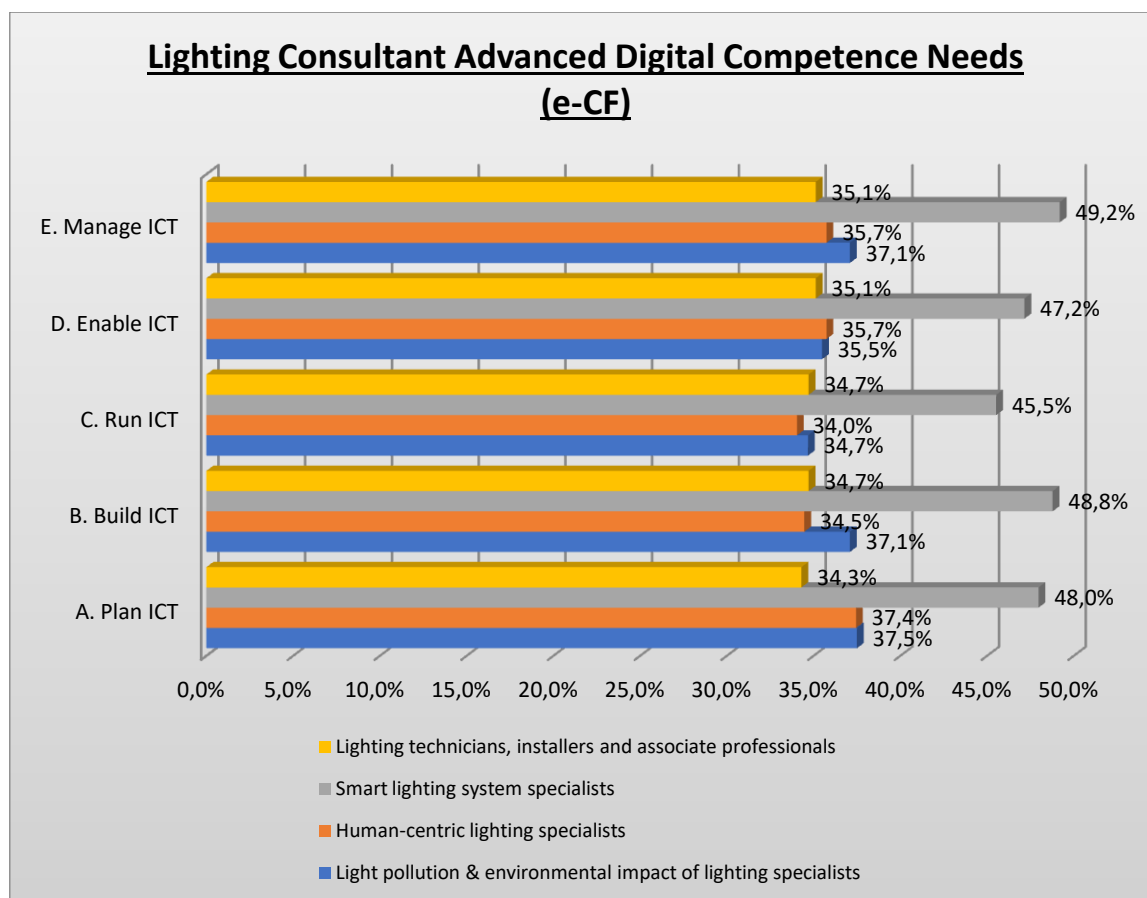


Figure 46: Lighting consultant advanced digital competence needs (e-CF areas)

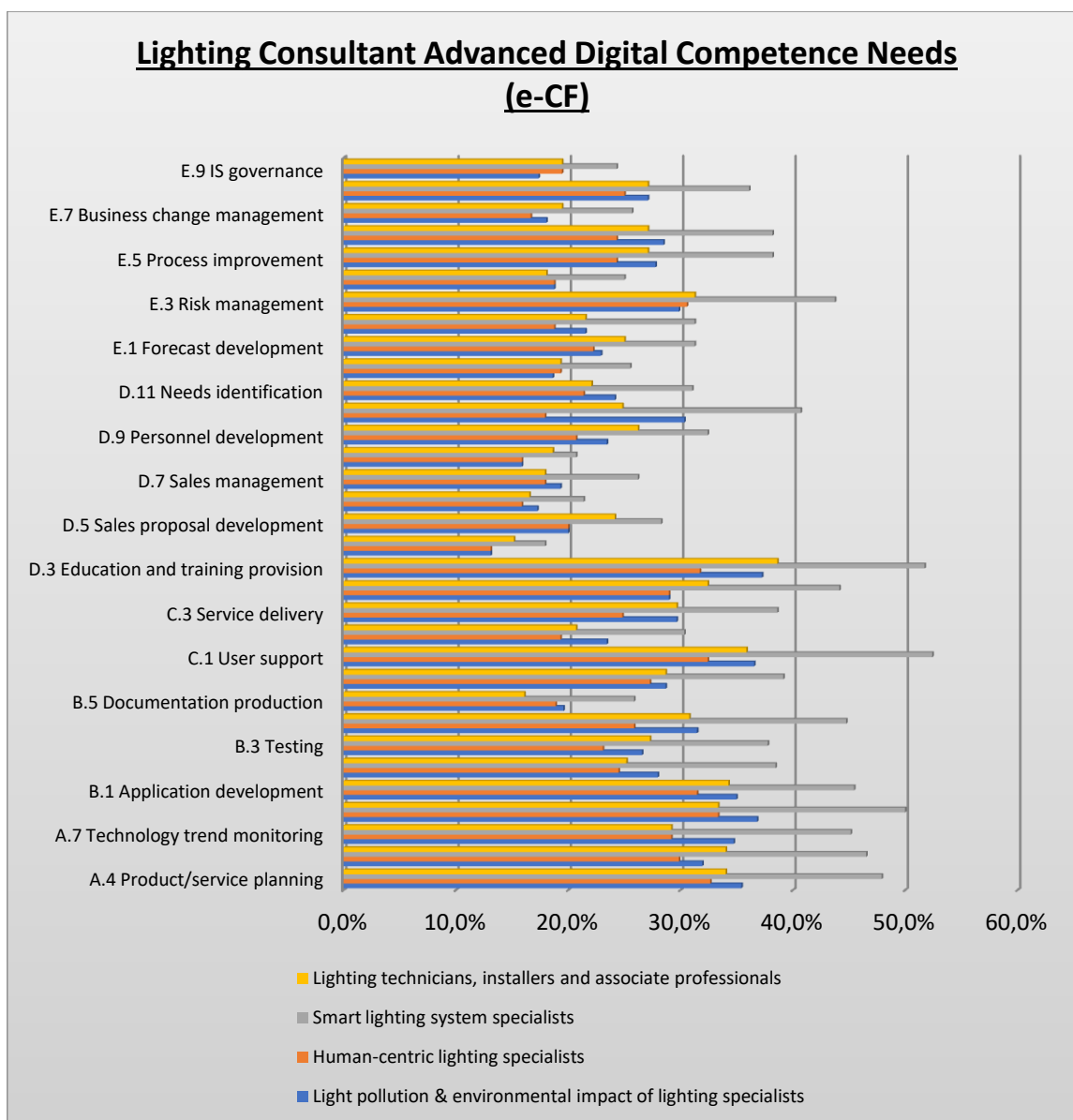


Figure 47: Lighting consultant advanced digital competence needs (e-CF)

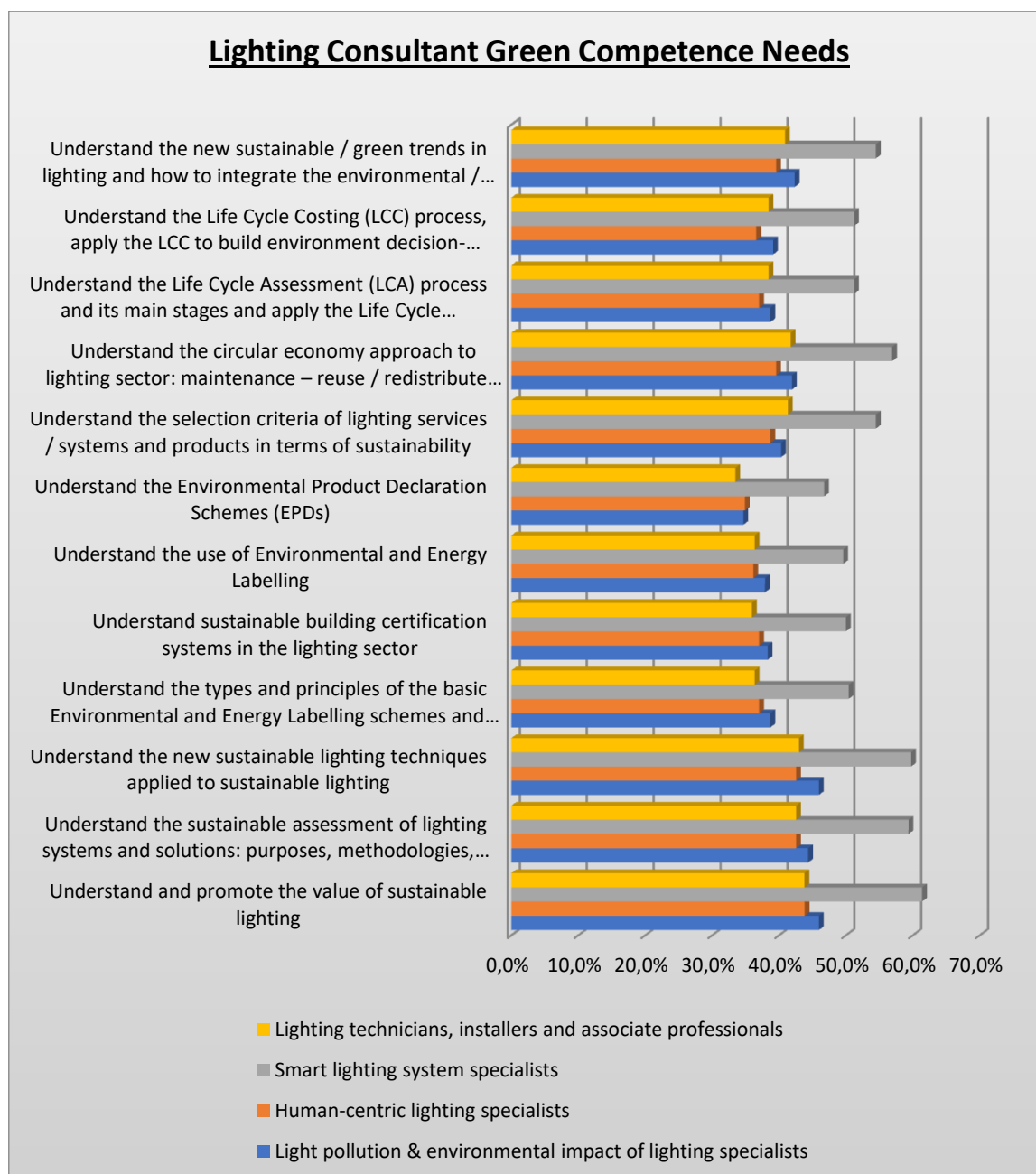


Figure 48: Lighting consultant green competence needs

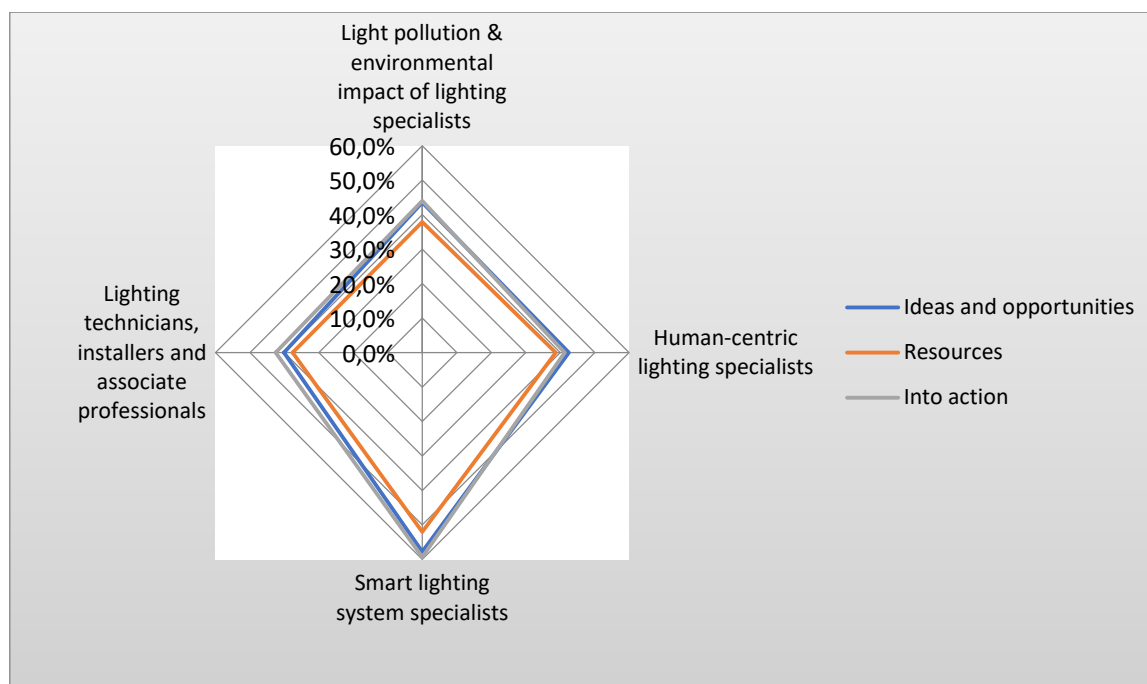


Figure 49: Lighting consultant entrepreneurship competence needs (EntreComp)

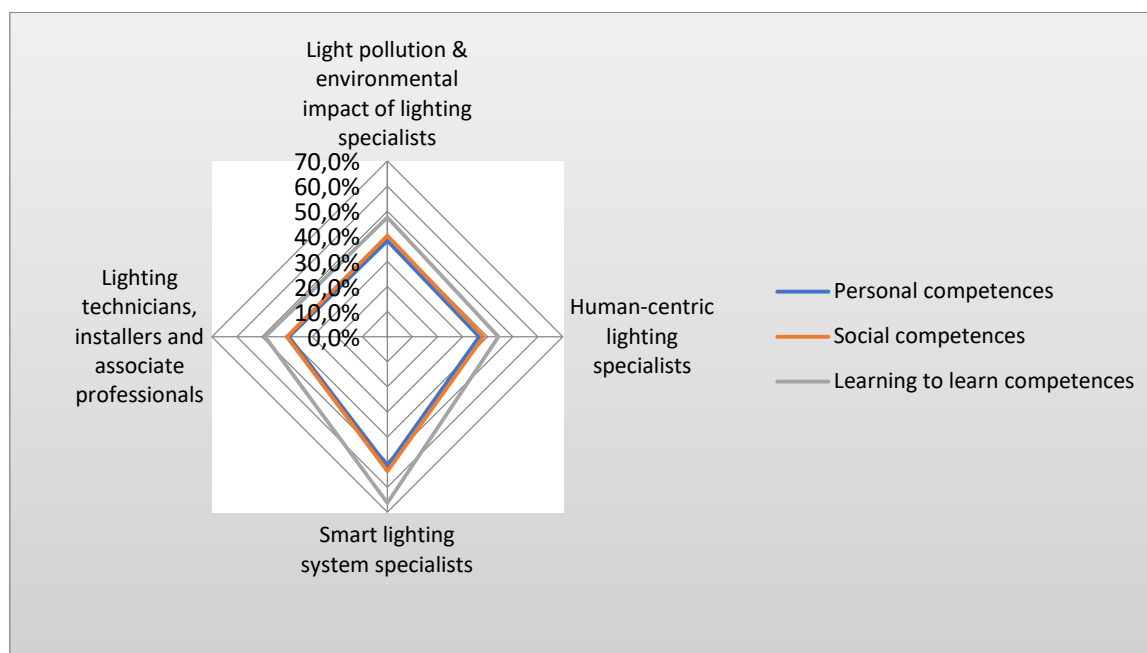


Figure 50: Lighting consultant life competence needs (LifeComp)

Overall, the Job Role profile of the Lighting Consultant is as follows;

Job Role Profile main characteristics			
Job Title:	LIGHTING CONSULTANT		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background)	<input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff	
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input checked="" type="checkbox"/> Human-centric lighting specialists	<input type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers	
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4)	<input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input checked="" type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	Skills and knowledge required: <ul style="list-style-type: none"> • Having an EQF 5 degree (at least), preferably a Bachelor's degree in a technical field, i.e. in Architecture, Interior Design, Electrical Engineering or related field and a Master's degree in Lighting • Possessing experience in lighting sector/electrical services • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the physiology and psychology of the human visual system • Understanding of energy efficient & sustainable lighting design • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in computer-aided design software, e.g. AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, Revit etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. • Knowledge of Adobe Creative Suite • Familiarity with customer relationship management software 		

	<ul style="list-style-type: none"> • Being proficient in Microsoft Office • Showing an understanding of lighting design
Technical/Preferred Skill Requirements:	
Lighting Competences/Knowledge	
[Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 3.4 Programming • 4.1 Protecting devices • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.9 Innovating • B.1 Application development • B.4 Solution deployment • C.1 User support • C.4 Problem management • D.3 Education and training provision • E.3 Risk management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.4 Financial and economic literacy 	

- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labelling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A lighting consultant, crafts ideas, creates designs and then transforms them into real-life solutions with a successful blend of creativity and pragmatism. For this type of professionals it is essential to closely collaborate hand-in-hand with architects, designers and creative teams. Some of the main missions of a lighting consultant are to,

- Provide expert advice and solutions for beautiful and functional lighting indoor or outdoor
- Recommend sustainable lighting options that will create pleasant effects in every space
- Convert lighting needs into a clear design with everything required for purchasing and installation
- Design light that is functional, dynamic and enhances living spaces
- Work in close collaboration with customers.

Moreover, a Lighting consultant knows how to respond to the market demand thanks to his/her (or its, in case of a company) technical, artistic, normative competences and know-how, as well as the ability to listen to the needs of customers, offering

assistance with willingness, dedication and sensitivity.
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> -
Additional information
<ul style="list-style-type: none"> Not regulated profession according to the Directive 2005/36/EC²⁶

²⁶ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.5 Landscape and Street Lighting Technician

A Landscape and Street Lighting Technician is responsible for the preparation, installation, rigging, wiring, operation and maintenance of lighting systems in theatres, venues, concert halls, broadcasting studios, indoor and outdoor live events etc. He or she implements the lighting design according to a lighting designer's plan and instructions and produces the appropriate visual effects for an arts/entertainment event, show or any type of broadcasted production. His / her work is physically demanding requiring physical mobility, balance, strength and agility because heavy lifting and working at heights in order to install the lighting equipment are often required. The work requires ability to use hand tools and power-driven machinery, knowledge of health and safety requirements and collaboration with other professionals, e.g. lighting designers, sound technicians, the theatre director, production manager etc. so as to deliver the optimal result in any type of production.

Key tasks and responsibilities of the Landscape and Street Lighting Technician includes the following:

- Interpreting a lighting designer's plan
- Installing, wiring, rigging, focusing and operating necessary lighting equipment
- Programming lighting control consoles and auxiliary equipment before the show/event
- Choose and combine colours to achieve the desired effect
- Provide and distribute power around the set and support areas
- Operating manual and computer-controlled lighting systems and controls during a show/event
- Performing routine maintenance functions such as replacing damaged light fixtures, luminaire drivers, color filters, so as to ensure the safe operation of lighting equipment and prevent technical problems
- Maintenance and proper utilization of electrical tools and equipment
- Operating within current health and safety regulations especially when working at heights and installing equipment
- Uninstalling all equipment at the end of the broadcast or production and ensure its safe transport and/or storage
- Attending production meetings to establish lighting requirements for a production
- Conferring with the lighting designer or the director of photography and other staff so as to integrate their creative vision into the lighting design as well as with other departments, such as sound and camera, the floor manager and producer etc.
- Coordinating the equipment and the technical crew and train other crew members as required
- Conducting risk assessments and ensure health and safety with regards to lighting
- Providing advice on the lighting budget and on the purchase of equipment
- Keeping abreast of the advances in technologies and techniques in the industry.

As a technician, his or her competence needs are identical with the needs of the *Lighting technicians, installers and associate professionals*. Moreover, he or she inherits the needs of the *Road lighting safety and Lighting security specialist*. Given the fact that quantitative survey did not include a Job Role Profile directly related to the landscapes, it would be of risk to present at this point quantitative data in respect to the separate needs. For sure, it is related to the *Light pollution and environmental impact of lighting*

specialist, the Road lighting safety and Lighting security specialist, the Smart lighting systems specialist, and the Lighting technicians, installers and associate professionals. Plus, some groups of tasks related to the landscapes and scenic lighting. Therefore, the competence needs are presented in the template below.

Job Role Profile main characteristics			
Job Title:	LANDSCAPE AND STREET LIGHTING TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists <input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input checked="" type="checkbox"/> Ground lighting officer (7412.4) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input checked="" type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Technical knowledge of lighting equipment • Basic electrical knowledge, e.g. wiring, testing, repairing etc. • Knowledge of lighting control protocols, e.g. DMX512 • Ability to use hand tools and power-driven machinery • Manual dexterity and a high level of physical fitness, stamina and agility • Knowledge of health and safety guidelines, regulations etc. • Attention to detail and creativity • Understanding of artistic concepts • Knowledge of lighting design, theatre and entertainment arts, live event technology regarding the operation of lighting systems may be required • Strong communication skills 		
Technical/Preferred Skill Requirements:			

Lighting Competences/Knowledge	
[Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 3.4 Programming • 4.1 Protecting devices • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.7 Technology trend monitoring • A.9 Innovating • B.1 Application development • B.2 Component integration • B.4 Solution deployment • B.6 Systems engineering • C.1 User support • C.3 Service delivery • C.4 Problem management • D.3 Education and training provision • E.3 Risk management • E.5 Process improvement • E.6 ICT quality management • E.8 Information security management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.4 Financial and economic literacy • 2.5 Mobilizing others • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk 	

- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labelling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Landscape and Street Lighting Technician is responsible for the preparation, installation, rigging, wiring, operation and maintenance of lighting systems in theatres, venues, concert halls, broadcasting studios, indoor and outdoor live events etc. He or she implements the lighting design according to a lighting designer's plan and instructions and produces the appropriate visual effects for an arts/entertainment event, show or any type of broadcasted production. His / her work is physically demanding requiring physical mobility, balance, strength and agility because heavy lifting and working at heights in order to install the lighting equipment are often required. The work requires ability to use hand tools and power-driven machinery, knowledge of health and safety requirements and collaboration with other professionals, e.g. lighting designers, sound technicians, the theatre director, production manager etc. so as to deliver the optimal result in any type of production.

Key tasks and responsibilities of the Landscape and Street Lighting Technician includes the following:

- Interpreting a lighting designer's plan
- Installing, wiring, rigging, focusing and operating necessary lighting equipment
- Programming lighting control consoles and auxiliary equipment before the show/event
- Choose and combine colours to achieve the desired effect
- Provide and distribute power around the set and support areas

- Operating manual and computer-controlled lighting systems and controls during a show/event
- Performing routine maintenance functions such as replacing damaged light fixtures, luminaire drivers, color filters, so as to ensure the safe operation of lighting equipment and prevent technical problems
- Maintenance and proper utilization of electrical tools and equipment
- Operating within current health and safety regulations especially when working at heights and installing equipment
- Uninstalling all equipment at the end of the broadcast or production and ensure its safe transport and/or storage
- Attending production meetings to establish lighting requirements for a production
- Conferring with the lighting designer or the director of photography and other staff so as to integrate their creative vision into the lighting design as well as with other departments, such as sound and camera, the floor manager and producer etc.
- Coordinating the equipment and the technical crew and train other crew members as required
- Conducting risk assessments and ensure health and safety with regards to lighting
- Providing advice on the lighting budget and on the purchase of equipment
- Keeping abreast of the advances in technologies and techniques in the industry.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of lighting systems successfully installed in a production set
- Positive review by his/her superiors

Additional information

- Not regulated profession according to the Directive 2005/36/EC²⁷

²⁷ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.6 Street Lighting Business Manager

A Street Lighting Engineer performs the engineering management of street lighting installation and maintenance activities. He/She plans, organizes and directs the work of professional, technical and administrative employees in a major division performing assessment processing and the preparation of plans, specifications, cost analyses, construction, cost estimates and testing related to the construction, reconstruction, operation maintenance and repair of a variety of municipal street lighting projects. A Street Lighting Engineer is responsible for the review and approval of street lighting designs prepared by subordinate engineers, as well as the preparation of street lighting installation and maintenance contracts for work performed by outside contractors. Moreover, his/her duties include developing policy statements on electrical energy and lighting issues, reviewing and approving monthly electrical utility power bills and developing and recommending proposals to refine operating procedures in order to increase productivity and reduce operating costs. His or her key tasks and responsibilities include the following:

- Coordination of the overall planning and design of a city-wide street lighting system
- Street lighting system installation and maintenance
- Management of street lighting budget
- Contract preparation
- Training

In respect to the identified job roles and professionals types of the ECOSLIGHT survey, the Street Lighting Business Manager is relate to *Road lighting safety and Lighting security specialist*, the *Manager*, the *R&D engineer / scientist*. Therefore, his or her competence needs are as follows:

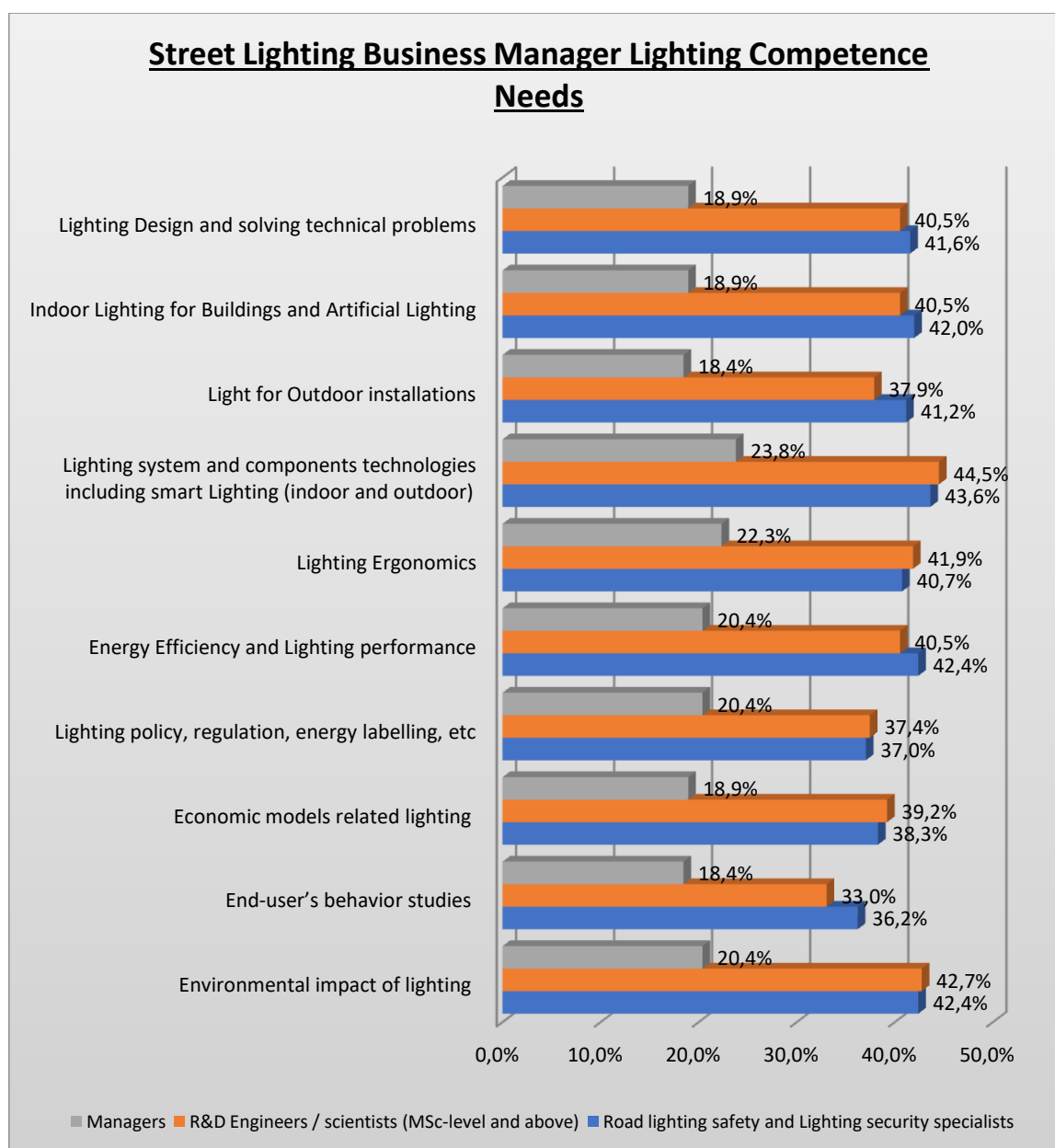


Figure 51: Street lighting business manager lighting competence needs

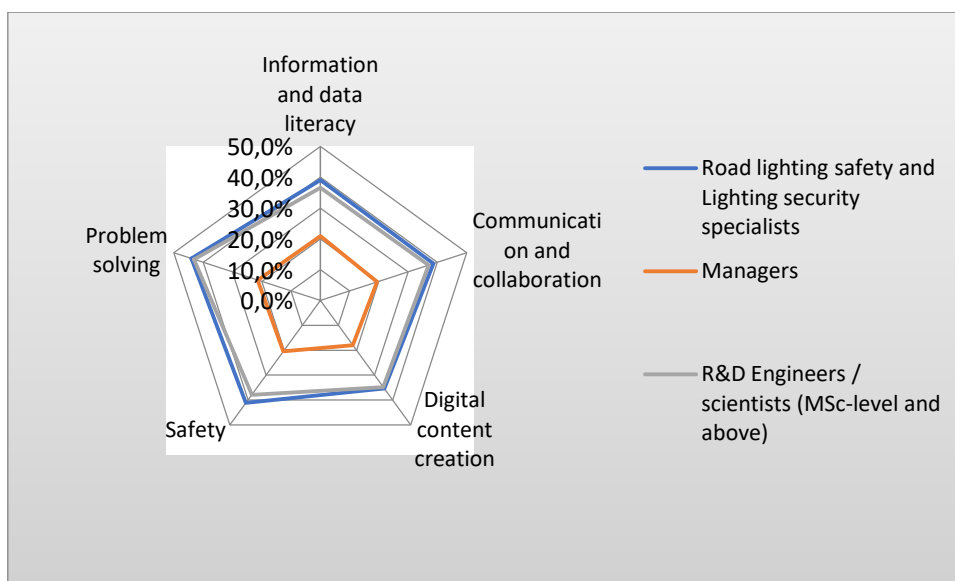


Figure 52: Street lighting business manager basic digital competence needs (DigComp areas)

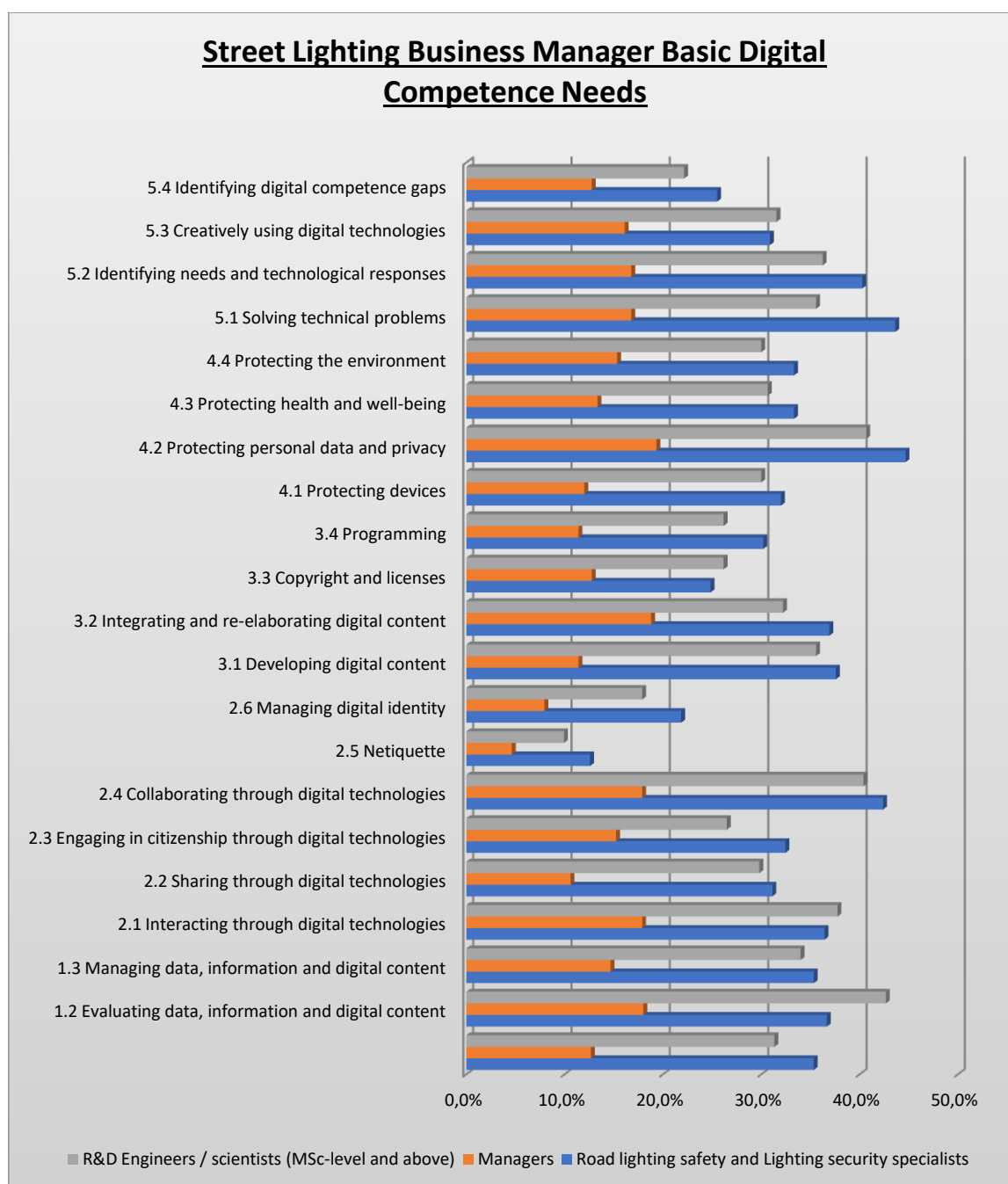


Figure 53: Street lighting business manager basic digital competence needs (DigComp)

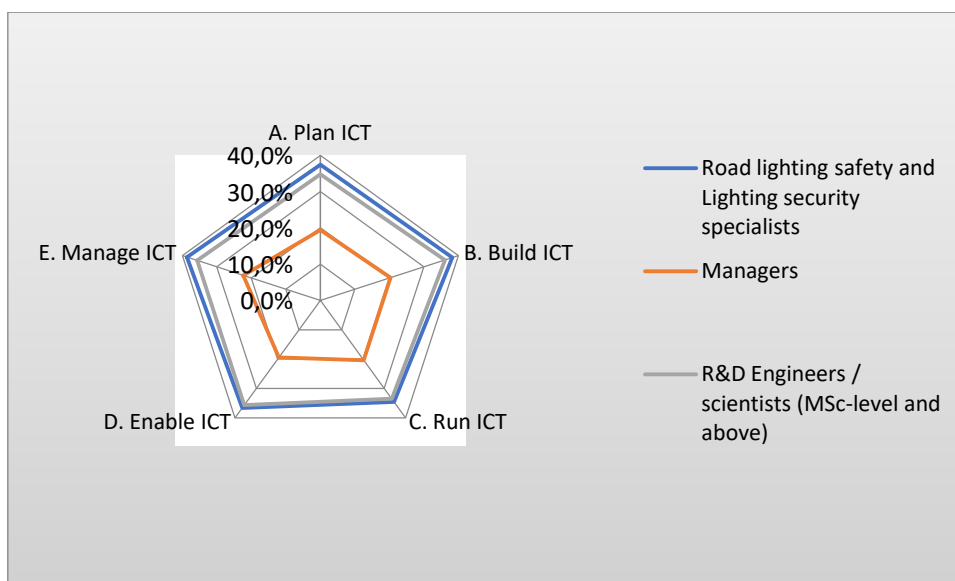


Figure 54: Street lighting business manager advanced digital competence needs (e-CF areas)

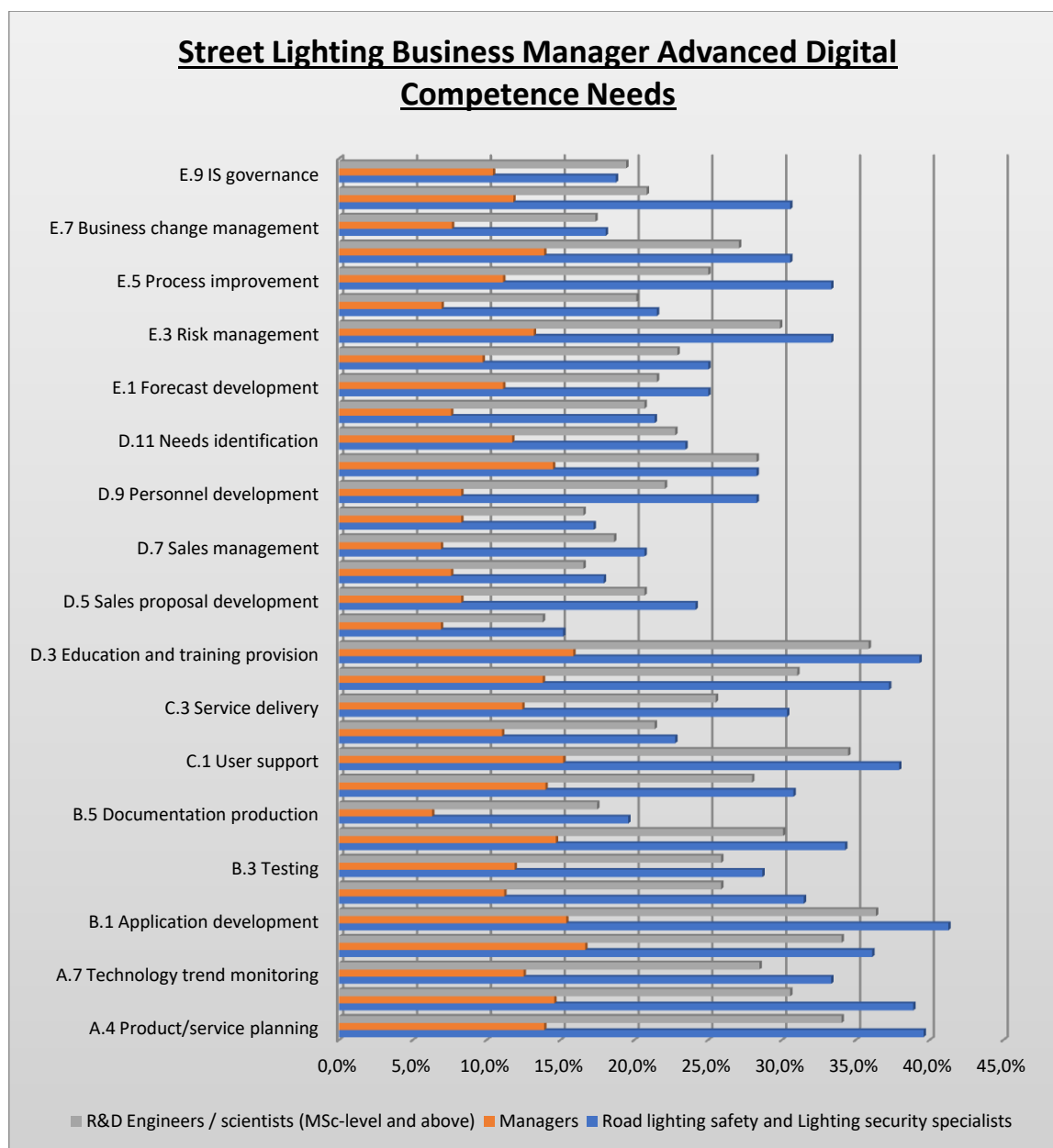


Figure 55: Street lighting business manager advanced digital competence needs (e-CF)



Figure 56: Street lighting business manager green competence needs

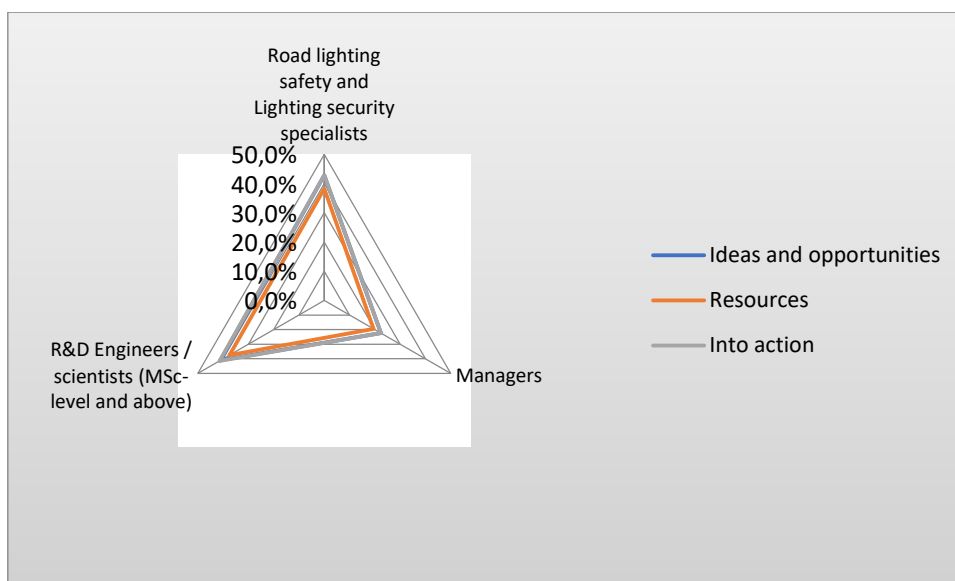


Figure 57: Street lighting business manager entrepreneurship competence needs (EntreComp)

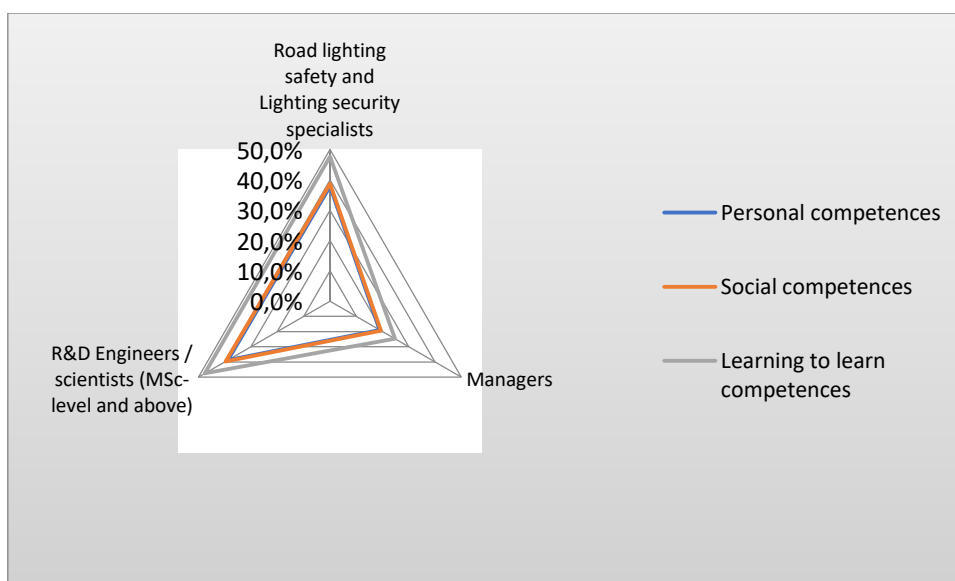


Figure 58: Street lighting business manager life competence needs (LifeComp)

Overall, the profile of the Street Lighting Business Manager is as follows;

ENVIRONMENTALLY CONSCIOUS SMART LIGHTING

Job Role Profile main characteristics			
Job Title:	STREET LIGHTING BUSINESS MANAGER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Type of Professional	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background)	<input type="checkbox"/> Lighting designers (artistic background) <input type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff	
Related profiles / groups of tasks	<input type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists	<input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers	
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input checked="" type="checkbox"/> Electromechanical engineer (2151.1.3) <input checked="" type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4)	<input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input type="checkbox"/> ICT technician (3512.4)	
Location:	<input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input checked="" type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> Skills and knowledge required: Good command of office tools, technical knowledge in lighting and electricity, certified mastery of the language (oral and written production). Qualities: Team management, ability to delegate, ability to analyze, step back, interpersonal skills and contact, rigor Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics Knowledge of the principles, practices, international and national norms, standards and legislation with regards to street lighting and public works as well as safety principles and practices Familiarity with street lighting materials, equipment and circuit requirements of a variety of street lighting systems and street lighting control protocols e.g. DALI, Zhaga-D4i, 0-10 V DC etc. Understanding of the principles with regards to civil, electrical, mechanical and illuminating engineering involved in the design, construction, testing, operation and maintenance of street and highway lighting Knowledge of the physiology and psychology of the human visual system Familiarity with current developments and technologies in the field of street lighting systems with emphasis on usage of energy efficient devices and systems 		

	<ul style="list-style-type: none"> • Comprehension of principles and practices of public administration, including municipal budgetary and administrative methods and practices, organizational development, and staffing • Familiarity with supervisory principles and practices including planning, delegating, and controlling the work of subordinates • Ability to train, instruct, evaluate, counsel and motivate subordinate work performance as well as supervisory responsibility • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in software for street lighting design software, e.g. Relux, Dialux • Describe the work Experience and education background expected • The principles, practices and standards of street and highway illumination; • Street lighting materials, equipment and circuit requirements of a variety of street lighting systems; • The principles of civil, electrical, and illuminating engineering involved in the design, construction, and operation of street and highway lighting; • Procedures and legal requirements involved in the establishment, construction and maintenance of lighting assessment districts; • Safety principles and practices; • Provisions of the American National Standard Practice of Roadway Lighting, Standard; Specifications for Public Works Construction, and Bureau of Street Lighting Standards as related to design, construction, and maintenance of street lighting systems; • Organization, policies and functions of the Bureau of Street Lighting and its relationships working with other units of City government; • Supervisory principles and practices including planning, delegating, and controlling the work of subordinates; • Training, instructing and evaluating subordinate work performance; • Counseling, disciplining and motivating subordinate personnel; • Procedures for grievance handling; • Supervisory responsibility as set forth by equal employment opportunity principles and guidelines; • Laws and regulations related to equal employment opportunity; • City personnel rules, policies, and procedures; and • Memoranda of understanding as applied to subordinate personnel.
Technical/Preferred Skill Requirements:	
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences	Advanced digital competences

<ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.1 Interacting through digital technologies • 2.3 Engaging in citizenship through digital technologies • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	<ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.9 Innovating • B.1 Application development • B.4 Solution deployment • C.1 User support • C.4 Problem management • D.3 Education and training provision • D.10 Information and knowledge management • E.3 Risk management • E.5 Process improvement • E.6 ICT quality management • E.8 Information security management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.4 Financial and economic literacy • 2.5 Mobilizing others • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 	
Green Competences [Please use list D]	
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labelling • Understand the Environmental Product Declaration Schemes (EPDs) • Understand the selection criteria of lighting services / systems and products in terms of sustainability • Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes • Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases • Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases • Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process 	

Life Competences [Please use list E]
<ul style="list-style-type: none"> • Self-regulation • Flexibility • Wellbeing • Empathy • Communication • Collaboration • Growth mindset • Critical thinking • Managing learning
Job description:
Key Tasks and Responsibilities:
[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
<p>A Street Lighting Engineer performs the engineering management of street lighting installation and maintenance activities. He/She plans, organizes and directs the work of professional, technical and administrative employees in a major division performing assessment processing and the preparation of plans, specifications, cost analyses, construction, cost estimates and testing related to the construction, reconstruction, operation maintenance and repair of a variety of municipal street lighting projects. A Street Lighting Engineer is responsible for the review and approval of street lighting designs prepared by subordinate engineers, as well as the preparation of street lighting installation and maintenance contracts for work performed by outside contractors. Moreover, his/her duties include developing policy statements on electrical energy and lighting issues, reviewing and approving monthly electrical utility power bills and developing and recommending proposals to refine operating procedures in order to increase productivity and reduce operating costs.</p> <p>Key Tasks and Responsibilities:</p> <ul style="list-style-type: none"> • Coordination of the overall planning and design of a city-wide street lighting system: A Street Lighting Engineer coordinates the planning, layout and engineering work of a city-wide street lighting program and directs illuminating engineering and visibility studies. He/She reviews preliminary and final lighting plans for feasibility, design, compliance with street lighting standards and legislation. Moreover, he/she revises and approves designs of new lighting systems prepared by engineering staff and provides technical advice. Tasks also include identification and evaluation of efficient existing and emerging technologies and estimation of costs of incorporating new technologies and improvements, as well as costs of installations and preparation of capital funding requests. Additionally, the Street Lighting Engineer revises standard specifications so as to include energy efficient technology and prepares bulletins and memoranda on street lighting procedures, standards and requirements. • Street lighting system installation and maintenance: The Street Lighting Engineer plans, assigns, supervises the installation and maintenance and repair of street lighting system, which includes poles, brackets, luminaires, wiring, lighting controls and reviews the activities of the installation and maintenance personnel. Additionally, he/she directs the identification and replacement of obsolete street lighting equipment. • Management of street lighting budget: The Street Lighting Engineer prepares the operating and capital budgets for the street lighting program. Moreover, he/she supervises the estimating the costs of new street lighting installation/upgrade projects or existing lighting maintenance/repair costs, as well as revenues and cash flow necessary to finance the operation of the lighting system. Duties also include monitoring monthly power usage and costs, preparation of reports and the submission of recommendations for the reduction of operating costs. • Contract preparation: The Street Lighting Engineer is responsible for the preparation of contract proposals regarding supply, installation and maintenance of street lighting equipment and discusses with equipment manufacturers, distributors, and contractors • Training: A Street Lighting Engineer must share his/her knowledge with other professionals, subordinates and provide training and educational material, e.g. technical presentations for them. <p>Collaboration with other professionals and authorities: A Street Lighting Engineer must collaborate closely with other colleagues, subordinates, principal officers, local and government authorities. communicates equal employment opportunity information to employees He has the responsibility to provide information to the public and others on the status of various</p>

lighting projects and appear before City Council, Council committees etc. He/She addresses civic and neighborhood groups, professional associations and others in order to resolve complaints or to acquaint the public with the City's street lighting goals, objectives and programs. Duties also include expert witness testimony in court.
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • Number of street lighting projects successfully completed with a certain timeline • Positive review by his/her superiors
Additional information
<ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC²⁸

²⁸ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.7 Smart Lighting Systems Technician

The Smart Lighting Systems Technician is an emerging profile, horizontal in a degree, which can be employed in indoor and outside; the proliferation of ICT technologies, sensors, and the IoT overall, has created the need of a job role profile capable of enhancing lighting tasks with smart lighting. This role can and should be at the level of technician and not upper, as the expertise and R&D come from IT professionals.

A Smart Lighting Systems Technician is a hybrid technical expert on IT smart solutions and lighting that should be able to:

- Analyze the lighting project data.
- Determine information system requirements and define project objectives.
- Apply software development process, development environments, tools and techniques.
- Make recommendations for necessary IT system components e.g. hardware, software and networking systems.
- Design, implement and deploy new smart lighting services.
- Operate IT systems and services in relation to lighting.
- Provide support and training to various types of users.

The Smart Lighting System Technician is related to the job role profile of *Smart Lighting Systems Specialist* and the *Lighting Technician, Installer and Associate Professional*. Therefore, his or her competence needs are identified as follows;

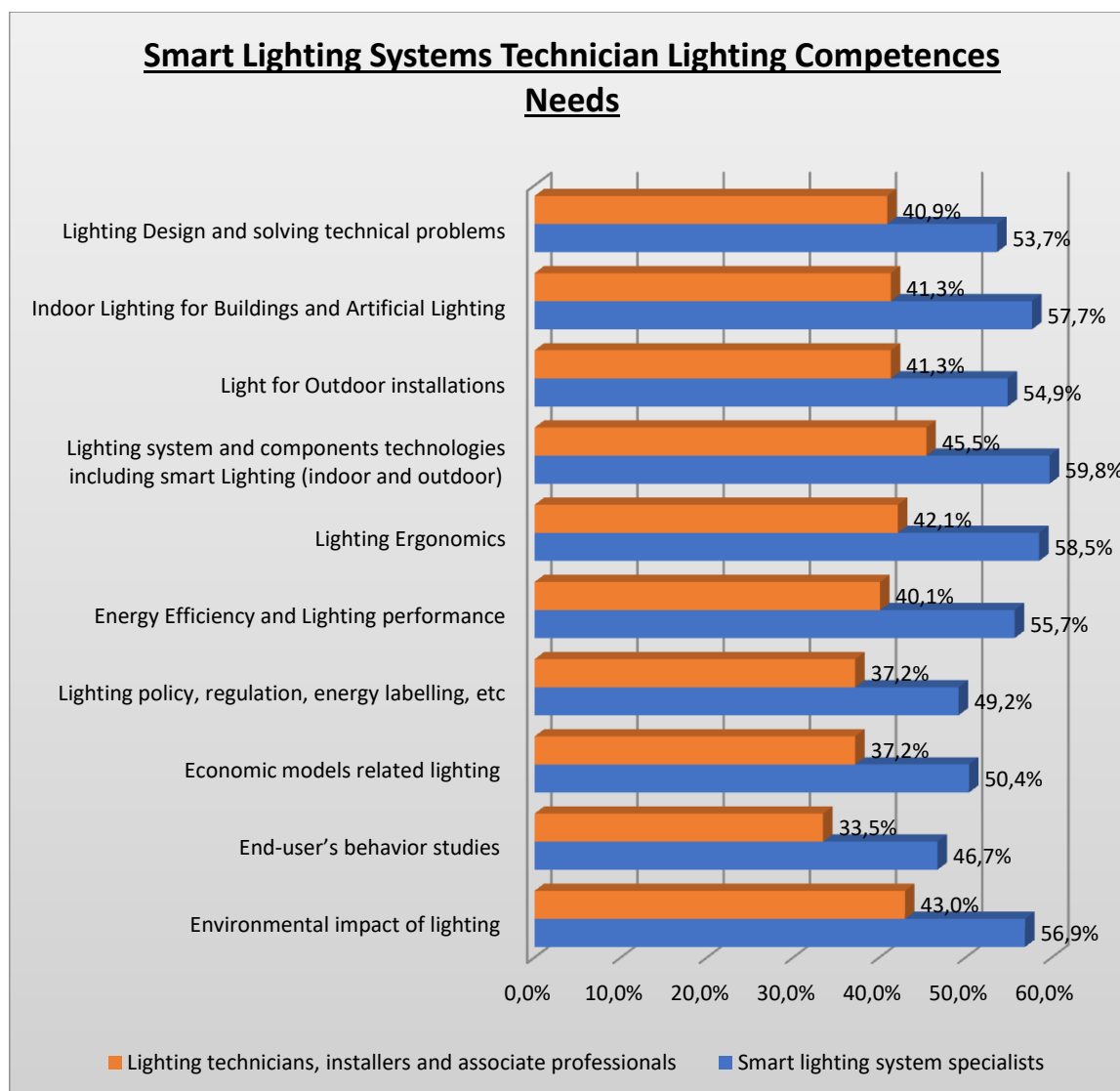


Figure 59: Smart lighting systems technician lighting competence needs

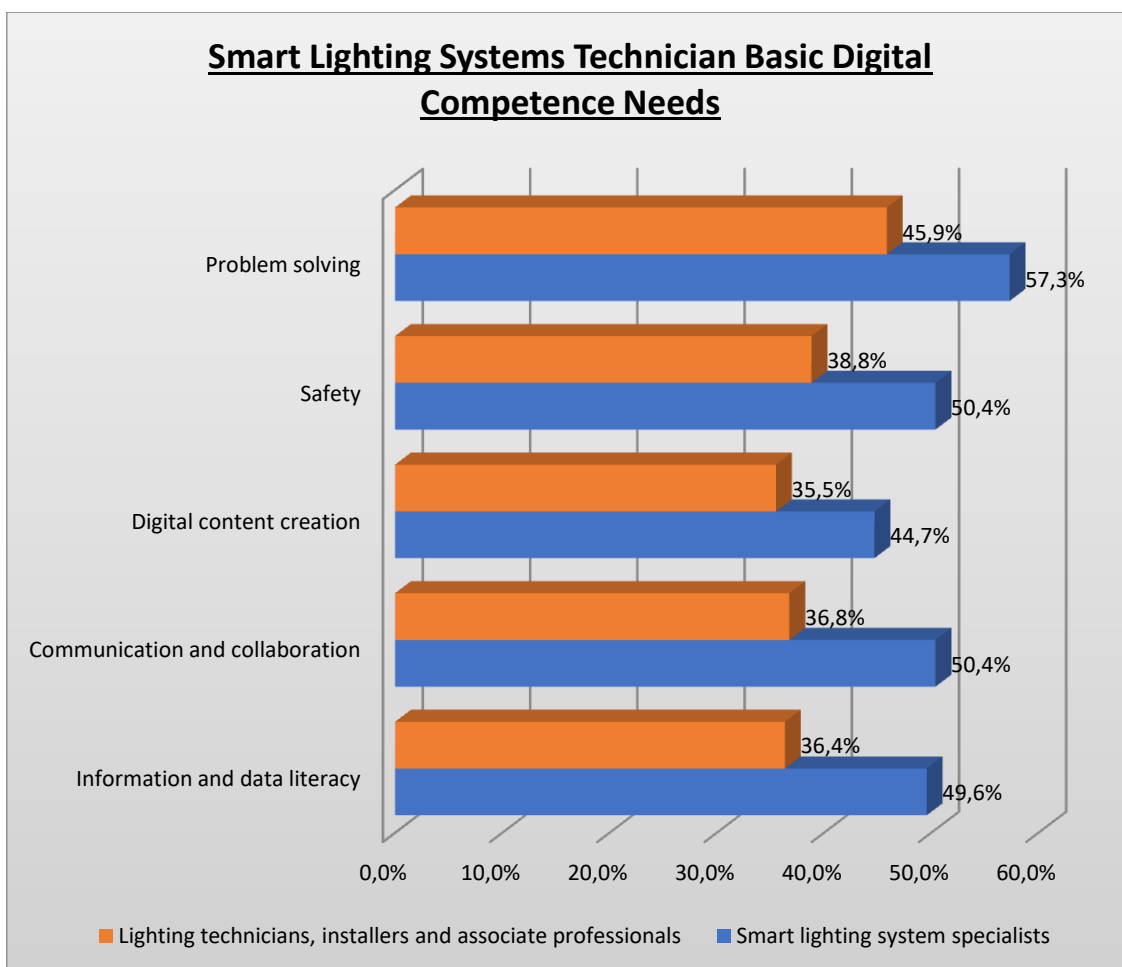


Figure 60: Smart lighting systems technician basic digital competence needs (DigComp areas)

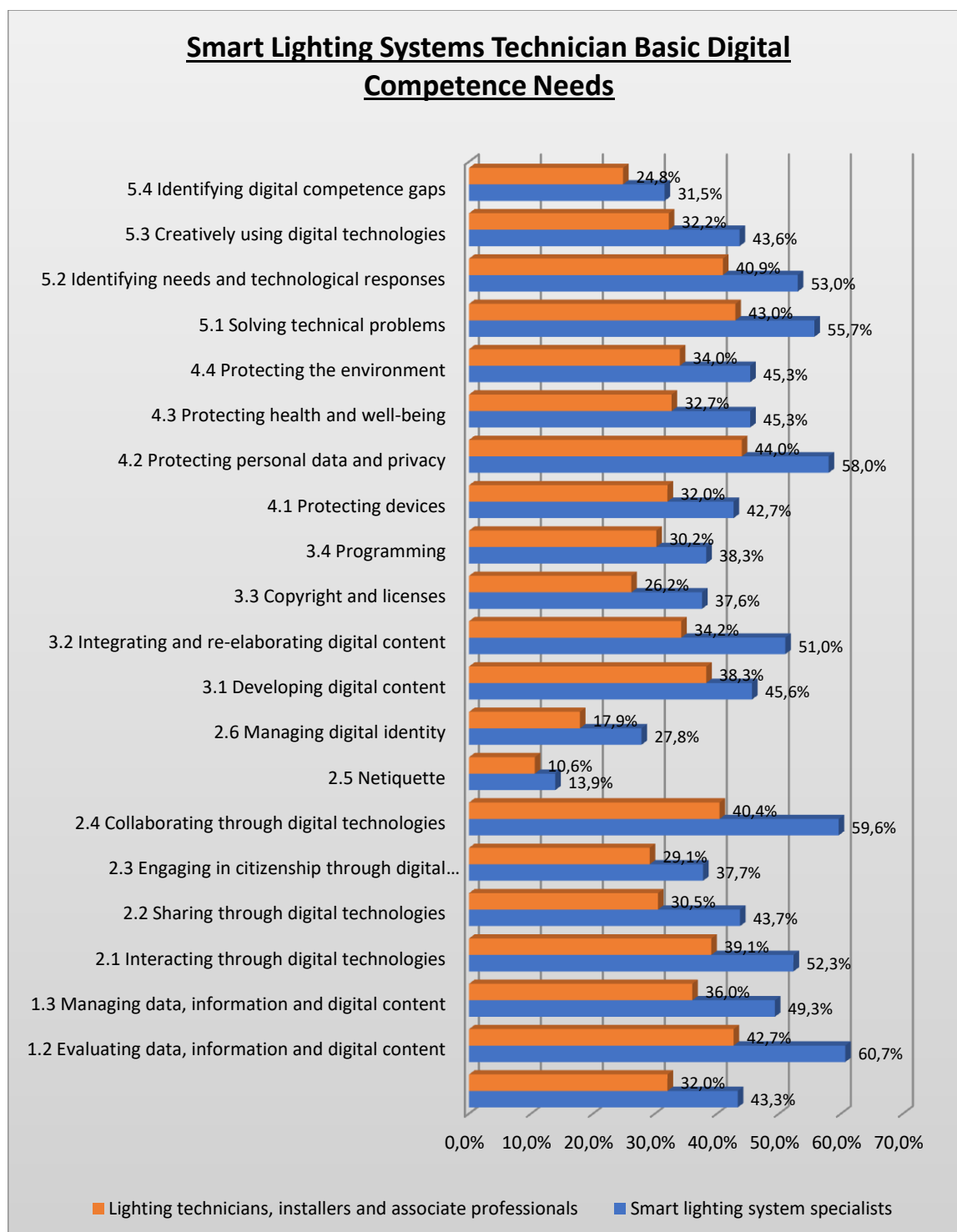


Figure 61: Smart lighting systems technician basic digital competence needs (DigComp)

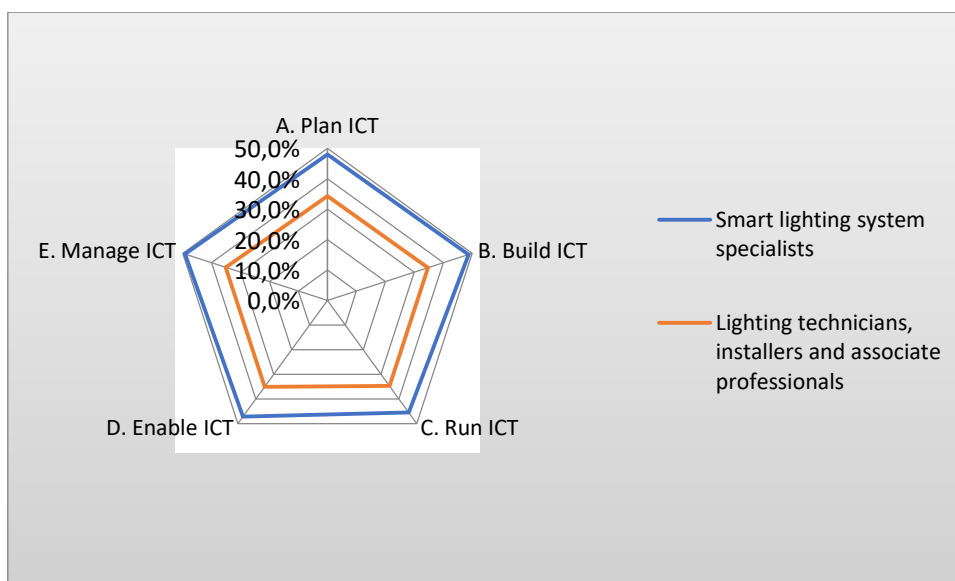


Figure 62: Smart lighting system technician advanced digital competence needs (e-CF areas)

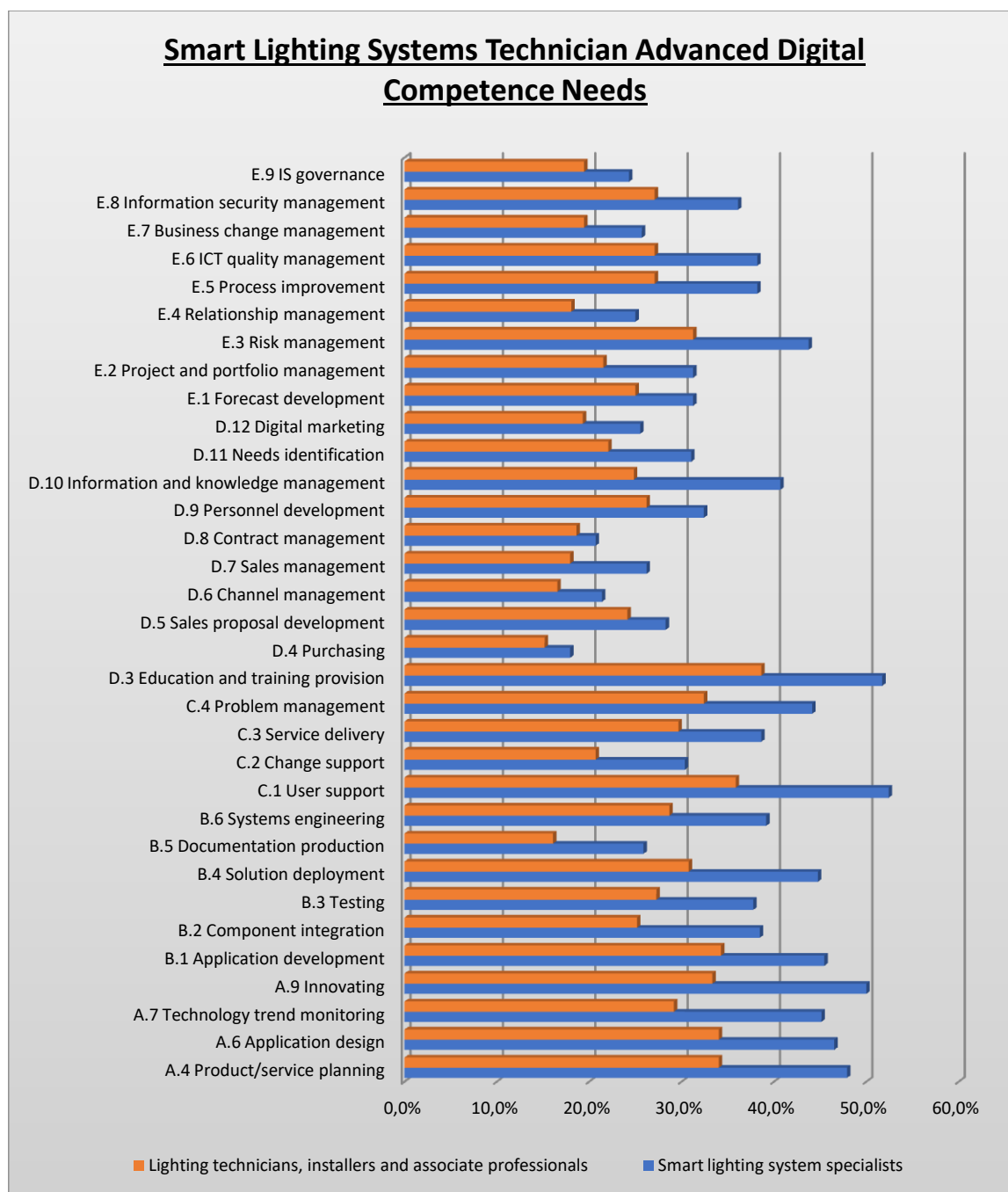


Figure 63: Smart lighting systems technician advanced digital competence needs (e-CF)

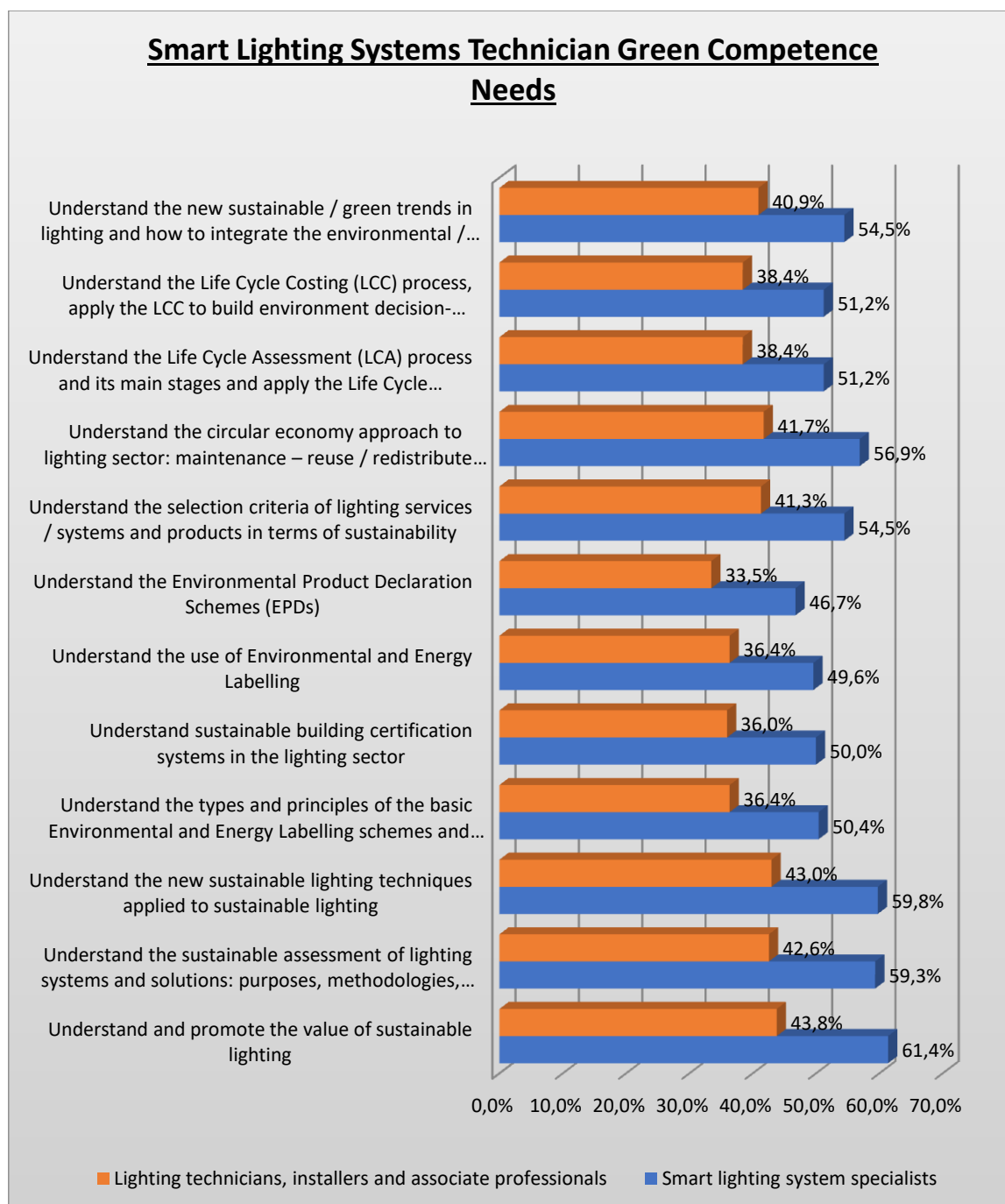


Figure 64: Smart lighting systems technician green competence needs

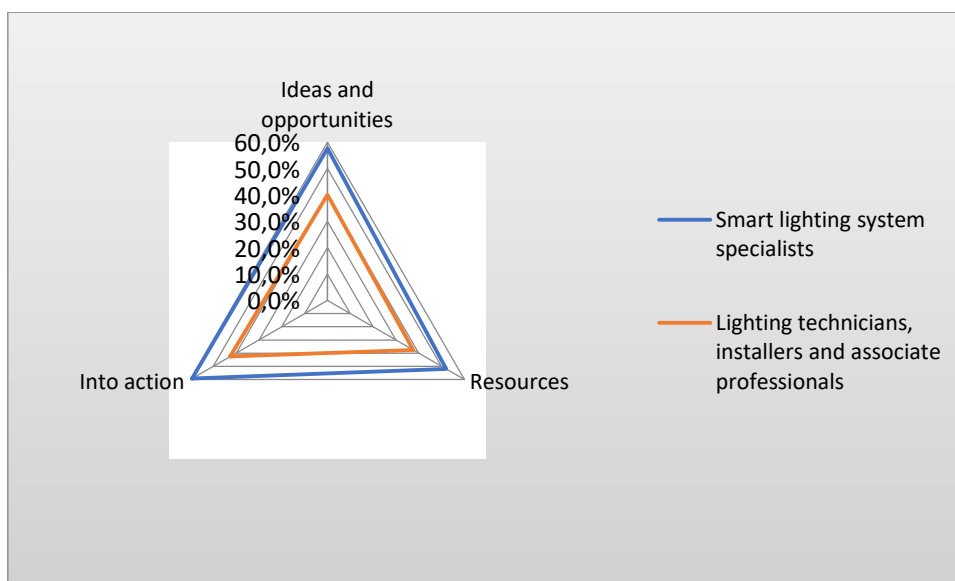


Figure 65: Smart lighting systems technician entrepreneurship competence needs (EntreComp)

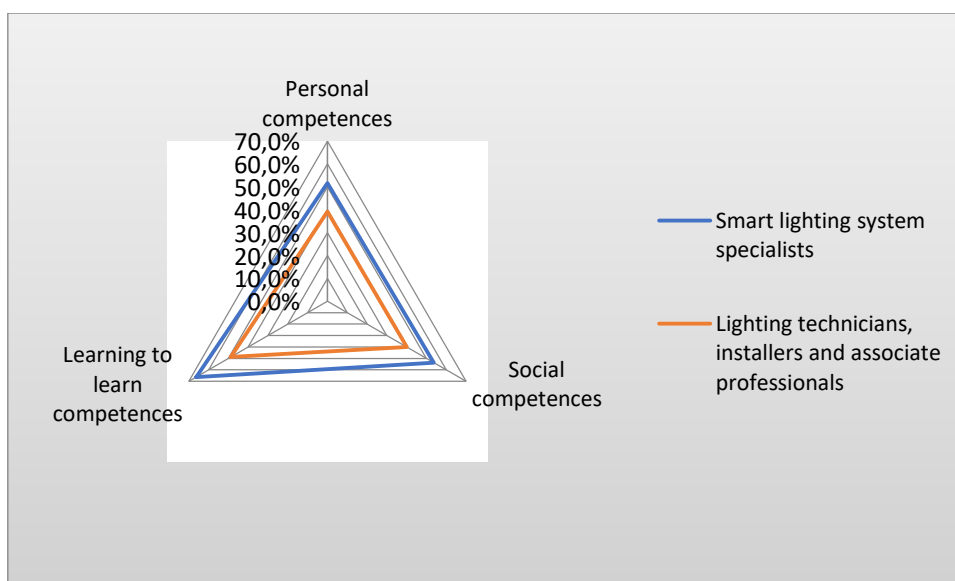


Figure 66: Smart lighting systems technician life competence needs (LifeComp)

The analytical profile of the Smart Lighting Systems Technician is as follows;

Job Role Profile main characteristics			
Job Title:	SMART LIGHTING SYSTEMS TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists <input type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input checked="" type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Exploit the potential of digital technologies. • Good Autocad, Dialux etc. Knowledge • Basic electronic knowledge (lighting technology 90% LED technology) • Solid knowledge of lighting and control technology • Digital sensitivity and existing IoT affinity • Prompt and timely delivery of consistently high-quality products and services. • Understand and transform the client's needs and the building features into the lighting design solution with respect to the current legal and technical regulations, and functional to the target space. • Assimilation of new technologies • Constant professional training and periodical updates regarding new technologies (smart technologies, digital solutions - home automation connected systems), technical regulations and market trends. • Technical solutions (lighting sources), smart solutions, home automations, digitalisation, administrative/certifications aspects. • Increase the knowledge of administrative regulations, especially if he/she collaborates with public bodies, and techniques: certifications, new 		

technological solutions (LED, smart solutions, IOT, etc).	
Technical/Preferred Skill Requirements:	
Lighting Competences/Knowledge	
[Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road Lighting Safety and Security • Lighting system and components technologies including smart Lighting (indoor & outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • End-user's behavior studies (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
Basic digital competences <ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 3.1 Developing digital content • 3.2 Integrating and re-elaborating digital content • 3.4 Programming • 4.1 Protecting devices • 4.2 Protecting personal data and privacy • 4.3 Protecting health and well-being • 4.4 Protecting the environment • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.7 Technology trend monitoring • A.9 Innovating • B.1 Application development • B.2 Component integration • B.3 Testing • B.4 Solution deployment • B.6 Systems engineering • C.1 User support • C.2 Change support • C.3 Service delivery • C.4 Problem management • D.3 Education and training provision • D.9 Personnel development • D.10 Information and knowledge management • D.11 Needs identification • E.1 Forecast development • E.2 Project and portfolio management • E.3 Risk management • E.5 Process improvement • E.6 ICT quality management • E.8 Information security management
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking 	

- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new sustainable lighting techniques applied to sustainable lighting
- Understand the types and principles of the basic Environmental and Energy Labelling schemes and national / international policies
- Understand sustainable building certification systems in the lighting sector
- Understand the use of Environmental and Energy Labelling
- Understand the Environmental Product Declaration Schemes (EPDs)
- Understand the selection criteria of lighting services / systems and products in terms of sustainability
- Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages and apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences [Please use list E]

- Self-regulation
- Flexibility
- Wellbeing
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

The Smart Lighting Systems Technician is an emerging profile, horizontal in a degree, which can be employed in indoor and outside; the proliferation of ICT technologies, sensors, and the IoT overall, has created the need of a job role profile capable of enhancing lighting tasks with smart lighting. This role can and should be at the level of technician and not upper, as the expertise and R&D come from IT professionals.

A Smart Lighting Systems Technician is a hybrid technical expert on IT smart solutions and lighting that should be able to:

- Analyze the lighting project data.

- Determine information system requirements and define project objectives.
- Apply software development process, development environments, tools and techniques.
- Make recommendations for necessary IT system components e.g. hardware, software and networking systems.
- Design, implement and deploy new smart lighting services.
- Operate IT systems and services in relation to lighting.
- Provide support and training to various types of users.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of smart lighting projects successfully completed with a certain timeline
- Positive review by his/her superiors

Additional information

- Not regulated profession according to the Directive 2005/36/EC²⁹

²⁹ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.8 Selection of Job Profiles for the development of the ECOSLIGHT curricula

In the previous section, the section identified the list of the ideal “ECOSLIGHT” profiles. These are the following:

1. Lighting Designer
2. Lighting Systems Engineer
3. Lighting Systems Assistant Engineers
4. Lighting Consultant
5. Landscape and Street Lighting Technician
6. Street Lighting Business Manager
7. Smart Lighting Systems Technician

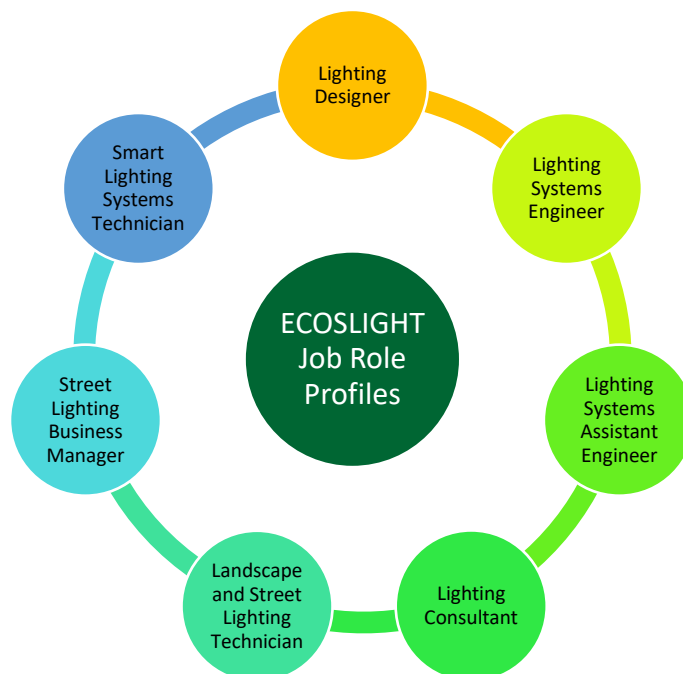


Figure 67: The ECOSLIGHT Job Role Profiles

The criteria for selecting among them and create and implement the ECOSLIGHT VET curricula are the following:

- a) The job role profile must correspond (and) to the EQF 5
- b) The selection must be aligned with the demand

Lighting Designers are ideally EQF level 6 (accepted also as level 5) and are demanded from the market. But, this profile is registered to the ESCO database, therefore it cannot be considered as an emerging profile. **Lighting Systems Engineers** correspond to the EQF level 6, therefore they cannot be selected. **Street Lighting Business Managers** are EQF level 6 and belong to the manager type of professional, for which the survey revealed the decreased demand. Therefore, it cannot be selected for the ECOSLIGHT VET curricula. The following four (4) profiles can be selected for the ECOSLIGHT VET curricula as they fulfil the criteria;

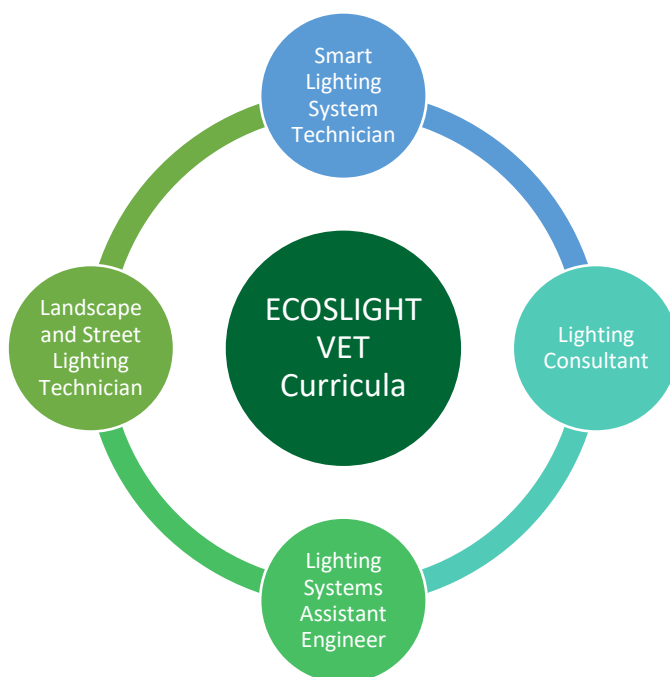


Figure 68: The selected ECOSLIGHT profiles for creating VET curricula

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6 Annex I: Competence lists used for the synthesis of the job role profiles

A. Lighting Competences/knowledge
Lighting Design & solving technical problems
Indoor Lighting for Buildings & Artificial Lighting / Daylight integration
Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.)
Lighting system technologies (Light source, drives, fixtures...)
Smart Lighting (indoor & outdoor), sensors, controls and metering
Light influence on human health, well-being and working performances (Lighting Ergonomics)
Road Lighting Safety and Security
Energy Efficiency & Lighting performance
Lighting policy, regulation, energy labelling, procurement, incentives and planning
Economic models related lighting (Investment, funding models, μ -credits, costs evaluation, life cycle cost, models, Light-as-Service)
End-user's behavior (satisfaction, acceptability, needs...)
Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
Intellectual property rights and other legal basic knowledge for contract management

B1. Digital Competences (wider areas)	DigComp 2.1 (detailed)
A. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content
	1.2 Evaluating data, information and digital content
	1.3 Managing data, information and digital content
B. Communication and collaboration	2.1 Interacting through digital technologies
	2.2 Sharing through digital technologies
	2.3 Engaging in citizenship through digital technologies
	2.4 Collaborating through digital technologies
	2.5 Netiquette
	2.6 Managing digital identity
C. Digital content creation	3.1 Developing digital content
	3.2 Integrating and re-elaborating digital content
	3.3 Copyright and licenses
	3.4 Programming
D. Safety	4.1 Protecting devices
	4.2 Protecting personal data and privacy
	4.3 Protecting health and well-being
	4.4 Protecting the environment

E. Problem solving	5.1 Solving technical problems
	5.2 Identifying needs and technological responses
	5.3 Creatively using digital technologies
	5.4 Identifying digital competence gaps

B2 ICT competences (wider areas)	e-CF 3.0 (detailed)
A. Plan ICT	A.1 Information systems and business strategy alignment
	A.2 Service level management
	A.3 Business plan development
	A.4 Product/service planning
	A.5 Architecture design
	A.6 Application design
	A.7 Technology trend monitoring
	A.8 Sustainability management
	A.9 Innovating
B. Build ICT	B.1 Application development
	B.2 Component integration
	B.3 Testing
	B.4 Solution deployment
	B.5 Documentation production
	B.6 Systems engineering
C. Run ICT	C.1 User support
	C.2 Change support
	C.3 Service delivery
	C.4 Problem management
D. Enable ICT	D.1 Information security strategy development
	D.2 ICT quality strategy development
	D.3 Education and training provision
	D.4 Purchasing
	D.5 Sales proposal development
	D.6 Channel management
	D.7 Sales management
	D.8 Contract management
	D.9 Personnel development
	D.10 Information and knowledge management

E. Manage ICT	D.11 Needs identification
	D.12 Digital marketing
	E.1 Forecast development
	E.2 Project and portfolio management
	E.3 Risk management
	E.4 Relationship management
	E.5 Process improvement
	E.6 ICT quality management
	E.7 Business change management
	E.8 Information security management
	E.9 IS governance

C. Entrepreneurial Competences (wider areas)	EntreComp (detailed)
1. Ideas and opportunities	1.1 Spotting opportunities
	1.2 Creativity
	1.3 Vision
	1.4 Valuing ideas
	1.5 Ethical and sustainable thinking
2. Resources	2.1 Self-awareness and self-efficacy
	2.2 Motivation and perseverance
	2.3 Mobilizing resources
	2.4 Financial and economic literacy
	2.5 Mobilizing others
3. Into action	3.1 Taking the initiative
	3.2 Planning and management
	3.3 Coping with uncertainty, ambiguity and risk
	3.4 Working with others
	3.5 Learning through experience

D. Green competences
Understand and promote the value of sustainable lighting
Understand the theoretical and working principles of sustainable lighting
Sustainable lighting techniques
Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards

Understand the new technologies applied to sustainable lighting
Types and principles of the basic Environmental and Energy Labeling schemes
Understand the use of Environmental and Energy Labeling in the lighting sector
Environmental Product Declaration Schemes (EPDs)
Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
Selection of lighting services/systems and products in terms of sustainability – criteria
Key lighting materials/equipment and its influence in the building's performance
Circular economy approach to lighting sector: maintenance - reuse/redistribute - refurbish/remanufacture – recycle processes
Understand the Life Cycle Assessment (LCA) process and its main stages
Apply the Life Cycle Assessment (LCA) process to lighting cases
Understand the Life Cycle Costing (LCC) process
Apply the LCC to build environment decision-making to lighting cases
How to integrate the environmental / sustainability criteria in the lighting design process
New sustainable/green trends in lighting

7 Annex II: Initial Job Role Profiles identified through market survey

7.1 Architectural lighting project manager / Lighting engineer

Job Role Profile main characteristics			
Job Title:	ARCHITECTURAL LIGHTING PROJECT MANAGER / LIGHTING ENGINEER		
Job Level	<input checked="" type="checkbox"/> Manager <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Senior Professional <input type="checkbox"/> Technician		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable		Skills and knowledge required: <ul style="list-style-type: none"> • Photometric knowledge (lux, lumens, candela, ...) • Project management • Basic knowledge of electricity, electronics, and optics • Knowledge of Autocad, Dialux, Photoshop software • Management of standards related to lighting and fixtures • It is also necessary to be patient, to be able to show good judgment and logic, and to be able to work in a team in order to exchange views and experiences as much as possible. 	
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, µ-credits, costs evaluation, life cycle cost, models, Light-as-Service) • End-user's behavior (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) • Intellectual property rights and other legal basic knowledge for contract management 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.3 Engaging in citizenship through digital technologies 			

- 2.4 Collaborating through digital technologies
- 2.5 Netiquette
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Sustainable lighting techniques
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Key lighting materials/equipment and its influence in the building's performance
- Selection of lighting services/systems and products in terms of sustainability – criteria
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
<p>The Architectural Lighting Project Manager / Lighting Engineer will evolve in this working environment :</p> <ul style="list-style-type: none"> • Office work • National or international travel (depending on the company and the projects) • Work mainly on computer (with the software mentioned below) • Hierarchical links: it really depends on the company: for a lighting design firm, the manager is the lighting designer himself. In another company, it could be a sales manager, an account manager, ... • Work most often with an internal team and / or with architects, project management, project management, ... • Depending on the company, it is possible to manage a small team linked to a design office part (as with manufacturers or resellers of lighting). <p>Possible evolutions towards the positions of Head of Engineering Office, Light Designer Office Manager</p> <ul style="list-style-type: none"> • Lighting study • Interior and / or exterior lighting • Technical support from the sales team • 2D or 3D computer graphics via software such as Photoshop, Dialux or even 3DsMax. • Project monitoring (which can range from the design phase to the programming phase) to ensure that all the trades are well coordinated and that the project owner is satisfied at the end. • On-site adjustments of devices and realization of light scenarios during a project with dynamic lighting • Possibility sometimes of developing with certain manufacturers, custom lighting. • Positions can be either freelance or permanent contract as a simple employee or manager.
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • -

7.2 Street lighting business manager

Job Role Profile main characteristics			
Job Title:	STREET LIGHTING BUSINESS MANAGER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> Skills and knowledge required: Good command of office tools, technical knowledge in lighting and electricity, certified mastery of the language (oral and written production). Qualities: Team management, ability to delegate, ability to analyze, step back, interpersonal skills and contact, rigor 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) Lighting system technologies (Light source, drives, fixtures...) Lighting policy, regulation, energy labelling, procurement, incentives and planning Economic models related lighting (Investment, funding models, μ-credits, costs evaluation, life cycle cost, models, Light-as-Service) End-user's behavior (satisfaction, acceptability, needs...) Intellectual property rights and other legal basic knowledge for contract management 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> 2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity 3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 			
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]			
<ul style="list-style-type: none"> 1.5 Ethical and sustainable thinking 2.1 Self-awareness and self-efficacy 2.2 Motivation and perseverance 			

- 2.3 Mobilizing resources
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Sustainable lighting techniques
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Selection of lighting services/systems and products in terms of sustainability – criteria
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

The Street Lighting Business Manager will evolve in this working environment :

- Office: 60% of the time
- Travel: 40% of the time (for customers or on site)
- Tools: Service or company vehicle, Laptop, Mobile phone
- Hierarchical links: Reporting directly to the Agency Director, supervises the site teams (work supervisors, team leaders, workers)
- Responsibility: Is responsible for the smooth running of its projects, financially and technically
- Management of a team: Yes
- Autonomy, Team work: Relative autonomy

Possible evolutions towards the positions of Agency Directors or Work Center manager

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

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7.3 Lighting project manager

Job Role Profile main characteristics			
Job Title:	LIGHTING PROJECT MANAGER		
Job Level	<input checked="" type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having Master's degree in Science, Engineering or comparable field • Possessing experience in lighting sector and project management • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the physiology and psychology of the human visual system • Understanding of energy efficient & sustainable lighting design • General understanding of the requirements of electrical installations, circuitry, load, voltage and familiarity with electrical codes. • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Strong supervisory, planning and leadership skills • Proficiency in computer-aided design software, e.g. AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, Revit etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. • Knowledge of Adobe Creative Suite • Knowledge of Project Management Software, e.g. MS Project • Familiarity with customer relationship management software 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, μ-credits, costs evaluation, life cycle cost, models, Light-as-Service) • End-user's behavior (satisfaction, acceptability, needs...) 			

- Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
- Intellectual property rights and other legal basic knowledge for contract management

Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]

- 1.1 Browsing, searching and filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content
- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.4 Collaborating through digital technologies
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 3.4 Programming
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- A.1 Information systems and business strategy alignment
- A.2 Service level management
- A.3 Business plan development
- A.4 Product/service planning
- A.7 Technology trend monitoring
- A.8 Sustainability management
- A.9 Innovating
- B.1 Application development
- B.4 Solution deployment
- B.5 Documentation production
- B.6 Systems engineering
- C.1 User support
- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.8 Contract management
- D.9 Personnel development
- D.10 Information and knowledge management
- D.11 Needs identification
- E.2 Project and portfolio management
- E.3 Risk management
- E.4 Relationship management
- E.5 Process improvement
- E.7 Business change management

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Key lighting materials/equipment and its influence in the building's performance
- Circular economy approach to lighting sector: maintenance - reuse/redistribute -refurbish/remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages
- Apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process
- Apply the LCC to build environment decision-making to lighting cases
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:
Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
<p>A Lighting Project Manager, also known as Lighting Project Coordinator plans, schedules, controls and coordinates all activities concerning the management of lighting projects from concept through completion. He is responsible for the supervision of the work of lighting designers, engineers and technicians and ensures that assigned projects are completed accurately, on-time, billed, within budget and within scope of the contract. He/she ensures that each lighting project is in full compliance with international and national norms, standards and legislation and maintains an effective balance between customer satisfaction and project financial results.</p> <p>Key Tasks and Responsibilities</p> <ul style="list-style-type: none"> • Engaging with clients: A Lighting Project Manager must confer constantly with clients so as to identify their needs, provide expert advice and information about the project's progress. He/she ensures maximum client satisfaction and supports the development and maintenance of viable long-term relationships with clients. He also prepares proposals and/or quotes for them. • Lighting project management: Evaluates the contractual scope of work, reviews and approves contractor bids, performs on-site supervision of the project's implementation in order to ensure that the project is completed timely and in accordance with established standards and legislation. Moreover, the Project Manager ensures maximum work safety, project efficiency and profitability. He/she schedules resources, field personnel and equipment to the various ongoing projects and orders all products and materials required for the implementation of each project. Furthermore, he/she manages risks, establishes project recovery plans when required and resolves disputes between members of the project's team. He/she prepares progress reports and contributes to the solution of any problem by providing his/her expertise. • Budget management: A Lighting Project Manager ensures that the implementation of the project lies within budget limits. He/she manages costs, ensures all project billing and invoicing is completed and delivered, maintains profitability goals and positive cash flow for assigned projects. <p>Collaboration with other professionals: Although a Lighting Project Manager must exhibit strong leadership skills, he must collaborate closely and efficiently with all the members of a project team, e.g. lighting designers, engineers, technicians. He needs to maintain active communication and effective collaboration with them. He/she participates in the quality control review of their work.</p>
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • Number of successfully completed lighting projects within a certain timeline • Positive review of the projects by his/her superiors and the clients

7.4 Assistant building work manager

Job Role Profile main characteristics			
Job Title:	ASSISTANT BUILDING WORK MANAGER		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable		<ul style="list-style-type: none"> Knowledge of the different types of lighting, light sources, optics, electrical connections ... Staff management, site costs, completion time for the various works (mast installation, connection, adjustment, junction box, connection of a cabinet, etc.), the necessary equipment Qualities : Organized, open to discussion, know how to make decisions 	
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> Lighting Design & solving technical problems Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) Lighting system technologies (Light source, drives, fixtures...) Smart Lighting (outdoor), sensors, controls and metering Road Lighting Safety and Security Energy Efficiency & Lighting performance Lighting policy, regulation, energy labelling, procurement, incentives and planning End-user's behavior (satisfaction, acceptability, needs...) 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> 2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 5.1 Solving technical problems 5.2 Identifying needs and technological responses 			
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]			
<ul style="list-style-type: none"> 1.5 Ethical and sustainable thinking 2.1 Self-awareness and self-efficacy 2.2 Motivation and perseverance 2.3 Mobilizing resources 			

- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Sustainable lighting techniques
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Selection of lighting services/systems and products in terms of sustainability – criteria
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

The Assistant Building Work Manager will evolve in this working environment :

- Hierarchical links: Agency director, sales manager, works supervisor
- Responsibility : Management of a team, Business and site monitoring (cost management), management of electrician teams
- Autonomy, Team work : Autonomy for the management and programming of worksites; Teamwork with work supervisors and teams

After about two years of successful experience, you can become a site supervisor. You will then work on larger sites. At the end of ten years, it is possible to become a works manager: you will then be responsible for several sites at the same time, and will supervise various works foremen.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

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7.5 Compliance engineer

Job Role Profile main characteristics			
Job Title:	COMPLIANCE ENGINEER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input checked="" type="checkbox"/> Indoor / Office <input type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Bachelor's Degree in electrical engineering (BSEE) or related field. • Proficiency the UL approval process and design requirements. • Minimum of 5 years' experience in product safety certification. Lighting industry experience can be a big plus. • Understanding of LED drivers, dimming systems, Lighting controls and PCB construction. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, luminaire drivers, dimming systems efficiency, optical characteristics, lighting controls • Knowledge of product safety certification engineering, experience working on listing products with Certifying Bodies as well as knowledge of related standards, e.g. ISO 17025 • Understanding of the parameters related to light fixture design (Lumen output, CCT, CRI, Ra, BUG, CoB, LED, etc.). • Excellent written and verbal communication skills. • MS Office applications (PowerPoint, Excel, Word, Outlook). • Ability to perform root cause failure analysis. • Understanding of the National Electrical Code (NEC). • Ability to read, comprehend and produce detailed drawings and schematics • Ability to use hand tools • Familiarity with precision measuring and monitoring of laboratory equipment • Safety consciousness, knowledge of safely working with electricity 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering 			

- Light influence on human health, well-being and working performances (Lighting Ergonomics)
- Road Lighting Safety and Security
- Energy Efficiency & Lighting performance
- Lighting policy, regulation, energy labelling, procurement, incentives and planning
- Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
- Intellectual property rights and other legal basic knowledge for contract management

Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]

- 1.1 Browsing, searching and filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content
- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.3 Engaging in citizenship through digital technologies
- 2.4 Collaborating through digital technologies
- 2.5 Netiquette
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- A.4 Product/service planning
- A.5 Architecture design
- A.6 Application design
- A.7 Technology trend monitoring
- A.8 Sustainability management
- A.9 Innovating
- B.1 Application development
- B.2 Component integration
- B.3 Testing
- B.4 Solution deployment
- B.5 Documentation production
- B.6 Systems engineering
- C.1 User support

- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- D.10 Information and knowledge management
- D.11 Needs identification
- E.3 Risk management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Key lighting materials/equipment and its influence in the building's performance
- Circular economy approach to lighting sector: maintenance - reuse/redistribute - refurbish/remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages
- Apply the Life Cycle Assessment (LCA) process to lighting cases

- Understand the Life Cycle Costing (LCC) process
- Apply the LCC to build environment decision-making to lighting cases
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Compliance Engineer supports the Research and Development department by identifying and meeting the compliance requirements for a company's lighting products. Duties include investigating compliance issues, analyzing and interpreting standards, conducting design validation and approbation tests on a wide range of lighting products as well as defining and applying technical specifications to develop test requirements and define design requirements for new products.

Key Tasks and Responsibilities:

- **Research & Development of new products:** A Compliance Engineer participates in the design and development of new lighting products along with other product development core professionals and prepares the formulation of product testing procedures.
- **Compliance testing of lighting products and maintenance of laboratory equipment:** A Compliance Engineer conducts various types of test on the company's product, e.g. photometric, electric, thermal, rain, and vibration tests to lighting products so as to verify the compliance of each product with international and national norms and standards as well as the company's technical specifications. Therefore, he/she must produce detailed documentation with regards to all tests and results. Additionally, he/she is responsible for the maintenance of laboratory apparatus and safety. Duties also include calibration of laboratory equipment and records of all monitoring devices and measurement apparatus.

The compliance engineer can be in charge of the following actions using his various skills:

- Prepare and execute lighting fixtures safety approval according to National Standards and policies
- Create and Maintain BOM, Certificates and Company's Safety Listing Reports
- Lead certification for Photometric Lab
- Help with installation, certification, calibration and maintenance of the laboratory equipment.
- Collect quotes and negotiate prices.
- Serve as the company's leading contact with certifying agencies and labs. Also, coordinate and manage monthly plant inspections
- Conduct certification (as DLC, Energy Star...)
- Resolve Variation Notices and non-compliance issues
- Lead the design review of multiple new products for meeting UL requirements

- Help to supervise internal Photometric Lab
- Responsible for company Thermal and IP test laboratories and equipment
- Establish product testing procedures, maintain paperwork and complete all needed tests and issue reports.
- Building prototypes and store tested samples.
- Assist with QC inspections

Collaboration with other professionals: A Compliance Engineer needs to cooperate with other professionals either for research and development or for compliance testing of lighting products.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of successfully completed compliance tests within a certain timeline
- Positive review by his/her superiors

7.6 Street lighting engineer

Job Role Profile main characteristics			
Job Title:	STREET LIGHTING ENGINEER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input checked="" type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having a Master's degree in Engineering • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the principles, practices, international and national norms, standards and legislation with regards to street lighting and public works as well as safety principles and practices • Familiarity with street lighting materials, equipment and circuit requirements of a variety of street lighting systems and street lighting control protocols e.g. DALI, Zhaga-D4i, 0-10 V DC etc. • Understanding of the principles with regards to civil, electrical, mechanical and illuminating engineering involved in the design, construction, testing, operation and maintenance of street and highway lighting • Knowledge of the physiology and psychology of the human visual system • Familiarity with current developments and technologies in the field of street lighting systems with emphasis on usage of energy efficient devices and systems • Comprehension of principles and practices of public administration, including municipal budgetary and administrative methods and practices, organizational development, and staffing • Familiarity with supervisory principles and practices including planning, delegating, and controlling the work of subordinates • Ability to train, instruct, evaluate, counsel and motivate subordinate work 		

	<p>performance as well as supervisory responsibility</p> <ul style="list-style-type: none"> • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in software for street lighting design software, e.g. Relux, Dialux • Describe the work Experience and education background expected • The principles, practices and standards of street and highway illumination; • Street lighting materials, equipment and circuit requirements of a variety of street lighting systems; • The principles of civil, electrical, and illuminating engineering involved in the design, construction, and operation of street and highway lighting; • Procedures and legal requirements involved in the establishment, construction and maintenance of lighting assessment districts; • Safety principles and practices; • Provisions of the American National Standard Practice of Roadway Lighting, Standard; Specifications for Public Works Construction, and Bureau of Street Lighting Standards as related to design, construction, and maintenance of street lighting systems; • Organization, policies and functions of the Bureau of Street Lighting and its relationships working with other units of City government; • Supervisory principles and practices including planning, delegating, and controlling the work of subordinates; • Training, instructing and evaluating subordinate work performance; • Counseling, disciplining and motivating subordinate personnel; • Procedures for grievance handling; • Supervisory responsibility as set forth by equal employment opportunity principles and guidelines; • Laws and regulations related to equal employment opportunity; • City personnel rules, policies, and procedures; and • Memoranda of understanding as applied to subordinate personnel.
Technical/Preferred Skill Requirements:	
Lighting Competences/Knowledge	
[Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]	
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • End-user's behavior (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) Intellectual property rights and other legal basic knowledge for contract management • Intellectual property rights and other legal basic knowledge for contract management 	
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]	
<ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies 	

- 2.4 Collaborating through digital technologies
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- A.4 Product/service planning
- A.5 Architecture design
- A.6 Application design
- A.7 Technology trend monitoring
- A.8 Sustainability management
- A.9 Innovating
- B.1 Application development
- B.2 Component integration
- B.3 Testing
- B.4 Solution deployment
- B.5 Documentation production
- B.6 Systems engineering
- C.1 User support
- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- D.8 Contract management
- D.9 Personnel development
- D.10 Information and knowledge management
- D.11 Needs identification
- E.2 Project and portfolio management
- E.3 Risk management
- E.4 Relationship management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance

- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Circular economy approach to lighting sector: maintenance - reuse/redistribute -refurbish/remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages
- Apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process
- Apply the LCC to build environment decision-making to lighting cases
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Street Lighting Engineer performs the engineering management of street lighting installation and maintenance activities. He/She plans, organizes and directs the work of professional, technical and administrative employees in a major division performing assessment processing and the preparation of plans, specifications, cost analyses, construction, cost estimates and

testing related to the construction, reconstruction, operation maintenance and repair of a variety of municipal street lighting projects. A Street Lighting Engineer is responsible for the review and approval of street lighting designs prepared by subordinate engineers, as well as the preparation of street lighting installation and maintenance contracts for work performed by outside contractors. Moreover, his/her duties include developing policy statements on electrical energy and lighting issues, reviewing and approving monthly electrical utility power bills and developing and recommending proposals to refine operating procedures in order to increase productivity and reduce operating costs.

Key Tasks and Responsibilities:

- **Coordination of the overall planning and design of a city-wide street lighting system:** A Street Lighting Engineer coordinates the planning, layout and engineering work of a city-wide street lighting program and directs illuminating engineering and visibility studies. He/She reviews preliminary and final lighting plans for feasibility, design, compliance with street lighting standards and legislation. Moreover, he/she revises and approves designs of new lighting systems prepared by engineering staff and provides technical advice. Tasks also include identification and evaluation of efficient existing and emerging technologies and estimation of costs of incorporating new technologies and improvements, as well as costs of installations and preparation of capital funding requests. Additionally, the Street Lighting Engineer revises standard specifications so as to include energy efficient technology and prepares bulletins and memoranda on street lighting procedures, standards and requirements.
- **Street lighting system installation and maintenance:** The Street Lighting Engineer plans, assigns, supervises the installation and maintenance and repair of street lighting system, which includes poles, brackets, luminaires, wiring, lighting controls and reviews the activities of the installation and maintenance personnel. Additionally, he/she directs the identification and replacement of obsolete street lighting equipment.
- **Management of street lighting budget:** The Street Lighting Engineer prepares the operating and capital budgets for the street lighting program. Moreover, he/she supervises the estimating the costs of new street lighting installation/upgrade projects or existing lighting maintenance/repair costs, as well as revenues and cash flow necessary to finance the operation of the lighting system. Duties also include monitoring monthly power usage and costs, preparation of reports and the submission of recommendations for the reduction of operating costs.
- **Contract preparation:** The Street Lighting Engineer is responsible for the preparation of contract proposals regarding supply, installation and maintenance of street lighting equipment and discusses with equipment manufacturers, distributors, and contractors
- **Training:** A Street Lighting Engineer must share his/her knowledge with other professionals, subordinates and provide training and educational material, e.g. technical presentations for them.

Collaboration with other professionals and authorities: A Street Lighting Engineer must collaborate closely with other colleagues, subordinates, principal officers, local and government authorities. communicates equal employment opportunity information to employees He has the responsibility to provide information to the public and others on the status of various lighting projects and appear before City Council, Council committees etc. He/She addresses civic and neighborhood groups, professional associations and others in order to resolve complaints or to acquaint the public with the City's street lighting goals, objectives and programs. Duties also include expert witness testimony in court.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of street lighting projects successfully completed with a certain timeline
- Positive review by his/her superiors

7.7 Lighting designer

Job Role Profile main characteristics			
Job Title:	LIGHTING DESIGNER		
Job Level	<input checked="" type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having a Bachelor's degree in a technical field, i.e. in Architecture, Interior Design, Electrical Engineering or related field and a Master's degree in Lighting • Possessing experience in lighting sector/electrical services • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the physiology and psychology of the human visual system • Understanding of energy efficient & sustainable lighting design • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in computer-aided design software, e.g. AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, Revit etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. • Knowledge of Adobe Creative Suite • Familiarity with customer relationship management software • Being proficient in Microsoft Office • Showing an understanding of lighting design • Proficiency in Adobe Creative Suite • Energy efficient design experience • Experience with CRM software <p>Advanced skills: While most employers did not require the following skills, multiple job listings included them as preferred. Add these to your Lighting Designer toolbox and broaden your career options.</p> <p>Lighting Designers are knowledgeable and experienced professionals who know how to deal with the intricacies of designing and installing electrical systems. They are organized multi-taskers who can juggle multiple clients at once. Both analytical and creative, successful Lighting Designers solve problems while also designing lighting systems that meet the aesthetic and design needs of their clients.</p>		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) 			

- Lighting system technologies (Light source, drives, fixtures...)
- Smart Lighting (indoor & outdoor), sensors, controls and metering
- Light influence on human health, well-being and working performances (Lighting Ergonomics)
- Road Lighting Safety and Security
- Energy Efficiency & Lighting performance
- Lighting policy, regulation, energy labelling, procurement, incentives and planning
- Economic models related lighting (Investment, funding models, μ -credits, costs evaluation, life cycle cost, models, Light-as-Service)
- End-user's behavior (satisfaction, acceptability, needs...)
- Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
- Intellectual property rights and other legal basic knowledge for contract management

Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]

- 1.1 Browsing, searching and filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content
- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.4 Collaborating through digital technologies
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 3.4 Programming
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- A.4 Product/service planning
- A.5 Architecture design
- A.6 Application design
- A.7 Technology trend monitoring
- A.8 Sustainability management
- A.9 Innovating
- B.2 Component integration
- C.1 User support
- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- D.9 Personnel development
- D.10 Information and knowledge management
- D.11 Needs identification

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Key lighting materials/equipment and its influence in the building's performance
- Circular economy approach to lighting sector: maintenance - reuse/redistribute -refurbish/remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages
- Apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process
- Apply the LCC to build environment decision-making to lighting cases
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:
Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
<p>A Lighting Designer also known as Lighting Design Specialist, Consultant or Engineer, designs and plans lighting and electrical systems, and artificial lighting systems according to the customer's requirements as well as international and national codes and standards. Furthermore, he/she is responsible for the implementation of lighting control as well as the integration of daylight where appropriate and works in collaboration with a variety of professionals, including interior designers, engineers and architects. The lighting design can be for residential, commercial or industrial spaces. A Lighting Designer usually works under limited supervision, but as a member of a collaborative team. Lighting designers usually work for lighting companies, architecture, interior design firms and service clients or independently as freelancers but sometimes they work for a large venue and are in charge of designing lighting for the venue's events.</p> <p>Key Tasks and Responsibilities</p> <ul style="list-style-type: none"> • Conference with clients : A lighting designer must confer with the clients so as to identify their desires, needs as well as the specifications of a lighting project. Moreover, he must nurture existing client relationships and proactively pursues opportunities for new business. • Assessment of the project site: In order to effectively design lighting systems for a given site, the Lighting Designer must travel to the site to assess and analyze it. They also communicate extensively with the customer while there to identify their desires and needs. A team of electrical engineers will typically travel with them to survey the site. • Lighting design : After adequately assessing a project site, the Lighting Designer designs a lighting plan for the site according to customer specifications, the assessment of the site itself while taking into account lighting quality, visual comfort, energy efficiency, human physiology and psychology, safety concerns as well as the compliance of lighting design with international and national codes and standards. During the design process, he/she acts as a liaison between the client and engineering departments, balancing client desires, performance of lighting equipment's and aesthetics with practical concerns, such as the project budget. More specifically, lighting design involves the development of lighting concepts, the selection of appropriate lighting equipment (luminaires, drives, lighting controls), the conduction of lighting calculations, the design of lighting control systems, the preparation of technical documentation and the technical presentation of proposed lighting solutions to customers and end users. During this process, the lighting designer must also produce renderings using pictures and software manipulation tools to create conceptual lighting images and produce compliance documentation according to international and national codes and standards. • Budget management : A Lighting Designer must pay attention to the budget of their project. Usually they are working within the financial constraints of their client, so they need to make sure as they are designing a lighting system that it remains within the client's budget. • Implementation of lighting design : Once the lighting design is approved, the Lighting Designer surveys the implementation of the lighting design concept namely the installation of lighting equipment to the project site according the project timeline. • Training & technical presentations: A lighting designer must share his/her knowledge with other colleagues and provide training and educational material, e.g. technical presentations for them. <p>Collaboration with other professionals: A lighting designer must collaborate closely with other designers, engineers and members of the project team. He/She must also constantly confer with the Project Manager for the successful coordination of the project. He/She participates in the quality control review of fellow designers and engineers. He needs to maintain an active communication with lighting representatives so as to be constantly informed about existing and emerging lighting products, industry trends, etc.</p>
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • Number of successfully completed lighting projects within a certain timeline • Positive review of the projects by the Project Manager and the clients

7.8 Product development engineer

Job Role Profile main characteristics			
Job Title:	PRODUCT DEVELOPMENT ENGINEER		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input checked="" type="checkbox"/> Indoor / Office <input type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having a Bachelor's degree in Mechanical Engineering or related field • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of sheet metal, die cast, aluminum and plastic extrusion and injection molding manufacturing techniques in order to design components for light fixtures • Understanding of energy efficient & sustainable lighting technologies • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in computer-aided design software, e.g. Solidworks, AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, μ-credits, costs evaluation, life cycle cost, models, Light-as-Service) • End-user's behavior (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 1.2 Evaluating data, information and digital content • 1.3 Managing data, information and digital content 			

- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.4 Collaborating through digital technologies
- 2.6 Managing digital identity
- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 3.4 Programming
- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- A.4 Product/service planning
- A.5 Architecture design
- A.6 Application design
- A.7 Technology trend monitoring
- A.8 Sustainability management
- A.9 Innovating
- B.1 Application development
- B.2 Component integration
- B.3 Testing
- B.4 Solution deployment
- B.5 Documentation production
- B.6 Systems engineering
- C.1 User support
- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- D.10 Information and knowledge management
- D.11 Needs identification
- E.3 Risk management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5 Mobilizing others

- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards
- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Environmental Product Declaration Schemes (EPDs)
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Key lighting materials/equipment and its influence in the building's performance
- Circular economy approach to lighting sector: maintenance - reuse/redistribute -refurbish/remanufacture – recycle processes
- Understand the Life Cycle Assessment (LCA) process and its main stages
- Apply the Life Cycle Assessment (LCA) process to lighting cases
- Understand the Life Cycle Costing (LCC) process
- Apply the LCC to build environment decision-making to lighting cases
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Product Development Engineer also known as Product Designer designs and develops new luminaires and components for them, e.g. reflectors, diffusers, lenses etc. and improves existing ones.

Key Tasks and Responsibilities

- Design and develop innovative luminaires and components adjusted on customer needs and technological competitiveness from concept through production including component selection, simulation test, prototype build, safety approvals, production integration and technical troubleshooting.
- Prepare product documentation namely bills of material structure, assembly process documentation, installation

instruction sheets, technical specification datasheets.

- Identify, initiate and implement solutions for process/product development that improves performance, reduces cost, strengthens yield and increases capability.
- Oversee the manufacturing process of light fixtures and components.

Collaborate with other professionals: engineers, lighting designers, managers and confer with clients.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of successfully completed lighting products within a certain timeline
- Positive review of the products by the company and the clients

7.9 Commissioning engineer

Job Role Profile main characteristics			
Job Title:	COMMISSIONING ENGINEER		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Having a Bachelor's degree in Electrical Engineering or related field • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Understanding of energy efficient & sustainable lighting design • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Strong fault-finding and technical troubleshooting skills • Basic electrical knowledge, e.g. wiring, testing etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations, e.g. DALI. 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting / Daylight integration • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Light influence on human health, well-being and working performances (Lighting Ergonomics) 			

- Road Lighting Safety and Security
- Energy Efficiency & Lighting performance
- Lighting policy, regulation, energy labelling, procurement, incentives and planning
- End-user's behavior (satisfaction, acceptability, needs...)

Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]

- 1.1 Browsing, searching and filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.4 Collaborating through digital technologies
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment
- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- C.1 User support
- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- D.10 Information and knowledge management
- D.11 Needs identification
- E.3 Risk management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.5 Mobilizing others
- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Understand and promote the value of sustainable lighting
- Understand the theoretical and working principles of sustainable lighting
- Sustainable lighting techniques
- Sustainability assessment of lighting systems and solutions: purposes, methodologies, standards

- Understand the new technologies applied to sustainable lighting
- Types and principles of the basic Environmental and Energy Labeling schemes
- Understand the use of Environmental and Energy Labeling in the lighting sector
- Lighting and sustainable building certification systems (e.g. LEED, GreenGlobes, NZEB, PassivHaus, EDGE, WELL + Verde certificate (Spain), HQE (France), Protocollo ITACA (Italy))
- Selection of lighting services/systems and products in terms of sustainability – criteria
- Key lighting materials/equipment and its influence in the building's performance
- Circular economy approach to lighting sector: maintenance - reuse/redistribute -refurbish/remanufacture – recycle processes
- How to integrate the environmental / sustainability criteria in the lighting design process
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Lighting Commissioning Engineer is responsible for the testing and commissioning of lighting control systems. He/She will provide on and off-site aftercare services so that the lighting control systems are maintained to a high level of operations across projects and sites.

Key Tasks and Responsibilities

- Preparing scheme drawings showing port details for luminaires and sensors plus IP networking
- Providing technical support and advice with regards to lighting installations and control systems
- Analyzing potential faults and give advice on technical solutions
- Monitoring and communicating any technical or installation issues
- Logging product defects
- Providing technical support and guidance to technicians, installers etc.
- Contributing to technical documentation of lighting equipment including application notes, technical tips, FAQs, and training documents

Preparing various technical reports and working closely with lighting designers, clients, the Project Manager etc.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of successfully completed commissioning lighting projects within a certain timeline
- Positive review of the products by the Project Manager and the clients

7.10 Lighting technician

Job Role Profile main characteristics			
Job Title:	LIGHTING TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Technical knowledge of lighting equipment • Basic electrical knowledge, e.g. wiring, testing, repairing etc. • Knowledge of lighting control protocols, e.g. DMX512 • Ability to use hand tools and power-driven machinery • Manual dexterity and a high level of physical fitness, stamina and agility • Knowledge of health and safety guidelines, regulations etc. • Attention to detail and creativity • Understanding of artistic concepts • Knowledge of lighting design, theatre and entertainment arts, live event technology regarding the operation of lighting systems may be required • Strong communication skills 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 5.1 Solving technical problems • 5.3 Creatively using digital technologies • A.7 Technology trend monitoring • A.8 Sustainability management • A.9 Innovating • B.4 Solution deployment • B.6 Systems engineering • C.1 User support • C.2 Change support 			

- C.3 Service delivery
- C.4 Problem management
- D.3 Education and training provision
- E.3 Risk management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 3.1 Taking the initiative
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Selection of lighting services/systems and products in terms of sustainability – criteria
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

Lighting technicians are responsible for the preparation, installation, rigging, wiring, operation and maintenance of lighting systems in theaters, venues, concert halls, broadcasting studios, indoor and outdoor live events etc. They implement the lighting design according to a lighting designer's plan and instructions and produce the appropriate visual effects for an arts/entertainment event, show or any type of broadcasted production. Their work is physically demanding requiring physical mobility, balance, strength and agility because heavy lifting and working at heights in order to install the lighting equipment are often required. Their work requires ability to use hand tools and power-driven machinery, knowledge of health and safety requirements and collaboration with other professionals, e.g. lighting designers, sound technicians, the theater director, production manager etc. so as to deliver the optimal result in any type of production.

Key Tasks and Responsibilities:

- Interpreting a lighting designer's plan
- Installing, wiring, rigging, focusing and operating necessary lighting equipment
- Programming lighting control consoles and auxiliary equipment before the show/event
- Choose and combine colors to achieve the desired effect

- Provide and distribute power around the set and support areas
- Operating manual and computer-controlled lighting systems and controls during a show/event
- Performing routine maintenance functions such as replacing damaged light fixtures, luminaire drivers, color filters, so as to ensure the safe operation of lighting equipment and prevent technical problems
- Maintenance and proper utilization of electrical tools and equipment
- Operating within current health and safety regulations especially when working at heights and installing equipment
- Uninstalling all equipment at the end of the broadcast or production and ensure its safe transport and/or storage
- Attending production meetings to establish lighting requirements for a production
- Conferring with the lighting designer or the director of photography and other staff so as to integrate their creative vision into the lighting design as well as with other departments, such as sound and camera, the floor manager and producer etc.
- Coordinating the equipment and the technical crew and train other crew members as required
- Conducting risk assessments and ensure health and safety with regards to lighting
- Providing advice on the lighting budget and on the purchase of equipment

Keeping abreast of the advances in technologies and techniques in the industry.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of lighting systems successfully installed in a production set
- Positive review by his/her superiors

7.11 Street lighting study leader

Job Role Profile main characteristics			
Job Title:	STREET LIGHTING STUDY LEADER		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input checked="" type="checkbox"/> Junior Professional <input type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input checked="" type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Knowledge of <ul style="list-style-type: none"> ◦ Computer and software : AUTOCAD, CANECO EP, DIALUX, MICROSTATION ◦ Basics in photometry and Lighting technologies ◦ Standards and policies : C17-200, EN13.201 etc... • Qualifications : <ul style="list-style-type: none"> ◦ General lighting (any application) ◦ Electricity ◦ Plan projector ◦ Lighting software ◦ Standards and regulations ◦ Sociability for meetings with municipalities, trade unions 		

Technical/Preferred Skill Requirements:
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning • End-user's behavior (satisfaction, acceptability, needs...) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment)
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]
<ul style="list-style-type: none"> • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 2.5 Netiquette • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 2.5 Mobilizing others • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience
Green Competences [Please use list D]
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Sustainable lighting techniques • Types and principles of the basic Environmental and Energy Labeling schemes • Understand the use of Environmental and Energy Labeling in the lighting sector • Selection of lighting services/systems and products in terms of sustainability – criteria • How to integrate the environmental / sustainability criteria in the lighting design process

<ul style="list-style-type: none"> • New sustainable/green trends in lighting
Life Competences [Please use list E]
<ul style="list-style-type: none"> • Self-regulation • Growth mindset • Empathy • Adaptability • Wellbeing • Communication • Collaboration • Managing learning • Critical thinking
Job description:
Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
The Street Lighting Study Leader will evolve in this working environment : <ul style="list-style-type: none"> • Hierarchical links: in constant contact with his business manager • Responsibility : Responsible for the study carried out and in relation for advice with his works supervisor and his operations • Autonomy, Team work : Autonomous in studies and in a team for monitoring work with his work supervisor and his business manager After few of successful experience, you can become a Project Manager.
Key Performance Indicators (KPIs): [Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]
<ul style="list-style-type: none"> • -

7.12 Street lighting technician

Job Role Profile main characteristics			
Job Title:	STREET LIGHTING TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Technical knowledge of street lighting equipment • Basic electrical knowledge, e.g. wiring, testing, repairing etc. • Knowledge of street lighting control protocols, e.g. DALI, Zhaga-D4i, 0-10 V DC etc. • Ability to use hand tools and power-driven machinery • Manual dexterity and a high level of physical fitness, stamina and agility • Knowledge of health and safety guidelines, regulations etc. • Attention to detail • Strong communication skills 		
Technical/Preferred Skill Requirements:			
Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]			
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Light for Outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) • Lighting system technologies (Light source, drives, fixtures...) • Smart Lighting (indoor & outdoor), sensors, controls and metering • Road Lighting Safety and Security • Energy Efficiency & Lighting performance • Lighting policy, regulation, energy labelling, procurement, incentives and planning 			
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]			
<ul style="list-style-type: none"> • 1.1 Browsing, searching and filtering data, information and digital content • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 5.1 Solving technical problems • 5.3 Creatively using digital technologies • A.7 Technology trend monitoring • A.8 Sustainability management • A.9 Innovating • B.4 Solution deployment • B.6 Systems engineering • C.1 User support 			

- C.2 Change support
- C.3 Service delivery
- C.4 Problem management
- E.3 Risk management
- E.5 Process improvement

Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]

- 1.2 Creativity
- 1.3 Vision
- 1.4 Valuing ideas
- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 3.1 Taking the initiative
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5 Learning through experience

Green Competences [Please use list D]

- Selection of lighting services/systems and products in terms of sustainability – criteria
- New sustainable/green trends in lighting

Life Competences [Please use list E]

- Self-regulation
- Growth mindset
- Empathy
- Adaptability
- Wellbeing
- Communication
- Collaboration
- Managing learning
- Critical thinking

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

Street Lighting Technicians perform skilled electrical work in installing and maintaining arterial, residential and commercial street lighting systems and is responsible for performing other duties as required, which include using a computer e.g. to update the maintenance management system as repair work is performed and completed. The physical demand of the work post is high due to heavy lifting and working at heights, so a Street Lighting Technician must possess a high level of physical fitness, strength, mobility, balance and agility. Duties require ability to use power-driven tools, knowledge of health and safety requirements and collaboration with other professionals, e.g. lighting designers, technicians, street lighting engineers etc.

Key Tasks and Responsibilities:

- Installation, operation, general maintenance, repair and adjustment of street lighting systems
- Relocations and modifications of street lighting systems
- Installation of large illuminated traffic signs
- Periodic preventive maintenance of street lights and replacement of damaged and obsolete equipment
- Record keeping of street lighting equipment inventory

- Maintenance and proper utilization of electrical tools and equipment
- Conduction of on site risk assessment and guarantee health and safety with regards to street lighting
- Production of reports documenting the amount of completed work

Cooperation with other professionals, communication with general public

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of street lighting systems successfully installed within a certain timeline
- Positive review by his/her superiors

7.13 Theatre lighting technician

Job Role Profile main characteristics			
Job Title:	THEATRE LIGHTING TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional	<input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician	
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input checked="" type="checkbox"/> Not applicable		<p>Open to non-graduates and graduates of any discipline.</p> <p>Skills and knowledge required:</p> <p>Relevant experience is essential. You may be required to learn or follow an internship to acquire good work practice for safety and effective working environment in technical theatre by establishing a required minimum knowledge base for all technical theatre practitioners. This encompasses both general areas of safety and health at work and areas of safe work practice and health particular to the area of professional stage and theatre production.</p> <p>Training :</p> <p>Most training takes place on the job. Lighting technicians are expected to undertake additional training throughout their careers to keep their knowledge up to date.</p> <p>Tips for application :</p> <p>Gain relevant experience. While the ability to rig, focus and fault-find are the minimum requirements, further skills such as lighting desk operation, roped access, electrical qualifications and other certificates are an advantage.</p> <p>Skills and qualities :</p> <ul style="list-style-type: none"> - Manual dexterity and an aptitude for electrical work and electronics. - Creative flair and excellent attention to detail. - Ability to work quickly and creatively as part of a team. - Patience, stamina, physical agility and ability to work comfortably at heights. - Good numeracy skills. 	
Technical/Preferred Skill Requirements:			

Lighting Competences/Knowledge [Please use list A. Type a description of any additional skills or experience that would be considered favorable for a candidate who is applying for this position. Use the annexed lists for specifying the requested competences]
<ul style="list-style-type: none"> • Lighting Design & solving technical problems • Indoor Lighting for Buildings & Artificial Lighting • Lighting system technologies (Light source, drives, fixtures...)
Digital and ICT Competences [Please use list B1 and B2, either wider areas or detailed skills]
<ul style="list-style-type: none"> • 2.1 Interacting through digital technologies • 2.2 Sharing through digital technologies • 2.4 Collaborating through digital technologies • 2.5 Netiquette
Entrepreneurial Competences [Please use list C, either wider areas or detailed skills]
<ul style="list-style-type: none"> • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 2.1 Self-awareness and self-efficacy • 2.2 Motivation and perseverance • 2.3 Mobilizing resources • 3.1 Taking the initiative • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience
Green Competences [Please use list D]
<ul style="list-style-type: none"> • Selection of lighting services/systems and products in terms of sustainability – criteria • New sustainable/green trends in lighting
Life Competences [Please use list E]
<ul style="list-style-type: none"> • Self-regulation • Growth mindset • Empathy • Adaptability • Wellbeing • Communication • Collaboration • Managing learning • Critical thinking
Job description:
Key Tasks and Responsibilities: [Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]
Theater lighting technicians employ high-level skills to prepare, rig, operate and maintain stage lighting systems and electrical effects. They produce the lighting effects seen in live theatre productions and their work can range from operating strobes, lasers and pyrotechnics to providing basic spotlighting depending on the production.

Hangs stage lights under the direction of the lighting designer.

Lighting technicians work closely with lighting designers, sound technicians, the director and the stage manager to combine their skills and help create the live theater experience.

- Work activities :
 - Interpreting a lighting designer's plan.
 - Rigging, focusing and operating necessary lighting equipment.
 - Programming consoles and loading automated colour change systems before a show.
 - Taking cues from the stage manager.
 - Operating manual and computer-controlled lighting systems during a show.
 - Maintaining the lighting equipment in good safe working condition.
 - Taking on frontline electrical maintenance duties when needed
 - Operating within current health and safety regulations to ensure a safe environment.
 - Keeping abreast of the advances in technologies and techniques in the industry.
- Work conditions :
 - Travel: not a routine part of the working day except for those employed with touring companies.
 - Working hours: usually long and unpredictable.

Location: in towns or cities throughout the country. Opportunities for self-employment: unlikely.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- -