albatts
Alliance for Batteries Technology, Training and Skills

Alliance for **B**atteries **T**echnology, **T**raining and **S**kills 2019-2023

Survey Results for Sub-sector
D5.2 Survey Results

26/02/2021

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

About Survey Deliverable

Report Title:	**Survey results for sub-sector (D5.2 Survey Results)**			
Responsible Project Partners:	SPIN360, VSB TUO	Contributing Project Partners:	AIA, Merinova, ACEA, APIA, Corvus, EFACEC, EUPPY, HE3DA, Realizeit, SKEA	
Document data:	**File name:**	D5.2 Survey results for sub-sector Mobile Applications of Batteries		
	Pages:	52	No. of annexes:	0
	Status:	Final	Dissemination level:	Public
Project title:	ALBATTS (Alliance for Batteries Technology, Training and Skills)		GA No.:	2019-612675
WP title:	W5 Intelligence in Mobile Battery Applications		Project No.:	612675-EPP-1-2019-1-SE-EPPKA2-SSA-B
			Deliverable No:	D5.2
Date:	Due date:	28/2/2021	Submission date:	26/2/2021
Keywords:	job roles, skills, drivers of change, sector attractiveness			
Reviewed by:	Václav Janda, ACEA		Review date:	25/2/2021
Approved by:	Zdeněk Petzl, AIA		Approval date:	25/2/2021

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Executive Summary (I/II)

The survey was open **from 7. 12. 2020 to 10. 2. 2021**. Stakeholders registered in the ALBATTS project as well as members of the DRIVES project were encouraged by email to complete the survey. Social networks, contacts in battery relevant projects and associations were used to promote the survey and increase the redemption. Altogether, **98 responses** were received that are deemed usable.

The majority of **respondents** belong to companies, followed by educational institutions. From the **NACE codes** perspective, the highest number of respondents belong to “manufacturing of batteries and accumulators“, “manufacturing of motor vehicles“ and “maintenance and repair of motor vehicles“. From the **value chain** perspective, entities active in “battery integration“ were the most strongly represented, followed by entities relevant to “components and cell manufacturing“ value chain stage.

According to the respondents, the battery sector seems to be mostly **driven by** „climate goals, regulation and environmental challenges“ in the long term perspective (while globalisation/global competitiveness is considered to be the most urgent driver), with “charging infrastructure deployment“, access to “raw materials“ and “cybersecurity“ being listed among the dominating factors.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Executive Summary (II/II)

When it comes to **job roles**, respondents were asked to assign importance to a list of job roles relevant to individual battery value chain stages. The job roles offered had been identified and shortlisted within the previous activities of the ALBATTS project. **Engineering** job roles (battery material, battery design, battery systems, battery manufacturing, battery recycling) ranked the highest, together with the **technicians** (testing, cell inspection, maintenance, servicing, dismantling, recycling) and SW developers and safety managers. Fire rescue, risk mitigation experts will be needed as well.

Among **skills and knowledge** that ranked the highest, according to the methodology used, are problem-solving and troubleshooting, teamwork, planning and analytical skills, while the highest ranking sector-specific skills requirements include embedded systems, battery management system (BMS), identifying process improvement, use of CAD software, and developing models.

The most important topics within **attractiveness of the battery sector** are, according to the respondents, innovation and key technologies followed by focus on sustainability**.** Other findings include interesting data on topics such as battery-related education, skills, and job roles missing.

The data gathered within the survey will be **further processed** within the upcoming activities of the ALBATTS project (sectoral intelligence analysis, desk research work, workshops with stakeholders) where additional surveys are going to be considered to verify existing intelligence and to collect new data.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Introduction

The Alliance for Batteries Technology, Training and Skills (ALBATTS) is a European Erasmus+ funded project with the objective of contributing to the electrification of transport and green energy in Europe, by designing a blueprint for competences and training schemes of the future in the battery and electromobility sector.

The survey is one of the main tools that ALBATTS partners use to gather information from stakeholders and follows the main outcomes coming from the previous deliverable *D5.1 - Desk research and data analysis for sub-sector IMBA - Release 1* based on desk research; one of the goals of the desk research was to map the current state of the art of the mobile battery applications sub-sector which will be then used for gap analysis.

The survey was part of intelligence activities: the main goal was to gather information about job roles and skills needed to build a complete battery value chain in Europe.

Information gathered by this survey will be further processed and analysed in D3.4 - Survey Results for Battery Sector report and when forming the sectoral intelligence deliverable, which is ultimately the roadmap for the battery sub-sector.

Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Methodology and Respondents

Co-funded by the
Erasmus+ Programme
of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Methodology

The stakeholders involved in the survey have been mapped according to the battery supply chain:

- **Raw materials and processing:** primary material sourcing with emphasis on rare earths and scarce metals. In the future, also integration of the recycled materials coming from end-of-life EV batteries into the production stream.
- **Components and cell manufacturing:** battery components, cell manufacturing methods.
- **Module and pack manufacturing:** creation of larger systems from battery cells and modules.
- **Battery integration:** integration of assembled battery modules together with Battery Management System into the specific use cases, such as passenger cars.
- **Operation, repair, and maintenance:** topics related mainly to passenger cars and vessel technology, operation, repair, and maintenance; topics including safety issues, charging and new emerging services.
- **Second life:** “life after life” of the batteries used, e. g. as energy storage.
- **Recycling:** re-use of the materials taken from used batteries, in line with “circular economy” principles. Important to ensure compliance with current and upcoming legislation and to avoid harming the environment.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Methodology

The survey is based on 5 main areas, as follows:

1. **GENERAL INFORMATION**: to characterise the respondents.
2. **DRIVERS OF CHANGE:** based on the desk research outcomes, an evaluation of the drivers of change is available in this section (rating information by importance and urgency).
3. **JOB ROLES:** to gather valuable data on current and future job roles to better understand the current situation of the fast-emerging battery sector and validating the desk research results.
4. **SKILLS:** following the previous section, if the respondent decides to "analyse" a specific job role, this area allows rating and suggesting skills for the chosen job role. Specific calculation of the skills index was done during the analysis.
5. **ATTRACTIVENESS OF THE SECTOR**: questions on what is needed to increase the attractiveness of the sector to better understand the current situation of the sector, by focusing on target groups which include primarily potential newcomers to the sector and also workers from other sectors who are considering entering this growing industry.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

KPIs

KPIs used to map the outcomes refer to the 5 above mentioned areas of the questionnaire:

#	CATEGORY	KPI	INDICATOR TITLE	UOM	ISIBA / IMBA	SUPPLY CHAIN STEPS
1	SAMPLE CHARACTERISATION	1.1	N° OF RESPONDENTS	N°	X	
1	SAMPLE CHARACTERISATION	1.2	TYPE OF ORGANISATION	%	X	
1	SAMPLE CHARACTERISATION	1.3	NACE CODE	%	X	
1	SAMPLE CHARACTERISATION	1.4	SUPPLY CHAIN COVERAGE	%	X	
1	SAMPLE CHARACTERISATION	1.5	RESPONDENTS PER COUNTRY	%	X	
2	DRIVERS OF CHANGE	2.1	IMPORTANCE OF DRIVERS OF CHANGE GROUPS - MACROCATEGORY	%	X	
2	DRIVERS OF CHANGE	2.2	URGENCY OF DRIVERS OF CHANGE GROUPS - MACROCATEGORY	%	X	
2	DRIVERS OF CHANGE	2.3	DoC CLIMATE GOALS, REGULATION, AND GREEN ENERGY - IMPORTANCE	%	X	
2	DRIVERS OF CHANGE	2.4	DoC CLIMATE GOALS, REGULATION, AND GREEN ENERGY - URGENCY	%	X	
2	DRIVERS OF CHANGE	2.5	DoC GLOBALIZATION - IMPORTANCE	%	X	
2	DRIVERS OF CHANGE	2.6	DoC GLOBALIZATION - URGENCY	%	X	
2	DRIVERS OF CHANGE	2.7	DoC NEW TECHNOLOGIES - IMPORTANCE	%	X	
2	DRIVERS OF CHANGE	2.8	DoC NEW TECHNOLOGIES - URGENCY	%	X	
2	DRIVERS OF CHANGE	2.9	SUGGESTED DRIVERS OF CHANGE AND ADDITIONAL QUESTIONS	OTHER	X	
3	JOB ROLES & SKILLS	3.1	JOB ROLES AND ADDITIONAL QUESTIONS	OTHER	X	X
3	JOB ROLES & SKILLS	3.2	SUGGESTED JOB ROLES	OTHER	X	
3	JOB ROLES & SKILLS	3.3	SKILLS INDEX	INDEX	X	
4	ATTRACTIVENESS	4.1	ATTRACTIVENESS FACTORS	%	X	
4	ATTRACTIVENESS	4.2	ATTRACTIVENESS OTHER QUESTIONS	%	X	

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Sample Characterization

Part or all of the survey was completed by **98 respondents**. Only those respondents completing at least the Job roles section were included.

Respondents identified themselves as follows:

- **43 respondents** as active in **both** mobile and stationary and other industrial applications of batteries sub-sector
- **37 respondents** as active in **mobile applications** of batteries sub-sector
- **18 respondents** as active in **stationary and other industrial** applications of batteries sub-sector

This deliverable describes the results for **mobile battery applications** sub-sector where **80** of responses were processed.

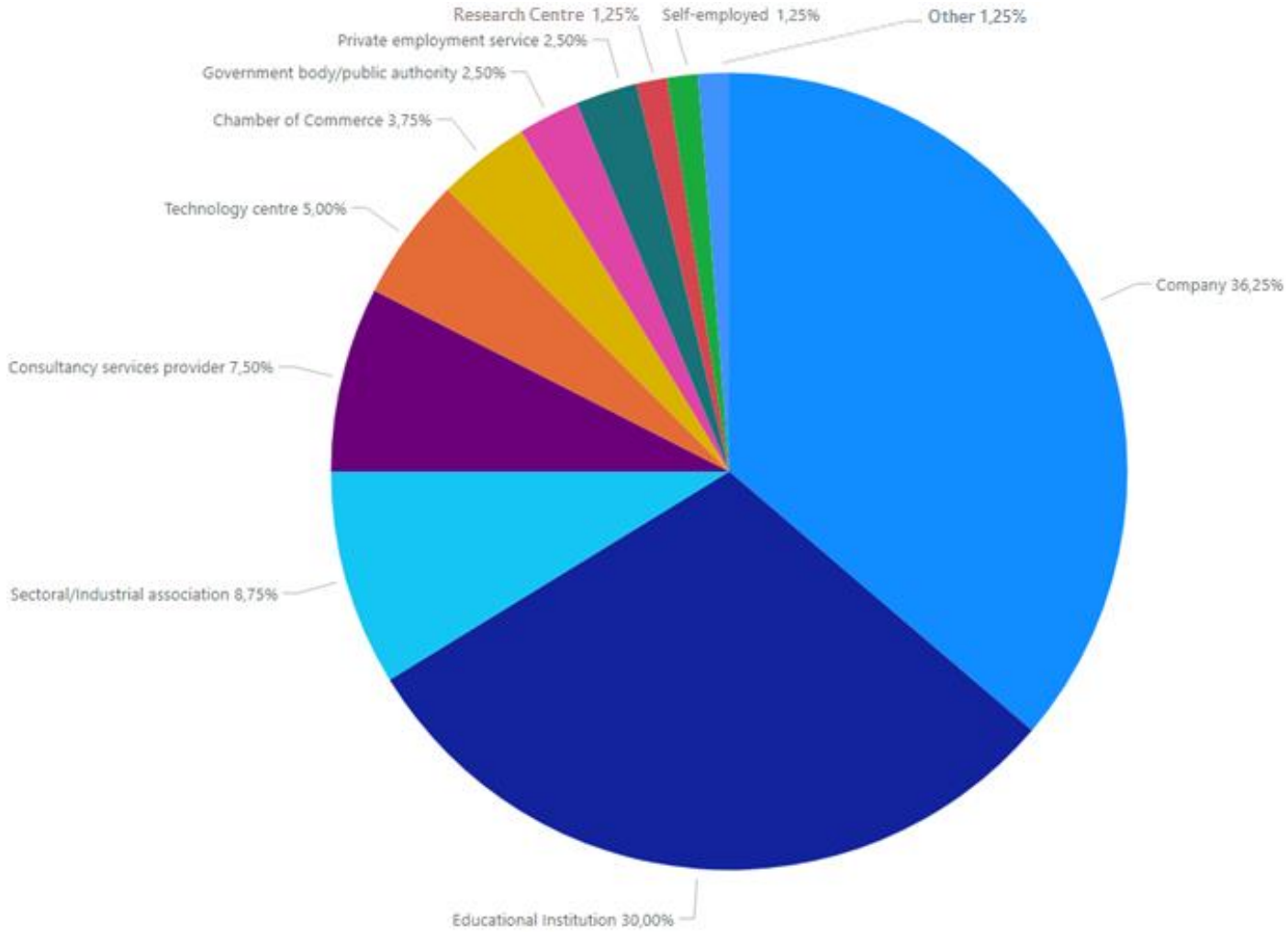
Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Type of Organisation

The majority of respondents belong to **companies** (36,25%), followed by **educational institutions** (30%).

Other stakeholders come from **sectoral/industrial associations** (8,75%), **consultancy service providers** (7,5%) as well as **technology centres** and **public authorities** to a minor extent.



Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

NACE Codes

The NACE codes are a European Industry-standard classification system similar in function to Standard Industry Classification (SIC) for classifying business activities.

Following list of NACE codes was used for sample characterization:

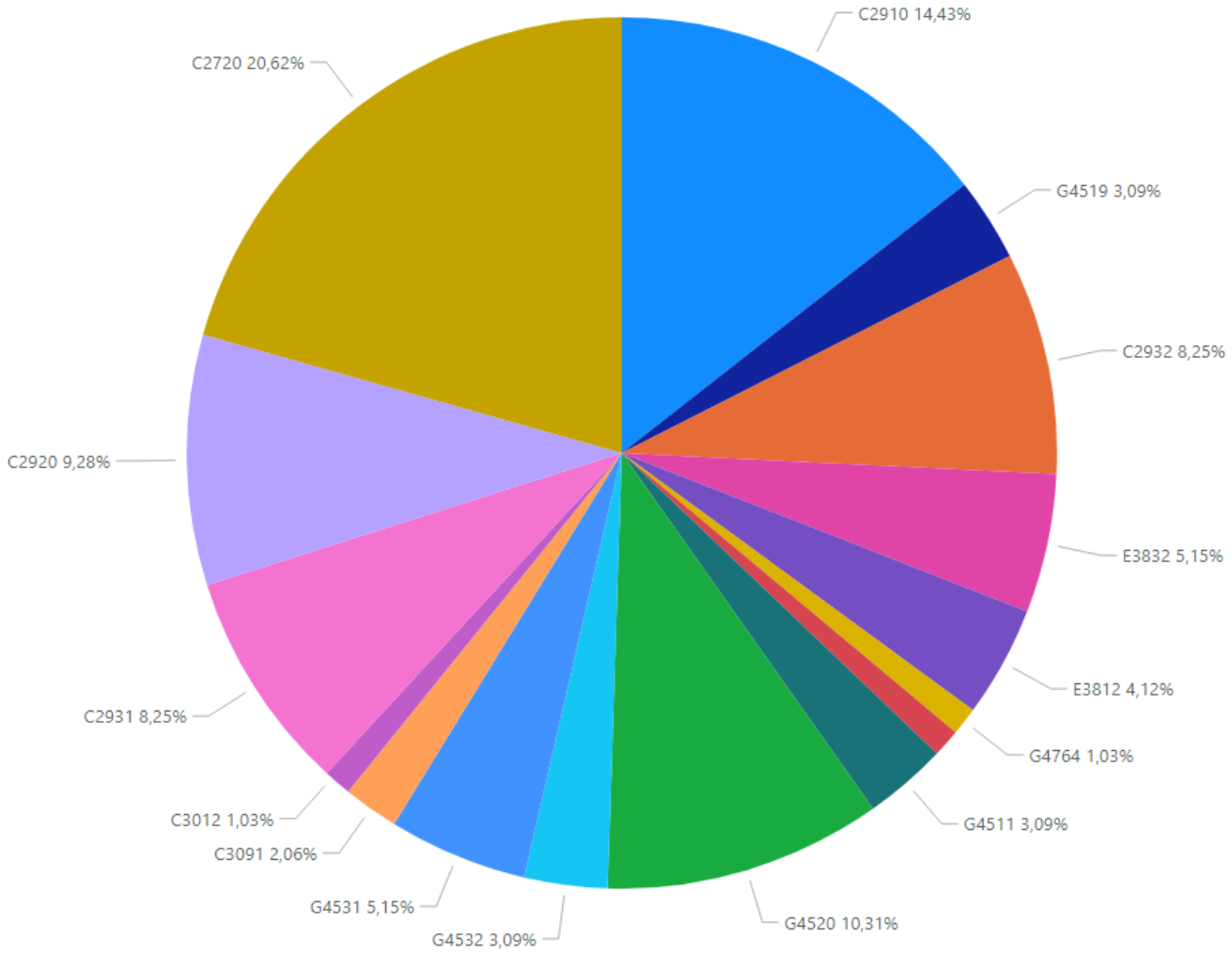
- C2920 Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
- C2931 Manufacture of electrical and electronic equipment for motor vehicles
- C2932 Manufacture of other parts and accessories for motor vehicles
- C3011 Building of ships and floating structures
- C3012 Building of pleasure and sporting boats
- C3091 Manufacture of motorcycles
- E3812 Collection of hazardous waste (collection of hazardous waste, such as used batteries)
- E3832 Recovery of sorted materials (recovery of materials from waste streams... or the separating and sorting of commingled recoverable materials.... shredding of metal waste, end-of-life vehicles)
- G4511 Sale of cars and light motor vehicles
- G4519 Sale of other motor vehicles
- G4531 Wholesale trade of motor vehicle parts and accessories
- G4532 Retail trade of motor vehicle parts and accessories
- G4540 Sale, maintenance and repair of motorcycles and related parts and accessories
- G4764 Retail sale of sporting equipment in specialised stores (ships, boats…)

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

NACE Codes

With regards to NACE Codes, the highest number of respondents belong to **C2720 Manufacture of batteries and accumulators** (20,62%), followed by **C2910 Manufacture of motor vehicles** (14,43%), **G4520 Maintenance and repair of motor vehicles (electrical repairs, repair of motor vehicle parts – battery)** (10,31%), **C2920 - Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers** (9,28%), **C2931 Manufacture of electrical and electronic equipment for motor vehicles** (8,25%) and **C2932 Manufacture of other parts and accessories for motor vehicles** (8,25%).



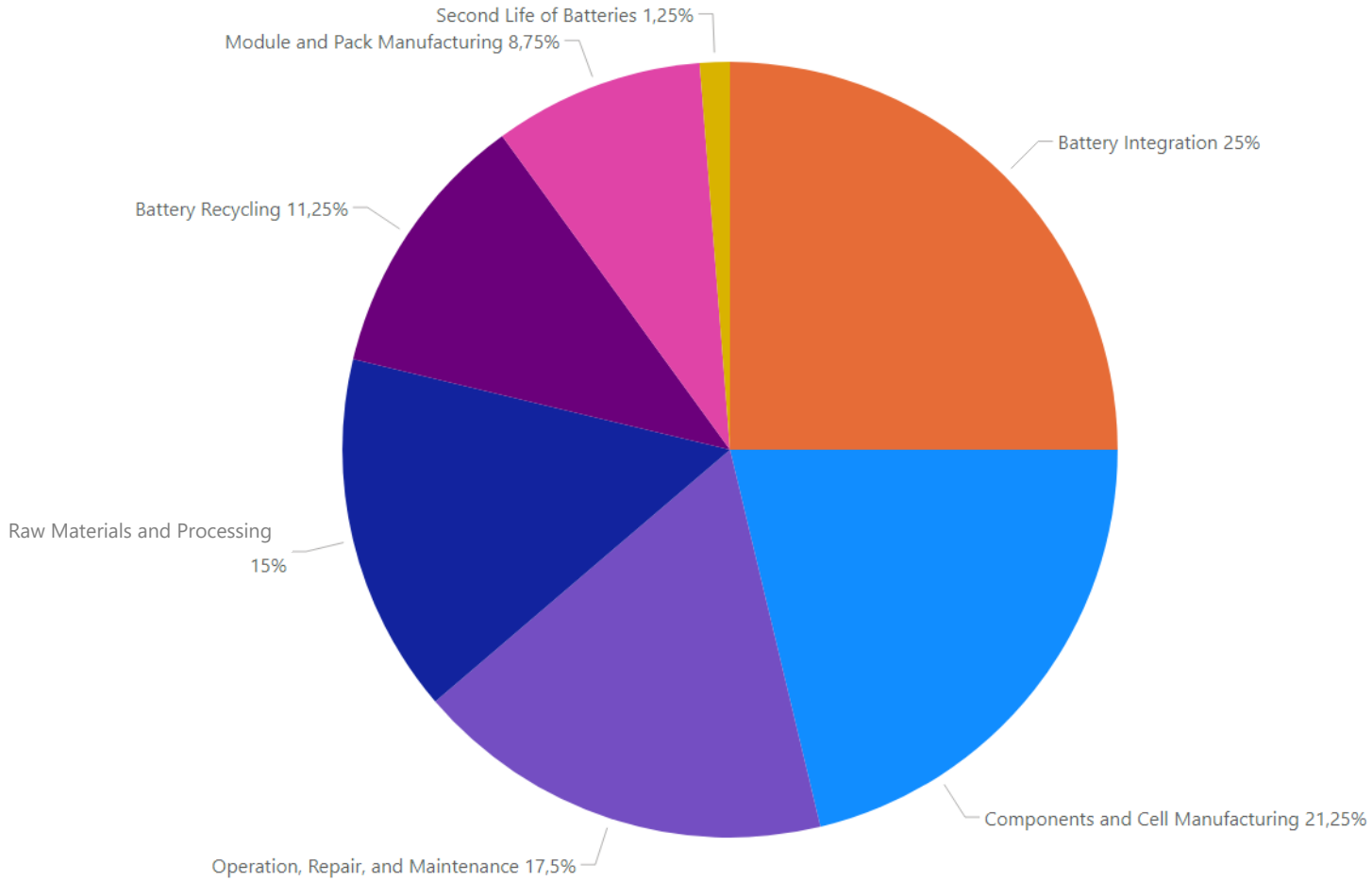
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Value Chain Coverage

As for the value chain coverage, we see that **battery integration** is the most frequent (25%), followed by **components and cell manufacturing** (21,25%).



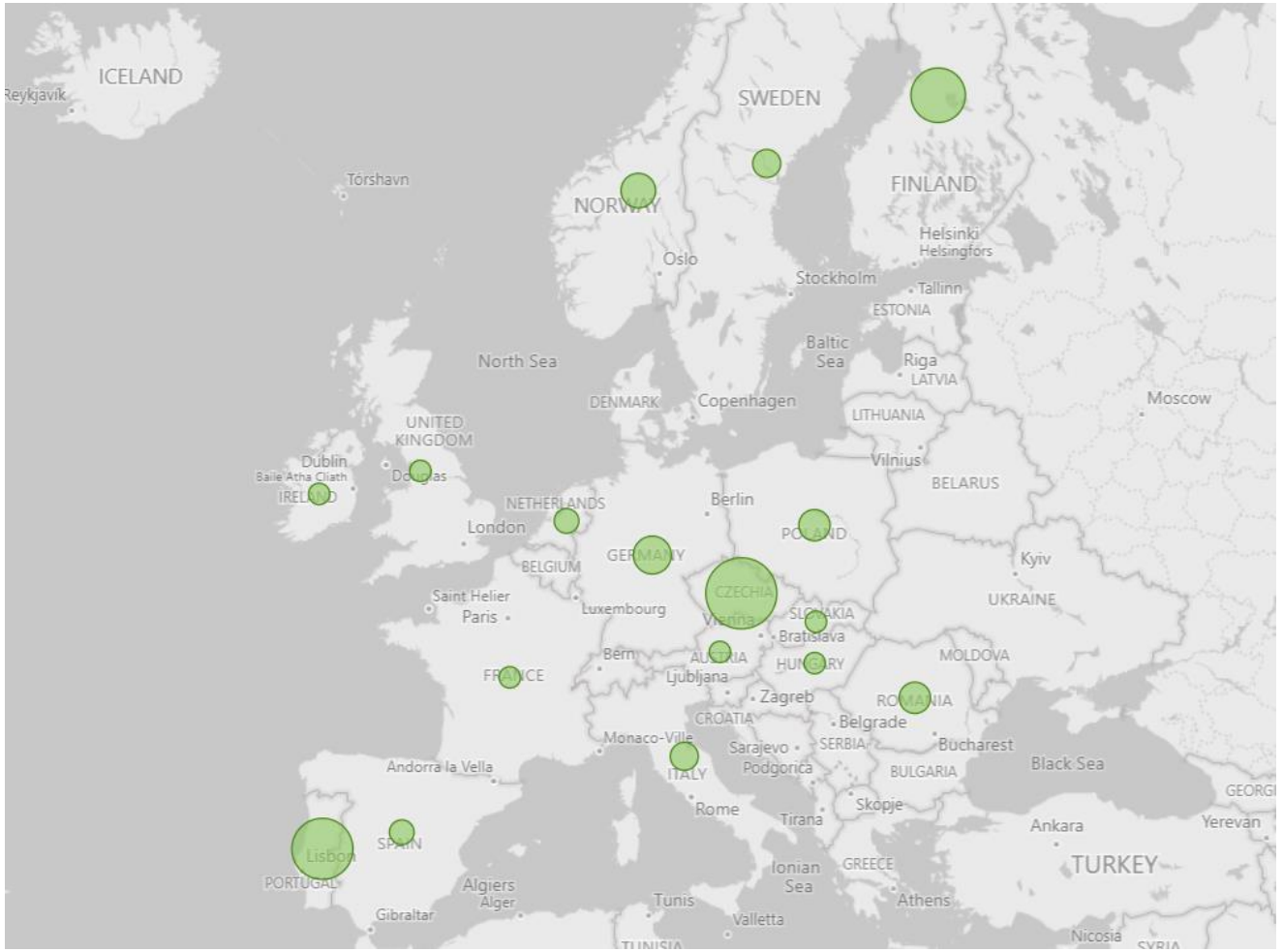
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Respondents per Country

The majority of respondents come from the **Czech Republic** (20%), **Portugal** (16,25%) and **Finland** (13,75%), but there are also responses from Germany, Norway, Romania, Poland and other countries as shown on the map.



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change

Co-funded by the
Erasmus+ Programme
of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change

Drivers of Change are factors which are going to bring change and have an impact on a sector across different levels. To do this, the 3 following macro categories of drivers of change have been identified:

- **New technologies**: the need for urgent and intense actions against climate change are widely recognized and batteries are an essential system for storing energy in electric vehicles and making renewable energy a reliable alternative source.

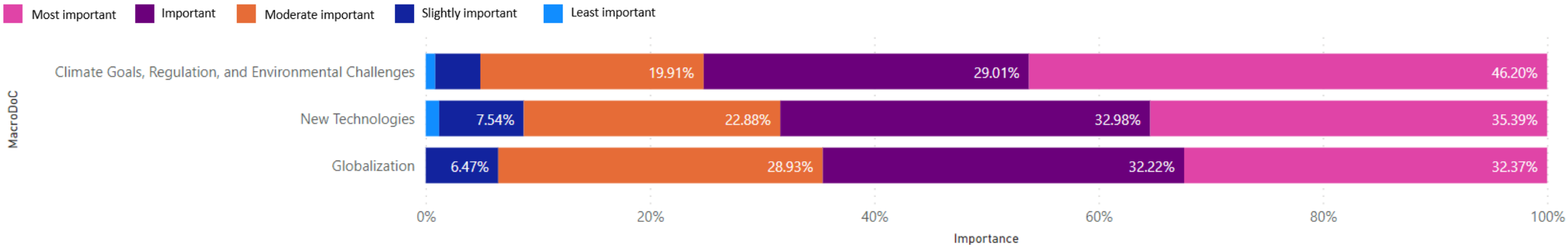
- **Globalisation**: over the coming years, production in global markets for EV batteries is expected to grow strongly and EU production must completely change its position to create a competitive advantage.

- **Climate goals, regulation and environmental challenges**: batteries are one of the most important climate target drivers to decarbonize road transportation and support the transition to a renewable power system.

Co-funded by the Erasmus+ Programme of the European Union

Drivers of Change – Macro Category - Importance

A matrix with the three above mentioned macro categories was proposed, and respondents were asked to evaluate them based on their importance (**1 - least important**; **5 - most important**). The results show that **climate goals, regulation and environmental challenges** is perceived as the most important category (**46,20% rated it with "5").** However, we also see that **new technologies** and **globalization**, although less voted for, are important and shall be taken into consideration.



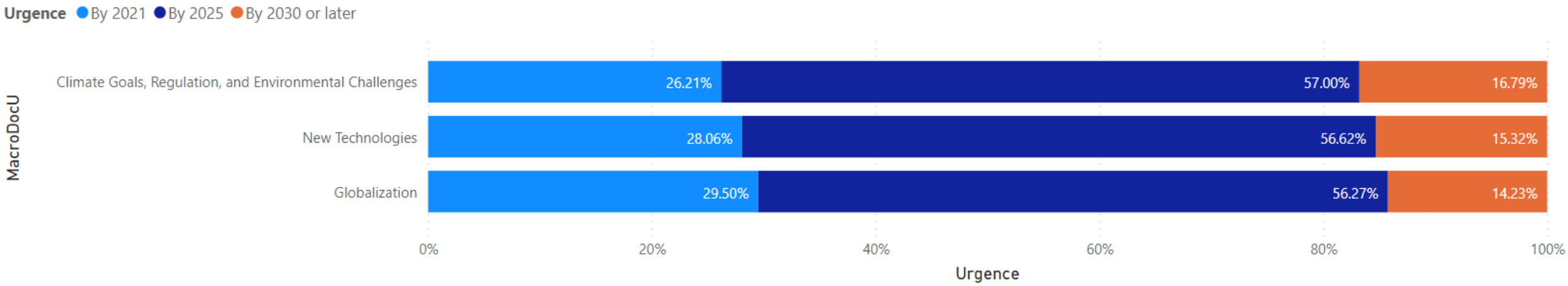
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Macrocategory - Urgency

A similar matrix has been applied also regarding the perceived urgency of the drivers of change (whether the macro category is relevant in 2021, 2025 or by 2030 or later). The results show that the most urgent one (by 2021) is **globalization** (29,5%), even if there is not a big gap with the other categories (28,06% for **new technologies** and 26,21% for **climate goals**). **Climate goals, regulation and environmental challenges** receives greater attention towards 2025 and by 2030 or later.



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Sub-category – Climate Goals, Regulation and Environmental Challenges

Batteries are one of the most important tools to address the road transport decarbonisation targets and support the transition to a renewable power system. Within the climate category, we can recognize 3 sub-categories:

- **Electrification and green energy**: batteries can fundamentally reduce greenhouse gas emissions in the transport and power sectors as they are a systemic enabler of a major shift to bring transportation and power to greenhouse gas neutrality.

- **Reducing CO_2 emissions from battery manufacturing**: since the production of batteries requires significant amounts of energy, an increase in the share of renewable energies and energy efficiency in the battery value chain would be a major step for decreasing CO_2 emissions from battery production.

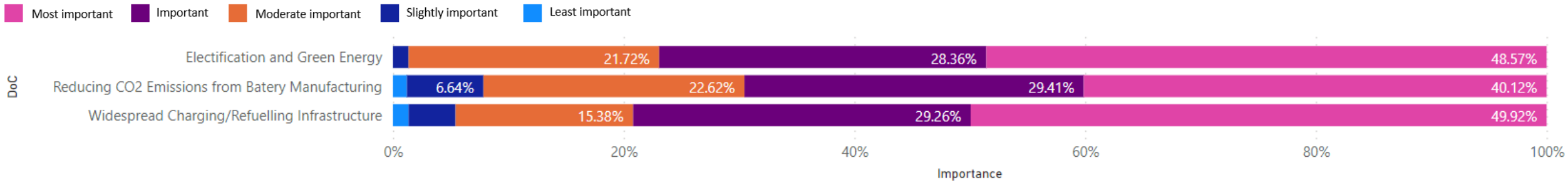
- **Widespread charging/refuelling infrastructure**: demand for widespread charging infrastructure is a key driver to boost the commercialization of a technology based on batteries. The easier the access to a reliable and suitable charging infrastructure is, the quicker the development of such new technologies will be.

Co-funded by the Erasmus+ Programme of the European Union

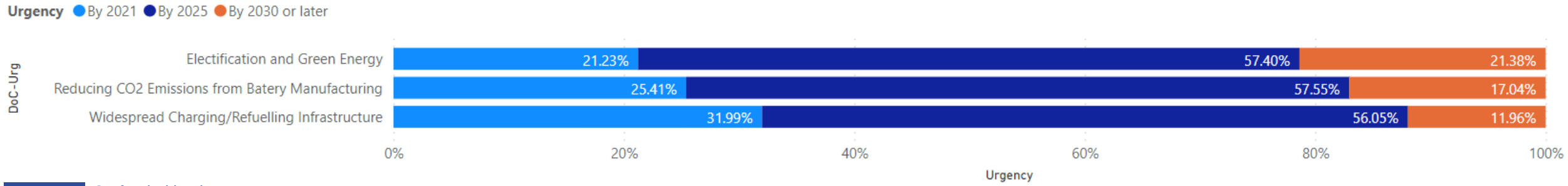
albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Sub-category – Climate Goals, Regulation and Environmental Challenges

Within the climate category, we see that for the respondents the most important factor is **widespread charging/refuelling infrastructure** (49,92%), though there is not a big gap with the other sub-categories (48,57% for **electrification** and 40,12% for **reducing CO2 emissions**).



Similarly, (by 2021) **widespread charging/refuelling infrastructure** (32%) is the most important factor. All the three sub-categories are almost equally urgent by 2025, whereas **electrification** is the most important factor in the longer term (by 2030 or later).



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Sub-category – Globalization

Over the coming years, production of EV batteries in global markets is expected to grow strongly and EU production must significantly improve its position to create a competitive advantage. Within the globalization category, we have the following sub-categories:

- **Access to raw materials**: With a rapid increase in numbers of EVs, sourcing of raw materials becomes critical, especially if some resources (limited in terms of quantity or geographical presence) are necessary for key components to be produced.

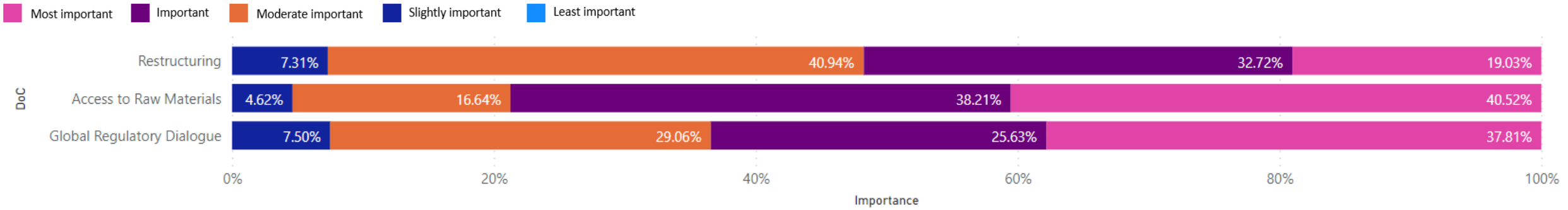
- **Global regulatory dialogue**: The European Commission and national governments in Europe will need to play a fundamental role in the elaboration of policies and strategies, from which the battery sector could benefit.

- **Restructuring**: Relevant industrial sectors are expected to undergo structural changes due to the development of zero-emission mobility.

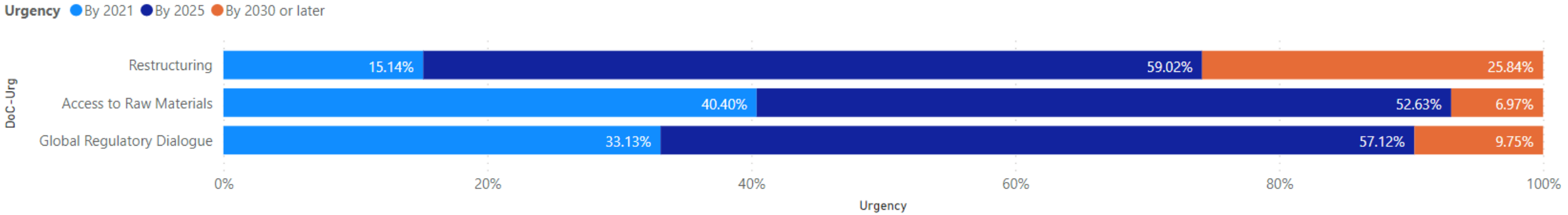
Co-funded by the Erasmus+ Programme of the European Union

Drivers of Change – Sub-category – Globalization

Within the globalization category, we see that for the respondents the most important sub-category is **access to raw materials** (40,52%), followed by **global regulatory dialogue** (37,81%).



Similarly, it is more urgent (by 2021) to address **access to raw materials** (40,40%). All the three sub-categories are almost equally urgent by 2025.



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Sub-category – New Technologies

The need for urgent and intense actions against climate change are widely recognized and batteries are an essential system for storing energy in electric vehicles and making renewable energy a reliable alternative source. Within the new technologies category, we have the following sub-categories:

- **Cybersecurity**: Exponential growth of Internet of Things (IoT) devices connected to a network, cloud infrastructures, the navigation and location information can compromise customer privacy and security, requiring providers to keep communications secure; this threat landscape requires the industry to modify the security approach, aimed at guaranteeing the resilience of the infrastructures to cyber-attacks. This will also increasingly affect various battery applications in the future.

- **Global Technical Harmonisation, Standardisation**: The supply chain structure within the sector will need to meet the challenges posed by new standards strongly influencing market conditions.

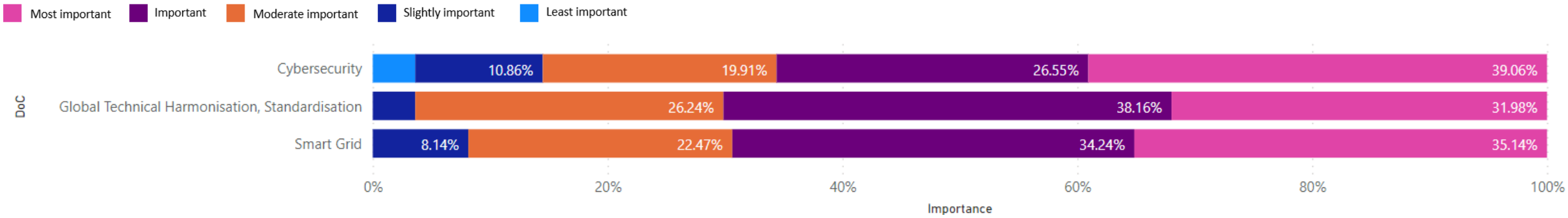
- **Smart Grid**: Storage is one of the most important smart grid components due to its key role in integrating renewable energy.

Co-funded by the Erasmus+ Programme of the European Union

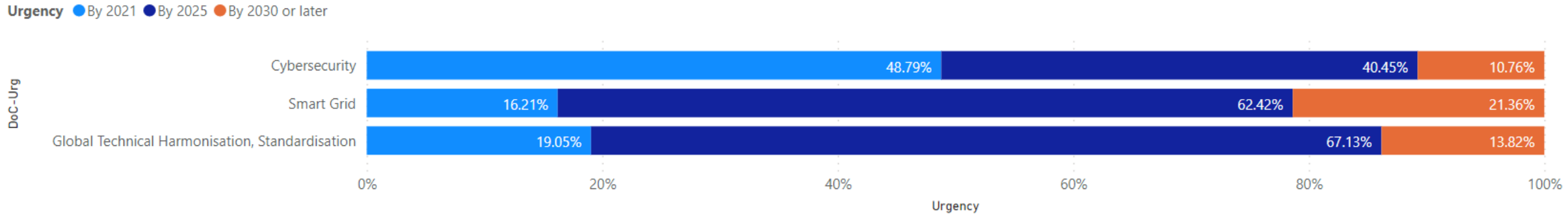
albatts
Alliance for Batteries Technology, Training and Skills

Drivers of Change – Sub-category – New Technologies

Within the new technologies category, we see that for the respondents the most important factor is **cybersecurity,** (39,06%), though there is not a big gap with the other sub-categories (35,14% for **smart grid** and 31,98% for **global technical harmonization, standardization**).



Similarly, the most urgent factors (by 2021) are **cybersecurity** (48,79%), whereas **smart grid** and **global technical harmonization, standardization** are perceived as more urgent by 2025.



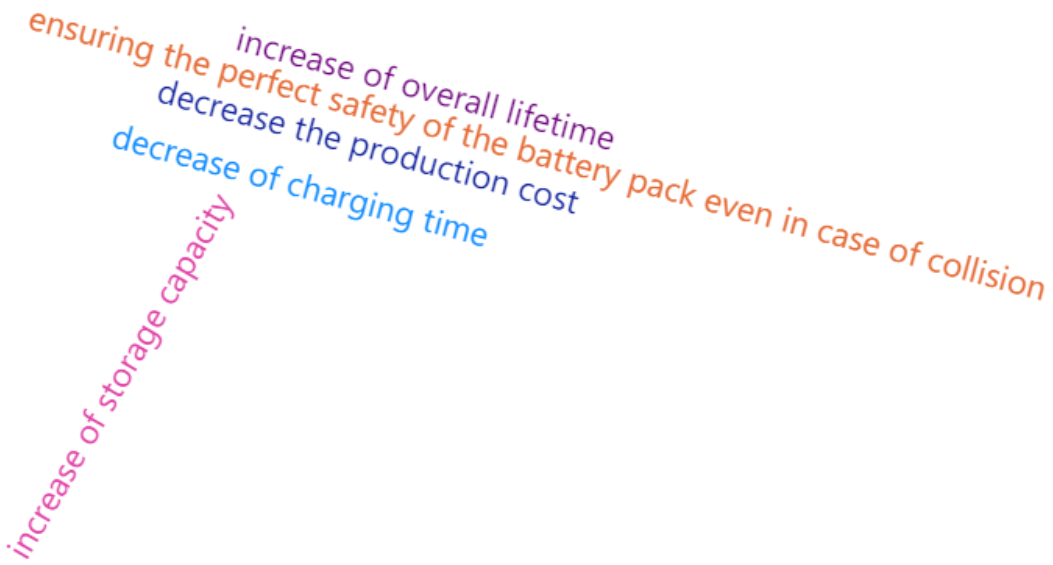
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

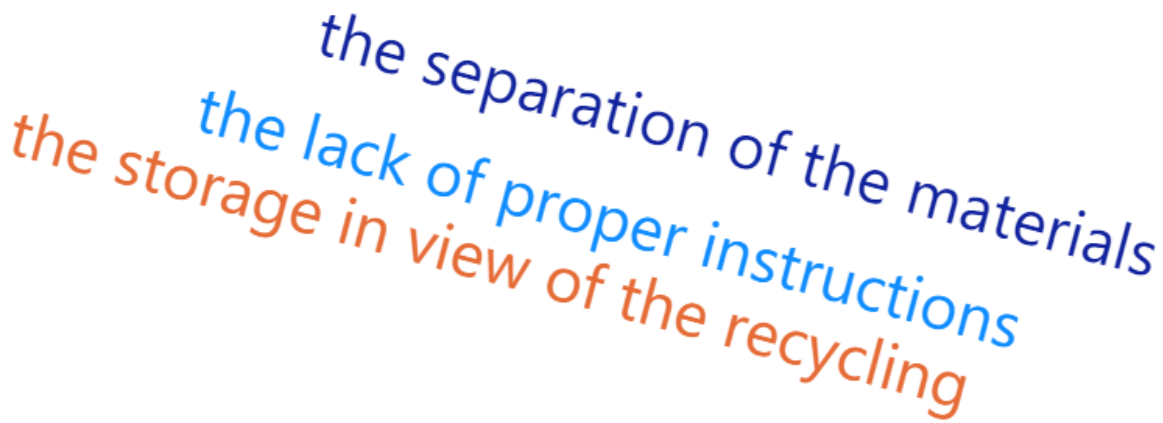
Additional Questions

As part of the drivers of change section, we asked respondents questions on the following topics.

We investigated **what needs to be improved on batteries in the future.**



We investigated the most urgent **challenges of battery recycling**.



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Other Drivers of Change

Respondents were also asked to list **other drivers of change** that they perceived as important.

Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Job Roles

Co-funded by the
Erasmus+ Programme
of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Job Roles and Skills

The section analyses responses concerning job roles relevant to the sub-sector.

Within the survey, respondents were asked to select a **value chain stage** they are active in.
Then they evaluated **importance** (**1 – least important**; **5 – most important**) in a list of possible job roles, which had been put together within the previous project activities, particularly the deliverable *D5.1 - Desk research and data analysis for sub-sector IMBA - Release 1.* If they ticked „Analyse“ they had the possibility to proceed with an analysis of the necessary **skills** related to the job role

Skills have been divided into 3 groups:

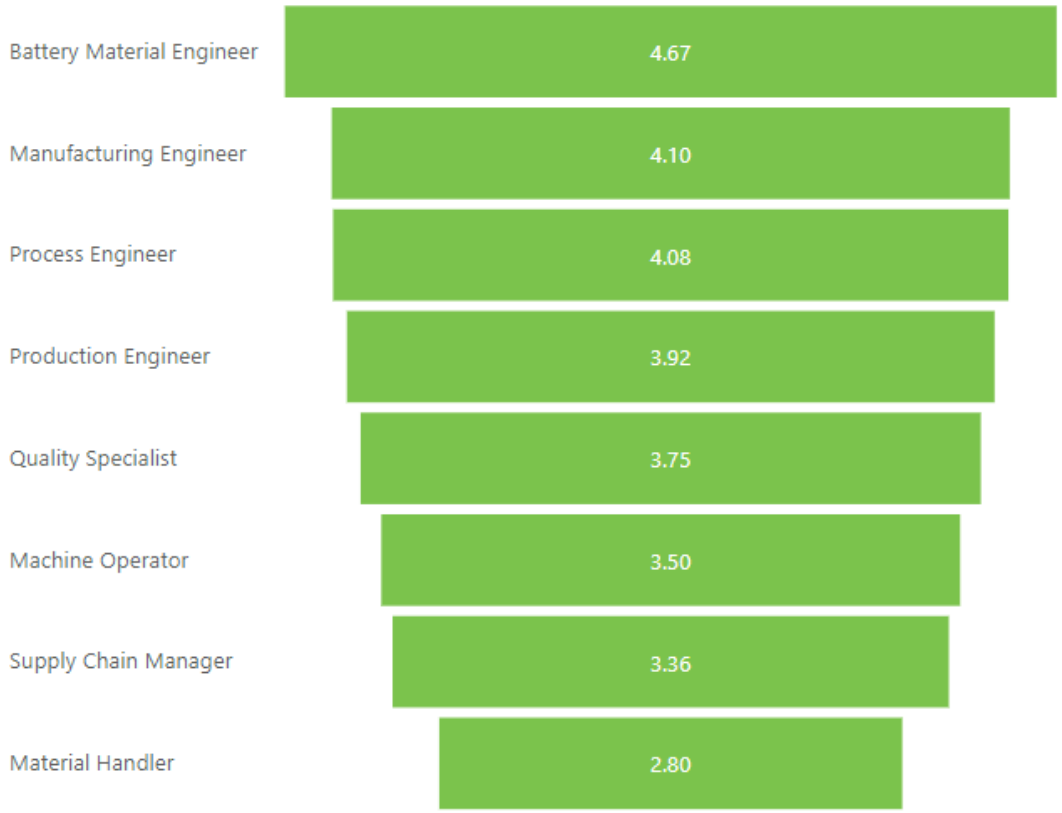
- **Soft Skills** are a combination of people skills, social skills, communication skills, character or personality traits, attitudes, career attributes, social intelligence and emotional intelligence quotients, among others, that enable people to navigate their environment, work well with others, perform well, and achieve their goals with complementary hard skills.
- **Transversal Skill** is an ability or expertise which may be used in a variety of roles or occupations. Examples include communication, problem-solving and self-control.
- **Sector Specific Skills** are particular or specialised skills necessary to perform particular jobs in specific sectors.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Raw Materials and Processing – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**raw materials and processing**" according to their perceived importance (1 – least important; 5 – most important).



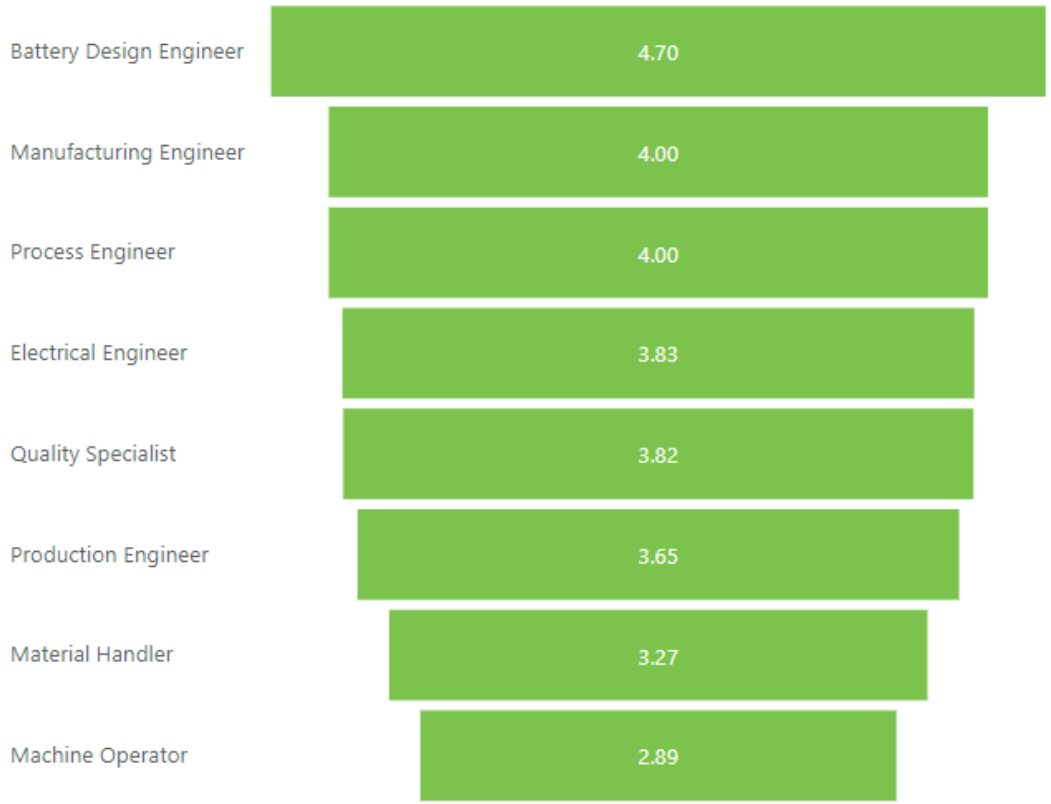
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Components and Cells Manufacturing – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**components and cells manufacturing**" according to their perceived importance (1 – least important; 5 – most important).



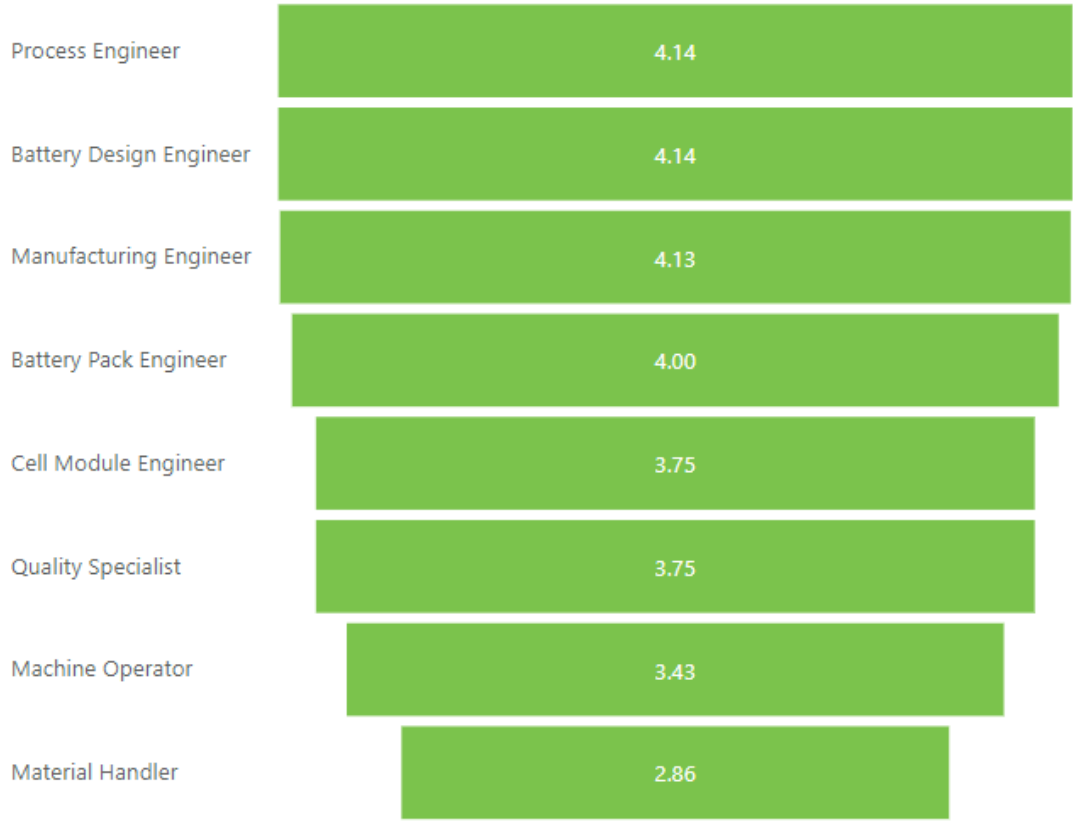
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Module and Pack Manufacturing – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**module and pack manufacturing**" according to their perceived importance (1 – least important; 5 – most important).



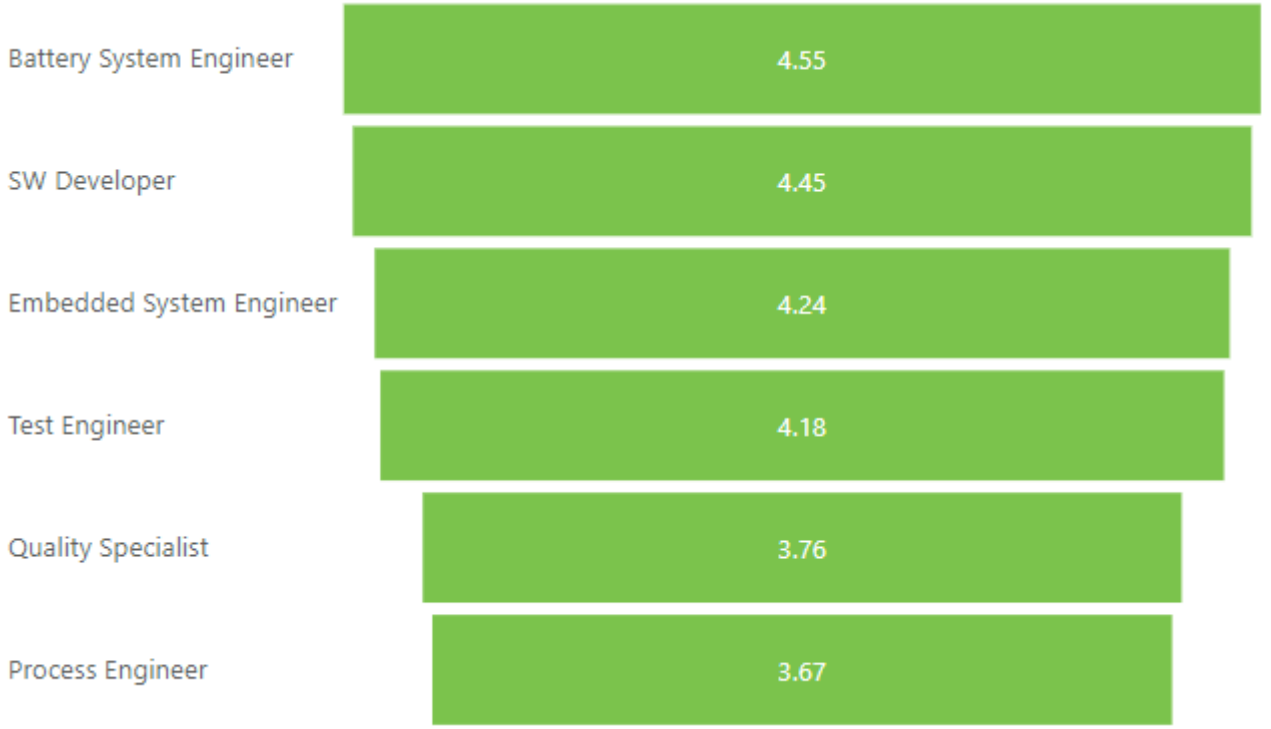
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Battery Integration – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**battery integration**" according to their perceived importance (1 – least important; 5 – most important).



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Operation, Repair, and Maintenance – Job Roles Importance

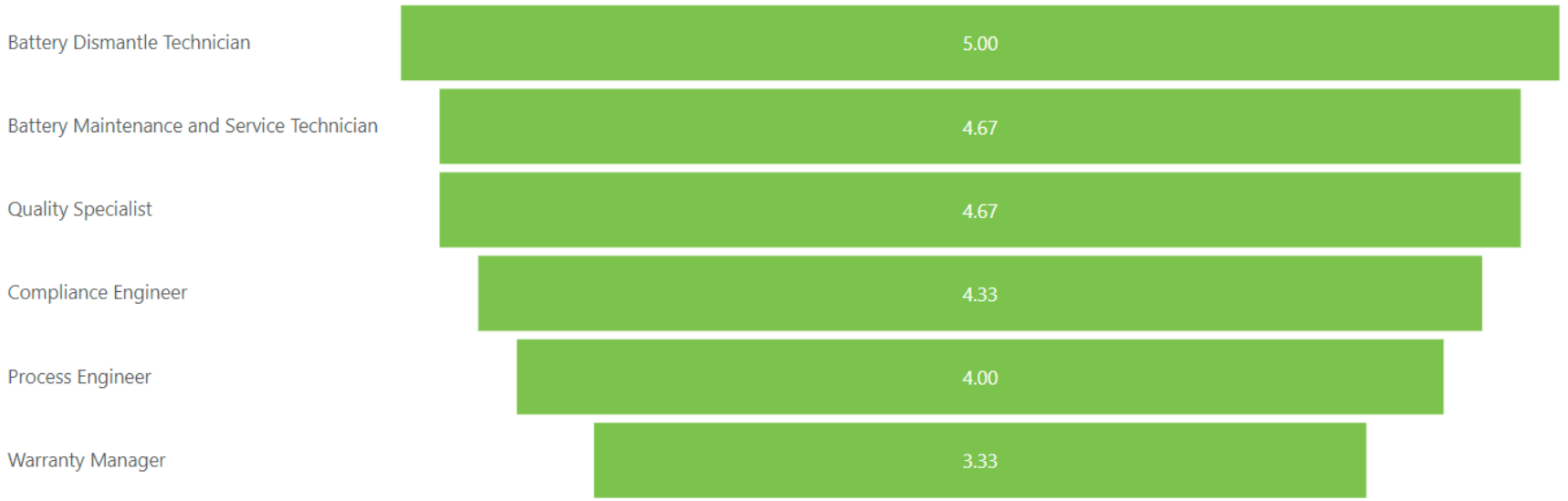
In this figure you can see the list of the most voted for job roles within "**operation, repair and maintenance**" according to their perceived importance (1 – least important; 5 – most important).

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Second Life of Batteries – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**second life of batteries**" according to their perceived importance (1 – least important; 5 – most important).

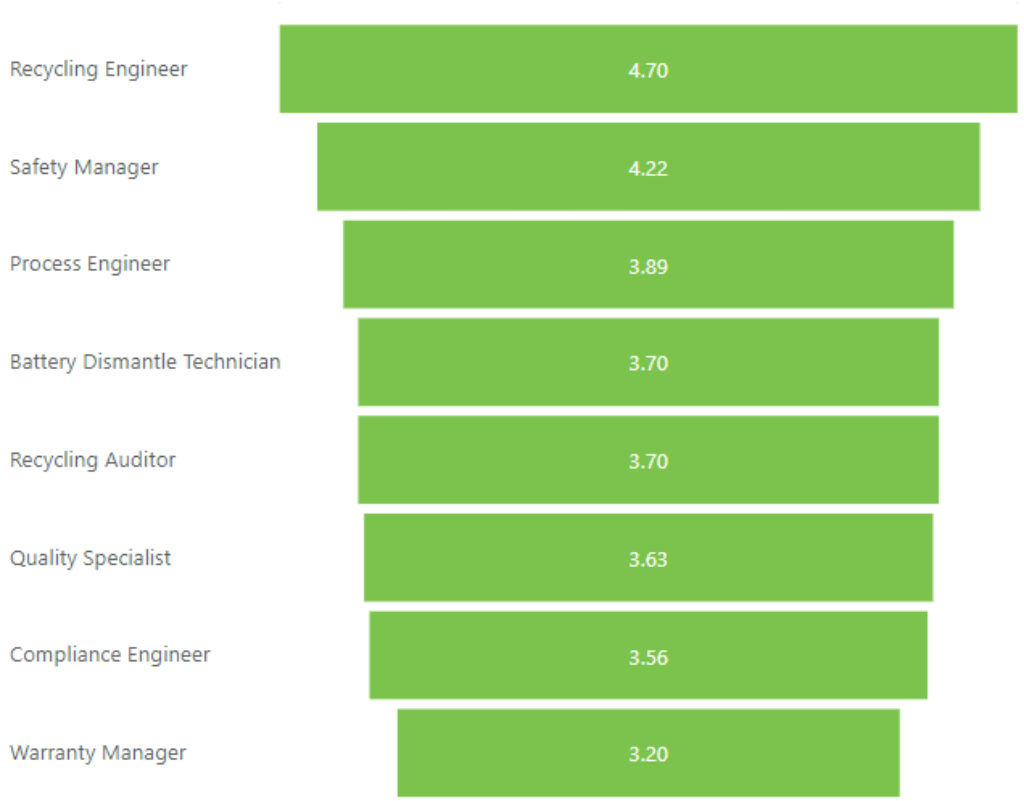


Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Battery Recycling – Job Roles Importance

In this figure you can see the list of the most voted for job roles within "**battery recycling**" according to their perceived importance (1 – least important; 5 – most important).



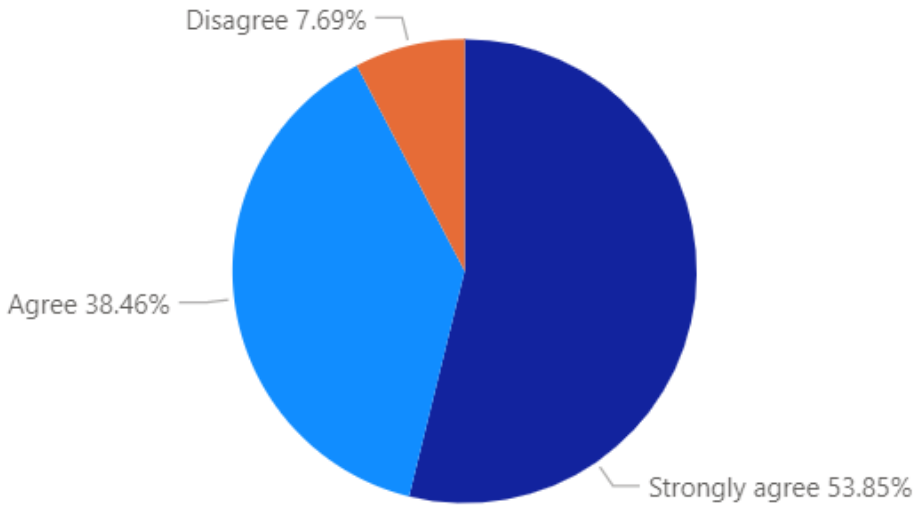
Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Additional Question

As part of the job roles and skills section, we asked respondents an additional question.

We investigated **whether the fire rescue and risk mitigation** job roles will be needed in the future.



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Other Job Roles

Respondents were also asked to list **other job roles** considered as important for the sector.

As we can see in the image, there is a number of suggestions, which can belong to the different phases of the supply chain analysed above.

Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Skills

Co-funded by the
Erasmus+ Programme
of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Skills Index Definition

Skills index is a **metric** to rate the importance of the skills/competences and knowledge. Respondents were shown a certain set of skills/competences and knowledge linked to a value chain stage and specific job roles, and they could rate their importance.

Skills index is **calculated** based on the:

- Average importance of the job role - number of times where respondents chose to “analyse” the job role further.
- Average importance of the calculated skill based on the respondent's evaluation.

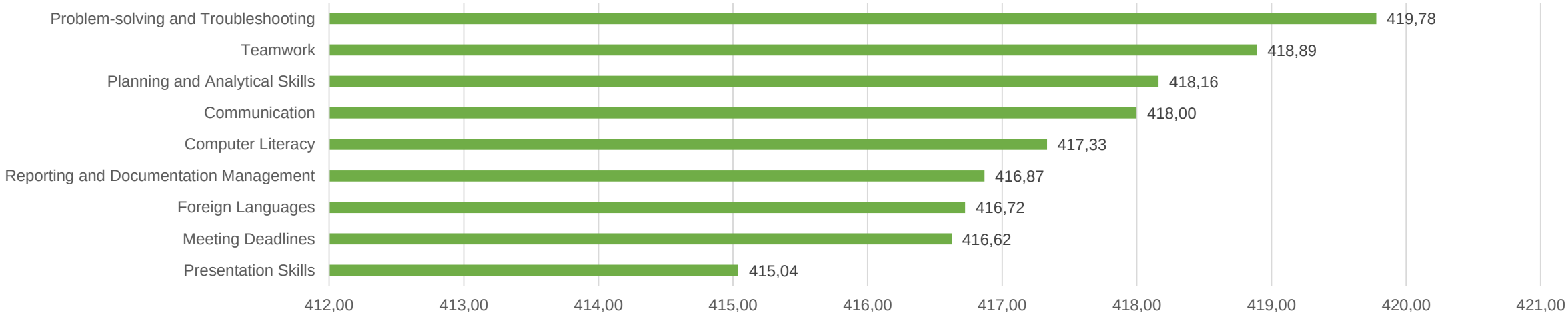
Final results show **soft and transversal skills** sorted by the skills index as well as the **sector specific skills** for the whole sub-sector.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Skills Index Soft and Transversal Skills/Competence and Knowledge

Skills index calculation shows that the skills/competence and knowledge perceived by respondents as the most important are: **Problem-solving and Troubleshooting, Teamwork, Planning and Analytical Skills**.

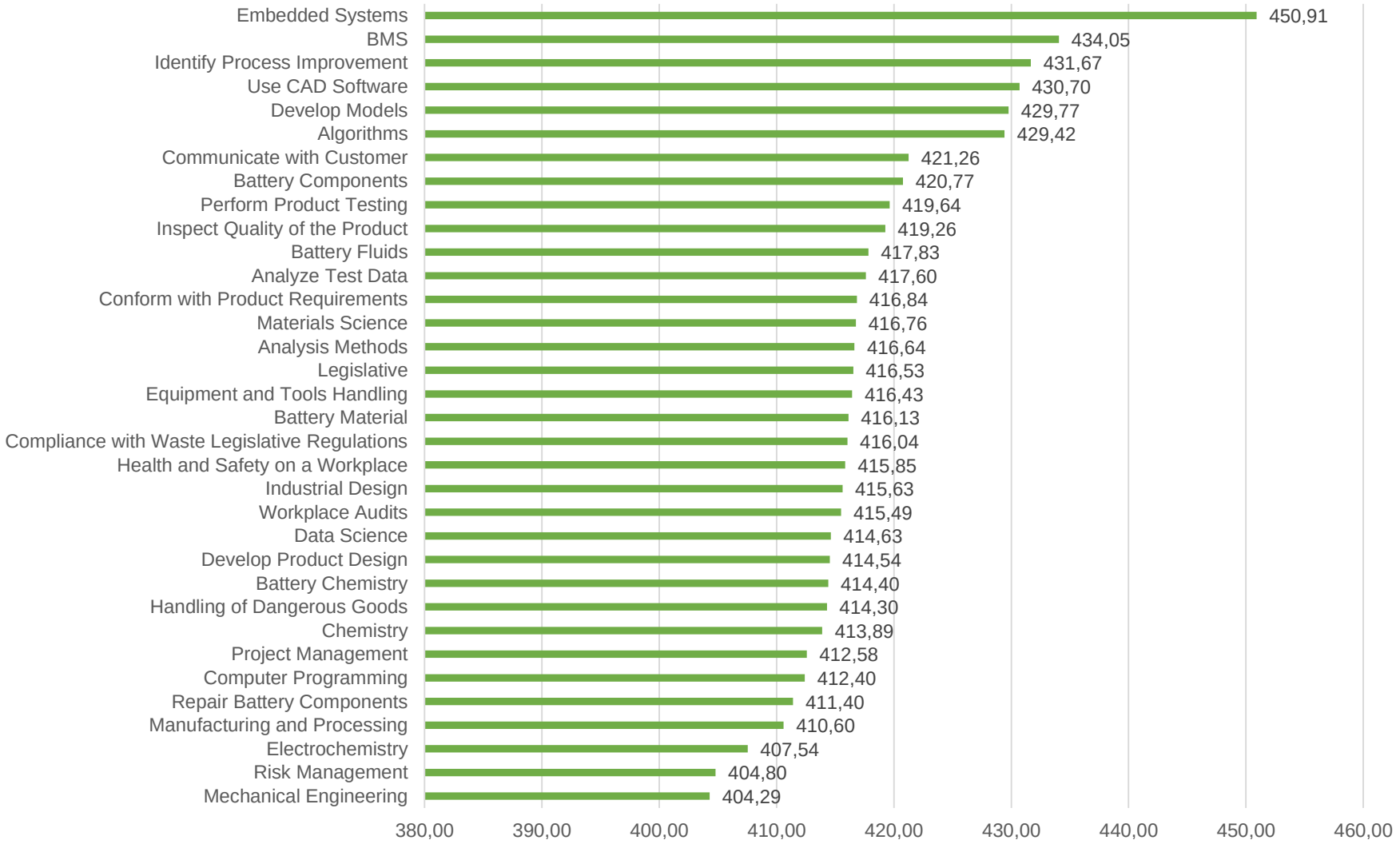


Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Skills Index Sector Specific Skills/Competence and Knowledge

Skills index calculation shows that the skills/competences and knowledge perceived by respondents as the most important are **„embedded systems“, „BMS“, „identify process improvement“, „use of CAD software“ and „develop models.“**



Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Sector Attractiveness

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Sector Attractiveness

The success of a sector depends on the competitiveness of the companies that operate there, which in turn depend on the skills of the workers.

A strong attractiveness of the sector brings together skilled and talented workers within it, creating a virtuous process of success.

Therefore, to strengthen the success of the sector it is first necessary to understand **how it is perceived by existing and potential workers**, as well as what their **preferences and** priorities are.

This section analyses factors the battery sector should concentrate on to **increase its attractiveness.**

In the survey, a list of possible attractiveness factors was made available to the respondents for their evaluation.

Co-funded by the Erasmus+ Programme of the European Union

Attractiveness of the Sector – Selected Factors

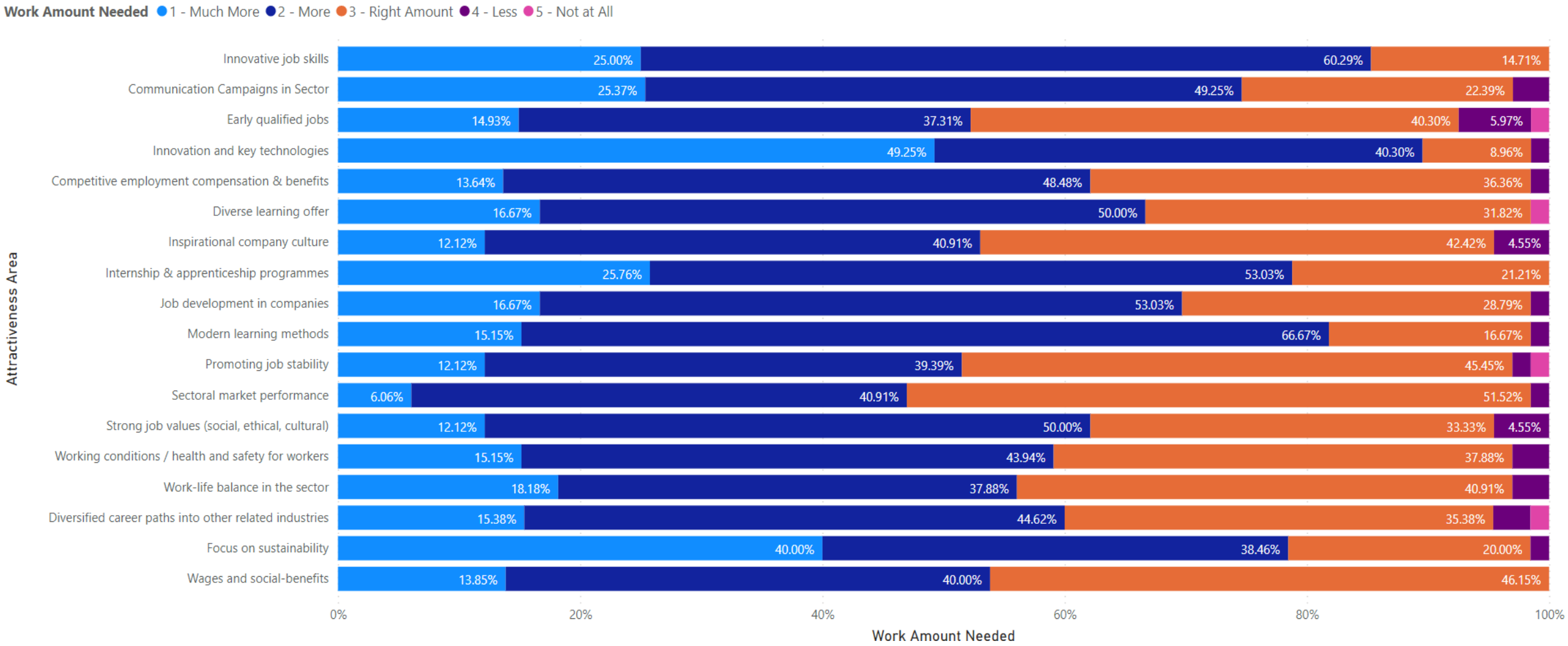
The figure on the following slide shows which areas the sector should focus on to **improve its attractiveness**. A matrix with some solutions was proposed and respondents were asked to evaluate them based on importance (**not at all, less, right amount, more** and **much more**).

Based on the results, we see that respondents evaluated as **much more** (i.e. most important) **innovation and key technologies** (49,25%) followed by **focus on sustainability** (40%).

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Attractiveness of the Sector – Selected Factors



Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

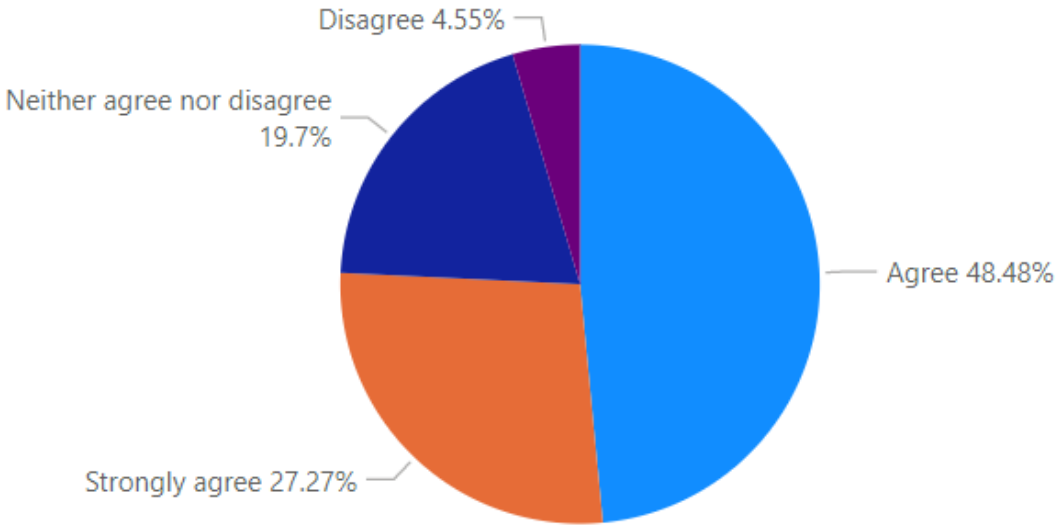
Other Findings

Co-funded by the
Erasmus+ Programme
of the European Union

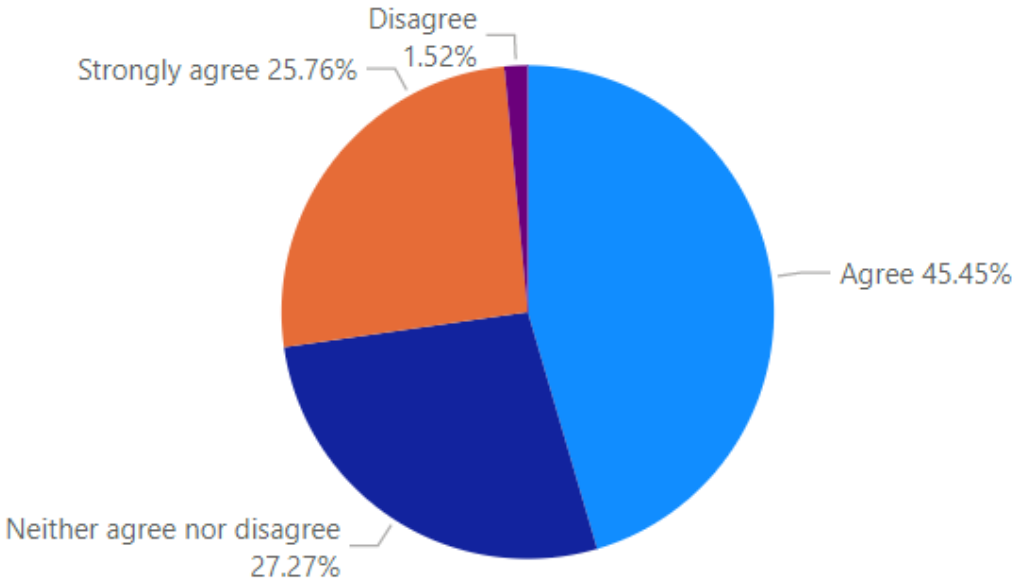
Additional Questions

As part of the attractiveness section, we asked respondents the following additional questions:

We investigated whether staff would need more skills and competences with **safety related topics**: most of the respondents **agreed or strongly agreed** on this topic



We asked whether it was **challenging to find battery related skilled and competent workforce** at the moment: most of the respondents **agreed** on this difficulty.

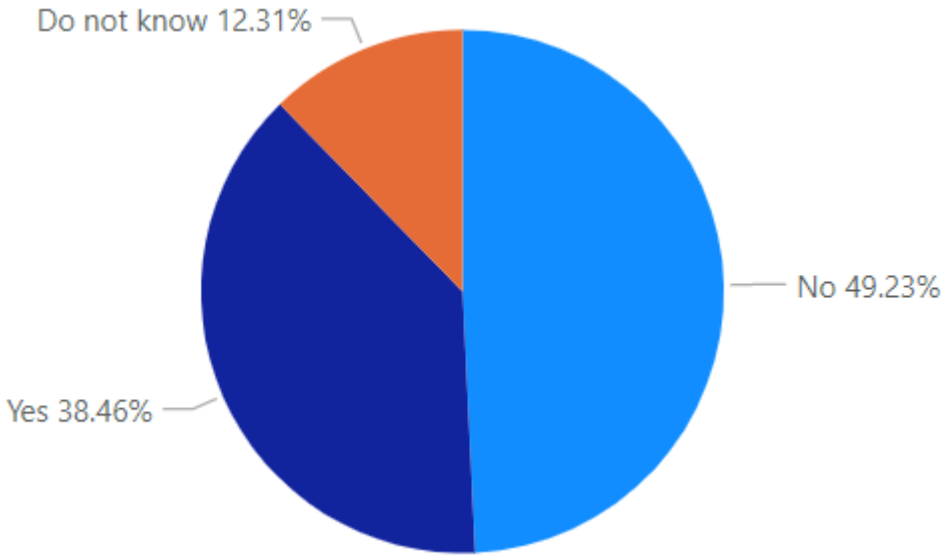


Co-funded by the Erasmus+ Programme of the European Union

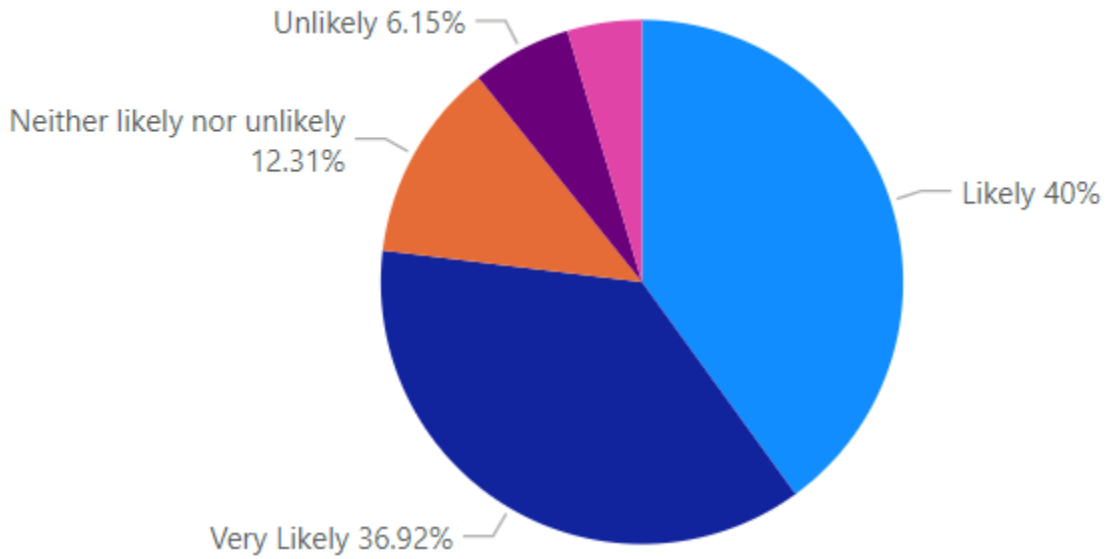
The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Additional Questions

We investigated if the respondent's institution **offered technical education** that provides skills and competences needed in a battery industry: 49,23% replied negatively.



We investigated if the organization of the respondent would **hire more workforce with battery related skills** and competences during the next 5 years: most of the respondents said that **this is likely** (40%) and **very likely** (36,92%).



Co-funded by the Erasmus+ Programme of the European Union

The European Commission support for the production of this publication under the Grant Agreement Nº 2019-612675 does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

albatts
Alliance for Batteries Technology, Training and Skills

Battery related education

In addition to the previous question about the **battery related education provision**, respondents had an opportunity to provide examples:

- Answers ranged from provision of internal training for new employees and seminars for externals, to industrial PhD programs as well as masters and internships.
- Topics included – recycling solutions, circular economy, materials engineering, chemical engineering and engineering physics and applied physics, electrical engineering, electrode manufacturing, environmental engineering, energy storage and energy harvest devices, renewable electricity sources.
- Main focus on e-mobility.

Some examples were more specific with the description of the offered education and descriptions with the courses and seminars.

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Skills missing

In addition to the previous question about the challenge of finding skilled and competent workforce, some respondents specified more in detail the following **skills** that are in demand:

- Industrial experience
- Batteries and project management
- Economical thinking
- Physics
- Chemistry
- Modelling
- System-level understanding
- Battery charge and discharge
- Battery repair
- Automation skills
- BMS
- Design
- Battery technology
- Physics engineering
- Electrochemistry
- Safety
- Testing methods
- EV Repair
- High Voltage Qualifications

Co-funded by the Erasmus+ Programme of the European Union

albatts
Alliance for Batteries Technology, Training and Skills

Job roles needed

In addition to the previous question about the challenge of finding skilled and competent workforce, some respondents specified more in detail the following **job roles** that are in demand:

- Battery experts
- Data Scientists
- Software Developers
- Electrical Engineers
- Process Expert teachers
- Materials specialists
- Operators
- Maintenance technicians
- Recycling engineer
- Process Engineer
- Electrochemist
- Electrochemical Engineer
- EV diagnose and repair engineer
- VET Teachers - Batteries

Co-funded by the Erasmus+ Programme of the European Union