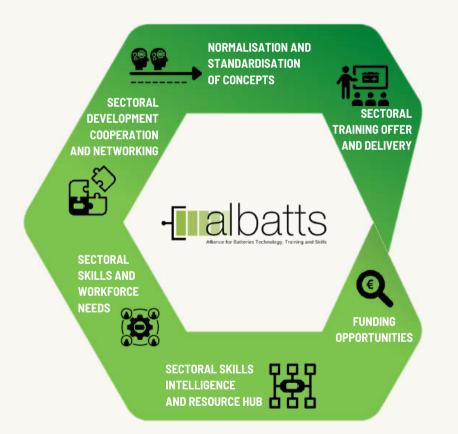
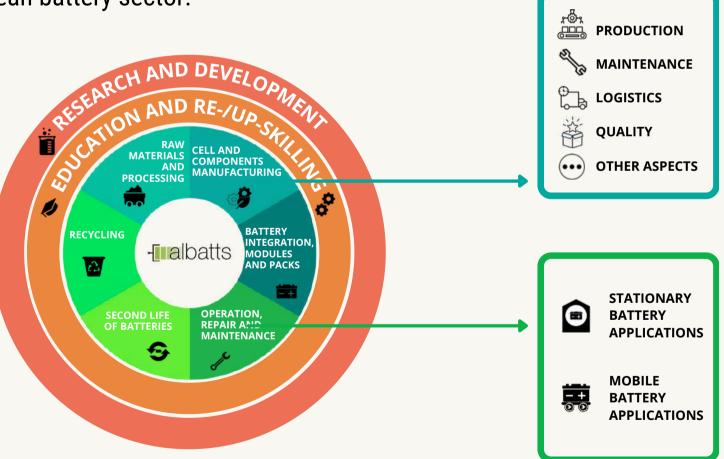
# **SECTORAL SKILLS INTELLIGENCE & STRATEGY FOR THE EUROPEAN BATTERY SECTOR**

D3.10 – Sectoral Skills Intelligence and Strategy – Release 2

This is the **second** release of the sectoral skills intelligence and strategy covering the whole European battery value chain from raw materials to recycling of batteries in terms of skills needs, job roles needs and recommendations.



The report also provides quantitative and qualitative overviews of the skills and the job roles needs per identified areas of interest consisting of the battery value chain steps, as well as specific aspects of production, quality or safety tailored to the battery production or other processes that are happening within the European battery sector.



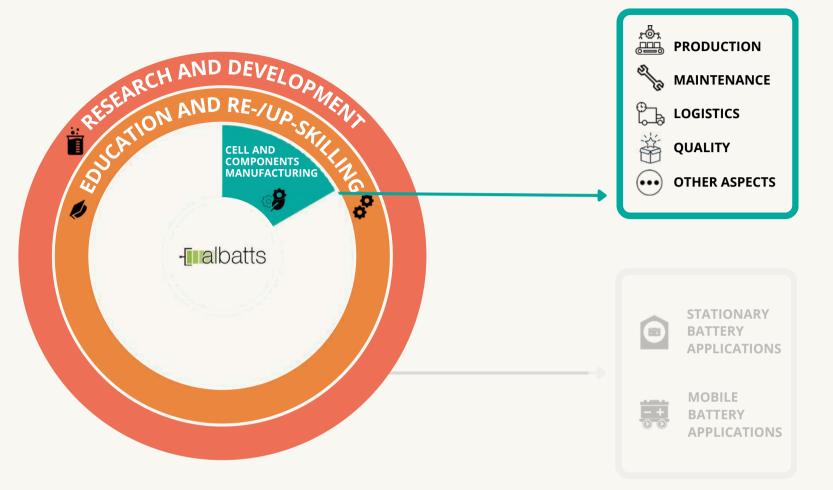
Readers will find designated actions needed in the sector to boost the overall re-/up-skilling activities as well as cooperation, information sharing and provision and many more.

This factsheet provides a summary of the report in what regards **PRODUCTION & MAINTENANCE of cell and components manufacturing.** 

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### **CELL AND COMPONENTS MANUFACTURING**

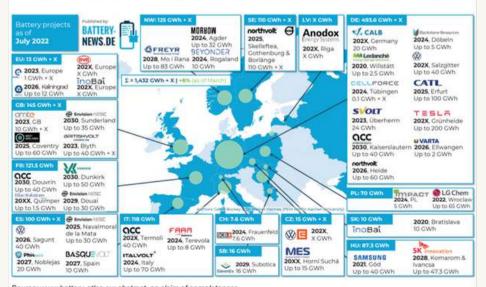


**COMPONENTS & CELL MANUFACTURING** step follows the raw materials and processing value chain step and concerns the manufacturing and development of different components for battery cells and the production of cells.

This factsheet describes the Gigafactory perspective. Different departments and their roles are described further below. Areas of interest covered are as follows:

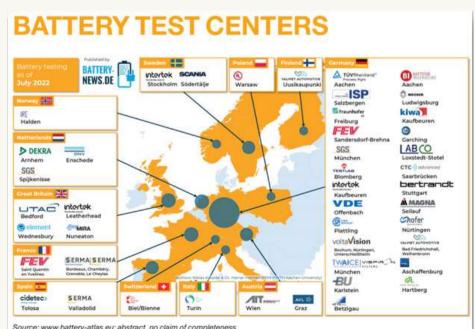
- Production and Maintenance
- Logistics
- Quality
- sales and digitalisation

### **STAKEHOLDERS/COMPANIES**



### **BATTERY CELL MANUFACTURERS EQUIPMENT SUPPLIERS**





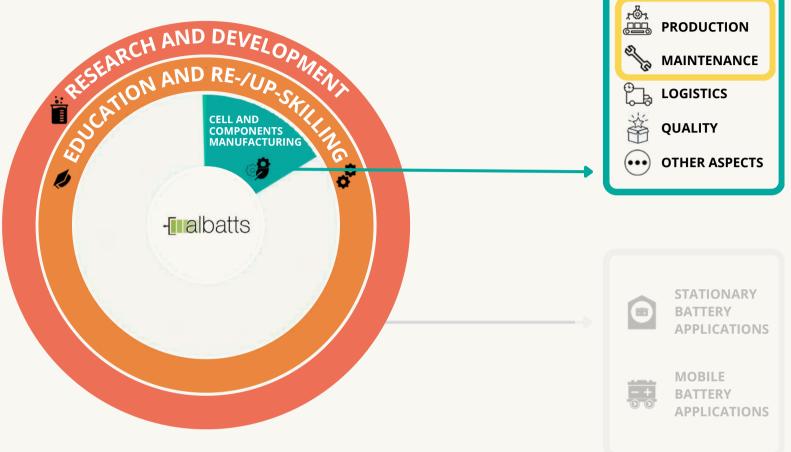
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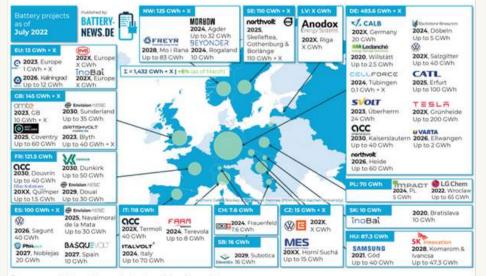
• Other departments and Aspects, specifically: purchasing, HR, finance,

### **CELL AND COMPONENTS MANUFACTURING**



## **STAKEHOLDERS/COMPANIES**

### **BATTERY CELL MANUFACTURERS**







### **Production and Maintenance**

A production department performs one of the key activities of a Li-ion battery manufacturing company. It can be considered a volume department due to having a relatively high number of employees when compared to the other departments.

The production department can be divided into two main sections (note: the "upstream production" part can be done in-house or outsourced):

Maintenance: The battery production line is a very complex system, and the manufacturing needs special conditions - the dry and clean rooms, for example, need periodic maintenance. Software maintenance needs to be carried out as well. Companies are trying to introduce preventive maintenance concepts aiming to prevent failures during production and outages. Within predictive maintenance, parts of the line should monitor themselves and predict when interventions will be needed.

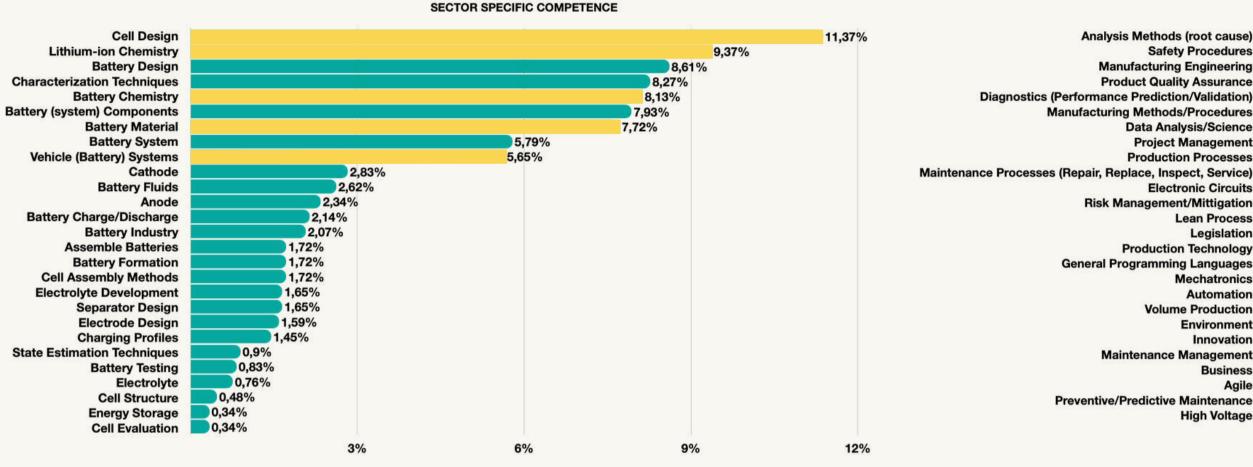
**TARGET GROUPS**: Educational institutions, battery producers, recruitment companies, head-hunters, consultants.



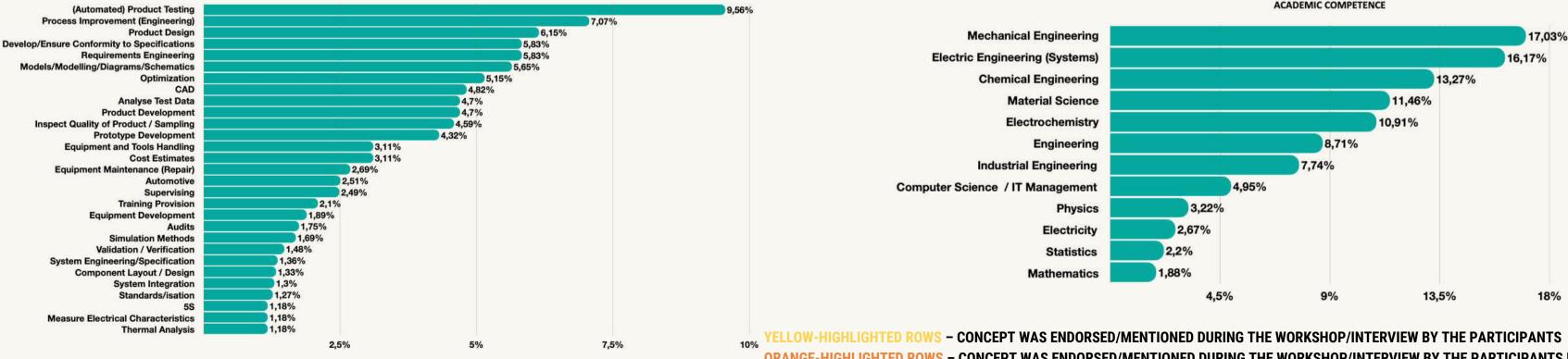
• "An upstream" production that prepares the input electrode materials. This production phase, where chemical processes take place, requires a lower number of employees than the following downstream production phase.

• "A downstream" production section that involves the other production steps such as electrode manufacturing, cell assembly (depending on battery design - prismatic, pouch, cylindrical) that is the most labor-intensive part, and cell finishing.

### **SKILLS, COMPETENCES & KNOWLEDGE NEEDS**



CROSS-SECTORAL SPECIFIC SKILLS



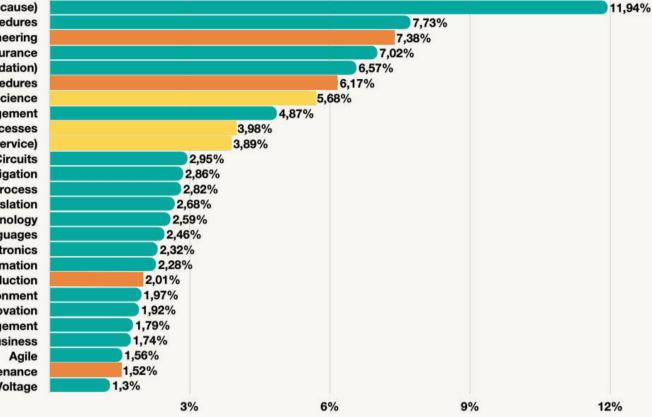
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Analysis Methods (root cause) Safety Procedures Manufacturing Engineering **Product Quality Assurance Data Analysis/Science Project Management Production Processes Electronic Circuits Risk Management/Mittigation** Lean Process Legislation **Production Technology** Mechatronics Automation **Volume Production** Environment Innovation Maintenance Management **Business** Agile **High Voltage** 



GO TO REPORT

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### ACADEMIC COMPETENCE

## ORANGE-HIGHLIGHTED ROWS - CONCEPT WAS ENDORSED/MENTIONED DURING THE WORKSHOP/INTERVIEW BY THE PARTICIPANTS MORE THAN ONCE

**JOB ROLES** 

**BATTERY CELL SIMULATION ENGINEER BATTERY MATERIALS ENGINEER HIGH-DENSITY ANODES** DEVELOPMENT ENGINEER HIGH-VOLTAGE STORAGE COMPONENTS CELL SIMULATION ENGINEER SR. BATTERY CELL ENGINEER MAINTENANCE ENGINEER ELECTROCHEMISTRY LEAD-BATTERY MATERIALS SR. ELECTRONICS ENGINEER TECHNICIAN FORMATION MAINTENANCE MANAGER CONTROLS ENGINEER **CELL TEST ENGINEER** ELECTRICAL ENGINEER MECHANICAL CELL DESIGN ENGINEER BATTERY MECHANICAL ENGINEER SENIOR CELL DESIGN ENGINEER LITHIUM ION CELL BATTERY SYSTEM ENGINEER **CELL ASSEMBLY PROCESS ENGINEER** MANUFACTURING ENGINEER **EQUIPMENT ENGINEER** MECHANICAL ENGINEER PRODUCTION MECHANICAL BATTERY DESIGN ENGINEER SENIOR/STAFF BATTERY ENGINEER ELECTRO-MECHANICAL ENGINEER PRINCIPAL MECHANICAL DESIGNER TOP CAP ENGINEER CELL DESIGN ENGINEER CELL MECHANICAL ENGINEER DESIGN ENGINEER-BATTERY TECHNOLOGY MECHANICAL DESIGN ENGINEER MANUFACTURING ENGINEER, LI-ION ENGINEER PRODUCT MANAGER CELL ASSEMBLY ENERGY STORAGE PRINCIPAL ENGINEER WHITE-COLLAR PRODUCTION MANAGER DOWNSTREAM PRODUCTION MANAGER CELL ASSEMBLY **AUTOMATION ENGINEER SENIOR ENGINEER-BATTERY MODELLING & ANALYSIS** ELECTRICAL DESIGN ENGINEER SENIOR BATTERY MECHANICAL ENGINEER

**BLUE-COLLAR** 

**TECHNICAL ASSEMBLY WORKER** ELECTROMECHANICAL EQUIPMENT ASSEMBLER CMM LAB TECHNICIAN

**BATTERY TECHNICIAN OPERATOR** MAINTENANCE TECHNICIAN SHIFT LEAD LITHIUM MAINTENANCE TECHNICIAN CALIBRATION TECHNICIAN **CELL ASSEMBLY TECHNICIAN ELECTRICAL TECHNICIAN** MECHANICAL DRAFTER INSTRUMENT TECHNICIAN TEAM ASSEMBLER **PRODUCTION ASSEMBLY OPERATO** 

**BATTERY PRODUCTION TECHNICIAN** COMPUTER-CONTROLLED MACHINE TOOL OPERATOR MATERIAL PLANNER **GENERAL-MACHINIST** 

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### **CONSIDERATIONS / RECOMMENDATIONS**

### PRODUCTION

- Apart from the general battery-related education, strengthening the skills and competencies to ensure understanding of setting up the production, preparing the related structures, commissioning the machines, chemical, and mechanical assembly, automation experience, and mechanical understanding of the automated systems combined with understanding the related software and calibration.
- Strengthening general IT and data analysis skills to cover future needs.
- Battery skills (also mentioned in the context of Production)
- "Dry and clean room" maintenance (including room contamination measurement)
- Predictive and preventive maintenance
- Diagnostics

### WHITE-COLLAR SPECIFIC NEEDS

- Increasing competencies in **production and material engineering, production** planning, production management, shift management, process engineering, cell design, machine learning and optimisation, modelling and simulation;
- Strengthening the focus on large-scale manufacturing, understanding of chemical processes and quality, risk and safety management;
- Battery industry-related knowledge skills: battery material, battery chemistry, battery fluids, battery components, battery testing, defective products removal

- ability to troubleshoot;



### **BLUE-COLLAR SPECIFIC NEEDS**

• "Upstream" production - increasing knowledge to understand the **risks, envision** the safety issues, and how chemicals behave;

• "Downstream" production - increase machine understanding, 5S skills, and the

• Overall production system understanding;

• Knowledge/skills: material handling, Clean/Dry Room Procedure/Validation,

Inspect Quality of Product / Sampling, material pressing, electrode process,

fine mechanics, HMI (Human Machine Interface)

- albatts Sectoral skills intelligence & strategy for the European Battery Sector - Release 2

### **CONSIDERATIONS / RECOMMENDATIONS**

### MAINTENANCE

Apart from the general battery-related education, strengthening the skills and competencies to ensure understanding of setting up the production, preparing the related structures, commissioning the machines, chemical, and mechanical assembly, automation experience, and mechanical understanding of the automated systems combined with understanding the related software and calibration.

Strengthening general IT and data analysis skills to cover future needs

"Dry and clean room" maintenance (including room contamination measurement)

**Predictive and preventive maintenance** 

### **LINKS & RESOURCES**

- Sectoral Skills Intelligence and Strategy Production and **Maintenance**
- See the list of the ALBATTS SKILLS CARDS



**Battery skills (also mentioned in the context of Production)** 





**Diagnostics** 

