Alliance for Batteries Technology, Training and Skills

2019-2023

Workshops on Job Roles and Skills:

Stationary Energy Storage in

Grids and Telecom Applications;

Battery Cells Manufacturing

Deliverable D4.3 - Future Needs Definition for sub-sector

NNN

ISIBA - Release 1



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EXECUTIVE SUMMARY

The fire safety of batteries and the question of how to extinguish them when aflame remain less known areas despite their increasing use in numerous applications. This and other current battery topics were discussed in workshop webinars conducted by the ALBATTS project in January 2021. The workshops brought together industry experts to discuss the latest developments in the rapidly increasing electrification of our society with the application of batteries in various areas of business and life. ALBATTS focuses on bringing industry and education stakeholders together to create a blueprint for the future education and training programs to ensure the availability of skilled workforce for the European battery industries.

Our goal with the workshops was to gather further up-to-date information on the implications of the deployment of energy storage systems for current and future job roles and skills. With the workshops we could directly reach out to the experts and complement the last year's desk research. The workshops discussed in this report are Stationary Energy Storage in Grids and Telecom Applications: Safety & Future Job Roles and Skills (January 26, 2021) and Battery Cells Manufacturing – Job Roles & Skills (January 20, 2021).

The findings of the **Stationary Workshop** included learning about battery fire safety and the implications of increasing battery usage as a gamechanger for firefighters requiring them to acquire new methods and skills. We also learned how the integration of renewables, growing electrification, new market designs and business models boost the development and integration of energy storage. The deployment of new technologies such as 5G cellular networks with their increased energy needs are further increasing the demand for energy storage. These developments have their impact on job roles and skills that were discussed.

The **Battery Manufacturing Workshop** revealed that there appears not to be a lack of applicants to work for battery industry, but their skills often do not match the requirements. The other findings included for example that ultimately, staff will be needed in all the levels, but the demand is greatest in operations followed by engineers, maintenance etc. The main European recruitment challenges for battery manufacturers were identified and they include for example the absence of battery manufacturing experience.







LIST OF ABBREVIATIONS

AC	Alternated Current
AI	 Artificial Intelligence
ALBATTS	 Alliance for Batteries Technology, Training and Skills
BESS	 Battery Energy Storage Systems
BMS	 Battery Management System
CENELEC	 European Committee for Electrotechnical Standardization
CLC	 Co-location Centre
CNG	 Compressed Natural Gas
СО	 Carbon Monoxide
CTIF	 International Technical Committee for the Prevention and
	Extinction of Fire
DC	 Direct Current
DG	 Directorate General
EBA	 European Battery Alliance
EC	 European Commission
EN	 European Standards
E/P	 Energy to Power
ESS	 Energy Storage System
EV	 Electric Vehicle
EU	 European Union
GWh	 Gigawatt hours
IEC	 International Electrotechnical Commission
IPCEI	 (Important Projects of Common European Interest)
IT	 Information Technology
LPR	 Liquid Propulsion Rocket
MOOC	 Massive Open Online Course
NCA	 (lithium) Nickel Cobalt Aluminium (oxide)
NCM	 Nickel Cobalt Manganese
NFPA	 National Fire Protection Association (US)
0&M	 Operation & Maintenance
PhD	 Doctor of Philosophy
PV	 Photovoltaics
Q&A	 Question & Answer





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R&D	 Research & Development
S1/S2/S3	 Electric Qualifications
Tukes	 The Finnish Safety and Chemicals Agency (Turvallisuus- ja
	kemikaalivirasto)
V	 Volt
VP	 Vice-President
VRE	 Variable Renewable Energy
VW	 Volkswagen







1 INTRODUCTION

The Task 4.4 Future Needs Definition of Work Package 4 assesses for example technologies and skills needs with several workshops. The first deliverable, D4.3 - Future Needs Definition for sub-sector ISIBA - Release 1 presents the two workshops organised in a webinar format in January 2020 and their findings. The workshops were as follows:

- Stationary Energy Storage in Grids and Telecom Applications: Safety & Future Job Roles and Skills (January 26, 2021)
- Battery Cells Manufacturing Job Roles & Skills (January 20, 2021)

The purpose of the workshops along with the concurrent survey process (Task 4.3, D4.2, February 2021) is to generate further job roles, skills, and competences related information in addition to the findings generated in the deliverable D4.1 - Desk research and data analysis for sub-sector ISIBA - Release 1 (August 2020) and D3.3 Desk research and data analysis - Release 1 (November 2020).

1.1 FOCUS AND ORGANISATION OF WORKSHOPS

The partners involved with organizing the workshops in Work Packages 4 and 5 decided to arrange a total of four online workshops in January concentrated on battery applications and relevant job roles and skills with the following topic areas:

- Automotive
- Maritime
- Battery manufacturing
- Stationary

The automotive and maritime topic areas are covered by the deliverable, D5.3 - Future Needs Definition for sub-sector IMBA - Release 1 while the battery manufacturing and stationary topic areas were covered in the deliverable D4.3 mentioned earlier above. The entire workshop process was organized, coordinated, and processed as an inter- work package joint operation (Work Packages 4, 5 and 3).





2 STATIONARY WORKSHOP

The preparation included planning and deciding the structure of the workshop. The important element was choosing the actual topics and finding the right expert organizations who would be interested in participating. Battery safety, grid and off-grid and telecom applications were chosen on the basis of the expertise of the ALBATTS members, what we considered important and what is trending now. The goal was to attract more audience with one general topic (Battery Safety) and then with two other areas covering different applications of the stationary energy storage: grid & off-grid and telecom (5G Stations).

2.1 THE PREPARATION PROCESS

The preparation occurred in the form of regular weekly workshop meetings lead by EFACEC which were accompanied with additional extra meetings when needed. In these meetings tasks were assigned and the status with the work process was followed up. The main participants included the workshop team members Mr José Fonseca of EFACEC as well as Ms Sari Rintakoski and Mr Kari Valkama of Merinova Technology Centre. Additionally, Mr Lukas Folbrecht (AIA – the workshop task leader), Mr Marek Spanyik (VSB-TUO) and Mr Afonso Araújo (EUpportunity) were almost always present as well. Additionally, the rest of the involved partners in the task were welcomed to join as well. There were also weekly coordination meetings with other workshops that were kept on Thursdays.

After the topic areas were selected the potential expert speakers and the moderator were contacted by the participating members and invited to join the workshop. We aimed to have diversity with the speakers by for example having both genders represented. The work prior to the actual webinar included close coordination and communication with the moderator, speakers, and the organizer team. The presentations were prepared by the speakers and reviewed and provided feedback by the workshop team members. The use of the tools, Webex platform and Mentimeter tool were practised together with the speakers and moderator when applicable.







The dissemination of the workshop event was done in collaboration with Work Package 2 in December and January. It included LinkedIn posts and sharing, e-mail and telephone contacting potential interested participants.

2.2 EXECUTION

This section describes the execution of the stationary workshop which was held on the 26th of January 2021.

2.2.1 Attendance

The participant count to the live stream of the stationary workshop webinar was 94 on the Webex platform. 26 viewers were following the live stream on ALBATTS Facebook profile. Since the event was kept, we have had a total of 98 people interacting with the webinar's video recording on the Facebook profile. There were over 140 registered to the workshop. Most of them represent industry and education sectors. The top 3 countries in terms of the number of registered were Portugal, Sweden and Finland. Not only Europeans did participate, but we also received registrations from elsewhere. More details about the participants can be seen in Figure 1 and Figure 2.









Figure 1. Number of registrations per type of entity









Figure 2. Number of registrations per country





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2.2.2 Speakers

Moderator and the speakers selected representing the project and some of the major industry players:

Moderator

Mr Johan Söderbom has been active in the energy sector for 25 years mainly working with R&D for the electricity system. Between 1995 and 2014 Johan worked at Vattenfall AB in various positions in R&D. From 2014 to 2019 Johan was heading a section at RISE (Research Institutes of Sweden) responsible for electrical and optical measurement technology and he now holds the position of thematic leader for Smart Grids and Energy Storage at EIT InnoEnergy.

Introduction of ALBATTS

Mr Kari Valkama is a project manager at the Technology Centre Merinova in Finland. Merinova is a key member of the energy cluster in the Vaasa region. Its cutting-edge expertise is in energy technology, business development and operational conditions. Technology Centre Merinova is involved in various projects, programs, and services both regionally, nationally and globally. Kari holds a degree in Business Administration. He has years of experience in working with business and general development related tasks in SME companies in metal and cleantech industries.

Presenters

Mr Mikko Saastamoinen is a shift officer in the rescue department of South Karelia (team leader). He has 20 years in fire & rescue services and is the main extrication instructor in rescue department of South Karelia and at the Finnish association of fire officers. He is also the Finnish representative in the CTIF commission for extrication & new technology (CTIF is an international fire and rescue association which has several different commissions). He was awarded the Firefighter of the Year award for 2020.







Ms Karoliina Meurman, Senior officer, Rescue service equipment, is working at the Finnish Safety and Chemicals Agency (Tukes) with market surveillance of products meant for early fire detection and extinguishing small fires, for example smoke alarms, CO alarms and first-aid extinguishing equipment. Tukes operates under several Ministries, the Ministry of Economic Affairs and Employment being in charge of the ministerial governance and supervision. In addition, Tukes functions for example under the Ministry of Social Affairs and Health and the Ministry of the Environment. Lithium-ion battery fires have become familiar to Karoliina when estimating the effect of lithium-ion battery fire extinguishers. Karoliina has also expanded her expertise into bigger battery applications and their fire risks. Karoliina holds a Master of Science in Technology (chemistry) and has worked as a public authority for 15 years.

Mr Ismael Miranda is currently the manager of the digital energy hub at EFACEC, dealing with microgrids and their optimal energy management. He holds a PhD in Electrical and Computer Engineering from the faculty of Engineering of the University of Porto, focused on the integration of Battery Storage in distribution networks of interconnected and islanded power systems. Since 2012 with EFACEC, Ismael has performed roles related with R&D, from a researcher in Smart Grids and developing the participation of the company in national and European projects, to leading the R&D department of the Energy Storage division.

Mr Jussi Havela is the Production Manager at Telia Towers. He has a background in the manufacturing industry of electrical equipment. His practical experience at ABB covers positions from designer to department management. Jussi has utilized this knowledge to manage critical facilities operations, first at Coromatic and now at Telia Towers.

2.2.3 Presentations

Operating Models in Emergency Situations with Batteries: Mr Mikko Saastamoinen – shift officer in rescue department of south Karelia

Mr Saastamoinen gave a presentation about responding to battery fire situation. Battery fires are difficult to extinguish, and the risk of re-ignition is very high. Consequently, there is a need for new methods and tactics for fire and rescue departments. Burning electric vehicles are submerged to water containers. When a burning battery is sunk to the water, the water will







become toxic waste that needs to be paid attention as well. The use of a fire blanket is a new rapid extinguishing method, which blocks and isolate any fire, even lithium battery fire. This method is still very new, and rescue departments are not fully aware of how to use them.

CTIF Commission, where Mr Mikko Saastamoinen is a Finnish representative, is encouraging and promoting the cooperation between fire services and other emergency services around the world. The Commission is active in three working fields: extrication road safety (UN Decade of Action for Road Safety), Energy storage systems (batteries, solar panels), and Smart tech (robots, self-driving cars, data transmission). Education, innovation, information, installation, regulation are the key words. The organization has the goal to share information with the involved entities. One example is a detailed handbook for handling battery fires.¹

Mr Saastamoinen presented ISO 17840 standard -project for alternative propulsion identification of EV storage technology. It is very important in case of fire or in accident. According to Mr Saastamoinen, what is needed is sharing, testing, and training.

Battery Safety: Ms Karoliina Meurman – Senior officer, Rescue service equipment at Tukes

Ms Meurman provided a presentation about the battery safety aspects and related roles of various stakeholders. She presented the Battery Network at Tukes, where experts of different types of Li-ion batteries from a number of Finnish authorities are involved with.

Ms Meurman presented the roles of different parties such as manufacturers in ensuring the safety, authorities being responsible for the legislation and surveillance, and the actual owners' responsibilities for how products are used.

According to Ms Meurman energy storage systems are not covered well by EU legislation. She mentioned installation standards HD 60364 Low-voltage electric installations, EN 50110-1 Operation of electrical installations. Additionally, the standard in which safe working method is provided, IEC 60364 Electrical Installations for Buildings, was mentioned.

Ms Meurman provided information about competences with regards to electrical works qualification and electrical safety examination. She explained what education is needed in



¹ <u>https://godr.sdis86.net/godr/godr-sr-en/index.html</u> Visited 2021-02-24



Finland to be granted a certificate of qualification. For example, the electrical qualification S1 is needed for person who works with over 1000 V.

There are several standards for Energy Storage Systems ESS. A standard from America is NFPA 855, "Standard for the Installation of Energy Storage Systems", which is very good from Ms Meurman's point of view. Five more standards are mentioned in the presentation.

Additionally, a new proposal for EU regulation, that has been provided concerning the batteries and their waste, was presented.

Nine different safety parameters have been given for ESS and those will be tested. With regards to risk scenarios and how to manage them, Ms Meurman mentioned stopping thermal propagation between cells and a possible risk of gas explosion, if fire occurs. With regards to the safety mechanisms she explained about automatic fire suppression systems.

ON-OFF Grid applications – Mr Ismael Miranda Business developer at EFACEC

Mr Miranda provided a presentation about on and off-grid application of energy storage. He explained the leading role of Lithium-ion technology for stationary battery storage.

Several applications for stationary energy storage are presented including bulk energy, ancillary, transmission infrastructure, distribution infrastructure and customer energy management service as well as off-grid applications.

Mr Miranda presented how Europe is growing and evolving while the US and Australia are the main markets of ancillary services. Energy storage and in particular battery energy storage can decrease costs in upgrading the transmission and distribution infrastructure. Storage can be closer to the end-user with customer energy management services, by reducing the cost of electricity. Off-grid can be applied in both geographical and electrical islands, for Europe or more remote places, such as in some countries in Africa and in other developing countries.

Integration of renewables and continuous decarbonization, growing electrification and new market designs and business models will unlock the development and integration of energy storage. The EU Green Deal and other European regulations are starting to recognize energy storage with a key role to achieve the sustainable goals for energy.

Additionally, Mr Miranda explained the needed competences and job roles.





The Case of 5G Base Stations: Mr Jussi Havela – Production Manager at Telia Towers

Mr Havela presented about the application of energy storage systems with cellular network base stations. 5G is a major driver of change, since that technology is heavily increasing the power consumption in telecom networks and it needs new solutions. He explained what is required to maintain the base stations and their batteries.

As a business environment telecom is heavily regulated by authorities. Towers has certain back up requirements timewise; depending how many customers the current base station is serving, it needs to be up 3, 6, or even 12 hours.

For telecom tower operators' service partners, who do the actual maintenance, it is important to understand the new technologies such as improving batteries and their monitoring. That forces a shift from a traditional maintenance perspective to more holistic service approach, in which the maintenance staff has to know extensively the technologies applied in base stations in order to provide the best support to a customer.

In the future, it will be necessary to get multiskilled employees, that traditionally have had an electrical qualification, but in the future, they will also need to have IT skills also to be able to perform maintenance on the whole site.

The operators have to be alert for new emerging technologies, to have an understanding of legislation and simultaneously key competitiveness. In the telecom operator's side postdoctoral/-graduated roles are preferred. The service providers' side requires formal qualifications, since they are doing regulated electrical work. For the telecom operators it is beneficial to understand what the demands are. The basic electrical installers or foremen roles will not disappear but adapt some needed skills to provide the best possible service for customers and the whole value chain. Mr Havela mentioned and explained the electric work qualifications needed for the personnel operating at the base stations in Finland. The gualification levels S2 or S3 are required.

The full description of the contents of the speeches are available in Appendix A: Workshop Notes and First Analysis. The workshop video-on-demand, the related slides and other information can be accessed on the ALBATTS website².



² Project ALBATTS Website, Events Page under: Project ALBATTS (project-albatts.eu) Visited 2021-02-24



2.2.4 Debate & Questions

Q: Is there any specific training for battery firefighting?

- **A**:
- There is specific training, although it is at a minimum level. French Firefighters created a database³ on how to deal with incidents with electric vehicles and batteries. It is a very new topic in need of big development.

Q: It is a challenge to find master thesis positions in companies? What would you recommend to maximize the chances? What skills are top priority in cell manufacturing and energy storage fields?

A:

- In terms of battery manufacturing, a strong background in electrochemistry is recommended. It is useful to know how to use modelling tools for thermal and electrical simulation. People need to be more aware of these tools and know how to use them in order to give the company some valuable work.
- For example, in the case of EFACEC, they have been receiving master thesis students, which are publicly available. Those can be viewed and used as inspiration to know what companies are looking for in terms of a master thesis.
- A master thesis can be done with the goal of improving the manufacturing quality.

Q: What kind of qualification (S1, S2 or S3) do you have to have to work at a base station?

A:

- It depends on the type of work. For antenna work, there is no need for qualification.
 For most of the cases, S3 is enough.
- As some higher voltage is involved, a S2 may be required, both for a technician or for a more formal position as a team leader for example.
- S1 is not as required as the voltage is not high enough.



³ Database accessible under: <u>Emergency response on vehicles | CTIF - International Association of Fire Services</u> for Safer Citizens through Skilled Firefighters Visited 2021-02-24



Q: Have you adopted any restrictions or regulations in Finland for parking lots in relation to electric vehicles?

- In Finland there are no restrictions, as the building itself should hold the fire event, whether it is from an electric or regular vehicle.
- The main constriction is related to the rescue service, how they should act. There is a question if charging stations should be installed, but nothing in the law yet.

More details are available in Appendix A: Workshop Notes and First Analysis.

Interactive Mentimeter questions to the audience

Due to the physical distancing required by the global pandemic, it was not possible to organize the workshops by having participants also physically present as it was originally intended when the project was launched. To bridge the lack of interaction between the participants, speakers, and organization, a set of questions was planned that was asked to the audience by using an audience response system, called as "Mentimeter" during the presentations.

The Mentimeter application allowed the speakers to ask a few questions to the audience, who answered them with an Internet browser in their own devices. It was also possible to see the responses and the related graphs on the screen.

By using this feature, it was possible to gather extra information from the audience, both more personal (location, value-chain category, how they heard of the workshop) and professional opinions on job roles, skills, competences and technology as seen in Figure 3, Figure 4 and Figure 5.







Which BESS application do you consider to be more relevant in the future?



What area your organization needs to focus the most to fully utilize future Battery Energy Storage Systems



Figure 4. The areas organizations need to focus the most on to fully Utilize the BESS





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Does your company have at least one battery fire safety specialist?



Figure 5. Organizations having a battery fire safety specialist

The full description of the contents of the Mentimeter questions and answers as well as their analysis is available in Appendix A: Workshop Notes and First Analysis.

2.2.5 Ex-post survey

After the workshop, a satisfaction mini survey was sent to the participants. Overall, the participants were very satisfied with the workshop. The main topic that got the audience most interested was battery safety. One person selected all the topics. Half the participants claim they learned something with the workshop. The other half claims they somehow learned something.

Written feedback:

- How do you think the webinar could have been made more effective?
- "Good as it is, I count the picture on what competence is needed will become clearer in the continuation of the project."
- In your opinion, what are the battery relevant future jobs and skills needed in the battery production sector and why?
- "electronics, electric specialist"
- "Quality, safety and security staff. Emergency handling experts. Installers of



Stationary battery applications"

- Comments and suggestions (including activities or initiatives you think would be useful for the future).
- "EU Projects (Erasmus+ or other Program) for new job development knowledge"
- "I think that more on how battery parks (like in the city of Hornsdale, Australia) can help power grid owners and electricity producers to get rid of dirty oil- and coaldriven peaker plants. This especially if hydropower production cannot be used for balancing the grid."

2.3 KEY FINDINGS

Key findings are listed into two categories based on the topics discussed.

Grid and off-grid & 5G base stations

- European initiatives and regulations, namely on the environmental and energy fields, are an incentive to the development of the energy storage business.
- Integration of renewables, growing electrification and new market designs and business models are boosting the development and integration of energy storage.
- The development and deployment of new technologies such as 5G cellular networks with their increased energy needs are further increasing the demand for energy storage solutions.
- Lithium-ion is and will be the leading technology for stationary battery storage due to the decreasing costs.
- Sharing information is crucial in order to develop the competences needed in the battery ecosystem.
- There is not one particular competence, skill or job role that is more relevant for stationary storage. The needs of the companies are distributed in a wide spectrum from electrochemistry to IT, software and algorithms.
- The vast majority of job roles and skills mentioned require university graduation for the people involved.
- Although it is widely accepted that battery safety is a very important sub-sector of the battery ecosystem, the topic needs further development in order to be a standard in companies.





 Teamwork between several different fields of knowledge is critical to develop a sustainable business in stationary energy storage.

Battery safety

- Increasing use of batteries and consequently growing risk of disaster situations involving battery fires acts as a driver of change for fire and rescue services' capabilities.
- Due to the challenging extinguishing of battery fires firefighters need to master new methods and techniques e.g., use of fire blankets and submerging into a water tank.
- ISO 17840 standard project aims to enable firefighters to identify a battery fire risk.
- Sharing information, testing and training are essential for providing future firefighters with skills and competences to manage various battery fire scenarios.
- Stationary energy storage systems are not well covered by existing EU Legislation.
 - Proposal for a regulation concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020 has been delivered.
- It is important to ensure the adequate skills and competences to maximize safety in the entire life cycle of batteries:
 - Manufacturers: capability to produce safe products, understand the legislation and standards as well as inform authorities and owners/users adequately.
 - Authorities: creation of legislation that upholds safety, conducting market surveillance and providing guidance.
 - Owners and users: skills and competences to conduct installation, maintenance and actual operating of batteries safely.
- What knowledge is needed to establish the best possible safety level of stationary energy storage systems?
 - o general knowledge of regulations and standards regarding batteries
 - o general knowledge of battery safety issues
 - operators (and users): knowledge on responsibilities of safety and regulations during different phases of the life- cycle





• knowledge of practical safety issues during different phases

Besides the above-mentioned findings multiple skills and competences as well as knowledge and associated job roles were identified, which can be seen on Figure 6 and Figure 7. Additionally, the set of drivers of change and other factors that influence the skills agenda in the battery sector can be seen depicted in Figure 8.



Figure 6. Identified Skills/Competence and Knowledge









Figure 8. Identified Drivers of Change





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2.4 FOLLOW-UP

After the workshop, a small briefing meeting was organized between organization and speakers. Overall, the satisfaction was consensual. Every participant in the meeting agreed that the event was successful. A good participation rate was achieved both as attendance as in answering the posed questions and a lot of useful information within the proposed topic was gathered. Similarly, some improvement topics were discussed to enhance the organization of the event:

Time management of the presentations: The presentations ended at the time the workshop was supposed to close, leaving a small margin for the Q&A panel. Some new time management methods should be adopted for the next event;

- Better communication with the speaker about the use of the Mentimeter: although the participation rate of the audience was satisfactory some discomfort with the tool was noticed, as it is not a very common application. If a new approach as Mentimeter is to be used in the next workshops, a more intensive preparation should be carried out;
- Learn how to incentivize the audience to ask more questions, and questions more related to the topic of the workshop: The chat box for questions had little participation. Had we had the time for the Q&A panel and the backup questions prepared before the workshop should be used. Methods to incentivize the participation in the chat should be learned and implemented.

For future workshops, some ideas were already presented. The structure of topics could remain the same: one general topic about batteries to attract a good number of participants and two more specific topics on stationary battery energy storage applications. A new approach to interacting with the audience was also proposed, with a division of the people into virtual rooms, which could lead to a more effective contribution of the audience with information to the project, as well as vice-versa.







3 BATTERY MANUFACTURING WORKSHOP

Every Friday there was a mini meeting with the representatives from the **Battery Manufacturing Workshop** led by Mr Jakub Gajdusek from HE3DA and the other key participants such as Mr Valkama and Ms Rintakoski from Merinova. The meetings often included Mr Jakub Stolfa and Mr Marek Spanyik.

3.1 PREPARATION

The preparation process was practically similar to the **Stationary Workshop.** After the topic areas were selected, the expert speakers and the moderator were invited to join the **Battery Manufacturing Workshop**. The work before the actual workshop included collaboration with the moderator, speakers and our team. The presentations were prepared by the speakers. The use of Webex platform was practised together with the speakers and moderator when applicable.

The dissemination of the workshop was done in December and January for all the four workshops in the series. It was conducted together with Work Package 2. These promotional activities included LinkedIn posts and sharing as well as e-mailing potentially interested participants.

3.2 EXECUTION

This section describes the execution of the stationary workshop which was held on the 20th of January 2021.

3.2.1 Attendance

The participant count to the live stream of the stationary workshop webinar was 97 on the Webex platform. 12 viewers were following the live stream on ALBATTS Facebook profile. Since the event was kept, we have had a total 110 people interacting with the webinar's video recording on the Facebook profile. There were nearly 140 registered to the workshop. Similarly to the stationary workshop, most of them represent industry and education sectors. The top three countries in terms of the number of registered were Sweden, Portugal and Belgium. Not only did Europeans participate, but we also received registrations from elsewhere. More details about the participants can be seen in Figure 9 and Figure 10.







Figure 9. Number of registrations per type of entity





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Figure 10. Number of registrations per country

3.2.2 Speakers

Moderator

Mr Björn Fagerström (PhD) is presently Director at EIT Manufacturing North. Experienced and dedicated professional with +30 years of work experience and +20 years of management experience, including +15 years of academic experience. Practise from a broad range of industries, such as O&G, Energy, Pulp & Paper, Automotive, Logistics, Education, Consumer Products, etc. Björn has had several roles, such as CEO, Project Manager/Director, R&D

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Director, Product Development Manager, Production Manager, etc. In addition, Björn has also been professor at Mälardalen University in Sweden for 15 years (part time), focused on R&D and Manufacturing.

Introduction of ALBATTS

Dr Anders Norberg is the coordinator of the ALBATTS project and works as an education strategist for the municipality of Skellefteå, the town in Northern Sweden where the Northvolt cell factory is being built. Anders is a former philosophy teacher but has worked with education development questions for many years in Northern Sweden, in EC projects and in research.

Presenters

Mr Caspar Rawles is the Head of Price Assessments at Benchmark Mineral Intelligence London, where he leads a team that collects and assess sensitive market price data on lithium, graphite, cobalt, and nickel for use in industry contracts and negotiations. At Benchmark, Caspar regularly travels to active mines and processing plants in many different countries with a specialist focus on China. He is regularly invited to give market-focused presentations around the world including Canada, China, Australia, and the United States.

Ms Ivone Kaizeler is the Team Leader for Competitiveness and International matters in the Automotive and Mobility Industries Unit of Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. She is in charge of the competitiveness of the automotive industry, relations with international partners and the European Battery Alliance. Previously she occupied several functions in the European Commission on Employment and Social Affairs, Industry and Competitiveness and Trade and worked in consultancy for 6 years. She graduated in Engineering from the Faculty of Sciences and Technology of the University of Lisbon, in 1994.

Mr Vaclav Binar is the Executive Board Chairman and CEO of MAGNA ENERGY STORAGE a.s., a HE3DA li-ion battery technology producer. He has a master's degree in Finance from the University of Economics Prague.







Ms Katarina Borstedt, Director of Growth at Northvolt. Responsible for the people perspective of Northvolt's growth in Skellefteå. Katarina has a background from management consultant and senior HR roles in the Pulp and Paper industry.

3.2.3 Presentations

Mr Caspar Rawles (Benchmark Mineral Intelligence) – State of the industry – The Battery Global Arms Race

Mr Rawles presented predictions of battery production capacities as well as raw material demand globally. As he stated, there are already 186 battery manufacturing plants operating or under construction or to be in production this year. In 2030, Benchmark Mineral Intelligence predicts the overall battery production capacity will grow up to 3,1 TWh with China dominating the market. One of the key factors for growing manufacturing capacities across the world is the unified quality for each of the market sector. When it comes to high-quality cells, the Tier 1 category are primarily used in the EV sector while the rest are used for stationary applications or with electronics. Despite the Chinese region being the most productive in terms of multiplying the battery capacities and constructing most of the new battery plants, the EU market, specifically countries like Germany, Poland, Sweden and other major countries, plan ahead and are starting to construct battery plants as well. As Mr Rawles discussed in the beginning, following the raise in production and capacities the European raw material demand in 2030 will multiply by 10-20 times with nickel, cobalt, manganese, lithium and graphite.

Ms Ivone Kaizeler (European Commission, Automotive Unit) – European Battery Alliance fostering a strategic value chain

Ms Kaizeler presented the support from the European Commission and discussed the specific plans and incentives an EU based company can have to help them to achieve the common European goal of a clean and sustainable future. The statement from the European Commission is about supporting battery manufacturers in the EU with following the European Battery Alliance Action Plan. One of the new and key European strategies is the European Green Deal which fights for a climate-neutral target of 2050 in both automotive and industry







sectors. Following the programme there is also a proposition of new battery regulations focusing on the production of low environmental impact, high-quality products by obtaining materials, by following ecological and social standards, that have a long lifespan, are safe and recyclable as per EBA Action Plan.

Mr Vaclav Binar (HE3DA/Magna Energy Storage) – New approach towards Li-ion battery mass manufacturing process

Mr Binar represents an innovative company already manufacturing new lithium batteries with changed assembly design process allowing the battery cell capacity starting from 1 kWh on 4 Volt. The new lithium battery platform brings a revolutionary safety parameter, 99% recyclability and new possibilities on large-scale battery storage systems. Mr Binar pointed out an expanding trend of projects requiring extensive work by the technical departments. Employees in the technical departments such as project managers and engineers are working together to perform the given tasks and verifying their feasibility from the technical perspective and reasonability from the time perspective due to the limited number of qualified people available to meet such a growing demand in the individual projects. The attractiveness of HE3DA among new potential employees is very high due to the novelty of the battery industry and due to it being currently the only company in that field of business in the country. However, there is a mismatch in between their skills and what is required for the production lines. The needed skills are very similar to those in an automotive industry.

Ms Katarina Borstedt (Northvolt) – Challenges & Opportunities in recruiting for the battery cell manufacturing ecosystem in the EU

Ms Borstedt is working with the skills and competencies needed for growing a Gigafactory by Northvolt. As she stated, there is not a lack of potential applicants, but their skills and competences often do not match the requirements of battery manufacturing. Northvolt estimates they have a need for up to 3000 employees once the factory is fully launched. Furthermore, they need employees ranging from Management and Administration to Engineers, Maintenance and Operations. The ratio for Operations is up to 75% of all the required employees. Another important aspect is the composition of the future employees, about 50 % of whom come from educational programmes without previous industry







experience. Additionally, a large share of the staff will be recruited outside the region. According Ms Borstedt their aim is to have a gender balanced workplace which will be a great challenge for the HR department. As she stated further, there is going to be a great lack of practical experience of 21st century manufacturing processes and a high demand for employees, who work in the automotive industry due to their high matching of skills and job roles with those of the battery manufacturing industry.

3.2.4 Debate & Questions

The debate was rather short but nevertheless the presenters were dealing with questions from the audience from the chat about the competences required from workers and how to attract new employees into the battery sector. Based on the common answers it can be regarded that automotive sector can be benchmarked in the battery industry in the context of quality related skills and competences. The attractiveness of the battery industry brings educated and skilled people, but further specification of the skills needed are on the agenda.

More details are available in Appendix B: Workshop Notes and First Analysis.

3.2.5 Ex-post survey

From the survey questions we have gathered quite similar answers related to presentations and the future job roles and skills. The most reflected answers were related to the high importance of skills in machinery and operations. Engineers effectively working with new machines and operations required to program and maintain the machinery settings will be the key problem and focus for the HR division of each battery manufacturing related companies. Another factor is the output data from the manufacturing section as well as the R&D analyses. Computing and evaluation of such numerous and large data quantities are crucial for further learning and therefore a critical point in the company recruitment strategy.

3.3 KEY FINDINGS

Summary of where the industry and technologies are heading and what relevant new job roles will be needed.





- A Gigafactory concept is mainly a European/North American endeavour. Chinese battery factories are generally smaller and more diversified with different kinds of cell chemistries and applications, such as electric tools, household electronics, etc. The European production is more EV-focused and aiming to provide quality batteries with competitive prices for making competitive European vehicles. The consequence is that this new concept of combining Industry 4.0, economies of scale, vertical integration and very high product quality demands will be mostly a European concept to develop and get working. The concept must be understood, accepted, and embraced by all the workers. A lot of people are required for active quality control and preventive maintenance.
- The three tiers of Li-ion battery qualities are a very useful categorisation, not only in production, but also for second use of batteries. Europe will concentrate on tier one, leaving most of the rest to Asia mainly. This emphasizes the quality control in all work done in a battery Gigafactory even more. This is also underpinned by the proposed new European battery regulations. Quality-related skills will be very important, a common "good-enough" or let-go attitude may not have much place in European battery manufacturing.
- The importance of **experienced maintenance staff** is clear. Here experiencedependent skills are probably very important (tricks of the trade), on top of theoretical knowledge and insights.
- There is not a lack of potential applicants, but their skills and competences often do not match the requirements of battery manufacturing.
- Employees will be needed to all the levels, which are Management, Administration and other support, Engineers, Maintenance and Operations with the last one, Operations being the biggest potential recruiter, with about 75% of all staff.
- Main European recruitment challenges include
 - o absence of practical experience from high volume manufacturing scale up
 - o little background experience in battery manufacturing across Europe
 - lack of understanding of the manufacturing in the industry areas that are close to battery manufacturing in terms of their production processes





Significant part of workers will come from educational programs, with no previous industrial experience that emphasizes the industry's need to for educational institutions to provide right kind of curricula for the future workers in battery

- There are many types of experienced work force (from machine operators to engineers and managers) that have relevant experience but lack knowledge about batteries. A good flexible basic course "Batteries 101" would be very useful and may be of highest importance to get in place as soon as possible.
- Recycling will be a very important activity, since it is not only about European environmental goals, but also about European self-sufficiency of resources for battery production. This highlights the importance of job profiles and their skill demands in recycling.

In a short summary we can state that there is a growing portfolio of companies across the whole battery value chain. The new attractive workspace lures professionals from engineering, management, electrician, maintenance and operations as well as scientists in R&D sector. Automotive sector has the most potential for employees with similar and wanted skills required by the battery manufacturers. Most of the new Gigafactories are located in remote areas with lack of inhabitants close to the working facility. Also, the learning processes for new workers are established individually in each company. Next to manufacturing comes the similarities needed for recycling industry.

Besides the above-mentioned findings, multiple skills/competence and knowledge and associated job roles were identified, this set can be seen in Figure 11 and Figure 12. Additionally, the set of drivers of change and other factors that influence the skills agenda in the battery sector can be seen depicted in Figure 13.





manufacturing.





Figure 11 Identified Skills/Competence and Knowledge

Maintenance staff Battery production engineers

Figure 12 Identified Job Roles







Relations between skills and job roles in different industries Chinese dominance to 2030 will continue even as Europe self sources EV batteries Green deal EBA battery action plan yee in the second of the secon

Figure 13 Identified Drivers of Change

More details are available in Appendix B: Workshop Notes and First Analysis.

3.4 FOLLOW-UP

After the webinar we have contacted and thanked our guest speakers and moderator. We consider the following as potential improvements to our future workshops:

- Deeper review of the presentations sent upfront and a list of key questions with regard ٠ to the main topic of the webinar
- At least two or three rehearsals for better understanding of the used live streaming • platform and circumstances as well as interactive add-ons to the webinar
- Use of simple and less complex questions prepared for the debate by our team more • questions with potential short answers from the guest speakers.





4 APPENDICES

There are two appendices to this document.

Appendix A:

Workshop Notes and First Analysis - Future Job Roles & Skills in Stationary Battery Storage: Battery Safety, Grid & Telecom Applications

Appendix B:

Workshop Notes and First Analysis - Battery Cells Manufacturing – Job Roles & Skills



