



HANDBOOK FOR TRAINING IN THE BATTERY INDUSTRY

The purpose of this factsheet is to highlight the Handbook's Part I main contents. Highlights will be followed by links to further information in the Handbook, which then may guide you to deeper information in the Handbook's Part II.

ALBATTTS published a **handbook to assist in developing teaching and training competence in Vocational Education and Training (VET) institutions and to help VET teachers provide training for the European battery sector**. It consists of training material and results from the ALBATTTS project. Also, it outlines how the training material and other outputs can be used for varying teaching situations and target groups.

The publication can be used by **TEACHERS** to get started in educating and training their students for work in the European battery and electromobility value chain. It also can be used by **TEACHER EDUCATORS, SCHOOL MANAGERS** and **COURSE DESIGNERS**. Another important target group is the internal training facilities in relevant **COMPANIES**. Hopefully, it can also be used as an inspiring example for teachers in the adjacent education fields of green skills.

In the ALBATTTS project, we carried out desk research, interviews, research, and workshops with experts and the industry and mapped job advertisements for the battery industry around Europe. Our material and recommendations are based on these results.

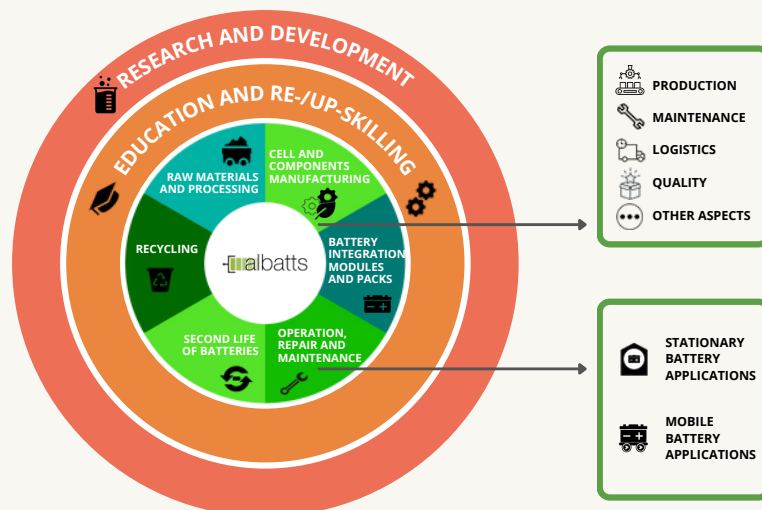
WHY, WHAT, WHERE AND HOW?

THE NEW BATTERY VALUE CHAIN - WHY TO TEACH

Europe has a whole new industry and value chain in fast expansion: **the battery and electromobility value chain**.

The battery value chain is composed of the following parts: raw materials and processing, components and cell manufacturing, formation of batteries, module and pack manufacturing, battery integration, operation, repair and maintenance, recycling and second life.

To know more about what composes the battery value chain, go to page 15 of the **Handbook**.



The Battery Value Chain, by ALBATTTS

There are also other steps in the value chain other than the emerging cell factories that are changing and need to recruit or up-skill/re-skill their workforce, for example in the automotive industry. An interesting way to keep track of the development of the value chain in various countries is through the European Battery Atlas.

THE WORKING ENVIRONMENT AND THE SKILLS NEEDED IN THE BATTERY INDUSTRY

The working environment in the battery industry can vary depending on the specific factory, company and location within the factory. However, there are some **common features coupling with the necessary skills related to the working environment**: volume production, automation technology, temperature control, safety procedures, clean/dry rooms, shift work, teamwork, international environment, continuous learning, product quality assurance and career growth.

To know more about each of these common features, go to page 17 of the [Handbook](#).

A **general set of skills can be considered for all positions in the gigafactory**: technical skills, attention to detail, problem-solving and troubleshooting, basic math skills, environmental responsibility, adaptability, communication, physical stamina, reliability and punctuality and time management.

To know more about each of these skills, go to page 18 of the [Handbook](#).

ALBATTTS SKILLS CARDS

The ALBATTTS project has worked to identify new or changed **job roles in the battery sector**. So far, we have noticed over 500 job roles, and we have specified 25 of them as clearly new job roles, of which 11 are on the vocational education levels, EQF 4 and 5.

The ALBATTTS Skills Cards describe several **occupational profiles with corresponding competencies** within the scope of battery manufacturing, e-mobility, and stationary battery storage. Each card has a short description of the job role and descriptions of cross-sectoral-specific competencies, sector-specific competencies, general transversal competencies, soft skills and academic competencies.



Example of a Skills Card Summary

Companies can use the Skills Cards to identify the needed competencies to 1) readjust/improve employee selection and recruitment, 2) train employees according to the latest sectoral needs, and 3) set up their businesses within the battery sector.

Training providers, such as VET providers or universities, will find them useful in creating training opportunities and improving existing curricula or training programmes. **National agencies** can use the Skills Cards to create or readjust national education plans. They may also be useful to the **general public** as a means to learn more about the different jobs in the battery sector.

Click [here](#) to consult the ALBATTTS Skills Cards.

CURRICULUM AND LEARNING CONTENT - WHAT TO TEACH

European schools and teachers operate within diverse education levels and national systems, each with its unique characteristics. Even though the European Union lacks authoritative control over national education strategies, it actively promotes collaboration and development through various initiatives, calls, and projects. This approach shapes **a flexible European education policy focused on cooperation and growth**.

FORMING A BATTERY CURRICULUM

In vocational education, the educational providers often have limited possibilities or resources for designing new courses for new regional needs. In higher education, universities can form new subjects and new courses, but this does not make them faster in adapting to new work market needs; in fact, they are often slower.

What publicly funded VET schools can do is be outspoken to authorities about their need for new suitable course plans. While waiting for these course plans, they can **choose the most applicable existing course plans and fill them with new examples, work tasks and applications when possible**. This is how training cooperation between adult education in Skellefteå (VUX) and the Northvolt Ett gigafactory started. Other countries can have other possibilities.

In the **ALBATTs report D6.4**, one may find the content of recommended learning objectives related to formulated Skills Cards/job descriptions. **Consulting and using this work is a good way to start forming a local curriculum with learning objectives and course and programme plans**. For the ALBATTs courses, a text document with learning objectives and other curriculum information is attached to each course.

LEARNING MATERIALS

When designing and preparing courses, commercially available material or free material can be used besides self-produced materials and content.

A List of OER Sources

MERLOT	Wiki Educator	<u>EU Resources and policies on OER:</u>
OER Commons	Wikiversity	
SkillsCommons	Open Course Library	EU science framework
Open Yale	Open Education Consortium	Open edu framework 2016
MIT OCW Initiative	Open University Learning Space	Open Edu guidelines
MIT OCW Channel	Edukatiko	Open edu publications
MIT Open Learning Library	Freevideolectures	EPALE
Khan Academy (multilingual)	ASA learning framework (Incl ALBATTs)	OER Policy
PhET (multilingual)		

To learn more about available materials for students and teachers who are learning this for the first time, go to page 21 of the **Handbook.**



CONTENT SOURCES FOR EDUCATION ADAPTATION

Teachers or course designers will be happy about finding new material, but instead of wanting to use it as it is, they often want to change or adapt it somehow. This is possible for some types of OERs with CC licenses; derivative works are not allowed for others. Sometimes, this need can be solved by contacting the creator or producing something new inspired by the OER found. It is challenging to balance making these changes and not violating copyright or IPR generally. If new material is produced, a reference to the original object with the comment “created after example of x” can be needed.

To know more about this topic, go to page 22 of the [Handbook](#).



YouTube
channels that
provide
interesting
materials

ENGINEERING CHANNELS	BATTERY/ENERGY STORAGE CHANNELS	EV TECHNOLOGY CHANNELS
Crash course channel	Billy Wu's Battery basics	Electric Viking
Lesic Learn Engineering through physics	Panasonic battery education	E for electric
The Engineering Mindset	Matt Ferrell on battery technology	Fully Charged News
10 best engineering education channels	The Limiting factor	Munro live
	Undecided	LESIC tesla motor
	Now You Know Channel	LESIC on battery car propulsion
	Just have a think	EV car maintenance

ALBATTs COURSES

ALBATTs has produced **free course material** on different aspects related to the battery industry.

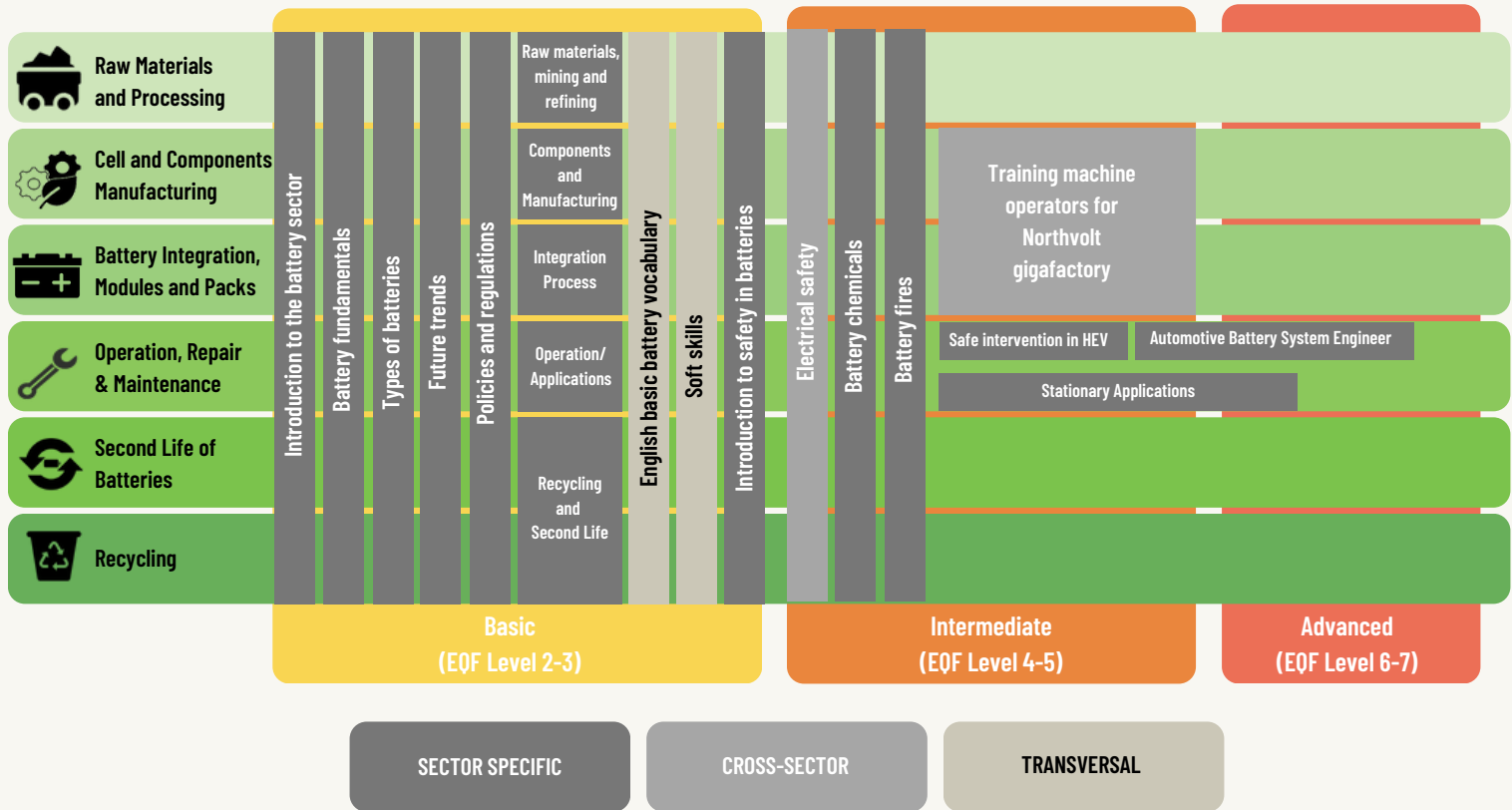
These courses are mapped against three different descriptors:

1. The value chain steps
2. The level (Basic, Intermediate and Advanced)
3. Sector-specific, cross-sector or transversal.

Additionally, the courses are divided into small modules using the micro-credential approach, where each corresponds to a specific learning outcome, making it more flexible, easy, and faster to update each course's content.



ALBATTTS Course Structure



To know more about the ALBATTTS courses, go to page 23 of the [Handbook](#) and visit our [COURSES WEBPAGE](#).



THE AUTOMOTIVE SKILLS ALLIANCE (ASA) LEARNING PLATFORM

The [Automotive Skills Alliance Learning platform](#) contains several courses offered by the ASA. The battery-relevant courses that were introduced in the previous section are grouped under the Battery Sector heading.

To learn how to register on this platform and enrol in the chosen courses, go to page 28 of the [Handbook](#). You can also learn about the roles in the ASA Learning Platform.



BEST PRACTICES TO DELIVER A COURSE

To learn about the best practices to deliver an online course, a blended learning course or an adaptive learning course, go to page 31 of the [Handbook](#).



COURSE COMPLETION AND DIGITAL BADGE GENERATION

The system issues the Digital Badges through the [Skills Hub](#) used by the Automotive Skills Alliance. Digital badges are micro-credentials that serve to recognise achieved competence or learning.

Digital badges are a type of micro-certificate that may be shared online to prove competence (learning outcome) on a certain level, and the Automotive Skills Alliance issues it as a large-scale partnership in the automotive-mobility ecosystem under the Pact for Skills. An example of this micro-credential is [Assertion - Skills Hub](#). The overall guide to the ASA micro-credentials is available [here](#).

Badges are organised into 4 layers:

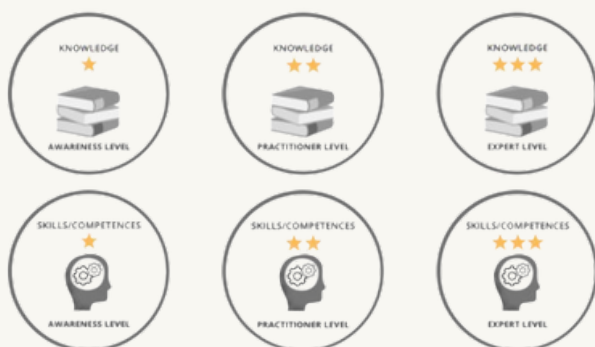
- Layer 1: Maturity Level – (1) Awareness; (2) Practitioner and (3) Expert Level Badges
- Layer 2: Concept Type – (1) Skill/Competence or (2) Knowledge
- Layer 3: Type of Completion – (1) Attendance; (2) Exam
- Layer 4: Recognition

To learn more about the organisation of the badges and the recognition criteria, go to page 33 of the [Handbook](#).



After all learning activities are completed, the Digital Badges are issued to confirm that the student has studied all the relevant material or learning sources, including answering the feedback survey.

Students will receive an email informing them about the course completion and about the fact that the badges were issued in the platform - Home - Skills Hub (<https://skills-framework.eu>). The students will also be given the credentials to log in to the system to access the badges.



Gray badges



Golden badges

LEARNING ENVIRONMENTS AND EQUIPMENT - WHERE TO TEACH

Humans learn everywhere and constantly, not only in organised environments. Schools sometimes seem to demand that a skill or theoretical understanding must be learnt and tested within their education classrooms to be approved knowledge, but a workplace seldom cares about that for individual skills. An exception is occupations with certification demands.

Our Handbook's section about physical learning environments and equipment provides **examples of physical learning environments** at VUX in Skellefteå. It also lists the Swedish national plans that are used.

In addition, there is a section about **digital/virtual learning environment and equipment**, such as **virtual reality, augmented reality, personal telepresence by use of telepresence robots, factory simulation, remote instrumentation, digital twin** and **artificial intelligence**.

Finally, the Handbook addresses the **advantages of an international learning environment**.

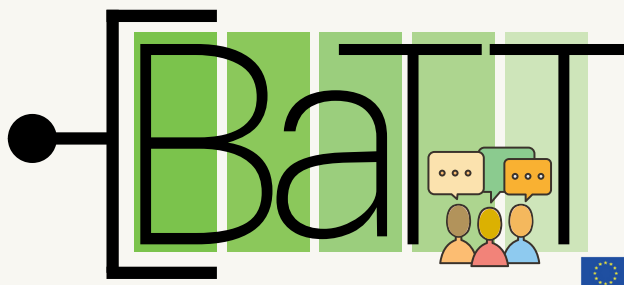
To learn more about these topics, go to page 35 of the [Handbook](#).



TO TRAIN THE TRAINERS - HOW?

Teachers or trainers should have the opportunity to engage in continuous learning both prior to and simultaneously with their teaching responsibilities, aligning with the learning process of their students.

The handbook outlines **possibilities for teacher training and competence development**: relevant **MOOC** ("Massive Open Online Courses"), the **study-buddy concept**, **methods for work-based learning in the industry** and **international opportunities**, such as the **BaTT Forum** ALBATTs initiative.



BATTERIES TEACHERS & TRAINERS FORUM

To learn more about the for teacher training and competence development, go to page 48 of the [Handbook](#).



REMINDER: The purpose of this factsheet is to highlight the Handbook's Part I main contents. Highlights were be followed by links to further information in the Handbook, which then may guide you to deeper information in the Handbook's Part II. **PAGE 7/7**