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Alliance for Batteries Technology, Training and Skills
2019-2023

Workshop Evaluation

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Electric vehicle manufacturing & Battery integration - Future qualifications needed

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

Alliance for Batteries, Technology, Training and Skills - ALBATTS – Project number 612675-EPP-1-2019-1-SE-EPPKA2-SSA-B.
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Workshop Evaluation

Workshop name:

Electric vehicle manufacturing & Battery integration - Future qualifications needed

Date and venue:

27-1-2021 Online Webex

Workshop purpose:

Identification of future job roles and skills; evaluation and verification of project progress/outputs

Organizer:

ALBATTS

Format:

Online Webinar

Location:

Webex https://www.project-albatts.eu/en/listnewsevents and Facebook https://fb.watch/3xi43M5fcz/

Content:

- Welcome by the moderator;
- Presentation on job roles & skills;
- Q&A Panel.

Schedule:

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Workshop Minutes

James Copping (DG GROW) opening remarks on "EU policy for the battery ecosystem - developing policies and strategies related to electric vehicle manufacturing in the EU"

The development in the battery sector is critical for the EU recovery and the future competitiveness of its economy.

Battery manufacturing in EU was almost absent in 2017 when the Battery Alliance was founded. Its main goal was to have solid battery manufacturing in Europe and the goal was achieved as the manufacturing, as well as the entire value chain have had an enormous growth in a few years.

Yesterday (January 26th, 2021), the Commission launched a second major IPCEI project in the battery field in which 42 companies from 12 European countries are directly involved, with approx. EUR 12 bn. public funding in total. Several other companies along the value chain are also going to be involved.

Such a major enterprise will need to be provided suitably qualified people in sufficient numbers and the efforts thereto are important: the Skills Agenda was released in 2020. There are still enormous challenges to be dealt with:

#1 short-term challenge - to find enough skilled employees to meet the growth of the companies at the moment;

#2 long-term challenge – to secure the education and training infrastructure for qualified staff.

Jakub Stolfa (VSB-TUO) on "Blueprints on skills in battery industry and automotive sector"

Initiatives in New Skills Agenda for Europe (2016) with action "The Blueprint for Sectoral Cooperation on Skills" with selected European initiatives related to automotive ecosystem:

- DRIVES covers whole automotive sector
- ALBATTS covers batteries for electromobility sector

The European Skills Agenda (2020) with action "Pact for Skills" (launched November 2020), where, from November 2020, it was started the Europe-wide collaboration on massive upskilling and reskilling under "Automotive Skills Alliance", which is also building on DRIVES and ALBATTS results.

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Petr Dolejsi (ACEA) on "Overview of the EV production status and perspectives, the impact of CO2 emissions targets and the applicable legislation"

Current status and trends in the EU automotive market

- Compared to ICE, Electric Passenger Cars sales still low in spite of the incentives, Electric Light Commercial Vehicles sales encouraging;
- Yet Electric Passenger Cars sales on the rise even in 2020 when the market nosedived.

Role of alternatively powered vehicles is still low in the EU

- Rising registrations in recent years and trend will continue to grow. The positive trend is clear and dominant and will shape the future.
- Because of the CO2 targets now carved in stone, the share of EVs will grow enormously especially the Electric Commercial Vehicles.
- Around 30% market share is expected by 2030

ACEA | BACKGROUND – KEY STATISTICS

- **With CO_2 targets fixed, more to expected...**

Projected number of newly registered ZLEV in 2030 (thousands of cars)				
Scenario	Plug-in hybrid vehicles (PHEV)	Battery Electric Vehicles (BEV)	Fuel Cell vehicles (FCEV)	**Total ZLEV)**
30%	2,162	1,420	380	3,962
40%	3,157	1,962	514	5,633
45%_40%ZLEV	4,266	4,468	1,166	9,900
50%	4,440	2,607	671	7,718
50%_30%ZLEV	2,703	3,567	1,066	7,336
50%_50%ZLEV	677	8,287	1,046	10,010
75%	5,836	8,930	1,762	16,528

Table 3: Projected number of newly registered ZLEV in 2030

6

Drivers of Change

- Regulatory requirements
  - CO2 reduction, benchmark levels for EV registrations for passenger cars
  - Additional -37,5% CO2 reduction target for 2030 which is an enormous figure
  - Associated with 35% benchmark level for passenger cars for 2030
  - To be further tightened by the Green Deal revision
  - Euro 7 legislation that will have an impact on the electrification
- COVID recovery plan
  - Many member states introduced incentives for fleet renewal
  - Supported by the EU funding through national programmes
  - Fleet renewal schemes will continue in 2021 but are not sustainable forever
  - The Commission in pushing to Green Deal objectives in transport sector
- Changing patterns of the consumers
  - OEMs deliver a plethora of models on the market

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- Under most incentive schemes across Europe, price parity is envisaged yet unsustainable
- Regional and municipal level societal push for even greener policies
- Economics is always essential for final consumers (even more for vans and HDV sector)

Key Challenges

- Lack of recharging infrastructure
  - Huge problem for all EU countries despite better recharging and refuelling in 3 most important countries (previously 4, with the UK). A Pan-European coverage is needed as soon as possible
- Sustainability of the supportive measures
  - Sustainability of the stimulating measures must be achieved through switching away from financial incentives otherwise EU Member States` budgets will get ruined;
- Transformation of labour force and restructuring
  - massive electrification will tackle the whole value chain as sales of EVs are expected to reach 30 to 40% in 2030
  - new skills needed fast in massive way which motivates the involvement of ACEA in projects aimed at identifying gaps and providing solutions in order to keep the existing 15 million jobs in the EU.
  - most regions will go through massive restructuring as the reshuffle of some jobs is expected
  - upskilling and reskilling projects are needed beyond DRIVES and ALBATTS hence the involvement in the newly established Pact for Skills and Automotive Skills Alliance

Dr. Oliver Fischer (Daimler) on "How manufacturers & education providers respond to electric vehicle manufacturing & battery integration needs?"

The invention of the automobile and the production of the first Internal Combustion Engine – breakthroughs of Mercedes – Benz.

Current structure of Daimler AG (3 legally independent companies):

- Mercedes-Benz AG – Cars and Vans
- Daimler Truck AG – Trucks and Buses
- Daimler Mobility AG – Mobility and Financial services

Just shy of 10 billion EUR R&D expenditure in 2019.

The electrification is the most fundamental transformation of the automobile since its creation and unluckily, it is overlapping the COVID – 19 Pandemic which took a toll on the R&D funding.

Despite the Pandemic, Daimler AG pursuits its goals and objectives regarding the environment and sustainability. The entire line-up will be electrified one way or another.

Daimler`s strategy will have 6 overall elements yet 3 of them will be the key for the near future evolution as they are strongly correlated:

- The use of the full potential of digitalization which is not a threat but an opportunity – generically known as CASE – Connectivity, Autonomous driving, Shared mobility and Electric propulsion systems

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- Sustainability within and beyond regulations, especially the CO2 neutrality
- Leadership in electric drive through the electrification of all segments.

The remaining strategic elements revolve around the customers` needs, the development of a strong core business and the transformation of the business according to a culture based on integrity, respect and equal opportunity.

The promotion of the key strategic elements is heavily based on the deeper involvement in the development of human resource training. As the need of skilled technicians and specialist is quite urgent, Daimler went the extra mile by advising the VET providers on the necessary mind sets, competencies and skills or even setting up its own qualifications such as the “Electric Specialist” with a modular design for basic qualification.

- Power-system, operating systems, high voltage system, IT infrastructure,
- Digitalization, sustainability, agile culture business transformation – integrity, respect and equal opportunity, customer focused
- Technical skills – modular and digital offering -> Flexibility
- Competences/skills and mind sets

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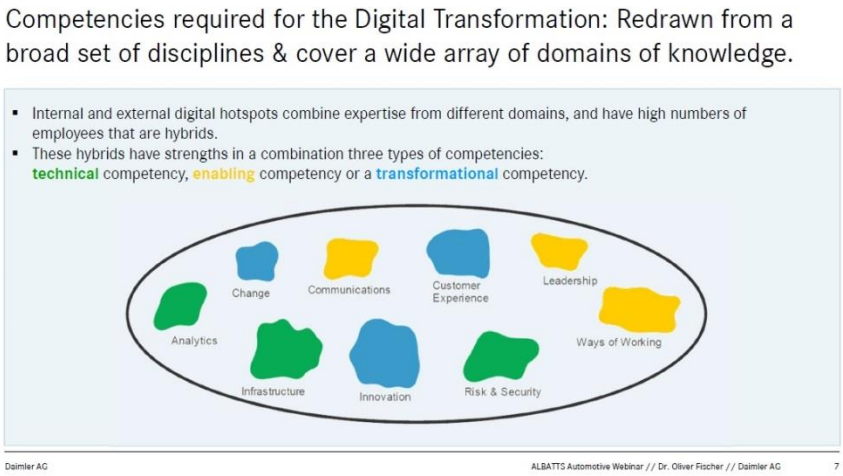
Three types of competencies: hybrids are common

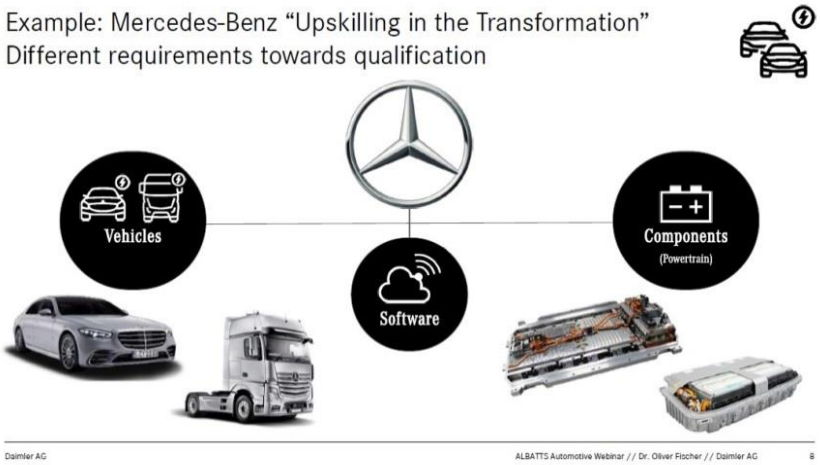
- Technical – analytics, infrastructure, risk and security
- Enabling – communication, leadership, ways of working
- Transformational – change, customer experience, innovation



Mercedes-Benz example

Requirements towards qualification

- vehicles
- software OS
- components (powertrain)



Ing. Stanislav Hackl (SKODA Academy (Skoda Auto a.s.) presentation

Even as a member of a major group, Skoda has become by itself a full-fledged automotive global player with production capacities in 3 European countries and in the 2 biggest Asian markets (China and India) with a total output in excess of 1.4 million units per year (2019).

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Skoda current line-up includes 6 rechargeable models (EV & PHEV).

The Electric and Plug-In vehicles use traction batteries operating at high voltage (350V) which is dangerous for human life hence special rules must comply with by maintenance and repair technicians that are allowed to perform only the works that they are trained for.

Skoda training scheme is based on a European standard (EN-50110- Operation of electrical installations) and consists of 3 competence levels covering all the works that may be carried out along the entire value chain of the automotive sector – assembly, maintenance and repair.

Special rules, construction and possible risks, qualification needed, training programs reflects European standards into 3 levels.

Compulsory training system for electric / hybrid cars

	Qualification title	Authorized work activities (target groups of employees)	Compulsory electrotechnical training – Training title	Validity	Compulsory type training – Training title	Validity
Level 3	High-voltage battery expert (VNEb)	All activities below and in addition: Evaluation, analyses, classification of safety and repair of damaged HV batteries (all NIO statuses)	Regulation no. 50/1978 Coll., on the professional qualifications in electrotechnics (at least §6) (technical development also § 11 Art.2) (course no. 1-09-001) (3 days) **Conditions for application:** • Electrotechnical education • Confirmation of the length of practice from the employer	3 years	Type training E-Car for electrical engineering (course no. 1-14-222) (6 lessons) + Analysis of traction batteries (course no. 1-14-234) (1 day)	forever**
	High-voltage expert (HVE)	Measurement and analysis of the energized HV system			Course content: • Electrical safety E-Car - Sensitization (Course no. 1-14-205)	forever**
		All work on a car with an attached HV system			• **Work conditions for electromobility (Course no. 1-14-209)**	1 year
		Creating working instructions for work with energized elements			• Safety instructions and vehicle operating instructions	forever**
		De / activation (disconnection / connection) of the HV system			• Commissioning of the HV system	forever**
Level 2	High-voltage technician (HVT)	All activities below and in addition: De / activation (disconnection / connection) of the HV system only according to the serial car work instructions	Instructions under §4 for electromobility (Course no. 1-14-208) (2 lessons) (note: forms part of type training no. 1-14-221)	3 years	Type training E-Car for non-electrical subjects (Course no. 1-14-221) (4 lessons) + Deactivation and activation of the HV system for non-electrical subjects (Course no. 1-14-223) (2 days)	forever**
	Electrically-educated person (EEP)	All activities below and in addition: Work or repair with deactivated (disconnected) HV system on HV components, HV lines and in their vicinity (see definition below)			Course content: • Electrical safety E-Car - Sensitization (Course no. 1-14-205)	forever**
		To be classified according to the safety protocol of the HV -battery according to the work instructions (not in the NIO dangerous status)			• **Instructions under §4 for electromobility (Course no. 1-14-208)**	3 years
		Occupational health and safety training - syllabus for HV vehicles			• Safety instructions and vehicle operating instructions	forever**
Level 1	Electrically acquainted person (EAP)	All assembly work on the car before the first activation (connection) of the HV system	OHS training (initial, initial or periodic training) (under §3 of regulation 50/1978 Coll.)	According to the rules of the organizational unit	Electrical safety E-Car - Sensitization (Course no. 1-14-205) (1 lesson)	forever**
		First activation (connection) of the HV system in the assembly line (ECOS / UPS)				
		Outside the assembly line: work / repair / replacement of parts on an electric car, if this activity is not in the vicinity (see definition below) HV-component or HV-line (HV-system can be both active and deactive)				
		Visual assessment and diagnostics of the HV battery (not in the NIO dangerous status)				
		Handling, transport and packing of HV-batteries (not in the NIO dangerous status)				
		Car charging / Car use and operation: In development, production or quality tests (electromobility training not needed for a company car)				
		Management or coordination of employees - workplaces with electric cars				

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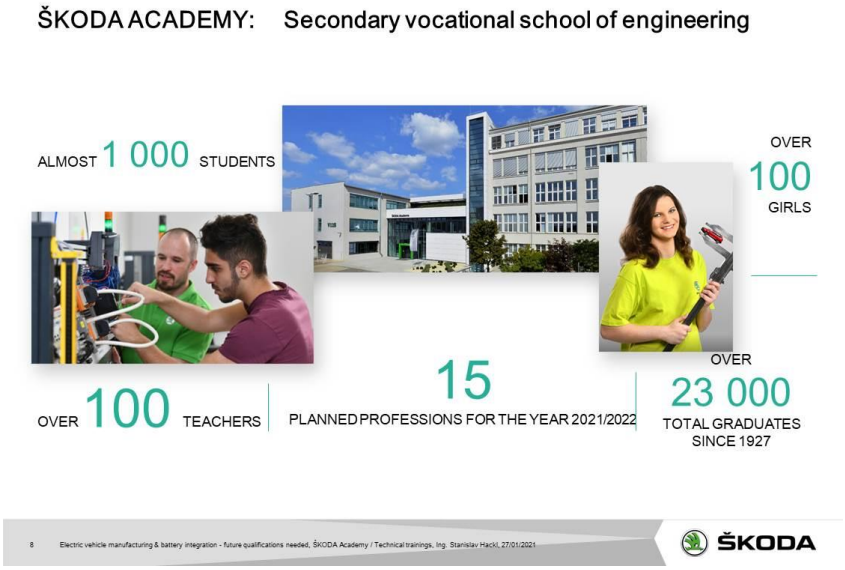
Compulsory training system for high voltage batteries

	Qualification title	Authorized work activities (target groups)		Compulsory electrotechnical training – Training title	Validity	Mandatory type training – Training title	Validity
Level 3	HV battery expert	Battery check in quality management processes		Regulation no. 50/1978 Coll., on the professional qualifications in electrotechnics (at least §6) (technical development also § 11 Art.2) (Course no. 1-09-001) **Conditions for application:** • Electrotechnical education • Confirmation of the length of practice from the employer	3 years	High voltage batteries for electrotechnical workers (Course no. 1-14-232) – Course content: • Electrical safety E-Car - Sensitization (Course no. 1-14-205) • **Work conditions for electromobility (Course no. 1-14-209)** • ESD protective measures • HV battery design • HV battery diagnostics	Forever * / 1 year / Forever *
		Repair work, analysis, HV Expert					
		Creating work instructions					
Level 2	HV battery technician	Assembly work on the HV battery assembly line.		Instructions under §4 of regulation No. 50/1978 Coll., for electromobility (Course no. 1-14-208) (note: forms part of basic training no. 1-14-231, after three years prolonged separately)	3 years	High voltage batteries for workers without electrotechnical education (Course no. 1-14-231) – Course content: • Electrical safety E-Car - Sensitization (Course no. 1-14-205) • **Instructions under §4 of regulation No. 50/1978 Coll. (Course no. 1-14-208)** • **Work conditions for electromobility (Course no. 1-14-209)** • Measurement of electrical quantities • ESD protective measures • HV battery design • HV battery diagnostics	Forever * / 3 years / 1 year / Forever *
		Team leader/foreman, shift co-ordinator and HV battery production setter					
Level 1	Electrically acquainted person	Entrance to the hall where the HV batteries are assembled		OHS training (initial, initial or periodic training) (under §3 of regulation 50/1978 Coll.)	According to the rules of the organizational unit	Electrical safety E-Car - Sensitization (Course no. 1-14-205)	Forever *
		Handling batteries and their components (shall not be critically damaged)					
		Pre-assembly of parts without voltage					
		Management or coordination of employees (workplace with HV batteries)					
Level 0	Anybody	Entrance to the hall where batteries are assembled by a person with minimal knowledge.	Employees (internal / external) who enter the hall occasionally and do no work on batteries or handle with HV batteries and their components	OHS training (initial, initial or periodic training) (under §3 of regulation 50/1978 Coll.)	According to the rules of the organizational unit	To enter the workplace, a person shall be aware of the danger and their entry is possible only if accompanied by a person at least acquainted.	
			Visits	ŠKODA AUTO Visiting Regulations	-		

Unfortunately, no schools in the Czech Republic prepare people for battery integration work which is why Skoda had no choice but establish a Secondary vocational school of engineering that already prepared over 1000 students in 15 new professions related to the electric drive.



In order to be better adapted to the future evolutions, automotive industry and especially the propulsion technologies, Skoda also set cooperation with universities and enabled internships.

As a result, there are over 350 technicians of different qualification levels involved in the EV component production.

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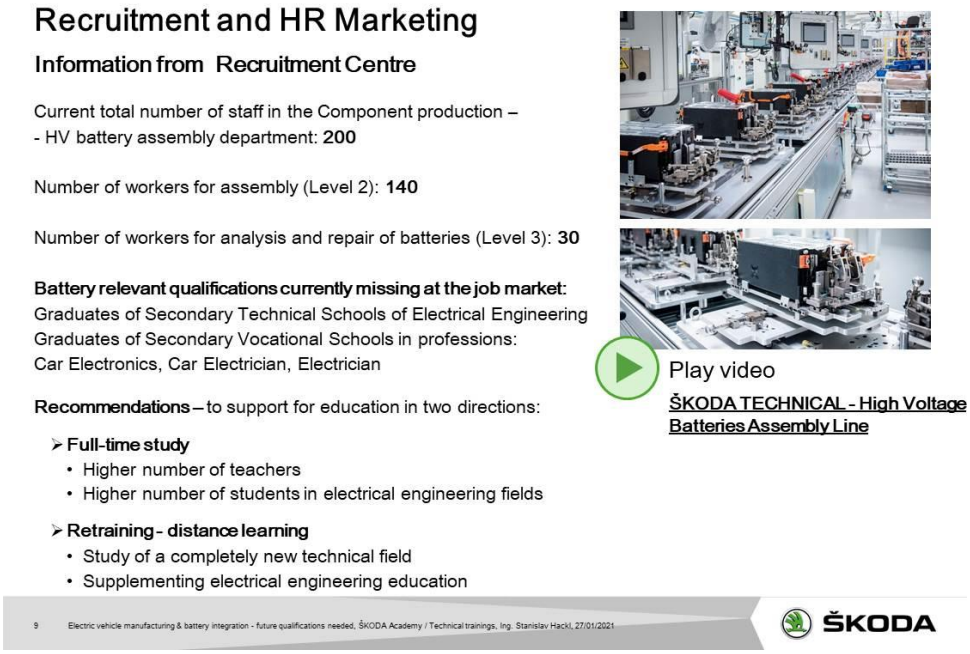
Despite all these efforts, electric engineering graduates are still missing – car electronics, car electrician, and electrician.

Based on its own experience in the field, Skoda recommendations imply full-time study programmes, higher number of teachers and students in electrical engineering fields and retraining through distance learning, study of a completely new technical field and supplementing electrical engineering education.



Sara Hermansson (NORTHVOLT) on "Building a new ecosystem from scratch"

In the previous job, at Scania, there was a fierce debate on the future of the HDV powertrain: optimize Diesel engine or switch to electric propulsion? In the end, the electric propulsion scored enough points for adoption.

Northvolt`s evolution is a clear tell-tale of the demand status in EU at least: from 20 people in 2017 to over 1100 in 2021. The battery demand is expected to skyrocket by 2030 (10-fold increase compared to 2020).

The main reason for the creation of Northvolt was to produce the cleanest batteries in the world. Low-emissions (close to zero), minimal environmental footprint, circular processes, responsible sourcing of raw materials will heftily contribute in achieving this goal.

Northvolt also uses cutting-edge battery technology at a low cost, thanks to the hydro energy that is not only fully sustainable but also stable and much cheaper than in China. Thusly, the battery CO2 footprint will be easily available.

Raw materials are bought directly from mines and will have to comply with ethical principles that are enshrined in the draft battery regulation – direct sourcing completely eliminates middlemen and enables the company to impose tough conditions on suppliers.

Vertical integration model - bringing as much of the supply chain in house as possible, in terms of battery systems development, digitalization, and recycling. It was mentioned that battery should have a CO_2 footprint available data, with raw materials "heritage".

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Another remarkable performance of Northvolt would be the in-house recycling of own decommissioned batteries which no economic operator is capable of nowadays.

According to the forecasts, the company will manufacture soon around 40 GWh worth of batteries (equivalent to 600.000 EVs) every year with a total staff of about 3000 people.

Q&A panel

1. **How do you see EV and battery revolution affect job market for skills and future job roles?**

- Very competitive, qualifications (education) tends to take a while to deliver, it is behind the industry, emphasis on qualification, certification important elements, general certification,
- For a certain amount of time, the automotive industry will have to take the necessary measures to cushion the blow of the transition by reskilling and upskilling workers on their own and source the necessary new staff with minimal external support. The emphasis will have to be more on internal qualification until the educational system, the VETs and the training organization are capable to pick up the slack and properly adjust to the demand.

2. **What are the Job Roles endangered?**

- According to the **Ing. Stanislav Hackl (SKODA Academy)** response as the results of a Fraunhofer study commissioned by Volkswagen group shows that the job loss in the manufacturing will be reasonable as many operations such as stamping, pressing, welding and painting will require the same workforce. Including the potential drop in demand and the evolution in robotization and automation of the manufacturing, the automotive industry would shed around 12% of its current workforce by 2030

- Suppliers instead will bear the brunt of the electrification as difference in component volume between EV and ICE vehicle is around 70%. The issue there will be the appeasement of the change in a socially acceptable manner.

3. **Recruitment issues**

- Driven people do not have skills set needed, mixing teams of specialised people with people that needs to be trained (background in related industries) for batteries, regular automotive is so distant, out of the box thinking. Unfortunately, the selection pool is still quite narrow and shallow – extra efforts are required to source staff.

- For the time being, people with any previous experience in batteries have an advantage: electrical engineering, risk awareness, battery operating conditions, vehicle system architecture, connection busses, diagnostic software, and data analytics. Electrical engineers are also quite easy to upskill to the new needs of the industry. Engine engineers, on the other hand will be more difficult to reskill and specialists from other dying industries such as paper production could more easily be reskilled to cell manufacturing as technological processes are quite similar. Chemical engineers could also find it easy to work in a battery factory or in a battery recycling plant.

4. **Evolution for EV**

- The required speed of transition is extremely high. Compared to other sectors where disruptive measures had to be implemented such as the mining that were not achieved in 30 years, the 10 years granted to the automotive seem to be mission impossible.

- The automotive industry in Europe currently keeps 15 million people busy. Adapting many of them to the foreseen changes alone will be a daunting task. It may be simple to switch knowledge for well educated (MSc and PhD) but it is going to be hard to switch competences in the less educated.

- Beyond the changes we cautiously envisage, there will be many other disruptions and the one we dread the most is the regulatory framework which gets altered too often and in a deep manner.

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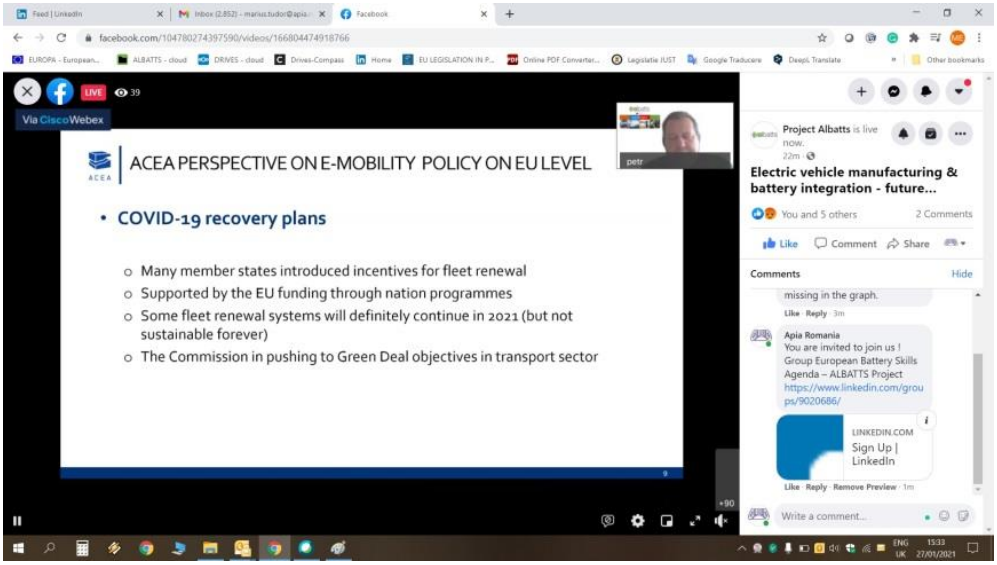
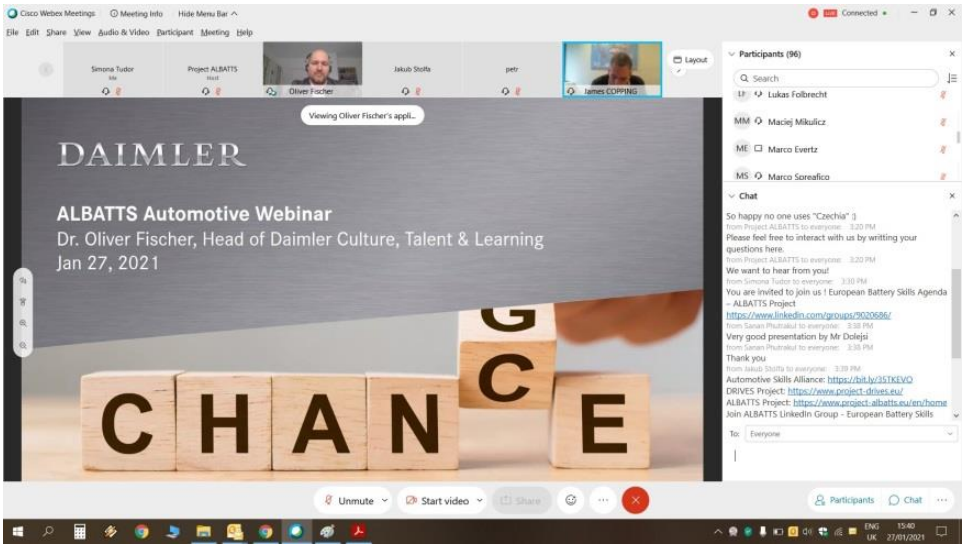
- The best solutions to curtail these potentially negative outcomes seem to be the timely adaptation of the workforce: upskilling and reskilling, identification of the proper trainings, expansion of the view on skills and competences, the improvement of the synergies between the industry and the universities and other training providers.

Attendence:

- on Webex: 96 particpants
- on Facebook: 39 participants





Mentimeter Answers:

1) Where are you from (Country)?

Even there were more than 96 participants, only 41% answered to this question. Most people that answered were in Czech Republic, followed by Sweden, Germany.

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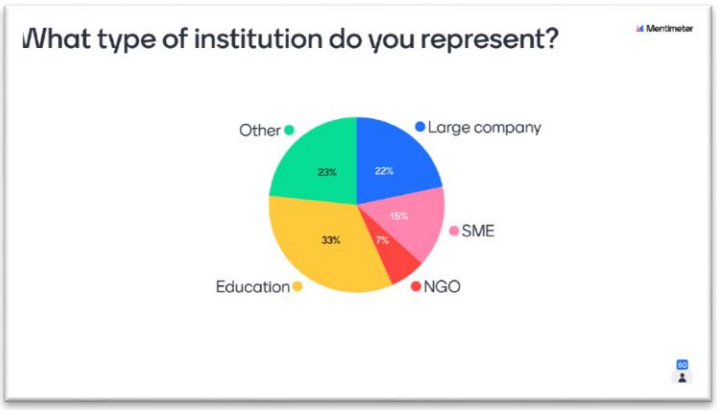
Czech Republic	Sweden	Italy	Germany	Romania	Finland	Netherlands	Norway
7	5	4	4	3	3	3	2

Brazil	Spain	Uruguay	France	Belgium	Portugal	Slovenia	**Total answers**
2	1	1	1	1	1	1	**39**

2) What type of institution do you represent?

A share of 62% from the total participants (96) answered to our survey. More than 33% were from Education segment, followed by large companies (22%) and other sectors (22%).

Type of institution	Answer	%
Education	20	33%
Other	14	23%
Large company	13	22%
SME	9	15%
NGO	4	7%
Total	**60**	**100%**



History of Webex Chat Box (edited):

from Project ALBATTS to everyone: 3:02 PM

Good afternoon everyone. Welcome!

from Project ALBATTS to everyone: 3:03 PM

After the webinar, please take a moment to answer our Battery Sector Intelligence Survey. The aim is to collect information about job roles and skills needed to build a complete battery value chain in Europe - https://stakeholders.project-albatts.eu/s/survey2020

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from Project ALBATTS to everyone: 3:20 PM

Please feel free to interact with us by writting your questions here.

from Project ALBATTS to everyone: 3:20 PM

We want to hear from you!

from Simona Tudor to everyone: 3:30 PM

You are invited to join us ! European Battery Skills Agenda – ALBATTS Project https://www.linkedin.com/groups/9020686/

from Jakub Stolfa to everyone: 3:39 PM

Automotive Skills Alliance: https://bit.ly/35TKEVO DRIVES Project: https://www.project-drives.eu/ ALBATTS Project: https://www.project-albatts.eu/en/home Join ALBATTS LinkedIn Group - European Battery Skills Agenda: https://www.linkedin.com/groups/9020686/ My presentation: https://cloud.project-albatts.eu/index.php/s/WJbjzCow5sy4mq2

from Soccorso Nino Gaeta to everyone: 3:39 PM

why covid has had a great impact in promoting EV?

from petr to everyone: 3:40 PM

With pleasure, of course, QA at the end, but happy to reply immediately if there are questions...petr

from Anders Norberg to everyone: 3:41 PM

Well, that is a research question why Covid is driving EV development, but many stakeholders have that conclusion and act after it. It may be because perspectives for the future has gone more into longer, sustainability issues.

from petr to everyone: 3:41 PM

i do not think this is COVID related...just COVID came in time where we have new target for 2020 (95g CO2) so it is a must for OEMs. Secondly, as a reaction to COVIID, number of national supportive schemes were introduced which helped a lot. again, there is a question, how long the member states can finance that...

from Anders Norberg to everyone: 3:44 PM

Covid as policy driver - it may just be that most of us have had both time and rerason to think about the future, individually and collectively.

from Marius Tudor to everyone: 3:45 PM

I think that the States should continue to stimulate the acquisition of EVs if they want to save a lot of lifes (premature deaths)

from Sanan Phutrakul to everyone: 3:46 PM

COVID is a catalyst to the transition to EV, not a cause.

from Sanan Phutrakul to everyone: 3:47 PM

€1.9 trillion in stimulus will motivate people.

from petr to everyone: 3:50 PM

:) it is artifical figure that collects all available...for EVs will go much less...and again. someone has to pay for it in future. do not forget situation in 2009 - fleet renewal helped...but then people got back to usual behavior. Without sustainable support + enabling conditions (like infrastructure), u will buy PHEV/BEV,

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but maybe come back to diesel because you will feel uncomfortable....must be coordinated and long-term

from Sanan Phutrakul to everyone: 4:01 PM

The Enyaq is a game changer for Škoda

from Simona Tudor to everyone: 4:01 PM

after these good presentations and speakers, debate and Q&A panel should be very interesting....

from Sanan Phutrakul to everyone: 4:07 PM

Mr. Hackl brings up an excellent point. Not every country's legislation is ready for the transition. Few people talk about this.

from Adam Piotrowski to everyone: 4:07 PM

@Mr.Hackl, recently I learned about Skoda MBA program for the automotive managers. Would you mind to share more details (such as recognised accreditations, type of classes - online or stationary)? Thanks for the great presentation

from Stanislav Hackl to everyone: 4:19 PM

For Adam Piotrowski: https://en.savs.cz/for-applicants/executive-mba

from Simon Engelke to everyone: 4:22 PM

Let me also share our BatteryMBA https://battery.mba/ taught by industry leaders (inc. CEO Siemens Oman, CTO Hitachi ABB Power Grids, and many more) and attended by employees from Hitachi ABB Power Grids, BP, Skoda, Electric Fish, and many more)

from Simon Engelke to everyone: 4:23 PM

In our first cohort we have attendees from 12 countries and 50:50 women:men. We are about to receive the same accredidation used by Cambridge, Oxford, and LSE for their online programmes.

from Martina Mernini to everyone: 4:28 PM

To Sara H. What do you think about sodium ion batteries? It seems that they have more cons than pros, also from the cost viewpoint.. Do you think that more investments in this research field will make them competitive? Thank you very much

from George Dan Preda to everyone: 4:29 PM

naturally, the number of jobs will decrease...

from Anders Norberg to everyone: 4:31 PM

Yes, possibly, but other jobs will emerge, as for example in battery production. A classic kind of technical development with consequences.

from Simon Engelke to everyone: 4:31 PM

Very much agree with this Sara! We have great experience with people transitioning across industries

from George Dan Preda to everyone: 4:33 PM

SKATE : Skill, Knowledge, Attitude, Training and and Experience.

from George Dan Preda to everyone: 4:37 PM

you are completely right

from Anders Norberg to everyone: 4:40 PM

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Thanks moderator, presenters and participants for this interesting workshop! We in ALBATTS learnt a lot. Let's keep in touch! More workshops and other outcomes coming! Anders Norberg, ALBATTS Coordinator

from Alex Wolfe to everyone: 4:42 PM

Thank you presenters, and ALBATTS for getting this together. Lots of interesting insight!

from Simona Tudor to everyone: 4:42 PM

Follow us on Linkedin group European Battery Skills Agenda – ALBATTS Project https://www.linkedin.com/groups/9020686/ to discuss more rf skilss and jobs and competences in battery ! Thank you all!

from Simon Engelke to everyone: 4:42 PM

Thank you for this great webinar! Happy to stay in touch: https://www.linkedin.com/in/simonengelke/

from Marius Tudor to everyone: 4:42 PM

Thanks to the moderator and speakers.

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Evaluation – Mapping to Topics of Intelligence

Stakeholders Identified:

Name	Specialization	Importance	Contacts/Links
ŠKODA Auto	Car manufacturing	BEV Manufacturer	https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Daimler	Car manufacturing	BEV Manufacturer	
Northvolt	Battery manufacturing	EV Battery Manufacturer	

Technologies Identified:

Name	Description	Comment	Links
Vertical integration process	Most production stage – in-house	Closer to carbon neutrality by eliminating transport and handling	https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Battery CO2 footprint tracking	Counting all-CO2 emissions across production stages	Compliance with future Batt. regulation	
EV Battery Recycling	In-house treatment of own batteries	1st operator to recycle EV battery entirely	

Job Roles Identified:

Name	Value Chain	Comment	Links
Electric engineers	Manufacturer		https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Car electricians	Manufacturer		
Electricians	all		
Teachers	VET, education		
R&D	R&D		
Operators	Integrators		
Technicians	all		
Chemical engineer	Manufacturer		

Skills/Competence or Knowledge Identified:

Name	Job Roles	Comment	Links
Power systems	engineer		
Operating systems	engineer, operator		
High voltage systems	electrician, engineer		
IT infrastructure	IT operator, IT engineer		
Technical skills	all		

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Flexibility	all
Analytical skills	all
Infrastructure	
Risk and security	
Communication	
Leadership	
Ways of working	
Adapt to changes	
Customer experience	
Innovation	
Software	
High voltage and system engineering	
Mechatronics	
Physics	
Electrical engineering	
Lithium ion batteries	
Experience	
Safety standards and regulations	
Industrial engineering	
Battery systems	
Cell validation	
Safety and environment	
Electrical engineering	
Risk awareness	
Battery operation conditions	
Vehicle systems architecture	
Connection busses	
Communication protocols	
Diagnostic SW	
Data analytics	

Drivers of Change Identified:

Name	Influence	Comment	Link
CO2 targets	vehicle manufacturing	30% MS in 2030 - expected	https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Regulatory requirements	Vehicle manufacturing	CO2 reduction; benchmark levels for CO2; Green Deal revision; Euro7	
Covid recovery plan	Increase the purchase power of citizens, capitalize the companies	EU funded, fleet renewal schemes; Green Deal	
Changing patterns of	Vehicle manufacturing	OEMs deliver more models on the market; price parity is approaching	

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consumers		with incentives; regional and municipal push
Digitalization	Company prosperity	Enhance flexibility and adaptability, especially to COVID
Sustainability	Company prosperity	Embrace voluntary standards
Agile business transformation	Company prosperity	Proactive approach of the business perspective to avoid disruptions
Focus on the customer	Company prosperity	Enhance the customer experience and improve customer satisfaction
Low emissions	Company strategy	Comply with or supersede climate goals
Minimal environmental footprint	Company strategy	Comply with or supersede climate goals
Responsible sourcing of materials	Company strategy	Ensure business sustainability
Need for recycling	Company strategy	Comply with regulatory requirements
Education is lagging behind the industry	Company strategy	Human resource is crucial and it has to keep up with the change
Some countries push harder for decarbonization	Company strategy	Extra investments could pay off big in terms of access on tough markets and public image

Sector Attractiveness Factors Identified:

Name	Influence	Comment	Links
Dying industries/jobs	Release social pressure	Minimal reskilling brings specialists back into the workforce	https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Smooth reskilling of specialists	Workforce mobility and flexibility	Chemical engineers could join the EV battery manufacturing and recycling	

Trainings/Courses and Education Identified:

Name	Focus	Type	Links
Modular and digital offering of technical skills			
Focus on mind sets and soft skills			
Categorization of skills and connection analysis			
Skoda training reflects European standards of 3 levels			https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf

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SKODA vocational school is the only that trains people for battery jobs		
Mixing teams of the specialists and learners to educate		
Harder to reskill less educated in this field especially		
Level 1 Electrically Acquainted Person – EAP	OHS Training	https://www.project-albatts.eu/Media/NewsEvents/2/NewsEvents_2_SLIDES_20210204_141632.pdf
Level 2 – Electrically Educated Person – EEP	Course no. 1-14-208	
Level 2 – High –Voltage Technician – HVT	Course no. 1-14-208	
Level 3 – High – Voltage Expert – HVE	Course no. 1-09-001	
Level 2 - High - Voltage Battery Expert – VNEb	Course no. 1-09-001	

Post-Workshop Survey

After the workshop, a satisfaction mini-survey was sent to the participants. According to the answers received on Jan 28 and Jan 29, only 5 persons responded – very low rate of feedback.

Overall, the participants were very satisfied with the webinar presentations and discussion.

What is your overall assessment of the event?		
Choice	**Answers**	**%**
1=Insufficient	0	0%
2	1	20%
3	0	0%
4	2	40%
5=Excelent	2	40%
Total	5	100%

The audience appreciated as interesting the presentations delivered by:

Which topic (presentation) did you find most interesting or useful?		
Choice	**Answer**	**%**
ACEA	2	33%
Daimler Academy	0	0%
Skoda Academy	2	33%
Northvolt	2	33%
Total	6	100%

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Almost all participants claim they gained knowledge and information from participation in the webinar.

Knowledge and information gained from participation at this event?		
Choice	**Answer**	**%**
Yes	4	80%
Somehow	1	20%
No	0	0%
Total	5	100%

Written feedback:

- How do you think the webinar could have been made more effective?
  - *"more direct experience from manufacturing companies"*
  - *"Another one, as a series."*
- In your opinion, what are the battery relevant future jobs and skills needed in the battery production sector and why?
  - *engineering and design to adapt to the new layout they will have to be allocated to on the vehicle*
  - *for automotive, and if we think about car manufacturing, a lot more mechatronics competence is needed.*
  - *assembly operator, testers, technicians, diagnosticians, engineers, H&S staff.*
  - *electronics, electrical specialisation, electrochemical*
- Comments and suggestions (including activities or initiatives you think would be useful, for the future)
  - *create a network of market aware professionals to tap new opportunities*
  - *I would like to hear some from an OEM, or possibly an initiated consultant, talk about how car manufacturing changes when transitioning to EVs. How many less workers? Which skill decreases in demands? Which new skills are needed? This is apparently a sensitive matter to talk openly about, since it is a question about many jobs in Europe. The same on the service side.*
  - *to repeat it quarterly the best, make it 1 hour.*
  - *projects for development of new professions in battery field in the frame of Erasmus + or other EU programs*

Lessons learned and points to be improved:

- Possible new topic for a future webinar: "Sodium ion batteries"
- Need to discuss more about reuse/recycling batteries in the context of circular economy (legislation and jobs needed)
- More interaction with the audience (by Mentimeter survey).
- Learn how to incentive the audience to ask more questions during and after the workshop.

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