

RECYCLING OF EV BATTERIES

RECYCLING EV BATTERIES:
SKILLS AND QUALIFICATION
NEEDED IN AUTO WORKSHOP

Conference Call

Amélie Sophie Salau

30th November 2021

acea



GREEN DEAL

- As ACEA we believe that carbon-neutral road transport is possible by 2050. Automobile manufacturers want to do their part, and they fully support the aims of the Commission's Green Deal.
- However, addressing the challenges ahead is a joint responsibility.
- It will represent a seismic shift, requiring a holistic approach with increasing efforts from all stakeholders.

KEY BACKGROUND ELEMENTS

ELECTRIC VEHICLE BATTERIES

Cars by fuel type, first quarter of 2021

MARKET SHARE (%) ■ Petrol ■ Diesel ■ Battery electric (BEV) ■ Plug-in hybrid (PHEV) ■ Hybrid electric (HEV) ■ Natural gas (NGV) ■ Other

PETROL
42.2%

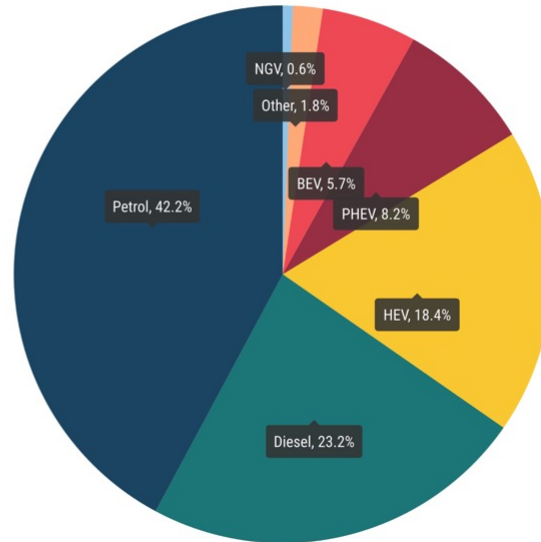
DIESEL
23.2%

HYBRID (HEV)
18.4%

PLUG-IN HYBRID (PHEV)
8.2%

BATTERY ELECTRIC (BEV)
5.7%

NATURAL GAS (NGV)
0.6%

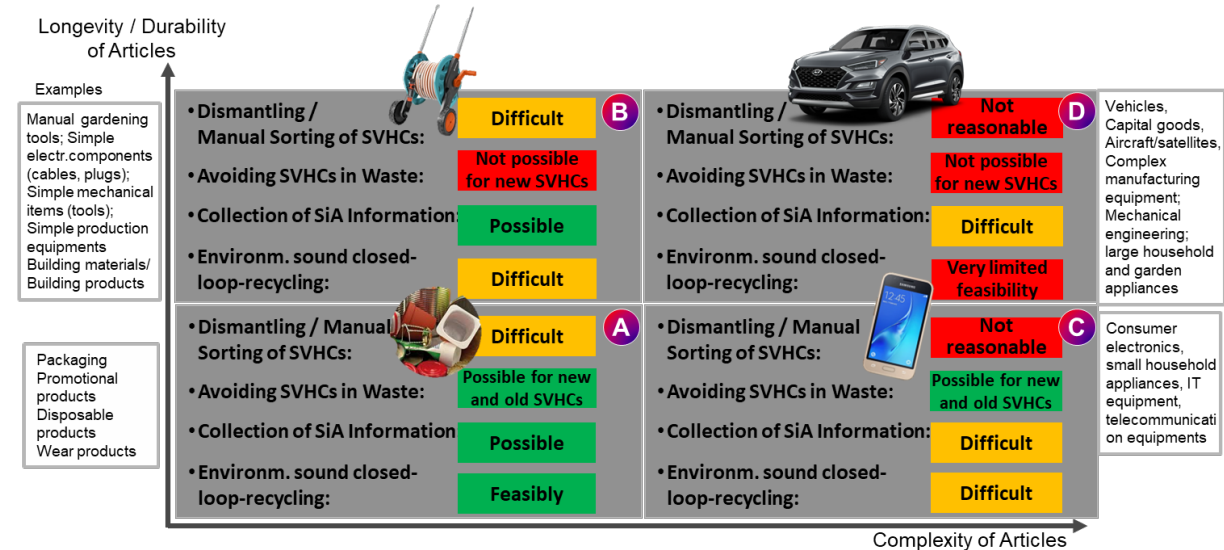


During the first quarter of the year, registrations of battery electric vehicles (BEVs) in the EU increased by 59.1% to reach 146,185 cars, with demand still benefiting from government stimuli for zero-emission vehicles.

CARS AND CIRCULAR ECONOMY

GENERAL ASPECTS

- Despite their complexity and durability, vehicles are the consumer products with the highest recycling rates.
- Automotive products are not comparable to any other product (e.g. packing) and the global downstream value chains are different.



GOAL:

Increase the use of (all) qualified secondary materials

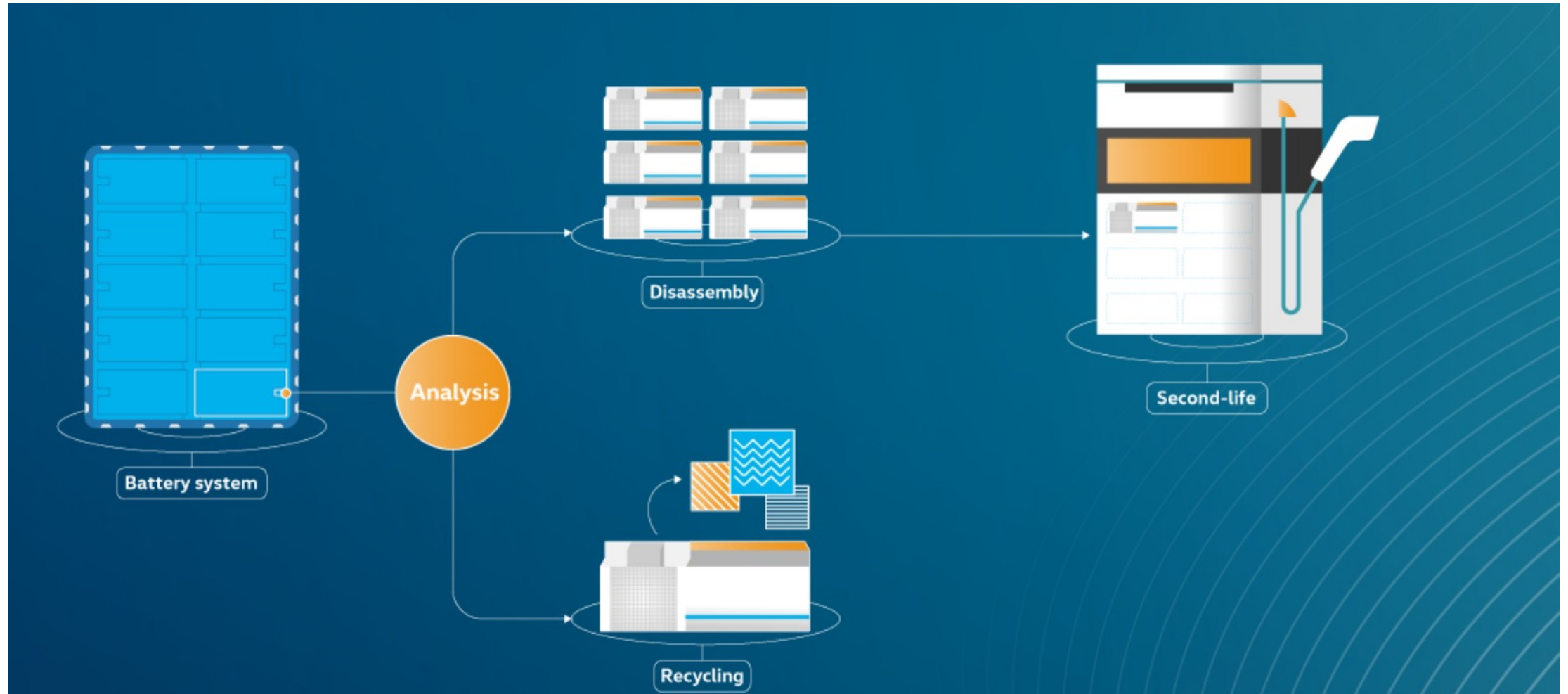
Reduce the use of virgin material from fossil sources and ores

AN ELECTRIC VEHICLE IS ONE PRODUCT



- Electric vehicle batteries should be treated from a vehicle perspective and not as an independent 'black box'
- Most OEMs are becoming battery producers
- Authorised operators must perform repair, reuse, remanufacturing and repurposing/recycling

RECYCLING



SKILLS NEEDED IN AUTO WORKSHOPS

- For general maintenance work (e.g. work on the exhaust system, oil change, tyre change): instructed personnel.
- Only skilled persons can work on high-voltage systems of vehicles, appropriate qualifications are required.
- Appropriate qualification for storage of batteries needed. Especially for the differentiation of damaged and non damaged batteries.
- Skilled personnel for fire protection and fire fighting
- Skilled personnel for logistics especially for the battery transportation and the definition of waste



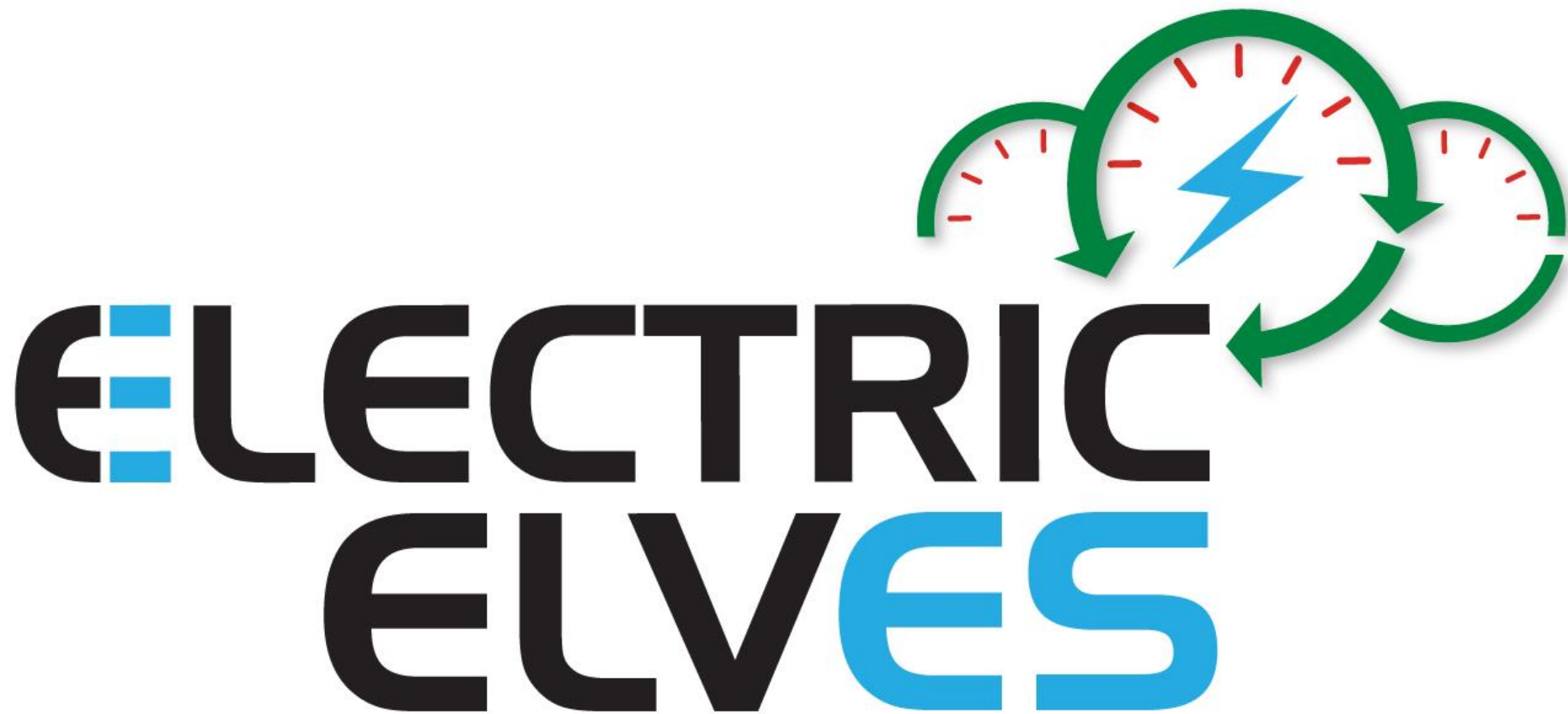
Electric ELVES

30 NOVEMBER 2021

ELVES – Who we are

- Compliance Scheme for End-of-Life Vehicles (ELVs) in Republic of Ireland
- Operating since 2017
- Funded by vehicle producers
- Network of Authorised Treatment Facilities that provide free take back of ELVs from the public for recycling
- ELV Targets - 85% reuse/recycling, 95% reuse/recovery
 - Network met both targets since 2017
 - Country met both targets from 2018





FOR A CIRCULAR EV BATTERY FUTURE

www.electricelves.ie

The start - 2018

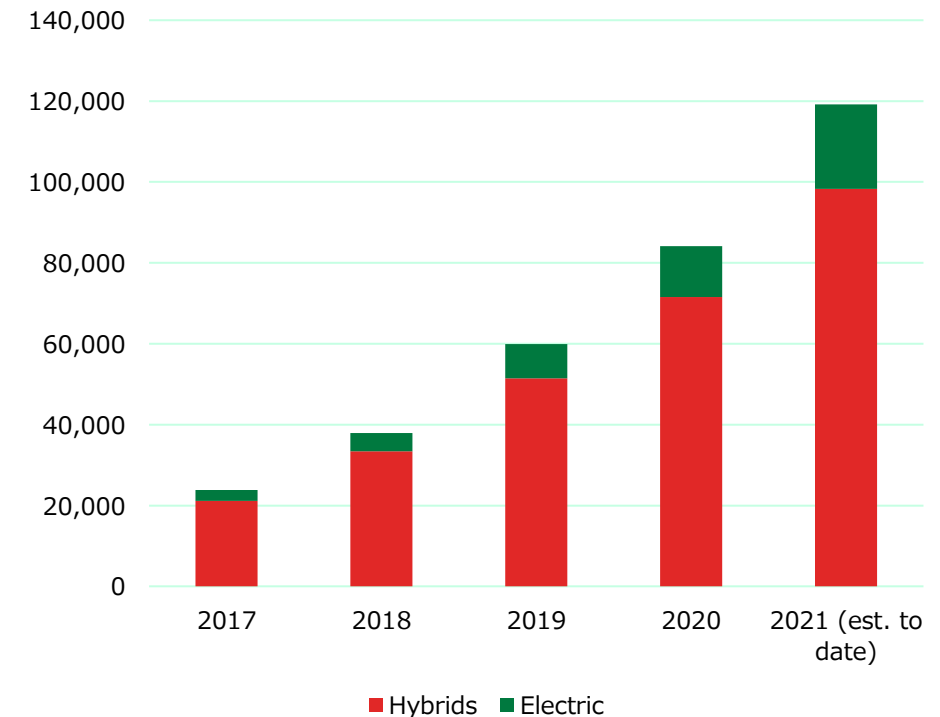
EVs starting to arise at Authorised Treatment Facilities:

- Early models – e.g. Prius
- Premature end-of-life – e.g. written off after accidents
- Warranty returns

Need for programme to:

- Deliver recycling required under regulation
- Support ATFs in this transition

No. of private electrified vehicles registered in
Ireland 2016-2021
(DTTaS & SIMI)



What is provided

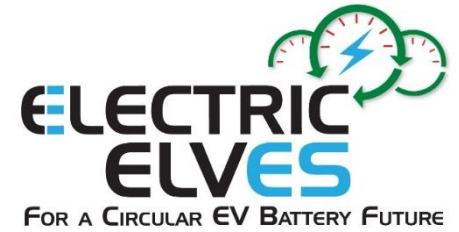
Key services provided:

- One point of contact for all vehicle marques
- Training & information support for Authorised Treatment Facilities (ATFs)
- Collection and recycling of EV batteries from ATFs and aftersales



The programme is provided to all ATFs in Ireland, free of charge.

Funding



Core programme:

- Collection and recycling – by marque, as per Batteries Regulations
- Training and information support – by all vehicle producers through ELVES

R&D Funding

- Application in to Sustainable Energy Authority Ireland, in partnership with University College Dublin and Maynooth University
- Testing for battery repurposing inline with incoming Battery and ELV Regulations



ATFs & EV Batteries



1st Step in EV Battery Recycling Process

What ATF staff need to do:

1. Transport/handle EVs – including damaged vehicles
2. Depollute vehicle – safely remove the EV battery
3. Safely store battery before collection for recycling

Need to do these three steps whilst keeping their staff safe

Awareness Training

- Started in 2019
- Designed and delivered by Salvage Wire Ltd – specialist in hybrid and electric vehicle training for ATFs
- One day awareness course - 6 locations so far, online in early 2021
- Advanced course planned
- Very positive response from ATFs
- Strong support from regional training centres



Awareness training

- Identifying an EV
- How they work
- Key risks and how to manage them
- Personal Protective Equipment needed
- Basic shut down procedure
- Key sources of information and support



Information support



- Support documents available on our website
- International Dismantling Information System (IDIS) - Marque and model dismantling information
- Manufacturer support if required
- Health and Safety Poster

Electric ELVES

The programme for electric vehicle batteries

The Electric ELVES Programme provides ATFs with the following support in relation to the handling of hybrid, electric, mild and micro hybrid vehicles:

- ★ Dismantling information provision
- ★ Training
- ★ Free collection and recycling of the battery
- ★ Additional support in the event that the vehicle/battery is potentially damaged.

The Electric ELVES programme is open to all ATFs, not just those in the ELVES and is delivered free of charge.

Programme documentation has been distributed to ATFs and copies can be found below:

- [Electric ELVES Programme - What to Do](#)
- [Vehicle Details Form \(Word\)](#)
- [Safe Handling of High Voltage Electrical components in Electrical End of Life Vehicles](#)

[Request an E](#)

SAFE HANDLING OF HIGH VOLTAGE VEHICLES

Electric and Hybrid Vehicles can be dangerous

STOP! - Research vehicle
Use IDIS (www.IDIS2.com) to confirm process to safely disconnect and remove the HV battery

Mark the vehicle with high voltage warning signs

STOP! - Assess vehicle condition
Look for HV battery damage, leakage or thermal incident.

Use PPE and high voltage tools
When working on high voltage components - all tools and PPE should be tested and checked before every use.

Follow the manufacturers process to make vehicle safe, confirm HV shut down and remove HV battery
• Use correct tools and PPE: Test before use. • NEVER WORK ALONE.
• Work in a dry, well-lit, well-ventilated area. • Follow manual handling processes - some components are heavy.

Store batteries correctly
Never mix chemistries. Keep dry and restrict access to storage area.

If unsure - Leave vehicle. Seek help and advice from trained persons.

All staff handling HV components and vehicles should have received appropriate training.
Contact ELVES for support and information through the Electric ELVES Programme - www.electricevelves.ie, info@elves.ie

IDIS ONLINE
6.06.033

Home
Brands
Help

Step 1 Brand

Step 2 Model

Step 3 Variant

Search...

Electric ELVES - Impact

- Delivers on vehicle producers obligations under end-of-life regulations and is helping ATFs prepare for the future
- Support provided to all ATFs (over 200 sites)
- Over 100 ATF staff have completed awareness training
- Over 100 batteries collected for recycling

Learnings – Knowledge and Skills

- Rapidly developing area
 - Technology
 - Regulation – Batteries, ELV, ADR etc..
 - Building real world experience
 - Standards
- Need for ATF specific training – new skills, different to mechanics
- Continuous – increasing demand, building skills, staff turnover



Electric ELVES Training Video - YouTube: ELVES Ireland

<https://youtu.be/EKZ90ndBGJY>





Thank
you

NMIS

National Manufacturing
Institute Scotland

Albatts and Manufacturing Skills Academy

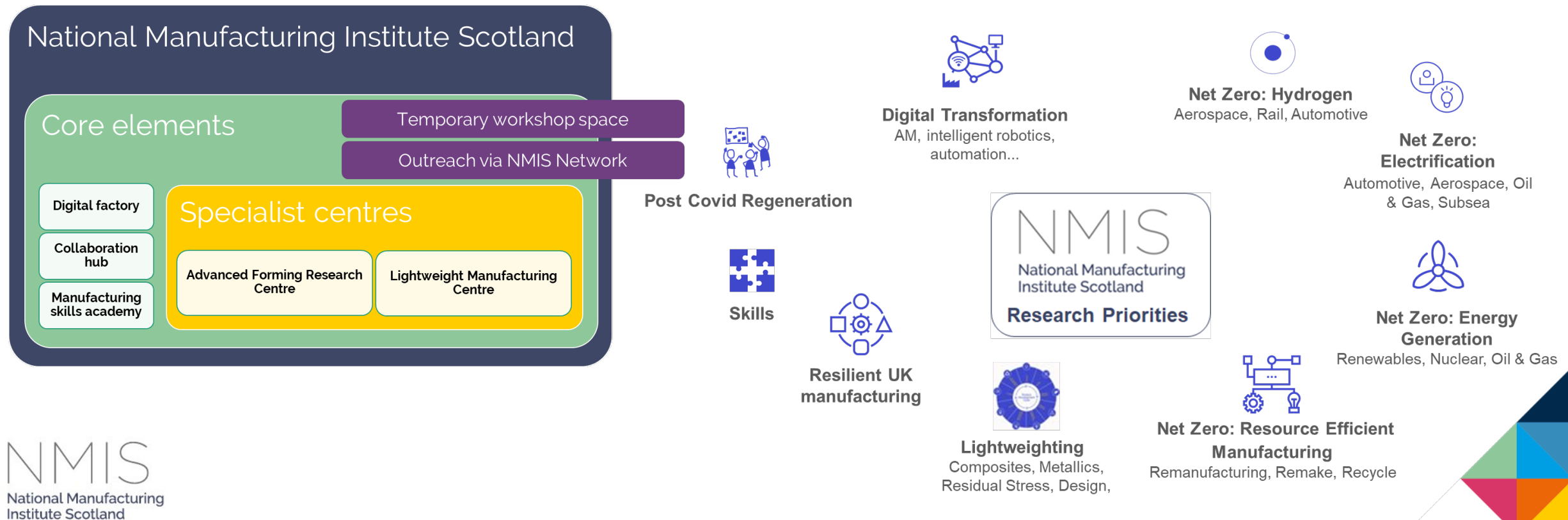
Stewart McKinlay

nmis.scot



NMIS Group – One Scotland Team

A combination of core NMIS capability, specialist technology centres and an active network of partners in the manufacturing community.



Skills Context – VET delivery and Research

College Name	Course Name	Notes
Dundee & Angus	Level 1 Electric/Hybrid awareness Level 2 Award in Electric/Hybrid Vehicle Hazard Management for Emergency and Recovery Personnel Level 2 Award in Electric/Hybrid Vehicle Routine Maintenance Activities	Courses range from 3 hours to 2 days
Edinburgh	IMI Level 1 Award in Electric/Hybrid Vehicle Awareness IMI Level 2 Award in Electric/Hybrid Vehicle Routine Maintenance Activities IMI Level 3 Award in Electric/Hybrid Vehicle System Repair and Replacement	IMI (Institute of Motor Industry)
Fife	L1 Award in Electric Vehicle Awareness L2 Electrically Propelled Vehicle Hazard Management L2 Hybrid electric vehicle operation and maintenance L3 Electrically Propelled Vehicle Repair and Replacement	Day release and evening classes
West Lothian	L2 Award in hybrid electric vehicle operations and maintenance L3 certificate in electric and hybrid vehicle awareness L3 Award in hybrid electric vehicle repair and replacement	SCQF L3 = EQF L1

<https://www.transport.gov.scot/publication/skills-for-low-carbon-heavy-duty-vehicles-hdvs/>



Skills Programmes

1. Modern Apprenticeships @SCQF L6 Engineering (EQF L4)
 - i. To factory gate
 - ii. After factory gate
2. Graduate Apprenticeships in Engineering Design and Manufacturing
3. VET courses previously outlined
4. Degrees
5. Doctorates
6. Micro-credentials



Current Funded Programme

NTTF (National Transition Training Fund) via SDS and SFC

1. Equality, Diversity, and Inclusion
2. CPD
3. Net Zero and Sustainability CPD
4. Micro-credentials
5. Graduate programme



European Skills Agenda in the Mobility-Automotive Ecosystem

Alliance for Batteries Technology, Training and Skills
2019-2023

Dr. Jakub Stofa,
VSB-TUO, ALBATTS Project WP Supervisor, DRIVES Project Coordinator & Automotive Skills Alliance Leader

ALBATTS Workshops: Recycling EV Batteries: Skills and Qualifications Needed, 30th November 2021



Mobility-Automotive Skills Agenda

The road until now



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Mobility-Automotive Skills Agenda - Background



- ⚡ **Automotive ecosystem** is facing **unprecedented transformation**
- ⚡ Caused by, e.g.
 - ⚡ Long-term shift towards **zero-emission, digital mobility, new mobility concepts, or carbon neutrality** by 2050
 - ⚡ Short-term **COVID impact**
- ⚡ Impact to the workforce – **cca. 15 million people employed** in European automotive value-chain
 - ⚡ **Jobs endangered VS. struggle to attract and recruit qualified people for new and emerging jobs**

Sustainable, massive and pragmatic approach towards education and training (up-/re-skilling) in the ecosystem is needed more than ever before

Mobility-Automotive Skills Agenda – Initiatives



- ⚡ **High Level Group GEAR 2030 (2015 - 2017) - Final report** on automotive competitiveness and sustainability
- ⚡ New Skills Agenda for Europe (2016) with action **The Blueprint for Sectoral Cooperation on Skills**



Automotive Sector
Ongoing (2018 - 2021)

www.project-drives.eu



Batteries Sector
Ongoing (2019 - 2023)

www.project-albatts.eu

- ⚡ European Skills Agenda (2020) with action **Pact for Skills (launched November 2020)**



**AUTOMOTIVE
SKILLS
ALLIANCE**

www.automotive-skills-alliance.eu



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Automotive-Mobility Skills Agenda

 **DRIVES** Blueprint Project
Development and Research on Innovative Vocational Education Skills



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Automotive-Mobility Skills Agenda –



- ⚡ 24 full project partners from 11 European Countries, including ACEA, CLEPA, ETRMA
- ⚡ Main results so far:
 - ⚡ [Strategy and Roadmap](#) including also [Sectoral Analysis of Skills Demand and Offer](#)
 - ⚡ [DRIVES Job Roles](#) and [DRIVES Learn Platform](#) (MOOCs, Blended learning, Trainer interaction courses) to offer directly to companies and also to education and training providers to their courses
 - ⚡ Courses are open now, register for free at: <https://learn.drives-compass.eu/>



- ⚡ **DRIVES Framework** – initial version of **EU-wide database of reference job roles and training courses** provided across Europe and possibility of digital badges for skills recognition

- ⚡ **Harmonisation of the job roles definitions** (“electronic version of the competence matrix”)
- ⚡ **Overview of courses** (paid/free, online/onsite, etc.)
- ⚡ **Individual Learning Account** (progress, digital badges)
- ⚡ See at: <https://drives-compass.eu/home>

- ⚡ **All DRIVES project results and activities at: www.project-drives.eu**



Automotive-Mobility Skills Agenda



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Automotive-Mobility Skills Agenda –



**AUTOMOTIVE
SKILLS
ALLIANCE**



- ⚡ **Sustainable collaboration on skills agenda** topics in the **Automotive Ecosystem**
- ⚡ ASA is also partnership of European Skills Agenda, **Pact for Skills in Automotive Ecosystem**
- ⚡ The ASA mission is to bring together different kind of stakeholders involved in the Automotive ecosystem and to ensure continuous, pragmatic and **sustainable cooperation on the skills agenda** in the ecosystem. Including Massive workforce **upskilling and reskilling across the automotive ecosystem**
- ⚡ **Get involved** in Working Groups (e.g. **Repair and Maintenance WG led by CECRA**), or webinars, pilot projects in the regions, or further collaborations: info@skills-alliance.eu
- ⚡ See more at: www.automotive-skills-alliance.eu



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Mobility-Automotive Skills Agenda

albatts Blueprint Project

Alliance for Batteries Technology, Training and Skills



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What is **ALBATTs**?



- ⚡ **20 Partners in 4-year** (2019-2023)
Erasmus+ funded project
- ⚡ **Blueprint for Sectoral Cooperation on Skills in Battery sector**
- ⚡ **Focus on demand and supply sides of competences in the battery value chain**





ALBATTIS

Sectoral Intelligence

Q1: What is going on?



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Recycling – Overall Needs

- ⚡ Overall focus on the skills/job roles needs for the whole value chain, example intelligence in **recycling**:
 - ⚡ Biggest **recruitment challenges**: engineers and researchers (first phase of the recycling facility set-up requires more white-collar workers, which levels more with the blue-collar as the plant is in the later stages of maturity)
 - ⚡ **Technology** and **processes**: chemical and physical recycling processes needs to be educated, this is joined with knowledge and skills of: (1) environmental management and circular economy; (2) battery design and design of components with the orientation on recycling at the end of the lifecycle; (3) battery materials, material science, chemistry and electrochemistry; (4) vehicle battery systems and systems overall; (5) material flow; (6) recycling processes, technologies, innovations and automation; and many more
 - ⚡ Strategies for **used battery collection**, methods and systems need to be developed



Recycling – Needed Job Roles



Blue-collar workers observed are having expertise in: **material handling; operation; machines; recycling;** and other.

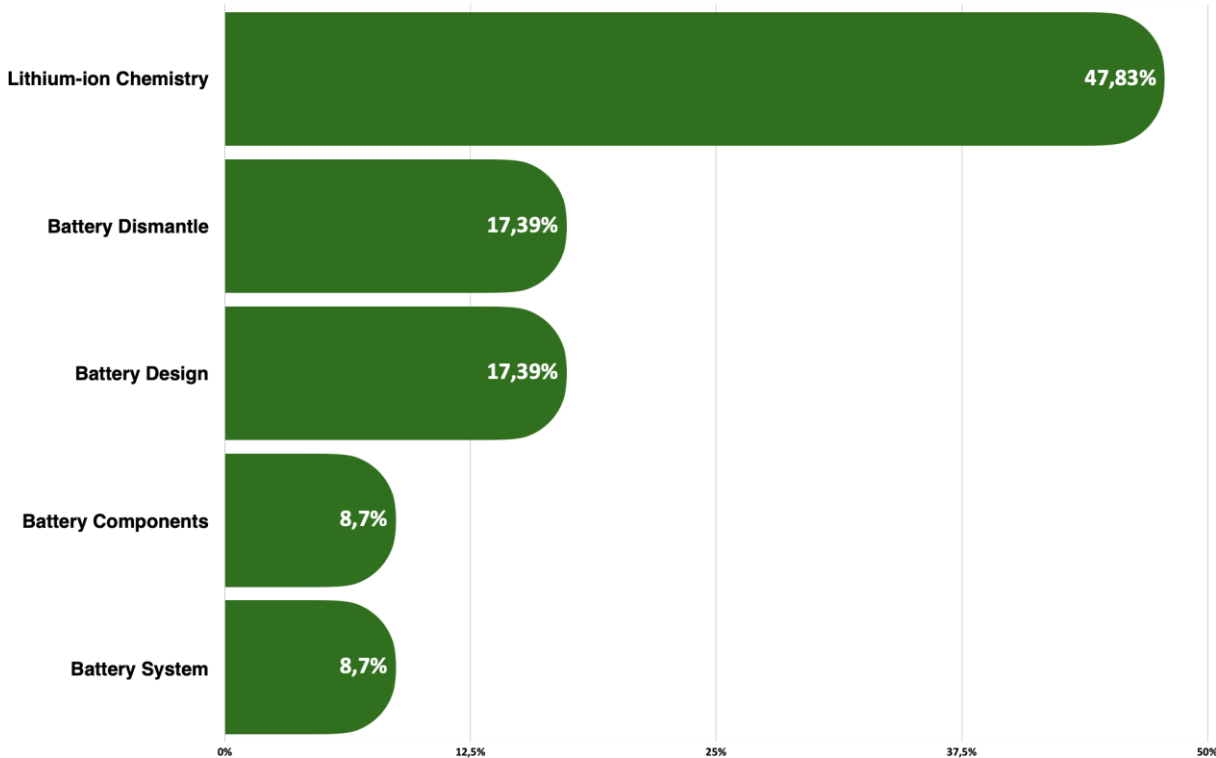
White-collar workers are having expertise in: **audits; safety; quality; process engineering;** and other.



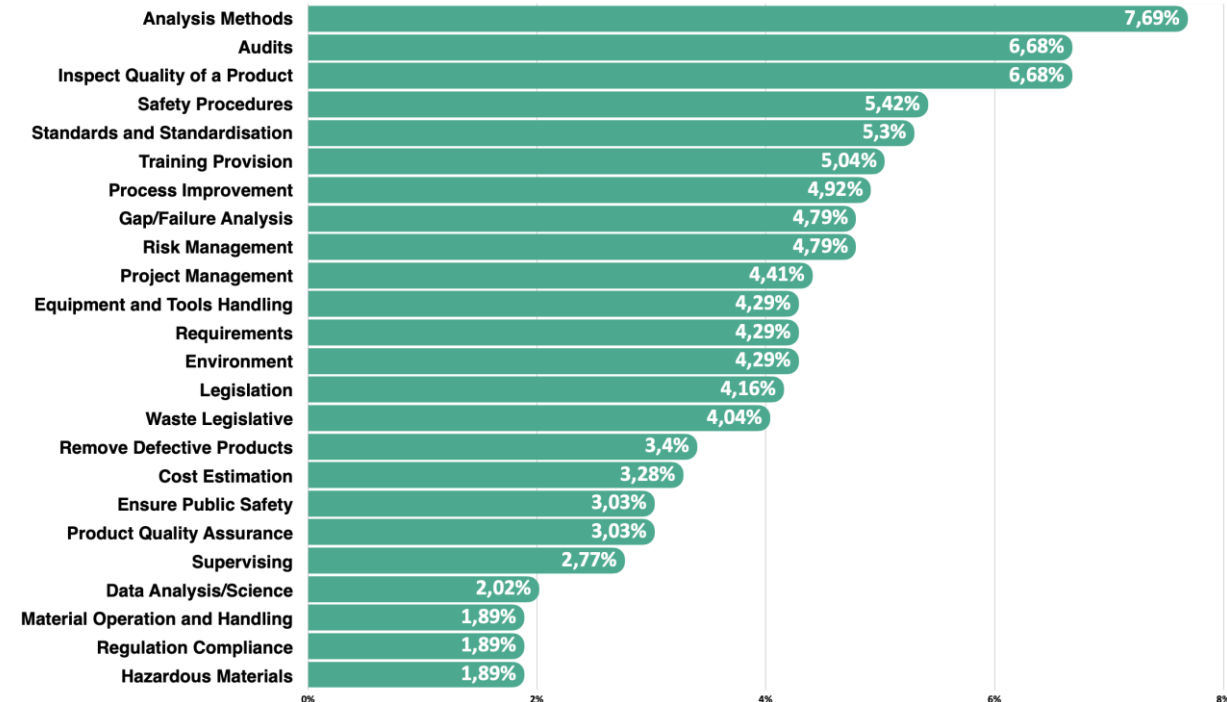


Recycling – Needed Skills/Knowledge

RECYCLING - SECTOR SPECIFIC COMPETENCE



RECYCLING - CROSS-SECTORAL SPECIFIC COMPETENCE



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ALBATTIS Desk Research

- ⚡ Desk research provide screening of the latest information relevant for skills agenda in Battery Sector
- ⚡ Desk Research starts by 2020 and will be hold till 2023





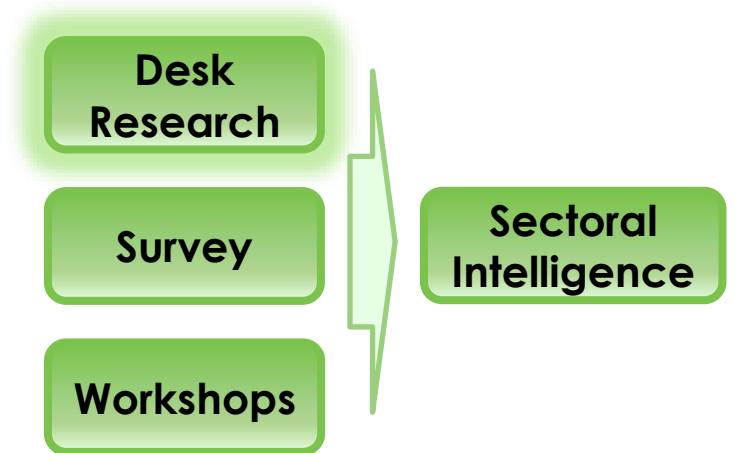
ALBATTIS Desk Research

Release I

- ⚡ [Overall Battery Sector](#) – Mobile and Stationary Applications (Nov 20)
- ⚡ [Stationary Battery Applications](#) Sub-sector (Aug 20)
- ⚡ [Mobile Battery Applications](#) Sub-sector (Aug 20)

Release II

- ⚡ Overall Battery Sector – RnD and Battery Manufacturing (Nov 21)
- ⚡ [Research and Development Report](#) (Aug 21)
- ⚡ [Battery Manufacturing Report](#) – “Gigafactories” (Aug 21)





ALBATTTS Online Survey

- ⚡ Online Survey is focused on detailed analysis of skills and job roles needed in the sector
- ⚡ [Survey results](#) for sub-sector Stationary and Industrial Battery Applications (Feb 21)
- ⚡ [Survey results](#) for sub-sector Mobile Battery Applications (Feb 21)
- [Survey Results](#) for Overall Battery Sector – (May 21)
 - + semi-formal interviews





ALBATTIS Workshop Series

- ⚡ Brings stakeholders together to participate on the skills intelligence updates and consult on the latest inputs
- ⚡ Workshop Series starts by 2021 and will be hold till 2023





Workshop Series

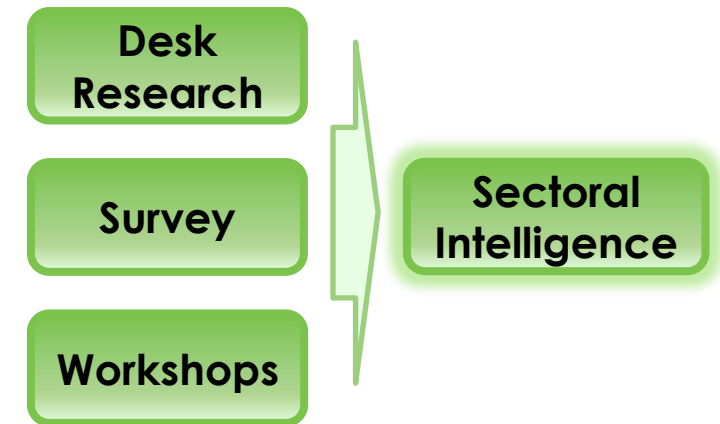
- ⚡ [Workshop Results – Stationary Battery Applications and Safety](#) (Feb 21)
- ⚡ [Workshop Results – Mobiles and Maritime Battery Applications](#) (Feb 21)
- [Workshop Results](#) – Overall Results (May 21)





Sectoral Intelligence - Roadmap

- [Sectoral Intelligence](#) for Mobile Battery Applications (Aug 21)
- [Sectoral Intelligence](#) for Stationary Battery Application (Aug 21)
- Sectoral Intelligence for Overall Sector (Nov 21)





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Education and Training

Q2: How can we address the education and training needs?



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ALBATTs will...

- Analyse new job roles/skills
- Suggest learning objectives
- Develop course plans
- Develop learning material
- Try out adaptive learning
- Pilot-test innovative courses
- Train-the-trainer guidelines
- Network!
- Use European instruments
- Implement results



To get involved with the **albatts** stakeholders group:

Stakeholder registration [here](#)

LinkedIn Group - European Battery Skills Agenda [here](#)



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Thank you

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