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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 963580.

Project Acronym: ALBATROSS

Project Full Title: Advanced Light-weight BATteRy systems Optimized for fast charging, Safety, and Second-life applications

Call Identifier: H2020-LC-BAT-2020

Type of Action: IA

Start Date: 1 January 2021

End Date: 31 December 2024

D9.3 – Communication materials pack including multimedia content

WP9	Exploitation and Dissemination
Due Date:	31/12/2021
Submission Date:	12/01/2022
Responsible Partner:	EWF
Version:	3.0
Status:	Final version

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Reviewer(s): João Marques (EWF), Cem Demirkesen (FORD), Niles Fleischer (ALGO), Iosu Cendoya (CID) and Onur Sinak (YOVA)

Deliverable Type: Other

Dissemination Level: Public

Version History

Version	Date	Author	Partner	Description
1.0	20/12/2021	Pedro CATARINO	EWF	First internal draft.
2.0	31/12/2021	Pedro CATARINO	EWF	Final Draft
3.0	10/01/2022	Pedro CATARINO	EWF	Final Draft

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1. Executive Summary

The present deliverable report, D9.3 'Communication materials pack including multimedia content', was produced as part of work package 9 (WP9) 'Exploitation and Dissemination' of the ALBATROSS project.

It is intended as an Information Pack and guidelines for the Consortium when disseminating information on:

- The Aims and Objectives of the ALBATROSS project
- Press releases, newsletters and social media communications
- Presentations on Project background, Progress and Status,
- Exhibitions, workshops and technical papers etc.

The content presented on this deliverable will be updated continuously along the project, while materials of dissemination are being produced and integrated in D9.5 and D9.9. Materials such as press releases, pictures, slides and any other suitable communication content should be integrated in these deliverables.

2. ALBATROSS and Partners logo

The ALBATROSS logo (Figure 1 - ALBATROSS logo) will be used in all dissemination material for project events and dissemination activities (e.g presentations, publications, leaflets, brochures) and in the project website.

Logos of the ALBATROSS partners are also shown from Figure 2 to Figure 22.

Figure 1 - ALBATROSS logo

Figure 2 - Logo of the partner YOVA

Figure 3 - Logo of the partner CLEAN

Figure 4 - Logo of the partner MBT

Figure 5 - Logo of the partner ALGO

Figure 6 - Logo of the partner ETL

Figure 7 - Logo of the partner Zem

Figure 8 - Logo of the partner (PST)

Figure 9 - Logo of the partner EWF

Figure 10 - Logo of the partner CRF

Figure 11 - Logo of the partner FEV

Figure 12 - Logo of the partner TWI

Figure 13 - Logo of the partner IREC

Figure 14 - Logo of the partner TVS

Figure 15 - Logo of the partner NTNU

Figure 16 - Logo of the partner IWS

Figure 17 - Logo of the partners CPI

Figure 18 - Logo of the partner AIMEN

Figure 19 - Logo of the partner UoN

Figure 20 - Logo of the partner LEI

Figure 21 - Logo of the partner FORD OTOSAN

Figure 22 - Logo of the partner CID

3. Content of Initial Project Presentation

An initial PowerPoint presentation has been produced at the beginning of the project, to be used by the ALBATROSS partners and the European Commission. The subsequent sub-paragraphs provide details on key information included within the presentation document.

3.1. Background of the proposal

Electrification of vehicles is seen as key to achieving global legislative requirements for CO2 emissions reductions. Zero emissions within cities and higher quality and higher performance electrified vehicles (EVs) is also making them more attractive. More than 2 million EVs were sold globally in 2018, 68,7% were battery electric vehicles (BEV) and 31,3% were plugin hybrid electric vehicles (PHEV), with an annual growth rate of 57,3%. Pack costs are expected to reduce from €155/kWh today to €90/kWh in 2030, through technological advancements and economies of scale.

However, several issues currently limit further exploitation. Specifically, concerns of drivers in regard to: battery range (and anxiety), cost, the long-term reliability of batteries and excessive charging times. Tesla has shown that better range is a key factor, having released a 20-40% higher range than its competitors, leading to Tesla selling 367 500 vehicles in 2019 (50% more than the previous year) ~ 15% market share. European manufacturers need to develop key technologies which address the buyer's main hesitation points.

3.2. ALBATROSS Call & Consortium

- H2020-LC-BAT-2020
- Start date: 1st January 2021
- Duration: 48 months
- Received EU Funding: €11,818,442.50 (€9,991,817.89 Grant)
- 21 Partners from 10 Countries

3.3. Overall Objectives of ALBATROSS

ALBATROSS addresses the needs of European Electric and Hybrid-Electric passenger vehicle market by overcoming driver concerns relating to battery range and anxiety, cost, long-term reliability and excessive charging times.

Developments focused on:

- Battery module and packaging,
- Battery management system,
- Thermal management and sensing,
- Material and process development,
- Dismantling, second life usage, reuse, recycle,
- Life cycle analysis and sustainability.

3.4. ALBATROSS solutions

There are some needs that the project will address with eco-design principles followed in each step.

- Poor temperature control limiting efficiency and charging rates will be overcome with heating and cooling technologies: catalytic burner, loop heat pipes, 2-phase immersion cooling and direct electrical heating
- Need to ensure individual cell temperate and electrical properties accurately and quickly tackled by parameters from current/voltage combined with direct measurement &novel sensing technologies
- Development of a battery management system processing on chip and in cloud to build larger dataset & assess battery state of health to address the need of a BMS to react quickly to control cells and need to address thermal lag/gradient issues from measuring temperature outside cells

- Thermal management systems add weight, so it is needed to lightweight the solution with lightweight battery tray & module using new materials and designs
- New advanced materials can't be joined with traditional techniques, so advanced joining techniques (friction stir/laser welding) will be used

3.5. Key Deliverables

- Finalised ALBATROSS system specification
- Initial conceptual design of the module
- Battery module subsystem, optimized for manufacturability and validated at TRL 6.
- Report on materials selection and processing.
- Design for Manufacture approach
- Integrated cooling & heating sub-system design validated at TRL6
- Report and recommendations on battery pack recycling.
- Integrated BMW i3 vehicle battery pack for on-vehicle and on bench and tested for safety
- ALBATROSS validated at TRL 7 and benchmarked

4. Project Website

The project website is available for the following URL: www.albatross-h2020.eu. The website is structured in 7 main tabs including: Home, About, Consortium/Members, Project Timeline, Work Packages and Leaders, News &Events and Contacts. The aim is to have a continuous update of the information on the website with the progress and public results, meetings, events and useful links. The disclaimer is always presented in the bottom of the page in every tab available. The website was developed by YESILOVA.

The Home tab is the one presented when entering the website page. There, it is possible to be linked to the other tabs available to the news and have a brief idea of the consortium.

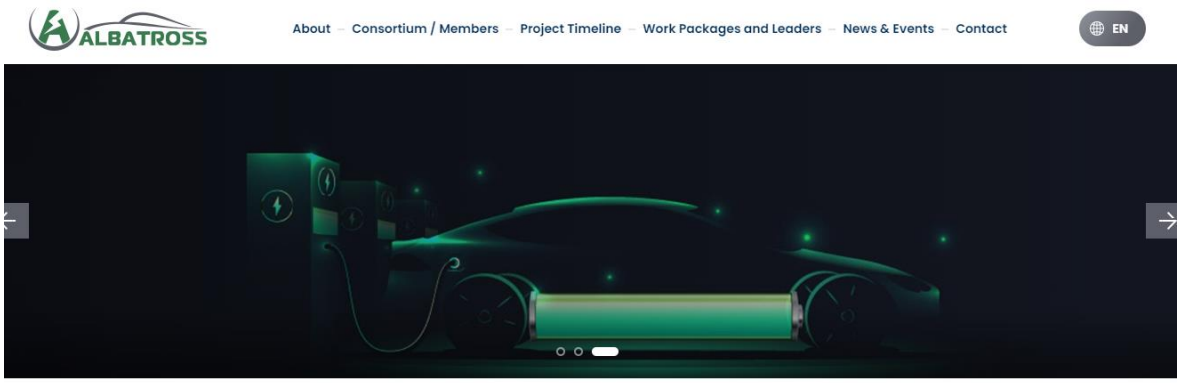

Figure 23 - ALBATROSS Home tab

5. Partner's websites

Specific news, articles and/or dedicated webpages featuring ALBATROSS information within the project partners organisation's website have been implemented. Some examples are shown in Figures 24 to 26 below.

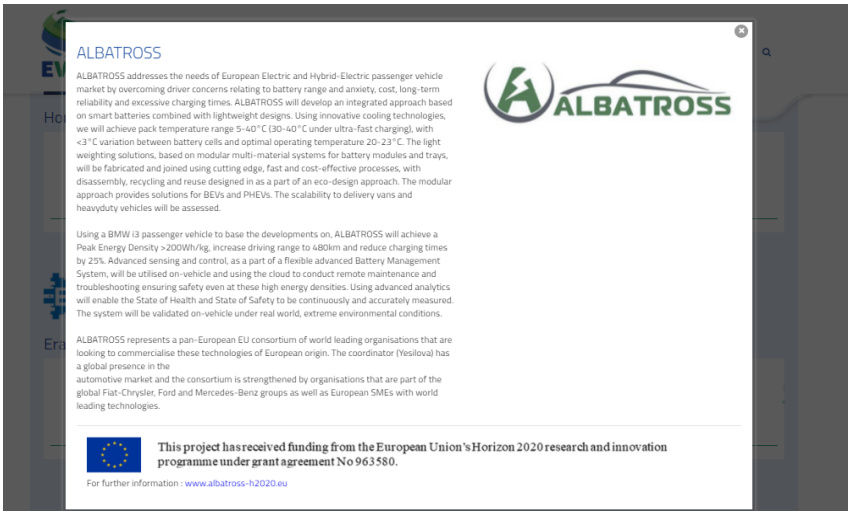

Figure 24 - ALBATROSS reference on EWF 's website

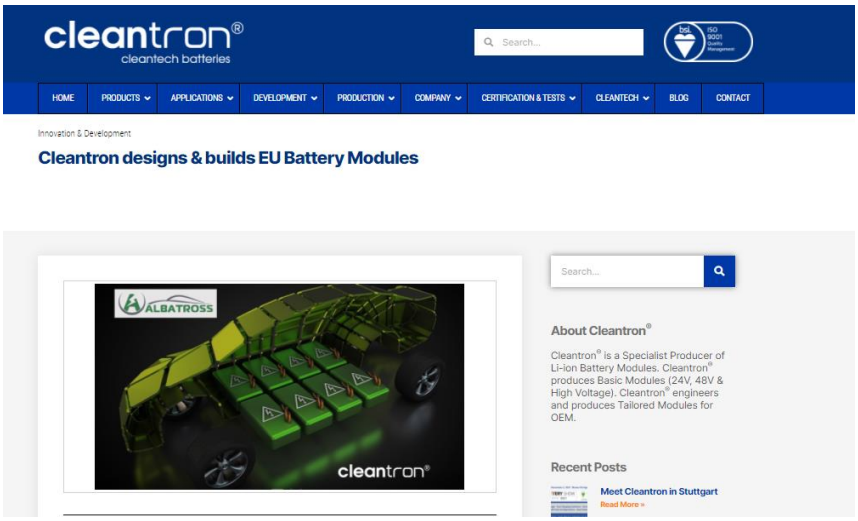

Figure 28 - ALBATROSS reference at CLEAN's website

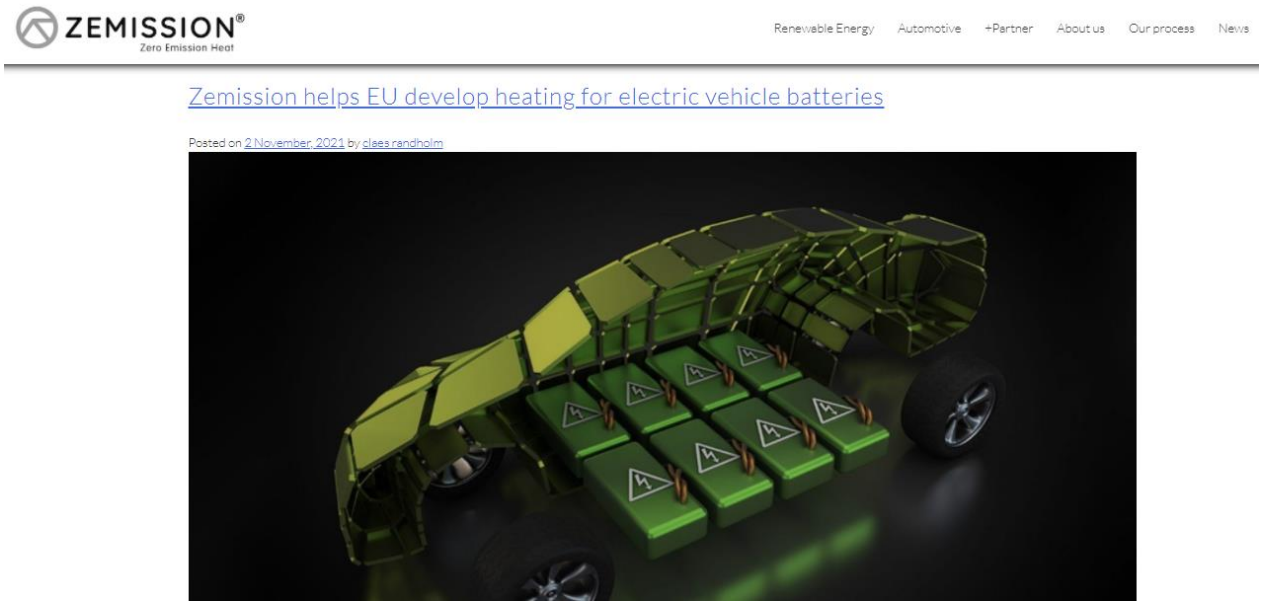

Figure 27 - ALBATROSS reference at Zem's website

6. Social Media

Various Social Media Platforms were considered for dissemination of results and project related success stories. These platforms will be a tool to disseminate the project results and news.

This will guarantee the success and survival of social platforms linked to the ALBATROSS project and also will attract the interest of the industry and allow the connection with stakeholders' pages and accounts in SM.

6.1. LinkedIn

The LinkedIn profile will enable a more professional/scientific engagement with relevant users in order to disseminate the project results. The link of the profile is: https://www.linkedin.com/showcase/h2020-albatross-project/?trk=affiliated-pages_result-card_full-click

6.2. Facebook

The Facebook page will address an engagement with general public. The link of the profile: https://www.facebook.com/Albatross-Project-H2020-100745362097521

6.3. Instagram

The Instagram will be a dissemination more based in pictures and videos. The link is: https://www.instagram.com/albatrossproject_h2020/

6.4. YouTube

The YouTube will be a dissemination more based in pictures and videos. The link is: https://www.youtube.com/channel/UCbjk3OirCf0mNaPmxiCXChg

7. ALBATROSS Dissemination Materials

At the moment a digital flyer and 2 videos were developed as dissemination materials. In the further years of the project more materials will be developed to disseminate the project outcomes.

7.1. Videos

In the ALBATROSS YouTube page is available the first teaser of the project (Figure 27). The video presents the project to the general public with the main goals and objectives of the project. It was developed with the propose to introduce the project concept

The second teaser is under final editing. After the partners revision will be published in January 2022 (Figure 28). A plan for the development of videos will agreed by partners in the beginning of 2022.

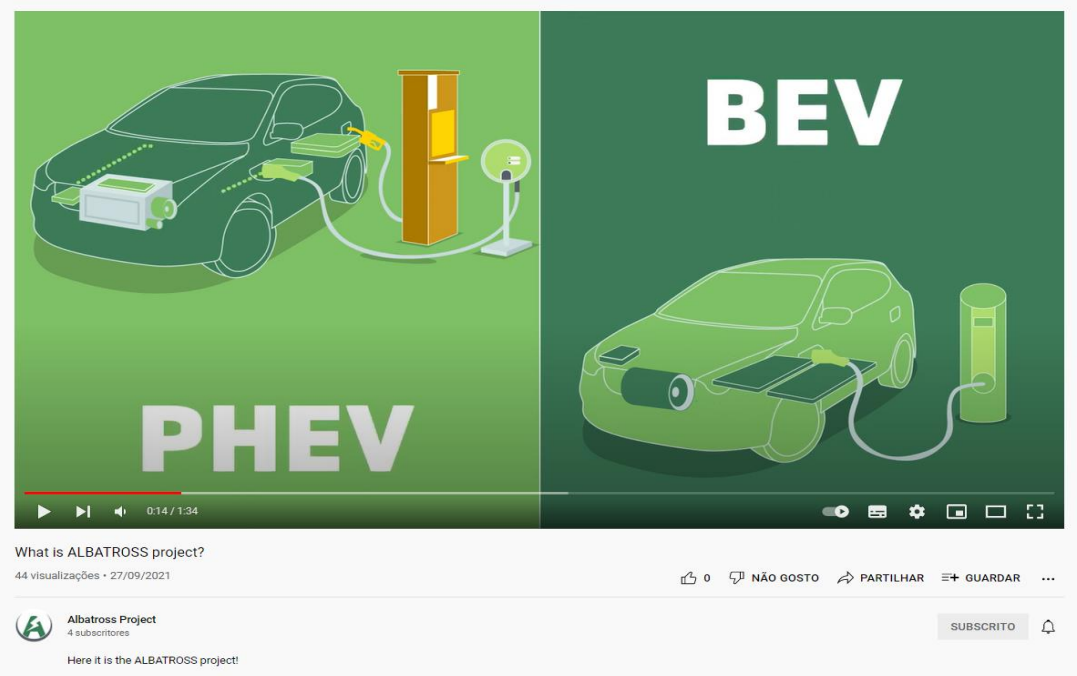

Figure 32 - ALBATROSS' video on YouTube

Figure 31 - 2nd ALBATROSS video

7.2. Flyer

In Figure 29 is the ALBATROSS Flyer that is under final editing

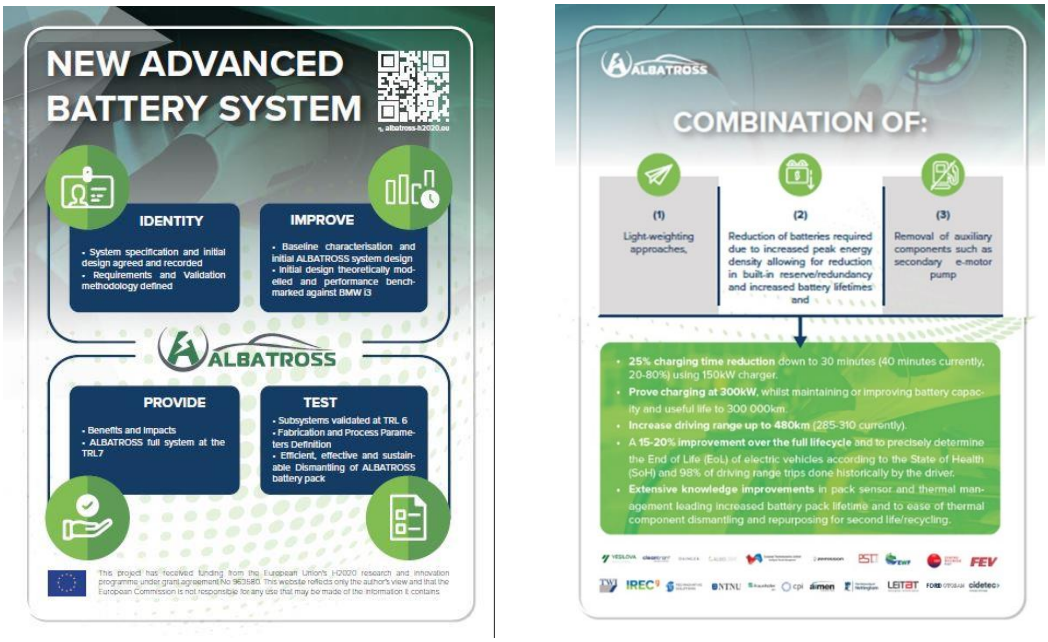

Figure 35 - ALBATROSS flyer

8. Abstract

An abstract was developed to submit under international conferences.

Albatross – Carbon neutrality and zero-emission vehicles with smart battery cells

1. ***Overview and motivation***

ALBATROSS is a European Funded project by the European Commission that addresses the needs of European Electric and Hybrid-Electric passenger vehicle market by overcoming driver concerns relating to battery range and anxiety, cost, long-term reliability and excessive charging times.

ALBATROSS will develop an integrated approach based on smart batteries combined with lightweight designs. Using innovative cooling technologies, we will achieve pack temperature range 5-40°C (30-40°C under ultra-fast charging), with <3°C variation between battery cells and optimal operating temperature 20-23°C. The light weighting solutions, based on modular multi-material systems for battery modules and trays, will be fabricated and joined using cutting edge, fast and cost-effective processes, with disassembly, recycling and reuse designed in as a part of an

eco-design approach. The modular approach provides solutions for BEVs and PHEVs. The scalability to delivery vans and heavy duty vehicles will be assessed.

Using a BMW i3 passenger vehicle to base the developments on, ALBATROSS will achieve a Peak Energy Density >200Wh/kg, increase driving range to 480km and reduce charging times by 25%. Advanced sensing and control, as a part of a flexible advanced Battery Management System, will be utilised on-vehicle and using the cloud to conduct remote maintenance and troubleshooting ensuring safety even at these high energy densities. Using advanced analytics will enable the State of Health and State of Safety to be continuously and accurately measured. The system will be validated on-vehicle under real world, extreme environmental conditions.

ALBATROSS represents a pan-European EU consortium of world leading organisations that are looking to commercialise these technologies of European origin.

2. ***Methodology, results and main contributions***

ALBATROSS aims to develop a commercially and technically viable "Smart battery cell" approach using very rapid, accurate individual cell temperature measurements coupled with very high efficiency heating and cooling technologies. The system must be able to overcome the inherent physical conditions of time-lag for accurate temperature measurements as well as fast and reliable heating/cooling of cells. Therefore, these approaches are coupled with highly advanced and fast BMSs coupled with cloud-based AI capabilities for learning and optimisation.

The overall ALBATROSS concept is built a unique approach that will combine a "Smart battery cells" approach with a lightweight, crash resistant battery system (trays and modules) within a sustainable and reliable manufacturing eco-system based advanced joining technology know-how to design and manufacture.

- *High density module designs based on selection of high energy density cylindrical cells*
- *High efficiency and rapid cooling and heating based on two-phase dielectric immersion thermal management zero-emission, bioethanol catalytic heating and direct differential heating of the cells using printed heaters*
- *Improved thermal management for increased heat transfer of battery pack components through direct laserbased microtexturing of metallic parts, whose microstructures act as large-scale surface heat exchangers*
- *Temperature measurements of individual cells using ALGO's Algoshield technology with a speed of 1kHz combined with direct (highly accurate) measurements using PST's printed sensors with accuracy <±0,1°C).*
- *Thermal management and BMSs for accurate measurement and control of the electrical and thermal properties of individual cells (FEV, ALGO) combined with a cloud-based system for continuous measurement and optimisation of the SOH/SOS, significantly reducing battery degradation and increasing battery lifetimes. Battery cell safety will be ensured using ALGO's unique approach to predict thermal runaway in advance enabling trigger control of cooling or electronic parameters to prevent this.*

• *Lightweight, crash resistant battery system to achieve design flexibility, safety and crashworthiness battery packs through using dissimilar materials, each of which has respective benefits. In order to combine composites with aluminium and join different aluminium alloys; advanced techniques such as laser welding, laser texturing, friction stir welding will be used. The aluminium-composite elements will reduce the weight of battery pack while smart use of heat treatable cast and extruded crash alloys will increase safety and thermal efficiency. The mechanical design of battery packaging will not only consider a design approach to use advanced joining, material technologies, but also lays out an architectural baseline for novel thermal management technologies, BMS and enhanced safety*

3. Conclusion and future works

The expected impacts are:

• *Considerably improved performance of the EV through reduced battery system weight by 20% at constant electric vehicle range for mid-size battery electric car. Through ALBATROSS, the battery system weight for a BMW i3 will be reduced by 20% to 222 kg.*

• *Overcome the uncertainty of range by achieving 25% shorter recharging time with a 150kW charger compared to the best in class electric car available on the market in 2018. The demonstrator must have the same battery capacity as the reference car and meet the useful battery life mentioned below. ALBATROSS will develop innovative thermal management designs and a BMS that achieves a battery recharging time 25% shorter (from 40 minutes to 30 minutes) with a 150kW charger for the BMW i3.*

• *Improved attractiveness of the EV through achieving extended useful battery life to 300 000 km in real driving referring to a mid-size passenger car using improved battery management, balancing and thermal management during high-power charging/discharging.*

• *ALBATROSS will demonstrate an approach to improved battery management, balancing and thermal management during high power charging/discharging, thereby extending the useful life of a battery in a mid-sized passenger car to at least 300 000 km.*

• *Contribution to Circular Economy goals through a minimum 20% Life Cycle Analysis improvement compared to existing products. The ALBATROSS pack will contribute to the EU Circular Economy goal through an improvement to Life Cycle Analysis (LCA) of 20% compared to current EV products.*

• *Considerably improved knowledge on module and pack sensorisation and thermal management. Innovative sensors and an advanced BMS will be combined with cloud-based AI techniques to come to a much greater understanding of pack sensorisation and thermal management.*

The abstract was already submitted for the 9th Transport Research Arena TRA Lisbon 2022 (Figure 30).

9th Transport Research Arena TRA Lisbon 2022, Portugal

Albatross – Carbon neutrality and zero-emission vehicles with smart battery cells

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Abstract

1. Overview and motivation

ALBATROSS is a European Funded project by the European Commission that addresses the needs of European Electric and Hybrid-Electric passenger vehicle market by overcoming driver concerns relating to battery range and anxiety, cost, long-term reliability and excessive charging times.
ALBATROSS will develop an integrated approach based on smart batteries combined with lightweight designs. Using innovative cooling technologies, we will achieve pack temperature range 5-40°C (30-40°C under ultra-fast charging), with <3°C variation between battery cells and optimal operating temperature 20-23°C. The light weighting solutions, based on modular multi-material systems for battery modules and trays, will be fabricated and joined using cutting edge, fast and cost-effective processes, with disassembly, recycling and reuse designed in as a part of an eco-design approach. The modular approach provides solutions for BEVs and PHEVs. The scalability to delivery vans and heavy duty vehicles will be assessed.
Using a BMW i3 passenger vehicle to base the developments on, ALBATROSS will achieve a Peak Energy Density >200Wh/kg, increase driving range to 480km and reduce charging times by 25%. Advanced sensing and control, as a part of a flexible advanced Battery Management System, will be utilised on-vehicle and using the cloud to conduct remote maintenance and troubleshooting ensuring safety even at these high energy densities. Using advanced analytics will enable the State of Health and State of Safety to be continuously and accurately measured. The system will be validated on-vehicle under real world, extreme environmental conditions.
ALBATROSS represents a pan-European EU consortium of world leading organisations that are looking to commercialise these technologies of European origin.

Figure 36 - Abstract submitted at 9th TRA Conference

9. Overall Plan for Communication Activities across the Project

Communication and Dissemination activities represent a very important part of the ALBATROSS project. The communication strategy has been designed to ensure that the commercial impact of the project is not endangered.

Therefore the project results to be communicated will split into:

Publicly available information, that will be widely communicated;

Confidential information, which will not be communicated outside of the consortium.

In addition to communicating the knowledge and results to potential end users, it is intended that all the publicly communicable deliverables will be shared within the scientific and academic communities related to the identified end-users. An overview of communication and

dissemination activities that will be implemented in the course of the project are summarised in Table 1.

Table 1 - Communication and Dissemination activities

Channel	Target audience	Communication activities
General communication activities		
Website	General public	The website already created will communicate up-to-date information relating to the project during and after the project. The website will be promoted as a useful tool for the partners to promote their involvement in ALBATROSS and is linked to partners' website and vice versa.
General marketing activities	General public	Project flyers and posters, which will describe the objectives of the project, will be made available. Press release and newsletter will be produces during the project which will be send to suitable media channels during the project at important stages of success worth disseminating.
Video	General public	1 video already publcished and other pending final editing. Will be more 11 videos to raise awareness of developments and build interest and one final viedo for demonstration activities. Will be made publically available via conduits, e.g. YouTube
Active communication activities		
Publications	End-users, experts and researchers in manufacturing processes and laser sectors	Authorship of papers in peer reviewed journals and trade magazines, promoting the scientific and technical results of the ALBATROSS project.
Conferences, Events and Trade fairs	End-users, experts and researchers in laser-based manufacturing community	Presentation posters/exhibition stands at major international academic conferences for the presentation of the project results and prototype demonstration to potential partners and end users. International academic conferences.
Workshops and seminars	End-users	Research results will be promoted by the organisation workshops, seminars and other dissemination events during which they will present the results of ALBATROSS
Public Open	End-users (e.g. OEM &	OEM and manufacturing partners and relevant sector representatives will be invited to the demonstration day event.

Day	manufacturing partners)	ALBATROSS results will be presented and discussed with industrial experts.
Interactions with related projects and initiatives	General public	Research projects funded by the EC under previous framework programmes that can provide useful input for the technological background of ALBATROSS. Most of the consortium members are currently involved in several EU or national funded projects and the existing liaisons will be used for dissemination.
Training	End-users, experts and students (looking at engaging with the Future Workforce)	Training activities as a part of an educational programme defining objectives, target audiences, training needs and skills. Undertaken as lectures at consortium meetings and distributed to the collaborating partners. Also, the organisation of training workshops (internal and external) will allow a wider dissemination of the project results as well as ensure the exploitation of the results after the end of the project.
Course material	End-user, experts, training schools and Universities	Course material resulting from the project will be gathered and used to be delivered in advanced university courses or vocational education and training (VET) courses, in the form of web-based demos, as well as courses for companies.

10. Conclusions

The communication materials will be very important for the good dissemination and communication of the project results and news. The Digital platforms and tools are more than ever the best ways for the suitable impact through the stakeholders.

The partners will be highly encouraged to provide regular updates and inputs of their work to create interesting news and activities for the relevant stakeholders.