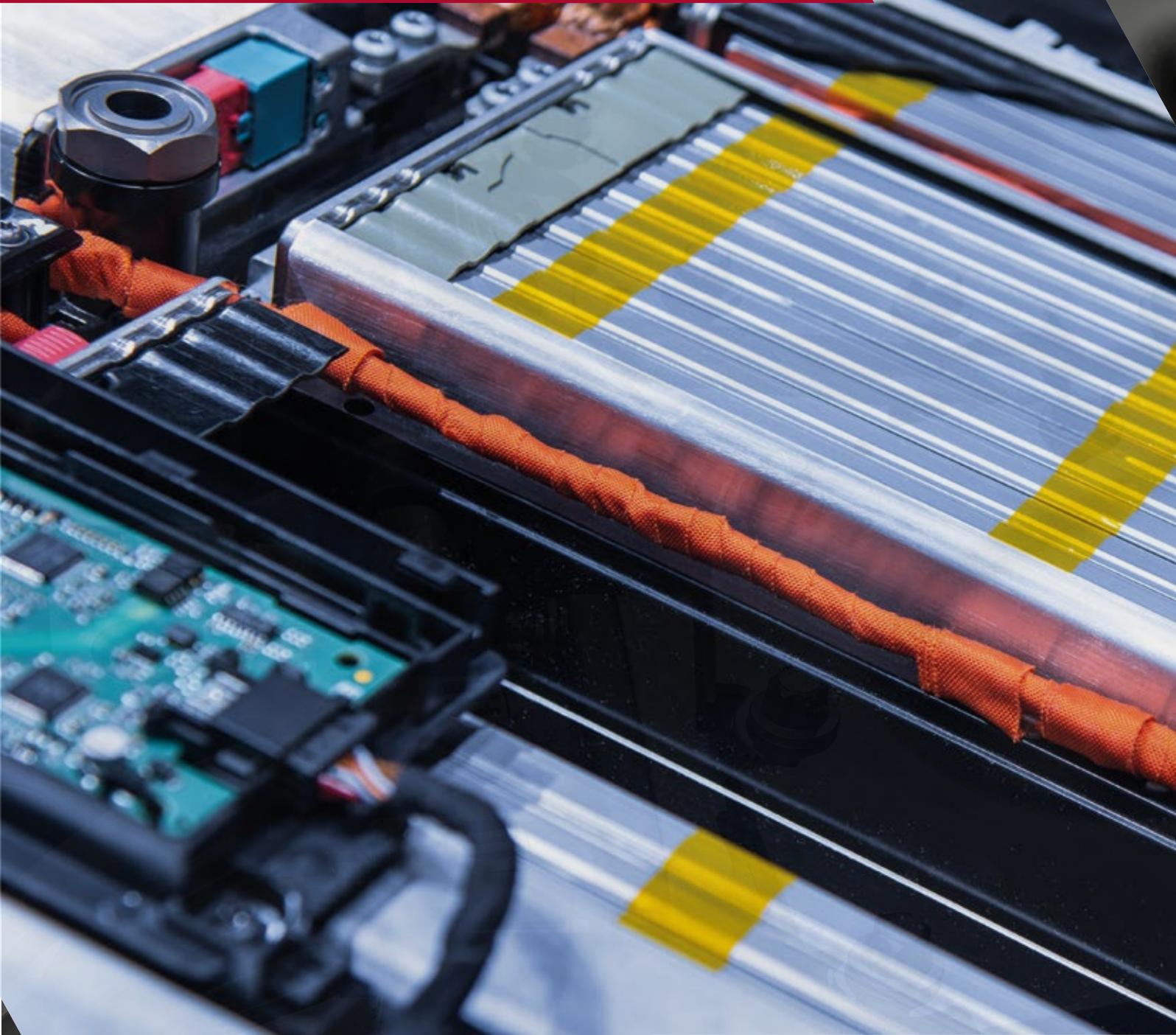


RESEARCH FOR EXTENDING THE LIFECYCLE OF HIGH-VOLTAGE BATTERIES



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INTRODUCTION

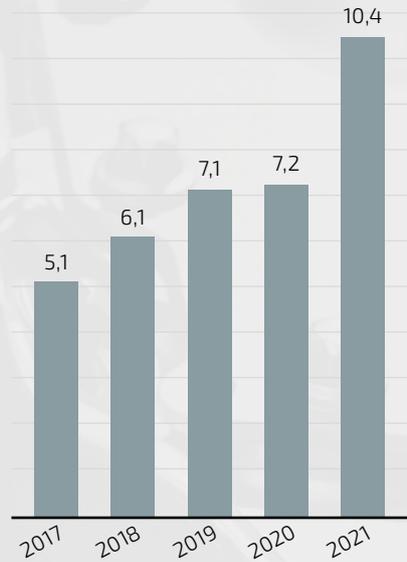
Diagno Finland Oy

Diagno Finland Oy is a leading player in the garage equipment and services sector. It is part of Örum Group, which has a history stretching back almost 100 years old. Örum Oy Ab is an automotive parts wholesaler that serves thousands of multi-brand garages in Finland.

Diagno offers garages across the country a wide range of equipment and services:

- sales of garage equipment
- tool sale and rental
- installation, maintenance and repair of garage equipment
- training
- technical hotline
- competence concepts

Net sales (million euros)



In cooperation with Örum's spare part service, Diagno offers the widest range of services on the market:

ÖRUM	DIAGNO				
Spare parts and components	Garage equipment and tools	Equipment maintenance	Training	Technical support	Concepts
Expanding range and availability, supported by partner networks	Wide range of garage equipment and tools for sale and rental	Life-cycle services for garage equipment: installation, maintenance, repair, etc.	Top-level technical specialists and approx. 3000 person training days / year	Hotline service with top-level technical specialists	Brembo Expert e-Expert Diesel Expert Chains

Diagno has a strong international network

Diagno is part of the Global One Automotive Alliance, a broad international network of companies that support multi-brand garages.

Leading international suppliers



SCHAEFFLER



MAHLE®



BOSCH
Invented for life

An extensive customer base of multi-brand garage chain



Diagno has launched the e-Expert concept, which supports the maintenance and repair of electric and hybrid cars. The over 50 garages that are part of the e-Expert concept have personnel trained in electric vehicle technology as well as up-to-date garage equipment. All servicing and repairs are carried out according to the car manufacturer's instructions, regardless of the brand, thus ensuring that the car's factory warranty remains valid. Diagno is the coordinator

and developer of the e-Expert concept. The company provides ongoing training for e-Expert garages and also ensures that garage equipment is kept up to date. Diagno technicians provide support to garages with any servicing and repair problems that arise, while also writing up instructions for dealing with similar situations. Diagno also helps with locating spare parts and solutions for repairing batteries and other electric car components.

PROJECT

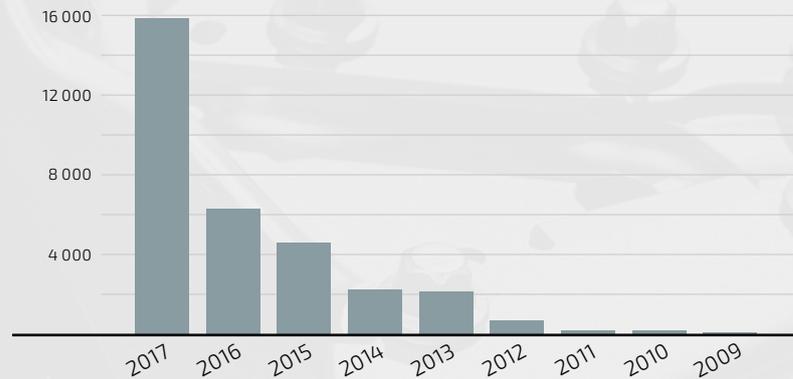
Lack of solutions for extending the lifecycle of high-voltage batteries

The use of electric cars is increasing at a rapid pace, and the challenges connected with electric car batteries will also grow significantly in the coming years. In the near future, we will be seeing explosive growth in the need for Li-Ion battery repairs. The number of Li-Ion battery cars on the road will increase by more than 30% per year over the next decade. The first generation of electric cars are already at the stage where their batteries need repair or replacement but their warranty has expired.

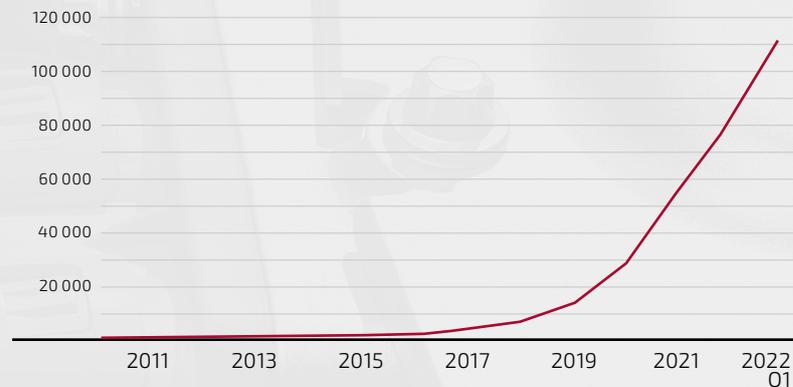
Together with several Finnish and international operators, Diagno mapped out the current situation for high-voltage battery lifecycle management and repair options.

The conclusion was that no international solutions have yet been found for the repair of ageing batteries or for the reuse of batteries that have reached the end of their lifecycle. There are no international operators in the market who specialise in the reuse and repair of batteries and who serve both brand organisations and the independent garage sector.

Plug-in passenger cars aged over 5yrs that are currently in traffic use



Plug-in passenger cars in traffic use as of 30 March 2022



We were able to identify three distinct problems that contribute to this situation:

<p>1. There is a lack of comprehensive instructions and spare parts for battery repairs</p> <ul style="list-style-type: none"> » No spare parts or repair methods are available » The only option is a new battery 	<p>2. Battery replacement and recycling is expensive and problematic</p> <ul style="list-style-type: none"> » Batteries are subject to ADR transport regulations » Handling and transporting damaged batteries is expensive and difficult 	<p>3. Purchase of electric cars is held back by lack of confidence in the technology</p> <ul style="list-style-type: none"> » It is often hard to know the condition of a used battery » Determining the resale value is difficult » Battery warranties normally last only 5–8 years » The average scrappage age in Finland is 21 years
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Objectives of the research project:

The project focuses on the research and development of battery lifecycles and battery recycling. It is divided into three main components:

- Enabling the reuse of batteries as spare parts
- Enabling reuse as repaired batteries
- Enabling the extension of the battery lifecycle by utilising measurement data obtained during use

Project implementation

The research project is managed by Diagno Finland Oy and is being carried out in cooperation with a number of pioneering companies and Finnish higher education institutions. Funding has been obtained from Business Finland's Smart Mobility and Batteries programme, and the project's final report will answer the question of whether it is possible to build battery reuse solutions for vehicle use.

The project was launched in early 2022 and is expected to run for around 15 months.

The steering group for the project consists of Örum Group CEO **Anu Ora**, Örum Light Vehicles Business Director **Rauno Stüff**, and Diagno Finland Oy CEO **Juha Seppälä**. The project manager is Diagno Finland Oy's Chief Operating Officer **Frans Malmari**.

CONTACT DETAILS

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