



INNOVÁCIÓS ÉS TECHNOLÓGIAI  
MINISZTERIUM



# National Battery Industry Strategy 2030



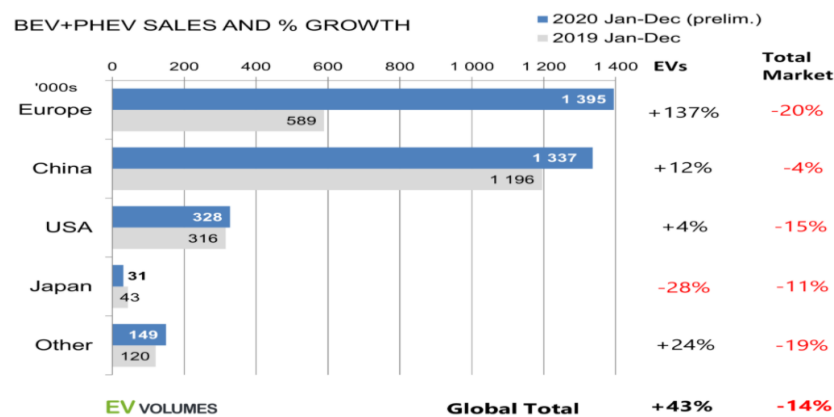
FELADATUNK A JÖVŐ

## Situation analysis

The rapid and increasingly widespread use of electricity generated with gradually decreasing carbon emissions plays an important role in achieving Hungary's climate policy goals. Sustainable batteries will play a key role in meeting the growing demand for electricity consumption.

Although environmental and climate impacts are perhaps the most apparent factors in sustainable battery production, it is also necessary to consider additional economic (e.g., reliable supply of raw materials, development of new circular business models etc.) and social (e.g., access to education etc.) aspects of sustainability in order to make the battery value chain truly sustainable.

We have reached a turning point of the growth cycle in the European electric vehicle market: while a total of 31% increase has been observed in Europe as a whole over the last 5 years, growth of 45-50% is forecast for the next 5 years - projected on a higher base. Logically, this also means a significant increase in demand for batteries and battery parts<sup>1</sup>.



Sales of electric vehicles in 2019 and 2020  
Source: Transport and Environment; EV Volumes

The recent significant decline in battery prices and the improvement in energy density have created new opportunities for battery-powered vehicles in all areas of transport. Nowadays, the use of electric vehicles, from downtown motorized scooters to heavy-duty long-distance trucks, is increasingly coming to the fore. Many companies, such as Tesla<sup>2</sup>, Volvo<sup>3</sup> or Scania<sup>4</sup>, have announced **the production of partially or fully electrically driven heavy-duty trucks**. The Swedish truck manufacturer Scania estimates that electric vehicles will account for about 10% of total vehicle sales by 2025, while by 2030 this proportion could reach 50%.

<sup>1</sup> Preliminary market surveys based on the UBS study of 2017 projected both a market turning point and rapid progress in contrast to, for example, "standard" scenarios by the International Energy Agency (IEA). The most optimistic forecast of the UBS study predicted sales of 24.2 million electric vehicles in 2025 (equivalent to a rate of 23% worldwide), in which case electric vehicles would become the most important means of transport in Europe by 2025.

<sup>2</sup> <https://www.tesla.com/cybertruck>

<sup>3</sup> <https://www.volvo Trucks.com/en-en/trucks/alternative-fuels/electric-trucks.html>

<sup>4</sup> <https://www.scania.com/group/en/home/products-and-services/trucks/battery-electric-truck.html>

The first network storage facility in Hungary was installed by E.On in 2018 followed shortly by Alteo with 3.92 MWh and ELMŰ (Innogy) with 6 MWh (6 MW + 8 MW capacity). Currently, the total capacity of the storage units applied in the primary Hungarian regulatory market is 28 MW. MVM plans to install 5 MW of capacity by 2022, which intends to increase up to 100 MW in the medium term, making them the largest network storage service provider in the region.

Global battery cell production is projected to reach 2,340 GWh by 2025, which is expected to increase further. The favourable market vision and the increased demand for battery cells are adequately reflected by the increase in the European battery production capacity. **Today, Hungary and Germany are the main targets for investments in battery production in Europe.**

The increased demand for batteries is reflected in the growing demand for battery raw materials. For example, compared to 2021, demand for lithium is expected to jump elevenfold by 2030, causing the supply-demand deficit to reach half of the estimated market volume of 2030. In view of this as well, European operators have started to invest in building out mining capacity. In Europe, lithium occurs in two forms:

1. in rocks that can be mined in the Iberian Peninsula, and in Northern- and Central-Europe, and
2. in lithium-rich geothermal deposits mainly in Germany along the Rhine (Rheingraben) and in Hungary.

Studies carried out by MOL show that **Hungary may have lithium-rich geothermal deposits, thus, in the future, it may be able to meet at least domestic demand and play a role in the production of quality raw materials suitable for battery production.**

Several procedures are currently being developed to exploit geothermal deposits, which process will accelerate in the near future in view of the growing demand for lithium. In addition, **the exploitation of geothermal deposits is much more favourable from an environmental and climate protection point of view** than other lithium mining technologies: for example, greenhouse gas emissions from mining of the mentioned rocks are 15 tons per 1 ton of lithium extracted, whereas geothermal extraction has practically no greenhouse gas emissions. The industrial water demand of mining is 50 times higher than the value of geothermal extraction.

The investment cost of mining in Hungary is significantly reduced by the fact that lithium can be extracted from the water of abandoned oil wells, so there is no need to drill new wells. The only downside to geothermal extraction is that the extraction results in lithium carbonate instead of lithium hydroxide, which is common in battery manufacturing, so an additional conversion process will be required before practical use.

If the planned giga factories start operating, the need to recycle the industrial waste generated in all areas of the production process will increase. As we are expecting a vast amount of production, the volume of waste will also be significant. **Ensuring access to recycling technologies is therefore essential.**

**An alternative option is to create a material circulation system overall Europe.** Increased energy density of batteries as well as more efficient control systems lead to resource efficiency as they require less metal to maintain functions. The challenges facing the industry are also related to the collection of batteries. The few car batteries currently at the end of their life cycle usually remain in the system one way or another, nonetheless the importance of collecting systems is growing due to the rapidly increasing production capacity and sales volume.

**We can consider the recycling system of conventional batteries and accumulators successfully applied in Hungary as a good practice,** which provides a suitable solution from the collection of batteries through transport to recycling.

## Prerequisites for a sustainable battery value chain in Hungary

**Hungary is ideally located on the European battery map,** thanks to its central geographical location, investments in cell and battery production facilities, the presence of large car manufacturers and its extensive supplier industry. **To maintain and strengthen this position, a qualitative leap is required: it is necessary to switch from the product “manufactured in Hungary” to the products “developed in Hungary”.**

In 2020, the Government of Hungary adopted its energy and climate policy targets to be achieved by 2030 and 2050. In line with the decisions of the European Council, Hungary has committed to reduce its greenhouse gas emissions by 55% by 2030 and to achieve climate neutrality (the lack of net emissions) together with other EU member states by 2050.

In this context, the National Energy Strategy and the National Energy and Climate Action Plan detail the process of decarbonisation of electricity production, as well as the goals to be achieved in other sectors, especially in the field of transport and energy consumption of buildings. In a separate chapter, the National Energy Strategy discusses the key issues of energy innovation and emphasizes the promotion of new solutions that ensure the energy storage essential for network stability. The Strategy also covers the integration of electric vehicles into the electricity grid (smart charging, “vehicle-to-grid” technologies).

In 2015, Hungary was one of the first EU member states to create its national electromobility strategy, the Jedlik Ányos Plan. The preparation for electromobility was made necessary by the fact that the automotive industry is a strategic sector of the Hungarian national economy, as it accounts for 14% of the gross domestic product and 21% of the export. There are 740 companies operating in Hungary along the automotive value chain, and approximately 175,000 jobs are related to the sector.

In 2016, Hungary outlined the National Policy Framework for the construction of alternative fuels infrastructure. The objectives of this “realistic scenario” included the placing of 21,000 domestic electric passenger cars on the market by 2020 and the creation of 2,100 public charging stations. The **first objective was met**, as the number of electric vehicles already exceeded 25,000 in December 2020, while the number of public charging stations began to

stagnate after an initial rapid rise. At the end of 2020, 1,320 charging terminals were operating in the country.

**EU strategies for low-emission mobility have increasingly encouraged the automotive industry to the transition to environmentally friendly electric powertrain technologies.**

As a result of the regulation, the production of electric vehicles and parts was also started in the car factories operating in Hungary. The Audi plant in Győr started the production of electric engines in 2018, while the Mercedes production plant in Kecskemét started assembling the CLA plug-in hybrid model in 2020. BMW is also planning to produce the latest purely electric models at its production plant being built in Debrecen.

After Germany, **Hungary is one of the largest centres of lithium-ion battery production in Europe.**<sup>5</sup>

Today, Samsung SDI and SKI Innovation operate several giant factories in Hungary, whose total production will potentially grow to 47.3 GWh by 2025 and up to 87.3 GWh by 2030. GS Yuasa also produces automotive lithium-ion starter batteries, while Inzi Control also manufactures battery modules. Many of the significant suppliers of the battery industry in Hungary are located directly near the main car manufacturing plants.

Since 2016, a total of **HUF 1,903.8 billion (EUR 5.29 billion) and approximately 13,757 jobs have been created as a result of working capital investments in the battery industry.**

Technological ideas for energy storage were discussed by the Energy Innovation Council, an expert platform set up by the Ministry for Innovation and Technology. The body also made proposals to create a regulatory environment conducive to energy innovation in line with the forthcoming energy strategy. Within the framework of the pilot projects proposed by the Council, battery technology has been launched to help ensure network balance and the introduction of flexible services. The 2021 plans include providing support for innovation projects for battery electric energy storage.

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<sup>5</sup> For example, in the field of battery cells, Hungary had the largest production capacity in the EU in 2017: [https://ec.europa.eu/jrc/sites/jrcsh/files/jrc114616\\_li-ion\\_batteries\\_two-pager\\_final.pdf](https://ec.europa.eu/jrc/sites/jrcsh/files/jrc114616_li-ion_batteries_two-pager_final.pdf)

## Vision and objectives

Based on the situation analysis presented above, the vision of the Strategy, which takes the form of a long-term concept, is to **support the establishment of a Hungarian battery value chain based on high value-added services and production in Hungary, as well as a joint value creation by international and national operators**. The strategy is committed to an environmentally and socially sustainable battery production, embedded in the European ecosystem.

The development of sustainable battery production, while achieving climate policy goals, enables the creation of a competitive industrial sector, thus contributing to national value generation and the creation of high-value jobs. We achieve the vision through 6 objectives:

- 1. Contribute to the decarbonisation of transport through the widespread use of batteries** and the provision of adequate electricity storage capacity for the use of renewable energy sources

Sustainable solutions for battery use in the energy supply, transportation and industrial sectors.

- 2. Creating a competitive and sustainable battery value chain in Hungary**

Establishing a strong market network through measures covering all areas of the battery value chain with the participation of Hungarian operators.

- 3. Ensuring a competitive advantage by creating a strong Hungarian R&D&I capacity**

Putting research and development to the forefront within the Hungarian battery value chain, at the same time contributing to the improvement of Hungary's innovation performance achieved at the European level.

- 4. Meeting the labour needs in the battery value chain**

A strong and skilled workforce is needed in the battery value chain to maintain and develop employment opportunities in the transition to an electricity-based and digital society.

- 5. Battery raw materials in the cycle of a sustainable economy and industry**

The extraction, recycling and multiple (re)-use of raw materials for battery production will create value and business opportunities in the transition to a sustainable and circular economy.

- 6. Strengthening international co-operation**

The development of strategic partnerships as well as national and regional co-operation will create a Hungarian battery cluster with strong positions in the European battery value chain.

## Action plan

TARGETS	PROCESSES	MEASURES
DECARBONISATION OF TRANSPORT AND THE TRANSFORMATION OF ENERGY SUPPLY THROUGH THE USE OF BATTERIES AND THE INCREASE OF THE LEVEL OF ELECTRIFICATION	Developing and implementing sustainable market solutions for battery use in the energy, the energy supply, the transport and the industrial sectors, in line with EU climate targets	<ul style="list-style-type: none"> <li>- Provide a national regulatory framework based on regulation at EU level to create new business opportunities</li> <li>- Assisting the decarbonisation processes of the transport sectors</li> <li>- Creating market and regulatory conditions conducive to the use of batteries in electricity supply</li> <li>- Boosting the use of fixed energy storage equipment (market related measures)</li> <li>- Increasing the added value of the Hungarian processing industry</li> <li>- Creating the conditions for the integration of direct capital investments into the Hungarian ecosystem</li> <li>- Developing financial tools to support sustainable technologies for innovative and clean technology companies in the battery value chain</li> <li>- Creating incentives to finance sustainable investments</li> </ul>
A COMPETITIVE AND SUSTAINABLE BATTERY VALUE CHAIN IN HUNGARY	Supporting developments of Hungarian interest covering different areas of the battery value chain	
COMPETITIVE ADVANTAGE THROUGH STRENGTHENING HUNGARIAN RESEARCH AND INNOVATION CAPACITIES	Focus on research and development	<ul style="list-style-type: none"> <li>- Strengthening battery innovation activities</li> <li>- Strengthening co-operation between universities, research institutes and industry</li> </ul>
MEETING THE LABOUR NEEDS IN THE BATTERY VALUE CHAIN	Develop and strengthen a skilled workforce in the battery value chain sectors	<ul style="list-style-type: none"> <li>- Expand the quantity and improve the quality of research and education on batteries</li> <li>- Raising social awareness</li> <li>- Financial support for workforce training along the entire value chain</li> </ul>
BATTERY RAW MATERIALS IN AN INDUSTRY WITH A SUSTAINABLE AND CIRCULAR ECONOMY	Providing access to raw materials for the manufacture of batteries through extraction, recycling and multiple (re)-use	<ul style="list-style-type: none"> <li>- Establishment of projects for the extraction of raw materials from domestic mining and recycling</li> <li>- Creating projects for the entire value chain</li> <li>- Supporting the multiple (re)-use and recycling of batteries to increase the material cycle rate</li> </ul>
STRENGTHENING INTERNATIONAL CO-OPERATION	Promoting national and regional co-operation	<ul style="list-style-type: none"> <li>- Implement and follow up proposals for action across the battery value chain based on wide-ranging collaboration</li> <li>- Strengthening Hungary's position in the European co-operation on batteries</li> <li>- Active co-operation within the European networks</li> </ul>



The following major projects will be given priority in the implementation of the measures:

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**Extraction of lithium from domestic geothermal assets**

In order to meet the exponentially growing demand for lithium in battery production, in addition to the expected efficiency improvement of conventional technologies and the gradual development of recycling technologies, it is necessary to extract non-conventional lithium sources. The mapping of Hungary's lithium assets and the establishment of responsible lithium extraction with low greenhouse gas emissions can play a key role in strengthening Hungary's battery industry.

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**Recycling of batteries**

For used batteries or packs, creation of recycling possibilities, cell diagnostics, utilization of used batteries with a capacity of 60-80% in other functions, and the recovery of battery materials and the validation of recycled materials and their returnability to component production. From the point of view of domestic industrial development, domestic R&D and enterprise development opportunities for component development and high value-added technology products receive special attention in the following areas in particular:

- development of battery analysis technologies,
- development of digital technologies for battery data sharing (“battery passport”),
- development of a battery design that facilitates disassembly and automated replacement of modules,
- mapping recycling opportunities, developing innovative recycling technologies,
- development of technologies for the recovery of raw materials from spent batteries, and
- developing practices for the disposal, collection and logistics of used batteries.

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**Participation of batteries in electricity market regulation**

Flexibility solutions for the network integration of decentralized, weather- and time-dependent renewable based generation will play a key role in the decarbonisation of the electricity sector. The project aims to develop and disseminate network storage solutions mainly in the following areas:

- the inclusion in the regulation of battery energy storage facilities installed next to the grid, renewable producers and large consumers,



- testing systems based on the interoperability of batteries of different technologies and other energy storage technologies (e.g., supercapacitors),
- increasing the efficiency of cross-border electricity trade, preparing aggregation projects, developing business models involving renewable producers, energy storage and consumers with flexible demand.

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**Battery development in the area of electromobility**

Increasing the capabilities to produce and control electric vehicle batteries can ensure the preservation of Hungary's role in the transformation of European car production along climate protection aspects, which is a key economic development interest given the weight of the sector. The project covers, among other things, the further training of those working in the sector, the use of the potential of shared electromobility (batteries specifically designed for electric fleets) and the development of V1G (smart charging) and V2G (grid balancing) technologies.

Presentation of the directions of intervention:

***1. Decarbonisation of transport and energy supply through the use of batteries and increased rate of electrification***

The following measures will help to achieve the first strategic objective:

*Measure 1.1: Provide a national regulatory framework based on regulation at EU level to create new business opportunities*

Hungary's expertise in the user segment of the value chain can be applied in the following areas (non-exhaustive list): definition of performance criteria; digital passports and interconnected data fields; battery recycling processes for the recovery of certain precious metals. The aim is to create the appropriate national legal environment as soon as possible.

*Measure 1.2: Securing the decarbonisation processes of the transport sectors*

Nowadays, the use of electric vehicles, from downtown motorized scooters to heavy-duty long-distance trucks, transport is increasingly coming to the fore in all its forms. Original Equipment Manufacturer (hereinafter referred to as: OEM) most of them today focus on battery electric vehicles. This trend is encouraged by a number of European countries through various types of measures (direct purchase support, tax reliefs, low corporate taxes, free use of bus lanes, parking discounts etc.). Through the mentioned measures, sales of electric vehicles have boomed and Europe has become the vanguard of change.

The trend of electrification is not only in the case of cars, but also of trucks, as OEMs are increasingly preparing to introduce models of electric battery-powered vehicles in Europe as well as worldwide. A prerequisite for accelerating the transition to battery-powered trucks is

access to high-performance charging points, which is not primarily a matter of technological development. It is necessary to specify with what the improvement of the infrastructure of the charging stations can be incited. In determining this, the objectives of the Hungarian National Hydrogen Strategy must also be taken into account, the 2 processes can complement each other during the transition to a green economy.

*Measure 1.3: Creating market and regulatory conditions conducive to the use of batteries in electricity supply (regulatory intervention)*

*Measure 1.4: Boosting the use of fixed energy storage equipment (Market related measures)*

In order to integrate renewable energy production into the system, it is essential to ensure the sustainable operation of energy supply systems, one of the most efficient means of which is the fixed-installed battery. In this way, not only distribution companies but also users, as active consumers, can participate in supporting the operation of the system.

The availability of large amounts of green energy, which is typically demanded by industry in a concentrated manner, can be achieved through grid-installed batteries and distributed generation capacity. In the market competition, the use of batteries is increasingly complemented by energy community business models with the participation of renewable producers, consumers, traders and service providers. These models seek to control the extent and time of production and consumption within the community, partly through energy storage and partly through business relationships, in such a way that their operation is economically sustainable with an uninterrupted energy supply.

## ***2. A competitive and sustainable battery value chain in Hungary***

Supporting national developments covering different areas of the battery value chain to ensure balanced battery value chain operation. With increased integration, good growth prospects can be achieved for Hungarian operators in all parts of the value chain.

*Measure 2.1: Increasing the added value of the Hungarian processing industry*

*Measure 2.2: Creating the conditions for the integration of direct capital investments into the Hungarian ecosystem*

The amount and size of foreign direct investment received in Hungary is also remarkable internationally. The number of jobs affected by these investments alone reaches 7.86% of the total number of employees in the domestic automotive industry. Thus, supply chains covering a significant part of the battery value chain are settling down, and the domestic processing industry is forced to adapt to the situation and connect to the value chain with parts not yet covered by these suppliers. To this day, only a small number of domestic enterprises have managed to get involved in the battery industry value chains.

Foreign working capital investments came in the early stages of the battery industry, therefore, by creating the right industrial and economic environment, there is a good chance that domestic suppliers will be involved in the value chains at this early stage, and will be able to participate in production processes with higher value-added work.

*Measure 2.3: Develop financial tools to support sustainable technologies for innovative clean technology companies in the battery value chain*

*Measure 2.4: Creating incentives to finance sustainable investment*

Sustainability and climate innovation are still considered risky investments. The risk-sharing model, in which climate-conscious companies can access larger but attractive loans on the money market through public risk-sharing, aims to increase investment in green and climate-friendly projects.

*Measure 2.5: Placing the energy needs of the battery industry on a renewable funds*

Based on some international calculations,<sup>6</sup> the current annual energy demand of domestic battery factories can be estimated at 5.7 to 8.6 PJ, while this demand could increase to 13.1 PJ in the next 3-5 years. The main source of green energy for this may be the expanding solar energy production. The capacity of the currently operating battery plants can be served by a solar power plant with an installed capacity of at least 1,500 MWp, which is about 75% of the total current domestic solar power plant capacities. If we want to supply the battery production plants that will be in production in the future entirely with solar energy, then in 3-5 years, the green energy demand of domestic battery production alone, without suppliers, can only be met by about 3,300 MWp of solar power plant capacity. This value exceeds 50% of the total solar power plant capacity planned to be commissioned in Hungary by 2030.

### ***3. Competitive advantage through strengthening Hungarian research and innovation capacities***

Focus on research and development in order to create a competitive Hungarian battery value chain. Co-operation between universities and businesses will improve the competitiveness of the sector and lay the groundwork for faster market penetration of innovative ideas and products.

*Measure 3.1: Strengthening battery innovation activities*

*Measure 3.2: Strengthening co-operation between universities, research institutes and industry*

Positive examples of close collaboration between industry and research are provided by geographical proximity. Several such international good practices can be mentioned. Volkswagen's Centre of Excellence will be built near the planned giant plant, and CATL's research institute, CATT, along with the Fraunhofer Institute, is located near the battery production site. The Swedish company Northvolt provides another example of how a closer co-operation with an industrial facility can have a positive, spill-over effect on surrounding ecosystems. Northvolt has two sites: Northvolt Labs, a laboratory in Västerås in southern Sweden and Northvolt Ett (manufacturing plant) in Skellefteå in northern Sweden. Västerås is the centre of Sweden's electrical engineering processing industry. The opening of the

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<sup>6</sup> <https://amosbbatto.wordpress.com/2017/07/05/emissions-from-gigafactory/>

Northvolt site in Västerås has created a brand new innovation environment that connects enterprises, the local university and the emerging market of startups.

In Skellefteå, Northvolt has a huge area to build the giant production site, which will be able to employ up to 3,000 people, which will have a clear impact on the development of the city of Skellefteå. The local government of Skellefteå has used this opportunity to promote the rapid development of the area. Some examples are: the construction of new (“sustainable and green”) industrial areas alongside the Northvolt facility for high-tech suppliers; the creation of a green (electricity-based) port, the creation of the first airport in Sweden for receiving electric flights; and launching a number of smart city projects to serve the needs of the residents who settle.

A similar good practice is the establishment of the MOL-PE Circular Economy Science Park Nonprofit Zrt. (Circular Economy Science and Innovation Park), which is jointly owned by Mol and the University of Pannonia, and aims to establish a European-scale circular economic innovation and research center in Nagykanizsa, building on the knowledge base of the University of Pannonia and MOL’s management and professional knowledge. The planned research and development and utilization projects aim at the development of circular technologies and products. They focus on, among other things, circular waste management, renewable energies such as the hydrogen economy, battery recycling, carbon dioxide utilization and sustainable water management.

The research, pilot and testing platforms and the design of environments are tailored to the ever-changing needs of industries and end-users. The transition to an electricity-based and digitised society increases the need for innovative and multidisciplinary research, which, for example, coordinates research in the energy industry and the information and communication technology industry with research in the battery and electrification industries.

A closer co-operation with European research initiatives (e.g., the Batteries Europe Technology and Innovation Platform, Batteries 2030+, the European Battery Association Battery Partnership Agreement within Horizon Europe) will allow the Hungarian research community to be in line with the long-term objectives set at European level.

#### ***4. Meeting the labour needs in the battery value chain***

Develop and strengthen a skilled workforce in the battery value chain sectors. **Access to skilled labour is currently one of the pitfalls in the battery value chain.** The transition to electric vehicles and industrial equipment requires new skills. Meeting the high labour demand requires both a significant expansion of undergraduate education and the creation of the possibility of re-skilling in the workplace. There is also a need for professional further training and skills development for teachers in youth education and adult training. Lecturers need to be provided with new knowledge not only in the field of batteries, but also in artificial intelligence, manufacturing technologies, controlled design, recycling, and an environmentally friendly worldview.

It may be beneficial for Hungary if the education and further training programmes currently being developed at EU level, covering the entire battery value chain (e.g. the ALBATTs project)<sup>7</sup>, are transposed in a way that meets Hungarian conditions. This includes vocational grammar schools, vocational training, higher education and access to other EU initiatives. It is also necessary to bridge inequalities between skills.

*Measure 4.1: Expand the quantity and improve the quality of research and education on batteries*

*Measure 4.2: Raising social awareness*

*Measure 4.3: Financial support for workforce training along the entire value chain*

With regard to education and workforce training, the Hungarian market requires immediate action. By the time the strategy was developed, all European car manufacturers appearing in Hungary had already announced a partial or complete switch to electric vehicles. Half of the approximately 175,000 people working in this automotive industry will be affected in some way. We estimate that about 40,000 of them will need to be re-skilled by the end of 2025.

For example, the EBA Academy Platform<sup>8</sup> was set up on this initiative, the aim of which is for the professionals of Hungarian educational enterprises to acquire the knowledge of re-skilling and for domestic companies to carry out the re-skilling in Hungary. This is an opportunity for domestic adult education institutions to acquire lasting competencies that can support the adult education needs of this growing industry beyond 2025 in the long run.

### ***5. Battery raw materials in a sustainable and circular economy-oriented industry***

Providing access to raw materials for the manufacture of batteries through mining, recycling and multiple (re)-use.

*Measure 5.1: Establishment of priority projects for the extraction of raw materials from domestic mining and recycling*

*Measure 5.2: Creating priority projects for the entire value chain*

*Measure 5.3: Supporting the multiple (re)-use and recycling of batteries to increase the material cycle rate*

Without its own production of the necessary metals and minerals, Europe will remain sensitive to changes in global trade. The multiple (re) use and recycling of raw materials is an important factor in the development of both a sustainable battery value chain and a circular economy. The much higher level of material recovery than at present and an increase in the proportion of raw materials extracted and processed in Europe will also help Europe to reduce its dependence on imports. Hungary is in an excellent position to develop raw material production capacities through access to primary raw materials, but especially through recycling capacities, including projects for the processing of waste from battery production.

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<sup>7</sup> Alliance for batteries technology, training and skills (ALBATTs): <https://www.project-albatts.eu/en/home>  
[https://ec.europa.eu/commission/presscorner/detail/%20nl/speech\\_21\\_1142](https://ec.europa.eu/commission/presscorner/detail/%20nl/speech_21_1142)

<sup>8</sup> [https://ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_21\\_1142](https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_21_1142)

Hungary has the opportunity to exploit the geothermal brines of the Pannonian Basin for lithium extraction and to develop lithium production processes with low carbon dioxide emissions. **The current battery production facilities in Hungary, together with the growing number of end-of-life electric vehicles, offer good opportunities to develop innovative and sustainable recycling processes of the valuable battery materials.**

#### ***6. Strengthening international co-operation***

Promoting national and regional co-operation to strengthen the role of the European battery value chain.

It is of the utmost importance that action proposals are implemented and monitored through broad industry co-operation.

*Measure 6.1: Application and follow-up of action proposals through extensive collaboration along the battery value chain*

Once one of the addressees of the measure was established, the Hungarian Battery Association could continue coordination and dialogue between stakeholders along the entire value chain, monitor and continuously update the action plan.

*Measure 6.2: Strengthening Hungary's position in the European co-operation on battery*

*Measure 6.3: Active co-operation within the European networks*