THE BIG PICTURE

Europe ramps up development of local EV battery sector in race to zero emissions

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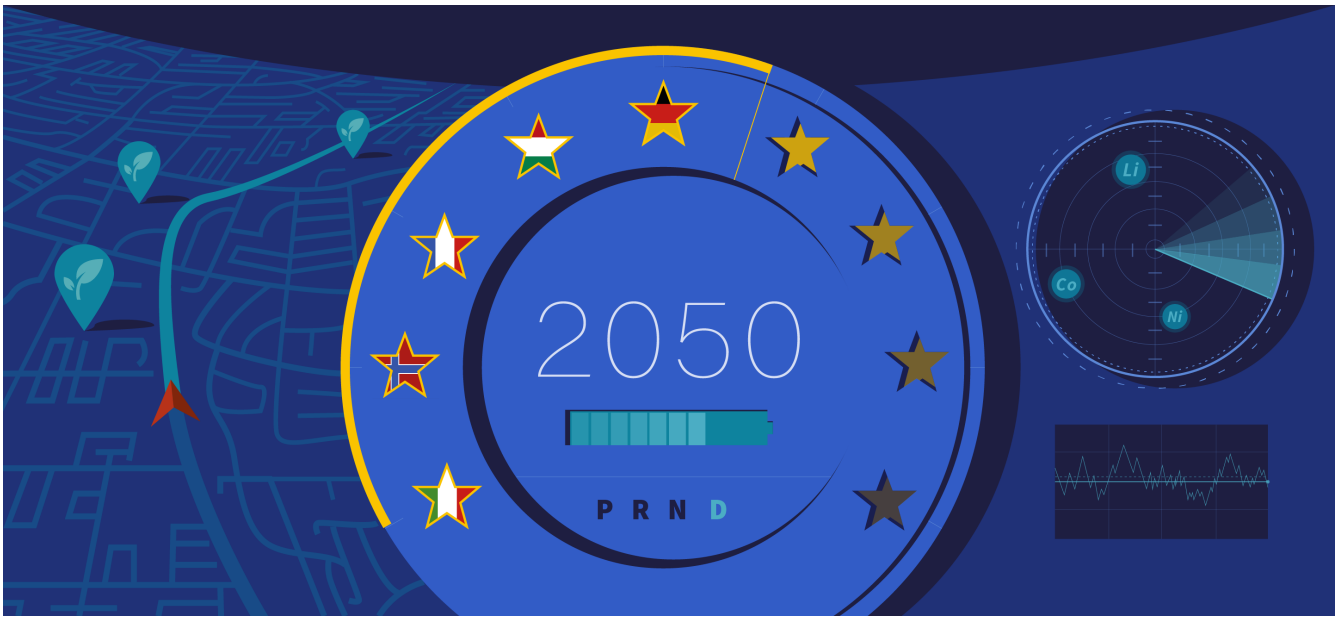

By Ouyang Shiyao ©CompassList

Startups, automakers jostle or unite to ride the fast-growing EV battery market, as the EU pumps billions into developing its own value chain, to cut reliance on imports

Several years behind its Asian competitors, the development of Europe's EV battery cell industry is at last gathering pace. Spurred by the EU's Covid economic recovery stimulus spending and net-zero emission targets, a slew of gigafactory projects has been announced in the past 18 months. Pure battery players and automakers, both local and foreign, are in the fray, setting up a race for clients, market share and crucial raw materials.

Last year, EV sales in Europe rose despite Covid-19 and the automotive sector's overall downturn because of policy weighted in favor of EVs, deemed "increasingly important to meet the [bloc's emission] targets," the International Energy Agency said in its **Global EV Outlook** 2021.

Under the EU's commitment to achieving net-zero greenhouse gas emissions by 2050 and the €1tn Green Deal put **forward** by the European Commission in July last year, the average emissions of new cars will be required to come down by 55% from 2030 and 100% from 2035, compared with 2021 levels.

This effectively means that the EU will accept only zero-emission new cars from 2035, **with** around 70% of all vehicles – cars, trucks, buses and others – expected to be electric by 2040. By comparison, there were nearly 1.33m **registrations** of new electric cars in Europe in 2020, just 11% of total new car registrations, an indication of the room for growth.

With more EVs expected on the road, consulting firm McKinsey **forecasts** battery demand in the EU will reach 1,200Gwh by 2040, which would support 80 gigafactories with an average output of 15Gwh per year. To date, there are plans to build up to 38 gigafactories worth total investments of €40bn on the continent, with an estimated total output of 1,000Gwh in 2030, **according** to clean energy NGO Transport and Environment.

Of these, several gigafactories are set to begin production next year. But first, all eyes are on Tesla's first facility in Europe: the gigafactory in Gruenheide, Brandenburg, near Berlin, will start making battery cells and its Model Y vehicles this month. Tesla, the world's largest EV maker which also coined the term gigafactory, lays claim to Europe's **top-selling** EV in the Model 3 and is currently Europe's **EV market leader** in terms of sales, closely followed by Germany's Volkswagen. France's Renault, Skoda from the Czech Republic, and South Korea's Hyundai complete the top five.

Asian players so far

Among European automakers, Volkswagen plans to build **six** gigafactories in Europe, including one in Spain in partnership with Seat. Automotive Cells Company (ACC), a joint

venture including Saft (Total), French multinational automotive group Stellantis (Peugeot, Citroen, DS, Opel and Vauxhall) and German manufacturer Opel, has plans for two gigafatories in France and Germany.

To these projects add those from ambitious startups – pure battery players Verkor, which plans to start pilot production at its first plant in southwest France next year, and Sweden's NorthVolt, whose planned gigafactories in Sweden and Germany are set to deliver a combined annual output capacity of 150Gwh by 2030.

"The market is very recent in Europe. Samsung and LG Chem [since renamed LG Energy Solution] started operating the first large factories in 2018. In 2020, the total output was 32Gwh a year in production capacity," Baptiste Possémé, Senior Consultant, Clean Tech Unit, at Enerdata, an energy market research and consultancy firm, told CompassList in a recent interview.

"An important aspect in the development of Europe compared to Asia is that [Europe's] current capacity is essentially being delivered by Asian players such as LG, Samsung and AESC [a JV between Nissan Motor, NEC Corp and NEC Tokin]."

Securing the supply chain

Nevertheless, Possémé predicts some EU projects will struggle to see the light of day, given that the capacity announced so far exceeds that of the market forecast for EVs in Europe.

"There is a real dynamic, but it is important to understand that within [the planned projects] not all are at the same stage of development," he said. "If you look at the announcements [of gigafactory projects] so far, they amount to a capacity of around 500-550Gwh in 2028.

"That is enough to power 10m passenger cars (aside from stationary storage, heavy vehicles, etc.), which is about the number of new cars sold each year in Europe, and the [gigafactory] production is likely to double by 2030. So, there will certainly be some losers in the race."

Verkor CEO and co-founder Benoit Lemaignan is more optimistic. "In Europe alone, the market will probably be exceeding 1,000Gwh of capacity needs, or production needs, in

2030. This will be in our eighth year of production. So, it's a lot and we are nowhere near that in terms of [total] deployed production or intended capacity. We think that any capacity available will be outsold," he said in a recent interview.

Key to success for gigafactory pure players like Northvolt, Verkor and Britishvolt will be winning firm orders for battery cells from car manufacturers, and securing the supply of key raw materials – most of which are currently imported.

"We have a challenge because Europe has limited quantities of the materials that we need for battery making. We need long-term partnerships with players from all over the world [for our raw materials]," Lemaignan said. Verkor is in a strategic partnership with Renault, its first customer, to secure raw materials and drive industrial development.

BritishVolt, which earlier this year was valued at $1bn as it raised a $70m Series B round from strategic investors including mining group Glencore, is **reported** to have signed up customers for two-thirds of its initial 10Gwh capacity. It has also **signed** a deal with Glencore for the strategic supply of cobalt.

Key Gigafactory Projects in the EU and UK

COUNTRY	COMPANY NAME (where company is not European-owned, have specified)	PRODUCTION START YEAR	PROJECTED MAXIMUM ANNUAL PRODUCTION CAPACITY (GWH)
Germany	Microvast (US)	1Q 2021	1.5–6
	Tesla (US)	Dec 2021	40
	CATL (China)	2022	14
	Farasis (China)	2022	16
	Svolt (China)	2023	24
	Varta	2024	10
	ACC	2025	8–24
Hungary	Samsung SDI (South Korea)	2018	40
	SK Innovation (South Korea): 3 gigafactories	2019, 2022, 2028	Total 50Gwh approx.
Norway	Freyr	2023	45
	Beyonder	2024	10
	Morrow	2024	32
France	Verkor	2022	16–50
	ACC	2023	8–24
Italy	Faam	2024	7–8Gwh scalable
	Italvolt	2024	45
Spain	Phi4Tech	2025	10
	Volkswagen, Seat and Iberdrola	2025	40
UK	BritishVolt	2023	10–30
	Envision AESC (Japan)		35 (extension of Nissan manufacturing capacity at Sunderland plant)
Poland	LG Energy Solution (South Korea)	2018	65
Slovakia	InoBat	2024	10
Sweden	Northvolt	2021	40 (Plus 2nd EU factory announced in partnership with Volvo)

Sources: CIC energiGune, PV Magazine, Xataka, Hipertextual

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China-dependent

The question of securing the supply of raw materials for the European industry has been a major focus for Europe since 2011, when it established the European Raw Materials Alliance (ERMA) in the wake of Chinese moves to **block** exports of nine key raw materials. A 2020 **report** by Benchmark Mineral Intelligence noted that China continues to dominate the chemical production of battery-grade raw materials with 80% of total global output.

Releasing its first Action Plan in September 2021, which is designed to secure access to raw materials for European industry, the ERMA **noted** the EU is “almost fully import dependent” on China for the supply of key raw materials. In July, the EC had **estimated** that, to meet its climate neutrality goals, which rely heavily on e-mobility, the EU would need up to 18 times more lithium by 2030 and five times more cobalt by 2030, rising to 60 times more lithium and 15 times more cobalt by 2050. That’s a **tall order**, considering that Europe is wholly dependent on lithium imports and prices have soared by over 60% since the beginning of the year.

"The [lithium] market is currently rather small, at 80,000 tons produced globally in 2020, and only about 70% of this was battery-capable," Michael Schmidt, an economic geologist at the German Mineral Resources Agency (DERA), said.

In addition to creating a level playing field for EU raw materials versus their foreign competitors, the Action Plan also calls for battery cell manufacturers to “consider” purchasing of materials from local producers, saying the EU and its member states “should pull all financial levers” to support the development of a European rare earths value chain.

Encouraged by such policy signaling, **several** European companies say they are on track to open mines to supply the raw materials needed for the region’s EV battery industry in the coming years. Among them, mining firm Keliber plans to begin producing battery-grade lithium hydroxide from lithium-rich spodumene rock in Finland in 2024. Plans for lithium mines in Portugal, Germany, Serbia and Austria are also in the works.

Invest in innovation

With an eye to the industry's sustainable development, the ERMA Action Plan has also identified the need to develop local capacity for recycling battery cells and extracting raw materials from old batteries for reuse. According to the European Battery Alliance (EBA), the number of EVs on European roads will nearly quadruple to 7–8m by 2025 from 2m currently, creating a stock of batteries with materials for recycling.

In early 2021, the EC approved a €2.9bn support package for a pan-European research and innovation project along the entire battery value chain – focusing on raw and advanced materials, battery cells and systems, recycling and sustainability. Named **European Battery Innovation**, the project will support related sector growth in 12 member states through 2028 and is expected to spark €9bn in follow-on private investments. Also this year, the EU proposed a **new** regulatory framework for batteries that would set collection rate targets for materials in battery cells.

Currently, almost no lithium is recovered in the EU because it is less cost-effective than buying primary supplies. Technologies for the efficient recycling of lithium-based batteries are still only being developed.

"[Recycled materials] will never be the principal source for battery manufacturing by definition, and secondly, it is a sector which will need a lot of European and legislative support to be profitable," Possémé of Enerdata said.

Indeed, several current projects to develop recycling capabilities have won significant support from the EU and its member states, **such as** those from French groups Orano Group, Solvay, and Veolia in partnership and Sweden's Stena Recycling.

Meanwhile, French multinational mining and minerals company Eramet has partnered French utility Suez and German chemicals giant BASF to develop a process to recycle lithium-ion batteries for EVs, but it hasn't yet included battery recycling in its portfolio.

“At this point, we are carrying out preliminary feasibility studies to assess whether it might be worthwhile developing this business by 2025–2030, when the volumes of batteries to be recycled are set to become substantial. Until then, regulations may still change,” Eramet strategy manager Nicolas Verdier **said**. Eramet is also exploring lithium mining in Europe, as part of the European Geothermal Lithium Brine (EuGeLi) **project** that is mostly financed by the EU.

Startups with new tech

While much of the headline-grabbing activity centers around building gigafactories or charging infrastructure, the sector is also racing to develop new technologies to boost EV battery efficiency – across usage, charging, maintenance, durability – and the manufacturing process, which would in turn help reduce the need for new batteries and raw materials.

Reducing the cost of batteries – and thus the cost of a new EV – is also a critical factor to the market’s development. While the **average** cost of an EV in China has almost halved in the past decade, the average cost of an EV in Europe rose 28% from €33,292 in 2012, to €42,568 this year.

That’s where startups are playing a key role. Possémé said Enerdata is currently working with several startups targeting the sector. They include Enerstone, whose electronic circuit optimizes battery operation, thereby increasing its lifespan, and Entroview, which has developed a characterization algorithm to improve the testing phase in lithium-ion cell factories, both in France; and Zurich-based Battrion, whose aligned graphite technology electrodes when used in batteries can half charging time, while reducing heat generation during charging, making the process safer.

In the race to cement their market positions, European car manufacturers are closely watching startups’ innovations with a view to acquiring new technologies. Renault, for example, recently **announced** it had partnered Whylot, a French startup specializing in the development of high-tech e-motors.

Several companies are also looking to develop **solid-state** batteries, which should be able to

hold more energy, charge faster and offer greater safety than the liquid lithium-ion batteries currently used in EVs.

“At the moment, Europe is clearly in a phase of industrialization, more than one of R&D,” said Possémé. “Everyone is using similar technologies, so it’s a question of massification, and behind it are the classic challenges associated with industrialization.

“Most of the projects, and especially the European projects like Verkor or Northvolt, are very young and have enormous challenges to face," he explained, noting the sector will continue to evolve as winners emerge from currently common technologies and players are forced to merge. “That’s not to say they won’t succeed. The European industry seems to be on a good footing to develop well in the years to come.”

Edited by Bernice Tang

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