

# BATTERY MARKET ANALYSIS

## EUROPEAN MARKET

Current status and perspectives

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# Introduction

## Executive summary: Key takeaways

### Market size

- **A strong growth of the European battery demand** is expected, mostly driven by **Li-ion batteries in electric vehicles**:
  - Li-ion Battery demand could reach up to 600 GWh per year by 2030 (compared to 85 GWh/year today)
  - Passenger and commercial EV will represent more than 90% of li-ion battery sales by 2030
  - The rest will be divided between stationary (large scale and residential storage) and consumer electronics.
  - Front-of-meter batteries will face competition from short-term storage (e.g., PHES), Power-To-Grid (Electrolysers) and Vehicle-To-Grid (V2G).
- **European battery production is expected to keep up with the demand**
  - All of the interviewees agree that not all gigafactory plants will succeed. There is uncertainty on which ones might fail.

### Second life and recycling

- The **European legislation will mostly drive the recycling market**. It is expected to grow strongly in the coming years.
- The volume and market for **second-life batteries will remain very small** by 2030. (0.1 to 0.3% of the volume of new batteries).

### Technologies

#### Current:

- European Li-ion demand has overcome the Lead Acid one in 2021. (85 vs. 72 GWh)
- Li-ion: The market is divided between **NMC, LFP and NCA**
  - NMC is mostly used for high-range EVs
  - LFP for mid-range and urban EVs, and for stationary storage
  - NCA are only used in Tesla's higher-end vehicles

#### Trends:

- **NMC, LFP and NCA are expected to keep the main share** of the battery demand by 2030 but new types of cathode will be industrialized:
  - **High-Nickel cathodes** in the short term
  - **High-Manganese cathodes** in the mid-term
- In the long term, two technologies are particularly expected:
  - **Solid-state batteries** for mobility (with strong industrial challenges)
  - **Na-ion** for stationary application (with strong competition from LFP and 2<sup>nd</sup> life batteries)
- The **lead-acid** batteries' market will continue to grow slowly, driven by SLI applications.
- Other technologies either reducing (e.g., **NiMH, NiCd**) or having trouble finding their market (e.g., **Flow batteries**)

### Countries\*

**UK:** Main market in Europe for large-scale storage, with the help of efficient market design and regulations. Open to innovations.

**Germany:** Mature market for stationary storage and 1st market in Europe by far for HSS.

**Spain:** Recent market with ambitious targets for 2030.

# Introduction

## Methodology

This report is focused on the **current status and the evolution of the European battery market** with a focus on three key countries: Germany, Spain and the United Kingdom. It is composed of three files:



The complete report  
(This document).

*22 10 07 - Enerdata - Battery  
market analysis*



List of sources  
used in the report

*22 10 07 - Enerdata -  
Literature review*



Detailed sources of the  
technology comparison

*22 10 07 - Enerdata -  
Technology comparison -  
Detailed sources.xlsx*

To complement our feedbacks (obtained through secondary desk research), **we interviewed 4 key European players** (see [Annex](#)) in order to compare their vision on the current status and trends of the European battery market.

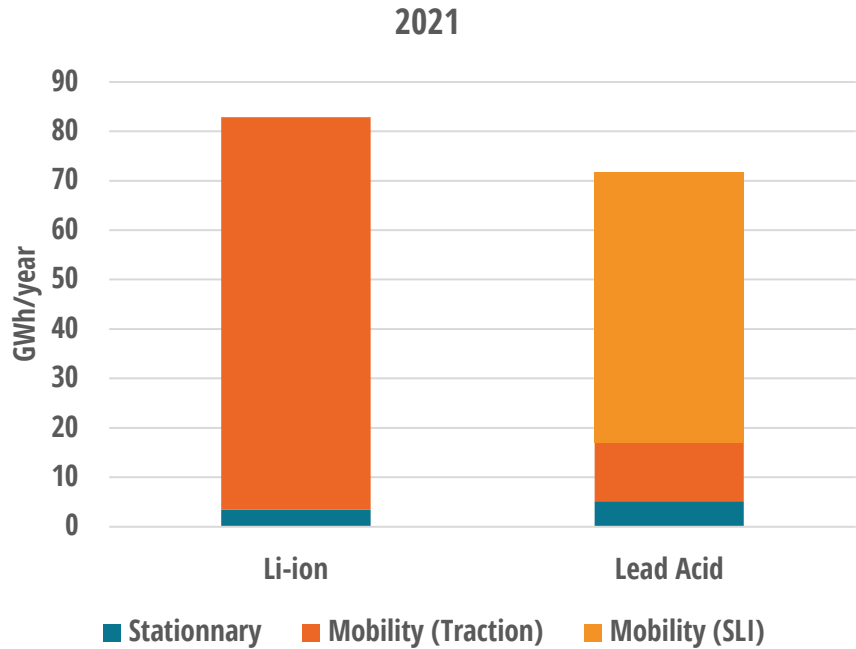
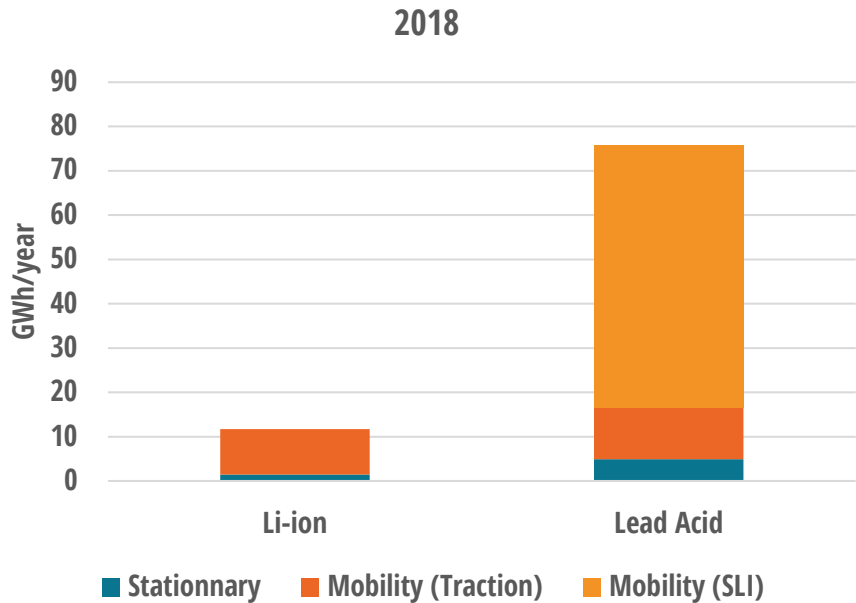
For confidentiality issues, we gathered all of their feedbacks and put it in the “Industry feedback” part of the report. **We did not disclose the source of each feedback.**

[Content Table](#)

# Illustrations

# Current market size of batteries in Europe

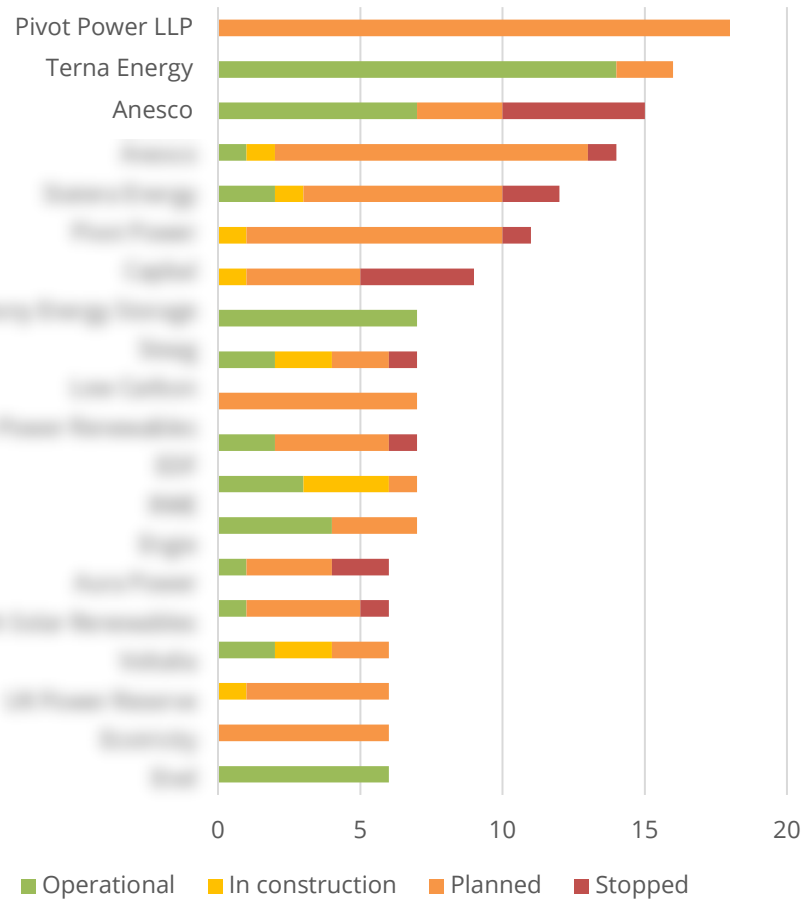
### Yearly sales of batteries in Europe



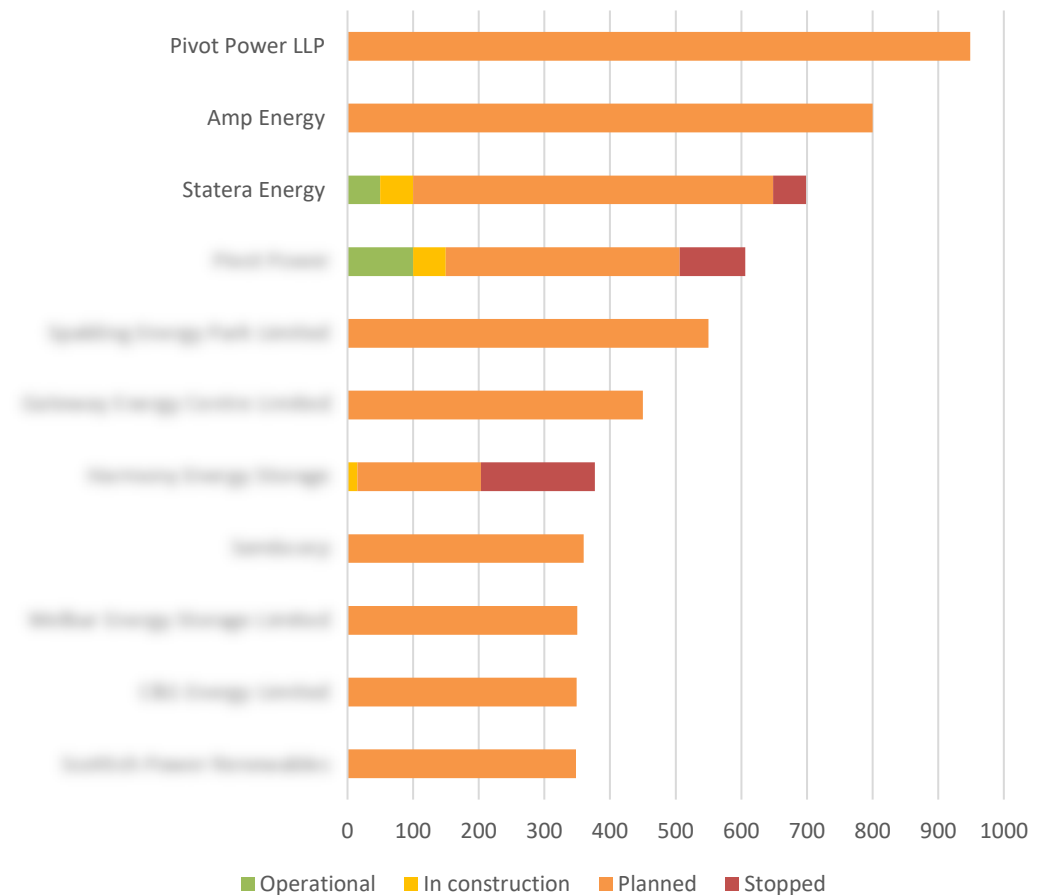
# Current status: Players analysis

## Focus – Project developers

Main European stationary battery developers, by number of projects



Main European stationary battery developers, by total size of projects



# Current status: Technologies comparison

## Summary

We analysed the key characteristics of 26 type of batteries, regrouped in 7 categories. Only mature technologies are developed in this chapter. See Future trends for developing and future technologies.

### Mature technologies

### Developing markets

### Future potentials



#### Lead Acid

- Deep cycle
- Starter batteries
- Lead crystal



#### Lithium-ion

- LFP
- NMC
- NCA
- LCO
- LMO
- LTO
- NCMA



#### Nickel Based

- Nickel-Cadmium
- Ni-MH



#### Flow batteries

- Vanadium Redox
- Zinc-Bromine



#### Sodium Based

- Sodium-ion
- Sodium-Sulphur
- Sodium-Nickel



#### Other innovative batteries

- Zinc-Air
- Organic batteries
- Multivalent systems
- Anion shuttle batteries
- Dual ion batteries



#### Solid State

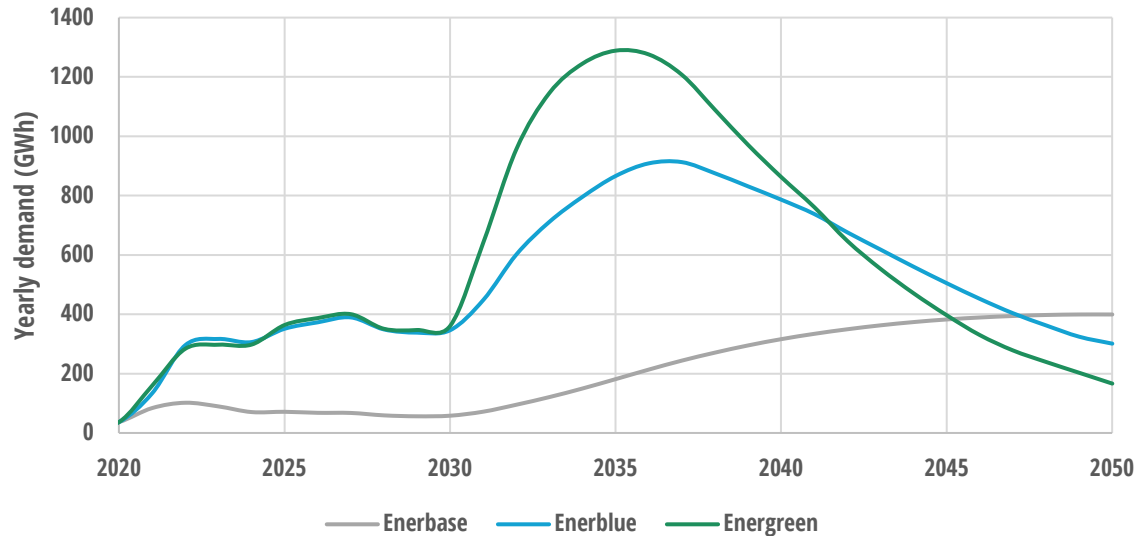
- Lithium-Metal (polymer)
- Advanced Lithium metal batteries
- Sodium metal
- Lithium-Sulphur

# Future trends: Market quantification

## Focus: Enerdata's scenarios

### Expected development of Li-ion battery demand for mobility in Europe

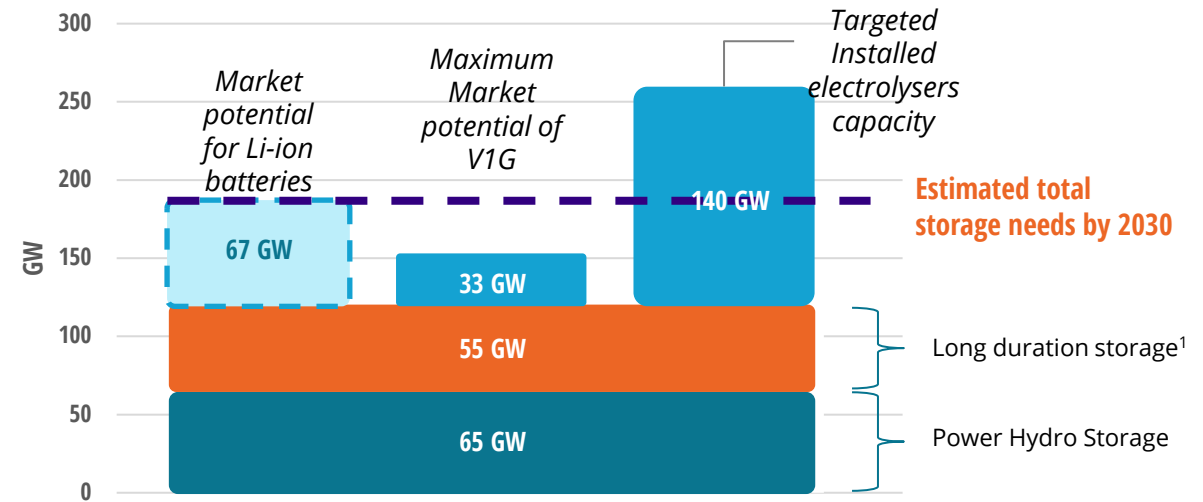
Total yearly demand of Li-ion batteries for mobility



Source: Enerdata's POLES Model

**N.B: These scenarios are not a forecast.** They describe our vision of the evolution of the battery market in different possible futures. The geographical perimeter of those scenarios is EU27 + Switzerland + Norway.

2030 EU Energy Storage needs



<sup>1</sup> - Includes Gravity storage, CAES, LAES, Flow batteries and Thermal Storage  
Source: EASE 2022, Enerdata Analysis



# Annex

## Acronyms and writing convention

### Acronyms

- **BEV:** Battery Electric Vehicles
- **CAES:** Compressed Air Electricity Storage
- **ESS:** Energy Storage System
- **LAES:** Liquefied Air Electricity Storage
- **LEV:** Light Electric Vehicles
- **EOL:** End of Life
- **EPC:** Engineering, Procurement, and Construction
- **EV:** Electric Vehicles (tourism cars)
- **FCR:** Frequency Regulation Market
- **FNA:** Federal Network Agency (Germany)
- **HP:** Hypothesis
- **LCOE:** Levelized Cost of Energy
- **LIB:** Li-ion Batteries
- **MS:** Member States
- **PHEV:** Plug-in Hybrid Electric Vehicles
- **PHS:** Pumped Hydro Storage
- **HSS:** Home Storage Systems
- **LSS:** Large Scale storage
- **SLI:** Starting, Lighting, and Ignition
- **SOH:** State of Health
- **RFB:** Redox-flow batteries
- **V1G:** Grid to Vehicles (i.e. smart charging)
- **V2G:** Vehicle-to-grid

### Other notations

**n.a. :** Non Available

**\*** : refers to a footnote

**Sources (S+#):** refers to the id of the source used for this information. The list of sources is available in the « *2023 - Enerdata – Battery Market Analysis - Literature review.xlsx* » file