Enerdata intelligence + consulting

2023

BATTERY MARKET ANALYSIS

EUROPEAN MARKET

Current status and perspectives

Baptiste POSSEME
Corentin BOILLET

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 and 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 2nd 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.

** The trends are the same on mobility in its different countries. They follow the European regulation on the prohibition of the sale of electric vehicles in 2035*

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

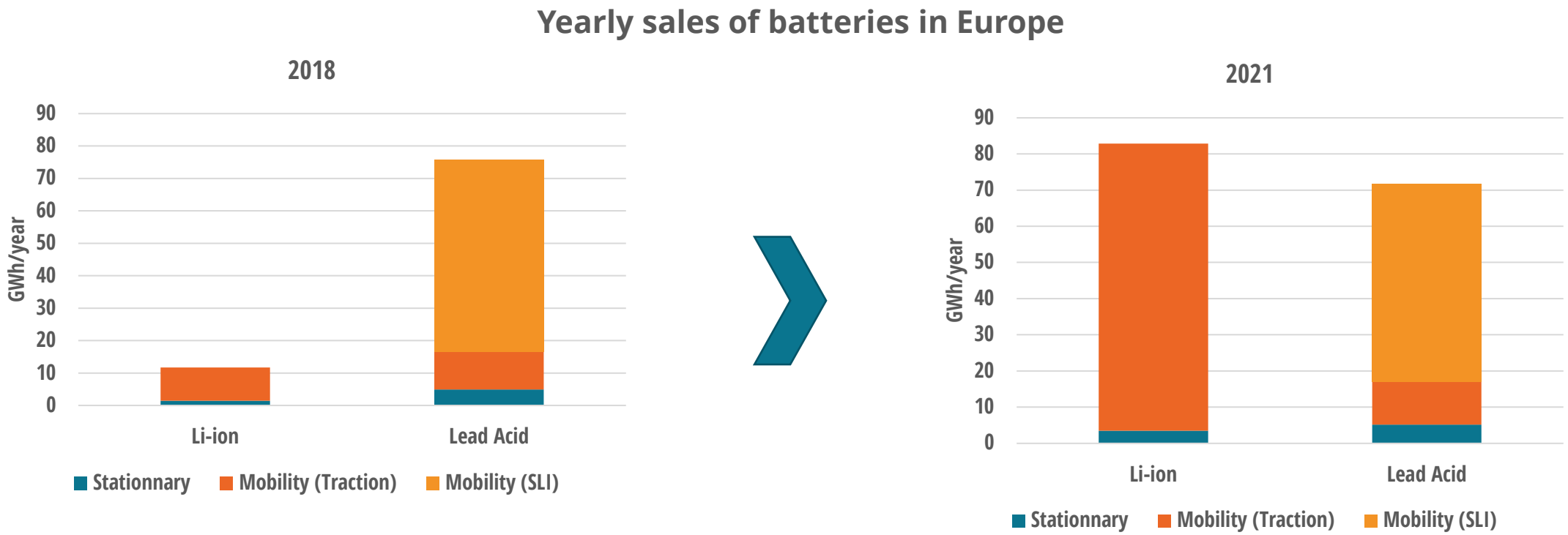
To complement our feedbacks (obtained through secondary desk research), **we interviewed 4 key European players** (see Annex) in order to compare their vision on the current status and trends of the European battery market.

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

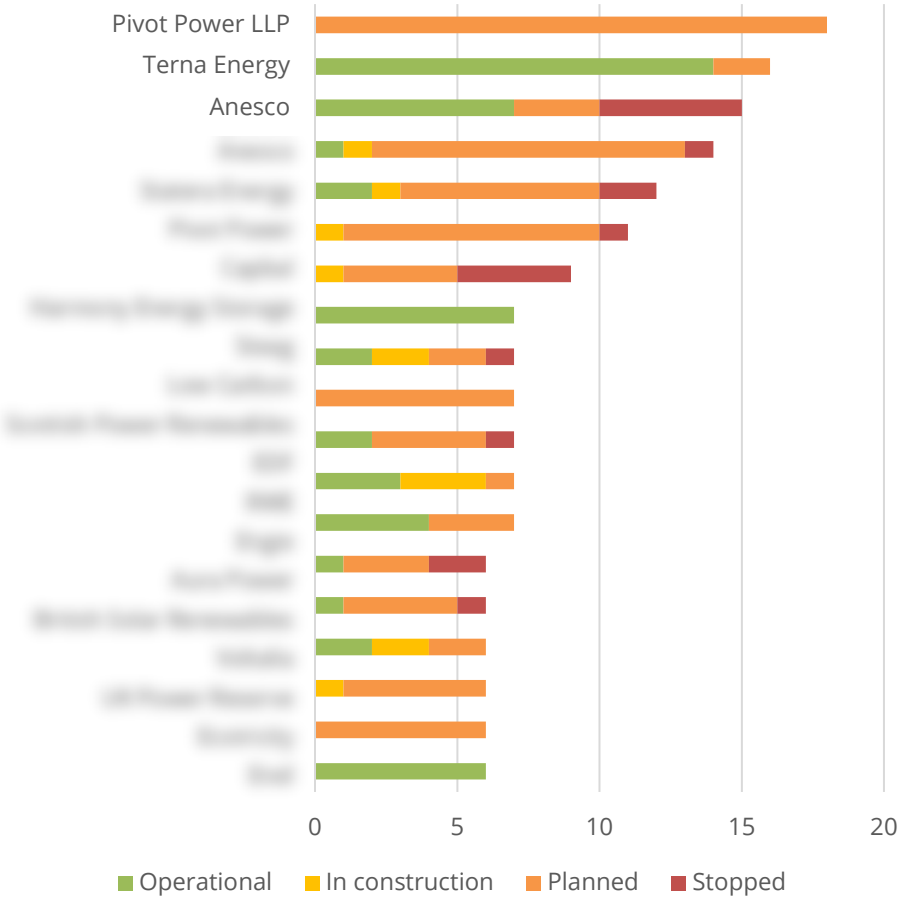
Current market size of batteries in Europe



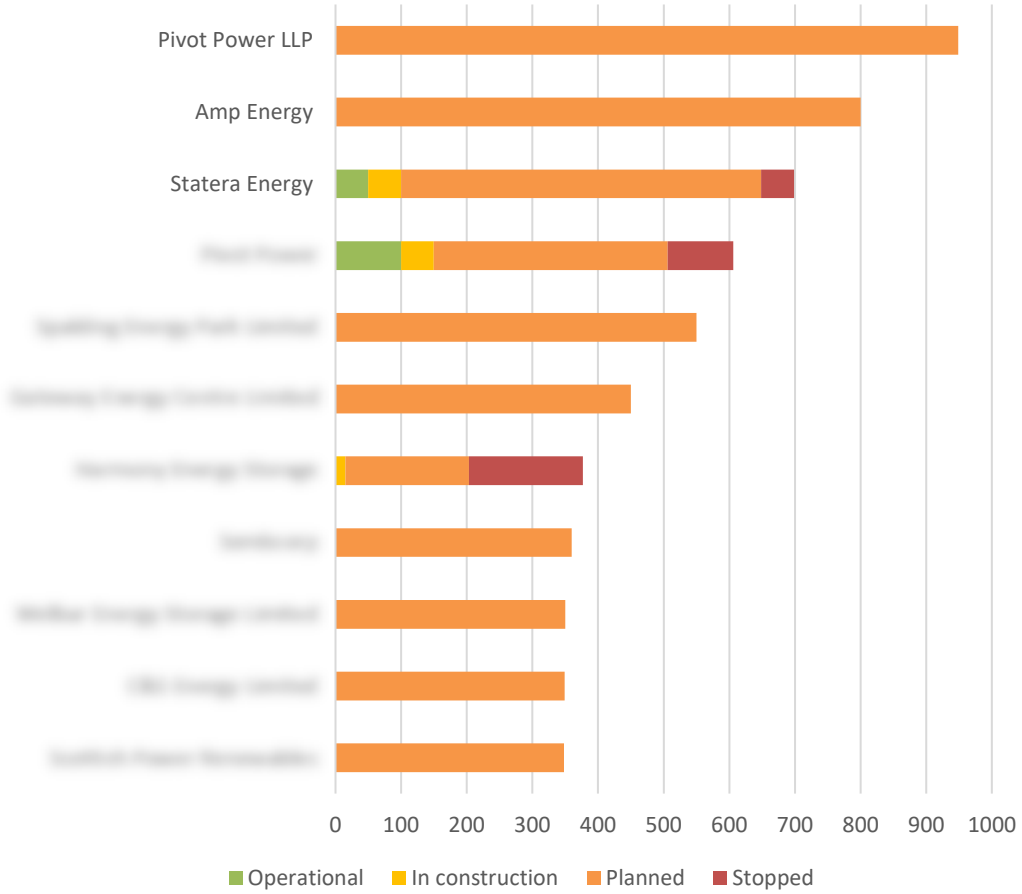
Current status: Players analysis

Focus – Project developers

Main European stationary battery developers, by number of projects



Main European stationary battery developers, by total size of projects



Source: Enerdata Power Plant Tracker, 2022 extract (S16)

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-Brome

Sodium Based

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

Other innovative batteries

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

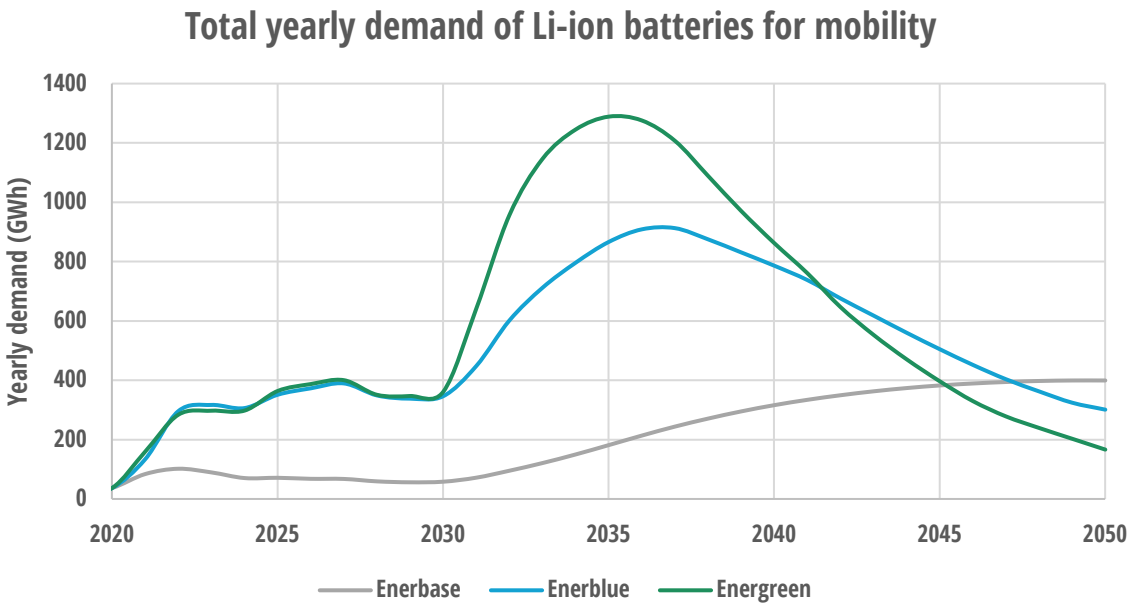
Solid State

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

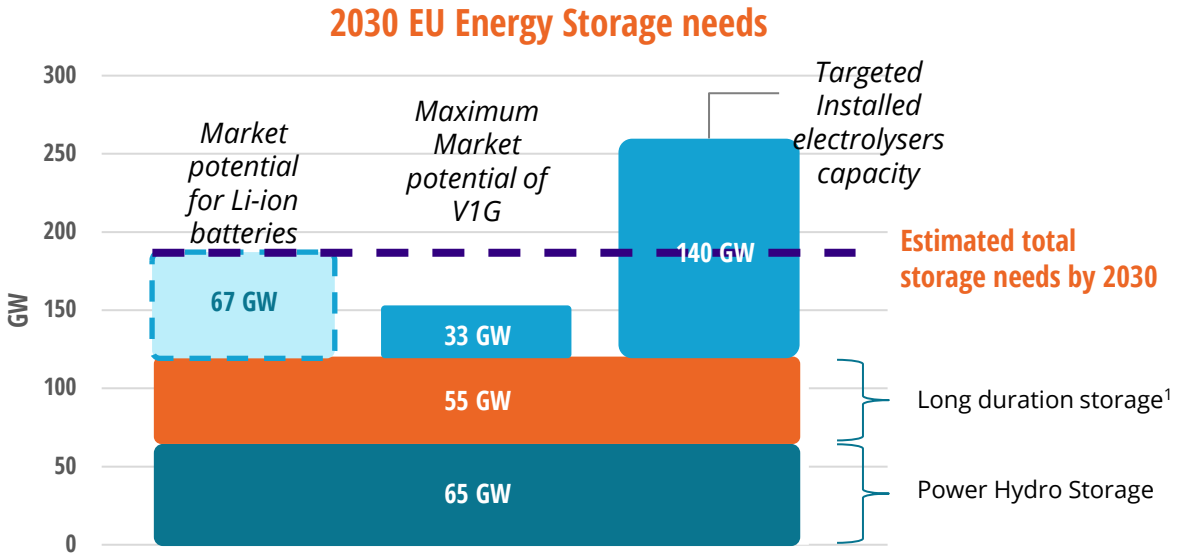
Future trends: Market quantification

Focus: Enerdata's scenarios

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



Source: Enerdata's POLES Model



1 – Includes Gravity storage, CAES, LAES, Flow batteries and Thermal Storage
Source: EASE 2022, Enerdata Analysis

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.

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