The Battery Race: battery manufacturing in Europe

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Location Matrix
where European battery plants can be expected

<table>
<thead>
<tr>
<th>INDEX</th>
<th>Weight</th>
<th>Germany</th>
<th>France</th>
<th>Hungary</th>
<th>Poland</th>
<th>Czech Republic</th>
<th>Slovak Republic</th>
<th>United States</th>
<th>China</th>
<th>South Korea</th>
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<td>Planned GWh 2030</td>
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- High location score matches high announced GWh by 2030
- Czech Republic is negotiating with VW & CEZ
- European Union market share expected to rise from 6% in 2019 to 16% in 2029
Database

- Labour:
  - Labour cost in manufacturing in 2017 PPP $/ h (ILO 2018)
  - Education and skills score (WEF 2020)
  - Labour laws and social protection (WEF 2020)

- Energy:
  - Electricity in Pence/ kWh (Gov. UK 2019)

- Logistics:
  - Logistic Performance Index (Worldbank 2018)

- Country Risk Premium:
  - New York University 2021

- Political Stability:
  - The global economy 2019

- Transparency:
  - Corruption perception index 2020

- Corporate Tax:
  - Tax foundation 2020

- Investment in Research/ Innovation:
  - WEF 2020

- Weighting chosen according to reference project
Battery Cell Production Sites
where European battery plants have been announced

Legend
- Planned annual capacity in GWh
- Estimated number of employees

- 1 - 20
- 21 - 40
- 41 - 60
- 61 - 80
- 81 - 100

No Data
- < 2000
- 2000 - 4000
- > 4000

760 GWh planned by 2030
Ø 58 employees per GWh
~ 44,000 direct jobs created
European Battery Demand and the assumptions made

- Cars produced in Europe: in 2025: 16 Mio in 2030: 16 Mio
- Share BEV/ xEV: in 2025: 70% in 2030: 83%
- Size battery BEV: in 2025: 73 kWh in 2030: 75 kWh
- Size battery PHEV: in 2025: 13 kWh in 2030: 13 kWh

**SCENARIO**

**High**
Share xEV of total production in 2025: 40% in 2030: 82%

**Low**
Share xEV of total production in 2025: 30% in 2030: 60%
European Battery Demand and the European battery production

- Various drivers of xEV demand:
  - Cost decrease
  - Government support
  - Supply of charging infrastructure
  - Increasing model availability on the European market:
    - Over 170 BEV models in 2025
    - Over 140 PHEV models in 2025

- Rising battery production capacity meets rising demand

- Possibility of overcapacity after mid-2020 in lower scenario

Source: M-Five own calculations, INACD Database
Value Chain
of lithium-ion batteries

- Raw materials
- Processed materials
- Electrodes
- Cells
- Modules
- Packs
- Vehicle Integration
- Recycling

EU OEM share Pre-2020

New focus

Increasing European Industry share 2021+