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# The battery race: what is at stake for Europe and what are the prospects?

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# Recent developments

## with impact on European battery cell production



### EV wake-up call

- New registrations by model in GER in 09/21:  
1<sup>st</sup> VW Golf (6886), 2<sup>nd</sup> Tesla Model 3 (6828)
- EV car produced outside Germany close to top selling single make in the country
- EV sales have grown out of the niche market
- This example shows the importance of the capability to produce batteries in Europe



### Geopolitical and economic challenges (e.g. pandemic, chip shortage, war)

- Reveal fragile global supply chains and high dependencies on foreign primary products (supply shortage/ raw material price increase)
- Shift in priorities from cost competitiveness to diversification
- Impulse to develop strategic autonomy, secure access to raw material, gain control over battery value chain, focus on recycling

# Location Matrix

identifies attractive countries for battery cell production

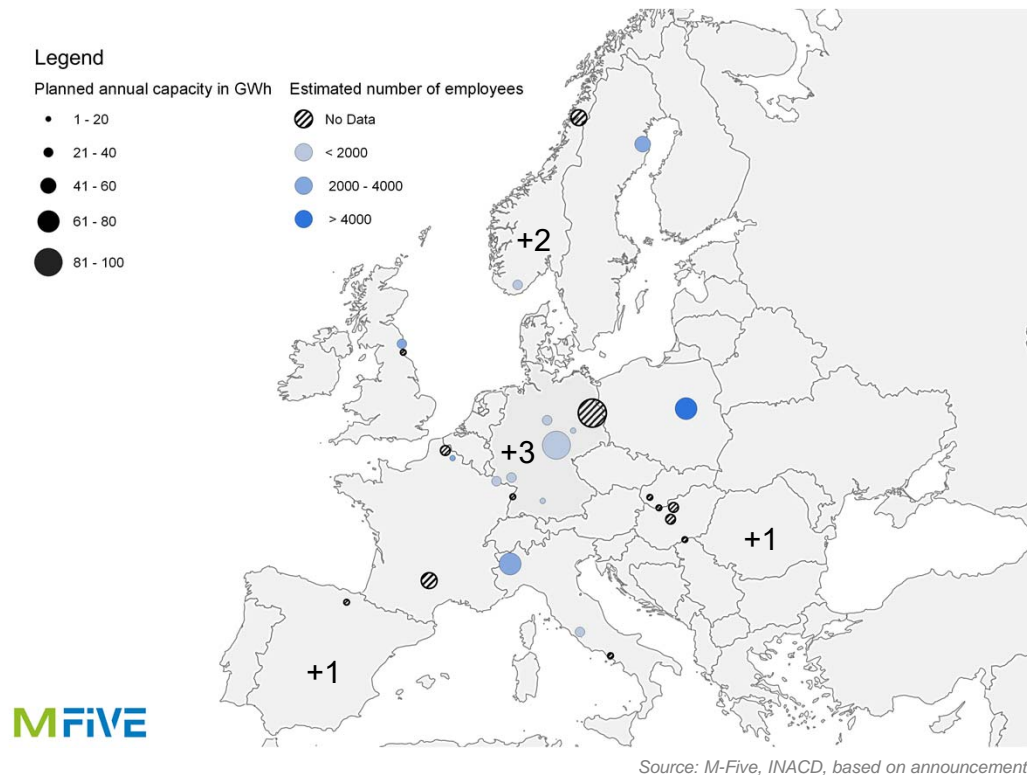
INDEX	Weight	Europe												Major Player			
		Sweden	Norway	Germany	Hungary	Czech Republic	France	Spain	Slovenia	Poland	Slovak Republic	Romania	Italy	United States	South Korea	China	Japan
Labour	0.27	3	3	3	4	4	3	3	3	4	3	4	3	4	4	4	3
Energy	0.25	5	5	2	5	4	4	3	3	3	3	3	2	4	3	3	2
Logistics	0.08	4	3	5	1	2	3	3	1	2	1	1	3	4	2	2	4
Corporate Tax	0.05	4	4	2	5	4	1	3	4	4	4	5	2	3	3	3	2
Country Risk Premium	0.05	5	5	5	1	4	4	2	3	3	3	1	1	5	4	3	3
Political Stability	0.05	4	5	4	1	2	3	3	2	1	2	1	2	3	4	1	3
Transparency	0.03	5	4	4	1	2	3	3	2	2	1	1	2	3	3	1	4
Business Attractiveness	0.05	4	5	4	3	2	4	3	3	2	2	2	2	5	5	3	3
Global Innovation	0.07	5	3	4	1	2	3	2	2	1	1	1	2	4	4	3	3
Vehicle Production	0.10	1	1	4	2	3	3	3	1	2	2	1	2	4	3	5	4
<b>Score</b>		<b>3.9</b>	<b>3.7</b>	<b>3.2</b>	<b>3.1</b>	<b>3.1</b>	<b>3.1</b>	<b>3.1</b>	<b>2.7</b>	<b>2.6</b>	<b>2.6</b>	<b>2.5</b>	<b>2.4</b>	<b>4.1</b>	<b>3.5</b>	<b>3.2</b>	<b>2.9</b>
<b>Planned GWh 2030</b>		60	75 +2	317 +3	88	0	94	10 +1	0	65	10	+1	110	288	32	1888	32

Source: M-Five, INACD

## FINDINGS

- EU offers an attractive investment environment
- High location score corresponds to high announced GWh by 2030
- EU share in global battery cell production rises to 25% in 2030 (China: 59% in 2030)

# Battery cell production sites announcements until end of 2021

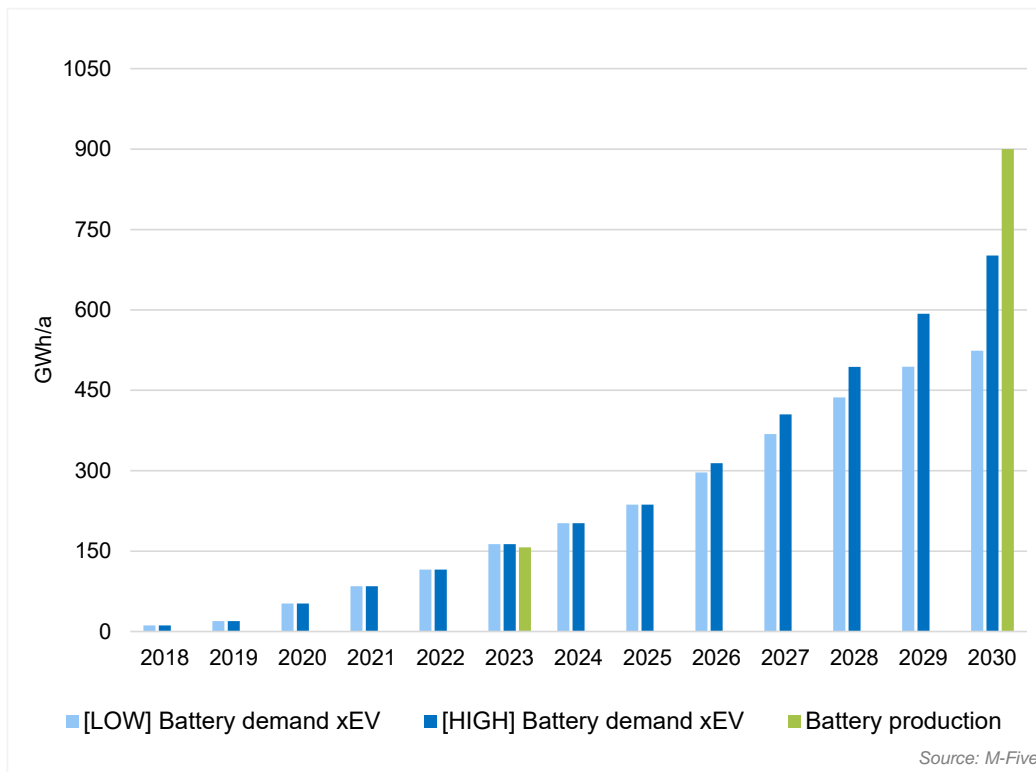


## FINDINGS

- 900 GWh planned by 2030
- Ø 58 employees per GWh
- ~ 52 000 direct jobs created
  
- Asian and American manufacturers enter the “local” market with own production capacities (about 50%)
  - + Strengthens EU innovation system
  - + Increases financial and human capital in the EU
  - Intensifies competition
  
- European producers focus on NMC and solid-state batteries (performance vs. cost focus)

# Battery cell demand scenarios

local demand is met by local production



## FINDINGS

### Assumptions 2030:

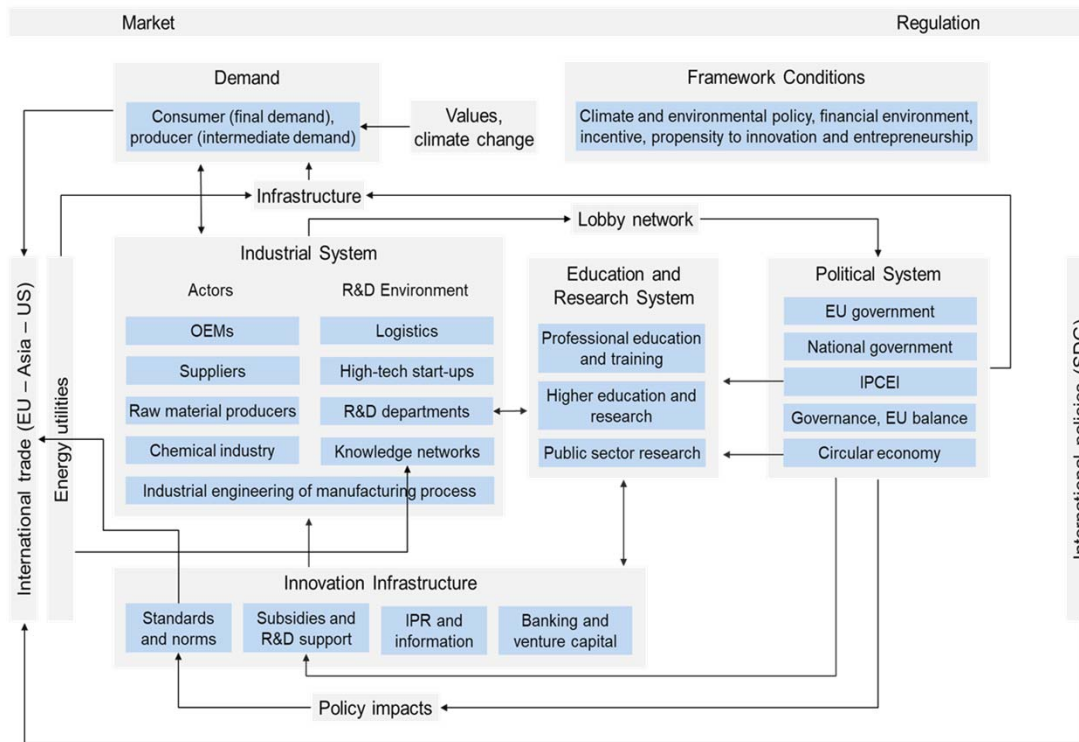
- Production: 15.5 Mio
- Share xEV/ production: 71% (53%)
- Share BEV/ xEV: 82%
- Battery capacity BEV: 75 kWh
- Battery capacity PHEV: 13 kWh

### Various drivers of xEV demand:

- Cost decrease
- Government support
- Supply of charging infrastructure
- Increase in model availability
  - > 170 BEV models in 2025,
  - > 140 PHEV models in 2025

# Innovation System Analysis

## environment for battery cell production in Europe



### FINDINGS

- Climate and environmental policy as key framework condition
- Actors, networks and institutions interact to create and implement innovations
- New actors emerge in the industrial system (e.g. raw material producers)
- Circular economy and recycling as opportunities for value creation

→ Multiplier effects

Source: M-Five

# Synthesis – European Strategies



## TECHNOLOGY

- Optimisation of NMC, further reduction of cobalt and nickel content
  - LFP might be purely imported and reduce (EU) NMC market size
  - Short term: market entry and catch-up through optimisation of current technology; Long term: increasing market share through solid state and next generation technologies
- Performance vs. cost competitiveness, potential underestimation of LFP in EU



## VALUE CHAIN

- Focus on vertical and upstream integration to increase control over the entire value chain and high value added
  - Establishing an EU recycling industry and a leading market for green batteries
- Need for green batteries is also understood by Asian competitors
- Securing access to raw materials as main challenge

# Synthesis – European Strategies



## EUROPE AS LOCATION

- Attractive location with 900 GWh announced by 2030, rising demand is met by rising production, strong existing innovation system
  - Hurdles to scaling, risk of overfunding and a battery bubble
  - Time is short as Asian players are already building capacity globally
- Growing EU share of global battery cell production, timing and competitiveness as most important factors



## EMPLOYMENT EFFECTS

- Massive transitions between sectors, occupations and regions with job losses, job creation and retraining needs
  - BEV not able to fully compensate for ICE losses
  - Additional trends (e.g. automation) and industries (e.g. energy infrastructure) create additional jobs
- Structural changes lead to employment losses, the counterfactual scenario would lead to significantly higher and irreparable losses (loss of market share of EU OEM)





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# Thank you for your attention!

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