



# Fraunhofer Research Institution for Battery Cell Production FFB

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BEPA Matchmaking Pitch  
February 26<sup>th</sup> 2025



# Fraunhofer Research Institution for Battery Cell Production FFB



Innovations for efficient  
and sustainable battery  
cell production



- Open battery cell factories for research and development purposes
- Up to € 820 million initial funding volume to build up the infrastructure
- More than 200 battery experts (including partners)
- Production capacity: theoretically up to 7 GWh/a (electrode)

# Fraunhofer Battery Alliance

- 26 Fraunhofer Institutes with competences along the battery value chain
- Broad research and development skills in various battery technologies
- Your development and cooperation partner with extensive experience and technical equipment

## Core competences



Material Research



Cells and Cell production



System and Integration



End-of-Life and Battery Recycling



Simulation and Modelling



Testing and Evaluation

## Markets and applications



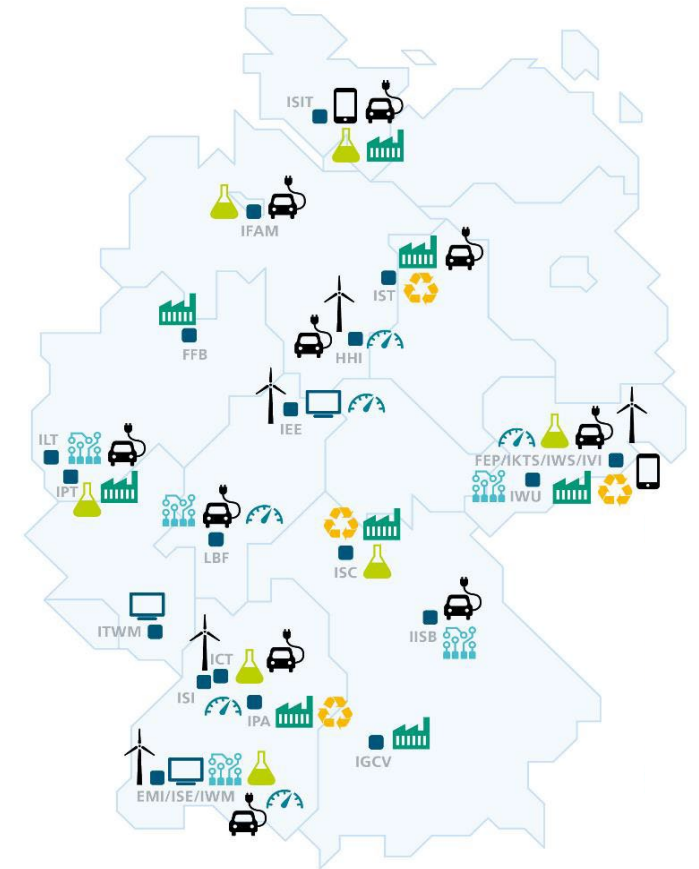
**Energy Storage Devices**  
(Electromobility, Heavy Duty, Rail, Aviation)



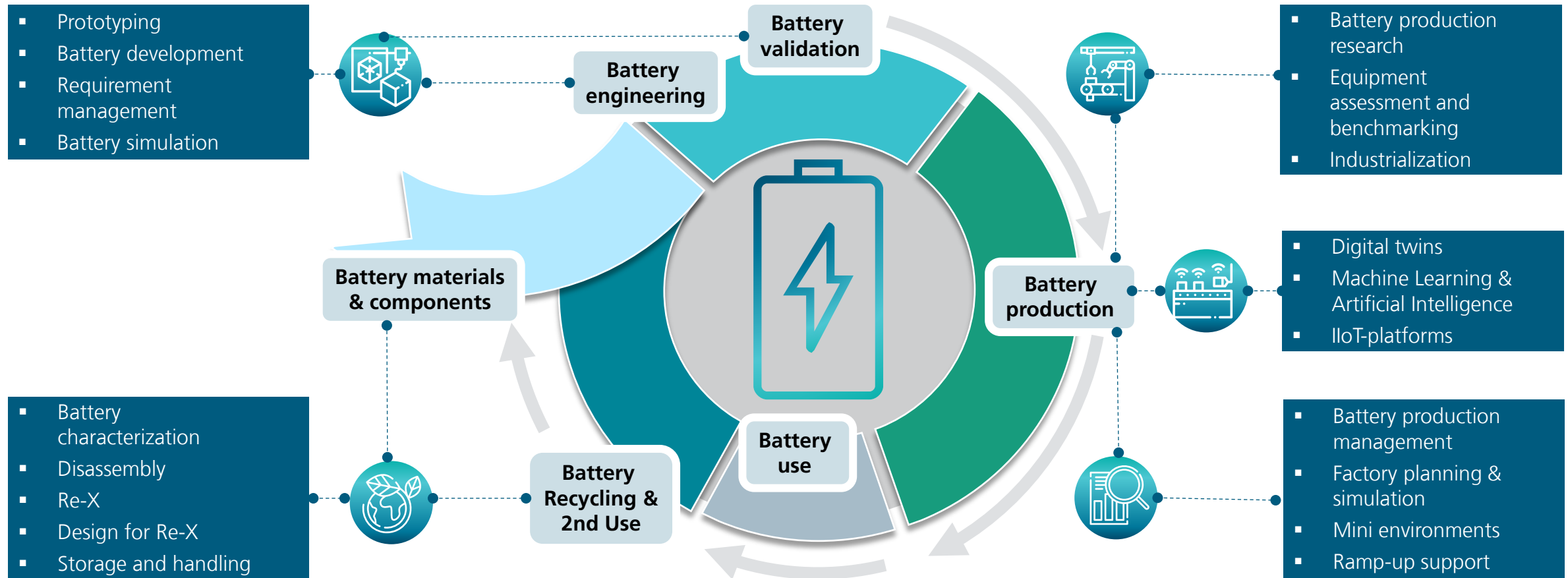
**Stationary Energy Storage**



**Powertools/ Consumer**



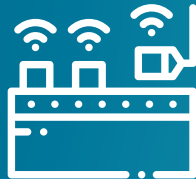
# Areas of expertise of Fraunhofer FFB and partners



# Areas of expertise of the Fraunhofer FFB and its partners



Process innovation and  
plant engineering



Digitalized battery cell  
production



Battery as a new  
business segment



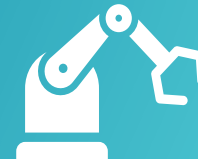
Battery cell innovation &  
sample production



Material cycles and  
sustainability



Factory Planning



Industrialization &  
Production Management



Quality in battery cell  
production

# Cooperation opportunities and fields of activity at Fraunhofer FFB

## National research projects

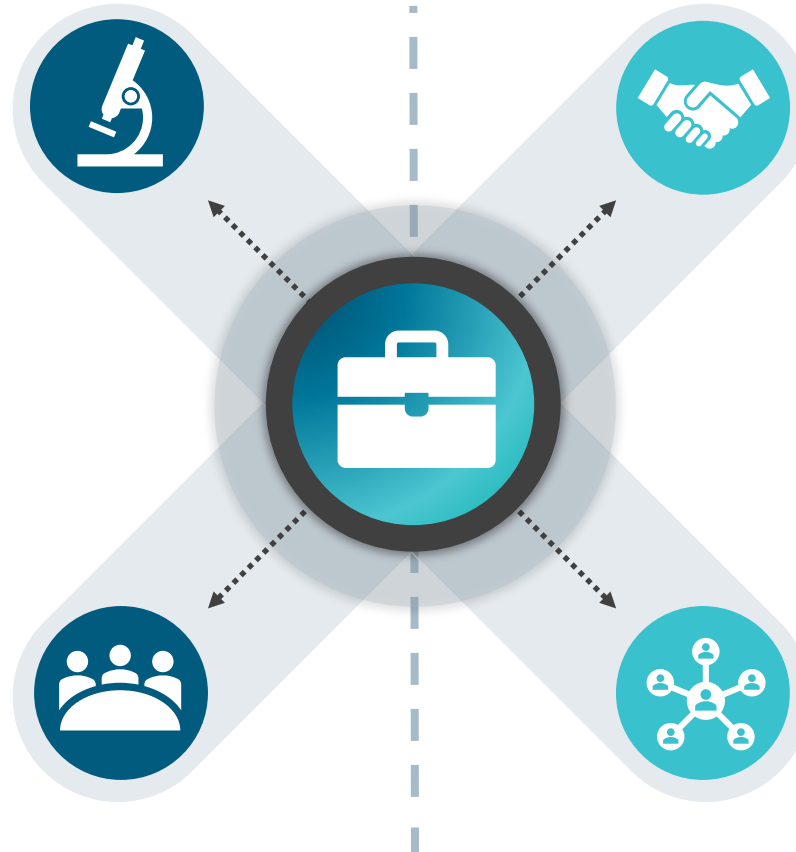
Nationally funded research projects enable collaboration in consortia of research and industry partners to investigate scientifically innovative issues.



## Public research

## International research projects

As part of international research projects, scientific issues are investigated to explore innovative fields of research in collaboration with global partners.



## Bilateral industrial projects

Together with companies, we work on individual industrial projects. With an appropriate infrastructure and experienced expertise, we are available for various issues in applied battery research.

## Industrial research

## Consortial industrial projects

By forming a consortium, complex and extensive research projects are efficiently coordinated and implemented by Fraunhofer FFB.



# Infrastructure of the Fraunhofer FFB

## Laboratories and construction phases

### »FFB Workspace« 2021

To be closed  
by 03/2025



430 m<sup>2</sup> floor space (incl. clean room)

50 MWh/a production capacity

Continuous mixing and coating of the negative anode and subsequent drying

### »FFB PreFab« 2024

SOP by  
06/2025



3,000 m<sup>2</sup> floor space

200 MWh/a production capacity

Fully digitalized production of pouch and prismatic cells, as well as the complete production of starting materials to the final cell

### »FFB Fab« 2027



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20,000 m<sup>2</sup> floor space

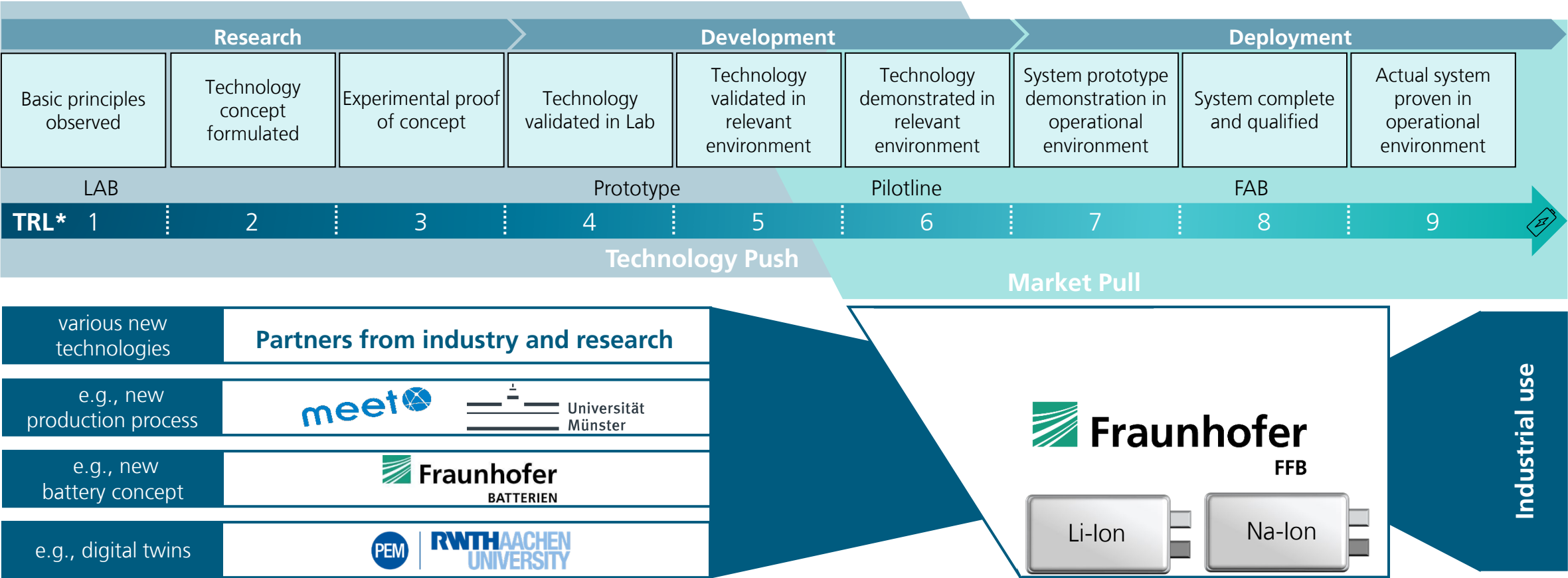
6.8 GWh/a Production capacity

3\*200 MWh/a Cell assembly

Fully digitalized production environment under **giga conditions with all process steps** and common cell formats

# Fraunhofer FFB in the context of the technological maturity levels

Development of innovations for industrial use

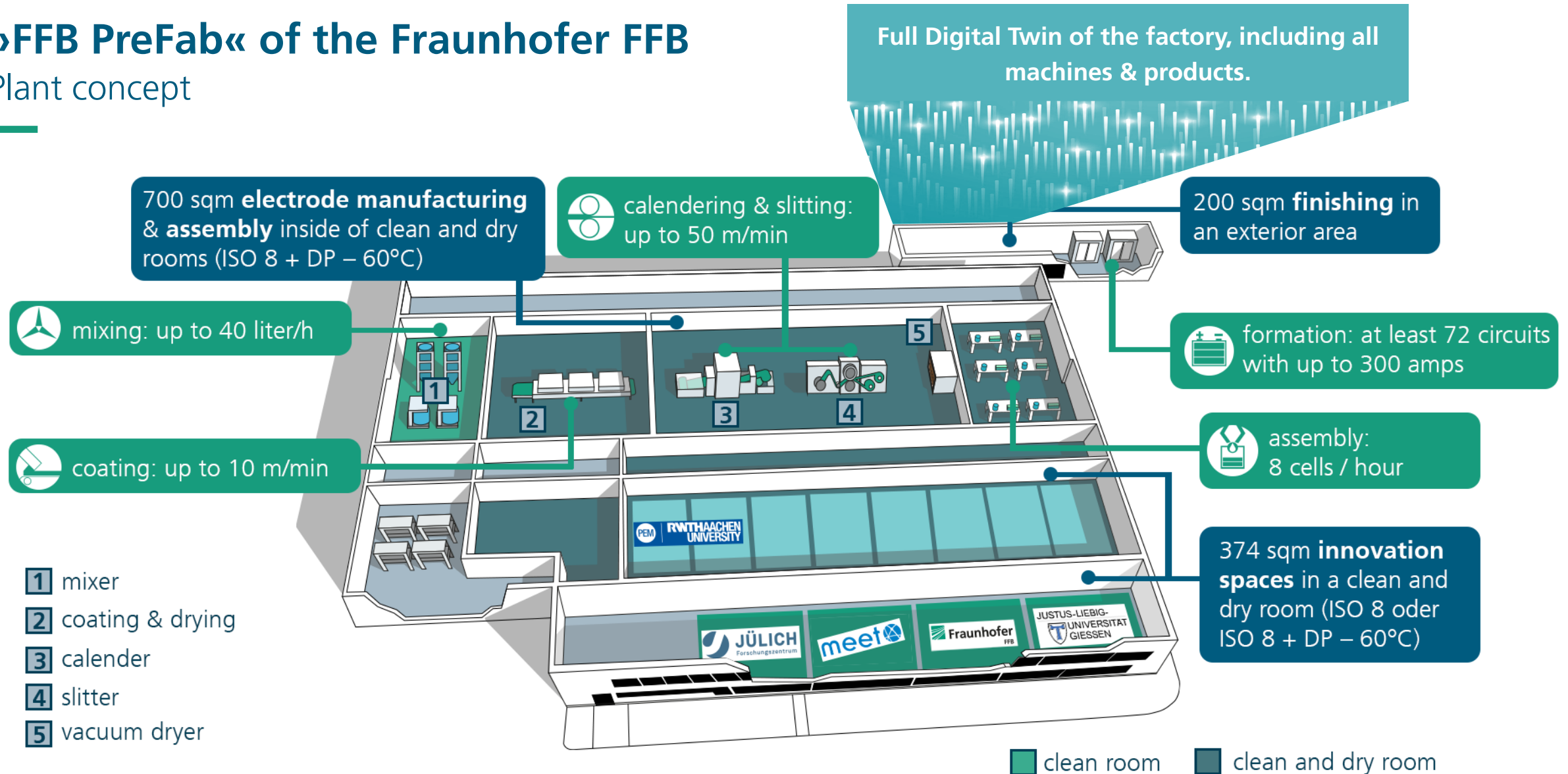


\*TRL = Technology Readiness Level



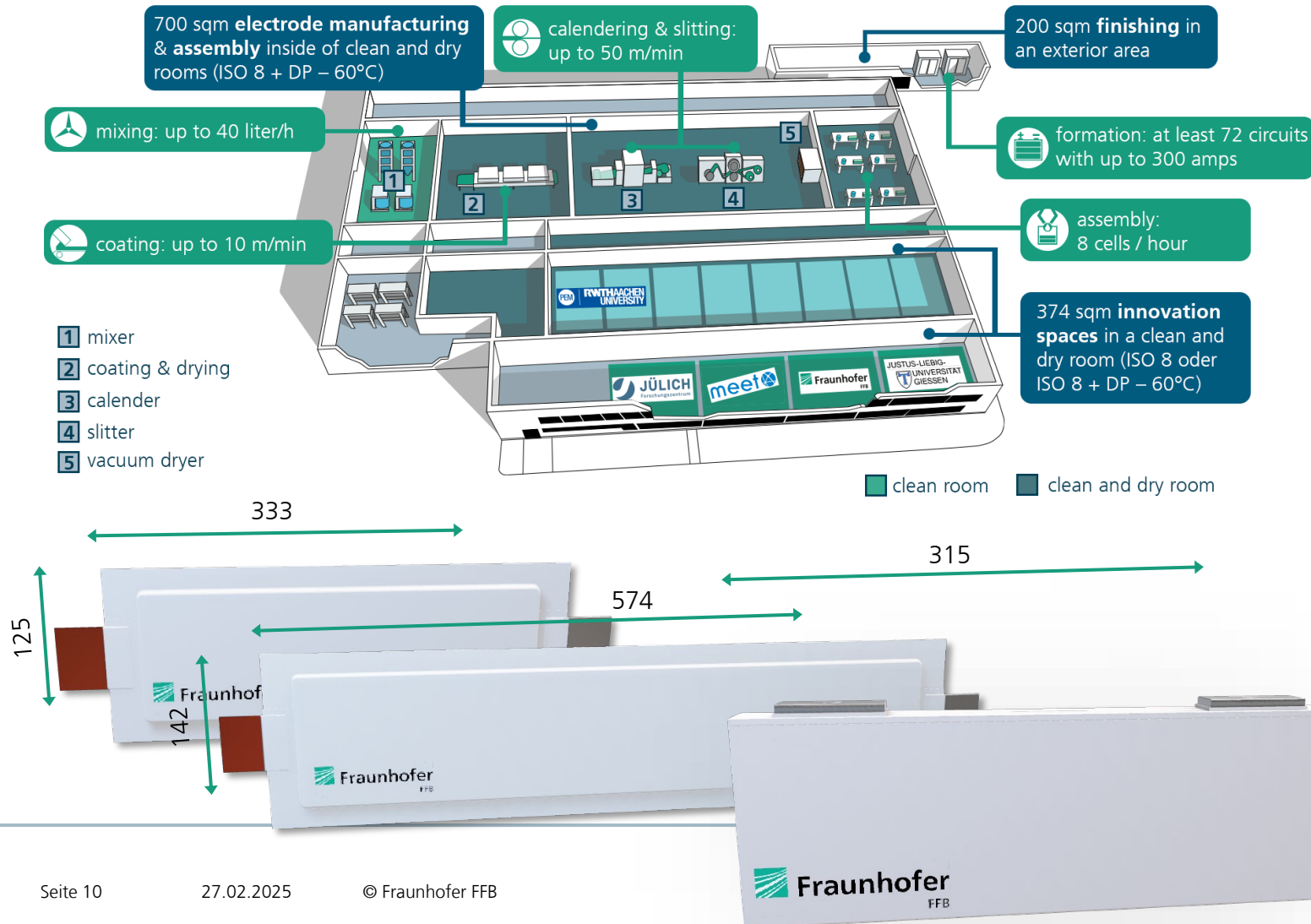
# »FFB PreFab« of the Fraunhofer FFB

## Plant concept



# »FFB PreFab« of the Fraunhofer FFB

## Plant concept and cell formats



## Main research fields in digitalization

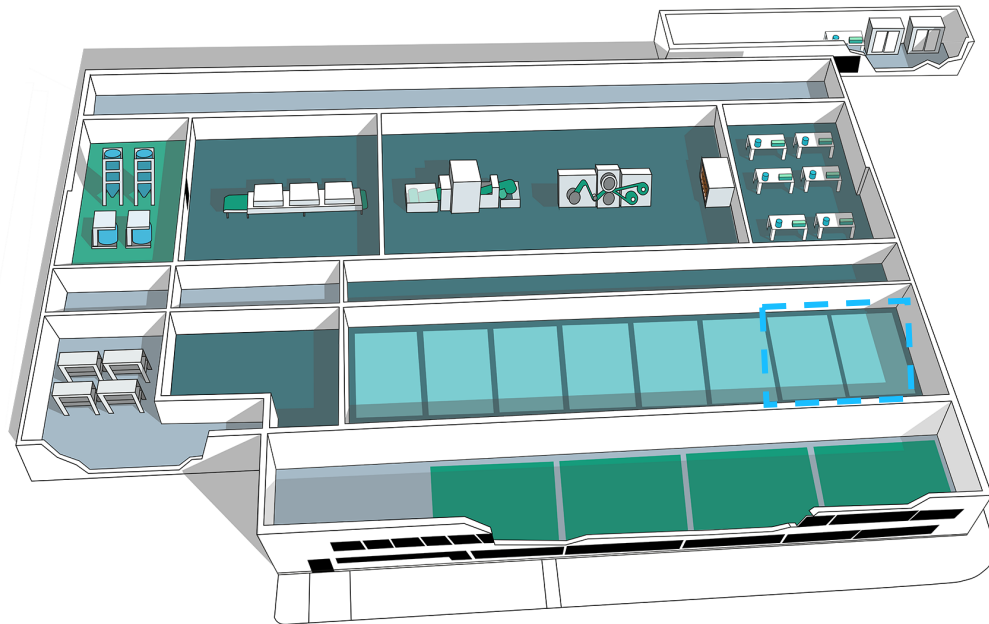
- **Digital Twins** (Building, Machine, Product): Digital twins are in place for our PreFab and are developed for partners as well.
- **Artificial Intelligence** for efficient battery production: Multiple projects on our own processes.
- Expert Systems **for Re-X-decision making:** Multiple projects for our partners.
- **Connectivity & data models** in IT/OT systems: Full architecture (IIoT, MES, etc.) in our factory – working in multiple standardization activities.
- **Factory Simulations:** Simulation of full factory, but also coupling of separate, smaller simulations.

# »FFB PreFab« of the Fraunhofer FFB

## Cell assembly for prismatic cells

### Assembly General

- manual production with traceability concept
- Throughput 10 cells per shift
- Flexibility 200-400mm (L) x 80-130mm (W) x 20-40mm (T)



### Process Step

### Description

#### Punching

- Separate mechanical punching for anode and cathode
- material feed from electrode coil to magazine
- image-based quality inspection on both sides

#### Stacking

- Hybrid machine concept for single-sheet stacking and Z-folding
- separator inspection

#### Hot Pressing

- 3-30 kN homogeneous pressing force
- manual feeding of semi-finished products

#### Tab Welding

- Manual ultrasonic-based main welding

#### Lid welding

- Flexible and automated laser welding system
- manual loading

#### Leakage test

- Individual system for leak testing based on helium
- manual feeding

#### Electrolyte filling

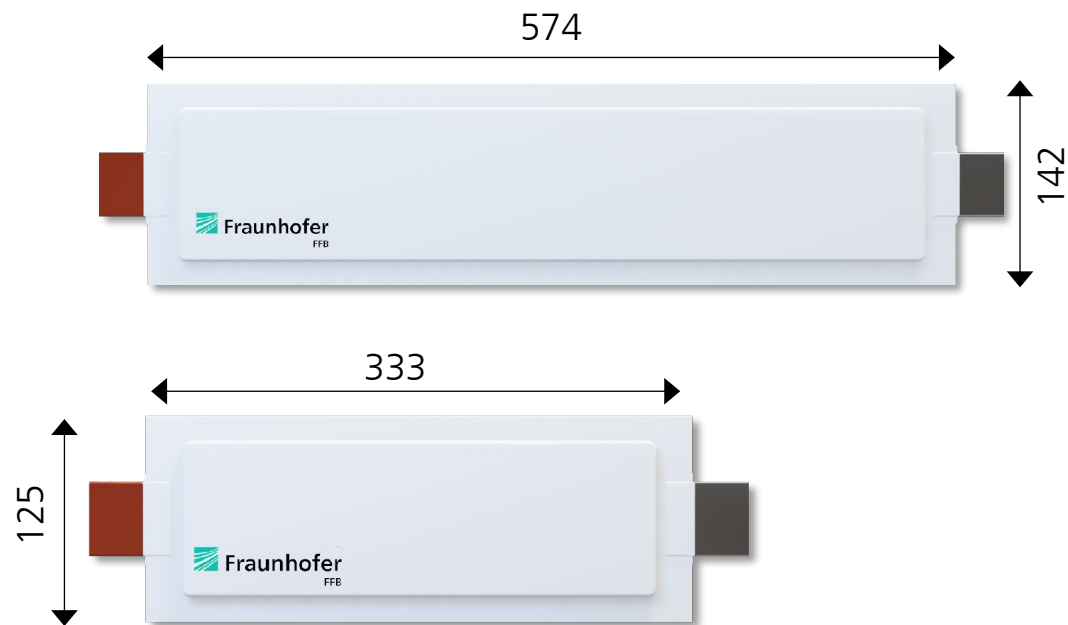
- Hybrid filling for prismatic hardcase and pouch cell
- filling in vacuum
- overpressure possible



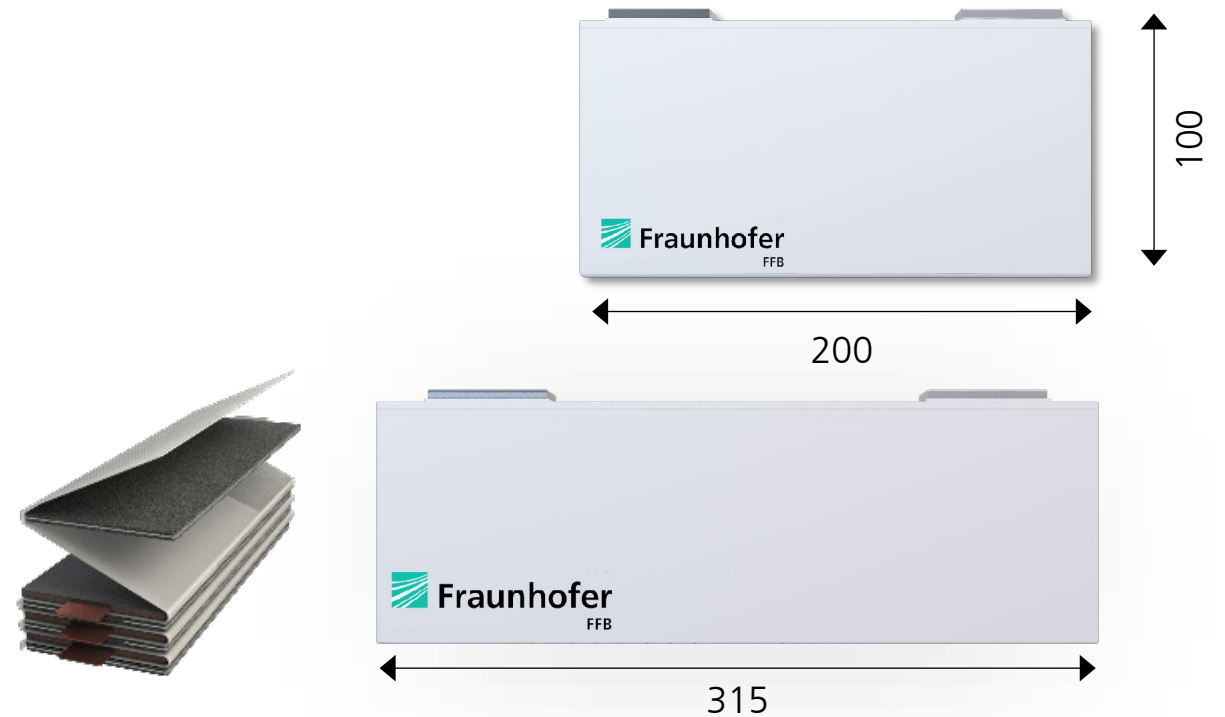
# »FFB PreFab« of the Fraunhofer FFB

## Pouch and Prismatic Cell Concepts

Pouch



Prismatic



# HORIZON-CL5-2025-04-D2-01:

Development of Sustainable and Design-to-Cost Batteries with (Energy-)Efficient Manufacturing Processes and Based on Advanced and Safer Materials

Manufacturing processes  
within scope of Fraunhofer FFB



Looking for partners



Innovative **cell production processes** at FFB:

- ✓ **Dry or aqueous processing** technologies
- ✓ **Advanced electrode drying** processes
- ✓ **Improved cell formation** processes and aging protocols
- ✓ **Fully digitized** line with high grade analytics + **sheet-based traceability**
- ✓ Improved **energy efficiency of processes in dry rooms**

**Looking for partners** in the field of:

- Automotive sector (OEMs)** to define target requirements
- Material** producers (LFMP, HLM Oxides, Na-Ion, Electrolytes)
- Integrators on **module and system level**
- Equipment manufacturers**

Thank you for your attention!





# Funding

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