

Battery Monitoring and Roadmapping 2030+ High-Energy-Batteries from Materials to Production

Dr. Axel Thielmann
Competence Center Emerging Technologies
Fraunhofer-Institute for Systems and Innovation Research ISI





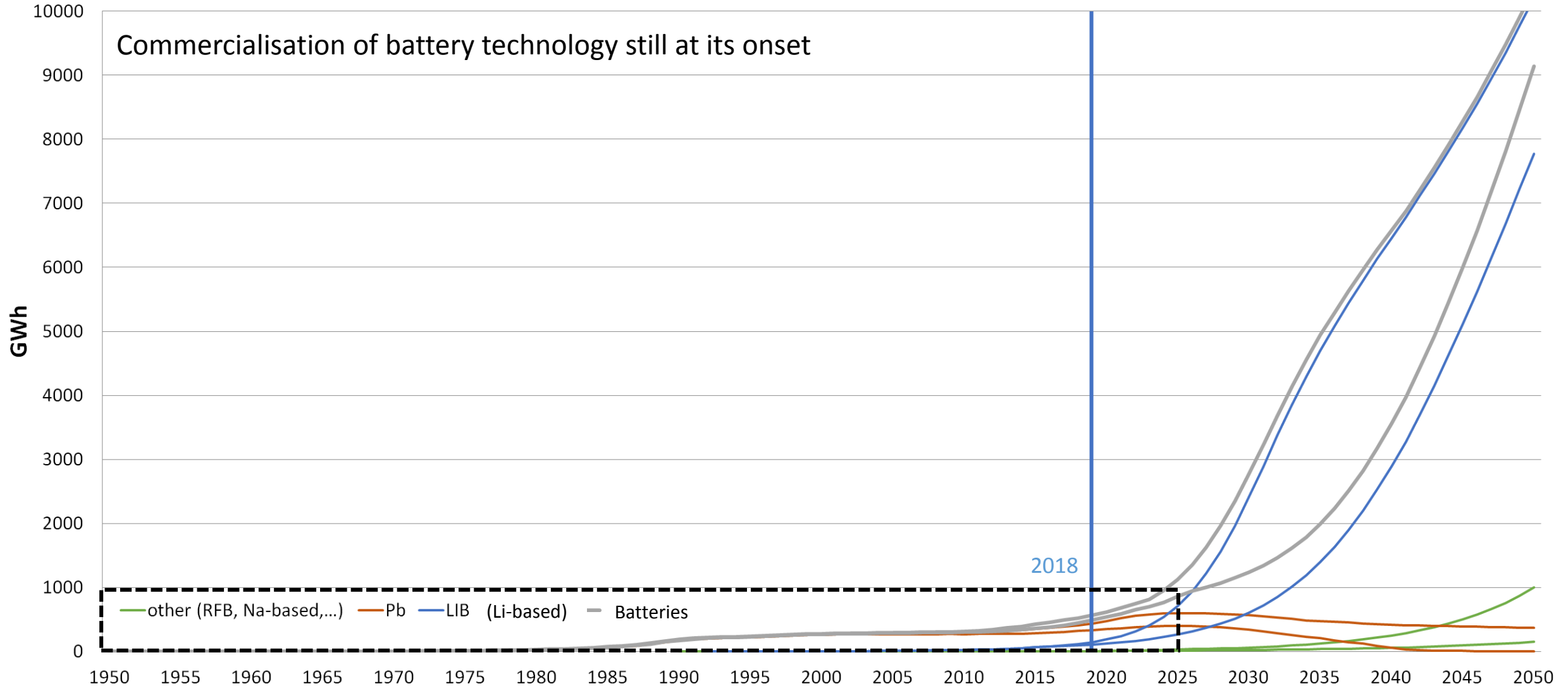
- Focused support on battery research projects by BMBF since 2009 (LIB2015, STROM, Batterie2020, ...)
- Accompanying research by Fraunhofer ISI:
 - National roadmapping since 2010
 - International monitoring since 2012
- Market and technology analysis
- Benchmarking of political, industrial and market conditions
- Identification of R&D-challenges
 - Policy, industry (SME), research

Download:

<http://www.isi.fraunhofer.de/isi-en/service/presseinfos/2017/press-release-29-2017-High-energy-batteries-2030.php>

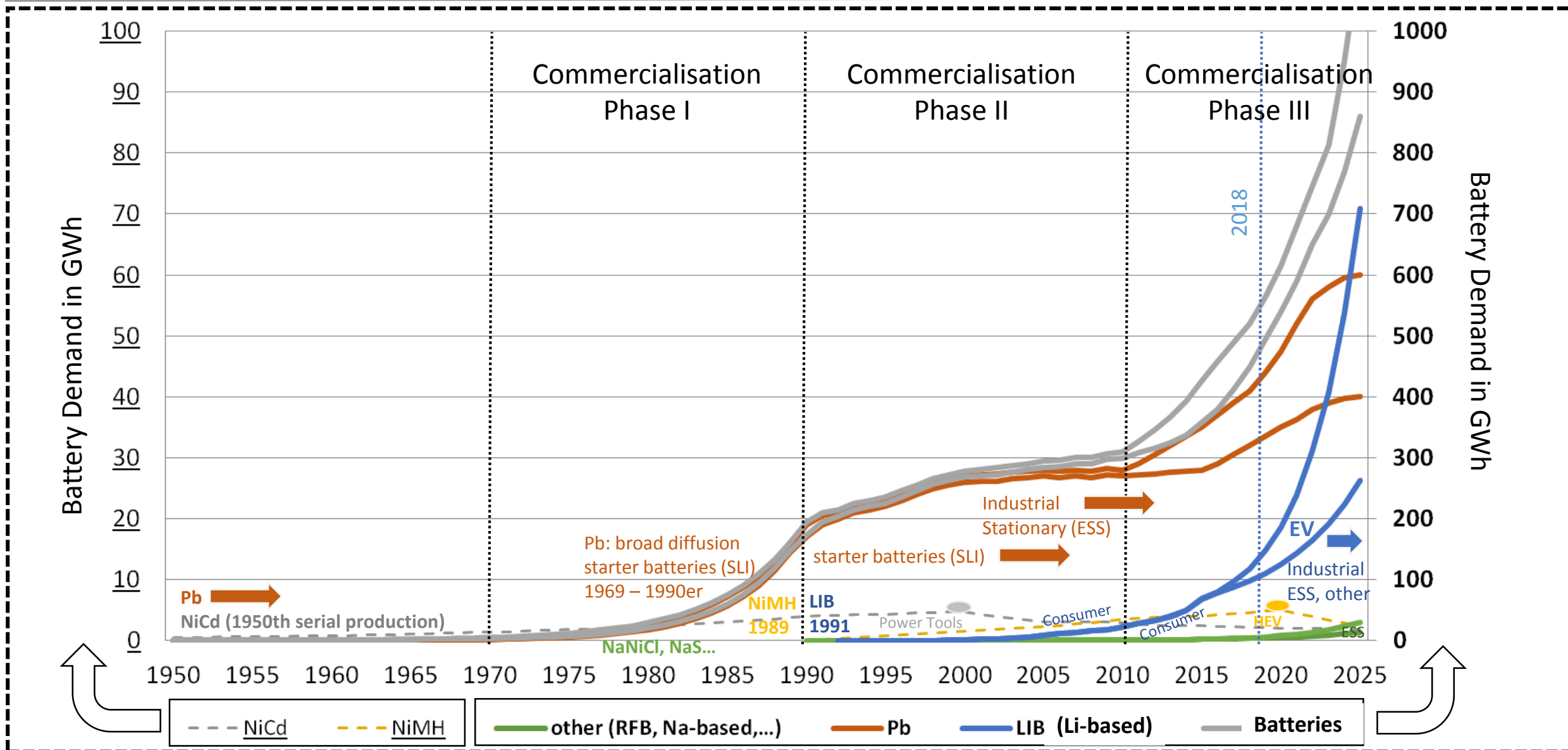
Future Monitoring and Roadmapping updates will be available at:

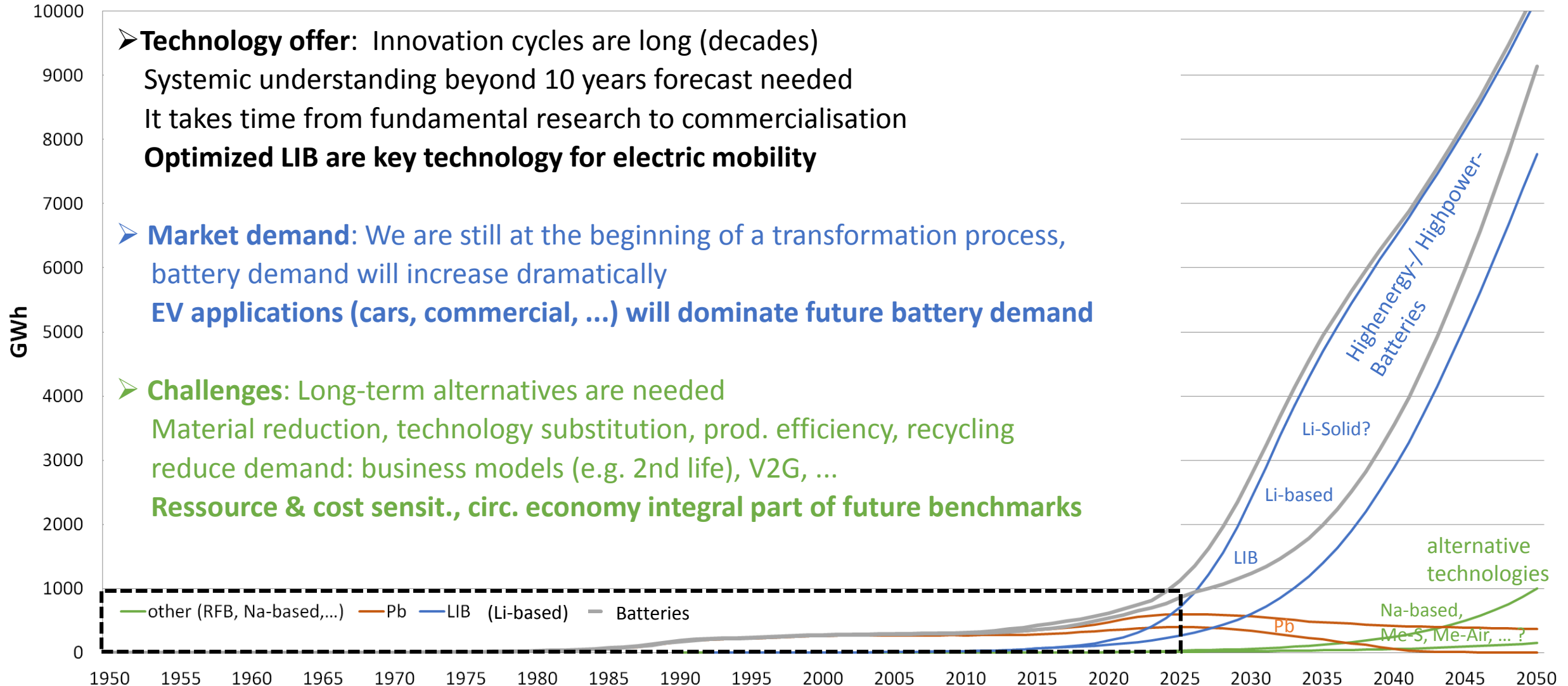
<http://www.isi.fraunhofer.de/isi-de/t/projekte/at-bema2020-batterie2020.php>



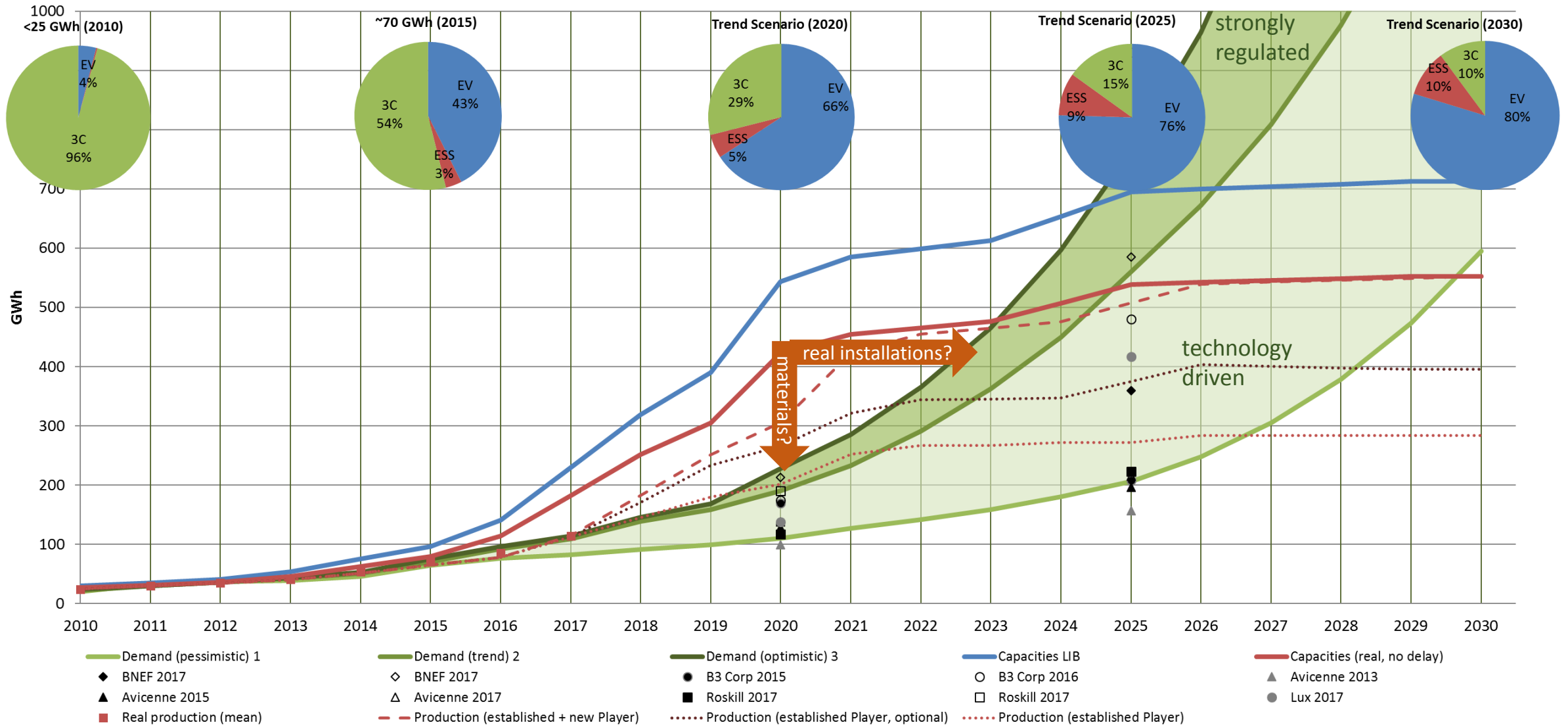
Source: Thielmann et al. 2017: Energy Storage Roadmap (update 2017) - Highenergy batteries 2030+ and prospects for future battery technologies, Fraunhofer ISI 2017.

Historical development of the global battery demand and future scenarios (1950-2025)

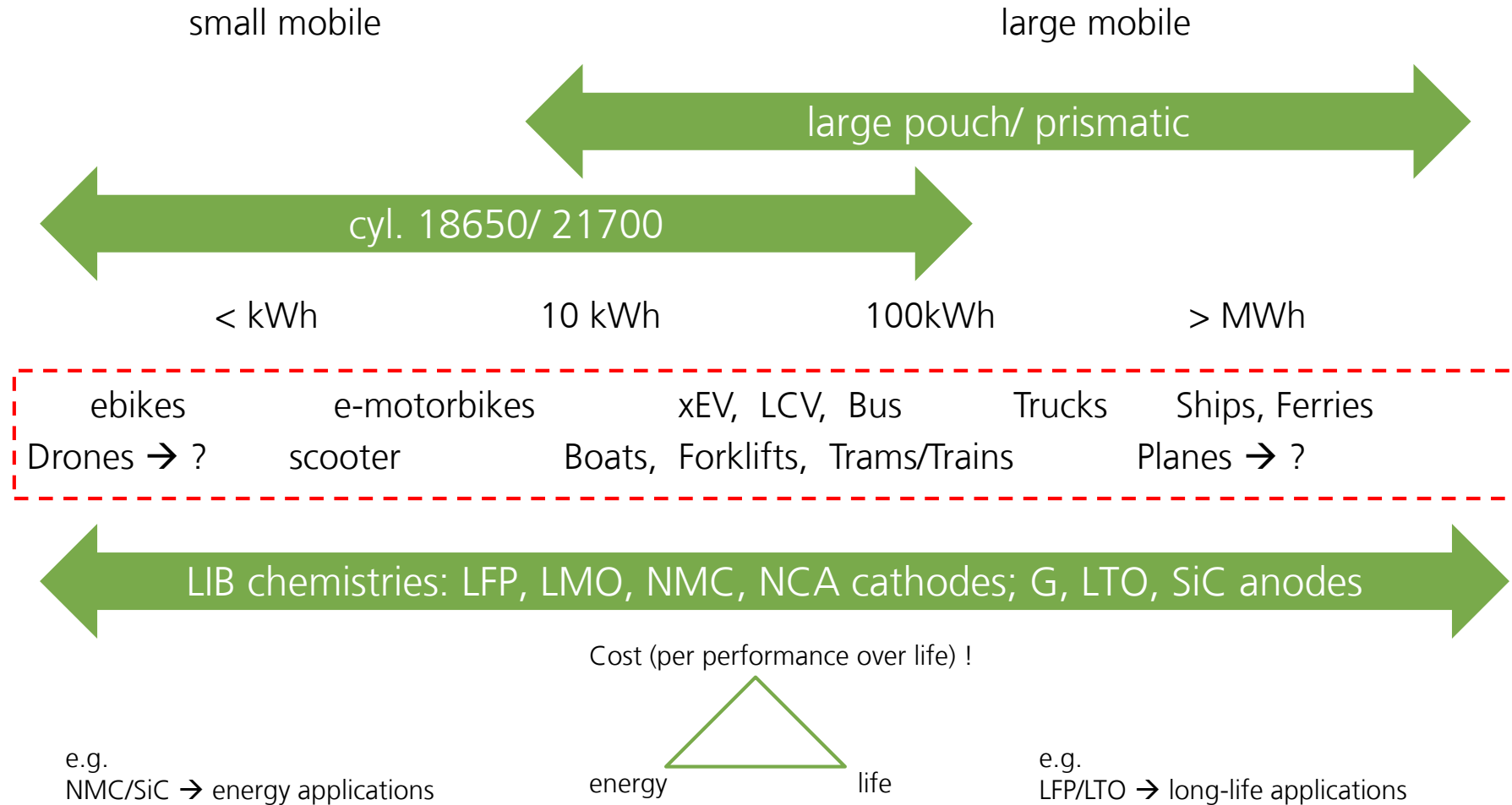




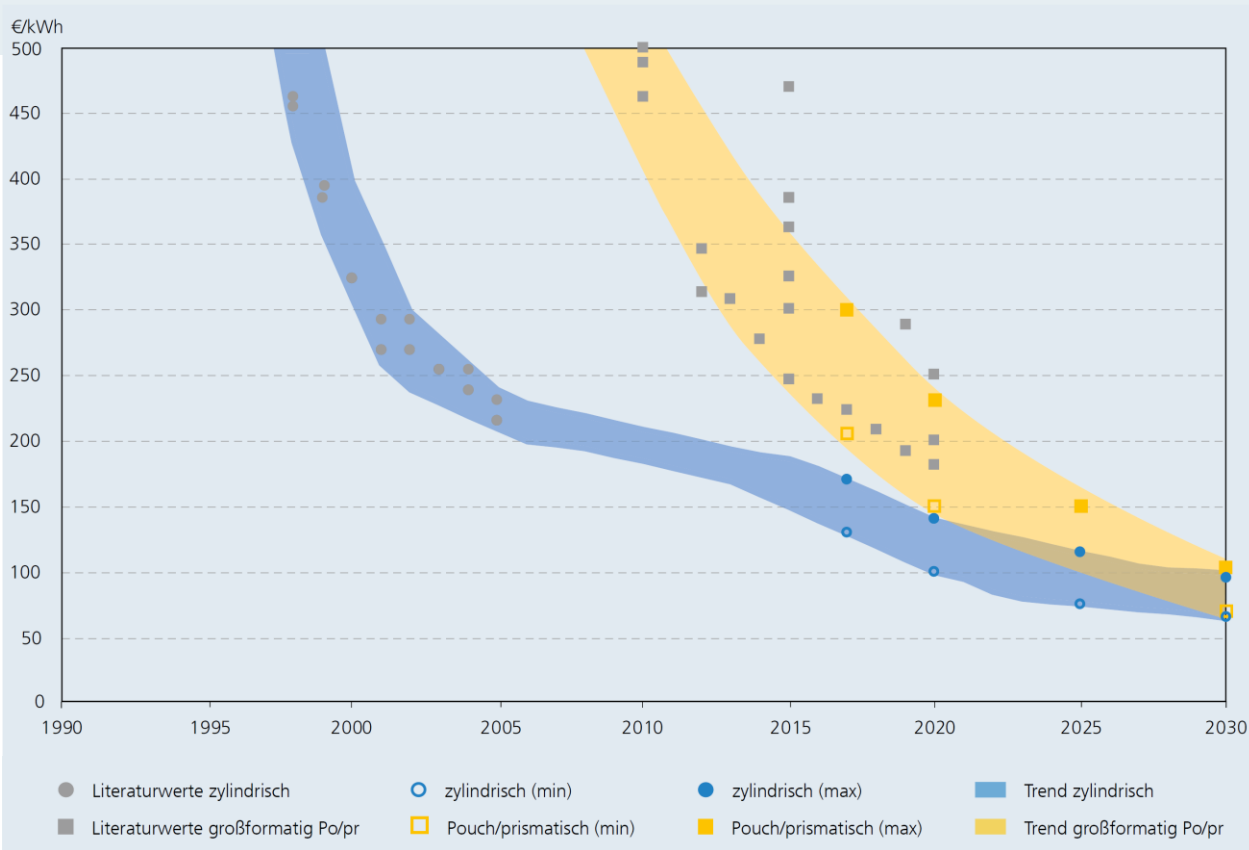
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Development of LIB cell costs (€/kWh) by cell format (cylindrical vs. large format prismatic, pouch)

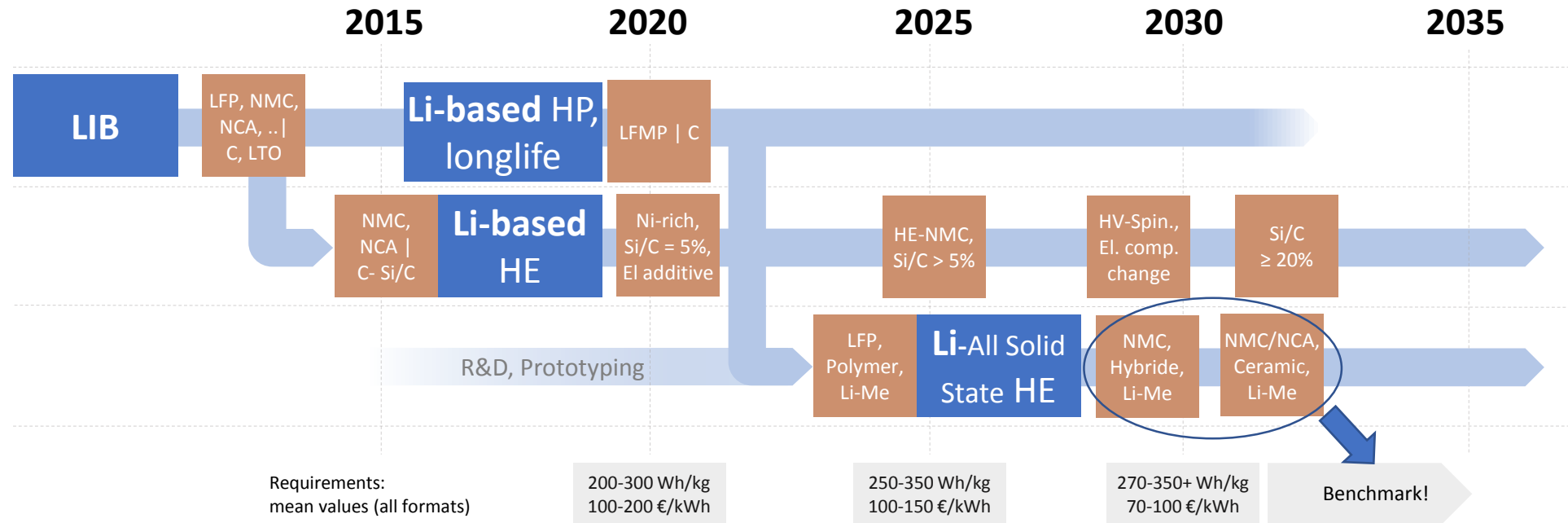


Development of vol. energy density (Wh/l) for LIB cells by cell format (cylindrical, prismatic, pouch)

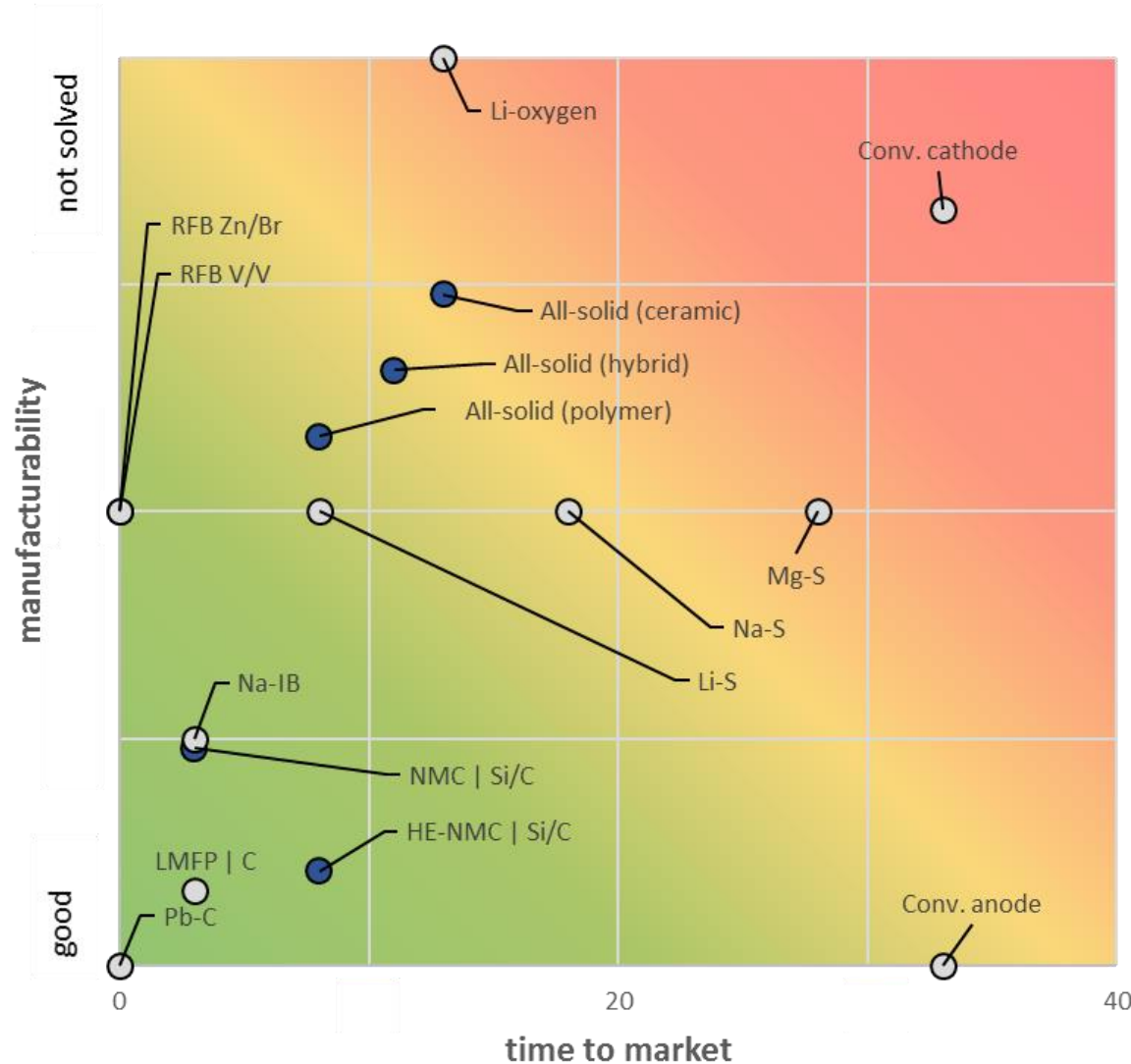


- energy densities on cell level
- for EV integration (vol.) energy densities on module/pack/system level most relevant

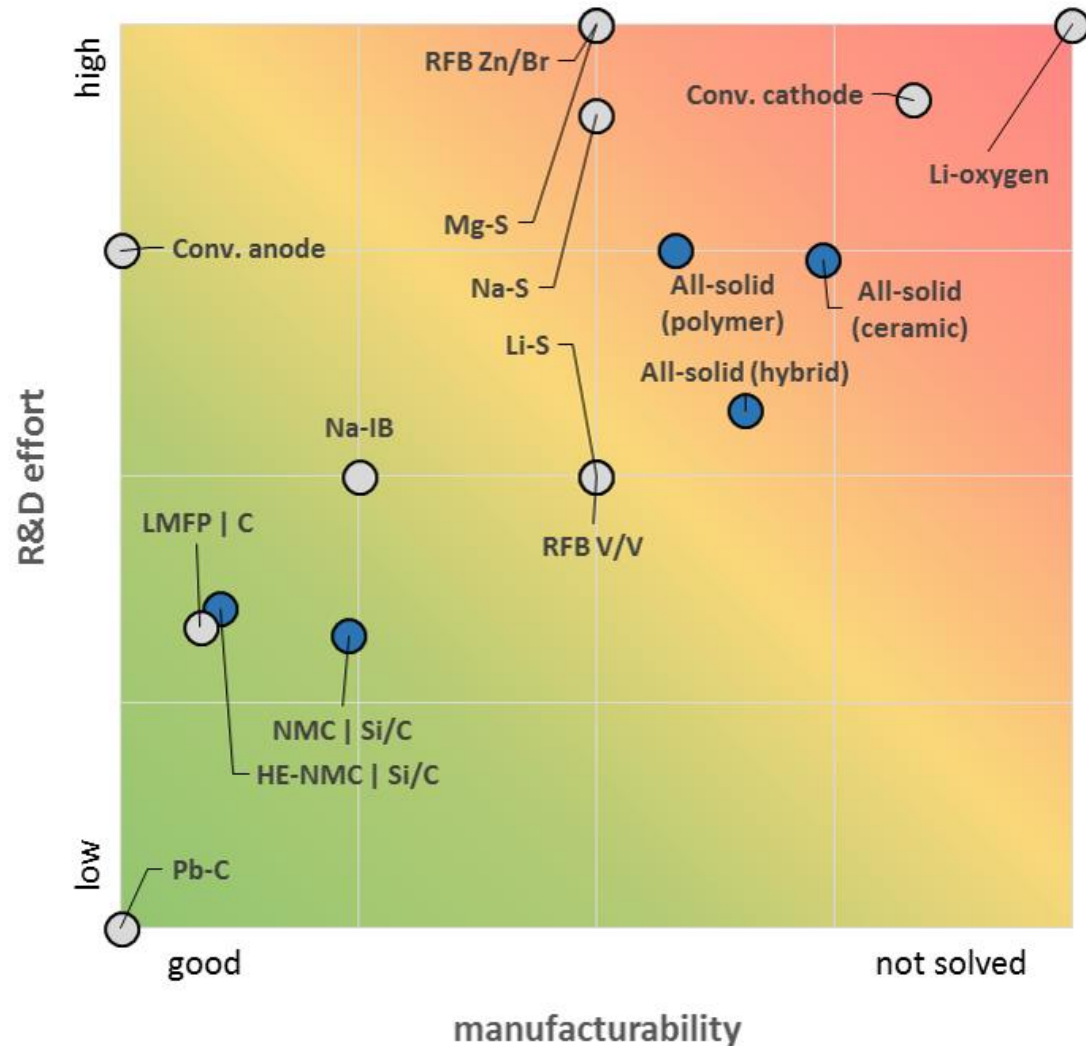
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- Technology development for HE-automotive batteries by changing gradually the cell components (cathodes, electrolyte/separator, anode)
- Towards solid electrolyte (solid state) batteries with Li-Me-Anode and HE-cathode



- **Short-term:** Drop-in of new materials / components compatible to existing infrastructure. **Optimized HE-LIBs.**
- **Mid-term:** Gradual introduction of **HE-all-solid-state batteries** (e.g. for high safety requirements). Manufacturability of cells with solid electrolyte not yet given.
- **Accompanying:** Post-LIB batteries for niche-applications (e.g. ESS, cheap consumer, aviation). Not suitable for xEV.



- Li-air, conversion materials based batteries, etc. need disruptive solution!
- Na-IB: parallel development to LIBs possible, but intrinsically lower energy densities
- grey: batteries with lower energy throughput (energy density and cycles) compared to Li-based batteries
 - USP: low cost, raw materials
- blue: automotive relevant high-energy Li-based batteries
 - optimized LIB (NMC, Si/C)

Fraunhofer ISI BEMA 2020 - project team

(BMBF-funding code 03XP0040B)

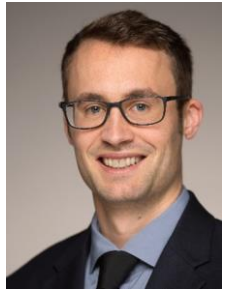
Dr. Axel Thielmann (project lead, senior scientist)

Deputy head Competence Center Emerging Technologies,
Head of business unit Industrial Technologies
Fraunhofer Institute for Systems and Innovation Research ISI
Breslauer Straße 48 | 76139 Karlsruhe, Germany
Phone: +49 721 6809-299 | Email: axel.thielmann@isi.fraunhofer.de



Dr. Christoph Neef (senior scientist)

Competence Center Emerging Technologies
Fraunhofer Institute for Systems and Innovation Research ISI
Breslauer Straße 48 | 76139 Karlsruhe, Germany
Phone: +49 721 6809-350 | Fax: +49 721 6809-315
Email: christoph.neef@isi.fraunhofer.de



Dr. Tim Hettesheimer (senior scientist)

Competence Center Energy Technology and Energy Systems
Fraunhofer Institute for Systems and Innovation Research ISI



Dr. Henning Döscher (senior scientist)

Competence Center Emerging Technologies
Fraunhofer Institute for Systems and Innovation Research ISI



Karin Herrmann (assistant)

Competence Center Emerging Technologies
Fraunhofer Institute for Systems and Innovation Research ISI



Prof. Dr. Martin Wietschel

Deputy head Competence Center Energy Technology and
Energy Systems, Head of business unit Energy Economy
Fraunhofer Institute for Systems and Innovation Research ISI

