



Innovative Insurance Solutions for Renewable Energy

Munich Re Green Tech Solutions

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Munich Re Green Tech Solutions

Organisational Structure



Established Renewables

- Solar Energy
- Wind Energy
- Inverter
- Tracker

Energy Storage+Efficiency

- Energy Storage
- E-Mobility
- Energy Efficiency

Innovative Technologies

- Bio Energy
- Fuel Cells
- Decontamination
- Water Treatment
- Recycling

Energy Storage System Cover & E-Mobility

Warranty types

Product warranty

Repair/replace **system components** of the covered system in case of failure

*this warranty is binary oriented, meaning that components either work or fail (i.e. do not fulfill datasheet spec)

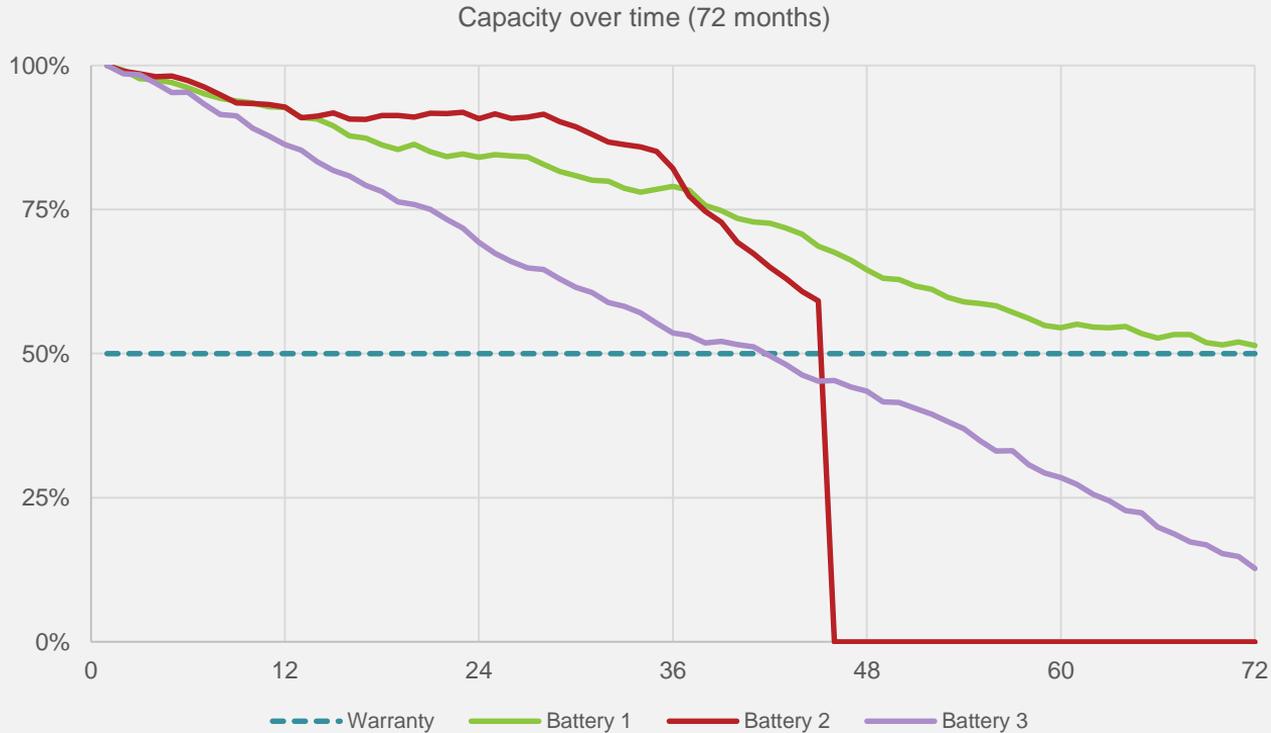
Performance warranty

Repair/replace/extend **battery modules** to achieve warranted performance

*this warranty can have various levels in terms of capacity (e.g. 70%/80%).

Battery Performance

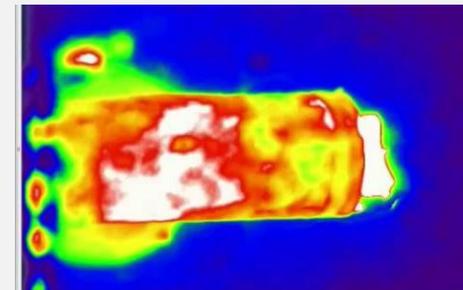
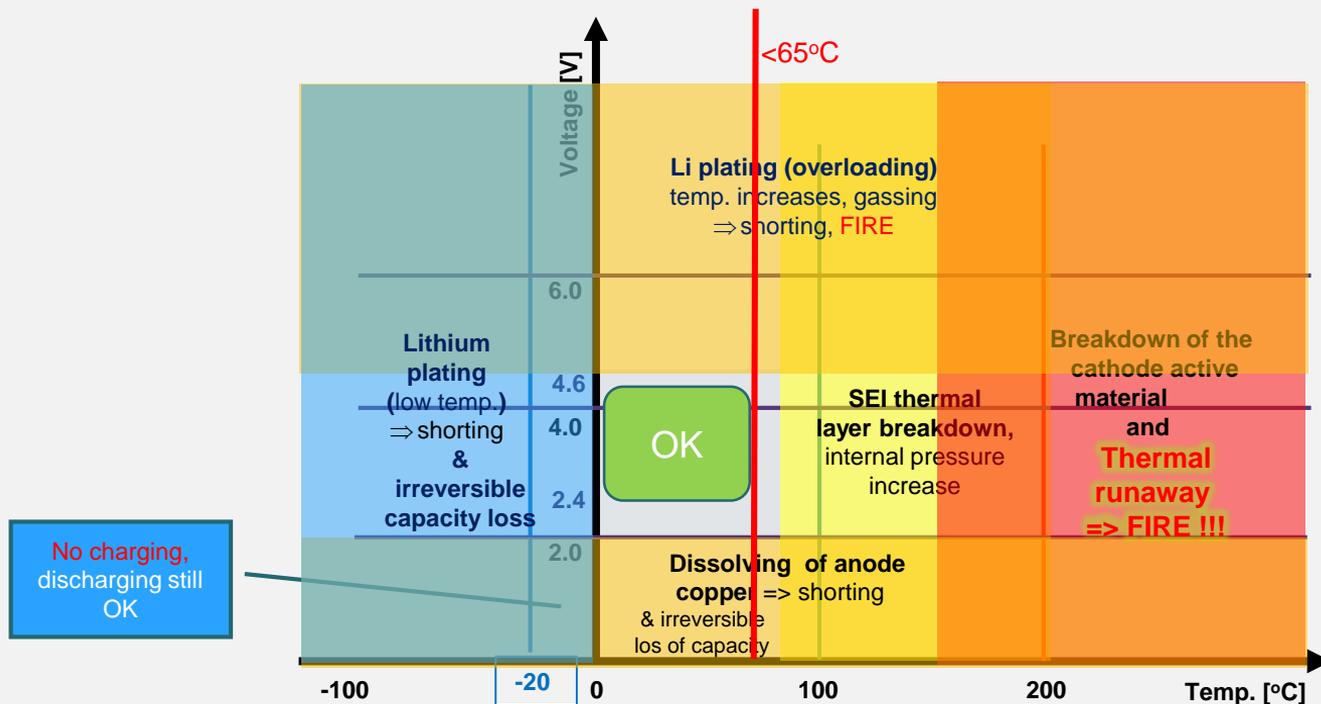
Energy Storage System (ESS) Performance Warranty Cover



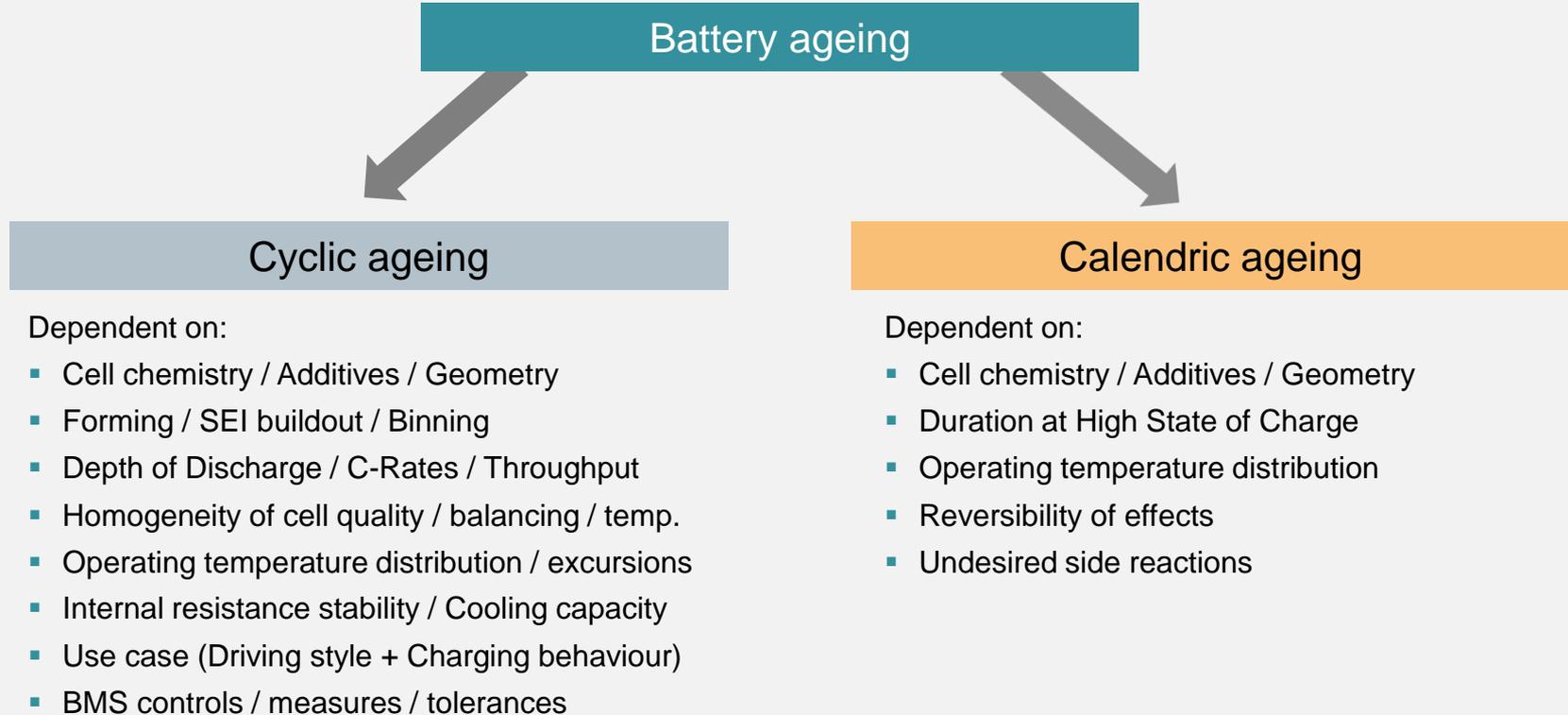
- Age: maximum number of warranted years
- Determination of failure: manufacturers sole discretion,
e.g. measurement procedure at authorized partner
- Remedies: battery repair/replacement to reach warranted level
- Exclusions: misuse, proper charging, accident, external influence, racing, etc.
- Restrictions: regular inspections (e.g. certification status)

Challenges of Fast Innovation Cycles

Lithium-ion cell operating window



SEI – Solid Electrolyte Interphase



Battery Failure Modes and Mechanisms

Unattended Operations over many years with minimum maintenance effort

- Temperature management fail / cooling capacity insufficient / inhomogeneities.
- Battery voltage or current control functions fail.
- Short-circuit in control or diagnostic cabling.
- Overcharge / deep-discharge / ground faults.
- Dirt accumulation without cleaning / minimum distance insufficient.
- Missing charge control during extended battery storage periods.
- Protection mechanisms not verified sufficiently.
- Loss of BMS function does not shut down subsystems into a safe state.
- Software updates not harmonized across subsystems.

- Design and production certified on the basis of the latest qualification standards
- Functional safety verified in design and installation
- Continuous monitoring and reporting
- Installation and maintenance according to manuals

Further information and contact at: <http://www.munichre.com/battery>

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