Energy Storage Bankability: Safety, Performance and the Role of Insurance

Jay Goldin
Vice President, Green Tech Solutions
jgoldin@munichre.com
March 4, 2020
Green Tech Solutions within Munich Re
The world’s largest reinsurer’s financial strength at your side

Munich Re (Group)

- World’s largest reinsurer by premium volume
- Founded in 1880
- Group Result 2019: €2.7 billion
- Approx. 41,000 employees

Rating

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<th>Rating</th>
<th>A.M Best</th>
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<th>Moody’s</th>
<th>S&amp;P</th>
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<td>AA (Very Strong)</td>
<td>Aa3 (Excellent)</td>
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Green Tech Solutions

- **Pooling expert resources** and know-how in the field of renewable energies and energy efficiency
- **Risk transfer solutions**, covering the performance of new, disruptive, and unproven technologies, are developed and deliver **technical endorsement, bankability and business enabling results** to all project stakeholders
Green Tech Solutions
Portfolio

Established Renewables

- Solar Energy
- Wind Energy

Energy Efficiency Technologies

- Electric Energy Storage
- LED
- Energy Savings
- Air Conditioning / Heating
- Sustainability Improvements

Disruptive Technologies

- Bio Energy / Waste to Energy
- Decontamination
- Fuel Cells
- Water Treatment
- Efficient Resource Extraction
Energy Storage Projects: Roles for Risk Transfer

- OEM
- Integrated Systems
- Developers
- Site Hosts
- Utilities

- Warranty Insurance
- Performance Insurance
- Property & Casualty Insurance
What could possibly go wrong?

Key Risks for a Storage System

Performance: aging batteries
Integration: software and controls
Chemical: fire, contamination
Operational: maintenance
Regulatory: tariffs, incentives
Financing: developer goes away
Supplier: warranty fulfillment
Good risk management is based on solid engineering analysis & maintenance

Failure Mode Effects Analysis
Manufacturing inspection
Maintenance Plan

Loss Control Engineering Report
Site analysis
Design analysis
Maintenance Plan

“Two Sides of the Same Coin”
IMIA is a network of experts in Engineering Insurance from around the world who share experiences, investigate and discuss emerging and critical issues and elaborate papers discussing all kinds of topics of Engineering Insurance.

Swiss Re  Munich Re  Zurich  HDI Global
Scor  Ceerisk  Helvetia  QBE

Report scope:
• Types of storage & Use cases
• Risk Assessment and loss events
• Codes & Standards
• Life potential, Wear and tear, equipment breakdown
• Underwriting check list and clauses

Report Here:
VDE: Breaking down the risk in energy storage

“It’s not a total loss, but it’s not working right”

First Step: Identify Project Participants and Obligations

Supply it
- Software
- Battery
- PCS/Inverter
- HVAC
- Enclosure

Put it together
- Integrated System Vendor
- Engineering
- Procurement
- Construction

Own & Run it
- Developer / System Owner
- Financing Entities

Use it
- Site/Host
- Utility
- ISO/RTO
Who Bears Performance Obligations if Things Don’t Work?

**Supply it**
- Software
- Battery
- PCS/Inverter
- HVAC
- Enclosure

**Put it together**
- Integrated System Vendor
- Engineering
- Procurement
- Construction

**Own & Run it**
- Developer / System Owner
- Financing Entities
- Entities

**Use it**
- Site/Host
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LDs for Capacity
LDs for Availability & Capacity
Peak Shaving
RA, DR Availability & Response

Equipment:
- Battery
- PCS/Inverter
- Enclosure
- HVAC
- Software

Processes:
- LDs for Capacity
- LDs for Availability & Capacity
- Peak Shaving
- RA, DR Availability & Response
VDE visualization of Cash Flow, Why Bankability Matters

Investor's ROI is earned only after debt servicing

Cash flow to Bank/Lender (debt service)
- Warranties / insurance
- Quality assurance

Ensuring debt service capability through:

Quality assurance (at commissioning & after operation):
- Components conformity
- System assessment
- Commissioning
- Operation / management
- Site evaluation

Bankability

Protecting ROI through quality assurance (pre-, at commissioning & after operation):
- Design Engineering review
- Technology review & component certification
- Contract & regulatory review
- Performance evaluation and review
- Factory inspections

 Investability & Insurability
# Investment Grade

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SolarStar
Rosamund, CA

Tesla
Green Tech Expertise and Internal Resources

Competitive advantage through market and technical expertise

- Dedicated Underwriters developing innovative solutions for renewable energies and clean technologies
- Dedicated PhD Risk Analysts for solar, wind, energy storage, bioconversion
- Business Development Team located close to the markets
For further information, please contact:

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