



Reliable warranty insurance: A key metric of sustainable PV projects

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Special Enterprise Risks
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Green Tech Solutions within Munich Re

... the world's largest reinsurer's financial strength for a greener world

Munich Re (Group)

- World's largest reinsurer by premium volume
- Founded 1880
- Revenue 2016: €48.9 bn
- approx. 43,000 employees

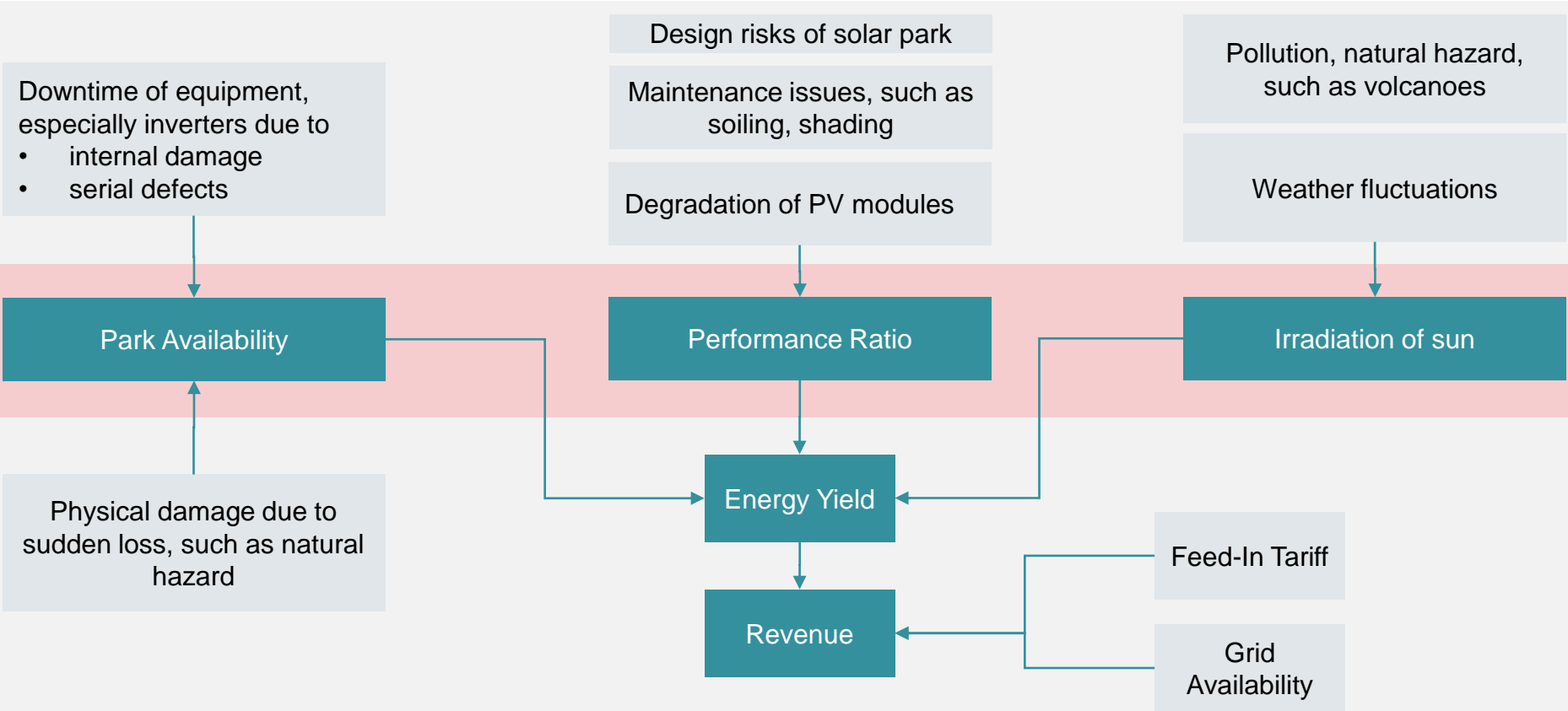
Group Results 2012 – 2016

2016	€ 2.6 bn
2015	€ 3.1 bn
2014	€ 3.2 bn
2013	€ 3.3 bn
2012	€ 3.2 bn

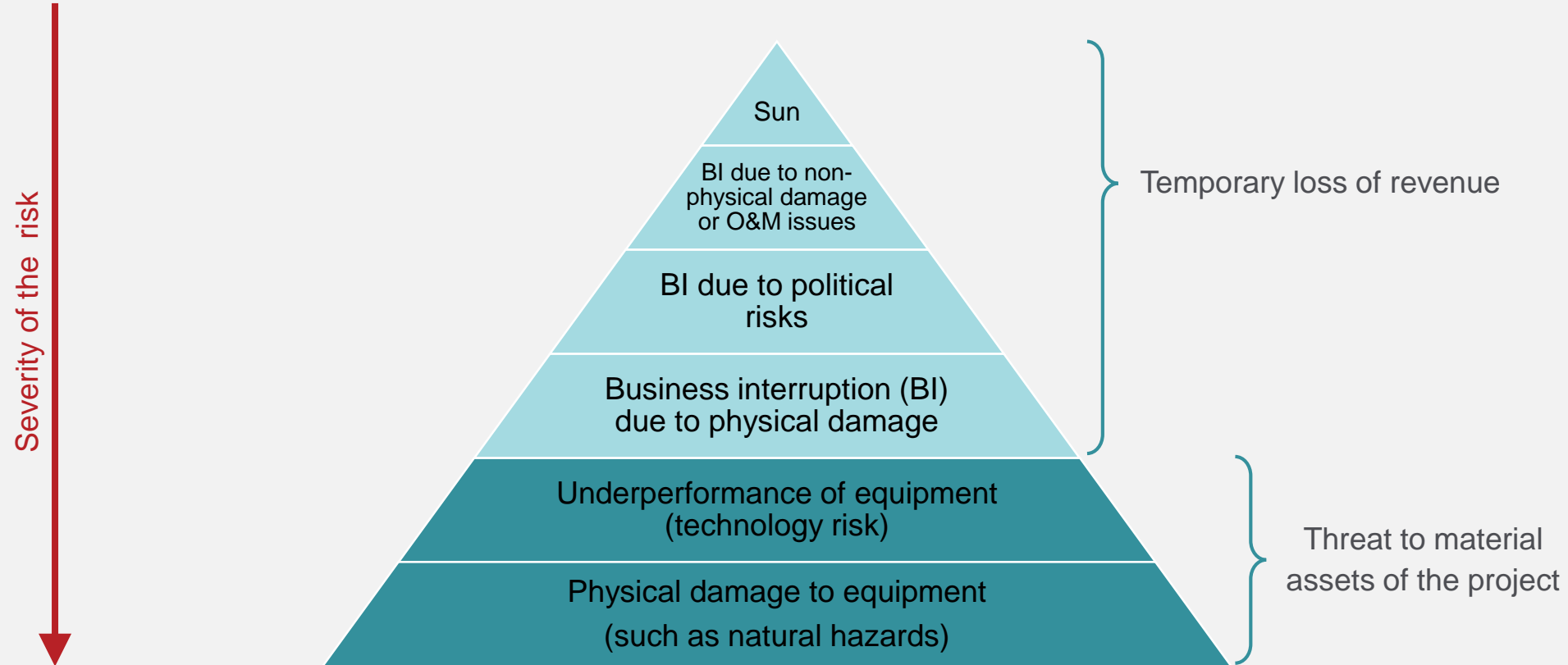


Rating		
A.M Best	A+ (Superior)	stable
Fitch	AA (Very Strong)	stable
Moody's	Aa3 (Excellent)	stable
S&P	AA- (Very Strong)	stable

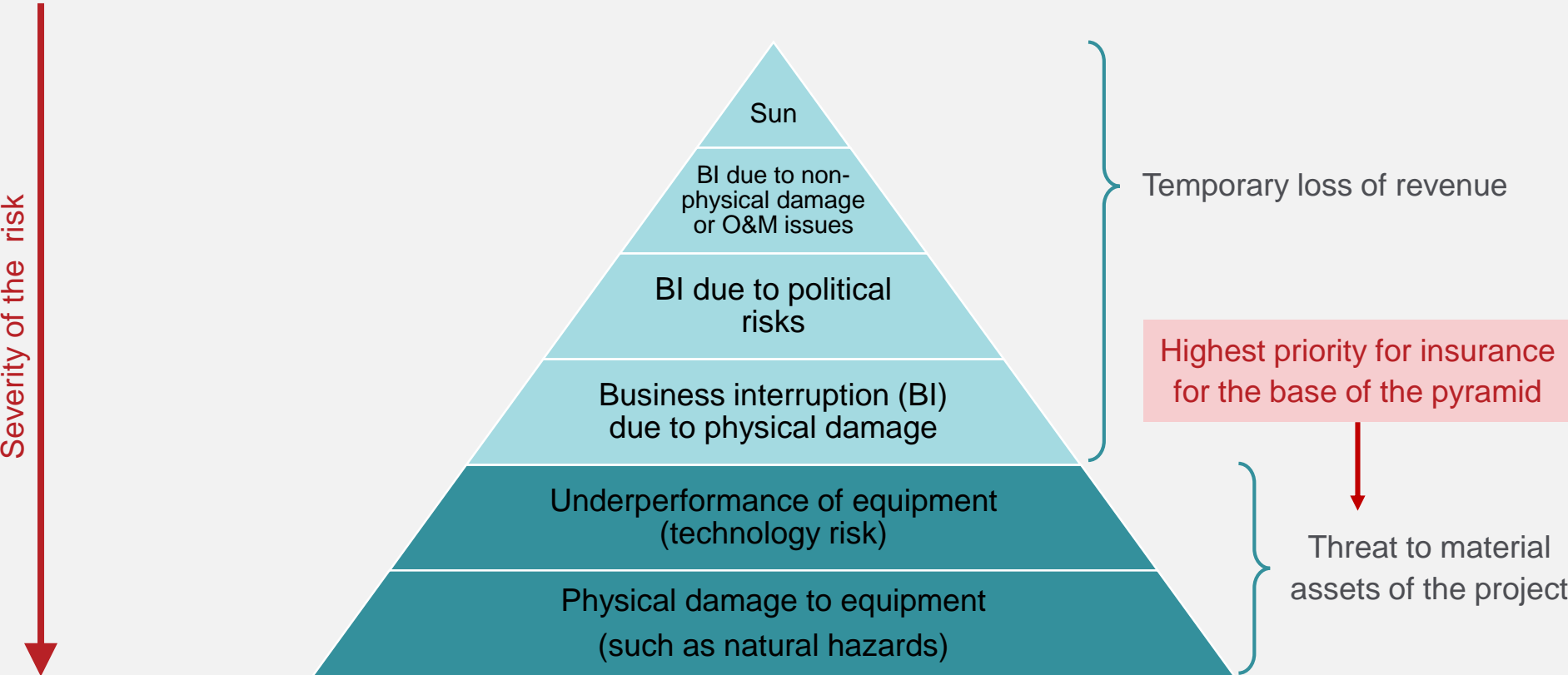
Risk diagram of a solar park during operational phase



Risk pyramid to prioritize requirement for insurance



Risk pyramid to prioritize requirement for insurance



Construction Phase

Traditional insurance solutions

- Erection All Risk (EAR)
- Delay in Start Up (DSU)

Operational Phase

Traditional insurance solutions

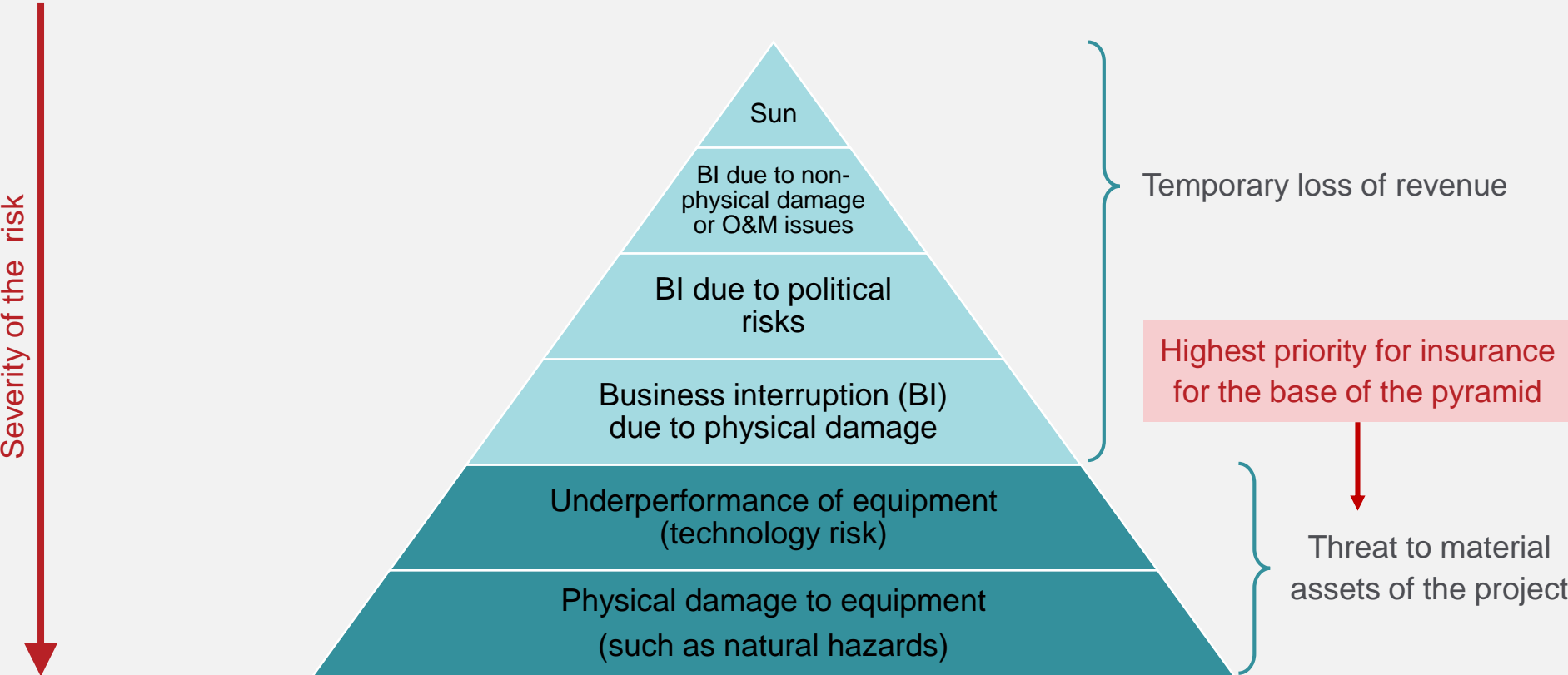
- Operational insurance policy (Physical Damage)
- Business Interruption (BI)

These insurances are annual policies.

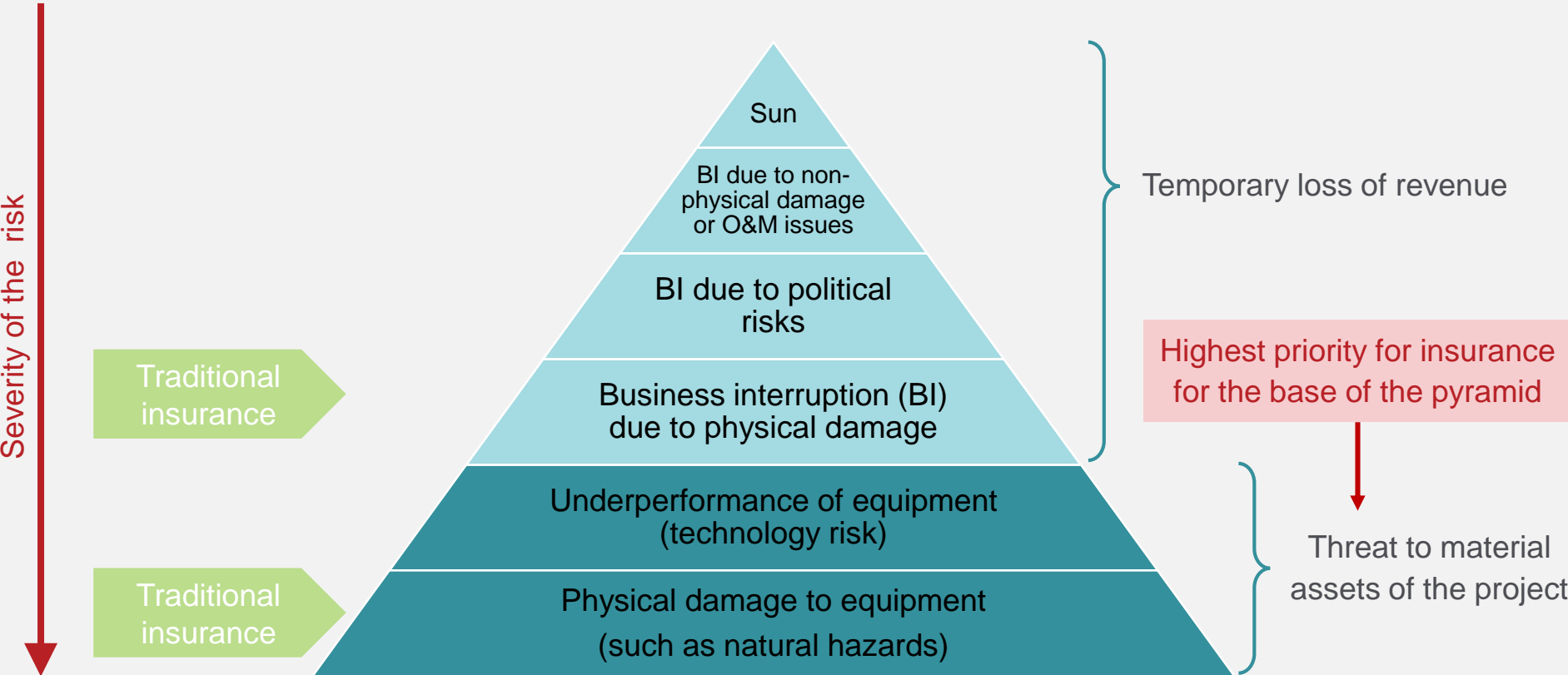
Traditional insurance solutions cover physical damage due to sudden loss and natural hazards, such as storm, earthquake, flood, fire, lightning etc.

They can also pay loss of revenue (DSU, BI).

Risk pyramid to prioritize requirement for insurance



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25 years Performance Warranty

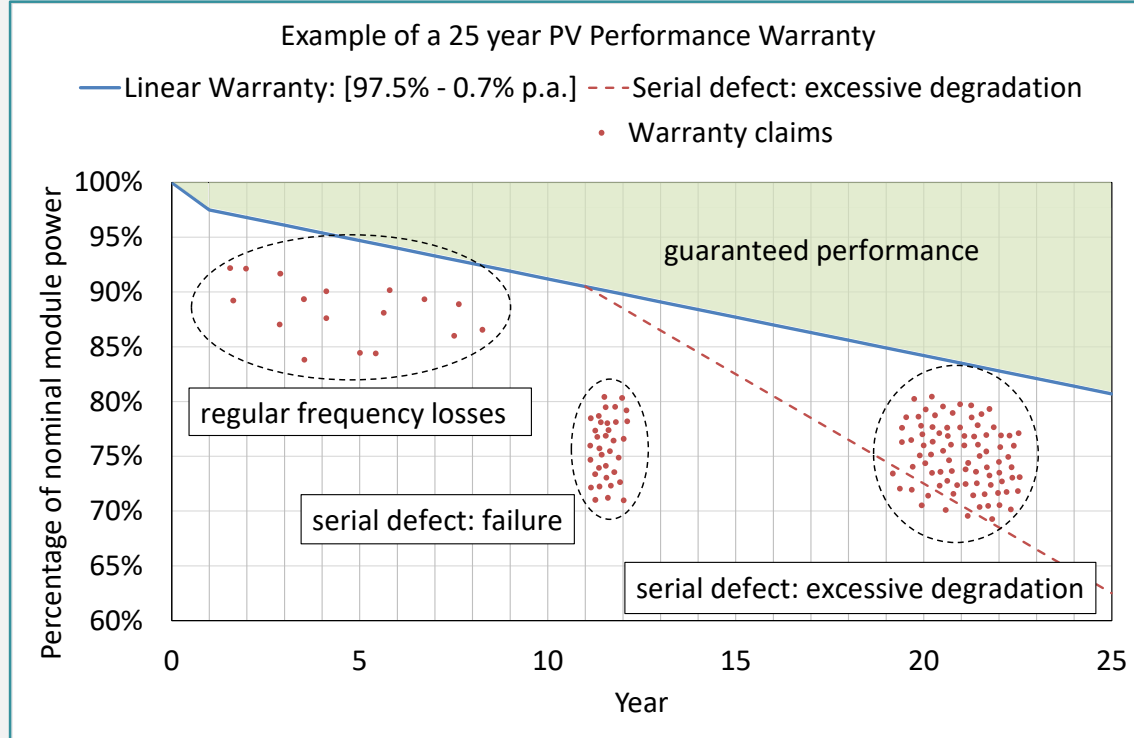
Long-term performance guarantee is required to convince investors

→ **THE** key metric of bankable PV modules

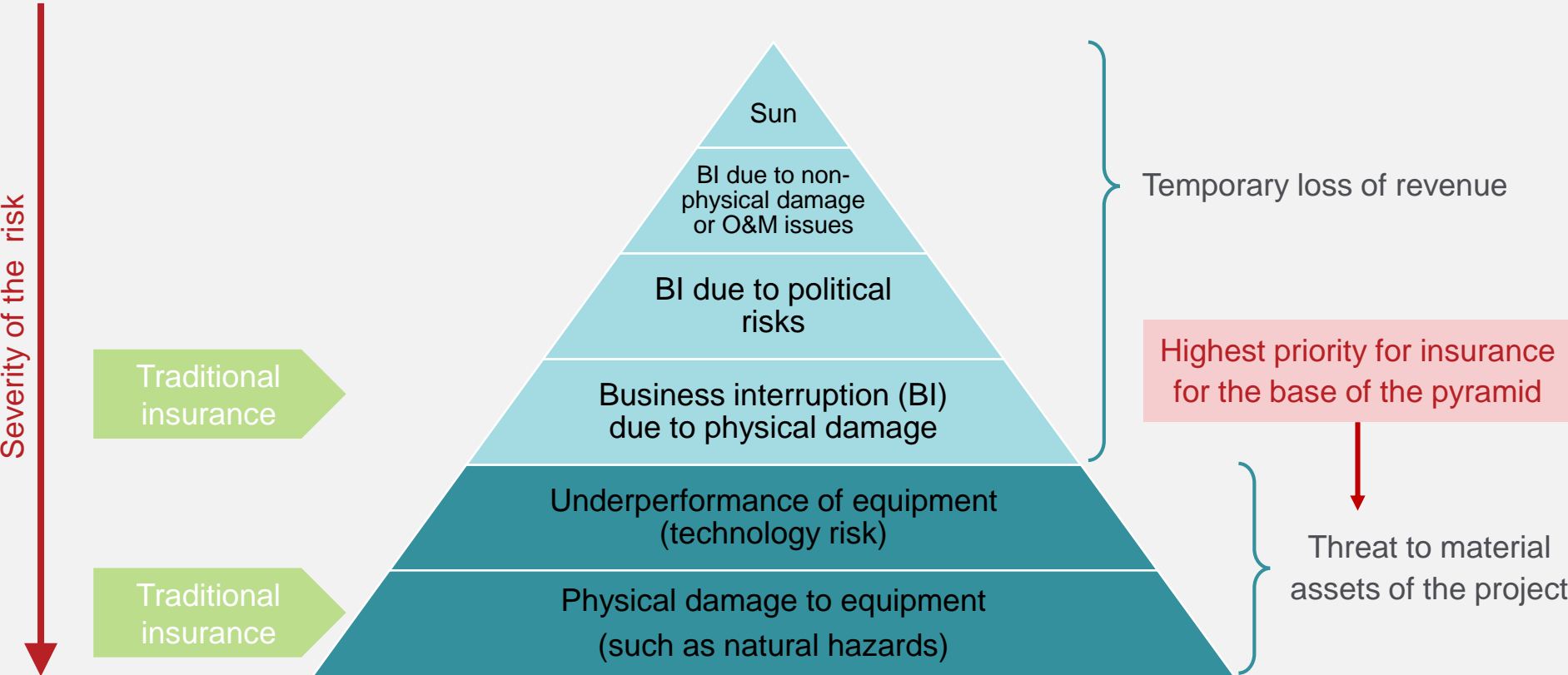
→ 25 years Performance Warranty became industry standard, **although real track record can never exist for 25 years**

→ (i) repair, (ii) replace, or (iii) compensate underperformance.

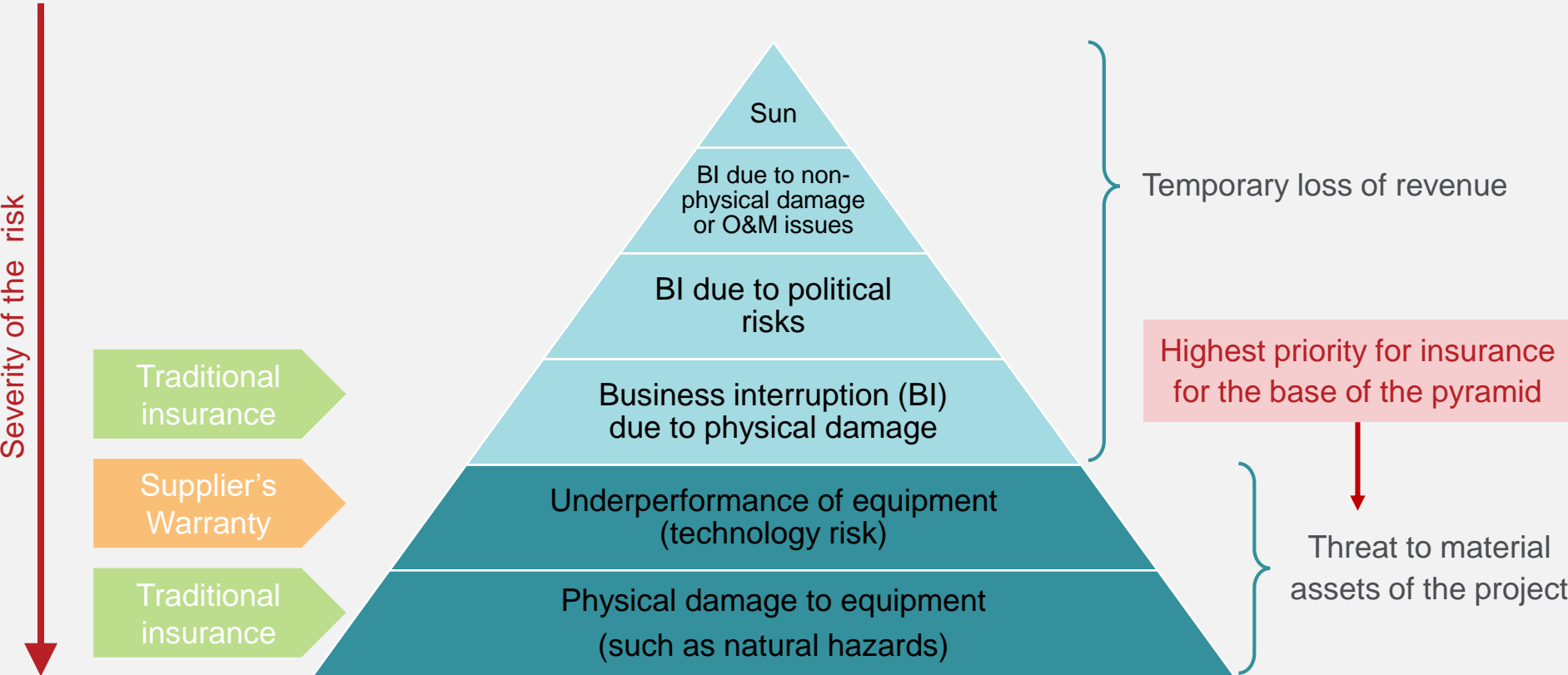
→ Getting more aggressive in the future:
→ 30 years
→ Lower degradations rates (-0.5%)
→ Include transportation, labor, etc
→ Include revenue guarantee



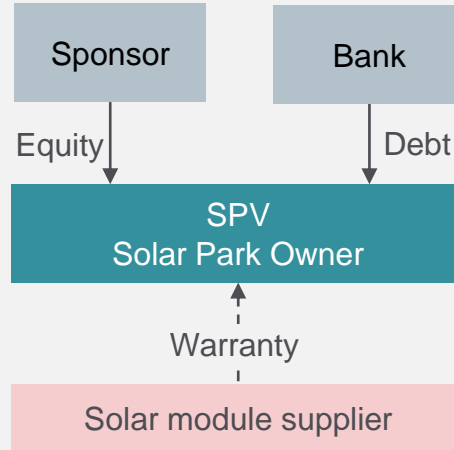
Risk pyramid to prioritize requirement for insurance



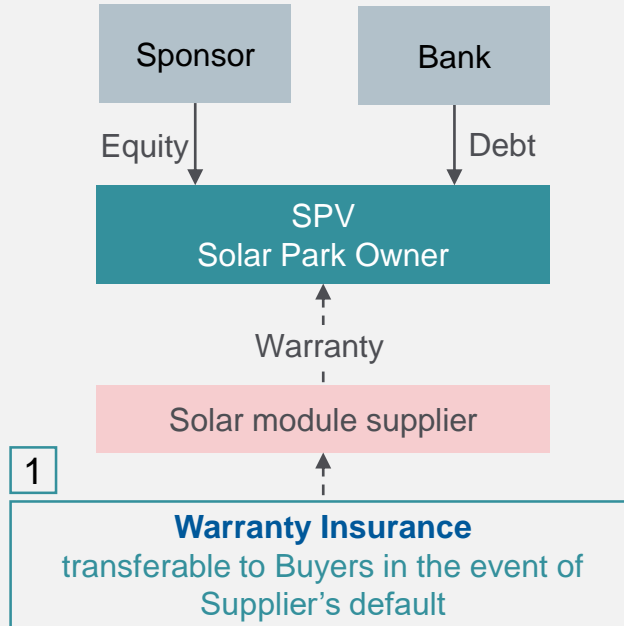
Risk pyramid to prioritize requirement for insurance

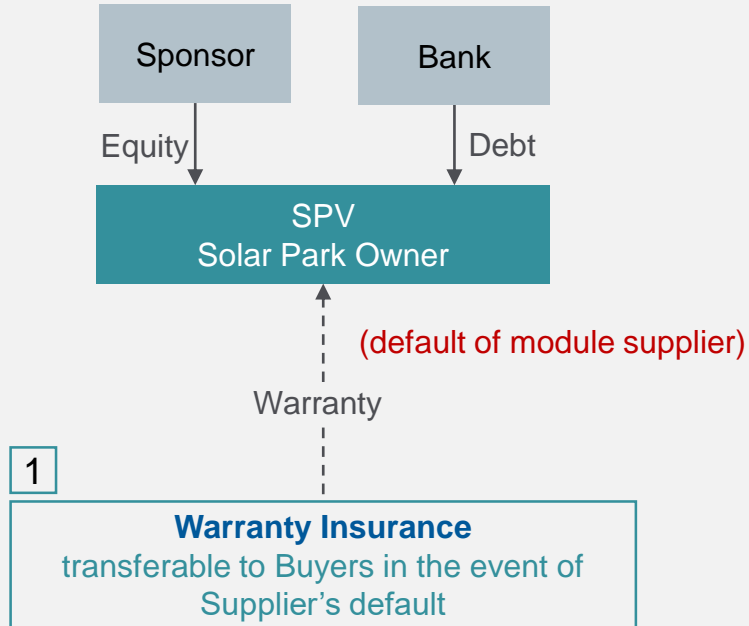


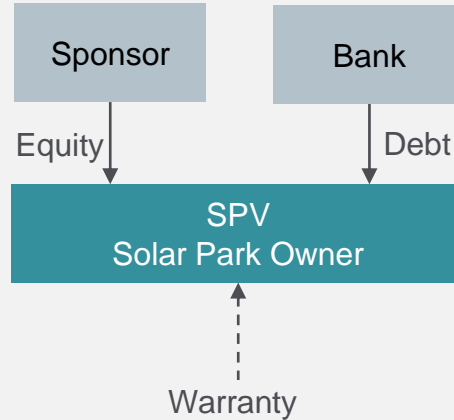
The warranty risk of solar



The warranty risk of solar







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Warranty Insurance

transferable to Buyers in the event of Supplier's default

Requirements

- limit dedicated exclusively to the SPV
- no reduction of limit in later years

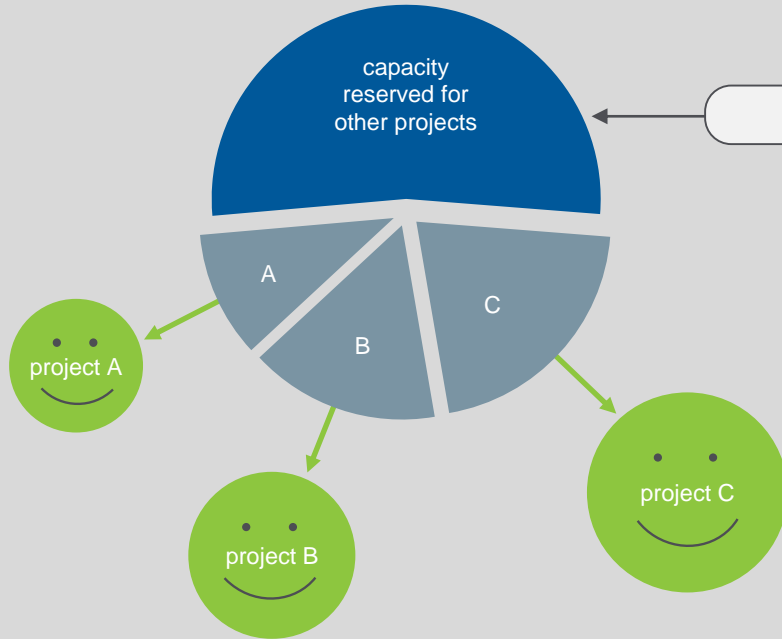
Be aware of

- very low limits
- reduction of limit in later years
- non-dedicated limits

Does module warranty insurance cover your project?

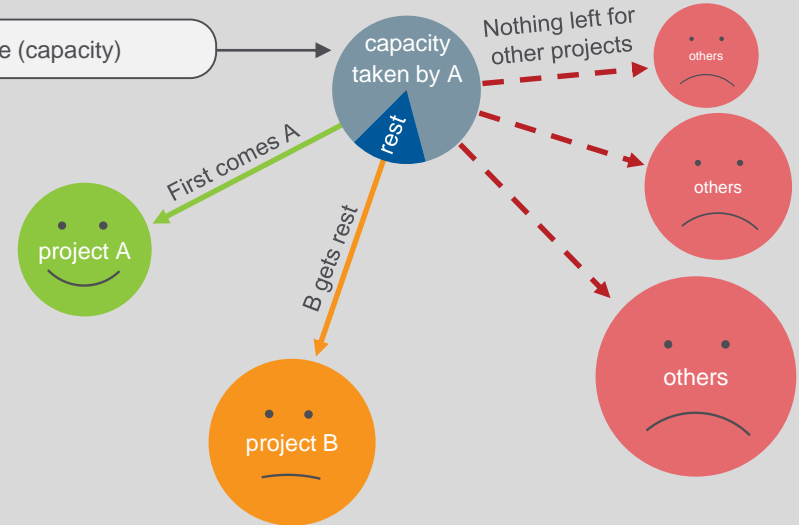
→ PV modules should carry a warranty insurance with a limit of at least 5%-10% of the park size (net of all deductibles) dedicated exclusively to the developer's solar park

High limit of insurance with dedicated portion for each project

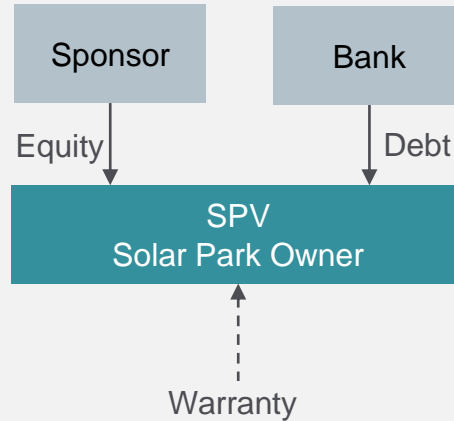


Meaningful risk-transfer for project owners gives improved bankability

Low limit of insurance accessible on a „first come, first serve“ basis



No real risk-transfer for project owners



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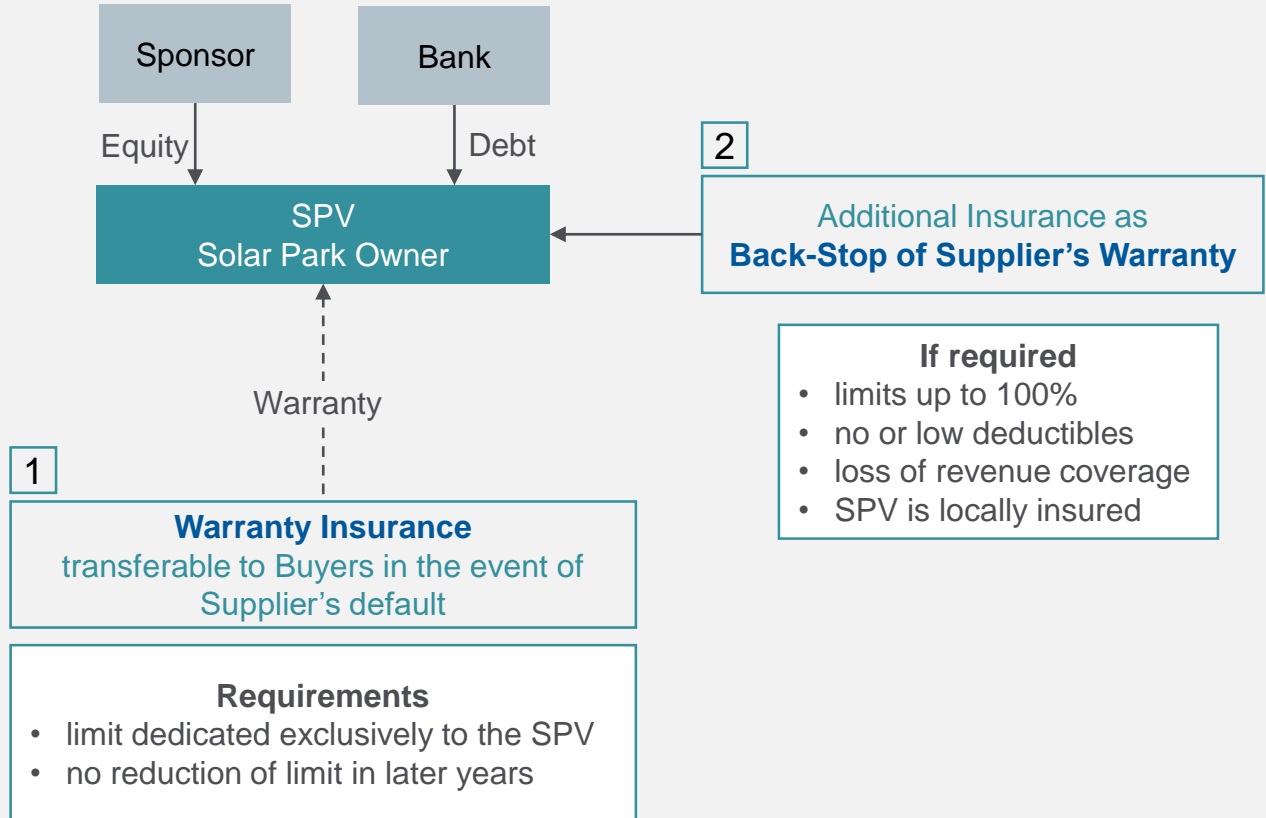
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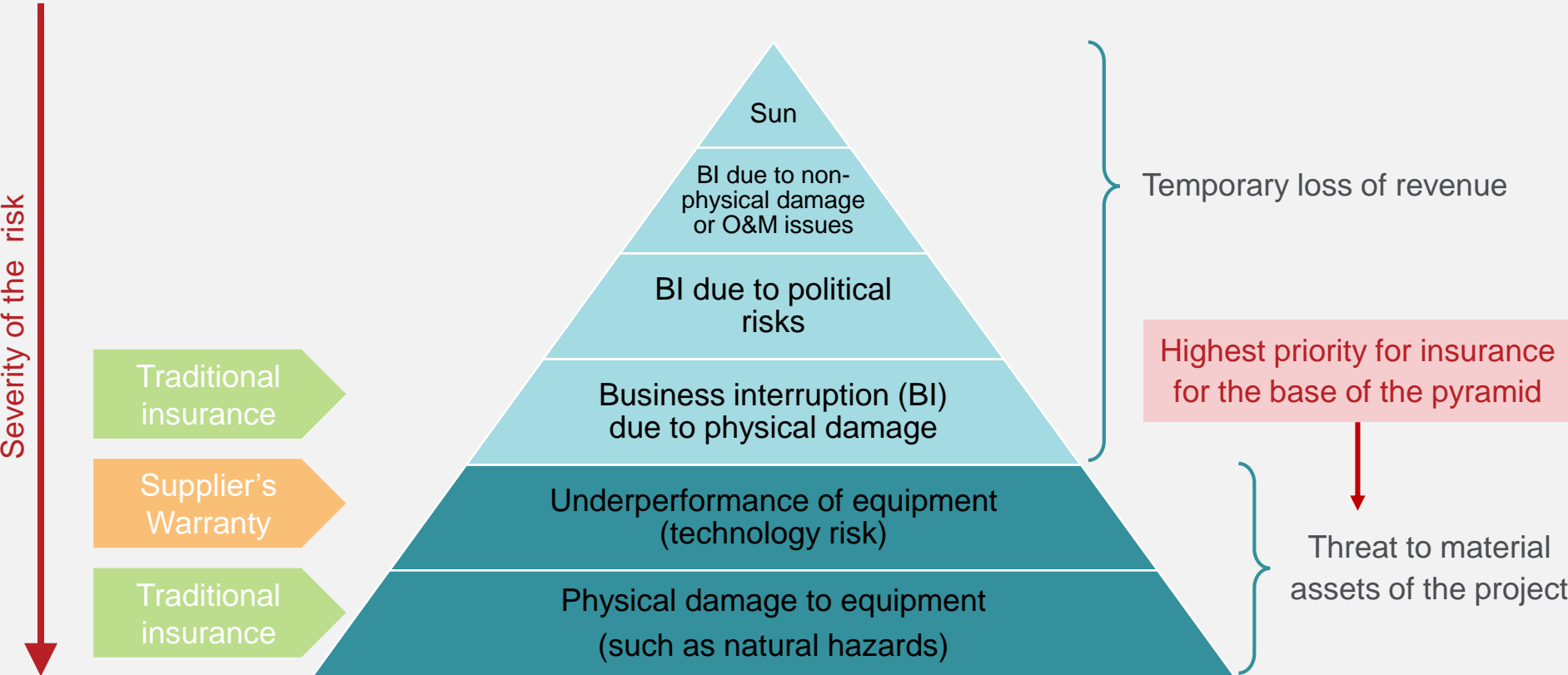
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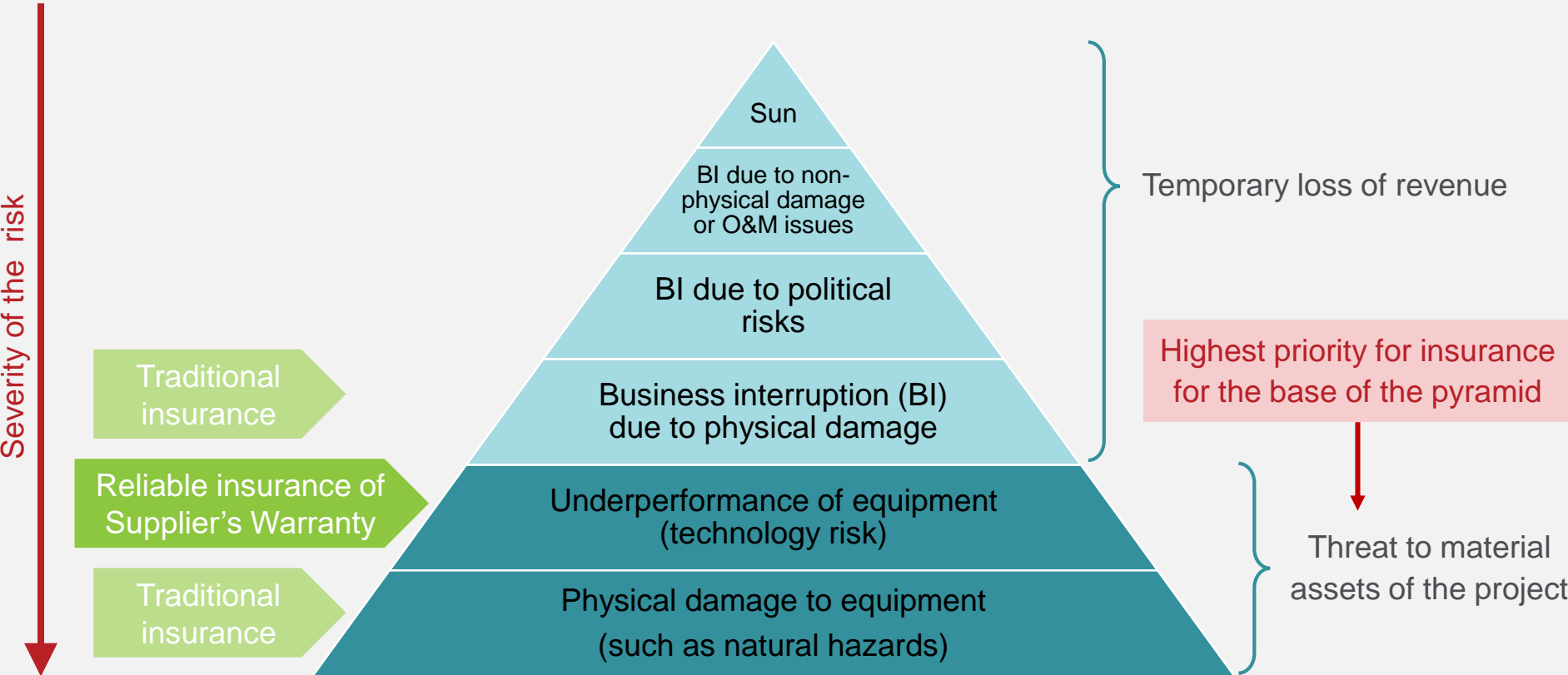
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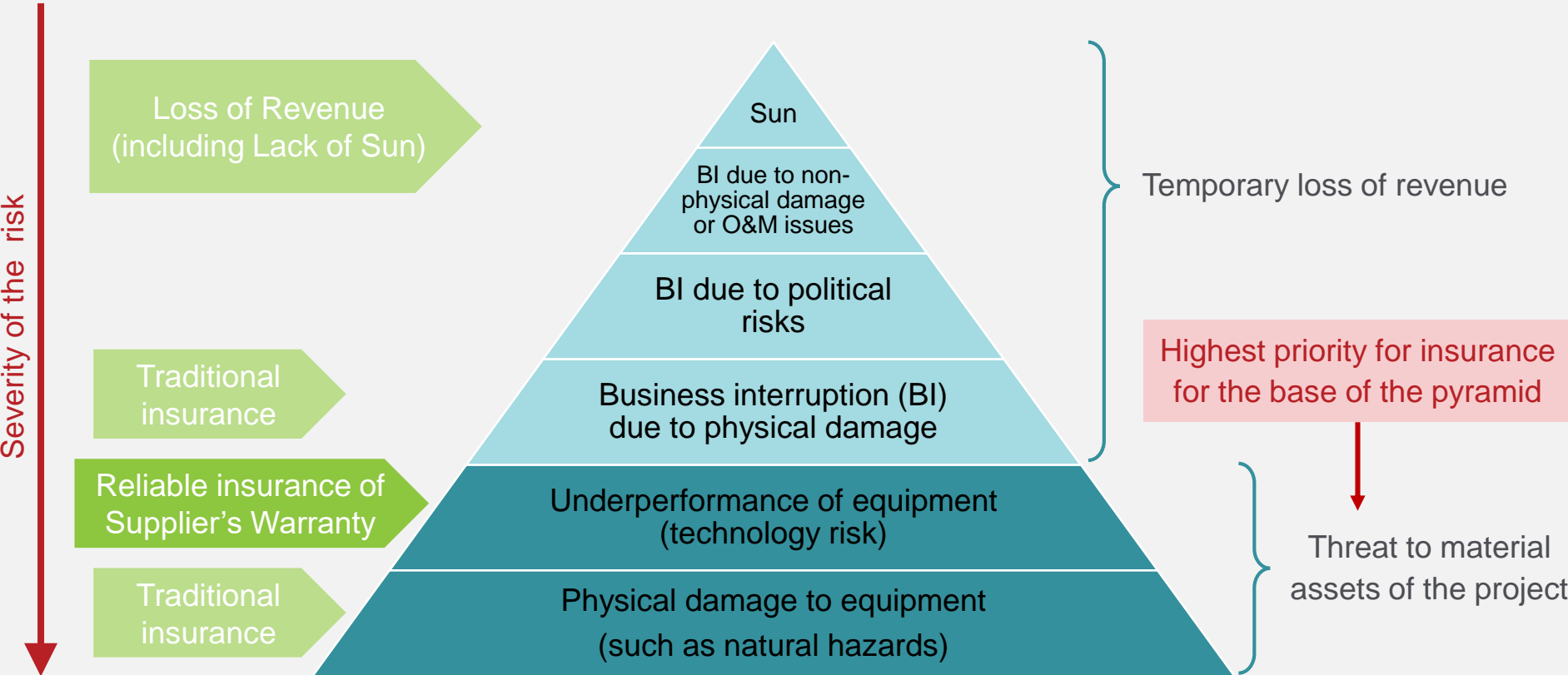
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Key metrics of bankable PV modules

- ✓ Supplier's credibility: track record and financial strength
- ✓ Bill of materials
- ✓ Factory inspections
- ✓ Production supervision
- ✓ Certifications
- ✓ Extended reliability tests
- ✓ Warranty conditions

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Reliable insurance of supplier's warranty

- ✓ limit of at least 5%-10% of the park size (net of all deductibles) dedicated exclusively to the SPV
- ✓ no reduction of limit in later years