

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

Jay Goldin

Vice President, Green Tech Solutions

jgoldin@munichre.com

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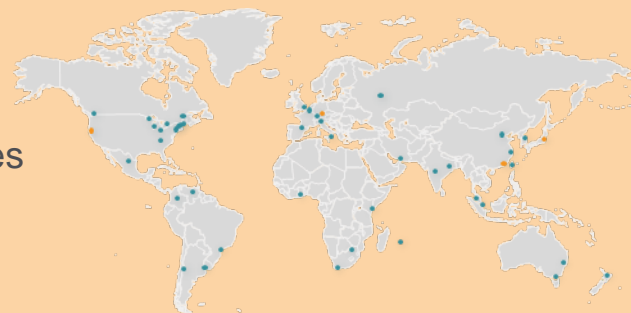
Welcome! How do you categorize your business?

- A. Manufacturer
- B. Integrated System Vendor
- C. Engineering Procurement & Construction (EPC)
- D. Project developer/owner
- E. Site owner/battery user
- F. Utility
- G. Project finance source (investor, lender)
- H. Other

Munich Re – world's largest reinsurer

World's **largest reinsurer**, also working with **large-scale businesses**

Founded in **1880**
Globally active with offices
in **100** countries



Balance sheet:
€ **267.8**bn (2016)



Group result:
€ **2.3**bn (2018)



Employees:
~43,000



Rated as:
A+, AA, Aa3 and AA-
(A.M Best, Fitch, Moody's, S&P)



Green Tech Solutions

Pooling expert resources and know-how in the field of
renewable energies and energy efficiency



Established Renewables

- Solar Energy
- Wind Energy
- Inverter



Smart Energy / Energy Storage

- Energy Storage
- E-Mobility
- Air Conditioning
- Sustainability Improvements



Innovative Technologies

- Bio Energy
- Fuel Cells
- Decontamination
- Water Treatment

What could possibly go wrong?

Key Risks for a Storage System

Performance: aging batteries

Integration: software and controls

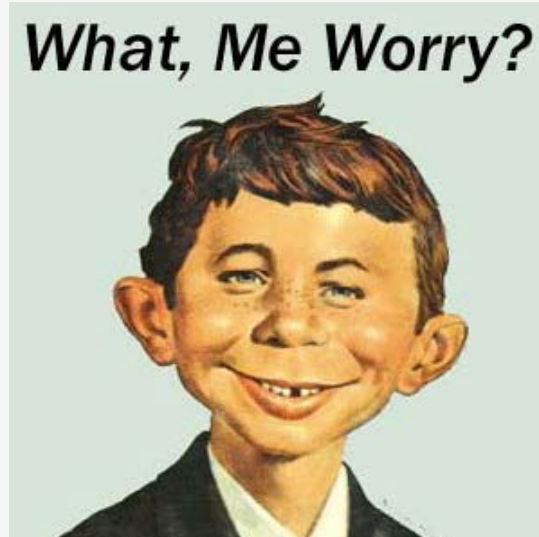
Chemical: fire, contamination

Operational: maintenance

Regulatory: tariffs, incentives

Financing: developer goes away

Supplier: warranty fulfillment



Energy Storage Projects: Roles for Risk Transfer

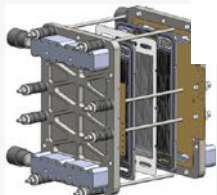
OEM

Integrated
Systems

Developers

Site Hosts

Utilities



Warranty Insurance

Performance Insurance

Property & Casualty
Insurance

Safety & Reliability are Two Sides of the Same Coin

Good risk management is based on solid engineering analysis & maintenance

Failure Mode
Effects Analysis

Manufacturing
inspection

Maintenance Plan

Replacement part
costs forecast



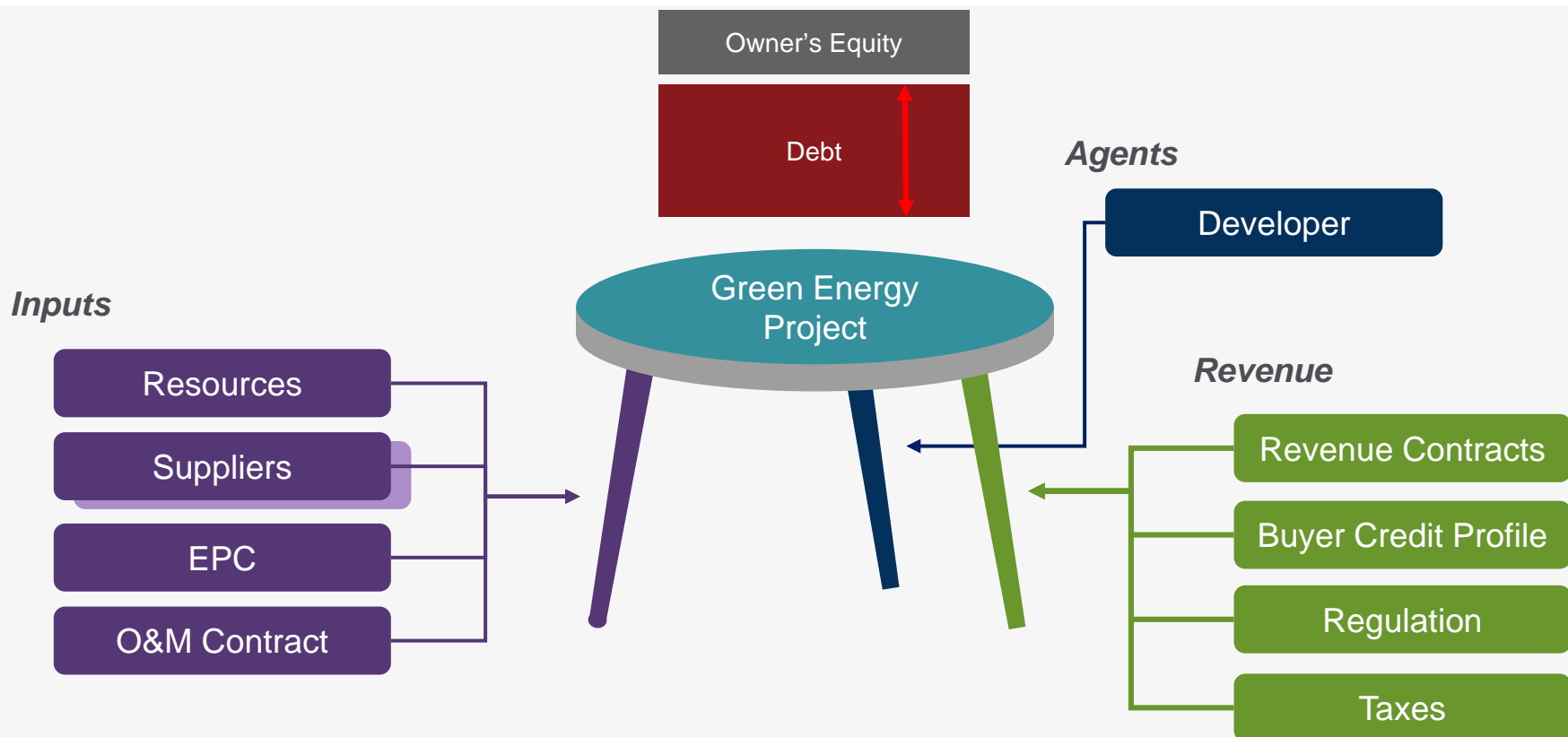
Loss Control
Engineering Report

Site analysis

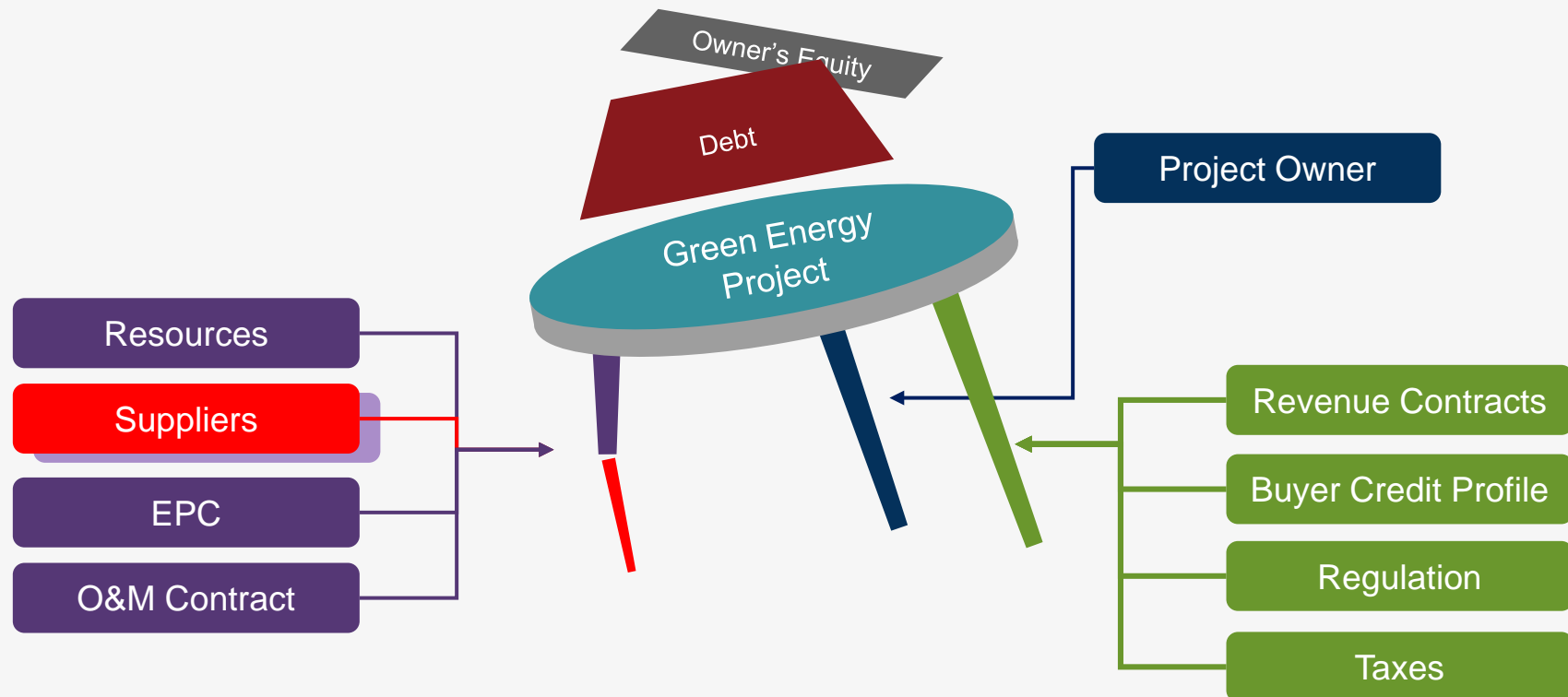
Design analysis

Maintenance Plan

Project Rating: Three legs to the Investment-Grade Stool



What Happens when a Key Supplier is Insolvent?



Beauty and Bankability are in the Eyes of the Beholder

Investment-Grade is in the eyes of the Ratings Agency

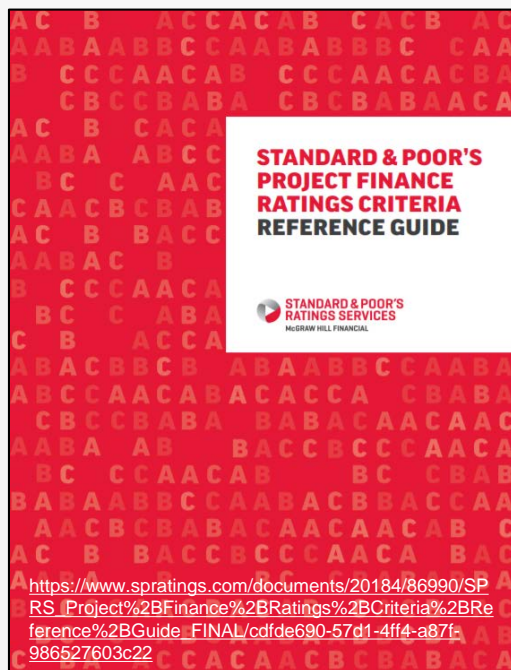






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Investment-Grade rating can fall based on offtaker, performance, supplier and market conditions

- June 7, 2013  **Moody's assigns Baa3 to \$700 million senior secured notes of Solar Star; outlook stable**
- June 23, 2016  **Solar Star Funding, LLC: Solar Star Funding, LLC's Transformer Outages Is Credit Negative**
- October 23, 2018  **Moody's upgrades Solar Star's senior secured bonds to Baa1 from Baa2; Outlook changed to stable**
- July 31, 2019  **Moody's affirms Solar Star's Baa2 rating and changes outlook to stable from negative**

RATING ACTION COMMENTARY

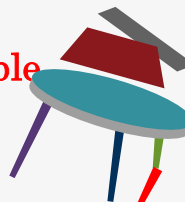
Fitch Affirms Topaz Solar Farms, LLC's Senior Notes at 'BBB'; Outlook Revised to Positive

Thu 16 Feb, 2017 - 8:44 AM ET

Fitch rates 550 MW First Solar-installed Topaz project notes at 'C' despite superb performance

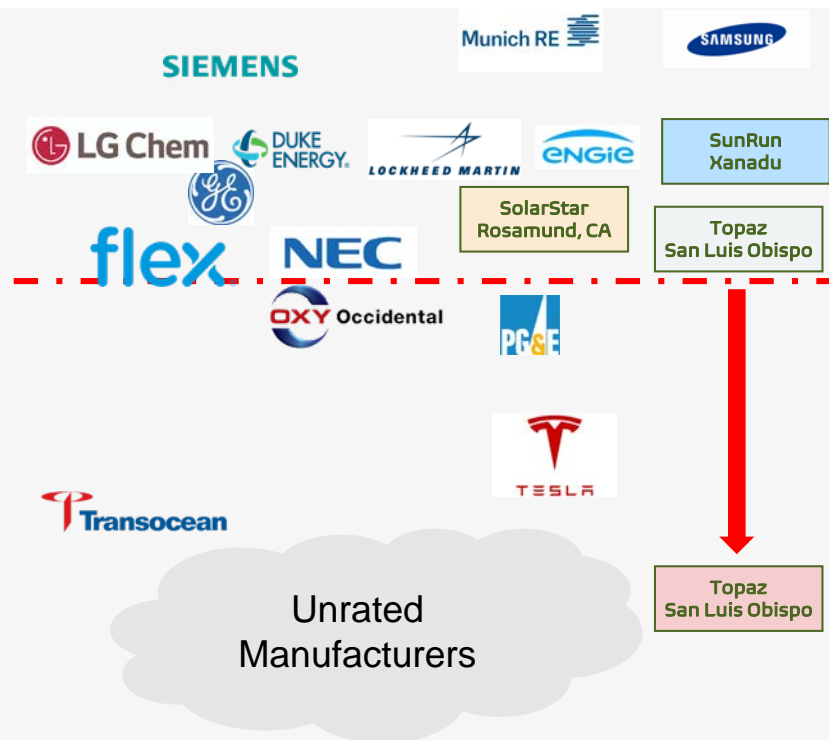
The credit rating of the Topaz project has been at "C" since 2019 because of the liability of having a bankrupt offtaker — PG&E. In the meantime, the ratings document affords some insight into mega-project finance and power generation performance.

APRIL 23, 2020 ERIC WESOFF



*Bob Dylan, Subterranean Homesick Blues
<https://www.youtube.com/watch?v=MGxjIBEZvx0>

"Investment Grade"



Moody's		S&P		Fitch		Rating description	
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term		
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime	Investment-grade
Aa1		AA+		AA+			
Aa2		AA		AA			
Aa3		AA-		AA-			
A1		A+	A+	F1			
A2		A	A				
A3	P-2	A-	A-2	A-	F2	Upper medium grade	
Baa1		BBB+		BBB+			
Baa2		P-3	BBB	A-3	BBB	F3	Lower medium grade
Baa3	BBB-		BBB-				
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative	Non-investment grade aka high-yield bonds aka junk bonds
Ba2		BB		BB			
Ba3		BB-		BB-			
B1		B+		B+			
B2		B		B			
B3		B-		B-			
Caa1		CCC+	C	CCC	C	Substantial risks	
Caa2		CCC		Extremely speculative			
Caa3		CCC-		Default imminent with little prospect for recovery			
Ca		CC					
		C					
/		D	/	DDD	/	In default	
			DD				
			D				

<https://www.benzinga.com/markets/bonds/16/09/8452635/what-do-corporate-credit-ratings-mean-for-investors?viewDesktop=1>

What's in Your Warranty?

Key elements to understand:

- Defect Warranty
 - Conform to manufacturer specifications
- Performance Warranty
 - Must specify the testing procedures
- Warranty claims procedure
- Explanation of repair/replace/refund



Exclusions: How to void your warranty?

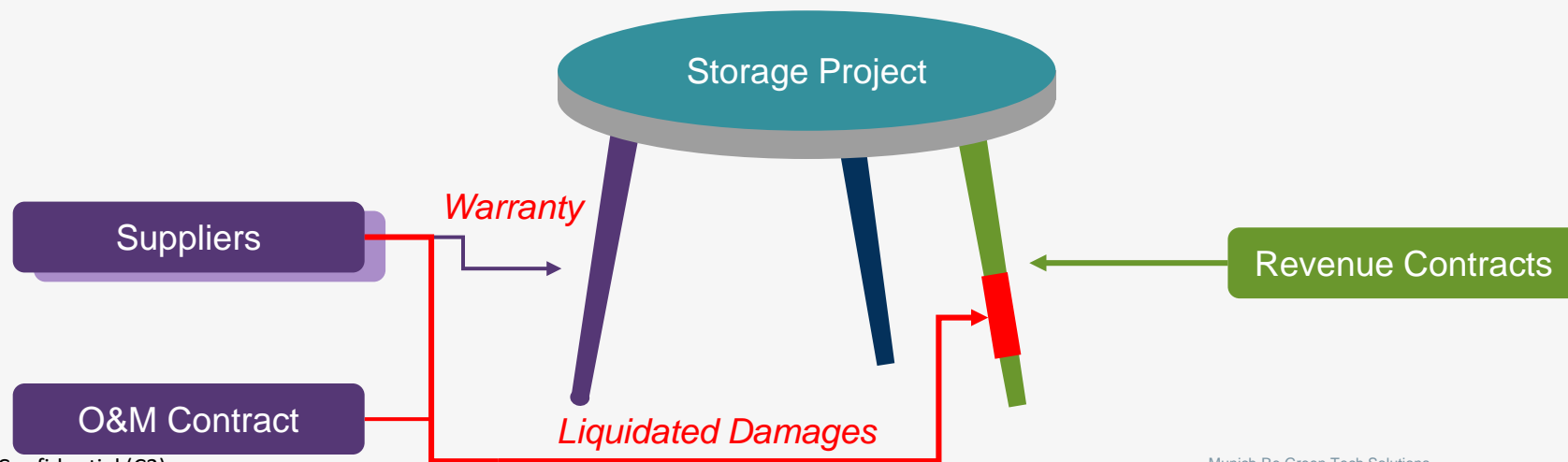
- Operate outside specified conditions (temperature, charge rate)
- Don't maintain the system
- Replace parts with unauthorized parts
- Unauthorized service personnel
- Cancel your internet connection



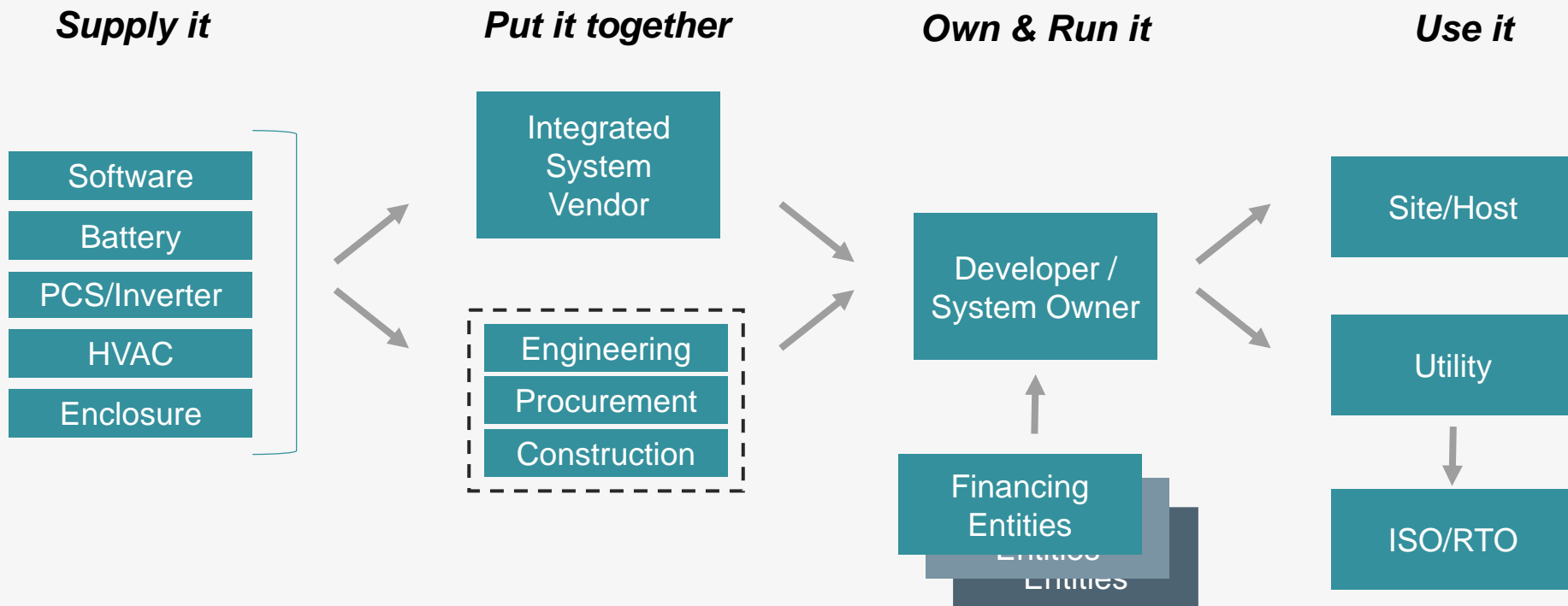
- We support manufacturer warranties: lithium-ion, flow batteries, fuel cells, solar
- Developing performance insurance: similar to solar, wind and fuel cell structures
- Risk analysis depends on our technical experts
- Long-term insurance (up to 10 years) to match financing needs
- Two basic structures:
 - Support manufacturer to enable usage in financed projects
 - Support project to improve financing and leverage

More than a Warranty: Performance Guarantees & LDs

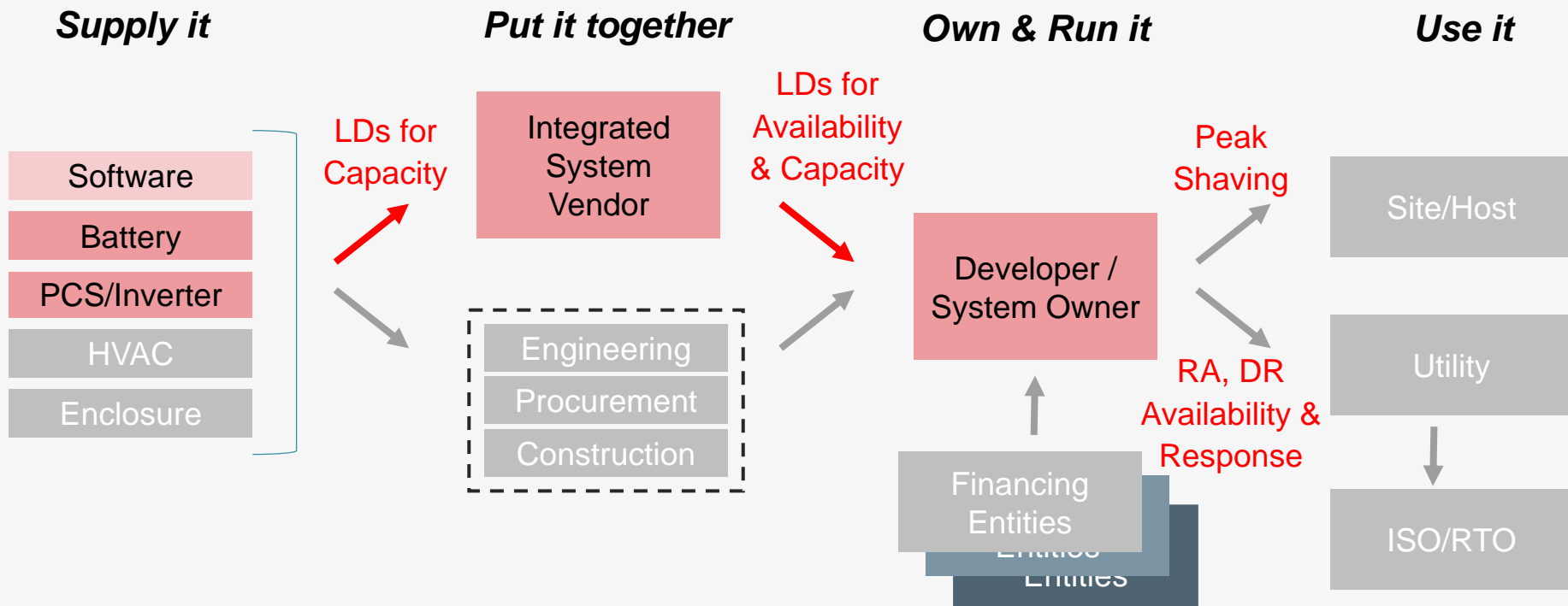
- Common for larger projects that need revenue assurance
- Beyond warranty (repair / replace) obligations...more like a revenue splint that supports the revenue leg
- Pre-negotiated fees for all kinds of issues: performance, capacity, uptime, delay
- Similar to a Service Level Agreement (SLA) – remedy rather than declaring “Breach”



First Step: Identify Project Participants and Obligations



Who Bears Performance Obligations if Things Don't Work?



For your RFP: Require an Investment Grade Warranty

1. Supplier must provide a warranty for the proposed Energy Storage System for the Project for at least 10 years of operation
 - Supplier to define key operating parameters in warranty, including, but not limited to capacity, efficiency, temperature, availability.
 - Supplier to define operations and maintenance requirements for warranty compliance.
2. Supplier must have an Investment Grade credit rating, secure Investment Grade parental guarantee, or Warranty Insurance policy from an entity with a minimum credit rating of S&P BB-, Moody's Baa3.
 - Parental Guarantee or Warranty Insurance term (in years) must be at least 10 years
 - Parental Guarantee or Warranty Insurance must provide for dedicated capacity for the Project assigned to Developer and transferable to future owners of the Project.



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