

Wells Fargo Views on Bifacial PV Technology

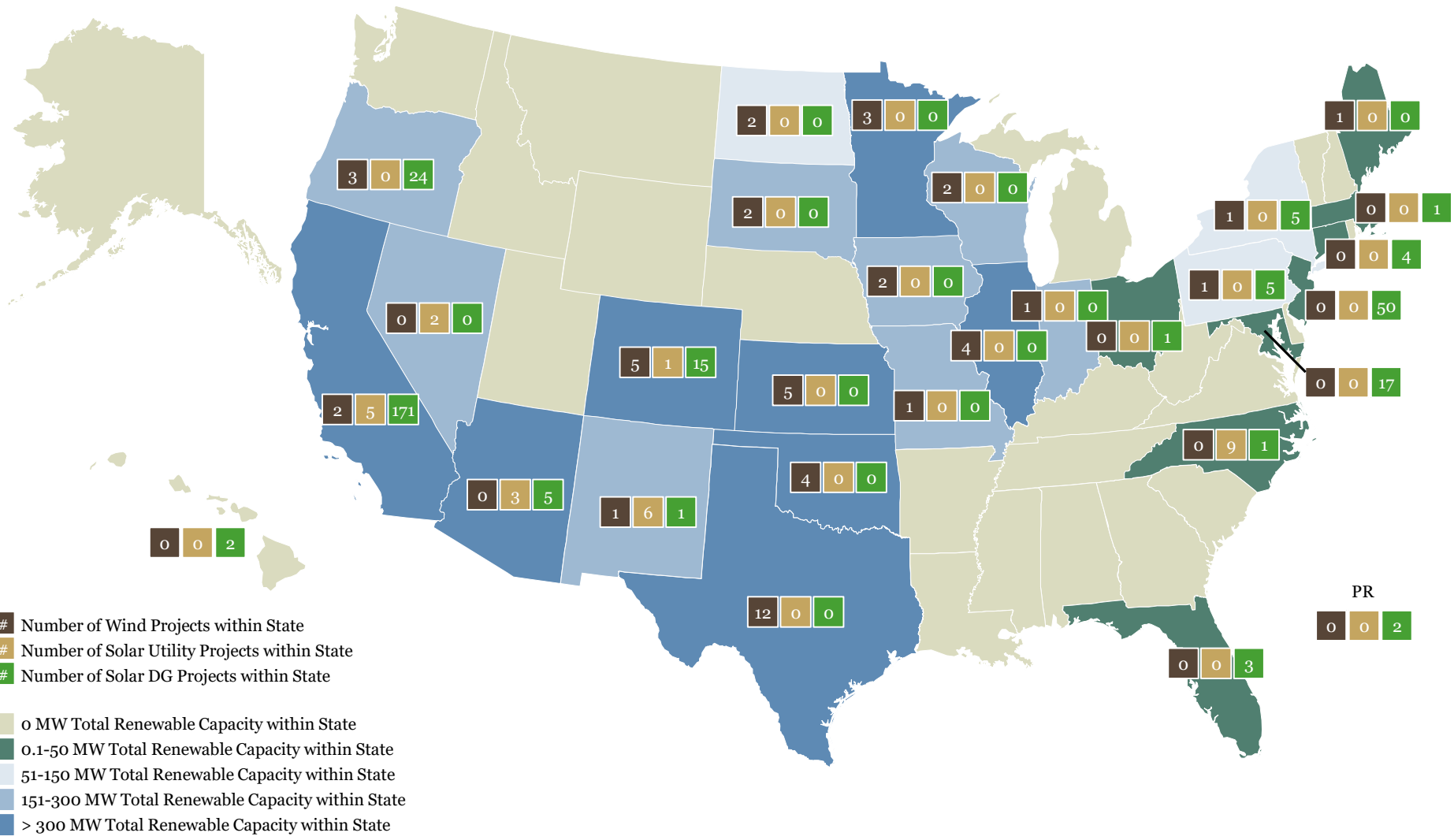
Jon Previtali, Director of Technology & Technical Services
2018 BifiPV Workshop
September 2018

Together we'll go far



Wells Fargo Renewable Energy & Environmental Finance (REEF)

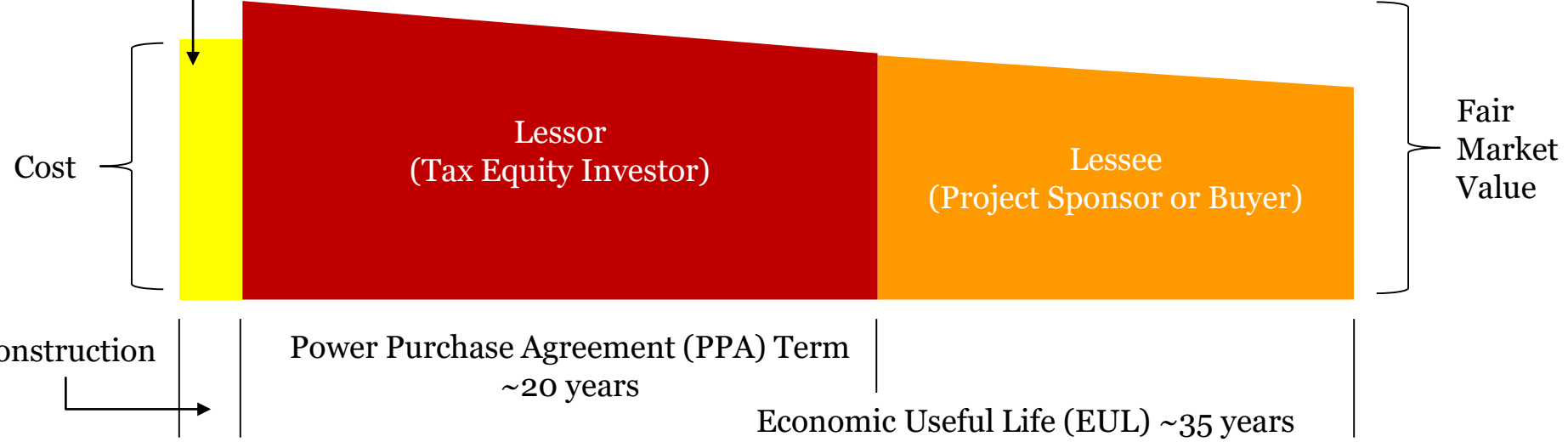
8+GW portfolio comprised of 50+ Wind projects and 300+ Solar projects



Partnership Flip Structure



Sale Leaseback Structure



**NREL System Advisor Model (SAM)
Financial Model Documentation**

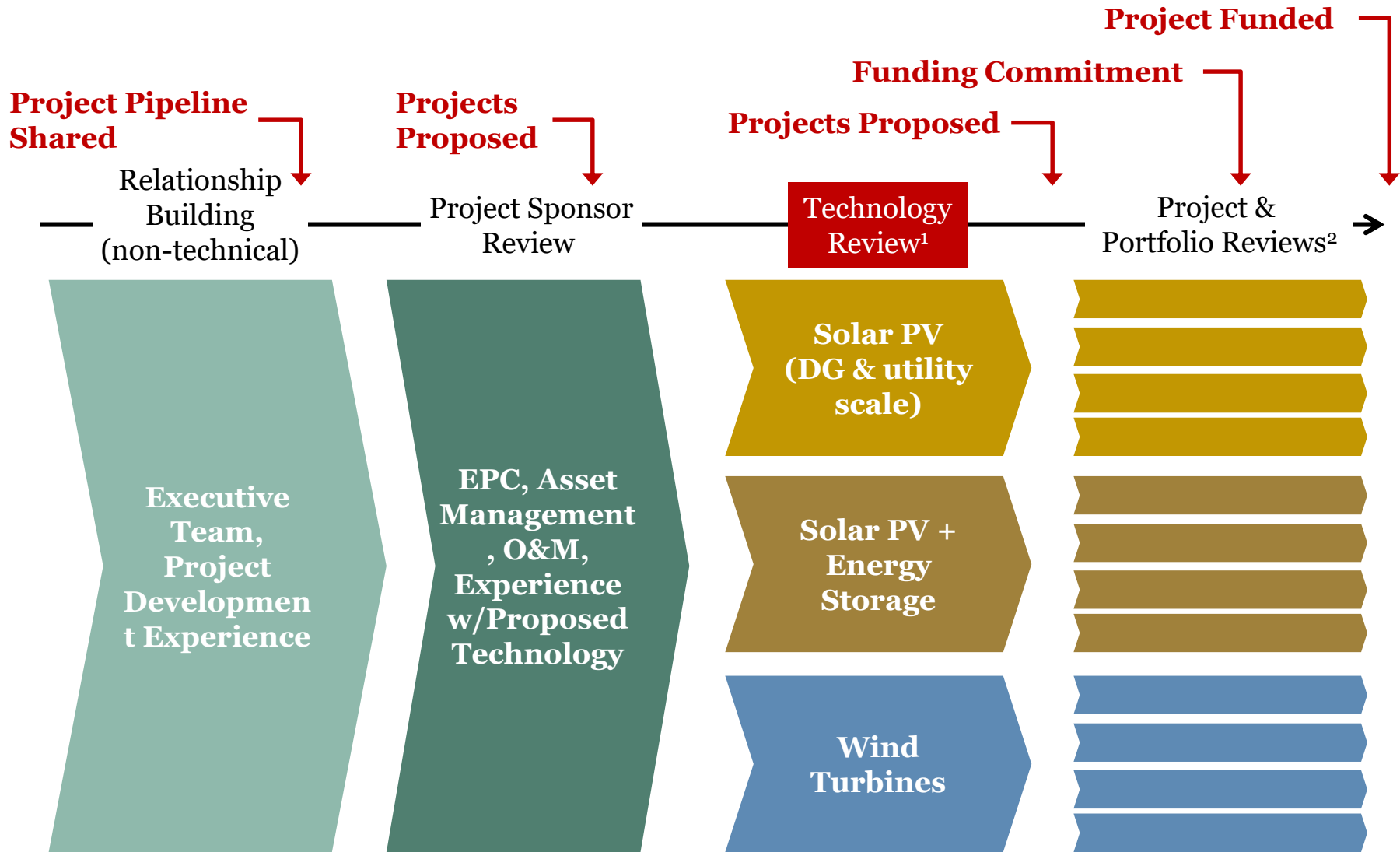
<https://sam.nrel.gov/financial>

Excel Models for:

- Residential Standard Loans
- Residential Mortgages
- Commercial Loans
- Single Owner Structures
- Partnership Flips
- Leveraged Partnership Flips
- Sale Leasebacks

Leveraged Partnership Flip						
	0	1	2	3	4	5
Leveraged Partnership Flip						
Operating Year	0	1	2	3	4	5
Production (AC-kWh)						
Net Production (AC-kWh)		16,188,480	16,107,538	16,027,000	15,946,865	15,867,000
Partial Income Statement: Project						
Revenues						
PPA						
Net Production (AC-kWh)		16,188,480	16,107,538	16,027,000	15,946,865	15,867,000
Price (¢/kWh)		27.83	28.11	28.39	28.67	28.95
Total PPA Revenue		4,505,415	4,527,717	4,550,129	4,572,652	4,595,172
Production Based Incentive (included if available for debt service)						
Federal		-	-	-	-	-
State		-	-	-	-	-
Utility		-	-	-	-	-
Other		-	-	-	-	-
Total PBI		-	-	-	-	-
Salvage Value		-	-	-	-	-
Total Revenue		4,505,415	4,527,717	4,550,129	4,572,652	4,595,172
Expenses						
Fixed Annual Cost		10,000	10,250	10,506	10,769	11,031
Fixed Cost by Capacity						
Capacity (DC kW)		10,000	10,000	10,000	10,000	10,000
Fixed Cost (\$/DC kW-yr)		22.00	22.50	23.00	23.52	24.04
Total		220,000	224,950	230,011	235,187	240,368
Variable Cost by Generation						
Generation (AC-MWh)		16,188	16,108	16,027	15,947	15,867
Variable Cost (\$/AC-MWh)		3.50	3.55	3.61	3.66	3.71
Total		56,660	57,222	57,790	58,364	58,938
Property Tax						
Pre-Financing Costs		40,227,150	40,227,150	40,227,150	40,227,150	40,227,150
% of Pre-Financing Costs Assessed		95.00%	95.00%	95.00%	95.00%	95.00%
Assessed Value of Property For Tax Purposes		38,215,793	38,215,793	38,215,793	38,215,793	38,215,793
Assessed Value Annual Decline		100.0%	95.0%	90.0%	85.0%	80.0%
Net Assessed Value		38,215,793	36,305,003	34,394,213	32,483,424	30,572,634
Annual Property Tax Rate		0.75%	0.75%	0.75%	0.75%	0.75%
Property Tax		286,618	272,288	257,957	243,626	229,295
Insurance		201,136	204,153	207,215	210,323	213,431
Total Expenses		774,414	768,862	763,479	758,268	753,069
EBITDA (cash available for debt service)		3,731,001	3,758,854	3,786,650	3,814,384	3,842,103
Cash Flow: Project						

Typical Progression of Technical Due Diligence for Project Finance

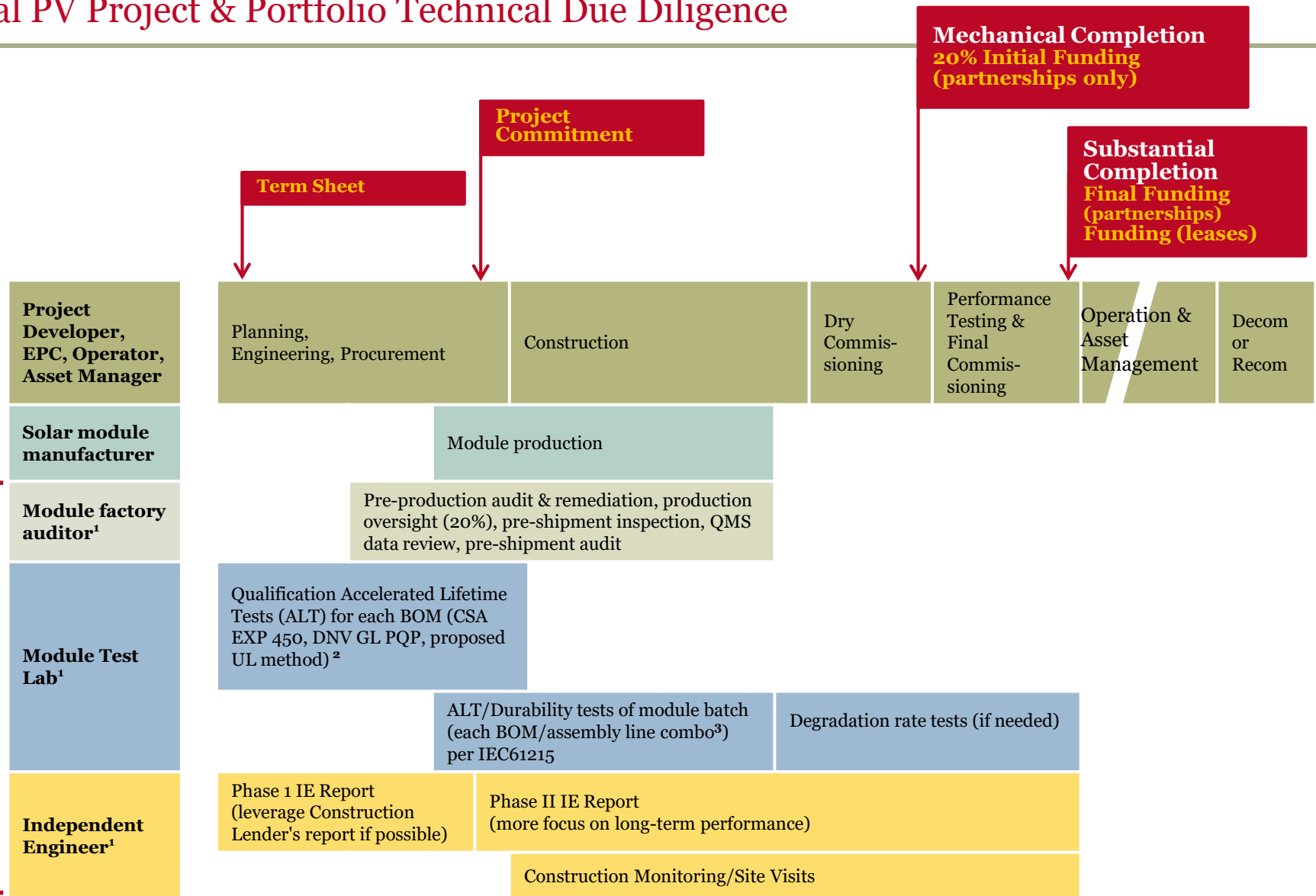


¹ Financial (credit rating) and commercial (contract) due diligence done in parallel to technical due diligence.

² See Typical PV Project & Portfolio Technical Due Diligence slide

Typical PV Project & Portfolio Technical Due Diligence

WF Approved Contractors, see IEC RE

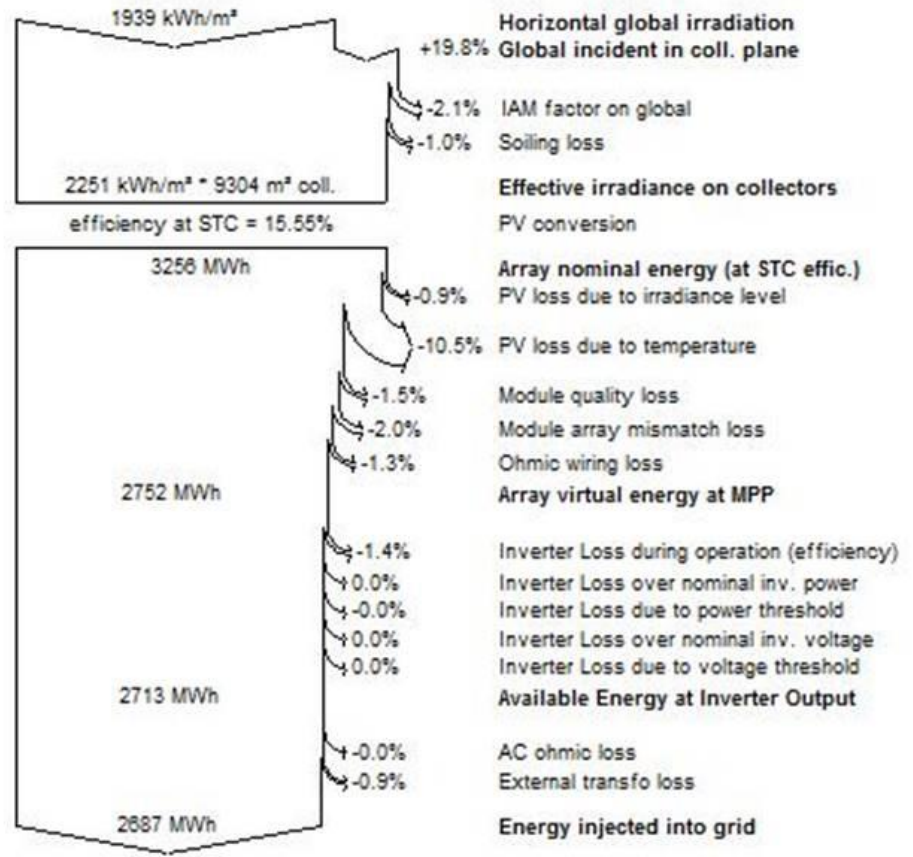


¹ Sampling techniques and expert judgement based on record can be used to reduce cost
² Ideally done in advance of module production, but could be done at start of production
³ Unless factory auditor confirms consistency between assembly lines

Performance & Durability Considerations

- *Third-Party Technical Review from Independent Engineer*
- Sufficient Operational or Test (empirical) data to validate modeling assumptions
- Energy Production Estimate and uncertainty
 - Weather resource data
 - Transposition + albedo model
 - Soiling and vegetation losses
- Degradation Rate
- Accelerated Lifetime Testing (baseline IEC 51215 and extended)
 - Updates informed by new material science
 - New latent defects and O&M remedies
- Factory Audits
 - Updates informed by new materials, processes

Loss diagram over the whole year



PVSyst Loss Assumptions

EPC and O&M Considerations

- Shipping & packaging procedures
- Installation process and handling
- New Trackers, module connections and BOS
 - Wind and dynamic mechanical loading
- Availability of spares
 - Interchangeability
- New operations & maintenance
 - washing, vegetation management, difficulty, tools & procedures, cost
- Warranties (exclusions, enforceability)



Source: Wikipedia Commons

Thank you!

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