Hot Issues in PV Performance and Solar Project Finance

Webinar Series, Session #2:
"PV Project Performance Guarantees – Commercial, Legal and Technical Considerations"

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Introduction and Overview

- Purpose of Performance Guarantees – Why Have Them?
- Type of Guarantees – What is Being Guaranteed and by Whom?
- Impact of Different Contracting Structures on the Provision of Performance Guarantees
- Technical Considerations for Assessing Compliance
- Common Gaps in Guaranteeing Solar PV Project Performance
- Legal Considerations in Structuring Performance Guarantees
- Q&A

Purpose of Performance Guarantees and Performance LDs:
A Legal Perspective

- Ensure satisfaction of Power Purchase Agreement requirements
  - Reduces the risk that Owner will have liability to the power offtaker
  - If liability cannot be avoided due to project underperformance, performance guarantees and damages payable by a third party serves to provide partial or total compensation to the Owner for such liabilities.
- Benefits of Pre-COD Performance Guarantees:
  - Assist in ensuring that the EPC Contractor has properly completed the Project prior to its acceptance by owner; and
  - Help to verify that the modules supplied by the supplier/manufacturer (either to EPC Contractor directly or to Owner who provides these Modules to the EPC Contractor) work as intended and warranted in the Module Supply Agreement.
  - Owner is in the strongest position to demand correction of defects, re-tests, etc. prior to acceptance and payment of the final one or two milestone payments.
- Clear remedies for Project underperformance facilitate quicker resolution to potential disputes, thereby reducing litigation risk.

Purpose of Performance Guarantees and Performance LDs:
A Business Perspective

- Reduce revenue return risk borne by equity investors and debt servicing risk borne by lenders by:
  - shifting risk of project underperformance to a third party or
  - spreading risk of project underperformance among multiple potentially responsible parties

- Key Factor in ensuring non-recourse/project financing

- Ensure Project Performance by all parties (Manufacturers, EPC Contractor, Owner)

What kind of Guarantees Exist?

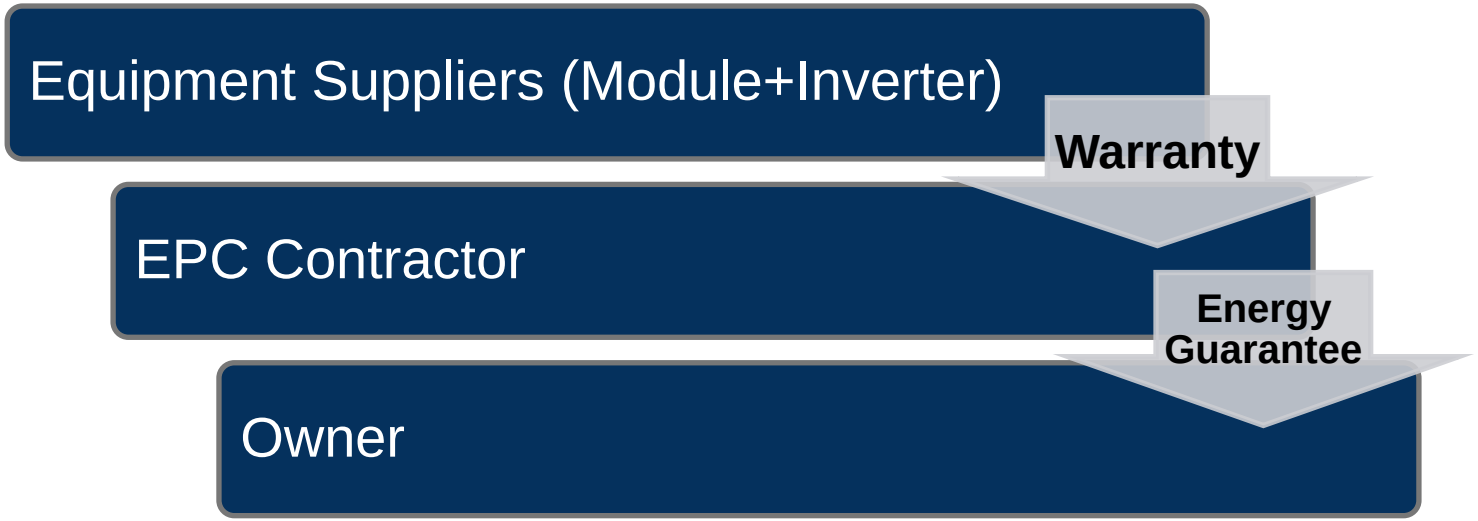
- **Short term**
  - Capacity guarantee (based on ASTM E2848 or other test)
  - Short term energy yield or performance ratio
  - Typically tested at COD in order to declare substantial and/or final completion
  - LD's are NPV based – to reflect a reduced plant output
  - Provided by EPC contractor
- **Longer term**
  - Energy yield or performance ratio
  - LD's can either be NPV based or loss of revenue based
  - Provided by EPC contractor or O&M contractor
  - Backed by manufacturers

What are common terms for guarantees?

- Typical terms are 1-5 years for longer term energy guarantees from EPC contractors
  - Longer term guarantees (5+ years) are not typically available from EPC contractors
- Module manufacturers do offer longer term product warranties
- Insurance products exist that offer longer term guarantees

Contracting Model affects Performance Guarantees

- Full wrap EPC preferred model for providing both short and long term guarantees
- If owner purchases some or all major equipment, contractor is less willing to wrap major equipment warranties.



Example – 20 MW Power Plant

AC Capacity	20 MW
DC Capacity	24 MWp
EPC Contract Value	$50 Million
Estimated Performance Ratio	80%
Annual Production	50 GWh
Annual Revenue	$5 Million
Typical O&M Annual Value	$500K

	NPV of Lost Revenue	Annual Value of Lost Revenue	Typical LD
1% PR Shortfall	$400K	$50K	$1 M
5% PR Shortfall	$2 M	$250K	$4 M
1 MW capacity shortfall	$2 M	$250K	$4 M

Example Plant

- Short term test at COD:
  - Plant tests 1% low in capacity or Performance Ratio
    - $1 M LD, payable by EPC, 2% of EPC contract
  - Plant tests 5% low in capacity or Performance Ratio
    - $5 M LD, payable by EPC – 10% of EPC contract
- At year one:
  - Plant has performed 1% low in performance ratio
    - NPV based LD's would be ~$1M, 200% annual O&M contract amount
    - Revenue based LD's would be $50K, 10% of contract amount

Why not just a short term test?

- **Industry would prefer short term tests:**
- EPC contractors unwilling to carry risk long term
  - Prefer long term guarantees in O&M Contract
- Owners don't want to provide longer term guarantees to lenders.

- **Technical drawbacks with Short Term Guarantees:**
- Solar plants are energy, not capacity, resources.
  - Validating energy generation takes time
  - Short term test has high uncertainty
- Immature industry
  - Lack of track record with utility scale plants
  - Concerns about long term reliability of equipment

Drafting a successful performance guarantee

- Performance Guarantees can be complex:
  - Legally
  - Commercially
  - Technically
- Important to have all parties have a common understanding of performance testing goals and methodologies.
  - How LD's are calculated (NPV based, loss of output)
  - Test protocol is clear and unambiguous
  - Commercial goals of all parties are met
- Technical issues are critical
  - Industry lacking in standards, expertise

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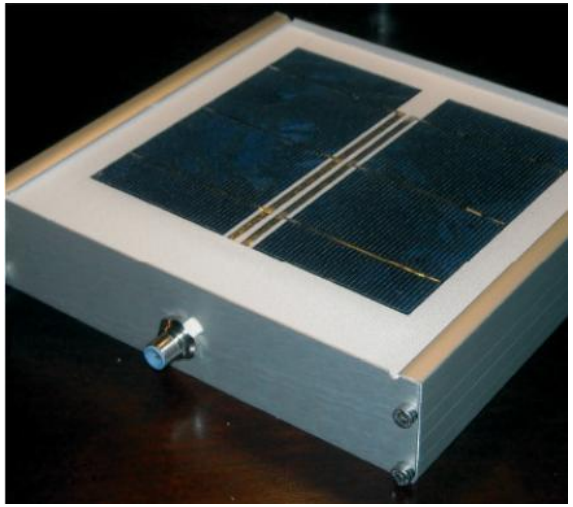
What is being guaranteed?

- Sunlight in, Electricity out. Simple, right?
  - The devil is in the details
- Sunlight In
  - Intensity (W/m^2)
  - Spectrum (AM 1.5)
  - Angle of incidence
- Electricity Out
  - Temperature
  - Panel response to varying conditions
  - Panel consistency (mismatch, degradation)
- Only as good as initial prediction (PVSyst)

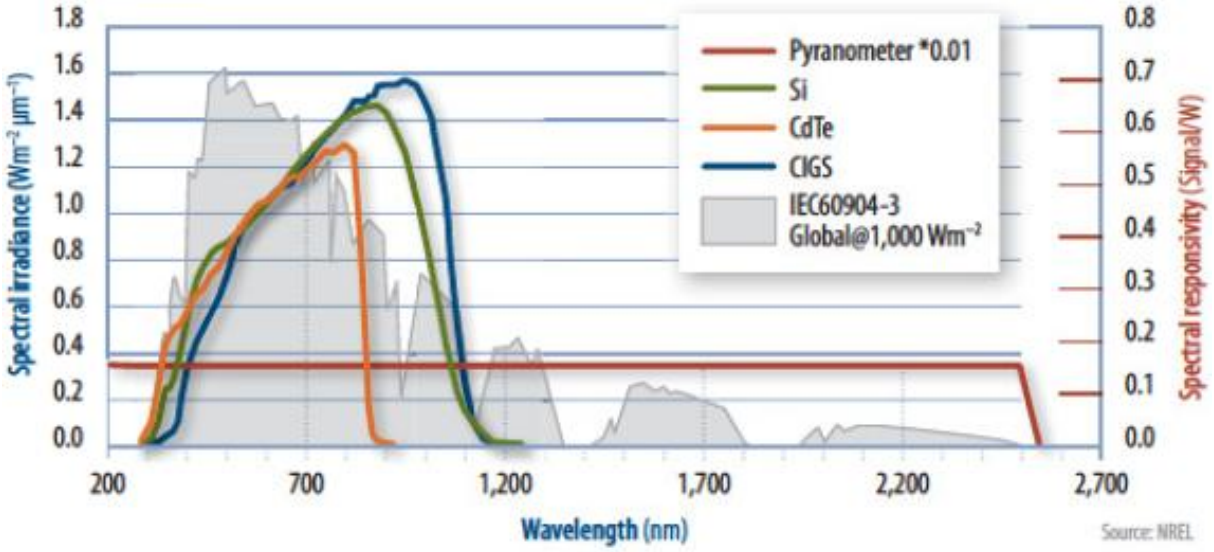
Sunlight Measurement

- Accurate measurement of sunlight is critical
  - Need to know gallons of fuel to measure MPG
  - Necessary to measure degradation rate



PVEL solar reference cell

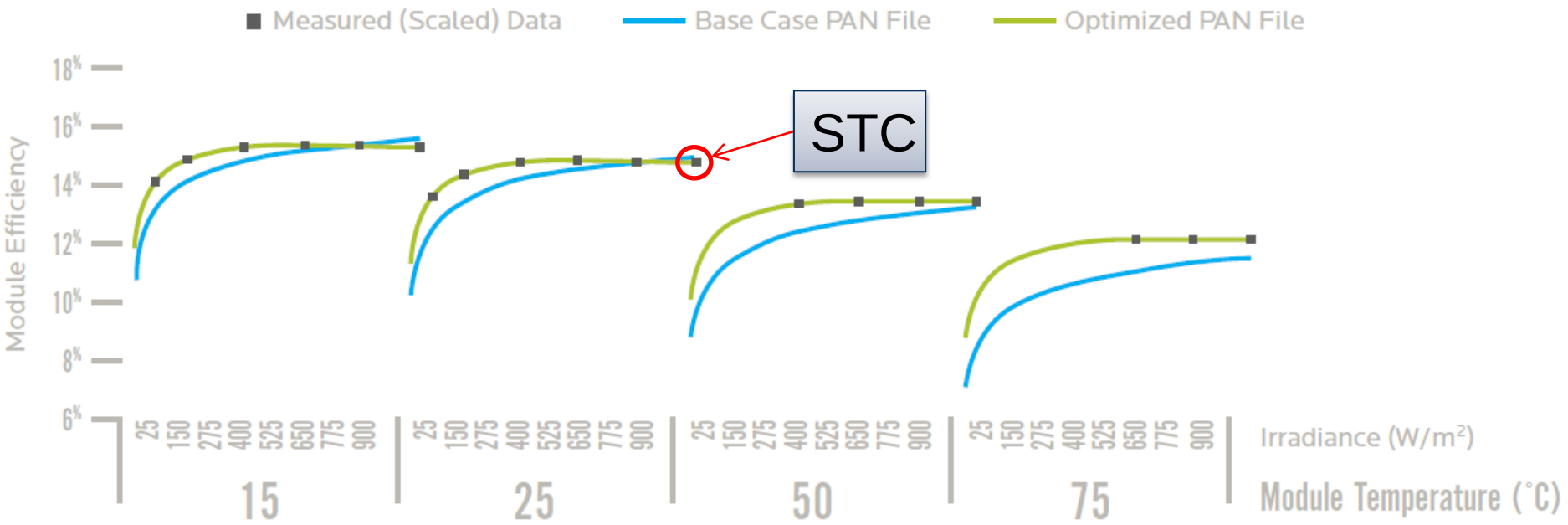
Chart shows spectral response of several PV technologies and pyranometer



Thermopile pyranometer

What is being guaranteed?

- Energy projections are determined using PVSyst
- All modules have .pan files that define how efficiency varies with environmental conditions
- B&V and PVEL offer .pan file generation service



What is being guaranteed?

- Panel manufacturers sell power
- Power plant operators sell energy (power over time)
- Performance Ratio: irradiance normalized performance
  - But not temperature normalized typically

$$PR = \left(\frac{Energy\ Produced, kWh}{Solar\ Radiation, kWh/m^2}\right) \times \left(\frac{1000\ W/m^2}{DC\ Nameplate\ Power, W}\right)$$

Module Power [kW]	System Power [kW]
• Preferred by manufacturer (warranty) • Under controlled conditions: STC • 1kW/m^2, 25˚C, AM1.5 • Measurement in the field has high uncertainty and requires normalization • Spectral normalization not always possible	• Capacity guarantee • Typically restricted environ conditions • Needs to be normalized • Standard for MW_{AC}: *ASTM E2848* • Irradiance measurement method must be defined and agreed upon • Can be impacted by module mismatch

Long-Term Guarantees

PR or Modeled / Measured Guarantee [%]	Energy Guarantee [kWh]
• Typical long-term guarantee today • Affected by many factors including • environment, system design, module mismatch • Need to specify AC or DC • Requires sophisticated field monitoring	• Preferred by system owner • Similar considerations as performance ratio • Guarantee provider takes on weather risk in addition to equipment performance risk

Guarantee vs. Expectation

- Owners expect their PVSyst model
- Guarantees always discount expected
- Can be substantial $ difference
- Degradation rate
- Equipment quality

>200 modules recently tested at PVEL

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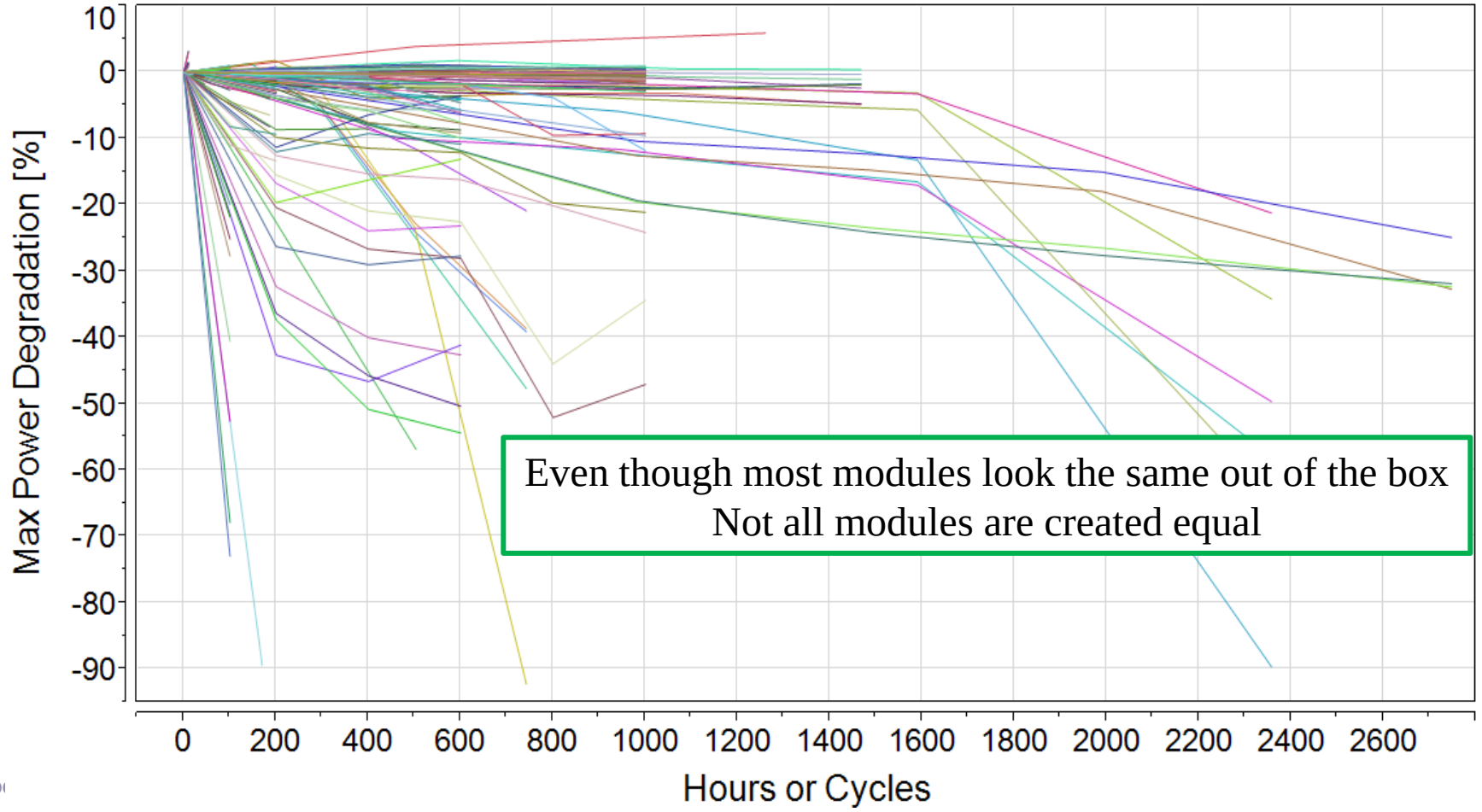

Even though most modules look the same out of the box
Not all modules are created equal

Equipment Quality

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- Pricing pressure on manufacturers is intense
- Raw materials, staff turn-over, tool aging, incremental process improvement, etc. all contribute to module quality

- PV Evolution Labs can help you mitigate technology risk
  - Supplier Qualification / Evaluation
  - Approved Vendor List (AVL) Management
  - .pan files and IAM
  - IEC and spec verification
  - Energy Yield Testing
  - Solar Reference Cells
  - Soiling Stations

Legal Considerations

Performance Guarantees From A Legal Perspective

- **Other Contract Mechanisms to Help Ensure Project Performance**
  - Covenants regarding the Module's (in the case of a MSA) or the Work's (in the case of an EPC Contract) compliance with:

MSA and EPC	EPC
➢ Specifications ➢ Applicable Laws ➢ Standards and Codes	➢ PIP/GIP/GUP/PEP ➢ Utility Requirements ➢ Installation Manuals ➢ Product warranties

  - Defining "defect" broadly
  - Covenants to comply with QA/QC Plans
  - Including pre-shipment and post-delivery inspection and testing regimes
  - Including shipping and packaging requirements
  - Timing of Acceptance
  - Warranties (equipment and work)

Legal Considerations

Performance Guarantees From A Legal Perspective (Cont.)

- **Significance of Performance Guarantees from a Legal Perspective**

> ***A performance guarantee is a guarantee that a particular result will be achieved.***

- **By providing a performance guarantee, does a contractor (or vendor) assume increased project risks? Not necessarily.**

- **Defenses to performance guarantees**
  - Impossibility
  - Impracticability

- **Can a project's performance be guaranteed without an express guarantee?**
  - Design Specifications vs. Performance Specifications

Legal Considerations

Use of Liquidated Damages as a Prescribed Remedy

- **What are Liquidated Damages?**

> **Amounts fixed, settled and agreed upon in advance by the parties to a contract – a stipulated sum, estimated by the parties, that acts as a proxy for the extent of injury or actual damages that a specified breach by the promisor (Contractor) would cause the promisee (Owner)**
> **-- Modified from *Pacific Hardware Steel Co. v. United States* and Williston, Contracts § 776**

- **Why Use Liquidated Damages?**
  - Permits quantification of the cost of compliance in advance, which permits informed decision-making
  - Reduces enforcement costs (e.g., ability to easily offset)
  - No duty on promisee (Owner) to mitigate damages
  - Permits specific allocation of risks – Owner can decide for certain reasons to allow for undercompensatory liquidated damages
  - Allows for computation of consequential damages, even if the contract contains a waiver of consequential damages (which most do)
  - Deterrence*

Legal Considerations

Necessary/Desirable Attributes of Enforceable LD Provisions

- Not a Penalty
- Actual damages are difficult to calculate at the time the contract is entered
- Reasonably calculated to address the likely damage/harm based on a defined breach of contract that are reasonably foreseeable and measured at the time the contract is entered
- Sole/Exclusive Remedy

Legal Considerations

Liquidated Damages under California Law

- **Contracts Generally**
  - LD provisions are ***presumed valid*** unless it can be shown that the liquidated damage provision was unreasonable *under the circumstances existing at the time* the contract was made [Cal.Civ. Code 1671(b)].
    - Must represent the result of a reasonable endeavor by the parties to estimate a fair average compensation for the loss that may be sustained [*Fireman's Fund Ins. Co. v. Morse Signal Devices,* 151 Cal. App. 3d 681 (2d Dist. 1984)]
    - Any analyses subsequent to the agreement relating to the reasonableness of the damages provisions is not relevant to their validity [*Ballard v. Equifax Check Services, Inc.,* 158 F.Supp. 2d 1163 (E.D. Cal. 2001)]
  - Factors (Evaluated as of the time the contract is entered)
    - Relationship of the liquidated damages to the anticipated range of harm
    - Relative equality of bargaining power
    - Whether parties were (one or both) represented by counsel
    - Parties' belief that proof of actual damages would be costly inconvenient
    - Difficulty in proving causation and foreseeability
    - Whether the liquidated damages provision was an inclusion in a form contract

Legal Considerations

Liquidated Damages under California Law (Cont.)

- **Consumer Contracts**
  - A liquidated damages provision in a consumer contract ***is presumed void*** [Cal.Civ.Code 1671(d)]
  - Presumption can be rebutted if the proponent of enforcing the clause demonstrates that:
    - it was impracticable or extremely difficult to fix the actual damage, ***and***
    - the amount of liquidated damages represents the result of a reasonable endeavor by the parties to estimate a fair average compensation for any loss that may be sustained. [*Utility Consumers' Action Network, Inv. v. AT&T Broadband of Southern California, Inc.*, 135 Cal. App. 4th 1023 (2d Dist. 2006)]

- **Effect of LD Provision on the Ultimate Relief Granted**
  - If LD provision upheld, then the Plaintiff need not show actual damages in order to recover [*McCarthy v. Tally,* 46 Cal. 2d 577 (1956)]
  - Voided LD clause = Plaintiff may sue for actual damages

Legal Considerations

Liquidated Damages Under New York Law

- **General Rules:**
  - Courts uphold liquidated damage provisions fixing damages for breach when the terms constitute a reasonable mechanism for estimating the compensation that should be paid to satisfy any loss flowing from the breach. [*McKinley Associates, LLC v. McKesson HBOC, Inc.*]

- **Invalidation:** Invalidation of a liquidated damages clause may result from one of the following circumstances:
  - the damages flowing from a prospective breach were readily ascertainable at the time of contracting ***or***
  - they constitute a penalty. [*JMD Holding Corp. v. Congress Financial Corp.*, 4 N.Y. 3d 373, 380 (2005)]

Legal Considerations

Liquidated Damages: General Trends under CA and NY Law

- Both states have show a growing deference to liquidated damages clauses in the commercial context, particularly in arm's-length transactions, but they must be properly structured to survive challenge.

- For California consumer contracts, the law is much more protective for consumers. Liquidated damage provisions must be drafted carefully to be valid.

- New York has not developed the same distinction between consumer and commercial contracts, ***but*** courts often take into consideration the circumstances surrounding contract formation including the sophistication of the parties and their representation by able counsel.

Legal Considerations

Interplay of Performance LDs with Other Contractual Provisions

- **Interplay With Limitations of Liability**
  - EPC Contracts almost always cap the Contractor's aggregate liability to the Owner under the contract (usually at 100% of the contract price)
  - Often Performance LDs and Delay LDs will be subject to further sublimits/buckets
    - 10-20% Performance LDs
    - 10-20% Delay LDs
    - 25%+ for all LDs

- **Termination**
  - Tiered approach
    - Minimum Performance Guarantees (no buy-down with LDs); ability to terminate if minimum guarantees are not met
    - Performance Guarantees (buy-down with LDs)
  - If Performance LD sublimit of liability reached, then termination

CLOSING THOUGHTS

- **Performance Guarantees are critical components of any large energy project, and the purpose of these guarantees have both legal and commercial benefits.**
- **While getting closer, the solar industry has not settled on standard guarantees and project structures**
- **The longer-term nature of the guarantees in this industry present unique structural issues for owners and contractors, including bankruptcy risk, thereby requiring the parties to consider additional credit support, reserves and insurance. They also in-part shape deal requirements (e.g., EPC Contractor will require the long-term O&M work to ensure it has control over the facility achieving the guarantee)**
- **Short term power is not necessarily indicative of long-term energy and project performance**
- **The boilerplate can be important. If the parties desire performance liquidated damages, make sure that the liquidated damages provisions are properly drafted based on governing state law.**

QUESTIONS

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