



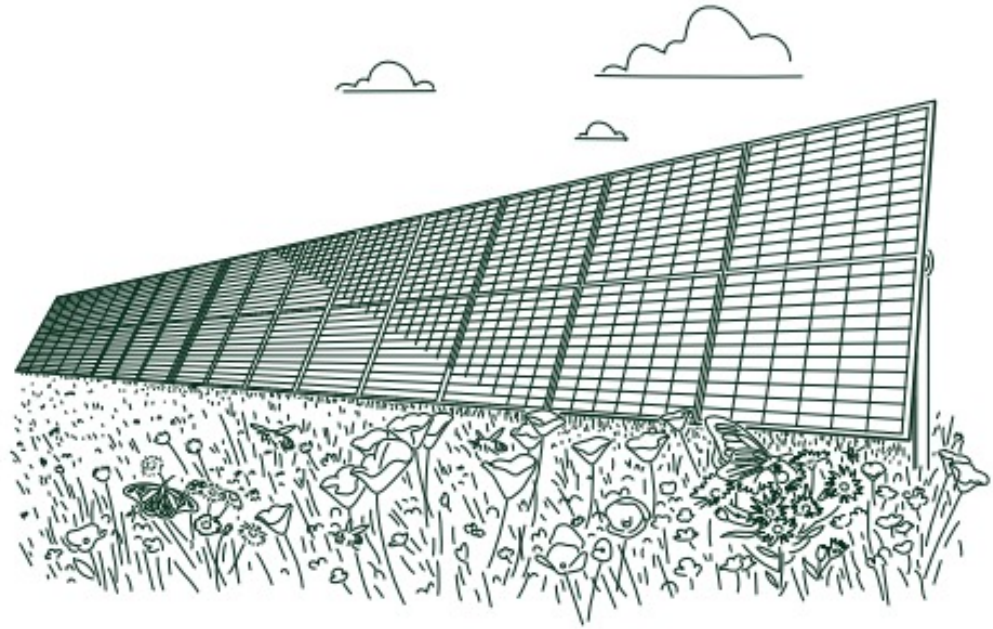
PVPMC 2025

# Capacity Testing from a Developer's Perspective

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# Overview

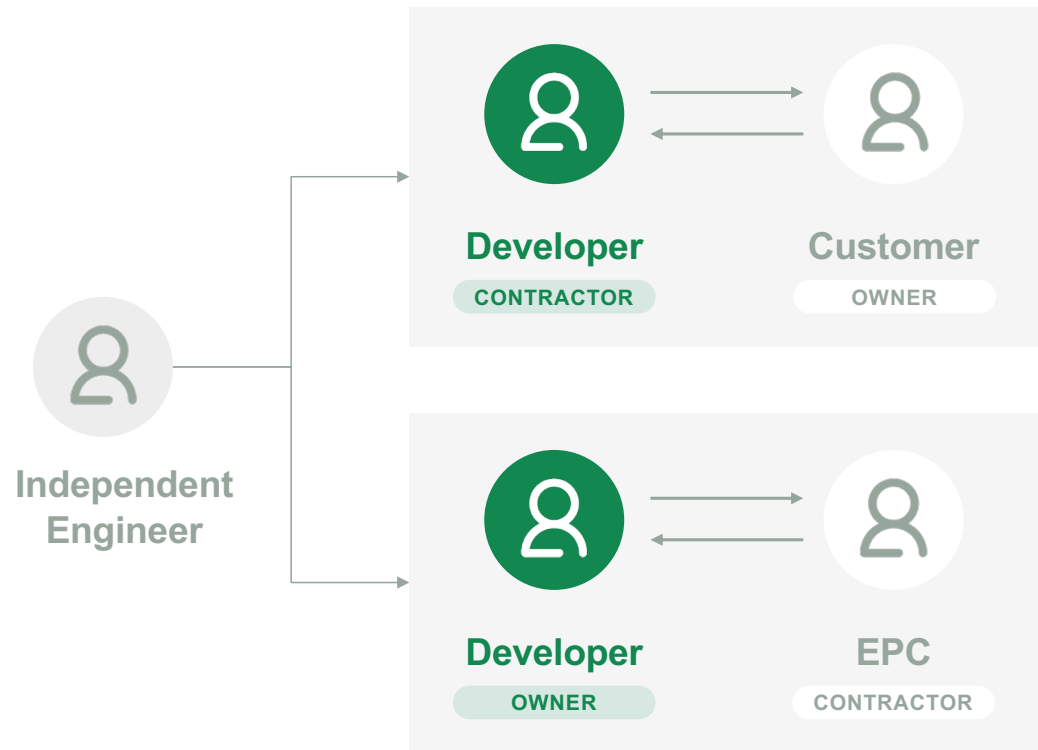
- Developer's Involvement on Capacity Testing
  - Contract Types
  - Model Alignment
  - Measurement Alignment
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# Contract Types

**Developers** may take on different scopes depending on the contract transaction.



# Developers must understand **all perspectives.**

## Independent Engineers

- An accurate assessment of the plant's expected performance
- Reduce uncertainty in model by reviewing:
  - 3<sup>rd</sup> party verified/ lab tested data
  - Site specific data
  - Latest industry trends as assumptions for unknown data

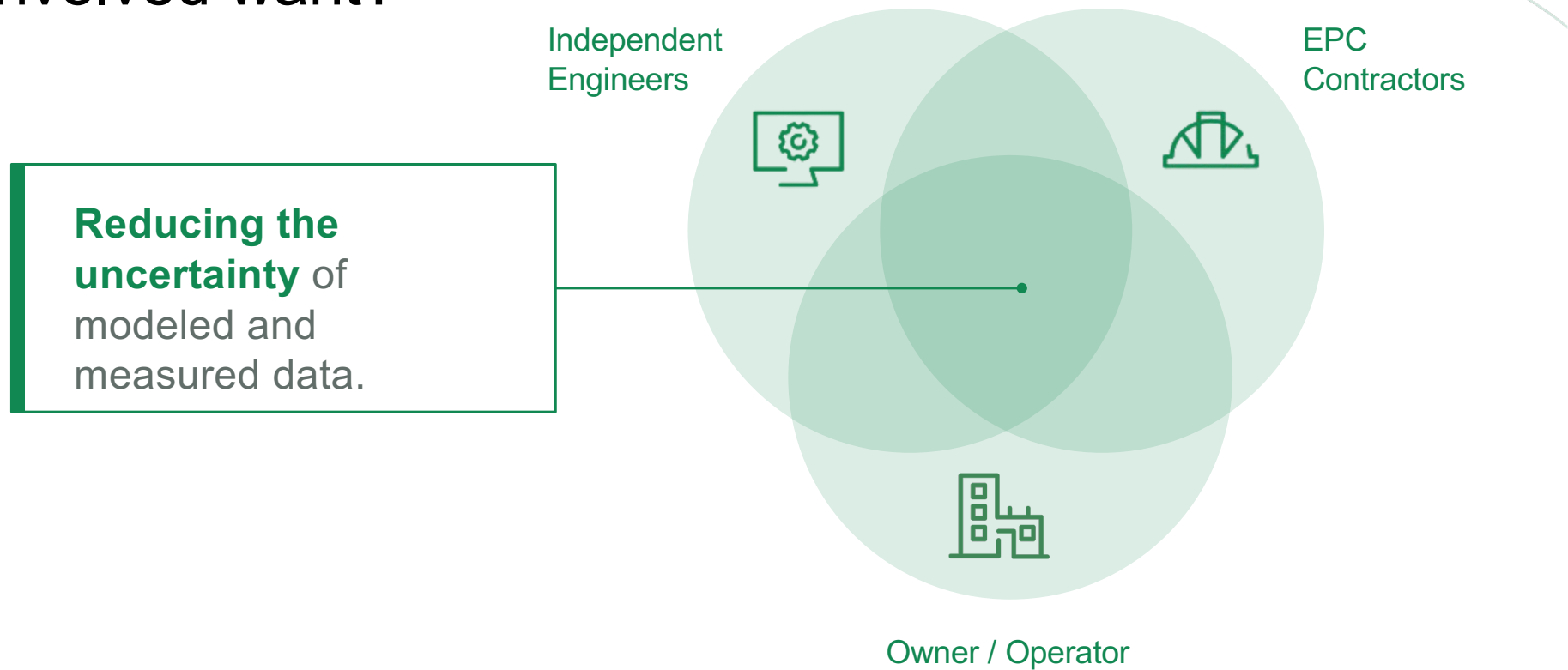
## EPC Contractors

- Schedule efficiency
  - Contract documents / scope well-defined
- Mobilization off-site
- Certainty that passing criteria can be met
- Cooperative weather to gather valid data points

## Owner / Operator

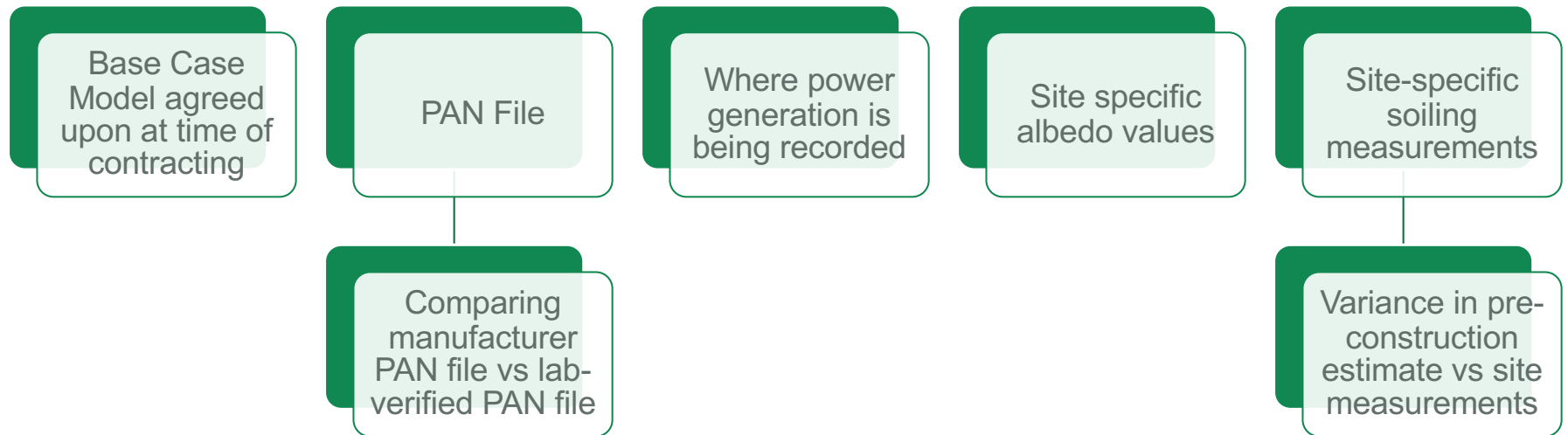
- Milestone completion
- Maintaining quality of power plant through O&M phase
  - Obligations to lenders / investors & the O&M team

# What do **all parties** involved want?



# Model Confidence

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# Model Confidence

Comparing **Manufacturer vs 3<sup>rd</sup> Party Lab PAN File** during capacity testing

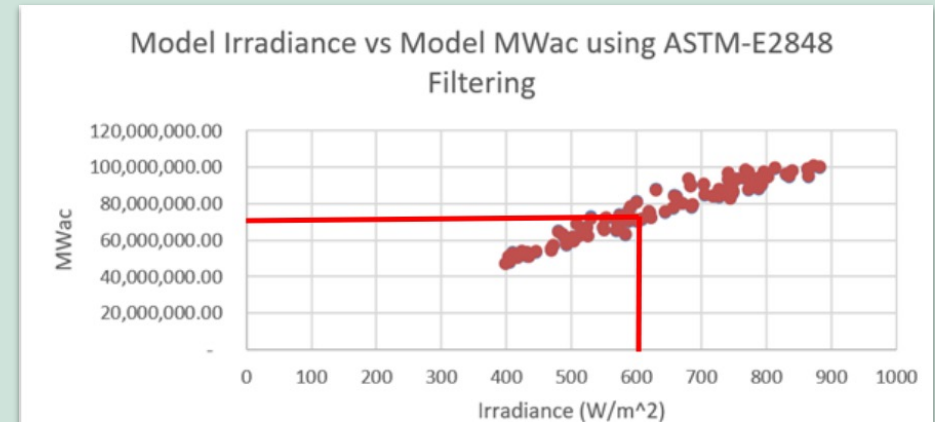
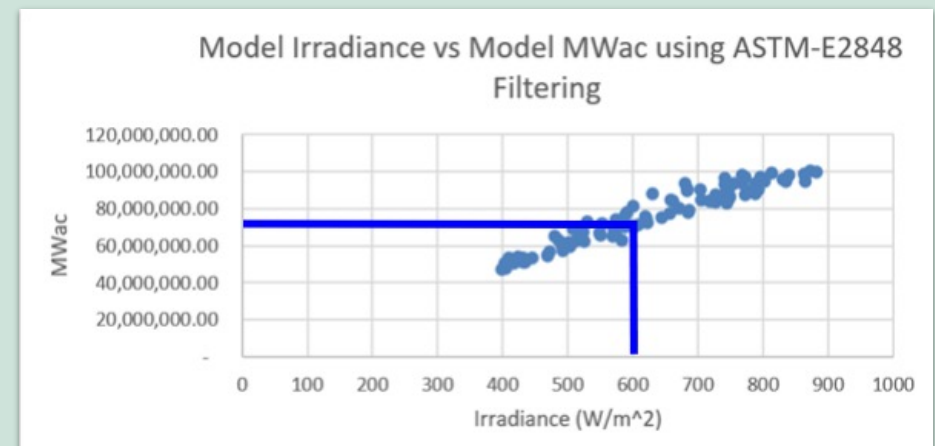
**Target Capacity at 600 W/m<sup>2</sup>**

Manufacturer PAN File: 77.85 MWac

3<sup>rd</sup> party PAN File: 77.47 MWac

Difference of 0.4% due to PAN file alone

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# Model Confidence



**Modelling Soiling:** There are varying ways to gather soiling loss percentages.

Pre-construction  
estimate

Soiling Station:  
Comparing currents  
from soiled module  
and clean module

IV Curve soiled  
strings vs clean  
strings

Optical soiling  
sensors

*Equation from Groundwork's  
2022 PVPMC presentation on  
"Soiling Measurement Data  
Processing to Support  
Production Loss Prediction"*

$$\text{Soiling Ratio} = \frac{I_{sc_{soiled}}}{I_{sc_{clean}}}$$

$$\text{Soiling Loss (\%)} = (1 - \text{SRatio}) * 100$$

# Measurement Confidence



## Sensors

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- High quality sensors, low uncertainty (IEC 61724-1)
- Cleanliness
- Position



## Impact of Environmental Conditions on Output

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- Standing water
- Varying snow
- Shading periods in morning/evening



## DC Health

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- Module degradation
- All DC input connected to inverter

# Moving Forward



## Industry to align on “standard” methodologies

Soiling: Is there a guaranteed accuracy with certain methods?

Bifaciality: Standard regression equation, or rPOA placement?

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## Capacity test requires field presence to validate measurement data.

- Varying environmental conditions
  - Sensor cleanliness
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## The importance of agreeing on procedures early

Establish base case model in Contract, with ability to update certain criteria as more information comes in

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