

# CLEANPATH VENTURES



The Need for Validation from Concept to a Terrawatt

NREL Workshop August 31, 2011

# Money drives the process

Technology  
Innovation &  
Quality  
Improvement

## Construction

Construction Equity  
Construction Debt  
Vendor Financing

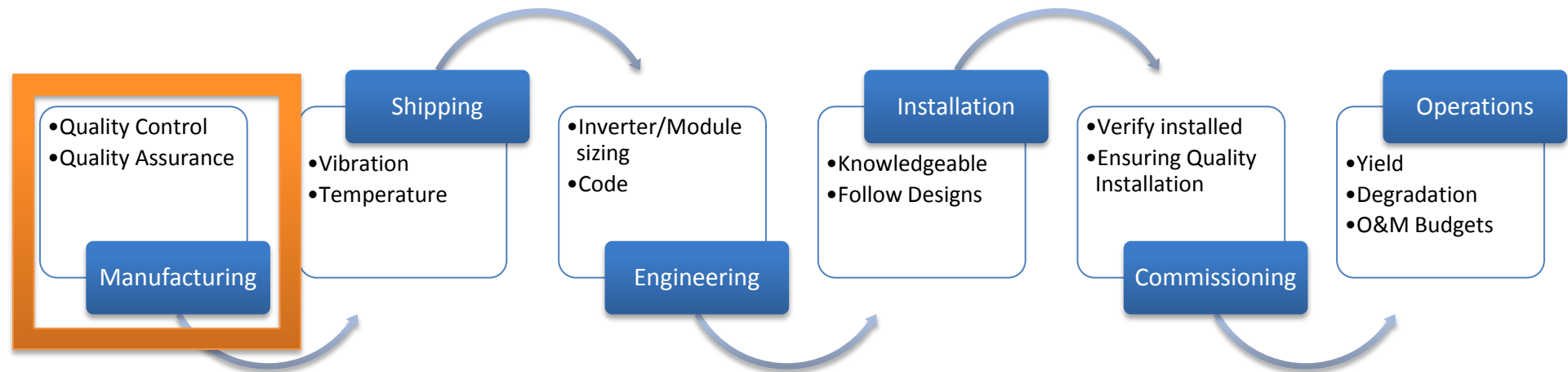
## Project Finance

Tax Equity  
Permanent Debt  
Sponsor Equity

## 6+ Year

Equity  
Refinanced Debt

# the quality control chain



# System/Module Validation

- Inputs
  - **Degradation**
    - uncertain
  - **PVSYST Pan Files**
    - Inaccurate/Inconsistent
- **Models**
  - **Validation of PVSYST to “real” world**
- **Outputs**
  - **Expected System Yield**
    - Curve not a point
    - Probability of performance
  - **Residual Value**
    - How long will the products work

# Perceived Certainty

# Implications of performance

Yield	100%	101%	102%	103%	105%	109%
Development Fee	5,300	5,900	6,500	7,000	8,800	10,400
% Increase		10%	20%	31%	51%	95%

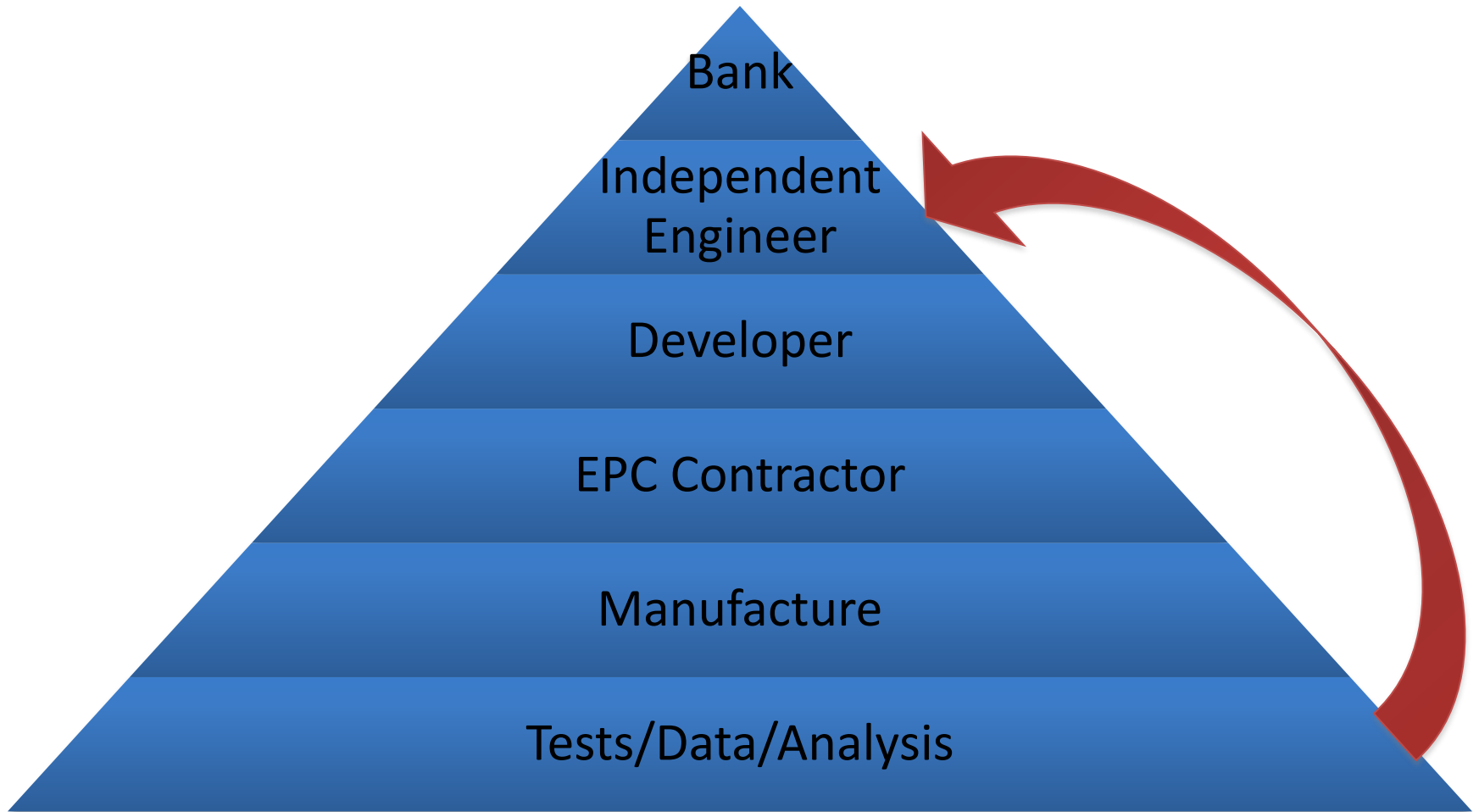
Degradation	0.75	0.60	0.50	0.40	0.30	0.20
Development Fee	4,600	5,300	5,900	6,500	7,000	7,600
% Increase		15%	28%	41%	52%	65%

O&M (\$/W)	28	24	20	16	12	8
Development Fee	1,800	2,600	3,400	4,200	4,900	5,700
% Increase		42%	84%	126%	169%	211%

12.5 MW System  
 Base Yield: 1950 kWh/kWp  
 7% Unlevered Return  
 0.60 Degradation  
 O&M \$10/MW

# Monetizing Quality

- Day 0 is extremely important
- Predictability, viability, and solid sponsorship is essential.
- Every 1% increase in yield increases the project profitability 10%
- Increased certainty in degradation is worth millions
- Decreases in O&M certainty is also worth millions
- There is a magnified effect of these three variables.





# Conclusions

- Quality WILL lead to more **valuable** systems
- Determining quality tests that give certainty is **essential & difficult**
- We need better ways to prove
  - PVSYST PAN File validation
  - Quality test to determine residual value probability
  - Quality tests that establish certainty of yield
  - Quality tests that give more certainty of unscheduled maintenance
  - Quality tests that give more certainty of degradation
- More Communication earlier
- More Communication with Lenders
- More Communication with Independent Engineers

Thank YOU!

David Williams  
Chief Risk Officer

CLEANPATH  
STEVENSON

[dwilliams@cleanpath.com](mailto:dwilliams@cleanpath.com)