



White Paper

# Three Essentials for Guiding Distributed Generation Diligence

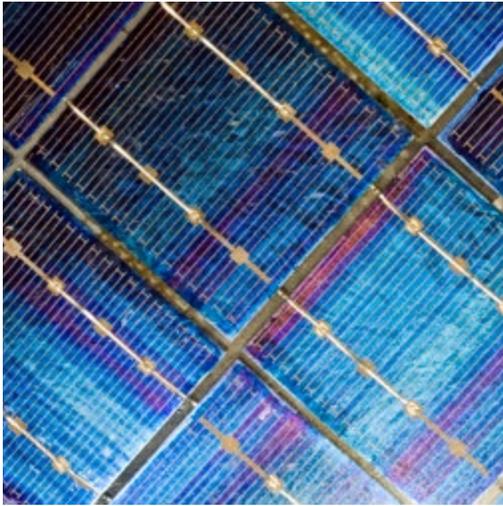
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## Shareables

- Technical due diligence for utility-scale projects must be adapted to support financing of distributed generation (DG) portfolios
- The necessary adaptation is informed by the approach used for product or equipment due diligence with three main pillars of review—processes, samples, and review of historic performance.
- Ensure a proper due diligence scope has been identified, and support cost-effective and timely review of financing.

## Executive Summary

Increasingly, developers, investors, and utilities are considering portfolios of distributed solar photovoltaic (PV) and other DG technologies. However, the traditional technical due diligence performed on utility scale assets is too expensive and impractical for distributed assets. The technological underpinning for PV installations is generally the same regardless of system scale; however, DG portfolios cannot sustain the cost associated with the same amount of project-specific diligence as utility scale systems. As a result, the diligence that has been accepted within the industry for financing utility-scale PV projects must be adapted for DG portfolios. The core of successful DG diligence must focus on processes, representative sample projects, and prior performance.



## Technical Guide to DG Due Diligence

It has been said you can have inexpensive and quick but not quality work, or high-quality and expediency but not low cost, and so on. Speed and quality through a cost-effective approach is essential for DG financing given the large number of assets that need to be reviewed and short timelines; while managing the cost to manage diligence expenses. When it comes to technical due diligence in support of financing distributed renewable energy projects, an effective balance is obtainable by keeping these key guidelines in mind.

Residential and commercial rooftops, car ports, small ground mount installations, and community solar developments represent significant investment opportunity in the aggregation of DG assets. However, the typical approach to utility-scale project due diligence—vetting all technical and commercial details for each development—must be adapted to meet the technical due diligence needs of aggregated DG portfolios. Rather than a project-level approach, a portfolio-level review is warranted.

### Utility-Scale Project Review Scope

- Site Selection Permitting
- Equipment Selection
- Contracts Technical Provisions (PPA, IA, EPC, Lease, O&M)
- Energy Estimates
- Construction Plans, Schedules and Budgets
- Commissioning and performance tracking plans
- O&M Plans & Budget
- Pro Forma Technical and Performance Inputs

### Product Review Scope

- Processes of Product Manufacturer
  - Design Processes
  - Manufacturing Processes
  - Quality Processes
- Sample Testing
  - Destructive Testing
  - Lifetime Testing
- Performance of Deployed Products
  - Performance Review
  - Warranty Returns
  - Serial Defects

### Recommended Process

#### DG Portfolio Review Scope

- Processes for Development
  - In-Person Meeting with Developer
  - Site Selection/Permitting
  - Equipment Selection & System Design
  - Contract Technical Provisions
  - Energy Generation Estimates
  - Installation, Commissioning, & Operations
- Sample Projects
  - Representative Cross Section of Portfolio
  - Geographic and Design Diversity
  - Identify if projects deviate from processes
  - Site Visits
- Portfolio Performance
  - Weather-Corrected Historical Performance Assessment
  - Assess availability and impact of system outages.
  - Support for technical inputs for the pro forma (degradation, generation, availability, O&M costs)

In support of this adaptation, the National Renewable Energy Laboratory (NREL) established the Solar Access to Public Capital working group in 2013. It helped develop resources and best practices for streamlining DG development and financing. In parallel, the renewable finance industry has been adapting the diligence approach used for product reviews, rather than project reviews, in assessment of DG portfolios. In a product (or technology) review, beyond looking at qualifications and experience of key participants, diligence focuses on the



processes for product design and manufacturing quality, a sample of products under extreme testing conditions, and the performance of products previously deployed. It shifts away from a details focus of each item running through the manufacturing line to a macro approach of reviewing the system that is creating the products. Such a product review is in many ways analogous to the review of a DG portfolio.

Adapting this diligence approach to DG finance yields a portfolio-level scope dependent on three main pillars:

- Review the processes for developing assets to assess conformance with industry best practice
- Evaluate a sample of projects to determine that processes are consistently implemented, and whether any major deviations from stated processes or industry best practice have occurred
- Analyze the performance of currently operating assets in terms of overall operation and energy generation to appraise whether processes have been effective

#### Processes

- In-Person Meeting with Developer
- Site Selection/Permitting
- Equipment Selection & System Design
- Contract Technical Provisions
- Energy Generation Estimates
- Installation, Commissioning, & Operations

#### Get Personal with Processes

An effective DG due diligence scope should include a review of developer processes and an in-person meeting with the developer to review details of their internal process documentation. The in-person meeting helps expand the understanding of the developer's approach and implementation of processes. The scope of diligence should include review of standard development, construction, and operation processes of the developer, specifically, processes for selecting project sites, obtaining permits, choosing equipment suppliers, developing system designs, estimating energy production, completing installation and commissioning, and performing necessary maintenance. Collectively, successful execution in all of these areas is critical for a project to perform in alignment with expectations. It is not uncommon for a developer to resist openly sharing detailed process documents for development, as they commonly represent a significant amount of intellectual property. Thus, an in-person meeting is often an effective method to supplement available documentation.

#### Sample Projects

- Representative Cross Section of Portfolio
- Geographic and Design Diversity
- Identify if projects deviate from processes
- Site Visits

#### Representative Sample Population

Due to the large number of assets in a DG portfolio, the scope of review should include an assessment of sample projects. Any deviations from stated processes and industry practice should be noted, and the reason for the deviation should be discussed. There has been limited consensus on a specific quantity or percentage of assets to be reviewed in detail. Instead, the total sample should consist of a meaningful cross-section of the characteristics of the portfolio presented for financing. This means the sample should include assets that utilize all, or a majority, of the equipment manufacturers selected for involvement.



It should also cover the breadth of the geographical distribution, as well as the type of installation—whether ground-mount, carport, or rooftop. Ideally, the independent engineer would either be responsible for selecting the sample assets or collaborate with the developer and other stakeholders to select sample assets to ensure projects presented for the sample-review are not "cherry-picked" among the best installed or performing assets.

The sample review should include a detailed analysis of all stages of development to confirm alignment in development and design with the stated processes and standard industry practice. There would certainly be cause for concern if a significant number of projects within the sample set are identified as having deviations. In fact, there was an instance whereby about half of the sample projects with a portfolio under review had exceptions to the processes.

Naturally, this leads to concerns on how exceptions were identified and approved, as well as whether the processes were truly being followed by the development team. The large amount of exceptions to the processes created a risk that was described in detail to the financiers, as well as recommendations on how to address the potential challenges this presented. A corollary to this portion of the review scope preferably would include visits to at least a portion of the sample assets to study the quality of installation and the condition of the asset.

#### Portfolio Performance

- Weather-Corrected Historical Performance Assessment
- Assess availability and impact of system outages
- Support for technical inputs for the pro forma (degradation, generation, availability, O&M costs)

#### Understanding Performance

We believe it is imperative to complete a performance review for operating assets when supporting DG financing, assuming the developer has previous relevant experience with similar assets and access to the operating data for those assets. The approach for efficiently completing said review has not necessarily been standardized. One key element required for the performance assessment is a clear baseline of expected generation, and an understanding of how that relates to current processes for developing estimated generation on future projects. This understanding is essential for understanding the results of the assessment and the potential impacts it has on future development and investment.

There are many different methods for completing the assessment, including a simplistic comparison of overall expected generation to actual generation; however, we recommend a more robust asset level analysis including weather and availability corrections in the performance review. A weather-corrected assessment of performance allows underperformance and the assets that have the greatest impact on portfolio metrics to be identified. Through our approach we can categorize performance trends and patterns that might signal more significant issues, as well as target specific assets for further investigation. We have developed an independent approach, including a defined decision tree for the analysis to help identify and address the issues of underperforming assets.

The concepts of process-, sample-, and performance-review are hardly novel, but confirming **1)** an in-person meeting to review processes and process documentation, **2)** a truly representative cross-section of sample projects are reviewed in detail, and **3)** a comprehensive assessment of actual performance is included in the scope will help ensure meaningful results from the due diligence article.



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