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Whitepaper

Evaluating the O&M Contractor

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Focus on
O&M for Solar



Methodology



Long-term
commitment



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1 Executive Summary

In an emerging market like O&M for solar PV, where there is still lack of standardization, there are numerous companies presenting different approaches and concepts. One thing that such companies do share in common though, is that “**Optimizing Performance**” is a term that is being increasingly used.

Although it is obvious the performance of an O&M Contractor is tightly connected to the asset’s performance optimization, the evaluation of the Contractor’s capability to perform and even excel in the contractual obligations is a more complex process.

By identifying the key tasks a Contractor has to fulfill we can drill down to the individual capabilities needed to execute and even excel in them. Such functions are:

- ⊕ Fast problem resolution
- ⊕ Minimization of faults
- ⊕ Detailed reporting and transparency

The **O&M Contractor Evaluation Tool** that has been developed by Alectris and presented in this White Paper includes currently 85 different discrete items that are related to the actual basic functions named above and categorized in a meaningful way. The Tool is delivered upon request in an editable format and provides the following options:

- ⊕ A holistic, unified approach to evaluating O&M considerations and capabilities
- ⊕ Plant owner self-determined priority setting
- ⊕ O&M contractor evaluation scores mapped to owner priorities
- ⊕ Typical O&M KPI’s mapped to O&M contractor capabilities
- ⊕ Customizable to add more evaluation areas
- ⊕ Graphic depiction of contractor scores

2 Overview

A lot is being spoken in the solar PV O&M market about **Optimizing Performance**, but only very rarely is it explained how this can be achieved in a convincing way. The performance of a PV asset is dependent on two basic parameters:

- ⊕ Quality of design and construction
- ⊕ Quality of Operations and Maintenance



The role an O&M Contractor that can possibly play during the design and construction phase of a project is a subject of a separate White Paper. In the present White Paper we focus on the connection between O&M and Performance Optimization and discuss about a basic set of criteria and qualities an O&M Contractor should have to be able to achieve Performance Optimization.

In the sections below we discuss how an evaluation tool can be developed based on the principle of the very well-known Balanced Scorecard theory. Various properties (whether from the HR perspective or technical and infrastructure) are identified and connected to three basic KPIs. The result is an easy to use tool that users comprehensive tool that can be used as a template and adjusted according to one's own perceptions and needs and provides graphical representations of an O&M Contractor valuation.

It must be clarified though that this tool is intended to assess the Contractor's **ability to perform** the contractual obligations and not to evaluate contractual parameters. Contractual parameters differ substantially according to the actual needs of the Owner and the PV Plant specifications and there can be no objective assessment thereof in a generic way.

3 What does “Optimizing Performance” really mean?

Optimizing Performance is a term that is very widely used in the solar PV O&M industry. There are two basic questions that need to be answered to define this term better:

- ☺ Which performance are we talking about?
- ☺ How is such Optimization achieved?

If we would expand this term, it would look like this: **“Optimizing Financial Plant Performance by Optimizing Contractor Operational Performance”**. In essence what this sentence means is that, during its operational phase, a solar PV plant will perform optimally if the Contractor is able to outperform and excel in his duties. We assume though in this case that the Contractor is not just simply asked to perform preventative maintenance activities, but is essence asked to monitor and analyze the plant's performance and actively engage in the asset's performance optimization.



4 Functions of an O&M Contractor

There are three basic functions an O&M Contractor is asked to perform:

- ⊕ Fast problem resolution
- ⊕ Minimization of faults
- ⊕ Detailed reporting and transparency

In order to determine the Contractor's ability to comply and even outperform the contractual obligations it is of essence to define what qualities and competencies are needed to excel in these three functions. To make the process simpler we will use a simplified analogy: The Contractor can be compared with a race car. Choosing a contractor is very similar to choosing a car to run a race.

4.1 The "Engine" of the Contractor

The "Engine" of the Contractor is a set of properties that are absolutely necessary to perform at a minimum, to be able to be even named O&M Contractor, similar to a car needing an engine to be able to move. Such core capabilities are the following:

- ⊕ DAS (Data Acquisition System)
- ⊕ Data Analysis Capabilities
- ⊕ Field Personnel
- ⊕ Control Room
- ⊕ Engineering Capabilities

With lack of any of the above capabilities an O&M Contractor is not able to perform, let alone excel in, any of the three basic functions presented in the previous section.

4.1.1 DAS (Data Acquisition System)

As regards to a DAS Contractors choose different strategies: Some have developed or are developing their own proprietary systems and some rely on third party platforms. One thing is for sure though: Contractors willing to rely on multiple systems are going to have a very hard time to consistently monitor their portfolio due to basic differences between systems of various vendors both in core capabilities and even the user interface, but also because data resides in separate databases and cannot be aggregated. A DAS can be easily evaluated based on specific capabilities ranging from time lag between data generation and insertion in a database, alerting capabilities.



Important is also to identify how comprehensive a DAS is in terms of devices monitored and also parameters measured on those devices.

4.1.2 Data Analysis Capabilities

Data in a solar PV Plant is massively generated. Humans are not able without the proper IT tools to dig into and analyze the data. Whether analytical capabilities are integrated in the DAS or are provided by an external tool, the requirements do remain the same. Analytical tools can be rated according to their customization capabilities and the range of pre-configured analytical reports. One important aspect that needs to be taken into consideration is the reporting on the actual activities performed by the Contractor and their outcome, provided of course that such data is been gathered by the Contractor. All the above should ideally be related to as-built data in a hierarchical manner, so that analysis is more meaningful to engineers.

4.1.3 Field Personnel

The importance of Field Personnel is quite obvious and there no need of further explanation. In the O&M market there is an ongoing discussion whether in-house field personnel is better than outsourced. There are pros and cons for both cases, but basically the evaluation is identical and has to do with the ability of fast intervention and efficient resolution of technical issues.

4.1.4 Control Room

The Control Room is the heart of the operations, the command center. The Operators in the Control Room are the people who will analyze faults and provide the instructions to the Field Personnel for their interventions. The technological infrastructure of the Control Room, which is tightly connected with the DAS and Analytical Tools, are also of key importance.

4.1.5 Engineering Capabilities

Engineering capabilities are very often undervalued mainly due to the fact that in many cases the role of the Contractor is restrained to basic preventative maintenance activities and responding to incidents. In our experience in all PV plants, especially the ones that are starting to age, the importance of Engineering in analyzing deficiencies and proposing technical enhancement is of major importance. Factors



like hand-on experience in solar PV, level of expertise and proven track record are important to evaluate the Engineering capabilities of a Contractor.

4.2 The “Supporting Systems” of the Contractor

Having a good engine still does not mean that a car can run a race. There are a series of supporting systems (wheel, tires, chassis etc) needed to keep the car running in an efficient manner. Similarly, a Contractor needs to have a series of supporting mechanisms to keep the “engine” running at maximum efficiency. Such “Supporting Systems” for a Contractor are:

- ☑ Quality Assurance and Accountability
- ☑ Process Control
- ☑ Knowledgebase of Problem Resolution
- ☑ Tracking Measurements by Field Personnel

4.2.1 Quality Assurance & Accountability

Like any other service provider an O&M Contractor has to make sure that the services provided are of the highest level. Especially in distributed environments, when different teams are getting involved in problem resolution, it is important to measure quality of the services, track activities of people involved and focus on deficiencies through training programs. Core importance is that such activities are measured in an objective way to provide the needed insight to the management.

4.2.2 Process Control

In many occasions, especially when the portfolio consists of geographically distributed solar PV plants, having a tight control on the processes though documented internal processes, written procedures for in house or outsources personnel is necessary to ensure that things are done according to the specifications.

4.2.3 Knowledgebase of Problem Resolution

Solar PV plants are very similar constructions regardless of their location. There are few technological differences and consequently the vast majority of arising issues tend to be very similar. Building up a centralized a knowledgebase of issues dealt with (and resolved) in the past can be a significant help for Engineers, Operators and Field Personnel to increase efficiency and speed of problem resolution.



4.2.4 Tracking of Measurements by Field Personnel

As previously discussed, a DAS is part of the “engine” of the Contractor since it captures measured vital data from devices in a solar PV Plant. This alone does not provide a holistic view of the plant, as throughout the duration of an O&M Contract, various activities are performed by the Contractor. Apart from simple tasks, preventative maintenance, a Contractor may perform a wide range of field measurements to analyze and troubleshoot faults. Such measurements are valuable data that help the understanding of a plant behavior. Consequently, a Contractor should ideally have system to store such data in a structured manner, possibly in a database together with data from the DAS, so that a holistic analysis is feasible by the Engineers and Operators.

4.3 The “Driver”

In the sections above we tried to use an analogy of a Contractor with a car. The core

“...an O&M Contractor is a long term partner with the asset Owner and he should be evaluated as such.”

competencies of the Contractor are compared to the engine of a car and the support structure is compared with the supporting systems of a car. Still with these two being at optimum, a car is still not able to run a race without a driver. Similarly with a Contractor, the human perspective should not be undervalued. After all, an O&M Contractor is a long term partner with the asset Owner and he should be evaluated as such. In this case basic business rules apply and any rating is mostly very subjective. There are though some fundamental

qualities than an asset Owner should take into consideration, like responsiveness, deep understanding of the customers’ needs, motivation, honesty and attitude in communications.



5 The Evaluation Tool

Making use of the detailed analysis above an Evaluation Tool has been developed by Alectris This Tool can be used to rate the Contractors ability to perform the contractual obligations and provides the following options:

- ✔ A holistic, unified approach to evaluating O&M considerations and capabilities
- ✔ Plant owner self-determined priority setting
- ✔ O&M contractor evaluation scores mapped to owner priorities
- ✔ Typical O&M KPI's mapped to O&M contractor capabilities
- ✔ Customizable to add more evaluation areas
- ✔ Graphic depiction of contractor scores

The first version of the tool contains 85 different items that can be rated by the Owner and are classified according to the categorization in the above sections. These 85 parameters are not equally important in achieving the respective goals, so an importance parameter must be taken into consideration in way that properties being more vital in fulfilling certain tasks are weighed differently than other less vital properties. The Owner has the ability to graphically review the total score by category, subcategory or KPI-centered. Some screenshots of a random rating result are showed below.

The tool is fully editable and configurable and can be sent upon request. For more information on ordering the Tool please refer to section 7.

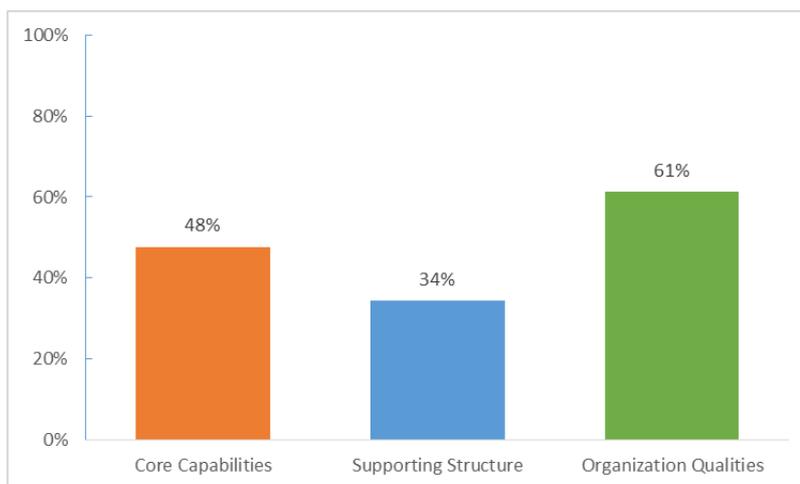


Figure 1: O&M Contractor evaluation according to categories (random numbers used)

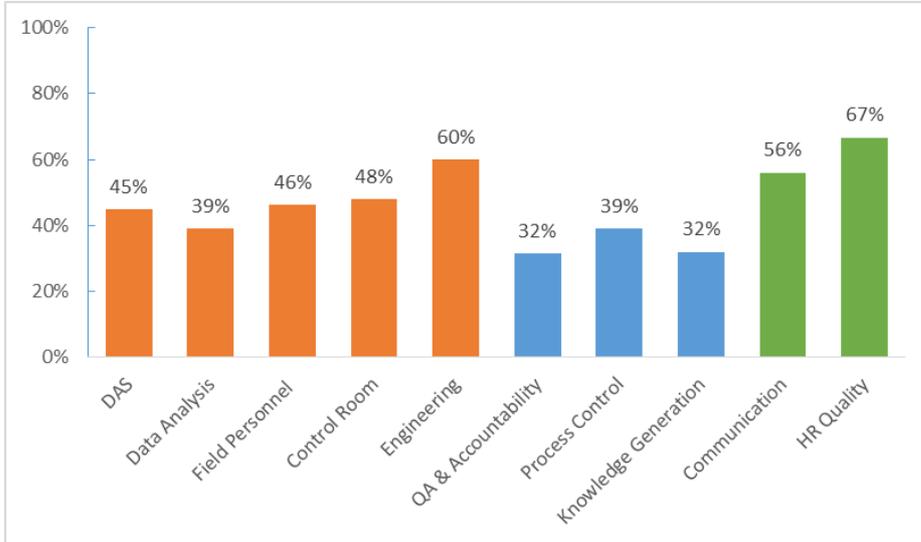


Figure 2: O&M Contractor evaluation according to subcategories (random numbers used)

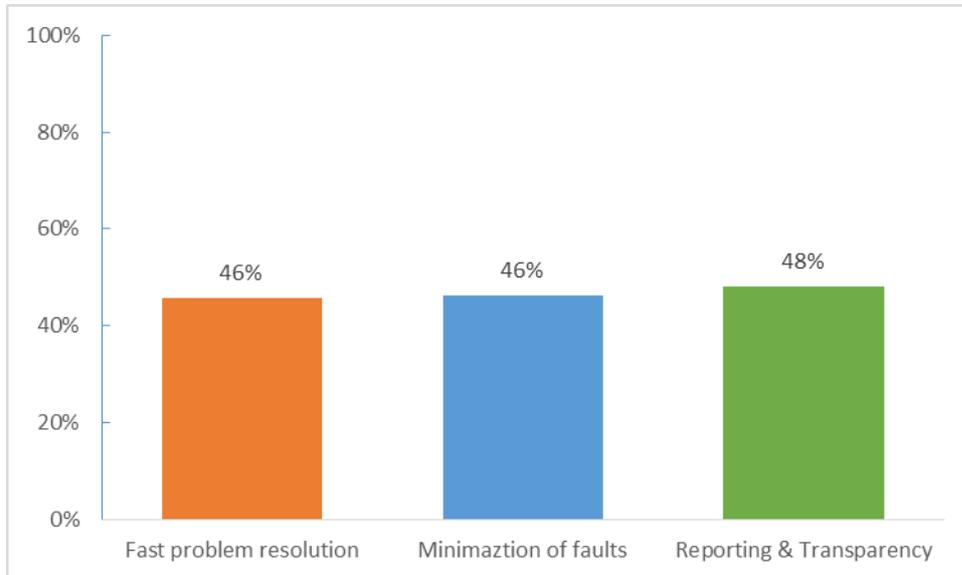


Figure 3: O&M Contractor evaluation according to KPIs (random numbers used)

6 Summary

Optimizing Performance of solar PV plants is very much dependent on the actual operational performance of the O&M Contractors, provided that such Contractors are asked to actively engage in the asset's performance optimization and not just conduct



simple maintenance tasks. It is therefore of essence that Owners should analyze and evaluate the Contractor’s ability to perform and, even better, excel in their duties.

The process of such analysis is done in three simple steps:

- ☑ Identification of basic functions
- ☑ Identification of basic capabilities to perform such functions
- ☑ Listing of criteria defining the level of competence for the above capabilities

Such process leads to a comprehensive Evaluation Tool developed by Alectris that is available to be sent upon request (please refer to section 7 below for information on how to order the Tool). The first version of the O&M Contractor Evaluation Tool contains 85 different items that can be rated by the person conducting the analysis. Each item is weighed according to its importance and participation in a task fulfillment. Additionally; these items are mapped to one or more of the basic functions identified in the first step. The outcome of such a process can be analyzed in numerous ways; three sample charts have been presented showing the valuation of every Contractor from different angles:

- ☑ Competency to fulfill each of the basic functions
- ☑ Evaluation by category
- ☑ Evaluation by Subcategory

This Tool is provided in editable format and is being constantly enhanced by Alectis. Evaluators can add or remove criteria and change the weighing parameters according to their preferences. This allows the option to map O&M Contractor capabilities to the specific needs of asset Owner and therefore create a personalized ranking system.

7 How to order the tool

To order this tool please refer to the contact persons below:

<i>Name/Position</i>	<i>Region</i>	<i>Contact Information</i>
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8 More Information

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