



Technical Due Diligence for Solar Power Plants

Service Description – Prices

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1. Introduction

Institutional investors use to mandate technical and legal Due Diligence (DD) works before investing in a solar power plant. The goal of the Technical DD is the following:

- Check of the compliance with the required technical specifications of the offered components.
- Determine potential defects.
- Analyze the actual production.
- Assessment of the O&M-concept.
- Ensure of the long term availability of the power plant.

After having finished the Technical DD (together with the Legal DD) the investor can make the final investment decision.

2. Description of services

on-site-checks	<ul style="list-style-type: none"> - visual check of the installation - measurement of cabling/modules according IEC 61557-1:2007 - I-V-curve measurement of strings - inspection of cabling in order to secure mechanical and UV-protection - inspection of lightning protection and equipotential - inspection of the structure for proper mounting - inspection of inverters to secure operation, mechanical and electrical protection - inspection of communication devices - inspection of complete documentation on site, schemas on different places of installation - inspection of security system with functional check - independent power supply for monitoring and security system
documentation	<ul style="list-style-type: none"> - review of the completeness of the technical documentation - control of strings and string plans - control of flash reports
plausibility checks	<ul style="list-style-type: none"> - dimension of the inverters - dimension of the cables - design of electrical protection - if requested a flash test in a independent institute (option, not included in basic cost)
yield estimation	<ul style="list-style-type: none"> - assessment of yield estimation of the seller

operation and maintenance	<ul style="list-style-type: none"> - control of maintenance organization - control of security concept - inspection of contracts (completeness, cost) - control of the functionality of the monitoring system - inspection of operational design (for example accessibility of components that need maintenance) - inspection of practical framework for the maintenance (for example how to get on the roof, how to access string boxes, fuses and inverters etc.)
report	- summary report with "to do list"
additional audits	- if needed additional visit after having done the "to do list"
production data	- assessment of available production data

Resources and equipment used:

- Meteororm 7 including access to actual meteorological data, Meteororm and SoDa
- Tri-Ka I-V-curve analyzer
- thermal imaging, hand camera and drone
- GMC PVSun Memo Tester
- data base with production values
- other measuring equipment

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4. References of Technical DD

Projects 2012	Power	Services	Mandated by	Date
ground mounted power plant in Sicily/Italy	2.6 MW	Complete technical inspection on-site	Swiss Investor	January 2012
roof top power plant near Alès/France	1.0 MW	Complete technical inspection on-site	consulting company	May 2012
roof top power plant near Bordeaux/France	4.3 MW	Complete technical inspection on-site	consulting company	June 2012
ground mounted power plant in Piemonte	2.5 MW	Complete technical inspection on-site	Swiss Investor	Aug 12
roof top power plants in South Germany	1.4 MW	preliminary check	German Investor	Aug 12
ground mounted power plant near Bari/Italy	1.0 MW	Complete technical inspection on-site	Swiss Investor	Nov 12
ground mounted power plant near Taranto/Italy	0.9 MW	Complete technical inspection on-site	Swiss Investor	Nov 12
ground mounted power plant near Taranto/Italy	1.0 MW	Complete technical inspection on-site	Swiss Investor	Nov 12
Projects 2013	Power	Services	Mandated by	Date
roof top power plant near Zurich	0.1 MW	technical inspection on-site and control of documentation	Swiss utility	Feb 13
ground mounted solar power plant near Nimes/France	4.3 MW	quality management during construction	Swiss utility	start Feb. 2013
roof top power plant near Milano	3.3 MW	Complete technical inspection on-site	Swiss Investor	March 2013
ground mounted power plant near Bari/Italy	1.0 MW	Complete technical inspection on-site	Swiss Investor	June 2013
ground mounted power plant near Brindisi/Italy	1.0 MW	Complete technical inspection on-site	Swiss Investor	June 2013
ground mounted solar power plant near Marseille/France	9.4 MW	quality management during construction	Swiss utility	start July 2013
ground mounted solar power plant near Marseille/France	4.5 MW	quality management during construction	Swiss utility	start July 2013
Projects 2014	Power	Services	Mandated by	Date
ground mounted power plant near Ravenna	2.3 MW	technical assessment	Swiss Investor	Jan 14
ground mounted power plant near Bordeaux	12.0 MW	Technical-DD	Swiss utility	May 2014
roof mounted solar power plant Birsfelden/Switzerland	1.3 MW	quality management during construction	private investor	Sept-Dez 2014
roof mounted solar power plant Baar/Switzerland	1.2 MW	technical audit	private investor	Sep 14
ground mounted power plant near Bari/Italy	1.0 MW	technical inspection after theft	Swiss Investor	October 2014
Projects 2015	Power	Services	Mandated by	Date
Group of 6 power plants in Switzerland	3.2 MW	technical DD	Swiss Investor	Apr 15
existing power plant	0.3 MW	technical audit	Swiss utility	Apr 15
ground mounted power plant near Taranto/Italy	2.0 MW	technical inspection after theft	German Investor	May 2015
ground mounted power plant near Modena/Italy	1.0 MW	technical inspection after theft	Italian Investor	June 2015

References „Commissioning Checks“

Projects before 2014	Power	Services	Mandated by	Date
roof mounted power plant in Albaterra South Spain	0.5 MW	commissioning audit	Swiss utility	July 2010
carport power plant in Huelva South Spain	2.6 MW	commissioning audit	Swiss utility	March 2011
roof top power plant near Sevilla South Spain	0.1 MW	commissioning audit	private investor	June 2011
green house power plant near Granada South Spain	4.3 MW	commissioning audit	Swiss utility	Apr 12
ground mounted power plant near Taranto/Italy	1.0 MW	Complete technical inspection on-site	Swiss Investor	Nov 12
ground mounted solar power plant near Nîmes/France	4.3 MW	commissioning audit	Swiss utility	Nov 13
roof mounted solar power plant Basel/Switzerland	0.8 MW	commissioning audit	Swiss utility	Nov 13
Projects 2014	Power	Services	Mandated by	Date
roof mounted solar power plant near Basel/Switzerland	2.0 MW	commissioning audit	private investor	Jan 14
roof mounted solar power plant near Basel/Switzerland	1.9 MW	commissioning audit	private investor	Feb 14
roof mounted solar power plant Basel/Switzerland	1.2 MW	commissioning audit	private investor	March 2014
roof mounted solar power plant Steg/Switzerland	0.45 MW	commissioning audit	private investor	Feb 14
roof mounted solar power plant Bellerive/Switzerland	0.30 MW	commissioning audit	private investor	March 2014
roof mounted solar power plant near Nyon/Switzerland	0.30 MW	commissioning audit	private investor	March 2014
ground mounted solar power plant near Aix/France	9.4 MW	commissioning audit	Swiss utility	Apr 14
roof mounted solar power plant Arbon/Switzerland	2.0 MW	commissioning audit	private investor	May 14
ground mounted solar power plant Kirchberg/Switzerland	0.2 MW	commissioning audit	private investor	July 14
Projects 2015	Power	Services	Mandated by	Date
roof mounted solar power plant near Basel/Switzerland	1.3 MW	commissioning audit	private investor	Mär 15
2 power plants in Switzerland	1.1 MW	commissioning audit	Swiss Investor	May 15
roof mounted power plant	0.2 MW	bi-annual audit	Swiss Investor	May 15
ground mounted solar power plant	4.5 MW	commissioning audit	Swiss utility	May15
2 power plants in Switzerland	0.8 MW	commissioning audit	Swiss Investor	July/Aug 15

Cham, September 2015