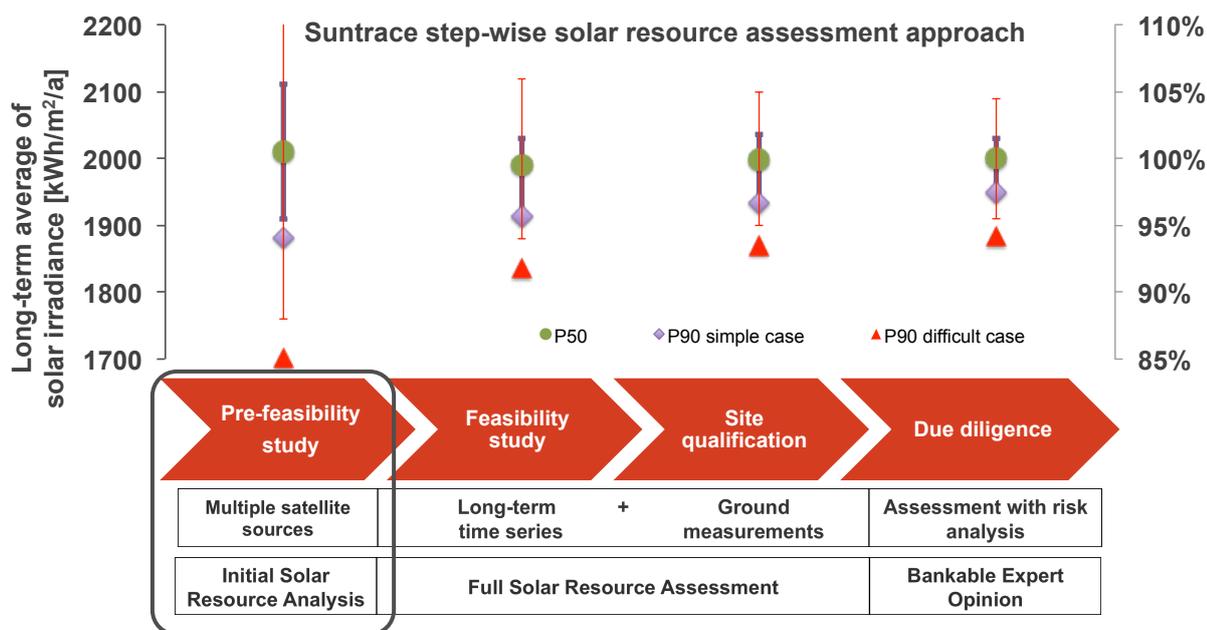


Initial Solar Resource Analysis

for pre-feasibility studies



During the pre-feasibility stage of project development, generally multiple sites are evaluated to identify the best location for developing new solar power projects. Acquiring information about typical solar radiation available at potential plant sites is of high importance. The climatological long-term annual average solar irradiance is the most crucial in sound decision making for site-selection. However, actual information about solar resource at the site(s) of interest is usually limited as ground-based Direct Normal Irradiance (DNI)/Global Horizontal Irradiance (GHI) measurements and site-specific satellite data are rarely available at this project development phase.



Analysis is done progressively in greater depth with each step, resulting in reduced uncertainty of solar radiation.

Our service **Initial Solar Resource Analysis** helps in the early stage of project development, when multiple sites are evaluated and a first qualified estimate of available solar resources is required. Analysis is based on deriving long-term climatological averages of DNI and GHI for Concentrating Solar Power (CSP) and Photovoltaic (PV) projects respectively, which represent P50 values. Based on the results the sites can be ranked accordingly leading to **site-selection**, which can be analyzed further in greater details.

Usually during pre-feasibility stage the cost for assessing the site(s) should be kept minimal with a tradeoff of higher uncertainty of solar radiation. Hence at this stage we collect all available sources of solar radiation data, which are accessible to us at low costs. In most cases these are various satellite-derived solar radiation data. We also have knowledge about ground-based measurements in many regions, which help us to better evaluate the situation.

From all sources, which we may apply and regard useful, a quality-weighted best estimate is calculated following the methodology of Meyer et al. (2008)¹. Weights are assigned to the different data sources based on their estimated quality in the region of interest, their temporal coverage, and representativeness. Based on our experience an uncertainty estimate of the derived DNI or GHI values is given.

The advantage of using multiple data sources is that variability in values of solar radiation delivered by different data sources for the site under question is taken into account. Following this approach the risk of not considering the variability between the data sources is eliminated, resulting into more realistic and

¹ Meyer, Richard, Jesús Torres Butron, Gunnar Marquardt, Marko Schwandt, Norbert Geuder, Carsten Hoyer-Klick, Elke Lorenz, and Annette Hammer. (2008) 'Combining Solar Irradiance Measurements And Various Satellite-Derived Products to A Site Specific Best Estimate'. In Proceedings of SolarPACES 2008. Las Vegas, USA.

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reliable estimates of solar radiation values. The uncertainty expected for long-term solar radiation is an important deliverable of our analysis, which plays an important role in site selection.

Scope

- check of the site location to get impression of its climatological situation with potential influences on locally available solar radiation,
- obtain solar radiation data from multiple data sources,
- analysis and comparison of multiple data sources with respect to
 - quality, representativeness,
 - spatial and temporal coverage
 - spatial and temporal resolution, etc.
- analysis of inter-annual variability of solar radiation in the region,
- estimation of uncertainties and representativeness of all data sources,
- determination of the expected long-term annual average (P50 value) of solar radiation,
- estimation of the expected uncertainty of the long-term annual average of solar radiation.
- optional: estimation of the expected monthly means of solar radiation for a typical year,
- optional: creation of a Typical Meteorological Year (TMY) for initial estimation of energy yields.

Deliverables

- overview report (minimum 4 pages) summarizing main results,
 - quality-weighted expected long-term annual average (P50 value) of solar radiation at the given site,
 - estimate of the expected uncertainty of long-term average,
 - an estimate of uncertainty of average values of solar radiation obtained from different sources,
 - visualization and description of main findings.
- ASCII text-file with annual and on request monthly values either for DNI and/or GHI.
- optional: at this stage a TMY data file in hourly time-resolution, which represents the long-term average (P50) DNI or GHI value, can be delivered upon request.

This type of service is meant as a quick check, to provide initial estimates for project development and site selection process. It is not recommended for engineering tasks. If more detailed analysis and results are required please check our advanced service packages. For description of our more detailed Full Solar Resource Assessments for Feasibility Studies, Bankable Expert Opinions and Solar Energy Specific Meteorological Stations, please contact us at meteo@suntrace.de or + 49 40 767 9638-0.