



PI Berlin

**From solar cells to the power plant:
customer-oriented independent expert**

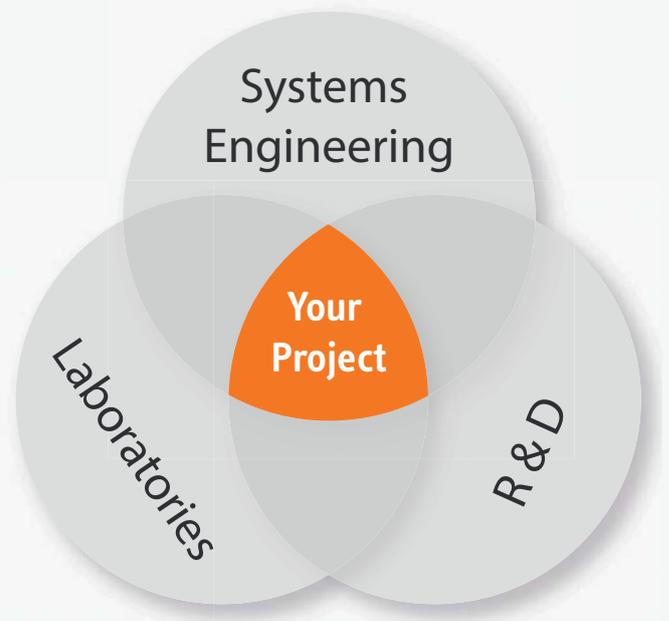


PI Berlin

From solar cells to the power plant, PI Berlin uses its years of experience to support your solar project as a customer-oriented independent expert.

With its internationally focused team of experts, PI Berlin provides a wide spectrum of inspection, planning and consultation services. The core of our work is the implementation and quality assurance of complex PV projects. Our expert advice guides customers through all processes, from the production of modules to the approval of the completed power plant.

The name PI Berlin stands for experience and quality. Our proven independence from manufacturers, construction companies, suppliers and project financiers is essential both for creating high quality solutions, and for winning and retaining customer trust.

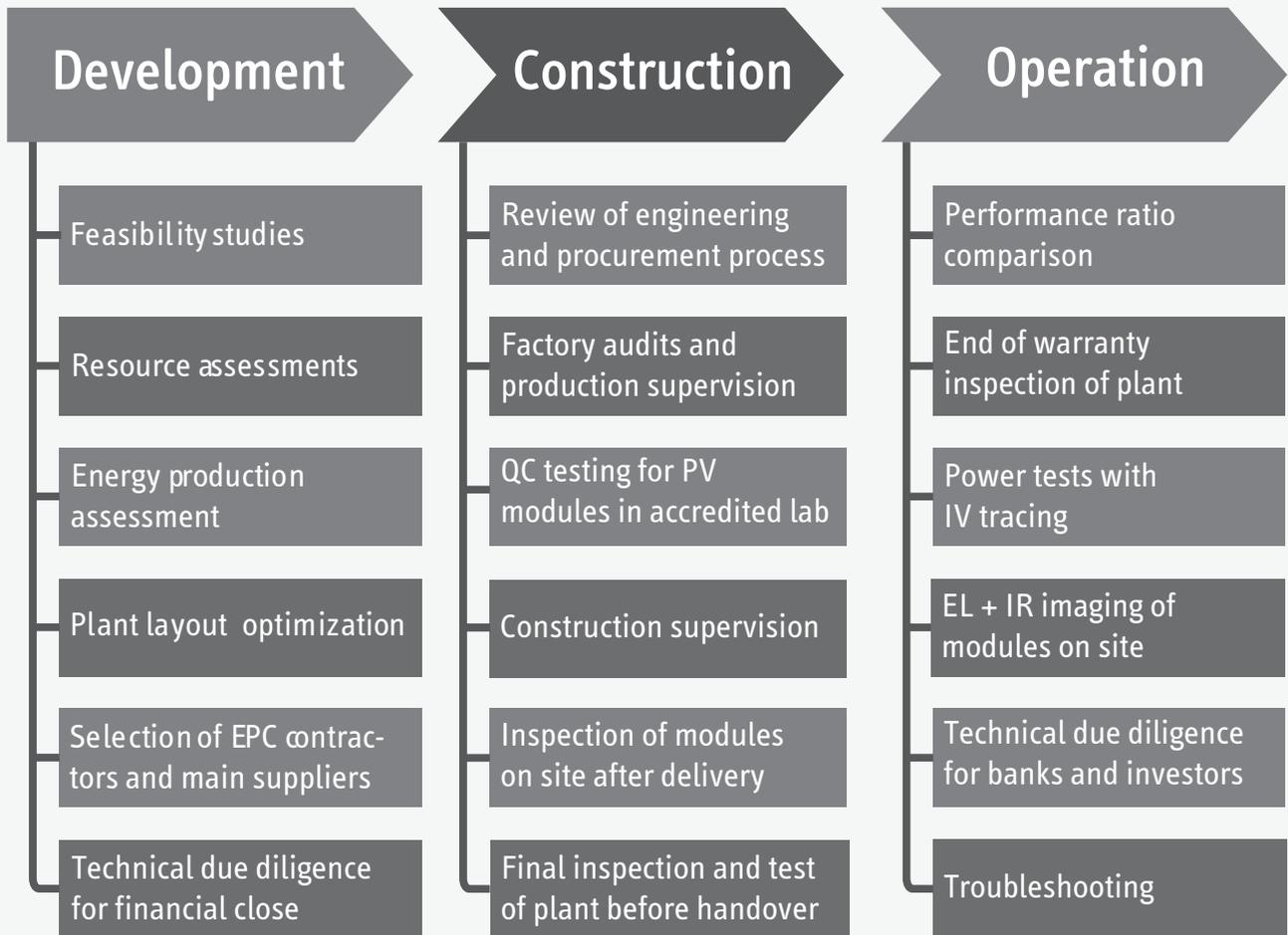


Your Advantages with PI Berlin

- Security and optimization of your investment in the solar industry
- Fast and flexible solutions from a single source, with expertise in power plants, module production and development
- Many years of experience in the photovoltaic industry
- Complete service with fast response times
- Fully equipped PV inspection laboratories in Germany and China in order to test and confirm the quality of your products
- Experienced and internationally renowned research and development team



Services for PV Projects



DEVELOPMENT

During the early stages of project development, PI Berlin offers a wide range of services to minimize your risk exposure. With PI Berlin's strong reputation with a number of international commercial and institutional lenders, you can rest assured that our results will be recognized and trusted within the financial and investor communities.

Ready to Build

As your project gets closer to realization, PI Berlin provides preliminary engineering services and supports your selection of EPC service providers

and main component suppliers based on years of experience gained in the field. In particular our in-house developed quality assurance plan minimizes the risks of component defects and installation deficiencies.

Financial Close

On behalf of investors and lenders, PI Berlin offers a comprehensive technical due diligence review to ensure all project benefits and risks are well understood and that your money is placed only in projects of the highest quality.



- Protection of your development capital**
- Optimal and reliable system configurations**

CONSTRUCTION

Before your project breaks ground and components are delivered to site, our specialized engineers provide services to review and monitor the engineering and procurement process. In particular our factory audits of main components ensure that only high quality products are delivered to your site.

Module Inspection

We recommend batch testing at our labs and on site once the modules are delivered and after installation completion to ensure proper benchmarking and a successful operation start.

Pre-takeover Inspection

During project construction, PI Berlin provides construction supervision, performance tests and final inspection before handover all in accordance with the relevant norms and project contracts.

Power Plant Certificate

As an additional product, PI Berlin provides a PV Plant Check Certification which verifies that the project has been built using the highest quality standards available in the industry. This certificate can be used by EPCs or developers to provide security to their clients, investors and lenders.



- Minimize risk before completion**
- Engineers with worldwide experience**



OPERATION

When in operation, PI Berlin is ideally suited to monitor, evaluate, inspect and test your power plant to ensure that your investment is providing the revenue expected and is operating in a safe and reliable manner. Our complete power plant inspection methods identify deficiencies and defects that could lead to under performance.

On-site Module Tests

In addition to sample module testing in our laboratories, we are able to conduct STC power tests (IV tracing), infrared thermal imaging and electroluminescence tests on site for up to 100%

of modules in the plant.

PI Berlin also provides industry tested solutions in order to repair and optimize power plants to increase their performance such as automated cleaning methods and regeneration of PID affected modules.

Technical Due Diligence

Complete technical due diligence packages are available that are founded in PI Berlin's breadth of experience of inspecting PV power plants around the world. As independent inspectors, we have acted on behalf of lenders to protect their security, of investors looking to acquire plants.



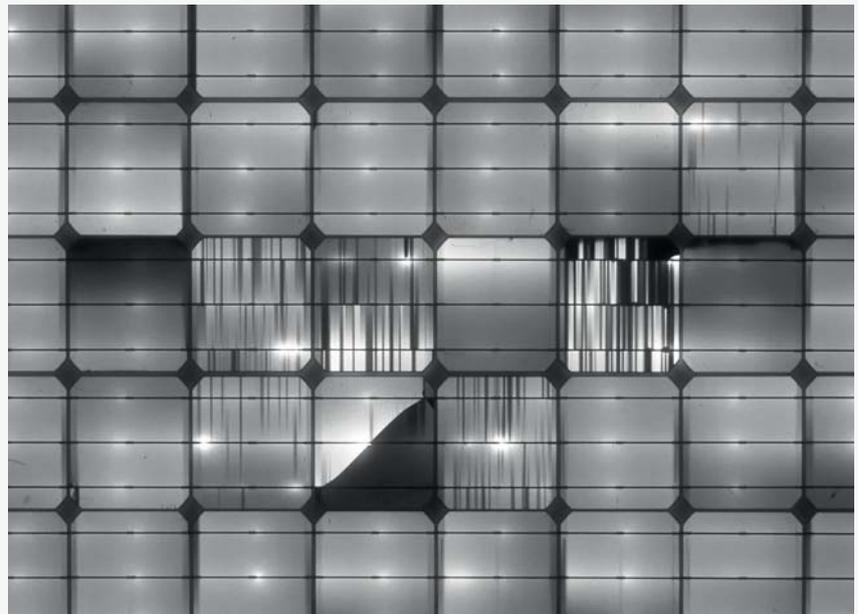
Quality assurance before final acceptance

Reliable and fast reaction time

TROUBLESHOOTING

Determining the cause of performance deficits is not always easy and may be the result of a combination of issues. Our investigation approach uses all the available information from the plant e.g. monitoring data, failure logs, on-site inspections and detailed module testing.

We work together with the customer to determine the appropriate course of action to rectify the plant's performance. As a highly recognized institute and consultant, PI Berlin provides expert opinions that can be used in warranty and insurance claims.



Trusted expert opinions

Supported by in-house laboratory and R&D team

LABORATORIES

Covering an area of over 2500m², PI Berlin's testing laboratory consists of state-of-the-art equipment. We are able to test standard modules as well as new prototypes for performance, reliability and durability

The photovoltaic test laboratory of PI Berlin is accredited by the national German accreditation authority (DAkKS) and internationally as a CBTL (Certified Body Testing Lab) by IECEE with TÜV Süd as NCB (National Certification Body). The accreditation is in accordance with IEC 17025 and therefore PI Berlin is officially recognized to carry out relevant IEC standards and beyond. In addition the laboratory is an official photovoltaic testing laboratory of Intertek/ETL to carry out testing in accordance with UL 1703. PI Berlin is listed and accepted by CEC (California Energy Commission) as well as many banks (e.g. DKB German Credit Bank) and financing institutions.

Worldwide Testing

In addition to the testing lab in Germany, a test lab in China with focus on the Asian market is available.

Quality Checks

With our laboratories we are able to analyse most of the encountered problems in PV modules. Fast quality checks with proper equipment combined with our experience enables an exact evaluation of PV module quality.

Together with our field teams and R&D the lab develops testing packages for special PV applications. If needed the lab team constructs testing equipment which is not yet available on the market.



RESEARCH AND DEVELOPMENT

Solar technology continues to develop at an extraordinary pace. In order to remain at the leading edge, PI Berlin conducts its own research activities on a wide range of topics with a focus on practical application.

Our R&D team uses experience gained from the field and the laboratory to further our understanding of industry critical issues such as soiling, PID and thin film performance. You can be assured that we apply the latest level of knowledge when evaluating your project.



CASE STUDY

- Project Name:** Confidential
- Project Description:** Total installed power: 15 MW | 60000 poly-crystalline modules
Ground mounted grid connected plant
- Project Location:** Island in Sub-Saharan Africa
- Challenge:** Technical Due Diligence on behalf of lender for re-financing of operating plant

Documentation Review

- Technical design for “fit for purpose”
- Comparison of yield estimate with operating data
- Key contracts such as EPC, PPA and O&M
- Land agreements and key permits
- O&M plan, operating reports and warranties

Module Tests in PI Berlin Laboratory

- STC, Electroluminescence, Visual Inspection, Dry Insulation, Peel Test, EVA Gel Content, PID Tests of sample batch
- Complete report and scoring

Site Analysis

- Inspection of complete PV plant (modules, inverters, cabling, security)
- Infrared testing of sample of modules

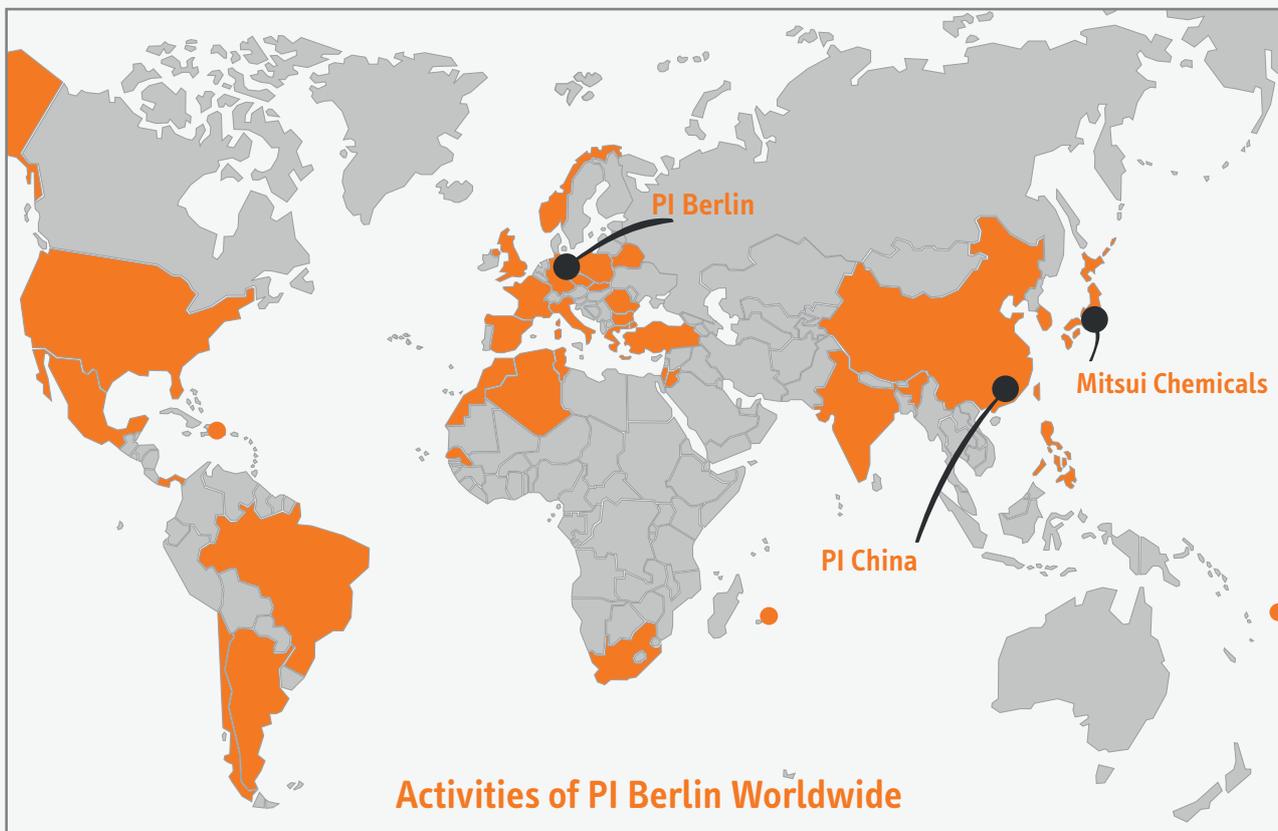
- Confirmation for yield assessment

Final Report

- Photo documentation
- Punch list with rating of importance
- Risk assessment of open items on site, in documentation and of module test results
- Scoring of PV plant quality according to PI Berlin defined weighting criteria

REFERENCES

- Technical consulting for over 2 GW of projects
- Over 25 countries including: Germany, Italy, France, Spain, Jordan, Chile, South Africa, Algeria, USA, Japan and China
- Over 20 module suppliers of mono and polycrystalline as well as thin film
- 5 major banks including: GLS, KfW, Deutsche Bank and ADB
- Over 10 investors/project developers including: rc-partners, re-cap, Mainstream Renewable Power
- Over 10 international EPCs including: Saferay, SunEdison, ib vogt, juwi and ET Solutions



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