BERLIN PI

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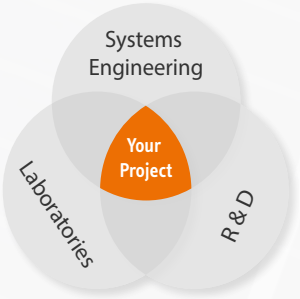
# Solar PV Training

## Capacity Building for a Brighter Future

# PV Training with PI Berlin




## A Reliable Partner in the PV Industry

PI Berlin was founded by solar pioneers who are in the industry since its early days two decades ago. As a consulting company, PI Berlin provides services through its accredited laboratory and engineering team for over ten years. Sharing this valuable experience through training has always been a part of our business.

## Unique Perspective

Our services cover a wide spectrum from the project development phase to construction and through operations. We consult for projects all over the world, on every continent. We not only know the importance of local climates but also of diverse cultures. Together our broad customer base and services give us insights into all aspects of solar PV projects.

## At the Leading Edge of PV Technology

PI Berlin is internationally renowned for its expertise in photovoltaics. We remain at the forefront of a constantly accelerating technology through testing of the latest module types, researching performance issues affecting operating plants and inspecting new sites using the latest system components. Our knowledge that we transfer is always up to date.

## Choose your Training Site

Our team is used to travelling around the globe for our customers. We can set up training classes locally at your site or we can hold the classes in Berlin, Germany at our offices and laboratory.



"A very good in-depth presentation on PV system design."
*– Engineer (Class with powerEDGE)*

# Practical Real-world Experience

Theory and case-studies in the classroom

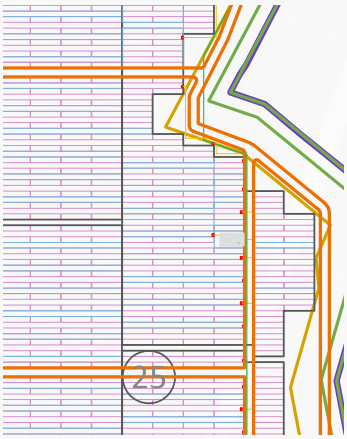
Workshops in the laboratory for module testing and failure analysis

Hands-on, practical training in PV plants

**Classes with PI Berlin link hands-on experience and in-depth classroom knowledge**

"Simple, amazing and informative!"
*– Head Construction Dept, Greenheat Corporation (EPC) and O & M. (Class with powerEDGE)*

# Our Course Offerings



## Design, Construction, Commissioning of PV Plants

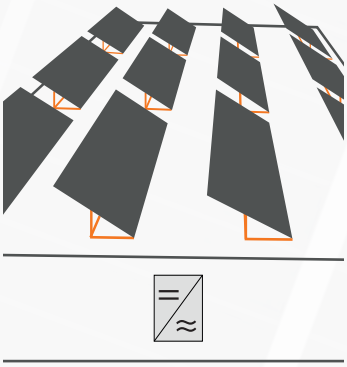
**Quality Control of Grid Connected PV Systems**

- Solar PV technology, the solar resource and energy yield prediction
- Key technical issues in contracts and permits
- Selection of relevant norms and standards for grid-connected large-scale PV systems
- Identification of solar sites and evaluating their potential
- PV plant design, commissioning, operation and maintenance
- Essential electrical devices used for failure detection in the field
- Quality assurance processes for PV plants

## Bankability of Photovoltaic Projects

**Identification and Mitigation of Technical Risks**

- Investment risks present in all PV projects and new markets
- Risks that are faced when selecting PV components
- Introduction to Failure Modes Effects Analysis (FMEA)
- Definition of the Cost Priority Number (CPN) depending on the stakeholder´s perspective
- Presentation of bankability products that are available for each project phase
- Identification of key technical risks in PPA, EPC and O&M contracts



## Deployment and Installation of Rooftop PV Projects

**Challenges, Benefits and Business Models**

- Assessment of rooftop suitability
- Rooftop specific standards and commissioning practices
- Introduction of new PV applications such as building integrated technologies
- Energy storage in rooftop systems
- Financing challenges for rooftop PV installations
- Role of utilities and rooftop management

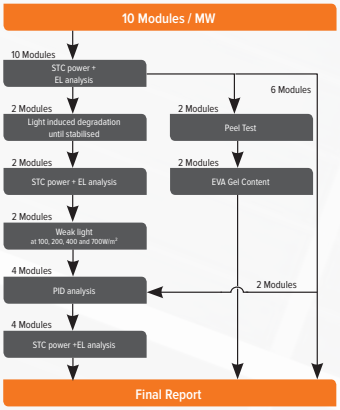


"One of the best masterclass in design, construction, commissioning and quality control of grid connected PV plants."
*– Manager, Tenaga Nasional Berhad (Class with powerEDGE)*

## Testing and Qualifying of PV Modules

**From the applicable standards to the implementation at the testing site**

- Basics about standardization, certification and accreditation
- Requirements for ISO 17025 accreditation
- IEC 61215 and 61730 test procedures and test stands
- Introduction into the PV testing equipment
- Understanding and interpreting laboratory reports
- Hands-on training with lab test equipment




## Best Practices in O&M of Utility Scale PV Plants

**Making sure that the power plant is in the right and capable hands**

- Aims and requirement of a proper O&M plan and service
- Required skills for the O&M staff
- Prices and cost breakdown of services
- Maintenance of key components and module cleaning
- Availability calculation
- Typical failure distribution in operating plants
- Reporting requirements and performance ratio evaluation

## Custom-designed Course

**You choose the goals, PI Berlin provides the content**

- Content and duration agreed in advance based on the particular needs of the customer
- Discussion and analysis of relevant case studies
- Combination of practical and in-class teaching
- In-house training possible

"[...] the workshop massively exceeded my expectations. [...] the materials were combined with a highly structured & yet responsive approach applied at every level of detail."
*– Project Developer, Tenaga Nasional Berhad. (Class with powerEDGE)*

# Who should join our courses?

## Project Developers

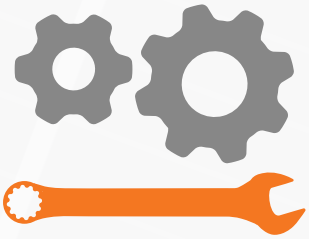
Project developers of solar PV plants are involved with many stakeholders and issues from the early stages of land acquisition and permitting to seeking financing and off-take agreements.

Questions arise along the way such as: What size plant can be installed on this land parcel? Which type of technologies should be considered? What will the yearly production be? A solid broad base of solar PV knowledge is necessary to answer these questions in areas of resource assessment, design, component suitability and construction.

## Government Representatives

Policy-making bodies that have committed to the implementation of solar PV in their country want to ensure that the PV plants that are developed and built provide reliable energy for the long term.

The task is to ensure that quality projects are awarded, constructed and operated at a reasonable tariff. A proper understanding of the industry recognized standards as well as the associated technical and commercial risks in projects is paramount for a successful national solar PV program.



## Designers, Installers, Suppliers and Operators

As an emerging and growing industry in many markets, solar PV offers the opportunity for local and multinational engineering, construction and supply companies to enter into a new area of business.

While there is often a high level of technical and practical knowledge already available with other electrical projects or components, the specific expertise and knowledge for implementing and operating solar PV projects of high quality and standards are often lacking.

## Investors and Lenders

Before providing financing for a new project or an existing operational PV plant, investors and lenders need to understand the current and future potential risks that can affect their bottom line.

Financial institutions don't typically have the technical background to know what these risks are, particularly when participating in a PV project for the first time. Our courses help make informed decisions to limit financial exposure and maximize returns for the long term.



"Good course to learn about major considerations when involved with PV plants."
*– Senior Manager, Building & Construction Authority (Class with powerEDGE)*

# Certification and Trainers

## Trainers

Our trainers are experts in photovoltaics and have many years of practical experience working with PV plants, module testing or quality control in the PV industry.

Our main trainers are Mr. Asier Ukar and Mr. Roman Penidon who have each been working with PI Berlin for almost 10 years. Our training staff is used to travelling and working with people from many cultures. They are sensitive to local customs and are open to adapting their style and approach to accommodate the participants.

Upon request, we can work with other trainers who can add expertise in areas of particular interest to the customer.

**Dipl.-Ing. Asier Ukar**

- Technical due diligence
- PV deployment in new markets
- Technical design of PV plants
- Field inspection and trouble shooting
- Provisional and final acceptance commissioning

**M.Sc. Romain Penidon**

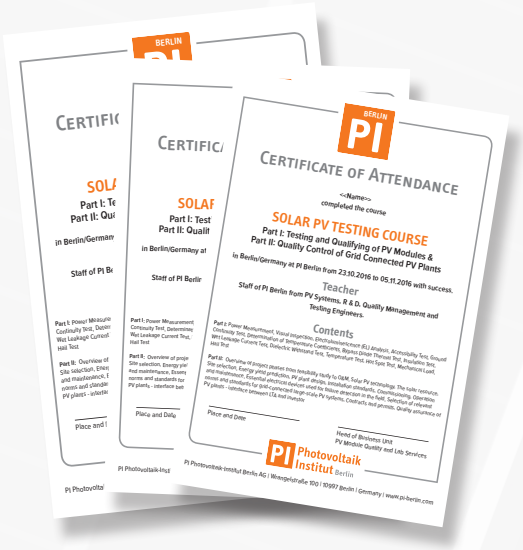
- Assessment of photovoltaic modules
- Photovoltaic modules certification (IEC 61215, 61646, 1730)
- Quality management of PV modules
- Materials for PV modules

## Certification

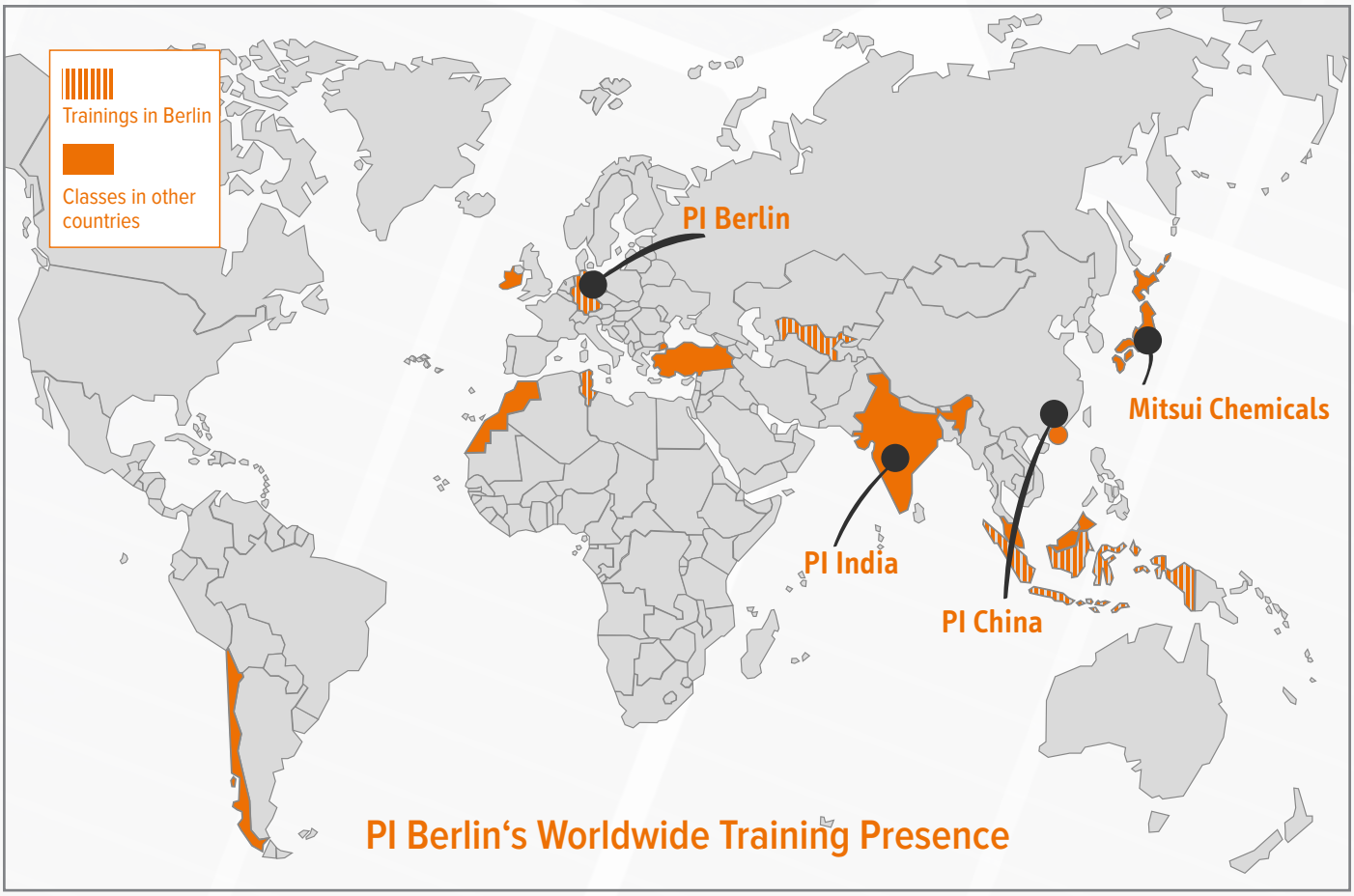
For the courses directly held by PI Berlin we have a minimum requirement of a parcipiation rate of the theoretical and the practical part of at least 80%.

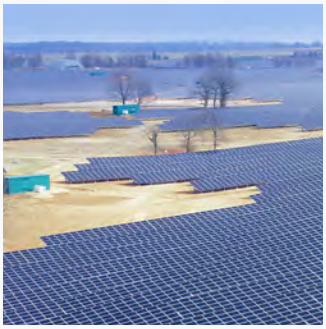
After completion of our classes the participants receive a certificate of attendance. The certificate includes the learning objectives as well as a detailed breakdown of the topics covered by the course.

In cooperation with our customers we can also define learning goals for each day and mandatory quizzes.




"Mandatory course for any PV plant player/owner."
*– Head of Department (Class with powerEDGE)*



## Our Partners

Universidad de Antofagasta

MITSUI CHEMICALS, INC.

IRESEN
Institut de Recherche en Energie Solaire et en Energies Nouvelles

powerEDGE®
Empower your future

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