

Photovoltaic (PV) Basics Workshop

Necessary knowledge that enables you to work in the Photovoltaic Sector



The training is designed to empower the participants to work in the Solar Energy Sector. **This training is necessary to take the right decisions and be able to plan, buy, install and operate** infinite, clean and independent solar energy systems.

- ☺ Would you also agree that **PV-Systems designed and installed without deeper knowledge and experience are a pity?**
A tremendous waste of energy and money?
- ☺ Would you agree that solar education is necessary to **avoid costly mistakes?**
- ☺ How would it feel to serve your country with endless, clean and independent solar energy with knowledge and **have success with it?**

**Let's not recognize or predict future.
Let's create it like we need it!**



The Academy of Solar Power Education (The Academy) aims to provide you the latest and best and photovoltaic education in the world. During the last 20 years Germany was the largest PV-market worldwide, the German education about PV is world leading. The content will be presented easy to understand, interactive and with strong relation to the practice. **Experience learning with excitement and fun. It is the initial key for your success.**

The Academy has trained Universitas Sumatra (USU), Universitas Indonesia (UI); and cooperates as well as with foreign or national companies and Institutions such as AHK-EKONID, PSPA, GIZ-GPCCI. **Don't miss it, register now!**



REQUIREMENTS

Passion for solar and strong interest in Renewable Energy.
This workshop is for anyone seeking ways to grow or set up their solar business fast without costly mistakes.



INSTRUCTOR

CEO/Dipl.-Ing. Environment Techniques
Authorized Expert for Photovoltaic Equipment (TÜV)

Alexander Kaub



TARGET GROUP

Entrepreneurs and their teams, installers, architects, planners, decision makers, sales specialists and **you**, if your business is concerning solar energy and

- ✓ you if you want to get your business growing fast
- ✓ you if you want to avoid costly mistakes!



COURSE FEE

Around 320 USD per participant
✓ inclusive certificate

- 5% Early Bird discount (30 days prior the event)
- 20% if you book all four PV courses!



LOCATION/DURATION

Photovoltaic (PV) Basics Workshop

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In 2 days, you will learn to know about:

Day One

1 why solar energy?

- facts, pros and cons about PV

2 components of PV-Systems in a glance, overview about:

- modules & inverters, devices in energy storage systems (Off Grid)
- mounting system, types and costs, DC-cabling and connectors
- grounding & lightning protection, monitoring systems, AC-material

3 sunlight becomes electricity

- design and calculation fundamentals
- performance and yield, global radiation, the technical units
- diffuse and direct radiation, radiation maps and data
- daily insolation, peak sun hours, azimuth and tilt angle
- group tasks: knowledge transfer into the practice
- direct und diffuse sunlight, yield, the photovoltaic effect
- knowledge transfer: use the data in several practical reports
- tasks: find climate data for you project site using PV Sol Premium

4 electrical basics to understand the correlations

- electrical basics, current, voltage, electric power, yield, temperature dependence, series/parallel circuits for modules
- standard test conditions (STC), efficiency versus price
- practical exercises (individual and in small groups)

5 solar modules and their properties

- module technology types, characteristic values, and production
- common modules defects and how to avoid them
- guaranty, quality, testing criteria, module comparison,
- module comparison, module selection
- aging mechanism, exercises in order to transfer into practice

6 inverter and their properties

- inverter types, inverter concepts
- PV grid tied inverter, bidirectional inverters, island inverter
- MPP-Tracking, unbalanced load, installation sites
- aging mechanism, live span, service and maintenance
- min. and max. modules in a string, parallel connection of strings
- knowledge transfer into practice: design the strings of inverter

Day Two

7 shading

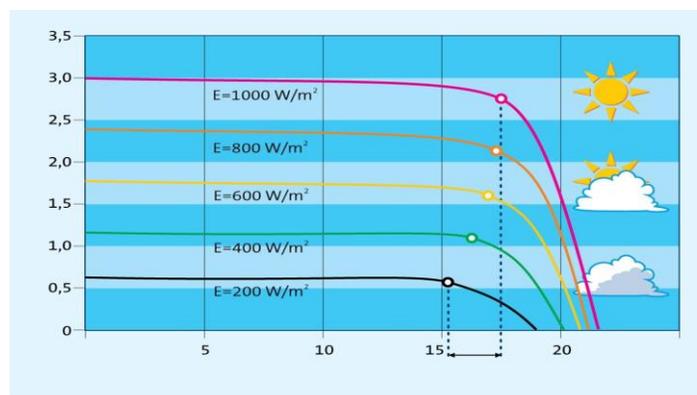
- types of shadows and their effects
- technical background, practical examples and impacts
- methods to identify shadows and to calculate the yield losses
- two ways to analyze and calculate shadow with PV-Sol Premium
- 4 solutions to minimize the effects of shadows
- exercise: minimize the effect of shadows

8 grid connection and energy storage

- overview On- and Off-Grid Systems
- grid parallel-, net metering-, energy storage solutions
- backup system & fuel saver, most cost effective systems solutions
- exercise: design a net metering system using PV Sol Premium

9 profitability analysis of PV plants for your customer

- yield forecast, cost of a PV-plant, calculating Return Of Investment
- loans and equity, own consumption/ feed in
- energy production costs/ calculation levelized cost of electricity
- cash account/ compare of investments/ detailed analysis and diagrams, arguments to convince your customer
- exercise to transfer your knowledge into practice



Alexander Kaub, founder and lecturer of **The Academy and inutec** is working successfully for the last 20 years in the field of solar photovoltaic (PV) energy. With his company inutec solarcenter he is a true pioneer who has taken part in all aspects of the solar market. From 2008, 2009 and 2010 his company generated every year around 18 million USD turn-over in Germany. He has impressive experience in designing, planning, installation, training, the growing solar market and operating a business. In 2013 he attended 12 seminars about the latest PV knowledge in Germany to be up to date. He is an Authorized Expert for Photovoltaic Equipment (TÜV).



BRING YOUR LAPTOP AND CHARGER!

Registration:

Online at www.TheAcademyOfSolarPowerEducation.com

e-mail: support@inutec-int.com

Venue:



inutec solarcenter international gmbh

www.inutec-int.com

Im Gewerbegebiet 17

38315 Schladen GERMANY

Registration online at
www.TheAcademyOfSolarPowerEducation.com
e-mail: support@inutec-int.com