

PV On Grid, Hybrid and Off Grid Solutions



The Academy
of Solar Power Education



Certified
Qualification
Valid until:
2017-10-06



www.tuv.com
ID: 0000043384

Alexander Kaub

Dipl.-Ing. Environment techniques

Authorised Expert for Photovoltaic
Equipment (TÜV)



Alexander Kaub



Authorised Expert for Photovoltaic
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Who we are

- **inutec solarcenter** is an innovative and dynamic company founded in 1993 under the leadership of environmental engineer Alexander Kaub.
- With over 20 years experience in the photovoltaic (PV) industry, inutec has become the leading source and provider of PV-arrays technology, design, consulting, project management & installation worldwide.
- Through the use of solar energy, we have helped hundreds of customers, companies, and communities to control their energy costs while saving the environment.



Photovoltaic experience – design, installation, commissioning, quality assurance

- inutec solarcenter **designed and installed** i.e. from 2006 – 2010 around **7000 kWp (7 MWp) every year** – experience for you.
- Our German branch inutec solarcenter deutschland gmbh is **assessing solar arrays and identify product failures-designing-installation mistakes**.
- Through the use of solar energy, we have helped hundreds of customers, companies, and communities with a **great pay back** while saving the environment.



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- **The Academy** of solar power education was founded on 2012. The Academy aims to **transfer all experience and knowledge in PV gained in Germany** to South East Asia & Africa. The Academy cooperates with many the **German AHK and GIZ** and **Universities** like Universitas Indonesia (UI) & Universitas Sumatra (USU).



What does our Key Competences mean for you?

- You will receive the best & reliable products in the world market
- **well designed** PV-arrays with **reliable quality** that will deliver you the
- **highest yield during the next 30 years** at the lowest cost



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Some references



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Reference: turnkey PV-plants



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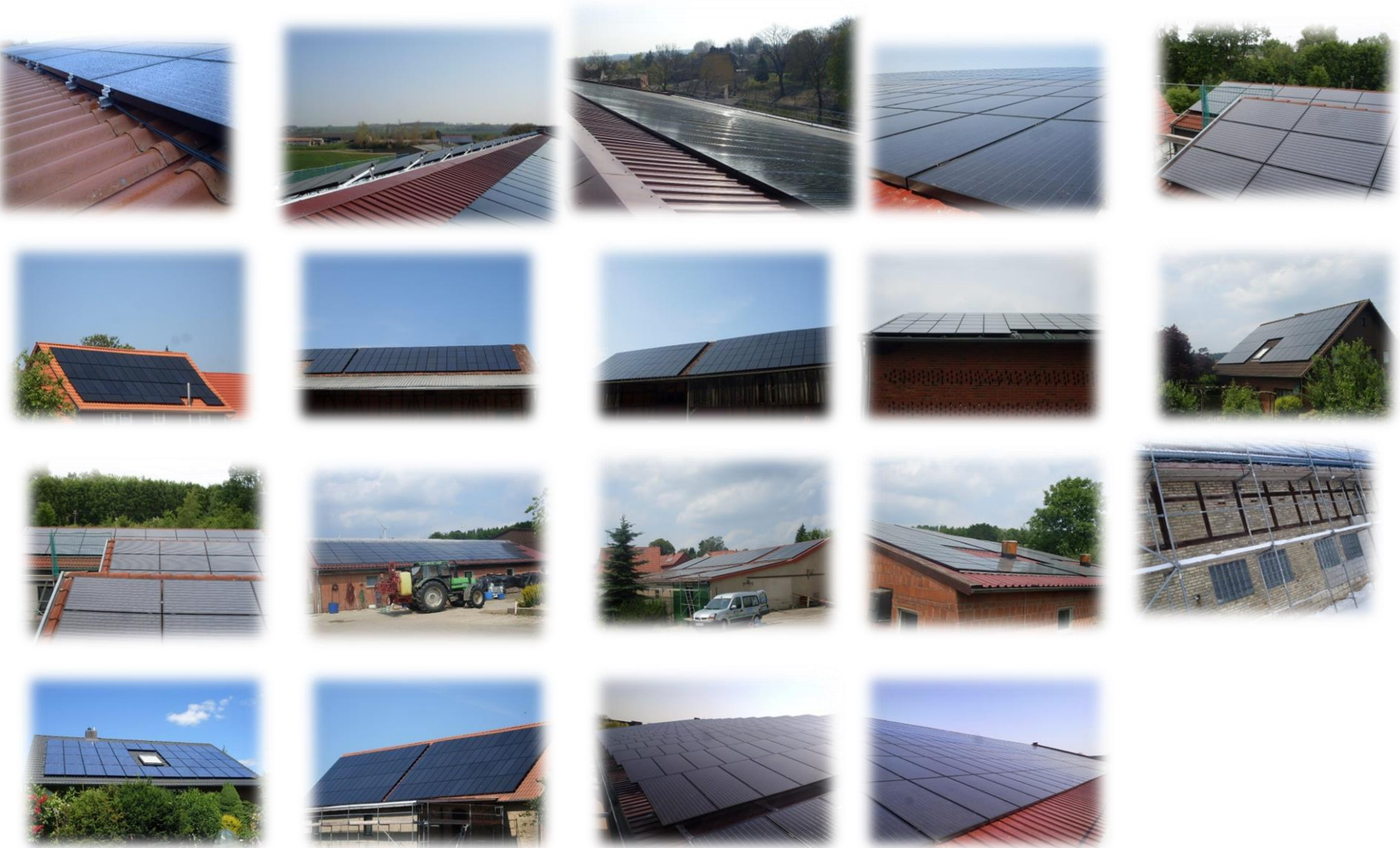


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2006 – 2010 around 7000 kWp every year



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Design, selection of the components, installation, commissioning



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200 MWp Cebu Solar Farm Project 50 MWp in Cebu, the Philippines



- Levelized cost of electricity: 7.85 USD ct/kWh
- Annual total of global radiation equals: 1715 kWh/m²
- Annual specific energy yield (approx.): 1500 kWh/ kWp
- The site: Cebu, the Philippines, N 09° 32,620', E 123° 21,964'
- Project Management: inutec solarcenter international

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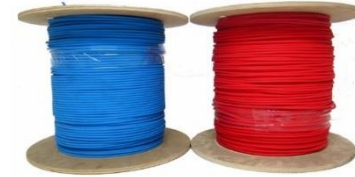
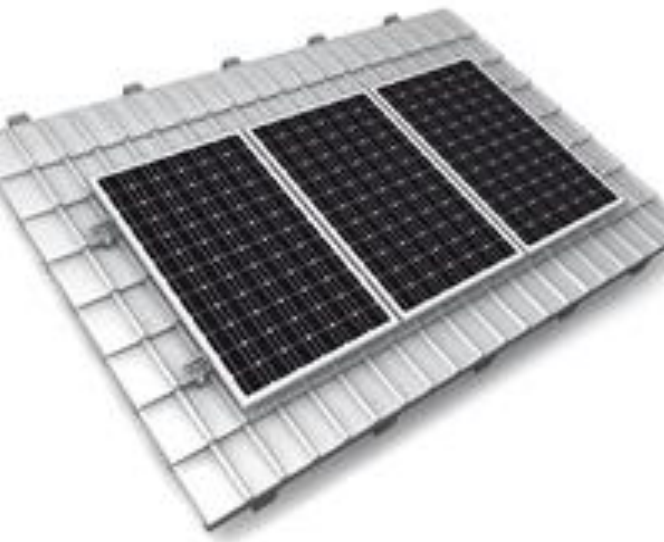


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Profit from 22 years experience how to choose the right components



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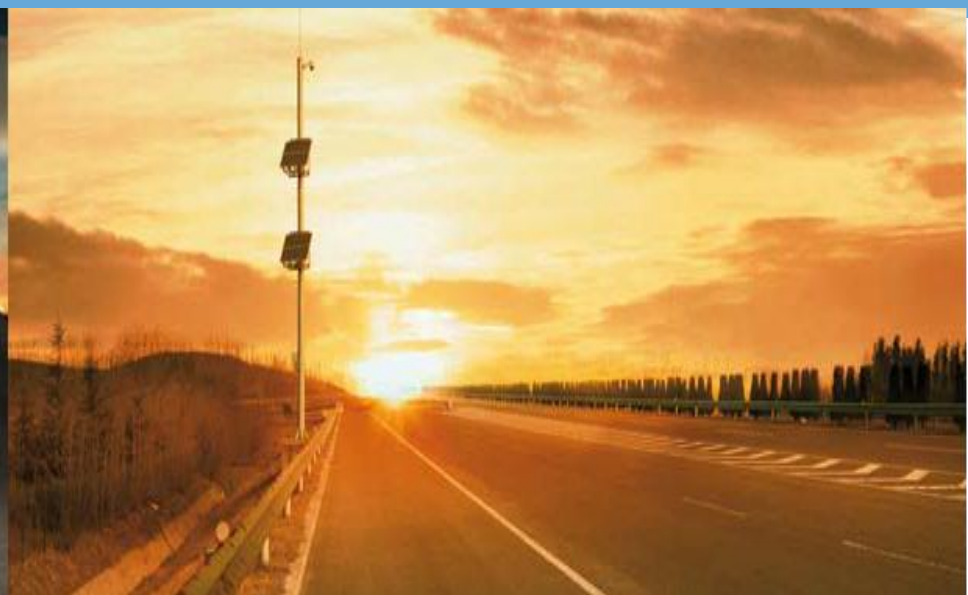


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Phocos AG is among the world's leading manufacturers of solar-powered charge controllers and components for autonomous power supply. Energy-saving appliances such as lamps, refrigeration/freezing and other accessories supplement the product spectrum. The products developed and produced by Phocos enable the eco-friendly and efficient use of solar energy.



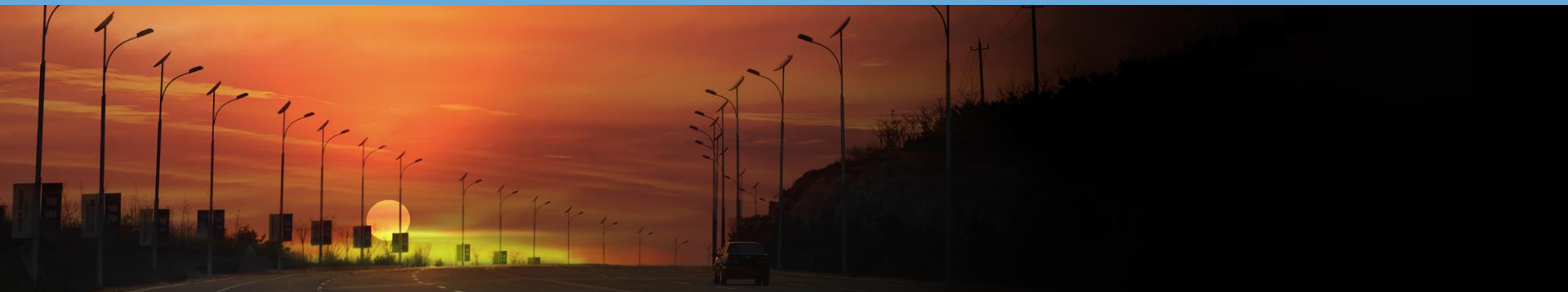
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Markets:

Rural electrification

Industry

Street lighting

Leisure activities



phocos



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Komponents of a Hybrid System

Residential Hybrid Energy Systems

> High and variable diesel effective prices



Diesel



Engine-generator-set



PV module



Sunny Boy



Battery



Sunny Island



Design an Off Grid hybrid system



PV project without grid connection

Design an off-grid system

PRACTICE
MAKES
PERFECT

1. Pumping in Puerto Princesa, the Philippines
2. Estimate and determine the components
3. Temperature settings
4. Use the Pumping Daytime load project
5. Choose your modules
(ground mounted) and PV-Inverter
6. Configure Storage System
 - without MC-Box
 - choose Sunny Island
 - choose Lead Acid batteries
7. configure the genset
8. Store it as Sunny Design file and send it to a.kaub@inutec-int.com



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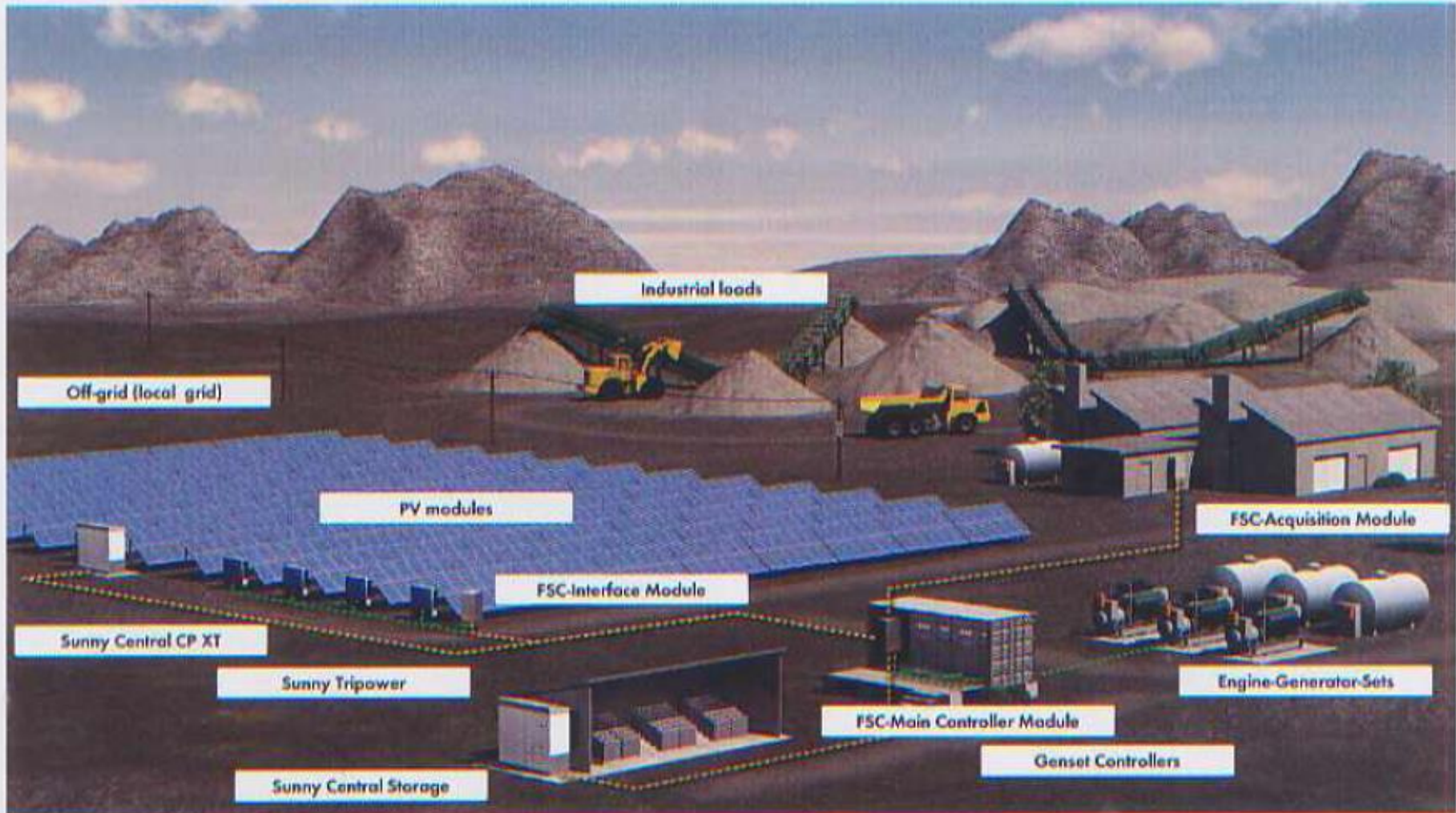
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Industrial Fuel Saving System

Components

> Overview:



Example: AC Coupled System



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MODULES

- > Common Solar Modules
- > Off Grid Modules (36, 72 or 144



INVERTER

- > Grid (PV) Inverter
- > Battery Inverter (Bidirektional, Inverter/Charger)



BATTERIES

- > OPzS Turbular Plate Lead Acid Batteries
- > OPzV Turbular Plate Gel



CHARGE CONTROLLERS

- > Charge controllers with MPPT
- > Charge controllers
- > Hybrid charge controller



KITS

- > Lighting Kits
- > Refrigerator Kits
- > Small Business Solutions



RURAL ELECTRIFICATION

- > Lighting
- > Refrigerating
- > Pumping
- > Loads



ACCESSORIES

- > Cables (DC)
- > Connectors (DC)
- > Mounting System
- > Monitoring System
- > Battery Charger

op/category/modules.html

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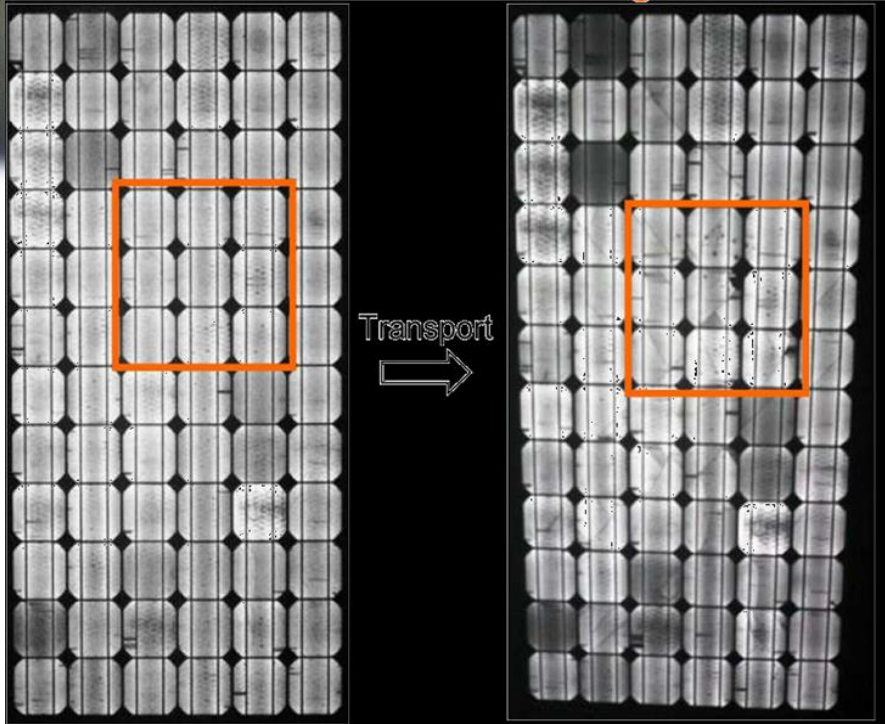
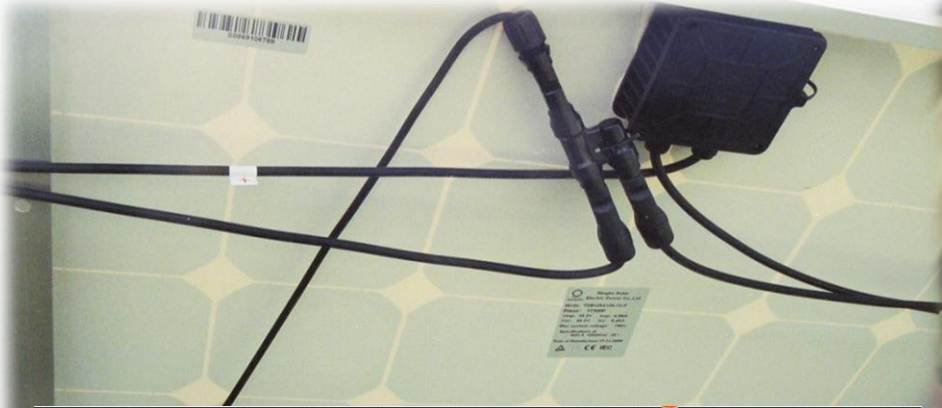
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Avoid mistakes. Imagine their costs..



(Source: TÜV Rheinland Seminar Gutachter photovoltaische Anlagen)

Quality assurance – our
important service for you

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Imagine the costs of mistakes....



(Source: TÜV Rheinland Seminar Gutachter photovoltaische Anlagen)

⊗ wrong purpose, ⊗ wrong products ⊗ wrong design
⊗ wrong treatment ⊗ wrong installation ... maintenance

Electrical wires DC: installation



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Electrical wires DC: installation



The Academy of Solar Power Education invites you!

Upcoming Events

- Manila, Philippines: May 10 2016 to May 11 2016
Photovoltaic (PV) Basics Workshops
- Manila, Philippines: May 12 2016 to May 13 2016
Advanced Workshop "Design Photovoltaic (PV) Arrays"
- Manila, Philippines: May 16 2016 to May 17 2016
Photovoltaic Workshop "Installation, Commissioning & avoiding Mistakes"
- Manila, Philippines: May 18 2016 to May 19 2016
Stand-alone Systems in Theory and Practice "Fit for Off Grid PV"
- Online: Jul 12 2016 to Sep 17 2016
PV Comprehensive Photovoltaic Online Learning Program
- Singapore: Jul 27 2016 to Jul 28 2016
PV - DESIGN, INSTALLATION & COMMISSIONING
(Provided from Power Edge Asia)

Take great online and offline courses
inutec PV trainings and exercises -
the best from the global leader Germany

Enroll now!



The first All in One inverter

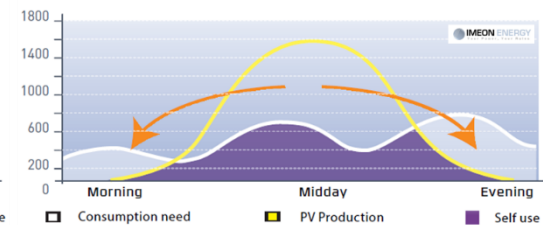
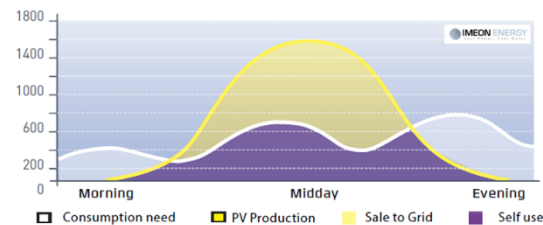
All In One

On Grid & Off Grid Inverter
Switch - Controller - Charger

New IMEON 3.6, 3kW PV input, 6kW AC output



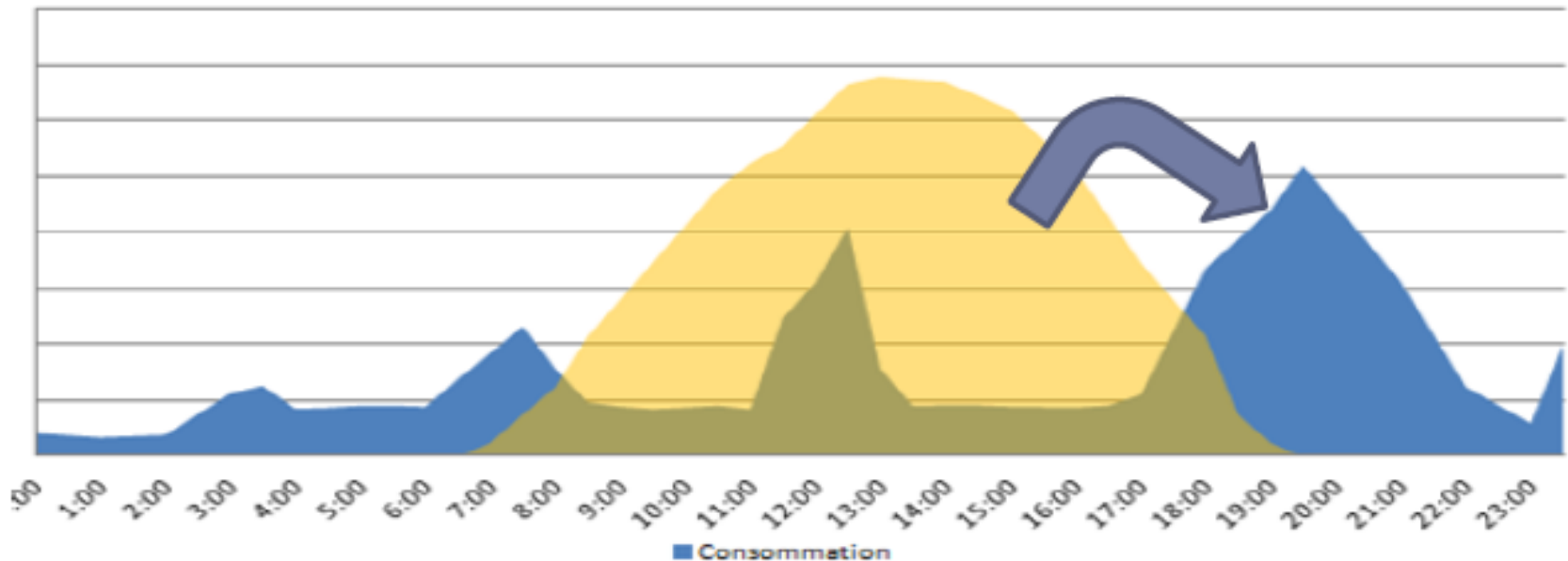
Smart Grid / **Back-up** (UPS) /
Isolated sites (**Off-Grid**) /
Connected to the grid (**Grid-Tie** / Hybrid) (Grid-Tie and Off-Grid)



Example: AC Coupled System

Surplus Energy Storage

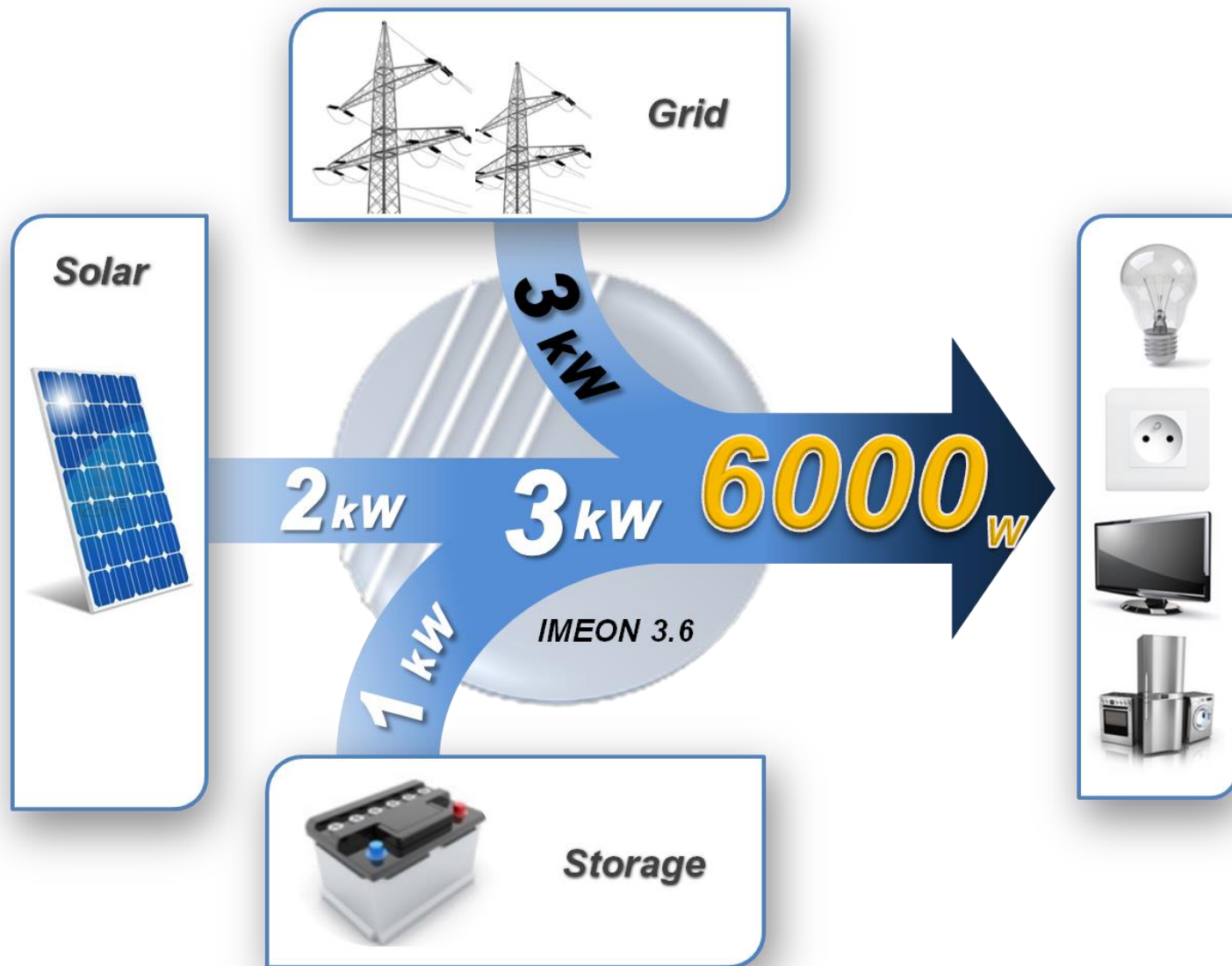
Production / Consumption profile



Priorities of PV production usage: Consumption / Batteries / Grid injection

Priorities of energy source usage: Solar / Batteries / Grid

Multi Phase Coupling Technology



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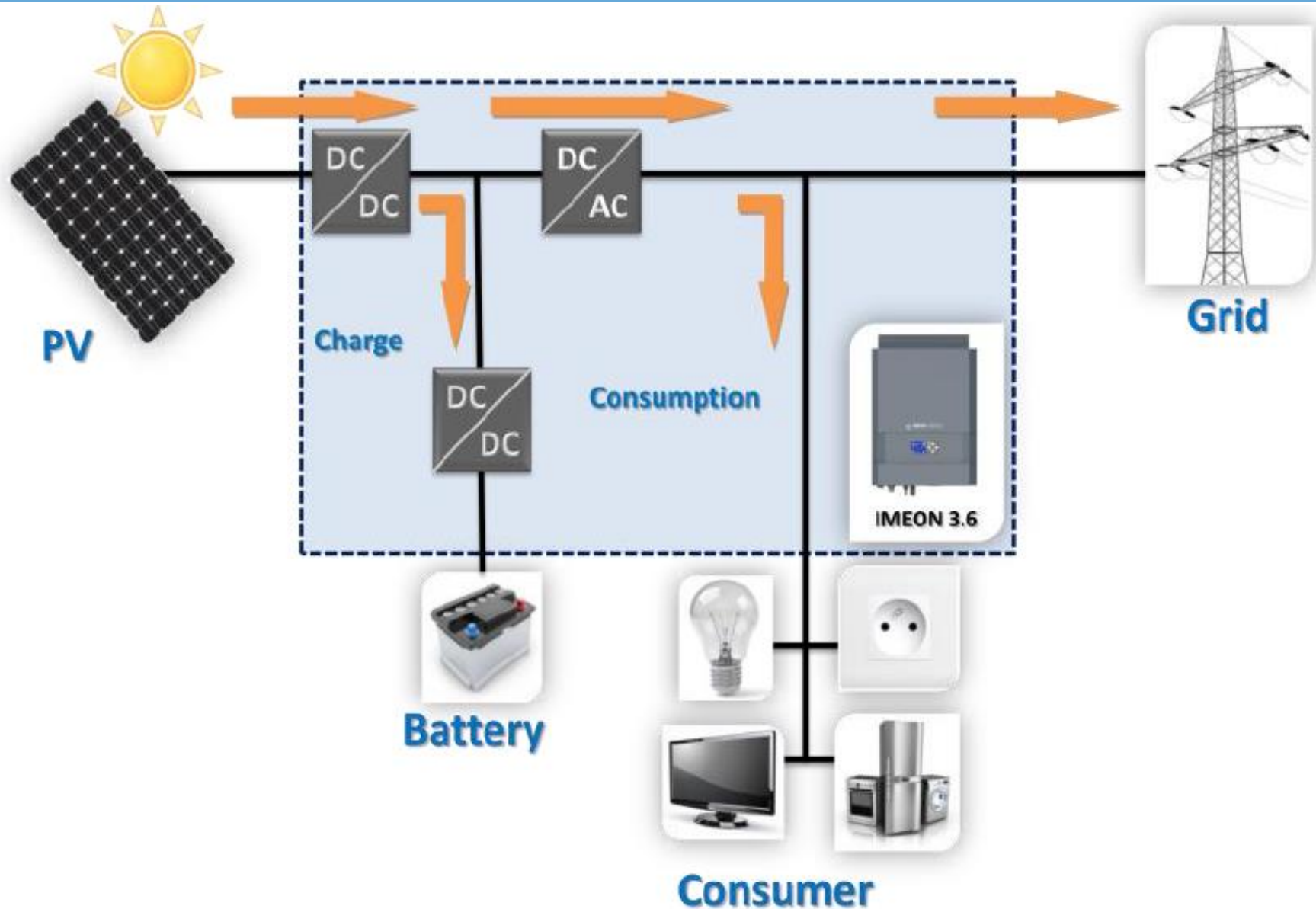
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Smart Grid System



Smart Grid Inverter



Be independent..

**It's Your Power
Your Rules**



ECONOMIC

There is no longer the need for separate components such as charge controllers or added inverters. The overall cost of the photovoltaic system can therefore be reduced by 30%. IMEON's innovative Smart-Grid function allows to lower the storage capacity, reduce battery cycling, as well as further prolonging the battery life.

ALL IN ONE

The IMEON 9.12 Smart Grid Inverter is specifically designed for any solar installation, regardless whether the system is an Off-Grid, Back-Up, Grid-Tie, or a hybrid power system. IMEON is a complete Plug-and-Play smart inverter which simplifies the installation process and reduces the overall setup time of a solar system.

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Smart Battery Management*

**Gestion intelligente des batteries*



The maximum charging current is 25A (3.6) and 160A (9.12). To optimize the battery life time, the charging current must be between 10% and 20% of the total battery bank capacity.

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Comissioning of the first Smart Grid Inverter im Manila, May 2016



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IMEON MANAGER

IMEON Manager

IMEON ENERGY
Your Power, Your Rules

IMEON Manager V 2.1.2

Home Flow Manager Battery Manager Scan

Function mode : ☐ Smart-grid ☐ Off-grid ☐ On-grid ☐ Back-up OK ?

Allow feed-in to the grid : ☐ Yes ☐ No OK ?

Allow AC to charge batteries : ☐ Yes ☐ No OK ?

Charge batteries from the grid authorized from h to h OK ?

Date (ex: 20140725) : Time : : : OK ?

LCD standby mode (0/30/60/300/600) : sec OK ?

Reset Quit

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Thank you!!

- *Local resellers and distributors are welcome!*

- **Contact us!**

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