

# Hocheffiziente, modulare Komponenten für solare Stromversorgungen

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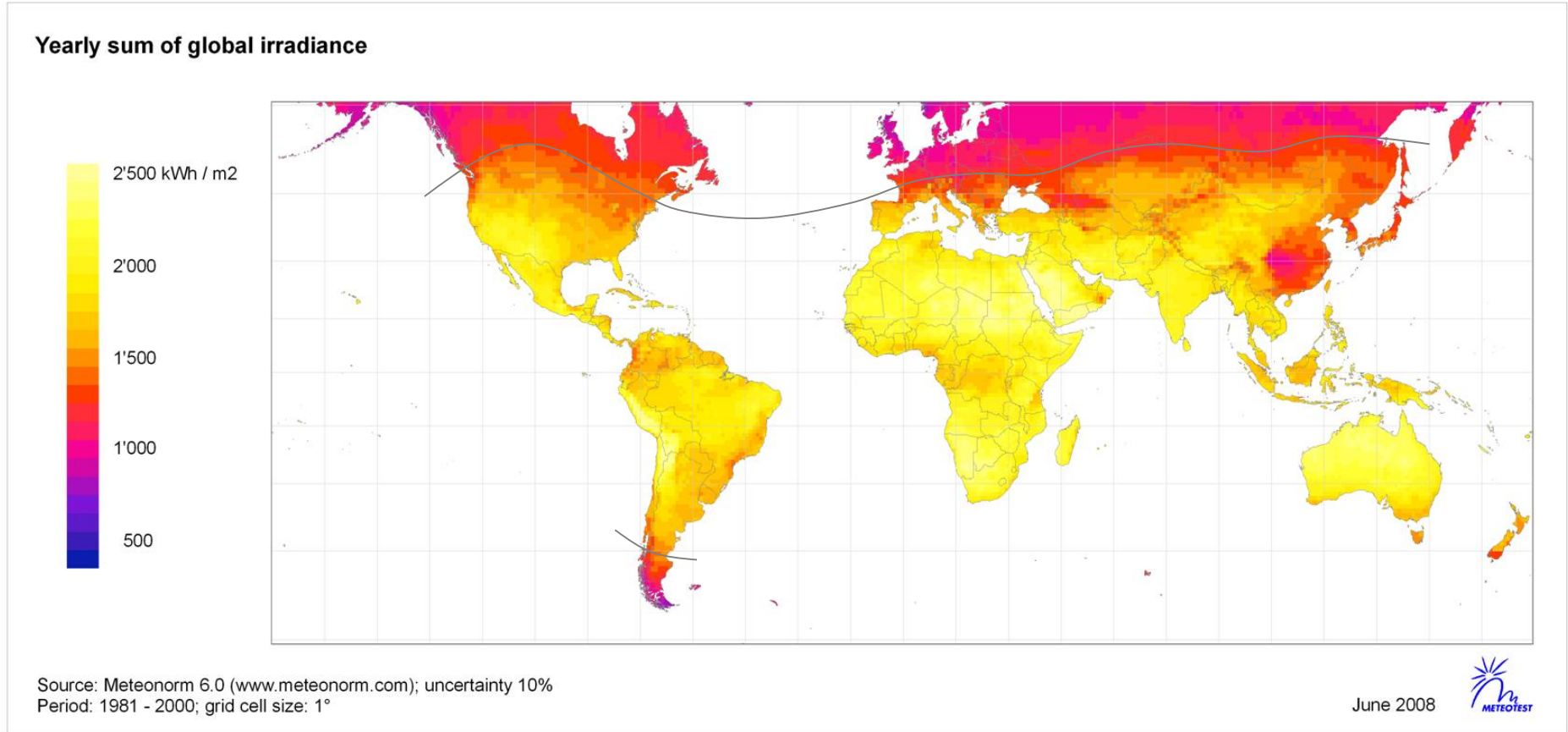
[www.sonnenrepublik.de](http://www.sonnenrepublik.de)



Startup Dec 2012 in Berlin, Germany

- Solar systems with total modularity
- Maximum power on minimal surface

# Solar Radiation



Yearly sun irradiance of 1500-2500 kWh/m<sup>2</sup> in most countries of the world  
→ about 4-7 hours full sunshine (1000W/m<sup>2</sup>) per day



# Light Intensity in Different Situations

Outdoor at noon,  
45° south

Indoor at noon,  
behind double  
glass window

Direct sunshine: <b>700 - 1200 W/m<sup>2</sup></b>	Slightly cloudy: <b>150 - 500 W/m<sup>2</sup></b>	Strongly cloudy: <b>20 - 100 W/m<sup>2</sup></b>
<b>500 - 900 W/m<sup>2</sup></b>	<b>50 - 200 W/m<sup>2</sup></b>	<b>5 - 50 W/m<sup>2</sup></b>

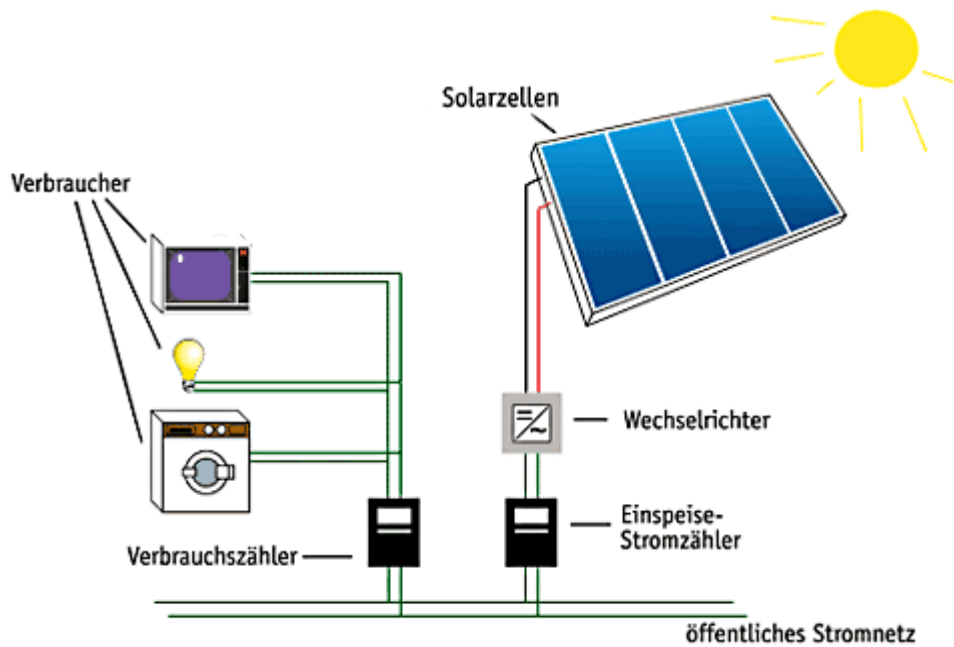
Indoor, artificial  
lighting

Standard bulb: <b>2 - 10 W/m<sup>2</sup></b> <b>(50 - 250 Lux)</b>	Fluorescent lamp: <b>1 - 3 W/m<sup>2</sup></b> <b>(150 - 500 Lux)</b>
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(in W/m<sup>2</sup> related to  
the spectral response  
of c-Si solar cells)

Light intensity range from about 1 ... 1000W/m<sup>2</sup> !

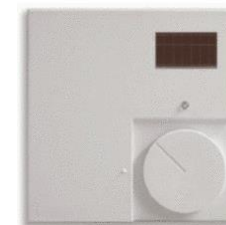
# Categories of Solar Power Supplies



Mobile oder stationary solar power supplies (medium power range)

Grid connected systems (medium to high power range)

Battery chargers for mobile consumer products (low power range)



Stationary power supplies for professional/industrial products (low power range)



## Why Modularity?

- Light Intensity Range → Variation of Power
- Design → Variation of Shape and Colour
- Adaption to various needs and preferences (seasonal, optical, etc.) → Variation of Power, Shape, Colour, Design
- Communicating and Marketing aspects → Share with friends, exchange, collect, advertise, ...

## Why High Efficiency?

- Actual mobile devices have limited surface and area  
-> Performance with thin film or standard solar cells not sufficient
- High efficiency solar cells also show better performance at low light  
-> Usage in indoor lighting possible

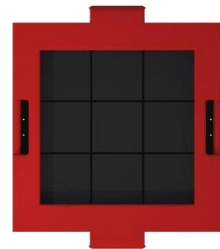
# Actual Solar Cell Technologies

Parameters (typ. Values)	Highest Eff.	High Eff.	Standard Si	a-Si
Power density @ 200lx FL	20 $\mu$ W/cm <sup>2</sup>	12 $\mu$ W/cm <sup>2</sup>	3 $\mu$ W/cm <sup>2</sup>	5 $\mu$ W/cm <sup>2</sup>
Power density @ full sunlight 100mW/cm <sup>2</sup>	25mW/cm <sup>2</sup>	22mW/cm <sup>2</sup>	17mW/cm <sup>2</sup>	8mW/cm <sup>2</sup>

# Novel Modular Device Platform: Clicc



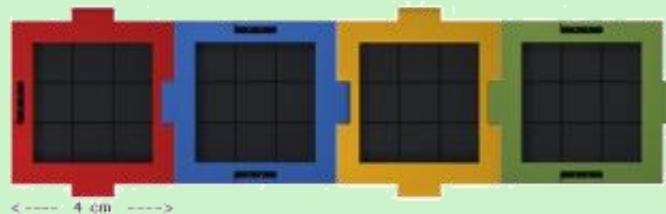
ClicCell



ClicLite



ClicCell Solar Modules  
in various versions (Colour, Design, etc.)



Producer: Sonnenrepublik

Standardized Interface ClicBar

Various Application Devices  
(Mobile chargers, Lights, Audio devices,  
Household appliances, Games, Bags/Clothes,  
Domestic engineering products, e-Mobility  
products, Medical engineering products,  
Military products, etc.)

Producer: Sonnenrepublik & Others!

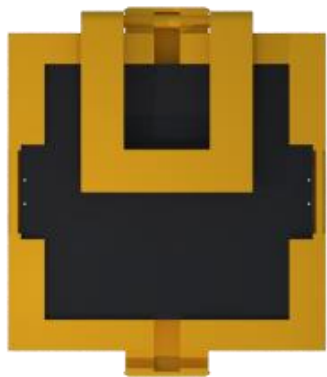
Clicc Platform with standardized Interface ClicBar



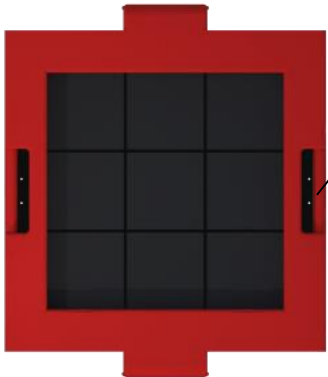
# Clicc System: How does it work?



# Technical Features First Products



Optional rear Clip for Button functionality



**Clicc Modules:**  
 40 x 44 x 4mm / 9g  
 0,17Wp / 5V  
 High-eff. solar cells  
 Special precision contacts  
 Up to 60-cell arrays (10Wp)

ClicBar



**ClicLite:**  
 55 x 42 x 14mm / 36 g  
 High-cap. battery  
 Ultra-bright LED  
 High-eff. DC converter  
 Ultra-low-power  $\mu$ Controller

# Technical Features New Products



## **ClicSwing:**

Foldable Direct Charger  
 1,1Wp /190mA @ 5V  
 High-eff. DC converter



## **ClicDoc:**

0,5Wp 3x Clicc  
 3000mAh Li-Ion battery  
 Ultra-bright LED lamps  
 High-eff. DC converter – 1A @ 5V  
 Ultra-low-power  $\mu$ Controller  
 Multi-Sensor functions  
 Full USB data communication

# Advantages / USP

- Solar system with total modularity, adaptable to nearly every application in the low power range
- High efficiency components (solar cells, battery, dc converter,  $\mu$ Controller, LED etc.) and advanced electronic circuits
- Precision contacts and robust housing materials in industrial quality – also available in longlife outdoor versions
- USB-A standard interface with data communication
- Charging of various battery types (NiMH/Cd, Li-Ion, RAM) in internal compartments (ClicTrak)
- High battery capacity for charging of up to 2 smartphones (ClicDoc)
- Premium design & quality - Made in Germany
- Housing components in various editions
- Reasonable prices – ClicCell costs around 7 € in retail

# Experimente

- Clicc Solarmodule: Strom/Spannungskurve in variierten Lichtverhältnissen
- Clicc Solarzellen / -module: Serienschaltung / Parallelschaltung
- ClicLite: Ladung des internen Li-Ionen Akkus
- ClicLite: Erzeugen stabiler Ausgangsspannung (5V USB)
- ClicSwing: Direktes Laden von USB-Geräten im Sonnenlicht
- ClicDoc: Messung + Anzeige von Solarstrahlung, -energy, vermiedener CO<sub>2</sub>-Menge, Temperatur, Luftdruck/barometrische Höhe, Himmelsrichtung (Erdmagnetfeld), Neigungswinkel etc.



Thank you !