


*BALANCED SYSTEMS.  
SMART ENERGY.*

## **SMART DC GRID TECHNOLOGY**



DC GRIDS ARE THE MOST EFFICIENT AND COST-EFFECTIVE OPTION FOR ENERGY ACCESS IN RURAL AREAS WITH HIGH BUILDING DENSITY. THEY ARE ALSO IDEAL FOR MARKETPLACES, RURAL HOTELS OR STAFF HOUSING OF PUBLIC INSTITUTIONS SUCH AS HEALTH POSTS OR SCHOOLS. WITH BOS TECHNOLOGY, SMART AND SCALABLE ENERGY ACCESS BECOMES A REALITY.



## OUR CUSTOMERS. OUR MARKETS.

### **SCALABLE TECHNOLOGY. BANKABLE BUSINESS MODEL.**

SMART DC GRIDS EMPLOY A SCALABLE AND BANKABLE BUSINESS MODEL AS ENERGY IS SOLD AS A SERVICE AND REGULAR CASH FLOWS ARE GENERATED.

#### **REMOTE VILLAGES**

SMART DC grids are perfectly suited to the needs of people living in remote villages with high building density. With low investments and a proven business model, sustainable energy access at low costs becomes a reality.

#### **REFUGEE CAMPS**

DC grids can serve the energy needs of people in refugee camps in an unprecedented way. Due to predefined energy quotas, a central energy system can deliver the required energy reliably and constantly.

#### **RURAL HEALTH POSTS AND SCHOOLS**

Accommodations for doctors, nurses and teachers located next to health posts or schools can easily be connected to the solar system powering the public premise. Small additional investment, big positive impact.



# SMART DC GRID. SMART FEATURES.

## SMART DC GRID OVERVIEW

IN A DC GRID, POWER CONSUMPTION IS METERED IN EACH HOUSEHOLD AND THE ELECTRICITY GENERATED IS SOLD BY THE GRID OPERATOR TO THE USERS BASED ON THEIR INDIVIDUAL ENERGY CONSUMPTION.

### 1 CENTRAL ENERGY STATION

A central energy station equipped with a solar home system and the BOS PT grid signal transmitter forms the central unit of a SMART DC grid. The central energy station can be any 12 / 24 VDC lead acid solar home system, but hybrid systems from BOS (e.g. HS500) are recommended.

### 2 DC GRID CONNECTED HOUSEHOLDS

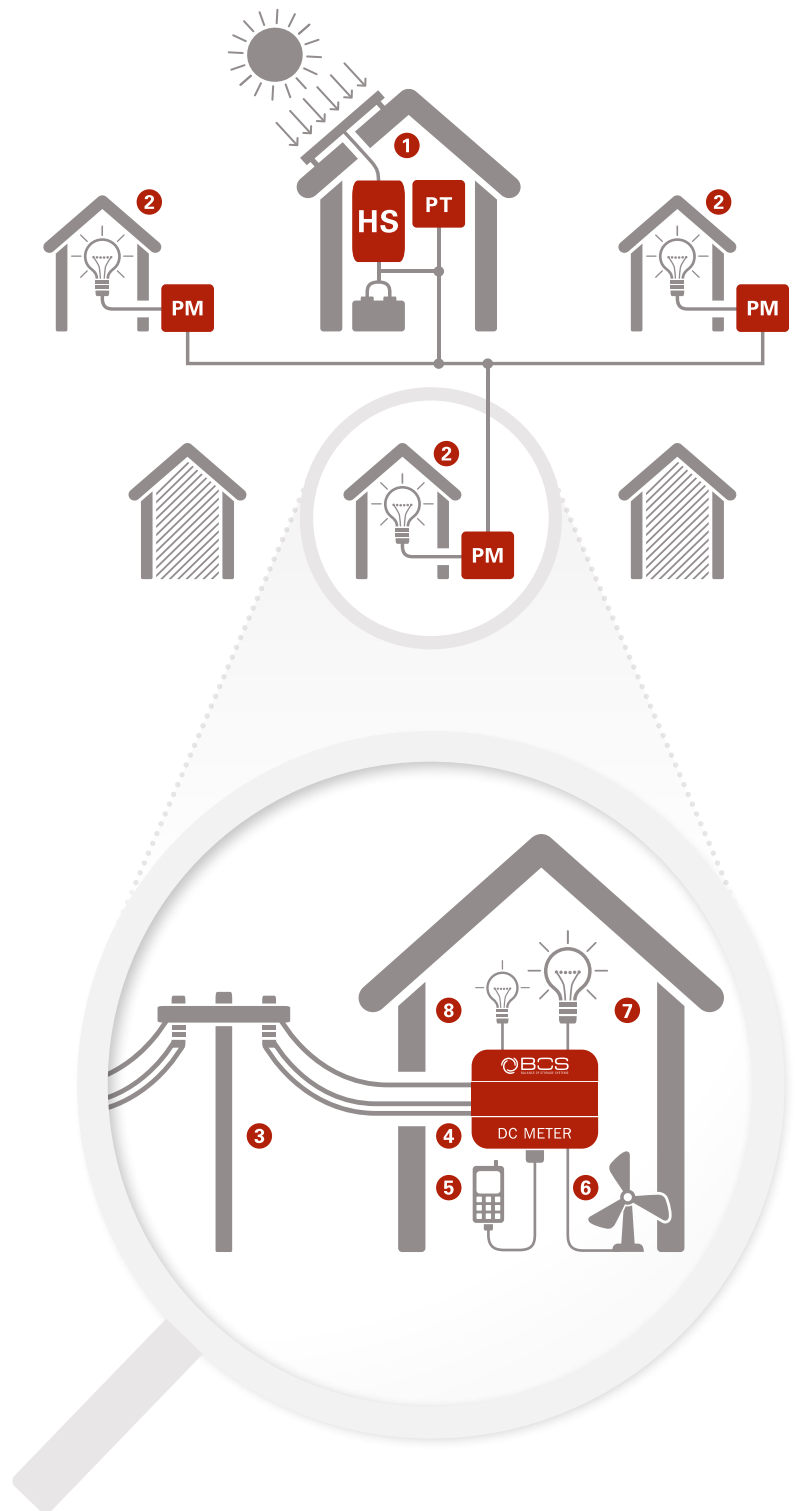
Individual households are equipped with the BOS PM smart power meter and connected to the central energy station over the DC grid.

### 3 4 INTELLIGENT POWER TARIFFS

The PT transmitter communicates through signals with the PM power meters. Power tariffs are cheaper during daytime and when there is excess energy in the grid. During night time or at times of low energy tariffs, become more expensive.

### 5 6 7 8 INTELLIGENT LOAD MANAGEMENT

The SMART DC grid switches excess energy loads and emergency lights automatically. Once the state of charge of the DC grid reaches full level, each meter automatically switches on a separate excess energy load output. This excess energy output powers big loads only during times of excess energy when tariffs are cheap, hence households optimize their energy costs. Once the state of charge of the DC grid reaches a low level, all loads are automatically disconnected. When users have used up their daily energy quota, they can still use an emergency light.



- |                          |                       |
|--------------------------|-----------------------|
| 1 Central energy station | 5 Integrated USB port |
| 2 DC grid connected user | 6 Excess load         |
| 3 DC grid                | 7 Standard load       |
| 4 DC power meter         | 8 Emergency light     |

## SMART SWITCHING OF LOADS

## INTEGRATED USB PORT TO CHARGE PHONES

## INDIVIDUAL TARIFFS FOR EACH HOUSEHOLD POSSIBLE



CONTINUOUS CASH FLOW

LOW INVESTMENT COSTS

PROVEN BUSINESS MODEL

MORE PROFITABLE THAN DIESEL GRIDS

NO MAINTENANCE AND OPERATION COSTS

# MAKE A DIFFERENCE. SELL SMART ENERGY.

## INEXPENSIVE AND BANKABLE ENERGY ACCESS

Stand-alone DC grids offer an inexpensive way to achieve energy access for all. Initial investment costs per household are very low. The sale of energy to users connected to the DC mini grid generates a continuous cash flow for the grid operator. As efficient DC loads are used, better energy performance is delivered. Users pay as much as they did before for a significantly improved energy service.

## PROVEN BUSINESS MODEL

The DC grid operator employs an effective business model which has been in use in AC diesel grids. With reasonable hardware costs, maintenance costs close to zero and no generation costs, DC grids are the best solution.

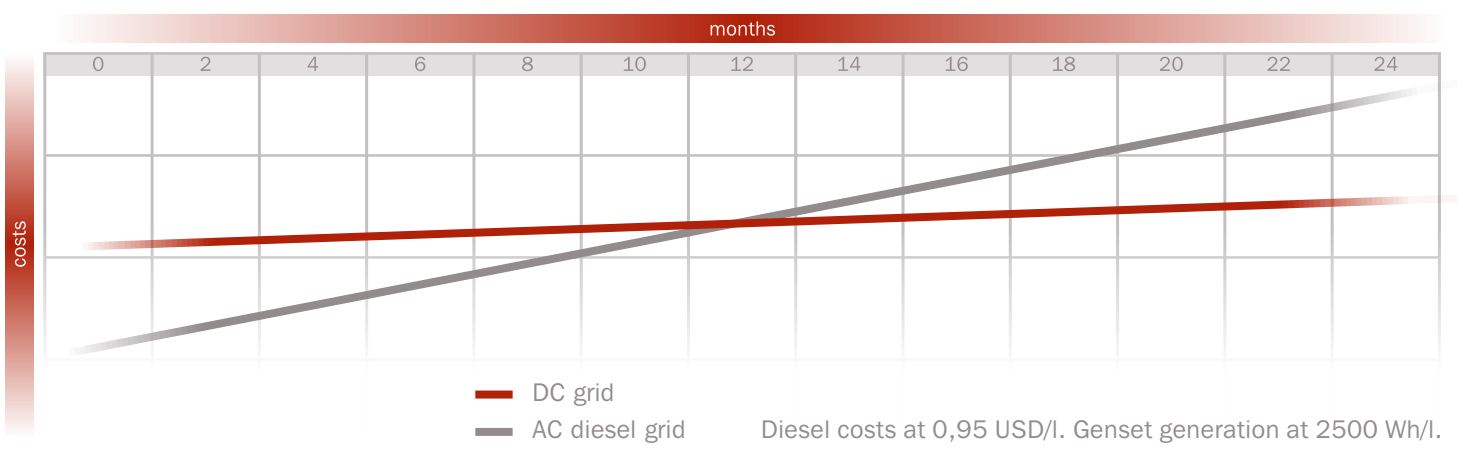
## SMART PAYMENT MODELS

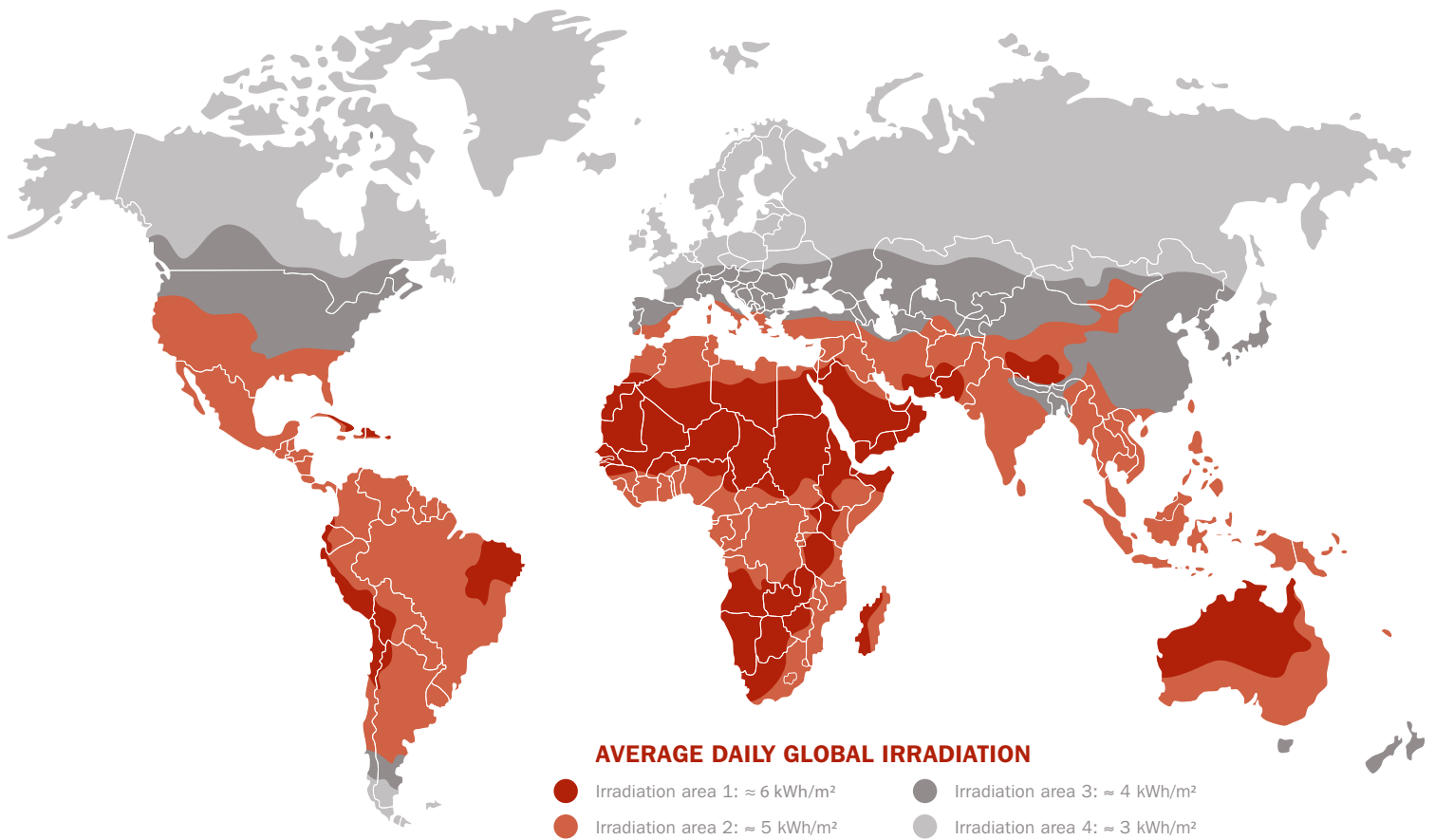
One possible payment model: The meter counts the user's energy quota downwards until it reaches level zero. Then it turns off the loads until a daily reset signal from the PT transmitter sets the meter level back to a high value. The PM power meter hardware supports the programming of different, individual tariff models.

## SELL ENERGY / IMPROVE ROI

In public buildings like schools and health posts, DC mini grids can be employed to provide energy to each user based on individual needs. If a bigger solar system is already available, return on investment can be improved significantly by selling energy to neighbours.

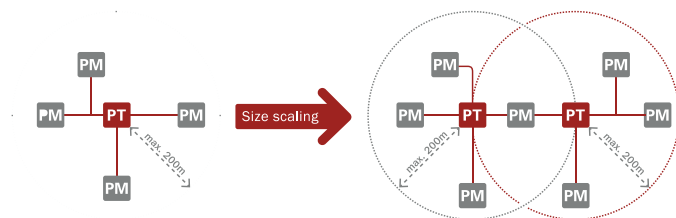
## COST COMPARISON DC MINI GRID VS. AC DIESEL GRID





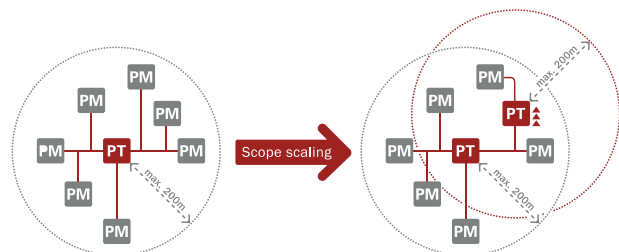
## TECHNICAL SET-UP. EASY SYSTEM SIZING.

### MICRO GRID SYSTEMS – SIZE AND SCOPE SCALING



A grid's size can be expanded by adding new clusters or power stations to existing clusters.

The grid grows from four households to seven.



A grid's scope can be expanded by upgrading one of the connected households within the existing mini grid cluster to serve as an additional power station. The connected households can now be powered by two energy stations and can hence consume more energy.

The household in the top right corner is upgraded to a power station. There are now two power stations serving in total six households, instead of one power station serving seven households previously.

PM: Power meter at each user PT: Power transmitter at each energy station

EASY SCALING IN SIZE AND SCOPE

OPTIMIZED FOR BOS HYBRID SYSTEMS

12 OR 24VDC TRANSMISSION POSSIBLE

COMPATIBLE WITH ANY 12 / 24VDC SOLAR SYSTEM



# BALANCED SYSTEMS. SMART ENERGY.

BOS Balance of Storage Systems AG is a German company offering smart hybrid energy storage solutions and DC grid technology. With our technologies, large parts of the off-grid community in developing and industrialised countries get access to high-quality, long-lasting and affordable energy solutions.

BOS AG works at the intersection where People, Planet and Profit meet. Optimizing the footprint and the return in each impact area is the strategic objective.



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