

# Dimensioning of a Solar/Battery Backup system

# Agenda

- What is dimensioning?
- User requirements and input data
- Solar dimensioning
- Battery dimensioning

# What is dimensioning?

- What do I need to cover my needs in terms of electricity?
  - How many solar panels?
  - How many batteries?
- What voltage/current do I want to obtain?
  - What is my load?

# Location Based Data

- Sun peak hours/day
  - Depending on your location
  - Plan for the worst!
- Nigeria: 4 sun peak/day

# User requirements

- Power consumption
  - Total consumption of all electrical devices
- Anatomy
  - How many days should the system work without power input?

# Equipment specification

- Battery
  - Capacity (Ah)
  - Max discharge (%)
  - Voltage (V)
- Solar Panels
  - Nominal power (W)

# Example

- Power Consumption (load): 120 W
- Battery
  - Voltage: 12V
  - Capacity: 100 Ah
  - Max discharge: 50%

**How many batteries do we need?**

# How much current do we need?

$$\text{Power} = \text{Voltage} * \text{Current} = V * I$$

$$I = 120 / 12 = 10 \text{ A}$$

# How much energy do we need?

In 1 day:

$$\text{Energy/day} = 10 \text{ A} * 24\text{h} = 240 \text{ Ah}$$

$$\text{Energy/day} = 12 \text{ V} * 240 \text{ Ah} = 2880 \text{ Wh}$$

In 5 days:

$$5 * 240 \text{ Ah} = 1200 \text{ Ah}$$

# How much energy do we need?

Assuming:

Max discharge level: 50%

Battery capacity: 100 Ah

Total energy =  $1200 / 0,5 = 2400$  Ah

No of batteries:  $2400 / 100 = 24$

# How many solar panels are needed?

Assuming:

4 sun peak hours/day (4000 W/m<sup>2</sup>)

Panel current: 5 A

Energy needed/day: 240 Ah

Energy provided: 5 A \* 4h = 20 Ah

No panels: 240/20 = 12