1. CHARGING A MOBILE PHONE WITH SMALL PV PANEL

Consider a small PV module to charge your mobile phone. The PV module has an active area of about 50cm^2 and an efficiency of 15%.

1. Check on your own mobile phone how much energy does it store.
2. Determine how many hours of peak power (1000 W/m^2) does it take to fill it up.
3. If you took the phone (and the PV charger!) to a location where the average annual insolation is about 1900 kWh/m^2/year, determine how often you could call home.

2. SELF-DEMAND IN PORTUGAL

Consider the *Lei do autoconsumo* in Portugal.

1. How much would a 200Wp PV system produce in Portugal? [average insolation: 1.5kWh/Wp/year]
2. Determine the maximum savings from such a PV system [lifetime: 30 years; price of grid electricity 15c€/kWh with 2% annual increment].
3. Assuming typical installation costs [2€/Wp], determine the payback time.
4. Discuss the costs and benefits of larger PV systems within this framework.

3. MODULE EFFICIENCY

Considering that the BOS & installation cost of a PV system with an efficiency of 15% is of the order 200 €/m^2 determine:

1. The total cost of the PV system per unit area, assuming that the module costs 1 €/Wp.
2. Imagine a new low cost module technology with a cost per unit area of the order of the price of glass (20 €/m^2). What is the minimum efficiency for the new module in order to have a competitive cost?

4. LAND FOR ENERGY

How much land would Portugal need to supply all its electricity needs with PV? [assume: demand: 50TWh/year; 1.5kWh/Wp/year; 15% efficiency].