



# GREEN ENERGY

## Pillars and dreams

### Dept. of Energy



# Objective: Imagine energy future with solid foundations



## Program

### Day 1

#### Energy and Renewables Scenarios

On the first day of the course we will understand what types of energy our society needs and from which energy sources it is produced today. An overview...



### Day 2

#### Electrical Networks

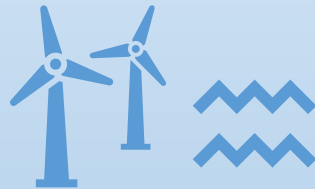
The integration of electricity produced from renewable sources into the national electricity system will be discussed. After producing it, what to do with it?



### Day 3

#### Water and Wind: machines for energy conversion

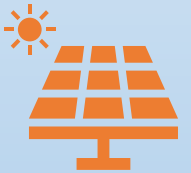
The exploitation of wind and hydropower has been well known for many years, but it is no less important in today's energy landscape. However.....



### Day 4

#### Solar energy

Sunlight is available in every part of the Earth, a resource that can be relied on to generate electrical, thermal and mechanical energy locally and sustainably. But what limits?

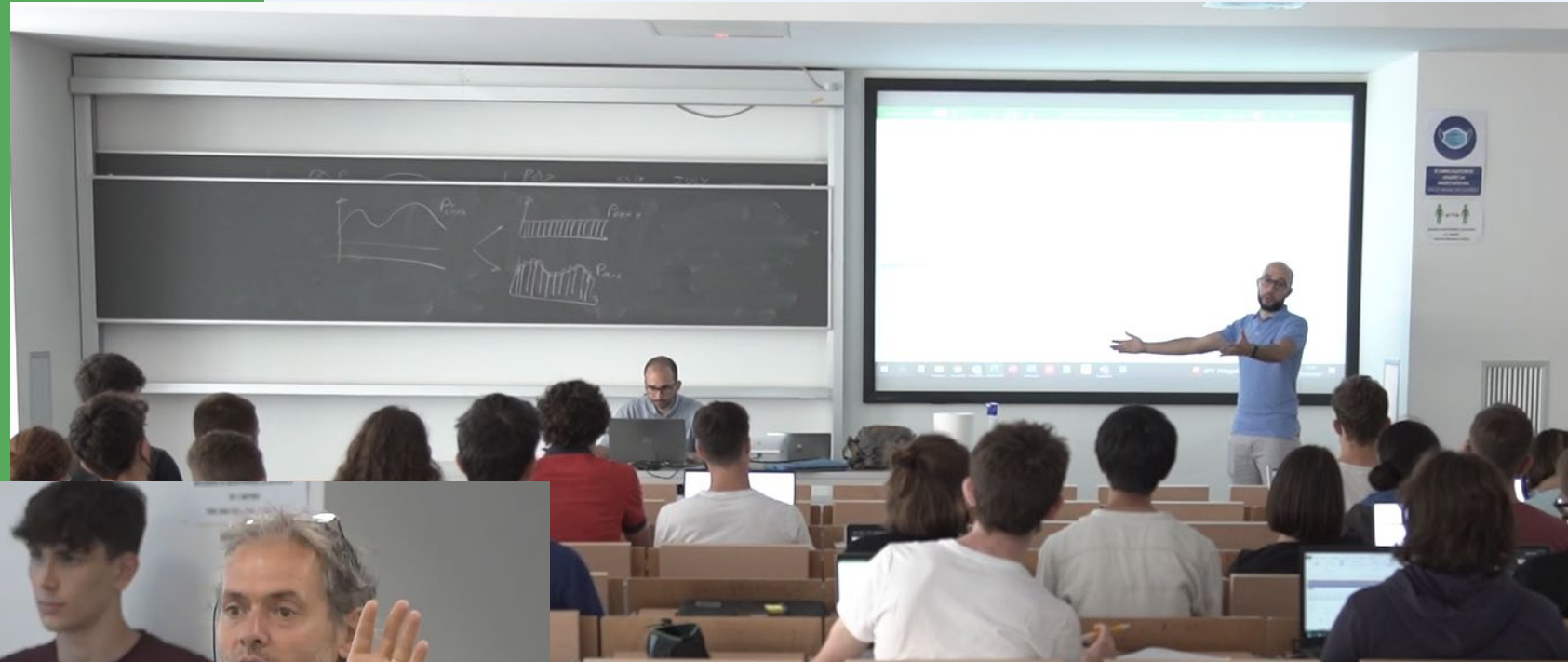


### Day 5

Group project .... and space for imagination ... but structured



# Morning theoretical background



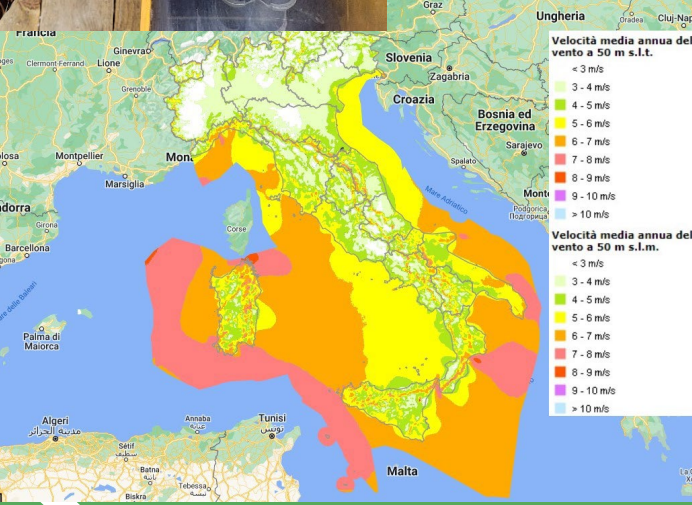
# Afternoon Exercise/Lab

## Labs on:

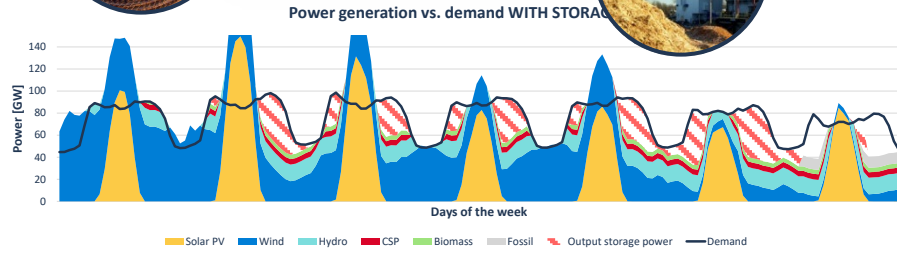
- Turbine hydro
- Wind Generator
- Where to install?



## Lab on photovoltaic modules (if weather conditions allow)



## Select your energy production mix



# 5° Day...

## Finalization and Presentation of the Group Project

- You are a team you are assigned an 'energy problem'
- The team is divided into 4 groups.
- Each group contributes to solving the problem by focusing on only 1 topic (the theme of a day) covered in the week.
- Presentations of contributions to group x group solutions.



- Solution = result of an energy mix **(a synergy among your skills)**

The diagram illustrates an energy system with three main stages:

- Stage 1:** A power source (represented by a battery icon) with a total loss of  $P_{loss\_total} = 45,07 \text{ kW}$ .
- Stage 2:** A transformer or distribution point. The current is  $I = 118,64 \text{ AMP}$  and the power is  $P = 2097,18 \text{ kW}$ . The maximum power is  $P_{max} = 6000 \text{ kW}$ . The loss at this stage is  $P_{loss} = 2,15 \text{ kW}$ .
- Stage 3:** A load or distribution point. The current is  $I = 84,74 \text{ AMP}$  and the power is  $P = 1500,00 \text{ kW}$ . The maximum power is  $P_{max} = 1700 \text{ kW}$ .

Additional details from the diagram:

- Between Stage 1 and Stage 2, the current is  $I = 33,90 \text{ AMP}$  and the power is  $P = 600,00 \text{ kW}$ . The maximum power is  $P_{max} = 4200 \text{ kW}$ .
- Between Stage 2 and Stage 3, the loss is  $P_{loss} = 0,69 \text{ kW}$ .
- Icons for a house, a solar panel, and a battery are shown at the top, representing different energy sources or loads.



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