

What you should know by heart (regarding Christoph Ballif's part only):

1. Introduction

- Production-based vs. consumption-based CO₂ emissions concept
- The energy-related sustainable development goals
- The link between economic growth, energy production and CO₂ emissions
- Typical process efficiencies
- Typical capacity factors
- The way energy statistical data are calculated and reported, what to pay attention to

2. CO₂ emissions and global warming

- Basic history of CO₂ concentration
- CO₂ and CO₂ equivalent emission, major causes
- Context and implications of the 1.5° and 2°C scenario, more likely scenarios
- Major impacts of global warming
- Current typical answers to the climate crisis, serious or not serious?

3. World energy production and usage

- Biggest, ecologically worst and best energy producer and consumer (countries)
- Energy consumption by main sectors
- Reserve vs resource, a general idea of the rate of consumption of fossil fuels
- Shale gas and Coal to Liquid fuels processes and statistics

4. Mitigating CO₂ emission and scenarios

- Typical energy per capita consumption for important countries
- Details of the different ways to mitigate CO₂ emissions: reduction of consumption, CO₂ capture, etc.
- Evolution and typical projection of renewable energy production and power plant capacity installation numbers (what is and what should be)
- How can the world attain a 60% (or 100%) renewable energy share of its electricity mix by 2050?
- What will it typically cost and what can be the benefit?
- Know a scenario for Europe, e.g., Breyer's one (for decarbonization of electricity sector)
- What could be done in Switzerland (e.g., the 50 GW PV scenario). Key role of electric transport and heat pumps
- The example of Germany in the energy transition (at least for developing renewable)

5. Challenges and Supports to a decarbonized world

- Smart grids: what it is, what it solves, and how.
- Electricity storage: how the different kind of storages can be used
- Some details about the different possibilities and implications of using given energy storage. For example, the sustainability of producing batteries.
- Know the reasons in the resolve of some (many) actors to prevent green technologies from rising.