Introduction
- Difficulties to shift to renewable energies
- Fossil fuel for energy production
- European project: MATESA

Function
Create energy from coal or natural gas, with or without a technology to capture CO₂

Functional unit
1 kWh of energy produced

Objectives
- Efforts to reduce CO₂ emissions in the atmosphere
- Compare 4 different strategies of energy production

Scenario 1
Energy production: Coal
Capture of CO₂: -
Storage of CO₂: -

Scenario 2
Energy production: Coal
Capture of CO₂: MEA
Storage of CO₂: Geological sequestration

Scenario 3
Energy production: Natural gas
Capture of CO₂: -
Storage of CO₂: -

Scenario 4
Energy production: Natural gas
Capture of CO₂: MEA
Storage of CO₂: Geological sequestration

Limits of the system

Capture
- Technologies other than MEA are researched (MOF, zeolites) in order to reduce these impacts.

Transport
- Results are not relevant here. Very few impacts BUT distance chosen is very short!!
  Better choice: 500 km

Geological storage
- Storage in exploited reservoir
  ⇒ enhanced oil recovery (EOR)
  ⇒ Improve oil uptake = reduce impacts by improving yield

Global Results
- Impacts on climate change divided by 3 when CO₂ is captured
- Impacts in other categories increase:
  - Coal:
    - Ionizing radiation: x 3
    - Water res. depletion: x 2.5
    - Ozone depletion: x 2
  - Natural gas:
    - Terrestrial eutroph.: x 1.75
    - 5 other categories: x 1.3
  - Main impacts due to storage: Impacted by capture and storage

Conclusion
- Goals of carbon capture and storage (CCS) technologies are achieved! CO₂ emissions are reduced.
- CCS technology better adapted with production of energy from natural gas (not so much with coal-fired power plant).
- Impacts on environment of CCS technology are not negligible in other categories ⇒ explore other alternatives of technologies.