

Activity 4.5

Title: Developing a Quantitative Model

Learning outcome: to gain an understanding and experience on how to build Quantitative models and apply it in the area of Renewable Energy

Applicable: it can be used in the fourth lecture of the Systems Thinking module

Green skills: discussion, collaborative planning, co-creation, systems thinking

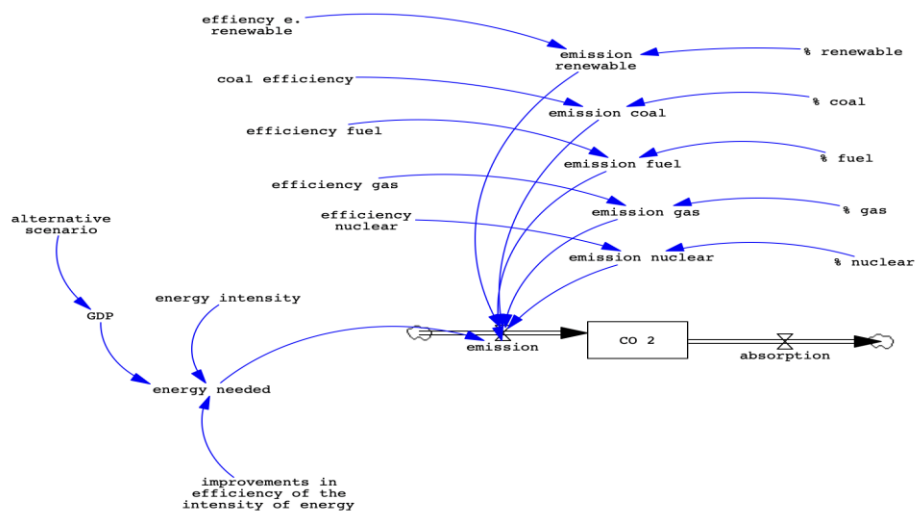
Instructions: Ask the students to develop the model of the following description

- We define these controls in Model – Settings: TIME STEP = 1
- INITIAL TIME = 1900 FINAL TIME = 2100
- (01) % coal = 0.05
- (02) % fuel = 0.5
- (03) % gas = 0.1
- (04) % nuclear = 0.3
- (05) % renewable = 0.05
- (06) absorption= 12500 Units: CO₂/Year
- (07) alternative scenario = 1
- (08) CO₂ = +emission-absorption, Initial value: 10000000
- (09) coal efficiency = 3 Units: CO₂/Kw
- (10) efficiency e. renewable = 0 Units: CO₂/Kw
- (11) efficiency fuel = 2 Units: CO₂/Kw
- (12) efficiency gas = 1 Units: CO₂/Kw
- (13) emission=energy needed * (emission coal+emission fuel+emission gas+emission nuclear+emission renewable) Units: CO₂/Year
- (14) emission coal = % coal * coal efficiency Units: CO₂/Kw
- (15) emission fuel = % fuel * efficiency fuel Units: CO₂/Kw
- (16) emission gas= % gas * efficiency gas Units: CO₂/Kw
- (17) emission nuclear= % nuclear * efficiency nuclear Units: CO₂/Kw
- (18) emission renewable= % renewable *efficiency e. renewable Units: CO₂/Kw
- (19) efficiency nuclear = 0 Units: CO₂/Kw



- (20) energy intensity = 10 Units: Kw/€
- (21) energy needed = GDP*energy intensity*improvements in efficiency of the intensity of energy Units: Kw
- (22) GDP= 1000*alternative scenario Units: € Business as Usual.
- (23) improvements in efficiency of the intensity of energy = 1

Correct Model



Ask the students to experiment with different policies on how to reduce CO2 emissions.

The model is provided!