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Train the Trainers -
Simulation tools about climate change

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Objectives of this presentation

- To define what simulation tools are and their types
- To present examples of simulation tools concerning various aspects of climate change.

Simulation tools

- Simulation tools are tools that represent a model of a system that is used to identify and understand the factors that control the system, represent its past or present state and/or predict its future behaviour.
- Computer simulations related to climate change aspects are usually in the following forms:
  - Simple non interactive simulation (e.g. video)
  - Interactive simulation tools (simple/sophisticated)
  - Games

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Simulations tools

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Clobal warming /1

- **NASA Climate Time Machine.** Provides a satellite look at our emissions and the rise in temperatures they've caused. https://climate.nasa.gov/interactives/climate-time-machine/
- **Footprint calculator.** Footprint Calculator is for anyone who wants to know its unique role in the climate crisis. The tool calculates how many planets, humanity would need if everybody lived the same lifestyle as you. https://www.footprintcalculator.org/
- **En-Roads simulation**. A simulation that gives you the chance to design your own policy scenarios to limit carbon emissions https://www.climateinteractive.org/en-roads/

Global warming /2

- **Greenhouse Effect**. Describe the effect of greenhouse gases and temperature. https://phet.colorado.edu/en/simulations/greenhouse-effect/about
- **Global temperature projections with increasing and decreasing greenhouse gas emissions.** This animation shows predicted changes in temperature across the globe, relative to pre-industrial levels, under two different emissions scenarios. https://www.climate.gov/teaching/resources/global-temperature-projections-increasing-and-decreasing-greenhouse-gas
- **Understanding Global Change Interactive**. This interactive module allows students and educators to build models that explain how the Earth system works. https://www.climate.gov/teaching/resources/understanding-global-change-interactive

Clobal warming /3

- **Warm Up Quiz**. This is a ten-question quiz of basic to intermediate information about global climate change. https://www.climate.gov/teaching/resources/warm-quiz
- **Illuminate: Climate change simulation game**. https://uwaterloo.ca/climate-institute/educational-programs/illuminate-climate-change-simulation-game

Carbon cycle

- **Carbon Cycle & Energy Labs.** A simulation of carbon cycle through atmosphere, oceans and crust. https://www.learner.org/series/the-habitable-planet-a-systems-approach-to-environmental-science/carbon-lab/

Carbon emissions

- **UN carbon footprint calculator**. Allows someone to calculate household, transport and lifestyle CO2 emissions. https://offset.climateneutralnow.org/
- **CARBON CALCULATOR.** Carbon Footprint Calculator For Individuals And Households. https://www.carbonfootprint.com/calculator.aspx
- Multi domain CO2 emissions calculartor. https://ecotree.green/en/calculate-flight-co2
- **IATA CO2 Connect Calculator**. Calculate the CO2 footprint of your flight. https://www.iata.org/en/services/statistics/intelligence/co2-connect/iata-co2-connect-passenger-calculator/
- **Meeting Emissions Calculator**. What is your carbon footprint when you travel for meetings? https://resources.owllabs.com/meeting-emissions-calculator
- **PC carbon footprint.** Allows you to calculate your pc CO2 emissions. https://outervision.com/power-supply-calculator

Soil

- **Soil Games.** https://www.soils4kids.org/games/
- Soil: Games. https://sciencetrek.org/sciencetrek/topics/soil/games.cfm
- Seed survivor. https://seedsurvivor.com/just-for-kids/games/

Deforestation

- **Erosion and deforestation**. https://www.edumedia-sciences.com/en/media/57-erosion-and-deforestation
- **Forest Monitoring Designed for Action**. https://www.globalforestwatch.org/

Recycling

- **Recycle Roundup**. National Geographic Kids. https://kids.nationalgeographic.com/games/action-adventure/article/recycle-roundup-new
- **Recycle city**. EPA. https://www3.epa.gov/recyclecity/
- **Recycling for Kids**. https://www.turtlediary.com/game/recycling-waste.html

Fossil fuel

- Fossil fuel interactive. Gives an idea about the amount of coal, oil, and gas the world extracts every day. https://www.climaterealityproject.org/blog/6-interactive-tools-better-understand-climate-crisis

General

- **NASA Climate Kids**. https://climatekids.nasa.gov/
- **Collection of various tools and experiments**. https://www.climate.gov/teaching/demos-experiments?page=0
- **The climate initiative.** https://www.theclimateinitiative.org/learninglab/

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Experiments

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Experiments

- **Thermal expansion of water**. This is a short experiment to demonstrate the concept of thermal expansion of water when heated, as an analogy to thermal expansion of oceans due to global warming. https://www.climate.gov/teaching/resources/thermal-expansion-water
- **Biofuels/Biomass Cellulose Lab**. In this lab activity, students investigate how to prepare a biofuel source for conversion to a combustible product. The activity models how raw materials are refined to process liquid fuels. https://www.climate.gov/teaching/resources/biofuelsbiomass-cellulose-lab
- **Comparison of the Effects of Increased CO2 in the Air to Seawater and Distilled Water**. Students examine how distilled water and seawater are affected differently by increasing carbon dioxide in the air. https://www.climate.gov/teaching/resources/comparison-effects-increased-co2-air-seawater-and-distilled-water

Experiments

- **Classroom Activities related to environment**. https://scied.ucar.edu/activity?field_learning_zone_category_target_id=32

- **Deforestation Simulation**. https://teachheart.org/wp-content/uploads/2021/01/Deforestation-Simulation.pdf

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Thank you for your attention

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