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C-ROADS CLIMATE NEGOTIATIONS

TEACHER'S GUIDE & REGIONAL ROLE-PLAY SCENARIOS

A classroom handbook for exploring emissions, forests and international climate cooperation.

6 regional delegations • Simulation and negotiation • Student decision sheets

CLIMATE EDUCATION / CLASSROOM SIMULATION

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PART I | TEACHER'S GUIDE

1. Introduction for teachers

C-ROADS (Climate Rapid Overview and Decision Support) is an interactive simulator showing how global greenhouse gas emissions and the policies of different countries affect global temperature rise by 2100.

It was developed by MIT, Climate Interactive and the U.S. State Department and is also used in the context of UN climate conferences (COP).

Goal of the classroom activity

Students make decisions on behalf of world leaders (for example, the United States, China, the EU, India, Africa and other countries) and try to work together to limit global warming to below 2 °C.

Simulator: https://www.climateinteractive.org/tools/c-roads/

2. How C-ROADS works

Students see interactive graphs of global temperature and emissions through 2100. They can change the parameters for each region:

Parameter	Meaning
Year to start reducing	The year when a country begins reducing emissions.
Reduction rate (%)	The annual percentage reduction in emissions.
Stop year	The year until which reductions continue (for example, 2100).
Deforestation / Afforestation	Whether forests are cleared or new forests are planted.
Methane & other gases	Changes in emissions of other greenhouse gases.

The simulator automatically displays:

- Global temperature rise
- CO_2 emissions by region
- Sea levels
- The effects of individual measures

Key parameters explained to students

Parameter	Meaning	Student-friendly explanation
Emissions Peak Year	Year when emissions reach their highest level and then begin to fall.	When does your country reach its highest emissions? An earlier peak is better for the planet.
Reductions Begin Year	Year when active emissions reductions begin.	When do we start concrete measures, such as switching to renewables or

		phasing out coal?
Annual Reduction Rate	Percentage by which emissions fall each year after reductions begin.	How quickly do we cut emissions each year? A higher number means faster action.
Prevent Deforestation (%)	Extent to which forest clearing is prevented (0–100%).	At 50%, half of the deforestation is prevented; at 100%, it is completely prevented.
Promote Afforestation (%)	Extent to which planting new forests is increased.	Invest in planting new forests. More forests can absorb more CO_2.

3. Suggested lesson plan (60 minutes)

Time	Activity
0–10 min	Short introduction: What is climate change? Explain C-ROADS.
10–15 min	Divide students into five groups (USA, China, EU, India, Africa).
15–25 min	Each group decides when to start reducing emissions and by how much.
25–40 min	The teacher enters decisions into the simulator (or students do so in a computer classroom).
40–50 min	Analyse results: Is the global temperature increase below 2 °C?
50–60 min	Discuss: Which countries should do more? Is the world fair?

For all six regional scenario sheets in this handbook, use six delegations instead of the five-group example above.

4. Scenarios students can test

Scenario	Description	Illustrative outcome in source
Business as usual	No country changes its emissions policies.	≈ +4.1 °C
Paris pledges	All countries fulfil Paris Agreement pledges through 2030.	≈ +3.0 °C
Global cooperation	All countries act immediately; wealthy countries finance poorer ones.	≈ +1.8 °C
Technology breakthrough	CO_2 capture technologies become widely available.	≈ +2.2 °C
Delayed action	Countries only start taking action in 2040.	≈ +3.5 °C

These are illustrative values from the original teaching material, not guaranteed outputs of the current simulator.

5. Example of student inputs

Region	Start of reductions	Annual rate	Plant forests?	Comment
USA	2030	4%	Yes	Reduce emissions and invest in technology.
China	2040	2%	No	Late start; emissions still growing.
EU	2025	5%	Yes	Aim for climate neutrality by 2050.
India	2050	1%	No	Focus on development rather than reductions.
Africa	2060	0.5%	Yes	Growth in renewable energy.

After entering the values, the simulator shows the projected temperature rise by 2100. If it exceeds 2 °C, students try again, seeking an agreement and a fairer distribution of action.

6. World map activity

On an outline map of the world, students mark:

- Areas with the highest emissions (e.g., China, USA)
- Regions experiencing the most drought
- Coastal regions at risk of flooding
- Countries investing heavily in green energy

This helps them visualise the consequences of political decisions.

7. Discussion and conclusions

- Have wealthy countries done enough?
- Is a global agreement possible without delay?
- Can technology alone solve the problem?
- What can we do as individuals?

Students compare the outcome of their scenario with the UN's 1.5 °C goal and discuss what needs to change.

Additional materials

- C-ROADS simulator: https://www.climateinteractive.org/tools/c-roads/
- C-ROADS Educator's Guide (PDF)
- Video tutorial: "How to Use C-ROADS Climate Simulator" (Climate Interactive YouTube channel)
- World Climate Simulation classroom activity: https://www.climateinteractive.org/programs/world-climate/

PART II | REGIONAL SCENARIOS

Give one regional sheet to each delegation. Students read their region's profile, agree on initial decisions, test them in C-ROADS and prepare to negotiate.

Shared task for all delegations

- Read the information about your assigned region.
- As a team, decide the emissions peak year, the year reductions begin, the annual reduction rate (%), how much forest to protect and how much new forest to plant.
- Prepare the data for C-ROADS.
- Check the projected global temperature increase by 2100.
- Record the results (for example, +2.7 °C) and prepare arguments for climate negotiations.
- Negotiate a new joint plan aimed at keeping warm below 1.5 °C.
- Compare the original and revised scenarios, analyse the changes and identify the most important climate actions.

DELEGATION 01

European Union

Context

The EU has one of the world's most ambitious climate plans, the European Green Deal. Many countries already use renewable energy and promote sustainable transport.

Role in the world

- About 450 million inhabitants.
- Accounts for around 7% of global emissions, but has historically been a major emitter.
- Has some of the world's most advanced climate policies.

Current situation

- Goal: reduce emissions by 55% by 2030 and achieve climate neutrality by 2050.
- Strong transition to wind, solar and hydropower.
- Substantial subsidies for planting forests and protecting nature.
- Some countries (e.g., Germany and Denmark) already produce more than 50% of electricity from renewables.

Scenario rationale

The EU acts quickly and decisively, investing in renewable energy and reforestation.

Discuss with your team

- When could the EU completely stop using coal and oil?
- What annual emissions reduction is achievable (3–6%)?
- What share of forests can it preserve or increase?
- Why is it important for wealthy regions to act first?
- How can the EU help other regions achieve similar goals?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C

DELEGATION 02

United States

Context

The United States is among the largest historical emitters, but also a leader in new technologies and renewable energy. Political obstacles and a strong fossil-fuel industry remain.

Role in the world

- Around 340 million people; among the most populous countries.
- One of the world's largest current emitters, after China.
- Historically responsible for around 25% of cumulative CO_2 emissions since the Industrial Revolution.
- The economy relies on oil, coal and gas, but also has a strong renewables industry.

Current situation

- Emissions have gradually fallen since 2007, partly thanks to solar and wind energy.
- Major differences between states; some, such as California, have strict climate laws.
- Stated goal in the source material: net-zero emissions by 2050.

Scenario rationale

The United States starts reducing emissions later because some states still depend on oil and gas, while also investing in forests and technology.

Discuss with your team

- When could the United States realistically reach peak emissions?
- How quickly could it reduce emissions (1–5%)?
- What percentage of forests could it protect or restore?
- How would US government decisions affect the rest of the world?
- Which measures could the United States introduce sooner?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C

DELEGATION 03

Other Developed Nations

Japan, Canada, Australia, South Korea and others

Context

These countries are economically developed but still depend on fossil fuels. They have the technology and resources to change, alongside domestic political obstacles.

Role in the world

- Wealthy countries with high per-capita energy consumption.
- Have financial and technological capacity to act quickly, but may delay because of economic interests.

Current situation

- Japan and South Korea plan net-zero emissions by 2050.
- Canada has high emissions linked to the oil industry and transport.
- Australia has long relied on coal but is investing in solar farms.
- Some countries have large forest areas (Canada and Norway).

Scenario rationale

These countries balance economic growth with environmental protection. They could take stronger action but often wait for other major powers.

Discuss with your team

- When should serious emissions reductions begin?
- How quickly can they move to clean energy?
- What percentage of forests can they protect, especially in Canada?
- Why do some wealthy countries hesitate?
- How could international agreements speed up their action?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C

DELEGATION 04

China

Green Transition

Context

China has the world's largest CO_2 emissions, but is also a global leader in solar panels, electric vehicles and wind power. It must balance development and environmental protection.

Role in the world

- Largest current emitter, responsible for about 30% of global CO_2 emissions.
- Leading producer of solar panels, batteries and electric cars.
- About 1.4 billion inhabitants.

Current situation

- Emissions are still growing in the source scenario; China plans to peak before 2030 and reach carbon neutrality by 2060.
- Heavy dependence on coal; over 55% of electricity comes from coal.
- Large afforestation programmes, including China's "Green Wall".

Scenario rationale

China continues industrial growth until 2030, then invests strongly in renewables and forestry.

Discuss with your team

- When could China realistically begin reducing emissions?
- What percentage of forests can it restore or protect?
- Is a faster transition possible without damaging the economy?
- How much would the world depend on China reducing emissions?
- Could China become a global climate leader?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C

DELEGATION 05

India

Development with Constraints

Context

India is growing rapidly and has an enormous population. It needs energy for development while remaining highly vulnerable to floods, droughts and heatwaves.

Role in the world

- A country of about 1.4 billion people.
- Emissions are rising as industry and energy systems expand.
- Average per-capita emissions are much lower than in the United States.

Current situation

- Heavy reliance on coal (about 70% of electricity in the source scenario).
- Rapidly increasing investment in solar energy.
- Already affected by floods, droughts and heatwaves.
- Goal: net-zero emissions by 2070.

Scenario rationale

India must meet its population's needs, making rapid cuts difficult. Even small changes in such a large country can have a major effect.

Discuss with your team

- When could India realistically reach peak emissions?
- How much can it invest in renewables?
- How much forest can it preserve despite urban and industrial expansion?
- How can wealthy countries help India switch to clean energy?
- What would happen if India took action as early as 2030?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C

DELEGATION 06

Other Developing Nations

Africa, Latin America and Southeast Asia — Green Alliance

Context

These regions have low emissions per person but face severe consequences of climate change. They contain major forest areas and have potential for reforestation.

Role in the world

- Large group of countries with relatively low emissions and high climate vulnerability.
- Forests, especially the Amazon and Congo, are crucial to the global CO_2 balance.

Current situation

- Dependence on agriculture and forests.
- Limited financial resources and technology.
- Growing populations increase pressure on resources.
- Some successful examples exist, such as Costa Rica's high renewable-electricity share.

Scenario rationale

These regions protect forests and fight deforestation but need financial and technological support from wealthier countries.

Discuss with your team

- How can development be balanced with environmental protection?
- What percentage of forests can be protected or restored?
- Should wealthy countries provide financial assistance?
- Should low-emission countries take the same actions as wealthy nations?
- What role should international cooperation play?

Your C-ROADS decisions

Emissions peak year	Reductions begin year	Annual reduction rate	Prevent deforestation	Promote afforestation
_____	_____	_____ %	_____ %	_____ %

Projected warming by 2100: _____ °C | Revised result after negotiations: _____ °C