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# Energy and Environment

## Students' Worksheets

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Project Partners





# WORKSHEET EE1: FOSSIL FUEL DETECTIVE

You have been learning about energy sources. Now you will go deeper into some energy sources to learn more about their relationship with the environment.

1. Using reliable internet websites, look for information on **coal, oil, or natural gas**, concerning:
  - i. Origin (Where it comes from)
  - ii. Advantages as a source of energy
  - iii. Disadvantages as a source of energy
  - iv. Environmental risks of using it as a source of energy

2. Use the table below to register the information collected.

Fossil Fuel	Origin	Advantages	Disadvantages	Environmental Risks

3. Based on the information collected, what do you think about the use of these energy sources?

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4. Why do you think societies still use fossil fuels despite their problems?

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## WORKSHEET EE2: EUROPEAN ENERGY PLANNERS 2030

You have learned about the relationship between energy and the environment and the need to use energy consistently with the requirements of a sustainable future.

1. Now, you are acting as a European energy planner for 2030. Your task is to create a balanced energy mix that meets environmental, economic, and social goals.
2. Your proposal should be evidence-based. Use the data and constraints provided to guide your decisions.

### Energy data

Type of energy	Current Share (2023)	CO <sub>2</sub> Emissions (kg CO <sub>2</sub> /MWh)	Cost (€/MWh)	Reliability	Public Acceptance
Wind (onshore)	15%	12	50	Medium	High
Solar (PV)	10%	45	55	Medium-Low	High
Hydro	5%	24	60	High	Medium
Nuclear	25%	12	70	Very High	Medium-Low
Natural Gas	25%	490	65	High	Medium
Coal	15%	820	55	Very High	Low
Biomass	5%	230	60	Medium	Medium

### Constraints

1. Total energy must add up to 100%.
2. Minimum renewable share:  $\geq 42.5\%$ .
3. Fossil fuel limit:  $\leq 50\%$ .
4. Maximum coal share:  $\leq 5\%$ .
5. Nuclear share: Optional, max 25%.
6. Aim for average generation cost  $\leq 60$  €/MWh.
7. Must include at least one high-reliability source (Hydro, Nuclear, or Gas).
8. Avoid relying solely on low-acceptance sources (e.g., coal).

3. Plan your Energy Mix. Fill in the table.

Type of Energy	Proposed % Share	Weighted CO <sub>2</sub> (kg CO <sub>2</sub> /MWh $\times$ %)	Weighted Cost (€/MWh $\times$ %)	Notes/Justification
Wind				
Solar				
Hydro				
Nuclear				
Natural Gas				
Coal				
Biomass				

**Total %:** \_\_\_\_%



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4. Make the following calculations:

- Total Weighted CO<sub>2</sub> Emissions: \_\_\_\_\_ kg CO<sub>2</sub>/MWh
- Total Weighted Cost: \_\_\_\_\_ €/MWh
- % Renewable Energy: \_\_\_\_\_ %
- % Fossil Fuel Energy: \_\_\_\_\_ %

5. Think about the following questions

5.1. How does your mix balance CO<sub>2</sub> reduction, cost, reliability, and public opinion?

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5.2. What trade-offs did you have to make?

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5.3. If you could include one new technology, what would it be and why?

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6. Prepare a short presentation for your European colleagues that shows:

- the composition of your energy mix;
- how it balances CO<sub>2</sub> reduction, cost, reliability, and public opinion;
- how satisfied you feel with your energy mix.