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WORKSHEET 1 – ENERGY DATA TABLE AND ANALYSIS

STEAM ACTIVITY PROJECT

The Mathematics of Reality is on STEAM

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Part A – Energy data table

Read the table below. It shows simplified data for different energy sources.

Energy source	Type	Average energy output (kWh per unit)	CO ₂ emissions (kg CO ₂ per kWh)	Approximate cost (€/kWh)
Coal	Non renewable	8	0.90	0.10
Natural gas	Non renewable	7	0.50	0.09
Solar	Renewable	4	0.05	0.12
Wind	Renewable	5	0.02	0.11
Hydropower	Renewable	6	0.03	0.08

(Values are simplified for educational purposes.)

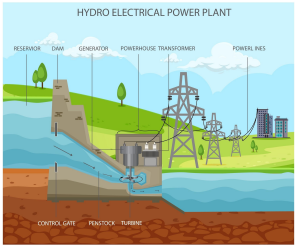
Part B – Questions

Which energy source has the highest energy output ?	COAL - 8 kWh per unit
Which energy source has the lowest CO ₂ emissions ?	WIND - 0.03 kg CO ₂ per kWh
Which energy source is the cheapest per kWh?	HYDROPOWER 0.08 €/kWh
Compare coal and solar :	
a) Which one produces more energy per unit?	COAL
b) Which one produces more CO ₂ per kWh?	COAL
Compare natural gas and wind	
a) Which one has lower CO ₂ emissions ?	WIND
b) Which one is more expensive ?	GAS

In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2–3 sentences.

In my opinion, **Hydropower** is the best choice because it has a high energy output (6 kWh) and the lowest cost (0.08 €). It is also very clean because it produces very little CO₂ compared to coal or gas. This source is cheap, powerful, and good for the planet at the same time.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	Provides a consistent base-load power supply. Infrastructure for processing is already mature.	Releases high amounts of CO ₂ and pollutants. Mining causes severe habitat destruction.
Natural gas	Emits less carbon than coal or oil when burned. Can quickly supplement renewable energy gaps.	Methane leaks during extraction are potent. Requires intensive hydraulic fracturing
Solar	Produces zero emissions during operation. Reduces reliance on centralized power grids.	Manufacturing panels involves toxic chemicals. Requires vast land areas for utility-scale farms.
Wind	Has one of the smallest carbon footprints. Land under turbines can still be used for farming.	Can be harmful to local birds. Causes "visual pollution" in scenic landscapes.
Hydropower	A reliable, long-term source of clean energy. Reservoirs can help with local flood control.	Flooding for dams displaces local wildlife. Alters river chemistry and disrupts fish migration.



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Part B – Questions

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b) Which one is more expensive ?	NATURAL GAS

In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2–3 sentences.

In my opinion, **wind energy** provides the best balance between energy output, low CO₂ emissions, and cost. Wind turbines generate large amounts of electricity without burning fossil fuels, and their operating costs are relatively low once installed. This makes wind power both environmentally friendly and economically efficient.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	1. Cheap and widely available. 2. Produces large amounts of energy.	1. Very high CO ₂ emissions and air pollution. 2. Causes environmental damage through mining.
Natural gas	1. Lower CO ₂ emissions than coal. 2. Reliable and efficient for electricity production.	1. Still a fossil fuel that contributes to climate change. 2. Risk of gas leaks and explosions.
Solar	1. Renewable and produces no CO ₂ during operation. 2. Low operating and maintenance costs.	1. Depends on sunlight and weather conditions. 2. High initial installation cost.
Wind	1. Clean and renewable energy source. 2. Low operating costs after installation.	1. Energy production depends on wind availability. 2. Can affect landscapes and wildlife (birds).
Hydropower	1. Produces large amounts of clean electricity. 2. Very reliable and efficient.	1. Dams can damage ecosystems and fish habitats. 2. High construction costs and risk of flooding nearby areas.





TEAM 3



HELLO
MY NAME IS

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Part A – Energy data table

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In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2-3 sentences.

Consider că **energia eoliană** oferă un echilibru bun între cantitatea de energie produsă, emisiile reduse de CO₂ și costuri. După instalarea turbinelor, energia este produsă fără arderea combustibililor fosili, iar costurile de funcționare sunt relativ mici.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	1. Produces a large amount of energy 2. Can produce energy continuously.	1. Produces a lot of CO ₂ . 2. Causes air pollution.
Natural gas	1. Produces less CO ₂ than coal. 2. Can produce energy when needed.	1. It is a fossil fuel. 2. It still produces CO ₂ .
Solar	1. Produces very low CO ₂ emissions during operation. 2. Sunlight is a renewable energy source.	1. Does not produce energy at night. 2. Energy production depends on the weather.
Wind	1. Produces very low CO ₂ emissions during operation. 2. Wind is a renewable energy source.	1. Energy production depends on wind speed. 2. Wind turbines need suitable locations.
Hydropower	1. Produces large amounts of energy. 2. Produces very low CO ₂ emissions during operation.	1. Dams can affect rivers and ecosystems. 2. Building a hydropower plant is expensive.



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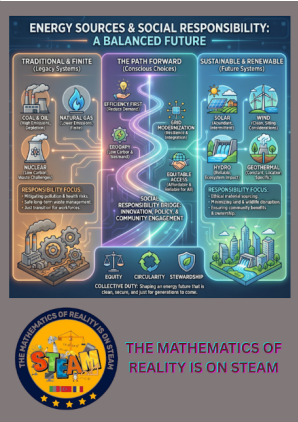
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In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2-3 sentences.

Eu aş alege **energia solară**, deoarece nu poluează aerul în timpul producerii energiei și folosește o sursă regenerabilă. Chiar dacă panourile solare costă destul de mult la început și depind de vreme, pe termen lung pot reduce costurile cu energia.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	1.Produce multă energie. 2.Poate fi folosit indiferent de vreme.	1.Produce mult CO ₂ . 2.Poluează aerul.
Natural gas	1.Produce energie constant. 2.Poluează mai puțin decât cărbunele.	1.Este o resursă neregenerabilă. 2.Produce CO ₂ .
Solar	1.Energia Soarelui este regenerabilă. 2.Nu produce CO ₂ în timpul funcționării.	1.Depinde de vreme. 2.Nu produce energie noaptea.
Wind	1.Este energie regenerabilă. 2.Produce foarte puține emisii.	1.Depinde de viteza vântului. 2.Turbinele ocupă spațiu.
Hydropower	1.Poate produce multă energie. 2.Are emisii reduse de CO ₂ .	1.Barajele sunt scumpe. 2.Pot afecta plantele și animalele din râuri.



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In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2–3 sentences.

Cred că energia hidroelectrică are un echilibru bun între cantitatea de energie produsă, emisi și costuri. Hidrocentralele pot produce multă energie cu emisi reduse de CO₂, dar construirea lor este costisitoare și poate afecta ecosistemele râurilor.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	1. Este ușor de folosit pentru producerea energiei. 2. Centralele pot funcționa permanent.	1. Este foarte poluant. 2. Este o resursă limitată.
Natural gas	1. Este mai puțin poluant decât cărbunele. 2. Centralele pot produce energie atunci când este nevoie.	1. Nu este regenerabil. 2. Arderea lui eliberează gaze cu efect de seră.
Solar	1. Folosește o sursă de energie gratuită. 2. Panourile nu poluează aerul când produc electricitate.	1. Produce mai puțin în zilele înnorate. 2. Instalarea panourilor poate fi costisitoare.
Wind	1. Vântul este o sursă gratuită de energie. 2. Nu necesită arderea combustibililor.	1. Nu funcționează bine dacă vântul este prea slab. 2. Turbinele pot produce zgomot.
Hydropower	1. Apa este o sursă regenerabilă. 2. Hidrocentralele pot produce cantități mari de electricitate.	1. Construirea barajelor costă mult. 2. Barajele pot modifica mediul natural.



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In your opinion, which energy source is the best balance between energy output, CO₂ emissions and cost? Explain your choice in 2-3 sentences.

Eu cred că **energia eoliană** este o alegere bună, deoarece produce energie fără să emită mult CO₂ și nu are nevoie de combustibil. Dezavantajul este că turbinele nu pot produce aceeași cantitate de energie tot timpul, deoarece depind de viteză vântului.

Energy source	Advantages (at least 2)	Disadvantages (at least 2)
Coal	1. Poate asigura energie în orice moment. 2. Produce cantități mari de electricitate.	1. Eliberează mult CO ₂ . 2. Exploatarea cărbunelui afectează mediul.
Natural gas	1. Are emisii mai mici decât cărbunele. 2. Este eficient pentru producerea electricității.	1. Contribuie la încălzirea globală. 2. Rezervele se pot epuiza.
Solar	1. Sursa este o sursă regenerabilă. 2. Are emisii foarte mici în timpul funcționării.	1. Producția se schimbă în funcție de vreme. 2. Este nevoie de spațiu pentru multe panouri.
Wind	1. Nu folosește combustibili fosili. 2. Are emisii reduse de CO ₂ .	1. Producția de energie nu este constantă. 2. Nu toate zonele au suficient vânt.
Hydropower	1. Produce energie cu emisii reduse. 2. Poate produce electricitate pentru perioade lungi.	1. Construcția hidrocentralelor este dificilă și costisitoare. 2. Poate schimba ecosistemul unui râu.

