

REIES – Lesson 2: Energy Use

Exercise Sheet

Complete the exercises below to practise the concepts from Lesson 2. Show all working for calculation questions.

Section A – Knowledge Questions

Exercise 1

Knowledge

The lesson shows how global energy consumption is divided across sectors. Using the figures from the slide for the world in 2022 (total: 620 EJ), answer the following:

- Which sector consumes the most energy globally, and approximately what share does it represent?
- List all six sectors shown in the chart and rank them from highest to lowest share for the world in 2022.
- In the Netherlands in 2022, one sector has a notably higher share than the global average. Which sector is it, and suggest one reason why.

Exercise 2

Knowledge

The lesson distinguishes between energy use and non-energy use of energy commodities.

- Explain in your own words what non-energy use means and give two examples from the lesson.
- Why is non-energy use important to account for separately when studying the energy system?
- In the Netherlands 2022 data, what percentage of total consumption is classified as non-energy use? Calculate the absolute amount in PJ.

Exercise 3

Knowledge

The lesson identifies six recognised renewable energy sources and explains why the shift to renewables is necessary.

- List the six recognised renewable energy sources mentioned in the lesson.
- What is the definition of renewable energy given in the lesson? What is the key criterion that distinguishes it from non-renewable energy?
- The lesson gives three reasons for shifting to renewables. State them in your own words and explain which you think is most urgent, and why.

Section B – Calculation Questions

Exercise 4

Calculation

The Netherlands consumed 2713 PJ of energy in 2022. Use the sector percentages from the lesson (NL, 2022) to answer:

- How much energy (in PJ) was consumed by the residential sector?
- How much energy (in PJ) was consumed by industry?
- How much energy (in PJ) was classified as non-energy use?
- Express the residential consumption in kWh. (Use: 1 PJ = 277.8 GWh.)

Exercise 5

Calculation

The lesson works through the renewable energy potential of the Netherlands for a 2050 scenario. Use these figures: population 20 million, energy demand 106 kWh per person per day.

- Calculate the total national energy demand in kWh per day.
- Convert this to GW (average continuous power). Remember: Power [W] = Energy [J] / time [s]. Use 24 hours = 86 400 s and 1 GW = 10^9 W.
- The lesson states this equals approximately 88 GW. Does your calculation confirm this?

Exercise 6

Calculation

Reproduce the wind-power-on-land calculation from the lesson. Given: NL land area = 41 500 km², wind generates 1 W/m², 6 % of land used.

- Calculate the power generated (in W, then GW).
- Convert to annual energy production in PJ. (Use: 1 year = 3.156×10^7 s; 1 PJ = 10^{15} J.)
- The lesson states 78.5 PJ. Does your answer match? Express this as a percentage of the 2800 PJ national target.

Section C – Internet Exploration Questions

Exercise 7

Internet Exploration

Go to the International Energy Agency website (www.iea.org) and find the most recent edition of the 'Key World Energy Statistics' or 'World Energy Balances' report.

- Find the most recent figure for global total final energy consumption (TFEC). How does it compare to the 620 EJ primary energy figure from the lesson? Why might these two numbers differ?
- Which world region has the highest energy consumption per capita? And which has the lowest? What does this tell you about global inequality in energy access?
- Find one statistic about energy access (e.g. number of people without electricity). Write 3–5 sentences explaining why energy access is relevant to the energy transition debate.

Exercise 8

Internet Exploration

Visit the CBS (Statistics Netherlands) energy dashboard at www.cbs.nl or the energy data portal at www.energie-nederland.nl to find current data on Dutch energy consumption.

- Find the most recent year's total energy consumption for the Netherlands in PJ. How does it compare to the 2713 PJ (2022) figure from the lesson? Has consumption gone up or down?
- Find the current share of renewable energy in the Netherlands' total energy mix. How close is the Netherlands to its 2030 renewable energy target? (Search for 'Netherlands renewable energy target 2030' if needed.)
- Based on what you find, write a short paragraph (5–7 sentences) reflecting on whether the Netherlands is on track for a CO₂-free energy system by 2050.