

MODULE 3

WORKSHEET 2: ECOLOGICAL LOGISTICS SYSTEM MODEL

Substantive Introduction

Designing an effective logistics system for hydrogen requires simultaneous consideration of:

- storage forms (CGH₂, LH₂, LOHC),
- type and length of transport (truck, rail, pipeline),
- carbon footprint (CO₂/tkm),
- availability and costs of infrastructure.

When designing a sustainable logistics system, the aim is to:

- minimizing greenhouse gas emissions,
- increasing energy efficiency,
- reducing environmental and social costs,
- integration with local renewable energy.

TASK 1: Selection of Transport Technology

Scenario: 20 tonnes of hydrogen are to be transported from an electrolyser to an industrial plant 400 km away.

You can choose from:

- Railway (CO₂ emissions: 5 kg/t/100 km)
- Pipeline (CO₂ emissions: 2 kg/t/100 km)
- LH₂ cryogenic truck (CO₂ emissions: 7 kg/t/100 km)

Calculate CO₂ emissions and choose the most ecological option. Justify your choice (3–5 sentences).

Task 2

TASK 2:

Build a Simplified H₂ Supply Chain Model

Draw or describe:

1. Starting point (hydrogen production),
2. Form of storage and conversion (e.g. LH₂, LOHC),
3. Means of transport and distance,
4. The end user and the method of using hydrogen.

Add 2 proposals for actions to reduce environmental impact.

Single Choice (5 questions):

Question 1: Which mode of transport is the most ecological over a distance of 400 km?

- A) LH₂ – truck
- B) Railway
- C) Pipeline
- D) Sea transport

Question 2: LOHC is a technology:

- A) cryogenic
- B) hydrogen in the carrier liquid
- C) using fuel cells
- D) compressed hydrogen

Question 3: The CO₂ emissions of the pipeline for 400 km of transport of 20 tonnes of hydrogen will be:

- A) 120 kg
- B) 160 kg
- C) 80 kg
- D) 40 kg

Question 4: Which of the following is a key element to consider when designing an effective hydrogen logistics system?

- A) Only minimizing transportation costs.
- B) Ignoring the form of hydrogen storage.
- C) Simultaneously taking into account the form of storage, type of transport, carbon footprint and infrastructure costs.
- D) Focusing only on integration with local renewable energy.

Question 5: What is NOT part of a green logistics strategy?

- A) minimizing empty runs
- B) use of HVO and biofuels
- C) using older vehicles to reduce costs
- D) integration with intermodal transport

ANSWER KEY

1.C / 2.B / 3.B / 4.C / 5.C

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