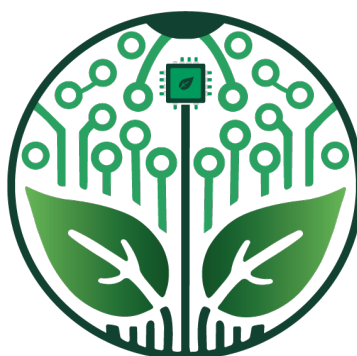


AI-GREENER

2024-1-AT01-KA220-SCH-
000248327



AI-GREENER

2024-1-AT01-KA220-SCH-
000248327

LESSON PLAN

Green Hydrogen: Storing Renewable Energy

 QUADRAT HAK x HLW Bundeshandelsakademie Wolfsberg Austria	 KOCAELİ - DARICA İLÇE MİLLÎ EĞİTİM MÜDÜRLÜĞÜ Darica İlçe Milli Eğitim Müdürlüğü Turkey	 CAMPUS 02 FACHHOCHSCHULE DER WIRTSCHAFT GmbH Austria	 ΔΙΕΥΘΥΝΣΗ ΔΕΥΤΕΡΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ ΚΕΦΑΛΛΙΝΙΑΣ Directorate of Secondary Education of Kefallinia Greece	 Jaunpiebalgas vidusskola Latvia	 sucessos criativos Sucessos Criativos, Lda Portugal	 Sredno obštotoobrazovatelno učilište Lyuben Karavelov Bulgaria
---	---	--	--	--	---	---



AI-GREENER

2024-1-AT01-KA220-SCH-
000248327

Authors

Jaunpiebalga Secondary school



Jaunpiebalgas vidusskola

Latvia

Karlis Krastins

Indrikis Andris Birznieks

Disclaimer



**Co-funded by
the European Union**

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.



1. TITLE

Green Hydrogen: Storing Renewable Energy

2. GRADE LEVEL

- ISCED Level 3 – Upper Secondary Education (ages 15–18)

3. SUBJECT AREA

- Sciences
- Environmental Studies
- Geography

4. TYPE

- Lesson Plan

5. DURATION

- 2 x 40-minute classes

6. LEARNING OBJECTIVES

- O1- Describe how green hydrogen is produced and why it can support renewable energy systems.
- O2- Compare energy storage options (batteries, pumped hydro, hydrogen) using basic efficiency concepts.
- O3- Use a simple calculator or simulation to estimate inputs/outputs of hydrogen production.
- O4- Propose a realistic green hydrogen use case and discuss sustainability trade-offs.



7. Key Competences Developed

- Literacy
- Mathematical competence and competence in STEM
- Digital competence
- Personal, social and learning to learn competence
- Citizenship competence

8. Prior Knowledge / Prerequisites

Basic chemistry concepts (water, energy) and basic mathematics skills.

9. Lesson/Project Outline

Phase 1 – Introduction (Engage & Contextualize)

Teacher introduces energy storage as a challenge for a renewable future (sun/wind variability).

Activities:

Quick discussion: Where can we store energy for later use?

Short demonstration/visual: electrolysis diagram (water → hydrogen + oxygen).

Watch a short explainer video on green hydrogen.

Outputs: class notes on what hydrogen is used for and why ‘green’ production matters.

Resource (name)	Link (to the folder on Teams)
Green hydrogen explained (video) https://www.youtube.com/watch?v=3IPR50-soNA	



Phase 2 – Exploration (Investigate & Compare)

Students explore the efficiency and sustainability of hydrogen compared to other storage options.

Activities:

Teacher provides a simple data sheet (or slide) with typical efficiencies for batteries, hydrogen, and pumped hydro.

In pairs, students answer:

Which option is best for short-term storage? Which fits seasonal storage?

What conditions make hydrogen more sustainable (renewable electricity, water availability, transport distance)?

Optional simulation/calculation: estimate how much electricity is needed to produce a given amount of hydrogen.

Outputs: comparison table and short written conclusions.

Resource (name)	Link (to the folder on Teams)

Phase 3 – Application (Hands-On Practice)

Groups develop a proposal for using green hydrogen in their region or an imagined city.

Activities:

Choose one sector: industry (steel), transport (buses/trucks), heating, or grid backup.

Define what renewables would power the electrolyser and how hydrogen would be stored/used.

Identify at least two risks or limitations (cost, efficiency losses, safety, infrastructure) and mitigation ideas.

Create a short presentation with a diagram showing the energy flow.

Outputs: green hydrogen use-case proposal with sustainability justification.

Resource (name)	Link (to the folder on Teams)

Phase 4 – Reflection & Consolidation (Present & Connect)

Groups present and reflect on where hydrogen fits best in a green transition.

Reflection questions:

When is hydrogen a good idea and when is it not?

How could AI help optimize electrolyser operation and storage planning?

What environmental impacts should be considered (water use, land use, materials)?

Outputs: presentations and a short exit ticket (3 key takeaways).



Resource (name)	Link (to the folder on Teams)

10. Assessment Criteria

Correctness of the storage comparison and reasoning.
Quality of the group hydrogen use-case diagram and explanation.
Evidence of understanding of efficiency and trade-offs.
Participation and reflection on appropriate applications.

Resource (name)	Link (to the folder on Teams)

11. Teaching Materials

Name	Type (Developed/Existing)	Link	Role in the lesso n
Green hydrogen explaine d	Existing video	https://www.youtube.com/watch?v=3IPR50-soNA	Phase 1

12. External Resources and References

Resource (name)	Link (external or to the folder on Teams)
IEA – Hydrogen (overview)	https://www.iea.org/topics/hydrogen
PhET simulations (energy basics)	https://phet.colorado.edu/en/simulations/filter?subjects=physics&gradeLevels=high-school