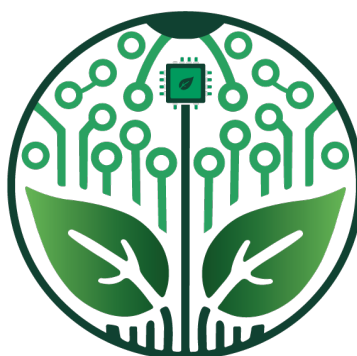




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LESSON PLAN

AI for Smart Energy Grids

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Disclaimer



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1. TITLE

AI for Smart Energy Grids

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- Explain why renewable energy sources need flexible grids and storage.
- O2- Interpret simple demand and generation charts and identify peak-load challenges.
- O3- Use a basic forecasting or optimization tool to propose a smart-grid balancing strategy.
- O4- Evaluate benefits and risks of smart meters and AI-driven energy management.



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 understanding of electricity (power, consumption) and basic spreadsheet/digital skills.

9. Lesson/Project Outline

Phase 1 – Introduction (Engage & Contextualize)

Students are introduced to the idea of a smart grid and why it matters for renewable energy.

Activities:

Quick brainstorm: Where does the electricity used at school/home come from? When do we use the most?

Teacher shows a short video about smart grids and real-time energy balancing.

Class discussion:

What changes when solar/wind power becomes a bigger part of the mix?

How could AI help predict demand and manage supply?

Outputs: shared list of challenges (peaks, variability) and possible smart solutions.

Resource (name)	Link (to the folder on Teams)
What is a Smart Grid? (video) https://www.youtube.com/watch?v=U3_6bG1q5G8	



Phase 2 – Exploration (Investigate & Compare)

Students explore real-time electricity data and compare different energy mixes.

Activities:

In pairs, students open an online electricity map or grid data dashboard provided by the teacher.

They observe one country/region and answer:

When is demand highest? Which sources dominate at different times?

Compare two regions (e.g., one with high wind, one with high hydro).

Discuss how forecasting (AI) could support decisions such as charging batteries, shifting demand, or importing power.

Outputs: short notes and a simple comparison table of patterns observed.

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

Phase 3 – Application (Hands-On Practice)

Students design a smart-grid action plan for a ‘high-renewables day’.

Activities:

In groups, students receive a scenario (high wind at night, high solar at noon, evening demand peak).

They choose at least two strategies (battery charging, demand response, EV charging schedule, flexible industry use).

Using a simple template or spreadsheet, groups outline how an AI forecast would trigger actions across the day.

Groups create a one-slide visual (poster/canva) summarizing their plan and expected benefits.

Outputs: group smart-grid plan, visual summary linking AI forecasting to grid stability.

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

Phase 4 – Reflection & Consolidation (Present & Connect)

Groups present their plans and connect them to sustainability goals.

Reflection questions:

Which strategy reduced waste (curtailment) the most?

What data is needed for AI to work well in energy systems?

Who should own and protect smart-meter data?

Outputs: group presentations and short individual reflection notes.

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



10. Assessment Criteria

Participation in data exploration and group discussion.
Quality and realism of the smart-grid balancing plan.
Clear explanation of how AI/forecasting supports decisions.
Reflection on privacy and responsible data use.

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

11. Teaching Materials

Name	Type (Developed/Existing)	Link	Role in the lesson
What is a Smart Grid?	Existing video	https://www.youtube.com/watch?v=U3_6bG1q5G8	Phase 1

12. External Resources and References

Resource (name)	Link (external or to the folder on Teams)
Electricity Maps (live data)	https://app.electricitymaps.com/
ENTSO-E Transparency Platform	https://transparency.entsoe.eu/