



AI Guide

ONLINE COURSE CONTENT

MODULE 4: DESIGNING CASE-BASED GREEN DECISION TASKS

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Artificial Intelligence for Green Understanding, Insights & Decision Empowerment



SQUAREDEV



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A. General Information

Module No	Module 4
Subtopic	4.3. Designing case-based green decision tasks
AI Literacy Component	AI-supported task scaffolding; scenario prompts; decision criteria definition and evaluation/performance assessment
Decision Making Skills	Comparative analysis; decision justification; collaborative decision-making
Learning Objectives for STEM HE Teachers	Design case-based activities that require learners to compare alternatives and justify green decisions.
Learning Objectives for STEM Students	Use evidence and critical thinking to make justified green decisions.
Suggested AI Tools	ChatGPT, Claude, Microsoft Copilot, Perplexity AI, Llama, Poe
Estimated Duration	60 minutes

B. Content for STEM HE Teachers

Designing case-based green decision tasks

Highlights

- Case-based learning activities can support AI-assisted green decision-making and encourage active engagement of students with real-life challenges.
- AI can support prediction, optimisation, monitoring and decision analysis, but human responsibility and accountability remain important, particularly in high-stakes decisions.
- Students should be encouraged to compare alternative solutions, evaluate uncertainties, and justify decisions using multiple criteria.

Introduction

Case-based learning has become an established instructional approach for developing higher-order thinking skills because it places learners in authentic situations where they must analyse evidence, evaluate alternatives, and justify decisions rather than simply recall factual knowledge. Unlike traditional teacher-centred instruction, case-based learning encourages active engagement with realistic problems, promoting critical thinking, problem-solving, and contextual reasoning. In sustainability education, this method is especially valuable because environmental challenges are often complex, multidisciplinary, and characterised by uncertainty, requiring learners to balance environmental, economic, and social aspects when making decisions (Herreid, 2011; UNESCO, 2020).

The application of artificial intelligence into case-based learning further enhances these learning experiences by enabling students to explore how AI-supported systems help environmental decision-making. AI technologies can process large and diverse datasets, observe patterns, generate predictions, and recommend potential solutions in areas such as climate adaptation, energy management, precision agriculture, biodiversity conservation, and resource efficiency. However, AI outputs should be interpreted critically rather than accepted uncritically, as their reliability depends on data quality, model assumptions, and contextual factors. Consequently, educational activities should position AI as a decision-support tool that complements, rather than replaces, human judgement and ethical reasoning, while maintaining appropriate human oversight, accountability and awareness of AI-related uncertainties (UNESCO, 2021; OECD, 2024a; OECD, 2024b).

Designing effective green decision cases requires authentic scenarios, reliable evidence, and carefully structured opportunities for students to compare alternative solutions. Well-designed cases encourage learners to identify relevant information, recognise uncertainties, evaluate trade-offs, and justify their recommendations using transparent reasoning. This process reflects the principles of Education for Sustainable Development which aims to develop competencies such as systems thinking, critical reflection, collaborative problem-solving, and responsible decision-making, enabling learners to address complex sustainability challenges in diverse contexts (UNESCO, 2017; Wiek, Withycombe & Redman, 2011).

This subtopic introduces practical guidance for designing AI-supported, case-based green decision tasks that foster analytical thinking and contextual judgement. By engaging with authentic sustainability cases, students learn to examine environmental problems from multiple perspectives, critically evaluate AI-generated recommendations, and assess whether proposed solutions can be transferred or adapted to different situations. Such learning experiences help prepare students to make informed, evidence-based decisions in an increasingly data-rich and AI-enabled society.

Green Decision Context

Many valuable learning activities can be developed from existing case studies, but also publicly available reports, datasets, or local sustainability initiatives. A well-designed case does not need to be complex; it should provide enough information for students to analyse a realistic decision and justify their conclusions. The following structure is recommended to create new classroom cases.

1. Define the environmental challenge and scenario

Begin with a clearly defined sustainability problem which requires a decision. Examples include:

- reducing electricity consumption in a university building;
- improving recycling rates on campus;
- reducing water use in agriculture;
- managing urban traffic emissions;
- monitoring forest health;
- predicting flood risks;
- selecting renewable energy investments.

Use the UN's sustainability data platform for sustainability-related indicators in your activity: [United Nations \(n.d.\)](#)



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2. Identify the decision to be made

Students should understand what decision must be taken, and several alternatives should be listed. For example:

A city council wants to reduce CO₂ emissions from municipal buildings. Should it invest in AI-based smart energy management, install additional solar panels, or improve building insulation?

3. Gather relevant evidence

High-quality case studies are built on reliable evidence. Teachers should encourage students to distinguish between verified information and unsupported claims. Provide data or ask students to look for available information, such as:

- energy and water consumption data;
- greenhouse gas emissions;
- climate forecasts;
- satellite imagery;
- environmental monitoring data;
- costs;
- maintenance requirements;
- local regulations;
- community needs.

Check the [Copernicus Browser](#) to access free satellite observations, and recommend it to your students: [European Commission, n.d.](#)

Students should also identify any missing information that could influence the final decision.

4. Consider the role of AI

Students should examine how AI contributes to the decision process. Questions can include:

- Which AI tools can be used for this decision?
- What prediction or recommendation does AI produce?
- Does AI optimise, classify, detect, forecast, or monitor?
- How accurate are the predictions?
- What are the limitations of the available data?

This encourages students to understand AI as a decision-support system rather than an autonomous decision-maker.

Check the [Google Earth Engine Timelapse](#) if you can include the available cases in your activity: [Google, n.d.](#)

5. Compare decision alternatives

Students should compare multiple solutions instead of evaluating only one. Possible comparison criteria include environmental impact, economic feasibility, social impact, technical feasibility, data availability, risks and uncertainty. This comparison develops contextual judgement by showing that the "best" solution depends on the specific circumstances.

Improve your own and then your students' critical thinking with the [MIND Digital Learning Platform](#). [MIND, n.d.](#)

Example for a Hypothetical Teaching Case: AI for Smart Irrigation in Agriculture

Scenario A farming cooperative experiences increasing water shortages during summer. Local authorities encourage more sustainable irrigation practices while maintaining crop yields. The cooperative is considering whether to implement an AI-supported irrigation system.	Students receive the following information: - historical rainfall records; - soil moisture sensor data; - weather forecasts; - crop water requirements; - irrigation costs; - regional water restrictions; - satellite vegetation images; - AI predictions of irrigation timing.
Students analyse - What environmental challenge is being addressed? - Which datasets are available? - Which additional information would improve the analysis? - How does AI support the decision? - What uncertainties exist? - Should the cooperative adopt the AI system? - Under what conditions might another solution be preferable?	Reflection After completing the case, students compare their recommendations and discuss why different groups reached different conclusions despite using the same evidence. This reinforces the importance of contextual judgement and demonstrates that AI supports - but does not replace - human decision-making.

AI tools

AI tools can help teachers create classroom activities and students implement the activities, for example:

- ChatGPT (OpenAI): Develop activity structures and descriptions
- Claude: Analyse case studies and identify key discussion points
- Microsoft Copilot: Generate sample recommendations
- Perplexity AI: Develop real-world case studies and fictional scenarios.
- Poe: Support comparing different alternatives.
- Canva Magic Design: Create infographics, posters, and visual case summaries
- Mentimeter AI: Supports interactive polls, quizzes, and classroom discussions
- AhaSlides: Interactive presentation to allow speakers to engage their audience in real-time through live polls, quizzes, Q&A sessions, and word clouds.

Check the Best Practices Report for more information about the tools.

Lesson Plan

A recommended lesson plan for integrating a case study.

60-Minute Lesson Plan: Case-Study-Based Decision Making with AI-Assisted Analysis	
Course level	Higher education (adaptable to any discipline using a real-world/industrial case)
Format	In-person, small-group work (teams of 3–5)



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Preparation	Case study document distributed in advance (students should have read it before class)
Learning Objectives	By the end of this session, students will be able to: • Evaluate the quality and relevance of evidence within a real-world case. • Use an AI tool as a decision-support aid while critically verifying its output. • Compare alternative solutions using a weighted decision matrix. • Justify a recommendation under uncertainty and defend it against peer challenge.
Lesson Sequence	
1. Introduction and instruction (5 minutes)	• The teacher frames the session: introduce the case study and its context, and state the decision the case requires (e.g., "Which supplier/process/design should the company adopt?"). • Restate ground rules: AI is a support tool, not a decision-maker; every AI output must be verified against the case evidence. • Assign or confirm teams and roles (facilitator, evidence lead, AI-verification lead, recorder). • Preview the deliverable: a one-page recommendation with justification, due at minute 50.
2. Evidence Review (10 minutes)	• In teams, students revisit the case materials (data tables, stakeholder statements, constraints, financials, etc.). • Each team completes a short evidence log: what facts are solid, what is assumption, what is missing. • Instructor circulates, prompting teams to flag gaps or conflicting data points. • <i>Output:</i> a shared evidence log per team (can be a shared doc or whiteboard).
3. Controlled AI-Assisted Analysis (10 minutes)	• Teams use a pre-approved AI tool with a standardized prompt template (provided by the teacher) to generate: possible options, risks, or a first-pass comparison based on the evidence log. • Constraint: AI is used only to <i>organise or supplement</i> team thinking — it may not be pasted directly into the final recommendation. • AI-verification lead cross-checks each AI claim against the case evidence and notes any unsupported or hallucinated claims.



	• <i>Output</i>: annotated AI output with verification notes (confirmed / unsupported / needs more data).
4. Weighted Decision Matrix and Team Deliberation (15 minutes)	• Teams build a weighted decision matrix comparing 2–4 alternatives against criteria they justify and weight themselves (e.g., cost, feasibility, risk, sustainability, stakeholder impact). • Each criterion's weight must be briefly justified in one sentence. • Team scores each alternative, discusses disagreements, and documents how uncertainty (missing/ambiguous data) affected scoring. • <i>Output</i>: completed decision matrix with weighting rationale and an uncertainty note per alternative.
5. Recommendation and Peer Challenge (15 minutes)	• Each team presents its recommendation in 2–3 minutes (rotate presenters). • A designated "challenge team" (rotating) asks at least one critical question per presentation: e.g., "What if this input were wrong?", "Why this weighting?", "What did the AI get wrong and how did you catch it?" • Presenting team responds and, if warranted, notes any refinement to their recommendation. • <i>Output</i>: a defended, and where needed revised, one-page recommendation.
6. Exit Ticket (5 minutes)	• Students individually provide short feedback in written format: • One thing the AI tool got wrong or oversimplified, and how you caught it. • One criterion in your matrix you'd weight differently next time, and why. • What would change your recommendation if new evidence appeared?
Self-assessment	• Besides the exit ticket, students can complete a self-assessment test before and after the class. It can be done on paper or as an online survey. • Each statement will be self-rated (1–5 confidence/competence scale) and there is one open-ended reflection question but only for the post-lesson test.



	- Recommended structure: - I can distinguish solid evidence from assumptions or gaps in a case. - I can compare multiple alternatives against clearly defined criteria. - I can factor uncertainty (missing/ambiguous data) into a decision. - I can check an AI tool's output against real evidence and catch errors. - I can justify a recommendation so it holds up under challenge - I contribute effectively to team decision-making. Open reflection: Which item above changed the most for you today, and why?
Instructor notes	Timing: the AI-assisted analysis and decision-matrix stages are the most likely to overrun — have a 1-minute warning cue ready for each. AI tool choice: pre-select and test the AI tool before class; provide the standardized prompt template so teams aren't spending time on prompt engineering. Peer challenge quality: monitor challenge team's questions, and intervene if they are too soft.

Sample lesson with guide for teachers:

The presented case study is connected to Xylem, Inc., a global water-technology company whose AI platform (Xylem Vue) is publicly documented as speeding up leak-detection analysis and supporting infrastructure decisions. The company has publicly discussed (including at a university fireside chat with CEO Matthew Pine) how AI cut leak-data analysis time from weeks to days, and it has been used as a real case-competition subject at a business school (Kogod School of Business, American University, 2025). The data used, however, are for classroom use, not actual operational data. Segment 3 also includes deliberately planted AI errors (a factual slip, a stereotyped generalisation, and an unstated assumption presented as fact), so the AI-verification exercise has something concrete to catch rather than students nodding along with AI output that sounds fine. The model decision matrix in Segment 4 is deliberately labelled "defensible, not correct", so students don't treat it as an answer key to reverse-engineer.



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1. Introduction and instruction

- Context: Xylem, Inc., a global water technology company operating in 150+ countries, whose AI platform Xylem Vue analyses water-system data to detect leaks, predict infrastructure failures, and support resource-management decisions. Xylem's CEO has publicly described how AI reduced the time to analyse regional water-system leak data from weeks to days, freeing engineers to focus on higher-value judgment calls rather than manual data review.
- The fictional scenario: A mid-sized regional water utility uses Xylem Vue to monitor its distribution network. This quarter, the AI platform has flagged five zones with elevated risk of pipe failure or significant water loss. The utility has capital and crew capacity to fully address only two zones this quarter. Utility leadership must decide which zones to prioritise.

Zone	AI-predicted failure risk	Estimated water loss if unaddressed (liters/day)	Repair cost estimate	Population served	Data confidence (AI-reported)	Notes
A – Downtown commercial	High (82%)	40,000	\$180,000	12,000	High (dense sensor coverage)	Recent pipe age data incomplete for 2 segments
B – Riverside residential	Medium (61%)	65,000	\$220,000	8,500	Medium (sparse sensors)	Community has raised prior complaints about discoloured water
C – Industrial Park	High (77%)	25,000	\$140,000	N/A (non-residential)	High	Major industrial client; contract penalties if disrupted
D – Rural east district	Medium (58%)	90,000	\$310,000	4,200	Low (minimal sensor coverage, model extrapolated)	Longest-neglected infrastructure; lower-income area
E – New suburb	Low (34%)	15,000	\$95,000	9,800	High	New pipes; AI flagged due to an unusual pressure anomaly, cause unconfirmed

- Further details:
 - Budget ceiling: \$400,000 total for this quarter
 - Crew capacity: max 2 zones can be fully addressed this quarter
 - Utility's stated mission includes both efficiency (loss reduction) and equity (historically underserved areas)
 - The AI model's confidence rating is itself an output to be scrutinized, not a fact
- Decision to be made:** Which two zones should the utility prioritize this quarter, and why?

2. Evidence Review: Get teams to interrogate the data table critically — especially the "Data confidence" column, which will be the next tasks. The evidence log should be a table with 3 categories (solid data, assumptions, gaps) and examples.

Facilitation prompts:

- "What does 'AI-reported confidence' actually mean here — model certainty, or sensor coverage?" (Answer: in this case, it's largely a proxy for sensor density — a data-quality artifact, not a statement about the physical risk itself. This is worth surfacing.)
- "Zone D has the highest water loss estimate but the lowest confidence — how does that change how you read it?"
- "Notice Zone E: low predicted risk, but flagged anyway for an *unconfirmed* anomaly. Why might the AI have flagged it despite low risk?"

3. Controlled AI-Assisted Analysis: Teams use an AI tool to help organise options — but the teacher must ensure the AI-verification step is taken seriously, not treated as a formality.

- Prompt template:

You are assisting a student team analyzing a water-utility infrastructure prioritization decision. Given the following case data [paste the 5-zone table], generate:

1. A brief risk-ranking of the five zones
2. Two possible prioritisation strategies (e.g., "maximise loss reduction" vs. "prioritise equity/underserved areas")
3. One risk or blind spot the team should double-check in each strategy

Do not invent data not provided in the table. Flag explicitly if you are making an assumption beyond the given data.

- Sample AI output for a verification exercise for classroom activity (deliberately includes 2–3 planted errors):

"Based on the data, Zones A and D present the highest priority due to their high failure risk and large populations served. Zone D, despite lower confidence, should be prioritized because rural areas are always the most vulnerable to infrastructure neglect. Zone C's industrial contract penalties make it a lower priority since industrial clients have more resources to handle disruption than residential ones. Zone E can be safely deprioritized since its risk is low and its confidence is high."

Instructor's answer key - errors planted for the verification exercise:

1. **Factual/data error:** The AI states Zone D has a "large population served" — the table actually shows Zone D has the *second-lowest* population (4,200). This is a checkable, catchable error.
2. **Unsupported generalization:** "rural areas are always the most vulnerable" is a sweeping claim not supported by the case data — the AI is pattern-matching to a generic stereotype rather than case evidence. Good verification leads should flag this explicitly.
3. **Questionable inference presented as fact:** The claim that industrial clients "have more resources to handle disruption" is a plausible assumption, not a given fact — the case data

doesn't state this. Verification leads should downgrade this to "assumption, needs checking," not accept it outright.

4. **A defensible point the AI got right:** Deprioritising Zone E due to low risk is reasonable — but note the AI doesn't flag the *unconfirmed anomaly*, which was explicitly called out in the case as worth investigating. This is a good discussion point: the AI omitted a nuance rather than stating something false.

4. Weighted Decision Matrix and Team Deliberation: Ensure teams justify their weights, not just fill in numbers. Suggested criteria:

- Water loss reduction (magnitude of the resource saved)
- Cost-effectiveness (loss reduced per dollar spent)
- Data confidence / uncertainty (how much to trust the underlying prediction)
- Equity impact (historically underserved populations, e.g., Zone D)
- Contractual/reputational risk (Zone C's industrial penalties; Zone B's prior complaints)

5. Recommendation and Peer Challenge: Coordinate the presentations and keep challenges substantive. Sample strong peer-challenge questions to model if a challenge team's questions are too soft:

- "Your matrix picked Zone D, but its data confidence was the lowest in the table. What would you do differently if that confidence were even lower — say, 20% instead of the 58% shown?"
- "If the AI's 'high confidence' rating for Zone A and C is really just a proxy for sensor density, not actual risk certainty, does your ranking still hold?"
- "You excluded Zone B despite prior community complaints about water quality — how did you weigh reputational/equity concerns there versus Zone D?"

6. Exit Ticket: Use the self-assessment/exit-ticket format established and adapt it to this specific case, e.g.:

- Which AI claim did you personally catch as wrong or unsupported, and how?
- Which criterion weighting would you personally change, and why?
- What new piece of data (e.g., better sensor coverage in Zone D) would most change your recommendation?

References:

- Kogod School of Business, American University (n.d.): *Gamechangers in Sustainability speaker series: Matthew Pine*. American University. <https://kogod.american.edu/gamechangers-in-sustainability-matthew-pine>
- Kogod School of Business, American University (2024): *Gamechangers in Sustainability speaker series with Xylem CEO Matthew Pine*. American University. <https://kogod.american.edu/news/gamechangers-in-sustainability-speaker-series-with-xylem-ceo-matthew-pine>
- Kogod School of Business, American University (2025): *How can AI help solve sustainability challenges?* American University. <https://kogod.american.edu/news/using-ai-to-solve-sustainability-challenges-a-case-study-of-xylem-inc>



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- Xylem Inc. (n.d.): *Xylem Vue: A single, integrated software and analytics platform*. Xylem. <https://www.xylem.com/en-us/brand/xylem-vue/platform/>

Recommended Readings

- Herreid, C. F. (2011): Case Study Teaching. *New Directions for Teaching and Learning*, 2011, 31-40. <https://doi.org/10.1002/tl.466>
- OECD (2024a): *Governing with Artificial Intelligence: Are governments ready?* OECD Artificial Intelligence Papers, No. 20. OECD Publishing, Paris. <https://doi.org/10.1787/26324bc2-en> Available: https://www.oecd.org/en/publications/governing-with-artificial-intelligence_795de142-en/full-report/ai-in-justice-administration-and-access-to-justice_f0cbe651.html
- OECD (2024b): *Assessing potential future artificial intelligence risks, benefits and policy imperatives*. OECD Artificial Intelligence Papers, No. 27. OECD Publishing, Paris. <https://doi.org/10.1787/3f4e3dfb-en> Available: https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/11/assessing-potential-future-artificial-intelligence-risks-benefits-and-policy-imperatives_8a491447/3f4e3dfb-en.pdf
- UNESCO (2017): *Education for Sustainable Development Goals: Learning Objectives*. Paris, UNESCO. <https://doi.org/10.54675/CGBA9153> Available: <https://unesdoc.unesco.org/ark:/48223/pf0000247444>
- UNESCO (2020): *Education for Sustainable Development: A Roadmap*. Paris, UNESCO. <https://doi.org/10.54675/YFRE1448> Available: <https://unesdoc.unesco.org/ark:/48223/pf0000374802>
- Wiek, A., Withycombe, L., & Redman, C. L. (2011): Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science*, 6(2), 203–218. <https://doi.org/10.1007/s11625-011-0132-6>

Videos/Interactive Resources

- European Commission (n.d.): Copernicus Data Space Ecosystem Browser. Available: <https://browser.dataspace.copernicus.eu/>
- Google (n.d.): Google Earth Engine Timelapse. Available: <https://earthengine.google.com/timelapse/>
- MIND (n.d.): MIND Digital Learning Platform. Available: <https://sites.google.com/view/mindonlinecourse41/digital-learning>
- United Nations (n.d.): SDG Global Database. Available: <https://unstats.un.org/sdgs/dataportal>



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