Embedding Sustainability Skills in Management Education: Pedagogical Innovations and Student Perspectives from a Regional University

Shahid Md Shahiduzzaman

Lecturer, UNE Business School

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Research Questions

- How is sustainability competency conceptualised within the literature on higher education?
- What pedagogical approaches are used to support sustainability education in higher education institutions?
- How is sustainability education implemented at a regional Australian university?

Why Embedding Sustainability is Challenging

- Most students lack prior sustainability literacy (unlike maths or science)
- Traditional business focus on profitability only
- Students struggle to relate sustainability to their own context
- No universal concept of sustainability
- Most programs integrate sustainability at surface level only

Why Universities Must Act

- Educating future leaders to address societal problems
  - Climate change
  - Biodiversity loss
  - Human rights violations
  - Technology adoption challenges
  - COVID-19: systemic collapse example
  - Skill shortage: the demand for qualified professional with green skills exceeded supply by up to two times, according to World Economic Forum (2024)


WORLD ECONOMIC FORUM

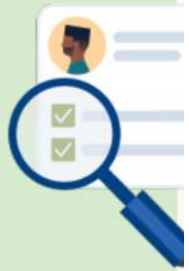
JOBS AND THE FUTURE OF WORK

Green job vacancies are on the rise – but workers with green skills are in short supply

Feb 29, 2024

Growth in demand for green skills is outpacing the increase in supply

Between 2022 and 2023

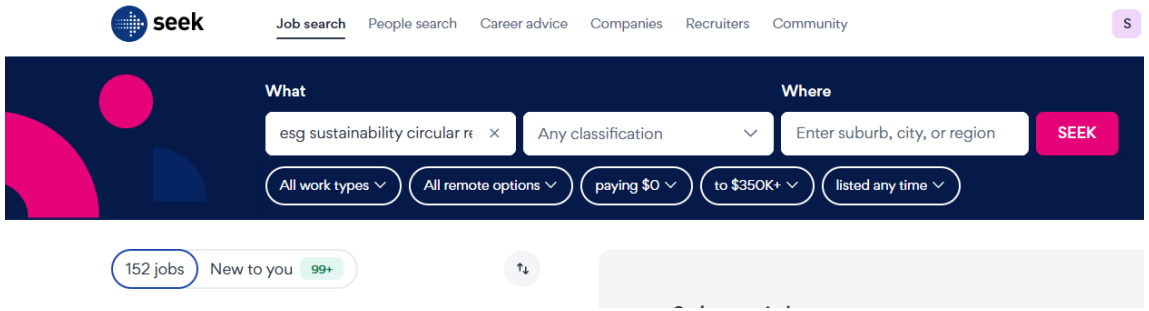


+12.3%

Share of green talent in the workforce

+22.4%

Share of job postings requiring at least one green skill



Sustainability Reporting Officer

Yancoal

YANCOAL

Sydney NSW (Hybrid)

- Permanent full-time opportunity with competitive remuneration package
- Support Yancoal's Sustainability team whilst developing your own skills
- Based in Sydney CBD with hybrid working arrangement

Permanent, full-time opportunity. Based in Sydney CBD with hybrid working arrangement.

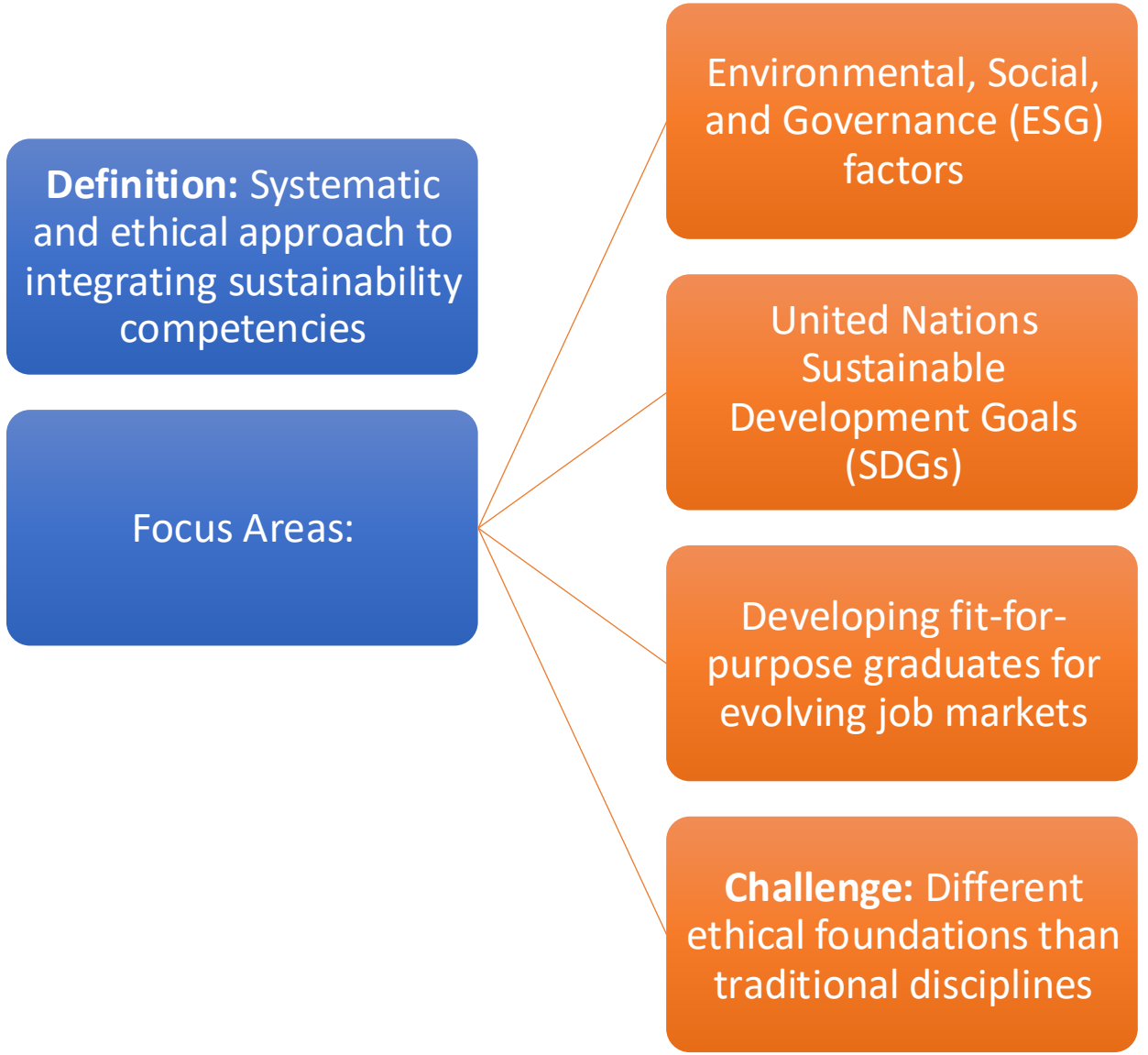
Featured

Future of Job

According to the World Economic Forum in the Future of Jobs Report (WEF 2025), 85% of employers intend to focus on upskilling their current workforce, with 70% planning to recruit new staffs.

It is imperative that the education and training system adapt accordingly, refining pedagogical approaches capable of effectively bridging this skills gaps.

What is Responsible Management Education (RME)?



Research Design Overview

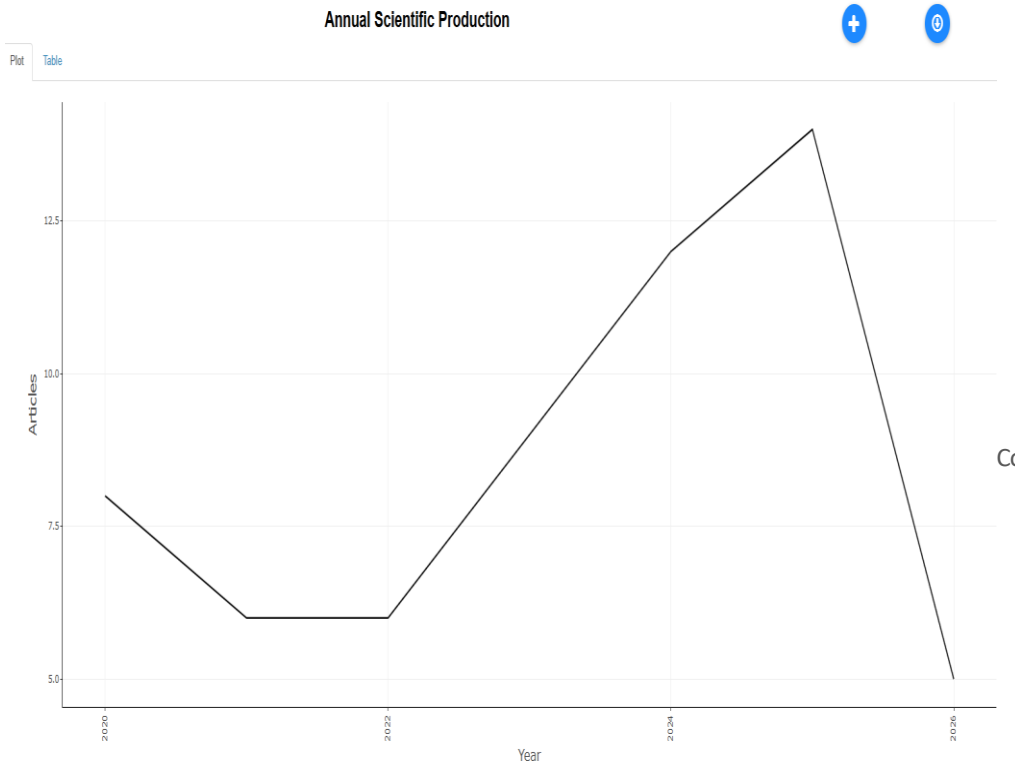
- Two-Stage Research Methodology
  - **Part 1:** Systematic Literature Review
    - Synthesise scholarship on sustainability competencies (Part 1A)
    - Identify pedagogical innovations (Part 1B)
  - **Part 2:** Case Analysis
    - Units: MM203 & MM503 (Management Practices in Responsible Organisations)
    - Context: UNE Business School (regional Australian university)
    - Data: Student engagement and feedback

Part 1A: Systematic Review of Sustainability Skills & Competencies

Search Strategy:
Database: Scopus
Search terms: (“sustainability” OR “ESG”) AND ("Competencies" OR "skills")
Disciplines: Business, Management, Accounting
Time period: 2020–2026
Results: 434 documents identified → 60 selected after manual audit
Exclusions: Sectoral studies, indirect studies, country-specific barriers

Summary Statistics

Timespan 2020:2026	Sources 44	Documents 60	Annual Growth Rate -7.53 %
Authors 199	Authors of single-authored docs 3	International Co-Authorship 43.33 %	Co-Authors per Doc 3.32



Key Sustainability Skills

- Four Major Skill Categories
  - Foundational Cognitive & Systems Thinking Skills (19)
  - Personal, Values & Behavioural Competencies (11)
  - Interpersonal & Collaboration Skills (23)
  - Practical & Technical Application Skills (31)

Category 1 – Cognitive & Systems Thinking

Key Skills:

- Systems Thinking (7 references): Integration micro, meso and macro level, a key skill to crate sustainability leadership. It is the key is the foundational cognitive ability to understand complex interconnections across economic, social, environmental, and technological domains.
- Critical Thinking (6 references): Critical thinking in sustainability context means questioning underlying assumptions, examining power structures, and evaluating claims rigorously rather than accepting them at face value.
- Problem-Solving / Cognitive Skills (6 references): Problem-solving and cognitive skills involve the ability to analyze complex challenges, break them into manageable components, generate creative solutions, and evaluate options against criteria. Mohan et al. (2025) identifies analytical and cognitive abilities as positively impacting graduate employability within Industry 5.0 context

- *Why It Matters: Foundation for understanding complex sustainability challenges*

Category 2 – Personal & Behavioural Competencies

- Key Skills:
  - Mindset & Values (7 references) : Mindset and values represent the foundational personal qualities that drive individuals toward sustainability-oriented decision-making and responsible action
  - Proactive Motivation & Agency (3 references): a study by Aljaaidi et al. 2025 assessed green project management competencies of 257 business students at Prince Sattam bin Abdulaziz University using structured questionnaire. They found that achievement motivation explained 54.8% of the variance in green project management competencies. Proactive motivation and agency can be assessed and developed through education
  - Continuous Learning / Lifelong Approach (Portuguez Castro 2025) : Universities should cultivate mindset of continuous learning, not just knowledge transfer. Teach students *how to learn* and where to find reliable sources. Normalize continued education as career expectation
- **Why It Matters:** Personal foundation for sustainable action and leadership

Category 3 – Interpersonal & Collaboration Skills

- Key Skills:
  - Collaboration & Teamwork (10 references) ⭐ *Most cited* : Collaboration and teamwork enable professionals to tackle complex sustainability challenges that no individual can solve alone. Research across sectors shows teamwork directly supports SDG 4 (Quality Education) and SDG 8 (Decent Work).
  - Communication & Dialogue (7 references) : Cam (2026) emphasizes Freirean dialogical approach where educator and learners co-create knowledge through critical conversation. Communication competencies include active listening, asking powerful questions, explaining complex concepts clearly, and adapting messages for different audiences. Georgallis & Bruijn (2022) show how case-based debates develop critical communication skills by forcing students to articulate and defend positions on complex sustainability issues.
  - Social & Cultural Awareness / Inclusion (7 references) : Social and cultural awareness means recognizing how sustainability challenges and solutions affect different communities differently, and engaging respectfully with diverse worldviews and knowledge systems.
- Why it matters: Translating knowledge into real-world action

Category 4: Practical & Technical Application Skills

- Sustainability Management & Strategy (7 references): Sustainability management and strategy competence involves translating sustainability principles into concrete organizational action—integrating ESG considerations into business models, supply chains, operations, and long-term planning.
- Green and Circular Economy (9 references): Green and circular economy skills enable professionals to design, implement, and optimize business models that minimize environmental impact while creating economic value
- Digital and Technological Skills (15 references): Digital and technological skills are the most frequently cited competencies across all many papers, reflecting dual urgency: digital transformation happening across all industries AND technology's critical role in enabling sustainability solutions. Oeij et al. (2024) frames Industry 5.0 as extending Industry 4.0's technology focus to emphasize human-centricity, sustainability, and resilience—technology must serve both business AND social/environmental goals.

Part 1B: Systematic Review of Pedagogical Approaches

- Search Strategy:
- Database: Scopus
- Search terms: ("sustainability" OR "ESG“) AND (“pedagogy” OR “teaching method”)
- Disciplines: Business, Management, Accounting
- Time period: 2020–2026
- Results: 49 peer-reviewed articles analysed

Five Major Pedagogical Categories

- Experiential and Action-Oriented Learning (6)
- Critical and Transformative Pedagogies (5)
- Curriculum and Systems-Level Approaches (5)
- Case-Based Methods (5)
- Technology-Enabled and Creative Methods (5)

Pedagogy 1 – Experiential & Action-Oriented Learning (6)

- Experiential and action-oriented learning moves beyond theoretical knowledge to practical application and real-world engagement. Students don't just *learn about* sustainability; they *engage with*
  - Project-Based / Problem-Based Learning (PBL): Trevisan, A.H. et al. (2026) identifies PBL as a key method of circular economy education.
  - Business Simulations: Adib (2024) – Study of business simulation incorporating sustainability-related decisions
  - Real-Time Community-Based Projects, e.g., Jestratijevic & Hillery (2023) – Action research project on clothing consumption
  - Traditional: Information → Understanding → (maybe) Application
  - Experiential: Action → Reflection → Understanding → Application → New Action

Pedagogy 2 – Critical & Transformative Pedagogies (5)

- Challenging Assumptions & Enabling Mindset Shifts
  - Reflexivity and Premise Reflection (examining deeply held beliefs): Premise = foundational belief or assumption (often implicit, unexamined). Premise reflection = questioning these foundations. Santos et al. 2024) : Teaching approach directly influences depth of reflection students achieve , so that they can challenge existing belief/framework
  - Degrowth Pedagogy (challenging existing (e.g. growth) paradigm): Challenges the growth-dependent paradigm that dominates business education (Liuzzo & Tsai 2025). Personal qualities, capacities, and ways of being that enable sustainable action, e.g., self awareness, ethical grounding.
  - Inner Development Goals (IDGs) Robles 2025, Powell & McGuigan 2024.
  - Dialogical Approach (co-creation of knowledge): mutually questioning, learning, making sense together

Pedagogy 3 – Curriculum & Systems-Level Approaches (5)

- Embedding Sustainability Across the Institution
  - Interdisciplinary / Transdisciplinary Curriculum Design: Curriculum and systems-level approaches represent a shift from asking "What teaching method is most effective?" to asking "How do we embed sustainability across the entire educational institution?" These approaches recognize that individual courses and pedagogical methods, while important, are insufficient if the broader curriculum, culture, operations, and governance of the institution don't reinforce sustainability.
  - Hacking the Curriculum (infusing macro-sustainability perspectives) : Watson et al. 2022, Peterson 2022 . Hacking the curriculum" means systematically infusing macro-sustainability and societal perspectives into existing courses without completely redesigning curriculum. It's about working within current structures to bring broader perspective.

Pedagogy 4 – Case-Based Methods (5)

- Case-based methods represent a foundational pedagogical approach in business education.
- *Using cases for critical engagement, debate, and reflexivity, not just problem-solving.*
  - Traditional Case Studies: Traditional case studies present a real (or realistic) business situation with a decision or problem. Students read the case, analyze the situation using provided frameworks, and develop recommendations or solutions.
  - Problem-Posing Case Studies (Santos et al. 2024). Case presents a problem and student develop a solution.
  - Reflexivity in Case Studies: students examine themselves in relation to the case—recognizing their own values, assumptions, and limitations. For example, **Sustainability leadership requires understanding one's own complicity, limitations, and capacity for change. Case study + reflexivity helps develop this awareness.**

Pedagogy 5 – Technology-Enabled Creative Methods (5)

- Duel competencies
- Digital Storytelling / Multiliteracies
- Arts-Based Activities (music, photography, fiction)
- Social Media as Pedagogical Tool (Twitter, discussion platforms)
- Collaborative Online International Learning (COIL) – global perspectives

Step 2: Case Study: Management Practices in Responsible Organisations (MM203/503)

MM203/503
Competencies and Pedagogical Alignment

Competencies	Pedagogy	Initiatives
Personal Values and Banhavior	Experiential and Action Oriented	Climate Literacy, Personal and Business Carbon Footprint
Foudnational Cognitive	Critical and Trabsformative	ESG data, Refinitive, Sustainalytics
Practical and Technical Applicatio	Case-Based Methods	Real World Industry Project (Assessment 1)
System Thinking	System-Level Approaced	SDGs, Net Zero, EndRoads Simulation, Degrowth
Interpersonal & Collaboration Skill	Dialogical Model	Interactive workshop, group discussions, weekly forum questions

System Thinking

Practical and Technical Application

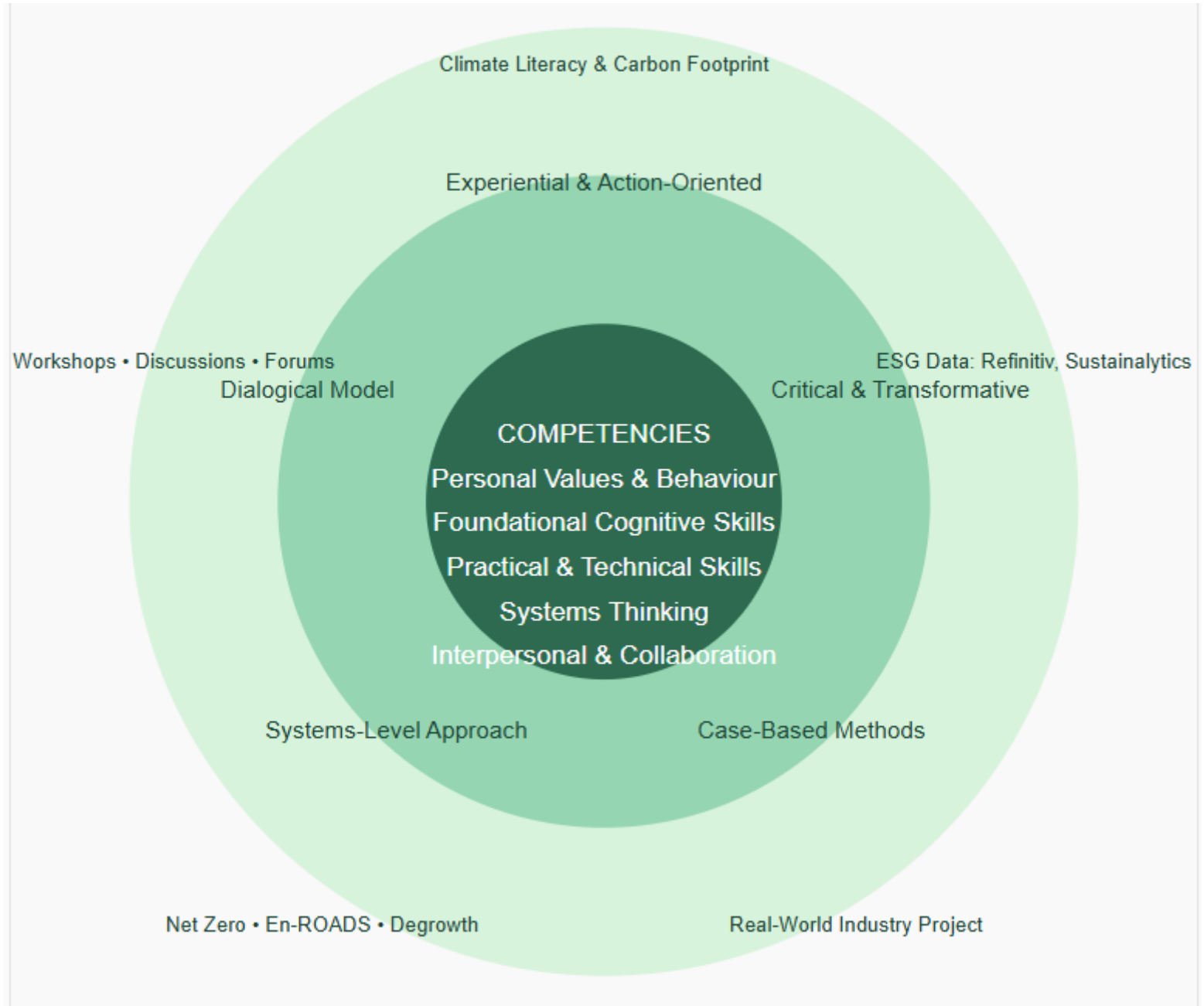
Personal Values and Behavior

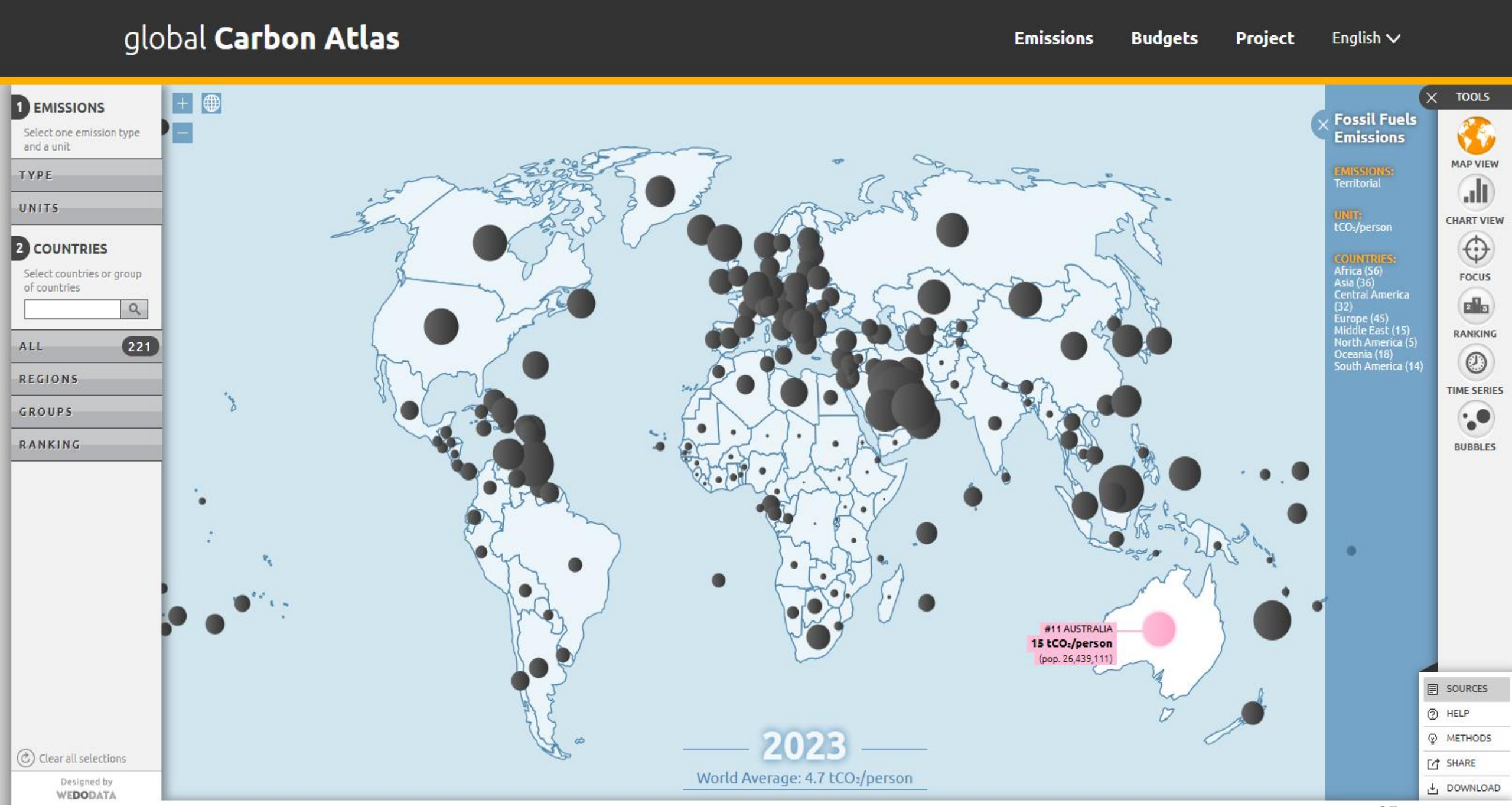
Foundational Cognitive

Interpersonal & Collaborative Skill

Learning Outcomes (MM203):

- demonstrate a well-developed knowledge of organisational theory with some depth in understanding responsible leadership processes, and apply this to business-related problems;
- use a range of cognitive and communication skills to identify, evaluate and synthesise relevant information from a range of sources on current frameworks used in the practice of responsible enterprise leadership in order to demonstrate judgement and analytical skills in solving sometimes complex business-related problems;
- work independently and/or collaboratively to plan and execute tasks to enhance professional knowledge and skills; and
- demonstrate the ability to recognise, reflect on, and respond appropriately to a range of ethical, cultural or social issues influencing the practice of business including the United Nations Sustainable Development Goals.


Climate Literacy & Carbon Footprint
Experiential & Action-Oriented
Workshops • Discussions • Forums
Dialogical Model
ESG Data: Refinitiv, Sustainalytics
Critical & Transformative
COMPETENCIES
Personal Values & Behaviour
Foundational Cognitive Skills
Practical & Technical Skills
Systems Thinking
Interpersonal & Collaboration
Systems-Level Approach
Case-Based Methods
Net Zero • En-ROADS • Degrowth
Real-World Industry Project



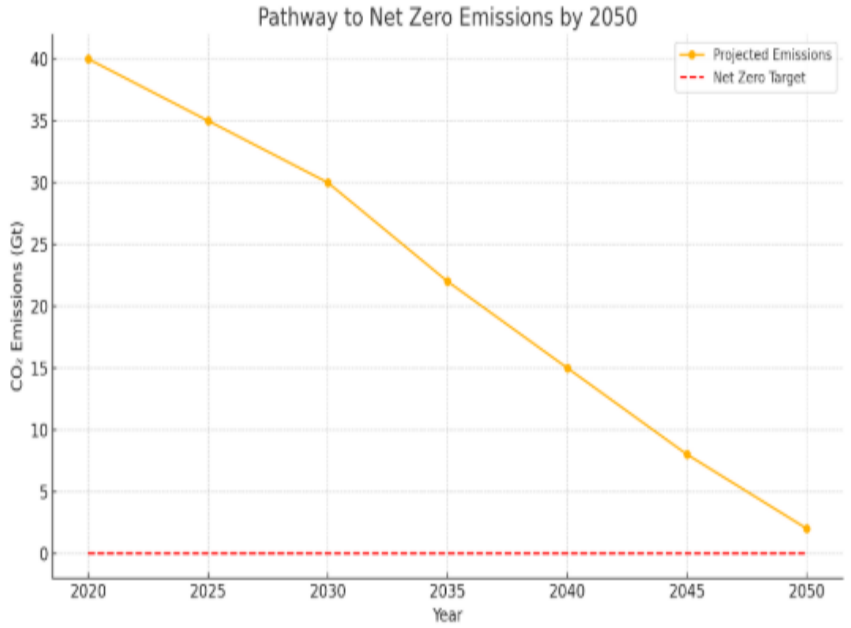
http://www.globalcarbonatlas.org/en/CO2-emissions

System Thinking: Net Zero

Balancing the amount of greenhouse gases emitted into the atmosphere with the amount removed — ideally reaching **zero net emissions** by a target year (often 2050) to limit global warming to 1.5°C above pre-industrial levels, as agreed in the Paris Agreement.

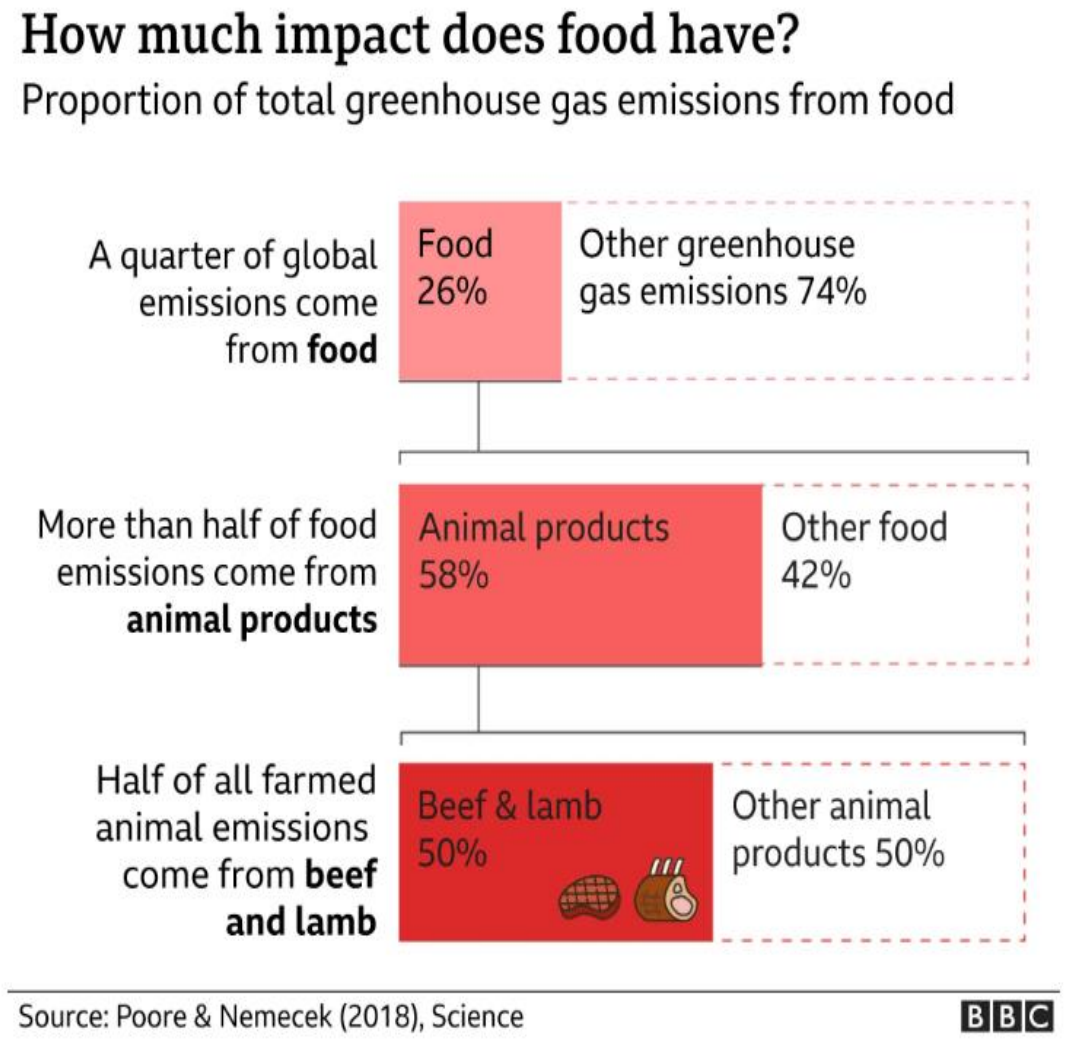
As of 2024, Earth's global temperature is already **about 1.2–1.3°C warmer** than the pre-industrial level.

In order to reach the target, the world needs **to halve CO_2 emissions by around 2030** and reach Net Zero CO_2 emissions by 2050.



CDP (2020) *Foundations for science-based net-zero target setting in the corporate sector:* https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf p5

Personal values and Behaviour Food Solutions



Avoiding meat and dairy products is one of the biggest ways to reduce your environmental impact, according to scientific studies.

Switching to a plant-based diet can help fight climate change, according to a major report by the UN's Intergovernmental Panel on Climate Change (IPCC), which says the West's high consumption of meat and dairy is fuelling global warming.

But what is the difference between beef and chicken?

Resources:

- **BBC Food Carbon Footprint Calculator**

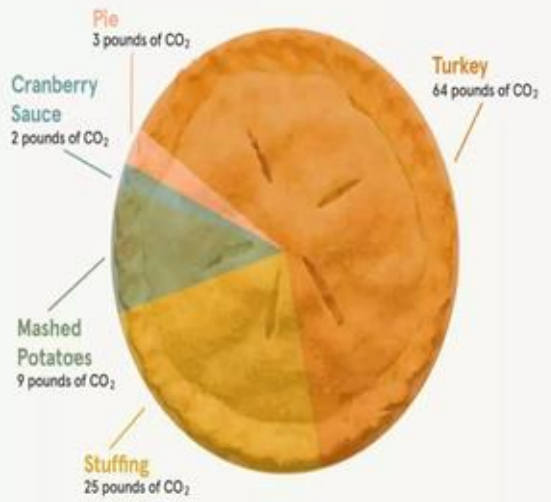
https://www.bbc.co.uk/news/science-environment-46459714

- **Vegan Society Carbon Calculator**

https://www.vegansociety.com/take-action/campaigns/plate-planet/carbon-calculator

Food Waste, & Carbon Impact

- Major holiday meals can have high carbon footprint
- E.g. Thanksgiving
- E.g. Ramadan & Eid al-Fitr (on average 2.6 kgCO2e per person per meal)
- (#FastOnWaste: Let's fast on waste this Ramadan - Islamic Relief UK; Choose only the best *low carbon* ingredients this Ramadan | Emirates Nature-WWF)
- Decrease Footprint and Reduce Waste
  - Cook less & efficiently
  - Buy food locally
  - Share more
  - Prepare leftover recipes
  - Compost



Personal Values and Behaviour: Travel

To travel 412 miles or 663 km

- Bike 30 kg CO_2e
- Coach 40 kg CO_2e
- Train 64 kg CO_2e
- Small electric car (driver only) 148 kg CO_2e
- Small efficient petrol car (driver only) 237 kg CO_2e
- Plane 368 kg CO_2e
- Large SUV (driver only) 1.02 tonnes CO_2e

Embodied carbon of **25 tonnes CO_2e** Range Rover Sport HSE (Calculation by Mike Berners-Lee (2020) *How bad are bananas?* Page 145)

High emitting countries: Canada uses **15.50 tonnes of CO_2 emissions** per capita (EU 6.42; US 15.24)

Low emitting countries: Bangladesh at **0.51 tonnes of CO_2 emissions** per capita (Brazil 2.04; Kenya 0.36)

Solutions:

Buy SMALL electric car!

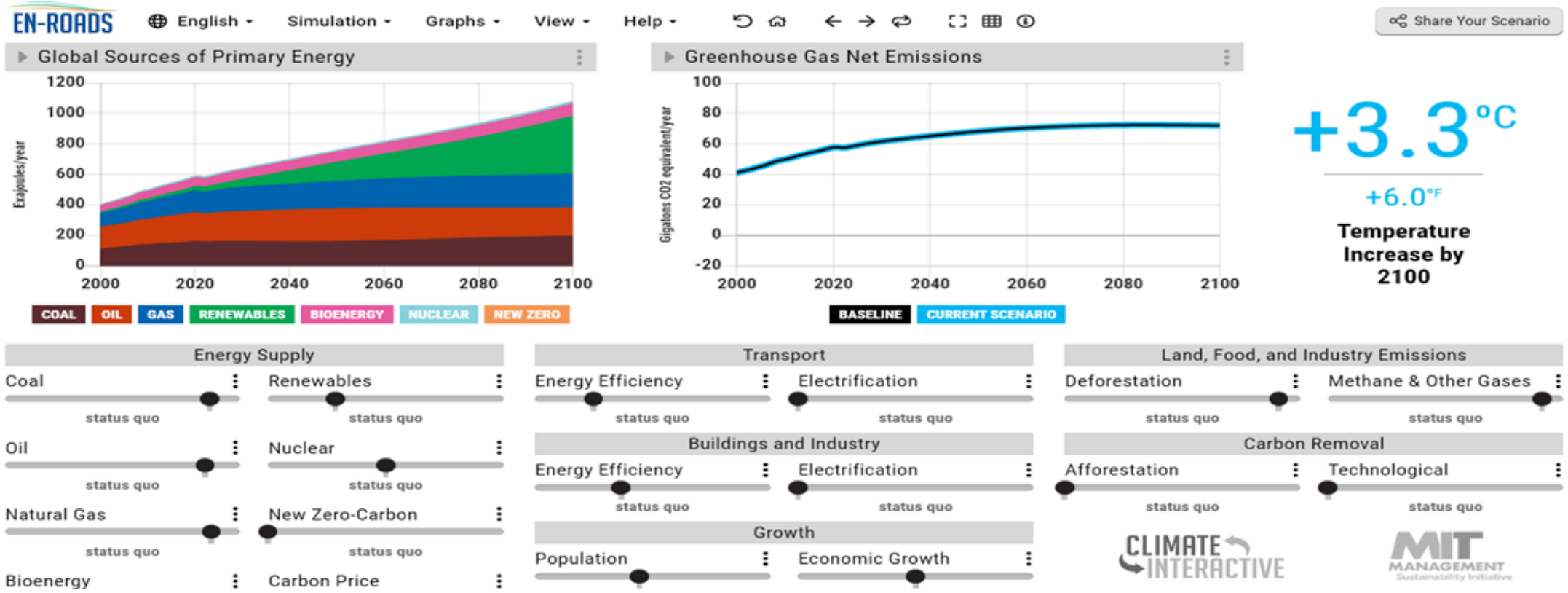
Replace car with bicycle or/and public transport

Car Sharing

Research needed: Improve carbon accounting for electric cars; Climate communication; Climate Literacy Training

Practical and Technical Applications: En-ROADS: a cutting-edge simulation model used to test climate solutions and generate climate scenarios for the future.

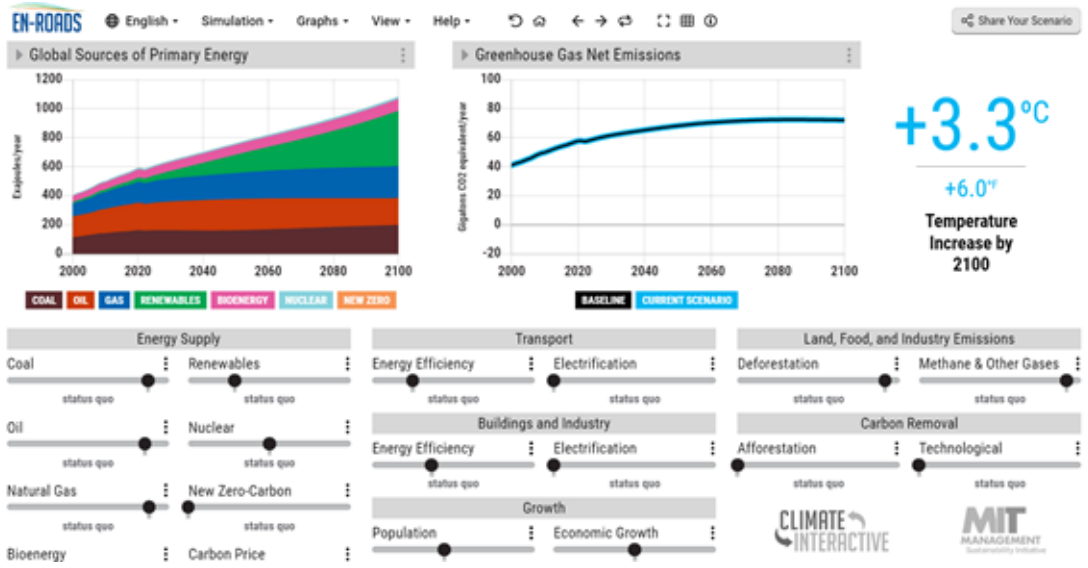
Our key challenge: How to get to 1.5°C?



PRME Principles for Responsible Management Education
Working Group on Climate Change and Environment

PRME Principles for Responsible Management Education
an initiative of the UN Global Compact

Solutions from En-ROADS



https://en-roads.climateinteractive.org/scenario.html?v=23.9.0

Big changes will be achieved by:

- Increasing energy efficiency and electrification in transport, buildings and industry.
- Reducing Methane e.g. by reducing food waste.
- Increasing natural carbon capture as much as possible, including stopping deforestation and increasing afforestation.
- Agreeing on a carbon price.
- CLIMATE LITERACY

PRME Principles for Responsible Management Education
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Overall Unit Satisfaction 2023-25

MM203 OVERALL UNIT SATISFACTION TRAJECTORY (2023-2025) 2023 TRI2 2023 TRI3 2024 TRI2 2025 TRI2 (Ext) (Ext) (Int/Ext) (Int/Ext) External

- 2023 TRI2: [redacted] 3.2/5.0 (n=17)
- 2023 TRI3: [redacted] 3.6/5.0 (n=16)
- 2024 TRI2: [redacted] 3.5/5.0 (n=15)
- 2025 TRI2: [redacted] 4.2/5.0 (n=35) ↑ SIGNIFICANT IMPROVEMENT Internal Only:

- Key Trend: External unit satisfaction improved 40% from 2023 TRI2 to 2025 TRI2 (from 3.2 → 4.2 out of 5.0)

MM203 PERFORMANCE DASHBOARD
2023 TRI2 → 2025 TRI2

Teaching Effectiveness 3.5 → 4.4 ↑ +26%
Assessment Clarity 3.5 → 4.4 ↑ +26%
Constructive Feedback 3.5 → 4.3 ↑ +23%
Intellectual Stimulation 3.2 → 4.0 ↑ +25%
Student Engagement 3.4 → 4.3 ↑ +26%
Knowledge Demonstration 3.5 → 4.4 ↑ +26%
Response Rate 12% → 30% ↑ +150%
Positive Sentiment 30% → 74% ↑ +147%
Negative Sentiment 35% → 6% ↓ -83%
Recommendation to Others 3.5 → 4.4 ↑ +26% (GOOD)
OVERALL TRAJECTORY: CONSISTENT IMPROVEMENT ACROSS ALL DIMENSIONS OVER 2-YEAR PERIOD

SENTIMENT ANALYSIS

2023 TRI2 (n=17)

Representative Quotes:

- "Worse unit I've ever done at UNE"
- "Genuinely hated this unit"
- "I now can't recommend the business school to anyone“
- Overall Tone: CRITICAL

2025 TRI2 (n=35)

Representative Quotes:

- "One of the best lecturers I've had" "Really enjoyed this unit"
- "Shahid showed genuine care and concern for student learning"
- "I would enjoy learning from this lecturer in future subjects"
- Overall Tone: HIGHLY POSITIVE

SENTIMENT SHIFT:
Negative: 35% → 6% (83% REDUCTION in negativity)
Positive: 30% → 74% (147% INCREASE in positive sentiment)

Personal values and reflection

This unit has certainly changed the way I am celebrating Christmas this year and the gifts which I have purchased for my family. This is my daughters first Christmas and I know how exciting it can be to purchase a lot of plastic toys or toys that will eventually end up in landfill.

Not only that, but I have also sent an order form for food to the family to complete so we have just enough food rather than too much food, most Christmas's we just discard before you can eat it all.

Hindsight I would like to review the way we use wrapping paper and how the gifts are prepared for the kids (not sure I can persuade the family to change this as the roots of ripping into presents runs deep!) but I can try!

I know marketing (our next topic) for Christmas does not help this time of year, and can place pressure and impulsive purchases, especially when in store.

The online stores incentivise if you spend a certain amount, you get free shipping or a gift, which I find a waste, aligning with muda, these companies are producing these small gifts, but I wonder how many do not get given out and are discarded to landfill.

I have tried to go off need more than want this year and with companies that choose better quality fabrics for clothing, in the hope they last longer (steering away from cheaper fast fashion), resulting in few items, due to the higher cost / purchase price.

- Lauren French (MM503 Student), December 18, 2025.

Personal Reflection

- Reflecting on my studies in Management Practices in Responsible Organisations at UNE, I have gained a deeper understanding of the dynamic interactions between ethics, responsibility and sustainability (ERS) in my role as a frontline health service manager. Developing a strong grasp of these ERS principles has reshaped my perspective on managing the opportunities and challenges that arise across the social, environmental and governance dimensions of leadership within my organisation

Conclusion

- Pedagogy refers to both how and why an educator influences learning.
- The how question refers to pedagogical approach, however, this why question is important.
- Previous research have attempted to review the existing pedagogy models in sustainability, however, there is significantly less research in competency, i.e., competency-based pedagogy model.
- In this paper, we try to address the gap by review both competency and sustainability pedagogy, with a case study from Australian regional university.