Version LR/2

EGT2
ENGINEERING TRIPOS PART IIA

Thursday 2 May 2024 2 to 3.40

Module 3E11

ENVIRONMENTAL SUSTAINABILITY AND BUSINESS

*Answer not more than **two** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your candidate number **not** your name on the cover sheet.*

STATIONERY REQUIREMENTS
Single-sided script paper

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM
None

10 minutes reading time is allowed for this paper at the start of the exam.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.

You may not remove any stationery from the Examination Room.

1 In environmental policy and business, the Planetary Boundaries (PB) concept has become a widely accepted way of thinking about how businesses are embedded in ecological systems and what this means for their operation. PB has also become a standard approach for goal setting in environmental management.

(a) Define and describe the concept of Planetary Boundaries. Sketch how the concept has been further developed over time. [30%]

(b) Explain how the concept (PB) can be used by businesses to guide their environmental management strategy. [30%]

(c) Building on (b): Sketch how businesses in the automotive industry can use PB in their Environmental, Social, and Governance (ESG) strategy. [40%]

Fit of question to lecture: We covered PB as a core concept in Sessions 1, 2 (see required reading Steffen et al. and Raworth et al.). We also used the concept in the Case Study of environmental management in the automotive industry (Sessions 4, 5). As one further development of PB, we discussed the Doughnut Economy (Raworth).

(a)

The concept of Planetary Boundaries (PB) is an environmental framework introduced in 2009 by a group of Earth system and environmental scientists led by Johan Rockström from the Stockholm Resilience Centre and Will Steffen from the Australian National University. The PB framework proposes that there are nine "planetary boundaries" within which humanity can safely operate. These boundaries are defined as thresholds which, if crossed, could result in irreversible environmental changes.

The nine boundaries are:

1. *climate change*
2. *biospheric integrity (biodiversity loss, ecosystem functions)*
3. *nitrogen and phosphorus cycles*
4. *ocean acidification*
5. *land-system-change*

6. *freshwater use*

7. *atmospherics aerosol loading*

8. *stratospheric ozone depletion*

9. *chemical pollution.*

(optional figure)

Some of these boundaries have irreversible tipping points. Over time, PB has evolved with increasing scientific understanding and better data: More precise thresholds have been established for some boundaries (e.g., chemical pollution), better indicators have been developed (e.g. biodiversity loss), and the interconnections between boundaries have been studied and emphasized. The most important extension has been the Doughnut Model (Kate Raworth) that adds the need of social foundations for thriving societies to PB's environmental boundaries. With that, concept has moved from a solely environmental concept to a broader sustainability concept that is used today in policy and management.

(b)

Businesses can use the PB framework to guide their environmental management strategy by aligning their goals and operations with the sustainability and carrying capacity of Earth's systems. The firm is viewed as one element embedded in wider ecosystems. Focusing on the environmental dimension, the PB can be used to inform and guide environmental management by (for instance):

- *Assessment and monitoring: Identify and select the most relevant planetary boundaries (Scope 1, 2, and 3), monitor operations to ensure they remain within sustainable limits.*

- *ESG Reporting: Incorporate PB framework into their sustainability reports, show stakeholders and stockholders how the firm contributes to most relevant sustainability efforts.*

- *Risk management: Understanding how crossing these boundaries could impact their operations, supply chains, and market, and preparing for these risks.*

- *Innovation and future proofing operations and products: Based on the above, find technological and other solutions to lessen the pressure on the boundaries and to prepare for the risks (adaptation opportunities, e.g. substitution of materials and processes)*

(c)

In the context of the automotive industry, integrating the PB framework into Environmental, Social, and Governance (ESG) strategy can be particularly effective. As explained in (b), it can be used to identify, assess, monitor, and report key environmentally relevant variables; to inform a firm's risk management and spur eco-friendly innovations.

Based on the case study presented in class throughout several sessions, we learned that the automotive industry is focusing on mitigating and adapting to the following boundaries:

- *climate change: reducing GHG emissions through electric vehicles (EVs) and alternative fuels; improving fuel efficiency,*

- *resource and fresh water uses: using renewable, recycled resources in manufacturing, save water and energy, circular processes, battery recycling*

- *chemical and air pollution: reduce chemical pollution (PFAS) and particulate matter (tires) in production and product use (e.g. lighter cars with thinner tires)*

- *biodiversity and ecosystems: secure that production sites do not impact heavily on biodiversity and ecosystem health*

Responsible sourcing and global supply chains for EVs and alternative fuels (E-fuels) are specific industry issues. Innovation of less environmentally taxing fuels, batteries as well as alternative forms of transport ("beyond core"). Beyond the original PB framework, its global supply chains include sensitive key materials (such as rare earths) sourced through environmentally and socially impactful mining, often in politically instable regions of the world.

By integrating the PB framework into their ESG strategy, automotive companies can contribute to global sustainability, drive innovation of materials, fuels and products; develop competitive advantages with more sustainable products and processes (e.g.

Zero Carbon Production); improve stakeholder relations; adhere to stockholder and investor requests, facilitate access to investors capital (IPO), and substantiate their licence to operate in a market selling products that are now widely pillorized and shamed (SVU Shaming). To discuss the pros and cons of loyalty programmes, students should explain the beneficial economics of loyalty (in terms of growth and margins effects) but also research evidence showing that loyalty programmes increase repeat business only in selected industries. Based on these conflicting arguments, students should develop a well-supported argument to back up their view. Then, drivers of loyalty that should be discussed include the paradox of service failure recovery, the principle of customer delight, and customer voluntary participation.

2 Within the Environmental, Social, and Governance (ESG) debate, businesses have increasingly been criticized for deliberately employing deceiving practices such as Greenwashing, Whitewashing, and Rhetorical Framing, undermining public trust in markets and deceiving customers and investors.

(a) Define and describe the three concepts (Greenwashing, Whitewashing, and Rhetorical Framing). Give one example for each. Do you expect these practices to increase or decrease in the next five years? [40%]

(b) Name and explain recent regulatory steps to limit companies employing these practices (EU, USA, or other countries if applicable). [30%]

(c) Name additional options (beyond regulation) for consumers, citizens, investors and responsible managers to stand up against these deceiving practices. [30%]

Fit of question to lecture: We covered Greenwashing, Whitewashing and Rhetorical Framing including regulations in Sessions 4 and 5 (see required reading Supran & Oreskes 2021; we covered Dutta-Powell et al 2023 in class). The topics that one can list in (c) have been covered all through the class.

(a)

Greenwashing: This refers to the practice of companies misleadingly portraying their products, services, or overall brand as environmentally friendly or sustainable, when in fact they are not.

Example: A company markets a product as "eco-friendly" because it uses a small percentage of recycled materials, but the production process of the product is highly polluting and unsustainable. (see examples in covered reports)

Whitewashing: This term is often used in a corporate context to describe the act of covering up or glossing over scandalous, unethical, or negative information by presenting a favourable view.

Example: A company facing allegations of poor labour practices might launch a public relations campaign highlighting its charitable contributions to divert attention from the labour issues. One specific type is "sportswashing" which nation states use to boost their reputation by hosting major sport events.

Rhetorical Framing: This involves the strategic use of language and communication to present information in a way that shapes perception and influence public opinion, often to divert attention from negative aspects.

Example: Supran & Oreskes (2021) have analysed Exxon Mobil's climate change communications in the past decades and show in detail how they deceptively use framing in a similar way as the tobacco industry has used it for decades, escaping scrutiny.

The future trend of these practices could go in either direction:

Increase: As public and regulatory pressure on environmental and social issues grows, companies might be more tempted to use these tactics to appear compliant or responsible without making substantive changes. Also, such practices have become much easier and cheaper to create due to (generative) AI, Fakenews, Deepfakes and other forms of intentional online disinformation. Data-driven personalized news and media messages can target people with different levels of skepticism and knowledge with respective messages, and the most effective message can be tested in seconds. In the long run, such deceptive practices undermine trust in corporate communication in general.

Decrease: Heightened scrutiny by regulators, media, and consumers, along with stronger regulatory frameworks, might deter companies from engaging in such practices. Indeed, in the UK and in the EU, for instance, there are increasingly strict regulatory barriers to all three (see b).

(b)

Significant measures are being implemented to address greenwashing and whitewashing worldwide:

United Kingdom:

The Competition and Markets Authority (CMA) has published the Green Claims Code. This code outlines six principles based on existing consumer law to guide businesses in communicating their green credentials accurately, without misleading consumers. The CMA focuses on ensuring that firms do not omit or hide important information and consider the full life cycle of the product. This initiative is part of a broader effort to prevent businesses from making misleading environmental claims.

The Financial Conduct Authority (FCA) has proposed a package of new rules, including the introduction of investment product sustainability labels and restrictions on the use of terms like "ESG," "green," or "sustainable." These measures are designed to protect consumers and improve trust in sustainable investment products, ensuring that products claiming sustainability characteristics genuinely possess them.

United States:

In the United States, there has also been a growing focus on combating greenwashing. The U.S. Federal Trade Commission (FTC) has guidelines known as the Green Guides, which are designed to help marketers ensure that their claims about the environmental attributes of their products are truthful and non-deceptive. Firms fear law suits that can mean very high punishment fees if caught in "washing".

European Union: (focus in class)

The European Union has proposed a comprehensive set of regulations to ensure the credibility of environmental claims made by companies. This initiative is part of the European Commission's broader strategy to combat greenwashing and misleading environmental claims, thereby promoting sustainability and protecting consumers. The proposed EU Directive on Green Claims, adopted in March 2023, seeks to establish clear and verifiable standards for environmental claims made by businesses. Key elements of the directive (that will be translated into national laws) include:

- *Substantiation of Claims: All environmental claims must be backed by widely recognized scientific evidence, considering the product's life cycle and relevant environmental impacts. These claims must demonstrate benefits beyond minimum legal requirements and identify any negative environmental trade-offs.*

- *Communication of Claims: Environmental claims must include instructions on how consumers can maximize the product's expected environmental performance. Commitments to future environmental performance are required to be time-bound and based on improvements within the trader's own operations.*

- *Verification of Claims: Member States must appoint independent third-party bodies to assess environmental claims and issue certificates of conformity. Certificates must be obtained before a claim is made public or a label is displayed.*

- *Environmental Labelling Schemes: The directive outlines specific requirements for environmental labelling schemes, ensuring transparency, accessibility, and credibility. It also includes provisions to address the proliferation of labelling schemes.*

- *Enforcement and Penalties: The directive mandates competent authorities to enforce compliance, including through regular checks and penalties for non-compliance. Penalties include fines, which can amount to up to 4% of the trader's annual turnover for cross-border infringements.*

The EU has also implemented the Sustainable Finance Disclosure Regulation (SFDR), which requires financial market participants to disclose sustainability risks and impacts, aiming to prevent greenwashing in financial products.

Various other countries and groups of countries (G7) are introducing or strengthening regulations to ensure accuracy and prevent misleading claims. This has been reflected in the drive towards global standardization of environmental, social, and governance (ESG) compliance. At the UK-hosted G7 summit, an agreement was secured to mandate climate disclosures across member economies by 2025. This agreement aims to globally standardize the approach to ESG compliance, which is a significant step in minimizing greenwashing.

(c)

Beyond regulatory action, proactive engagement by consumers, investors, NGOs, the media, and ethical business leaders can flag and counteract deceptive practices like greenwashing, whitewashing, and rhetorical framing.

- *Consumer Action: Consumers can educate themselves about these practices, support transparent and genuinely sustainable brands, and use social media to hold companies accountable. They can boycott companies with a bad reputation regarding deceptive practices. Consumer organizations and testing institutions (such as "Which?" in the UK or Consumers International or BEUC) can compile reports and present the results to policymakers to regulate better. They can also train consumers in detecting and immunizing against "washing" and rhetoric.*

- *Climate Litigation through NGOs and individuals is on the rise worldwide and has led to major court decisions both in the EU and the US.*

- *Investor Scrutiny: Investors can demand more rigorous and verifiable sustainability reporting from companies and shift investments towards those with a credible track record in ESG (Environmental, Social, and Governance) performance.*

- *Third-Party Certification and Auditing: Encouraging or requiring companies to obtain certification from reputable third-party environmental and social standards can help in verifying their claims. Certified, trustworthy, independent labels can work as market signals for consumers.*

- *Media and NGO Oversight: Media outlets and non-governmental organizations can play a crucial role in investigating and exposing deceptive practices, thereby increasing public awareness and pressure on companies.*

- *Responsible Leadership: Managers and business leaders who are committed to ethical practices can foster a corporate culture of transparency and responsibility, setting industry standards. Bonus systems consider how success has been achieved, shunning deceptive practices.*

3 Carbon offsetting is a climate mitigation strategy that nation-states and businesses employ to become "carbon neutral" on the balance sheet.

(a) Define and explain Carbon offsetting strategies. What are the opportunities and what are the risks of adopting these strategies? What are the prerequisites for Carbon offsetting to be effective and trustworthy? [40

(b) Besides offsetting and technological approaches, businesses and policymakers apply so-called "behavioural instruments" to mitigate carbon emissions. One of them is

"green defaults". Define and explain behavioural instruments in general and green defaults in specific. [30%]

(c) Sketch one (real or hypothetical) example of a behavioural instrument (such as defaults or other nudges) employed in an industry of your choice. [30%]

Fit of question to lecture: We covered Carbon offsetting strategies in Sessions 4 and 5 (see pre-assignment, optional reading covered in class Boyd et al. 2023).

We covered behavioural instruments and green defaults in Session 7 (see optional reading covered in class Decrinis et al. 2023, Sunstein & Reisch, 2014). Here, we also discussed potential applications to our automotive industry example in the form of green defaults and of emotional nudges in the ordering of EVs as company cars. Other examples are of course also valid.

(a)

Carbon offsetting involves compensating for carbon dioxide or other greenhouse gas emissions made by a business or individual by participating in schemes designed to make equivalent reductions in emissions elsewhere. This can involve various strategies such as:

- *Investing in Renewable Energy Projects: Supporting wind, solar, or hydroelectric power projects.*
- *Tree Planting and Reforestation: Trees absorb CO2, making forestry projects popular offsets.*
- *Regenerative agriculture and soil improvements*
- *Energy Efficiency Projects: Funding improvements in energy efficiency in industrial or developing contexts.*
- *Capturing Methane: Investing in projects that reduce methane emissions, like capturing landfill gas.*
- *Many more …*

Opportunities

- *Global Impact: Carbon offsetting allows emissions reductions to occur where it is most cost-effective, globally.*
- *Sustainability Goals: Assists businesses and nations in meeting their sustainability and carbon neutrality goals.*
- *Economic Incentives: Creates economic incentives for developing low-carbon technologies.*

Risks

Misleading Claims: If not properly managed, offsetting can lead to claims of carbon neutrality that don't reflect a true reduction in overall carbon emissions.

Dependency Over Reduction: Companies might rely on offsetting rather than reducing their own emissions.

Quality and Verification Issues: Not all offset projects are equally effective or verifiable.

The four key prerequisites for effectiveness are:

1. *Real and Verifiable Reductions: Offsets must correspond to real and measurable reductions in emissions.*
2. *Additionality: The carbon reduction or sequestration would not have occurred without the offsetting project.*
3. *Permanence: Ensuring that the benefits of offsets are long-lasting and not reversed.*
4. *Transparency and Certification: Using certified and transparent schemes to ensure credibility.*

(b)

Behavioural instruments (or rather: Behaviourally informed instruments) in environmental policy use insights from behavioural science to influence the choices people make, encouraging more sustainable behaviours. There are different types of nudges, educational and architectural ones. Nudges are subtle policy shifts that encourage people to make certain choices without restricting their freedom to choose. One example is leveraging the influence of social norms and peer behaviour.

Green defaults are a specific type of architectural nudge where the default choice in a system is set to the most environmentally friendly option. People are more likely to stick with the default option, so setting the green choice as default can significantly influence behaviour.

Example (see readings and class): In energy plans, the default option could be a green energy source, with customers having to opt-out if they prefer a different source.

(c)

By using behaviourally informed instruments, businesses in the automotive industry can subtly influence customer and employee choices towards more sustainable options, contributing to broader efforts to mitigate carbon emissions.

Example 1: See Decrinis et al. 2023, Nudging green employee behaviour at Porsche AG

Example 2: A car rental company could set the default option for all online car rentals to the most fuel-efficient or electric vehicle available. Customers who might not have actively chosen an eco-friendly car are more likely to stick with this default option, thereby inadvertently choosing a lower-emission vehicle. This leads to a reduction in overall carbon emissions from the company's fleet, promoting greener transportation choices among consumers without restricting their freedom of choice.

END OF PAPER