

Lesson 8.3 Exercises: Climate Finance and Sustainable Investing

Module 8: The Future Problem

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Digital Finance — BSc Course

Exercise 1: ESG Materiality Mapping

Scenario: You are an analyst at a Swiss asset manager. You need to identify the **most financially material** ESG issue for each of the following companies.

Company	Industry
A	Global oil & gas producer
B	Swiss private bank
C	Social media platform
D	Fast-fashion retailer
E	Lithium mining company

Tasks:

- For each company, identify the single most material ESG issue and state whether it falls under E, S, or G.
- For Company A (oil & gas), explain in 2–3 sentences how the identified ESG issue creates financial risk.
- Company E (lithium mining) produces a material essential for electric vehicles. Does being part of the “green transition” make it immune to ESG risks? Explain.

Difficulty: Introductory — tests understanding of materiality and ESG categories.

Exercise 2: Classifying Climate Risks

Scenario: Classify each of the following events as **physical risk** (acute or chronic), **transition risk**, or **liability risk**.

- ① The EU introduces a carbon border adjustment mechanism (CBAM) taxing imports from high-emission countries
- ② A prolonged drought reduces hydroelectric power generation in Switzerland by 20%
- ③ A class-action lawsuit is filed against a major bank for financing deforestation in the Amazon
- ④ An insurance company raises coastal property premiums by 40% due to increasing hurricane frequency
- ⑤ A government announces a ban on sales of new internal combustion engine vehicles by 2035
- ⑥ An investment fund is fined by regulators for labeling a fossil-fuel-heavy portfolio as “sustainable”

Tasks:

- a) Classify each event. For events 1–3, provide a one-sentence justification.
- b) Event 4 could be interpreted as both physical and transition risk. Explain how.
- c) Which of the three risk types do you think is hardest for financial models to quantify? Why?

Difficulty: Introductory–Intermediate — tests classification and reasoning.

Exercise 3: Carbon Market — Cap-and-Trade Calculation

Scenario: A European cement factory participates in the EU ETS. It has been allocated **50,000 free allowances** (1 allowance = 1 tonne CO₂). Its actual emissions this year are **72,000 tonnes**. The current EU ETS price is **EUR 75 per tonne**.

Tasks:

- a) How many additional allowances must the factory purchase?
- b) What is the total cost of those additional allowances in EUR?
- c) The factory can invest EUR 1.5 million in energy efficiency upgrades that would reduce annual emissions by 15,000 tonnes. Should it invest, or continue buying allowances? Show the break-even calculation.
- d) If the carbon price rises to EUR 120 per tonne next year, how does the break-even calculation change?
- e) In 2–3 sentences, explain why a rising carbon price creates an incentive for companies to decarbonize rather than simply buying allowances.

Difficulty: Intermediate — combines arithmetic with economic reasoning.

Exercise 4: Mapping a Company's Carbon Footprint

Scenario: SwissAuto AG manufactures electric vehicles. It reports the following emissions data:

Source	Tonnes CO ₂	Category
Factory natural gas heating	5,000	?
Purchased electricity for factory	8,000	?
Steel purchased from suppliers	45,000	?
Employee commuting	2,000	?
Customer electricity use to charge EVs	120,000	?
Business air travel	1,500	?

Tasks:

- Classify each source as Scope 1, 2, or 3.
- Calculate total Scope 1, total Scope 2, and total Scope 3 emissions.
- What percentage of total emissions is Scope 3?
- A competitor reports only Scope 1 and 2. Why might this be misleading?

Difficulty: Intermediate — requires classification and basic arithmetic.

Exercise 5: Green Bond vs. Sustainability-Linked Bond

Scenario: You are evaluating two bonds from GreenEnergy Corp:

	Bond A: Green Bond	Bond B: SLB
Maturity	10 years	10 years
Coupon	3.20%	3.25% (base)
Use of proceeds	Solar farm construction	General corporate purposes
SPT	N/A	Reduce Scope 1 by 30% by 2030
Penalty for miss	N/A	Coupon +25 bps
External review	Climate Bonds certified	ISS ESG Second Party Opinion

Tasks:

- a Explain in 2–3 sentences why Bond A has a lower coupon than Bond B (the “greenium”).
- b If GreenEnergy Corp misses the SPT in 2030, what is the new coupon on Bond B?
- c Which bond gives the investor more transparency about where the money goes? Why?
- d Which bond creates a stronger financial incentive for the company to decarbonize? Justify.
- e A critic says: “The 25 bps step-up is too small to matter for a large corporation.” Do you agree? Discuss.

Difficulty: Intermediate — requires comparing two instruments and evaluating incentive structures.

Exercise 6: Bank Financed Emissions (PCAF Method)

Scenario: SwissBank AG has the following lending portfolio:

Borrower	Loan (CHF M)	Enterprise Value (CHF M)	Annual Emissions (t CO ₂)
SteelCo	50	1,000	800,000
SolarTech	30	600	5,000
AirlinePlus	80	2,000	1,200,000
FoodRetail	40	800	60,000

Tasks:

- a) For each borrower, calculate the financed emissions attributed to SwissBank using:
$$\text{Attribution} = \frac{\text{Loan}}{\text{Enterprise Value}} \times \text{Emissions}.$$
- b) What is SwissBank's total financed emissions across the four borrowers?
- c) Which single borrower contributes the most to SwissBank's financed emissions?
- d) If SwissBank reduces its loan to AirlinePlus by 50%, by how many tonnes do its financed emissions decrease?
- e) Is reducing loan exposure the only way for a bank to lower financed emissions? Name one alternative.

Difficulty: Intermediate — applies the PCAF attribution formula.

Exercise 7: Greenwashing — Spot the Red Flags

Scenario: “EcoInvest Global Fund” markets itself with the following claims:

- ❶ “Our fund is 100% sustainable and planet-friendly”
- ❷ The fund holds 8% in oil & gas companies (which the prospectus classifies as “transition companies”)
- ❸ The fund reports a MSCI ESG rating of AA but does not disclose Sustainalytics or S&P scores
- ❹ Marketing materials prominently feature a wind turbine photo, but the fund’s largest holding (15%) is a tech conglomerate
- ❺ The fund claims “net-zero portfolio” based on purchased carbon offsets from a forestry project with no independent verification

Tasks:

- a) For each claim (1–5), identify whether it is a greenwashing red flag and explain why or why not.
- b) Under the EU SFDR classification, would this fund likely qualify as Article 8 or Article 9? Why?
- c) Draft a 3-sentence investor warning about this fund, explaining the key risks.

Difficulty: Advanced — requires critical evaluation and regulatory knowledge.

Exercise 8: Climate Risk Stress Test for a Swiss Pension Fund

Scenario: You manage a CHF 5 billion Swiss pension fund with the following asset allocation:

Asset Class	Allocation	Climate Exposure
Swiss equities	25%	Moderate (pharma, industrials)
Global equities	30%	High (includes oil, mining)
Swiss real estate	20%	Physical risk (flooding, heat)
Green bonds	10%	Low
Government bonds	15%	Low

Tasks:

- a Under a “delayed transition” NGFS scenario (sharp policy action after 2030, carbon price spikes to USD 300/t by 2050), which asset classes face the greatest **transition risk**? Estimate rough percentage losses for each.
- b Under a “hot-house world” scenario (4°C warming, minimal policy), which asset classes face the greatest **physical risk**?
- c Propose three concrete portfolio adjustments to improve climate resilience.
- d Write a 5-sentence executive summary for the pension fund’s board of trustees.

Difficulty: Advanced–Integrative — combines all lesson concepts into a realistic portfolio scenario.