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IKT3620: Introduction to Environmental Economics
             Study Questions
               Dr. Tunç Durmaz
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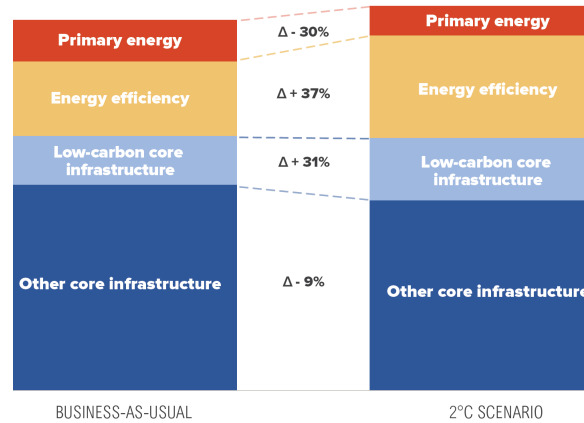
Important: Please kindly note that the questions you will come across in the exam may not be limited to the study questions provided to you.

1. Explain the main differences between weak and strong sustainability, and why these matter for government policy on sustainable development.

2. An alternative economic indicator of sustainable development is 'genuine savings (or adjusted net savings).'

   a) Using the table below and calculate the genuine savings of Niger. Show your calculations.

   b) Genuine saving provides a "weak sustainability rule." Explain.

	Gross national saving	CFC	Education invest-ments	Energy depletion	Mineral depletion	Net forest depletion	PM damage	CO_2 damage	Genuine savings
Niger	2.7	6.9	2.3	0	0	4.1	0.5	0.4	.....

Notes: CFC: depreciation of produced capital; PM: particulate matter (PM10).

3. What is carbon capture and storage and why is it (or it may be) important?

4. Consider an economy in which only fossil fuel energy is produced. Due to the global warming problem, the regulator decides to levy a specific/unit carbon tax, v, on CO2 emissions. With the carbon tax, the regulator aims to restrict the CO2 emissions by %50. Suppose that the price of fossil fuel energy, p, is 200. The cost of producing fossil fuel energy is $c(x) = x^2$ where x stands for fossil fuel energy. Note that one unit of energy causes one unit of CO2 emissions.

   a- What should be the level of the unit tax such that the regulators achieves its goal?

   b- Suppose that the economy has access to carbon capture and storage technology (CCS) allowing CO2 emissions to be captured, transported, and stored. The cost of CCS is given by the following function: $c_k(k) = 20k + k^2$. What needs to be the level of the carbon tax such that the level of CO2 emissions (i.e., $x - k$) is %50 of the level of emissions without any regulation. What are the levels of x and k?

   c- Calculate the economic surpluses created in the two cases.

   d- Compare the two outcomes (a- and b-)? Explain the main differences.

5. The graph below demonstrates the percentage changes in expenditure on infrastructure until 2030 that is required to keep the global temperature rise since the Industrial Revolution below 2°C (2°C scenario). Explain how a change in each block (e.g., the decrease in primary energy by 30%) can contribute to the ultimate aim of keeping global temperature rise below 2°C.

Primary energy Δ - 30% Primary energy

Energy efficiency Δ + 37% Energy efficiency

Low-carbon core infrastructure Δ + 31% Low-carbon core infrastructure

Other core infrastructure Δ - 9% Other core infrastructure

BUSINESS-AS-USUAL 2°C SCENARIO

Notes: *Primary energy*: extraction of oil, gas, and coal; *Energy efficiency*: buildings, energy, and transportation; *Low-carbon core infrastructure*: renewable energy, nuclear, CCS, low-carbon transport (e.g., light rail systems), climate-proofed water and sanitation including some adaptation infrastructure (e.g., sea walls and flood protection); *Other core infrastructure*: standard water/sanitation, high-carbon transport (e.g.m roads), energy production, and telecommunications

6. (10 points) Explain what is meant by 'decoupling economic growth and GHG emissions?'

7. (10 points) What is 'environmental Kuznet's curve?'

8. Suppose there are three residents and a coal-fired power plant that generates air pollution. One resident is a farmer. Therefore, she suffers from both health problems and low agricultural output. The other two only have health issues due to air pollution. For 21000TL, a scrubber, that will clean up the pollution, can be installed. The farmer would be willing to pay 15000TL to get rid of air pollution whereas the other two would be would pay 1000TL each only. Consider two plans to finance the scrubber. Plan A calls for a head-payment of 7000TL (per person). Plan B calls for the (most) affected party (the farmer) to pay 21000TL and everyone else nothing. Compare each plan to the status quo and indicate society's choice using

   a) the Pareto criterion;
   b) potential Pareto improvement.