



ST ANDREW'S JUNIOR COLLEGE

Weighted Assessment 1 (WA 1)

General Certificate of Education Advanced Level

Higher 1

ECONOMICS

8843

35 minutes

READ THESE INSTRUCTIONS FIRST

Write your name and class on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

At the end of the test, fasten all your work securely together with the question paper provided.

The number of marks is given in brackets [] at the end of each question or part question.

This document consists of **3** printed pages.

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[Turn Over]

Answer all questions

Question 1: Singapore Electricity Market

Extract 1 Cleaner energy sources

Chemical processes can turn biomass into biofuels like ethanol and methanol, and some crops yield vegetable oil, another fuel. Also, when biomass decomposes anaerobically (without air), methane gas is generated, which is yet another potential fuel (methane is CH₄, the main component of natural gas). All of these energy sources are derived from biomass plant matter.

Generating a significant amount of biomass energy requires large amounts of land. The economics of biomass energy are thus to a large extent land economics. How much land can be made available, and at what price? Using land for biomass energy production always has an opportunity cost, since the same land could be used to produce food or fiber, or to preserve wilderness. The effect of large-scale biomass energy use on food availability and prices is a particular concern.

Source: The Economics of Renewable Energy, <http://ase.tufts.edu/gdae>

Extract 2 Nearly a quarter of Singapore's power generation capacity due for replacement in next 5 years: EMA

With almost a quarter of Singapore's power generation capacity expected to reach the end of its lifespan over the next five years, the Energy Market Authority (EMA) is studying how future gas power plants entering the power system before 2030 could impact its target for net zero emissions by or around 2050.

These power plants that currently run on natural gas, a less polluting fossil fuel that produces 95 per cent of the country's energy, will remain the "backbone of Singapore's electricity generation" even as the power sector decarbonises, the industry regulator said in a tender on Sept 8.

This comes after a report, which was commissioned by EMA, said in March that it is realistic for the power sector to bring down its planet-warming emissions to net zero by 2050 in ways that will neither compromise Singapore's energy security nor affordability.

Strategies that the report recommended include intensifying research in cleaner energy sources such as hydrogen and geothermal. Still, natural gas is needed to ensure "a reliable supply of electricity" amid the transition to cleaner and renewable energy sources, the EMA spokesman said.

Dr Victor Nian, chief executive of independent think-tank Centre for Strategic Energy and Resources, said imposing a carbon emission intensity limit demonstrates EMA's commitment to decarbonise the power sector, noting that achieving this requires a phased approach.

"However, before our industry can adopt hydrogen and ammonia, we still need to address the present gaps and uncertainties, such as the lack of infrastructure supporting a hydrogen or ammonia economy, technology readiness and commercial viability, future cost of hydrogen and ammonia relative to the cost of fossil fuel, and security of supply," he added.

Source: The Straits Times, 19 Sep 2022

Questions

- (a) With reference to Extract 1 and using a Production Possibility Curve (PPC): **[4]**
Explain the opportunity cost of allocating more land to develop cleaner energy sources such as biomass energy, assuming a country uses land to produce both food and energy.
- (b) With reference to Extract 2 and using a Production Possibility Curve (PPC): **[4]**
Explain the impact of technological advancement in the harnessing of geothermal energy on Singapore's economic growth.
- (c) With reference to Extract 2,
- (i) Explain the factors a Singapore government should consider when making a decision on whether to continue to invest in cleaner energy sources such as geothermal energy. **[6]**
- (ii) Comment on whether they should do so. **[2]**

[Total Marks: 16 marks]