Extract 1: Asian economies using oil subsidies

In the global financial crisis, worldwide energy consumption paused. But Asia continues to grow, despite the dour economic outlook in the United States and Europe, and so does its energy needs.

Yet supply has been hit by uncertainties in the Middle East. Although we have not seen major disruptions, prices for crude oil are fluctuating, ranging up to US$120 per barrel, and most predict the long-term trend will be upwards.

To ensure affordability, Vietnam, Indonesia and Malaysia continue to subsidise energy, increasing government burdens as oil prices rise. Their artificially low energy prices increase waste and destroy incentives to invest in alternative technologies.

Studies suggest that energy efficiency measures can achieve at least the equivalent savings in power needs with safe, off-the-shelf technology at a much lower cost. Renewable energy currently costs more but with technological advances, may prove viable in the medium term.

Source: *Today Online*, 27 July 2011

Extract 2: UK's Green Revolution

Thousands of new wind turbines could be built across the UK as part of a £100bn investment in renewable energy that could create hundreds of thousands of new "green collar" jobs, Gordon Brown announced today.

The prime minister unveiled what he described as a "green revolution" and "the most dramatic change in energy policy since the advent of nuclear power". He wants to build up Britain's clean power supply in order to reach the EU-imposed target of producing 15% of the country's energy from renewable sources by 2020.

In a speech to an energy summit at the Tate Modern art gallery in central London, Brown said that the North Sea, which has passed its peak in terms of oil and gas supplies, will be turned into "the equivalent for wind power of what the Gulf of Arabia is for oil". Wind turbines will also be built inland, but with sensitivity towards local communities.

The government will also shortly begin a new advertising campaign showing people what steps they can take to reduce their energy and fuel bills – steps such as turning appliances off rather than leaving them on standby, and fitting new shower heads.

The prime minister also said that he was prepared to take on public opinion over green taxes, insisting that a low-carbon society would not emerge from a "business as usual" approach.

Source: Guardian, June, 2008

Table 1: Wind Energy Capacity in UK 2000-2010 (MW=Megawatts)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MW	406	474	552	648	888	1,353	1,962	2,406	2,974	4,245	5,204

Extract 3: China's plans for solar power

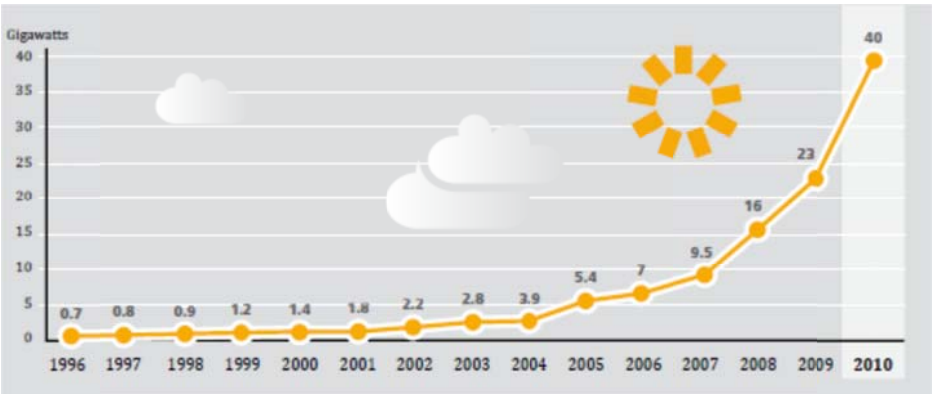
China is to throw its economic might behind a national solar power plan that could result in it becoming one of the world's biggest harvesters of the sun's energy. The government body responsible for overseeing energy policy has finalised a proposal for billions of pounds of subsidies for solar farms and rooftop panels.

The central government and the five major utilities have deemed solar power too expensive, particularly compared with coal, which generates electricity for between an eighth and a tenth of the cost. But the global economic crisis and increasing concerns about climate change and energy security have prompted a change in attitudes. China is the world's leading manufacturer of solar panels, which turn sunlight into electricity and 95% of these are exported.

Despite the infusion of cash and government support for renewable sources of energy, China is expected to remain dependent on coal for about 70% of its energy needs for at least the next two decades, meaning it will remain the world's biggest emitter of CO2, a major greenhouse gas. Also, China's program has been criticized for poor planning as a significant part of power generating capacity installed around the country has been left idle due to insufficient grid connection.

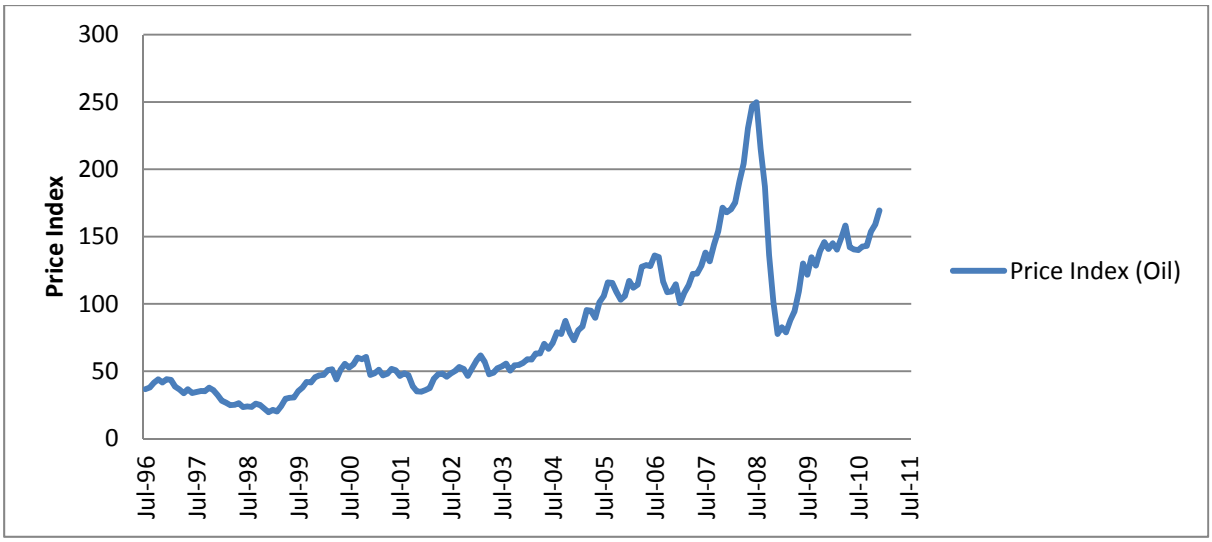
Source: The Guardian, May 2009

Figure 1: Existing World Solar Energy Capacity, 1996-2010



Source: *PV news, EPIA*

Figure 2: World Oil Price Index, 1996-2010 (2005=100)



Source: International Monetary Fund

Questions

(a)	(i)	Compare changes in oil prices from 1996 to 2010 and existing world solar energy capacity over the same time period.	[2]
	(ii)	Using a supply and demand diagram, account for the changes in the world price of oil.	[5]
(b)		Explain how subsidies hinder the working of the price mechanism as seen in Extract 1.	[5]
(c)		Using a Production Possibility Curve, analyse the macroeconomic impact of the 'Green Revolution' on the UK	[6]
(d)	(i)	Explain the source of market failure in the market for renewable energy	[4]
	(ii)	In light of the data provided, if you were a consultant economist, would you recommend that the Singapore government leave the production of renewable energy to the market? Justify your answer.	[8]

Answers

(a)(i)	Compare changes in oil prices from 1996 to 2010 and existing world solar energy capacity over the same time period.	[2]
	- *Both show an overall increase over the period (Similarity, 1m)* - *Solar energy capacity increases throughout the period, however, oil prices had a large fall in price in 2009. (Difference, 1m)*	

(a)(ii)	Using a supply and demand diagram, account for the changes in the world price of oil.	[6]
	<u>Evidence from extract 1</u> *Demand: Asia's energy needs increase* *Supply: Uncertainties in Middle East* *Also possible: expectation of oil prices (can be demand/supply)* *Both shifts reinforce the increase in price → large increase in price of oil* *<u>Evaluation</u>* *PED<1: necessity, resource needed for generation of energy and many goods and services → large increase in price of oil*	
(b)	Explain how subsidies hinder the working of the price mechanism as seen in Extract 1.	[4]
	Subsidy → lowers cost of production of energy derived from oil → supply shifts leftwards → price falls *Since oil based energy and renewable energy are substitutes (inferred from extract 1,3) → a fall in price of one leads to a fall in demand for renewable energy → fall in price of renewable energy* *A fall in price of renewable energy will reduce producers' willingness to invest in it due to reduced profitability.*	
(c)	Using a Production Possibility Curve, analyse the macroeconomic impact of the 'Green Revolution' on the UK	[6]
	Possible macro impacts: *1) Actual growth due increased Investment (Evidence: 100 billion investment) leading to...* *2) Increased employment (Evidence:"could create hundreds of thousands of new 'green collar' jobs")* *This can be demonstrated by a movement towards the boundary of the PPC.* *3) Potential growth (Evidence: build up Britain's clean power supply → infer greater development of energy infrastructure + increased in energy resources. Also, Table 1)* *This can be demonstrated by an outward shift of the PPC. Because greater investment is made into this sector, a comparison between a smaller outward shift (w/o green investment) can be also made.*	
(d)(i)	Explain the source of market failure in the market for renewable	[4]

	energy	
	Students will be required to identify the source of market failure → positive externalities in production and explain how that leads to the market failing. Diagram required. *Evidence: "concerns about climate change" "world's biggest emitter of CO2, a major greenhouse gas" (extract 3)*	
(d)(ii)	In light of the data provided, if you were a consultant economist, would you recommend that the Singapore government leave the production of renewable energy to the market? Justify your answer.	[8]
	Students will be required to discuss whether, in light of the market failure explained in (e)(i), the Singapore government should therefore intervene. Examples of intervention that have been used by UK and China should be considered and students should make some comparisons between these 2 countries and Singapore to consider possibility of transference of policies. ***Thesis: Singapore should not leave it to the free market and should intervene → policies can bring us closer to the socially optimal output*** *Quote: "a low-carbon society would not emerge from a "business as usual" approach" (Ext 1) →the market has failed → leading to underproduction of renewable energy. On its own, the goal of a low carbon society will not happen.* *Policy 1 - Subsidies: Evidence of effectiveness: UK's intervention via subsidies/govt investment has led to an increase in the solar energy capacity (Table 1) → closer to socially optimal* *Evaluation: The subsidies are likely to be costly (ext 3) and will have large opportunity costs to the country.* *Policy 2 - Education: Singapore can also use UK's example of education (ext 2) to educate the population → switch to use of renewable energy, encourage households to set up solar panels* *Evaluation: Uncertain* *Other benefits of intervening: Besides the macro impacts, investing in renewable energy technology/infrastructure can also provide energy security for a country (ext 3)* ***Anti-thesis: Singapore should not intervene and should leave it to the free market → limitations/problems of the policies + government failure*** *Other options available to reduce pollution: S'pore can promote energy saving methods through R&D and/or education (ext 1,2)*	

	Evaluation: Quoted in extract 1 to be as effective as investing in renewable energy, especially in the short term. *Government Failure: China's government may have over-subsidised* *Evidence of problem: →"poor planning" "power generating capacity installed around the country has been left idle" (ext 3)* *Evaluation: However, this is unlikely to happen in Singapore if the government carefully addresses it using a cost-benefit analysis.* *Conclusion: Singapore should intervene using a combination of market based policies and education to correct the market failure.*	