Question 1: The changing landscape of European Energy Market

Suggested Answers

a) i) Using Extract 1, explain one demand factor and one supply factor to account for the rise in price of liquefied natural gas (LNG) in Europe. **[4]**

"heat waves in Europe have sparked stronger seasonal demand due to increased power demand, as the use of air conditioning climbs" → increase in demand for power/energy for the use of air conditioning→ as LNG is a **derived demand** for energy → increase in demand for LNG

"Heightened geopolitical tension, especially with the ongoing war in Ukraine and disruption of shipping on the Red Sea, has adversely affected LNG supply" → **production process of LNG is disrupted** with war → **fall in supply** for LNG

The increase in demand and fall in supply will cause a shortage accounting for a rise in price.

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)	Students generally interpreted the question correctly i.e. they have elicited demand and supply factors and linked how these factors can result in a rise in price of LNG.	
(-)	A significant minority of students did not explain how the shortage will eventually lead to a rise in price of LNG.	
Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**
(-)	However, a significant number of students merely elicited the evidence from the extract and stated that demand rose, and supply fell, without explaining the Economic concepts e.g. how the rise in demand for power for the use of air conditioning may result in the rise in derived demand for LNG is not clear.	

	Hence, this means that the rigour in the explanation of factors is not evident.	
(-)	A handful of students thought that power and LNG are complements instead of derived demand; the relationship between the 2 goods is not accurate.	

ii) Explain the likely value of price elasticity of supply for LNG. **[2]**

"Bottlenecks and infrastructural limitations still exist in some regions" → supply will be more price inelastic and **value of PES will be smaller than 1** due to **lack of spare capacity/factor immobility as producers find it difficult to increase their production due to bottlenecks and infrastructural limitations.**

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)	Majority students understood the requirements of the question, where they have to identify the PES value and justify with determinants.	
(-)	Some students identified the right PES determinant(s) e.g. spare capacity but determined the value of PES wrongly e.g. they wrote that PES>1. This is attributed to the wrong elicitation of evidence. Students are reminded to read the extracts carefully and gather the right evidence to support their answers.	
(-)	Some students did not interpret the question correctly. The question asked for the likely **value** of PES, and hence students are required to state the **value** i.e. PES<1, and not just merely state that supply is price-inelastic.	
Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**
(+)	Majority of the students are able to identify that the value of PES is less than 1.	
(-)	A significant number of students conflated PES determinants with PED determinants. For instance, many of them justified that PES<1 because LNG is a necessity or has low availability of substitutes.	

		However, the degree of necessity and the availability of substitutes are PED determinants.	

b) Explain how the rise in price of LNG might affect the aggregate supply of a European country. **[2]**

A rise in the price of LNG **increases the unit cost of production**.

Ceteris paribus, **profits fall** which lower individual supply curves and hence total output produced in economy fall, **causing fall in short run aggregate supply**.

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)	Majority of the students understood the requirements of the question to provide the explanation how increase in unit cost of production affected aggregate supply.	
(-)	Handful of students included diagram which is not required of the question and marks allocated.	
Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**
(+)/(-)	Majority of students were able to explain how LNG is a crucial factor input and thus make the linkage to an increase in unit COP resulting in a decrease in SRAS. However, they were a handful which erroneously linked to an increase in SRAS instead.	
(-)	Weaker responses gave an undeveloped explanation on how rise in price of LNG led to a decrease in productive capacity and LRAS.	

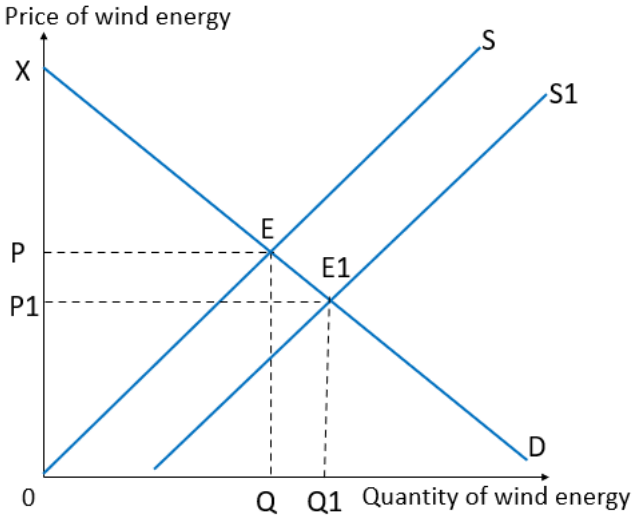
c) Considering the possible advantages and disadvantages to consumers, assess whether the exclusivity agreement between Repsol and EDF is likely to be of overall benefit to consumers. **[8]**

Interpret Exclusivity Agreement between Repsol and EDF:

Renewable energy firms Repsol and EDF will have a larger market share → will lead to both costs and benefits to consumers in terms of price and quality.

R1: Explain the possible advantages to consumers with the exclusivity agreement

- **Internal EOS** → Increase in scale of production allow them to better utilise existing offshore wind power from EDF Renewable (Extract 2) → Cost savings can arise from the use of better and larger machine or indivisible input that is spread over a larger quantity of output –> enables them to produce more output and sell their output at lower prices ("increase affordability") → increase in consumer surplus from XEP to XE1P1. Thus, benefitting consumers.



OR

- **Dynamic efficiency:** Higher market share → able to retain supernormal profits → able and willing to engage in R&D → **process** innovation

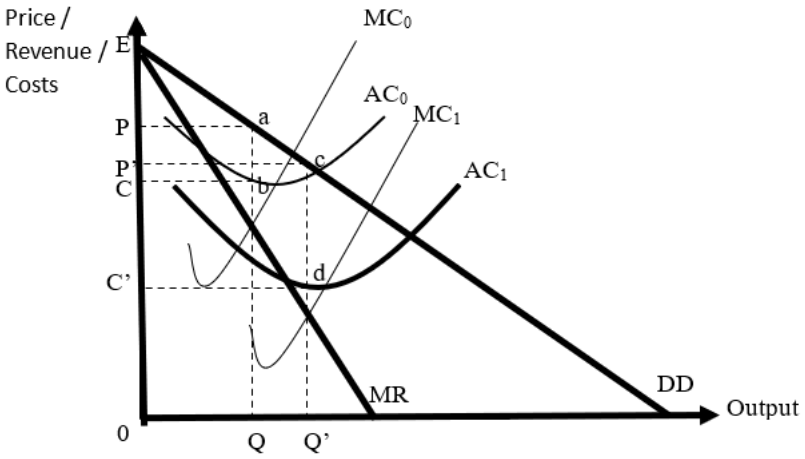


Figure 1

- For example, firms could adopt technology to increase productivity and reduce the manpower needed.
- After successful process innovation, the firm now operates with lower marginal cost of production from MC_0 to MC_1. Average cost will also fall from AC_0 to AC_1. When the MC is lowered, the profit-maximising firm now finds that MR exceeds MC and adjusts its output to 0Q' where MR cuts MC_1. The firm will charge a lower price at P' and sell more units at Q'. The level of consumer surplus will increase from EaP to EcP'. Thus, benefitting consumers.
- **Dynamic efficiency:** Higher market share → able to retain supernormal profits → able and willing to engage in R&D → product innovation → Extract 2 "better quality renewable energy solutions". This will improve consumer welfare and, hence benefiting consumers.

  EV: The extent of benefits to consumers depends on the expertise of the firms to ensure a higher success of process and product innovation. **Extract 2:** DF Renewables is an international leader in renewable electricity generation + company benefits from more than 10 years of experience in offshore wind power and is also one of the pioneers of floating offshore wind technology & Repsol's knowledge of the Spanish and Portuguese markets.

  Hence, the likelihood of a successful innovation is high due to the firms' many years of experience and deep understanding of the Spanish and Portuguese markets. Hence, the exclusivity agreement is likely to bring about large benefits to the consumers.

R2: Explain the possible disadvantages to consumers with the exclusivity agreement

- Reduce competition → abuse market power and set higher price → greater extent that P is above marginal cost (P>MC), resulting in greater underproduction. This implies that consumer welfare is not maximised because the value that consumers place on the additional units (represented by price) is higher than what it cost the producer to produce 1 more unit of the good (represented by marginal cost), showing that more output is desired by consumers. Hence, there will be a fall in consumer surplus due to rise in price and fall in output, thus not benefitting consumers.
- With the exclusivity agreement → reduced competition with other firms → more complacent and lack the incentive to innovate and invest in R&D → lack of variety and choices → "Limiting consumer choices" → will worsen consumer welfare and hence does not benefit consumers.

Evaluative conclusion [Criterion: Nature of the industry – extent of contestability]:

Whether the exclusivity agreement benefits the consumers depends on the extent of contestability in the renewable energy industry. The EU's renewable energy industry is facing increasing competition from both European and non-European producers. Hence, the firms may still behave more competitively, and the price charged will thus be relatively lower. They may also have a stronger incentive to innovate and produce better quality products to maintain its position and market share as the renewable energy industry is highly contestable. Thus, the exclusivity agreement is likely to be highly beneficial to consumers.

Level	Knowledge, Application/Understanding, and Analysis	Marks
L2	For a well-developed answer that has: ● **good scope and balance** – explain the benefit AND cost to consumers for firms with larger market share or after signing the exclusivity agreement ● **good rigour** – explain using firm diagram and link to impact to consumer surplus, choices and consumers to link to consumers. ● **good application to context** – use the case material where appropriate, to support analysis	4 – 6
L1	For an under-developed answer that:	1 – 3

	● lacks scope and balance – only benefit OR cost to consumers for firms with larger market share or after signing the exclusivity agreement ● only explain iEOS and dEOS or efficiency for R1 and R2 and/or ● lacks rigour – descriptive explanation with little use of economic analysis ● lacks application to context – limited use of case material to support analysis	

Level	Evaluation	Marks
E2	One well-explained evaluative statement.	2
E1	One evaluative statement that may be poorly substantiated or not supported by the arguments presented in the answer. ● No marks for listing down of irrelevant evaluative points.	1

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)	Most students understood the question requirement and explained both the costs and benefits to consumers.	
(+)/(-)	Most students attempted to write an evaluative conclusion. However, for some students the evaluative conclusion can be improved. Students need to have a stand and an opinion that is contextualised and supported by economic reasoning for a good evaluative conclusion.	
(-)	Poor time management. Many students wrote more costs and benefits than requirement. This may affect students' ability to complete the paper.	
Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**

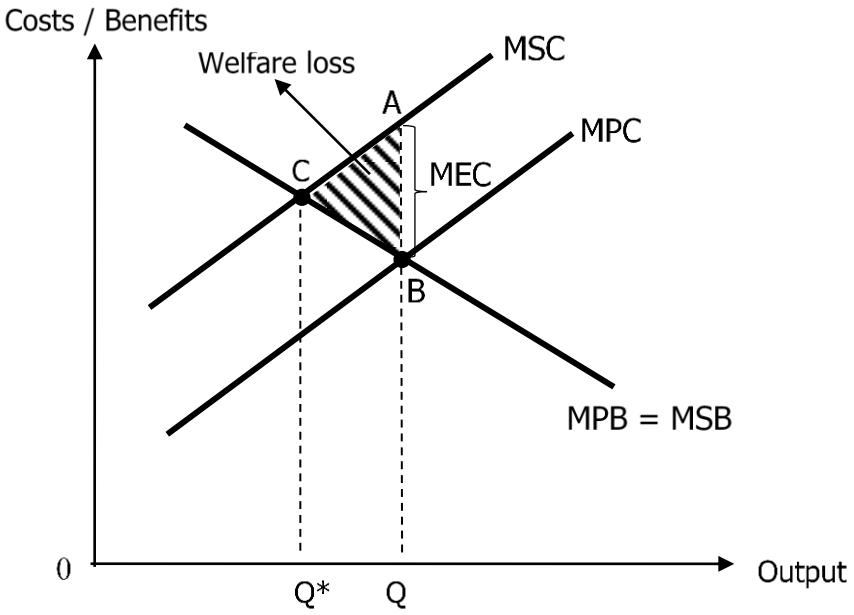
	(+)	Many students were able to explain how the exclusivity agreement affects the price, variety and choice with economic rigour.		
	(-)	However, some students did not link to consumer surplus in their analysis.		
	(-)	Many students quoted the evidence from the extract on the impact on the consumers and explained how it affects SOL and macroeconomics goals. They were not addressing the question. For this question, students need to explain how the exclusivity agreement leads to the different outcomes on the consumers.		

d) **With reference to Extract 3, explain the source of market failure for the non-renewable energy market.** **[4]**

- **Private output (MPB=MPC):** The private benefit of producing non-renewable energy includes revenue earned from the sale of non-renewable energy, while the private cost includes the cost of production like wages, factory rental costs etc. Non-renewable energy producers do not consider the external costs and they will produce at private output Q, where MPB = MPC. This is where private welfare is maximised.

Explain the negative externalities in production

- From Extract 3, the production of non-renewable energy using fossil fuels such as coal produces carbon emission and emit toxic air pollution which is cancerous. This affects third parties such as people residing near the factories, who incurred higher costs for medical treatments, which are not compensated for.
- **[State the divergence]:** In the presence of such a negative externality in the production of non-renewable energy, **MSC > MPC.** There is no divergence in the benefit curve as there are no positive externalities present.



- **Socially Optimal Output (MSB=MSC):** Society's welfare is maximised at MSB = MSC, where the socially optimal output level occurs at Q*.
- **Allocative inefficiency:** At Q, **MSC (distance AQ) >MSB (distance BQ)** and this means that an additional unit of output creates more costs to society than benefits. Hence there is an over-allocation of resources in the form of an overproduction by Q*Q units.
- **Deadweight loss to society:** Thus, this creates a deadweight loss to society by the amount ABC as total social cost (area CAQQ*) arising from producing Q*Q is greater than the total social benefit (area CBQQ*.

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)/(-)	Most students understood the question requirement and explained how the market fails. However, some merely provided the elaboration of marginal external costs.	
(-)	Some students did not make reference to Extract 3 and thus explained the wrong activity that gave rise to negative externalities. Extract 3 "Climate Change and the EU Emission Trading System (ETS)" clearly signals production activity since the ETS is imposed on firms.	

	Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**
	(+)/(-)	Majority of students were able to explain how negative externalities in production resulted in market failure using the PDSAD acronym. However, some students did not explain the private and the social output level.	
	(+)/(-)	Majority of the students were able to show application and understanding in their elaboration of MEC. However, weaker responses did not specify 3rd parties or provided generic 3rd parties like 'public', 'people' and 'others'. Students need to recognise that these generic 3rd parties may include consumers of fossil fuels, hence are not considered as 3rd parties.	
	(-)	Some students showed weak understanding of the divergence in their explanation of negative externalities – due to presence of MEC, divergence between MSC and MPC (MSC>MPC), but instead, these students wrote divergence as MSC>MSB.	
	(-)	A few students elaborated the wrong source of market failure – explained information failure instead.	
	(-)	A few students drew erroneous diagram / wrong labelling of the diagram depicting negative externalities.	

e)	**Discuss whether the EU Emissions Trading System (ETS) is the best way to achieve efficiency and equity in the energy market.** **Introduction**: As mentioned in part d), there is an overallocation of resources and hence government should implement policies to achieve efficiency in resource allocation. **R1: EU ETS is the good way to achieve efficiency and equity in the energy market** Government caps overall carbon emission at socially ideal level, Q* and distributes pollution permits. Assuming the level of emissions allowed by the permit is lower than each firm's existing level of emission, firms either	**[10]**

i) adopt cleaner and greener methods of operation to reduce their level of emission to meet the permitted level OR

ii) buy additional permits so that they can emit more than their original limit.

Firms that can reduce their emissions relatively more cheaply will have an **incentive** to cut their emission and sell excess permits to firms that find it more expensive. Firms facing high costs in decreasing emissions will find it cheaper to purchase permits from low polluting firms. The costs of these permits will add to the costs of production and raise the MPC of producers. → ↑ price on carbon emissions. → ↓ Overproduction and allocative inefficiency until MSB=MSC.

Prices of tradable permits might **increase product prices** as firms are likely to pass on higher cost of production (from additional permits) **to consumers**. Also, it **reduces price competitiveness of the good** especially in the **international market.** → may disproportionately affect lower-income households more through increased energy prices → increases inequity in energy market

(+): Cap-and-trade provides **certainty in outcome** due to the predetermined amount of **socially optimal level of pollution.**

EV: The ETS permits decreases each year (Extract 3) which allow reduction in pollution in the longer term.

(+) Revenue from EU ETS go to countries budget (Extract 3) which allow government to spend on tackling negative externalities or other productive areas.

(-) Difficulty in determining the right level of emissions cap and can be influenced by political pressures. If caps are too high, it would not be effective; if too low, there could be underproduction. Hence, inefficiency persists.

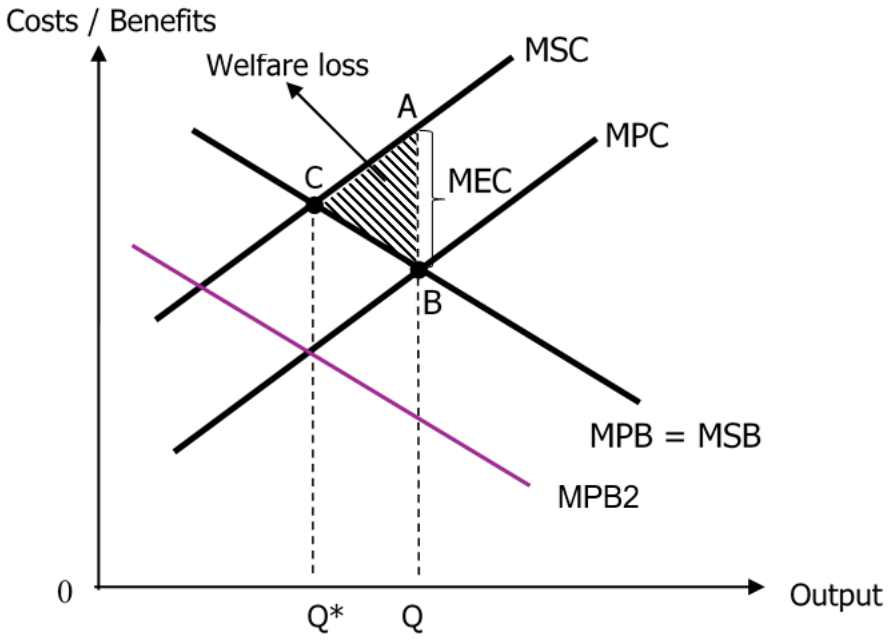
(-) There's a risk that stringent emissions policies might cause companies to relocate to regions with less strict regulations. This could lead to job losses in the EU without reducing global emissions.

R2: European Green Deal is a better way to achieve efficiency and equity in the market.

i) Subsidies to support R&D in energy efficiency OR
ii) Subsidies to capacity building to promote R&D OR
iii) Reduction in barriers to entry to renewable energy

Subsidies to capacity building to promote R&D → Lower unit cost of producing renewable energy / Reduction in barriers to entry to renewable energy → Increase in supply of renewable energy hence lower prices of renewable energy. The lower prices ration consumers in the market and

ensure increase in consumption of renewable energy for the lower income group, ensuring more equal allocation of resources, hence lower inequity.



Since renewable energy are substitutes to coal since they are both sources of energy, producers will reduce consumption of coal. MPB will shift to the left such that the new private output is at 0Qs.

How well it works + EV/Criterion [unintended benefits & root cause of problem]:

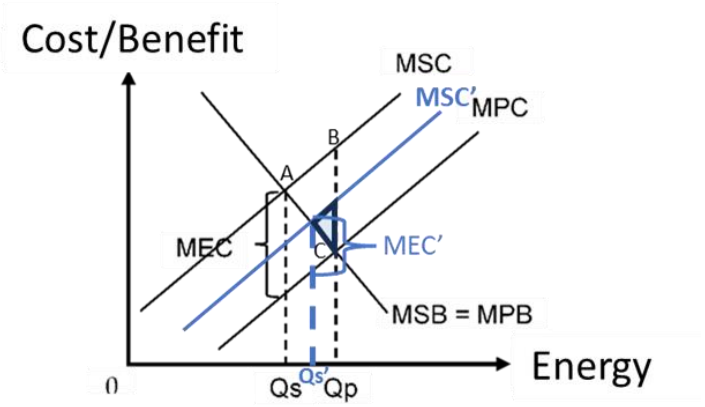
1. Extract 4 “High implementation costs… Green Deal” → Subsidies on renewable energy is **costly**. → This may worsen the government budget position. EV: Since many European countries are facing budget deficit, it is likely that the benefit of reducing the budget deficit such as improve credit rating and attractiveness of FDI outweighs the gain in terms of external benefits of government’s subsidies, then the use of the government’s subsidies represents a possible misallocation of resources.
2. Extract 4 “requires significant investment in green technologies and infrastructure, which may make European companies less competitive globally.” Firms incur higher costs with the use of green technology as compared to use of coal since the infrastructure is new. The higher cost of production will cause prices to increase and hence reduce the competitiveness of the firms which lower their profits. This reduce the incentive for firms to adopt green technology and continue to use coal production.

OR

With subsidies to support R&D in energy efficiency, firms lower unit cost of production in financing R&D/ capacity building. With greater R&D in energy efficiency → reduces MEC from carbon emissions arising from coal usage → corresponding carbon emissions no longer as pollutive and harmful to 3rd parties

As MEC decreases to MEC', MSC moves to MSC', which is nearer to MPC. The new socially optimal level of energy is at Qs', where MSC' = MSB, which is closer to the private level Qp → less overproduction → Less divergence between MSC & MSB @ Qp → less allocatively inefficient

The DWL falls from ABC to shaded area, as the negative externalities from carbon emissions are reduced → policy measure addresses negative externalities arising from carbon emissions



Furthermore, subsidies to support R&D will also lower cost of production in turn, lower prices of energy. The lower prices ration consumers in the market and ensure increase in consumption of renewable energy for the lower income group, ensuring more equal allocation of resources, hence lower inequity.

Overall judgement:

[C:Time, Re]In the short run, the ETS is effective in ensuring that firms produce at the socially optimal level as it works through the market. [C Constraints, Root Cause,Re]:Given that many EU countries are facing budget deficits, ETS works well as it do not require funding and firms can tap on the earnings on ETS. However, reducing usage of coal is not the key to tackle market failure since negative externalities are generated. Instead, government should look at alternative energy sources that are cleaner such as the renewable energy. Hence, there needs to be subsidies to encourage such R&D activities in the long term.

Given the global nature of climate change, collaboration among EU countries is vital to pool expertise, share resources, and increase the chances of

successful innovation, addressing the limitation of R&D. By prioritizing R&D in renewable energy alongside the ETS, governments can address both the immediate need to reduce emissions and the long-term goal of achieving a sustainable, low-carbon economy.

Mark Scheme

Knowledge, Understanding, Interpretation, Application and Analysis		
Level	**Descriptors**	**Marks**
L2	A balanced response that contains well-explained economic reasoning and analysis on EU ETS and an alternative policy that may implement in order to achieve economic outcomes in the question (i.e. efficiency and equity in the energy market). NOTE: While alternative policies are accepted, answers should consider the European Green Deal as suggested in case material.	4-7
L1	Mere listing of key terms and unexplained assertions, e.g. application of economic policy without linking it to economic outcomes in the question (i.e. efficiency and equity in the energy market). Answers may also demonstrate incorrect or no use of economic analysis (i.e. benefit & costs analysis).	1-3

Evaluation

Level	**Descriptors**	**Marks**
E3	One **explained** evaluative statement + One recommendation. 3rd EV mark can only be given when recommendation is supported using earlier evaluation.	3
E2	One **explained** evaluative statement OR Two **weakly supported** evaluative statements. Comparison of strengths and/or limitation of the two policies considered well explained.	2

E1	One evaluative statement that may be **poorly substantiated or not supported** by the arguments presented in the answer.	1

Markers' Report		
Skills Strengths (+): What are the required skills that were well-demonstrated? Areas for improvement (-): What are the skills that were lacking/ not well-demonstrated?		**Aha moment!**
(+)	Majority of the students were able to give a balanced response by providing 2 policies.	
(-)	Some did not consider the EU context and the case material and gave a largely theoretical response. Better scripts were able to recognise the high prices of oil due to Ukraine war and constraints of EU government when addressing questions.	
(+/-)	Majority of the students were stronger to link the policies to the impact on efficiency than equity in the energy market.	
Content Strengths (+): What are some concepts that were well-explained with clear linkages made? Areas for improvement (-): What are some concept gaps / conceptual errors?		**Aha moment!**
(+/-)	Most students were able to recognise tradeable pollution permits will reduce carbon emissions however some did not link back to the energy market. Some students explain the impact of the policies on firms instead on the energy market itself.	
(-)	Students were not very clear of the workings of tradeable pollution permits. For instance, they explained that the purchase of tradeable pollution permits will worsen the pollution levels without recognising that since government control the amount of pollution level to be at the socially ideal output level, the overall pollution level should reduce.	
(-)	Some students are less precise in explaining linkages to how policies tackle allocation inefficiency in the market and gave an assertive explanation on how the policies work.	
(-)	Students explained how there is inequity in terms of permits allocated instead of the energy market.	

	(+/-)	While most students included the strengths and limitations of the policies, students are weaker at explaining the strengths and limitations of tradeable permits.		
	(+)	Most students are able to recognise that they can look at the impact of renewable and non renewable energy in the question.		

MY REFLECTION/LEARNING POINTS FROM CSQ1

After going through the corrections in class and reviewing the suggested answers to CSQ1, here is my…

1 reflection/learning point with respect to **SKILLS**:

1 reflection/learning point with respect to **CONTENT**: