Australian National University

Venue _____

School of Public Policy

EXAMINATION

Semester 2 - End of Semester, 2019

IDEC8089_Semester 2 Energy Economics

This paper is for all students.

Examination Duration: 120 minutes

Reading Time: 15 minutes

Exam Conditions:

Central Examination

Students must return the examination paper at the end of the examination

This examination paper is available to the ANU Library archives

Materials Permitted In The Exam Venue:

(No electronic aids are permitted e.g. laptops, phones)

Calculator (non programmable)

Materials To Be Supplied To Students:

1 x 20 page plain

Scribble Paper

Instructions To Students:

Please show all working.

SECTION A – TRUE/FALSE
[30 marks]
[6 marks each]

State whether each is TRUE or FALSE and concisely explain your reasoning as well as you can.

1. If the whole _____ _____ electricity generator may regret entering into a contract for _____ _____ ent.

2. If a baseline _____ _____ s trading scheme is in place, a price signal exists that will incentivise reductions in emissions.

3. An oil resource rent tax involves a percentage tax on accounting profits from an oil extraction site.

4. Probabilistic Safety analysis (PSA) of a proposed nuclear power station cannot take into account the costs of a nuclear accident on the natural environment.

5. When bidding into the wholesale spot market, each electricity generator should always bid its marginal cost of generation.

SECTION B – CONCEPTUAL
[30 marks]
[10 marks each]

Use at least one graph in each of your answers.

6. **Missing money**
   What is the "missing money problem" in electricity markets? What are its implications? Briefly describe two approaches for reducing the problem.

7. **Time-varying prices**
   Explain how moving to time-varying retail electricity prices can lead to improved outcomes from an economic point of view. Please focus on opportunities from both lower prices at some times and higher prices at other times.

8. **Domestic reservation policy**
   What is a domestic reservation policy for natural gas? What would be the advantages and disadvantages for Australia from adopting this policy?

SECTION C – CALCULATIONS [40 marks]

Make sure to provide the units for your answers.

9. **Probabilistic ... for nuclear** [20 marks]

Imagine that ... options for a new nuclear power station. The probabilistic ... (PSA) parameters for each option are shown in Table 1.

Assume a real ... rate of 0.06 and that the life of each plant will be 40 years. For simplicity ... that the plants can be opened immediately and are identical in all respects other than their level of safety. Also assume that there are no risks to consider after the 40 years of plant operation.

Table 1:

Probabilistic safety analysis (PSA) parameters for a new nuclear power station

Source term (% of inventory)	Damage ($ million; real prices)	Annual probability
Design option 1		
0	0	0.99
0.0005	20	0.004
0.5	4,200	0.003
5	100,210	0.002
80	1,000,000	0.001
Design option 2		
0	0	0.994
0.001	100	0.003
0.005	800	0.002
1	20,000	0.0008
80	1,000,000	0.0002

a) Define "source term" in this context. [2 marks]

b) Based on the above data, what is the minimum up-front amount that society should be willing to pay for the safer option? Show your calculations clearly. [12 marks]

c) If a higher discount rate were used, should society be willing to pay more or less for a safer design? Explain the intuition behind your answer. Using the numbers above, provide a demonstration of this phenomenon. [6 marks]

10. **International oil trade** **[20 marks]**

Imagine that the market for oil is characterised by the following demand and supply functions:

United : $\quad\quad$ Rest of world (RoW)
$Q^D = 4,$ $\quad\quad\quad\quad$ $Q^D = 8{,}000 - 40P$
$Q^S = 20$ $\quad\quad\quad\quad$ $Q^S = 80P$

Price (P) is $\quad\quad$ (Q) is in million barrels. D is demand. S is supply. There are no barriers to trade. Both markets are competitive. $P, Q \geq 0$.

a) If there are no transaction costs, calculate the equilibrium oil price and the quantity of oil that will be traded between the US and the RoW. In which direction will the trade flow? [8 marks]

b) If the transaction cost of trade between the two markets is X per barrel, calculate the equilibrium oil prices in both the US and the RoW. [8 marks]

c) What is the "law of one price" in economics? Explain whether your above results are consistent with this law. [4 marks]

END OF EXAMINATION