

**Energy Economics and Policy – Econ333/Mech674
Midterm Exam - Fall 2011**

Name:

Part I. True or False (circle the right answer):

- 1-True or False: The increase in energy consumption over the past 50 years was stimulated by relatively "cheap" fossil fuels and increased rates of industrialization in North America, Europe, and Japan.
- 2-True or False: In developing countries per capita energy consumption is much lower than in developed countries.
- 3-True or False: The world's largest gas consuming region is the Middle East.
- 4-True or False: World total primary energy demand over the period 1980-2005 grew at 5% and the International Energy Agency predicts that it will grow at 5% over the period of 2005-2030.
- 5-True or False: The power sector accounts for about 10% of all CO2 emissions worldwide.
- 6-True or False: World electricity production by fuel shows that coal accounts for the largest share with around 40%.
- 7-True or False: The largest requirements in capacity requirements in the electricity sector in the coming decades are in China, OECD Europe and OECD North America.
- 8-True or False: There are only proven reserves, no additional recoverable reserves or hypothetical reserves, consequently we can easily calculate the point in time by which we will run out of gas or oil.
- 9-True or False: The reserves-to-production ratio of a fossil fuel deposit is calculated in the following way: the reserves remaining at the end of any year are divided by the production in that year.
- 10-True or False: The reserves to production ratio of a fossil fuel deposit gives you an estimate about the length of time that those remaining reserves would last if production would continue at that rate.
- 11-True or False: The reserves to production ratio is perfectly reliable and non-controversial.
- 12-True or False: In the short run a firm will shut down if $P < AVC$, and if $ATC > P > AVC$ then the firm will make quasi-rents.
- 13-True or False: In the long run a firm will shut down if $P < ATC$ and rents are $ATC > P > AVC$.
- 14-True or False: Imposing a tax on a firm that causes an externality through air pollution, would result in internalizing the externality provided that the tax is properly set.
- 15-True or False: The power generation mix implies that the higher the concentration in the power supply mix, the less vulnerable the country is in terms of supply risks.

Part II. Short answer questions

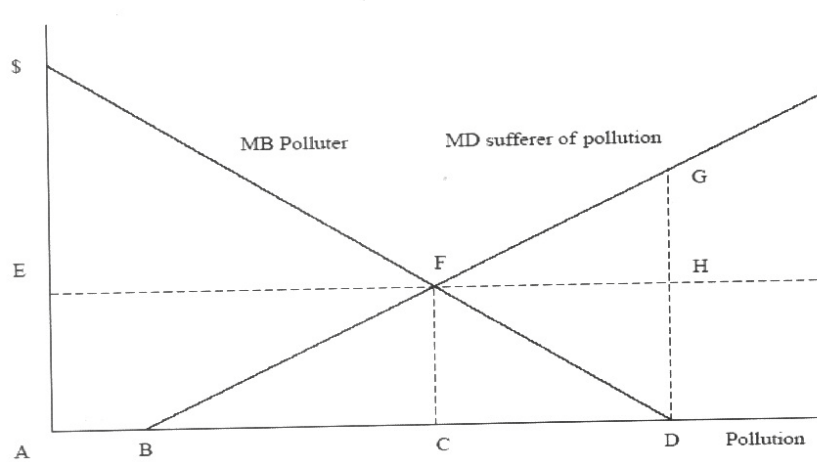
1. Give the definition of primary energy intensity. Which type of analysis is this indicator mainly used for?

2. Why does primary energy intensity increase during a country's phase of industrialization? Why does it reach a maximum and decline thereafter? (Give two reasons for each of the questions)

Handwritten notes:
- primary energy
- should have said
- first period
- 1970-80

3. Why do countries that possess non-renewable natural resources (such as gas or oil for example) ask for a royalty (or tax on profits) from producers?

4. One can look at externalities by focusing on pollutant's costs and benefits. The graph below depicts the benefits to the polluters and the costs to the sufferers. We can imagine a factory using the water of a river for its production process and a village that due to this activity has a reduced enjoyment of the river for various recreational purposes.



Briefly explain:

a) What is the efficient level of pollution in this example? Why?

b) What level of pollution occurs:

-if those who suffer from the damages have the property rights to the water?

-if the polluters have the right to the water?

-if property rights are not well defined?

c) Explain **why**, if property rights are well defined and the polluter and the sufferers are equally powerful (let's say villagers organize efficiently to negotiate with the factory owner) an efficient solution can be achieved.

III. Your pick: pick ONE of the following two exercises:

1) Two cement-producing factories emit CO₂ emissions in Banana Republic. The ministry of environment has decided that the pollution has become unbearable and needs to be reduced by 2 tons. It costs factory 1 \$30 per ton to reduce emissions while it costs factory 2 as much as \$150 to abate 1 ton of CO₂.

- a) The ministry of environment could impose a so called command and control (CAC) measure and force each factory to reduce CO₂ emissions by 1 ton in order to reach its goal. What is the total cost of this CAC measure?

b) Alternatively to the option presented in a) regulators could issue tradable emissions permits to each factory. To achieve the 2 ton reduction, they would issue a number of permits equal to current emissions minus one ton to each factory. If the cost of one permit is \$ 35, what is the cost of the tradable permits approach? By how many tons will factory one reduce its emissions? And what about factory 2?

c) Is the total abatement cost lower under the CAC option or under the tradable permit option? When is factory 1 better off? And when is factory 2 better off?

2. The article by Hossein Razavi, 'Natural Gas Pricing in Countries of the Middle East and North Africa' deals with some of the challenges faced by Algeria, Qatar, Egypt and Iran. **(Keep your answers to the essence!!!)**

a) Briefly highlight the major characteristics of the gas markets in the four countries.

b) How do these countries distinguish themselves from each other with respect to the gas sector? With respect to domestic pricing of gas?

d) Can you identify some major reasons why some countries were more successful than others in attracting investments in the gas sector?

e) What is the opportunity cost of exported gas for these countries?

e) Domestic gas markets in these countries are largely characterized by government intervention hence there is no domestic market determined gas price that emerges. What kind of alternative method is the author using to approximate this price?