

Final examination Energy Analysis, 24 January 2008, 9.00 –12.00

- This exam has 4 questions, each having equal weight
- You can use the book, a dictionary and Key World Energy Statistics.
- The answers of the exercises may **not** be used.
- You can use a calculator.
- The answers can be provided either in English or Dutch.
- Provide your name and student number on each separate sheet of paper.

1. Car Production

A car producer aims at making an existing model more efficient. Therefore, in the design the aerodynamics of the car is improved and the weight is decreased. Because of the improvements, the car should now use 6.3 liter gasoline in stead of 7 liters gasoline per 100 km.

- a. How much may this more efficient car cost in order to be still competitive? Assume that the average customer uses a payback period of 3 years. Use a gasoline price of €1.30/liter and 20.000 km driven on average per year.
- b. The adaptations in the first produced new model will cost €1700. How many more efficient cars must the producer produce in order to stay below the additional price from question a? Use a progress ratio of 0.9 for the additional costs.

2. Energy Tax

In the country of Stalina an energy tax of 50% is levied on the price of natural gas and electricity by households. The new government decided to increase the energy tax to 55% starting from 1 January 2008. In 2007, the 7 million households in Stalina pay €1500 per year on average for natural gas and electricity.

- a. Calculate the average effect of this tax increase on the energy consumption of households. Use a price elasticity for energy consumption of -0.15.
- b. Calculate the annual extra tax income for the Stalinian government.

The government wishes to use the benefits of this tax increase to stimulate energy conservation.

- c. Propose and discuss a policy instrument that effectively generates energy savings using these benefits.

3. Decomposition analysis

The brick and tiles industry in the country Ceramica has the following production and energy characteristics:

	1995		2000	
	Production	Energy use	Production	Energy use
Bricks	2.5 mln tonnes	3 GJ/tonne	3.2 mln tonnes	2.7 GJ/tonne
Tiles	1.0 mln tonnes	4 GJ/tonne	1.1 mln tonnes	3.8 GJ/tonne
Total	3.5 mln tonnes		4.3 mln tonnes	12,82 PJ

Between the years 1995 and 2000 the total volume increased from 3.5 to 4.3 mln tonnes (use this as total volume of activities).

- a. Determine the energy use of the brick and tile industry in 2000
- b. Determine the separate effects of volume, structure and efficiency
- c. Compose a decomposition graph similar to the one in figure 13.1 in the book.

4. OECD Energy Balance 2005

Use the Simplified OECD Energy Balance 2005 from the Booklet Key World Energy Statistics 2007:

- a. Determine the efficiency of the electricity plants.
- b. Determine the primary energy use of the Industry and the Transport sector using eq. 2.8 and the efficiency determined in question a.
- c. Discuss the accuracy of the primary energy use determined in question b.