LE03 FINAL WRITTEN EXAM **Spring 2008**

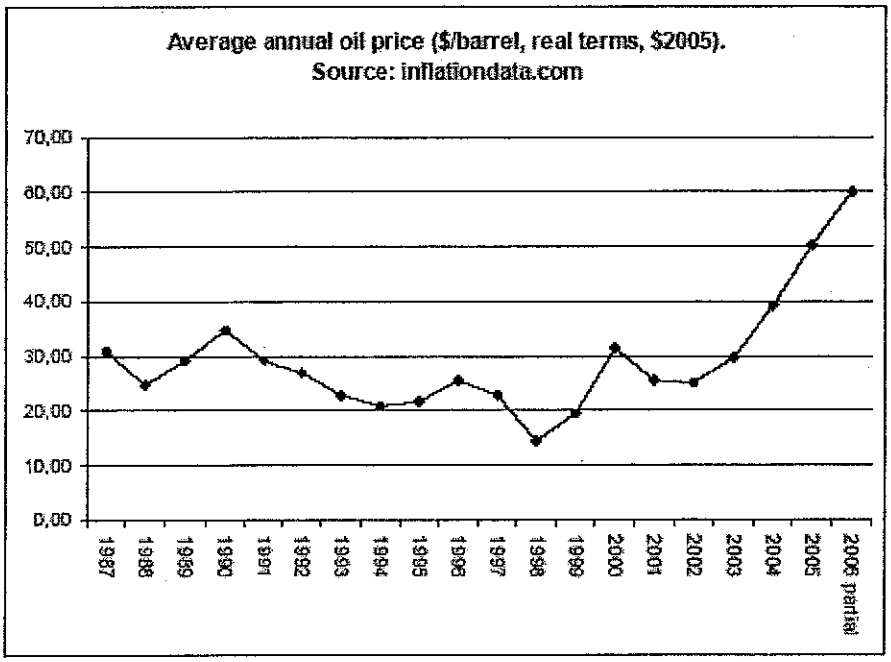
Name _____ **Branch /semester**_____

TD Teacher _____ **Grade** _____ **/25**

NO DOCUMENTS ALLOWED

PART ONE: GRAPH READING 5 points

Figure 1.4: Average oil prices over the period 1987 - 2006



Exercise 1: Describing graphs.

Look at the graph above then complete the following exercise with adverbs, adjectives or prepositions.

From 1987 to 1988 the price of oil fell ..... 3 points but it rose again ..... the next two years.

Until 1994, as OPEC countries produced more oil, the price decreased .....

This was followed by a ..... increase in 1995. However the oil price never exceeded $35 a barrel until 2003 when it started to rise .....

This was due to an increase ..... demand ..... emerging countries like India and China.

Exercise 2: Describing trends.

*Complete the following text with **verbs**. Do not use any of the verbs used in exercise 1.*

These last few weeks, the price of oil has literally .....

Last week it ..... at $130 a barrel. Pessimists expect it to ..... $200 before the end of the year but even if it ..... stable at $130 a barrel, it will hurt the economy of the whole planet.

At the same time as the oil price increased, housing prices in the US ..... because of the Subprimes crisis so that some houses have now lost half of their value.

PART TWO: REPORT WRITING 20 points

The city of Viernheim, located in the heavily industrialized Rhein-Neckar area of Germany, is committed to developing an efficient and sustainable energy policy. They have already made considerable efforts to reduce carbon emissions in their town and, in 2005, they won first prize for their category (cities up to 100,000 inhabitants) in the German competition "Energiesparkommune 2005". They are now looking to develop Renewable Energy Systems (RES) to 20% RES by 2020. As investment in renewable systems will be costly, they are planning to collaborate with several neighbouring cities.

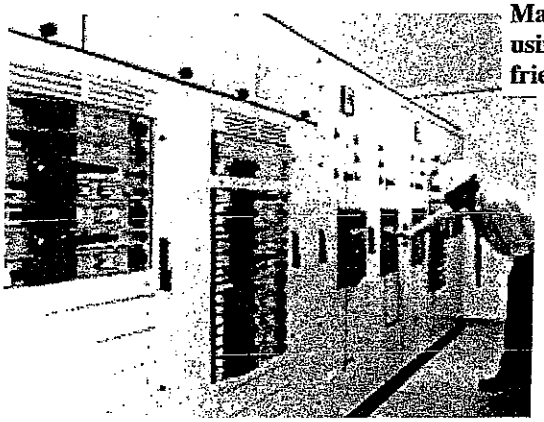
Three models from the Rhein-Neckar region are being considered:

1) Making power from waste wood – the Mannheim biomass power plant
2) "Power Station Earth" – the Landau geothermal plant
3) World record-breaking rooftop solar power plant – the "Sunspot" in Bürstadt

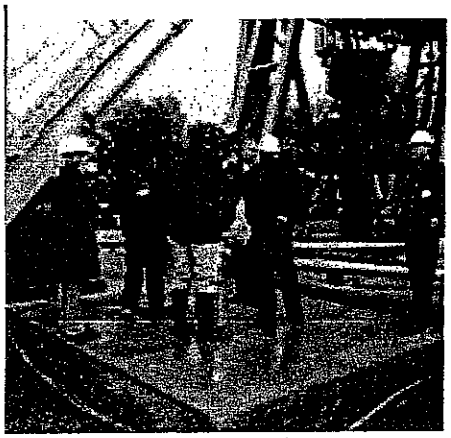
TASK: You have been asked, as an outside consultant, to assess the three models and to decide which one model you believe would be best for Viernheim and its partners to adapt to their needs.
After analyzing the documents, you will write a REPORT (250 words minimum – 400 words maximum) addressed to the Mayor of Viernheim in which you will assess the three propositions, basing your arguments on the main criteria of analysis, and give your recommendations.

DOCUMENTS:

1. Viernheim's city profile
2. Data file on the three models
3. Renewable energy costs
4. Employment and turnover in German solar power
5. Projections of Renewable Electricity World Net Capacity
6. Projections of Renewable Electricity Carbon Dioxide Emissions Savings

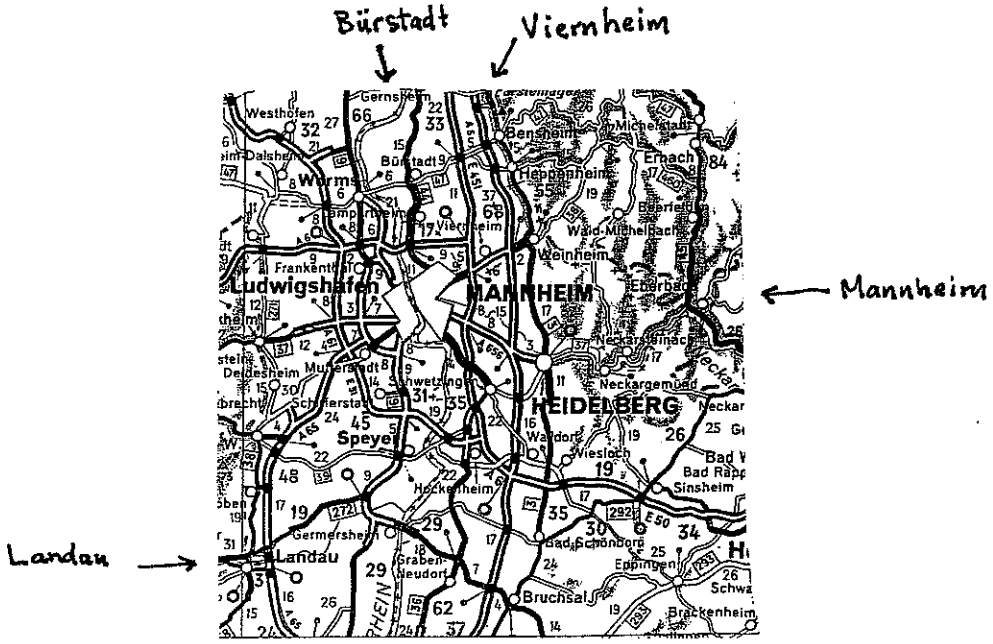


Mannheim is home to Baden-Wurtembourg's largest biomass power plant, using waste wood taken from a 100-km radius area in an environmentally friendly fashion.



The dual benefit of combined heat and power. The geothermal power station in Landau generates electricity for 6,000 households and heat for a further 300.

The "Sunspot" in Bürstadt. Since April 2005 the quiet little town of Bürstadt has been home to the world's largest photovoltaic (PV) installation on a single roof – as large as eight football fields.



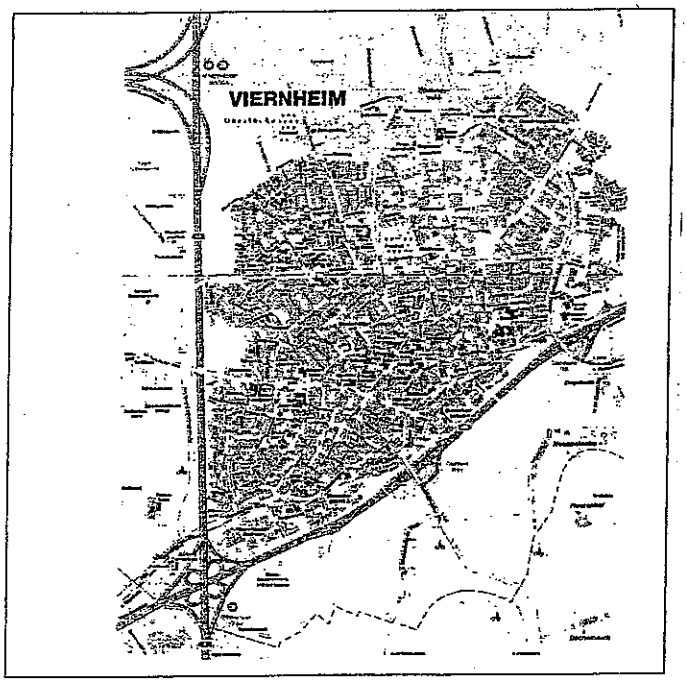
Document 1: City profile : Viernheim, Germany

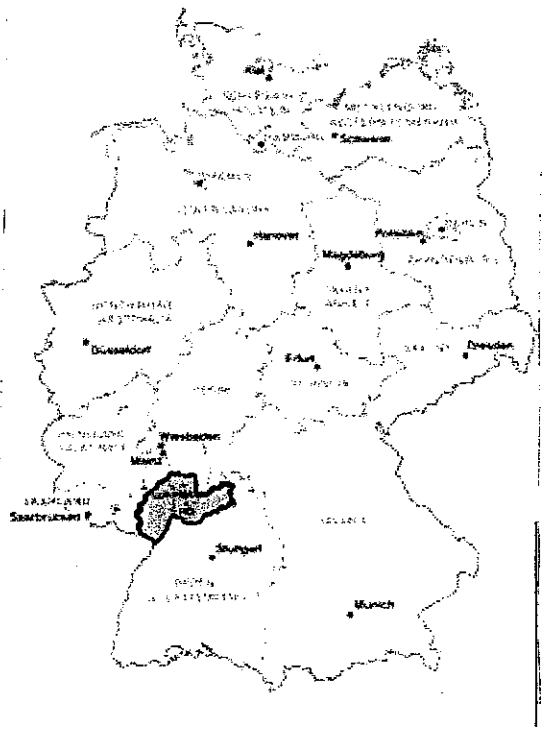
The city of Viernheim is located at the northern edge of the densely populated Rhein-Neckar urban region, which is heavily exposed to atmospheric pollutants.

Number of households: 12,000
Electricity consumption per year: 6 Megawatts
Nearest large cities: Mannheim, Heidelberg

Relevant political, socio-economic, environmental background: Surrounded by two motorways and a secondary road and thus exposed to 120,000 vehicles daily, people here have long been sensitized with regard to environmental aspects. At least within the city itself it was planned to create a contrast to the heavy pollution from outside. At the beginning of the 1980's, local government politicians, administration, and the population set the path for an eco-sensitive urban development, a sustainable climate protection strategy, and an efficient energy policy. The public utilities built the first co-generation units and (...) launched subsidy programmes for solar plants, low-energy buildings and conversion to district heating. The revised traffic plan established the objective of reducing and slowing down traffic. The first ecological settlements with low-energy buildings evolved.

From the abstract for the ICLEI conference in Rovigo, Italy, 2008.





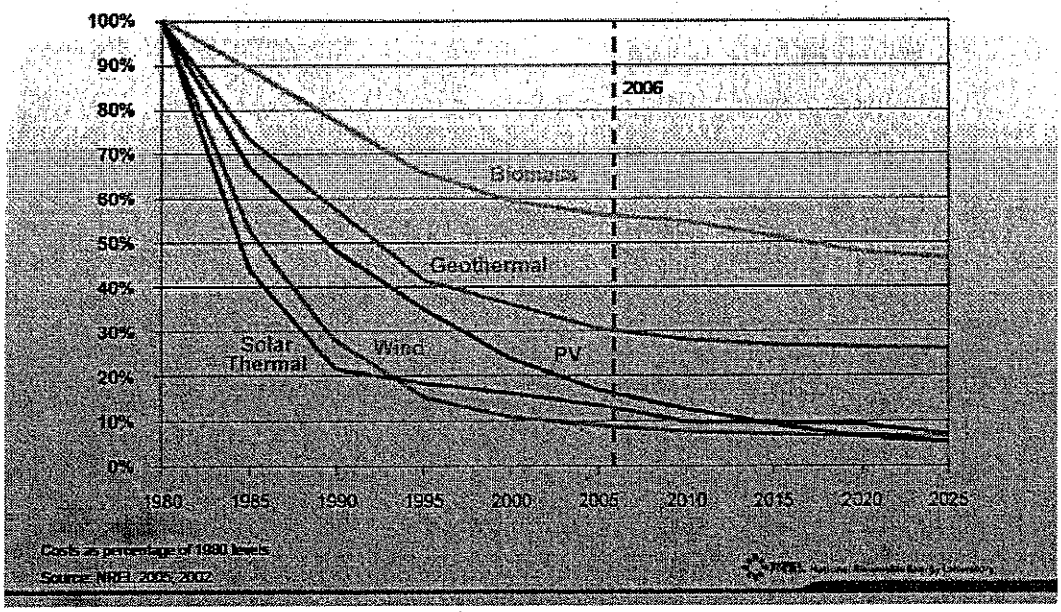
Document 2: Comparative data file

	Mannheim biomass power plant	Landau geothermal plant	Bürstadt solar power plant
Output	20 megawatts electrical power on average over a year	2.9 megawatts electrical power on average over a year + up to 6 megawatts heat	5 MW of installed capacity (in top favourable conditions: bright sun, no cloud, no shadows, not too hot, etc.)
Supply	electricity for 50,000 households	electricity for 6,000 households; heat for 300 households	electricity for 2,000 households on average
Availability of fuel in the area	120,000 m3 waste wood (wood chips) per year, taken from 100-km radius area	large reserve of subterranean thermal water in the Rhine rift valley; inexhaustible and constantly available.	ideal climatic conditions for solar energy in southern Germany
Initial investment cost	19.6 million euros (980 euros / kW)	15.2 million euros (5,200 euros / kW)	23 million euros (5,500 euros / kWh) privately financed, partly by leading operator of photovoltaic installations.
Price of electricity	30-35 eurocents / kWh	13 to 20 eurocents / kWh	49 eurocents / kWh; expected to be 23 cents by 2020 compared to 28 cents for conventional power
CO2 savings and sustainability	• about 100,000 metric tons CO2 saved / year compared to German average electricity consumption; • carbon-neutral fuel 25% of which is delivered by rail for reduced road traffic in area.	about 5,800 metric tons / year	3,000 metric tons / year; No harmful emissions
Technological assets	Harmful substances in released flue gases are destroyed by high temperatures in the boiler or filtered out by other procedures	• Dual benefit of the combined heat and power system (co-generation); • High potential for development.	• Can be easily connected to the public electricity grid • Capital invested will be recovered after 12 years
Constraints	Dependent on availability of local wood waste to reduce transport costs	• Exact geological conditions (economically useful water sources) can only be verified when the boreholes are actually drilled into the ground • Slow delivery time currently for drilling equipment and components for power stations.	• Necessity of having a single large available roof surface for maximum benefit (factory workshop, football stadium…) • intermittent nature of sunshine, therefore energy output dependent on weather conditions.

Document 3: Energy costs (current and projected)

A. Conventional power is projected to become more expensive. At a minor increase of 2.5% per annum, the price of power will rise for the private consumer from 19.6 eurocents/kWh today to 28 eurocents/kWh in 2020.

B. Renewable energy projections



Document 4: Employment and turnover in German solar power sector

Market growth has led to the development of a highly dynamic solar-power industry, with 30,000 jobs and turnover of 2 billion euros in 2004, rising to 2.7 billion in 2005. In photovoltaic technology alone, 20,000 people were employed in 2005. Associations involved with solar power are counting on a total of 200,000 jobs over the next fifteen years in Germany.

Document 5: Projections of Renewable Electricity World Net Capacity (in Gigawatts)

Renewable energy	2006	2010	2020	2030
Biomass/Wood (excludes cogeneration)	2.09	2.15	2.46	4.63
Geothermal	2.23	2.56	4.61	6.64
Solar	0.67	1.17	1.47	2.62

Document 6: Projections of Renewable Electricity Carbon Dioxide Emissions Savings (Million Metric Tons Carbon Equivalent per Year)

Renewable Energy	2006	2010	2020	2030
Biomass / Wood	3.63	8.87	7.98	7.55
Geothermal	2.87	3.48	5.59	6.88