The following questions are about fossil fuel energy production.
1. Draw a Sankey diagram for a coal-fired plant. Begin with coal, and end with electricity at the home (include losses at all stages).

A 95.0 MW coal-fired power station is proposed for a city. It is expected to have an efficiency of about 35%, and use a coal with an energy density of 35.0 MJ kg^{-1}.

2. Calculate the mass of coal that must be burned per day to provide the desired output power.

3. How many train cars per day are needed to keep this plant supplied with coal if each car holds 2.5 metric tons (1 metric ton = 1000kg) of coal?

The following questions are about nuclear power.
4. If a nuclear power plant powered by uranium-235 (90,000,000 MJ/kg) has the same output and the same efficiency as the coal-fired plant of the previous problem, how many kg of nuclear fuel will it burn per day? Per year?

5. Discuss the role of the moderator and the control rods in the production of controlled fission in a thermal fission reactor.

The following questions are about hydroelectric power systems.

6. List two positive and two negative points for using a hydroelectric dam in a power grid?

1000 m

25 m

2000 m

55 m
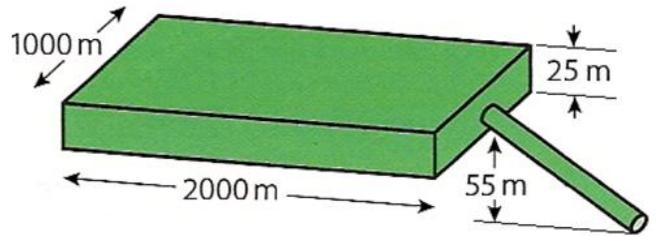
7. Calculate the potential energy yield of this hydroelectric scheme.

8. If the water flow rate is 15 m³ per second, what is the power provided by the moving water?

A wind turbine has a blade length of 14.0 m. Before the air strikes the blades it has a speed of 18.0 ms⁻¹ and a density of 1.15 kg m⁻³. After passing through the blades, the air has a speed of 6.50 ms⁻¹ and a density of 1.45 kg m⁻³. The efficiency of the turbine is 16.2%.

9. Find the power carried by the air before striking the blades.

10. Find the power carried by the air after passing through the blades.

11. Find the power output generated by the wind turbine.

A photovoltaic cell on a calculator has an area of 4.00 cm² and an efficiency of 6.75%. The cell is placed in a position where the sun's intensity is I = 750. Wm⁻².

12. What is the power output of the cell?

13. If the cell is rated at 0.500 V, what is its current output?

14. How many of the cells would you need to supply a current of 10.0 A? How would you connect the cells?

The following questions are about solar heating panels.

15. Distinguish between a photovoltaic cell and a heating panel.