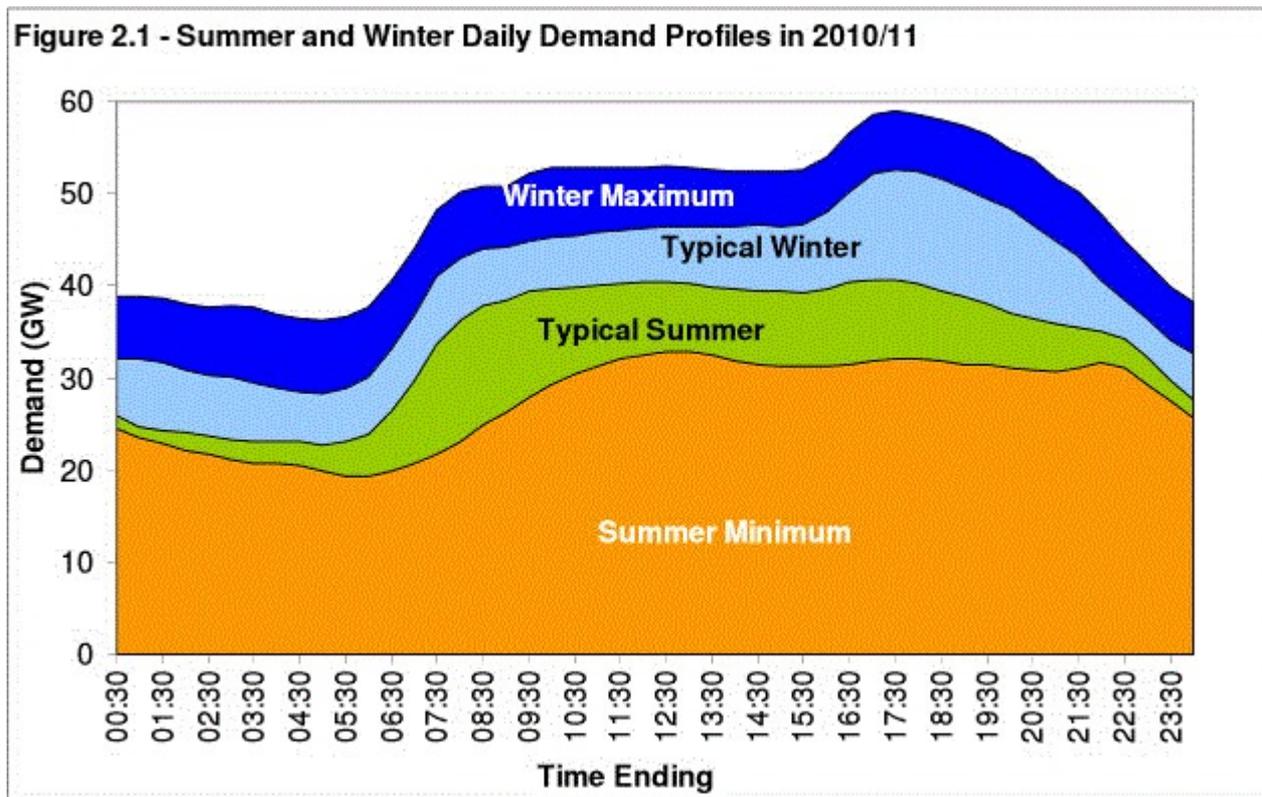
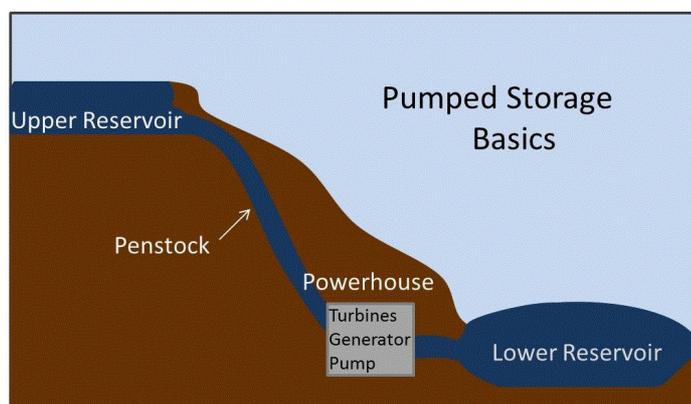


# Questions

## load curves



## Pumped storage



Pumped storage reservoirs aren't really a means of generating electrical power. They're a way of storing energy so that we can release it quickly when we need it.

Demand for electrical power changes throughout the day and if power stations don't generate more power immediately, there'll be power cuts around the country.

However, most of our power is generated by fossil fuel or nuclear power stations which take very long to crank themselves up to full power. This problem could be solved by implementing the use of pumped storage systems. Pumped storage reservoirs are able to go from nothing to full power immediately, keeping us supplied around half an hour until the other power stations catch up.

Q00□ Which of the following is NOT an advantage of pumped storage?

- A. The ability to store large quantities of renewable energy.
- B. Energy is available within seconds.
- C. Very long working life.
- D. No pollution or waste.
- E. None of the above
- No response

- Q01  Which of the following is NOT a disadvantage of pumped storage?
- A. Initial construction costs are more expensive compared to thermal generation.
  - B. Permanent visual impact on the landscape.
  - C. Depends on amount of rain that has fallen
  - D. Not all of the energy stored can be recovered. (Efficiency approx. 70%)
  - No response

- Q02  When is a pumped storage station most likely to be operational?
- A. midnight and midday
  - B. morning and evening
  - C. mornings only
  - D. evenings only
  - No response

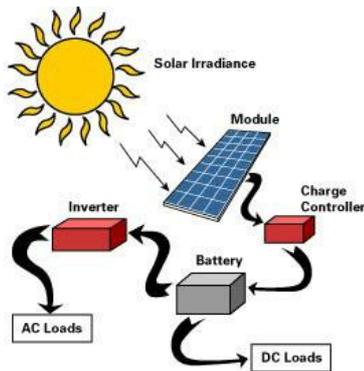
## Wind



Wind turbines feature a number of components, including blades, a shaft, a generator and a tower. The blades look like propellers, except that instead of creating wind, they catch the wind. The shaft is connected to the blades, and it rotates as the blades turn with the wind. The generator transforms the rotations of the shaft mechanical energy into electrical energy.

- Q03  Which of the following is NOT an advantage of wind power?
- A. Its reliable
  - B. Energy from wind is renewable
  - C. It is very useful for remote areas that are not connected to the main electricity grid.
  - D. It produces no greenhouse gases
  - E. Land used for wind farms can usually be used for other things as well (like farming)
  - No response

- Q04  Which of the following is NOT a disadvantage of wind power?
- A. The wind is not always predictable
  - B. Suitable areas for wind farms are often near the coast, where land is expensive.
  - C. Expensive to run
  - D. Can kill birds - migrating flocks tend to like strong winds.
  - E. Generating energy from wind creates noise, so turbines shouldn't be built near houses.
  - No response

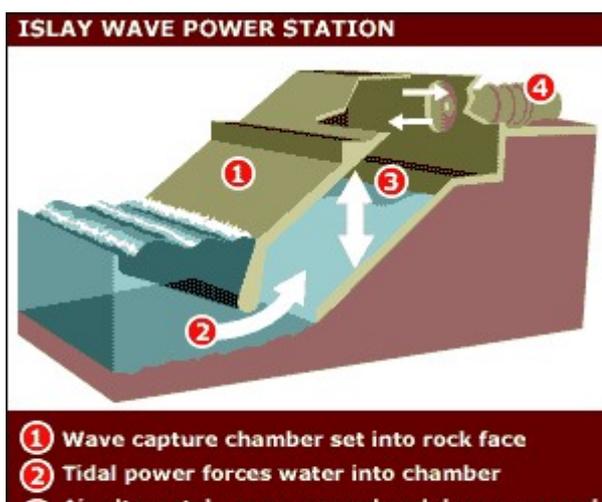


Solar energy is harnessed by the help of photovoltaic cells, also known as PV cells. These cells convert the light energy given off by the sun into electricity. PV cells are primarily made of silicon, which is of semiconductor material. Its job is to absorb sunlight. When combined with one or more other materials, silicon would exhibit electrical properties under the presence of sunlight. The solar energy frees the electrons from their atoms, allowing them to move through the silicon. This occurrence is known as the photovoltaic effect. When the freed electrons, each carrying a negative charge flows towards the front surface of the PV cell, it results in an imbalance of charge between the front and back surface of the cell. This creates a difference in voltage potential similar to that of a battery. The two surfaces are then connected to an external load, allowing electricity to flow.

- Q05  Which of the following is NOT an advantage of solar power?
- A. Solar energy is free!
  - B. Photovoltaic cells require minimal maintenance, resulting in high reliability.
  - C. Does not cause noise pollution
  - D. Land can be used for other activities
  - E. No response

- Q06  Which of the following is NOT a disadvantage of solar power?
- A. Photovoltaic cells cannot work at night when sunlight is absent
  - B. The cost of harnessing solar energy is expensive as the silicon chips used in the photovoltaic cells are very expensive. Moreover, the total cost in buying these solar cells are much more compared to the amount of energy the cells can produce.
  - C. Can only work in countries that receive sufficient amount of sunlight
  - D. Solar panels produce greenhouse gases
  - E. No response

## Wave power



Wave power is derived from energy in ocean waves, which occur due to the motion of wind over the sea. There is a transfer of energy, ultimately from the sun to the sea (via the wind) as wind power is considered as a short-term solar-energy storage. It is a non-polluting and renewable source of energy as it can be replaced rapidly by a certain natural processes, in which this case, involves the power generated from the wind. Because wave power is easily derived from natural processes, it is a flexible source of affordable energy. Wave power devices absorb this energy to generate electricity and can be floating, fixed to the

- ③ Air alternately compressed and decompressed by "oscillating water column"
- ④ Rushes of air drive the Wells Turbine, creating power

sea bed offshore, or constructed at the sea's edge on a suitable shoreline. However, it is not easy to harness this energy and convert it into electricity in large amounts. This is because the waves are irregular in direction, durability and size. Thus, wave power stations are rare.

- Q07  Which of the following is NOT an advantage of wave power?
- A. The energy is free; no fuel needed, no waste produced.
  - B. Expensive to operate and maintain.
  - C. Can produce a great deal of energy.
  - D. Does not contribute towards global warming, or acid rain
  - E. Shelters the coast, useful in harbour areas or erosion zones
  - No response

- Q08  Which of the following is NOT a disadvantage of wave power?
- A. Does not produce enough power
  - B. Unreliable - sometimes you'll get loads of energy, sometimes nothing.
  - C. Needs a suitable site, where waves are consistently strong.
  - D. Some designs are noisy.
  - E. Must be able to withstand very rough weather.
  - No response

## Tidal power



Tidal power is a means of electricity generation achieved by capturing the energy contained in moving water mass due to tides. There are two types of tidal energy: kinetic energy of currents between ebbing and surging tides, and potential energy from the difference in height (or head) between high and low tides. The former method is considered much more feasible today than building ocean-based dams or barrages, and many coastal sites worldwide are being examined for their suitability to produce tidal (current) energy. Tidal power is classified as a renewable energy source, because tides are caused by the orbital mechanics of the solar system and are considered inexhaustible within a human timeframe. The root source of the energy comes from the slow deceleration of the Earth's rotation. The Moon gains energy from this interaction and is slowly receding from the Earth. Tidal power has great potential for future power and electricity generation because of the total amount of energy contained in this rotation. Tidal power is reliably predictable (unlike wind energy, wave energy and solar power). The construction of these tidal power stations cost a lot and they work best in high tides which cannot be guaranteed. Therefore, there are few tidal power stations in the world.

- Q09  Which of the following is NOT an advantage of tidal power?
- A. It produces no greenhouse gases or other waste, or pollution.
  - B. It needs no fuel.
  - C. It produces electricity reliably.
  - D. Not expensive to maintain.
  - E. Tides are totally predictable.
  - G. Offshore turbines and vertical-axis turbines are not expensive to build and do not have a large environmental impact.
  - H. None of the above
  - No response

- Q10  Which of the following is NOT a disadvantage of tidal power?
- A. A barrage across an estuary is very expensive to build, and affects a very wide area,<sup>3</sup>the environment is changed for many miles upstream and downstream.
  - B. Many birds rely on the tide uncovering the mud flats so that they can feed. There are few suitable sites for tidal barrages.
  - C. Tidal power will eventually run out
  - D. Only provides power for around 10 hours each day, when the tide is actually moving in or out.
  - No response

## Hydroelectric power



Fast-flowing water released from dams in mountainous areas can turn water turbines to produce electricity. While it doesn't cause pollution, there are many other environmental impacts to consider such as fish breeding, loss of wildlife habitat and changes in water flow of rivers. When large dams are built the flow of the dammed river is changed radically and large areas of land are flooded, including wildlife habitats and farming land.

[Click here for a more detailed explanation of how a hydroelectric dam works.](#)

Hydroelectric power supplies 20% of world electricity. Norway produces virtually all of its electricity from hydro, while Iceland produces 83% of its requirements, Austria produces 67% of all electricity generated in the country from hydro. Canada is the world's largest producer of hydro power and produces over 70% of its electricity from hydroelectric sources.

- Q11  Which of the following is NOT an advantage of HEP?
- A. It is renewable
  - B. Hydroelectricity produces no gas emissions or waste.
  - C. It is more reliable than solar and wind power, because water can be stored and there is more of it, more often available.
  - D. Hydroelectric stations are inexpensive to operate.
  - E. Expensive to build
  - No response

- Q12  Which of the following is NOT a disadvantage of HEP?
- A. The dams are very expensive to build.

- B. It is unreliable
- C. Building a large dam will flood a very large area upstream, causing problems for animals that used to live there.
- D. Finding a suitable site can be difficult - the impact on residents and the environment may be unacceptable.
- E. Water quality and quantity downstream can be affected, which can have an impact on plant life.
- No response

**fuel or renewable?**

Q13

Energy resource	Type	How we use it	Present supply	UK reserves
Coal	<input type="text"/>	electricity, other	11%, 6%	50–100+ years
Gas	<input type="text"/>	electricity, domestic, industrial	12%, 16%, 14%	20–40 years
Nuclear	<input type="text"/>	electricity	7%	imported
Oil	<input type="text"/>	electricity, transport, industrial	<1%, 24%, 8%	30–40 years
Geothermal	<input type="text"/>	electricity, heating		–
Hydro-electric	<input type="text"/>	electricity	<1%	–
Solar	<input type="text"/>	electricity, heating	–	–
Tidal	<input type="text"/>	electricity	–	–
Waves	<input type="text"/>	electricity	–	–
Wind	<input type="text"/>	electricity	1%	–