verifica la comprensione

Leggi il brano e rispondi alle domande.

Wind power

Wind power is considered a renewable energy source. Historically, wind power in the form of windmills has been used for centuries for such tasks as grinding grain and pumping water. Modern commercial wind turbines produce electricity by using rotational energy to drive a generator. They are made up of a blade or rotor and an enclosure called a nacelle that contains a drive train atop a tall tower. Large wind turbines (producing up to 1.8 megawatts of power) can have a blade length of over 40 metres and be placed on towers 80 metres tall. Smaller turbines can be used to provide power to individual homes. Wind farms are areas where a number of wind turbines are grouped together, providing a larger total energy source.

Wind resources are calculated based on the average wind speed and the distribution of wind speed values occurring within a particular area. Areas are grouped into wind power classes that range from 1 to 7. A wind power class of 3 or above (equivalent to a wind power density of 150-200 watts per square metre, or a mean wind of 5.1-5.6 metres per second) is suitable for utility-scale wind power generation, although some suitable sites may also be found in areas of classes 1 and 2. In the United States there are substantial wind resources in the Great Plains region as well as in some offshore locations. As of 2007 the largest wind farm in the world was the Horse Hollow Wind Project in Texas, which produces 730 megawatts. By comparison, a typical new coal-fired generating plant averages about 550 megawatts.

By the early 21st century, wind was contributing slightly more than 1 percent of the world's total electricity, and electricity generation by wind has been increasing dramatically because of concerns over the cost of petroleum and the effects of fossil fuel combustion on the climate and environment. From 2004 to 2007, for example, total wind power increased from 59 to 95 gigawatts worldwide. Germany possesses the most installed wind capacity (16.6 gigawatts), and Denmark generates the largest percentage of its electricity from wind (nearly 20 percent). The wind power industry estimates that the world could feasibly generate 12 percent of its total electricity from wind power by 2020. Various estimates put the cost of wind energy between 3 and 12 cents per kilowatt-hour, depending on the location. This is comparable to the cost of fossil energy. (The cost of coal-generated electricity is estimated at 4-8 cents per kilowatt-hour.)

Challenges to the large-scale implementation of wind energy include siting requirements such as wind availability, aesthetic and environmental concerns, and land availability. Wind farms are most cost-effective in areas with consistent strong winds; however, these areas are not necessarily near large population centres. Thus, power lines and other components of electrical distribution systems must have the capacity to transmit this electricity to consumers. In addition, since wind is an intermittent and inconsistent power source, storing power may be necessary. Public advocacy groups have raised concerns about the potential disruptions that wind farms may have on wildlife and overall aesthetics.

For example, the first proposed offshore wind farm in the United States, the Cape Wind Project located off the coast of Cape Cod in Massachusetts, has been opposed by residents concerned about the natural landscape. In addition, wind generators have been blamed for injuring and killing birds; however, experts have shown that modern turbines have a small effect on bird populations. The National Audubon Society, a large environmental group based in the United States and focused on the conservation of birds and other wildlife, is strongly in favour of wind power, provided that wind farms are appropriately sited to minimize the impacts on migrating bird populations and important wildlife habitat.

(www.britannica.com)

a) How was wind power used in the past? How is electricity produced by modern commercial wind turbines?
b) Why and how has electricity generation by wind increased since the beginning of the 21st century?
c) What are wind farms and what problems does the installation of a wind farm involve?