Answers to the Most Commonly Asked Questions about Electricity

Electricity is the most versatile form of energy. But it's also the most mysterious. We can't see it. We can't smell it. We can't hear it. Here are answers to some of the questions people often ask about electricity.

1. Where does electricity come from?

   Electricity is electrons in motion. It occurs in nature in the form of lightning, electric eels, and even the small shock you sometimes get when you touch a doorknob. Most of the electricity we use in our everyday lives is made in a power plant by spinning a magnet inside coils of wire. This puts electrons in motion and creates a flow of electricity. It's made the same way, whether it's produced in a small coal burning power plant or the most modern nuclear plant.

2. What's an electron?

   It's a very, very small particle of an atom carrying a tiny electrical charge. (To give you an idea of its size, it takes six billion electrons to light a 100-watt light bulb for a single second.)

3. How does an electric eel make electricity?

   The electric eel has a battery that extends most of the length of its body. The battery has a great number of "electric plates" that chemically manufacture electricity. When the eel want to discharge this natural battery, he can produce enough electricity to stun a horse.

4. What's the difference between voltage and amperage?

   Electric current is the flow of electrons. Amperage is the amount of flow. And voltage is the amount of pressure behind the flow.

5. Why doesn't a bird get electrocuted when it lands on an electric line?

   Because it only lands on one wire. Electricity takes the path of least resistance. It's simply easier for the electricity to continue along the metal wire than it is for it to enter

the bird. But, if the bird landed on two wires with different voltages, the electricity would flow through the bird from the wire with the higher voltage to the wire with the lower voltage, and the bird would be electrocuted.

6. Does the human brain produce electricity?

   Not only the brain, but the entire body produces electricity through chemical reactions in the cells. The body is a highly complex electrical system with the brain functioning as the control and switching center. Most everything we see, hear, smell, taste and feel is the result of tiny electrical signals sent to the brain from various parts of the body.

7. What is static electricity?

   Static electricity is electricity that is “standing still”. Every substance in nature has atoms. And every atom has electrons. But some atoms can have too many electrons, and some atoms, not enough. If a substance doesn’t have enough electrons, it is positively charged. If it has too many, it has a negative charge of electricity.

8. Why do I sometimes get a shock when I touch a doorknob?

   Because of static electricity. When your feet rub against a surface such as a carpet, your body can pick up or lose electrons. If your body builds up a surplus of electrons and your hand comes near something that doesn’t have enough electrons (such as a doorknob), the electrons will leap from your hand to the doorknob, causing a small shock. (If your body doesn’t have enough electrons and the doorknob has too many, the electrons will jump from the knob to your hand.)

9. Is static electricity ever dangerous?

   One form of static electricity can become very dangerous, lightning. During a storm, the sky churns and builds up a concentration of electrons in certain places. When the electrons build up massive voltage, they will suddenly leap from one cloud to another cloud (of lower voltage) or from a cloud to the ground and cause a flash of lightning.

10. Why is there so much static electricity in clothes when I take them out of the dryer?

    There is a lot of tumbling and rubbing back and forth of clothes in the dryer. This builds up an electric charge just like scuffing your feet on the carpet. The very dry atmosphere of the dryer makes it difficult for the electric charge to leave the clothes.

11. How is electricity made?

    Electricity is made by spinning a magnet inside coils of wire. This is the principle of the electric generator, which provides 99% of the electricity used in the world. The

generator consists of two main parts: a rotating part called a “rotor,” which is essentially a massive magnet; and a stationary part called a “stator,” which is essentially coils of copper wire surrounding the rotor. When the rotor rotates, the copper wire has a changing magnetic field penetrating it, and electricity is produced.

12. What fuels can be used to make electricity?

Any energy source. Today, about 45% of electricity produced in the United States is produced by burning coal. But anything that can spin a turbine can be used to make electricity. We can burn oil or gas to boil water to make steam to turn the turbine. We can use the heat from nuclear reaction to make steam. We can use the natural steam locked inside the earth or we can use the pressure of falling water to turn the turbine.

13. Why can’t all the electricity be made from waterfalls and dams?

There simply aren’t enough large waterfalls or dam sights in the country. So, waterpower is used to produce only about 13% of electricity in the United States. This is unfortunate because it is one of the most efficient ways to make electricity.

14. How long will our coal and oil last?

Nobody knows exactly, because there are still some coal and oil deposits left to be discovered. However, we do know that oil is in short enough supply that we would be wise to conserve it. Our supply of coal is abundant; enough to last for hundreds of years, however, not all of this coal is clean-burning. And not all of it is easily mined.

15. Why isn’t somebody looking for some other way to make electricity?

They have been. Long before the oil shortage, thousands of engineers and scientists were looking for new ways to make electricity. Some of these new ways are in operation today. Nuclear power, for example. Work is also continuing on new kinds of nuclear power. (Nuclear fusion, and the fast-breeder reactor that will make more fuel than it uses.) Other ideas are still under study; wind power and solar power, for example. Unfortunately, even the most optimistic estimates place the practical use of these ideas far into the future.

16. Is nuclear electricity more dangerous than regular electricity?

No. Actually, there’s no such thing as nuclear electricity. All electricity is exactly the same. It doesn’t matter what energy source is used to make the electricity.

17. How does a nuclear power plant make electricity?

A nuclear plant makes electricity in much the same way any power plant does. It boils water to make steam to turn the turbine to make the electricity. The difference is it uses the heat from nuclear reaction instead of fire to boil the water.

18. What's the difference between nuclear fission and nuclear fusion?

Nuclear fission is the splitting apart of heavy atoms. Nuclear fusion is the joining together, or fusion, of light atoms. Both release enormous amounts of energy. All of the nuclear plants today operate by nuclear fission. It probably won't be commercially practical within this century.

19. What are the chances of a nuclear power plant blowing up?

It is physically impossible for a nuclear plant to blow up like a nuclear bomb. But, when some people hear the word "nuclear", they immediately think of a nuclear bomb. Actually, nuclear bombs and nuclear plants are very different. The arrangement and dilution of nuclear plant fuel prevent any possibility of explosion.

20. Doesn't a nuclear plant release dangerous amounts of radioactivity in the air?

No. Nuclear power plants are designed to give off practically no radiation. In fact, even if you lived next door to a nuclear plant, you'd receive only a fraction of the radiation you already get from nature almost anywhere on earth. (Surprisingly, you'd actually receive more radiation during on flight across the county in a jet liner than you'd get in a year living next to a nuclear plant.)

21. What is done with the radioactive fuel after it's been used?

All but a small portion of this fuel will be recycled to make more nuclear fuel. The unused waste will be reduced to a dry, solid form for careful storage and monitoring at federal repositories.

22. What is "Thermal Pollution"?

"Thermal pollution" is the term sometimes used to describe the warming of water as it passes through power plants. It's not entirely accurate to call it "pollution," because this warmer water isn't necessarily a problem. (Some marine life actually thrives in the warmer waters near power plants.) Usually, the temperature in the surrounding waters is raised only a few degrees. In areas where heat discharge has been a problem, utilities have sometimes spent millions of dollars on cooling towers, ponds, and canals.

23. Why can't electricity be made from the sun?

It can. But right now, it's a very expensive and not very practical proposition. One of the problems is that the sun spreads its energy over a very wide area. To capture useful amounts of this energy, we would have to build enormous solar collectors. The solar collectors would have to be at least ten square miles in area to produce the electricity we get from a modern 1000-megawatt power plant. Another problem is that we need electricity 24 hours a day, and the sun doesn't shine 24 hours a day. (There is no practical way electric current can be stored. It has to be used as it is made or converted into other forms of energy.)

24. Don't batteries store electricity?

Not actually. Batteries make electricity through chemical reactions. In an auto battery, for example, different reactions at the two poles of the battery provide a flow of electrons from one pole through the starter to the other pole. When the chemical reactions are complete, the battery is "dead" and must be charged.

25. What happens when I recharge a battery?

When you connect a storage battery to an outside electrical source, electrons flow through the battery. This regenerates the chemicals and recharges the battery.

26. Why don't I get a shock when I touch a battery?

A small dry-cell battery, such as a flashlight battery, simply doesn't have enough voltage to give a shock. However, under certain conditions, a large wet-cell battery, such as your car battery, could give a serious shock. (If you touched both poles simultaneously with wet hands, for example.)

27. Why does my car battery have less power in cold weather than warm weather?

For two reasons: 1) The chemical reaction that sets the electrons free is much slower in cold weather. 2) Your battery seems to have less power because it takes much more power to start an engine in cold weather than warm weather.

28. What's the difference between a battery and a fuel cell?

The fuel cell is a first cousin to the battery. The battery produces electric current from a built-in supply of chemicals until it goes "dead". On the other hand, the fuel cell continuously receives fuels such as kerosene and oxygen from outside tanks. The two fuels react with each other inside the cells to produce a current of electricity.

29. What don't they make electric cars?

Several companies are making electric cars today, but current models are limited in both speed and range. They have a top speed of about 65 mph and range of about 60 miles between battery charges. New types of long-range batteries are being developed.

30. Can I get hurt touching appliances during a thunder and lightning storm?

It's not very likely, but it is possible. If lightning should strike very near your house, there is a chance of a powerful, momentary surge of electricity in the wiring of your home. If this happens, there is a slight chance that even a well-insulated appliance could deliver a serious shock, especially if you are well grounded (standing in water or touching a metal pipe, for example). You can help protect yourself by equipping your home with a device called a home lightning protector.

31. What happens to the electricity that gets to my house if I don't use it?

The same thing that happens to the water that gets to your house that you don't use. It waits patiently at the outlet until you turn something on that lets it flow and be useful.

32. Can electricity leak out of electric sockets?

No. The air between the two contacts of the socket actually blocks the flow of electricity. Unless the socket is damaged, or there is some sort of electrical short circuit, the only way the electricity can get out of the socket is when something is plugged into the socket. This completes the electric circuit and allows the electricity to flow from the outlet.

33. I was on a month's vacation and my home still used electricity. Why?

Think back. Were any appliances still running? The refrigerator, freezer, clocks? Even if everything had been shut off, you could still be billed for electricity. Some utilities read the meter only occasionally and average the cost over several months. If you were on vacation in August, for example, you may have been billed for part of July and September's electricity.

34. Don't things like the electric slicing knife and toothbrush waste a lot of electricity?

Not really. The electric slicing knife uses about two cents worth of electricity a year. A continuously charging electric toothbrush uses about 30 cents worth a year.

35. Will America ever run out of electricity?

Not if we plan ahead. Electricity is simply the movement of electrons. But we don't have a limitless force to move the electrons. That's why we have to keep making the wisest possible use of all our present and future fuels, keep building more power plants, keep looking for new and more efficient ways to move the electrons, to make sure there will always be all the electricity America will ever need.