UNIT 7-POWER PLANTS

TRANSLATION

LARGE/BIG/GREAT/HIGH AMOUNTS OF ELECTRICITY/power CANNOT BE GENERATED/produced UNLESS (*No se pueden generar grandes cantidades de electricidad a menos que*) a coil rotates in a magnetic field and that **IS DONE BY MEANS OF A TURBINE** (*se hace mediante una turbina*) connected to a generator. The turbine converts the kinetic or thermal energy of a flowing fluid **INTO** useful rotational energy. A generator contains the stator, **WHICH IS THE MAGNET** (*que es el imán*) and a rotor, **WHICH IS THE COIL** (*que es la bobina*).
WHEN/as THE ROTOR TURNS/SPINS/rotates (*Cuando gira el rotor*) the wires cut the lines of force in the magnetic field of the stator **(THUS/this way) PRODUCING AN ALTERNATING CURRENT** (*produciendo una corriente alterna*). The enormous size of modern generators and the speed **AT WHICH** (A LA QUE) the rotor can turn mean that electric power of very high voltage can be produced. **AS MUCH AS HALF A MILLION VOLTS** (*Tanto como medio millón de voltios*) can be transmitted over high voltage lines to substations **IN WHICH/where VOLTAGE IS REDUCED/DECREASED/LOWERED BY (MEANS OF/by using/with (the aid/help/assistance of)** (*en las que se reduce el voltaje mediante transformadores*).
The rotor is turned **BY** a turbine, a huge machine moved by water or **VAPOUR/STEAM IN POWER PLANTS** (*vapor en las centrales eléctricas*).
There are different types of power plants **ACCORDING TO/ON THE BASIS OF/DEPENDING ON THE ENERGY SOURCE/source of energy (THAT/WHICH IS) USED** (*según la fuente de energía que se use*) to move the turbine. By far, the most important sources of power are those produced by **THE CHEMICAL ENERGY OF FOSSIL FUELS, LIKE/SUCH AS OIL OR COAL** (*la energía química de los combustibles fósiles, como el petróleo o el carbón*), nuclear energy and the potential energy of waterfalls.
Fossil-fueled power plants contain a boiler, **WHICH WORKS LIKE** (*que funciona como*) a big kettle.
AFTER BEING HEATED (UP) TO A CERTAIN/SPECIFIC/PARTICULAR/GIVEN TEMPERATURE (*Después de ser calentado hasta una determinada temperatura*), the steam is passed through small holes, increasing the speed of the water molecules. The fast moving molecules hit the blades of the turbine and **MAKE IT TURN/ROTATE/SPIN** (*hacen que gire*).

To HEAT-HEATED – rise temperature
To HIT-HIT-HIT- strike

ORAL PRACTICE

VIDEO: COAL POWER PLANT

1.Where is half of world's electricity generated? **IN COAL POWER PLANTS**

2.How many CPP are there in the world? **CLOSE TO 3000**

3.The video shows how this controversial **YET** indispensable PPs work, i.e. how **TO CONVERT** the energy stored in the **COAL TO ELECTRICITY**

4.To increase burning efficiency, a **POWDER COAL** and air **MIXTURE** enters the furnace

5. **DURING THE BURNING PROCESS,** the chemical energy stored in the coal is released **AS HEAT** to create **HIGH TEMPERATURES INSIDE** the furnace.

6.This **HEAT** passes to the water **INSIDE THE COILS/PIPES** located in the furnace.

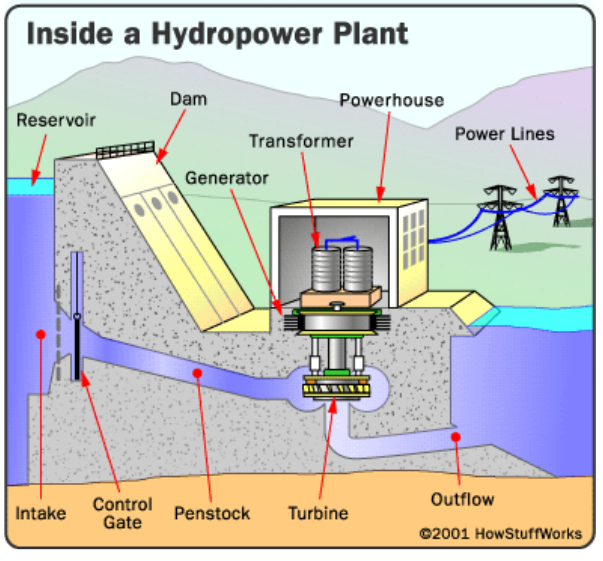
7.The **HOT WATER** is then forced to move to **THE BOILER** where it evaporates and **GENERATES HIGH PRESSURE STEAM**.

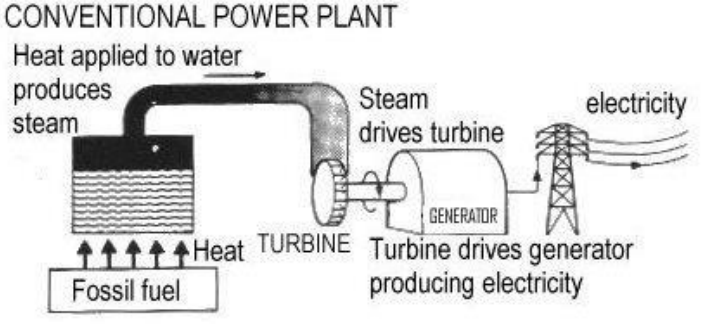
8.The high-pressure steam **IS TAKEN TO** the steam turbine

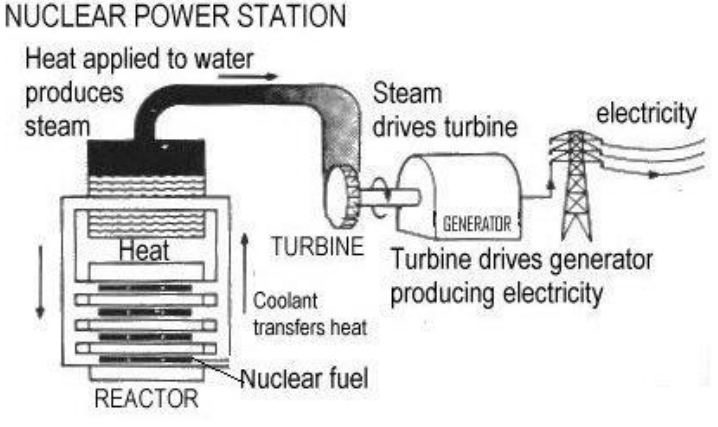
9.The energy inside the steam **IS CONVERTED TO MECHANICAL ENERGY**.

10.This mechanical energy is then transferred **TO THE GENERATOR** where it will **BE CONVERTED TO ELECTRICITY**

11.The generated electricity is **FINALLY** transferred to the grid through a **TRANSFORMER** and is ready to **BE CONSUMED** by the public







WRITING
CONVENTIONAL POWER PLANTS
Write an essay (max. 200 words) **comparing** the **processes** taking place in the **different types of POWER PLANTS** below, and mention **advantages** and **disadvantages** of each**. Include and UNDERLINE**

SPITE INSTEAD WHEREAS DUE BESIDES PREVENT(+VB)
IN ORDER ALTHOUGH ALLOW(+VB) RESULT (VERB)

The **SEQUENCE EXPRESSIONS** on page 122 will also help you

EXPRESSING SEQUENCE (from page 122)

First / Firstly / First of all	.... begins /commences with / starts with	Finally / Eventually
In the first step / stage	The first step / stage is	At the end of the process
To begin with		In the last stage
Secondly,	After this,	
Later, / Afterwards	The next step is ...	
Then, / Next,	In the next stage,	... finishes / concludes with
Subsequently	In the following / next stage	The last step / stage is ....
So far,		
Up to now		
Beforehand	Before this	
Previously,	Prior to this	
Earlier,	In the preceding / previous / former stage	
At the same time,	During	
Simultaneously,	While ...	
Meantime / Meanwhile	As ...	
In the meantime	When ...	

Other useful expressions are:

- To take place
- To carry out
- To occur / happen
- by means of ...
- (by) using ...
- With the help of ...
- One method for /way of ... (+ verb in –ING) .... is to ....

GRAMMAR: verb tenses

NUCLEAR ENERGY

Nuclear energy is the energy **RELEASED** (RELEASE) through the fission or fusion of atomic nuclei. In the process **KNOWN** (KNOW) **AS** nuclear fusion two light atoms join together **UNDER** conditions of extreme **HEAT** and **PRESSURE** (at **LEAST** 50,000,000 degrees Celsius) until they merge, forming a new nucleus **WHOSE** mass is only slightly smaller **THAN** the total masses of the nuclei that **FUSE/ARE FUSED** (FUSE). The opposite process is nuclear **FISSION** which **MEANS** (MEAN) “splitting apart” or “dividing”. If either nuclear fusion or fission **TAKES** place quickly, the result is a sudden release of **ENERGY** but so far the only one **THAT** can **BE SLOWED** (SLOW) down and **CONTROLLED** (CONTROL) is fission.

Nuclear fission is the splitting of the nucleus of an atom; however, only a few elements are suitable **FOR** use **IN** this way, the most important ones **BEING** (BE) U-235, U-233 and Pu-239. When one of **THESE** elements is **STRUCK** (STRIKE) by a free neutron, **IT BREAKS** (BREAK) down **INTO** two lighter nuclei, **WHICH** fly apart **AT** high speeds, colliding **WITH** surrounding atoms. This kinetic energy **IS CONVERTED** (CONVERT) **INTO** heat. **AT** the same time, two or three more neutrons **ARE RELEASED** (RELEASE) and one of **THEM** enters the nucleus of a neighbouring atom, causing fission **TO OCCUR** (OCCUR) again, and so on. The reaction **SPREADS** (SPREAD) very quickly with more and more energy **RELEASED** (RELEASE). This **IS REFERRED** (REFER) to as **A** “chain” reaction because the splitting of each nucleus **IS LINKED** (LINK) to another and another and another.

If this reaction **IS UNCONTROLLED** (UNCONTROL), the result is an atomic explosion like **THE ONE CAUSED** (CAUSE) by the atomic bombs of Hiroshima and Nagasaki. However, the reaction can **BE SLOWED** (SLOW) down and that is **WHAT** happens in a nuclear reactor or pile. Here the highly fissile material **IS SURROUNDED** (SURROUND) **BY** a substance that is non-fissile, **FOR** instance, graphite. This material IS **CALLED** (CALL) A moderator. The neutrons **LOSE** (LOSE) some of **THEIR** energy through **COLLIDING** with the atoms of the moderator and no expansion **IS PRODUCED** (PRODUCE). The moderator has a second function: by **SLOWING** (SLOW) down the speed of the free neutrons, **IT** makes it more likely that one neutron will collide **WITH** the nucleus of a neighbouring atom to continue the chain **REACTION**

The major advantage of nuclear energy is that it **DOES NOT DEPEND** (NOT DEPEND) **ON** any local factors. A nuclear reactor, **UNLIKE** conventional power plants, **DOES** not have **TO BE BUILT** (BUILD) near a fossil-fuel source, nor does it depend **ON** a large flow of water **WHICH** may **BE REDUCED** (REDUCE) during some seasons of the year.

GRAMMAR REVISION

THE NUCLEAR REACTOR

Salto de página

The nuclear reactor is the place **IN** which a fission ..... reaction **TAKES** place. It contains sufficient fissionable material distributed in **THE** form of rods to produce the appropriate result. The reactor consists **OF** a fuel, a moderator and **A** cooling system. An instrument releases a free neutron **WHICH** strikes the nucleus of an atom of U-235. The nucleus breaks releasing other free neutrons which collide **WITH** other nuclei and split, and so on.

However, if no explosion occurs**, IT** is because the pile **IS** moderated **BY** a non-fissionable material such **AS** graphite or heavy water. This absorbs most **OF** the free neutrons and prevents them **FROM** splitting too **MANY** nuclei too quickly. The process releases great **AMOUNTS** of energy in the form of heat. This heat is then used to boil water and the steam produced can be **USED** to generate electric power.

As the fuel becomes extremely radioactive during **.....ITS.....** (SU) use inside the reactor, when **....IT.....** is taken out of the vessels, **..IT.....** is stored in the fuel pools, where it is cooled for a period of time, in general more **.....THAN.....** a year, before sending **....IT.....** to the processing plant.

VIDEO: THE NUCLEAR REACTOR

This is a pellet of simulated URANIUM the exact SIZE that is USED in the fuel rods. This TINY pellet CONTAINS more ENERGY than 6 car loads of coal. We have 20 MILLION of these pellets INSIDE the reactor vessel. We call it the CORE. Around the core, of course, there is WATER. WATER is used as a COOLANT. Now, inside the fuel is another set of rods called the CONTROL RODS. These rods actually control the NUCLEAR REACTION. What happens is this: when the core is put on line, that is when it is ACTIVATED, the control rods are lifted out; with them gone, the NUCLEAR FUEL sets up a CHAIN REACTION that PRODUCES a tremendous AMOUNT of HEAT, that BOILS the WATER, that turns to STEAM, that TURNS the TURBINE, that turns the GENERATOR, that PRODUCES ELECTRICITY. That´s it.

Salto de página**LISTENING**

COMPARISON OF NUCLEAR ENERGY WITH CONVENTIONAL METHODS

What do you want to know about energy generation?

We've heard so much these days about different **fuels** and **processes**. We've been told that **nuclear power** is more efficient than conventional **fossil fuels** and we know that **fossil fuels** are limited. How can we compare the efficiency of the different fuels and processes?

-Well, first of all, what types of fuel do you know? **Conventional fossil fuels, i.e., oil, coal and gas, and nuclear fuels, i.e., uranium and plutonium.**

-Right, and what processes do you use? Well, I know there different **nuclear reactors** and different conventional **processes**.

-Well let's imagine a bucket of fuel? What exactly do you mean? How much does a bucket hold?

-Say a bucket holds **10 kg** How long does a bucket last?

That depends on the type of fuel and the type of process. Let's look at the **2 million Kw power station**. How many megawatts does this make?

2 million kw make **2,000 megawatts**

-So which fuel produces the most energy? That's **nuclear fuel**

-Which process does this use? It uses the most efficient nuclear process, which **converts** all the matter in this fuel into **energy**.

-So, how long will it last? You will be surprised when I tell you that it may last **8 ½ years**. In fact, you will be very surprised if you compare it with the **hydrogen fusion reactor**.

- How long does a bucket of fuel last if you use that process? **Only two weeks**

- Only two weeks, there is certainly an incredible difference

- The next process is a **fast reactor**. After just a week. And now we come on to **natural uranium**. And when will that fuel stop producing energy?

After **three days**. Now let's look at **conventional fossil fuels**, shall we? How long do you think a bucket of oil will last? **One hour**?

-Well, nearly. In fact it will last **1/18 (one eighteenth) of a second**. And the same goes with **coal**. So which country today produces most electricity using nuclear energy? 1/1800 one eighteen hundredth

-Well, In Europe, **France**, and then West Germany.

Contrary of others materials, the iron can be given as example of a metal that corrodes easy

Contrarily to/By contrast to/Unlike other materials, iron can be given as AN example of (a) metal corroding/that/which corrodes easily – that is easy to corrode

In regard to the plastics, they can to be shape as times as needed

Regarding/As regards/with regard to plastics, they can be reshaped as MANY times as needed/ /as much as needed

VIDEO: CHERNOBYL- 5 YEARS LATER

The giant STEEL AND CONCRETE coffin containing the remains of NUCLEAR POWER STATION N 4 at Chernobyl, what Soviets call "the sarcophagus" is slowly crumbling, emitting MUCH HIGHER LEVELS OF RADIATION than the Soviets have admitted. Readings we took five days ago show RADIATION LEVELS up to 375 TIMES HIGHER THAN BEFORE THE ACCIDENT. It means that a human being would receive a dose of radiation GREATER THAN the safety limit for an entire year IN LESS THAN 14 HOURS. The fact that the reactor is giving off significant AMOUNTS OF RADIATION and that the area is CONTAMINATED FOR MILES AROUND means that CHERNOBYL IS STILL UNSAFE. 5 YEARS AGO THE SARCOPHAGUS WAS BUILT so quickly and so poorly that it is crumbling under its own weight. Soviet scientists say that a second containment structure must be built before THE FIRST ONE CRACKS open and collapses completely. You can see HOW SERIOUS IT IS FROM INSIDE the sarcophagus. SUNLIGHT FROM THE OUTSIDE FILTERS THROUGH THE CRACKS IS THE ROOF. Soviet scientists are not sure how to dispose of the 135 TONS OF NUCLEAR FUEL that will remain dangerous for centuries. AND REACTOR N 4 IS NOT THE ONLY DANGER. It could all happen again here, just A FEW HUNDRED FEET from the ruined reactor WHERE WORKERS STILL OPERATE NUCLEAR POWER STATION N 3. They get a radiation check as they arrive. Reactor number 3 uses THE SAME TECHNOLOGY AND POWER SYSTEM AS THE REACTOR that exploded. Nuclear physicists say that it is unstable and dangerously designed. It is also obsolete. THE CONTROL ROOM HAS NO COMPUTERS. All the switching and signals are set up by hand. The supervisor of this shift is a hero of Chernobyl. Alexander R. risked his life to shut down station number 3 WHILE N 4 WAS DISINTEGRATING NEXT DOOR. The radiation seems to be taking its toll on B's health.