

Fire tube boilers
water tube boilers
environmental
sciences essay



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Fire tube boilers have a series of straight tubes which are situated inside an outer shell filled with water. Water tube boilers have diversely bent and complex tubes which are extended between an upper head namely streams drum and lower heads. The hot combustion gases flow via the tubes heating the water around the tube. Hot combustion gases are circulated around and outside of the tubes filled with water. Suitable for low pressure steam because at high pressure the thickness of the tube increases if an external pressure is applied. With the same tube thickness, the pressure in a water tube boiler can be twice that of a fire tube boiler. Ideal for high (above 500 psig) steam pressure and high temperature upto 1000 F and has large capacity exceeding millions of lb/h of steam. Suitable for high pressures as gas is contained inside tubes. Hence you see more of them in hydrogen, ammonia plants, where the gas pressures can be in the range of 500 to 3000 psig. Extended surfaces can be used in waste heat applications to make the boilers compact if the gas stream is clean

2)

a)

Hydro electricity Solar Fossil fuels (petroleum, LP gas, Diesel, Kerosene and Coal) Wind Agricultural biomass Chemical Batteries Bio gas Combustibles, fire wood b) The transferring to electrical energy is a convenient process. Also the distribution and production process are convenient when compared with other energy sources. It is versatile and controllable. Electricity is clean energy source as it does not give any residue after usage. Electricity is convenient to use it is a cheaper source of energy It is a safer source of energy And it is a reliable source of energy. The non renewable energy

sources produce a large amount of carbon dioxide and other pollutants to the environment. These increased impurities have led to the global warming. This problem can be overcome by replacing these energy sources with alternative energy sources. The alternative energy are considered as free sources and are renewable, and emit less carbon dioxide comparatively. These include, Biomass Wind energy Solar energy Geothermal energy Hydro electric energy

Solar Energy

The sun emits light and heat energy of 174, 423, 000, 000, 000 kilowatt hours to the earth per hour. This large amount of energy is sufficient to fulfill the needs of the entire global population, and also to supply light and heat energy for the growth and living of fauna and flora too. Solar energy can be used for space and water heating in buildings. Electricity can be generated from solar energy through solar electric cells namely photo voltaic cells. These cells can convert light energy into electrical energy which could be used for lighting, powering equipments or to charge storage batteries etc. the maintenance is easier and the running cost is quite low. Solar panels or solar connectors can be used to obtain solar thermal to heat water using direct sunlight. The water circulating through the solar panels or collectors get heated and can be stored in tanks. There are various types of solar thermal systems which could provide hot water for domestic, commercial or industrial use. And the temperature of the water depends on the amount of sunlight and water could be warmed even in cloudy conditions. We can also use parabolic mirrors where the sun rays hit to heat water. And the windows or window blinds could be simply opened in order to allow natural sunlight to

enter and heat a room. Solar power can also be used to desalinization of water. Some of the advantages of using solar energy are, It's a renewable resource and will never diminish. Since there are no chemical reactions taking place, it causes no pollution to water or air. Can be used very efficiently for purposes like heating and lighting. SolarPower. jpg

Wind Power

Wind power can be used to operate machineries like flour mills, and wind turbine systems on small buildings can be used to collect large turbines in wind farms on sea and land. The wind farms can generate electricity. Wind power can be used to pump water and grind grain as used by ancient Persians. Wind energy is available and Pollution free. But the installation cost is high, and the turbines cannot be installed easily. And even the maintaining cost could be quite high. A Large number of wind generators are required to produce wind energy; therefore a big amount of space is required to produce heat or electricity. And wind turbines cannot be put up at any place but only in a suitable windy place and there should be adequate land space for installation. WindPower. jpg

Geo thermal Energy

Geo thermal energy is obtained from the heat of the earth by radioactive decay. It is found to be a clean and sustainable source of energy. The resources are obtained from the low ground to hot water and hot rock available a few miles below the earth surface and also deep down a molten rock namely magma with extremely high temperature. Nearly everywhere the low ground or upper ten feet of the surface of the earth an almost constant temperature between 50° and 60°F (10° and 16°C) is maintained. <https://assignbuster.com/fire-tube-boilers-water-tube-boilers-environmental-sciences-essay/>

Geo thermal energy can be used for bathing in hot water, space heating, electricity generation, desalination, agricultural activities and industrial applications. This is reliable, sustainable and economical and environmental friendly. But geo thermal wells do give out green house gases, not as much as fossil fuels though. It gives out a low amount. The digging and exploration processes are very costly. For heating and cooling of buildings a geo thermal heat pump can tap the resource. The heat pump contains a heat pump, duct work, and a heat exchanger. The heat pump can remove heat from the heat exchanger in winter and pump it into an indoor air delivery system. And during summer it could do the vice versa, the heat is moved from the indoor air to the heat exchanger. The removed heat from the indoor air can also be used to heat the water for a hot water supply. For generating electricity, wells can be dug into underground reservoirs. The steam from a reservoir can be used to power a turbine or a generator in a geothermal power plant. Directly, for heating purposes, the hot water near the surface of the earth can be used. The heating applications can be heating of buildings, drying of crops, in green houses, at fish farms to heat water, and any other industrial applications like pasteurizing milk etc.

Biomass

Biomass is organic matter produced due to the photosynthesis of light.

Organic matter can be plants, biological materials from living things or plant derived materials. The organic matters are stored and then made to produce energy. The energy conversion in biomass can be done by thermal conversion, biochemical conversion or chemical conversion. Human have used biomass even in history to derive energy when they used wood to

produce fire. Nowadays, biomass can be used to generate electricity through steam turbines or gasifiers. And also can be used to produce heat by direct combustion. The energy derived from biomass gives out less carbon dioxide, but it does not release new carbon to the environment which makes it safer than burning fossil fuels. Wood is one of the biggest biomass energy sources nowadays. For example the residues from forest, dead trees, stumps, and also solid waste can be used to produce biomass energy. Biomass can convert organic matters into fibres or some other industrial chemicals such as bio fuel. Plant Energy can be produced by specific crops which are grown with the sole purpose to give high output of energy. For example, wheat, where the straw can be burned in order to produce heat or energy and the grain can be used as a liquid fuel for transportation. Plant biomass can undergo degradation through a series of chemical treatments from cellulose to glucose, and the final glucose can be used as a first generation bio fuel. By rotting of agricultural waste, human waste and garbage, methane can be obtained. Fermentation of crops like corn and sugar cane can produce ethanol which is a transportation fuel. From left over food items such as vegetable oils and animal fats, another transportation fuel bio diesel can be produced.

Hydro Electric energy

Hydro electricity is the electricity generated by hydro (water) power by letting the water flow or fall with effect of gravitational force. The cost of production is comparatively quite low, and has a lesser output of greenhouse gases and produces no direct waste.

d)

03)

a)

CENTRAL AIR CONDITIONING SYSTEMS

UNITARY AIR CONDITIONING SYSTEMS

Operating and maintenance work could be done without hindrances to the occupants or work as it's normally located in unoccupied separate space.

Operating and maintenance could be hindrances as it's located within the working or occupied premises. Needs a huge space

Does not need a huge space
No noise because it is placed away from the occupied space
Gives out noise as its located within the occupied premises

A lot of pre planning is required before installation as the process is quite complicated. Have to get the concern of architects, mechanical and structural engineers

No need of pre planning as the installation process is quite easy. Not necessary to get the concern of engineers. Air balancing is difficult. No difficulty in air balancing

b)

i) Window air Conditioner
Split air conditioner
Central air conditioner
ii)

04)

Three phase installation
Three phase power can be used when we need more power like in industrial and commercial application as some electrical

equipments (like air conditioners, motors and pumps, UPS systems, Bulky machineries etc) consume a large current. Normally a three phase power is

not transmitted to domestic houses. But if it is, it's split at the main

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distribution board. This is an electrical supply for huge electrical installation and transmitted by the national grid system. This system uses a less conducting material in order to transfer electricity than single, double phase or direct current systems at the equal voltage. Three alternative currents having the same frequency and which reach their instantaneous peak values at varying times are carried by three circuit conductors. The three phase system can sometimes have a neutral wire and sometimes not. If there's a neutral wire, the system can use high voltage at the same time can support low voltage single phase appliances as well.

3-phase. jpg

Mechanical energy is converted into a group of alternating electrical current by electromagnetic coil or by winding a generator at the power station. All the currents are of the same frequency but the time is differed to give varying phases and the currents have sinusoidal functions of time. The phases are equally spaced and give one third of a cycle separation.

Transformers change the output voltage of generators at the power station to a suitable level to transmit in order to reduce losses. After converting voltage several times in the transmission network the voltage eventually transformed for standard use before supplying to customers.

Transformer Between the phases of a three phase supply, a delta connected transformer is connected.

06)**a)**

Advantages The transferring to electrical energy is a convenient process. The distribution and production process are convenient when compared with other energy sources. It is versatile and controllable. Electricity is clean energy source as it does not give any residue after usage. Electricity is convenient to use it is a cheaper source of energy It is a safer source of energy And it is a reliable source of energy. Disadvantages Electricity could be harmful if not carefully used or if there is any leakage. Can even cause death due to high electric shock. Currently in Sri Lanka and also the world, the demand for electricity has increased and has to be quite careful while using without any wastage to conserve energy. To make a resistance free path in power lines a large amount of energy even more than the amount used to produce it is needed. There is no way of storing the extra electricity that is not used. Electricity is useful but at the same time can be harmful. Therefore certain safety devices are installed in order to provide protection against electric shock, over current, and isolation and switching. The devices are as follows, Switch gear Factors to be considered when choosing and installing a standby Generator Availability of space to store the generator Power requirement in the place where the generator is going to be installed Dimension of the generator Choose whether you want a air cooled or liquid cooled standby generator depending on the power requirement. Liquid cool systems give more power. Type of fuel used in the generator (natural gas or propane) Installation and purchasing cost Obtain permit from relevant authorities before installation Needs professional help for installation Install a

transfer switch, which will close all the utility power lines in the electrical system off safely and opens a direct line to the generator and does the reverse when the house power supply is restored. Whether the transfer switch is automatic or manual

Amount of noise given out

Go through local building codes before installation

The generator should be placed on top of a concrete slab or plastic mounting pads. Seek the help of a contractor to mount the generator. Contact the gas or propane company to properly fix the generator to the energy source. Get the help of an electrician to fix the unit to the electrical supply. In the building under study, there are around Students visiting the place, and around staff working including the lecturers, office staff and the maintenance staff. The basement of the building contains the car park and a canteen. In the ground floor the administrative offices are located. And then onward there are three more floors where the lecture halls are located. As this is an institute with gathering of whole lot of students, it is very important to manage the transportation of goods and people within the building. There could be a large number of students moving around the building or up and down the building at the same time. Normally during the morning hours and the afternoon hours that is before the lectures start you can see a high congestion in the building due to the accumulation of students all over the building. In this case care should be taken to move the people without bumping into each other, or causing delays to attend lecture due to congestion, or any other uncomfortable things that could occur due to overcrowding. And special preference should be given to vertical transportation as more risks of injuries are associated with this if a proper vertical transportation provisions are not available not available. And when it

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comes to good, there is no much instances of transporting goods round the building especially up and down the building. But in the basement, where the canteen is located, there's a need to transport goods, that is provisions.

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