Energy situation in pakistan environmental sciences essay

Environment, Ecology

Pakistan has been enduring from energy crisis since the last few old ages, which has earnestly affected its people. The power sector of Pakistan suffers from a serious deficit of up to 5000MW (USAID Pakistan: Energy Efficiency and Capacity, 2012) . The spread between demand and supply has been invariably widening. Peoples are passing insomniac darks in summer. Load casting has become an issue of all the people. Where the rich people can afford UPS and generators, the hapless 1s can merely afford to bear the effects of power outage. Apart from personal jobs of the people, acute power outages have earnestly paralyzed the commercial and economic activities in the state and are making many hurdlings in development of the state.

If we examine the present energy profile of Pakistan, it is run intoing its energy demands from different beginnings. Pakistan is bring forthing 48 per centum of its electricity from gas, 33 per centum from hydel power, 17 per centum from oil, two per centum from atomic and one per centum from coal. If we examine the figures, it is clear that Pakistan is underutilizing its natural resources to bring forth electricity. We have failed to work those resources that nature has bestowed upon us. We have non decently tapped our natural resources, even though we could hold met our energy crisis by making that and it is clip we look at this facet with unfastened eyes before the state of affairs gets wholly out of manus doing the hereafter coevalss to endure the rough effects.

Energy used by Pakistan and spread between its demand and supply:

Energy usage refers to utilize of primary energy before transmutation to other end-use fuels, which is equal to autochthonal production plus imports and stock alterations, minus exports and fuels supplied to ships and aircraft engaged in international conveyance (TheWorldBank, 2012) . In footings of per capita ingestion Pakistan ranks comparatively low - 164 out of 217 states (CIAWorldFactbook, 2003-2011) . Energy utilizations and national income per capita are straight related, because energy ingestion is critical to the development of an industrial economic system. In malice of being at the lower terminal of the word-wide energy devouring spectrum, Pakistan faces serious troubles in carry throughing its energy demands due to even lesser supply than the demand of energy. The Government estimates that energy demand will go on to turn during the following two decennaries, with Pakistan necessitating an estimated extra 35, 000 MW of power coevals capacity by 2020. Based on the analysis, the expected new power coevals build out will be about 7, 700 MW of extra capacity by 2020, go forthing a spread of over 27, 000 MW. In a nutshell, supply rate is neglecting to maintain in sync with the increasing demand rate owing to industrialisation, growing inagribusinessand services sectors, urbanisation, lifting per capita income and electrification of rural and urban countries.

Possible solutions to the job of Energy crisis:

In order to do up for the shortage and acquire the state out of a serious energy crisis that it is soon facing, both short-run and long-run policy enterprise are needed that enhance the state 's capacity to run into its

demands. The possible solutions to the energy deficit can be divided into three chief types:

1. Conservation of present energy beginnings

This includes cut downing inordinate ingestion of electricity and hence conveying down the demand for energy. This is short term step that can significantly cut down on the burden during peak demand periods by salvaging electricity. Conservation includes alterations in life style as good installing of energy efficient devices, edifice patterns and electricity distribution and direction programs that optimize the supply when the demand is at its extremum.

2. Importing more energy

Another option to assist increase the energy base of the state is depending on more imported fuel. At present Pakistan meets 75 % of its energy demands by domestic resources including gas, oil and hydroelectricity production. Merely 25 % energy demands are being managed through imports. Presently, programs are underway for importing gas from cardinal Asia. However, this scenario is besides certain to hold a negative impact on Pakistan 's balance of payments and hence a more reliable and sustainable beginning of energy is required.

3. Investing in autochthonal renewable and non renewable energy beginnings

The 3rd option for Pakistan is developing its autochthonal capacity to use the untapped potency of its fuel militias. There is important room for development in all resources including oil, gas, coal and hydel - provided

that the proficient and commercial restraints associated with the public-service corporation of these resources are overcome.

Coal as a new enterprise for Pakistan:

Despite being a non-renewable energy beginning, surveies indicate that coal is traveling to play a really important function in the planetary energy scenario during the following two centuries. Harmonizing to an IEA study, coal usage is likely to turn from 41 % to 44 % , as a beginning for power coevals, by 2030 due to energy security and monetary value volatility. On the other manus, the portion of coal as a beginning of electricity bring forthing fuel in Pakistan bases at a meager 0. 1 % in comparing to the universe norm of 41 % . Given the crisp rise in the oil monetary values in the international market every bit good as the fast depletion of Pakistan 's gas militias due to increased demand, it is imperative that Pakistan look towards alternate beginnings of energy including coal.

There are a figure of advantages pointed out in favour of this development. These include:

Abundance and security of supply.

Energy denseness comparable to other beginnings of thermic power.

Relatively easier to develop. The excavation and power production engineerings exist and merely an infrastructural development is required prior to their execution

Handiness of clean coal engineerings and ways to minimise environmental jeopardies

These are the grounds why Pakistan looks towards inventing a feasible scheme for the development of its coal militias at Thar.

THARPARKAR COAL MINES:

The majority of Pakistan 's autochthonal coal resources lie in Sindh. The largest modesty, 175 billion metric tons of lignite coal, is located in the Thar Desert of Sindh. Thar coal is yet to be developed for excavation and power coevals. The development of the Thar resources would supply. The electricity coevals potency of 100, 000 MW based on estimated ingestion of 536 million metric tons of coal per twelvemonth, could be a important fuel resource used for proviso of coal base burden capacity in the system supplementing gas based capacity. Further, usage of Thar militias for power coevals would assist in cut downing inordinate trust on imported fuel thereby cut downing the force per unit area of balance of payments in the state. The entire estimated militias in Thar field including measured and conjectural are about 175 billion metric tons. The existent mensural militias are 2. 7 billion tones, the oil equivalent of which is 6. 59 billion barrels. The oil equivalent of 175 billion metric tons of coal is about 427 billion barrels.

The coal Fieldss cover a entire country of over 9000 sq. km in the Tharparkar desert. The field is covered by sand dunes that extend to an mean deepness of 80 metres. Below that is a bed of sandstone and siltstone which extends from 11m to 127m in thickness. Further underneath are variable

sedimentations of clay rock resting on the Bara formation in which coal is embedded. The beds of coal scope in thickness from 0. 20m to 22. 81m ; the maximal thickness widening up to 36m in certain topographic point. The coal seam itself is present at a deepness of between 114-203m. The chief beginning of H2O in Thar is groundwater. The groundwater is present in three chief aquifers at changing deepnesss. The mean deepnesss are 50m, 120m and more than 200m which means that at least one aquifer is located in the coal bearing zone and will back up the mining/extraction processes (GovernmentofSind, 2008) .

Quality of Coal

Coal quality and its contents have serious effects on the efficiency of the power workss in which it is used and besides on the grade ofpollutionthat is created as a effect of electricity coevals. The coal found in Thar is lignite holding a lower warming value as compared to other types which makes it suited for electricity coevals. Its power coevals capacity is 10, 289 MW. The brown coal at Thar has a heating value of 6200 - 11, 000Btu/lb. Other of import constituents of the coal and their proportion are:

Carbon (19. 35-22 %) ,

Ash (5. 18-6. 56 %) ,

Moisture (43. 24-49. 01 %) ,

Volatile affair (26. 5-33. 04 %) and

Sulphur (0. 92-1. 34 %) .

Production of electricity from coal:

Some of the methods of production of electricity from coal are as follows:

Pulverized Fuel (PF) engineering:

In this procedure, coal is reduced to ticket pulverization signifier, stored and so transported by air to the burner as coal air mixture for burning. This method involves direct combustion of the coal to bring forth heat that is used to bring forth steam from H2O to turn conventional steam turbines. It is a straightforward technique but direct combustion of coal increases the external costs of energy by let go ofing nursery gases and other toxic oxides and fouling particulate affair into the ambiance in big sums. The efficiency of such a system is merely approximately 33 % .

Fluidized Bed Combustion (FBC) engineering:

Fluidized-bed burning (FBC) engineering is a type of burning procedure in which the solid coal is suspended on jets of air. In this manner, more efficient commixture of gas and solids occurs, taking to more efficient heat transportation. The low temperature demand for burning reaction is one of the primary advantages because it reduces the formation of toxic azotic oxide. Additionally, FBC engineering causes inexpensive and easy remotion of sulfur dioxide during burning in comparing with the `` stack scrubber '' engineering. Furthermore, add-on of other solid fuels (such as biomass) along with the coal can besides be supported by FBC into the reaction mixture. A

Coal Gasification (CG) technology/IGCC:

IGCCA (Integrated Gasification Combined-Cycle) A with Carbon Capture and Storage (CCS) engineering allows coal to be used to bring forth power as flawlessly as natural gas.

IGCC engineering has three basic constituents. In the gasification stage, heat, force per unit area, pure O and H2O are used to interrupt char down into its constituent parts and change over it into a clean man-made gas (syngas) . The syngas is cleaned before it can be converted into utility natural gas (SNG) which finally fuels the power turbines. Staying particulates are removed from the syngas in the particulate scrubber. Carbon monoxide is converted to carbon dioxide (CO2) by adding steam in displacement vas. The gasification procedure makes it possible to capture most of the quicksilver, sulfurA and C dioxide (CO2) in the syngas. The captured CO2A will be transported via grapevine for usage in enhanced oil recovery or storage in a saline geologic reservoir.

The IGCC works so converts the syngas into utility natural gas (SNG or methane) , through a procedure called methanation. The SNG, which is comparatively high in energy content, powers two gas turbines. Excess heat contained in the fumes from those turbines so heats H2O to power a steam turbine. The higher energy content of the SNG (as compared with syngas) improves the efficiency of the power production. This combined rhythm ends up heightening the power works 's efficiency up to 60 % . Gasification is the engineering that most power workss are switching towards global and Thar

Coal development is besides expected to construct IGCC workss for an environmental friendly procedure of coevals of electricity.

The electricity to be produced from the coal gas would be about Rs. 4 per unit.

Environmental Analysis:

The beginnings ofair pollutionfrom coal based power workss fall include C emanations, particulate affair and other nursery gases and toxic oxides. Carbon emanations and other green house gases such as methane and N oxides are of import from the clime alteration perspective whereas toxic oxides and volatile particulate affair pose wellness jeopardies if the human population is exposed to certain degrees. In add-on to these quicksilver and other heavy metals are released which are linked with both neurological and developmental harm in worlds and other animate beings. Fly ash and underside ash are residues created when coal is burned at power workss. In the yesteryear, fly ash was released into the air through the smokestack, but now most of it is captured by pollution control devices, like scrubbers.

The chief beginning of groundwater pollution is from the belowground processes that are carried out in the locality of aquifers in order to pull out coal or syngas. This affects the quality of groundwater and besides reduces its measure. It should be kept in head that land H2O is the lone beginning of H2O for the people of Thar.

Dirt and Land pollution is a consequence of the excavation procedure itself as it may go forth the land non useable for agricultural or business by life

because of drastic alterations in the surface or deposition of harmful affair in the dirt.

Clean coal engineering and cut downing the harmful impacts of coal excavation:

Clean coal technologyA is a aggregation of engineerings being developed to cut down the environmental impacts ofA coalA energy coevals. Some clean coal engineerings purify the coal before it burns. One type of coal readying is coal rinsing. It removes unwanted minerals by blending crushed coal with a liquid and leting the drosss to divide and settle. Other systems control the coal burn to minimise emanations of S dioxide, N oxides and particulates. A Wet scrubbers, or flue gas desulfurization systems, take S dioxide, a major cause of acid rain, by spraying flue gas with limestone and H2O. Low-NOx (nitrogen oxide) burnersA cut down the creative activity of N oxides by curtailing O and pull stringsing the burning process. A Electrostatic precipitatorsA take particulates that aggravate asthma and do respiratory complaints by bear downing atoms with an electrical field and so capturing them on aggregation home bases. GasificationA avoids firing coal wholly. With incorporate gasification combined rhythm (IGCC) systems, steam and hot pressurized air or O combine with coal in a reaction that forces C molecules apart. The resultingA syngas, a mixture of C monoxide and H, is so cleaned and burned in a gas turbine to do electricity.

Carbon gaining control and storageA is the most promising clean coal engineering. In order to detect the most efficient and economical agencies ofA C gaining control, research workers have developed several

engineerings. One of them, flue-gas separation is a technique thatA removes CO2 with a dissolver, strips off the CO2 with steam, and condenses the steam into a concentrated watercourse. The CO2A can so be sequestered, which puts CO2A into storage, perchance belowground, in such a manner that it will stay at that place for good. Flue gas separation besides renders commercially useable CO2. Another procedure, A oxy-fuel burning, burns the fuel in pure or enriched O to make a flue gas composed chiefly of CO2 and H2O which saves the energy required for dividing the CO2 from other flue gasses. A 3rd engineering, A pre-combustion gaining control, removes the CO2 before it 's burned as a portion of a gasification procedure. The CO2 removed can be stored in geologic or pelagic reservoirs from where it ca n't come in the ambiance. A DepletedA oilA or gas Fieldss and deep saline aquifers safely contain CO2 while deep belowground coal seams absorb it. A procedure calledA enhanced oil recoveryA already uses CO2 to keep force per unit area and better extraction in oil reservoirs. All signifiers of CO2 storage require careful readying and monitoring to avoid making environmental problemsA

Reuse and recycling can besides cut down coal 's environmental impact. Land that was antecedently used for coal excavation can be reclaimed for utilizations like airdromes, landfills, and golf classs. Waste merchandises captured by scrubbers can be used to bring forth merchandises like cement and man-made gypsum for drywall.