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Research Article

CO_2 Sequestration

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Starting with an overview of Science, Engineering, Technology and Management. An application of Science is called Engineering; an application of Engineering is called Technology; and applying the Knowledge of Science, Engineering & Technology in Management.

Globally, due to the realization that, from last three decades, carbon dioxide sequestration gaining interest to reduce the concentration of CO_2. CO_2 Sequestration terms as CO_2 capture. In the atmosphere capture carbon dioxide through chemical process and physical process. This process is not new and used by petroleum, petrochemical, chemical and power industries. Carbon dioxide Sequestration Technology involves the process of extracting, separating, transporting and storage. Carbon dioxide emissions can be preventing before release into the atmosphere. By this, global warming can be defer and dangerous climate change can be stop. The most important challenges that should be considered are regulatory, political, technical and economical.

There are mostly three types of CO_2 Sequestration, namely Terrestrial, Geologic and Mineral. In terrestrial sequestration, removal of CO_2 and storage of CO_2 takes place from the atmosphere by tree planting, farming, restoration and forestation. In geologic sequestration storing of CO_2 takes place permanently in subsurface level such as natural gas deposits, oil reservoirs, deep formation of saline, shale rich in oil and gas, formation of basalt. In mineral sequestration, CO2 dissolved with calcium and magnesium to form carbonate salts. The whole process is slow natural process reaction to form limestone. On the other hand, in faster process dunite (rock) reacted with CO2 to form carbonate along with iron and silica oxide.

The features that research examines carbon sequestration shows, reduction in the emissions of greenhouse gases. Its whole concept based on green energy, improving efficiency of energy and increasing the source of non-carbon energy. It should be noted that, the refineries and power plants are mostly located near large CO_2 storage sites from large stationery sources. In the atmosphere removal of CO_2 takes place and deposit it in a reservoir is another form of CO_2 used. It is the concept of geo-engineering.

Research Scholars tells that sequestration process can save up to 25% of the plants rated capacity .e.g. if plant's rated output capacity is 600 MW, then after CO_2 sequestration and compression technique the rated capacity can be reduced to 450 MW. Financially, the use of this technology would give an additional 1% to 5% of cost/KW-hr.

Moreover, Carbon dioxide sequestration in petroleum industry use for Enhanced Oil Recovery Method (EOR). In Petroleum fields CO_2 can raise the production of the reservoirs. It is a potential time improving method. Economically, EOR capture and store carbon dioxide, taking interest in global community, especially Health, Safety and Environment (HSE) field.

The prediction of International Energy Agency that currently India ranked sixth in the world in terms of total CO_2 emitted/year. In upcoming years India will be on high and will become the top three leaders of the world by 2030. Similarly, according to World Coal Association, coal will rise by 60% over the same period and meet the demand of electricity and increased the rates. In addition to, The IPCC (Intergovernmental Panel on Climate Change) has concluded that CO_2 sequestration can contribute 35-50 % emission reduction and low carbon formation by 2100. The number of global reduction scenarios which concluded that CO_2 sequestration is the new technology for CO_2 savings in both oil & gas & power industries.

The important barriers for implementing CO2 sequestration technology in India is lack of research & development (R&D) labs, political instability and foreign policies.

Our main approach is to substitute high level of carbon emitting fuels with low level of carbon fuels, presenting substantial opportunities for the oil industry to take part and reduce emissions. Thus, by considering a fossil fuels (Oil, Coal and Gas) continuation, provide world's total energy, therefore we require Sequester CO_2.

Sources

Refer Society of Petroleum Engineers (SPE)
Refer Petroleum Explosive Safety Organization (PESO)
Refer Maharashtra Pollution Control Board (MPCB)