Geological CO_2 storage

Abstract

Use of fossil fuels will widely continue and the carbon dioxide (CO_2) emissions will be responsible for the rise of mean global temperature in next century, this will happen if no new policy towards emission reduction become effective. It is clear that this way of development isn't sustainable. Many options occur that can lead to the reduction of CO_2 emissions from the energy sector. These include improvement in efficiency and a turn into renewable energy and maybe in nuclear energy (nuclear fusion) too. Though, policies that will only take account these options will only, in best scenario, partially give solution. Capture of carbon dioxide (CO_2) and storage technologies (CCS, Carbon-dioxide Capture and Storage) comprises another promissory option which can drastically reduce these emissions. To achieve this target, governments shall consider taking action so as to ensure that CCS technologies will start developing now, and that they will expand in a wide range through next decades.

The present project deals with the assessment of the most promising reduction method of carbon dioxide (CO_2) emissions. The method refers in capture and permanent storage of CO_2. The storage can become in underground saline aquifers of big depth (more than 800m), in oceans depth, in depleted or commercial non-viable hydrocarbons deposits and still in artificial caverns. Capture techniques should be presented, which may be applied in specific polluters as electric power projects that use fossil fuels, steel industry, cement industry and other industrial sectors. By those methods of storage in this project, interest should be focused in the case of underground deep saline aquifers. Selection criteria of suitable field that should be taken into account should be presented. The injection process and the physical-geochemical reactions that take place after the injection should be described too. The financial impact of Capture and Storage technology application in sectors as of energy production, fossil fuels and in the renewable energy should be presented. Finally, future prospects and scenarios for CO_2 emissions reduction that should take place in the next three decades should be presented. The prospects and possibilities of geological storage of CO_2 in Greece should be quoted and presented also.

4.3 Storage in exhausted oil and gas fields (deep saline aquifers, exhausted coal beds, oceans, other options)

5. Geological storage

5.1 Criteria for geological storage (geological, geothermal, hydrodynamic, socio-economic etc.)
5.2 CO_2 compression in deep aquifers
5.3 The geochemistry of the geological storage
5.4 Site selection and storage inspection. Leakage problems
5.5 Environmental impact assessment
5.6 Storage capacity

6. Financial aspects

6.1 Power plants efficiency and emissions
6.2 Energy generation cost
6.3 Electricity generation cost
6.4 CO_2 mitigation cost
6.5 Economic impacts
6.6 Future perspectives

7. Geological storage of carbon dioxide in Greece

7.1 Possible sites in Greece
7.2 Capture technologies

8. Conclusions