GEOLOGICAL OPTIONS FOR DECREASING GREENHOUSE GAS EMISSIONS

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There is likely to be a large increase in the use of renewable energy in the next century but for the foreseeable future, fossil fuels are likely to meet most of the world's expanding energy needs. Indeed, unless there are major technological breakthroughs, the use of fossil fuels and the emission of CO2 and other greenhouse gases will continue to grow for many years to come. What are the options for dealing with this and what role might geology play? Based on current technology there are a number of options. Fuel switching, the move from carbon intensive energy sources, such as coal to natural gas, will result in a significant cut in CO2 emissions. Gas will become the fuel of choice for many countries as a result. This will in turn result in a refocussing of exploration more towards gas, particularly accumulations that are low in CO2. In order to offset CO2 emissions, carbon can be sequestered using a variety of techniques. The only one currently being undertaken at a significant scale is in trees. This is a valid strategy in some situations but it does mean massive use of land for tree planting, high management costs and sequestration is only for about 30 years in most circumstances. Ocean disposal of CO2 is an option but one that is presently strongly opposed by many environmentalists. The most promising technique at the moment is geological disposal of CO2. There are a variety of ways that this can be done including disposal of large subsurface voids, in depleted oil and gas fields and in coal seams. However the option receiving the greatest attention at the present time is disposal (as supercritical CO2) intosaline aquifers at a depth of about 800m or more. Geological disposal of CO2 separated from flue gases emitted by conventional power stations (usually coal burning) may be an option for the future, but for the present, the cost of separation is too high. Nuclear power is greenhouse gas friendly and some consider that there will be a significant upturn in the construction of nuclear power plants in the early years of the 21st century. However for the present we see no signs of this getting underway, with the proportion of power provided by nuclear set to fall. From a geological perspective it is the nuclear waste disposal issue that looms largest. One of the disposal issues presently under discussion is the merits (and potential problems) in taking an international underground repository approach to radioactive waste disposal. There is no question that some areas could potentially provide opportunities to do this, but as always in nuclear matters, politics and community