Technology Fact Sheet for Mitigation

Technology 8: **Carbon capture and storage** [i]

Subsector	Energy supply
Sector GHG emission (tCO_2-eq)	6,399,000 tCO_2-eq from the energy supply subsector in 2006
Technology Name	**Carbon capture and storage**
Background/Notes, Short description of the technology option sourced from ClimateTechWiki, Seminars, etc	Carbon capture and storage (CCS) is a combination of technologies designed to prevent the release of CO_2 generated through conventional power generation and industrial production processes by injecting the CO_2 in suitable underground storage reservoirs. Basically,capture technology separates CO_2 emissions from the process, after which the compressed CO_2 is transported to a suitable geological storage location and injected. Feasible methods of transporting of CO_2 include both pipelines and shipping. Appropriate geological storage locations for CO_2 include abandoned oil and gas fields, deep saline formations and unmixable coal seams. The dominant reason to do CCS is for CO_2 emission reductions from industry and power generation; without incentives for such emission reductions, little CCS can be expected. The deployment of CCS in the industrial and power generation sectors would allow fossil fuel use to continue with a significant decrease in CO_2 emissions. However, a full CCS chain has yet to be implemented, and many technical, environmental and economic uncertainties remain (http://climatetechwiki.org/technology/ccs)
Implementation assumptions, How the technology will be implemented and diffused across the subsector?	Coal is the main primary energy source in Mongolia at present, accounting for about 98 percent of total solid fuel consumption. Most open cast coal mines in Mongolia are operating at a shallow depth. There are around 320 coal deposits and occurrences (80 deposits and 240 occurrences) according to the Geological Information Center of Mongolia. The total geological coal resources are estimated at approx. 150 billion metric tons, including about 24 billion metric tons explored. Over 70 percent of the total coal production is consumed by thermal power stations with the remainder going to heating plants, industry and individuals. Coal is expected to remain the most important primary energy resource in the foreseeable future because of the great coal reserves in Mongolia dwarfing the reserves of other energy resources, such as oil and gas. Therefore CCS technology in the future could be important technology for Mongolia to reduce GHG emissions. 600 MW conventional coal with CCS power plant has been considered to replace 600 MW conventional coal based power plant.

	The replacement capacity is based on equivalent energy output by both power plants. It is assumed that the capital cost of conventional coal with CCS power plant is 2.52 million USD/MW including equipment and construction, planning and fixed cost for CCS infrastructure. The capital cost of conventional coal based power plant is 1 million USD/MW including equipment and construction, planning.
Reduction in GHG emissions	GHG emissions are expected to be reduced by 3,676,000 tCO_2-eq/year.
Impact Statements - How this option impacts the country development priorities	
Social development priorities	The environmental and safety risks of CCS depend on the legal regime in which the technology operates. Most experts expect that CO_2 storage can be done safely and permanently, but if the selection of reservoirs is not consistently and strictly regulated, the storage operation not continuously monitored and the site not suitably abandoned, CO_2 seepage may occur which would result in greenhouse gas emissions and in extreme cases could lead to health and other environmental damage (http://climatetechwiki.org/technology/ccs)
Economic development priorities	The level to which CCS supports sustainable development is a widely debated topic. The discussions around allowing CCS into the Kyoto Protocol's Clean Development Mechanism exemplify the varying opinions between stakeholders. It is argued by some that no technology involving the combustion of fossil fuels can be associated with sustainable development, due to the finite nature of such resources. Others point towards the effects of fossil fuel use, beyond emissions of CO_2 alone, including the environmental impacts of coal mining (Coninck, 2008). Currently, by far most applications of CCS are not economically feasible. The additional equipment used to capture and compress CO_2 also requires significant amounts of energy, which increases the fuel needs of a coal-fired power plant by between 25-40% and also drives up the costs (IPCC, 2005). (http://climatetechwiki.org/technology/ccs)
Environmental development priorities	There are a number of negative environmental impacts that cannot be avoided, and a number of others that can be managed. Due to the increased energy requirement of the capture, additional coal will have to be mined, potentially leading to greater landscape deterioration at extraction sites and emissions to air and water. Depending on the type of capture equipment used, spent solvents can lead to effluents of hazardous wastes which may have consequences for the environment, and water use may increase (http://climatetechwiki.org/technology/ccs)
Other considerations and priorities such as market potential	Potential market is medium
Costs	

Capital costs	It is assumed that the capital cost of conventional coal with CCS power plant is 2.52 million USD/MW including equipment and construction, planning and fixed cost for CCS infrastructure. The capital cost of conventional coal based power plant is 1 million USD/MW including equipment and construction, planning.
Operational and Maintenance costs	For calculation of all costs and emissions it is used FICAM model. The total annual cost of the conventional coal with CCS power plant is USD260 million, compared to the annual cost of USD87 million for the conventional coal based power plant.
Cost of GHG reduction	The reduction of GHG emissions in CO_2-eq is 3,676,000 tons with in annual cost of USD173 million. The cost of GHG reduction is 47 USD/ tCO_2-eq.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment For Climate Change Mitigation– Mongolia. You can access the complete report from the TNA project website http://tech-action.org/**