Technology Fact Sheet for Mitigation

Technology 4: **Integrated coal gasification combined cycle** [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	**Integrated coal gasification combined cycle**
Background/Notes, Short description of the technology option sourced from ClimateTechWiki, Seminars, etc	Advanced combined cycles, in which the gas turbine exhaust is used as a heat source for a steam turbine cycle, can achieve overall thermal efficiencies in excess of 50%.First, coal is gasified by creating a 'shortage' of air/oxygen in a closed pressurized reactor. This creates a chemical reaction of the coal with the oxygen. This creates a superheated steam with which electricity is generated. Currently, purification takes place at relatively low temperatures (around 50^{o}C), but techniques to clean at temperatures of around 500-600^{o}C have been tested. This could increase the overall efficiency of IGCC to over 60%. IGCC plants can also be configured to facilitate CO_2 capture before the combustion of the syngas. In this process, the syngas is 'shifted' using steam to convert CO to CO_2, which is then separated for possible long-term sequestration.
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% of total solid fuel consumption. 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. Several thermal electric power stations will be constructed in Mongolia. GHG emissions could be reduced if integrated coal gasification combined cycle technology is applied. A thermal power station with 600 MW capacity is needed to be built using integrated coal gasification combined cycletechnology.
Reduction in GHG emissions	GHG emissions are expected to be reduced by972,000 tCO_2
Impact Statements - How this option impacts the country development priorities	
Social development priorities	The electricity supply will improve.
Economic development priorities	Annual electricity production of power plants is to reach 3,300.0 million kWh. Integrated coal gasification combined cycle power plants have the potential to reduce fuel consumption of existing thermal power plants by 25-30 percent. Coal consumption per kWh will be reduced.

Environmental development priorities	Reduced air pollution:Concentration of noxious gases in flue gas will be decreased by 25 %.
Other considerations and priorities such as market potential	-
Costs	
Capital costs	IGCC costs around USD 2000 per kW. The IGCC power plants will require around 600 MW, therefore an investment of 1.32 billion USD. Assuming a life time of 40 years the annualized cost would be around 33.0 million USD.
Operational and Maintenance costs	Annual coal consumption will be 1.44 million tons. Total coal cost per year is expected to be 43.2 million USD. Where: coal cost is 30 USD /t. Total Operational and Maintenance costs will be 94.0 million USD per year. Electricity generation cost of power plants will be 0.026 USD/kWh
Cost of GHG reduction	Cost of GHG reduction will be 96.7 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/**