Technology Fact Sheet

Technology Name	**Long term large scale Combined cycle power plants**[i]		
Subsector GHG emission (megatonnes CO2-eq)	**7,7248 Million t CO2 from energy sector in 2005**		
Background/Notes, Short description of the technology option	Combined cycle using a gas turbine, heat recovery steam generator and a steam turbine is one of the mature technology that can be applied at the moment in order to produce electricity at high thermal efficiency. By using CC it can be reduced the amount of fuel to be used for generation of the same quantity of electricity in comparison with the generation of electricity in the steam condensing units. Using such large power units results in a range of benefits, including reduced air pollution, less greenhouse gases and better service for end users. The main drawback compared to large conventional power plants, relies not in the technology itself but in the lack of financial resources for investments. Due to the fact that in the cost of the electricity produced by the conventional steam condensing power units it is not taken into consideration the impact on environmental the price of the electricity produced in such power plants may be lower that the same indicator of the CC units. (**source: climatetechwiki.org)**		
Implementation assumptions, How the technology will be implemented and diffused across the subsector? Explain if the technology could have some improvements in the country environment.	The combined cycles units may be built as new power plants or may replace the existing units in conventional thermal power plants. It is envisaged that this technology will use natural gas as fuel.		
Implementation barriers	Lack of information regarding benefits, lack of experience in this field, lack of financial resources for investments and skepticism to implement such a technology, as well as the fear that the old thermal power plants will sell electricity at lower prices.		
Reduction in GHG emissions (megatonnes CO2-eq)	If implemented the technology will result in annual reduction of 330000 tones of CO2 for 2030.		
Impact Statements - How this option impacts the country development priorities	Increase country energy security		
Country **social** development priorities	Increased efficiency of energy conversion and use; • Lower emissions to the environment, in particular of CO2, the main greenhouse gas; • Large cost savings due to less quantity of natural gas used to generate electricity; • An opportunity to increase the diversity of power plants, and provide competition in generation. • Increased employment - a number of studies have now concluded that the development of cogeneration systems is a generator of jobs. Using this technology there will result in more than 15 % less fuel used to use the same quantity of electricity.		
Country **economic** development priorities – economic	A well-designed and operated CC will always provide better energy efficiency than conventional plant, leading to both energy and cost savings. Less fuel used means less natural gas imported and less paid for it as well as the		

benefits	decrease of energy dependency.		
Country **environmental** development priorities	In addition to direct cost savings, cogeneration yields significant environmental benefits through using fossil fuels more efficiently. In particular, it is a highly effective means of reducing carbon dioxide (CO2) and sulphur dioxide (SO2) emissions. Oxides of nitrogen (NOx) are also generally reduced by the introduction of modern combustion plant. Increased efficiency of energy conversion and use; • Lower emissions to the environment, in particular of CO2, the main greenhouse gas; Reduced air pollution: By producing of 2.1 billion kWh of electricity will result in reduction of about 470000 tons of CO2 per year.		
Other considerations and priorities such as market potential	It is estimated that the market potential of such a technology is about 300000 kW.		
Costs			
Capital costs	The typical investment costs in large CC, is approximately 750 $/kW.		
Operational and Maintenance costs	Operational and maintenance costs excluding fuel for gas-turbine CC is typically about 36 $/kW per year. The cost of fuel component depends on the natural gas price.		
Cost of GHG reduction	The cost of electricity produced by such CC is lower than the cost of electricity produced by thermal power plant electricity of which will be replaced, using the same fuel. In such a case the GHG reduction does not have any cost.		
Lifetime	Economic lifetime is 20 years. Technical lifetime is 25 years.		
Other	Total energy efficiency is approximately >60 %.		
		Old	**New**
Efficiency	%	36	60
Fixed O&M costs	$/kW*month	2	36
Variable O&M costs	$/MWh	3	0
Investments	$/kW	0	750
Fuel price	$/tcc	552	552
Time of use of rated capacity	h/an	6000	7000
Fuel consumption	gcc/kWh	341.67	205
Fuel price	$/kgcc	**0.552**	**0.552**
Fuel used	kgcc/kWh	**0.34**	**0.205**
Cost of used fuel	$/kWh	**0.189**	**0.113**
Annual capital costs	$/kW*an		37.500
Per unit fixed O&M costs	$/kWh	**0.004**	**0.005**
Per unit variable O&M costs	$/kWh	**0.003**	**0.005**
Total costs	**$/kWh**	**0.196**	**0.124**

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**