Technology Fact Sheet for Mitigation

Technology 4: **LPG for household and commercial cooking** [i]

Subsector	Commercial, Residential Energy Consumption
Sector GHG emission (tCO_2-eq)	1,425,000 tCO_2-eq in 2006
Technology Name	**LPG for household and commercial cooking**
Background/Notes, Short description of the technology option sourced from ClimateTechWiki, Seminars, etc	Liquefied petroleum gas (LPG) is a mixture of propane and butane, which are gases that become liquid under pressure and can then be stored in pressurized containers (Dell and Rand, 2004). The proportion of each gas varies depending on the source and climate. Propane is preferred where the climate is cold and butane where it is warm. LPG has a high energy per unit volume and is convenient to use. Its calorific value per unit volume is about 2.5 times larger than that of natural gas (methane). It is used for road transport, cooking, heating, refrigeration, air conditioning and in spray cans. It is a portable source of energy used for remote and leisure applications in the EU and in cooking and transport in developing countries. LPG is manufactured during the refining of crude oil (40%) or from natural gas during extraction (60%). http://climatetechwiki.org/technology/lpg_lng_cooking
Implementation assumptions, How the technology will be implemented and diffused across the subsector?	In Mongolia the main benefits of LPG in rural areas, especially in Gobi region, are in helping people to switch from unsustainable biomass use to a clean and safe cooking fuel. In urban areas, the use of LPG for cooking could reduce electricity consumption. For calculation of CO_2 emissions, we assume that LPG for cooking technology will be implemented in 50% of the urban residential and commercial sector by 2020. The electricity consumption for the residential and commercial sector was 809.7 million kWh in 2010 (Mongolian Statistical Yearbook). It is assumed that 30% of this consumption is used for cooking. The substituted electricity by LPG will be about 121,500 MWh.
Reduction in GHG emissions	LPG has a typical specific calorific value of 46.1 MJ/kg (http://en.wikipedia.org/wiki/Liquefied_petroleum_gas) or 12.8 kWh/kg 1kWh LPG consumption emits 0.24 $kgCO_2$http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html 1kWh electricity consumption from grid emits 1.103 $kgCO_2$. GHG emissions are expected to be reduced by 105.000 tCO_2/year.
Impact Statements - How this option impacts the country development priorities	

Social development priorities	In developing countries the main benefits of LPG are in helping people to switch from unsustainable biomass use, to a clean and safe cooking fuel. This provides enormous health benefits helping to avoid the 1.6million deaths/year from respiratory problems caused by smoke and other pollutants released by inefficient biomass burning in enclosed spaces. It also releases women and children from the drudgery of collecting firewood and health problems associated with carrying heavy bundles long distances. There are also benefits for local ecology and biodiversity. The UN Millennium project recommends that globally the number of households using non-sustainable biomass for cooking should be halved by 2015. http://climatetechwiki.org/technology/lpg_lng_cooking
Economic development priorities	
Environmental development priorities	In Mongolia the main benefits of LPG in rural areas, especially in Gobi region, are in helping people to switch from unsustainable biomass use to a clean and safe cooking fuel. In urban areas, use of LPG can reduce air pollution of big cities.
Other considerations and priorities such as market potential	The market potential is big
Costs	
Capital costs	We assume that the capital cost of LPG cooker and electric cooker is about same.
Operational and Maintenance costs	Recently, the LPG cost in the Mongolian market was 1800 MNT/kg (1.28 USD/kg). 1kg LPG is equal to 12.8 kWh electricity. As mentioned above the annual electricity consumption to be replaced by LPG is 121,500 MWh. This amount of electricity could be substituted by 9490 tons of LPG fuel. The cost of LGP will be 17.1 million USD. The cost of electricity will be 9.3 million USD.
Cost of GHG reduction	The GHG reduction cost will be 74.3 USD/tCO_2

[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/**