1. Project Ideas for the Energy Sector

1.1 Brief summary of the Project Ideas for Energy Sector

The project ideas described below are concrete actions for realization of the Technology Action Plans for Energy sector.

The following project ideas have been prepared for the energy sector:

- To construct of a 220 KW hydropower plant on the Egiingol River in the Selenge aimag to regulate the Combined Heat and Power plant (CHP) regimes of central grid
- To construct the Wind Park project in Govi region
- To build a super critical thermal power plant with an installed capacity of 600 MW at the Baganuur Coal mine, which is located 130 km from Ulaanbaatar.

Attracting investors' interest and supporting their motivation to progress with a project idea is essential for a successful project launch. It is therefore important that during the early stages of a project, investors are able to access relevant project-related information, including a brief description of the project's main economic and technical features, country legal and regulatory environment, existing barriers and activities planned. In this context, the project ideas presented below are developed in response to the needs identified above and as such provide a first step for the attraction of investor interest in the transfer, diffusion and deployment of energy mitigation technologies.

1.2 The construction of Hydropower Plant in Egiin River

1.2.1 Introduction/Background

The TNA/TAP process has identified largescale HPP technologies as a top priority technology for climate change mitigation, which is in line with the development priorities of Mongolia.

The proposed project activity will be a 220 MW hydroelectric power generation facility, which is to be constructed on the Egiin River.

The proposed project is located approximately 300 km north west of Ulaanbaatar. The Egiin River is the third largest river in Mongolia, and the project will be constructed near the confluence of this river and the Selenge River. The area within the projected reservoir inundation zone consists mainly of natural pastureland (used sparsely by nomadic locals) with small areas of forest and crop land

The proposed roller-compacted concrete (RCC) dam is composed of aggregates and cementious material (Portland cement, fly ash from power plants and milled natural pumice). The planned dam has a crest length of 710 m, width of 8 m and height above foundation of 95 m. The planned reservoir capacity is 4,000 million $m^3$and it would extend 50 km away from the dam and have a maximum surface area of 125 km^2 (Egiin HPP PDD 206)

The power station is planned to have four 55 MW Francis turbines with design head of 59 m and the discharge of 105 m^3/s. The foreseen annual electricity generation is 412 GWh. The turbines will be fed by embedded steel penstocks passing through the dam. The plant will be connected by a direct, double-circuit 220 KV line to a large sub-station in Erdenetat a distance of approximately 64 km.

The reservoir will be flood 120 km^2 of marginal agricultural land, and displace rather less than 500 persons. Alternative arable land and resettlement locations exist at short distance from the affected area, and resettlement costs will be comparatively low.

1.2.2 Objectives

To construct a 220 kW Hydro Power Plant in Egiingol river of Selenge aimag[21] to regulate regimes of coal fired Combined Heat and Power plants (CHP) in central grid of Mongolia. All capacities in national grid are in form of base load stations such as coal fired CHPs and the grid at present has no special peaking, load adjusting capacity. Peak power has for many years been imported from Russia. In long term power imports will not be reliable or predictable source of supply for Mongolia.

1.2.3 Measurable outputs

It is expected to generate and supply approximately 500,000 MWh/year of electricity for the Mongolian national grid. It will achieve CO_2 emission reductions of just over 192,500 tCO_2/year (Egiin HPP PDD, 2006)by displacing electricity that would otherwise be generated by coal-fired power plants

1.2.4 Relationship to the country's sustainable development priorities

The large scale HPP is supported by many country policy instruments, including:

- The Law on Renewable Energy of Mongolia (LREM 2007);
- National Renewable Energy Program of Mongolia (2005-2020) (NREP 2005)
- Mongolia Second National Communication under the UNFCCC (MSNC 2010)
- Mongolia: Nationally appropriate mitigation actions of developing country (NAMA 2010)
- National Action Program on Climate Change (MAPCC 2011)
- Integrated Energy System (National Program) (IES 2007)

The National renewable energy program approved by parliament in 2005 indicates: "Gradually implement goal of increasing the share of renewable energy in the total energy production and reaching 3-5 percent in the national energy by the year 2010, 20-25 percent share by 2020". But the target for 2010 has not been achieved. As of 2011, the share of renewable energy in total electricity production is only 1.11%. In the future, the electricity generation will increase gradually and reach 7800 million kWh in 2020. In order to reach the 20% target, the electricity generation from renewable energy sources especially from HPPs should be increased gradually.

1.2.5 Project Deliverables

In addition to power generation and greenhouse gas (GHG) emission reduction, the project will contribute to sustainable development by:

- 500,000 MWh of annual electricity generation from the HPP will be involved in the country energy balance, improving regime of coal fired power plants and reducing electricity imported and thus increasing country energy security;
- displacing coal with a domestic renewable resources for power generation
- providing jobs and training for semi-skilled and skilled workers during after the construction and operation stages of the project;
- during the construction period, local villagers can earn additional income through selling their agricultural produce to workers;
- theincorporation of other productive water use projects such as water supply, irrigation, tourism and recreation.
- reduce import electricity

1.2.6 Project scope and possible implementation

The proposed Egiin hydro electric project will be built on the Egiin River in north central Mongolia in about 300km northwest of the capitalcity of Ulaanbaatar.

The Egiin is Mongolia's third largest river and at the proposed damsite has a catchment area of about 40,000km^2. The damsite is located about 4km upstream of the confluence of the Egiin and the Selenge ‡the country's biggest river (Egiin HPP 2006).

There are good construction conditions for Egiin HPP, and no restricting factors exist in technology, society and environment. To build this hydropower station is economically attractive as it has remarkable economical

21. The aimagis a first level administrative subdivision of Mongolia. Mongolia is divided into 21 aimags

returns and social effect of developing the local economy.

The Project covers the area of utilization of renewable sources. The HPP will be connected to national grid. Public Private Partnership approach could be attracted in the project implementation.

1.2.7 Project activities

Concrete future investor's activities oriented to build Egiin HPP will start after the appropriate contract is signed. After the contract enters into force, the investor/company selected will proceed to:

- obtain all permits;
- contacting with all local authorities;
- make power purchase agreement with electricity transmission company ;dam excavation
- dam concrete placing
- power station

1.2.8 Project Timeline

4 years (2015-2019).

The following timeline for implementing the project is to be expected.

It is assumed that the work for concrete placing is carried only for the summer season (from April to October).

Diversion work - 2015 (June – October)

Dam excavation – August 2015 – October 2016

Dam Concrete Placing – April 2017 – October 2018

Power station –April 2018 – August 2019

1.2.9 Budget/Resource requirements

The following budget in USD for implementing the project is to be expected.

Civil engineering works
177600

Electro-mechanical equipment
83800

Contingencies
30400

Engineering and administration
22000

Total
313800

For implementing the project, it is need soft loan from international funding sources.

1.2.10 Measurement/Evaluation

The output as electricity distribution (500,000 MWh/year) to the central grid will be measured by electricity meter on in the power house of the HPP.

1.2.11 Possible Complications/ Challenges

The low electricity tariff is hindering foreign investment in hydro power plants. Even though in the renewable energy law, it is mentioned that higher feed-in tariff should be provided for electricity supplied by renewable energy resources, the electricity generated by HPPs with capacity more than 5MW is not eligible to receive high feed-in tariff (**RE Law 2007**). The low tariff hinders investment in hydro power plant project as the power purchase agreement doesn't reflect the feed-in tariff mentioned in the renewable energy law.

There lacks domestic technical capacity on the installation and operation of large scale HPP. Therefore selection of technology, equipment purchase, contracting will require study and time and high transaction cost.

Bureaucracy is high in energy sector as it is a public sector. The bureaucracy itself limits possibilities to implement projects and increases costs to conduct project baseline surveys.

Depending on climate condition of Mongolia the time in year for construction of HPP is only in the summer season from April to October.

1.2.12 Responsibilities and Coordination

Government/Ministry of Energy will be responsible in coordination with private companies and international financing organizations

1.3 The Wind Park project in Govi region

1.3.1 Introduction/Background

Renewable energy power plants are planned to be established in the Gobi and the Eastern aimags according to the Government Strategy.

- Energy demand of Sainshand is expected to grow due to planned construction of the industrial park in the area.
- Sainshand is a windy area in Mongolia. Wind assessment is being done by the National Renewable Energy Center

1.3.2 Objectives

To construct a wind park in Gobi region to operate inparallel with the national grid in order to meet increasing demand for energy in Sainshand.The project activity will also generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants, which dominate the power supply to the Central Grid of Mongolia.

1.3.3 What are the outputs and are they measurable?

The capacity of the proposed wind park will be 52 MW and the expected annual electricity generation is 170 million kWh/year.

The electricity produced by the wind park will be supplied to the Central Grid.

1.3.4 Relationship to the country's sustainable development priorities

- Improve electricity supply to users
- Reduce coal combustion and GHG emissions. The expected GHG emissionsare 174,000 tons CO_2/year
- The large scale HPP is supported by many country policy instruments, including:
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- National Renewable Energy Program of Mongolia (2005-2020) (NREP 2005)
- Mongolia Second National Communication under the UNFCCC (MSNC 2010)
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1.3.5 Project Deliverables

Construction of Wind Park in Gobi region capacity 52 MW and the expected annual electricity generation is 170 million kWh/year.

1.3.6 Project scope and possible implementation

The proposed project is located in the Southern Mongolia,providing a total of 52 MW. The project site has an excellent wind resource, which has been measured extensively. The proposed wind park will be constructed in area near to Sainshand of Dornogobi aimag. The wind farm will deliver its electricity to the proposed mining processing plants located in Dundgobi, Dornogobi and Umnugobi aimags as well as to the consumers in Central Grid of Mongolia.

The project will assist Mongolia in stimulating and accelerating the commercialization of grid connected renewable energy technologies and markets. It will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. Furthermore the project will demonstrate the viability of larger grid connected wind farms, which can supportimproved air quality, alternative sustainable energy futures,