

**UNITED NATIONS DEVELOPMENT PROGRAM
GLOBAL ENVIRONMENT FACILITY**

PROPOSAL FOR PDF BLOCK B & C GRANTS

Country: Kazakstan

Project Title: *Removing Barriers to Wind Power Production in Kazakstan*

Focal Area: Climate Change

Amount of PDF Funding Requested: US\$ 350,000

Government Cofunding: US\$ 100,000 (in kind)

Duration: 12 months

Requesting Agency: UNDP / The Government of Kazakstan

Executing Agency: DDSMS

Block B X **Block C**

Block A Grant Awarded: No

I. Summary Project Objectives and Description

The objective of the full-scale project to be developed with the PDF resources requested here is to remove barriers to commercial scale, grid-connected wind power production in Kazakstan, thereby reducing the need for new fossil fuel based power plants and the associated greenhouse gas emissions.

The project is expected to achieve this goal by: (i) building institutional capacity for research, planning and technology transfer related to wind power production; (ii) reducing the uncertainties on costs and various technical issues related to wind power production; and (iii) demonstrating the feasibility of wind power production in Kazakstan in order to get the necessary political and financial support to move towards larger, commercial scale applications. A pre-feasibility study followed by a recent mission of the World Bank has indicated that a feasible first step would be the construction of a 40 MW demonstration plant in “Dzungar Gate”. This site has been identified to provide excellent wind resources, with average wind speeds of 9-10 m/s.

Parallel to the demonstration component, a more detailed assessment of the wind resources in Kazakhstan will be made by launching a measurement program in other promising sites, and a training program will be conducted focusing on installation, operation and maintenance of the equipment, and development/use of analytic tools to assess the potential role of wind power production in Kazakhstan. This analysis will cover technical issues like specific requirements that intermittent renewable energy sources pose for load management, economic aspects like long-run marginal cost of different options, potential for cost reductions through local manufacturing of the components, social and environmental aspects.

It should be noted that GEF resources will not be used to fund the demonstration plant per se, but for technical assistance to remove barriers to large-scale, grid-connected wind power production in Kazakhstan. In that regard, negotiations with other international partners for cofunding and technical cooperation (incl. joint ventures) will be initiated and conducted.

II. Description of Proposed PDF Activities

This project preparation request represents the first phase of a three-phase process. The PDF-financed activities described here (Phase I) consist of formulation of a project brief for Phase II. The following activities have been identified as necessary in order to undertake this task:

1. Undertake a “market analysis” focusing on the (i) size of the market (including identification of suitable sites and assessment of wind resources in these sites based on the existing meteorological data¹); (ii) consistency with the general development plan for the power sector in Kazakhstan; (iii) investment needs and potential financial resources/arrangements to utilize the available wind resources; and (iv) identification of all key barriers to wind power production in Kazakhstan, including high implementation costs and energy price distortions, and estimate the extent that these barriers hamper the cost-effective implementation of wind power projects;
2. Conduct targeted studies to fill the gaps in technical, economic, social or environmental information regarding the construction of a demonstration plant. A more detailed assessment of the characteristic of the available wind resources in the proposed demonstration site (to be carried out by, or in association with the local institutions), as well as evaluation of the selected prototypes and commercially available wind power plant designs with respect to the specific wind characteristics of Kazakhstan, and especially regarding the Dzungar gate will form a part of this activity;
3. Identify and mobilize cofunding and international partners for the construction of a demonstration plant and determine the optimal size for the demonstration plant based on

¹ Although it is well known that due to various reasons the standard meteorological data does not usually provide the quality needed for an accurate assessment of wind resource to wind power production, it has also been recognized that the estimated duration and resources available for this PDF phase are not enough to conduct a broad measurement to improve the wind resource assessment nation wide.

the available financial resources and the more detailed technical information gained during the feasibility study;

4. Evaluate the local capacity to operate, maintain and manufacture wind power plants and/or components (including the evaluation of the potential for joint ventures);
5. Formulate a strategy and a proposal for a set of measures to overcome all the main barriers to large-scale, grid-connected wind power production in Kazakhstan (including better assessment of available wind resources in Kazakhstan);
6. Undertake an independent technical/economic evaluation of the project identifying potential risks that can prevent meeting the short or long term objectives of the project, and suggesting changes that should be made to meet those objectives; and
7. Finalize the project brief for the phase II of the project.

Regarding the implementation of the different activities, they will be carried out in close consultation with all the relevant stakeholders including government ministries, academic institutions, state or privately owned power producing, power purchasing or manufacturing companies, and other relevant organisations dealing with technical, economic, financial, social or environmental aspects of the project (including environmental NGOs). The funds needed for the involvement of these groups and consultations with them are incorporated into the budgets of each specific activity of the project.

III. PDF Outputs

The output of the PDF will be a project brief for the Phase II of the project demonstrating the ability to achieve the goals set for the project including:

- i. an assessment of the size of the market, the quantity of financial resources required, and the contribution that fulfilling the full scope of the project would make in mitigating greenhouse gases in Kazakhstan;
- ii. a plan for involvement of all the key stakeholders;
- iii. a description of all the key barriers to wind power production in Kazakhstan, and a strategy and proposed set of measures to remove those barriers;
- iv. a technical, economic, social and environmental feasibility study of the demonstration plant;
- v. a detailed incremental cost analysis following the GEF guidelines;

- vi. a financing plan and agreements on cofunding for the demonstration plant, and an initial analysis of the resources available for the subsequent investment phase (phase III); and
- vii. a plan and a set measures for monitoring and evaluating the programmatic benefits of the project.

IV. Eligibility

Kazakstan ratified the Climate Change Convention on 17 May 1995.

Kazakstan is the largest emitter of greenhouse gases in Central Asia. A recent inventory conducted under the U.S. Country Study Programme concluded that the total emissions of Kazakstan were equivalent to about 65 million tonnes of carbon in 1990. Of this amount, the energy sector contributed almost 90%.

The share of fossil fuel power plants in the total electricity generation has been traditionally high in Kazakstan, being 93-94 % on average. Not surprisingly, the improvement of energy efficiency both in the supply side (especially by further developing the cogeneration), and in the demand side has been identified as the most efficient measure to mitigate GHG emissions. Recognizing the importance of this issue, the Government has launched and approved a “Programme of Energy Saving” which is recognized as a priority for the country. This programme includes an initiative to engage more renewable energy sources into Kazakstan’s energy sector.

The mitigation analysis conducted under the US Country Study Program has listed wind power as one main mitigation option to reduce the GHG emissions into the atmosphere in Kazakstan. The “Dzungar-gate”, with average wind speeds of 9 m/s, was identified as the most promising site for first installations. The total available capacity within this area has been estimated to as 300-500 MW. South Kazakstan has currently a considerable electricity deficit (around 30%) which is made up by imports from other Central Asian countries at relatively high prices (4-4.5 c/kWh).

Internationally, experience in many countries has shown that wind power can provide a cost-effective, technically and environmentally sound source of power if certain prerequisites are met. The most important of these is the availability of suitable sites with adequate, steady wind speeds, and technical compatibility with the rest of the generating system, taking into account the transmission distances and the intermittent nature of wind power production. The rapidly growing interest in wind energy is demonstrated by the annual growth rate of 1,200 MW of installed capacity in 1995 compared to the 200 MW installed during the year 1990. The total installed capacity in 1995 was 4,470 MW. Seventy per cent of this capacity is in the USA, Denmark and Germany, but new markets are opening up. Of the developing countries, India is far ahead with the total installed capacity of 500 MW in 1995.

Operationally the project falls under the GEF Operational Program # 6, “Promoting the Adoption of Renewable Energy By Removing Barriers and Reducing Implementation Costs”.

V. National Level Support

The Government of Kazakstan has demonstrated serious interest to study and promote the use of renewable energy sources. USAID is currently assisting the Government in legal and regulatory aspects regarding the transition towards market economy in the energy sector. Although the electricity tariffs are still low, the rationalization of fuel and electricity prices to reflect the real prices and market forces is under way.

According to the pre-feasibility study and the recent World Bank mission, the personnel in the Ministry of Energy and Coal Industry, ALMATYENERGO, and the local research institutes are highly qualified to implement the various activities of the project, but training and access to the latest available information on topics such as available technical options, market oriented planning and operation practises, and financing (incl. support and incentives to attract domestic and foreign investments) is needed.

Regarding the funding for this PDF phase, the Government of Kazakstan will contribute US \$ 100,000 (in-kind) to cover a part of the costs of project preparation. Cofunding for the demonstration plant and the following investment phase is expected both from the Government of Kazakstan and from bilateral and/or multilateral sources which will be identified during the further preparation of the project.

VI. Items to be Financed

Activity	GEF (US\$)	Government (US\$ in-kind)
1. Market analysis (size, funding requirements, identification of barriers etc.)	30,000	15,000
2. Upgrading the technical/economic/social/ environmental feasibility study regarding the construction of the demonstration plant in Dzungar gate (including wind resource assessment and measurements and evaluation of selected wind turbine designs)	224,000	70,000
3. Mobilization of key stakeholders and cofunding for the project	15,000	5,000
4. Evaluate the local capacity to maintain and manufacture wind power plants and/or components (including the evaluation of the potential for joint ventures)	10,000	5,000
5. Formulate a strategy to overcome all the main barriers to large-scale, grid-connected wind power production in Kazakhstan	15,000	5,000
6. An independent technical/economic evaluation of the demonstration project identifying potential risks that can prevent meeting the short or long term objectives of the project and suggesting measures and changes to meet those objectives.	15,000	
7. Finalize the project brief for the phase II of the project	10,000	
Subtotal	324,000	
Project Support Services	31,000	
TOTAL	350,000	100,000

VII. Special Features

A pre-feasibility study for the project has been prepared by the International Financing Agency in cooperation with the State Energy Company, ALMATYENERGO. The study concluded that prospects for successful introduction of wind power into the Kazakhstan's generating system exist, but a full feasibility study is needed to gain additional information on wind resources, and on various technical, economic, social, environmental, logistical and financial aspects of the project.

According to studies made by the ALMATYENERGO, there are nine regions in Kazakstan which are most suitable for the development of wind energy projects. All of these regions should have wind speeds that average over 8 m/s making them suitable candidates for cost-effective wind power production. The main reasons for selecting the Dzungar gate for the development of the first wind power plant (beside the excellent wind resources) were a) need for new power generation capacity in the region; b) a transmission grid nearby which can be upgraded with relative little cost; c) highly skilled supporting companies with good steel fabrication and construction skills close to the site; d) regional political support; and e) good transportation facilities.

A special feature regarding the wind resources in the Dzungar gate are occasional “Evgei” and “Saikan” winds, which sometimes can reach wind speeds larger than 60 m/s. In that regard, specific emphasis has to be put on evaluating the existing wind turbine designs to ensure that they are able to resist the high wind speeds, and also that they will produce the optimal output with the wind speeds that are relatively high also in average compared to many other countries such as Denmark, USA, and India. On the other hand, it should be emphasized that GEF funding will not be provided for technology development per se, e.g. for the development of totally new wind power designs.

Regarding the assessment of wind resources in Kazakstan, it should be noted that funding under the first phase of the project (PDF) will be provided only to conduct the additional measurements needed for the construction of the first demonstration plant in the Dzungar gate. However, funding for a more detailed assessment of the wind resources of other sites can eventually be provided in the later stage.