

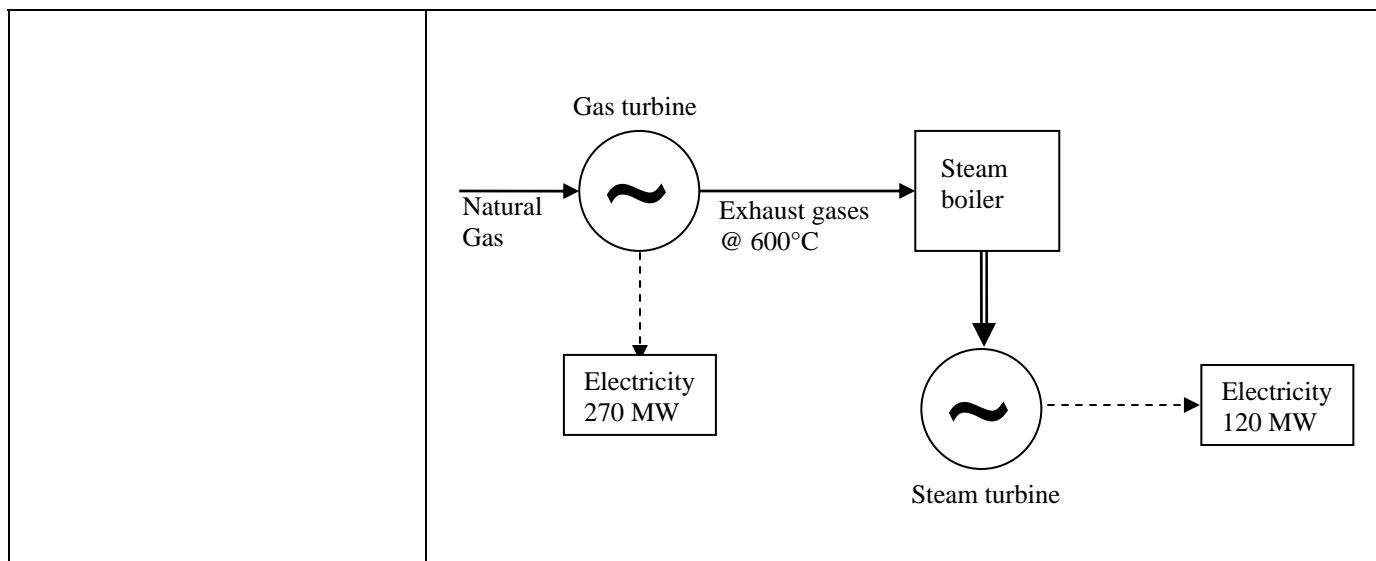
PROJECT IDEA NOTE (PIN)

Name of Project: **Construction of a 370 MW combined-cycle natural gas fired plant at the Tashkent Power Station**

Date submitted: **25 April 2007**

A. PROJECT DESCRIPTION, TYPE, LOCATION AND SCHEDULE

OBJECTIVE OF THE PROJECT	<p>Objective of the upgrade of the Tashkent Electrical Power Station (TPS) is to:</p> <ul style="list-style-type: none"> – Ensure uninterrupted power supply for consumers; – Ensure energy security and independence in Uzbekistan; – Improve energy efficiency by installing up to date technology; – Meet increasing consumer demands for electricity and prepare for decreasing generation capacity; – Reduce fuel consumption and GHG emissions.
PROJECT DESCRIPTION AND PROPOSED ACTIVITIES	<p>The proposed project consists of the installation of a 370 MW combined-cycle natural gas fired electricity generating plant (CCP) at the TPS. The projected CCP includes a gas turbine, steam generator for heat recovery (waste heat recovery boiler), steam turbine, water supply and discharge system, fuel feeding plant, gas compressor, monitoring system and ancillary equipment. The project includes development of engineering design, laying the foundation for power complex building and equipment, heat recovery steam-gas generator installation, gas and steam turbines installation and commissioning. All 12 existing steam power generating units will be retained and will continue to operate into the foreseeable future.</p> <p>The Tashkent Electrical Power Station (TPS) is located in the north-eastern area of Tashkent. It is designed for electrical power generation only, and was put into operation in 1961. The TPS capacity is 1860 MW, and includes 12 steam power generating units (with an average capacity of 155 MW per each unit) connected to chimney blocks (with a height of 120 m). The main fuel used is natural gas (85%) and the reserve fuel is mazut (15%).</p> <p>Given that the planned operating life of the existing generating units is 32-40 years, the TPS currently suffers from decreasing generation capacity due to reduced production efficiency. Although currently operating beyond their planned operating lifetime, the existing steam boilers and turbines have been well maintained are expected to operate for a further 15 – 20 years. Uzbekenergo have experience of operating boilers beyond their planned lifetime, and one example of such practice is the steam turbine unit installed at the Angren plant which has now been operating for over 60 years, and is still in operation. However, existing capacity needs to be increased to meet increasing demand for energy as a result of growth in industrial production and income of the population.</p>
TECHNOLOGY TO BE EMPLOYED	<p>The combined cycle power generation technology is based on the gas-steam cycle, with the use of exhaust gases and steam for electricity generation.</p> <p>Natural gas is fed to a gas burner, and the resulting hot exhaust gases drive the first stage of the cycle, the gas turbine. The generating capacity for the gas turbine is 250 MW. The hot exhaust gases at a temperature of 600°C are then fed to a boiler in order to raise steam. The resulting steam is then used to drive the second stage of the cycle, the steam turbine. The generating capacity of the second stage of the cycle is 120 MW. The total resulting capacity of the plant is therefore 370 MW. The production efficiency of this type of combine cycle plant is 55%, compared to only 33% for a single cycle plant. Heavy fuel oil will not be used by this new plant. A schematic outlining the technology to be used is presented in the schematic below.</p>



TYPE OF PROJECT

Greenhouse gases targeted CO ₂ /CH ₄ /N ₂ O/HFCs/PFCs/SF ₆	CO ₂
Type of activities Abatement/CO ₂ sequestration	Reduction of CO ₂ emissions
Field of activities	3

LOCATION OF THE PROJECT

Country	Uzbekistan
City	Tashkent
Brief description of the location of the project	The CCP is planned to be constructed in the territory of the Tashkent TPS. The construction site is located in the Kibrai district of the Tashkent region (to the north-east from Tashkent). The closest residential buildings of power engineering specialists adjoin the station in the north.

PROJECT PARTICIPANT

Name of the Project Participant	'Uzbekenergo' Public Joint-Stock Company (PJSC)
Role of the Project Participant	a. Owner of the site or project b. Owner of the emission reductions c. Seller of the emission reductions d. Project investor
Organizational category	a. Public joint-stock company, 100% of shares is owned by the Government of the RU
Contact person	First Deputy Director of the Board of Directors — Bakhodir Abdurakhmanov
Address	Tashkent, 6 Khorezmskaya St., 100100
Telephone/Fax	(998 71) 233 6129
E-mail and web address	sjsc@uzpak.uz
Main activities	<ul style="list-style-type: none"> – Adequate power supply to consumers irrespective of their departmental identity or pattern of ownership; – Technical upgrade and re-equipment which requires investments and technologies, including the foreign ones; – Short-term and long-term projections, development of targeted scientific, technical, economic and social programs for the development of power sector and coal industry, and efficient use of natural resources and existing industrial capacity;

	<ul style="list-style-type: none"> – Enhancement of economic, technical, technological and investment cooperation with power supply systems of neighboring countries, foreign countries as well as strengthening of export potential of the sector; – Construction and commissioning of power generating facilities, operation and maintenance of facilities in the power and coal sectors.
Summary of the relevant experience of the Project Participant	The 'Uzbekenergo' PJSC was established in 2001 as a substitute for the former Ministry of Energy and Electrification of the RUz. This company operates power generation facilities with the total capacity of over 12 GW, of which thermal power stations account for 86% and hydropower plants account for 14%. The company owns 50% of total power generation capacity in Uzbekistan. The company has been operating power stations for over 80 years.
EXPECTED SCHEDULE	
Earliest project start date	2009
Expected first year of CER/ERU/VERs delivery	2012
Project lifetime	25 years
For CDM projects: Expected Crediting Period	10 fixed years
Current status or phase of the project	<p>The project is at the stage of tendering for general contractor for supply and installation.</p> <p>Feasibility study of the project was updated in 2008. Detailed technical documentation is being developed.</p>
Current status of acceptance of the Host Country	<p>The Host Country has approved the project, as evidenced by Resolution #157 of the Cabinet of Ministers of the RU "On Measures to Use the Concessional Loan of the Japanese Government Extended for the Upgrade of the TashTPS" dated May 13, 2002.</p> <p>The Project is included in the Program on Development of Energy Sector for a Period up to 2010" approved by the Cabinet of Ministers in 2000.</p> <p>The project was approved as CDM project by DNA Uzbekistan in April 2007.</p>
The position of the Host Country with regard to the Kyoto Protocol	<p>Has the Host Country ratified/acceded to the Kyoto Protocol? <u>YES</u>, in 1999</p> <p>Has the Host Country established a CDM Designated National Authority / JI Designated Focal Point? <u>YES</u>, in 2006</p>

B. METHODOLOGY AND ADDITIONALITY

ESTIMATE OF GREENHOUSE GASES ABATED/ CO₂ SEQUESTERED	<p>Annual (if varies annually, provide schedule): 402 173 tCO₂-equivalent</p> <p>Estimates of emission reductions have been made based on the approved baseline methodology AM0029:</p> <p>Baseline</p>
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	<p>The annual output of the project is: $364\,000\text{ kW} \times (1 - 0,07) \times 8\,760\text{ h} \times 0,85 = 2,520\text{ GWh}$,</p> <p><i>Where:</i> $364\,000\text{ kW}$ — energy output on generator terminal; $0,07$ — losses via transmission $0,85$ — capacity (load) factor</p> <p>so emissions in the baseline scenario are equal to: $ER_CM = 2,520\text{ GWh} \times 617\text{ tonnes/GWh}^1 = 1,554,840\text{ tonnes CO}_2\text{ equivalent}$</p> <p>Project The annual fuel consumption of the new CCP is 606.67 million cubic meters; The emission coefficient for natural gas is 1.9 tones CO₂/thou. cubic meters, so project's emissions are equal to: $ER_{ccpu} = 606,670\text{ thou. m}^3 \times 1.9\text{ tonnes/thou. m}^3 = 1,152,667\text{ tones CO}_2$</p> <p>Emission Reductions $ER = ER_CM - ER_{ccpu} = 402,173\text{ tonnes CO}_2$</p> <p>¹ Emissions reductions combined margin, calculated within the framework of UNDP project, equal to 617 g CO₂/kWh, or 617 tonnes CO₂/GWh (In accordance with data from SJSC "Uzbekenergo" fro 2005-2007)</p>
BASELINE SCENARIO	<p>With reference to the approved baseline methodology AM0029, a number of alternatives for the baseline can be considered. These have been evaluated as follows:</p> <ul style="list-style-type: none"> • The project activity not implemented as a CDM project: The proposed project activity is unlikely to be financially attractive without carbon financing • Power generation using natural gas, but technologies other than project activity: The option of installing a single cycle plant is not considered to be cost effective or energy efficient, as the efficiency of the plant would be approximately 33% compared to 55% for the CCP. This option would lead to increased gas consumption and increased emissions. The law "On the Rational Use of Power" (dated April 25, 1997; amended in compliance with the Law of RU #428-II dated April 24, 2003), aims to create general legal framework that will govern such areas as preservation of national energy resources, efficient use of energy and production capacity. Article 10 of this law provides for "... the establishment of energy-efficient demonstration zones for implementation of projects with high energy efficiency; promotion of the development of energy-efficient and environment friendly technologies and productions." The proposed project would serve as such a demonstration project, in particular as this technology has not previously been used in Uzbekistan, and is only the second example in Central Asia. • Power generation technologies using energy sources other than natural gas: Natural gas is Uzbekistan's major fossil fuel resource, and currently accounts for 86% of total fuel consumption in power plants operated by Uzbekenergo. It is considered to be the most efficient and cleanest fossil fuel for Uzbekistan. Uzbekistan natural gas resources are currently estimated at 3 trillion of reserves, so this fuel will figure in the countries energy scenarios for the long term. Renewable energy resources, namely wind and solar, are not currently considered to be cost effective options in Uzbekistan for the capacity of plant required.

- **Import of electricity from connected grids:** The TPS is connected to the main 500 KV United Central Asian grid.

The final option, import of electricity from connected grid is considered to be the baseline, as it would not require any significant investments, and would not be reliant on carbon financing.

ADDITIONALITY

A simplified assessment of additionally according to AM0029 is presented below:

Step 1: Investment analysis
 Securing enough capital for the investments required for this project is a significant barrier. The most recent feasibility study, completed in 2002, estimated that total project costs would amount to approximately US\$ 230 mln. With increases in the cost of fuel and raw materials since 2002, however, the true cost of investments today has increased significantly, and total investment costs are now estimated to be approximately US\$ 463 mln.

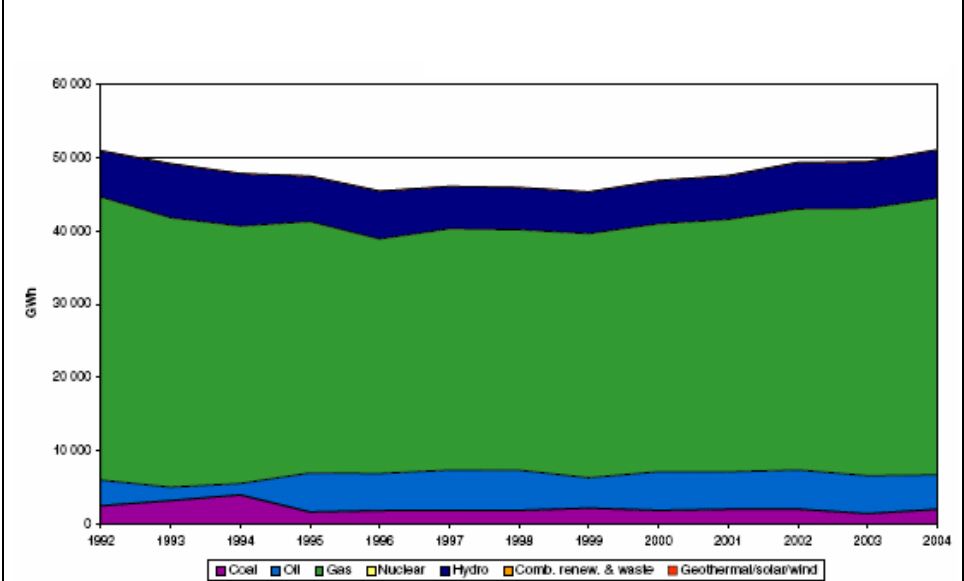
Step 2: Common practice analysis
 The fact that no CCP has yet been installed in Uzbekistan demonstrates that the project is not common practice in the country.

Step 3: Impact of CDM registration
 CDM registration would provide financial benefits in the form of project revenue by selling CERs. This is expected to attract the further funding required for project investments.

As all 3 steps above are considered to be satisfied, the project is additional.

SECTOR BACKGROUND

The power system of Uzbekistan consists of 37 thermal power plants and hydropower plants with a total installed capacity of 11.2 million kW and feasible daily production of about 47 – 48 billion kWh. A total length of electric power network of Uzbekistan’s power system is over 230,000 km of power transmission lines (all voltages) and transformer substations having a total capacity of 45 million kW. The evolution of electricity generation by fuel to 2004 (latest data available from IEA) is presented below:



The basic provisions and directions for development of the electricity sector are reflected in "The Program of Development and Reconstruction of Generating Capacities in Power Industry of the Republic of Uzbekistan for the period till 2010», approved by the Government. In connection to this, the technical re-equipment and reconstruction of power plants and electrical networks are the main strategic tasks for the short and medium-term. The strategic aims of development of Electric Power Industry to 2010 are the following¹:

- Retention and enforcement of power independence of the country, provision of reliable and stable functioning of power capacities, reliable consumer supply of electrical and thermal energy;
- Further improvement of energy production for increased efficiency of use of fuel and energy resources;
- Decrease of negative impact of energy production on the environment.

High priority areas for the electricity and energy sector in Uzbekistan are currently:

- Sequential implementation of measures on demonopolization in the energy sector, its deregulation, establishment of competition in electric energy distribution, provision of equal opportunities and access of market participants to power transmission lines;
- Phased transformation of the large energy sector enterprises (such as thermal power plants, combined heat and power plants, power grid enterprises, etc.) into joint stock companies;
- Accelerated deregulation and privatization of social infrastructure, enterprises and agencies involved in design works, building and installation, and maintenance. Establishment, on their basis, of nongovernmental forms of property including private enterprises;
- To attract foreign investments in transformation of the energy sector enterprises into joint stock companies, reconstruction, modernization, and further development of power generating facilities and power grids;
- Introduction of market principles and mechanisms in the management systems and economic relations related to power generation, transportation and sales;
- Ensure integrated and sustainable development in the energy sector and coal mining.

The Law "On the Rational Use of Power" (dated April 25, 1997; amended in compliance with the Law of RU #428-II dated April 24, 2003) aims to create general legal framework that will govern such areas as preservation of national energy resources, efficient use of energy and production capacity. Article 10 provides for "... the establishment of energy-efficient demonstration zones for implementation of projects with high energy efficiency; promotion of the development of energy-efficient and environment friendly technologies and productions."

The Government of RU develops and implements programs and projects focused on the rational use of energy; coordinates activities of the ministries, departments, enterprises, institutions and organizations as well as the Government of the Republic of Karakalpakstan, regional and Tashkent authorities in the development of energy-efficient programs and projects; assists in the implementation of projects on integration of energy-efficient

	<p>equipment and modern technology.</p> <p>Article 19. Incentives for power producers and users For the rational use of power, the Government of Uzbekistan provides legal entities and individuals with the following incentives:</p> <ul style="list-style-type: none"> • financing of national, sectoral, and regional targeted programs and projects on the rational energy use from the funds of the public concessional loan; • financing of intersectoral scientific and design works, production of pilot batches of energy-efficient equipment. <p>Uzbek Government may set lower tariffs for power consumption by legal entities and individuals who manage to reduce energy consumption compared to the established standards.</p> <p>¹ SJSC Uzbekenergo official website www.uzenergy.uzpak.uz</p>
METHODOLOGY	Yes, AM 0029 (Grid connected electricity generation plants using natural gas), including ACM 0002 (Grid connected electricity generation from renewable sources)

C. FINANCE

TOTAL CAPITAL COST ESTIMATE (PRE-OPERATIONAL)	
Total project costs	US\$ 463.5 mln (based on feasibility study updated in 2008)
SOURCES OF FINANCE TO BE SOUGHT OR ALREADY IDENTIFIED	
Equity	'Uzbekenergo' SJSC — US\$ 76,9 mln
Debt – Long-term	<p>Loan of the Japanese Government (JICA) — US\$ 274,3 mln</p> <p>Loan of Fund of Reconstruction and Development of Uzbekistan — US\$ 76,2 mln</p> <p>Loan of commercial banks — US\$ 36,1 mln</p>
INDICATIVE CER/ERU/VER PRICE PER tCO₂e	US\$ 10
TOTAL EMISSION REDUCTION PURCHASE AGREEMENT (ERPA) VALUE	
A period until 2012 (end of the first commitment period)	402 173 x 10 = 4 021 730 US\$
A period of 10 years	4 021 730 x 10 = 40 217 300 US\$

D. EXPECTED ENVIRONMENTAL AND SOCIAL BENEFITS

LOCAL BENEFITS	Operation of the CCP will provide secure and dependable electricity supply to the local population. The number of power cuts in the city of Tashkent will be significantly reduced.
GLOBAL BENEFITS	<p>The project will lead to a significant reduction in GHG, estimated at 402 173 tCO₂-equivalent per year. The project will also lead to significant reduction in emissions of other pollutants, including:</p> <ul style="list-style-type: none"> • Sulphur Dioxide • Oxides of Nitrogen • Particulates
SOCIO-ECONOMIC ASPECTS	

<p>What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?</p>	<p>The project will lead to more controllable energy prices as the CCP is fired by locally produced fuel and is therefore not so sensitive to price increases in imported fuel or electricity. This should lead to more controllable electricity tariffs.</p>
<p>What are the possible direct effects?</p>	<p>The project will lead to the creation of 34 new jobs. As the CCP is new technology in Uzbekistan, most of the new jobs will require relatively high skills and qualifications, and a high level of transfer of know-how to local staff is also expected.</p>
<p>What are the possible other effects?</p>	<p>As this is the first example of CCP technology in Uzbekistan, and only the second example in Central Asia, the project is expected to serve a demonstration project for application of energy efficient CCP technology in the region.</p>
<p>ENVIRONMENTAL STRATEGY/ PRIORITIES OF THE HOST COUNTRY</p>	<p>Since independence, Uzbekistan has passed over 35 laws directly or indirectly related to environment protection and 55 regulatory acts. These laws and regulatory acts aims to enhance efficiency of the usage of energy resources and improve environment. The Republic of Uzbekistan is interested in the implementation of economically sound projects to reduce greenhouse effect.</p> <p>To lay the foundation for international cooperation for environmental protection, Uzbekistan signed the following international conventions:</p> <ul style="list-style-type: none"> • Convention on Biological Diversity (1995); • Vienna Convention for the Protection of the Ozone Layer (1993); • UN Framework Convention on Climate Change; • the Kyoto Protocol (1999). <p>The proposed project will contribute to environmental protection and is therefore consistent with the environmental strategy and priorities of the Host Country.</p>