

Renewable Policy Research Project: Uzbekistan
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I. Overview of Energy Sector

A. Conventional energy sources

Uzbekistan has substantial conventional energy resources, estimated at 7.7 billion tons of oil equivalent (toe). Natural gas is the main source of primary energy, constituting nearly 85% of the total amount of energy it produces. The current annual electricity demand of approximately 48,000 gigawatt hours (GWh) is produced primarily from conventional thermal power generation, with 77% of plants powered by natural gas, 7% by fuel oil, and 3.5% by coal. The remaining 12.5% of the electricity comes from hydropower, the only renewable energy resource currently being utilized to a significant degree. In 2002, the total power generation was 49,300 GWh, out of which 47,900 GWh was generated by power plants belonging to Uzbekenergo, 1,200 GWh by the Ministry of Agriculture and Water Resources (MAWR), and 200 GWh by the power plants with other owners.

Uzbekistan is among the ten top countries with regard to uranium reserves. There are at least 25 uranium reserves. Proven reserves of nearly 65,000 tons can be produced at a cost of \$80 per kg. In addition there are a further 17,500 tons that can be produced at \$80-130 per kg and 47,000 tons that can be recovered at over \$130 per kg. In many respects, the production rate will depend on greater access to modern technology. A major consideration is to reduce further environmental degradation during future production. Present uranium production, including the operation at Navoi, depends on materials and equipment supplied by Russia.

While Uzbekistan is currently energy self-sufficient, shortages in production are projected in the near future and, at the current rates of consumption, it is estimated that the current energy reserves will be depleted in 35 to 40 years.

B. Renewable energy sources

Despite the fact that tremendous natural gas reserves discourage the development of renewable energy fuel sources, Uzbekistan has great potential for developing renewable energy. Estimates put Uzbekistan's huge renewable energy potential at nearly 51 billion t.o.e. If today's global engineering and technological know-how were in place in Uzbekistan, it would be possible to produce 179 million t.o.e. using renewable energy - more than triple the amount of fossil fuel the country now produces annually.

1. Solar energy

Solar energy is the most promising renewable technology for Uzbekistan. In general, it is estimated the Uzbekistan is one of the best countries for integration of solar power. Annual energy potential from solar radiation on the territory of Uzbekistan exceeds its total proven hydrocarbon reserves. On average Uzbekistan has 270 days per year with sufficient sunlight to operate solar devices. Solar heat systems are often the lowest cost energy source for communities that are remote and difficult to access.

The highest levels of solar radiation are found in the south of Uzbekistan, but there has been experimentation of using solar energy across the country to supplement local and isolated agrarian communities, when transfer of power through conventional means is difficult or impossible. Solar energy can solve the energy problems of remote communities for which connection to the national power grid or to gas lines is not economically viable. The development of solar energy technologies can help improve living standards, assist Uzbekistan in complying with the environmental obligations in international climate change treaties and lay the foundation of a solar energy industry which can

create new jobs and stimulate technology development.

In the 1980s, Uzbekistan had a relatively well-developed solar energy research and development and production base. Uzbekistan is still the largest center of science in Central Asia that is carrying out high level fundamental and applied research and development in the field of renewable energy, and in particular scientific, research and design activities on practical application of solar energy. However investment into research and development has dipped sharply since 1991.

Since the year 2000 international donors (UNDP, TESIS) emphasize the importance of developing solar energy in Uzbekistan. A set of pilot projects has been implemented that shows that solar energy can serve as a supplemental resource, decreasing CO₂ emissions and reducing fossil fuel consumption. Thus, in 2003, the UNDP funded a demonstration project to assemble, install and put into operation 25 PV systems of two types in remote settlements in Karakalpakstan: one for household purposes and the other for water pumping from underground sources.

2. Hydropower

Currently, the only renewable with some share in the energy balance of Uzbekistan is hydropower. The hydropower potential from natural water flows in Uzbekistan is about 20,000 MW, about 30% from small hydropower sources. Only 30% of the small-scale hydropower potential is used. If the potential for hydropower stations is optimized, the electricity generated will be sufficient for all pumping stations, and the water transportation systems under the jurisdiction of the Ministry of Agriculture and Water Resources (MAWR).

The development of small-scale hydropower is a priority in the country's investment policy as embodied in the 1995 State Program of Small Hydropower Development. The program highlights the importance of regulating energy usage, nature conservation, and environmental protection along with the development of small-scale hydropower in the country. Its purpose is to effectively use the hydropower potential of rivers, improve technical aspects, and increase power supply in rural areas. Studies show the technical feasibility of constructing 43 small hydropower plants under the existing water reservoirs, and 98 on irrigation canals and collectors. The twin use of water for power generation and irrigation augurs well for sustainable development.

3. Biomass energy

Cotton is an essential staple crop in Uzbekistan. The use of cotton harvest waste locally as domestic fuel for household equipment is already widespread. The development of modern technologies for utilization of biomass for heat and power is in a very preliminary state in Uzbekistan.

4. Geothermal resources

Uzbekistan has significant potential geothermal resources, both hydro-geothermal and petro-geothermal, but the temperature of the resources is generally less than 50°C, which makes their application difficult.

5. Wind energy

There is very low potential for wind energy in the country.

II. Policy and legal framework for renewable energy

There are no clear policies/laws/regulations specifically designed to promote the generation and utilization of electricity from renewable sources. But there are some provisions on prioritizing renewable energy development in a wide range of related laws, regulations, programs, and policy papers that have been adopted in Uzbekistan. Those include:

- The Law On Environment Protection (1992).
- The Law On Rational Use of Energy (1997). The Law was adopted as a result of the

government signing the *European Energy Charter Treaty and Energy Charter Protocol* on energy efficiency and relevant environmental aspects on 17 December 1994. The main objective of the treaty is to establish a legal framework to promote longterm cooperation in the energy sector in accordance with the principles of the European Energy Charter. This protocol requires each party to prepare a strategy for energy conservation. Therefore, in accordance with the *Law on Rational Use of Energy*, Uzbekistan's Cabinet of Ministers adopted an energy-saving program on 14 February 2002.

- The President Decree On Deepening Economic Reforms in the Energy Sector of the Republic of Uzbekistan (2001).
- Cabinet of Ministers Decree On Improving the Performance of Uzbekenergo State Stock Company (2004).
- Cabinet of Ministers Decree No. 476, dated December 28, 1995, "Development of hydro energy in the Republic of Uzbekistan," which stipulates the effective utilization of hydro potential of rivers, water flows and hydro-engineering structures to improve the energy supply of rural areas.
- Main Directions of Energy Strategy of Uzbekistan in the period up to 2010 (1995). Among government policy priorities in the energy sector according to this document, is "to promote economically sound diversification of energy supply source to increase the share of coal, use of renewable and non-traditional energy sources development of small-scale hydropower system".
- Energy Sector Development Program by 2010 (1999).
- 'Program for development and reconstruction of power generating facilities in energy sector of the Republic of Uzbekistan for the period before 2010.'

In 2000, the Program on Development and Reconstruction of Generating Facilities in Energy Sector in Uzbekistan was developed. The program envisages the expansion of alternative energy usage such as solar and wind power, and installation of stand-alone power supply systems in regions that are remote and difficult access. According to these policies and laws, Uzbekistan was supposed to expand renewable energy use up to 1-2.5% by 2005-2010, but they have not been implemented so far.

III. Institutional framework for renewable energy

There is no clear institutional arrangement for promoting renewable energy development. Currently in Uzbekistan, regulations of renewable energy belongs within the energy sector.

Uzbekenergo. The governmental power utility state joint stock company (SJSC) "Uzbekenergo." Uzbekenergo is a state-owned holding company under the Ministry of Energy that owns and manages electric power plant subsidiaries, transmission subsidiaries, distribution subsidiaries and specialized support companies. However, this organization, dealing with electricity generation and distribution, places a low priority on renewable energy, which it views as a competitor of traditional energy forms. Therefore, renewable energy is receiving minimal attention.

Uzsuvenergo is a Specialized Association (SA) that was created in 1996 under the Ministry of Agriculture and Water Resources (MAWR) with the mandate to operate and develop small hydropower plants in the Republic of Uzbekistan.

State Committee on Nature Protection set the development of renewable energy sources as a future environmental priority and established National Research and Innovation Center Ecoenergy. Ecoenergy focus its activities on developing measures for conservational conventional energy sources, clean technology, and the introduction alternative energy sources.

The Main Administration of Hydrometeorology is the national focal point under the Convention

on Climate Change. In Uzbekistan over 80% of all harmful substances emitted into the atmosphere are byproducts of fuel combustion. Of the 160.5 million tons of greenhouse gases (in CO₂ equivalent) produced on the territory of Uzbekistan in 1999, the energy sector produced 137.3 million tons, i.e., 85.5% of all greenhouse gas emissions.

IV. Barriers to promoting renewable energy and possible ways for development

Increased use of renewable energy can provide Uzbekistan with a more stable energy supply especially in the rural areas. Renewable energy sources are environmentally friendly, reduce harmful environmental pollution at the local level and bring significant global environmental benefits. Most importantly, these energy systems are often the more cost-effective form of energy supply in remote areas. However, renewable energy development in Uzbekistan still faces many barriers (political, institutional, financial and technical) to its effective introduction and implementation. They are *inter alia* as follows:

- There are no regulations clearly defining a program to promote the utilization of renewable energy systems, or legislation supporting renewable energy applications;
- There are no policy and legal mechanisms allowing independent producers of energy from renewable sources;
- Lack of economic mechanisms, particularly tax mechanisms which would benefit relatively high capital-intensive investments;
- The announced measures in the Energy Efficiency Program of Uzbekistan until 2010 have a very theoretical approach, supporting the research and development of technologies, but do not include support for practical and wide-scale application;
- High costs of renewable energy and low cost of natural gas in domestic market; state subsidies for conventional energy generation create energy prices and tariffs that are tremendously distorted, and do not represent the true costs of generating and delivering energy;
- Cost of energy resources does not reflect actual cost of environment restoration;
- There is no national entity responsible for coordination and development of renewable energy;
- There is a need for development technical and human capacity related to renewable energy production and development. There is a gap between theory and practical experience;
- Energy sector persons responsible at national, regional and local levels are mostly not aware of the potential application of renewable energy;
- Lack of investment into research and development of renewable energy;
- Relatively low level of per capita income, the unfamiliarity of new technology and the lack of ancillary industries would act against any quick adaptation of renewable energy;
- The lack of information on the potential of renewable energy sources and the economic, social and environmental benefits relating to their utilization; and
- The lack of domestic economic entities involved in the manufacturing of renewable energy equipment on a large scale.

IV. The possible ways for developing and promoting renewable energy

The key elements for successful promotion of renewable energy technology are an elaborated favorable government policy and program, the necessary funding and a body committed to promoting the technology and its applications. Development of renewable energy requires a clear long-term national policy and legal framework that will put in place regulations, financial incentives, and

targeted transparent subsidies (justified by environmental and social benefits). Another requirement is an effective market for renewable resources that should be supported by the development of the programs and institutional bodies that will be interested in introduction and implementation of such technology. Creation of an authorized institutional body to be responsible for the introduction of new renewable energy technologies as well as for development and adoption of a government support program are key elements. It's necessary to establish at least a special Renewable Energy Unit within the Ministry of Economy, preferably not under the Ministry of Energy. The unit should be institute to implement energy policies and monitor ongoing state programs, and to liaise with donor agencies with regard to the development of renewable energy sources.

To support sustained market development, a long-term effort is needed that must be supported by all parties, including government, banks, private sector, research and development organizations, universities, NGOs, consumers, and the utility. Pilot projects are needed but they by themselves will not trigger market expansion. Capacity building needs to be done in advance of market acceleration. There is also a need for subsidies for the renewable energy sector and subsidized R&D; tax exemptions; access to grid for renewable energy producers; funding of renewable energy research; awareness raising on renewable energy; soft investment environment for renewable energy development; and taxation for fossil fuel based on environment restoration.

One of the important elements of success is technology transfer incentives for foreign and local manufacturers to establish manufacturing and/or build complex projects that will contain significant transfer of knowledge and input of local content and capability. The Clean Development Mechanism under the Kyoto protocol might be used as a way to stimulate foreign investment.

More focused approach is needed to address off-grid renewable energy options in rural areas and small towns in Uzbekistan.

V. Renewable energy in regional context

Uzbekistan plays a keystone role in the Central Asian power industry. Of all the generating facilities connected to the integrated Central Asian grid (encompassing Tajikistan, Kyrgyzstan, Turkmenistan, and southern Kazakhstan), half are located in Uzbekistan. There are some initiatives to promote renewable energy in the regional level: International Commission on Sustainable Development for Central Asia decision on establishing Regional network on renewable energy sources, and The Economic Cooperation Organization focus on renewable sources of energy, etc.

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