

Energy

At the second RECC (Rural Electric Cooperative Corporation) meeting in New Delhi it was noted that the possibilities to trade electricity under international standard power purchase agreements have the potential for mutual benefit to several central and south Asia countries. In this context, it is important to encourage and facilitate transportation of energy resources to all countries of the region. Joint steps will be taken to promote the hydropower potential of the region. In addition to significant hydro potential, Afghanistan's gas, oil, and coal natural reserves will also be considered for development with private sector participation for spurring investment, trade and stability in the region.

Current Status of Cross Border Energy Trade in Afghanistan:

There is no need to explain how electricity is crucial for the economic development of any economy. In terms of energy consumption, Afghanistan has one of the lowest in per capita energy usage in the region due to decades of war that has reversed the rate progress and development and destroyed much of the energy infrastructure. With the improvement of peace and stability in Afghanistan, a very high rate of progress can be anticipated for coming years to compensate for the years of steady downturn. At the current stage efforts are underway to increase the present estimated consumption rate of 25 kW per capita per year nearly 500 times as much to match the average regional rate of consumption. In the 1970s and the 1980s, Afghanistan was an energy (gas) exporting country. The negative impacts of war has changed that and now Afghanistan imports electricity from every country on the northern border and Iran on the western border.

With the return of peace and stability and the formation of the ANDS (Afghanistan National Development Strategy) Afghanistan and its development partners became more involved with cross border energy trade. This trend in energy trade has developed further with construction of the North East Power System (NEPS) where 300 MW or more of electricity may be imported from the Central Asian Republics to Afghanistan.

In Afghanistan during this past March, domestically generated hydro power represents nearly 45 per cent of the total grid connected power supply capacity. Thermal and diesel generated power represents 3 per cent while imported power (at present) represents about 52 per cent of Afghanistan's total grid connected power supply capacity. Note that these percentages do not include the multitude of non-grid connected micro hydro and diesel fuelled gensets throughout the country. It is estimated that later this year imported power will increase significantly due to completion and commissioning of a large part of the NEPS and completion of transmission system work in Uzbekistan.

Currently, Afghanistan imports about 120 MW of power from four neighbouring countries (Iran, Tajikistan, Turkmenistan and Uzbekistan). Under the North East Power System (NEPS) Afghanistan expects to import at least 150 MW of electricity from

Uzbekistan in 2009 and increasing to 300 MW or more by 2010, subject to Power Purchase Agreements and completion of planned transmission, substations and distribution systems construction and rehabilitation work.

Additionally, through the developing CASA-1000 Project, 1300 MW of additional power from Tajikistan and Kyrgyzstan may be exported to Pakistan via Afghanistan by 2012. It is expected that 300 MW of this power will be utilized in Afghanistan and the remaining 1000 MW exported to Pakistan. The plan is to use a 500 kV Direct Current (DC) transmission system to minimize line losses, although requiring more expensive converter substations.

Afghanistan's Vision for the future:

Over the next few decades, it is hoped that there will be more electricity generation as well as regional trade in electricity. Afghanistan was voted as the 54th member nation of the Energy Charter Treaty in December 2007, and the accession process is on-going. One of the objectives of the Energy Charter Treaty is cross border energy transit and trade in an environmentally acceptable manner.

- **NEPS** and **CASA-1000** both are cornerstones of Afghanistan's vision. Both represent important steps in a long journey.
- It is hoped that the volume of imported power from Central Asia to South Asia and passing through Afghanistan will grow over time. South Asian demand for electricity is growing fast. Similarly, Central Asian countries are developing their export capacities.
- **Medium Term Vision:** Over the next five to seven years, Afghanistan will import additional power from new sources. It may construct more new transmission lines to bring more power from Tajikistan, Turkmenistan, and Uzbekistan. In the longer run, Afghanistan's vision is to become a power transit country. It is also laying the foundations for a National Electricity Grid.
- Eventually, it is hoped that both Afghanistan and Pakistan will become major power transmission hubs. Working together both could bring low-cost power from Central Asia to Afghanistan and then send it on to Pakistan and perhaps further to India.

Power Generation within Afghanistan:

While the CASA-1000 Project currently is planning to send power to and through Afghanistan, the country also wants to develop its own domestic power resources. Over the next 20 years, Afghanistan aims to supply more power to its own towns and cities from its own energy resources, including increased hydro power, and development of natural gas and coal reserves for electricity production. **With the great**

hydropower potentials, Afghanistan within 10 to 15 years might be able to export electricity to South Asia from its own sources.

Energy resources – including coal, natural gas, hydropower and some oil – are in abundance in Afghanistan, with gas and hydropower potential more than sufficient to meet the country's energy needs. The hydropower potential, mainly in the upper Amu Darya and Panj Rivers is about 20,000 MW. Natural gas resources are estimated as follows: (i) proved recoverable 6 – 8 billion cubic meters; (ii) proved probable 25 billion cubic meters; and (iii) possible 250 billion cubic meters. Coal reserves are also substantial, but the full magnitude of Afghanistan's coal reserves is still being assessed.

In terms of specific hydro-power projects, the country has already identified more than ten hydro-project sites with total capacity of more than 10,000 MW. Several of these projects could be built over the next 10 - 15 years. These include hydro-projects on the Amu Darya River (about 5000 MW); hydro-projects on the Panj River (about 4000 MW) and a cascade hydro-project on the Kokcha River (about 1000 MW).

Since Afghanistan also has high quality coal, natural gas, and some petroleum it has significant opportunities for coal-to-power and gas-to-power generation, including development of investor owned Independent Power Producers such as the potential CMC coal fuelled TPP serving the Aynak Copper Mine and Kabul City.

Overall, the major components of Afghanistan's Energy Development Strategy are:

1. **NEPS** – the North East Power System will provide 300 MW or more of power for NE Afghanistan, including Kabul City. **Completion of NEPS is the most important component of Afghan energy strategy.**
2. Another part of the strategy is CASA-1000. This project would add another 300 MW for Kabul, plus 1000 MW of power that would be exported to Pakistan providing important transit revenue to Afghanistan.
3. Over the next few years Afghanistan hopes to add at least one more major power transmission line in the system. A Transmission Systems Study will determine the best approach, but it might involve converting gas in Turkmenistan into electricity, and then sending it via High Voltage Direct Current (HVDC) lines¹ to Kabul City and on to Pakistan, or construction of a High Voltage Alternating Current (HVAC) transmission system from Turkmenistan to Aqeena (border crossing location) to Andkhoy, Sheberghan and Naibabad, and additional HVAC transmission lines to Kabul City. Additional transmission capacity in the south and east of Afghanistan is also planned to improve the quality of life for the people and help to enhance the security situation in the region.
4. The strategy involves using domestic energy sources, which will be developed for use domestically and for export. This might come from hydro-power from

¹ The development of high-voltage direct current (HVDC) transmission technology opens up the prospect of gas-by-wire over much longer distances than was previously feasible. HVDC technology already underlies the current proposals for NEPS and CASA-1000.

already identified potential hydro-projects. It might also come from gas-to-power, where the current initiative at Sheberghan to develop 100 MW of power is one example. Or it might come from coal-to-power.

5. At an appropriate time, it is hoped that TAPI will actually go forward. China, Pakistan, and India have already demonstrated long-term gas demand with each country planning to import at least 20 to 30 billion cubic meters per year via regional pipelines. **With future development of gas fields, Afghanistan would also welcome the chance to resume gas exports to its neighbors.**
6. Various bilateral electricity trade deals like NEPS together with evolving new multilateral projects like **CASA-1000** could eventually lead to the creation of an integrated Central Asia-South Asia Regional Electricity Market (**CASAREM**). Over time this could incorporate the Central Asian Republics, Iran, Afghanistan, Pakistan, and possibly India. A similar market might emerge for trading natural gas as well. In a variety of ways, the bilateral and multilateral regional energy trading initiatives that are beginning to happen today may contribute to broader objectives of regional economic cooperation and political stabilization for the region.

Certain recent developments indicate that Afghanistan is about to realize its potential as a main route for energy trading between central and south Asian nations. Afghanistan's participation in the Energy Charter Treaty Task Force meeting on regional electricity cooperation and agreement on pursuing transmission of electricity among four Central and South Asian countries are examples of this phenomenon.

In conclusion, key participants are continuing to show interest in the Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline project. But despite these broad macro developments, the power situation in major cities of Afghanistan continues to be serious. The North East Power System (NEPS) project will bring power to many urban centres including Kabul City from Tajikistan and Uzbekistan (and hopefully Turkmenistan) improving the quality of life and economic development, and improving the security situation for the benefit of all.