

NANGARHAR ELECTRICITY EXPANSION INITIATIVE CASE STUDY

*(NOTE: THIS CASE IS FOR TRAINING PURPOSES ONLY. IT USES A COMBINATION OF
FACTUAL AND NON-FACTUAL DATA.)*

Nangarhar Province lies in eastern Afghanistan along the border with Pakistan. It was once a major center of opium poppy production but with the success of poppy eradication programs, production dropped by 95% and poverty among peasant farmers has risen as they seek new livelihoods.

The provincial capital, Jalalabad, is the largest city in eastern Afghanistan, home to 183,000 people and is only 90 miles by road from both Kabul and Peshawar, Pakistan. Situated on the main road between Pakistan and Afghanistan, it is a growing city with a relatively strong economic base.

Nangarhar province has the third largest population (about 1.3 million) in Afghanistan after Kabul and Herat. Its economy is in a better shape than the rest of Afghanistan because of strong high agricultural production, credit facilities for small business, and employment opportunities. Nangarhar is also important for security reasons.



Taliban fighters are active in the province, and there continues to be insurgency outside of Jalalabad, with weapons supplies coming from across the Pakistan border. Although Jalalabad is relatively safe due to a large presence of Afghan National Police and Afghan armed forces, areas outside of Jalalabad see regular Taliban activity.

For strategic reasons, the USG would like to stimulate legitimate economic opportunities and build confidence in government services such as electricity supply. USAID was asked by the National Security Council and Embassy to significantly increase electricity supply to Nangarhar. The target areas initially are Jalalabad and the economic corridor to the Pakistan border and the border crossing point at Torkham. USAID was told to prepare a preliminary plan and budget for a fast-tracked electricity expansion program within 3 months.

Electricity Services in Nangarhar

Electricity services in Afghanistan are provided by a division of the government-owned national electricity company, DABS. DABS/Nangarhar (DABS/N) provides services to Nangarhar Province. Currently only the city of Jalalabad is supplied by DABS/N; other areas of Nangarhar have either small scale hydro generation, diesel generators, or no electricity.

In 2008, the total number of DABS/N electricity customers was 11,000. In the past few years, households received energy for a few hours every third day. Business customers receive energy most days, but supply is less than 6 hours a day. Government agencies get a 24-hour supply on a priority basis. Government agencies consume 67% of energy supplied by DABS/N. However, government agencies pay only 6% of their electricity bills. Therefore, DABM faces **low revenue realization, leading to poor supply and lack of funds to expand services.**

Electricity Customers in Jalalabad City (2009)			
Consumer Category	No. of Customers	Energy Consumption %	Bill Collection Efficiency %
Domestic	9,214	25	94
Government/public agencies	364	67	6
Commercial and industrial	1,697	8	89
Government-owned pumping stations	10	Incl. above	
Total	11285		

Unreliable electricity supply is a major constraint on Nangarhar's economic activity. Because of inability to supply all demand, DABS/N allows a private company, Roshani, to generate and distribute electricity to customers in Jalalabad. Roshani supplies up to 1 MW to approximately 600 residential and 350 commercial/industrial customers and charges 52 US cents/kWh. Supplies are restricted to several hours every day for Roshani customers.

Planned commercialization of DABM/S and its distribution units

The Afghan government is committed to setting up a new commercialized electricity system owned and operated by DABS. DABS is an autonomous public corporation working under Afghan company law. DABS has a strong senior management team that is currently working on introducing new commercial, technical and management systems into the electricity sector. **This is important because it is expected that DABS will soon begin working on a new business model for its distribution divisions, including DABS Nangarhar.**

World Bank and USG have helped the Afghan Government to restructure and commercialize DABS. This includes support for the commercialization of Kabul's

electricity distribution division. Under this new project, a US contractor will provide capital and operating equipment to Kabul Electricity Directorate (KED), and will rebuild KED’s technical and commercial capacity. Similar arrangements are being considered for other DABS provincial units. Provincial leaders in Nangarhar told you that want technical assistance and capital grants to implement a loss reduction program, to expand energy supplies, and to build staff capacity.

The USG and the Nangarhar Government agree that the local economy urgently needs more affordable electricity. As the Jalalabad mayor told you on your reconnaissance visit:

“Farmers are no longer growing poppy. Many come to Jalalabad and the highway corridor for work. We must have electricity for factories to create jobs.”

Jalalabad’s mayor emphasized that the corridor connecting Kabul, Jalalabad, and Peshawar is a hub of commercial activity, stating “You see, many small businesses along the road have no access to the grid. They depend instead on expensive power from diesel gensets, costing 45 cents/ kWh. How are we going to grow with rates like that?”

Power Demand

Winter is the season with highest electricity consumption. Current winter peak power demand in Jalalabad is 41 MW, and is expected to increase to 59 MW in 2015 assuming availability of affordable energy.

The World Bank is funding development of an industrial park along the highway near Jalalabad. The park load is estimated to be 14.5 MW, and WB is looking for private diesel generation to supply this load, at least initially, because of short supply in DABS/N’s grid.

Forecast of Power and Energy Demand – Jalalabad City (excluding Industrial Park load)				
	2005	2009	2010	2015
Power Demand (MW) – peak	13.6	41	42	59
Energy Demand (MWh/Year)	66,245	159,800	172,400	240,000

Power Supply- current situation

The government-owned Darunta hydropower plant is the only available source of power supply for Jalalabad other than expensive diesel generators. Darunta is a small multi-purpose project that is also used for irrigation. The hydro plant is more than 40 years old; only two of its three generators were operating in late 2008. Its original capacity of 11.4 MW is reduced to 6 MW. Plant maintenance has been poor due to lack of funds within DABM, the electricity utility that DABS replaces. Rehabilitation of Darunta will be completed by mid 2010.



The corridor from Jalalabad to the Pakistan border is supplied by 40 small diesel generation units owned and operated by private businessmen. Private producers supply 1 MW to Torkham using diesel generators. Tariffs for these supplies are in the 40 to 55 US cent range per unit. Supply is reliable, but its high cost constrains many roadside businesses, including energy intensive enterprises such as metal workshops, ice manufacturers, car repair shops, and cold stores. Electricity at these prices is unaffordable to many residential customers, schools, clinics and small shops.

Potential future power supply

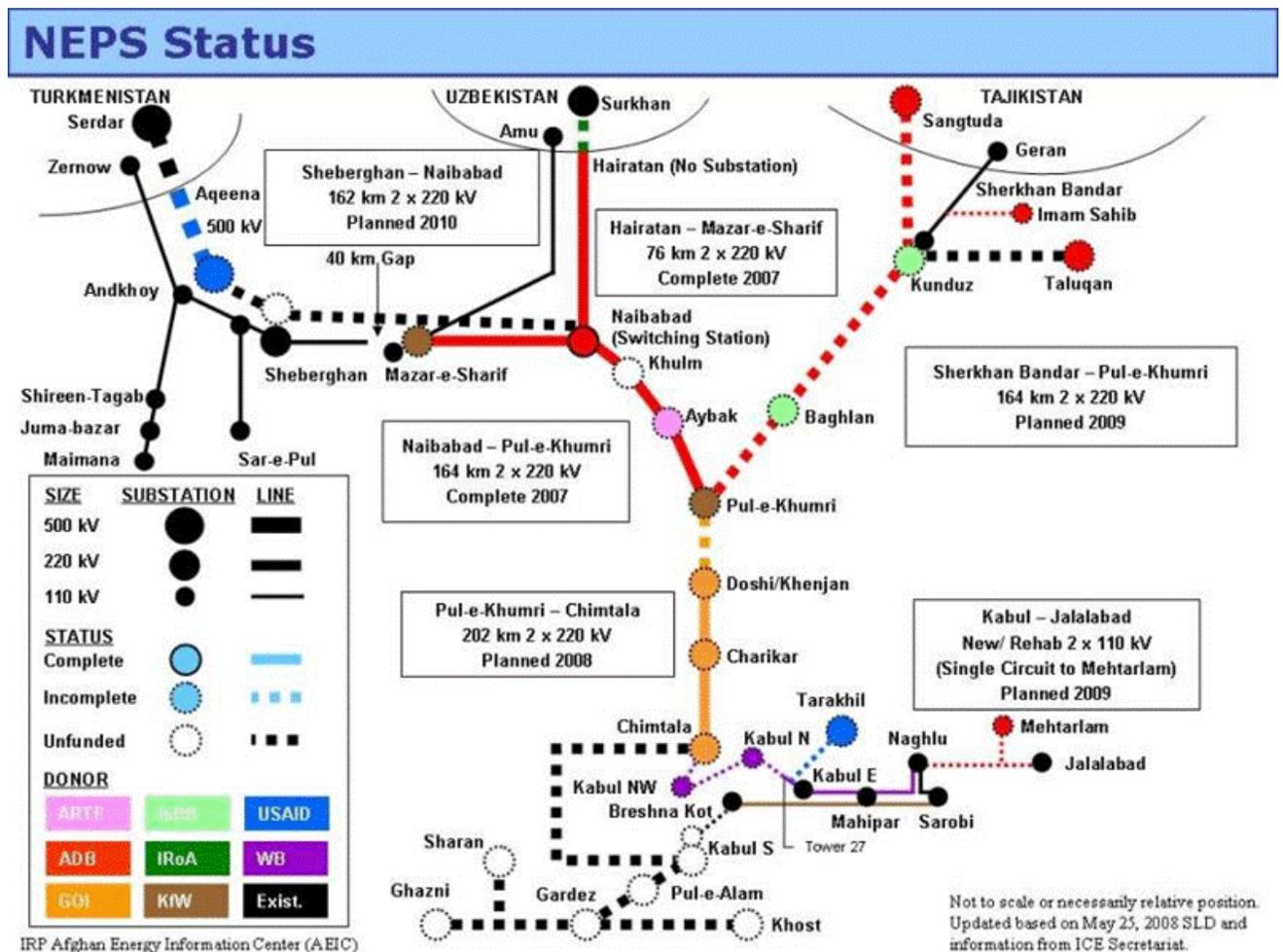
A new billion-dollar transmission system, the Northeast Power System (NEPS), funded by multiple donors, has been built to import energy from Central Asia to northern and eastern Afghanistan (see NEPS schematic attached). The 220 kV NEPS system will eventually transmit up to 250 MW power from Uzbekistan and Tajikistan to the cities of Mazar-e-Sharif, Kabul, and potentially to Nangarhar and provinces south of Kabul. Power import from Uzbekistan is expected to increase from 70 MW today to 250 MW in late 2010.

Nangarhar will be connected to NEPS through a 110 kV line funded by ADB. This line could carry up to 100 MW to Nangarhar and should be operational by December 2010.

Nangarhar can potentially buy some energy from Kabul area. The energy mix provided to Nangarhar from NEPS would include Uzbek/Tajik imports, existing hydro generation and high-cost diesel generation from Kabul's two diesel plants. The blended cost for this electricity is expected to be about 9.5 US cents/kWh.

From your field assessment, you have concluded that there are several options for providing/improving additional supply to Nangarhar:

1. A study done in the 1970s indicates an opportunity to build a storage-type hydro generation plant with a capacity of around 400-500 MW in the Kunar province, north of Nangarhar and transmit the power through mountainous areas. It may also be possible to export a portion of Kunar generation to Pakistan. However, the Kunar area is a Taliban strong-hold; this situation may change once the surge of new troops arrives in late 2009. The project would take 7 years to build and would require investment of \$400 million. A storage type plant would ensure winter power supplies. However, a run-of-river type plant may become attractive because of shorter construction period and a lower initial cost for development.
2. Install efficient new diesel generation – at the Jalalabad load center or along the highway to meet peak demands. This is likely to cost 25 to 35 cents per kWh.
3. Buy import electricity from NEPS at 9.5 cents per kWh.



4. Build renewable energy projects (solar, wind, micro-hydro). Consider an initial installation of 5 MW solar units to power street lights, water pumping for irrigation, solar lamps – battery charging stations. Each of these developments will require specific considerations of cost to USG, technical challenges regarding O&M support and sustainability of such development, and security issues
5. Some combination of the above options.

Your analysis shows that future supplies will probably cost more than the current revenue that DABM/N realizes. This means that raising revenue realization is a key objective.

Electricity Distribution

After years of civil war, the Jalalabad distribution system is in disrepair. The substations and low voltage distribution networks are inadequate, overloaded, and outdated. While there are 6,000 meters, the number of customers connected to the network is much higher. Although it is known that illegal connections exist, there is little data on the extent of this problem.

System rehabilitation

An Australian firm, SMEC, estimated in 2006 that rehabilitating the Jalalabad network would require an investment of \$18 million. ADB is funding improvement of Jalalabad distribution system which is expected to be completed by end of 2010.



Financial viability of DABM/N

Despite cheap electricity from the Darunta Hydro Plant, DABM/N’s cost recovery is very low. In 2008, DABM/N charged residential customers up to 10 US cents per kWh, while government, commercial and industrial customers paid up to 20 US cents per kWh. However, despite these high tariff rates, “aggregate technical and commercial (AT&C) losses” are about 65%, and the cash actually realized by DABM/N is insufficient to pay for maintenance, purchase of fuel, and payment for future NEPS energy supply.

An analysis of DABM/N’s commercial accounts in 2008 suggests that Jalalabad’s cash realization per kWh is about 3.5 cents/kWh on the average. As depicted in the table below, total cost of supply for DABS/N using only energy from Darunta is 3 cents.

Once NEPS electricity becomes available, DABS/N costs will rise significantly. Your best estimate for a blended cost of electricity from Darunta and Kabul/ Uzbek is 9.5 cents per kWh, when taking into account transmission O&M costs and transmission loss. This indicates that overall DABS/N will lose 6.4 cents per kWh once new supply is available from NEPS. Losses would deepen if supply was augmented by diesel gen-sets. Since DABS Headquarters does not have sufficient funds to pay for fuel for Kabul, it is unlikely that DABS can provide a subsidy to Nangarhar.

Total Cost of Supply for 41MW in 2009 (Jalalabad demand only)					
Source	Supply (MW)	Supply costs* (\$/kWh)	Transmission costs (\$/kWh)	Distribution costs (\$/kWh)	Total (\$/kWh)
Darunta	11.4	.005	-	.03	.035
NEPS	29.2	.095	.01	.03	.125
Total	40.6	Weighted average			.099
Cash Realized	current trend				.035
Loss per Unit	current trend				.064

* Best estimate

You have estimated that at these prices, supplying 41 MW will result in annual total costs of \$15.1 million to DABS/N. DABS/N revenue will be around \$5.6 million, for a cash loss of \$9.5 million. **This would be not sustainable.**

Assignment

Your review indicates that while it is possible to expand supply dramatically in the next 18 months, the **primary concern is DABS/N’s ability to provide an affordable and quality service on a sustainable basis.** Your program needs to take into account the transition that DABS is making from a corrupt, loss making public utility to a fully sustainable, commercialized public company. DABS/N is at the beginning of this transition process.

A budget for expanding electricity into Nangarhar has not yet been decided, but, depending on the results of your assessment, funding could be up to \$150 million. Tomorrow, you and your team will present the key elements of a new program to the Mission Director and senior USG staff. You know that the Mission Director is frustrated with donor funding that is needed to “prop up” the Kabul electricity system and is looking for a solution in Nangarhar that will deliver strong results in the short term and be sustained in the future.

The main question that you must answer is:

How to “commercialize” DABM/N operations?

Options Include:

- *Improve operations through training, new systems and incentives*
- *Corporatize DABM/Nangarhar and introduce better corporate management and governance*
- *Use a management contract with performance incentives*
- *Other*

A second question is whether USAID should build 5 megawatts of wind or solar capacity in Nangarhar. This would provide low cost electricity to the province (if the USG builds it on a grant basis), but it introduces issues related to sustaining these facilities.

You should recommend an approach that is likely to result in sustainable services in the long-term (20+years). Please outline your main recommendations in a few (5 – 10) bulleted key points.