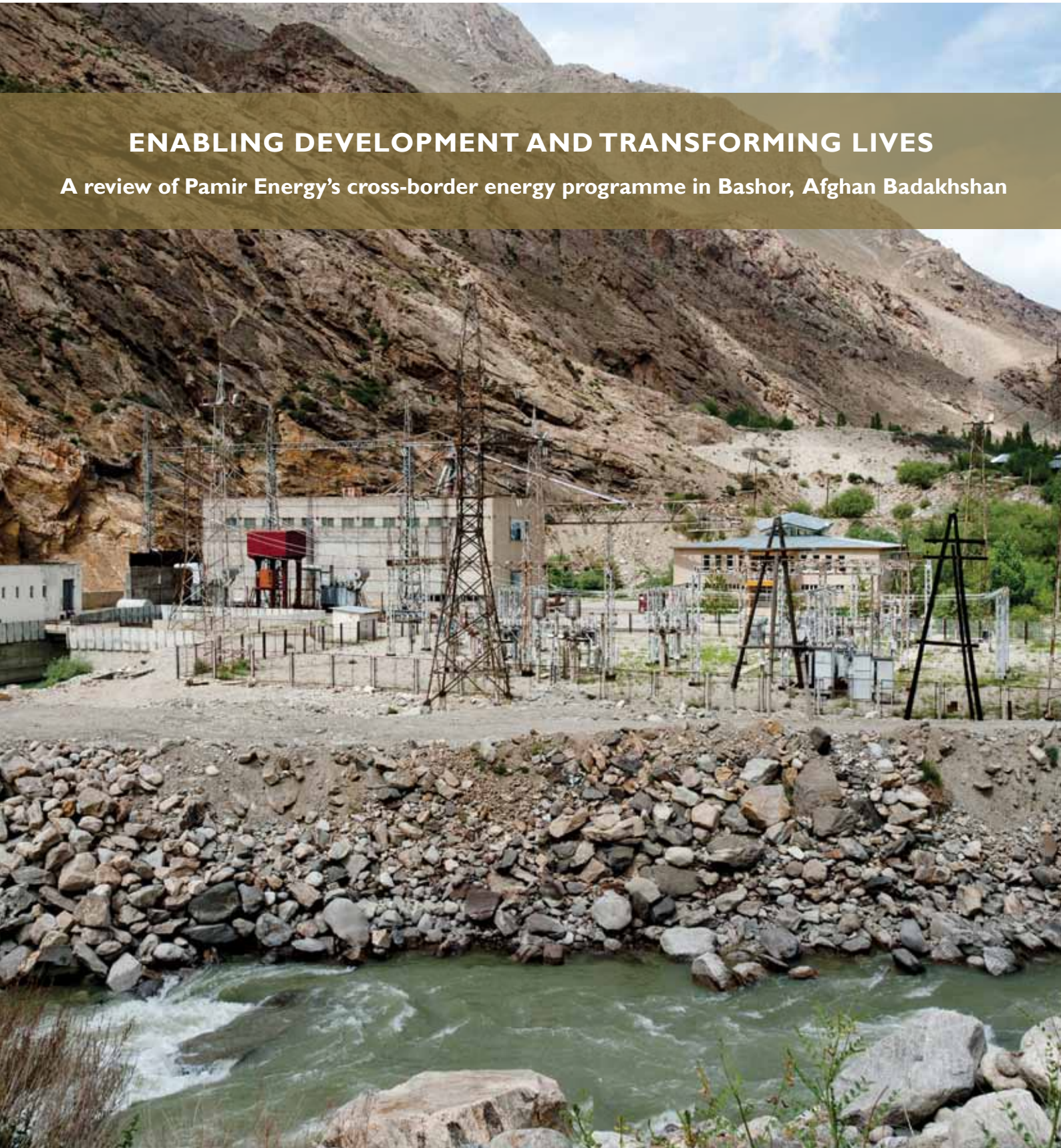
AKDN

AGA KHAN DEVELOPMENT NETWORK



ENABLING DEVELOPMENT AND TRANSFORMING LIVES

A review of Pamir Energy's cross-border energy programme in Bashor, Afghan Badakhshan

Cover: The Aga Khan Development Network's cross-border energy programme provides year-round, 24-hour electricity generated by Pamir Energy in Tajikistan to communities in Afghan Badakhshan – none of which previously had access to reliable energy.

Photographer: Jean-Luc Ray

Table of Contents

Executive Summary

The Aga Khan Development Network's (AKDN) cross-border energy programme provides year-round, 24-hour electricity, which is generated in Tajikistan and transmitted to communities in Afghan Badakhshan that did not previously have access to reliable energy supplies. The following list captures important information and milestones in the programme:

- *Started: 2008, Bashor (Shugnan district centre)*
- *Currently: More than 3,470 customers (over 28,500 people) have access to reliable electricity in the Shugnan, Ishkashim and Darvaz areas of Badakhshan, Afghanistan*
- *Rate of consumption growth: 40 percent per annum*
- *Plans for expansion: Pamir Energy aims to provide power supplies to approximately 40 percent of Afghan Badakhshan (200,000 people) by 2020*
- *Financed by: Roshan Telecommunications (part of AKDN), the Norwegian Ministry of Foreign Affairs, the German Federal Government via the PATRIP Foundation, and USAID*

Following the collapse of the Soviet Union in 1991 and a five-year civil war, Tajikistan's electrical infrastructure was in need of significant investment. Among the most affected areas was the Gorno-Badakhshan Autonomous Oblast (GBAO), where economic and human development was stifled during the cold winter months as a result of a lack of electricity for heating and the consequent closure of schools, health centres and businesses.

Many of the region's 220,000 residents resorted to wood fuel for their heating and cooking needs during the winter, resulting in the decimation of 70 percent of the region's forests within a decade and a sharp increase in respiratory disorders due to smoke inhalation.

In this fragile context, the Aga Khan Fund for Economic Development (AKFED) took bold but calculated steps to bring partners and resources to address the issue. In 2002, AKFED formed the Pamir Energy company in partnership with the International Finance Corporation, and under a public-private partnership agreement signed with the Government of Tajikistan, the company assumed the operational management of all power generation, transmission and distribution facilities of GBAO for a 25-year concession period.

Despite the dire need for electrical infrastructure in GBAO prior to Pamir Energy's founding, attracting private investment to the region was difficult, especially following the civil war. The legacy of Soviet subsidies meant that those fortunate to have electricity paid less than one-tenth of the production cost, while measuring consumption for billing purposes was nearly impossible in view of the dated electrical metering system.

To address cost issues, AKFED developed a pioneering subsidy scheme, making electricity both affordable to residents and financially viable for Pamir Energy. One of the subsidies ensures provision of a minimum "lifeline" monthly power supply to all households served by the company at a rate of US $0.25/kilowatt-hour, one of the lowest in the world among privately-owned utilities. Subsidies are generously funded by two grants, one by the Swiss Government (SECO) and the other by the Government of Tajikistan through financing by the International Development Association, a member of the World Bank Group.

The renewable energy produced by Pamir Energy's plants has displaced the need to burn trees or use high-polluting diesel generators. Due to its limited greenhouse emissions, Pamir Energy has been able to generate revenue by selling carbon credits abroad, in line with the terms of the Kyoto Protocol.

Rehabilitation Efforts

Since taking over the electrical utility operations in GBAO, Pamir Energy has invested some US$ 37 million to repair the region's electrical infrastructure and expand its hydroelectric capacity. It has installed additional turbines and generators at Pamir I, the company's main generating plant, and retrofitted them with new equipment and systems.

Renovations have also occurred at the company's nine mini hydropower plants, which provide power to villages and small settlements in remote areas. This has enabled an increase in the total installed capacity from 33 to 43.5 megawatts (MW).

Pamir Energy seeks innovative ways to provide power during the difficult winter months when power generation is restricted due to low river flows, yet electricity need is at its greatest. At Pamir I, the company has created a retention structure which can increase the Gunt River's flow by as much as 40 percent during the winter. Additionally, the company has consistently increased the accuracy of power billing by recalibrating old electricity meters and installing new individual meters. Over 80 percent of all power sold in GBAO is now billed through individual meters, with the balance sold through group meters. This has enabled the company to improve its revenue collection process and set new standards for Tajikistan.

Following an accident at the Pamir 1 Hydro Power Plant (HPP) in February 2007, Pamir Energy renovated most of the plant and equipment, enabling the company to now provide a 24-hour supply throughout the year to customers on its main grid. As an integral part of ongoing improvements, the company has reduced losses to 14 percent in 2013 compared to 39 percent in 2006. Pamir Energy intends to continue the trend and further reduce losses over the next three to five years.

Impact

Pamir Energy aims to be a model for public-private partnership in the restructuring of Tajikistan's power grid. As a result of Pamir Energy's efforts, 70 percent of its customers in GBAO (those who are connected to the main grid) now enjoy 24 hours of power a day for the first time since the end of the Soviet era, while the remaining 30 percent receive 16-18 hours of power a day.

The renewable energy produced by Pamir Energy's plants has displaced the need to burn trees or use high-polluting diesel generators. Due to its limited greenhouse emissions, Pamir Energy has been able to generate revenue by selling carbon credits abroad, in line with the terms of the Kyoto Protocol. In addition, the company continues to be a source of livelihood and skill development, providing employment opportunities to over 600 local residents and 200 contractual opportunities.

Expansion

Pamir Energy continues to expand its power generation capacity through rehabilitation of the small HPPs and connecting them to the main grid where appropriate. It is anticipated that by the year 2027, the Company will have invested US$ 50 million in electrical infrastructure, producing for the region a total economic benefit of US$ 85 million.

Meanwhile, loss reduction has freed up energy for export to neighbouring Afghanistan. The following review is devoted to Pamir Energy's cross-border energy programme.

As a result of Pamir Energy's efforts, 70 percent of its customers in GBAO (those who are connected to the main grid) now enjoy 24 hours of power a day for the first time since the end of the Soviet era, while the remaining 30 percent receive 16-18 hours of power a day.

Cross-border Energy for Afghan Badakhshan

In addition to overseeing the grid construction in Afghanistan and handing over assets to the Afghan energy utility company (DABS) upon completion, Pamir Energy is also providing yearly training to DABS in Khorog on electrical engineering, operations and maintenance of equipment, tariffs, billing and collections, metering and identification of power theft, occupational, technical and fire safety, and energy efficiency.

Loss reduction has improved Pamir Energy's capacity and freed up energy to be exported to Afghanistan. In June 2008, the company began exporting energy through a cross-border transmission line to Afghan Badakhshan, bringing energy services to 500 households in Shugnan District for the first time in history. Since then, support from the Norwegian Ministry of Foreign Affairs, Roshan (a sister AKFED project company) and USAID has helped Pamir Energy to cover 14 villages in Shugnan (1,178 households – all households in each village), government and commercial buildings, health clinics and local schools. By the end of 2013, more than 3,470 customers (over 28,500 people) were accessing reliable electricity in the Shugnan, Ishkashim and Darvaz areas of Badakhshan, Afghanistan.

The construction of the grid in Afghanistan is overseen by Pamir Energy, which hands over assets to the Afghan energy utility Da Afghna Breshna Shirkat (DABS) upon completion. Power for Afghanistan is then sold wholesale by Pamir Energy to DABS. The onward collection of bills in Shugnan is then undertaken by DABS. Electricity provision between the two utilities is regulated by a power purchase agreement, with wholesale tariffs set at 3.25 US cents per kWh while DABS charges its residential customers at 4 US cents and non-residential at 9 US cents (standard Afghan rates). Consumption in the first year was 360,400 kWh and rose to 1,464,000 kWh in 2012 (over 3x increase). The number of customers increased to 1,178. Afghan customers are willing to pay for electricity because the cost for hydropower is less than diesel, wood and other energy options, and power supplies are stable. However, with the increased use of electric appliances customers remain cautious, and increasingly value electricity as a precious commodity and avoid wastage.

Pamir Energy also provides yearly training to DABS in Khorog on electrical engineering, operations and maintenance of equipment, tariffs, billing and collections, metering and identification of power theft, occupational, technical and fire safety, and energy efficiency. It remains available to assist with emergency repairs as well. Over time, this programme has allowed Pamir Energy to transition its cross-border provision from a social development programme to a sustainable client base – a significant contribution to the long-term, regionally-led economic development of the cross-border region.

"In the past we worked only with our hands and we could fulfil one order per day. Today we have electric woodworking machines and we can fill three to four orders."

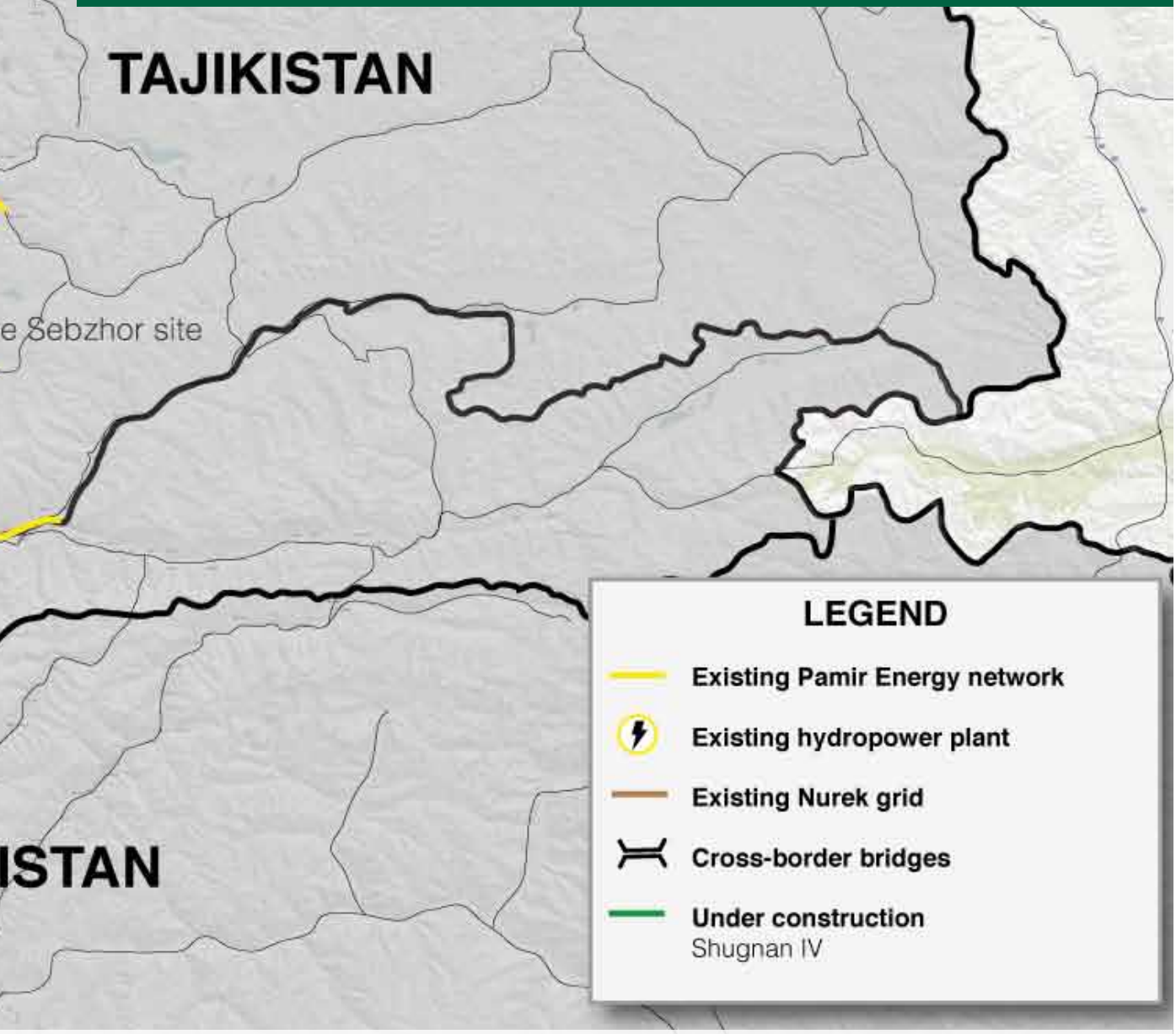
-- Carpentry shop master

Quality of Life (QoL) Assessments: In addition to reviews such as this one, AKDN measures it quantitative and qualitative QoL surveys documenting change in communities as a result of m

To build on its understanding of the effects of first-time energy provision in Afghan Badakhshan, in 2012 AKDN conducted qualitative interviews with 37 people in Bashor, the Shugnan district centre. The purpose of this document is to provide a summary of these interviews, and to show the impact of AKDN's cross-border energy programme on the local population.

The interviews revealed that access to electricity has affected the population positively, making it possible for them to feel more secure and in control of their lives and livelihoods. Children sleep in warm rooms and eat hot food in a well lit house. Outside, the community is more able to enjoy evening gatherings. Residents also noted the modernising impact of electricity, primarily from greater access to media and communications.

The key findings of the study are summarised thematically in the following five sections: **Women, Workload and Home Life**, **Health and Health Care**, **Economic Development**, **Education** and **Community Life and Government**.



s interventions through comprehensive periodic
ulti-sector development.

Women who were interviewed in the Bashor Study reported that electric stoves have transformed cooking into a much less time-consuming chore. On average, they spend four hours less per day preparing family meals, time which can be used towards income-generating and -savings activities that can improve their household's overall quality of life.

Women, Workload and Home Life

At home, interviewees reported tangible changes in quality of life since 2008 when electricity was first provided.

Time: In the running of the household, women reported that they no longer have to spend two to three hours per day gathering firewood. Nor do they have to get up early in the morning to prepare cooking fires for breakfast. If a baby needs feeding in the middle of the night, it is easy to heat food on their electric stoves. Seventy percent of households are using electricity (versus wood) for cooking.

Wood collection and burning: The head of the Bashor district development authority noted that before AKDN's cross-border energy programme, villagers cut their fruit trees for firewood. After the fruit trees were gone, forest trees were cut instead which resulted in deforestation around the village. Today, obtaining wood is no longer a significant task, and tree cover is re-growing. Seven out of ten households report using electric stoves for cooking in summer and only cook on wood stoves in winter when they are also heating with wood. In future, AKDN expects that some houses will convert to electric heaters and electric cooking in winter.

Safety: Household members are aware of the risks of improper electrical wiring and overloading the circuits. There are still challenges regarding safety, however, particularly when new houses are constructed in the vicinity of existing transmission lines.

Affordability: Households report that the electricity they use is affordable, and cheaper than diesel, oil or wood. Typical households have modest numbers of electrical appliances, so they are able to run them economically.

"Our electric bills are much lower than the cost for wood."

-- Government official

Interviewees reported:

- Signficant time saved on cooking chores (four hours per day)
- No pressure to collect wood for daily burning
- Electricity as affordable

A reliable supply of electricity from Pamir Energy's cross-border transmission line enables the medical staff at the Comprehensive Health Centre to operate more sophisticated equipment and consult specialists in Khorog through an eHealth programme. As a result, patients benefit from greater quality and a more comprehensive range of health services.

Health and Health Care

The health system in Bashor is supported by AKDN through clinic management, community information campaigns and cross-border support. All these have been improved with access to reliable electricity.

Access to quality health care services: At the Comprehensive Health Centre (CHC), doctors and nurses noted that having electricity has increased the number of procedures and diagnostic tests they are able to perform. In recent years the number of people visiting the health facility also increased, with patients coming from outside the local area (e.g., Darmorakht or Rushan,

Afghanistan), in addition to the nearby villages. An eHealth programme has been initiated, linking the clinic to specialists in Khorog, Faisabad and Kabul. Interventions related to maternal and child health (such as deliveries, which often happen at night, postnatal care and immunisations) have seen significant benefits from having reliable electricity for heat, light, refrigeration and the use of certain instruments.

In 2013, the clinic recorded 314 deliveries, 766 pre- and post-natal visits, 1,559 family planning visits and nearly 20,000 outpatient visits.

Improved knowledge of health and hygiene: Respondents, young and old, female and male, noted that media influenced their health behaviour. People watch TV programmes related to hygiene and nutrition. The principal of the girls school mentioned that students are more neat and clean when they come to school, as they have bathrooms and warm water in their houses.

"Before, we had to sterilise medical tools on a fire and could not run tests to diagnose patients' health problems. We were struggling with vaccination boxes but now we have powerful microscopes and fridges for vaccines."

-- Health clinic doctor

Interviewees reported:

- Greater range of health services offered at the Bashor Comprehensive Health Clinic
- Higher quality services provided in warm and bright space
- Reduced need to travel to Faisabad or Kabul for diagnosis
- Increased knowledge of good health and hygiene practices

Since Pamir Energy began exporting energy across the border to Afghanistan, the Bashor market has been able to expand its number of stores and variety of wares, and its shops stay open 20 percent longer. As a result, the increased revenue for shop owners allows for improvements to their households' overall quality of life.

Economic Development

Services: In addition to an expansion of the number of stores and variety of wares available, the Bashor market now has a photo salon, auto repair shop and several carpentry shops that use electricity for their work.

Trade: Because electricity is available in the area, traders have begun to sell electronic products such as electric kettles, ovens, stoves, heaters, TVs, carpentry tools and media storage (CDs, DVDs, USB sticks).

Long-term entrepreneurship and craftsmanship: Businessmen, traders and craftsmen stated that if their businesses

continue to grow, in the future they will expand and employ additional workers. One businessman said he would like to bring an electric mill to Bashor to provide milling services. Craftsmen in the carpentry and auto trades reported using electric tools for approximately six hours per day, greatly increasing the work they are able to complete. In the long term, access to energy will continue to support economic activity.

Bazaar: In the *dukans* (small shops), traders noted that before there was reliable electricity, in winter, they closed at 4pm when it got dark and the shops became very cold. Today they have lights and heaters in their *dukans*, and traders can work until 6pm (40-50 hours per week). One trader reported proudly that even late at night, if a customer needs something urgently, he can go to his *dukan*, turn on the lights and provide the needed products.

Craftsmen interviewed reported using electric tools for approximately six hours per day, greatly increasing the work they are able to complete. In the long term, access to energy will continue to support economic activity.

Interviewees reported:

- Shops carry more products and stay open 20 percent longer
- Craftspeople use electric tools, reducing time spent on each task
- Trade and repair of electric goods and services are viable economic activities
- Further opportunities are being considered by local entrepreneurs

To the extent that society has become increasingly information- and knowledge-based, access to Information and Communication Technologies (ICT) has become likewise a prerequisite for economic and social equity. A reliable power supply in Bashor has made it possible for students in this remote and marginalised community to access the Internet and other digital media, improving their prospects for learning and future employment and greater social inclusion.

Education

The ability to learn from new sources of information and study more due to improved lighting at night has provided education benefits to pupils, parents and community members of all ages and genders.

In school: When Bashor gained access to electricity four years ago, the schools were provided with light, available 24 hours per day. Today, the primary and secondary schools use electricity for light, and also for IT at the Teacher Training College (including Internet and computer courses). **Although schools still close from December to March due to a lack of heating (wood or electric), because of electricity, test scores have improved from 50 to 80 percent since 2008.**

Computers: Some students are reportedly using computers at home, and in the future, five Ministry of Education computers will be installed at the secondary school. Once the computers are available, both secondary school teachers and students plan to use them for learning purposes. Lesson planning and teaching has not changed greatly as a result of electricity, though now students can complete more work because they have more time to study.

Studying: Older community members reported using oil light fixtures for reading at night and only for a limited time because of the costs associated with using oil. Now, students have access to electricity throughout the day and are able to study more because they have light any time, day or night.

Access to Internet and TV: Youth reported that access to TV, DVDs and CDs helps them to widen their outlook of the world and learn new things. They watch TV programmes via satellite and watch movies of various genres. Parents and teachers also observed that children and youth are regularly watching TV and are learning other languages (e.g. Farsi) and about other things such as hygiene, fashion etc. Teachers acknowledge that children should be encouraged to focus on positive ideas from TV like news, languages and Quran verses.

"Access to electricity made a big impact on children's studying and learning habits because in the past they used to bring a lot of excuses related to lack of access to light at nighttime. Now, they can't use that excuse anymore and have to study."

-- Schoolteacher

Interviewees reported:

- Students are able to study for longer:

  "We can study 'til late at night and don't have to worry that the oil will finish soon or the house is getting cold." *-- Student*

- Parents have more time available to assist children with schoolwork
- Computers are available in schools and in some homes
- IT services are available in the bazaar

More evening events, like this wedding, are made possible by the provision of electricity.

Community Life and Government

Community life: Access to electricity has further enabled community activity, with more time available for community gatherings, especially during the evenings. The komiriyo, the religious leader in Bashor, noted that with the time savings made available by electricity, more people are now able to attend religious service.

Women noted that time usually devoted to collecting wood and tending cooking fires could now be spent with their families.

However, respondents also noted that with the option of watching TV, listening to music or playing video games sometimes this

resulted in less interactions. They also noted that some youth are picking up "negative habits and behaviour" from TV, likely a result of access to outside media and fashion.

Communication: Mobile phones, enabled also by the delivery of cellular phone service to the region, have had a major positive effect on community, government and civil society. Government officials and most households have mobile phones, making the organisation of meetings easier and decision-making more fluid. For families, communication with relatives outside the village has also improved significantly; important for an area with many migrant workers.

Government effectiveness: In everyday work, the government has started using computers and trained its local staff in IT. The current government administration was under significant pressure to find a solution to the lack of energy in Bashor. Consequently, AKDN's cross-border programme has played a key part in the government's efforts to improve quality of life for its constituents and deliver essential services.

I use a mobile phone, which is a very important means of communication as I am coordinating 29 councils.

-- Government official

Interviewees reported:

- Evening community gatherings enabled
- Improved ability of government officials to convene meetings
- Reduced workload for processing of paperwork with computers in government offices
- Improved government effectiveness

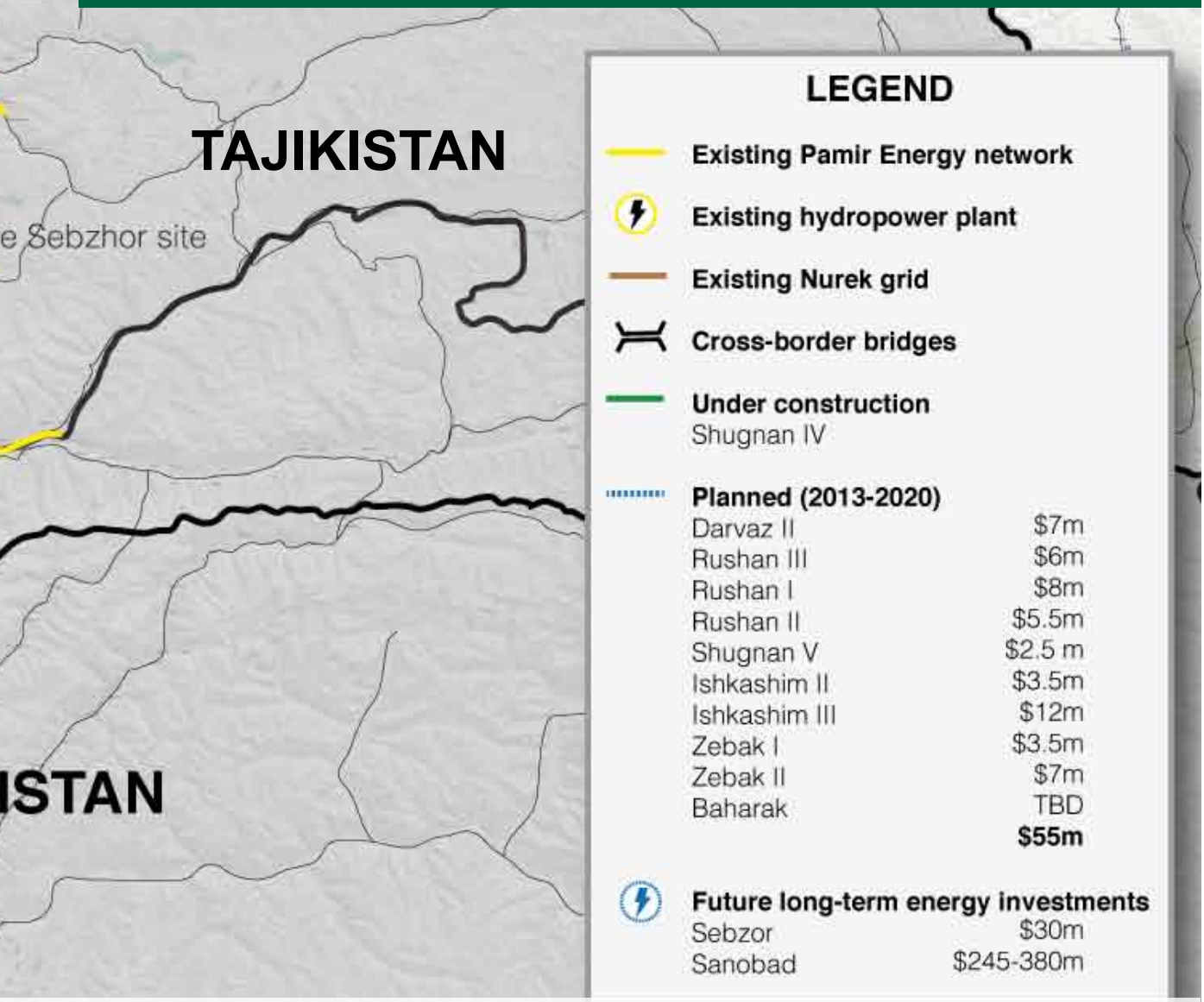
Plans for Cross-border Energy Expansion: 2013-2020

The cross-border energy projects in AKDN's pipeline will build upon existing investments and provision for 40,000 of its current customers and expand energy services to 40 percent of Afgh

To expand reliable electricity to more areas of northern Afghanistan, AKDN is seeking additional financing for transmission lines and investment in new generation capacity. Long-term plans include developing regional energy generation facilities at Sanobad and Sebzhor. This will involve rehabilitation and maintenance of existing assets, including its network of small hydropower plants and transmission lines, re-metering and grid upgrades.

In line with the findings of the Bashor review, AKDN's experience indicates that further investments in cross-border energy will:

- Enable increased regional economic activity and enterprise development on both sides of the border
- Build upon and reinforce the stability of the border regions, advancing opportunities for legitimate livelihoods
- Prevent environmental degradation by reducing dependence on diesel and biomass
- Promote regional energy cooperation
- Enable significant improvements in health and education services and women's welfare
- Send a powerful signal about the future of the region, benefitting thousands of people and facilitating long-term economic and social development



Pamir Energy's current energy infrastructure, improve energy hanistan Badakhshan (approximately 200,000 people).

Pamir Energy is the first energy company in Tajikistan, founded in December 2002 under a public-private partnership agreement between the Government of Tajikistan, the Aga Khan Fund for Economic Development (AKFED) and the International Finance Cooperation. Pamir Energy's initial focus is restoring and operating electrical infrastructure to international standards in Gorno-Badakhshan Autonomous Oblast (GBAO) in Tajikistan. It is staffed by 600 employees (15 percent women and 100 percent local). The financial partners of Pamir Energy are the International Development Agency (World Bank), the International Finance Corporation (IFC) and the Swiss Economic Cooperation Office (SECO).

The Aga Khan Fund for Economic Development (AKFED) is an international development agency of the Aga Khan Development Network, dedicated to promoting entrepreneurship and building economically sound enterprises in the developing world. AKFED focuses on building enterprises in parts of the world that lack sufficient foreign direct investment. It also makes bold but calculated investments in situations that are fragile and complex.

The Aga Khan Development Network (AKDN) is a group of development agencies with mandates that include the environment, health, education, architecture, culture, microfinance, rural development, disaster reduction, the promotion of private-sector enterprise and the revitalisation of historic cities. AKDN agencies conduct their programmes without regard to faith, origin or gender and have decades of experience in integrating economic, social and cultural development.

For more information about AKDN, Pamir Energy and the cross-border energy programme, please visit:
www.akdn.org/tajikistan_economic.asp

Pamir Energy
75. Gulmamadov Str.
736100, Khorog
Tajikistan
Tel: +992 35 222 3383
Fax: +992 35 222 2519
E-mail: daler.jumaev@pamirenergy.com

Photography: AKDN / Sandra Calligaro, Jean-Luc Ray, AKDN staff

AKDN

AGA KHAN DEVELOPMENT NETWORK

www.akdn.org