Energy is Life
Bringing Power to Afghanistan

Asian Development Bank
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All photos by Jason Howe.

Note: In this publication, “$” refers to US dollars.
For nearly three decades, the availability of secure energy supplies in Afghanistan was significantly disrupted by conflict. Much of the country’s power generation, transmission, and distribution infrastructure was destroyed, and what remained was stretched far beyond capacity. More than 90% of the population had no access to electricity.

In January 2009, electricity began to flow into Kabul along a newly constructed transmission line running from neighboring Uzbekistan. For the first time in more than a generation, the majority of the capital’s 4 million people can now enjoy the benefits of power.

The electricity is transmitted along a 420-kilometer (km) corridor of the North East Power System (NEPS). One of the largest infrastructure projects ever undertaken in Afghanistan, the first phase of the NEPS transmission project has been breathtaking in its scope. More than 1,300 towers were constructed across some of the most challenging mountainous terrain on earth, and they now bring steady power to a capital once mired in darkness.

The Asian Development Bank (ADB) has played a key role in the rehabilitation and construction of various components of NEPS, directly financing the transmission line from Pul-e-Khumri, north of Kabul, to the border with Uzbekistan through $40 million in concessional Asian Development Fund loans. Another $56.5 million in ADB financing will help build new transmission lines linking Afghanistan and Tajikistan, further increasing power supply to the NEPS. An additional $50 million loan and grant assistance package will help connect 1.2 million people in rural Afghanistan to the NEPS network.

Helping bring electricity to the population is a key component of ADB’s strategy to support Afghanistan’s reconstruction and development. With the November 2008 approval by ADB’s Board of Directors of a $570 million energy sector multitranche financing facility, the energy sector has become the largest component of ADB’s overall Afghanistan portfolio.
Kabul needed power, and needed it fast.
In 2001, after almost three decades of war and 7 years of Taliban rule, the city's infrastructure was wrecked. With every day that passed, the problems grew more acute.

Millions of refugees were flocking back to the capital and euphoria gripped the city as Afghans dreamed of a peaceful, prosperous future in a homeland rebuilt.

But Kabul was creaking under the burden of its population explosion. The capital now contained 4 million people—a massive increase from its 1980 population of 1 million.

Because critical investments in generation, transmission, and distribution systems had not kept pace with changing realities, only sporadic electricity was available in the capital. Those who could afford imported diesel fuel ran loud, belching generators, while the rest of the city's inhabitants simply went without.

Afghanistan's new government was under pressure to deliver.

One proposed solution—the building of a massive hydroelectric power station at the confluence of the three major rivers that flow out of the Hindu Kush mountains—was ruled out for a simple, practical reason: time.

“The design and the construction would have taken up to 15 years because it required tunneling through nearly 20 km of mountains. The real issue was time, and we simply didn't have any,” said Mr. Ahmad Wali Shairzay, Afghanistan's former Deputy Energy Minister.
How Power Came to Kabul

REHABILITATING THE NORTH EAST POWER SYSTEM

Power lines stretch across the river border between Uzbekistan and Afghanistan at Hairatan.

• Power lines stretch across the river border between Uzbekistan and Afghanistan at Hairatan.
Afghanistan’s Minister of Commerce and Industry Wahidullah Shahrani was in Manila September 2009

"ADB was one of the few development partners, right from the beginning, to understand the importance of the energy sector in spurring economic growth and development."

— Wahidullah Shahrani
Minister of Commerce and Industry

That’s when Afghanistan began considering buying and transmitting power from abroad.

Afghanistan’s northern neighbors—Tajikistan, Turkmenistan, and Uzbekistan—all have comprehensive power generation and distribution networks and were willing to sell their surpluses.

But Kabul is situated more than 400 km from Uzbekistan—its closest northern neighbor, along a route comprising some of the most formidable terrain on earth.

The central challenge: How to link Uzbek supply with Kabul’s demand?

That’s where ADB came in. And the NEPS—one of Afghanistan’s largest-ever infrastructure projects—was born.

Afghanistan’s Minister of Commerce and Industry Wahidullah Shahrani credits ADB with having the vision and resources to conceive and help build a transmission line running directly from Uzbekistan to Kabul.
“ADB was one of the few development partners, right from the beginning, to understand the importance of the energy sector in spurring economic growth and development,” said Mr. Shahrani.

ADB worked with a consortium of development partners including the United States, Germany, Japan, India, World Bank, and Islamic Development Bank, and work began on the NEPS in 2004. The Government of Uzbekistan also contributed to the effort, constructing a transmission link on its side of the border to connect with Afghanistan’s new grid.

Over the next 4 years, more than 1,300 massive pylons were erected to hold transmission lines stretching from the Uzbekistan border to Kabul.

In January 2009, 40 megawatts (MW) of power began transmitting along the new lines.

The impact was immediate.

Kabul’s chronic power shortage—which had become so acute that President Hamid Karzai had issued a decree diverting electricity away from government ministries to hospitals and other essential services—gave way to a steady supply of electricity reaching the capital.

“How Power Came to Kabul

“The government wanted to import power, but they needed investment. That’s when ADB and the Government of India came in.”

—Ahmad Wali Shairzay
Former Deputy Energy Minister
High Wires

AFGHANISTAN’S NEW POWER LINES ARE AMONG THE HIGHEST IN THE WORLD

The transmission towers weigh more than 15,835 metric tons—equivalent to roughly 40 fully laden jumbo jets—and they support more than 3,600 kilometers of heavy-duty electric cable. Stretched end to end, the wires could travel from Manila to Shanghai—and back again.
Powering more than 3,800 meters above sea level, Afghanistan's new power lines are among the highest in the world.

The Hindu Kush peaks are snowbound all year round, and the main mountain pass is notoriously dangerous. About 250 avalanches occur every year.

It took more than 4 years to build the 1,387 pylons that link Kabul with Uzbekistan, over 400 km to the north. The 220-kilovolt (kV) transmission line is the backbone of a new electricity grid which lets Afghanistan buy surplus power from her neighbors in the north.

Together, the transmission towers weigh more than 15,835 metric tons—equivalent to roughly 40 fully laden jumbo jets, and they support more than 3,600 kilometers of heavy-duty electric cable. Stretched end to end, the wires could travel from Manila to Shanghai—and back again.

The towers were constructed by the Indian firm KEC International at the Pul-e Charkhi Pole Plant on the outskirts of Kabul. Building them was one of the many challenges facing the company.

B.S. Gautam, KEC's country director, says the legacy of war complicated virtually every aspect of the construction process.

"To begin with, the infrastructure here is nonexistent. Our material, which in India would take 2 days to get delivered, takes 45 days to 2 months to arrive," Mr. Gautam said.

There is also the question of security. "At first it was difficult to persuade our Indian staff to come to Afghanistan, and then there was the challenge of keeping them safe once they were here."

Problematic points along the route required innovative solutions. Between Hairatan and Pul-e-Khumri, the power line runs through a gorge too narrow for ordinary pylons. Engineers designed special one-sided towers just 2.5 meters wide to get the cables safely through.

Bureaucratic customs procedures and bad roads were a constant challenge. The company manufactured most of its materials in India, but the road links among Afghanistan, India, and Pakistan were unreliable.

Everything had to be shipped from India to Iran, and then driven through Turkmenistan, into Uzbekistan, and finally into Afghanistan at Hairatan, in the north. Parts were also bought in from various manufacturers in Austria, People's Republic of China, and Finland.

Afghanistan's Minister of Commerce and Industry Wahidullah Shahrani said that the same interconnected network that brought construction materials to KEC's plant in Pul-e Charkhi holds the key to his country's economic development.

"Afghanistan is located in a strategic geographical area which connects Central Asia with South Asia as well as the Middle East. One day, we hope that Afghanistan will serve as a major bridging country which can link these three major regions."
Shopkeeper Mohammed Isaq knows the value of electricity—as a television shop owner, his livelihood depends on it. “Electricity is our life,” he said.

Until recently, electricity in Kabul was sporadic and totally unpredictable. A few hours a day was available—if you were lucky—once or twice a week.

However, in early 2009, parts of Kabul began receiving round-the-clock power for the first time in decades.

In the city’s main electronics bazaar, where Mr. Isaq has his shop, Kabul’s middle class are embracing the benefits of reliable electricity. The pavements are now packed with shoppers. Police officers struggle to stop cars from double parking as they collect big boxes of products.

Mohammed Karim said his sales have greatly improved. “The season for selling televisions is the Afghan New Year, and we sold twice as many this year,” he said.

Other businesses in the bazaar have fared less well from the Uzbek electricity.

Mohammed Yaqub is a partner in one of Afghanistan’s biggest electrical showrooms, where generator sales have plummeted. But even he can see a silver lining to decreased profits.

“We are still happy that Kabul has power,” he said. “There might be 50 or 100 generator shops in Kabul, but there are 4 million people with power, and we are happy for them.”

A STEADY SUPPLY OF ELECTRICITY IS CHANGING LIVES IN AFGHANISTAN

Energy is Life
Reliable electricity means higher sales and more income for lightbulb shop owner Haji Abdul Hameed.
On the outskirts of Kabul, the city’s main industrial park has been plagued by acute electricity shortages in recent years.

Most businesses here relied on generators run on imported diesel fuel. Many factories closed because the cost of fuel meant businesses could not compete with factories in the People’s Republic of China and Pakistan.

Now firms can rely on a vastly improved power supply but it’s still not enough for them to operate at full capacity due to Kabul’s overstressed distribution system. ADB is currently helping rehabilitate the system so that it can supply uninterrupted power to a greater number of consumers.

Haji Abdul Jabar started out more than 20 years ago hawking sandals from a small wooden cart in Jalalabad. A natural flair for business led him to establish the Marco Polo Shoe Factory in Kabul where he now employs 60 people and produces thousands of sandals every day.

His sandals are made on two modern, power-hungry molding machines which rely on a massive generator that emits huge plumes of smoke into the factory courtyard.

“It takes around 20 liters of fuel to produce just an hour of generation,” said Mr. Jabar. The fuel bill is almost as much as his monthly labor cost, so he’s excited about more electricity coming his way and is confident about the future.

Next to his factory is the building site where he is building a warehouse and more work spaces. “I am going to buy two new machines and will be able to employ twice as many people,” he said.

Across the swampy mud track outside Mr. Jabar’s factory is the New Afghan Itifaq Sports Company which manufactures sports bags and soccer balls.

The balls are all hand stitched, mostly by women and disabled men working from home. In the factory, rolls of imitation leather are cut into hexagonal patches ready for dispatch to the stitchers. Sophisticated screen-printing machinery prints customized logos onto the balls, while embroidery machines stitch company logos onto satchels and kit bags.
Haji Abdul Jabar’s Marco Polo Shoe factory produces thousands of shoes every day in its plant on the outskirts of Kabul.

Energy is Life

Haji Muhammed Arif, the owner, said that when using electricity, each ball costs a quarter of the price as it does when using a generator.

“We sell most balls for about $3.00, but if we had electricity all the time, we could sell them for $2.50,” he said.

Both Mr. Jabar and Mr. Arif realize the importance of giving people jobs. Afghanistan’s economy all but ground to a halt under the Taliban, and while many businesses are now thriving, unemployment remains a massive problem.

A hand-painted sign over the entrance to the Itifaq factory offers a solution: “Livelihoods through honest work.” It is a dream of many Afghans, not just the business-minded like Mr. Jabar and Mr. Arif.

Commerce and Industry Minister Wahidullah Shahranı believes that electricity has completely revitalized the private sector.

“New production is going to create thousands of jobs for the ordinary Afghans, creating income that will be circulated in the economy,” the minister said.
Bringing Light to the Classroom

KABUL’S IMPROVED ELECTRICITY SUPPLY TOUCHES THE LIVES OF THOSE WHO NEED IT MOST

In a small classroom amid the heat and dust of an Afghan summer are a dozen street children who spend most of their days working for a few pennies in Kabul’s bazaars.

Their school books are lit by a lone fluorescent light. Beneath the babble of excited voices is the hum of an electric fan.

Until recently, that would have been impossible, but the advent of electricity to Kabul is transforming people’s lives.

The children at the Aschiana Center in the Kabul suburb of Shar-e-Naw are among the poorest in the country. They all work to support their families, often selling chewing gum in traffic jams or sifting through rubbish dumps for plastic bottles.

Most of their families are too poor to own appliances that run on electricity. Many of them live in houses beyond the reach of the city’s grid. But at school, at least, they are feeling the benefits of electricity.

“Electricity is like water,” said engineer Mohammed Yousef, the center’s director. “You need it for life, especially when you are working with children. You need fans to cool the classrooms, otherwise they can’t concentrate. You need lights so they can see.”

Aschiana educates illiterate children to a point where they can be integrated into the government school system.

Eleven-year-old Malika has been coming here for 2 years. Each afternoon, she trawls the streets for scrap paper and plastic bottles. In the winter she burns the paper in her home to keep her family warm. The bottles she sells for recycling.

“I make about 50 or 60 afghanis a day ($1),” she said. “We don’t have a television, but our home has a light, so we can see at night without using a gas lamp.”

Her teacher Ahmed Shah said the electricity makes his students healthier. “There are real health benefits,” he said. “Before they would burn fuels in small rooms for light. Now they have electricity. The air is cleaner.”

Aziz, 16, is learning to paint. “I didn’t have any money and I was the only one in my family who could work,” he said. After school he goes to the bazaars and sells plastic bags to shoppers for a few pennies each.

“Electricity means we can stay cool at school,” he added. “It’s so hot. Otherwise we couldn’t study.”

Before the fans were on, Aziz said his paints used to melt because of the heat.
With electricity, students can concentrate on their lessons and learn more, earning them a way out of poverty.
Before the fans were on, students had to deal with paints melting in the heat.
The electricity in Kabul is on almost 24 hours a day, thanks to a 420-kilometer transmission line, partly funded by the ADB, linking Afghanistan with Uzbekistan.

Afghanistan’s Minister of Commerce and Industry Wahidullah Shahrani said a regular supply of power is also helping university students in the capital.

“Before the flow of power from Uzbekistan, universities and other academic institutions in Kabul would have to close by mid-afternoon. Now, because of this power supply, which is very efficient, very cheap, and very reliable, we have been able to introduce evening classes at Kabul University.”

For many of the poorest people in Kabul, electricity and the things it powers are still luxuries beyond their reach. But most people can see the benefits to their city.

“Power helps everybody,” said baker Sher Mohammed. “It’s about our quality of life. We’re exhausted when we finish work. But if we get home and there’s power, it makes life a little bit easier.”

“Electricity is like water. You need it for life, especially when you are working with children. You need fans to cool the classrooms, otherwise they can’t concentrate. You need lights so they can see.”

Mohammed Yousef, director of the Aschiana Center

Investment Plan
The investment cost of the power component is approximately $40 million. The total loan is $150 million for all components.

Overview
The power component includes the construction of the Naibabad Switching Station and double-circuit 220 kV transmission lines between the Uzbekistan border and Naibabad (53 km), Naibabad and Mazar-e Sharif (23 km), and Naibabad and Pul-e- Khumri (164 km). These facilities were completed in August 2007.

Impact
The transmission lines and switching station developed under the power component are major sections of the NEPS that enables power to be imported from Uzbekistan and supplied to major load centers, including Kabul.

Since January 2009, 40 megawatts (MW) of imported power are being supplied to Kabul, providing many of the city’s 4 million inhabitants with 24-hour electricity for the first time in decades. Imports have since increased to 80 MW and will expand to the designed 300 MW when the full NEPS system is commissioned in 2010.

ADB’s contribution to the NEPS is made in cooperation with a range of other funding agencies. The remaining sections of the 220 kV transmission lines were funded by the Government of India, while contributions also came from the Afghanistan Reconstruction Trust Fund, World Bank, and the governments of Afghanistan, Germany, and the United States.

Ongoing ADB projects are further expanding the NEPS to supply uninterrupted power to a greater number of consumers.

Regional Power Transmission Interconnection Project (2006)

Investment Plan
The investment cost of the project is estimated at $109.5 million, of which the Afghan component is $55.5 million, and the Tajik component is $54.0 million. In Afghanistan, ADB has provided a loan equivalent to $35.0 million from its Special Funds resources (63% of the cost of the component). In Tajikistan, ADB has provided a loan equivalent to $21.5 million from its Special Funds resources (40% of the component cost).

Overview
The project will allow summer surplus electric energy in Tajikistan to be exported to Afghanistan, which is suffering electric energy deficits. This will be achieved through the construction of a 220 kV interconnection between the Afghan and Tajik power grids. The interconnection will link the Tajik hydropower stations located on the Vakhsh River to the border town of Sherkan Bandar and then to the Afghan cities of Kunduz, Baglan, and Pul-e-Khumri. At Pul-e-Khumri the transmission line will be connected to Afghanistan’s recently commissioned the NEPS, allowing energy to be supplied to the major load center in Kabul.

The project also includes upgrading and new investments in Tajikistan that will help reduce the winter power deficit by increasing generation output and decreasing technical losses. An additional 320 gigawatt-hour (GWh) of annual generation output in Tajikistan is forecast.

Impact
The project will expand trade and cooperation in the power sector through transmission interconnectivity between Tajikistan and Afghanistan. It will restore power supply and reduce costs for consumers in Afghanistan, and will increase the power export and income generation capacity of Tajikistan.

Status
A 20-year power purchase agreement was signed in September 2008 by the Tajikistan power utility (Barki Tajik) and the Afghanistan power utility (Da Afghan Breshna Sherkat) under which 500 GWh will be exported annually from Tajikistan to Afghanistan during the summer months. After 5 years, new export quantities will be agreed upon based on Tajikistan’s export surplus and Afghanistan’s demand. Construction contracts have been awarded in both countries and project commissioning is scheduled for the second half of 2010.
The Balkh Zone switching station in Naibabad
Energy is Life: Bringing Power to Afghanistan

For nearly three decades, the availability of secure energy supplies in Afghanistan was significantly disrupted by conflict. Much of the country’s power generation, transmission, and distribution infrastructure was destroyed, and what remained was stretched far beyond capacity. More than 90% of the population had no access to electricity. In January 2009, with the help of the Asian Development Bank and through the North East Power System, electricity began to flow into Kabul along a newly constructed transmission line running from neighboring Uzbekistan. For the first time in more than a generation, the majority of the capital’s 4 million people can now enjoy the benefits of power.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to two-thirds of the world’s poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.