



AGA KHAN DEVELOPMENT NETWORK

GENERATING HOPE FOR A BRIGHTER FUTURE

Bringing electricity to Arua, Uganda

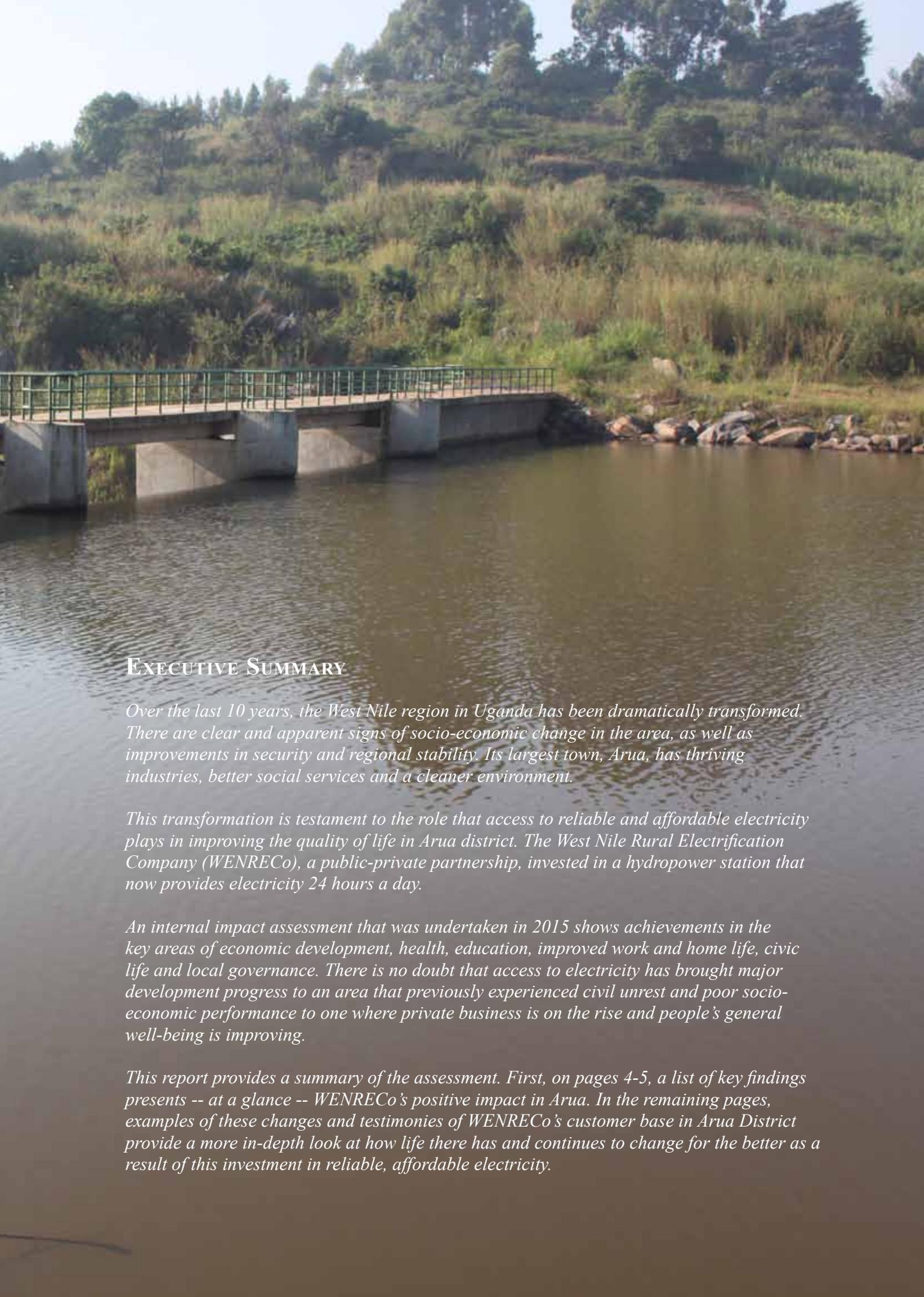


Cover: The West Nile Rural Electrification Company (WENRECo), a public-private partnership, invested in a hydropower station that now provides electricity 24 hours a day. As a result, the West Nile region in Uganda has been dramatically transformed.

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EXECUTIVE SUMMARY

Over the last 10 years, the West Nile region in Uganda has been dramatically transformed. There are clear and apparent signs of socio-economic change in the area, as well as improvements in security and regional stability. Its largest town, Arua, has thriving industries, better social services and a cleaner environment.

This transformation is testament to the role that access to reliable and affordable electricity plays in improving the quality of life in Arua district. The West Nile Rural Electrification Company (WENRECo), a public-private partnership, invested in a hydropower station that now provides electricity 24 hours a day.

An internal impact assessment that was undertaken in 2015 shows achievements in the key areas of economic development, health, education, improved work and home life, civic life and local governance. There is no doubt that access to electricity has brought major development progress to an area that previously experienced civil unrest and poor socio-economic performance to one where private business is on the rise and people's general well-being is improving.

This report provides a summary of the assessment. First, on pages 4-5, a list of key findings presents -- at a glance -- WENRECo's positive impact in Arua. In the remaining pages, examples of these changes and testimonies of WENRECo's customer base in Arua District provide a more in-depth look at how life there has and continues to change for the better as a result of this investment in reliable, affordable electricity.

KEY FINDINGS AT A GLANCE



ECONOMIC DEVELOPMENT

Improved access to financial services

- New commercial banks
- Access to loans and credit for local businesses
- New business start-ups

Services and trade

- New Internet cafés, shops and services
- Increase in trading hours
- Affordable electrical goods

Manufacturing and industry

- Thriving small and medium enterprises
- Apprenticeships for young people
- Increased local employment
- Expansion of agro-processing companies, bringing cost benefits to farmers

Tourism

- Increased number of hotels and tourism services

Integration of ICT

- More efficiencies and benefits for large industries, small businesses and education establishments
- Increased number of ICT providers



HEALTH

Better access to health care

- Lower costs of running modern equipment in hospitals, resulting in lower perinatal and infant mortality rates
- Higher professional staffing levels
- Improved response times with provision of emergency telephone lines
- Reduction in air pollution and decline in respiratory infections, particularly among children
- Improved public health education through Internet, TV and radio



EDUCATION

Improved learning institutions

- New primary schools, secondary schools, technical institutes and universities
- Increase in student numbers, with a shift to more technical subjects
- Addition of computer laboratories in schools
- Introduction of online courses
- Extended study time
- Improved education service delivery through Internet facilities, conference call systems
- Higher quality of teaching professionals



IMPROVED QUALITY OF LIFE FOR WOMEN

Improved work and home life

- Use of electric tools for domestic chores
- Improved security with the addition of street lights
- Opportunities to pursue further training at night classes
- Extension of business days with potential increases in income
- Enhanced family life and gender relations

CIVIC LIFE AND GOVERNANCE



Access to clean water

- New wells, reservoirs, two modern waste treatment plants



Access to information

- New local radio stations, mobile telecommunication networks, television services
- Access to mobile trading for farmers
- Improved communication and civic engagement for communities through the use of emails and mobile phones
- Access to mobile money services

GENERATING HOPE FOR A BRIGHTER FUTURE: BRINGING ELECTRICITY TO ARUA, UGANDA



Uganda Vision (2013-2040) envisages that the country will require 8,601 megawatts (MW) by 2020, 14,670 MW by 2025 and 41,738 MW by 2040 compared to the current capacity of 852 MW as of 2013, which is the lowest installed capacity in the East African region.

Context

Despite rapid economic growth, countries in sub-Saharan Africa are still facing enormous challenges to reduce poverty, with nearly half of the population living on less than US\$ 1.25 a day. In an effort to bring the benefits from investment in infrastructure and energy to low-income communities and address the inequalities in access to electricity, countries are investing in electricity grid extension and off-grid projects. Access to electricity is essential for a basic dignified standard of living. Without electricity, it is a struggle to receive adequate medical care, pursue an education, communicate and receive information, and earn a living.

In Uganda, agriculture is the mainstay of the national economy, contributing to 23 percent of the total GDP and employing up to 75 percent of the national workforce. There is a strategic and gradual shift away from subsistence agriculture towards commercial agriculture, agro-processing and development of the manufacturing sector. Investment in infrastructure is a key driver towards this goal.

In the 1990s, lack of resources meant that the Uganda Electricity Board (UEB) was unable to expand or improve the existing electricity network. National electricity access in urban areas was at five percent, while in rural areas it was at one percent. With biomass production constituting 93 percent of total energy consumption, the Rural Electrification Strategy and Plan 2001-12 (RESP 1) was put in place, which increased national and rural access to 14 percent and seven percent respectively by 2013. The Rural Electrification Agency (REA) continues to subsidise investment in rural electrification, particularly in the development of isolated grid systems.

Geographical Location

The West Nile region is located in the northwest of Uganda and is the second poorest of the 10 sub-regions of Uganda. It is home to 2.6 million people and includes Arua District, the fourth most populated of all 112 districts in Uganda. Arua town, which lies over 500 km from the capital city Kampala, is the 16th largest urban centre in Uganda, and has the largest population in the sub-region, with its population growing by three percent per year.

While this sub-region is home to 6.1 percent of the national population, it constitutes 12.8 percent of income-poor households: 42 percent of its population is income-poor, compared to the national average of 19.7 percent. The average nominal monthly income in West Nile is US\$ 108, compared to the national average of US\$ 158.

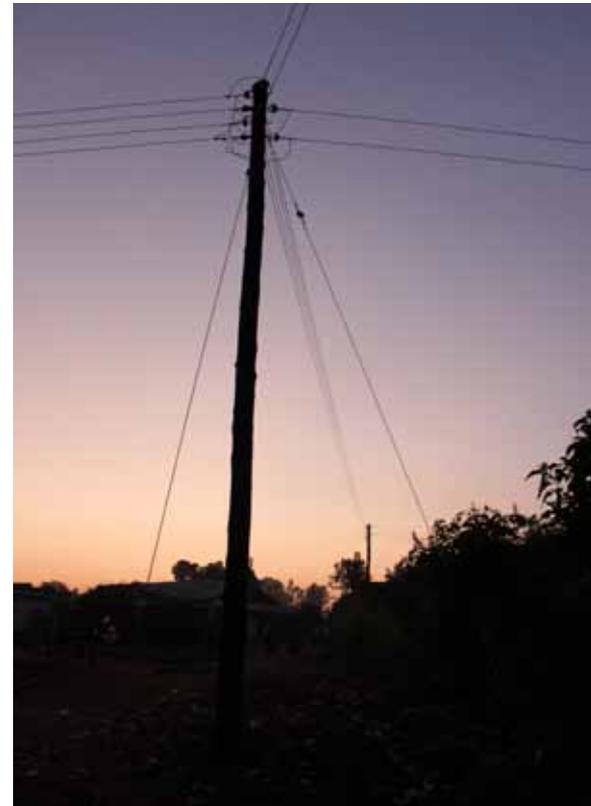
For most of the 1980s and 1990s, West Nile experienced conflict and insurgency. Although this ended in 2001, the area remained unattractive for investment in industry and infrastructure by private-sector players. In addition, the long distance from Kampala prohibited the region from being connected to the national grid. Only 0.3 percent of the community used electricity, with the overwhelming majority (over 80 percent) using some form of biomass fuel. Those that could afford electricity used expensive generators during the regular outages.

Unreliable electricity provision is detrimental to livelihoods due to low-profit margins, and at worst it endangers lives, as in the case of local hospitals which depend on a constant flow of electricity to power life-saving equipment, such as incubators and oxygen concentrators.

Before 2001, UEB provided electricity to the districts of Arua and Nebbi using diesel systems to generate electricity for a maximum of four hours per day in the evenings only, and this often resulted in frequent load shedding. In addition, using diesel and kerosene to generate electricity was very expensive, environmentally damaging, and brought risks to human health.

The West Nile Rural Electrification Company (WENRECo)

The lack of a reliable and affordable power supply has been a key obstacle to the socio-economic development of the region. The World Bank-funded Energy for Rural Transformation (ERT) programme identified the region as a special concession area, with the primary objective of providing sustainable power in Arua and Nebbi districts. This resulted in the West Nile Electrification project being tendered out to a private-sector player under a Public-Private Partnership (PPP) in 2002.



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Above and opposite: The WENRECo project targeted the electrification of 30 health centres, 60 schools, 250 businesses and 6,000 households between 2013 and 2015.

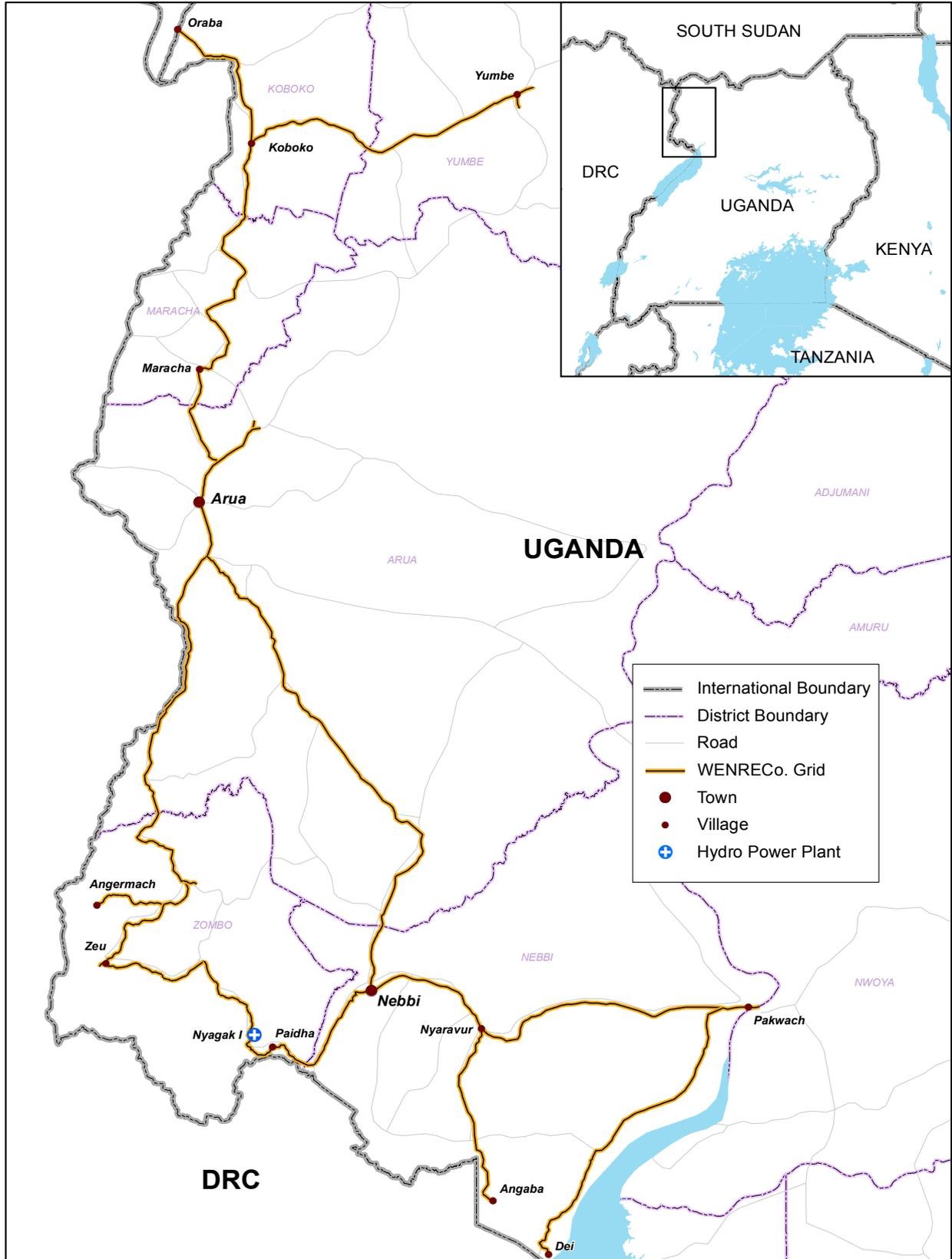
WENRECo was formed in 2003 by the Industrial Promotion Services (IPS), a programme of the Aga Khan Fund for Economic Development (AKFED) to fulfil the government's request for international assistance in the construction of a vertically integrated isolated grid on a Build Own Operate (BOO) basis. The company won a 25-year licence from the Electricity Regulatory Authority (ERA) for the generation, distribution and sale of electricity in the West Nile region. The initial catchment area covered Arua and Nebbi districts, but this has since been expanded to include Koboko, Maracha, Zombo and Yumbe districts, and the whole of the region in 2014. The WENRECo project targeted the electrification of 30 health centres, 60 schools, 250 businesses and 6,000 households between 2013 and 2015.

The project, developed with the assistance of KfW Development Bank and the World Bank, proposed a capital buy-down through a subsidy in order to make the tariffs affordable and more in line with the tariff levels offered by the national grid. This meant that once the assets had been developed, no further subsidies would be required, and at an affordable tariff level, the private investor could earn a commercial return.

WENRECo's financial model includes projections up to 2027. This is updated annually and is used as a tool to assess when a tariff revision is required, taking affordability and financial returns into account. The Electricity Regulatory Authority approves any changes in tariffs as part of a wider regulatory process put in place to maintain the balance between affordability and financial sustainability.

Transfer of assets

The existing Uganda Electricity Board assets were transferred to WENRECo under an Assets Transfer Agreement. These consisted of two 360 kilo-volt-ampere (KVA) generators located in Arua town and a third (250 KVA) located in Nebbi town. WENRECo initially installed a 1.5 MW thermal plant (Heavy Fuel Oil – HFO plant) to replace the obsolete and expensive-to-run small generators that previously served the area. This was commissioned in 2004 and enabled WENRECo to provide new connections and increase the supply from a maximum of four to 18 hours per day. After the commissioning of the 3.5 MW Nyagak I hydropower plant in 2012, electricity supply increased to 24 hours a day. By the end of 2014, the number of connections rose to 5,900, an increase of 4,600.





According to Mr. Albert Mulele, Branch Manager of Centenary Bank, the availability of electricity has brought with it the establishment and growth of different businesses that needed power, that previously were not in the area.

A brief assessment was carried out by interviewing a cross-section of WENRECo’s customer base in Arua District to determine the impact of affordable and reliable electricity access on the rural communities in the region. The key findings are as follows.

Economic Development

Access to Financial Services: Prior to the WENRECo project, there were only two banks in the region, and many small businesses closed down due to lack of financial services. In desperation they would often turn to loan sharks at interest rates of 30 percent upwards per month, which stifled business growth and development. Over the last 10 years, the number of commercial

banks has increased from two to 20, due to a reduction in running costs as a result of a cheaper and more consistent energy supply. The increased competition between banks, which are adopting a more customised grassroots approach, has enabled local businesses to access financial services, such as loans and other lines of credit, at lower rates and over longer periods.

Affordable and constant electricity has attracted high levels of entrepreneurship and the migration of young skilled workers to the region, which, in turn, has increased the demand for financial services. Growth in the informal sector, such as metal working, has created opportunities for apprenticeships and training for many formerly unemployed youth. At Laru Academy for Youth Metal Fabrication, the Manager, Junior Alike, states that since 2013, due to the presence of electricity, over 100 young people have been trained in metal working, many of whom have gone on to start their own businesses.

Services and Trade: Before 2003, the service industry (including restaurants, bars and hospitality services) was rather stagnant, largely due to the absence of reliable and affordable electricity, and services, where available, were expensive.

Since the commissioning of the hydropower project, there have been noticeable improvements in the service sector in Arua, including the opening of Internet cafés, car repair shops and hair salons. The managing director of one of the Internet cafés states that when the facility runs on hydro-electricity, surfing time costs US\$ 0.6 per hour. This rises to US\$ 2.4 per hour if the facility switches to a diesel generator. Such cost savings are passed on to the customers, making products and services more affordable.

Electricity provision has also boosted internal and external trade, with the latter targeting DRC and South Sudan. The presence of electrical lighting has facilitated night-time trade - Arua market now opens for 24 hours on one day each month. Many of the dukas (small shops) that now use electricity are open 72 hours a week, as they can operate at night without the need for candles or kerosene lamps, which were often a fire hazard.

As well as the increase in trading hours, the types of products sold have also changed. The growing numbers of vendors in Arua town have replaced their stock of old battery-powered products with modern electrical equipment and appliances such as television sets, refrigerators, shavers, kettles, heaters, carpentry tools,



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media devices (e.g., CDs, DVDs, USB sticks), etc. Over the last five years, as competition has continued to grow, prices of these products have been reduced, making them even more affordable to the local community.

Manufacturing and Industry: Arua is now considered one of the fastest developing regions in Uganda, with the population increasing from 44,000 to 63,000 in the last decade. This has had the effect of increasing demand in various markets, thus driving competition, and in turn making products and services more affordable and easily available. This has resulted in an increase in thriving small and medium enterprises, many of which are looking to expand.

The availability of reliable, affordable energy has facilitated the growth of an ailing agro-processing sector, adding a much needed boost to the region's agrarian economy. Key agro-processing companies in Arua include Malayika Enterprises (a manufacturer of bread and baked goods) and Nile Natural Fruit Products.

In full production, these recently established industries already employ over 350 local people and purchase produce directly from 3,000 farmers. This enables farmers to have higher farm gate prices due to the exclusion of middlemen from the supply chain and a steady market. As a result, there has been an overall improvement in the sustainable income levels of thousands of farming households.

Mr Patel, managing director of Malayika Enterprises, confirmed that using hydropower instead of generators had resulted in a 60 percent reduction in energy costs, from 10 million Ugandan Shillings per month (US\$ 3,400) to 4 million Ugandan Shillings per month (US\$ 1,360). This allowed the company to expand into new markets by reinvesting its savings.

While these processing facilities are creating backward and forward linkages in the area, especially in employment creation and strengthening of the various supply chains, the presence of processing facilities has resulted in new opportunities for businesses in Arua. According to the West Nile Private Sector Development Promotion Centre (WENIPS), a centre established by the government of Uganda to build the capacity of the private sector, there has been an increase in business start-ups in the area and an improvement in business management, including business process outsourcing, access to markets, customer care



According to Mr. Omar Abdullay (WENIPS), electricity is acting as an incentive in attracting the private sector to Arua, especially processors and industrialists.

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Data from the finance department of the Arua District local government shows that tax revenues increased from US\$ 236,600 in the 2006/07 financial year to US\$ 482,000 in the 2013/14 financial year, a 104 percent increase. The resident district commissioner, Mr Peter Debele, claims that this increase is partly attributed to an increase in the number of registered private businesses as a result of affordable and reliable electricity.



Over the last two years, the mayor's office in Arua has received 15 information requests per month on average about the availability of industrial land in Arua – a rare occurrence prior to the

commissioning of Nyagak I. As the demand for land by medium to large-scale industries increases, the movement of people and cargo, with the latter cross-border, continues to rise. In response, the government plans to upgrade Arua airstrip to an international airport over the next few years. The increase in industries has triggered government plans to set up the Arua Industrial Park.

Promoting Tourism: As the largest district and town in West Nile, Arua has always had a link to tourism, with its cultural history and the presence of local royalty. However, the insecurity of the 1990s, coupled with the lack of electricity, made the sector unattractive from an investment standpoint. From 2005, when electricity provision increased to 18 hours per day, there was a strategic increase in establishments that supported the tourism industry, particularly hotels. According to Mayor Charles Asiki, between 2009 and 2013, the majority of the new 2-3 star hotels opened in the knowledge that the Nyagak I hydropower project was under development.

One of the biggest hotels in Arua, the 40-room Desert Breeze Hotel, was formally opened by President Museveni in 2011. The owner, Mr Michael Oluma, told us that the hotel used to rely on a 55 KVA generator and gas for cooking and daily operations, which was very expensive. In 2012, energy costs decreased by more than 60 percent; with this came support services such as Internet facilities and satellite TV. In his opinion, the hotel would not be functional without hydropower, as operating it on diesel full time would result in financial losses.

Integrating ICT: ICT is being integrated into business operations, including micro-businesses such as carpentry. One of the carpenters indicated that he develops his timber designs using a laptop and design software, which has helped him capture a steady market and stand out in the field. According to the West Nile Private Sector Promotion Centre, at least 45 percent of all the private businesses in Arua now use ICT, increasing their production efficiencies. The presence of electricity and the demand for ICT tools and equipment has led to an unprecedented increase in the number of ICT providers in Arua. In addition, in the education sector, two of the schools visited had computer laboratories as part of student learning. At Bugema University, the administrator acknowledged that ICT plays a key part in content delivery, and mentioned that the university is exploring the introduction of online courses.



Improved Services and Trade

“When I was building my house in Arua, I had to travel to Kampala, over 500 km away, to buy doors and windows because we did not have these services in Arua. When the HFO plant was switched on in 2005, local artisans were brought on board, although the services were still expensive. After the commissioning of the hydropower project in 2012, we can now get good quality doors, windows and gates fabricated and installed in Arua at market prices.”

-- Charles Asiki, Mayor, Arua Municipality



Before WENRECo (2003) pregnant mothers trying to give birth in the absence of electric lighting often had complications, resulting in the mortality of the infant and/or the mother. This has since improved.

Access to Health Care



The WENRECo customer database shows that the number of health centres/clinics in the district connected to electricity has increased from six in 2004 to 23 in 2014, ensuring better access to well-equipped healthcare services for the people of Arua.

The Arua Regional Referral Hospital, a 412-bed facility serving the entire West Nile region, previously relied on a 150 KV diesel generator and solar photovoltaic systems. According to the hospital administrator, Mr Godfrey Mawa, the hospital was spending an average of US\$ 6,300 per month on diesel. When the 1.5 MW HFO plant became operational, energy costs were reduced by 30 percent to US\$ 4,100 per month, followed

by a further reduction to US\$ 1,700 per month after Nyagak I came online – a total reduction of 72 percent. These savings have allowed the hospital to expand, specialise, and invest in new equipment, providing more advanced treatments. The hospital now boasts modern diagnostic, curative and preventive equipment, all of which operate on electricity. The hospital houses a large blood bank that serves the whole of the West Nile region; previously, all blood had to be sourced from Kampala. Furthermore, the hospital's Department of Orthopaedics has installed a plant to manufacture tools and equipment for those with disabilities and the aged, such as prosthetics and wheelchairs. This is the only facility in northern Uganda that carries out such high-level production, serving over 670 individuals since 2013.

A reduction in infant mortality rates was set out in UN Millennium Goal 4. In 2008, the World Health Organization estimated perinatal mortality rates at 43 per 1,000 births in Uganda, with statistics significantly higher in rural areas located more than five miles from a hospital with adequate facilities. This is compared to 10 in every 1,000 in the developed world. A contributing factor was identified as the difficulty of identifying complications during the labour process in the absence of sufficient lighting. Improved lighting at Arua Regional Referral Hospital has increased service delivery, especially for child treatment, immunisation and expectant mothers, reducing the risks previously associated with pregnancy. The Uganda Bureau of Statistics confirms that the proportion of women safely giving birth increased from 34 percent in 2011/12 to 37 percent in 2012/13.

There has been a significant improvement in the response times of emergency medical technicians at Arua Hospital, according to the hospital administrator, Dr Odu, especially for trauma cases and pregnancies. These are directly linked to mobile telecommunications, and the hospital now has an emergency telephone number. Additionally, the presence of a blood bank has saved lives in emergency cases.

Another significant factor in access to appropriate health care was the reluctance of skilled workers to live in the area due to poor amenities as a direct result of being off-grid. This is no longer the case. At the time of the assessment, Arua Referral Hospital reported 100 percent staffing levels for professionals. According to Dr Odu, the presence of electricity has contributed to this, as well as a wider range of services due to the presence of external



Arua Regional Referral Hospital, a 412-bed facility serving the entire West Nile Region, now boasts of modern analytical/ diagnostic, curative and preventive equipment, all of which operate on electricity. In addition to laboratory and oxygen machines, the hospital houses a large blood bank that serves the whole of the West Nile Region. Previously, all blood would be sourced from Kampala.

personnel and better quality medical services. One of the nurses interviewed confirmed that she is now willing to work in Arua because of better living conditions compared to before 2012.

In the private sphere, lack of electricity means using alternative sources of light and heat. The majority of these sources are derived from some form of carbon-emitting fuel such as kerosene or paraffin. There is extensive evidence that indoor air pollution is strongly linked to a decline in human health, especially amongst children, as is the presence of pollutants associated with kerosene in the environment. In addition, kerosene lamps have high environmental impacts. It is estimated that these devices are responsible for seven percent of annual global black carbon emissions. Many looking into the possible impact of electrification on health in Africa have noted a 2014 study carried out in El Salvador¹, where the transition from kerosene lamps to electricity resulted in a 63 percent reduction in overnight air pollutant concentration and a reduction of up to 44 percent in acute respiratory infections incidence amongst children under six. More generally, information obtained from the Internet, TV and radio has also proven to be a strong influencer in terms of public health education.

1 Barron, M and Torero, M (2014). *Short Term Effects of Household Electrification: Experimental*

Better Access to Well-Equipped Healthcare Services



2004: 6 health centres/clinics connected to electricity
2014: 23 health centres/clinics connected to electricity



“In the early 2000s, I used to travel to the National Referral Hospital in Kampala because Arua Hospital did not have staff and medical equipment, but since WENRECO launched the Nyagak hydropower project this has changed as the hospital invested in staff and equipment. As a result, I am confident of getting treatment anytime of the day here in Arua.”

-- Patient, Arua Referral Hospital

“The presence of electrical equipment has resulted in increased confidence in us by the local population, increasing the number of patient walk-ins. As a result, our bed occupancy averages at 97 percent, which is much more than it was before WENRECO.”

-- Mr. Mawa Godfrey, Arua Regional Referral Hospital Administrator



Since WENRECo, there has been a shift towards more electricity-facilitated technical courses in Arua, including electrical repairs and installations (photo above), engineering and manufacturing technologies, IT/ICT, and media and publishing.

Education



“The cost of running the generator was huge... WENRECo was a big relief.”

*-- Mr. Andama George,
Headmaster of Mvara School*

Improved Learning Institutions: Prior to the presence of WENRECo, there were only four primary schools, six secondary schools and four technical institutes receiving electricity in Arua municipality. Today, 18 primary schools, 16 secondary schools and 16 technical institutes are connected to the grid. Additionally, six new universities have been built in the last 10 years.

According to the principal of Nile Institute of Management, there has been a gradual shift from traditional subjects (agriculture, tailoring, cookery, carpentry and joinery, and building and construction), to more electricity-facilitated technical courses such as IT/ICT, media and publishing, electrical repairs and installations, engineering and manufacturing technologies, which can all be

traced to the presence of electricity in Arua. Most institutions of higher learning have recorded a significant increase in student enrolment since January 2013.

Bugema University opened its Arua branch in 2009 with 34 students, a number that rose to over 270 by the end of 2014. While this increase cannot be solely attributed to the existence of WENRECo, the presence of electricity has enabled unique learning opportunities, especially adult evening classes, which many take advantage of so they can continue to work during the daytime. The presence of electricity has also contributed to improved lighting, better computer labs, internet facilities, conference call systems in educational centres, adding value to education service delivery.

Extended Study Time, Improved Teaching Quality: Mr George, headmaster at Mvara School, says that the lack of access to affordable electricity was having an adverse effect on the performance levels of both children and teachers. The unavoidable cost of having lights on in the evening to allow pupils to study and take remedial classes if necessary even for a small period of time (i.e. eight to ten o'clock in the evening) put a massive financial strain on the institution which had been operating at a loss for over a decade.

At all levels of education, institutions are now able to attract and retain qualified and experienced staff. This is partly because the facilities at such institutions are electrified (including homes, entertainment spaces, etc.). Teachers are now able to enjoy the same standard of living as their counterparts in other electrified districts of Uganda. Mr George says that because teachers now have electricity at home, they are able to better prepare their lesson plans, carry out background research, mark examination scripts at night and have access to modern communication tools (Internet, TV, etc.). This has meant that students who now have more time to study receive a higher standard of education, and teachers work in a more comfortable environment.

Whilst the rise in educational institutions cannot be solely attributed to WENRECo, the significant rise in and shift towards ICT-based training courses would undoubtedly not be possible without the availability of affordable and consistent electricity. Some universities are now running 24-hour computer labs. The increased access to the Internet has also assisted learning, especially at the higher levels where it is essential for research.

“Bugema University would never have opened a branch in Arua in the absence of electricity generated by WENRECo as the cost of doing business would be too high.”

*--Mr. Kamanyire Ibrahim,
University Administrator*





The addition of street lights has brought a new level of security to women in the region and has presented opportunities to pursue further training at night classes and extend business hours, thereby increasing their incomes.

Improved Quality of Life for Women

As in many African communities, women bear the majority of household duties alone. The assessment looked at the impact of electricity and the improvements that have been made available to women at the household level. With women spending 13-16 hours per day on domestic work, electricity is seen as an indispensable labour-saving tool by many of the women interviewed. One of the hardest and most time-consuming chores is pounding harvested crops. However, affordable energy means that the women interviewed are now using tools such as electric grinding machines to significantly reduce the amount of time and effort needed to carry out such tasks.

Lighting has also made cooking easier and many women noted a renewed stability in family life as televisions and lighting meant that their husbands were drawn home earlier instead of seeking entertainment outside their homes.

The addition of street lights has brought a new level of security to women in the region and has presented opportunities to pursue further training at night classes, which fits around their current professional lives, and extend business hours, thereby increasing their incomes.



WENRECo's service has led to an increase in access to clean and safe water and a reduction in water-borne diseases, one of the key requirements for societal transformation.

Civic Life and Governance

Access to clean water: WENRECo's service has led to an increase in access to clean and safe water and a reduction in water-borne diseases, one of the key requirements for societal transformation. Prior to 2002, the provision of clean water was under the mandate of the Arua Water Department. In 2002, the National Water and Sewerage Corporation (NWSC) took over responsibility for the production and distribution of water and sewerage services within the boundaries of Arua district. Review of performance data showed that in 2002, NWSC was producing 30,000m³ of water per day and serving just under 2,000 customers using a diesel generator that consumed 600 litres per day, the equivalent of US\$ 21,500 per month. According to the NWSC area manager, after the commissioning of the HFO plant in 2005, energy costs decreased by 40 percent, enabling the agency to invest in capacity expansion and widening of the water network.

Better Water Sanitation

“Because of the presence of affordable and reliable electricity, NWSC is, in 2015, going to increase production by constructing 10 new production wells, construct another reservoir with 35,000m² capacity to enable us to connect more households and institutions, while two modern waste treatment plants will be constructed in Arua. This, without doubt, would not be possible if we were operating on diesel generators. And the impact we have had in the area is massive, seen by the exponential increase in demand for water and sewerage services by the local population.”

-- Mr Wandwasi, NWSC Area Manager

As a result, by 2010, the customer base had increased from 2,000 to 5,800 (reaching approximately 30,000 people), and daily production capacity had increased from 30,000m³ to 100,000m³ litres of water. By the end of 2014, despite NWSC producing more water than ever (an increase of 300 percent), total energy costs had in fact reduced by 60 percent (to US\$ 8,500) as a result of hydroelectricity.

Access to Information: Before 2004, mass media and telecommunications in Arua were restricted due to the lack of a fast and reliable communications network, largely because of the absence of reliable electricity. This changed in 2004 when WENRECo embarked on the installation of the HFO plant, with the first two FM stations (both Radio PACIS and Nile FM) coming on air. The number of local FM stations had increased to six by 2014, subsequently improving the impact on access to news and information on personal well-being and market/product prices. By the end of 2014, there were five mobile telecommunication networks fully operational (Airtel Uganda with Warid Telecom; MTN Uganda; Uganda Telecom; Orange Uganda; and Roke Telecom), a tremendous improvement in rural telephone services, especially in comparison to 2003 when only MTN Uganda operated a network in Arua. There is access to free-to-air television services, while satellite television services are also available, thereby further reinforcing improvements in accessing up-to-date, high quality and reliable information.

As a result, communication has improved for the whole community. Farmers, especially those who produce maize, beans, cassava and coffee and can now use their mobile phones to access mobile platforms which share up-to-date market prices. Managed by the West Nile Private Sector Promotion Centre, many farmers are now able to sell their products at better prices while eliminating the middlemen from the supply chain. This access to markets has enhanced farmer productivity and output.



Furthermore, women indicated that their health and nutritional statuses had improved because of access to information. This was attributed to the presence of TV sets and FM radio sets in the household, which air information on practices and behaviours to improve health, nutrition, sanitation, etc.

Mobile Money Services: In a country with 34.9 million people, only 20 percent of the population has operating bank accounts

Safe and Reliable Financial Transactions



2003: 1 mobile phone network in Arua
2014: 5 mobile phone networks in Arua

About half of all Ugandans make financial transactions using mobile phones



“I can buy inputs using mobile money but also get paid on the same platform. This allows me time to just focus on how to improve my business. Furthermore, the money on my account is safe even if I lose my cell phone.”

-- Market Trader, Arua

with commercial banks. One of the main reasons is that most banks are not willing to improve their rural networks due to high operating costs. As a result, more than 17 million Ugandans now transact on financial platforms using mobile telecommunication networks. In 2013, mobile money transactions undertaken were worth UGX 18.6 trillion (US\$ 6.5 billion; considerably more than the total Ugandan national budget). In Arua, the trend is the same. Mobile money platforms are entirely dependent on live telecom networks, which are also dependent on telecom-masts. In Arua, the presence of reliable and affordable electricity has led to

the establishment of many telecom masts, ensuring reliability in mobile network presence, facilitating the growth and utilization of mobile money. All the respondents confirmed that they find it easy to transact using mobile money, an aspect that was not possible before 2003. Such transactions are safe, fast and can be undertaken anytime of the day.

“It’s very easy now to reach people on an everyday basis, with the use of either mobile telephones or email...This has increased our efficiency.”

-- Mr. Charles Asiki, Arua Mayor

Governance: According to Mr Peter Debele, the Arua resident district commissioner (RDC), before 2005, when electricity was unavailable during the day, most of the local government vacancies requiring candidates to have a bachelor’s or master’s degrees remained unfilled for long periods of time. As with the sourcing of teachers and medical staff, attracting qualified candidates to the area was a challenge due to the lack of electricity-related amenities, including 24-hour lighting, Internet access and a sufficient phone network coverage. However, this has now changed with positions being filled easily by a combination of newly graduated locals (some of the first to benefit from the newly established higher learning institutions in Arua), or by appropriate candidates from further afield who now perceive Arua as a viable location to live and work. This has resulted in better design, implementation and monitoring of government programmes.

Access to electricity has enabled the use of computers to plan, implement and report on project progress, leading to higher efficiencies, which was not the case 10 years ago. Additionally, the transition to the current unified reporting structure adopted by the decentralisation system of governance has been made more efficient through the use of computer-generated reporting frameworks. In brief, effective governance has been directly facilitated by access to reliable electricity.

This positive impact on governance resonates with the local civil society organisations. According to Mr Basil Mobutu of the Arua NGO Forum, communication tools such as FM radio stations, mobile telephone services, etc., have increased community awareness and participation. Citizens have access to good governance practices (transparency, accountability and the rule of law) and campaigns targeted at better leadership and improved service delivery. The forum is able to communicate more regularly with grassroots community-based organisations (CBOs) on matters of programme design, implementation and follow-up, thereby increasing their efficiency and effectiveness. Electricity

has had a profound impact on lobbying and policy advocacy. With better communication, campaigns can now reach the intended people faster and at lower cost.



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Achievements

The WENRECo project has shown that affordable and reliable access to electricity in rural areas is achievable and can have a positive impact on development. The impact assessment was carried out on just under 6,000 billed electricity connections. The 2014 Ugandan Census found an average household population of 5.2 individuals, meaning that approximately 31,000 people have been directly impacted by access to electricity. The secondary impact trickles down to many more households, and with a grid extension project underway, more communities in the region will benefit.

In 2015, Arua came in second place in the category “Best small city in Africa” at the inaugural African Mayor Awards.

Key achievements include:



93%

WENRECo has 68 permanent employees, of which 93% are from Arua and the greater West Nile region.

A PIONEER IN ITS FIELD

WENRECO is the first isolated-grid power project under a PPP in sub-Saharan Africa and contributed to PPP policy formulation in the energy sector in Uganda. The project is proof that such PPPs can be successful, especially if the government follows up with cost-effective tariffs.

ADAPTATION TO CLIMATE CHANGE

Like the Bujagali Hydropower plant, which provides nearly half of the electricity in Uganda, and is also supported by AKDN Industrial Promotion Services, WENRECo is amongst the first projects in Africa to certify carbon emission reduction units purchased under the Clean Development Mechanism (CDM), as set out in the Kyoto Protocol, and has been a success story on carbon financing. Tapping into renewable energy sources for rural electrification contributes significantly to climate change initiatives, especially the reduction of carbon dioxide (CO₂) from the environment.

MIGRATION TO A SMART NETWORK

WENRECo has migrated from post-paid to pre-paid metering, and at the end of 2014, over 60 percent of total customers were on the pre-paid platform. While this has resulted in increased collection efficiency of up to 85 percent, it has helped the electricity end-users better manage their power consumption and expenditure. It has also resulted in a significant reduction in commercial losses,

from 30 percent in 2012 to 22 percent in 2014. Most household heads interviewed welcome the migration to pre-paid metering. However, there is a need for further end-user training on the management of pre-paid meters, and increased accessibility to electricity tokens across a wider geographic area.

POWER CONNECTION LOANS

In Uganda, as in most developing countries, initial installation costs are one of the biggest obstacles to electricity connections. WENRECo, in partnership with Uganda Energy and Credit Capitalisation Company Limited, has designed a power connection loan that is being pilot-managed by Centenary Bank. Launched towards the end of 2014, this loan facility is offered at below-market interest rates (15 percent compared to a market average of 25 percent), and is aimed at providing credit to those who want to get an electricity connection but are unable to meet the upfront costs.

EMPLOYING LOCAL PERSONNEL

WENRECo has 68 permanent employees, of which 93 percent are from Arua and the greater West Nile region. This is a strategic action to help build the capacity of local people. It was noted that the staff and local leaders interviewed were proud of the institution and believed it to be a source of inspiration for the community.

HEALTH AND SAFETY

Historically in Uganda, a lack of education on safety and handling had resulted in a high number of electrocutions in areas where power lines had been extended. This is not the case in Arua, where there have been only two fatalities recorded since 2003, and these were both a direct result of the collapse of an inherited and old distribution network. This is testament to WENRECO's effective community campaign on health and safety.



31,000

WENRECo generates affordable and reliable electricity for 31,000 people in Arua

Challenges Faced by WENRECo

Initiatives such as the WENRECo project have shown that rural electrification projects are susceptible to a volatile global and national economy, further compounded by a remote location. This often implies lack of skilled labour, high transport costs and associated risks. Support towards pre-investment studies and capital buy-down policies help to ensure a faster project turnaround and lower, realistic tariffs for end-users.

Challenges include:

- Initial difficulty attracting highly qualified personnel to manage, operate and maintain services due to the remote location.
- Managing public expectations effectively.
- High transport costs due to distance of the project from the capital, as some spare parts cannot be sourced in the project area.
- The impact of external factors, particularly given the length of the project development timeframe.
- While IPS has experience in attracting credible partners, the remoteness and size of the project and the socio-economic conditions of the communities meant that attracting technical partners to join the project took much longer than expected, thereby affecting progress to project completion.
- The need to create awareness and inform end-users on the productive use of electricity so as to ensure residents are able to best capitalise on this newly available resource.
- Connecting rural communities, particularly given the cost of infrastructure (i.e., transmission and distribution) and maintenance relative to the low revenues generated from these customers.

Future Plans

WENRECo has had a notable impact in the West Nile area. The company is now exploring ways to connect more people and increase its capacity over time. Central to the company's future plans are:

- Increased number of connections. There is demand to connect more households, institutions and businesses to the WENRECo grid. The company will continue to connect more commercial users, which will in turn spur significant socio-economic development in the area.
- Development of other renewable energy projects. As demand increases, particularly from commercial users, the capacity of Nyagak I will soon be exhausted. This would result in the return of load shedding in the area and the loss of hard-won development gains. WENRECo is exploring the development of other small-scale renewable energy projects and supporting productive uses of energy projects to enhance end-user energy efficiency.
- Replication of such a project in new areas, incorporating the lessons learnt and best practices from WENRECO.

The West Nile Rural Electrification Company (WENRECo) was formed in 2003 by the Industrial Promotion Services (IPS), a programme of the Aga Khan Fund for Economic Development (AKFED) to fulfil the government's request for international assistance in the construction of a vertically integrated isolated grid on a Build Own Operate (BOO) basis. The company won a 25-year licence from the Electricity Regulatory Authority (ERA) for the generation, distribution and sale of electricity in the West Nile region. The initial catchment area covered Arua and Nebbi districts, but this has since been expanded to include Koboko, Maracha, Zombo and Yumbe districts, and the whole of the region in 2014.

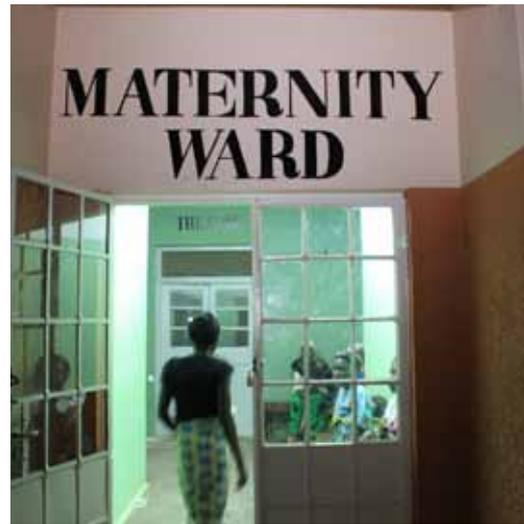
The Aga Khan Fund for Economic Development (AKFED) is an international development agency of the Aga Khan Development Network (AKDN), dedicated to promoting entrepreneurship and building economically sound enterprises in the developing world. AKFED focusses on building enterprises in parts of the world 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 the AKDN or WENRECo, please visit:

www.ipskenya.com

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