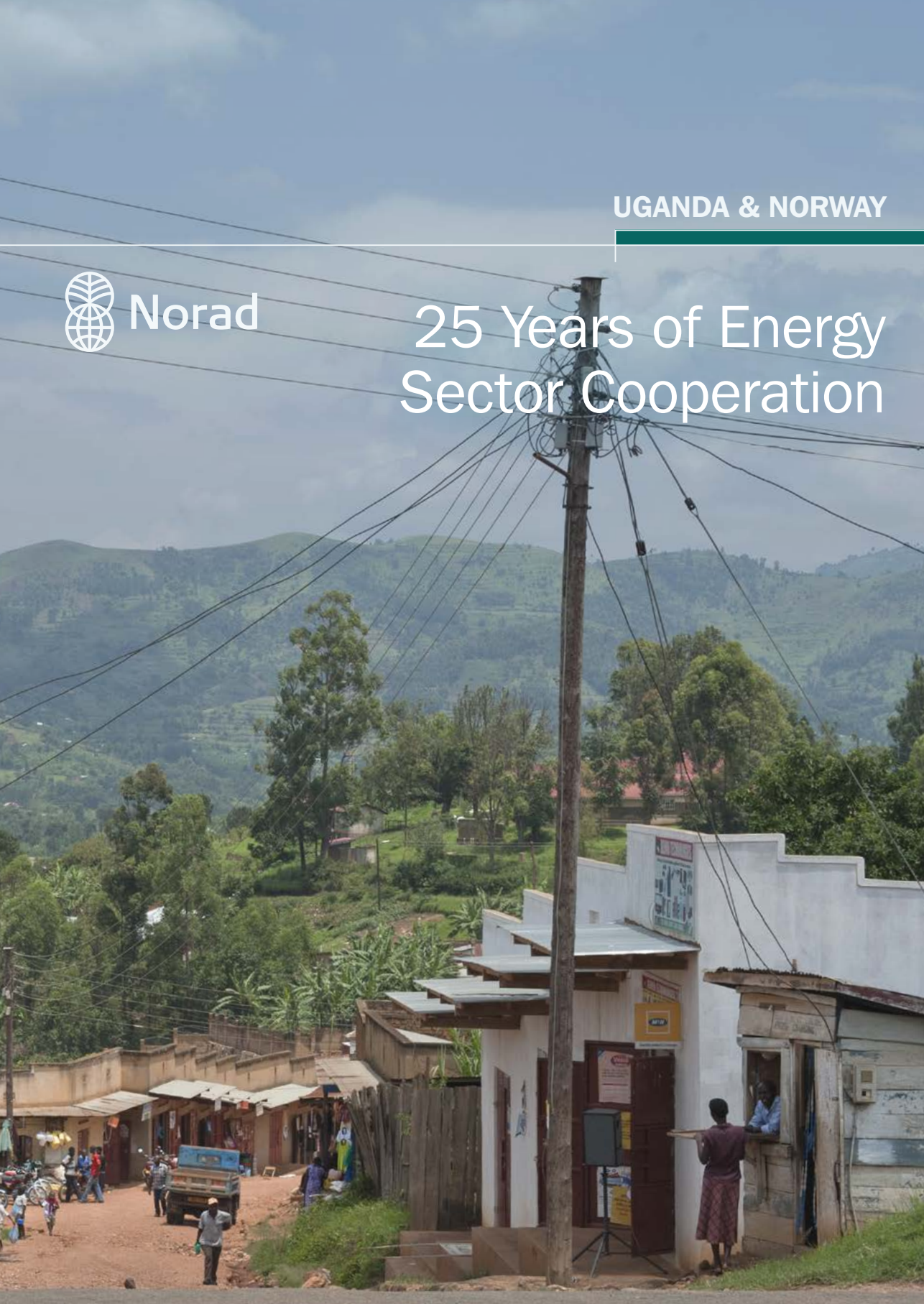


UGANDA & NORWAY



25 Years of Energy Sector Cooperation





UTENRIKSDEPARTEMENTET

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PHOTO: KEN OPPRANN

Introduction

In Uganda today, just 15 per cent of the population enjoy reliable access to electricity. Although still low, this is a great improvement over the situation 25 years ago when less than 5 per cent had access to the grid and nearly 40 per cent of the country lived in absolute poverty. These gains have been hard won and, for a majority of Ugandans, their livelihoods remain fragile. The road back to poverty is a short one.

It is well established that access to clean, affordable electric power is a fundamental pre-requisite for all countries to lift themselves out of poverty and develop into advanced, resilient and sustainable societies. In Uganda – as this report shows – electric power is essential for delivery of public services, job creation and economic growth. Indeed it can be argued that much of Uganda’s recent development achievements have gone hand-in-hand with improvements in access to electricity.

Norway has been involved in the development of the Ugandan electricity sector since the mid-1990s, beginning with support for hydropower generation along the Nile.

2016 marks the milestone of 25 years of Norwegian development assistance in clean energy development. Over this period, our engagement with the Ugandan government, companies, NGOs and the Ugandan people has deepened across the key areas of power generation, transmission and technical capacity building. In the same period Uganda’s power sector has moved from being in stasis to being one of Africa’s most rapidly developing and promising markets. Today the sector is in the midst of an unprecedented boom in construction of new generation and transmission infrastructure.

Nonetheless, there is still a long way to go before Uganda reaches its goal of 80 per cent access to electricity by 2040 (National Vision 2040). The challenges are complex and manifold and will continue to require assistance from Uganda’s international development partners to facilitate the investments that are needed for the expansion and consolidation of its electricity system.

This report presents some of the major achievements resulting from cooperation between Norway and Uganda over the past 25 years. These include:

1. Institutional partnerships with the main actors in the Ugandan energy sector
2. Development of small and large hydropower stations
3. Construction of more than 2000km of high and medium voltage power lines, connecting up to 25 000 households in rural areas and finally
4. Education and research into clean energy generation

The report is organized around these four themes, highlighting specific projects in the context of a rapidly developing energy sector from around 1990 onwards.

A full database of clean energy-related activities receiving Norwegian development assistance can be found in the Annex.

This report covers cooperation in the area of electricity generation only. Norwegian assistance to Uganda in relation to development of its oil and gas sector (for example the Oil for Development Programme) is not discussed here.

In 25 years Uganda has...



increased access to electricity from 5 to 15 per cent of the population



increased annual energy production from about 600 to almost 3000 GWh



unbundled its power sector and become one of the region's more attractive countries for renewable energy investments



recently been ranked the 3rd best country regarding clean energy in Africa



reduced its national power grid energy losses from about 50 to 25 per cent



established an academic environment for education and research within clean and renewable energy

...Norwegian support has contributed to



connecting more than 25 000 new electricity customers to the grid in rural areas



providing a more reliable electricity supply for schools, hospitals and industries in several districts



developing several large and small hydropower plants



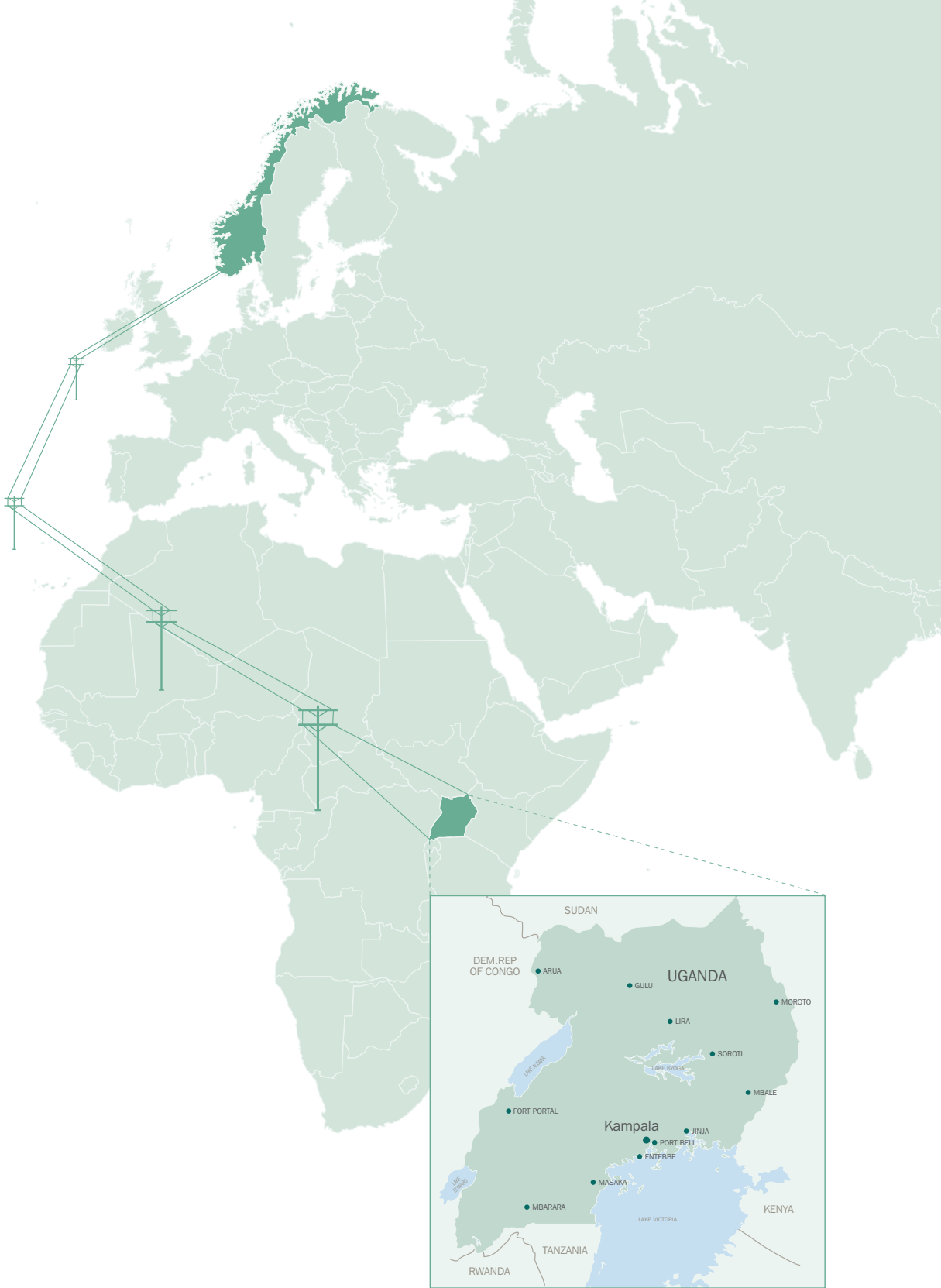
establishing a more modern and predictable regulatory framework for the power sector



construction of more than 2000 km of power lines



cooperation in research, education and entrepreneurship within clean energy





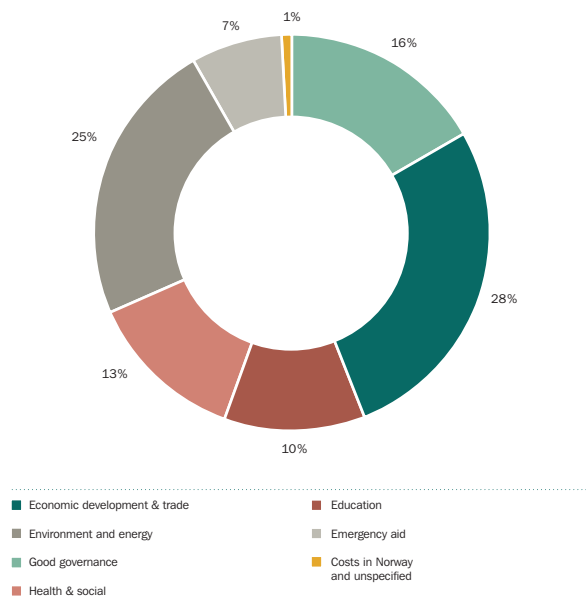
History and Major Milestones

Norway and Uganda: development partners since the 1960s

Development cooperation between Norway and Uganda began in the mid-1960s with the arrival of Norwegian forestry experts. Cooperation was suspended in 1973 after the establishment of Idi Amin’s brutal dictatorship, but resumed after his removal in the late 1980s.

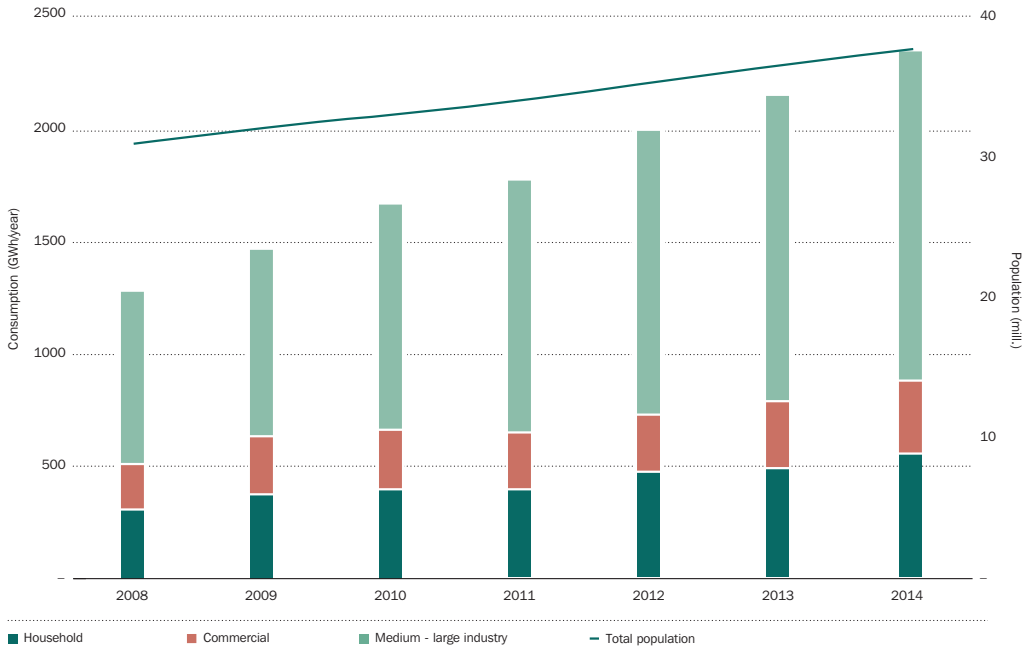
In 1996 Norway established a permanent embassy in Kampala and Uganda was accorded the status of a “major development partner”. Total Norwegian development assistance to Uganda in the period 1990–2015 amounts to more than NOK 7000 million (approximately USD 900 million in absolute dollar terms). Energy sector development has been one of the most important focus areas, comprising a quarter of the total amount spent.

FIGURE 1: BREAKDOWN OF TOTAL NORWEGIAN DEVELOPMENT ASSISTANCE BY FOCUS AREA (1960–2015).



[Source: Norad]

FIGURE 2: UGANDAN TOTAL ENERGY CONSUMPTION (2008–2014)



[Source: ERA]

25 YEARS OF POWER SECTOR DEVELOPMENT


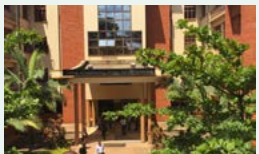


Norwegian clean energy support to Uganda has largely been directed towards the power sector, in order to increase access to electricity nationwide.

At the beginning of the 1990s less than five per cent of Uganda’s population had access to electricity and there was almost no electricity at all in rural areas. Total installed generation capacity was just 180 MW and more than 40 per cent of all power production was lost due to poor management and maintenance of the electricity grid.

Today, access to electricity in Uganda is up to 15 per cent, installed capacity has increased fivefold and grid losses are down to 25 per cent.

Uganda’s annual electricity consumption in 2014 totalled 2300 GWh. Although this means overall consumption has doubled within the past six years (figure 2), it still corresponds to less than 5 per cent of Norway’s total electricity use. Considering that Uganda has seen its population rise by more than 20 per cent in the same period, there is still much work to do.

Milestones in Energy Cooperation

1993	▶	Uganda enters agreement with Norway to co-finance the Kiira hydropower plant (200MW) with equipment made by Kvæner. Construction completed in 2001. Marks the beginning of many years of cooperation in the energy sector.	
1996	▶	Norway finances rehabilitation of two transformer stations in the central transmission network to handle power production from new power stations (1996-2000).	
1997	▶	NVE supports a new energy law and establishment of a de-regulated governance structure for the power sector (1997 – 1999).	
2000	▶	NVE supports establishment of legal, economic and technical frameworks for the power sector and builds capacity within the regulator, the Electricity Regulatory Authority (ERA).	
2006	▶		Statnett Norway enters into a twin-cooperation agreement with the Uganda Electricity Transmission Company Limited (UETCL) for improving capacity in electricity network design (2006-2014).
2007	▶	Norway's "initiative for clean energy in development cooperation" is established, and the energy cooperation with Uganda is scaled up	
2008	▶		<p>Norway finances construction of a new Technical Facility at Makere, officially opened in 2009.</p> <p>Cooperation between NTNU and Makerere University intensified with a new master's programme in renewable energy and research into solar energy. Support to many doctoral students.</p>
2009	▶		TrønderEnergi and Norfund build the run-of-river hydropower plant Bugoye (13 MW) in western Uganda. Norway supports the project with USD 10 million.
2010	▶	Uganda and Norway enter into their largest ever agreement where Norway finances the Nkenda – Hoima project (226 km 220 kV transmission lines). Total Norwegian support is USD 50 million (2010 – 2017).	
2011	▶		Norway supports the Rural Electrification Agency with the construction of 1800 km of power lines and at least 25 000 new electricity customers in several districts.
2013	▶	Uganda, Norway and other partners implement the GET FIT Uganda, a major support programme for development of small hydro, biomass and solar power projects.	

Power Sector Reform in the 1990s

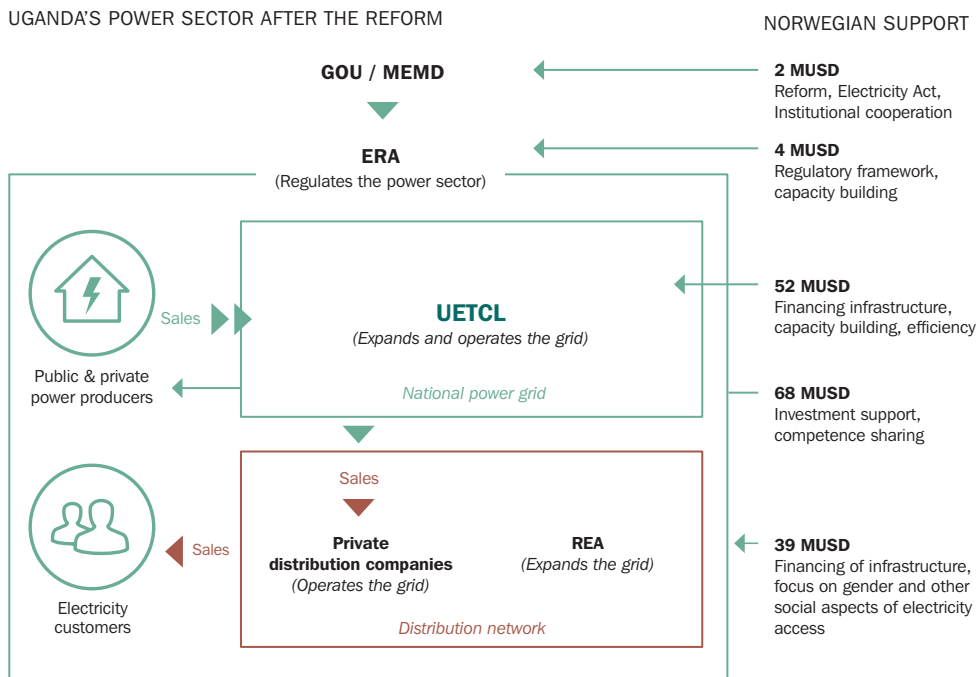
In the 1990s, Uganda's state owned company, Uganda Electricity Board (UEB), had a monopoly on production, transmission and distribution of power as well as responsibility for regulation of the power market. UEB had financial, administrative and technical problems resulting in power shortages and transmission losses amounting to nearly 50 per cent of production.

As part of a wave of privatization overseen by Ugandan authorities in the 1990s, it was decided to restructure and privatize the power sector, a process supported by the World Bank and Norway. The accompanying deregulation of the power market allowed private power producers and distribution companies to operate under licensing agreements. This work cumulated in the passing of a new Electricity Act in 1999.

A holistic approach to energy sector support

As part of the power sector reform, a number of new state actors were established. Since then, Norwegian development assistance has focused towards most areas of Uganda's power sector. The diagram below (figure 3) illustrates the basic sector structure, and the extent of financial support to key institutions and infrastructure.

FIGURE 3: THE BASIC STRUCTURE OF THE UGANDAN POWER SECTOR AND NORWEGIAN FINANCIAL SUPPORT TO KEY INSTITUTIONS



"The cooperation between Norway and Uganda has contributed to making our power sector more independent and more viable, largely due to the partnership supporting both infrastructure and competence within several of the key institutions of the sector."



ENG. MOSES MURENGEZI, Ministry of Energy and Minerals
PHOTO: CHRISTOPHER RUUD, MULTICONSULT

A range of international development partners are involved in Uganda's energy sector. In order to ensure a high level of coordination and to avoid duplication of efforts, MEMD hosts a Joint Sector Working Group, including key sector stakeholders and development partners. Through monthly meetings, important issues are discussed and stakeholders align their efforts. Norway has been chairing the working group since 2015.

Reform without results?

In the years that followed the power market reforms, the newly established ERA (Electricity Regulatory Authority) experienced major challenges. Private investment in power production and distribution did not occur as quickly or to the degree that had been hoped for. This meant that the sector remained dependent on state budgetary support to maintain existing power production and invest in much needed new infrastructure. The result was a power crisis emerging in the mid-2000s.

In 2006 the crisis deepened due to draught, poor regulation of hydropower plants on the Nile and falling water levels in Lake Victoria. Consequently, existing hydropower plants could no longer generate at full capacity. In order to help maintain a reasonable level of electricity supply, in 2007 Norway invested 70 million kroner (USD 11 million) in a 50 MW heavy oil power plant. Such plants provided nearly 40 per cent of Uganda's total electricity production in the period 2009–2011 (figure 4).

FIGURE 4: NORWEGIAN FINANCIAL SUPPORT TO THE UGANDAN ENERGY SECTOR



[Source: ERA]

Brighter times ahead

In 2012 the Bujagali 250 MW hydropower plant was commissioned, enabling Uganda to significantly reduce consumption of expensive fossil fuels for electricity generation. Today two other large hydro plants are also under construction - Isimba (183 MW) and Karuma (600 MW) - both of which should be completed around 2020.

In fact, Uganda now has more privately developed power plants than any other country in Sub-Saharan Africa aside from South Africa. No less than five new projects have begun construction in 2015, including up to 20 MW of grid connected solar capacity with multiple small hydro projects expected to begin construction in 2016.

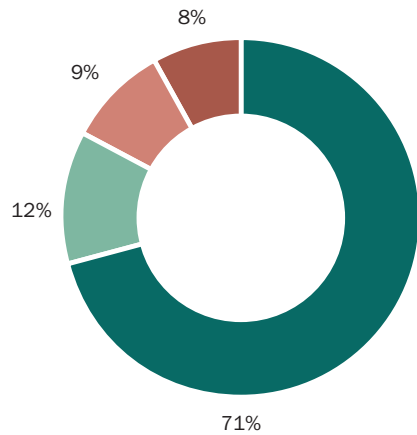
Much of the credit for the progress in Uganda's power sector should go to the sector regulator, ERA. Norway (via the Norwegian regulator NVE) completed its five-year programme of technical assistance to ERA in 2005. We are encouraged that, ten years later, ERA remains a regulator that continues to invest in internal competence and improvements to the regulatory framework originally set forth in the 1999 Electricity Act.

“Cooperation with Norway has been instrumental in setting our regulatory framework on a sure foundation.”



DR. BENON MUTAMBI, CEO, ERA. PHOTO: GET FIT UGANDA

FIGURE 5: THE UGANDAN POWER SYSTEM PRODUCTION BY TECHNOLOGY AND PRIVATE/ PUBLIC OWNERSHIP (2015).



■ Large hydropower ■ Biomass
■ Thermal power ■ Small hydro



■ Public power producers
■ Independent power producers

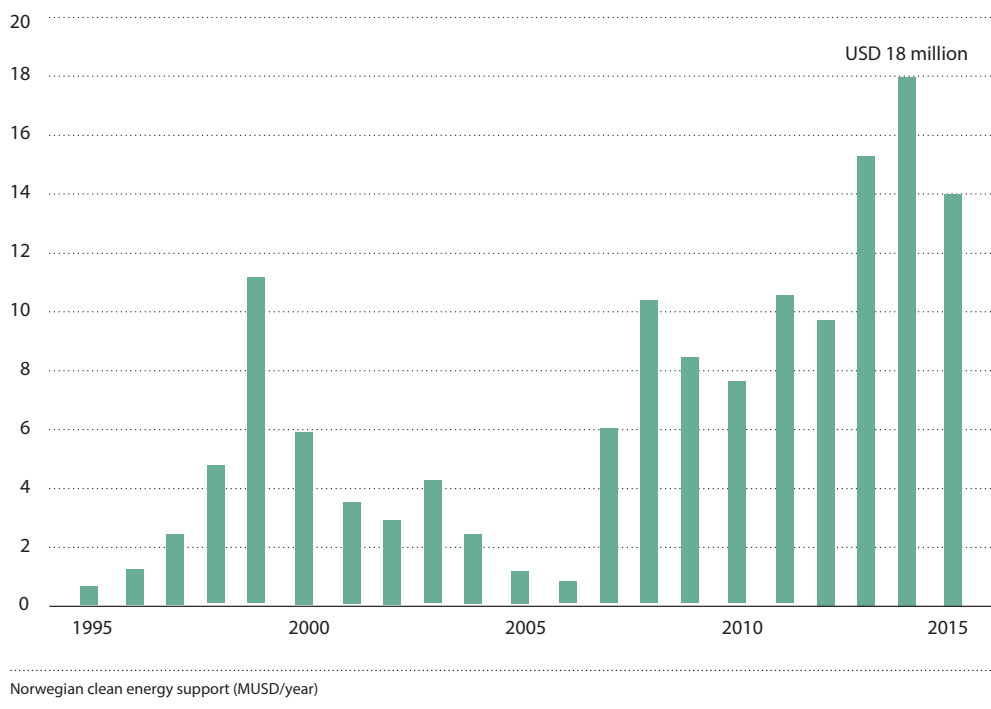
[Source: ERA]

Overview of financial support to clean energy

Total Norwegian development assistance to the Ugandan energy sector in the period 1990–2015 has been approximately NOK 1.2 billion (excluding petroleum sector assistance)¹. Support to the sector reached its highest level in 2014, totalling NOK 154 million (approx. USD 18 million).

In all, nearly 90 per cent of Norwegian assistance has gone towards financing of infrastructure and generation assets.

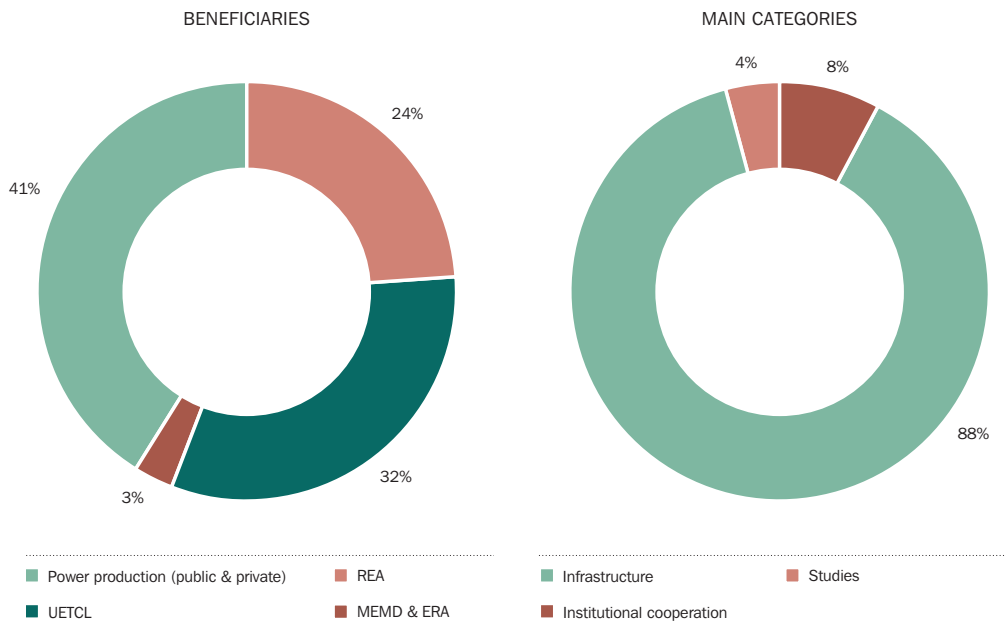
FIGURE 6: NORWEGIAN FINANCIAL SUPPORT TO THE UGANDAN ENERGY SECTOR



¹ Nominal figures, including remaining 2015 budget. Not including Norfund investments.



FIGURE 7: MAIN BENEFICIARIES AND CATEGORIES FOR THE NORWEGIAN ENERGY SECTOR SUPPORT



[Source: NORAD]



Uganda's Hydropower Development

The Nile, Uganda's most important power resource

Like Norway, Uganda has large hydropower production potential. Since the 1950s the country has built nearly 600 MW of large scale hydropower, split among three different plants (Nalubaale, Kiira and Bujagali). All of them rely on water from the Nile and the natural reservoir provided by Lake Victoria. They form the core of the Ugandan power system with approximately 70 per cent of installed capacity.

Norway has played a central role in the development of Uganda's hydropower potential whilst seeking to ensure that projects adhere to the strictest environmental and social standards. The new Isimba (183 MW) and Karuma (600 MW) hydropower plants are due to be completed around 2020 and have both benefited from Norway-funded feasibility studies. Norwegian hydropower experts have over the years provided their insights to multiple studies, project management and construction agreements.



Norwegian Kværner supplied equipment to the Owen Falls Extension (Kiira Hydropower Plant), which was partly financed by the Norwegian Government. The Kiira project later attracted criticism for contributing to loss of water from Lake Victoria and the resulting power crisis (see above). Today water levels have returned to normal and the plant produces as designed. PHOTO: UEGCL

Bugoye – Norwegian Private Investment in Small Hydropower

Uganda has massive potential for small hydropower plants, particularly in the area around the Rwenzori mountains in West Uganda and Mt. Elgon in the East.

The 13 MW hydropower project Bugoye in western Uganda was developed by Norwegian power producer TrønderEnergi and Norfund (the Norwegian investment fund for developing countries), and commissioned in 2009. The run-of-river plant was designed by the Norwegian engineering consultancy firm Multiconsult (previously Norplan) in partnership with engineers from the Ugandan firm Newplan.

Construction costs totalled NOK 300 million (approx. USD 55 million), of which the government of Norway contributed about NOK 60 million (USD 12 million). Annual production has averaged approximately 80 GWh, equivalent to 7 per cent of total national electricity production. It provides power to supply an estimated 1.5 million people.



Bugoye power house. PHOTO: MORTEN SVELLE

The plant was commissioned while the power crisis was still ongoing and demand for power was acute. Bugoye was also the country's first ever commercially financed power station, an important milestone in the sector's history.

Social and environmental impacts

To ensure genuine local support for the project, the developers implemented a comprehensive compensation programme. A local committee participated in management of the compensation programme in order to protect the rights and interests of local residents including the local municipality, village elders and women's groups.

All of the 30 or so families that needed to relocate were able to choose where to live and were given a new house financed by the developers. A further 600 households received compensation for loss of land and ongoing assistance to ensure they could maintain sustainable livelihoods. Moreover, the compensation system entailed a local development programme that funded construction of two new health clinics, sanitary latrines and a comprehensive water supply system for people in the vicinity of the power station. The programme also supported local business development, agricultural outreach, facilitation of a local sports club and a contribution to protection of the Rwenzori National Park.



Construction of Bugoye created many local jobs. Here construction workers fill the walls of the canal. PHOTO: KEN OPPRANN

Based on the policy of close cooperation with local people, full openness about the compensation regime and numerous concrete services and projects, Bugoye was implemented with the backing of a large majority of the local population.

One study conducted by the Overseas Development Institute (ODI) in 2013 found that construction of Bugoye HEP had helped created 10 000 new jobs in Uganda, 1000 directly in the planning, construction and management of the plant.

“The past three years have been the best of my career. All the power outages were ruining my business. We only had power for about 24 hours per week, while I needed to pay rent and salaries for three employees for the entire month. Since Bugoye was built however, the power supply has improved drastically.”

FRED BANANUKA, owner of a carpentry workshop in Bugoye.

STRENGTHENED NATIONAL HYDROPOWER COMPETENCE



Managing director in Bugoye Hydropower Limited, Annicient Busingye, at a course in Norway arranged by International Centre for Hydropower (ICH). PHOTO: ANNICIENT BUSINGYE

Annicient Busingye is a good example that Uganda is in a process of strengthening its national competence within hydropower development. She started as an accountant at Norfund and TrønderEnergi's local company (TronderPower) for development of the Bugoye hydropower project in 2008. Since then Annicient has had an increasingly central role in the project, and she now functions as managing director of the operating company Bugoye Hydro Ltd.

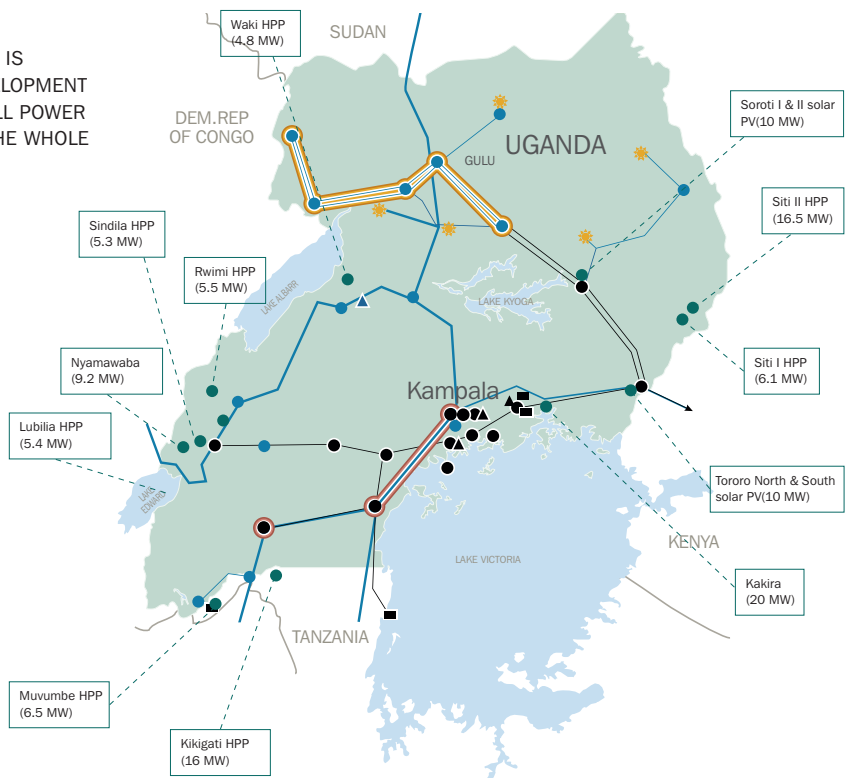
“As part of the Bugoye team I have learned a lot about all aspects of hydropower development and have gained valuable project experience. Uganda needs such projects to strengthen and develop our national hydropower competence and to manage our vast hydro resources in an optimal way,” says Annicient.

GET FiT Uganda – Releasing private investment in small power plants

Demand for power in Uganda is set to climb steeply in the coming years. The GET FIT¹ programme was begun in 2013 to help ensure that anticipated power shortages could be avoided without resorting to construction of additional heavy fuel oil power stations. The programme was designed to facilitate a wave of private investment in small power plants through use of a “results-based” subsidy to commercial developers. The concept was developed by Deutsche Bank and KfW together with Uganda’s electricity authorities. Financial support comes from Germany, the UK, the EU and Norway. The programme is implemented by the Norwegian engineering firm, Multiconsult (previously Norplan).

In total, GET FIT supported development of up to 15 small hydro projects, a biomass power station and two solar PV projects. The programme has garnered international attention for its innovative support mechanism whereby developers obtain a certain amount of financial support during certain periods for every kWh they produce. In that way, the programme has managed to stimulate private investment worth more than five times the cost of the programme. Read more at www.getfit-uganda.org.

FIGURE 8: GET FIT IS SUPPORTING DEVELOPMENT OF MULTIPLE SMALL POWER PROJECTS OVER THE WHOLE OF UGANDA



¹ Global Energy Transfer Feed-in Tariff. The Feed-in Tariff refers to the fixed, technology-specific price received by power producers for each kWh of energy delivered to the grid.



Electricity for Rural Development

A major objective of the power sector reforms was to facilitate private investments in the expansion of the distribution network. The reforms have succeeded in contributing to a substantial increase in access to electricity in the largest cities, where demand for power is high. But in rural areas, where demand is lower and customers widely scattered, there is a much lower commercial incentive to install new distribution systems.

To secure improved access to electricity in rural areas and improve economic growth, in 2001 the Ugandan Authorities established the 2001 Rural Electrification Agency (REA). Since REA was established in 2001 it has built 12 000 kilometers of power lines and connected at least 60 000 users in rural areas to the grid. Of these, Norway has financed 1800km of power lines and until now 16 000 new connections, with a target of 25 000 new customers.

These customers include:

- > District headquarters and other public institutions
- > Hospitals and health clinics
- > Schools
- > Industrial users
- > Small and medium businesses
- > Households

FIGURE 8: TOTAL KILOMETRES OF POWER-LINES BUILT BY REA

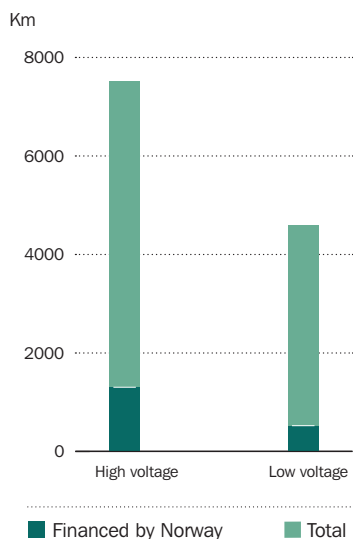
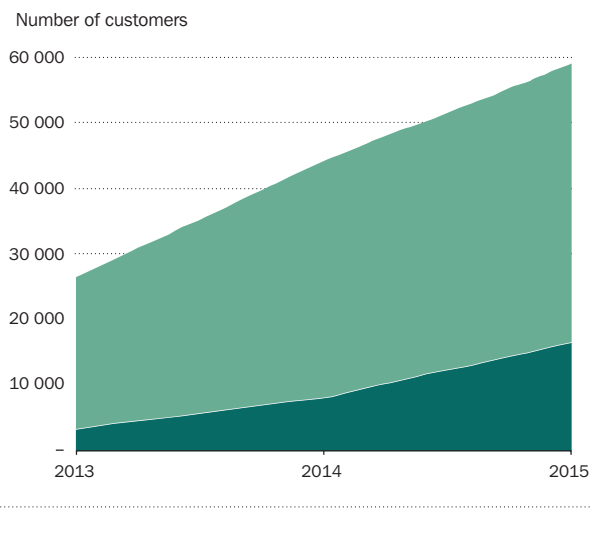


FIGURE 9: TOTAL NEW CONNECTIONS MADE BY REA



[Source: REA]

KPMG – MONITORING NORWEGIAN SUPPORT TO CLEAN ENERGY

The Norwegian Embassy in Kampala has a comprehensive clean energy project portfolio representing funding commitments in the range of USD 100 million. To ensure close project follow-up and achievement of associated development targets, the Embassy has contracted KPMG for monitoring of all power projects Norway is investing in. Some of the main monitoring activities are:

- > Pre-contract procurement monitoring, hereunder review of compliance with procurement regulations and procedures
- > Financial monitoring
- > Monitoring and assessment of project progress and results
- > Project risk management

SAMPLE 1

ST. FRANCIS HOSPITAL – SAVING LIVES WITH POWER

The St Francis hospital in Mutolere in West Uganda is one of the many locations that have obtained electricity through REA's projects. The hospital has 250 beds and treats at least 50 patients a day. The hospital also accommodates 250 students in nursing and medicine. Even though power cuts do still occur, improved access to electricity has had an immeasurably positive impact on the hospital: light all day round, modern electrical treatment equipment, the ability to boil water for disinfection, refrigeration for medicine and food and use of computer systems.



.....
Midwives at the St. Francis Hospital handle 10 –20 births every day and save many infants through use of incubators – a device dependent on stable power supply. PHOTO: KEN OPPRANN
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Patients and nursing students at the St. Francis Hospital. PHOTO: KEN OPPRANN

"Previously we had power from a diesel aggregate, which was very expensive to operate and maintain. We could only use it during certain surgical procedures and for a few hours in the evening for light. With cheaper power from the grid we are now treating more patients in a safer way and with more modern equipment, as for example the incubator for infants. This enables us to save more lives and provide better education for our students"

SISTER NYEMERA RIMINA, St. Francis Hospital, Mutolere

Because of reliable access to electricity, the hospital is now in the process of building new treatment facilities and capacity for additional students. Students will be able to learn to use modern medical equipment and PCs, and take advantage of lighting for evening studies.

"Although the situation is now a lot better than before we got connected, we are hoping that the electricity supply will become even more stable. Power outages still represent a challenge and can be critical for patients."

Technical manager St. Francis Hospital, Mutolere

KISORO POTATOES TO SUPPLY KAMPALA WITH FRIES

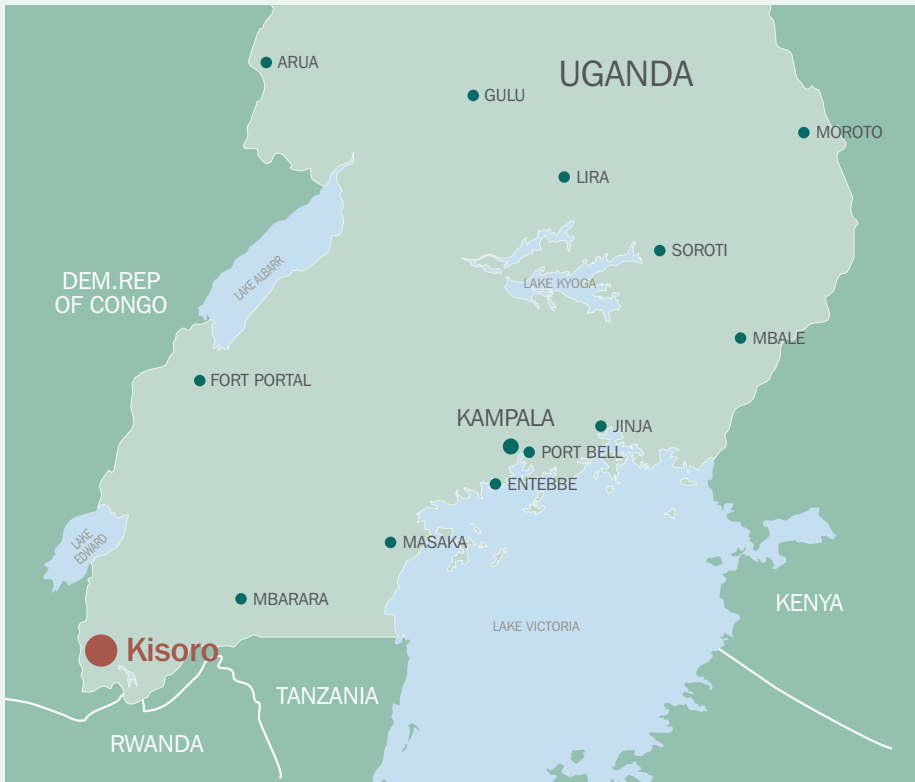


The brand new factory in Kisoro is now ready to supply Ugandan fast food lovers with fries from local potatoes. Factory manager B. Mutabazi (left) tells energy counsellor at the Norwegian embassy, Hans Peter Christophersen, that building the factory had been planned for a while. However, the investment was only possible thanks to the provision of a dedicated power line constructed by REA. PHOTO: KEN OPPRANN

Uganda's demand for potato products such as chips and French fries is increasing. Growing potatoes is one of the rural areas most important sources of food and income. However, due to lack of electricity supply, the national production of processed potato products is not sufficient to meet the demand. The US fast food chain Kentucky Fried Chicken (KFC) which

has opened outlets in Uganda, is currently importing fries from Egypt to serve its customers in Kampala.

When REA recently electrified several areas in the Kisoro district, local entrepreneurs finally had the opportunity to invest in a factory processing local potatoes. The factory is now completed, with



processing machinery and low temperature storage facilities duly installed. The investment would not have been financially viable without access to the electricity grid, due to the high costs associated with running the machinery on diesel generators.

"Our production and a huge demand for potatoes will contribute to increase the income of local farmers. We already have agreements with several actors for the supply of fries to their restaurants. Our products will also be available in the freezers of some grocery stores."

B. MUTABAZI, manager at the fries factory in Kisoro

POWER FOR GENDER EQUALITY



Dr. Patricia Litho, REA. PHOTO: KEN OPPRANN

Efforts for gender equality are important in rural Uganda. Access to electricity can be a tool in this regard, by prioritizing power supply for areas of use which benefit women.

“Through its cooperation with REA, Norway has been a pioneer in using electricity access as a tool for gender equality in rural areas. Norway has demanded that REA prioritizes this aspect during project implementation,” says REAs deputy executive director Werikhe Khaukha Godfrey.

“When connecting new villages to the grid, we encourage and facilitate prioritization of electricity access for typical female activities at the same level as for typical male appliances such as e.g. carpentry tools. Examples are female-driven businesses such as production of clothing, salons, local water supply or kitchen appliances for the households,” says Dr. Patricia Litho, head of REAs Community Outreach.





Strengthening the Backbone of the Power Network

Norwegian support to infrastructure and capacity building

UETCL was established in 2001 to build, manage and maintain Uganda’s central power transmission network that forms the main link between generators and distribution companies that deliver power to end users.

Norway has financed multiple studies, and the design and construction of transformer stations and power lines together with UETCL since the 1990s. This area of support has amounted to at least NOK 350 million (approx. USD 50 million) over the past 15 years.

Some major achievements include financing for the Nkenda – Hoima power line, among the largest energy projects in Uganda. It comprises 225 km of high voltage cabling across western Uganda. Other major projects supported by Norwegian and international donors include the Hoima – Kafu line (90 kilometres) and Karuma – Kampala line (300 kilometres). These new transmission lines are critical to strengthen the national grid, increase electricity access and facilitate potential large industry in western Uganda, along with evacuating power from the many planned hydropower projects in the region.

As part of Norway’s assistance to UETCL, experts from the Norwegian grid operator Statnett forged a long-standing capacity building partnership in 2006, an arrangement that finally wound down in 2014.



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Senior projects engineer Anna A. Muhereza leads the implementation of the Nkenda–Hoima project in western Uganda. Here together with two of the project engineers Paul Tumusabe and Aloysius Mbonyebiyombi. PHOTO: CHRISTOPHER RUUD, MULTICONSULT
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Representatives from UETCL and Statnett at the start of an 8-year cooperation programme. “Despite major differences between the situation of UETCL and Statnett, both organizations faced many of the same technical administrative and organizational challenges,” said the project leader for Statnett, Nils Ole Kristensen (far right in picture). PHOTO: STATNETT
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IS AN INVESTMENT



Education, innovation and entrepreneurship

Makerere University – Creating future leaders in renewable energy

Uganda and Norway have long worked together in the field of education. Links have been formed across multiple disciplines and institutions in both countries. One such linkage is a partnership between Uganda’s leading university, Makerere, in Kampala, NTNU and the University of Bergen, Norway (UiB).

In the field of clean energy Makerere and NTNU have implemented a national programme for development research and education (NUFU) via Norad’s Programme for Master’s Studies (NOMA). To date, 16 Ugandan students have graduated from the master’s programme and around 15 students will graduate each year in the period to come.

Furthermore, at least 45 Ugandan students have benefited from an exchange programme to NTNU in the period 2000–2015 as part of the internationally respected master’s course in hydropower development.

The Engineering Building at Makerere University

It can be argued that one of Norway’s most important investments in Uganda’s future occurred in 2009, when the Engineering Building at Makerere Campus was officially opened. The building was funded entirely by the government of Norway, through a grant of NOK 100 million (USD 15 million). The building totals 6600 square metres and contains advanced teaching facilities, computer laboratories, reading areas and offices. Around 3200 master’s and doctoral students enjoy these facilities, working in a wide range of technical fields. The fast-growing electrical engineering section of the facility is a major provider of young talent to the Ugandan power sector.



Dr. Geoffrey Bakkabulindi in front of the new Engineering Faculty where he lectures in electrical engineering. The building was financed by Norway and opened in 2009.

PHOTO: CHRISTOPHER RUUD, MULTICONSULT

“The access to modern facilities makes the engineering education at Makerere more attractive and fruitful for both students and staff. Through my involvement in Uganda’s commercial power sector development, I meet several of the former students educated here, now working in the private sector or public entities. It is satisfactory to see that they hold the competence required to further develop and strengthen our energy sector.”

DR. GEOFFREY BAKKABULINDI, Electrical and Computer Engineering, Makerere University

Innovation and Entrepreneurship

Thanks in part to Norway's support for engineering education, improved technical competence in energy and technology in Uganda is leading to increased activity in the areas of innovation and entrepreneurship. Particularly notable is innovation in the area of cheaper, better and healthier solutions for lighting and cooking. Many million Ugandans still have no access to electricity, and many continue to use charcoal and cook over open fires, which poses major health and safety risks.

LOCAL ENTREPRENEURSHIP FOR CLEAN LIGHTING AND COOKING IN KASESE



Woman cooking over a traditional fire. PHOTO: KEN OPPRANN

Key results: Complete value chains, for the provision and sale of clean cook stoves and solar home systems through local organizations, have been developed.

Norwegian support:

NOK 22.8 million over five years.

WWF is implementing a five-year Clean Energy Programme in Uganda, cooperat-

ing with the district government, businesses and civil society organizations through the Champion District Initiative in the Kasese District. In this rural area people live out of reach of the electricity grid. They light their homes using kerosene, and cook their food over open fires, burning wood and charcoal inside their homes. For more people in rural areas to have access to new equipment, it is important

not only to install it in some homes, but to create complete and sustainable value chains for continued purchasing, distribution and sale of cook stoves and solar home systems.

WWF has established and provided seed capital to local community-based organizations that allow them to buy the first batch of clean cook stoves for selling. The value chains and competence necessary for selling and installing these products have also been put in

place. The community-based organizations offer families not only the product itself, but also a way to afford it, through microcredit and a tailored payback plan. 10 000 Kasese families now cook dinner using a fuel efficient cook stove, and 2000 families have purchased solar home systems as a result of the programme.

Read more at:

http://www.wwf.no/dette_jobber_med/energi/fornybar_energi_i_utviklingsland/the_champion_district/

INCUBATOR FOR UGANDA'S RENEWABLE ENERGY ENTREPRENEURS



Waste from maize production has a great potential as a source for electricity in Uganda. PHOTO: PAMOJA CLEANTECH

REBI (Renewable Energy Business Incubator) was established in 2011 and is Uganda's first business incubator within clean energy.

The organization is based at the technical faculty at Makerere, and housed by the Department for Electrical and Computer Engineering. The incubator is a platform



Waste from maize production has a great potential as a source for electricity in Uganda. PHOTO: PAMOJA CLEANTECH

for development of local entrepreneurship and innovation within renewable energy. REBI offers technical assistance for product development, advice for development of business plans and competence sharing through its wide network within the academic environment at Makerere and in the private sector. The incubator is supported by Makerere, the Royal Norwegian Society for Development, Norad and others.

Any entrepreneur with a clean energy business idea can apply for REBI support. The incubator handpicks the most promising and innovative projects and helps to further develop these new or existing business concepts. Until now REBI has contributed to the development of several small successful companies within, for example, micro scale hydropower, bio waste electricity generation in rural areas, small innovative solar PV products and biofuel production. Read more about these projects at www.energyincubator.org

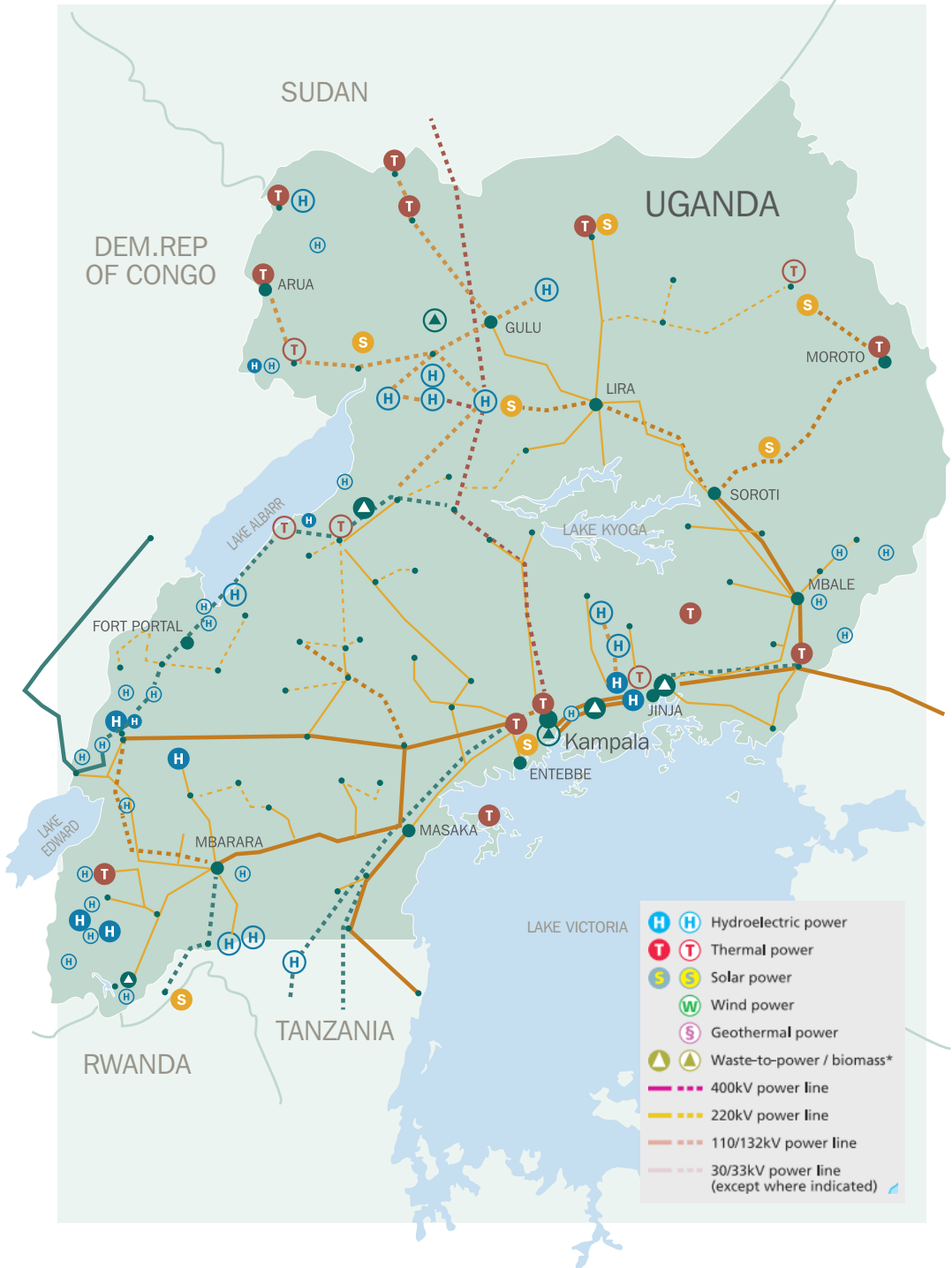


Annex I – Project overview

Project	Duration	Type	Support (MNOK)
Owen Falls Extension - Kiira HPP	1993 - 2001	Financing for construction of the Kiira HPP (200 MW) on the Nile. Equipment delivered by Norwegian supplier Aker Kværner.	164
Karuma Power Project – Feasibility Study	1995	Financing for feasibility studies for Karuma HPP, originally designed for 150-200 MW. Under construction today with a planned capacity of 600 MW.	15
Rehabilitation of transformer substations in the transmission network (UEB / UETCL)	1996 - 2000	Reinforcement of key substations to cater for power from new hydropower plants on the Nile. Main components: 2 new transformers and associated equipment -Distribution transformers -Training for operation & maintenance personnel -Consultant services for design and construction supervision	112
Institutional cooperation, NVE and MEMD	1997 - 1999	Support to preparation of the new Electricity Act (1999) and power sector structure (restructuring and privatization of the sector) during the power sector reform.	6
Institutional cooperation, NTNU and Makerere University	1999 –	Broad cooperation within education and research until today, still ongoing. Specific cooperation in clean energy through the programmes NUFU, NOMA and EnPE.	N/A
Institutional cooperation, ERA and NVE	2000 -2005	Capacity building within tariff modelling, regulatory mechanisms according to the new Electricity Act, development of concession – and licensing procedures. NVE contributed technical assistance related to both legal, economic and technical aspects	26
Energy for Rural Transformation - Arua - Nebbi 33 kV line (REA)	2005	Financing of 56 km 33 kV line for rural electrification	13
Strengthening of the State Administration of the Electricity Sector	2005 - 2006	Institutional cooperation NVE and MEMD. Capacity building at MEMD within administration of the power sector.	3
Energy Sector Working Group	2007 -	Working group for coordination of the development cooperation in the energy sector. Norway has chaired the group since 2015.	N/A
Institutional cooperation, UETCL and Statnett (“Twinning”)	2006 - 2014	Programme for capacity building and exchange of experience in power system planning and optimization of operations for the central power transmission network in Uganda	40
Energy for rural transformation: Bushenyi – Tukungiri, electrification	2006	Financing for a transactional advisor for the electrification project	2
Namanve Thermal Power Project	2007	Investment grant to construction of heavy fuel oil based thermal power plant (50 MW) to meet national power demand during the power crisis. Plant constructed and owned by Norwegian company Jacobsen Electro.	71

Project	Duration	Type	Support (MNOK)
Bugoye HPP	2007 -2009	Investment grant to construction of a 13 MW run-of-river HPP in Western Uganda. Built and owned by Norwegian TrønderEnergi and Norfund.	60
Isimba HPP	2008	Financing of feasibility study for 188 MW HPP, which is currently under construction	21
This Karuma HPP – Grid connection	2009	Financing of feasibility study for grid interconnection for Karuma HPP (600 MW), which is currently under construction	15
Makerere University - Engineering building	2009	Financing of the Engineering Building at Makerere University	100
Rural Electrification (REA)	2010 -	Financing of 1800 km medium voltage distribution lines for rural electrification and connection of 16 000 new customers thus far (October 2015)	233
Nkenda - Hoima Transmission Line Project (UETCL)	2010 -	Financing of 226 km 220 kV transmission line in Western Uganda. Three main components: - Feasibility study - EPC contractor - Construction supervision	307
Gender in energy	2010	Focus on and awareness of gender equality in rural electrification projects (REA)	N/A
Renewable Energy Business Incubator (REBI)	2011 -	Innovation / entrepreneurship networking / capacity building	4
Procurement Expert Hoima - Kafu	2011	Financing of procurement consultant during the Hoima – Kafu transmission line project	2
Hoima - Kafu Transmission Line Project (UETCL)	2012	Financing of feasibility study for 100 km 220 kV transmission line in Western Uganda	7
Nile Basin Initiative: Uganda - DRC transmission project	2013 - 2014	Financing of feasibility study for planned transmission line between Uganda and DR Congo	14
Monitoring of the clean energy programme at the Norwegian Embassy in Uganda	2013 -	KPMG – Monitoring of all projects in the embassy's clean energy portfolio	23
Mirama Hill - Nsongezi transmission line project	2013	Financing of feasibility study for a planned transmission line in south-western Uganda	9
Clean energy for cooking and light	2013 -	Financing for WWF's initiative for establishment of value chains for sale of clean cook-stoves and solar home systems in Kasese, Western Uganda.	23
GET FIT Uganda	2013 - 2019	Co-financing of programme for support to development of small-scale renewable power projects (hydro, solar PV and biomass)	92

Annex II - Power sector infrastructure



Annex III - Sources

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- > <http://global-climatescope.org/en/country/uganda/#/details>

PERSONS

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- > Willy Kiryahika,
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- > Moses Murengezi, MEMD
- > Hans Peter Christophersen, MFA
- > Samuel Kujoba, MFA
- > Kristin T. Wæringsaasen, Norad
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- > Marte Kopstad, MFA
- > Morten Svelle, MFA
- > Anna Akello Muhereza, UETCL
- > Annicent Busingye,
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- > Nils Ole Kristensen, Statnett
- > Geir Yngve Hermansen, Norad
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ENERGY COUNSELORS AT THE NORWEGIAN EMBASSY IN UGANDA 1998-2015

Energy has been an important part of the development cooperation, and the following persons have functioned as energy counselor at the Norwegian Embassy in Uganda:

Name	Period
Hans Peter Christophersen	2014 -
Kristin T. Wæringsaasen	2012 - 2014
Katrin Charlotte Lervik	2010 - 2012
Nils Dårflot	2008 – 2010
Daniel Sandberg	2006 – 2009
Geir Yngve Hermansen	2003 - 2006
Hans Venvik	2001 - 2003
Britt Hilde Kjølås	1998 - 2001

Acronyms and Abbreviations

BPC	Bugoye Participatory Committee
ERA	Uganda Electricity Regulatory Authority
GET FIT	Global Energy Transfer Feed-in Tariff
GoU	Government of Uganda
GWh	gigawatt hour
KfW	Kreditanstalt für Wiederaufbau ("Reconstruction Credit Institute"), German development bank
KTH	KTH Royal Institute of Technology, Sweden
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour
Ltd.	Limited
MEMD	Ministry of Energy and Mineral Development
MFA	Ministry of Foreign Affairs
MW	megawatt
NUFU	National Programme for Development, Research and Education
NOMA	Norad's Programme for Master's Studies
Norad	Norwegian Agency for Development Cooperation
NTNU	Norwegian University of Science and Technology
NVE	The Norwegian Water Resources and Energy Directorate
ODI	Overseas Development Institute
REA	Rural Electrification Agency
REBI	Renewable Energy Business Incubator
UEB	Uganda Electricity Board
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited
WWF	World Wide Fund for Nature
UETCL	Uganda Electricity Transmission Company Limited
WWF	World Wide Fund for Nature



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