THE NILE STORY

BRIEFING NOTE 2

Powering the Nile Basin

The Nile countries are endowed with substantial energy resources. Yet, these have not been fully tapped and several Nile countries have low levels of access to electricity. This note showcases the achievements made at the regional level to address this issue through cooperative projects of regional significance. These include projects that extend and link transmission lines to achieve interconnections, and ones that promote responsible development and generation of hydropower. The Nile Basin Initiative (NBI) has played a catalytic role in facilitating these projects, reducing power poverty, and increasing national energy security.

Once implemented, these cooperative regional infrastructure projects on power generation and transmission are expected to result in the following benefits:

22 MILLION people could benefit through more reliable power supply and lower cost power generation.

More energy is expected to be available by 2020: over **8,500 MW** through new regional interconnection lines, and at least **167.5 MW** through new generation capacity.

TENFOLD more generation capacity could be available through national projects that were identified as regional priorities by NBI work.

At least **3000** kilometers of new transmission lines are expected to improve regional connectivity so electricity can easily be moved from source to demand.

By sharing risks, costs and benefits between countries, cooperation is **REDUCING NATIONAL COSTS** of infrastructure projects, and promoting regional power markets.

Through these achievements, reliability and affordability of power is being improved - energy security will be increased at the regional level. Nationally driven projects of regional significance are ensuring equity, sustainability, and alignment with national energy supply-and-demand priorities.

Power poverty in the Nile region

Most Nile Basin countries are characterized by very low levels of access to electricity, and the lack of a fully connected or reliable regional power grid. This creates a real barrier to economic development. Without modern energy for basic needs like cooking and lighting, countries in power poverty typically experience constraints in income generation, and education and health services.

Compounding this, the use of charcoal and fuel wood to meet household energy demands is significant in most of the region, often with negative environmental, climate and health impacts. 'Greener' energy is needed. In addition, energy demands are increasing, driven by rising populations, as well as levels of urbanization and prosperity. Demand for electricity is growing at 10% per year. Expansion of regional electricity trade is therefore a real priority for the Nile countries.

Studies conducted by the NBI show that the Nile Basin has immense, untapped sources of alternative energy to face this challenge, including hydropower, geothermal, natural gas, oil, coal, peat, solar, and wind.

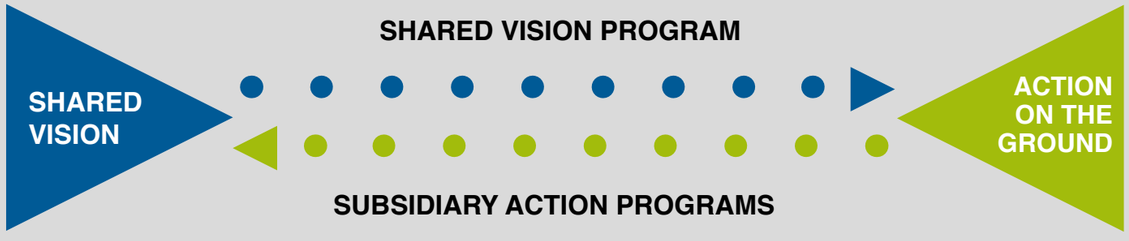
Hydropower, especially, has enormous potential, and is attractive due to its long economic life and low cost per unit of energy produced. It can also avert the greenhouse gas emissions associated with other types of power generation, which can contribute to climate change. But hydropower requires significant investment in infrastructure, and can be contentious in terms of potential impacts on downstream river flows in other countries.

This is where transboundary approaches to agree and develop projects, and to share the costs and maximize benefits, can play a valuable role. They offer an opportunity to consider national demands in the context of a regional resource. And they offer significant cost savings compared to countries investing in power projects independently.

The role of the Nile Basin Initiative

A key driver behind the establishment and vision of the NBI was to tap the potential benefits of regional integration and improvement of the power sector. It was recognized that there was a role for an institution to support transboundary work towards this.

The SVP was designed to build trust and capacity, as well as an enabling environment for investments. While the SAPs were designed to support identification, negotiation, and implementation of cooperative investment projects, with a focus on mutual and sustainable benefits for the countries involved.



The two pronged cooperative program designed by the Nile countries has worked well, with the SVP getting started early to lay the foundations to enable commitments to investment projects, and the SAPs then doing the preparatory study and assessment work to get the projects off the ground. In the power sector, the SVP supported a range of policy and institutional work, along with analysis of opportunities to drive power generation and trade, while the SAPs have promoted development of infrastructure for power generation and transmission to facilitate regional power trade and security.

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Achievements of the Shared Vision Program

A number of elements of the SVP have been critical to its success:

- **Providing forums and facilitating dialogue.** These have helped countries to build trust and confidence in each other, as well as to promote cooperation. The NBI created the first forum of ministers to discuss power and energy issues, which identified the need for permanent regional power institutions. The Nile Basin Power Trade working group was set up as an institutional means for collaboration between countries, to build understanding of the sector at the regional level, enhance analytical capacity, and guide investments.

- **The Regional Power Trade Project (RPTP).** This was a key component of the SVP. It aimed to help the Nile Basin countries coordinate the development of regional power markets. Activities focused on building the confidence of countries when considering transboundary investments. This was through several complementary elements, including capacity building (for example, training more than 800 government and power utility company technical specialists on 'transboundary thinking' in energy projects), and knowledge development (in the form of studies assessing the potentials to expand power generation and increase transboundary investment to support water resource development, as well as to assess the regulatory and institutional environment). The dialogue promoted through these was valuable to promote power investments.

- **The Comprehensive Basin-Wide Study (CBWS).** Knowledge development under the RPTP's second phase included the influential 2011 CBWS of power development options and trade opportunities. This revealed the scale of power demand across the region, the wide range of power options available (including solar, wind, coal, and geothermal), as well as the potential for hydropower to provide 65% of the region's power. The study identified more than 145,000 MW of hydropower potential across the Basin, less than 3% of which (in upstream countries) had been developed. The outcome was a regional power development strategy, which made recommendations on how investments across the Basin should be sequenced from a regional perspective, allowing rational prioritization of project preparations by the NBI and by countries. It also developed a model for a 'transmission backbone' that would connect the Nile Basin country grids as part of a long-term interconnection strategy. Importantly, the CBWS showed that by developing hydropower regionally, rather than nationally, NBI countries could save billions of dollars.

- **Institutional support.** This, alongside improved technical capacity in regional power trade issues, has enabled the Nile Basin institutions to offer an independent, regional mechanism for sharing information between countries and developing truly transboundary investment ideas that have real regional significance.

Through these interventions, the SVP inspired and influenced energy reforms, ensuring consideration of transboundary considerations in national policies. It also catalyzed the formation of the East African Power Pool (EAPP). Importantly, it provided the information to enable decision-makers confidently to commit to working cooperatively with other countries to plan and develop projects of regional significance, by ensuring that they fully understood the opportunities and the benefits that could be shared.

What are regional power pools?
Governments in several regions of the world are concerned that past efforts to develop national power grids capable of delivering reliable electricity supply to their citizens at affordable prices have fallen short of expectation. They are increasingly interested in new regional, bilateral, or multilateral approaches that emphasize better coordination and 'pooling' of their efforts to create more robust regional power grids with the potential of lowering capital investment requirements across time and reducing system operational costs.

Regional power pools offer positive impacts on: i) the cost of power due to economies of scale (implementation of big projects serving many countries); ii) energy mix (countries with dominant hydro potentials supplying those with dominant thermal (gas and coal) potentials); and iii) increased access to modern energy services, which in turn will trigger increased access to clean water and improved health care systems. NBI provides a ready regional platform for agreement on pooling risks, operations and benefit sharing, and it also promotes investments. This has resulted in the advancement of interconnections between countries in a very short amount of time.

Achievements of the Subsidiary Action Programs

The SAPs (NELSAP in the Nile equatorial lakes region and ENTRO in the eastern Nile region) have also played a catalytic role in identifying and driving forward regional investment projects in the power sector.

- Responding to power poverty in the equatorial lakes countries, the 2007 strategic Sectoral Social and Environmental Assessment (SSEA) of power development options for the NELSAP region offered sectoral guidance to decision-making on power in the region. In the eastern Nile, a cooperative regional assessment (CRA) of power trade opportunities looked at project feasibilities and priorities. Both the SSEA and the CRA have been highly influential in the project identification process, and have helped to ensure that project identification and preparation has considered social and environmental issues.

- Under both the SAPs and the SVP, the NBI has mainstreamed environmental, social, and gender issues into the project development process. The NBI has developed policies for all investment project preparation processes and action plans to ensure these key livelihood issues are considered.

- With projects identified, the SAPs have put all the building blocks in place for good transboundary projects. They have worked closely with national governments:

  - Facilitating in-depth feasibility studies of potential projects, and highlighting opportunities and risks, costs and benefits, as well as the options for sharing all of these.

  - Ensuring the preparation and design of responsible and sustainable projects through best-practice policies and action plans. Investment projects are planned and implemented with minimal impacts on local people and habitats.

  - Facilitating power trade agreements between countries, based on regional and project-specific studies.

  - Playing an active role in mobilizing investment for the implementation of projects, something which the countries would have found difficult on their own.

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Powerful projects, real results

Through these interlinked activities, the NBI has been pivotal in some key achievements. It has:

- Helped countries understand the benefits of cooperation on the management and development of the Nile resources. A regional approach makes investment more cost effective than if countries were to pursue power projects unilaterally.

- Supported member countries to agree and cooperatively pursue investment projects of regional significance. Eleven projects are currently under implementation, five of which are related to power generation, transmission or trade.

- Identified and facilitated investment in projects that bring clear mutual and sustainable benefits.

These regional investment projects in the power sector have secured more than US$1 billion (2015), and US$2.2 billion is already in the pipeline for the next 10 years. By 2018, it is expected that completed transboundary projects will install at least 167.5 MW of hydropower capacity. Countries are also driving forward many more NBI identified projects that will install thousands more MW of generation capacity.

Today, some of the most power-poor countries of the Nile are pursuing power generation, connection, and trade projects. Taking advantage of regional grid development, real steps are being taken to innovatively address power poverty and security, and to power transformational development across the region.

Power generation and trade achievements

With a focus on achieving transboundary cooperation, the NBI has facilitated the preparation of, and investments in, the following projects:

Interconnecting the electric grids of NEL countries
This project in the Nile equatorial lakes region was identified by the SSEA and through other joint work with the World Bank, and is underway. This project is about improving availability of electricity across the region by increasing the cross-border sharing of power. Working with the EAPP, it is creating a power exchange market among the countries.

A total of over US$530 million has already been invested to support improved transmission of electricity (995 MW in total) to benefit the five equatorial lakes countries of Kenya, Uganda, Rwanda, Burundi, and the Democratic Republic of Congo (DRC). Through four interconnections, it will cover over 1,000 km, transmitted via 220 kV and 400 kV lines:

- Kenya-Uganda, 254 km
- Uganda-Rwanda, 172 km
- Rwanda-Burundi, 200 km
- Burundi-DRC-Rwanda, 545 km

Power generation and trade achievements continued

Each of these is implemented by national coordination units, and coordinated and harmonized with support from NELSAP. The countries are now working to sign agreements with each other, which will detail the terms of payment for their power trade.

Ethiopia-Sudan interconnection project

Commissioned in 2013, this project has erected 296 km of line with a transmission capacity rating of 1200 MW. Around 1.4 million households - 8 million people - are expected to benefit from access to cheaper power. The power trade has increased Ethiopia's foreign-exchange earnings by US$8.8 million per year. The consumers in Sudan benefit from lower tariffs (US$0.05 per kWh for imported power, compared to US$0.096 per kWh from power generated domestically).

Backbone Zambia-Tanzania-Kenya project

Through several components, this will link the EAPP countries to the Southern Africa Power Pool (SAPP), enabling power sharing not just between individual countries, but across the region. This will mean that a power surplus in any one country could be made available to any connected country. Preparatory studies have been carried out for the following 400 kV interconnections:

- The Kenya-Tanzania interconnection project, which will allow cross-border exchange of power via a 260 km transmission line, also connecting more widely across the region by linking to the Nile equatorial lakes regional interconnection project above.
- The Iringa-Mbeya transmission line (292 km) in Tanzania will further extend the Kenya-Tanzania line.
- The Tanzania (Mbeya)-Zambia (Kabwe) transmission line (1,000 km) will complete the Kenya-Tanzania-Zambia connection, making the significant link between the EAPP and the SAPP.

Rusumo Falls hydroelectric project

Rusumo will generate new power in a region of significant power poverty, and add approximately 370 km of transmission infrastructure (strengthening the existing interconnection system in Burundi and Rwanda, and linking it with Tanzania). It will bring electricity to 520,000 Burundians, 467,000 Rwandese, and 159,000 Tanzanians. It is being implemented by the three countries collaboratively, with technical support from NELSAP.

In addition, the NBI has also carried out in-depth studies for the following interconnection projects:

- **Uganda-DRC transmission line study.** Preparing to build a high-voltage transmission line (353 km) in north eastern DRC, to complete the Nile equatorial lakes regional power grid. Once implemented, about 838,000 inhabitants in the three towns of Beni (100,000), Bunia (366,000) and Butembo (218,000) will directly benefit from power supply and 154,000 will benefit from rural electrification.
- Under the **NCORE Project**, options are being assessed to integrate South Sudan into the regional grid through the Hydropower Expansion and Regional Integration Plan. South Sudan has the lowest levels of generation capacity (30 MW) and electrification (2%) in the region. The project is looking at hydropower generation and connection options, with the intention to help South Sudan in national decision making about power investments, and to plan its future regional cooperation on power.

Projects of regional significance

This term is often used by the NBI to describe the projects it supports. It reflects the shift from projects identified, planned and implemented unilaterally by individual countries without consideration of regional impacts, to projects that take a regional approach. Projects of regional significance involve a more collaborative approach, which can include sharing the risks, costs and benefits, and can result in reducing negative impacts, improving overall development benefits, and cost efficiencies for those involved.

Case Study – Rusumo Falls hydroelectric project

Economic development in Burundi, Rwanda, and Tanzania is constrained by very low rates of access to electricity – 5%, 16% and 18% respectively. Sited on the border of these countries, the Rusumo Falls hydroelectric project is a flagship example of transboundary cooperation for economic development.

Conceived over 30 years ago, the project was at that time unable to get off the ground. This was due to a number of barriers, such as funding challenges, political instability, conflicts between countries, lack of security for investors, and the lack of a mechanism to coordinate a transboundary project of this scale.

The NBI has played a significant role in moving the Rusumo project forward. By investing in power options studies and collaborative feasibility studies, it has highlighted how the risks related to some of these barriers can be mitigated.

This has contributed to a level of understanding and trust between the three countries that has enabled them to reconsider the viability of the Rusumo concept. In 2005, they committed to work together to develop the power plant, and to manage sustainably the water catchments that supply it.

Eight years later, US$470 million was secured from investors – the World Bank, African Development Bank, and European bilateral development partners. Construction of the power plant starts in 2015.

The impacts expected will be tremendous and life-changing for many people. In the long term, the Rusumo Falls project will generate and transmit 80 MW of electricity a year – a significant increase for Burundi and Rwanda in particular, where current total installed capacities are only 52 MW and 110 MW respectively. The project is bringing electricity to 520,000 Burundians, 467,000 Rwandese and 159,000 Tanzanians. This reliable and cheaper electricity will be transformative for national and local economies currently in a position of substantial power poverty.

The social and environmental policy guidance of the NBI has also contributed to this being achieved responsibly, with minimal negative impacts at the local scale. For example, the countries cooperatively agreed to opt to use a 'run of river' design, which does not require the creation of a reservoir. This means fewer local people and sensitive ecosystems will be affected by the development. Meaningful participation of local people in the planning process ensures they understand and accept what implementation will mean in practice, recognising the bigger picture of benefits for all.

Fanuel Munyarukundo has lived in the Rusumo area since 1987. He has a row of shops by the project site. The father of 10 says: *"The project is good. There will be more power." Fanuel is a community representative to the project committee. He adds: "We are glad that we were consulted throughout – as a result we believe that this is our project and that we stand to benefit from it once it is completed."*

Powering development benefits

This transformation in the way the Nile riparian countries are working together on power has brought real benefits:

- **Countries now cooperate to plan, drive and 'own' the projects.** For example, the Rusumo Falls hydropower project is executed by a Project Coordination Unit (in NELSAP) on behalf of the Rusumo Power Company, which is owned jointly by all three countries.

- **The projects are grounded on principles of equitable and sustainable development.** Through consensus building between governments, the NBI processes demand consultation of stakeholders, community needs assessments, environmental and social impact studies, and gender analysis in the feasibility studies and implementation guidelines.

- **Cooperation in power infrastructure development brings efficiencies.** It has reduced the national costs of project financing, and promoted regional power trade and markets. This improves power reliability and affordability for the region.

- **More power is accessible.** Catalyzed by NBI support, by 2020 completed transboundary projects could have the capacity to generate around 170 MW, regionally identified national projects will generate thousands more, and interconnection lines could transmit over 8,500 MW. This would make 22 million people more power secure, through improved availability of electricity and lower cost of power generation. This is a significant contribution to alleviating the macro-level energy poverty and security issues for the region.

- **Cleaner energy is more feasible**. Through hydropower investment projects and regional power trade developments, countries are better able to make more judicious energy choices that avoid higher carbon development pathways that exacerbate climate change.

Real, visible benefits are now starting to be seen. These inspire scale-up, and further build the political commitment to transboundary efforts on energy security. The sector has a great deal more potential, and NBI supported transboundary cooperation is a clear way to power the Nile Basin to its full development potential.

This note forms one of a series of briefing notes prepared to mark the completion of the Nile Basin Trust Fund (NBTF). The Nile Basin Trust Fund was opened in 2003 at the request of Ministers responsible for water affairs in the Nile countries, and was administered by the World Bank on behalf of ten donors.

The series of briefing notes highlight the achievements of the Nile Program, a set of projects and sub-programs that have been supported by Nile riparian countries, the Nile Basin Trust Fund and other donors in parallel to the NBTF, largely implemented by the Nile Basin Initiative (NBI).

NBI Member States

Burundi · DR Congo · Egypt · Ethiopia · Kenya · Rwanda · South Sudan · Sudan · Tanzania · Uganda

Nile Basin Trust Fund Partners

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