

A collaborative project between the Ministry of Energy and Mineral Development and African and German academics and researchers

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Version: February 14, 2005

Current version of this document available at:
http://www.berlinnairobi.org/tmp/energy_project.pdf

Goal

Establish collaboration between African and German academics and researchers on an energy research project that is:

1. Funded by the Volkswagen Foundation
2. Addressing an issue chosen by Ugandan Government officials and energy experts
3. Fostering regional collaboration and enhancing Ugandan energy expertise and its visibility.

Aim of this document: prepare the precise definition of the project for the submission of a pre-proposal to the Volkswagen Foundation before its deadline of June 1, 2005.

Summary

Development of energy research is essential to economic growth and poverty reduction in Uganda:

In its goal of reducing poverty and sustaining the current economic growth, an important challenge for the Government of Uganda is to manage a large development of the energy sector. A key issue identified in its document *Energy Policy for Uganda* is the current inadequacy within government institutions to plan for and monitor the sector, and carry out appropriate research and development, in part due to the lack of curricula in energy studies at institutions of higher learning.

The Volkswagen Foundation supports Afro-German energy research:

These issues fall within the scope of the Volkswagen Foundation initiative to support the further development of research and applications in Sub-Saharan Africa, and of the collaboration between African and German academics.

The Berlin-Nairobi Exchange can arrange the discussion, and prepare and submit a pre-proposal:

The Berlin-Nairobi Exchange proposes to use: 1) its successful experience in fostering collaboration between East African and German academics and researchers, 2) the contacts it has established with energy experts in Germany, and, 3) the presence of its members in Kampala, Nairobi, within German academia, and at UNESCO, to initiate a discussion between the Ministry of Energy and Mineral Development and African and German academics and researchers, with the goal of identifying an issue that could be addressed with a project supported by the Volkswagen Foundation. The organization further proposes to take care of synthesizing input from these parties into a pre-proposal and of its submission to the Volkswagen Foundation.

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Introduction: economic growth implies energy consumption

As in the rest of the world, energy plays a major role in the economy of Uganda. The growth of this economy has been impressive in the last decade, averaging about 6% a year. However 35% of the population still lives in poverty. To reduce poverty, the economy needs to sustain its growth in the next decade, and one important challenge for the Government of Uganda is to match this growth in the energy sector.

Energy is a key sector of the economy of Uganda

Indeed, the energy is a key sector in many aspects. Access to modern, reliable sources of energy is vital to most other sectors of the economy. In addition, fuel taxes and electricity value added taxes provide a significant source of Treasury income, and power exports to neighboring countries are important to the country's foreign exchange earnings, while fuel imports are a major contributor to the trade deficit. This sector also receives a significant part of public investments, and is now attracting the largest private sector investments. Hence, the energy sector will be an important source of employment in the near future.

Energy-poverty impedes poverty reduction goals

Energy-poverty is still widespread in Uganda, and is a major impediment to the economic development of many parts of the country, especially rural areas where most of the population lives. The Government's Poverty Eradication Action Plan recognizes the importance of rural electrification in order to achieve its goals. More than 90% of total energy consumption is in the form of biomass burning, and only 5% of the population (2% in rural areas) has access to electricity.

The Environmental impact will hamper future growth if not addressed

The environmental impact of the energy sector is becoming significant, and in the future will hamper sustained economic growth if it is not addressed, in addition to its negative effects on the population's well being. Biomass burning has resulted in significant deforestation, and in its current form has adverse effects on the health of users. Hydropower plants have had a large environmental impact, which must be assessed, and mitigation strategies must be developed in order to use the country's large hydropower potential in a sustainable manner.

Uganda is leading the regional integration of energy systems

Uganda's hydropower exports are important for its neighbors, and the country plays a leading role within the efforts of the New Partnership for Africa's Development (NEPAD) towards further integration of energy systems within the region. There is now an opportunity to expand the export of Uganda's hydropower, the energy trade, and the optimization of the development and use of energy resources.

Volkswagen Foundation initiative and potential for fruitful collaboration

The Volkswagen Foundation will support research projects that address an important need in Africa

Under its funding initiative “Knowledge for Tomorrow – Cooperative Research Projects in Sub-Saharan Africa”, the Volkswagen Foundation released a call for pre-proposals on “Resources, their Dynamics, and Sustainability – Capacity-Development in Comparative and Integrated Approaches” (see References on p. 7). One of the areas of natural resources in focus is “sustainable energy for domestic use”. The initiative aims at providing sustainable support for research in Sub-Saharan Africa, by funding a research project that addresses an urgent and important need in the African context.

The Government of Uganda identifies energy research development as a key issue

A key issue in the energy sector, listed first in the document *Energy Policy for Uganda* of the Ministry of Energy and Mineral Development (see References on p. 7), is the inadequate capacity within government institutions to plan for and monitor the sector, and carry out appropriate research and development. One of the causes identified is the lack of appropriate curricula in energy studies at institutions of higher learning.

It therefore appears that important issues in the energy sector in Uganda fall within the thematic scope of the Volkswagen Foundation’s initiative. There is thus opportunity to define a research project that would: 1) be funded by the Volkswagen Foundation, 2) contribute to the achievements of the goals of the energy policy of the Government of Uganda.

Broad outline of the project

The Volkswagen Foundation supports collaboration between African and German academics

The Volkswagen Foundation seeks to achieve its objective by providing support for research projects and training networks to be developed and run by African scholars, and to provide juniors at the masters, doctorate or post-doctorate level with the opportunity to enhance their skills and conduct research, and open perspectives for the best of them to stay in academia. Explicitly stated collaboration between German and African academic partners is required, but in line with its general orientation of fostering research networks within Africa, the initiative strongly favors projects that involve the collaboration with multiple African research or educational institutions. Finally, the early involvement of the country’s authorities in the project is encouraged.

The Berlin-Nairobi Exchange can initiate the discussion and take care of the pre-proposal

It is proposed to initiate a discussion between the Ministry of Energy and Mineral Development, Ugandan academics and researchers, and their colleagues from other African countries and Germany, in order to identify an issue of importance that could be addressed with a project funded by the Volkswagen Foundation. A pre-proposal would be written and submitted before the deadline of June 1, 2005. The Berlin-Nairobi Exchange (see Annex I on p. 8) proposes to take care of initiating the contacts, synthesizing the discussions into a pre-proposal, and take care of submission details.

Tentative timeline for the preparation of the pre-proposal

1. *February 2005*: establishment of contacts between the Berlin-Nairobi Exchange and officials of the Ministry of Energy and Mineral Development, and academics in Kampala or other African countries.
2. *March 2005*: visit to Kampala of Dr. Berque, the UNESCO-Paris contact of the Berlin-Nairobi Exchange. During this visit, initial input will be collected from Ugandan academics and Ministry officials on the type of project most needed. The goal is to

formulate the outline of a project that addresses an important need in Uganda and falls within the scope of the Volkswagen Foundation initiative.

3. *April 2005*: presentation of this project outline to German partners with the relevant expertise. African and German academics discuss the project in more detail, and agree on the content of the pre-proposal. Indications of enclosing with the pre-proposal an application for support for a preparatory meeting are discussed.
4. *May 2005*: writing of the pre-proposal, and after final collection of feedback from all stakeholders, submission to the Volkswagen Foundation.

Tentative timeline for preparation of the proposal (if pre-proposal is accepted)

The Volkswagen Foundation will provide the funds to organize the following:

1. *June 2005-June 2006*: if support has been obtained, organize and hold a preparatory meeting to discuss the elaboration of the project and proposal itself. The Volkswagen Foundation aims to take its final decision in July 2006.
2. *June 2006 – June 2009*: if proposal is accepted, support agreed-upon activities. These could include:
 - Research by African and German academics for the project
 - Grants to African masters, doctoral or post-doctoral students to study in the field of energy and/or energy management and participate in the research
 - Organization of workshops
 - Travel grants for participating researchers and students
 - Elaboration and dissemination of teaching and training material
 - Preparation of recommendations and/or management tools for the Ministry of Energy and Mineral Development.

Preliminary outline of the role of participants

The roles suggested here are preliminary outlines. African stakeholders will define the project goal, and the role of the parties will then be determined with more precision in discussion between all stakeholders.

The Ministry of Energy and Mineral Development will define the project goal

This role will be defined more precisely after discussion between the parties. Experts and decision-makers from the Ministry, in collaboration with the other parties, will define the issue to be addressed, formulate the initial outline of the project, and orient the project during its subsequent development. The Ministry could also take an active role in the program implementation and in coordination activities with Education authorities. A possibility for collaboration is suggested in Annex II on p. 9.

African researchers and students will conduct the research and training

This role will be defined more precisely after discussion between the parties. African academics will conduct research, identify teaching priorities, organize training and/or classes at institutions of higher learning, and supervise African students in their participation in the research conducted.

German academics will share their expertise where needed

This role will be defined more precisely after discussion between the parties. The German contacts of the Berlin-Nairobi Exchange (see Annex III on p. 10 and table at the end of the document) cover a wide range of expertise, have explicitly expressed interest in collaboration with African academics, and many already have experience working in Africa. Some were as

specific as expressing their readiness to visit Africa or to host an African student or visiting scientist in their institution.

The Berlin-Nairobi Exchange will be the communication hub

Using its successful experience in fostering the collaboration between East African and German academic and research institutions, the Berlin-Nairobi Exchange will initiate the contacts between the parties. The organization has already established contacts with German academics and researchers in the field of energy (see Annex III on p. 10 and table at the end of the document).

Recognizing that support is not available at this stage, the organization also proposes to collect input from participants and write the pre-proposal accordingly, and once it has the parties' agreement, ensure that it is submitted in a suitable and competitive format.

Taking advantage of the presence of its members in Kampala, Nairobi, in German academic and higher learning institutions, and at UNESCO offices, this organization will also actively facilitate contacts between the participants, and act as a communication hub for the project.

Other ways in which the Berlin-Nairobi Exchange can contribute to the project may arise after discussion between the parties.

UNESCO could bring its networks and experience in international cooperation

This role will be defined more precisely after discussion between the parties. UNESCO could provide the project with its unique experience in fostering and coordinating international collaboration in science and education.

The Berlin-Nairobi Exchange has, in particular, contact with Professor Massaquoi of the UNESCO office in Nairobi, especially through a collaborative project on multimedia software for teaching physics. Professor Massaquoi is the founder and coordinator of the African Network of Science and Technological Institutions (ANSTI), which has a sub-network on renewable energies.

Dr. Joannes Berque of the Berlin-Nairobi Exchange works at UNESCO headquarters in Paris, and is in regular contact with Dr. Osman Benchikh, responsible of energy and renewable energies at UNESCO, who has already expressed interest in the project.

Acknowledgements

This document was written from the contributions of members of the Berlin-Nairobi Exchange.

Dr. Ehrlich Desa of UNESCO's International Oceanographic Commission provided very valuable guidance and comments.

References

The document *Energy Policy for Uganda*: available from the Ministry of Energy and Mineral Development and at <http://www.energyandminerals.go.ug/EnergyPolicy.pdf>

Call for pre-proposal of the Volkswagen Foundation's initiative: available at http://www.volkswagen-stiftung.de/foerderung/foerderinitiativen/merkblaetter/MB%2081a_e.pdf

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Annex I

Presentation of the Berlin-Nairobi Exchange

Dr. Jurgen Theiss conceived the general idea behind the Berlin-Nairobi Exchange during his internship at UNESCO Headquarters in 1995. UNESCO has always been calling upon scientists to make an effort to better integrate the sciences in Africa into their worldwide community. A better integration would greatly benefit Africa's development. Being aware that many projects in Africa devised by non-Africans have failed due to a lack of understanding Africa, Jurgen Theiss wanted to emphasize that it is important that European scientists first learn about African culture, an obviously necessary condition to fruitful cooperation that too often is overlooked by western scientists. He therefore developed a program that gives German physics students the opportunity to study in Kenya. Being young and open-minded these students would become fully immersed in Kenyan life and learn from and about Africa.

Since 1998, the Berlin-Nairobi Exchange has all together sent 10 Berlin physics students to the University of Nairobi for one academic year and arranged German Academic Exchange Service (DAAD) scholarships for most of them. As it was hoped, during their year in Nairobi they are fully immersed in Kenyan life and especially at the University of Nairobi. This has not only corrected and refined their understanding of Africa but also that of their home universities. By opening the German universities' eyes towards Africa, our students played a crucial part in initiating various collaborative projects between German and Kenyan universities. In fact, some students are actively engaged in establishing these collaborations, which are currently in solar cells research, multimedia software, and monitoring the atmosphere. The development of an energy model, as it is suggested in this project document, represents another promising collaboration.

In order to coordinate its various activities effectively the Berlin-Nairobi Exchange was officially incorporated in California in June 2004. It is now an official nonprofit corporation, which will soon be registered in Germany and Kenya. Its 10-years' of experience of establishing collaborations between Germany and Kenya, its various relevant contacts in both countries and at UNESCO, and its organizational framework make it an ideal coordinating agency for the envisaged energy model development.

Annex II

A possibility for collaboration: development of an energy model for Uganda

It is emphasized that, as stated earlier, Ugandan participants will choose the project, to ensure that it addresses an important need in their country. The project outlined in this annex is thus just one possibility for collaboration, proposed as an item for discussion because it seems to address a need expressed in the document *Energy Policy for Uganda*, and expertise for this project is available within the German contacts of the Berlin-Nairobi Exchange – although, again it is available in a wide range of other energy related research.

Objective in the energy policy addressed:

Improve energy governance and administration (broad objective number 3 in the energy policy document, section 3.2). In particular, contribute to the government effort to build capacity at the national and local levels for better formulation of energy policies and programs.

Project outline:

As a first proposition for a project within the general theme we suggest a stocktaking of the energy infrastructure in the east African region and then the development of a bottom-up energy supply model in parallel with a technology database. With such a model one would be able to estimate the potentials for an efficient use of individual renewable energy technologies and energy carriers in the region, taking into account local practices and experiences. To provide recommendations for the sustainable use of resources, the model may further be extended to explicitly include environmental impacts, such as deforestation, landscapes and ecosystem changes due to hydropower plants, crop damage through ground level ozone and acid rain, and also greenhouse gas emissions. With this the model would become a powerful tool for supporting policy makers in devising an integrated energy approach. German scientists with experience in energy modeling will be encouraged to participate in the development of such a model and in the training of young African scientists. Such an interdisciplinary project would not only strengthen the German-African, but also the inter-African co-operation.

Annex III
Berlin-Nairobi Exchange contacts in Germany

Fabian Wagner of the Berlin-Nairobi Exchange works at the International Institute for Applied Systems Analysis and has established contacts with German energy experts, who already explicitly expressed interest in collaborating with African academics, and who already have experience in collaborating with African colleagues. Some were as specific as expressing their readiness to visit Africa or to host an African student or visiting scientist in their institution.

Those contacts are established with various German institutions and cover a wide range of expertise. If agreed upon, the Berlin-Nairobi Exchange can also distribute funds to different institutions, wherever the needed expertise is. Some institutions are more into technical solutions and computer models (Stuttgart) others are more into policy and political issues (Wuppertal). These institutions have advised the German Government on policy issues, and thus have experience working with policy-makers.

The Berlin-Nairobi Exchange also has excellent contacts with the director of the DAAD office in Nairobi, who fosters academic collaboration between German and African institutions.

For more specific information, please refer to the table on the following two pages.

Institution	Contact Name	Who will participate?	Will the institution be able to host postdocs/doctoral students?	Experience/past projects in Africa	Would the participants be interested to spend some time in Africa?	Suggestions for further contacts
Institut fuer Energiewirtschaft und Rationelle Energieanwendung Stuttgart	Ulrich Fahl	Dr. Ludger Ellrop, Head of the unit Systemanalysis Renewable Energies (SEE) in the IER, and Dr. Ulrich Fahl, Head of the unit Energy economics and system analysis (ESA) of the IER. In addition Bernhard Frey, Uwe Remme und Peter Bickel are involved in related questions and could contribute. If needed other staff could get involved, and smaller tasks can be carried out by students.	Yes. For a PhD from the university the presence at the institute is required, external PhDs are the exception. Visitors are always welcome	Various joint research projects, also with industry; several colleagues have spent time in Africa <ul style="list-style-type: none"> · CHAPOSA: in South Africa, Zambia, Mali, Tanzania, South and East Africa · SUSAC and CAPSSA: in the whole of South-, West- and East Africa · GTZ-Wood Energy: Morocco, Senegal, Tunisia and others · UNIDO-CDM-Mechanism: Nigeria 	Yes	Prof. Emmanuel Chidumayo: Biological Sciences Department, University of Zambia Great East Road, Box 32379, Lusaka, Zambia Tel.: +260 (-1) 25 25 14, echidumayo@natsci.unza.zm chichi@zamserv.zamtel.zm
Wuppertal Institut	Manfred Fishedick	Manfred Fishedick (partly). Depending on funding Carman Dienst, Sven Aemuelier/Dirk Mitze and probably a visiting scientist (Anand Shukla) could be involved.	Yes, subject to room availability and external funding	So far mainly through projects in Northern Africa (DSM-Project Street-Lighting in Jordan, solar thermal power in Morocco), but we are also currently collecting contacts in Africa for our WISIONS-Project. In addition we have contacts in Mali, Lesotho and Tanzania.	Probably yes	Maybe those that rund the Geothermal Initiative that was added to the International Action Plan at Renewables 2004.
Seven-to-one (previously IER)	Christoph Schlenzig	Christoph Schlenzig + 1 (1 week)		Several projects in East and West Africa	No	
Wuppertal Institut (consultant)	Dieter Seifried					
International Institute for Applied Systems Analysis (IIASA) - Austria	Fabian Wagner	Fabian Wagner (partly)	Probably no	no	no	

Institution	Contact Name	Special Interest	Information requested from African partners	Contact	Address
Institut fuer Energiewirtschaft und Rationelle Energieanwendung Stuttgart	Ulrich Fahl	We have a lot of information and experiences from the GTZ wood energy project in Senegal, and to this sector we can contribute much. In particular, we have developed and tested a co-operative model to strengthen and to involve our African partners. Other research questions include the integration of the energy supply and energy application into an integrated system (integrated resource planning), and also general question of energy demand evolution. Finally, the IER has already developed several integrated emission abatement strategies for developing countries; for this we use the EcoSense model, for which independent version for instance for Brazil/Latin America and for China exist.		Ulrich.Fahl@ier.uni-stuttgart.de	IER Heßbrühlstrasse 49a 70565 Stuttgart Tel. ++49-(0)711-78061-30 Fax: ++49-(0)711-7803953
Wuppertal Institut	Manfred Fishedick	Interest not so much in classical modeling; for this in a first step maybe standard systems could be used, which could then be expanded and adapted. For us it would be very interesting to think about the following: - how information on examples of 'good practice' could be integrated into the work (e.g. a database of this beyond the modeling); - how in particular rural electrification options can be represented (PhD thesis of our Indian visiting scientists); - what is the applicability of future technologies such as long-term hydrogen applications; - how can aspects of financing be incorporated (incl. CDM, micro financing etc)	I think the next step would be a first project proposal, in which the scope of the project should be formulated; only after that we can specify our own contribution better.	manfred.fishedick@wuppertalinst.org	Wuppertal Institute for Climate, Environment and Energy Döppersberg 19 42103 Wuppertal P.O. Box 10 04 80 42004 Wuppertal Phone: +49-(0)202 2492-121 Fax: +49-(0)202 2492-108
Seven-to-one (previously IER)	Christoph Schlenzig	Training & Backstopping; MESAP-PlaNet Model	Who would participate? Which institutions? How many people? Which aims? Motivations?	christoph.schlenzig@seven2one.de	
Wuppertal Institut (consultant)	Dieter Seifried			seifried@oe2.de	
International Institute for Applied Systems Analysis (IIASA) - Austria	Fabian Wagner	Integration of energy and resource planning with emission mitigation strategies not only of greenhouse gases, but also of air pollutants. Assessment of short and long-term benefits and co-benefits.		wagnerf@iiasa.ac.at	IIASA Schlossplatz 1 2361 Laxenburg - Austria