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Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung

Background Paper –

Relevant information for the 6th *lab of tomorrow*

Dear participant,

This paper provides an overview of all documents that might be of interest for you, in order to get prepared for the 6th *lab of tomorrow*. If you want to dive more into a certain topic, we will be happy to send you the whole pdf / article via email. All you need to do is text us the name of the paper and the author (laboftomorrow@giz.de). Enjoy the read and see you soon in Munich!

Your
lab of tomorrow – Team.

Author: The Republic of Uganda
Title: Second Development Plan 2015/6 – 2019/20
Publishing Date: June 2015
Executive Summary: This National Development Plan (NDPII) is the second in a series of six five-year Plans aimed at achieving the Uganda Vision 2040. The goal of this Plan is to propel the country towards middle income status by 2020 through strengthening the country's competitiveness for sustainable wealth creation, employment and inclusive growth. Uganda's development status and trends over the period 2008/09 to 2013/14 reflect an improvement in a number of areas. Uganda's economic growth rate has averaged 5.5 percent between 2010/11 and 2013/14, remaining below the target of 7.2 percent for the entire NDPI.
Agriculture remains the backbone of Uganda's economy. In 2012/13, the sector accounted for 25.3 percent of the country's GDP from 24.7 percent in 2010/11. It employs about 72 percent of the total labour force (formal and informal), 77 percent of whom are women, and 63 per cent are youth, mostly residing in the rural areas. Over the NDPI period, the sector registered sluggish growth from 1.0 percent in 2010/11, to 1.33 percent during 2013/14. Farming is still dominated by smallholder farmers engaged in food and cash crops, horticulture, fishing and livestock farming. The sector's strength is leveraged through, among others, the National Agricultural Policy 2013 which sets a solid framework to guide investment and delivery of agricultural services. […]

Author: Ministry of Energy and Mineral Development, Government of Uganda
Title: Indicative Rural Electrification Master Plan
Publishing Date: January 2009
Executive Summary: The Energy Policy for Uganda aims at meeting the energy needs of Uganda's population for social and economic development. One of the key objectives is to increase access to modern affordable and reliable energy services – including electricity – as a contribution to poverty eradication. The Rural Electrification Strategy and Plan (RESP) provides the framework within which the electrification process occurs. It focuses amongst others on rural electrification. The primary objective of the RESP is to reduce inequalities in access to electricity and the associated opportunities for increased social welfare, education, health and income

generating opportunities. The Energy for Rural Transformation (ERT) Project, whose design was based on the RESP, aims to develop Uganda's rural energy sector so that it makes due contribution to bringing about rural transformation. A key component of the ERT is the development of an Indicative Rural Electrification Master Plan (IREMP). The IREMP deals with conceptual designs only and is supposed to avoid a too detailed planning. The IREMP has been developed to reflect various alternatives of future network extensions, taking into account any planning for future transmission lines, sub-stations and distribution networks, industrial projects and international power exchange projects. The IREMP outlines guidelines, describes preferred standards and the phased implementation of future rural electrification in Uganda, as well as giving estimations of costs. It is intended that the IREMP act as a catalyst for the implementation of rural electrification projects. […]

Author: Ministry of Energy and Mineral Development Uganda
Title: Biomass Energy Strategy (BEST) Uganda
Publishing Date: 2013
Executive Summary: The Biomass Energy Strategy (BEST) 2013 development process was highly participatory involving presentation of the biomass sector situation analysis to a wide range of stakeholders such that consensus is built on both the technical and the social economic aspects. The situation analysis reveals that the biomass energy sector is generally flawed: There is scanty and inadequate data with no clearly defined data collection, archiving and updating mechanisms; Facts about biomass energy and its contribution to Uganda's social, economic and industrial growth are not well known; There are several renewable energy awareness campaigns but some segments of the audience e.g. key government agencies, policy makers, legislature are not well targeted; Key responsible government agencies are not well coordinated and have thus failed to put in place a comprehensive regulatory mechanism; highly inefficient technologies are common at various levels of the biomass value chain i.e., harvesting, transformation into secondary energy (mainly charcoal), transportation and at end-use. […]

Author: Embassy of the Kingdom of the Netherlands in Uganda
Title: Energy Country Report: Uganda
Publishing Date: November 2015
Executive Summary: Uganda was selected for an energy mapping exercise based on its relatively large potential to increase electrification rates; the progress displayed since 2000 to increase energy access; in-country availability of renewable and non-renewable resources; and its national energy-related ambitions. The objective of the country report is to provide a full but concise picture of energy related aspirations, plans and activities in Uganda by national actors (e.g. national authorities, private sector, civil society organizations) and international actors (e.g. bilateral and multilateral development partners, private sector, international initiatives). To assist in the preparation of the country report, a desktop report on the energy sector of Uganda was prepared by the OPEC Fund for International Development (OFID).
This Energy Country Report for Uganda focuses primarily on electricity (-generation, -transmission, -distribution, and -access) and provides a description of the energy profile of Uganda, maps the energy related landscape (including actors, institutions and policy frameworks) and planned and currently implemented activities. The report also gives an overview of priorities, needs, challenges and opportunities, partly gathered from twenty interviews with thirty key people in government's energy agencies and institutions, development partners, the private sector and civil society and the Energy Workshop discussions. […]

Author: Uganda Electricity Transmission Authority Ltd. (UETCL)
Title: Grid Development Plan 2015-2013
Publishing Date: 2015
Executive Summary: Uganda Electricity Transmission Company Limited (UETCL) has a leading role in developing, Operating and maintaining an efficient High Voltage Transmission Grid (HVTG) to meet the national load demand, power evacuation from new generation plants and regional power exchange requirement through regional interconnections within the national and International technical, social-economic and environmental standards. A key responsibility in this respect is to constantly plan and develop the HVTG. The purpose is to establish a rationale for building a robust network, improve reliability and quality of supply, which will in turn contribute

towards the economic development of Uganda. In line with company objectives, the Grid Development Plan (GDevP) is a strategic document in UETCL's overall planning process and thus must be communicated to all major stakeholders. The plan, which covers a period of 15 years, identifies and justifies new grid investments. It is reviewed and updated annually to reflect latest information on Government policy and strategies. It is also an input to the company's financial projections and annual budget. The GDevP presents results of technical analyses for various investments to meet the national demand and power exchange obligations. The technical analysis derived from power system studies form a basis for determining technical feasibility of the proposed projects. The results from the technical analysis are used to determine the Grid Investment plan and the associated cost estimates which culminate into financial projections. The Environmental and Social Impact Assessment are carried out before implementation of each individual project as required by the National Environment Management Authority (NEMA). The results from the above analyses indicate high capital investment requirements over the first five years (2016-2020). This is mainly attributed to the many generation plants that are to be commissioned during this period and the corresponding power evacuation transmission lines and Substations. In order to absorb the new generation capacity, several grid and substations extensions and reinforcements are to be implemented in the same period.

Author: Electricity Regulatory Authority (ERA)
Title: Developments and Investment Opportunities in Renewable Energy Resources in Uganda
Publishing Date: June 2013
Introduction: The overall Government Policy Vision for the role of renewable energy in the national economy is to make modern renewable energy a substantial part of the national energy consumption.
In pursuit of that vision, the goal of Uganda's Renewable Energy Policy is to increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017. Uganda has considerable unexploited renewable energy resources for energy production and provision of energy services. These

resources include biomass, geothermal, large-scale hydro, mini/micro/pico hydro, wind and solar energy.

Author: Electricity Regulatory Authority (ERA)
Title: Grid Analysis for Integration of Wind/Solar Generation Plants
Publishing Date: November 2015
Introduction: The Ugandan grid currently operates at 11kV, 33kV, 66kV and 132kV with a generation mix comprising of large hydro, mini hydro, thermal and cogeneration plants.
In addition to the above generation mix, government intends to add solar and wind generation plants in line with the renewable energy policy for Uganda, 2007 that advocates for distributed electricity generation using renewable energy technologies. Worldwide the main concerns with solar and wind renewable energy sources that relate to grid stability and their possible solutions are:
I. Power generated by a solar/wind plant cannot be forecasted in the mid-term that is for more than one day ahead as easily as thermal/hydro generation. A global solution is to have enough primary reserve to cover the intermittent nature of solar/wind energy plants.
II. The solar/wind plants do not provide a large amount of short circuit current in case of a fault. Given that these power plants substitute thermal/ hydro power plants, short circuit current decreases in the system and protection relays might have problems to trip in case of a fault. The solution is to keep enough thermal/hydro power plants connected to the system to provide the short circuit short circuit current for the short circuit relays to operate.
The objective of this study is to determine the amount of wind and solar capacity that can be integrated into the national generation mix without affecting grid stability in cognizance of commissioning of 220kV, 400kV transmission lines, 600MW Karuma, 183MW Isimba hydro power plants and the GETFIT projects.

Author: World Business Council for Sustainable Development (WBCSD)
Title: Business Case for Low-Carbon Microgrids
Publishing Date: October 2016

Executive Summary: The success in limiting climate change and achieving a 2°C pathway will also depend on the solutions deployed to electrify remote areas around the world. Addressing the lack of clean, reliable and affordable energy for billions of people and industries alike in places remote from a reliable power grid is one of the world's most critical development challenges, highlighted in the Sustainable Development Goal Number 7: Affordable and clean energy.
Through the WBCSD REscale program, a group of leading energy and technology companies are working together on solutions to accelerate the deployment of renewables and the transition to a low-carbon electricity system. Three upcoming reports are directly addressing crucial barriers to fully unlock the potential for renewables: access to finance, ensuring bankability of renewable projects and improving integration of growing levels of renewables into electricity markets – particularly in regions where billions of people currently lack access to clean, affordable energy.

Author: College of Agriculture and Environmental Sciences // Department of Environmental Management (Makerere University)
Title: The use of Biomass Energy Resources: A case study of the Communities around Mabira Forest Reserve
Publishing Date: June 2016
Executive Summary: Urban and rural households are facing increasing energy costs or spend more time collecting firewood. Furthermore, the traditional use of firewood is responsible for high indoor air pollution levels, thus causing respiratory diseases that affect women and children in particular. Moreover, the latter spend many hours and travel long distances to collect fuel wood. This deprives women of valuable time to engage in income generating activities and children to go to school and study. About 90% of Ugandans depend on biomass energy for cooking and heating. Firewood is the commonly used especially in rural area whereas charcoal is mainly used in urban areas. Other biomass fuels like dung and agricultural wastes are used. Most people burn biomass in less efficient ways using traditional cook stoves. Forests are the main sources of biomass fuel especially for firewood and charcoal production.
Using inefficient technologies to burn biomass especially for cooking has contributed to high demand of biomass fuel hence increasing forest degradation in Uganda. This

research aims at finding out the sources of biomass energy resources used by the communities around Mabira forest reserve and what technologies they use.

Author: intec – GOPA International Energy Consultants
Title: Analysis of lessons learned in Biogas projects in Uganda and selected other developing countries – Overview Study
Publishing Date: September 2016
Executive Summary: This study has been funded by the German Ministry for Economic Cooperation and Development under the Green Climate Fund Readiness Programme (financed by BMZ and commissioned by KfW). GOPA as the implementing Consultant was asked to provide an overview study regarding the lessons learned on biogas in Uganda and in selected developing countries. The study should provide the framework for the development of future biogas projects and programmes in Uganda for small scale household biogas plants and larger biogas plants using organic waste from market, as part of a national biogas strategy and/or preparation for Green Climate Fund concept notes or funding proposals.
The location and climate in Uganda predominantly offers favourable conditions for the operation of biogas plants. Southwest of Uganda, as well as the Central and South-eastern districts are the most attractive areas for large-scale commercialization of biogas plants. These districts also corresponded to the areas exhibiting the largest fuel wood supply deficits, suggesting that biogas dissemination can have a large immediate impact on forest resources and biodiversity conservation. It is recommended for future feasibility studies to include a detailed data collection phase regarding the water stressed areas in Uganda in order to select the suitable biogas technologies for different locations according to their location.
Typical substrates in Uganda include animal manure (cattle, goats, pigs and poultry), domestic organic waste (spoiled vegetables, food leftovers) green and plant waste (elephant grass, various leaves, banana peel) and human faeces.Some farmers lack animals and therewith manure but have the willingness and ability to invest in in a biogas plant. Therefore, research on alternative affordable feed materials for this category of farmers is needed. […]

Author: Hystra hybrid strategies consulting
Title: Reaching Scale in Access to Energy
Publishing Date: May 2017
Executive Summary: This report investigates barriers and solutions to scale for market-based approaches offering cleaner energy access to low-income customers in developing countries, for home and small-scale productive uses. The objective is not to provide an exhaustive view a cross all technologies and geographies, but rather to learn from a selection of the most innovative and successful practitioners, representing solutions with high potential and innovation dynamics: solar lanterns, solar home systems, clean energy microgrids, solar irrigation pumps, and improved cook stoves. The findings are based on an in-depth review of the performance and work of 26 practitioners, selected after a global scan of over 300 organizations. While the lessons drawn from them may not be applicable in all situations, they will hopefully inspire other practitioners, as well as donors, investors, companies, and policy makers, in their efforts to provide access to energy for all.

Author: Arthur Contejean and Louis Verin
Title: Making mini-grids work Productive uses of electricity in Tanzania
Publishing Date: January 2017
Executive Summary: Clean-energy mini-grids (CEMGs) can increase overall access to energy. They can also foster small enterprises in developing countries' rural areas because they provide power suitable for tools and machines. Private CEMG operators could become catalysts for rural development, not only because they operate sufficiently large assets, but also because:
• They target specific geographical areas and their success often depends on local development;
• They know their regions on a daily and long-term basis, allowing proper follow up;
• Being in the private-sector, they inherently strive to maximize return with limited resources;
• They are locally-based and efficient organisations on which to anchor other public and private development initiatives.
Nonetheless, becoming such a catalyst depends on economic contexts, regulatory frameworks and CEMG operators' choices. This document, based on current

experience from Tanzania gathered through visits, interviews and literature reviews, attempts to assess how well CEMGs can and do serve productive uses of electricity (PUE) and play development roles. We aim to generate discussion among policymakers, funders and rural electrification practitioners who might support CEMG projects in Tanzania and elsewhere.

Helpful Links:

https://energypedia.info/wiki/Uganda_Energy_Situation

https://www.usaid.gov/sites/default/files/documents/1860/UgandaCountryFactSheet.2016.09_FINAL.pdf

http://uganda.opendataforafrica.org/

http://www.rea.or.ug/resources/Annex%201%20Electricity%20Infrastructure.pdf

https://www.hivos.org/sites/default/files/uganda_profile.pdf

http://www.indexmundi.com/uganda/energy_profile.html

http://uganda.opendataforafrica.org/hslpowb/uganda-energy-profile

http://uganda.opendataforafrica.org/fysscwg/uganda-primary-energy-production-quadrillion-btu

http://uganda.opendataforafrica.org/xvnhdub/uganda-electricity-net-generation-billion-kwh

http://uganda.opendataforafrica.org/hvkkzwc/uganda-electricity-installed-capacity-million-kilowatts

http://uganda.opendataforafrica.org/vxbluy/uganda-electricity-net-consumption-billion-kwh

http://uganda.opendataforafrica.org/ttbehbb/uganda-electricity-installed-capacity-1980-2012

http://www.rea.or.ug/resources/Annex%202%20Nature%20of%20Demand%20GIS%20Maps.pdf