National Round Table Forum

"ENERGY ACCESSIBILITY & EFFICIENCY IN KENYA"

– Report –

Enrich

SUCCEED network

Ministry of Education
Science and Technology

AFRICAN VIRTUAL UNIVERSITY
UNIVERSITE VIRTUELLE AFRICAINE
UNIVERSIDADE VIRTUAL AFRICANA

Project	*Enhancing Energy Accessibility & Efficiency through establishing sustainable STI Support National Networks with a regional dimension in East Africa*
Acronym	**ENRICH**
Grant Number	FED/2013/330-235

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ENRICH consortium:

European Union:

- University of Alicante, Spain (Coordinator)
- Glasgow Caledonian University, United Kingdom

East Africa:

- African Virtual University, Kenya
- Moi University, Kenya
- Mzumbe University, Tanzania
- Makerere University, Uganda
- Inter-University Council of East Africa, Uganda
- Directorate of Research management & Development, Ministry of Education, Science and Technology, Kenya
- Tanzanian Commission for Science and Technology, Tanzania
- Uganda national council for science and technology, Uganda

SUCCEED Network consortium:

European Union:

- University of Alicante, Spain (Coordinator)

East Africa:

- Université du Burundi, Burundi
- Moi University, Kenya
- University of Rwanda, Rwanda
- Mzumbe University, Tanzania
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The present document was developed and edited by the partner institutions of the ACP S&T and ACP/Edulink Projects ENRICH '*Enhancing Energy Accessibility & Efficiency through establishing sustainable STI Support National Networks with a regional dimension in East Africa'* and SUCCEED Network '*East African Higher Education Network on Sustainable and Energy Efficient Campus Development*', under the coordination of the University of Alicante (Spain).

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FOREWORD

Energy deficit and energy poverty have become a major obstacle to growth and development in Eastern Africa. One of the major energy issues is price volatility and energy security. Eastern Africa suffers from high prices in the energy market and shrinking natural energy resources. Restricted access to energy resources is hampering the East African region from sustainable development.

Despite the energy emergency in the region, support from research institutes and academia is inadequate to address this situation. However, at the policy level, various countries have stressed the importance of energy access and quality research and innovations. Unfortunately, there is a mismatch between policies, political decisions and societal needs.

ENRICH

Launched in February 2014, the three-year project ENRICH is an ACP S&T project (contract number FED/2013/330-235) funded by the European Commission, which aims to promote quality science, technology and innovation (STI) support services in Kenya, Tanzania and Uganda, and strengthen co-operation links in the energy sector at national and regional level among academia, researchers, industries and policy makers. Regional co-operation in the energy and environment sectors in East African countries will be promoted by establishing three national networks to support STI and a regional portal with a database of experts. This infrastructure will foster regional dialogue improving the flow of communication between the levels of policy and operation. Managers and researchers will be trained in crucial aspects of innovation management and will replicate these trainings through national support networks. Collaboration and dialogue with policy makers will take place at national (round tables) and regional (supranational conferences) level.

SUCCEED Network

Launched in October 2013, the three-year project SUCCEED Network is an ACP/Edulink project (contract number FED/2013/320-274) funded by the European Commission, which aims to promote East African university campuses as "living laboratories" for sustainability and energy efficiency, in particular by establishing a sustainable campus development platform to foster collaborative learning and action for energy access and efficiency, with the idea of contributing to solve the problems described above. The project will do this via a set of activities with the objective of improving institutional, academic and cooperation building which should result in a stronger institutional background, an enriched academic offer in renewable energy and energy efficiency, and an increased attractiveness for relevant stakeholders in order to establish new cooperation schemes in the field of energy.

OBJECTIVES OF THE NATIONAL ROUND TABLE

The National Round Table Forum *"Energy accessibility & efficiency in Kenya"* was held on May 3rd 2016 at the Nairobi Campus of Moi University. It was organised in the framework of the ENRICH & Succeed Network ACP S&T and ACP/Edulink projects.

The aim of the event was to bring together the main stakeholders in the field of energy in Kenya (including higher management and researchers from Higher Education Institutions, research & project managers, policy makers, managers from energy industries, experts) to exchange ideas and discuss energy issues at a national level in Kenya.

The **specific objectives** of the National Round Table were to:

- Discuss problems and issues in the field of Energy affecting National Stakeholders, with the idea of identifying where the Higher Education System could contribute with specific services/input.
- Enhance awareness of the real needs of Science, Technology and Innovation (STI) related to energy access and efficiency in Kenya.
- Encourage dialogue and strengthen co-operation links in the energy sector at national level among academia, researchers, industries and policy makers.
- Present the ENRICH & Succeed Network projects and their developments.

PARTICIPANTS

The National Round Table brought together several relevant stakeholders in the field of Energy in Kenya, including:

Institution	Name	Role
African Virtual University	Mr Mathias Goldstein	Business Development Manager
	Dr Atieno Adala	Manager Research & Development
	Mr Tom Ojwang	Researcher
MOI University	Prof. Richard K. Mibey	Vice Chancellor
	Prof. Anne K. Nangulu	Professor/Project Coordinator
	Dr Edwin Ataro	Associate Professor/Researcher
	Dr. Jamin Masinde Masasabi	Associate Professor/Researcher
	Prof. (Eng.) S. Simiyu Sitati, PhD	Associate Professor/Researcher , Dean, School of Engineering
	Prof. Loice Maru	Director Nairobi Campus
	Mr Nicodemus Tuiyot	Senior Assistant Registrar
	Ms. Petronila Chepkwony	Senior Administrative Assistant
	Mr. Bernard Ombati	ICT Technician
	Ms. Faith Ndathe	Secretary
	Mr. Raymond Kandie	Transport Department
	Mr. Chris Okech	Personal Assistant, Vice Chancellor's Office
Directorate of Research Management & Development, Ministry of Education, Science and Technology	Dr. George Anthony Ombakho	Director of Research Management and Development
	Dr. Eric Mwangi	Deputy Director Research
	Mr Jacob Kamwaria Njagih	Assistant Director Research
Energy Regulatory Commission	Eng. Tom Simiyu	Technical Officer
	Mr. Robert Pavel Oimeki	Director, Renewable Energy
Technical University of Kenya	Prof. Paul Baki	Physics Department
Consumer Trends Ltd.	Mr. Joseph Wambuki	Head of Research and Business advisory teams
	Mr. Godfrey Akumali	Leader of the Development Research team
Jomo Kenyatta University of Agriculture and Technology	Dr. Margaret Wachu Gichuhi	Research Fellow/Lecturer Institute of Energy and Environmental Technology
National Commission for Science, Technology and Innovation	Dr. David Otwoma	Head of Physical, Industrial and Energy Schedule

These were joined by non-Kenyan partners from the ENRICH and SUCCEED Network projects:

Institution	Country	Name	Role
University of Alicante	Spain	Dr. Roberto Escarré	Director of International Project Management Office

		Ms Noelia López	Senior Project Manager, International Project Management Office
		Ms Cristina Beans	Senior Project Manager, International Project Management Office
Glasgow Caledonian University	United Kingdom	Mr Pablo López Alonso	European Projects Manager
		Ms Rose Cawood	European Projects Manager
Mzumbe University	Tanzania	Dr. Joseph J. Sungau	Coordinator and Researcher
		Dr. Athanas A. Ngalawa	Head of Centre for Rural Development and Lecturer
Makerere University	Uganda	Dr. Gerald Eilu	Associate Professor, Department of Forestry, Biodiversity & Tourism, School of Forestry, Environmental and Geographical Sciences
		Dr. Florence Nakayiwa	Director of the Planning and Development Department
Uganda National Council for Science and Technology	Uganda	Dr. Deborah Kasule	Head, Science and Technology Outreach & Information Management Unit
University of Rwanda	Rwanda	Prof. Bonfils Safari	Director of Academic Quality
Université du Burundi	Burundi	Dr. Pierre Célestin Karangwa	Professor/Researcher

ROUND TABLE

DISCUSSION POINTS: 'STI SUPPORT SERVICES ON ENERGY ACCESS AND EFFICIENCY AND REAL NEEDS IN KENYA'

Moderator: Prof. Eng. Simiyu Sitati – Dean, School of Engineering, MOI UNIVERSITY, KENYA

Panellists:

1. Dr. David Otwoma – Chief Science Secretary National Commission For Science Technology and Innovation, Kenya, with a background in nuclear energy, energy schedule, training energy models, distribution, marketing dispatch, access and affordability.
2. Mr. Joseph Wambuki – Head of Research and Business advisory teams, Consumer Trends Ltd., Kenya, representing the private sector.
3. Eng. Tom Simiyu – Technical Officer, Energy Regulatory Commission, Kenya
4. Dr. Margaret Gichuhi – Researcher and lecturer in environmental management and climate change at Institute of Energy and Environmental Technology, Jomo Kenyatta University of Agriculture and Technology, Kenya.

The Round Table discussion was initiated by each of the panellists presenting the contributions of their institutions in the field of Energy and providing initial discussion points. The contributions were followed by a Q&A discussion session led by the Moderator.

Dr. David Otwoma presented the National Commission for Science Technology Innovation (formed in 2013 by the Science, Technology and Innovation Act) whose role is to advise the Government. The Commission also provides funds for research, masters, PhDs, research chair (5 years). Other activities include supervising the Kenyan Generating Company, Kenya Power (distributer), Kenyan Regulating Commission, Rural Electrification Entity. The main sources of energy in Kenya are geothermal, petroleum, solar and hydro (problematic due to patchy rainfall). They have developped the 2009-2029 Least Cost Power Development Plan which lays out the best way to develop affordable energy. For this economical factors must be considered carefully in order to align business, government and lower cost generation facilities. In addition Dr. Otwoma mentioned the need for marketers to buy electricity at off-peak times.

Mr. Joseph Wambuki stated that there needs to be more assistance to entrepreneurs entering the energy market as the private sector plays a big part in Kenyan economy. According to Mr. Wambuki there are six key considerations for HEIs and Policy makers to take into account:

1. Motivating entrepreneurs who are involved in distribution so they can further develop their capacities.
2. Lack of Funding is a big issue for entrepreneurs.
3. Policy on Renewable Energy tarifs relief (tax breaks) needs to be developed.
4. Universities need to engage more with the private sector through Technology Transfer systems in order to develop renewable energy technologies (i.e. creation of spin-offs) and to help entrepreneurs feel like they share in a part of university knowledge.
5. Standards: As the technology is developped, there need to be mechanisms to ensure end consumers that they are obtaining good quality products amd not counterfeits (a frequent problem in Kenya with solar panels and biogas tanks).
6. Awareness is essential for the private sector to be able to interact with the people and for end consumers to be aware of standards and technology available. Important channels to raise this awareness could be radio broadcast and women's community groups or networks.

Eng. Tom Simiyu presented the role of the Energy Regulatory Commission (ERC) in the Electric Power Supply System (a power point presentation is available in the annexes). The ERC is a single sector regulatory agency responsible for the economic and technical regulation of electric power, renewable energy and downstream petroleum sub-sectors, whose tasks include setting and reviewing tariffs, issuing licences and permits, enforcement of compliances, resolution of complaints and disputes and approval of power purchase and network service contracts as well as providing indicative national energy planning.

Eng. Simiyu underlined the importance of a high quality electricity supply for socio-economic development, which is only possible when all segments of the value chain (generation, transmission, distribution, retail supply) are well designed, constructed, operated and maintained. For this the equipment used must be of high quality and the workmanship of high standards, with regular tests done of the installations. With regards to this Higher Education Institutions must teach their students the importance of good practices and quality work so they will be better prepared to work at these high standards once they enter the work force.

At the moment connectivity to the national electric grid in Kenya stands at 45%, but accessibility is only at 25%. These numbers are a result of the challenges present in Kenya, which include:

1. Lack of performance of requisite tests of installations
2. Use of substandard materials and poor workmanship
3. Difficulty in distinguishing genuine materials from counterfeits
4. Non-compliance with safety standards
5. Ignorance of relevant standards, statutes and regulations
6. High system power losses (>20%)
7. High number of HV/MV/LV breakdowns
8. Stagnant load growth

The Kenyan government's objective is to have 70% of connectivity by 2017 and universal access by 2020.

Dr. Margaret Gichuhi stated that the Institute of Energy and Environmental Technology in Jomo Kenyatta University offers energy courses in a range of study programmes, and is working to emphasise energy more in their various degrees, particularly in their Environmental Impact Assessment programme and with regards to applications in Agriculture. Students are asked to develop technology (prototypes) in Kenya.

During the discussion session the following points were made:

- Disconnect between HEIs and societal needs:
    - HEI graduates do not have sufficient practical training, when they enter the labour market they are "mini-Academics" who only consider the theoretical framework as the final solution instead of looking closely at the problem at hand in order to find a better solution.
    - HEIs should ensure Energy education is multi-disciplinary and not limited to scientists and engineers (be provided to all degree students among the "general knowledge" courses).
- More cooperation and networking needed between HEIs and private sector:
    - The private sector and HEIs need to cooperate more to provide meaningful internships for students and graduates so they can have "hands-on"

experience and be better adapted to the workplace. At the moment the private sector doesn't facilitate this because they do not understand how it could be of any use for them.
    - HEIs could cooperate more in National Networks (sharing educational materials online, research cooperation etc.).
- Research needs:
    - It is important for researchers to distinguish between fundamental and applied research, and to develop more of the latter.
    - Researchers need access to data (from government and private sector) for research.
- Regarding the sources of energy in Kenya, geothermal will always be reliable whereas hydro and solar depend on the weather.

DISCUSSION POINTS: 'CONTRIBUTION OF HIGHER EDUCATION SYSTEM TO SOLVE ISSUES IN THE FIELD OF ENERGY AFFECTING NATIONAL STAKEHOLDERS IN KENYA'

Moderator: Dr. George Ombakho – Director of Research Management and Development, Ministry of Education Science and Technology, Kenya
Panellists:

1. Dr. Deborah Kasule – Uganda National Council for Science and Technology, involved in S&T policy, performance mentoring and research support.
2. Prof. Paul Baki – Physics Department, Technical University of Kenya
3. Dr. Eric Mwangi – Deputy Director Research, Ministry of Education, Science and Technology of Kenya

4. Mr. Godfrey Akumali – Leader of the Development Research team, Consumer Trends Ltd., Kenya
5. Mr. Robert Pavel Oimeki – Director, Renewable Energy Energy Regulatory Commission, Kenya

Dr. Deborah Kasule stated that an important challenge to overcome is the general mismatch of society's needs and policy.

Regarding the role of Higher Education Institutions, she says it is important that the areas of Research & Innovation help bring benefits to society, for example by providing good research in Centres of Excellence or Technology Incubators. She said that the primaring role of HEIs is training and capacity building, but not just of HEI students during official study programmes, also by providing shorter courses (i.e. on entrepreneurship) and helping to maintain and improve the capacities of workers in the private sector (provide lifelong learning opportunities). For this HEIs need to develop a cooperation scheme with the private sector including joint projects, consultancies related to energy and formal networks.

Dr. Eric Mwangi discussed the need to encourage dialogue and strengthen cooperation links in the energy sector. With this in mind, the East Africa Energy Access and Efficiency Network (EAENet) needs to clearly set its objectives and priorities, establish a joint programming and joint funding scheme in order to be sustainable and create ownership. Furthermore, partnership should be at regional, national and bi-regional (EU-Africa) level. EAENet should create new ideas, include capacity building actions and mobilities as well as develop a network of excellence. It shouldn't be limited to one partnership on energy, but should set the framework for cross-cutting topics.

Dr. Mwangi also mentioned that it is important to consider what Energy can do for society in terms of development and resilience, and that it is important to obtain funding to further develop energy projects and networks. Philanthropic bodies, development banks and regional programmes can fund good research, however there is a need to look for opportunities. In addition, he discussed the FP7 CAAST-Net project which is building bi-regional partnerships for Global Challenges, involving 25 partners in the EU and Africa, and stressing the importance of developping links between HEIs and industry. The second phase of this co-fund project is being developped, and there will be funding opportunities under the H2020 ACP calls launched in early 2017 open to members of ERA-Net.

Prof. Paul Baki reminded the participants that most research results do not reach the public as it is only published in scientific journals with no one to "translate" it for the lay person. This results in a disconnect between HEIs and the public who could be an end-user of this newly-created knowledge.

HEIs could contribute through to energy issues in the area of training for technicians, engineers, managers etc who work in energy. HEIs also need to engage with policy makers as

policies must have a basis in empirical information, attention needs to be given in order to make a difference, if Kenya aims to be a middle income country in the near future. HEI researchers have the liberty of time to do research (something not available in the private sector), but this is not transmitted to the private sector often due to trust issues: there is a mistrust of academic institutions in private sector and dialogue needed to overcome this. In addition, infrastructures and facilites for doing research are needed and a call with priorities to be addressed. Multisectorial collaboration and interdisciplinary research should be foreseen, with the support of government and the proper policy instruments (a triple helix approach), as the science of today could be the technology of tomorrow.

Mr. Godfrey Akumali stated that universities are currently producing graduates in each area, including engineering which involves technical and social aspects. Universities must be better informed of the real needs of consumers (employers) and help focus the attempts to address these needs. Inter-disciplinary courses are needed so that energy becomes a shared common cause. Furthermore, continuous capacity building for young people with innovative ideas is needed, followed by an incubation phase so the ideas can meet market needs. Technical expertise should also be provided in order for the product to be technically acceptable.

Mr. Akumali also reminded that over 50% of the population in Kenya still lives below a dollar a day, so uptake is low for solutions. Affordability must therefore be a key issue considered when developping new technology. For example in Kenya cooking is a major issue, which will be amplified with the future growth of the population in the country.

Mr. Robert Pavel Oimeki presented some key areas of the ERC such as renewable energy and energy efficiency, metering, regulation of pricing, technical standards of operation, maintaining energy data, statistics to the government. He stated that the highest proportion of energy in Kenya comes from geothermal, hydro, then diesel, and that it is important to properly manage the demand side of energ (including regulations and quality management). With regards to quality he noted the importance of labelling and manufacture or importing of high-quality products (and not the high-energy consuming appliances Kenya receives at this time).

Additionally, at the moment Kenya does not have an Energy research institute, or Energy research labs or any support for the creation of spin-offs. Support therefore needs to be provided to researchers and entrepreneurs, through the creation of an engineering hub/centre, geared towards innovation. This would support ideas to the point where they could go to market.

During the discussion session the following points were made:

- HEIs campuses as “living labs”:

- HEI campuses should develop and share their best practices and educational materials in the field of Energy to help each other develop further (following the model of the SUCCEED Network).
- HEI campuses present excellent conditions to establish themselves as "living labs" to promote new ideas, particularly in the field of energy use and efficiency. Considering the high percentage of an HEI's budget dedicated to energy consumption, they should be the first interested in setting up units to study how to improve this (i.e. doing Energy Audits).

- Technology transfer and innovation:
  - Technology transfer systems should be in place between HEIs and the private sector in order to efficiently utilise research outputs.
  - An innovation hub would have to have sufficient funding to involve university labs, and investment to reach the product stage.
  - Ideally a country should have centres of excellence, incubators, good standards and programmes funded to develop technology.
- Networks
  - Any Network established should have clear and relevant objectives and activities, in order to attract and increase an active membership.
- Links with society
  - HEIs must develop and strengthen relationships with society. This could be done in part by maintaining links with their Alumni after they graduate. HEIs could also bring in industrial experts to teach students, as well as develop the curriculum with the involvement of the public/private sector.
  - Capacity building is also needed at user-level and for small businesses, using a multidsiciplinary approach. This is available up to a certain point in some HEIs, but it is not enough and often not relevant based on societal needs.
  - Private sector viability is the best thing that can occur as they are relevant to the market and community.
- Energy use and management
  - Regarding energy use in Kenya, there is a high degree of Energy poverty and the objective is to reach a rate of connections in rural communities of around 90%. People use biomass for energy purposes, solar water heating is being enforced, solar PV regulation has done well.
  - Energy management has achieved some things but it is in the process of transition, as a government they want to encourage people to live sustainably, want to create an energy management course; piloting the course would be a good idea.
  - HEIs can lead the way in tackling the Energy challenges.
  - Efficiency, affordability and commercialisation are harder as it takes a long time before it can take off outside of a small geographical area, and examples are needed as well to learn from.

CONCLUSIONS AND RECOMMENDATIONS

Participants in the Roundtable, involving government, private businesses and higher education, provided a good **diagnosis of the Energy Sector** in Kenya. Discussions on connectivity, access to rural areas, the energy mix or the relation between energy and the economic growth were considered in the presentations & discussions.

The Round Table also showed that there is currently **little interaction between the higher education system, the private sector and the government**. Although there is a vision on the importance of having a fluid relationship between those actors, there is almost no implementation at this time.

As to **how universities may contribute to increasing this relationship**, universities have human capital, research disciplines & infrastructure needed for research. They could contribute with Studies and Research to start the Innovation process and bring applied research to end users by collaborating with enterprises who will have identified the relevant issues to target. Enterprises (and also government) usually do not have either the human capital for research nor infrastructure or time to develop that. In order to work on this **universities should**:

1) Adapt/update their curricula (=increasing the employability of their graduates by identifying the employment sector's real needs; increase interdisciplinarity);
2) Improve their research (=more applied and less basic research);
3) Improve their Technology Transfer Offices (=provide specific services for enterprises)

Both the **ENRICH & SUCCEED Network** projects have activities in this framework.

- Example 1: SUCCEED Network universities should organise Fundraising workshops for local actors and provide Energy Audits service to enterprises:
- Example 2: ENRICH is promoting Technology Transfer between universities and local stakeholders

Funding is needed to increase the scope of both projects, but it has been shown that there is funding **available at a national and international level for good ideas**.

Further **Round Tables** should be organised as a **good practice** as they:

- Involve relevant stakeholders (although the number of participants needs to be increased compared to the present event);
- Provide good logistics & infrastructure facilitating the meeting of said stakeholders;
- Stimulate relevant discussions which may bring good ideas for projects, policies, other activities etc.

ANNEXES

The following annexes can be downloaded at:
https://www.dropbox.com/sh/32nm6lo7kqxd175/AADCO8hKgIA1FLBKjIsptRmXa?dl=0

- Agenda
- Power Point Presentations
    a. 01_Kenya_NNRTF_Intro_Escarre_3.5.2016
    b. 02_ENRICH_Project Overview_National RT Kenya_NL UA
    c. 03_Project SUCCEED Network Overview_CB
    d. 04_CAASTNet -Plus Presentation_EM DRMD
    e. 05_Private Sector Insight on Efficient Energy Access
    f. 06_Electric Power Supply System- ERC
    g. 07_
    h. 08_Kenya_NRTF_Conclusions_Escarre_3.5.2016