Workshop Conclusions

Higher Education for the Renewable Energy Sector in Africa

10/11 July 2014
Hotel Umubano, Kigali, Rwando

Organised by the
EU Energy Initiative Partnership Dialogue Facility (EUEI PDF)

Higher Education Activities in the Framework of the
Africa-EU Renewable Energy Cooperation Programme (RECP)

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Higher Education for Renewable Energy in Africa

1. Introduction and background

The Africa-EU Renewable Energy Cooperation Programme (RECP) aims at developing renewable energy markets in Africa. With a focus on (1) Policy Advisory Services, (2) Private Sector Cooperation, (3) Project Development and Flagship Investment Projects, it now has started activities in the area of (4) Technology, Innovation, and Capacity Development. Implemented by the EU Energy Initiative Partnership Dialogue Facility (EUEI PDF), Action Area 4 comprises currently **technical and vocational training** as well as **the Higher Education Sector**.

Several programmes and initiatives already exist to foster **Renewable Energy Education** in the **African tertiary sector**. Nevertheless, there is a clear need for **further strengthening and coordinating this development**. Within Action Area 4, the RECP intends to initiate support to Higher Education activities.

1.1 Introduction: Kick off workshop on Higher Education under the RECP

It is evident that renewable energy markets with all their benefits to energy access, a more sustainable energy supply, as well as increased generation capacities, **will only develop, if the required capacities exist**. Higher Education plays a key role in training the next generation of energy professionals in Africa. Engineers, as well as policy-makers need to be trained in order to plan, size, design, develop, operate, and maintain renewable energy installations at all sizes and level, as well as to develop conducive policy frameworks that promote the use of renewable energy technologies.

In order to initiate activities in the area of Higher Education, the EUEI PDF brought together 77 participants from 22 different African and several European countries, including decision-makers from national ministries and higher education institutions, renewable energy private sector representatives, as well as international experts and cooperation partners. With the aim to **exchange experiences and analyses on higher education activities**, **common trends and frameworks** for the renewable energy market development in Africa, participants exchanged and advised on the need for support interventions; possible **partners and potential activities for the RECP were identified** and **feedback to the RECP approach** to higher education was provided.

The agenda of the workshop can be found at the end of this document. All presentations are available for download on the EUEI PDF website.

2. Current State of the African Higher Education Sectors and the Renewable Energy Market Penetration

With an analytical approach on key aspects of Masters-level teaching, the workshop's opening day aimed at characterising the state of the art of the African tertiary education sector, including emerging trends in teaching. In addition, the market penetration of renewable energy technologies was addressed.

African Tertiary Education in the perspective of Global Trends

Despite the global trend of tertiary education developing towards a mass phenomenon, including in countries such as China, India or Brazil, Africa is still lagging behind when it comes to high-quality teaching to a considerable share of society. Characteristic indicators such as the *Gross Enrolment Ratio for the Tertiary Sector* (GER), *Public Expenditure on Tertiary Education* are largely showing slow upward trends, at best, with significant variations between countries and regions. It seems evident that postgraduate education at Master's level is still limited in Africa, providing high-quality training for qualified individuals taking up jobs that require thorough academic training.

Consequently, a significant percentage of African students continue to decide to study aboard, confirmed by Africa's high *Outbound Mobility Ratio*. The indicator *Inbound Mobility Ratio also confirms the lack of attractiveness of African universities to foreign students*. While these indicators represent general trends in the tertiary sector in Africa, they are not less relevant for the sub-sector of energy or renewable energy teaching.

Renewable Energy Markets – Demand for Master's Graduates

The demand for skilled labour from Africa's renewable energy markets is a key driver for African universities to establish, further develop and profile renewable energy Master's programmes and, for graduates to find adequate employment in the market (both in the public as well as the private sector). The current stage of the market penetration in Africa, however, is quite diverse. While there are vast differences in policies and their implementation, markets and market sub segments also vary greatly across technologies. A thorough assessment of the market potential cannot be part of these workshop conclusions. It is clear, however, that before the start of any RECP support activity, and indeed, before the initiation or promotion of higher education activities for renewable energy, a thorough and in-depth assessment of the renewable energy market potential as well as the associated labour market potential needs to take place, in order to identify needs both in quantity and quality of skills. Academic institutions need to train the right people, the right number of people, and the right sets of skills. This needs to be carefully studied before programmes are set up or supported.

3. Selected Key Features for Modern RE Master's Programme

The following key features were identified and addressed during the workshop:

Relationship of Teaching and Research

In contrast to undergraduate programmes, the relationship between teaching and research for any postgraduate programme has to be considered seriously and sensitively. Research can be seen as one of the core activities of universities and is of vital interest for qualified staff recruitment. At the same time, the challenges for African universities to tally up with the current state of research of other universities around the globe may in many cases be substantial. At the same time, it is also important to note that many educational policies require teaching staff at Masters' level to have acquired a PhD degree. The attractiveness for qualified PhD holders of a university, however, may also be determined be the (level of) research it is undertaking. It has hence to be carefully examined on a case-by-case basis to what extent Masters degrees should be oriented towards research or teaching. While there is a general lack of PhD degree holders in the area of renewables on the continent, it seems also vital to produce qualified graduates, venturing into the job market after graduation.

Gender Equality

Worldwide, the percentage of female students has increased significantly. In many subject areas the female enrolment rations have surpassed 50%. Yet, in engineering and science this trends cannot be observed. While it presents a challenge for universities across the globe to attract female students to science and engineering degrees, this is particularly evident for Africa according to the *Gender Parity Index*.

Quality Assurance

Quality Assurance is looked upon as one of the key features for any modern Higher Education System. While commissions for tertiary education are responsible for programme accreditation, for providing standards and guidelines, and to play a monitoring or supervisory role, the primary responsibility for quality assurance should remain with academic institutions themselves. Through the institutions' quality assurance system, a designated officer or unit should be responsible e.g. for establishment of a monitoring system, periodic reviews of academic programmes and core activities, internal audits and respective information systems. Quality assurance should not be limited to monitoring the performance of academic programmes, but also look into factors such as employment of graduates, and monitor the overall achievements of universities towards their vision and mission.

Internationalisation

Pan-African dialogue and cooperation between universities can foster quality assurance of institutions while widening academic opportunities offered to students in a resource-efficient way.

Internationalisation can involve the exchange of lecturers and students, the development and implementation of joint academic programmes, alignment of research education activities, etc.

Distance Education

Despite the challenges faced by distance education in Africa – e.g. poor internet access rates, lack of institutional framework and limited acceptance – distance education holds a great potential for tertiary education. Distance education can significantly widen university access to persons previously excluded due to economic, geographic or social reasons. It can target both high school graduates without access to academy and professionals or postgraduates with flexibility/mobility restrictions. Especially in the field of engineering, hands-on practical training is however required. Blended programmes and courses, involving both online and face-to face teaching, can tackle this issue.

Interdisciplinarity

The renewable energy sector requires a broad range of skills. On the one hand, engineers are required for the design, construction, operation, and maintenance of systems. On the other, careful energy planning is required to integrate renewable energy technologies into the wider system. Policy-makers need to be able to develop conducive policies, potentially administer public auctioning or procurement processes, etc. For academic education, one could conclude that renewable energy education should thus not be limited to a single discipline as the overlap with other sectors is obvious. At the same a certain focus is necessary to really master the subject (or sub-sector of it). It seems thus a sensible option to ensure that, for example, postgraduates from a renewable energy engineering programme will be required to gain a certain understanding of energy policy and energy economics. It could hence be an option that ensure a technical focus, e.g. by limiting interdisciplinary subjects to a designated rate of 30% of the curricula.

Partnerships

Partnerships are critical for universities for various reasons. Partnerships between African universities in a certain region can for example ensure that (e.g. through MoUs) universities agree to offer teaching on a certain technology on their hope institution, while others are taught at a university close by. Similarly, partnerships and active dialogue with local industry and businesses can stimulate local markets and open doors to these markets for students. Cooperation with the European market, world-leading in expertise for renewable energy, also bears great potential benefits. Teachers can be exchanged (and thereby the quality of teaching improved), research can be conducted in a collaborative manner, research proposals can be handed in jointly, students can exchange, teaching material can be exchanged, etc.

4. African Renewable Energy Master Programmes

While the first day of the workshop addressed various more conceptual issues and approaches that constitute a modern Masters programme, the focus of the second day was to share concrete experiences from renewable energy Masters programmes[1] running, or under development. In addition, possible support interventions for the RECP in support of Masters programmes were developed (see section 6).

At present, throughout Africa, there are only a small number of Master programmes on the ground or in the planning phase. They differ significantly in stage of development, teaching and content profiles, financing structure and experiences. The range is from purely technical, engineering programmes based at a single university to a transnational setting, involving taught courses at several universities, addressing renewable energy within an interdisciplinary approach.

The central element for many programmes, and indeed the respective universities, is their financing and business model. Programmes (and universities) are struggling to re-finance themselves. Many programmes ask for (sometimes very considerable) tuition fees, often resulting in a lack of attractiveness for students. In many cases, programmes had been started with initial funding from international cooperation partners, but transferring into a sustainable model, based on its own funding scheme, has often proven difficult.

However, there are positive examples on the continent where universities have broadened their funding basis. Additional sources of income for universities are for example consultancy work. Universities have considerable expertise that can be put into value for example with international agencies, active in a country or region. Both lecturers as well as PhD students can undertake research, provide advice in the sector, etc. Similarly, training and executive education that could be offered both to the public as well as the private sector can provide an additional source of income and decrease the dependency from tuition or support from outside.

In addition, there is also a role to play for the private sector. Large corporations active in countries can for example be drawn in to provide scholarships or cover tuition of students (with the aim to employ these at a later stage, or for corporate responsibility reasons), or sponsor entire chairs at universities. It seems obvious that a well thought-through business plan should be developed parallel to the development of a renewable energy Masters' programme. Similarly, an active exchange should be established with the private sector.

[1] Presentations with more detail on these programmes can be accessed through the link to the EUEI PDF website provided on the cover page of this summary.

5. Framework for Potential Support Interventions and Entry Points for the RECP

With the conceptual discussions on day 1, and the concrete examples given on day 2, the last part of the workshop focussed on the formulation of concrete proposals where the RECP could add value. With a first support intervention of ca. 9-18 months to be initiated in summer/autumn 2014, and additional ones to follow, the programme intends to support universities in their efforts in offering Masters' level education for renewable energy.

Participants' proposals for potential interventions addressing the sector's challenges can be grouped as follows:

- **Co-operation between** already existing African RE **Master's programmes**, those under construction or still in the planning phase; regarding the following aspects and measures
  - Content: Sharing complementary modules (as electives/specialisation offer)
  - Mobility: Providing trans-university mobility of students and staff
  - Facilities: Lab Sharing
  - Marketing: Common
  - Teaching Mode: Appropriate application of distance and blended learning

- **Co-operation with the private sector** (intra-African and international), regarding
  - Employability through private sector's engagement in curriculum development
  - Student' exposure to the market through Internship e.g. (Master Theses positions)
  - Establishment of designated liaison offices within universities responsible for private sector cooperation

- Support to **standardization and accreditation** of academic programmes

- Support to **increase variety of courses/modules** offered by universities
  - Distance learning
  - Summer schools
  - Executive Master programmes
  - Short training courses for professionals

- Developing of appropriate **business models** for Master's programme, comprising
  - Sustainable tuition fee models
  - Income generation beyond tuition through executive education, training, and notably consultancy and research services
  - Efficiency increases (e.g. through linking up with universities in the region)

- **Communication** enhancement
  - Linking with existing and functioning continental communication platforms

- Establishment of a platform for dialogue and exchange on existing and planned programmes, research activities, course material etc.
- Organisation of regular meetings and workshops at regional and continental level

- **Development of capacity development strategies beyond Masters' education**
  - Involving vocational training, graduate, postgraduate, and PhD

Programme Day 1 – 10 July 2014

08:30-09:00	**Registration at Conference Venue**
09:00-10:00	**Welcome and Opening Remarks** **Chair:** Crispen Zana (Advisor, African Union Commission / EUEI PDF) • Welcome (H.E. Emma Francoise Isumbingabo, Minister of State for Energy and Water, Ministry of Infrastructure, Rwanda) • Africa-EU Renewable Energy Cooperation Programme (Peter Cattelaens, EUEI PDF)
10:00-10:30	**Setting the Scene: Higher Education for the Renewable Energy Sector in Africa** • Overview (Michael Golba, University of Oldenburg, Consultant to EUEI PDF)
10:30-11:00	**Group Picture and Coffee Break**
11:00-13:00	**Session 1: RE Higher Education - Political frameworks & Private Sector Cooperation** **Chair:** Izael da Silva (Strathmore University, Nairobi, Kenya) • Political Framework for Higher Education (Christine Gasingirwa, Ministry of Education, Rwanda) • Research and Development for Sustainable Energy (Marcel Gakuba, EWSA - Energy, Water and Sanitation Authority, Rwanda) • Renewable Energy Markets in Africa (Martin Meyer-Renschhausen, Darmstadt University of Applied Science, Germany) • Competences and Skills for the Private Sector (Matthew Matimbwi, Tanzania Renewable Energy Association, Dar es Salaam)
13:00-14:00	**Lunch Break**
14:00-16:00	**Session 2: RE Master Programmes - Key Features** **Chair:** Andrew Leitch (Nelson Mandela Metropolitan University, Port Elizabeth, South Africa) • Interdependence of Teaching and Research (Lorenzo Mattarolo, Politecnico di Milano, Italy) • Quality Assurance (Rispa Odongo, Commission for Higher Education, Nairobi, Kenya) • Gender, Energy and Higher Education (Rosa Chilundo, Universidade Pedagógica, Maputo, Mozambique) • Distance Education (Bakary Diallo, African Virtual University, Nairobi, Kenya)
16:00-16:30	**Coffee Break**
16:30-17:30	**Wrap-Up Day 1: RE Master Programmes in Africa – Features and Framework** **Chair:** Richard Blanchard (Loughborough University, United Kingdom) **Participants:** Izael da Silva (Kenya), Andrew Leitch (South Africa), Michael Golba (Consultant to EUEI PDF)
18:00	**Dinner Reception**

Programme Day 2 – 11 July 2014

09:00-09:15	**Introduction to the Day and Renewable Energy Masters Programmes in Rwanda** • Introduction to the Day (Peter Cattelaens, EUEI PDF)
09:15-10:45	**Session 3: RE Master Programmes – Examples (Presentations)** **Chair:** Ahmad Addo (Kwame Nkrumah University of Science and Technology, Accra, Ghana) • Introducing a Renewable Energy Masters Programme in Rwanda (Bonfils Safari, University of Rwanda) • Southern African Energy Initiative - SASEI (Al-Mas Sendegeya, Polytechnic of Namibia, Windhoek) • West African Science Service Center on Climate Change and Adapted Land Use - WASCAL (Alassane Abdoulaye, Université Abdou Moumouni de Niamey, Niger) • Institut International d'Ingénierie de l'Eau et de l'Environnement – 2iE (Daniel Yamegueu, Ouagadougou, Burkina Faso) • M.Sc. Renewable Energy (Clement Shonhiwa, University of Zimbabwe, Harare) • Masters in Renewable Energy (Cuthbert Kimambo, University of Dar es Salaam, Tanzania)
10:45-11:15	**Coffee Break**
11:15-12:00	**Session 3: RE Master Programmes – Examples (Panel Discussion)** **Chair:** Ahmad Addo (Kwame Nkrumah University of Science and Technology, Accra, Ghana) **Participants:** Bonfils Safari (Rwanda), Al-Mas Sendegeya (Namibia), Alassane Abdoulaye (Niger), Daniel Yamegueu (Burkina Faso), Clement Shonhiwa (Zimbabwe), Cuthbert Kimambo (Tanzania)
12:30-13:30	**Lunch Break**
13:30-15:45	**Working Groups: Higher Education within the RECP - From Strategy to Implementation** Focussing on the Establishment and Enhancement of RE Master Programmes **Introduction:** Michael Golba & Andreas Guenther (Univ. of Oldenburg, Consultants to EUEI PDF) **Group 1:** Necessary structures and processes for universities to run RE Masters programmes Chair: Herbert Robinson (African Institute for Economic Development and Planning, Senegal) **Group 2:** Political frameworks for RE Masters programmes Chair: Bothwell Batidzirai (University of Capetown, South Africa) **Group 3:** Relation with the private sector and the job market Chair: Jean Bosco Rwiyamirira (Rwanda Renewable Energy Association) **Group 4:** Role of international cooperation Chair: Helvi Ileka (Polytechnic of Namibia, Windhoek)
15:45-16:15	**Coffee Break**
16:15-17:15	**Panel Discussion: RE Postgraduate Programmes in Africa - Framework and Visions** **Chair:** Peter Cattelaens, EUEI PDF **Participants:** Chairs of Groups 1, 2, 3, 4 & Michael Golba (Consultant to EUEI PDF)
17:15- 17:30	**Closing Session**

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