



## Call for applications for PhD studies at the African Center of Excellence in Energy for Sustainable Development (ACE-ESD) under the UR-Sweden Research Training Partnership Programme 2019-2024 on Sustainable Energy

### Background

The African Center of Excellence in Energy for Sustainable Development (ACEESD), at the College of Science and Technology (CST), University of Rwanda (UR), is funded by the World Bank and an approved ACE II project center of excellence envisioned to address key economic challenges resulting from low rural energy access, poor adoption of energy technologies in rural areas, and poor inter-state energy trading in the Eastern and Southern Africa region. The ACE-ESD is partnering with three Swedish universities in a new five-year Research Training Program (2019-2024) funded by the Swedish International Development Agency (Sida) aiming to strengthen research capacity on Sustainable Energy. The Swedish partners are Chalmers University of Technology, Jönköping International Business School and School of Global Studies, University of Gothenburg.

### Program description

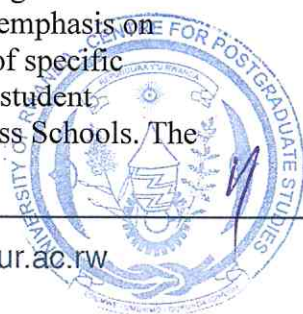
Five PhD students will be enrolled for a **PhD by Research degree at UR**, with a total visit of 9 months in Sweden, where they are enrolled for a Licentiate Degree. The students will thus earn a PhD degree in Rwanda as well as a Licentiate degree from Sweden, which is a valued degree among Swedish engineers and industry. Students will be able to take courses in Sweden and be supervised jointly by Swedish and UR senior staff. The partnership program is focused on interdisciplinary and policy-relevant energy research on the theme: *Smart electrification for rural development using locally available renewable energy resources appropriate to Rwanda*. The program investigates Rwanda's future energy system, exploring the interaction between energy demand and energy system design. *The PhD students will work on the shared overall research question: what is the role of micro-grids in Rwanda's future energy system?* Candidates are invited to submit their applications according to the sub-theme and process described below. Studies are expected to start in January 2020 and last 4 years.

### Thematic focus (see specification of respective sub-theme at the end of this document)

We invite candidates for conducting a PhD on one of the following five sub-themes:

- the role of bioenergy for rural development in Rwanda's future energy system*
- the role of solar power for rural development in Rwanda's future energy system*
- mini-grids combining different supplies – hydro and solar power*
- the role of policy and finance for energy development in Rwanda*
- social and environmental impacts of electrification for rural development*

The program will contribute to addressing real world problems of importance to Rwanda's development challenges and developing appropriate local solutions, establishing a link between researchers and energy sector actors that is now missing. There is an emphasis on problem-oriented research, energy systems design (rather than improvements of specific materials or components), field studies and stakeholder interactions. The PhD student working on *Policy and finance* will work with Jönköping International Business Schools. The other four students will work with Chalmers University of Technology.







### Eligibility

The applicant must be:

- i. Employed staff of the University of Rwanda;
- ii. Holding an MSc degree in a relevant or specific field (see description of sub-themes below);
- iii. English proficient;
- iv. Able to work independently as well as work in a team;
- v. Ready to spend a total of nine months in Sweden in two separate visits;
- vi. Ready to continue working at the University of Rwanda after completion of the PhD studies in the teaching, research and innovation capacities;
- vii. Prepared to work full time on the project and not in possession of another fellowship for PhD studies

Note that the candidate is expected to contribute to teaching at ACE ESD. Other side activities, assignments, consultancies or employment are strongly discouraged. Female applicants are encouraged to apply and there is a gender equality component in the program that will provide some support for women who travel with children.

### Interested applicants should submit the following:

- i. A cover letter for the position, the subject should be **PhD at ACE-ESD in one of the following areas: Energy Economics, Electrical Power Systems, or Renewable Energy**, and it must specify which of the sub-themes the applicant is applying for. It should also include a description of the motivation (max 1 page) for joining the program
- ii. Recommendation letters from two academic referees;
- i. Copy of the Master's degree certificate (or equivalent);
- ii. Copies of valid identification card or passport
- iii. Copy of the Master dissertation;
- iv. Literature review of maximum 3 pages (see literature review format below);
- v. Current CV (include full specification of the Masters' degree specialization)

Please send the above mentioned (scanned and saved in one document) to the Scholarships Officer at UR CPGS, Mrs Gloriose UMULISA GASHAYIJA (email: [gashayijagloriose@gmail.com](mailto:gashayijagloriose@gmail.com)) with a copy to the Head of PhD Studies at ACE-ESD [hakizimanajd@gmail.com](mailto:hakizimanajd@gmail.com), and to the subprogram team leaders [c.kabiri@ur.ac.rw](mailto:c.kabiri@ur.ac.rw), and [helene.ahlborg@chalmers.se](mailto:helene.ahlborg@chalmers.se).

### 1. Literature review format (2-3 pages)

The literature review aims to show the applicant has the ability to engage with scientific literature, identify the state of the art and research gaps. It must include the following: Name of Applicant, College and Campus, the applied for PhD position (position A, B, C, D or E).

### 2. Summary of current situation for Rwanda's energy system

Describe the state of energy systems in Rwanda in general, and the situation in terms of your chosen topic (bioenergy/ solar PV/ hydro power/ policy and finance/ societal demand for and impact of rural electrification), with reference to literature. (Maximum 1 page)







### 3. Identified knowledge gaps

Describe what you identify as the main knowledge gaps when it comes to a) the role micro-grids will play in Rwanda's future energy system, and b) what you see as the main knowledge gaps specifically for (bioenergy/ solar PV/ hydro power/ policy and finance/ societal demand for and impact of rural electrification), with reference to literature. (Maximum 1.5 page)

### 4. References

Include all references that you base your description on, with citations in the text and full references in a reference list (Maximum ½ page)

### Recruitment process

Applications must be submitted online no later than 22<sup>nd</sup> September.

The candidates will be notified if they are called for an interview and the interviews are expected to take place at UR campus in Kigali on 28<sup>th</sup> October to 1<sup>st</sup> November.

The interview process will, apart from the interview, include an exercise of reading a scientific article, summarizing and analyzing its content and discussing it. The recruitment team includes senior staff from both UR and Swedish universities. Successful candidates will be notified a couple of weeks after the interview and expected to start on their new position January 15<sup>th</sup> 2020.

### Specifications of focus for the 5 positions:

#### Position A. The role of bioenergy for rural development in Rwanda's future energy system

This PhD research is focused on the possible roles of bioenergy for rural development in Rwanda during and after electrification. Today, bioenergy is the most important energy source in rural areas but in the future energy system electricity access will be much more widespread which raises questions about the future role of bioenergy. This research will integrate quantitative and qualitative research methods and analysis. Based on assessments of what is happening with bioenergy use in villages undergoing electrification, techno-economic-social studies will be carried out for identifying different sized and types of bioenergy technologies which could still play an important role in electrified local energy systems, for example, bioenergy for small scale process industries. These issues are also closely related to future applications of clean cooking.

The research is based on a mixed methods approach and the ideal candidate has a basic education including thermodynamics, process engineering, energy economics and modelling. Also applicants with other relevant backgrounds are welcome to apply. The PhD student will work in a team with a postdoc researcher and their respective focus will be decided based on the respective candidate's competences and interests. The PhD degree will be in Renewable Energy at UR.

#### Position B. The role of solar power for rural development in Rwanda's future energy system

Solar power is highly scalable. It can be applied from small scale technologies like solar lanterns to power plant size. This range of solar power technologies makes it important to talk about the different solar power system scales and where they fit into Rwanda's futures







power system. This PhD research is focused on the role of solar power for rural development. Starting from the potential for integrating various sizes and system designs of solar PV in rural energy systems, this research combines future-oriented energy systems engineering perspectives, electric power engineering and modelling with an understanding of the socioeconomic, technical, environmental and organizational characteristics of respective designs. The research engages with questions such as: what are the advantages and disadvantages of various designs of solar PV systems in micro-grid applications, in relation to locally specific preconditions and demands, and in relation to other system solutions, such as stand-alone systems (solar home systems) and the national grid?

The PhD candidate will work in a team with a postdoc researcher. The candidate should preferably have a combination of electric power engineering and energy systems modelling background, but also applicants with other relevant backgrounds are welcome to apply. The PhD degree will be in Electrical Power Systems at UR.

**Position C. Minigrids combining different supplies – hydro and solar power**

This PhD research is focused on the role of combined energy sources in micro-grids in Rwanda's future energy system. Starting in the current role played by small-scale hydropower in micro-grids, the research will then study and evaluate hydropower technologies or modifications of hydropower to allow for combination with solar PV to get a more robust system, or a system that creates other values like increased generation reliability or allowing more intermittent power production. The value will be investigated both for stand-alone micro-grids as well as interconnected systems (that is, connection to the national grid). The research will combine an engineering perspective on hybrid hydropower-based system design for micro-grid electricity provision with attention to socioeconomic and environmental preconditions and consequences. The PhD candidate will work in a team with a postdoc researcher. The candidate preferably has a background in electric power engineering. Also candidates with other relevant backgrounds are welcome to apply. The PhD degree will be in Electrical Power Systems at UR.

**Position D. The role of policy and finance for energy development in Rwanda**

This PhD research focuses on the role of policy and finance for renewable energy and a future "smart grid" in Rwanda. Starting in analysis of current energy-related policies in Rwanda, this research explores the role of policy and financing for shaping the country's future energy system and the degree to which policies enable a high share of renewable energy in general and decentralized and small-scale energy systems in particular. In addition to policy analysis, the candidate will work with GIS based applications and statistical data to identify the match between energy resource potential and societal demand and industrialization. Building on existing GIS data and new energy system models that are developed for the region and neighboring countries, the candidate will identify knowledge gaps that hamper energy policy-making but also cross-sector coordination between energy sector actors and other sectors such as education, healthcare, agriculture and industry for which energy may be a catalyst, and which in turn have important consequences for trends, scenarios and predictions of importance to the energy sector.





The candidate preferably has a master degree in economics or statistics, but also interested candidates with other degrees are welcome to apply. The Swedish degree will be in economics or statistics. The PhD degree will be in Energy Economics at UR.

**Position E. Social and environmental impacts of electrification for rural development**

This PhD research will focus on social and environmental impacts of electrification for rural development. It takes as starting point the complexity of how energy and development are related. The research studies the consequences for society and nature from the development of renewable energy in Rwanda, contributing with sustainability assessments of possible pathways to 100% renewable energy system that reaches 100% of the population. In particular, it considers effects on human wellbeing, poverty eradication, ecological integrity, land use and carbon emissions. The candidate will work with a combination of qualitative methods (case studies to understand local needs, effects and the role for communities) and scenarios combining quantitative modeling, preferentially based on GIS, and qualitative data to study trends at national level.

The candidate has a background in either social science studies of development-related topics, or more natural science background with expertise on land use, environmental change or similar. The candidate will be part of a team and collaborate with a postdoc researcher. The PhD degree will be in Renewable Energy at UR.

**Submission deadline:** The deadline for applications: 22 September 2019

Done at Kigali on 13<sup>th</sup> August 2019



**Dr Celestin NTIVUGURUZA**

*Acting Director, University of Rwanda Centre for Postgraduate Studies (UR CPGS)*