



***COLLEGE OF SCIENCE AND TECHNOLOGY***

**AFRICAN CENTER OF EXCELLENCE IN ENERGY FOR SUSTAINABLE DEVELOPMENT (ACEESD)**

**Summary of the ACEESD Proposal**

The **Africa Center of Excellence in Energy for Sustainable Development** (ACEESD) is 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 East Africa region. These challenges are mainly due to lack of appropriate energy trading frameworks as well as lack of required infrastructure to facilitate the trading. The marginalized areas have been cut off from absorbing modern energy services which act as key drivers for economic growth through industrialization and creation of knowledge based economies.

In order to address the challenges, ACEESD will commit to interdisciplinary research and training in smart micro-grid energy systems, tailored to serve remote and/or rural areas using renewable sources and inter-state energy trading. This will provide the much needed critical mass of MSc and PhD graduates who are fit-for-purpose, and who will serve as the backbone of this transformation.

ACEESD will be a unique, first-of-its-kind resource Center in the East and Southern African region. It will focus on enabling a deeper understanding of renewable micro-grid technologies and inter-state energy trade. The Center will establish a framework for knowledge sharing through student and staff exchange, as well as technology transfer to communities. The Center will also develop strategies and regional policies aimed at strengthening and promoting harmonization of energy trade.

Rwanda provides the ideal climate for ACEESD. It has displayed sustained high rate of economic growth supported by a track record of strong, transparent governance and management structure. In addition, as a host institution, the College of Science and Technology has strong support links with industry, government and international partners from the Region, Europe and USA. This will invariably result in the program having a significant impact on policy formulation, optimization of business models and technology transfer for achieving national and regional energy priorities. The existing collaborations will foster strong regional and international partnerships to facilitate access to world-class research infrastructure such as laboratories, as well as facilities.

**Section 1: Basic Institutional and Proposal information**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Originating Institution (s): College of Science and Technology, Rwanda  Center of Excellence Name (and acronym): African Centre of Excellence in Energy for Sustainable Development (ACEESD)  Total Amount Requested (US$):  Co-Financing from other sources both cash and in-kind contributions (including core funding) (US$): MINIRENA  Main Departments/Units involved in the Center: Electrical and Electronics Engineering, Mechanical Engineering, Civil and Geomatics Engineering, Physics, Business, Economics and Architecture | | | | | | | | | | | | | | |
| *Position* | | | | *Name* | | *Address* | | | | *Office Phone* | | | *Mobile* | | *Email* | |
| Head of Institution | | | | Prof. Manasse Mbonye | | CST-Kigali  P. O. Box 3900,  Kigali, Rwanda | | | | +250 252 574696/  +250 252 574698 | | | +250788304263 | | principal.cst@ur.ac.rw | |
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| Deputy Center Leader/Principal investigator | | | | Prof. Bruce Krogh | | Carnegie Mellon University  Telecom House, Boulevard de l'Umuganda, Kacyiru, Kigali, Rwanda | | | |  | | | +250784 840 855 | | krogh@ece.cmu.edu | |
| **Basic Institutional Information (this institutional data should include data from the last 5 years):**  **Main Departments participating in the proposed ACE: Academic Staff and Students** | | | | | | | | | | | | | | | | |
| *Academic year* | *Name of Department/ Units* | | *No. of Academic Staff (full- time equivalent)* | | *Non-National* | | *Academic Staff Qualifications* | | | | | *No. of Students* | | | | |
| *PhD*  *(% of total)* | *Master*  *(% of total)* | *Bachelor*  *(% of total)* | | *Others*  *(Specify)*  *Lab. Technicians* | *Total* | | *Female*  *(% of total)*  *Segregated at BSc, MSc and PhD level* | | *Non-national*  *(% of total)* |
| 2014/15 | Electrical and Electronics Engineering | | 45 | | 3 | | 11 | 67 | 22 | | 2 | 774 (BSc) 10 PhD) | | 18 (BSc) | |  |
| 2013/14 | 43 | | 3 | | 7 | 74 | 19 | | 0 | 816 (BSc) | | 20 (BSc) | |  |
| 2012/13 | 41 | | 3 | | 7 | 78 | 15 | | 0 | 866 (BSc) | | 24 (BSc) | |  |
| 2011/12 | 41 | | 3 | | 7 | 78 | 15 | | 0 | 1274 (BSc) | | 24 (BSc) | |  |
| 2010/11 | 38 | | 3 | | 8 | 76 | 16 | | 0 | 1062 (BSc) | | 18 (BSc) | |  |
| 2014/15 | Mechanical and Energy Engineering | | 16 | | 2 | | 12.5 | 43.5 | 43.7 | | - | 231 (BSc) | | - | |  |
| 2013/14 | 13 | | 2 | | 15.4 | 46.1 | 38.5 | | - | 173 (BSc) | | - | |  |
| 2012/13 | 14 | | 3 | | 21.4 | 50 | 28.6 | | - | 195 (BSc) | | - | |  |
| 2011/12 | 11 | | 3 | | 27.3 | 45.4 | 27.3 | | - | 190 (BSc) | | - | |  |
| 2010/11 | 17 | | 3 | | 17.6 | 47 | 35.4 | | - | 186 (BSc) | | - | |  |
| 2014/15 | Physics | | 20 | | 1 | | 5 (25%) | 10 (50%) | 5 (25%) | | 1 administrative assistant  1 Lab Tech | 78(BSc) | | 18 (23%) | | 0 |
| 2013/14 | 16 | | 1 | | 5 (31%) | 8 (50%) | 3 (19%) | | 2 lab Tech | 84 (BSc) | | 22 (26%) | | 0 |
| 2012/13 | 16 | | 1 | | 6 (38%) | 7 (44%) | 3 (19%) | | 2 Lab Tech | 97 (BSc) | | 25 (25%) | | 0 |
| 2011/12 | 21 | | 3 | | 11 (52%) | 6 (29%) | 4 (19%) | | 2 Lab Tech | 106 (BSc) | | 24 (22%) | | 0 |
| 2010/11 | 21 | | 4 | | 12 (57%) | 6 (29%) | 3 (19%) | | 2 Lab Tech | 112 (BSc) | | 26 (23%) | | 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Academic Programs offered for 2014/15 relevant to the proposed ACE:** | | | | | | | | | | | |
|  | *S/N.* | *Title of Program* | | | *Level (Bachelor, Master or PhD)* | | *Duration*  *(Years)* | *Enrolment 2014/15*  *(all classes)* | | *No. of Graduates 2013/14* | *Program Accreditation (Yes/No)* | *Last Year of Accreditation* |
|  | 1. | Renewable Energy | | | PhD | | 4 | 10 | | 0 | Yes | 2014 |
|  | 2. | Renewable Energy in partnership with KTH, Sweden | | | MSc | | 2 | 5 | | 5 | Yes | 2010 |
|  | 3. | Transportation Engineering & Economics | | | MSc/PhD | | 2 | 10 | | 11 | Yes | 2010 |
|  | 4. | Electrical Engineering | | | BSc/MSc/PhD | | 4 | 228 | | 43 | Yes | 2010 |
|  | 5. | Mechanical Engineering | | | BSc/MSc/PhD | | 4 | 202 | | 57 | Yes | 2008 |
|  | 6. | Physics | | | BSc/MSc/PhD | | 4 | 55 | | 18 | Yes | 2008 |
|  | 7 | Economics | | | BSc/MSc/PhD | | 4 |  | | 180 | Yes | 2010 |
|  | 8. | Management | | | BSc/MSc | | 4 |  | | 55 | Yes | 2010 |
|  | Note: add rows as required. | | | | | | | | | | |  |
|  | Institutional budget [in national and international (where applicable) currency] for the last two fiscal years: | | | | | | | | | | |  |
| *FY 2013/14* | *Total budget* | | *Government subvention* | *Tuition and other student fees* | | *Revenue from consultancies* | | | *Other revenue (if large include source; include international funding for both education and research projects/programs with from international partners)* | | |  |
| *National RwF* | *5,208,736,188* | | *4,259,098,289* | *533,091,933* | | *150,000,000* | | | *266,545,966* | | |  |
| *International RwF* | *-* | | *-* | *-* | | *-* | | | *147,595,857* | | |  |
| *FY 2014/15* | *Total budget* | | *Government subvention* | *Tuition and other student fees* | | *Revenue from consultancies* | | | *Other revenue (if large include source; include international funding for both education and research projects/programs with from international partners)* | | |  |
| *National RwF* | *8,291,569,188* | | *6,387,019,328* | *1,065,649,000* | | *157,768,157* | | | *681,132,703* | | |  |
| *International RwF* | *-* | | *-* | *-* | | *-* | | | *947,990,858.51* | | |  |

**Section 2: SWOT Analysis of the Institution/Proposed ACE**

Briefly provide a SWOT analysis of the proposal using the table below:

|  |  |  |
| --- | --- | --- |
|  | *Strengths* | *Weaknesses* |
| *Opportunities*   1. Train more regional/national Masters/PhD students 2. Help to improve regional/national energy policies 3. Train more regional/national technicians for the energy sector 4. Strengthen research and teaching excellence 5. Develop practical and economically viable renewable energy solutions and applications in agriculture, health and education. 6. Strengthen regional and international partnerships and collaborations in energy research | Strategic question: which opportunities can be explored through the strengths of the institution/proposed ACE?   1. High quality academic programs with outstanding research standards will significantly increase the training of energy professionals and scientists 2. Strong link of CST with industry, business community and government will help to train more highly skilled energy practitioners and policy makers in the region. 3. Strong partnerships with international organizations and universities will foster collaboration in developing appropriate energy solutions. 4. Strong governance and management structure with transparency will enable fair student admissions and recruitment processes, and timely decision making and procurement. 5. Good teaching and research environment for high-quality impact research and training. 6. Strong political will to develop research and academic excellence. | Strategic question: which opportunities may help overcome weaknesses of the institution/proposed ACE?   1. Collaboration with international and regional partners (Colorado State University) to facilitate access to research infrastructure in clean energy such as laboratory equipment and to fast-track capacity building through postgraduate training (Masters and PhD). 2. Through MSc/PhD programs and short courses, train a critical mass of multidisciplinary researchers in the region. 3. Take advantage of government and World Bank support to address financial needs while instituting more sustainable financial sources for CST and ACEESD |
| *Threats*   1. Intermittent financial support to fund academic programs 2. Limited opportunities for industrial internships/research for students 3. Competition from renowned academic institutions | Strategic question: how can the institution/proposed ACE use its strengths to reduce its vulnerabilities?   1. Using strong partnership and industry collaborations, students and faculty can benefit from industrial experiences of industry partners both national/regional and international. 2. Leveraging on CST-UR unique position as the only public Science and Technology Higher Education Institution, it can easily attract support and resources from the government and its partners for optimal control and utilization of funds, to fund academic programs. 3. The teaching and research standards of CST can improve through strong partnership with international and regional institutions to enable CST compete at the global level. | Strategic question: to which threats is the institution/ proposed ACE particularly vulnerable and how can it overcome these?   1. The ACEESD will be the first of its kind in Rwanda, and Centers such as this will be a core state-of-the-art research facility that will transform energy research and technologies development to support livelihoods and thus reinforce CST’s image as a leading research and learning institution. 2. An increase in ACEESD’s collaborative activities with partners in academia and industry coupled with strong government support would create opportunities for pooling resources together to overcome the threat of intermittent financial support |

**Section 3 Development Challenge and Objectives of the Proposed ACE**

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***3.1 Briefly state the development challenge that the proposal is designed to address in your institution.***

The importance of energy for sustainable development has been underscored by critical global actions such as the UN’s Sustainable Energy For All initiative (SE4ALL), and the strong integration of energy into the Post-2015 Development Agenda. Modern energy access acts as a catalyst for development – in education, health, food security, productive enterprise, environment and participatory democracy – which in turn supports further improvements in energy access. It connects economic growth with social equity and environmental sustainability which are important Millennium Development Goals. However, the vast majority of sub-Saharan Africans lack access to affordable clean energy and critical energy services. The sub-region is home to over 48% of the 1.3 billion people worldwide lacking access to electricity[[1]](#footnote-1), and 80% of the population do not have access to clean and safe cooking facilities[[2]](#footnote-2). Furthermore, a large proportion of these are in rural areas in the region, with electrification rate of only 16%, where the majority of food and raw materials are produced, resulting in tremendous loss of productivity. Within the East African sub region, most of the countries have more than 90% of their population relying on biomass while electrification access rates remain low ranging from 12% in Uganda to 14% in Tanzania and 18% in Kenya[[3]](#footnote-3). This presents a significant challenge to addressing the global energy access problem. Renewable energy adoption (through micro-grids using solar, micro-hydropower, wind, geothermal etc.) and energy trading are two critical areas requiring huge investment and multi-stakeholder partnership to help address this challenge.

However, the challenge is that the sub-region lacks the critical mass of highly skilled professionals, with specialized knowledge in engineering and technology (especially in power systems and in electrical engineering) that is required to generate the innovations needed to boost productivity in the energy sector. For example, UNESCO data for 2012 show that, only 11.2% of graduates from Rwanda were in the fields of engineering, manufacturing and construction. The situation is similar or worse in other East and Southern Africa countries (0.78 % in Burundi, 6.40% in Uganda, 3.82% in Mozambique, 17.45 % in Kenya and 4.88% in Ethiopia) and especially at the Masters or PhD levels. [[4]](#footnote-4). This scarcity of expertise, coupled with inadequate state-of-the-art laboratories and infrastructure to facilitate such training and research, points to the shortage of requisite intellectual expertise required to train such specialized personnel for the energy sector.

Compounding these is the issue of developing and harmonizing energy trade policies within the sub-region, which is oft beset by breakdowns in policy dialogue, changes in policy priorities of governments among others. To adequately handle these, calls for the building of policy development skills for policy makers and technical/engineering professionals. Skills in diverse areas such as decision-making science, economics, regulatory and legal are pre-requisites to enable energy managers and policy makers negotiate adequate and sustaining energy policies that create the enabling environment required for a transformation of the energy landscape through renewable micro-grid systems.

There is an urgent need therefore, to train highly skilled energy professionals, policy makers and practitioners through competent and world-class advanced level postgraduate education who will focus on research into the development of renewable energy technologies and solutions for the critical/priority sectors of the economy. This is crucial to the adoption of advanced and smart renewable energy technologies and solutions in agriculture (solar irrigation, agro-processing etc.); health (improved storage of vaccines and maternal health delivery, remote surgery, etc), education (access to Open Educational Resources – OERs, etc); economy (small scale, e-commerce, business can improve productivity, etc); participatory governance (citizens get informed and partake in governance issues) while ensuring the sustainability of the environment.

***3.2 Describe how this proposal if funded would contribute to addressing the development challenge***

The mission and vision of ACEESD is to create a world-class energy centre that will be a regional hub for research and training of African engineers, policy makers and energy utility managers (in micro-grid energy systems using renewable energy sources and interstate energy trading, management and policy); contribute to rural development through technology transfer; and nurture and promote entrepreneurship development in the energy sector towards sustainable development.

Rwanda provides the ideal climate for ACEESD. It has displayed sustained high rate of economic growth supported by a track record of strong, transparent governance and management structure. In addition, as a host institution, the College of Science and Technology has strong support links with industry, government and international partners from the Region, Europe and USA. This will invariably result in the program having a significant impact on policy formulation, optimization of business models and technology transfer for achieving national and regional energy priorities. The existing collaborations will foster strong regional and international partnerships to facilitate access to world-class research infrastructure such as laboratories, as well as facilities.

The Centre also recognises that without proper management of utilities, interconnection of grid and mini-grids as it envisions will be challenging and thus is expected to inform energy trading and management policy for the Eastern and Southern Africa Regions, through research and training of policy makers and professionals in inter-state energy trade and connectivity.

It is envisioned that a new and alternative approach in overcoming the challenges described above would be to provide home grown solutions by developing expertise in the field of low maintenance smart micro-grid power generation plants and systems (using Solar or PV Systems, Mini or Micro Hydro, Geothermal, Wind, Biomass & Biodiesel energy resources) that are customised to each remote area with the ability to upgrade.

In order to achieve this, the Centre needs to train a critical number of a new breed of graduates with expertise in the field of Renewable Energy micro-grids at the Masters and PhD levels in the fields of Renewable Energy, Electrical Power Systems Engineering and Energy Management, Trade and Policy,The Centre will take an applied research approach to solving development challenges, through offering practical and innovative solutions that can be easily transferred to various industrial players and key stakeholders in the field of energy. Research undertaken shall be interdisciplinary in nature with and in collaboration with institutional partners in the USA, Europe and within the region. Again, all research and training shall be student-centered and MSc/PhD students will be expected to play leading roles in research development. The Centre will facilitate industrial placements for students who will work with our industrial partners to make their research more relevant to community and industry needs.

The objectives of ACEESD thus shall include, but will not be limited to, the following:

* To provide national and regional capacity-building (Masters & PhD) for the establishment and implementation of energy systems using local energy sources and appropriate technologies to cover energy needs for sustainable development;
* To provide policy development skills training for students, policy-makers and utility managers aimed at building policy and monitoring capacity in the region which is critical for effective interconnection of energy systems.
* To provide energy research, consultancy and advisory services to both public and private organizations at national, regional and international levels;
* To develop and transfer appropriate energy technologies for sustainable development at the national and regional levels;
* To contribute and strengthen cooperation between industry and academia in the field of clean energy.

***3.3 Describe the role of partner institutions in successfully addressing the development challenges, jointly with and under the guidance of your own institution.***

It might be useful in assessing partnerships to use the sorting matrix below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Category/type of partnership** | **Key Partner** | **Partner** | **Associate Partner** |
| Advanced knowledge institution | Colorado State University, USA |  |  |
| Private sector national | Rwanda Energy Group (REG) | Great Lakes Energy Ltd.  Barefoot Power Rwanda Ltd. | Institution of Engineers, Rwanda |
| Private sector international |  |  |  |
| Peer universities national | Carnegie Mellon University, Rwanda (CMU-R) | College of Business and Economics (CBE) |  |
| Peer universities regional | Makerere University, Uganda | The Nelson Mandela Africa Institution of Science and Technology  Addis Ababa Institute of Technology |  |
| Peer universities international | University of Agder, Norway |  |  |
| Research institutions national |  | National Industrial Research and Development Agency (NIRDA) |  |
| Research institutions regional | Strathmore Energy Research Centre, Nairobi, Kenya (SERC) |  |  |
| Research institutions international |  | Tubitak Marmara Research Center Energy Institute |  |
| Others |  | Rwanda Utility Regulatory Authority (RURA) |  |

**Colorado State University (CSU), Energy Institute, USA**

Colorado State University’s (CSU) leading power research facilities represents a unique facility and research staff for conducting power systems research. ACEESD will draw on the rich experience of CSU energy work which has focused on energy for the developing world, including clean burning cook stoves, off-grid electricity systems, distributed systems and renewable energy generation. As a key partner, CSU will run joint or remote degree programs in engineering with the ACEESD which will allow students from the Centre to spend part of their graduate study at CSU (Fort Collins, Colorado). Also, this partnership will lead to the creation of mirror laboratory facilities in Kigali which will parallel existing facilities at CSU. This partnership is also envisioned to go beyond engineering to include business and entrepreneurship programs. Lastly, CSU will collaborate with ACEESD on workshops and seminars related to off-grid electrification, the use of methane from Lake Kivu for cooking and transportation, and other energy-related topics.

**Carnegie Mellon University, Rwanda (CMU-R)**

Carnegie Mellon University in Rwanda (CMU-R) is a branch of the Carnegie Mellon University (CMU) College of Engineering global campus, offering the Master of Science in Information Technology (MSIT) and the Master of Science in Electrical and Computer Engineering (MS ECE). With strong collaborations with faculty at CMU’s Pittsburgh and Silicon Valley campuses, CMU-R is complementing its graduate engineering education programs with research initiatives addressing, in particular, the opportunities and challenges in East Africa.

As a key partner, CMU-R will have a position in the management and governance structure of ACEESD and will collaborate with the Center in the following areas:

* Offering Courses, workshops and seminars relevant to energy and sustainable development.
* Support ACEESD research by providing access to their laboratories and computational resources
* Advising of ACEESD PhD candidates and
* Cultivating interactions for the Centre with relevant industrial partners and governmental research organizations

**University of Agder, Norway (UiA)**

University of Agder in Norway already has an existing partnership with overlap in faculty and shared learning experiences with CST; they will assist in curriculum development and will host faculty and students for training and research especially in Renewable energy and e-leaning

**The Nelson Mandela Africa Institution of Science and Technology (NM-AIST), Addis Ababa Institute of Technology (AAiT) and Makere University, Kampala, Uganda (MUK)**

As the Peer regional universities, the center will collaborate with them in the following focus:

* Teaching exchange (academic staff),
* Supervision/co-supervision of students,
* Students exchange with the award of scholarships,
* External generation income (raise funding),
* Joint research and publications,
* Reviewing PhD's proposal,
* Curriculum proposal collaboration.

**Rwanda Energy Group (REG)**

Rwanda Energy Group has overall responsibility for the development of energy resources and supply of electricity in Rwanda. REG is a group of companies (Energy Utility Corporation Limited – EUCL & Energy Development Corporation Limited – EDCL). The group is firmly committed to supporting the objectives of ACEESD particularly in the following areas:

* Industrial attachments and Internships to student for skills transfer and sustainable development,
* Enabling research development and helping in the dissemination of findings on indigenous energy sources,
* Providing access to energy infrastructure for research promotion and exposure to latest technologies,
* Strengthening the cooperation between industry and academia in the training of local and regional workforce in renewable energy.

**Rwanda Utilities Regulatory Authority (RURA)**

RURA is the government regulatory agency in Rwanda, mandated to monitor and regulate an efficient, sustainable and reliable energy sector in a transparent and fair manner. RURA will collaborate with ACEESD and its partners in organizing workshops and seminars, as well as provide internships to students. It will also work closely with ACEESD to develop further partnerships with relevant governmental institutions and partners from industry, and to promote best practices in the development of renewable energy technologies for sustainable development at national, regional and international levels.

**Great Lakes Energy Ltd.**

Great Lakes Energy is a solar innovation and distribution enterprise. For the past decade, the enterprise has focused on the energy challenges of rural healthcare, using its knowledge, experience & expertise to equip healthcare providers with optimized energy solutions, so they can deliver the best possible patient care. The ACEESD will collaborate with Great Lakes Energy in testing and scaling up more energy technologies that have direct socio-economic impact on the lives of rural communities.

***3.4 Describe existing similar centers of excellence in your country or in neighboring countries with the same objective (if any)***

The Makerere University in Kampala Uganda has a Centre for Research in Energy and Energy Conservation (CREEC) which has similar focus areas with those of ACEESD. ACEESD has successfully brokered an active partnership with CREEC to assist in the areas of capacity building through a staff and student exchange program, joint research and development collaborations, and conferences. Also, the Strathmore University in Kenya, in partnership with GIZ, has established a Renewable Energy and Energy Efficiency Competence Center for East Africa (Strathmore Energy Research Centre – SERC). This Center is a strategic institution that the ACEESD has established a partnership in the design, demonstration and testing of renewable energy technologies as well as in curricula and training course development.

The distinguishing feature of the ACEESD from these two Centers is that they do not run postgraduate programs. SERC however runs industrial training events and short courses. The ACEESD will seek to partner SERC in the development and hosting of our industrial and short training courses for professionals and policy makers.

***3.5.*** ***Describe how your Center’s proposal fits into (i) your Institution’s overall Strategic Plan, (ii) your overarching/parent institution’s/line ministries Strategic Plan and (iii) your country’s or regional organization’s Strategic Plan (attach Strategic Plans if and when appropriate).***

1. The ACEESD’s proposal fits into the following CST strategic plan targets:

Development of Centers of excellence in research innovation and technology transfer

Delivering of additional undergraduate and postgraduate programs in energy which is a high priority area

Establishment and implementation of comprehensive staff development, retention, and motivation programs for capacity development

Increase in opportunities for access to continuous education; and promotion of a culture of entrepreneurship and business skills acquisition. In achieving this, the Centre will adopt CST’s approach of creating entrepreneurs through providing training in Entrepreneurship Development. In addition, the Centre will facilitate linkages between both its students and graduates and industry/sector partners and communities to secure them internships, job opportunities and community collaborations. Every student of the Centre will be supported to undertake at least, an internship/industrial placement with our sector partners – who have all expressed strong commitment in this regard.

1. The Rwanda Economic Development and Poverty Reduction Strategy II (EDPRS II) and Vision 2020 strategically target increasing electrification access to 70% in 2017, with a focus on off-grid solutions. The establishment and operationalization of the ACEESD will be pivotal in providing the much needed research and development that will inform policy, and plans aimed at solving the country’s energy challenges.
2. Regionally, the East African Community (EAC) in its Regional Energy Access Strategy has set targets to:

Provide access to reliable electricity for urban and peri-urban poor.

Provide access to modern energy services for all schools, clinics, hospitals and community centers in all partner states.

Interconnect the power systems of member countries and improve energy trade within the region. These are key strategic areas that the ACEESD’s proposed objectives and goals fits into. The Center seeks to train highly-skilled professionals, industry and policy-makers and advance research in mini or off-grid energy technology systems to promote the uptake of modern energy technologies and services in rural, peri-urban poor, and urban communities lacking access to energy.

Section **4: Expected Results of the Proposed ACE**

*Guidance: Please fill in the table below (being as precise as possible). See the project description, development objectives and results framework for more clarity in the reference material. Insert annual targets and milestones. All proposed activities should align to this.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Objective** | **Indicator** | **Baseline**  **(2014)** | **Baseline**  **(2015)** | **Annual Targets**  **(2016)** | **Annual Targets**  **(2017)** | **Annual Targets**  **(2018)** | **Annual Targets**  **(2019)** |
| 1. Strengthen Education Capacity, excellence, – quality, and productivity | Number of new students in ACE courses (30% must be regional students\*):   * New PhD students (% female) (% regional) * New Master students (% female) (% regional) * New short term (min. 40 hours) (% female) (% regional) | 0  5  0 | 10  15  0 | 10 (40%) (40%)  30 (40%) (40%)  20 (40%) (40%) | 10 (40%) (40%)  30 (40%) (40%)  20 (40%) (40%) | 10 (40%) (40%)  30 (40%) (40%)  20 (40%) (40%) | 10 (40%) (40%)  30 (40%) (40%)  20 (40%) (40%) |
| 1. Strengthen Education Capacity & Development Impact | No. of academic staff with at least 1-month internship in a private sector company or a local institution relevant to their field/ sector (% female) | 0 | 5 | 10 (20%) | 10 (30%) | 15 (30%) | 15 (30%) |
| No. of Students with at least 1-month internship in a private sector company or a local institution relevant to their field/ sector (% female) | 5 | 10 | 15 (30%) | 15 (30%) | 20 (30%) | 20 (30%) |
| No. of internationally accredited education programs including sub-regional accreditation | 0 | 0 | 0 | 0 | 3 | 3 |
| No. of students employed by industry  No. of students who create/ start businesses  No. of students employed by universities as faculty members | 12  7  4 | 16  10  6 | 20  10  10 | 20  10  10 | 25  7  16 | 12  7  16 |
| 3.Strengthen Research Capacity excellence – quality and productivity | Number of internationally peer reviewed research publications in disciplines supported by the ACE Program  No. of new research collaboration in region  No. of students employed by research organizations  No. of patents, invention disclosures, trademarks and copyrights | 5  6 | 7  8 | 22  5  20 | 25  8  20 | 25  10  25 | 30  15  25 |
| 4.Strengthen education and research capacity (through increased financial sustainability) and demonstration of value to students and partners | Amount of externally generated revenue by the ACEs | $1,476,854 | $1,500,000 | $1,500,000 | $2,000,000 | $2,500,000 | $2,500,000 |

**\*This refers to students from outside the ACE hosting country**

**Presence of Innovation and Industry Clusters in Geographical Proximity to the Institution**

|  |  |  |
| --- | --- | --- |
| **Are there any innovation/industry clusters that collaborate with your institution?**  **If yes:** | | |
| 1 | Where are they located? | Kigali, Rwanda |
| 2 | What types of activities are they doing? | Youth Innovator Networks, Incubation Facilities, Technology Transfer in collaboration with Universities |
| 3 | Are there any existing interactions between the cluster (s) and your institution? | Yes |
| 4 | Institutional set up, focus, structure and on-going activities of the cluster (s) | First Annual Research and Innovation Week (August 25th -29th , 2015) |
| 5 | Contribution of the cluster (s) to SMEs and entrepreneurship development | HeHe Labs, Private Sector Federation Chamber (Youth innovator networks) |
| 6 | Financing arrangements and sustainability strategies for the cluster (s) | Not approved yet |

**Section 5:**  **ACE Action Plans (Limited to 22 pages in total – 2 pages maximum per action plan)**

**5.1 ACE Action Plan to achieve Learning Excellence (Maximum 2 pages for this section)**

**5.1.1 Objective of plan**

To build capacity through training national and regional Masters & PhD students, technicians, and policy makers who would be able to establish and implement energy systems based on the use of available energy sources and appropriate technologies to cover energy needs for sustainable development.

**5.1.2 Expected results:**

* Strengthen Education Capacity excellence – quality and productivity:
* Number of MSc/PhD students and graduates
* Short Courses and Industrial Training
* Investment in Purchasing Lab and learning Equipment
* Initiating program accreditation at national and regional levels
* Revising existing programs and curricula at University level
* Faculty capacity development and upgrading (including attracting new faculty)
* Regular project review meetings

The following are the details of what this action plan entails:

**5.1.3 Masters and PhD Programs:**

ACEESD will develop excellent curricula for the training of high level MSc and PhD students. The curricula will be implemented initially at the College of Science & Technology, University of Rwanda, and will be developed and shared with staff at partner universities in East and Southern Africa. ACEESD’s courses will be accredited by the Energy Institute, UK, and the World Federation of Engineering Organizations. The teaching of the courses and the interactions will be facilitated by online learning and videoconferencing. This means that facilities will be installed at partner institutions, to facilitate excellence in teaching by world class professors of international calibre. The MSc and PhD programs will be multidisciplinary in nature to allow students from different backgrounds in electrical engineering, mechanical engineering, physics, business and economics to receive broad world class training in their pursued careers.

The PhD program will prepare students to conduct high impact research in three areas: Renewable Energy; Electrical Power Systems; and Energy Management, Trade and Policy (with a focus on smart micro and mini-grid systems). The center will also include sandwich research experiences at partner institutions in Africa, Europe and United States.

**ACEESD Masters and PhD Programmes**

* MSc in Renewable Energy Technologies and PhD by research focusing on Smart Grid Technologies (Wind, Solar, Mini-Hydro, Biomass, Geothermal).
* MSc in Electrical Power Systems and PhD by research focusing on Power systems dynamics, power electronics for renewable energy, generation, transmission and distribution systems.
* MSc Energy Management, Trade and Policy and PhD by research focusing on Economic Evaluation of Renewable Energy Technologies; Inter-State Energy Trade Policy, Utilities Management.

A critical component of all ACEESD’s Masters and PhD programs will be the building of the policy development skills of students. This is in recognition of the fact, specialized knowledge in engineering and technology alone is not adequate to address the development challenges this proposal seeks to tackle. Thus each curriculum developed will aim to provide students with diverse skills including regulatory, legal and economic expertise to enable our graduates deal with the more challenging issues of inter-state energy trade within the Eastern and Southern Africa region. To this end, ACEESD has partnered with the College of Business of Economic of University of Rwanda and also seeking an active partnership with the Carnegie Mellon University Business School, University of Florida’s Public Utilities Research Centre, to strengthen the policy focus of the Centre.

CST’s resident academic staff will initially teach the MSc and PhD courses, complemented by visiting faculty from partner universities across the world. These will include, Colorado, CMU-R, Turbitak, Adger and East and Southern Africa universities. Students will also be able to gain access to digital labs and libraries at partner universities to avoid the need for ACEESD to invest in procuring expensive labs and equipment which are available from partner institutions. The use of these and video conferencing facilities will attract academic staff from partner institutions, as well as CST’s academic staff, to deliver courses from their home universities.

**5.1.4 Short Courses and Industrial Training**

Demand-driven courses in energy will be designed for both the public and private sector professionals. Within the ACEESD secretariat, a unit will be setup to coordinate all short course programs. The courses will be designed to appeal to participants from industry and from government for their professional development. Based on the initial efforts at CST, the potential topics for the short courses will include: *Photovoltaic systems performance analysis*; *Photovoltaics for Rural Electrification, Biomass conversion technology,* *Economic regulation of electric utilities*; *Energy Economics;* *Energy Utility Regulation and Strategy;* *Micro-Hydropower Plant Design, Power System Reliability Models;* *Safety and Precautions in Hazardous Areas for Engineers;* and *Software training (Matlab, SCADA, Labview, Scilab, SimulationX etc.)*. The short courses will be taught by ACEESD’s academic and leading international experts from academia and industry. They will be delivered at CST and at the partner institutions in East and Southern Africa.

Typically, the Centre’s short courses and/or professional training will target both entry-level and mid-career individuals who are seeking to enhance their knowledge and become more effective. Course participants will predominantly come from industry – especially our sector partners. Entrepreneurship development and management skills training will be built into our short courses to provide participants the complementary skills to successfully create new business models or startups to address energy challenges in their institutions or communities.

**5.1.5 Purchasing of Laboratory and Teaching Equipment**

The proposed ACEESD will provide some funding to upgrade the labs to functional standards within the areas of specialization programs. This will involve investments in labs for Electrical Power System, Renewable Energy, Smart Grid and Power Electronics. The goal will be to develop the basic infrastructure required for applied research by the Centre’s students. Again, these labs and equipment will be critical for delivering our industrial training programs.

**5.1.6 Improved Teaching, Learning and Pedagogical Methodologies**

The proposed approach is to apply modern teaching-learning techniques; provide hands-on learning, develop team-based teaching and team-based learning, foster applied problem solving skills, group work, including use of student-centered and word-based learning.

**5.1.7 Initiating program accreditation at national and regional levels & regular review of curricula**

The accreditation will help to have quality and credible plan to achieve international quality benchmarking, it will help to increase the level of assurance that quality service meets or exceeds international standards; to be able to expect same level of service quality across the region in all accredited service provider organization/programs; to be confident that there are appropriate protection in place for privacy, staff competence and supervision, handling of complaints, physical safety, etc.

It will help to create mechanisms for accountability to the person served; to know whether there is a quality improvement process in place to continually improve services; know that there is an opportunity to have input into services generally and can expect to participate in the planning for one's own services.

With the accredited program, it will make us confident that the organization is providing good services and has built-in mechanisms to ensure it is continually working to improve its services; reasonable level of assurance that the organization is well-run and provides good return on investment, which should mean fewer major problems that arise compared to non-accredited service provider organizations.

**5.1.7 Faculty capacity development and upgrading (including attracting new faculty)**

As part of ACEESD’s capacity developing strategy, faculty of the Centre will be supported to undergo training in pedagogy and teaching skills, undertake an exchange visit to partner universities and undergo an industrial placement for at least one month every year. Most importantly, an incentive structure to motivate our students will be put in place, where the top graduating students of the Centre will be engaged for a year to support teaching and research efforts.

Also, administrative and support staff will be supported to undertake professional training courses to enhance their efficiency and productivity.

* 1. **ACE Action Plan for Research Excellence (Maximum 2 pages for this section)**

***5.2.1 Describe briefly to which Objectives and Results each action plan will contribute:***

The research program of the center will aim at delivering innovation in sustainable energy generation, and distribution to remote and rural areas of the East and South African Sub-region. The center will develop around its strong foundation of core faculty members to realize rapid growth of the research capacity. This is probably the strongest asset of ACEESD, in addition to its large network of international research collaborators and partner institutions mentioned above. The center stands a unique chance to grow with and through the career activities of the young scientists who constitute the core faculty.

The research activities of the center will include:

* MSc and PhD level research programs
* Collaborative research program through the linkage of independent research programs by faculty with Peer Universities and sector partners in the region.
* Core facility for micro grid energy-generation based technologies
* Software and systems development for smart grid

***5.2.2 Describe in detail what this action plan entails:***

The research on smart micro-grid and clean energy distribution by the faculty of the center aims at impacting the sustainable development agenda for Africa’s marginalized remote and rural areas. To this end recruitment of faculty, especially those to be based in the center will target scientists with active and independent research projects from the USA, Europe and partner Institutions within the Region. This is a key strategy for maintaining long- term sustainable funding for the center, while the center will also seek funding for collaborative projects to be shared among the faculty members.

**5.2.3 MSc. and PhD level research program**:

During the debut period of the PhD programs, the Center will support an initial cohort of ten (10) PhD students who will be expected to receive their PhD degrees over a period of approximately four (4) years. Another cohort of 10 new PhD students will also be recruited in 2017, and 15 in the subsequent two years. The partner institutions in the East and Central African region have a pool of potential PhD students who currently serve as Assistant Lecturers who will need to complete PhD degrees before promotion to Lecturer positions. In this way, the program will contribute to the training of fifty (50) PhD graduates. Beyond the PhD students, new MSc/PhD programs in renewable energy and energy sustainability, Energy management, and electrical power system will be initiated at the ACEESD and partner institutions in Uganda and Kenya. Finally, interdisciplinary and transdisciplinary PhD research will also be organized at the participating universities in disciplines such as urban planning and physics, chemistry and engineering.

*Publication:* In order to realize quality research, ACEESD will partner with highly experienced researchers and internationally recognized professors at our partner universities. A close working relationship with highly experienced institutions will be enhanced through regular staff exchanges and visits for ACEESD faculty and PhD students funded through a competitive process. The faculty will access funded visits for up to three (3) months per year, while the PhD students will be funded to visit for up to six (6) months per year. These visits are expected to ensure great exposure of participating students and faculty to highly experienced researchers and environments that will greatly enhance their research quality. The outcomes of these interactions will be evaluated based on the quality of research publications and presentations, as well as intellectual property outcomes.

**5.2.4. Linkage of independent research programs of faculty and other researchers:**

The Center will use its core facility to link and coordinate many mini/micro grid and energy trade research programs, including researchers and institutions outside the Center. This clearly secures a steady and sustainable stream of funding to operate the facility while creating the required synergies necessary for delivering on the core mandate of the Center. This plan also ensures that research projects conducted by our MSc and PhD staff are multidisciplinary.

**5.2.5 Core facility for Smart Micro Grid Cell:**

There are key technologies required for cutting-edge research that the ACEESD will procure. These include: Labs and equipment for Smart Grids and power transmission / distribution and Software development tools.

**5.2.6 Research high performance-computing platform:**

The center will establish a highly equipped computer laboratory with SCADA software for use in simulation of smart micro-grids. The facility will be linked with a video conferencing facility to facilitate an e-learning platform for long distance learning.

* 1. **ACE Action Plan for Quality Assurance (Maximum 2 pages for this section)**

***5.3.1 Describe briefly to which Objectives and Results this action plan will contribute:***

***Objective:***This action plan seeks to improve excellence in learning, teaching, research, assessment criteria and strategies for ACEESD courses and training programs. The action plan is underpinned by the following key principle: All quality assurance policies, processes and principles will be developed in consultation with ACEESD’s partners and operated with their full support. All operating procedures will also be reviewed on a regular basis. ACEESD will provide evidence to show how its activities and processes meet with all guidelines, standards and objectives which will be examined and assessed by peers and partners as part of the quality assurance process.

**Results:**

* Quality Assurance System and Policy
* ACEESD Teaching, Learning and Assessment Guidelines
* Framework for Assessing Doctoral Degrees

**5.3.2 *Describe in detail what this action plan entails*:**

The ACEESD will develop and implement a Quality Assurance System which will offer guidelines for the realization of a quality assurance operation at the center. The quality assurance system will include quality assessment tools, including self-assessment and external assessment including accreditations to monitor the core activities of the Center with the aim of improving the quality and standards of teaching/learning, scholarship, research and community outreach. The Center’s quality assurance system which will include roles of students, staff, partners and other stakeholders will be publicly available.

**5.3.3 Quality Assessment Tools:**

Quality Assessment Tools will be established for each of core stakeholders of the center namely; students, staff, facilities and peer review processes. These also include formal mechanisms for periodic review or evaluation of core activities: programs, research and community outreach services.

Students:The Center will institute clear procedures to assure the assessment of students. Students will be assessed using published criteria, regulations and procedures, which will be applied consistently. These will include clear procedures to assure the quality of the examinations. The Center will draw on the rich experience of CST and other partner institutions to create excellent assessment criteria that is robust. Supervision of student research projects will involve joint committees of academics and faculty drawn from the Center, Colorado State University, Carnegie Mellon University, and other renowned institutions.

Faculty, teaching staff, Visiting Academics:The quality of faculty/teaching staff is an important pillar for running the ACEESD. A Search Committee will be instituted within the Secretariat which will be responsible for screening, hiring and recommending for appointment, high quality academic/faculty staff with the requisite qualifications. A policy for Staff recruitment, development and promotion will be developed and implemented to ensure that staff is competent to conduct the core activities of the Center.

**5.3.4 Quality Assurance of facilities**

The quality of infrastructure such as lab facilities, equipment, instruments among others are fundamental to the successful running of a Center of Excellence. Throughout the early stages of the procurement to installation, calibration and actual use of such infrastructure, these will be guided by clear guidelines and procedures. ACEESD will have clear procedures in place to ensure that the quality of the facilities needed for student learning are adequate and appropriate for each program offered. Facilities and learning equipment will be matched against internationally recognized standards in smart micro grids power systems.

**5.3.5 Financing of quality assurance systems and processes**

The College of Science and Technology, University of Rwanda, under which the ACCESD is to be hosted, has a very elaborate Quality Assurance system and whose activities geared towards continued quality improvement, are funded by the government of Rwanda, and in accordance with the institution’s annual budget. The Center’s Secretariat will work directly with the Quality Assurance Officer at the CST, to further strengthen quality assurance both in the Center and the host institution.

**5.3.6 Self - assessment**

ACEESD will conduct periodic program reviews on an annual basis. This shall be carried out using *peer review methods.* Assessment of teaching and learning as well as facilities will be carried out at the end of each academic period of the program to assess the strengths and weaknesses in program delivery. This will help to further develop modules descriptions and improve on pedagogical approaches where needed. This self-assessment will also be carried out partly through student evaluations to establish the quality of delivery of the program and research findings review through peer review processes.

**5.3.7 Information systems**

ACEESD will establish an East and South Africa regional resource Center to act as a center for database collection of all relevant information for its use in ensuring effective management of its core activities. An institution should ensure that it collects, analyzes and uses relevant information for the effective management of its core activities.

**5.3.8 Quality Assurance Handbook**

ACEESD will adopt the CST Quality Assurance & Enhancement Handbook which also includes a copy of the National Qualifications Framework for Higher Education. The framework sets standards that must be followed, monitored, and evaluated for purposes of improving and enhancing the quality of higher education delivery. The information therein is easily accessible at CST or at the Higher Education Council from among its several documents of guidance.

* 1. **ACE Action Plan regarding Equity Dimensions (Maximum 2 pages for this section)**

***5.4.1 Describe briefly to which Results this Action Plan will contribute:***

ACEESD seeks to address the equity concern by enhancing the equity orientation of some of the key project activities that include strategic planning, data generation and use, and provides accountability across levels. The need to generate and use information efficiently and effectively to deliver quality energy services to a vast majority of poor and unreached people across the state is one of the core concerns of the proposed project. The proposal acknowledges the current lack of empirical evidence and proposes to generate it as an essential input into policy and planning processes. This is to be done by undertaking theme based research and studies. It is envisaged that evidence emerging from these studies would feed into policy processes.

The ACE purpose will be to engage participants from national/regional institutions, as well as representatives from industry, government and development stakeholders in short courses and research programs that involve the diverse participation of men and women and other stakeholders across East and South Africa in equitable distribution. The reasonable accommodation and support provisions for students and staff with special needs in the ACE shall entail all necessary and appropriate modifications and adjustments in services and programs of study; in facilities and resources through accessibility provisions where needed (and not imposed), only to ensure that the staff or students with special needs have equal opportunity to same services as peers in the same setting.

This purpose will result in:

* Equitable distribution for the number of women,
* Representation across East and South Africa,
* Representation of industry and government.

**5.4.2 *Describe in some detail what this action plan entails***

The following detailed actions will help the center to spread its activities in institutions and countries across the sub-region:

* 1. Involvement of students and staff from all targeted countries and partner institutions in all workshops and research organized by the center.
  2. Supporting numerous in-country and gender specific workshops and researches coordinated by other institutions and organization.
  3. Intensify engagements with marginalized rural communities across the sub-region.

**i. Involvement of students and staff from all targeted countries and partner institutions in all workshops and research organized by the center:** The center will establish partnership that will be used to host workshops in a bilateral manner. Some of the key-faculty members of the center have already organized workshops in their partner institutions outside Rwanda. The center will partner with a number of training initiatives through the large network of workshop alumni. This allows for broad and equitable spread of the center expertise and activities across the sub-region.

**ii. Supporting numerous in-country and gender specific workshops and researches coordinated by other institutions and organization:** Supporting existing in-country and gender specific workshops around the sub-region is another important strategic plan that will spread the research capacity coming through the center. The center will achieve this through partnerships with non-governmental organizations, development agencies, etc with active research and programs related to gender and energy. The Center’s online platform will also provide training resources to enhance these outreach programs.

**iii. Intensify engagements with marginalized rural communities across the sub-region:** Energy is a key strategic sector for the region because it is a basic requirement for development. The provision of adequate energy infrastructure is essential for the development of industries and businesses especially in marginalized communities ensuring high quality service delivery from social institutions such as health facilities, schools and administrative offices in the East and Southern Africa population. Thus community involvement will be a key priority area for the Centre.

* 1. **ACE Action Plan for Attracting Academic Staff and Students from the Region (Maximum 2 pages for this section)**

***5.5.1*** ***Describe briefly to which Objectives and Results this action plan will contribute***

The ACEESD project targets the future of education and professional competence development in the engineering fields, particularly in the energy sector. This action plan aims at creating a premier engineering research and education network-focused Center for staff and students in the region, where safe and reliable energy solutions for enabling and increasing energy technology adoption in rural areas can be developed.

***5.5.2 Describe in detail what this action plan entails***:

ACEESD will establish a knowledge base with professional profiles of all faculty and experts involved, and catalog the research infrastructure and facilities available. Planning of concrete bilateral research projects and joint Vocational, Bachelor, Master and PhD degrees will be explored as part of the ACEESD project.

On the educational side, the objective is to develop engineers and policy makers that understand multi-scale modeling and intelligent systems within a multi-disciplinary curriculum to produce environmentally protective systems and solutions. This will be accomplished by integrating a broad range of engineering research programs applicable to the spectrum of engineering with full-scale and near full-scale testing laboratories located in each partner state. The goal is a global engineering curriculum accessible by mobility and exchange of faculty and students.

Results

* Host workshops and conferences in both East and South Africa as a marketing tool to attract staff and students
* Establish joint Masters and PhD programs and projects.
* Market intensively the Centre’s programs and projects using speaking tours and traditional and social media platforms.

The main project will:

**Host workshops and conferences in both East and South Africa as a marketing tool to attract staff and students**: The project envisions annual conferences to be hosted in the ten main partner cities of Africa. These conferences will be used as marketing avenues to attract high-caliber staff and students from these countries to teach research or study at the ACEESD. It will also further encourage collaboration between higher learning institutions in the regions.

**Establish joint Master and PhDs programs and projects:** These will allow students from regional universities to undertake their projects in their home country while gaining access to the facilities of the Center as well as receiving inputs from the international partners. This arrangement will be extended to include students of partner institutions outside of the Centre’s Masters/PhD program in a mutually beneficial arrangement.

**Market intensively the Centre’s programs and projects using speaking tours and traditional and social media platforms.** The ACEESD will use newspapers, magazines, radio stations, TV stations, websites and social media to broadcast its activities and success stories. The advertising and marketing efforts will be complemented with the establishment of an ACEESD Tweeter and Facebook accounts, and an ACEESD website that will highlight ACEESD’s activities. These are intended to increase the visibility of the Center and its programs and projects to staff and students in the region. The center will also use its unique position to attract distinguished scientists and experts in energy from its partners, including those with no formal links to the Center, to travel the sub-region on a speaking tour. These events will serve the purposes of popularizing and creating awareness on the Center, its programs, projects and available research and training opportunities with the ultimate aim of attracting students and staff from these countries to the Center.

**Provision of Language Support to encourage participation of students from both Anglophone and Francophone participants:** In an effort to ensure the joint participation of Francophone and Anglophone participants, English or French translations will be provided by professionals during all of the short courses and workshops. This will be done to ensure that the participants can communicate effectively. Funding for language school support and relocation expenses will also be provided to support the movement of faculty and students between partner institutions and industry within East & South Africa. The funds will cover the cost of travel, as well as the cost of institutionalized faculty exchange and regional travel for research and training.

* 1. **ACE Action Plan for National and Regional Academic Partners (Maximum 2 pages for this section)**

***5.6.1*** ***Describe briefly to which Objectives and Results this action plan will contribute***

This action plan aims at expanding research and learning opportunities, and forging academic cooperation across national and regional partner institutions using interdisciplinary and transdisciplinary approaches.

**Results**

* Create capacity in high quality engineering competence development and education.
* With help from partner universities, become providers of internationally accredited programs.
* Equal partnership in a network of world leading universities and research institutes with opportunities for doctorates and joint research projects.
* Accelerate industrial development through world class technology transfer and competence building.
* Internationalization of our core knowledge and competencies in new emerging regions.

5.6.2 ***Describe in detail what this action plan entails***

A key aspect of ACEESD program will be to develop teaching capacity for all partners. Alongside curricula development, the project will create teacher-training programs to help support faculty in delivering the content. This component will also offer a unique research and student/faculty exchange opportunity as partners develop best practices in creating scalable competency-based energy programs.

Optional projects in entrepreneurship and technology transfer will be suggested to complement the educational programs. In addition, infrastructure projects targeting requirements and specifications to establish and finance engineering laboratories will be added to provide access to East and South African partners.

Conferences, workshops and symposia will rotate between the ACEESD’s partners, with the initial conference in Rwanda. The conferences will allow participants to face issues of human capacity development and invite companies into a dialogue on how to best increase competencies in the energy sector of developing regions.

The key activities that are needed for attracting national and regional academic partners include:

**Establish satellite offices and laboratories through recruitment of existing independent research groups in partner institutions:** The center will establish partnerships that will be used to host satellite workshops in a bilateral manner. The center will explore a number of training initiatives through the large network of workshop alumni over the past five years. This will allow for broad and equitable spread of the center expertise and activities across the sub-region.

**Plan an exchange program for faculty and students for laboratory visits, seminars and lectures:** Many bilateral exchanges between faculty and students on a sustainable basis will make the center highly visible to its partner institutions and increasingly build development-oriented networks.

**Invite National and Regional Academic Partners**: Staff scientists, researchers and/or policymakers will be invited to participate in ACEESD short courses and workshops. They will participate either as students or instructors, depending on their background, qualifications and experience. The goal will be to engage the staff members at key national, regional and sub-regional organizations in the training and research activities of ACEESD. Furthermore, the active scientists at these organizations will be engaged as partners in the focused research groups, and the seed grants that will support engagement in research. This will be facilitated by funding their visits to participating regional/national partner institutions (for research and training activities) or by funding the visits by ACEESD students and faculty to the key government stakeholders from the national, regional and sub-regional sectors. The impact of these visits will be quantified using questionnaires that will be administered on the participants and the partner organizations.

* 1. **ACE Action Plan for National and Regional Sector Partners (Maximum 2 pages for this section)**

***5.7.1 Describe briefly to which Objectives and Results this action plan will contribute:***

The purpose of this action plan is to engage participants from national/regional government agencies and private institutions, in cooperation with sector and research labs in research, learning and outreach activities.

To ensure that the proposed program has an impact on regional and national sector partner institutions, a special effort will be made to engage more participants from the institutions/organizations in the training and research activities of ACEESD.

***5.7.2 Describe in detail what this action plan entails:***

The following are the key activities to create strong ties to national and regional partner institutions:

* 1. Training of key personnel and technology transfer services.
  2. Technical cooperation in fieldwork and study sites operations.
  3. Consultancy services on research and development activities
  4. Service provision in the core-facility for sample processing and analyses.
  5. Provision of equipment maintenance through the facility established in partnership with key equipment makers at the center, as well as the center’s own equipment management and maintenance unit.

**Training of key personnel and technology transfer services:** ACEESD’s will offer opportunities for retraining of personnel, where sector partners will collaborate with the Center’s curriculum development team to develop specialized courses to suit the needs of their personnel. This service will form part of a large bundle of services, which will allow the Center to negotiate for financial and technical support from key national and regional partners.

**Technical cooperation in fieldwork and study sites operations:** There are many partners identified with who core CST academic staff members already have working relationships with. These strategic partners (REG, RURA, NIRDA, Great Lakes Energy, Barefoot Power etc.) will offer technical expertise and resources that the Center will need in its research and training purposes. These partners will be crucial in the translation of the research coming out of the Center into products and services and also provide avenues for pilot commercialization activities.

**Consultancy on research and development activities:** The Center will engage with a number of private sector partners to provide consultancy services leading to the commercialization of research output. The large range of research activities to be undertaken by the center, coupled with the large number of talented personnel to be attracted and trained, will lead to a significantly high number of market viable innovations in energy trade, and power production and monitoring. To make a significant impact on provision of energy in rural East and Southern African region where it is lacking, it is crucial that the center assembles a wide array of private sector partners. These will ensure sustainable funding streams for the center to continue to expand its training and research activities in energy sectors.

**Service provision in the core-facility for sample processing and analyses:** Apart from consultancy services, sector partners can benefit from the center’s core facility on a fee-paying basis. This will be more cost-effective for a small local company to have access to cutting-edge technology and expertise to gain a competitive edge in a market dominated by large global players.

**Provision of equipment maintenance through the facility established in partnership with key equipment makers at the center, as well as the center’s own equipment management and maintenance unit:** Many companies and institutions that can afford sophisticated equipment are reluctant to acquire them because of the absence of affordable maintenance services. It is not economically viable for all the major equipment makers to establish themselves in small countries in the sub-region with research activities. The Center therefore, will provide the much needed hub for all the equipment servicing to be provided to clients. The center stands to benefit from this unit in remarkable ways that will enhance its uptake of technology. It will therefore be a major driver of development by allowing high rate of technology uptake to advance science research through access to cheap and effective maintenance services that can now be provided readily in East and Southern Africa.

* 1. **ACE Action Plan for Collaboration with International Academic Partners (Maximum 2 pages for this section)**

***5.8.1 Describe briefly to which Objectives and Results this action plan will contribute:***

The objective of this action plan is to engage high quality international partners in the development of enhanced quality research and training activities by students and faculty. This will help the ACEESD cooperate in international research and training while getting supervision for Doctoral and Masters Students. Key partners such as the Colorado State University, USA and the Turbitak Research Centre, Turkey with their wide and rich experience, will assist in curriculum development, staff and student capacity building through exchange visits, joint publications, and teaching of courses through international collaboration.

***5.8.2 Describe in detail what this action plan entails***:

The following activities are being proposed to strengthen collaboration with our international academic partners:

**Constitute a minimum of 30% of the lecturers and instructors at the Center’s workshops and training activities from international academic partners.** The center will seek to have equal proportions of local, regional and international faculty in all its programs. This creates an intellectually enriched team that is good both for students and the faculty as well. **Joint supervision in all Masters/PhD projects:** All thesis project supervisory committees for students of the Center will be composed of two to three faculty members, with one each based at the Center, a sub-regional partner and an international partner. In addition, the Center will encourage the international partners to involve its faculty and laboratory in the projects, this will offer additional avenue for expanding the collaboration and increasing research activities.

**Partners in all network projects at the center:** The distribution of network projects will always involve faculty at sub-regional and international level depending on interest and nature of the project. All options will be explored to ensure research teams are always built across the three groups of faculty of the Center.

**Network of mentors for young faculty members and doctoral fellows of the center:** International partners will be extremely valuable in mentoring Masters/PhD students of the center, as they ensure the training and research work are up to international standards. They provide networking opportunities for the students, which will be good for their future career development.

* 1. **ACE Action Plan for Management and Governance (Maximum 2 pages for this section)**

**5.9.1 *Describe briefly to which Objectives and Results this action plan will contribute:***

**Objective:** To ensure that the ACEESD is able to effectively and efficiently achieve its training and research objectives through a clear governance structure free from ambiguities and political influences. This action plans sets out the proposed governance and management structure needed to ensure this.

**Results:** A clear governance structure, procedures manuals, regular evaluation, transparent selections processes, communication strategies including the use of ICT and a code of conduct.

***5.9.2 Describe in detail what this action plan entails:***

At the start of each year, an orientation program will be organized to introduce all new faculty, staff and students of the Center, to the Code of Conduct of ACEESD. This code of conduct will provide each team member with an honor code which requires members to ensure that actions are rid of political or special interests. All staff will be trained in World Bank procedures and program implementation and reporting.

The ACEESD will be hosted at CST, with the CST’s Principal as the Head of the Centre. The Center will be managed by a Director or Center Leader who will be advised by the International Scientific Board and the ACEESD Steering Committee. The Steering Committee will meet at once every quarter and shall serve the Board of Directors for the Centre. Its membership will include representatives from each partner institution of the Centre. The International Scientific Advisory Board will be made up of 5-7 eminent experts in the key focus areas of the Centre and shall advise the Centre Management on all technical and standardization issues including international accreditation and benchmarking of the Centre’s academic programs. The International Scientific Advisory Board will meet at once every year.

There will be an ACEESD Secretariat to be headed by an Administrator who will report to the Deputy Centre Leader/Principal Investigator. The PI/Deputy Center Leader will report to the Center Leader, who will have responsibility for national and regional integration and partnerships. The Center Leader reports directly to the Principal of CST, who is the Center Head. Three academic units/departments in the three focal areas of ACEESD’s academic programs will also be established (with the Heads reporting to the Deputy Centre Leader). These will be responsible for all academic related activities of the Centre.

The ACEESD Secretariat under the supervision of the PI/Deputy Center Leader will see to the day-to-day running and implementation of programs at the Center. The Secretariats activities will include, but will not be limited to: scheduling and communication, program planning and coordination, marketing, monitoring and evaluation, budgeting, managing international and national collaborations, industrial collaborations, student internships/study visits, all student and staff exchange programs, community outreach among others. ICT and multimedia including social media tools such as websites, Facebook, Twitter, and Blogs will be used by the Secretariat to publicize and market ACEESD activities and its success stories. It will also be responsible for performance evaluation of staff, activities in teaching, research and outreach. The Secretariat will work closely with the Academic Departments of the Centre for a smooth operation of the Centre’s annual work programs. It will have a dedicated officer each for Finance, Procurement, ICT and a driver and cleaner.

An Industrial/Communities outreach Unit will also be established within the Secretariat to engage in capacity development and liaise with industry, government sector agencies as well as community leaders and local authorities across the East Africa region. This is for purposes of field testing of developed technologies, as well as research work of PhD and Master’s students. This unit will also assist in running of short and industrial training programs in collaboration with academic departments.

It is envisaged that this action plan will be implemented over the period of the project, with the following as milestones – establishment of ACEESD Steering Committee; Secretariat; International Scientific Advisory Board, appointment of Administrator, administrative staff, and the administration of MOUs and MOAs.

It is also expected that by the end of the implementation of this action plan, the ACEESD would have engaged high quality international partners in the development of enhanced quality of research and training activities. The following output indicators would also be used for monitoring and evaluating this action plan: a clear governance structure, procedures manuals, regular evaluation, transparent selections processes, communication strategies including the use of ICT, and a code of conduct.

Proposed Organogram of the ACEESD



* 1. **ACE Action Plan for Sustainable Financing (Maximum 2 pages for this section)**

***5.10.1 Describe briefly to which Objectives and Results this action plan will contribute***

The objective of ACE is to develop a plan for sustainable financing. The center will engage in a number of activities with a number of key partners in academia, government and industry, who are relevant for the financial sustainability of the center. Many of the plans provided by the center are strategic in securing its long-term financial viability. The crucial principles for ensuring secured finances include budgetary discipline, strict adherence to performance contracts, and recruitment of highly qualified professionals. The program will consist of funding for the universities’ academic, technical, and administrative staff, other operational costs, and investments into goods, training, services and limited civil works. The key activities below will be needed to ensure sustainable financing and these will be taken by the center:

* Recruitment of faculty of the center will be based on their existing independent, funded research programs.
* Support Masters/PhD students to apply for additional funding.
* Fee paying professional development programs for renewable energy sector
* Project grants from international agencies to fund network projects initiated by the center
* Consultancy fees for supporting research and development activities of private companies
* Independent training workshop grants raised by faculty and carried out through the center
* Fees from industry of research output from the center.
* Establishment of additional services outfit to primarily service the needs of the center, and offer spare capacity to other institutions and private individuals on a commercial basis.

***5.10.2 Describe in detail what this action plan entails:***

The detailed description of this action plan is as follows:

**Recruitment of faculty of the center to be based on their existing independent, funded research programs (following the rules of the University of Rwanda/ College of Science and Technology):**

To ensure the long-term sustainability of the center, it is essential that recruitment of faculty focuses on attracting individuals who are already active in winning grants to fund their independent research programs. The proposed center will have the good fortune of the pioneering core-faculty members who all have active and funded research projects.

**Support Masters/PhD students to apply for additional funding**: There are several donor agencies that provide small grants and scholarships for graduate students, therefore students will be trained on grant writing techniques and encouraged to take advantage of these opportunities.

**Fee paying professional development programs for energy sector:** ACEESD could benefit from engaging in research contracts for government agencies and the private sector. The proposed industrial activities could involve testing and characterization programs for industry, and contract research for government/development agencies. On a smaller to medium scale, the target companies would be small technology-oriented entities without the resources to own their own laboratories. There, ACEESD partners could assist with testing, characterization and trade facilities as well as research. ACEESD faculty could also be available to consult with members from the private sector for specified periods.

**Project grants from international agencies for funding network projects initiated by the center**:

The center plans to actively pursue the idea of network projects by applying for major grants designed for big projects with the assistance of our international partners. With the solid base that will be provided by this ACE grant, the center will advantage all its assets to the competition for international grants.

**Consultancy fees for supporting research and development activities of private companies**:

Most companies engaged in commercialization of new research findings require consultancy services in the scale up processes. The center will engage with a number of private sector partners to provide consultancy services leading to the trade of research output.

**Independent training workshop grants raised by faculty and carried out through the center:**

This model will be encouraged to ensure that every independent grant provides an allocation for workshops to be carried out through the center.

**Fees from industry of research output from the cente**r: A good number of reputable universities generate huge amounts of income through trade of intellectual property. The center will engage with a number of private sector partners to license the Center’s research output for commercialization. The wide range of research activities to be undertaken by the center coupled with the large number of talented personnel to be attracted and trained, will lead to significantly high numbers of market-viable innovations in electrical power, renewable energy and industrial trading. These measures will ensure sustainable funding streams for the center to continue to expand its training and research activities.

**Establishment of additional services outfit to primarily service the needs of the center and offer spare capacity to other institutions and private individuals on a commercial basis**: Critical analysis of the project budget of the center, backed by some years of experience running workshops in Rwanda, has demonstrated clearly the need of the center to engage in provision of required services at a cost. It is in the interest of the center to invest its projected expenditure on these services and set up outfits to provide these services at stable prices over the four years. These services will include; electrical equipment supplies, laboratory supplies store, Economy-type guest housing, equipment management and maintenance, and power production and supplies etc.

* 1. **ACE Action Plan for Monitoring and Evaluation (Maximum 2 pages for this section)**

***5.11.1 Describe briefly to which Objectives and Results this action plan will contribute***

The framework for formulation of the Action Plan at the ACEESD shall focus on the following key components of Monitoring and Evaluation:

**Capacity Building:** ACEESD shall access the development Context of the Energy sector in the East and Southern Africa Partner States, and undertake targeted intervention to address the regional needs in the field of energy sector.

The ACEESD shall formulate key guidelines in **Energy Policies, Generation Strategy and Regional Priorities** to form a basis of key goals and objectivesof ACEESD in answering the needs of supply of Energy in Rural and remote areas.

**Situational assessment of Rwanda as the host Country for the ACEESD Program** shall be undertaken to analyze the overall effectiveness of the running program. This shall be followed by the regional assessment of partner states within the East and Southern Africa region.

***5.11.2 Describe in detail what this action plan entails***:

**Capacity Building:** ACEESD shall carry out a comprehensive overview of the regional, and partner states in the East and Southern Africa countries and their developmental context. The overview shall assess how energy supply and poor penetration in rural areas affect the economic sector, social and educational sectors. Intervention to address these challenges shall be tackled through targeted strategic action plan in building capacity. This will be done through investment in training infrastructure, curriculum design and reviews, and capacity building of academic faculty for the Center and regional partners through post graduate training in +Masters and/or PhD programs. Local support for the program shall be carried out through administrative support in organizing Continuous Professional Development training for various industrial stakeholders. The training will take the form of workshops and conferences, as well as short courses. The Center shall also offer technical support and community support by training technicians and community outreach program officers. Finally, outcome of training students and actual construction of off grid energy power generation grid shall be covered.

**Energy Policies, Energy Generation Strategy and Regional Priorities** shall form the key goals and Objectives of ACEESD. The implementation plans shall guide the programs of the Center in terms of research and academic training that shall be put in place in order to achieve supply of Energy in Rural and remote areas. The specific needs on realizing equitable economic growth through sustainable development is outlined in the MDG, Agenda 2063 etc. Formulated policies, strategies and areas of priorities shall undergo meta-evaluation process along various developmental themes. The global, regional and partner countries’ report shall be analyzed and subsequently evaluated.

**Host Country Program:** The situation assessment of Rwanda as the host country for the ACEESD shall be undertaken to analyze the overall effectiveness of the running program. The Country enjoys good governance and has clear policy of institutional management with high output level. ACEESD shall be hosted in the University of Rwanda – College of Science and Technology, which is under the Ministry of Education. The host institution has very clear and elaborate structure and policy that guides establishment of Academic Centers of excellence. On one hand, a comprehensive analysis of the needs of the Center shall be addressed through strengthening its governance structure while building on her opportunities, and on the other, addressing high risk areas. Regular evaluation and assessments shall be carried out also in regional partner states within the East and Southern Africa and reports on the progress of programs, projects and activities shall be expected.

**ACEESD Projects Evaluation:** Thisshall be undertaken through a structured reporting arrangement as in the World Bank guidelines. Key personnel shall undergo training during the initial stages to familiarize themselves with World Bank M&E procedures. The ACEESD project evaluation shall be assessed based on laid out accounting detailed procurement plans as well as disbursement plans, internal audits, external audits, annual project and management reports, and mid-year progress reviews. Regular field visits shall be carried out to ascertain the effectiveness of the program. Tracer studies needs to be put in place to feedback into the review of the ACEESD overall mandate.

**Section 6: Use of Existing Physical Resources**

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| Resource | Currently Used for and by | Proposed Project Use |
| Office spaces for Electrical and Electronics Department | Used by faculty of Engineering for their current  Institution dispensations. | Accommodate/house resident faculty of the Center. |
| ICT Department | Provides the university community with fast internet access and ICT training. | Will be used for the online services needed by the Center. |
| Library | Provides library services  including e-book subscription to the university community | Will be used for the library services needed by the Center. |
| Efficient procurement of scientific and engineering  equipment and materials | For procuring scientific and engineering equipment and materials for the university community. | Will be used for procuring the equipment and materials for the Center. |
| Variety of electrical and Electronics components and equipment | Used for research by faculty in the electrical and electronics department. | Will be used for analytical studies in the Center. |
| Lab Technicians (4), Workshop engineers (4)  Administrative Staff (3), Support Librarian (3),  Teaching and Research Assistants (15). | Supports the technical, administrative for electrical and electronics department | Will also be used to support the Center of Excellence. |
| Class rooms equipped with projectors | Used by faculty for their current  Institution teaching | Will be used for the teaching services needed by the Center |
| Video conference room (2) | Used by faculty for their current  Online meeting and teaching | Will also be used to support world-class online learning technical solutions for the Center of Excellence. |

###### Section 7: Academic Staff Resources, Capacity Building and Visiting Academic Staff /Industry Experts Plan

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| **Type of Academic Staff/Experts (existing, visiting, new, industry etc.)** | **Area of Expertise** | **Comment (benefits)** |
| Prof. Manasse Mbonye | Physics  Relativistic Astrophysicist | Head of Institution  Principal of College of Science and Technology/ University of Rwanda  World class researcher and teacher in Physics |
| Prof. Etienne Ntagwirumugara | Electrical, Electronics & Telecommunication | Proposed Center Leader  Head of Electrical and Electronics Engineering Department/ College of Science and Technology. World class researcher and teacher in Electrical and Electronics Engineering |
| Prof. Bruce Krogh | Electrical and Computer Engineering | Deputy Center Leader/Principal investigator  World class researcher and teacher in Electrical and Computer Engineering |
| Prof. Nelson Ijumba | Electrical Engineering  Power and energy systems  Impact of technologies on sustainable development | The Deputy Vice-Chancellor, University of Rwanda. Professor of Electrical Engineering  World class researcher and teacher in Electrical |
| Prof. Bonfils Safari | Astrophysics, Space and Climate Science | Head of Physics Department/ College of Science and Technology  Highly experienced teacher and  Researcher in Physics |
| Prof. Santhi Kumaran | Microwave and Optical Engineering and Computer Engineering | Dean, School of ICT/ College of Science and Technology. Highly experienced teacher and  Researcher in Computer Engineering |
| Dr. Ignace Gatare | Electrical Engineering (Telecom & Photonics) | The Director General of Science and Technology Commission/Rwanda  Highly experienced teacher and  Researcher |
| Dr. Ernest Mazimpaka | Renewable Energy | Head of Mechanical & Energy Department |

**Main areas for further capacity building of Academic staff**

Academic Exchange programs – College of Science and Technology, Colorado State University and Turbitak Research Centre partnership

Internal and External training workshop facilitation

Renewable Energy (Mini and Micro Grid)

Power Systems and Energy Management

**Expected Benefits of Visiting Academic Staff**

Research collaborations, peer review and joint publications of research findings

Training of Faculty and Students

Supervision and Mentorship of Masters and PhD students

Facilitator and Speaker engagements at workshops, conferences and symposia

Funding Proposal development and grant writing

**Section 8: Implementation Capacity, Arrangements and Plans**

8.1 ***Describe the overall implementation capacity and arrangements set up to implement this proposal.***

The ACEESD will have Prof. Etienne Ntagwirumugara (Center Leader) and Prof. Bruce Krogh (Deputy Center Leader and Principal Investor) to be in charge of the Center. The Center Leader will report to the Principal of the College of Science and Technology (Prof. Manasse Mbonye). The Center leaders will be assisted by a Steering Committee made up of international and regional partners and an International Scientific Advisory Board.

In the initial quarter of the project implementation, all these teams/groups will be brought together to develop the work plan and schedule of activities for the first year. All staff (administrative and faculty) will undergo training in World Bank procedures, in the management of large donor-funded projects, as well as in CST’s administrative, financial and procurement procedures. In the first year, all administrative processes and procedures for the management of ACEESD’s units and the Secretariat will be established. These processes and procedures which will be developed into Comprehensive Procedures Handbooks will cover procurement, monitoring and evaluation, accounting, and program implementation and reporting.

As identified in the action plan for management and governance structure, the day-to-day running of the Centre will be managed by the ACEESD Secretariat. The Secretariat (under the supervision of the Deputy Centre Leader) will oversee activities such as program administration, coordination of performance contracts and Memorandum of Understandings (MOUs) with all partners, development of work schedules with and for all units. The liaison with all industrial, government and sector agencies as well as community leaders and local authorities across the East Africa region will be handled by an Industrial/Communities outreach Unit which will be established within the Secretariat. This is for purposes of field testing of developed technologies, as well as research work of PhD and Master’s students. The Secretariat will be headed by an Executive Secretary and two Principal Assistants who will be hired on a full-time basis.

CST management personnel with extensive experience in the management of large donor-funded projects will provide oversight monitoring services to the Secretariat. These include CST’s Director of Finance (Mr. HIGIRO C. Johnson); Procurement Officer (Mr. GAHUNGA Callixte) and the Director of Administration and HRM Unit (Mr. RURANGWA Fred).

* + 1. **Academic management**

The CST has a very strong structure for maintaining academic quality in teaching, learning, and research, underpinned by the various policy and strategy documents. Academic management of the ACEESD will thus fall within this strong management structure of CST as well as its partner institutions. The Academic Quality Assurance Unit (AQAU) headed by Dr. Béatrice K. MIRONKO, is responsible for maintaining quality in academic affairs at the CST. This Unit in turn reports directly to Prof. Manasse Mbonye (Principal of CST). Recruitment of Professors, Visiting Professors, Associate Professors, Assistant Professors and Lecturers into the Center will also follow the transparent and rigorous criteria of CST to ensure that teaching of the ACEESD’s high-quality programs and carrying out research is led by world class academics. Student admissions will also follow UR-CST’s fair and transparent process, which involves i) calls for applications ii) assessment of applications using the clearly defined criteria in the call for applications and iii) announcement of shortlisted candidates. The ACEESD Secretariat will be responsible for tracking progress of students who will be awarded fellowships or sponsorships to ensure they maintain the academic requirements of their fellowship awards. ACEESD’s partner institutions will also implement academic management processes in line with their institutions framework for academic governance.

* + 1. **Administration, including financial, procurement, and environmental aspects**

The overall financial management of the ACEESD will be done under the supervision of CST’s Director of Finance (Mr. HIGIRO Johnson) who holds a Bachelors’ Degree in Accounting and a Certified IPSAS. Mr. HIGIRO has thirteen (13) years of experience in Public Accounting. He has served in the following financial positions in the CST: Internal Auditor (January 2007 – October 2008); Director of Finance former KIST (December 2008 to June 2013) and Director of Finance College of Science and Technology (July 2013 to date).

The Office of the Director of Finance is tasked to undertake all internal audits, and provides financial management for all expenditure on programs at the College. This service shall extend to the ACEESD through an effective and centralized financial management system effected by the Government through the National Bank of Rwanda.

Procurement shall be by Procurement Officer, Mr. GAHUNGA Callixte, who holds a Bachelor of Commerce (Accounting Option). He is also a holder of ACCA Part 1 and is currently pursuing ACCA part II. Mr. GAHUNGA has 8 years of experience as the Procurement officer at the College and is well acquainted with all internal and external procedures of procurement of goods and services as outlined at the National and International levels.

The procurement plan for the ACEESD shall follow established procedures at CST which involve developing procurement strategic and action plans complete with cost estimates of various items and components. The action plans will be prepared in advance to ensure timely procurement of all goods and services that the Centre shall need to operate effectively. The document will be submitted to the Director of Planning for review and procurement plan based on the action plan is posted on the College websites for public viewing.

The procurement for the ACEESD shall be subjected to the National Guidelines and Regulations stipulated by the Rwanda Public Procurement Authority and guidelines. Other items beyond Rwf 3,000,000 shall be subjected to the International Tender procedures and per the World Bank guidelines and procedures.

**Section 9: Implementation Plan of each ACE Action plan**

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.1 Learning Excellence** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Developing the program |  | Design of programs |  | Programs Evaluation |  | Programs Review |  | Programs Evaluation |  | Programs Review |  | Programs Evaluation |  | Programs Review |  | Programs Evaluation |
| Master Research Programs | Registration | Workshops |  |  | Registration | Workshops |  |  | Registration | Workshops |  |  | Registration | Workshops |  |  |
| PhD Research Programs | Registration | Workshops |  |  | Registration | Workshops |  |  | Registration | Workshops |  |  | Registration | Workshops |  |  |
| Short Courses | Registration |  |  |  | Registration |  |  |  | Registration |  |  |  | Registration |  |  |  |
| Industrial Training |  |  |  | Workshops |  |  |  | Workshops |  |  |  | Workshops |  |  |  | Workshops |
| Purchasing Lab and learning Equipment | Review of existing labs and equipment | Lab and equipment procurement |  |  | Installation |  |  |  |  |  |  |  |  |  |  |  |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.2 Research Excellence** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| PhD and Master Research Program |  | Research  Starts |  |  |  | Research  Starts | Research  visit abroad |  |  | Research  Starts | Research  visit abroad |  |  | Research  Starts | Research  visit abroad |  |
| Linkage of Faculty Research | Apply |  |  |  | Apply |  |  |  | Apply |  |  |  | Apply |  |  |  |
| Collaborative research program | Apply |  |  |  | Apply |  |  |  | Apply |  |  |  | Apply |  |  |  |
| Software and system development for smart grid | Procure  equipment |  | Set up the  unit |  | Create research  profile system |  |  |  |  |  |  |  |  |  |  |  |
| Core facility for micro grid | Planning |  |  | Research  symposia  with  industry  partners | Planning |  |  | Research  symposia  with  industry  partners | Planning |  |  | Research  symposia  with  industry  partners | Planning |  |  | Research  symposia  with  industry  partners |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.3 Quality Assurance** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Quality Assessment Tools | Review |  |  | evaluation of core activities | review |  |  | evaluation of core activities | review |  |  | evaluation of core activities | review |  |  | evaluation of core activities |
| Quality Assurance of facilities |  | Review |  | international recognized standard |  | Review |  | international recognized standard |  | Review |  | international recognized standard |  | Review |  | international recognized standard |
| Financing of quality assurance |  |  |  | Report to QA/UR |  |  |  | Report to QA/UR |  |  |  | Report to QA/UR |  |  |  | Report to QA/UR |
| Self- assessment |  |  |  | evaluation |  |  |  | evaluation |  |  |  | evaluation |  |  |  | evaluation |
| Information systems | Collect database |  |  |  | Collect database |  |  |  | Collect database |  |  |  | Collect database |  |  |  |
| Quality Assurance handbook | Document elaboration |  |  | Review |  |  |  | Review |  |  |  | Review |  |  |  | Review |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.4 Equity Dimensions** | 1st  Qtr. | 2nd  Qtr | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| All-inclusive partner and Center Workshops | Starting when needed |  |  |  | continuous |  |  |  | continuous |  |  |  | continuous |  |  |  |
| Satellite Workshop in target  countries/institutions |  |  |  | workshop |  |  |  | workshop |  |  |  | workshop |  |  |  | workshop |
| Networking the Core facility and  Center projects in the sub-region | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  |
| Support in-country and gender  specific workshops | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  |
| Carryout public energy assessments |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |  |  |  | Continuous, as and  when needed |
| e-learning platform |  |  | Create e-  learning  environment |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.5 Attracting Academic Staff and Students from the Region** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Establishment joint Master and PhDs programs and Projects with the region |  |  |  | Enroll sub-  region  students’ in  programs |  |  |  | Enroll sub-  region  students in  programs |  |  |  | Enroll sub-  region  students in  programs |  |  |  | Enroll sub-  region  students in  programs |
| Conduct outreach programs and  seminar/lecture tours |  |  | Sub-regional  Outreach  programs |  |  |  | Sub-regional  Outreach  programs |  |  |  | Sub-regional  Outreach  programs |  |  |  | Sub-regional  Outreach  programs |  |
| Establishment of satellite offices and laboratories | Planning |  |  | Establishment |  |  |  | Establishment |  |  |  | Establishment |  |  |  |  |
| Host workshops and conferences in both East and South Africa |  |  |  | conduct |  |  |  | conduct |  |  |  | conduct |  |  |  | conduct |
| The advertising and marketing efforts | Starting |  |  | Continuous | Continuous |  |  | Continuous | Continuous |  |  | Continuous | Continuous |  |  | Continuous |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.6 National and Regional Academic Partners** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Joint Master and PhD programs |  |  |  |  | Registration |  |  |  | Registration |  |  |  | Registration |  |  |  |
| projects collaboration with  institutions/countries in the sub-region |  |  |  | Recruitment |  |  |  | Recruitment |  |  |  | Recruitment |  |  |  | Recruitment |
| Exchange programs |  |  | start |  |  |  | start |  |  |  | start |  |  |  | start |  |
| Recruit academic faculty in partner  institutions |  |  |  | Recruitment  of research  groups |  |  |  | Recruitment  of research  groups |  |  |  | Recruitment  of research  groups |  |  |  | Recruitment  of research  groups |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.7 National and Regional Sector Partners** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Technical cooperation | Processing |  |  |  | when needed |  |  |  |  |  |  |  |  |  |  |  |
| Consultancy services on research | Processing |  |  |  | when needed |  |  |  |  |  |  |  |  |  |  |  |
| Training of key personnel | Processing |  |  |  | when needed |  |  |  |  |  |  |  |  |  |  |  |
| Provision of equipment maintenance | Processing |  |  |  | when needed |  |  |  |  |  |  |  |  |  |  |  |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.8 Collaboration with International Academic Partners** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Partners in Center projects |  |  |  | Partners  recruitment |  |  |  | Partners  recruitment |  |  |  | Partners  recruitment |  |  |  | Partners  recruitment |
| Joint supervision with international  Partners | research projects, |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Some % of the Center Faculty will be  international | workshops organized,  continuous |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.9 Management and Governance** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Governance structure |  |  | Setting |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Regular evaluation team |  |  | Setting |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.10 Sustainable Financing** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Establishment of additional services |  |  | Setting |  |  |  | Setting |  |  |  | Setting |  |  |  | Setting |  |
| Fees from industry of research output |  |  |  | starting |  |  |  | starting |  |  |  | starting |  |  |  | starting |
| Independent training workshop grants | Continuous |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Consultancy fees for supporting research | Continuous |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Project grants from international agencies | Application |  |  |  | Application |  |  |  | Application |  |  |  | Application |  |  |  |
| Fee paying professional development programs | Workshop |  |  |  | workshop |  |  |  | workshop |  |  |  | workshop |  |  |  |
| Support Masters/PhD students to apply for additional funding |  |  |  | Apply for  grant |  |  |  | Apply for  grant |  |  |  | Apply for  grant |  |  |  | Apply for  grant |

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| **Description of Activities** | **Year 1** | | | | **Year 2** | | | | **Year 3** | | | | **Year 4** | | | |
| **5.11 Monitoring and Evaluation** | 1st  Qtr. | 2nd  Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr. | 4th  Qtr. | 1st  Qtr | 2nd Qtr. | 3rd  Qtr | 4th  Qtr |
| Procurement plans | start |  |  | start |  |  |  | start |  |  |  | start |  |  |  | start |
| Disbursement plans (Activities and finance) | Planning |  |  |  | continuous |  |  |  | continuous |  |  |  | continuous |  |  |  |
| Internal audits | Conduct | Conduct | Conduct | Conduct | Conduct | continuous |  |  |  |  |  |  |  |  |  |  |
| External audits |  |  |  | Conduct |  |  |  | Conduct |  |  |  | Conduct |  |  |  | Conduct |
| Progress reviews | Processing |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Management reports | Report | Continuous |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Regular field visit | Processing |  |  | Processing |  |  |  | Processing |  |  |  | Processing |  |  |  | Processing |
| Tracer studies |  |  |  |  |  |  |  |  | conducting |  |  |  |  |  |  | conducting |

**Section 10: Main Cost Items of the Proposal**

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| --- | --- | --- | --- |
|  | Action Plan | List major Items/group of items that are required to carry out each action plan in Section 5 | Estimated CostUS$ |
| 1 | Program coordination and  partners | Regional, National & International Partners -Supervision of PhD students.  -World class institutional partners. -Number of faculty and student exchange visits. - joint publications -Courses taught by international collaboration | 1,920,000 |
| 2 | Research and Learning Excellence: Interdisciplinary MSc/PhD  Programs | Books & Periodicals/Boarding/Local Transportation  PhD Students (775.000), Masters (555220) | 1,330,220 |
| 3 | Programs Accreditations | Internal & External Evaluations  National & International Accreditation | 800,000 |
| 4 | Short training programs/ workshops(National/Regional) | Short course curriculum development; location of national  /regional short course venue agreed and approved by ACEESD partners; participant enrolment/faculty acceptance to teach. | 245,200 |
| 5 | Research, collaborative networks and  capacity building excellence: International travel  Fellowships (Increased publication) | Support for Visiting Professors, Travels and Per Diems, international journal papers and proceedings and conference attendances.  20 Professors(2000/parson/year) =160.000  Publications: Pay charges ($1000), 102 publications for the all project=102.000 | 262,000 |
| 6 | Capacity building and management  Excellence: Secretariat (governance structure) | Salaries for Center Staff  Honorarium for faculty and team leaders  175.000 per year = 175.000\*4 | 700,000 |
| 7 | Research and training: National Regional and international  faculty and students visits  Strengthen Education Capacity &  Development: Outreach to industry, to schools and Girls | Accommodation and subsistence, Field trips to study sites in national, regional and international with collaboration of institutions partners.  Formation and Establishment of Industry/academic research groups.  Diverse participation of women/girls and other stakeholders across East and Southern Africa in short courses and research programs organized by ACEESD. Stimulate the interest of girls in science at an early age, exposing them to contemporary outcomes. | 500,000 |
| 8 | Sustainable financing Excellence:  Lab and teaching Equipment and IT  infrastructure | Excellence Supplies room, equipment stores and laboratory space for faculty, Broadband, Software and Journals  Other equipment and maintenance training for equipment handling and payment of utility bills  E-Learning platforms, High Performance Computer Cluster  Large scale Memory Access Computer and Shared Mass Storage Device | 1,200,000 |
| Total | | | 6,957,420 |
| Total value of Proposal budget in US Dollars | | | **6,957,420** |

**Section 11 : Implementation Risks (Maximum ½ page)**

The successful implementation of the multi-stakeholder partnerships, targets and plans of action of ACEESD is very critical and this is the area where ACESSD will face significant risks. The Center envisages the risks of meeting World Bank targets and guidelines on control and management especially in the first two years of project implementation. This will be strategically addressed by the competent management of the Center through project initial training on World Bank procedures at the beginning of project implementation for all members of the project.

There are also the risks of project partners not achieving set targets and objectives, and also the risks of monitoring and evaluating programs and activities across varied institutions in different locations. To mitigate these risks, a number of measures and strategies will be adopted. First, the ACEESD sub-committee on legal and finance matters will ensure that all partner institutions with assigned roles within the ACEESD, sign performance contracts and/or MOUs prior to actually implementing any plans. Again, these performance contracts and MOUs will be structured in a phased manner with well-defined objectives/milestones to allow for close monitoring, evaluation and assessment of completed phases before granting approval for the execution of subsequent phases. In addition, regular and continuous personnel development activities will be undertaken to bring ACEESD employees (faculty and administrative) and students up-to-speed on changes and new developments in the implementation of the project. Lastly, periodic and regular meetings will be organized for all units of the Centre to help improve group coherence and team work.

**Section 12: Additional Information Relevant to the Evaluation of this Proposal (Maximum one page)**



The new building of the Core Science and Department of Electrical and Electronics Laboratories in which part of the proposed ACEESD

**Simplified Implementation Plan of each ACEESD Action plan**





1. ***World Energy Outlook 2014 Electricity Database*** [↑](#footnote-ref-1)
2. ***World Energy Outlook 2014 Biomass Database*** [↑](#footnote-ref-2)
3. ***UNECA, 2014 Energy Access and Security in Eastern Africa*** [↑](#footnote-ref-3)
4. ***UNESCO Institute of Statistics Database (2015)*** [↑](#footnote-ref-4)