

EVALUATION AND ACCREDITATION DOCUMENTS

M.Sc. Renewable and New Energy Systems

Africa Centre of Excellence for Sustainable
Power and Energy Development (ACE-SPED)

University of Nigeria Nsukka (UNN)

Nsukka, Nigeria

June 2024

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EVALUATION REPORT

M.Sc. Renewable and New Energy Systems

Africa Centre of Excellence for Sustainable
Power and Energy Development (ACE-SPED)

University of Nigeria Nsukka (UNN)

Nsukka, Nigeria

May 2024

The University of Nigeria Nsukka has mandated the Hcéres to perform the evaluation of its Renewable and New Energy Systems M.Sc. programme. The evaluation is based on the “External Evaluation Standards” of foreign study programmes, adopted by the Hcéres Board on 31st January 2022. These standards are available on the Hcéres website (hceres.fr).

On behalf of the experts committee¹ :

Olivier Boutin, President of the committee

In the name of Hcéres¹ :

Stéphane Le Boulter, Acting President

¹In accordance with articles R. 114-15 and R. 114-10 of the Research Code, evaluation reports are signed by the chairman of the experts committee and countersigned by the President of Hcéres.

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I. STUDY PROGRAMME IDENTITY SHEET

- University: University of Nigeria Nsukka (UNN), Nsukka, Nigeria
- Department concerned: Faculty of Engineering
- Title of the programme: M.Sc. Renewable and New Energy Systems
- Year of creation and context: 2019, at the creation of the ACE. The programme was established as an enhancement of the Biomass and Renewable Energy programme previously run by the University.
- Site where the programme is taught (town and campus): main campus, University of Nigeria Nsukka (UNN), Nsukka, Nigeria

PROGRAMME DIRECTOR

- Surname, first name: Asoiro, Felix Uzochukwu
- Profession and grade: Senior Lecturer
- Main subject taught: Agricultural and Bioresources Engineering

METHODS AND RESULTS OF THE PREVIOUS ACCREDITATION(S)

- In 2022, the programme was evaluated by the National Universities Commission (NUC). The programme received its full accreditation by the NUC for 5 years, from April 2022 to April 2027.
- No previous international accreditation.

HUMAN AND MATERIAL RESOURCES DEDICATED TO THE PROGRAMME

– Human resources

Academic staff	Professors	Associate Professors	Senior Lecturers	Lecturers	Total
	12	5	9	3	29
Technical staff	Chief Laboratory Supervisor	Assistant Chief Technologist	Technologists and Senior Technologists	Others	Total
	1	1	20	3	25
Administrative staff	Deputy Bursars	Principal and Higher Executive Officers	Assistant Registrar	System Analyst	Total
	3	2	1	1	7

– Material resources:

Two fully equipped classrooms, Zoom, Google meet, Microsoft Office applications (PowerPoint, Word, and Excel) e-library resources including subscription to 92 Energy Journals under Science direct, AGORA, Science 4 Life, Smart TV and Smart Board, Turnitin Software, etc.

Research laboratories with equipment on analytical purposes and renewable energy: Soxhlet extractor, dissolved oxygen meter, digital tensometer, pellet durability tester, simultaneous thermal analyser, elemental analyser, moisture analyser, handheld gas analyser, solarimeter, briquetting machine (hydraulic press); X-ray diffractometer, Fourier transform infrared spectroscopy, centrifuge, ultrasonics, photoluminescence, electrochemistry (biologic and VERSATAT), battery testing machine, UV spectroscopic machine, I-V machine, spin coating machine, spray pyrolysis machine, hydrothermal machine, SILAR machine, electrodeposition machine, oven, fume chamber, fluorescence microscope; iKA bomb calorimeter, muffle furnace, 11 m³ biogas digester, 100 kVA refuse-derived fuel gasifier plant, several units of small-scale biogas digesters, 15kW solar PV mini grid.

STUDENT POPULATION: EVOLUTION AND TYPOLOGY OVER THE LAST 4 YEARS

		2019/2020	2020/2021	2021/2022	2022/2023
Enrolment	Male	2	8	11	16
	Female	2	3	3	8
	Total	4	11	14	24
	<i>including foreigners</i>	1	1	2	9

Graduates	Male	-	2	8	11
	Female	-	2	3	3
	Total	-	4	11	14
	<i>including foreigners</i>	-	1	1	2

II. PRESENTATION OF THE STUDY PROGRAMME

1 – Presentation of the study programme

The Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED) is a World Bank-supported institution situated within the University of Nigeria's main campus in Nsukka, Enugu State, Nigeria. Established in 2019, the Centre is dedicated to addressing the energy and power challenges prevalent in the West and Central Africa sub-regions. It achieves this by conducting pioneering research and offering comprehensive academic and professional training programmes. ACE-SPED provides a range of academic offerings at both master's and doctoral levels. These programmes cover diverse facets of sustainable power and energy development, including Renewable & New Energy Systems, Power Engineering, Sustainable Energy Materials, Control & Instrumentation Engineering, Industrial Electronics & Power Devices, Energy Policy, Regulation & Management, Engineering Design & Product Development, and Management of Technology & Innovation.

The M.Sc. programme in Renewable and New Energy Systems is designed with a keen awareness of the significant developmental challenges prevalent in the Sub-Saharan region, particularly concerning inadequate access to electricity and energy resources for the population. This level of energy poverty, along with concerns regarding energy security and environmental sustainability, poses a major threat to progress and development. Auspiciously, the region is endowed with abundant natural resources that can be harnessed to address these challenges. However, there is often a deficiency in both the quantity and quality of human capital and technology required to harness these resources effectively. The programme is strategically crafted to bridge this gap in human within the energy and power industry in Sub-Saharan Africa. By focusing on Renewable & New Energy Systems, it aims to train highly skilled professionals capable of offering practical solutions to the region's energy challenges. Admission to the programme requires a Bachelor's degree in Engineering or Physical Sciences from a recognised University, with a minimum CGPA of 2.75. Through this programme, students are equipped with the necessary skills to function as energy entrepreneurs or as valuable team players within the renewable energy ecosystem.

2 – Presentation of the programme's self-evaluation approach

Although the Faculty of Engineering has a dedicated committee on quality assurance, no information was provided regarding the process of self-evaluation. However, the self-evaluation report that was submitted was comprehensive, accompanied with appendices containing both qualitative and quantitative data. The committee requested a few additional documents, all of which were promptly provided within the week.

III. COMPOSITION OF THE EXPERTS PANEL

- **Olivier BOUTIN**, Chair of the panel, Full professor, Aix-Marseille University, France
- **Renaud BOUCHET**, Full professor, INP Grenoble, France
- **Melika HINAJE**, Full professor, Lorraine University, France
- **Julie FINKEL**, Ph.D. candidate, University of Montpellier, France

Hcéres was represented by **Zakia MESTARI**, project manager, Europe and International Department.

IV. VISIT DESCRIPTION

- **Date of the visit:** the visit took place on Thursday 18th January 2024.
- **Summary of the proceedings:** before the visit took place, the self-evaluation report and numerous

appendices had been received by the experts. Two preparatory meetings between the Director of the Hcéres Europe and International Department, the project manager and the panel of experts were held in Paris (20th December) and online (8th January). The on-site visit took place for one day, according to a schedule agreed between the ACE-SPED, the National Universities Commission and the panel. During the visit, the experts asked for a few more documents to get quantitative data. All these documents have been received.

- **Organisation of the visit:** for safety reasons, the visit was organised in hybrid mode in Abuja and the panel was not able to visit the Centre in Nsukka. The Centre leaders, the programme director and the postgraduate coordinator of the Federal University of Technology met the panel in Abuja, as well as some students and academics.
- **Cooperation of study programme and institution to be accredited:** ACE-SPED has been cooperative throughout the process. The self-evaluation report was sent according to the agreed schedule. The questions asked before and during the visit were answered clearly and precisely. The panel is satisfied with the conclusion reached, which is based on available and relevant information. Moreover, the involvement of the National Universities Commission has been very helpful throughout the process.
- **People met:** the panel was able to meet with 34 people from different panels:

	Session	Audience
8:00 – 9:30	Presentation of the programme and discussion with the top management	Centre Leaders, programmes directors and their teams
9:30 – 10:30	Academic staff	Representative panel of academics from both programmes
10:45 – 11:45	Quality assurance	Quality assurance representatives
11:45 – 12:45	Alumni	Representative panel of alumni
13:45 – 14:45	Socio-economic partners and employers	Representative panel of socio-economic partners and employers
14:45 – 15:45	Students	Representative panel of students from both programmes
16:30 – 17:00	Closing session	Centre Leaders, programmes directors and their teams

V. EVALUATION REPORT

1 – Training policy and characterisation

The M.Sc. Renewable and New Energy Systems (RNES) adheres closely to the University of Nigeria Nsukka's postgraduate regulations, thereby reflecting the university's overarching training strategy. The Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED) is located within the University of Nigeria, Nsukka, Enugu State, Nigeria, and it was established in 2019. Among its array of programmes, the M.Sc. RNES stands out as one of the six offerings under the Centre's umbrella. These programmes are intricately designed to complement each other within the broader field of Energy. With a primary focus on addressing energy and power challenges in West Africa and Central Africa, the programme encompasses both academic and professional facets. It is housed within the Faculty of Engineering, which covers eight departments, emphasising Sustainable Energy as a priority area. Distinguished from other M.Sc. programmes at the University, RNES boasted a highly multidisciplinary curriculum. Graduates of this programme are well-positioned to pursue a Ph.D. in Renewable and New Energy System, an offering within the same Centre. The programme welcomes students with a Bachelor's in Engineering or Science, provided they possess a sufficient scientific level. The multidisciplinary nature of the programme is evident through the inclusion of various energy-related aspects in both core and elective courses, allowing students to explore different facets of the field. For instance, the core course "Renewable energy financing and portfolio standards" provides valuable insights into the economics of energy, contributing to interdisciplinary learning. Moreover, sustainable development is integrated into several courses dedicated to energy, engineering, and conversion topics. While there is a dedicated elective course on sustainable issues ("Principle of sustainable energy"), considering its importance, it could be beneficial to elevate its status to a core course within the curriculum.

At the University level, many agreements have been signed, which allow staff and students' exchanges on the one hand, and research purposes, with universities in Africa (10) and large projects with significant financial support, on the other hand. The programme develops international partnerships in West Africa (University of Lomé, Togo; University of Energy and Natural Resources, Ghana), Africa (University of Cape Town, Stellenbosch University, University of Johannesburg, Tsawane University of Technology in Pretoria, South Africa) and other parts of the world (Brunel University in London, United Kingdom; University of Reading, United Kingdom; Florida State University, United States of America; Italian Agency for New Technologies, Trisaia, Italia), mainly for teaching, research collaboration and students' supervision. One particularly noteworthy partnership is with University of Cape Town, facilitating the participation of M.Sc. students in the Transforming Energy Access-Learning Partnerships (TEA-LP) programme. This initiative provides additional funding to train on mini grid technology (18 students by 2025). Moreover, through the partnership with the British Council, some students are already being funded by the EU-ECOWAS scholarship, which fully covers tuition fees and hostel accommodation. The programme and the Centre also operate for the University into the West African Power Pool Network, to develop collaborations among partners. It would be interesting to develop more the interaction of the ACE-SPED with all universities and projects, especially when energy thematics are involved. To meet the World Bank requirement of 25% regional students intake, ACE-SPED has implemented various incentives aimed at attracting students from other African countries. Over the past four years, the Centre has successfully integrated twelve regional students into the programme (among 60 students in total). These students hail from countries such as Ghana, Cameroon, Sierra Leone, Liberia, and Benin, and all benefit from scholarships covering fees, tuition, accommodation, and a stipend provided on campus. Additionally, they receive support for a fully paid return trip to their home country and medical insurance. Through initiatives like the West African Centres of Excellence in Energy Network (WACEENET), ACE-SPED facilitated student mobility and collaboration with partner institutions. In 2023 alone, seven students from RCEES (Regional Centre for Energy and Environmental Sustainability, University of Energy and Natural Resources, Ghana) and CERME (*Centre d'Excellence Régional pour la Maîtrise de l'Électricité*, Togo) benefited from a one-month incoming mobility to ACE-SPED. Similarly, one student from ACE-SPED conducted research at RCEES in Ghana, while another student pursued research activities in Togo.

At the national level, the programme perfectly identifies supporting collaborations for teaching, research, and graduate supervision with several institutions, such as laboratories in universities like Lagos or Port Harcourt. During the first semester, students are required to prepare a proposal report, which they present as a seminar to the Centre's staff, students, and other stakeholders. The curriculum includes a research project focused on any of the thematic areas of ACE-SPED, guided by an academic staff appointed by the Centre. This research project spans the second and third semesters, and it is evaluated through a project report and an oral examination by a board of internal and external examiners. Professors and researchers share insights into their research activities, covering specialties such as Solar Photovoltaic, Renewable Energy, Material Science, which are linked to the courses of the study programme. Moreover, the programme proposes a dedicated course segment on research methods, including information literacy, plagiarism, ethics and legal aspects, and research integrity. A dedicated workshop on professional ethics is organised by the Centre.

The study programme takes into account socio-economic needs by incorporating various current and innovative aspects of energy, aligning well with the requirements for energy developments in Nigeria and West Africa. Socio-economic partners were involved in the creation of the programme and its content, participating in a Sectorial Advisory Board. Industrial actors also have the opportunity to attend the programme, with one person currently enrolled in this capacity. The duration of the programme can be adapted to accommodate working students, with some companies covering their fees, offering significant value to the programme. Additionally, the programme proposes several short courses for industrial companies: a four-day “Renewable energy for sustainable electrical energy supply in Sub-Saharan Africa”; a five-day Training Workshop on Energy management in the industry and at home (University of Energy and Natural Resources, Sunyani, Ghana); a two-day Training Workshop on Applications of solar energy in agriculture (National Centre for Energy Research and Development, Federal Ministry of Science, Technology and Innovation). The continued development of short courses is essential and must be encouraged to meet the evolving needs of industry stakeholders. The programme has established numerous collaborations and exchanges with socio-economic partners, totalling 27, at both national and international levels. These collaborations primarily focus on internships with national partners such as Power project, Greenage Technology, Pilgrim Micropower Limited, the Foundation for Innovative electronics and New Energy systems, and the National Centre for Energy Research and Development. International collaborations include entities like Mirai Denchi Inc., in Japan and Material Applications and 3D printing solution in Germany. As part of the programme requirements, all ACE-SPED students are mandated to undertake at least a one-month internship in a private company. The Industrial Liaison Office is tasked with identifying suitable companies for the internships. Following this, students are supervised by appointed staff members during their internship period. Upon completion, students are required to present a written report, typically an ACE-SPED approved logbook, and deliver an oral presentation at the Centre. Additionally, students receive training in CV writing and interview preparation.

In conclusion, the M.Sc. programme in Renewable and New Energy Systems (RNES) offered by the ACE-SPED is a vital component of the eight departments of the University's Faculty of Engineering. Established in 2019, the programme offers high-level, multidisciplinary and transdisciplinary training in the field of renewable energy, to meet the evolving needs and industry in Nigeria and in the broader West Africa region. It is also related to the needs of populations for delocalised energy production systems based on local resources.

Supported by a robust network of national and international collaborations, including participation in the West African Centres of Excellence in Energy Network (WACEENET), the programme offers opportunities for students and staff exchanges, enriching the learning experience. International partnerships could be further developed and used. The emphasis on academic research, exemplified by the 18-month research project integrated into the Master's programme, prepare students for advanced studies and careers in research and development. Furthermore, the programme extensive network of socio-economic partners actively contributes to curriculum development and provides valuable opportunities for students to gain practical experience through a one-month internship.

2 – Pedagogical organisation of the study programme

The programme's objectives and content are clearly defined, outlined in the curriculum and skill approaches.

The programme duration spans eighteen months, divided into three semesters. The first two semesters focus on coursework, while the final semester comprises a one month internship in a private company followed by five months of research on the candidate's chosen topic. Stakeholders, including students, can access detailed information about the programme's goals and expectations through resources such as the university's website and the Postgraduate Handbook. Currently, the programme's structure does not offer different pathways, with only two elective courses available. Providing students with more elective course options and the opportunity to switch between different programmes within the ACE-SPED Centre. During the internship component, students maintain a “log book” where industrial supervisors document their progress and skill acquisition. Regular evaluations and feedback sessions ensure students receive guidance and support. This direct feedback loop between students, industrial partners, and programme management contributes to continuous improvement.

The M.Sc. RNES properly diversifies its teaching methods, as lecturers are required to prepare course materials, including lecture notes and slides, following established standards set by the Academic Programme Co-ordinator. Lectures are conducted both on-site and online. Each course is typically taught by a team of two lecturers. For online lectures, instructors utilise the ACE-SPED studio to record their lectures, which are then shared with the students or uploaded to the Learning Management System. Practical of the programme often involves demonstrations by technical staff, who specialise in specific fields relevant to the programme. For instance, practical sessions on solar photovoltaics may include demonstrations on design, sizing, and installation of solar panels. The Centre has constructed a solar-based mini-grid system to provide hands-on experience and enhance understanding of solar energy concepts. The student-to-staff ratio is conducive to personalised attention, allowing academic staff to effectively support and monitor student progress throughout the three

semesters of the programme. Financial support is available to all students enrolled in ACE-SPED, with scholarships to meet different needs. Regional students receive comprehensive support covering tuition, accommodation, project support, and stipends, while national students receive support for tuition and project expenses. Fee-paying national students receive support for project expenses. To maintain their scholarship, students are expected to maintain a minimum GPA of 3.5 at the end of the first semester. Students have the flexibility to pursue the programme on a full-time basis, completing it within three to five semesters, or on a part-time basis with a timeframe of five to eight semesters. The Centre offers three modes of content delivery: (i) asynchronous (lectures are recorded in a studio and posted on the website for students), (ii) synchronous (lectures are delivered via Zoom and Learning Management System in real time), (iii) and physical contact. The Centre has a dedicated lecture studio for preparing and delivering online content. Currently, students are required to be on campus for at least 50% of courses. During the Covid-19 pandemic period, all courses were conducted online, but now a blend of online and on-site learning is implemented. Examinations are conducted on-site. PA specific course (namely Research methodology and ICT in Engineering) covers the use of information and communication technologies, focusing on design methods, data collection and management, and project management. The ACE-SPED provides support for virtual platforms such as Zoom, Google Meet, and MS Office.

No specific preparation is offered for incoming and outgoing mobility, which could be an area for further development and enhancement. Nevertheless, non-English-speaking students from foreign countries are provided with intensive English courses during the first semester (3 times a week, 4 hours per course at the Language Department), and students have the opportunity to obtain certification upon completion.

Despite the absence of dedicated course, the programme incorporates elements of entrepreneurship into its curriculum. However, aspects of entrepreneurship are integrated into certain courses such as “Advanced methods of engineering design and analysis” and “Renewable energy financing and portfolio standards”. These courses touch upon topics like marketing, finance, and corporate functions. Additionally, students are equipped with skills to function as energy entrepreneurs or team players within the renewable energy ecosystem. As part of the programme’s practical training component, students are required to undertake a compulsory one-month internship in a private company, selected from a list of 50 industrial partners provided by the Centre. The Industrial Liaison Office assists in identifying suitable internship placements, and each student is supervised by a staff member from ACE-SPED during their internship. Students on internship are provided with some funding and the internships are evaluated based on a written report and a seminar presentation. It would be interesting to increase the duration of this internship to several months to help the development of the career plans of the students.

In conclusion, the programme is meticulously organised, with clearly defined objectives, knowledge, and skills for students. Professional competencies are cultivated through a combination of research projects and internships, with the latter being monitored using logbooks by industrial tutors. While the teaching is diverse, there is potential to enhance personalisation by increasing the number of elective courses.

The programme’s structure facilitates student success, offering flexibility through hybrid learning options and maintaining a favourable staff-to-student ratio. Each student receives personalised supervision, and scholarships are available to support their studies, with full funding provided to foreign students. English language support is also offered as needed. To further bolster international engagement, intensive training on incoming and outgoing mobility could be developed. Additionally, while entrepreneurship training is integrated into mandatory courses and internships, extending the internship duration of several months could enhance students’ exposure to the professional world.

3 – Attractiveness, performance and relevance of the study programme

The programme employs a diverse range of channels to attract different types of audience, for example flyers, website promotion, network with other universities (from Nigeria, South-Africa, Togo, and Ghana), and social media outreach. The bi-annual Association of African Universities (AAU) workshop promotes the programme through physical outreach. The regional students also promote the programme in their home countries. The programme has a full scholarship policy for regional students to encourage them to apply and meet the objective given by the World Bank of welcoming 25% of regional students. Nigerian students also benefit from tuition coverage. By prioritizing regional student recruitment and support, the University aims to strengthen its impact and reputation in the region over the years to come. Finally, new students receive orientation upon admission, ensuring a smooth transition into the programme. The programme’s outreach efforts have yielded significant results, with a growing number of applicants each year (from Uganda, Sierra Leone, Liberia, Cameroon, and Ghana). In the 2022-2023 academic year, there were 121 applicants, making a substantial from previous years. The admission rate stood at 24.8%, reflecting the programme’s competitiveness. Enrolment numbers have also seen a notable rise, from four students in 2019 to 30 in 2022.

The programme uses various methods to regularly monitor student success, including class quizzes, take-home assignments, practical report, written examinations, seminar presentations, and project executions and presentations. These evaluations not only help enhance student performance but also enable students to assess their own progress while providing valuable feedback to adapt support measures accordingly. Moreover, students have the opportunity to provide feedback on lectures and lecturers through evaluation surveys. Student success data, are publicly accessible on the Centre's website. Each student is required to submit a progress report to their supervisors and the Head of Department at the end of each semester. A noteworthy aspect is the high success rate of students enrolled in the programme, as evidenced by the fact that all students who started the programme during the evaluated period have successfully graduated. Therefore, the success rate is well monitored by the programme. Furthermore, the provision of scholarships to all students over the last three years, plays a crucial role in promoting and facilitating their academic achievements.

The programme has implemented a graduate tracer mechanism established by the Association of African Universities (AAU) to systematically monitor and track the progress of graduates after completing the programme. As part of this initiative, four graduate students secured positions at the company where they completed their internships, demonstrating the effectiveness of the programme in facilitating job-market integration. Although there is no formal graduate network organised by the Centre, alumni maintain regular contact with each other through social media platforms.

In conclusion, the programme uses various information systems to raise its awareness and attractiveness, from virtual methods to physical outreach. Through networks like the AAU, it promotes awareness and attracts a different pool of students, particularly from the region. The programme strategy includes full scholarships and a language support to attract regional students, resulting in a student body representing various African countries (Uganda, Sierra Leone, Liberia, Cameroon, and Ghana). While Nigerian students may face financial challenges without full scholarship, the programme's flexibility accommodates their needs, allowing them to pursue studies while working. The programme is the most attractive one offered at the Centre: in 2022-2023, 121 students out of 140 applying to the Centre were applying to this programme. The number of applicants has increased over the last four years (18 in 2019-2020 to 121 in 2022-2023). Regular assessment methods ensure students receive necessary support and feedback, contributing to their overall success. Additionally, the adoption of the graduate tracer mechanism, developed by the Association of African Universities, enables ongoing monitoring of alumni progress. All relevant data, including graduate outcomes and students' success metrics, are transparently available on the Centre's website.

4 – Academic programme management and continuous improvement

The programme management is consistent, and the functioning is efficient, thanks to clear guidelines and rules governing the interactions between the teaching team, the programme coordinator, and the Centre management fostering a collaborative environment. The administrative staff is the same for all the programmes of the ACE-SPED centre, as the number of students is not sufficient for each programme to have its own staff. Led by a Director and a Deputy Director, the ACE-SPED also has a specific coordinator for the programme. Transparency is maintained through the provision of a comprehensive list of programme contributors, including foreign teaching staff, accessible to students and other stakeholders via the programme handbook.

The programme benefits from ample resources, both in terms of personnel and facilities, despite its relatively small student population. Adequate staffing levels ensure efficient programme management, with dedicated administrative, teaching, and technical staff. The programme classrooms well-equipped with two classrooms featuring modern technological infrastructure. Rich academic resources enhance the programme's offerings, including access to a library with subscriptions to 92 journals in the field of energy, both in physical and electronic formats. To facilitate project works, the teaching team leverages its network of collaborators to place students in laboratories or research institutes with the necessary facilities. This arrangement is temporary until the Centre establishes its own premises and equips them adequately. Extensive laboratory facilities, equipped with advanced analytical equipment (Soxhlet extractor, dissolved oxygen meter, elemental analyser, X-ray diffractometer, Fourier Transform Infrared Spectroscopy etc.), and specialised tools for renewable energy research provides students with hands-on learning experiences (biogas digester, gasifier plant (100 and 500 kVA), 15kW Solar PV mini grid etc.). Access to essential software tools, such as regression analysis and modelling software, Matlab, ANSYS, FLUENT, etc. Moreover, ongoing infrastructure developments, such as the renovation of foreign students' residence halls and the construction of the permanent ACE-SPED site, underscore the commitment to enhancing the programme's capacity and facilities for student support and accommodation. Some of the teaching staff can benefit from the WACEENET international network to receive training and develop collaborations. Other teaching staffs have received trainings to enhance their teaching practices in Abuja and share their learnings with colleagues. A considerable portion of the teaching staff holds a Ph.D. from a foreign university (China, the United Kingdom, South Africa, etc.).

Robust evaluation processes are in place for both staff and students, overseen by the Quality Assurance Committee and the Monitoring and Evaluation unit of ACE-SPED. The School of Postgraduate Studies board, comprising representatives from the faculty, plays a crucial role in managing various aspects of the programme, including research proposals, supervision assignments, curriculum development, and student progress monitoring. Even though student representation is currently absent from these boards, which would have presented an opportunity for greater student involvement in programme governance and decision-making processes, inputs and feedbacks are often obtained from students through the representatives elected by them. Currently, the programme enjoys full accreditation from the NUC.

The recruitment procedures for students are transparent and clearly defined at the University level, aligning with established academic standards. Eligibility criteria for admission include a Bachelor's degree in Engineering or Physical Sciences from a recognised university, with minimum CGPA requirement of 2.75 out of 5, which is more stringent than the university's recommendation of 2.5. Examination timetables are meticulously prepared and shared with both faculty and students at least two weeks prior to the examinations. Lecturers and teaching research assistants are responsible for conducting examinations, and results undergo moderation and approval by the academic board of the Centre. Throughout the courses, regular "quizzes" are administered to gauge students' understanding and acquisition of essential knowledge and skills. Students receive regular updates on programme operations and functioning. Evaluation procedures for courses include online surveys where students can provide qualitative and quantitative feedback on their learning experience. Students have space to voice concerns or complaints directly to course coordinators or supervisors, facilitating continuous improvement based on student input. Informal processes exist to address student demands and suggestions, with regular meetings within the teaching team to consider necessary evolutions in the programme. The study programme prioritises capacity enhancement and quality assurance through periodic training sessions for both staff and students on programme quality, ethics, and other relevant topics. Originality of lecture notes is emphasised, and all student projects undergo plagiarism testing using Turnitin software to ensure compliance with university standards.

In conclusion, the programme exhibits strong organisation and efficiency, led by a centralised approach from ACE-SPED, which is coherent given the relatively low number of students on the various programmes. With clearly defined roles for the programme coordinator and teaching staff, administrative processes run smoothly. Adequate staffing levels ensure seamless operations, supported by well-equipped facilities and resources for students learning in renewable energies. While, pedagogical training for teaching staff exists, further development could enhance instructional quality. Transparent procedures from recruitment to graduation facilitate a conducive learning environment, with opportunities for students' feedback and input. Even though a student representative is elected and plays an active role with other students, it would be beneficial to involve students in decision-making bodies, at least at the programme and Centre levels. Ethical considerations are prioritised, with anti-plagiarism in place to uphold academic integrity.

VI. CONCLUSION

The Master programme in Renewable and New Energy Systems (RNES) offered by the Africa Centre of Excellence for Sustainable Power and Energy Development (ACE-SPED) at the University of Nigeria, Nsukka, Enugu State, has been operational since 2019. This programme is designed to address contemporary challenges associated with fossil fuel and global warming by providing advanced scientific education in the field of Renewable Energy. Leveraging the diverse expertise available within the Faculty of Engineering, the curriculum encompasses a wide range of disciplines including physics, chemistry, chemical engineering, and more. This multidisciplinary approach ensures that students are equipped with the knowledge and skills needed to thrive in the evolving job market.

To achieve this, it relies on a variety of networks operating at different levels. At the local and national levels, students benefit from access to several research laboratories, providing them with the necessary infrastructure to conduct their research projects appropriately. The programme also fosters extensive interactions with various partners from the socio-economic world. These partners actively contribute to curriculum development, participate in advisory boards and seminars, and offer opportunities for students to undertake mandatory one-month internships within their organisations. Furthermore, the programme offers flexible scheduling arrangements, allowing professionals to pursue their studies while continuing to work. Additionally, it provides short courses on specific topics. There is potential for further development of these training opportunities to better serve the professional community. Internationally, the programme has established partnerships with foreign universities, also the full extent of their value is not always well highlighted. However, it is worth noting that the programme is affiliated with two valuable networks, the Transforming Energy Access-Learning Partnerships (TEA-LP) programme and the West African Centres of Excellence in Energy Network (WACEENET). These networks facilitate extensive exchanges and collaborations for both students and teaching staff. However, based on the high quality of the training, international exchanges could be further strengthened to increase the visibility of the programme, and to encourage more outgoing mobility for students.

The programme operates with highly organised, structured, and motivated teams, operating efficiently and cohesively from the director of the Centre down to the teaching staff. All processes, including recruitment, teaching assessment, and graduation, are transparent and accessible to all stakeholders. This creates a conducive learning environment for students, supported not only by excellent organisation but also by adequate material resources (classrooms, facilities, and software), although there is always room for improvement and diversification of equipment. Moreover, students have avenues to provide feedback and suggestions for improvement through various channels, and effective measures are implemented accordingly. The programme ensures comprehensive student follow-up, from tracking the number of applications to monitoring their progress and outcomes after graduation.

The RNES programme is overseen by dedicated and engaged teams. It aligns with the objectives of ACE-SPED and demonstrates exceptional networking initiatives with the socio-economic and academic spheres, both domestically and internationally. This robust foundation positions the program for promising growth in training of high-level engineers in Renewable Energies. The imminent inauguration of a new building dedicated to the Centre, students, and scientific equipment further underscores this trajectory of progress and development.

Strengths

- The well-designed programme and relevant response to the challenges facing Nigeria (and our world more broadly) to develop renewable energies accessible to most of the population to replace the use of fossil fuels
- The highly motivated and efficient management and teaching team, which enables students to work in optimal conditions
- The numerous partnerships with the socio-economic world, for hosting students, intervening in the training, and offering them the opportunity to follow suitable professional training courses
- The two valuable networks the programme belongs to: the Transforming Energy Access-Learning Partnerships (TEA-LP) programme and the West African Centres of Excellence in Energy Network (WACEENET), for research collaborations and staff/student mobility
- The precise and relevant students' follow up

Weaknesses

- The quite low outgoing international mobility for students and teaching staff, and the vague added value of the academic international partnership

- The low number of elective courses, which is a limitation for the personal career development of the students
- The absence of a students' representative in the University boards
- The too short internship period, which prevents full involvement and exposure of the students to the professional world
- The improvable access to scientific facilities, especially considering the fast technical development of the facilities linked to renewable energy

Recommendations

- The two networks TEA-LP and WACEENET could be used to develop further research collaborations, and facilitate student and staff mobility; academic international partnerships could be more efficient in the functioning of the programmes and the students can be trained and supported for outgoing international mobility.
- The number of elective courses should be increased to personalise students' career paths, for instance by diversifying the courses on renewable energies.
- The students' representatives should be involved in different decision-making bodies, at least at the programme and Centre levels, to increase their engagement in the programme and to better incorporate their valuable suggestions.
- The mandatory length of the internship should be increased in conjunction with the economic social partners, for instance up to four months, and perhaps to integrate it with the research project.
- Based on the large number of partnerships with socioeconomic world, the number of students' industry visits could be increased, and agreements should be negotiated for the use of industrial facilities by the programme to enhance students learning and exposure to real-world applications.

VII. COMMENTS OF THE INSTITUTION



The World Bank



AFRICA CENTRE OF EXCELLENCE FOR SUSTAINABLE POWER AND ENERGY DEVELOPMENT

UNIVERSITY OF NIGERIA, NSUKKA
OFFICE OF THE DIRECTOR

☎: (+234) 812 586 4681
(+81)90 2700 4888

Date: 2024.05.30.

Ref: UNN/ACE-SPED/RNES/24
.....

The Acting President,
Hcéres Accreditation Agency
Paris, France.

Dear Mr. Stéphane Le Boulter,

**OBSERVATIONS OF A FACTUAL NATURE ON THE PROVISIONAL REPORT OF THE MASTER'S
DEGREE PROGRAMME ON RENEWABLE AND NEW ENERGY SYSTEMS OF ACE-SPED**

I wish to thank you for your response to our comments on your provisional report on the Master's degree programme on Renewable and New Energy Systems of our Africa Centre of Excellence for Sustainable Power and Energy Development, University of Nigeria, Nsukka. The following sections (in green colour) should be used:

Programme Director:

On Page 2:

- Surname, first name: Asoiro, Felix Uzochukwu
- Profession and grade: Senior Lecturer
- Main subject taught: Agricultural and Bioresources Engineering”

Page 4, Line 3: “University of Nigeria, Nsukka”

1 – Training policy and characterization

Page 6, Lines 1, 4 & 9: “M.Sc. and M.Eng.”

2 – Pedagogical organisation of the study programme

Line 12: “M.Sc. and M.Eng.”

Line 14: Replace “Lectures are conducted both on-site and online.”

All through the document: the correct acronym is “ACE-SPED”

Once again, I thank you for your useful comments and provisional report on our programme.

Yours sincerely,



Engr. Prof. E. C. Ejiogu,

Director,

Africa Centre of Excellence for Sustainable Power and Energy Development

University of Nigeria, Nsukka.





2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10

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ACCREDITATION DECISION

M.Sc. Renewable and New Energy Systems

Africa Centre of Excellence for Sustainable
Power and Energy Development (ACE-SPED)

University of Nigeria Nsukka (UNN)

Nsukka, Nigeria

June 2024

SCOPE OF THE ACCREDITATION GRANTED BY HCÉRES

HCÉRES has based its evaluation process on a set of objectives that study programmes must pursue to ensure recognised quality within France and Europe. These objectives are divided up into four accreditation criteria.

The Accreditation Commission issues an opinion about the accreditation of the study programme after examining the file. The Hcéres President takes the decision based on the Commission's opinion and the final evaluation report of the programme. This accreditation decision, taken in plenary session, is the result of a collegial and reasoned process.

The decision issued by Hcéres regarding the accreditation of the study programme corresponds to the awarding of a label to the evaluated entity.

This decision is independent of the accreditations carried out by the French State and therefore does not entail recognition in France of the institution or the diplomas delivered by it.

Decision No. EI-2024-39 on the accreditation of the M.Sc. Renewable and New Energy Systems, delivered by the University of Nigeria, Nsukka, Nigeria

The President of the High Council for the Evaluation of Research and Higher Education,

Considering the Research Code, in particular Articles L. 114-3-1 to L. 114-3-6;

Considering the Board's deliberation of 29th September 2022 on the accreditation criteria for courses abroad (excluding doctoral/PhD programmes);

Considering the Decision No. 2023-9 of 16th March 2023 on the international accreditation procedure of the High Council for the Evaluation of Research and Higher Education;

Considering the agreement DEI_2023_CONV17 of 14th June 2023 for the evaluation/accreditation of fourteen training courses, delivered by six Centres of Excellence in Nigeria;

Considering the opinion issued by the Accreditation Commission on 18th June 2024;

Decides:

Article 1

Noting that the M.Sc. Renewable and New Energy Systems delivered by the University of Nigeria, Nsukka, in Nigeria meets the four accreditation criteria, voted by the Board of the High Council on 29th September 2022, as follows:

ACCREDITATION CRITERION 1: TRAINING POLICY AND CHARACTERISATION

The M.Sc. programme in Renewable and New Energy Systems (RNES) offered by the ACE-SPED is a vital component of the eight departments of the University's Faculty of Engineering. Established in 2019, the programme offers high-level, multidisciplinary and transdisciplinary training in the field of renewable energy, to meet the evolving needs and industry in Nigeria and in the broader West Africa region. It is also related to the needs of populations for delocalised energy production systems based on local resources. Supported by a robust network of national and international collaborations, including participation in the West African Centres of Excellence in Energy Network (WACEENET), the programme offers opportunities for students and staff exchanges, enriching the learning experience. International partnerships could be further developed and used. The emphasis on academic research, exemplified by the 18-month research project integrated into the Master's programme, prepares students for advanced studies and careers in research and development. Furthermore, the programme's extensive network of socio-economic partners actively contributes to curriculum development and provides valuable opportunities for students to gain practical experience through a one-month internship.

ACCREDITATION CRITERION 2: THE PEDAGOGICAL ORGANISATION OF THE STUDY PROGRAMME

The programme is meticulously organised, with clearly defined objectives, knowledge, and skills for students. Professional competencies are cultivated through a combination of research projects and internships, with the latter being monitored using logbooks by industrial tutors. While the teaching is diverse, there is potential to enhance personalisation by increasing the number of elective courses. The programme's structure facilitates student success, offering flexibility through hybrid learning options and maintaining a favourable staff-to-student ratio. Each student receives personalised supervision, and scholarships are available to support their studies, with full funding provided to foreign students. English language support is also offered as needed. To further bolster international engagement, intensive training on incoming and outgoing mobility could be developed. Additionally, while entrepreneurship training is integrated into mandatory courses and internships, extending the internship duration of several months could enhance students' exposure to the professional world.

ACCREDITATION CRITERION 3: ATTRACTIVENESS, PERFORMANCE AND RELEVANCE OF THE STUDY PROGRAMME

The programme uses various information systems to raise its awareness and attractiveness, from virtual methods to physical outreach. Through networks like the AAU, it promotes awareness and attracts a different pool of students, particularly from the region. The programme strategy includes full scholarships and a language support to attract regional students, resulting in a student body representing various African countries (Uganda, Sierra Leone, Liberia, Cameroon, and Ghana). While Nigerian students may face financial challenges without full scholarship, the programme's flexibility accommodates their needs, allowing them to pursue studies while working. The programme is the most attractive one offered at the Centre: in 2022-2023, 121 students out of 140 applying to the Centre were applying to this programme. The number of applicants has increased over the last four years (18 in 2019-2020 to 121 in 2022-2023). Regular assessment methods ensure students receive necessary support and feedback, contributing to their overall success. Additionally, the adoption of the graduate tracer mechanism, developed by the Association of African Universities, enables ongoing monitoring of alumni progress. All relevant data, including graduate outcomes and students' success metrics, are transparently available on the Centre's website.

ACCREDITATION CRITERION 4: MANAGEMENT AND CONTINUOUS IMPROVEMENT OF THE ACADEMIC PROGRAMME

The programme exhibits strong organisation and efficiency, led by a centralised approach from ACE-SPED, which is coherent given the relatively low number of students on the various programmes. With clearly defined roles for the programme coordinator and teaching staff, administrative processes run smoothly.

Adequate staffing levels ensure seamless operations, supported by well-equipped facilities and resources for students learning in renewable energies. While, pedagogical training for teaching staff exists, further development could enhance instructional quality.

Transparent procedures from recruitment to graduation facilitate a conducive learning environment, with opportunities for students' feedback and input. Even though a student representative is elected and plays an active role with other students, it would be beneficial to involve students in decision-making bodies, at least at the programme and Centre levels. Ethical considerations are prioritised, with anti-plagiarism in place to uphold academic integrity.

Article 2

The M.Sc. Renewable and New Energy Systems delivered by the University of Nigeria, Nsukka, in Nigeria, is accredited for a period of five years from the date of this decision.

Article 3

The decision is accompanied by the following recommendations and comments:

- The two networks TEA-LP and WACEENET could be used to develop further research collaborations, and facilitate student and staff mobility; academic international partnerships could be more efficient in the functioning of the programmes and the students can be trained and supported for outgoing international mobility.
- The number of elective courses should be increased to personalise students' career paths, for instance by diversifying the courses on renewable energies.
- The students' representatives should be involved in different decision-making bodies, at least at the programme and Centre levels, to increase their engagement in the programme and to better incorporate their valuable suggestions.
- The mandatory length of the internship should be increased in conjunction with the economic social partners, for instance up to four months, and perhaps to integrate it with the research project.
- Based on the large number of partnerships with socioeconomic world, the number of students' industry visits could be increased, and agreements should be negotiated for the use of industrial facilities by the programme to enhance students learning and exposure to real-world applications.



Article 4

This decision will be published on the Hcéres website.

Paris, 27th June 2024.

The acting President

signed

Stéphane Le Bouler



2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10

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