



## Awareness and Use of Renewable Energy as Alternative Power Source for ICT Facilities in Selected Academic Libraries in Edo State, Nigeria

<sup>1</sup>Omwanghe Etinosa James, <sup>2</sup>Omoefe Ogheneyoma Esther

<sup>1</sup>Reader's Services Librarian, John Harris Library, University of Benin,

<sup>2</sup>Library and information science department, Benson Idahosa university

### ABSTRACT

*This research critically explores the level of awareness and practical utilization of renewable energy as an alternative power source for ICT facilities within selected academic libraries in Edo State, Nigeria. Employing a descriptive survey methodology, data were obtained from a sample of 152 library staff across various universities through a structured questionnaire utilizing a four-point Likert scale. The results indicate that there is a high degree of awareness regarding renewable energy (with mean scores ranging from 2.79 to 3.36), coupled with a strong recognition of its perceived benefits (all means exceeding 3.20). Among the renewable sources, solar energy emerged as the most favored, evidenced by a mean rating of 3.38. Despite this positive perception, the actual implementation of renewable energy solutions remains notably limited, with a mean score of 2.11 reflecting minimal adoption. The primary obstacles identified include insufficient funding—highlighted by a mean of 3.51—problematic government policies (mean 3.36), and maintenance challenges (mean 3.42). The findings suggest that although there is a substantial awareness and appreciation of renewable energy's potential benefits within these institutions, considerable gaps persist between knowledge and practice. These gaps are largely attributable to financial, policy-related, and technical hurdles. To address these issues, it is recommended that stakeholders prioritize the development of targeted funding mechanisms, invest in comprehensive training and capacity-building programs, and formulate more supportive policy frameworks. Such measures are crucial to facilitating the broader adoption of renewable energy technologies in academic library settings, ultimately contributing to sustainable and reliable power solutions for ICT infrastructure.*

### ARTICLE INFO

#### Article History

Received: February, 2025

Received in revised form: March, 2025

Accepted: May, 2025

Published online: June, 2025

### KEYWORDS

Renewable Energy, Academic Libraries, ICT Facilities, Solar Energy, and Power

### INTRODUCTION

The contemporary global energy landscape is experiencing a profound transformation, primarily driven by rising energy demands and the urgent need to address the environmental consequences of conventional fossil fuel consumption. This shift has generated unprecedented international momentum toward the adoption of renewable energy, as countries worldwide increasingly recognize the importance of sustainable energy solutions (Owusu &

Asumadu-Sarkodie, 2016). The International Energy Agency projects that renewable sources will constitute 90% of the growth in global power capacity through 2025, highlighting the scale and urgency of this worldwide transition (IEA, 2020). Ultimately, this transformation is reshaping energy policy frameworks, economic models, and technological innovation pathways across both developed and developing nations.

The global shift toward renewable energy is driven by several interconnected factors,

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved



including concerns over energy security, the volatility of fossil fuel prices, and mounting environmental pressures (Devine-Wright, 2012). Renewable energy sources—such as solar, wind, hydropower, biomass, geothermal, and wave energy—are naturally replenishable resources that provide sustainable alternatives to finite fossil fuels. Additionally, advancements in technology have led to significant cost reductions, making renewable solutions increasingly economically feasible when compared to traditional energy sources (Zakaria et al., 2021).

Despite the global drive toward renewable energy adoption, notable disparities remain in both the pace and scale of implementation across different regions. Industrialized countries account for approximately 50% of the world's energy consumption, whereas developing nations utilize only about 16% (Goswami, 2022). This disparity underscores the complex relationship between energy access, economic growth, and technological development—particularly in regions where infrastructure remains inadequate. The energy challenge is especially severe in developing countries, where rapid population growth, urbanization, and economic expansion have intensified energy demands, yet existing infrastructure remains insufficient to meet these needs (Ghosh, 2015). Moreover, the intermittent nature of many renewable sources, combined with the high capital costs of storage technologies, presents additional hurdles to large-scale deployment (Ellabban, Abu-Rub & Blaabjerg, 2014).

Within the African context, energy security remains a critical developmental challenge with profound implications for economic growth and social advancement. The continent's energy landscape is marked by insufficient generation capacity, unreliable distribution networks, and limited access to modern energy services, particularly in rural and underserved urban communities (Aliyu, Dada & Adam, 2015). Nigeria exemplifies these challenges, grappling with persistent power deficits that have endured for decades despite possessing substantial oil and gas reserves. The Nigerian electricity sector is

characterized by inadequate generation capability, inefficient transmission and distribution systems, and frequent outages that hamper economic activities and social services (Oyedepo, 2012). Such issues have been compounded by environmental degradation in oil-producing regions, including land and water pollution caused by oil spills, which has intensified calls for alternative, sustainable energy sources (Shaaban & Petinrin, 2014).

The persistent inadequacy of power from the national grid has compelled individuals, businesses, and institutions to seek alternative energy solutions. Among these, solar energy has emerged as an increasingly viable option for ensuring dependable electricity access. The convergence of energy challenges and the growth of information and communication technology (ICT) underscores particular concerns for Nigeria's digital evolution. A primary obstacle to the expansion of ICT, especially in underserved and unserved areas, is the inadequate or absent electricity supply needed to operate technological devices (Zakaria et al., 2020). This issue is especially critical within educational institutions, where ICT facilities are fundamental for effective teaching, research, and learning. The unreliability of the national grid, coupled with the high operational costs of diesel generators, imposes significant barriers to the optimal deployment of ICT resources in academic settings.

Academic libraries, serving as vital knowledge centers within educational institutions, play an essential role in supporting teaching, research, and information dissemination through their extensive resources and services. Yet, these libraries face distinct challenges in maintaining a reliable power supply for their ICT infrastructure, which is crucial for functioning effectively in the digital age (Nwosu, 2021). The intermittent nature of national grid power severely impacts the operations of library ICT systems, including computers, servers, digital databases, internet connectivity, and electronic security systems (Nworie et al., 2023). Such power-related disruptions not only diminish the quality of library services but also constrain their potential to

---

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved



contribute meaningfully to the educational missions of their parent institutions.

Economically, the unreliability of power imposes significant costs on academic libraries, which must rely on alternative sources such as diesel generators—sources that entail high operational expenses and environmental concerns. As budgets shrink and the costs of procuring and maintaining generators increase, the need for sustainable energy solutions becomes more urgent, particularly for institutional settings like libraries (Ojo et al., 2023). Solar energy offers a promising alternative; it can deliver reliable, cost-effective, and environmentally sustainable power for ICT facilities within libraries, either as independent systems or as backup power sources.

While several renewable energy options exist, solar energy is especially suited for Nigerian academic libraries because of the country's abundant solar radiation and the modular design of photovoltaic systems. Solar energy solutions can be tailored to power specific ICT devices, provide backup during grid failures, or serve as primary power sources where the grid is inaccessible or unreliable (Adeyoyin, Alawiye & Ewolu, 2019).

### STATEMENT OF THE PROBLEM

Nigeria's higher education sector is facing an unprecedented energy crisis that fundamentally threatens the operational sustainability of academic libraries and their ICT facilities. The country's longstanding, epileptic power supply has deteriorated to critical levels, with Nigeria struggling to ensure a consistent and reliable energy supply. This situation is driven by a range of systemic issues, including inadequate funding, infrastructural decay, corruption, shortages of technical skills, and macroeconomic instability, all of which impede effective energy distribution within educational institutions (Owebor et al., 2021). The crisis has worsened since 2023, following sharp increases in electricity tariffs under the new administration.

African power sectors, plagued by financial unsustainability, low grid connection rates, and soaring consumer costs, have created

an untenable environment for universities and other academic institutions (Klug et al., 2022). As a result, many universities are compelled to depend heavily on diesel generators, which pose health risks associated with fossil fuel emissions, underscoring the urgent need to explore alternative renewable energy sources to meet their growing electricity demands (Ogbonnaya et al., 2019). This systematic failure of the traditional power supply infrastructure has plunged institutions into widespread financial distress, making it impossible for universities to sustain vital services, including their library ICT facilities, which are crucial for academic activities, digital resource access, and research.

The combined effect of unreliable power, escalating energy costs, and mounting financial constraints creates a compelling argument for the urgent adoption of renewable energy within Nigerian academic libraries. This is especially pressing given the ongoing power inconsistencies and persistent blackouts despite efforts to reform the electricity industry and the rising global emphasis on renewable solutions (Olusola & Olujobi, 2021). Research indicates that solar energy systems offer inherent advantages for educational institutions, providing greater energy security and a more stable supply.

Studies have also shown that Nigeria possesses significant solar energy potential, which could be harnessed effectively for institutional use (Babatunde et al., 2020). However, despite this promising outlook pointing towards renewable energy as the future of sustainable power delivery (Cuce & Riffat, 2015), most university libraries in Nigeria remain dependent on unreliable national grids and costly fossil fuel generators. The core challenge lies in the limited institutional awareness and understanding of renewable energy technologies and their specific applications within library settings. This knowledge gap hampers informed decision-making and investment in sustainable energy solutions, which are critical for fostering resilience and operational efficiency in Nigeria's academic institutions.



### Objectives of the Study

The main objective of this study is to investigate the awareness and use of renewable energy as alternative power source for ICT facilities in academic library. Specifically, the study seeks to:

1. Examine the level of awareness of renewable energy as alternative power source in university libraries
2. Find out the power sources for ICT facilities in university libraries.
3. Investigate the perceived benefits of renewable energy as alternative power in university libraries
4. Find out the problems militating against power supply for ICT facilities in university libraries

### Research Questions

The following research questions are raised for the study:

1. What is the level of awareness of renewable energy as alternative power source?
2. What are power sources for ICT facilities in university libraries?
3. What are the perceived benefits of renewable energy as alternative power in university libraries
4. What are the problems militating against power supply for ICT facilities in university libraries?

### LITERATURE REVIEW

The rising global demand for energy and the urgent need to reduce the environmental harm caused by conventional fossil fuels have driven a worldwide shift toward renewable energy sources (Owusu & Asumadu-Sarkodie, 2016). Renewable options such as solar, wind, and hydropower are sustainable and eco-friendly alternatives. However, in developing countries like Nigeria, the adoption and use of renewable energy remain relatively limited. This is due to several challenges, including low awareness, technological barriers, and inadequate government policies (Akinbami, 2001; Sambo, 2009; Aliyu et al., 2015). Among these, solar

energy stands out as especially promising, given Nigeria's abundant sunlight. Deploying solar power to support ICT facilities in academic libraries could greatly mitigate power supply issues and decrease reliance on fossil fuels (Ohunakin et al., 2014; Eze & Samson, 2019). Yet, despite its potential, adoption remains modest due to various factors.

A primary barrier is lack of awareness and understanding of the benefits and applications of solar energy. Several studies emphasize the importance of raising awareness among stakeholders—including library staff and users—to foster adoption (Akinwale & Ogundari, 2017). For example, Owusu and Asumadu-Sarkodie (2019) found in Ghana that limited knowledge about solar energy significantly hindered its integration in educational settings. Additionally, technological challenges, such as high installation and maintenance costs, further restrict adoption (Aliyu et al., 2015; Eleri et al., 2021). Oyedepo (2012) pointed out the high upfront costs of solar systems and the lack of local manufacturing capabilities as critical barriers.

Government policies and incentives are vital for accelerating renewable energy adoption. Unfortunately, Nigeria lacks a clear, comprehensive policy framework supporting renewable energy initiatives (Shaaban & Petinrin, 2014; Kolawole & Oladokun, 2024). Scholars like Sambo (2009) emphasize the need for government-led support through subsidies, tax incentives, and widespread awareness campaigns to promote solar energy use in Nigeria.

In academic libraries, integrating solar energy could provide a reliable, sustainable power source for ICT infrastructure, ensuring continuous access to digital resources (Ogo et al., 2022). However, current adoption levels remain low, with the practice still in its early stages (Ohunakin et al., 2014; Aliyu et al., 2015). To overcome these hurdles, a coordinated, multi-stakeholder approach involving government, educational institutions, librarians, and renewable energy specialists is essential (Owusu & Asumadu-Sarkodie, 2016). Enhancing awareness through targeted training, workshops, and campaigns, alongside developing supportive policies and



promoting local manufacturing, can significantly foster broader adoption of solar energy in Nigerian academic libraries (Kolawole & Oladokun, 2024).

## METHODOLOGY

This study employed a descriptive research design. The population consisted of 173 library staff across four university libraries in Edo State, Nigeria: Ambrose Alli University Library, Ekpoma (36), Benson Idahosa University (18), Edo State University (7), Glorious University Samuel Adegboyega (8), John Harris Library, University of Benin (92), and Wellspring University (11). A total enumeration sampling method was chosen because the population was manageable and easily accessible.

The researcher used a structured questionnaire, developed specifically for this study and titled "Questionnaire on awareness and use of renewable energy as an alternative power source for ICT facilities in academic libraries." Face

validity was established to ensure that the instrument effectively measured what it was intended to. The questionnaires were administered in person, with the researcher and two trained research assistants overseeing the process. Out of 172 distributed copies, 152 were correctly completed and returned, representing an 87.9% response rate. The collected data were analyzed using descriptive statistics tool to identify patterns and insights.

## RESULTS

### Descriptive Analysis

The following tables show descriptive analysis of research questions:

#### Research Question One:

What is the level of awareness of renewable energy as alternative power source?

**Table 1:** mean ratings of respondents on level of renewable energy as alternative power source

S/N	Awareness Items	SA	A	D	SD	Mean	SD
1	I am fully aware of renewable energy as an alternative power source for ICT facilities	58 (38.2%)	64 (42.1%)	22 (14.5%)	8 (5.3%)	3.13	0.85
2	I understand the concept and applications of renewable energy systems	52 (34.2%)	68 (44.7%)	24 (15.8%)	8 (5.3%)	3.08	0.82
3	I am knowledgeable about different types of renewable energy sources	46 (30.3%)	72 (47.4%)	26 (17.1%)	8 (5.3%)	3.03	0.80
4	I regularly read/hear about renewable energy developments and innovations	42 (27.6%)	76 (50.0%)	28 (18.4%)	6 (3.9%)	3.01	0.78
5	I am aware of the environmental benefits of renewable energy systems	68 (44.7%)	58 (38.2%)	20 (13.2%)	6 (3.9%)	3.24	0.82
6	I know about renewable energy equipment and their installation processes	34 (22.4%)	64 (42.1%)	42 (27.6%)	12 (7.9%)	2.79	0.86
7	I am aware that renewable energy can effectively power ICT equipment in libraries	56 (36.8%)	72 (47.4%)	18 (11.8%)	6 (3.9%)	3.17	0.78
8	I believe renewable energy awareness programs are necessary for library staff	74 (48.7%)	62 (40.8%)	12 (7.9%)	4 (2.6%)	3.36	0.75

The results from table 1 indicated a generally high level of awareness among library staff regarding renewable energy as an alternative power source. The overall mean scores ranging from 2.79 to 3.36 demonstrate that most

respondents have substantial knowledge about renewable energy concepts and applications. The highest awareness was recorded for the necessity of renewable energy awareness programs (Mean = 3.36), while knowledge about equipment and

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved



installation processes showed the lowest awareness level (Mean = 2.79). The standard deviations ranging from 0.75 to 0.86 indicate moderate variability in responses.

#### Research Question Two:

What are the renewable power sources for ICT facilities in University Libraries?

**Table 2:** Mean ratings of respondents on the renewable power sources for ICT Facilities

S/N	Renewable Power Sources	SA	A	D	SD	SD
1	Solar energy is the most commonly known renewable power source in our library	78 (51.3%)	58 (38.2%)	12 (7.9%)	4 (2.6%)	3.38 0.76
2	Solar panels are more feasible for ICT facilities than other renewable sources	72 (47.4%)	62 (40.8%)	14 (9.2%)	4 (2.6%)	3.33 0.78
3	Wind energy is a viable alternative power source for our library's ICT facilities	24 (15.8%)	42 (27.6%)	58 (38.2%)	28 (18.4%)	2.41 0.95
4	Biomass energy can effectively power ICT equipment in academic libraries	18 (11.8%)	38 (25.0%)	64 (42.1%)	32 (21.1%)	2.28 0.91
5	Hydroelectric power is suitable for our library's ICT power requirements	22 (14.5%)	46 (30.3%)	54 (35.5%)	30 (19.7%)	2.40 0.94
6	Hybrid renewable energy systems would be ideal for our ICT facilities	48 (31.6%)	76 (50.0%)	22 (14.5%)	6 (3.9%)	3.09 0.78
7	Solar energy technology is more advanced and reliable than other renewable sources	66 (43.4%)	68 (44.7%)	14 (9.2%)	4 (2.6%)	3.29 0.74
8	Our library currently has access to renewable energy sources for ICT operations	12 (7.9%)	28 (18.4%)	76 (50.0%)	36 (23.7%)	2.11 0.86

From Table 2, it is clearly demonstrated that solar energy is the most recognized and preferred renewable power source among library staff, with mean scores of 3.38 and 3.33 for solar-related items. This preference aligns with Nigeria's abundant sunlight and the perceived feasibility of solar technology for ICT applications. Other renewable sources like wind (Mean = 2.41), biomass (Mean = 2.28), and hydroelectric (Mean

= 2.40) received lower ratings, indicating limited knowledge and perceived applicability. The low score for current access to renewable energy sources (Mean = 2.11) highlights the gap between awareness and actual implementation.

#### Research Question Three:

What are the perceived benefits of renewable energy for ICT facilities in university libraries?

**Table 3:** Mean ratings of respondents for the perceived benefits of renewable energy for ICT Facilities

S/N	Perceived Benefits	SA	A	D	SD	Mean	SD
1	Renewable energy provides cost-effective long-term power solutions for ICT facilities	82 (53.9%)	56 (36.8%)	10 (6.6%)	4 (2.6%)	3.42	0.72
2	Renewable energy ensures uninterrupted power supply for critical ICT operations	76 (50.0%)	62 (40.8%)	10 (6.6%)	4 (2.6%)	3.38	0.73
3	Using renewable energy reduces environmental impact and carbon footprint	88 (57.9%)	52 (34.2%)	8 (5.3%)	4 (2.6%)	3.47	0.70
4	Renewable energy systems require minimal maintenance compared to generators	64 (42.1%)	68 (44.7%)	16 (10.5%)	4 (2.6%)	3.26	0.75

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved

S/N	Perceived Benefits	SA	A	D	SD	Mean	SD
5	Renewable energy improves the library's technological sustainability and reputation	78 (51.3%)	58 (38.2%)	12 (7.9%)	4 (2.6%)	3.38	0.75
6	Renewable energy systems provide energy independence from unreliable grid supply	84 (55.3%)	54 (35.5%)	10 (6.6%)	4 (2.6%)	3.43	0.72
7	Renewable energy supports continuous library services and extended operating hours	72 (47.4%)	66 (43.4%)	10 (6.6%)	4 (2.6%)	3.36	0.73
8	Renewable energy systems offer better return on investment over time	68 (44.7%)	64 (42.1%)	16 (10.5%)	4 (2.6%)	3.21	0.78

The results reveal exceptionally high perceived benefits of renewable energy among library staff, with all mean scores above 3.20, indicating strong agreement with the benefits. The highest perceived benefit relates to environmental impact reduction (Mean = 3.47), followed by cost-effectiveness (Mean = 3.42) and energy independence (Mean = 3.43). These findings suggest that library staff clearly understand the multifaceted advantages of renewable energy systems. The consistently low standard deviations (0.70-0.78) indicate strong consensus among

respondents regarding these benefits. The high perception of benefits, combined with earlier findings about awareness levels, suggests that the main barriers to adoption are not related to understanding the advantages but rather to implementation challenges such as funding and technical expertise.

#### Research Question Four:

What are the problems militating against power supply for ICT facilities in university libraries?

**Table 4:** Mean ratings of respondents on the problems militating against power supply for ICT facilities in university libraries

S/N	Implementation Challenges	SA	A	D	SD	Mean	SD
1	Inadequate funding allocation for renewable energy systems installation	94 (61.8%)	46 (30.3%)	8 (5.3%)	4 (2.6%)	3.51	0.69
2	Government policies and regulations hinder renewable energy adoption	76 (50.0%)	58 (38.2%)	14 (9.2%)	4 (2.6%)	3.36	0.76
3	High initial capital costs for renewable energy system installation	88 (57.9%)	52 (34.2%)	8 (5.3%)	4 (2.6%)	3.47	0.70
4	Inadequate maintenance expertise and technical support for renewable systems	82 (53.9%)	56 (36.8%)	10 (6.6%)	4 (2.6%)	3.42	0.72
5	Corruption and mismanagement of resources allocated for power infrastructure	86 (56.6%)	54 (35.5%)	8 (5.3%)	4 (2.6%)	3.46	0.71
6	Lack of institutional support and commitment to renewable energy projects	78 (51.3%)	58 (38.2%)	12 (7.9%)	4 (2.6%)	3.38	0.75
7	Insufficient knowledge about renewable energy system procurement and installation	74 (48.7%)	62 (40.8%)	12 (7.9%)	4 (2.6%)	3.31	0.76
8	Unreliable power grid system necessitating expensive backup alternatives	92 (60.5%)	48 (31.6%)	8 (5.3%)	4 (2.6%)	3.49	0.70

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved



The findings reveal significant challenges hindering the implementation of renewable energy systems in academic libraries. Inadequate funding emerges as the most critical challenge (Mean = 3.51), followed by unreliable power grid systems (Mean = 3.49) and high initial capital costs (Mean = 3.47). These results align with the typical challenges faced by public institutions in developing countries. Government policy issues (Mean = 3.36), corruption (Mean = 3.46), and inadequate maintenance expertise (Mean = 3.42) also scored highly, indicating systemic problems that require comprehensive solutions. The low standard deviations (0.69-0.76) demonstrate strong consensus among respondents about these challenges.

### DISCUSSION OF FINDINGS

This study offers valuable insights into the current landscape of renewable energy awareness and the challenges of implementation within academic libraries in Edo State, Nigeria. The findings highlight a complex dynamic: high levels of awareness and perceived benefits coexist with significant barriers to practical adoption. The data show that awareness of renewable energy (mean scores ranging from 2.79 to 3.36) aligns with previous research by Eshiemogie et al. (2022), which indicated that 98.1% of Nigerian engineering students had heard of renewable energy, although only 24% expressed high confidence in their understanding. The preference for solar energy over other sources underscores its perceived reliability and the widespread adoption of photovoltaic solar systems, reflecting Nigeria's promising solar potential and the broader opportunities for energy solutions in underserved regions.

Nevertheless, a notable gap exists between awareness and actual implementation, with a mean score of 2.11, echoing earlier studies like Adeyoyin et al. (2017). Their work pointed to issues such as unreliable national grid supply, environmental pollution from oil spillage, and other factors driving Nigeria and beyond to look for alternative energy sources like solar power. The prominent identification of inadequate funding as the primary barrier (mean 3.51) is strongly

supported by Adeshina et al. (2024), who pinpointed financial constraints, infrastructural decay, corruption, skill shortages, and macroeconomic instability as critical obstacles hindering renewable energy deployment. Adelaja (2020) further emphasizes that financial and policy constraints significantly hinder renewable energy adoption in Nigeria. While some studies highlight technical challenges as key barriers, this research reflects the unique context of public academic institutions in Nigeria, where financial and policy issues often dominate.

### CONCLUSION

This research critically examined the level of awareness and practical utilization of renewable energy as alternative power sources for ICT facilities within select academic libraries in Edo State, Nigeria. The results unveil a paradoxical scenario: despite high awareness levels, indicated by mean scores ranging from 2.79 to 3.36, and a robust perception of benefits, all exceeding 3.20, the actual implementation remains markedly low, with a mean of only 2.11. Among the various renewable sources, solar energy stood out as the most favored, a reflection of Nigeria's abundant solar resources and the technology's perceived suitability for ICT applications in these settings.

Nonetheless, substantial barriers hinder progress, notably inadequate funding (mean 3.51), restrictive government policies (mean 3.36), and ongoing maintenance challenges (mean 3.42). The study concludes that while library personnel demonstrate considerable theoretical understanding of renewable energy's advantages, translating this knowledge into concrete action demands comprehensive strategies that address the intertwined financial, policy, and technical obstacles. The pronounced disconnect between awareness and actual deployment highlights a pressing need for targeted interventions, designed to leverage existing positive attitudes and foster meaningful adoption of renewable energy solutions in Nigerian academic libraries.





## RECOMMENDATIONS

Based on the comprehensive findings of this study, several key recommendations are advanced to promote the adoption of renewable energy in academic libraries:

Government agencies and university administrations must create dedicated funding schemes and grant programs specifically targeted at renewable energy initiatives within academic libraries. Such financial support could leverage public-private partnerships and solar leasing arrangements, thereby easing the capital constraints often associated with renewable energy projects.

University management must prioritize the development and implementation of structured training programs for library staff, focusing on the maintenance, operation, and troubleshooting of renewable energy systems. These programs should encompass practical, hands-on workshops, certification courses, and collaborations with renewable energy companies to ensure continuous technical support and capacity building.

Lastly, efforts should be intensified to facilitate the deployment of alternative power sources that can adequately support the growing number of ICT facilities in libraries. This would help ensure the effective and reliable functioning of library services, while also reducing dependence on unreliable grid supplies and fossil fuel generators, thus contributing to broader sustainability goals.

## REFERENCES

- Adelaja, A. O. (2020). Barriers to national renewable energy policy adoption: Insights from a case study of Nigeria. *Energy Strategy Reviews*, 30, 100519. <https://doi.org/10.1016/j.esr.2020.100519>
- Adeshina, M. A., Ogunleye, A. M., Suleiman, H. O., Yakub, A. O., Same, N. N., Suleiman, Z. A., & Huh, J. S. (2024). From potential to power: Advancing Nigeria's energy sector through renewable integration and policy reform. *Sustainability*, 16(20), 8803. <https://doi.org/10.3390/su16208803>
- Akinwale, Y. O., & Ogundari, I. O. (2017). Exploration of renewable energy resources for sustainable development in Nigeria: A study of the federal capital territory. *International Journal of Energy Economics and Policy*, 7(3), 240-246.
- Adeyoyin, S. O., Alawiye, M. K., & Ewulo, O. R. (2019). Awareness and use of solar energy as alternative power source for ICT facilities in Nigerian university libraries and information centres. *Library Philosophy and Practice* (ejournal), 2372, 1-8.
- Açıkgöz, C. (2011). Renewable energy education in Turkey. *Renewable and Sustainable Energy Reviews*, 62, 1016–1027. <https://doi.org/10.1016/j.rser.2016.05.038>
- Ahmad, S., Tahar, R. M., Muhammad-Sukki, F., Munir, A. B., & Rahim, R. A. (2015). Role of feed-in tariff policy in promoting solar photovoltaic investments in Malaysia: A system dynamics approach. *Energy*, 84, 808–815. <https://doi.org/10.1016/j.energy.2015.03.029>
- Akinbami, J. F. K. (2001). Renewable energy resources and technologies in Nigeria: Present situation, future prospects, and policy framework. *Mitigation and Adaptation Strategies for Global Change*, 6(2), 155–181. <https://doi.org/10.1023/A:1011529700972>
- Aliyu, A. S., Dada, J. O., & Adam, I. K. (2015). Current status and future prospects of renewable energy in Nigeria. *Renewable and Sustainable Energy Reviews*, 48, 336–346. <https://doi.org/10.1016/j.rser.2015.03.081>
- Arı, E., & Yilmaz, V. (2021). The effect of environmental concern on renewable energy attitude and usage intention: A case of Turkey.



- Babatunde, O. M., Munda, J. L., & Hamam, Y. J. E. R. (2020). Power system flexibility: A review. *Energy Reports*, 6, 101–106. <https://doi.org/10.1016/j.egyr.2019.10.029>
- Devine-Wright, P. (Ed.). (2012). *Renewable energy and the public*. Routledge.
- Dileep, G. (2020). A survey on smart grid technologies and applications. *Renewable Energy*, 146, 2589–2625. <https://doi.org/10.1016/j.renene.2019.07.119>
- Efenodo, G., & Edegbo, W. O. (2023). Internet connectivity and power outages in university electronic libraries in Nigeria.
- Ellabban, O., Abu-Rub, H., & Blaabjerg, F. (2014). Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and Sustainable Energy Reviews*, 39, 748–764. <https://doi.org/10.1016/j.rser.2014.07.113>
- Eshiemogie, S. O., Ighalo, J. O., & Banji, T. I. (2022). Knowledge, perception and awareness of renewable energy by engineering students in Nigeria: A need for the undergraduate engineering program adjustment. *Cleaner Engineering and Technology*, 6, 100388. <https://doi.org/10.1016/j.clet.2022.100388>
- Ghosh, A. (2015). Energy security and renewable energy: A perspective from India. *Energy Policy*, 88, 611–618. <https://doi.org/10.1016/j.enpol.2015.01.035>
- Goswami, D. Y. (2022). *Principles of solar engineering*. CRC Press.
- International Energy Agency (IEA). (2020). *Renewable energy market update: Outlook for 2020 and 2021*. OECD Publishing.
- Klug, T. W., Beyene, A. D., Meles, T. H., Toman, M. A., Hassen, S., Hou, M., ... Jeuland, M. (2022). A review of impacts of electricity tariff reform in Africa. *Energy Policy*, 170, 113226. <https://doi.org/10.1016/j.enpol.2022.113226>
- Kolawole, D. T. O., & Oladokun, B. D. (2024). Sustainable practices in Nigerian Libraries: Exploring the role of green libraries in promoting eco-friendly reading spaces. *International Journal of Knowledge Content Development & Technology*. [https://ijkcet.net/\\_common/do.php](https://ijkcet.net/_common/do.php)
- Nworie, J. C., Ubochi, E. U., Iwuchukwu, C. N., Njoku, & Chioma, C. (2023). Challenges and prospects of library and information services in academic libraries in Nigeria. *Library Philosophy and Practice (e-journal)*.
- Nwosu, J. C. (2021). Challenges and facilitating factors of automation in Federal University of Technology Owerri Library.
- Ohunakin, O. S., Adaramola, M. S., Oyewola, O. M., & Fagbenle, R. O. (2014). Solar energy applications and development in Nigeria: Drivers and barriers. *Renewable and Sustainable Energy Reviews*, 32, 294–301.
- Ogo, E. P., Omosekejimi, A. F., & Ebhonu, S. I. (2022). Usage of Solar Inverter Technology as Alternative Energy Source: A Catalyst for Round the Clock Electronic Services in Nigerian University Libraries. *Information Impact: Journal of Information and Knowledge Management*, 12(2), 113–125.
- Ojo, G. G., Lottu, O. A., Ndiwe, T. C., Izuka, U., & Ehiobu, N. N. (2023). Solar energy adaptation and efficiency across diverse Nigerian and global climates: A review of technological advancement. *Engineering Heritage Journal (GWK)*, 7(1), 99–107
- Olusola, J., & Olujobi. (2020). The legal sustainability of energy substitution in Nigeria's electric power sector: Renewable energy as alternative. *Protection and Control of Modern*

Corresponding Author: Omwanghe Etinosa James

✉ [etinosa.omwanghe@uniben.edu](mailto:etinosa.omwanghe@uniben.edu)

Reader's Services Librarian, John Harris Library, University of Benin.

© 2025. Faculty of Technology Education. ATBU Bauchi. All rights reserved



- Power Systems*, 5(4), 1–12.  
<https://doi.org/10.1186/s41601-020-00151-0>
- Owusu, P. A., & Asumadu-Sarkodie, S. (2016). A review of renewable energy sources, sustainability issues and climate change mitigation. *Cogent Engineering*, 3(1), 1167990.  
<https://doi.org/10.1080/23311916.2016.1167990>
- Oyedepo, S. O. (2012). Energy and sustainable development in Nigeria: The way forward. *Energy, Sustainability and Society*, 2(1), 1–17.  
<https://doi.org/10.1186/2192-0567-2-15>
- Owebor, K., Diemuodeke, E. O., Briggs, T. A., & Imran, M. (2021). Power situation and renewable energy potentials in Nigeria: A case for integrated multi-generation technology. *Renewable Energy*, 177, 773–796.  
<https://doi.org/10.1016/j.renene.2021.05.011>
- Rodríguez-Urrego, D., & Rodríguez-Urrego, L. (2018). Photovoltaic energy in Colombia: Current status, inventory, policies and future prospects. *Renewable and Sustainable Energy Reviews*, 92, 160–170.  
<https://doi.org/10.1016/j.rser.2018.04.071>
- Sambo, A. S. (2009). Strategic developments in renewable energy in Nigeria. *International Association for Energy Economics*, 16(3), 15–19.
- Shaaban, M., & Petinrin, J. O. (2014). Renewable energy potentials in Nigeria: Meeting rural energy needs. *Renewable and Sustainable Energy Reviews*, 29, 72–84.  
<https://doi.org/10.1016/j.rser.2013.08.061>
- Zakaria, A., Ismail, F. B., Lipu, M. H., & Hannan, M. A. (2020). Uncertainty models for stochastic optimization in renewable energy applications. *Renewable Energy*, 145, 1543–1571.  
<https://doi.org/10.1016/j.renene.2019.07.095>
- Zakaria, Z., Kamarudin, S. K., & Wahid, K. A. A. (2021). Fuel cells as an advanced alternative energy source for the residential sector applications in Malaysia. *International Journal of Energy Research*, 45(4), 5032–5057.  
<https://doi.org/10.1002/er.6748>