



Assam Don Bosco University committed to Research in the field of Energy Sustainability and SDG 7



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Established in 2008, **Assam Don Bosco University (ABDU)**, Guwahati is the first University in India of the Don Bosco Society, present across 136 countries serving 9 million students. ABDU is committed to a Sustainability Programme, which is the university's roadmap for building and operating a vibrant campus community. As global cluster lead in SDG-7, ABDU is engaged in dialogue with Strathmore University, Kenya and Qatar University for collaboration in affordable and clean energy.



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In this regard, a webinar by Strathmore University has helped this collaborative effort. Prof. Izael Pereira Da Silva from the Strathmore University delivered this webinar to the students of Assam Don Bosco University on 10 May 2019, in which he presented a session on 'Energy Audit and Management'.



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With an installed grid-connected rooftop solar photovoltaic power systems of 320 KW, ABDU campus is practicing green energy. Water reservoirs have been created utilizing the natural streams coursing through the campus; the installation of a facility for generating micro-hydroelectric power up to 15 KW is underway.

A major portion of the University's research areas focuses on improvement in energy efficiency. The University is coordinating international level activities to enhance international co-operation to facilitate access to and research on clean energy and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology and clean energy technology. Membership in the International Association of Universities and taking up of the responsibility of the global cluster leader of SDG 7 helps ABDU realize its vision of promoting modern and renewable energy sources globally, for the greater interest of the Mankind.

Collaboration Plan of ABDU to achieve SDG7

In the spirit of contributing to the field of sustainable energy, Assam Don Bosco University is coordinating activities with other global academic institutions to promote joint academic and technical endeavours, keeping in view the following scope of collaboration.

Areas of collaboration may be proposed by either institution and may include, but are not limited to:

1. **Renewable Energy Generation/Harvesting:** Exchange of Ideas and expertise on Clean and Sustainable Energy, such as- Solar Energy, Bio-Mass Energy, Energy from Wastes and other renewable energy sources.
2. **Energy Audit and Management:** Exchange of procedures and ideas for Energy Audit and Management in the Institutions.
3. **Training program on Renewable Energy systems:** Collaborative course development and implementation for the training of professionals and students on Renewable energy systems.
4. **Social Commitment programs:** Student exchange under community attachment program.
5. **Online classes:** Online classes and workshops by the faculty members of both the institutions for the students and collaborating organizations.
6. **Faculty and Student Exchange:** Faculty and student exchange programs for academic purposes and internships.
7. **Collaborative Research:** Collaborative research, symposia, conferences, etc. on Affordable, Sustainable, Reliable and Modern energy.

ADBU looks forward to such fruitful responses to enhance academic and research opportunities for staff and students and to develop cultural linkages between them and for sharing of perspectives and a way forward for planning activities in the relevant SDG.

Speaking about the research, ADBU is committed to excellence and diversity in research that enhances the quality of life. The University is undertaking research in the generation of affordable energy from new and renewable sources in a cost-effective manner targeted for use in rural areas of the country. In addition, the research areas are focussed on the use of Energy in an optimized manner for the conservation of natural resources for future generations. Some of the selected ongoing research areas in the field of Energy are:

- **Development of Energy Generation from Bio-Wastes:** One successful model of Energy Generation from Cow-Dung is shown in fig. 1. The product is named as Cow-Dung Battery, mainly based on generating electric energy from animal waste. When series-connected, discharged batteries are placed in a basin containing some cow dung and saltwater, and exposed to sunlight, the positive and negative charges produced in the solution are collected in the series-connected batteries to produce a current; thus the batteries get re-charged. They can then be re-used where batteries are required. The cow dung needs to be replaced once in 45 days. By adding sulphuric acid to the mixture, the efficiency can be increased. This project has great relevance in rural setup considering the low cost. Moreover, there is a plan to cascade this training through the university's self-skilling platform "Swabhalamban" as deemed feasible. It is noteworthy that through the "Swabalamban" project ADBU provides free training to the educated (up to 10th standard) unemployed youth in technical job oriented skills for employment opportunities in Electronics & Information Technology Hardware, installation and maintenance of power backup systems, Basic Electrical Maintenance, desktop publishing, welding, fitting & blacksmithy, electrical house wiring and plumbing.

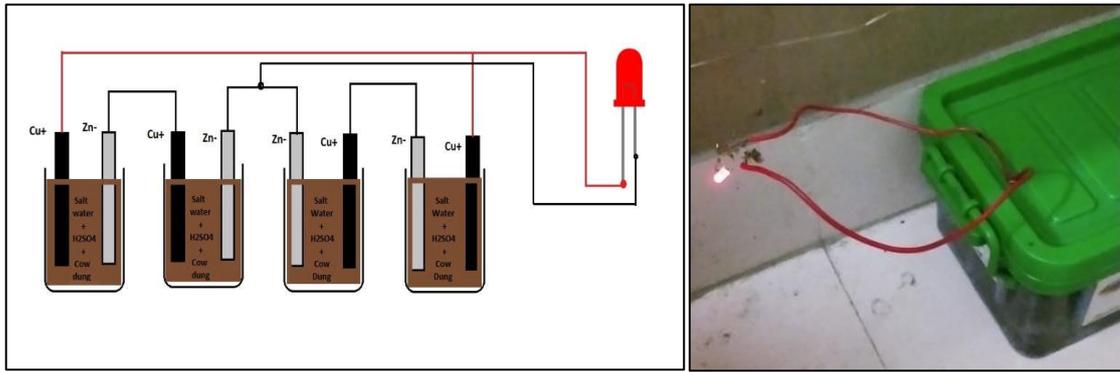
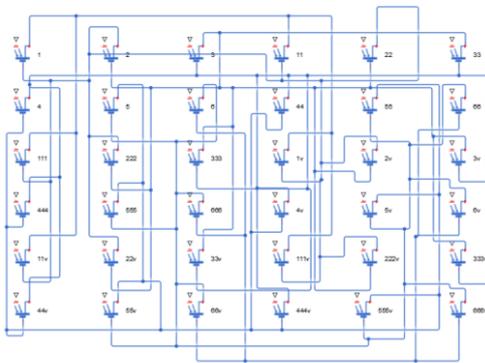


Fig. 1: Cow-Dung Battery

- Development of a novel algorithm to increase the performance of Photo Voltaic array in partial shading condition: This project presents a technique to configure the modules in the PV array to enhance the generated power from the array under partial shading condition. In this approach, the physical locations of the modules in a total-cross-tied (TCT) connected PV array are arranged in such a way, so as to distribute the shading effect on the entire PV array, this reduces the mismatch loss and enhances power output. Further, this arrangement of PV modules is made without altering the electrical connection of the module in the array. The theoretical results (fig. 2) obtained using simulation studies demonstrate a significant power improvement in the proposed configuration with respect to the TCT configuration.



Simulation Results: Power Difference			
Shading condition	TCT Configuration (watt)	Proposed configuration (watt)	Increase in Efficiency (%)
Short & wide	80.1498	93.1686	13.97
Short & narrow	80.161	93.168	13.95
Long & wide	63.0243	93.1686	32.35
Long & narrow	80.1608	93.2	13.98

Fig. 2: A novel algorithm to increase the performance of Photo Voltaic array in partial shading conditions

- Development of Systems for Efficient and Optimum Energy usage: A circuit for Automated switching of home appliances, which can be operated using a mobile-based application, is shown in fig. 3. These systems can be used to control the operation of electrical appliances in an optimal manner so that energy can be saved.

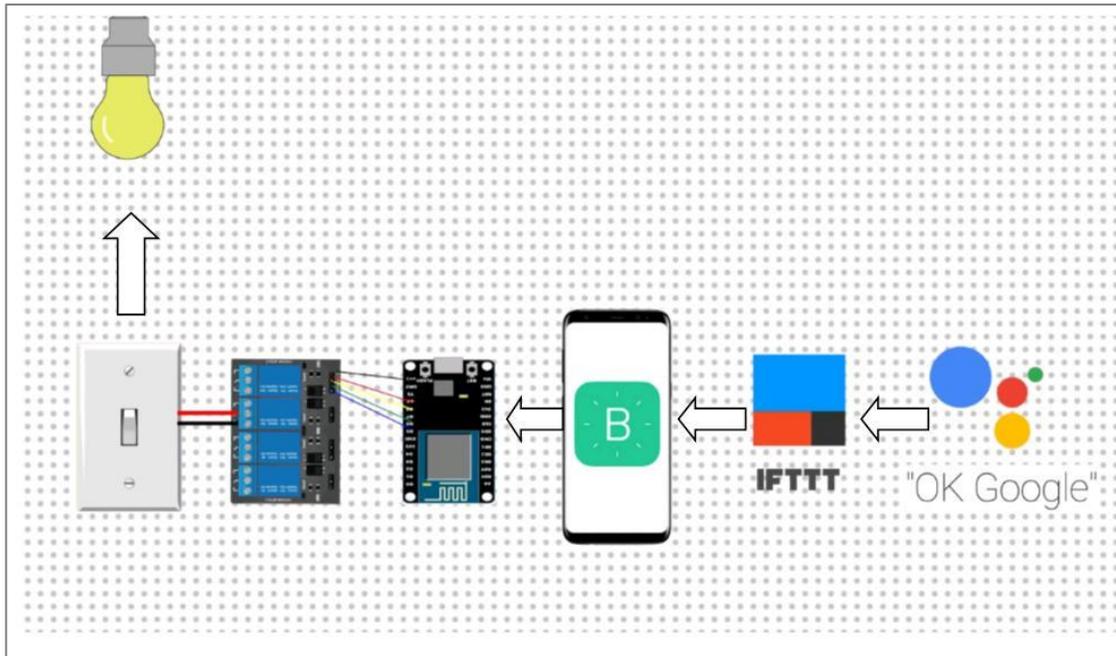


Fig. 3: Circuit for Automated Switching of Home Appliances

- Development of Electrical Power System monitoring system: An Electrical Circuit integrated with a mobile application is developed for monitoring substation power supplies in real-time. The mobile-based monitoring makes the optimum scheduling of power supply possible through rapid decision making by the stakeholders. A model of the circuit developed is shown in fig. 4.



Fig. 4: Substation Monitoring Device

ABDU thrives on taking an active part in the global endeavour of ensuring universal access to affordable, reliable and modern energy services. The University intends to lead the way in substantially increasing the share of renewable energy in the requirement of the total energy mix and looks forward to collaboration in academic and research opportunities for facilitating access to clean energy technology and energy efficiency.