



DR. BHIMRAO AMBEDKAR UNIVERSITY, AGRA

(Formerly Agra University, Agra)

A+ Accredited by NAAC

Report on

Sustainable Development Goal 7



SDG 7 AFFORDABLE AND CLEAN ENERGY

Ensure access to affordable, reliable, sustainable
and modern energy for all

Sustainable Development Goal 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all. Energy is central to nearly every major development challenge, from economic growth and public health to climate action, and its availability, affordability and cleanliness underpin sustainable progress. Higher education institutions have a distinctive role to play, both as adopters of clean-energy solutions on their own campuses and as generators of research and awareness that shape how future generations understand and use energy.

Dr Bhimrao Ambedkar University, Agra (formerly Agra University), an NAAC A+ accredited institution now marking a century of academic excellence (1927–2027), is committed to advancing SDG 7 through its research output, campus energy practices, and community engagement. This report presents the University's contribution to Affordable and Clean Energy in line with the Times Higher Education Sustainability Impact Ratings methodology, covering research on clean energy, institutional measures, energy use density, community outreach, and low-carbon energy use.

The policy builds upon DBRAU's existing Policy on Green Clean Campus and documented sustainability achievements, including the installation of approximately 130 kWp solar panels with plans to expand to 500 kWp, replacement of over 4,200 conventional tube lights with LEDs achieving annual electricity savings of more than 14.54 lakh kWh, implementation of rainwater harvesting systems with 34 pits, and establishment of a Centre of Excellence on Solar Cells and Renewable Energy. The university has embedded a three-credit course on green practices in its curricula, operates a 400 KLD capacity Sewage Treatment Plant (STP) and 30 KLD Effluent Treatment Plant (ETP), and maintains comprehensive waste management systems including composting, e-waste segregation, and biomedical waste disposal following statutory norms.



Use of bicycles and battery-operated vehicles within the campus premises

Mobility on campus has also been reoriented around low-carbon choices. Students and staff are encouraged to use bicycles within the campus premises, and battery-operated vehicles are provided for differently abled students and for general campus transportation, reducing fuel consumption and vehicular emissions. This is paired with a broader lifestyle-sustainability push: the University has implemented a complete ban on single-use plastic items across campus and promotes reusable alternatives, while regular plantation drives involving faculty, staff and students reinforce ecological responsibility alongside the energy programme.

On the built-environment side, energy efficiency is now written into construction policy rather than left to individual buildings. All newly constructed and renovated buildings are required to be energy-

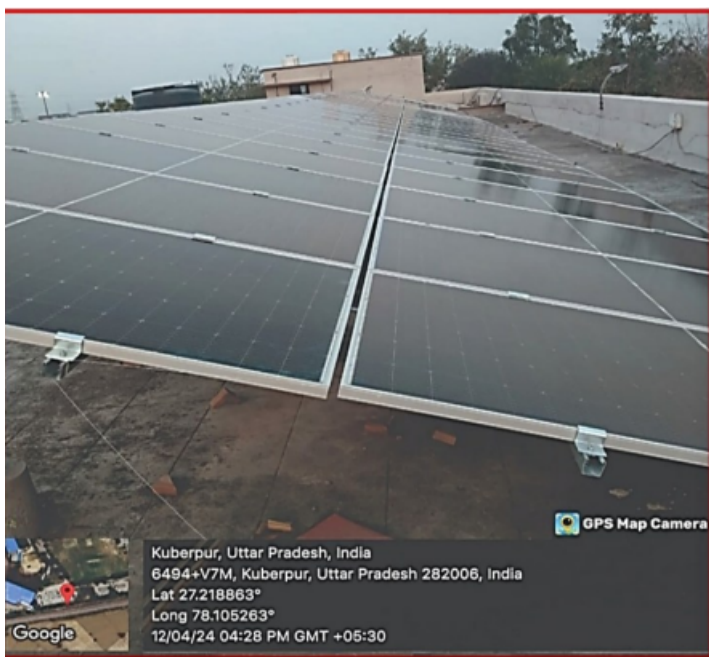
efficient and GRIHA-compliant, integrating insulation, energy-efficient lighting, solar panels, rainwater harvesting and environmentally responsible construction materials so as to lower carbon emissions and improve indoor environmental quality. Solar generation itself is distributed across the University's two campuses: rooftop solar installations currently produce 60 kWh at the Khandari Campus and 70 kWh at the Chalesar Campus, feeding directly into daily institutional load and reducing dependence on grid electricity, on the basis on which the University's expansion plan toward 500 kWp is being built.



I.B.S.

Picture	Fixed Axis 
Capacity	60 KW
Out put Units (KWp)	240 Units
Application	Solar power back up for existing electrical appliances viz., Tube lights, Fans, EPABx Computers, Printers etc., HVAC, Pumping etc.
Scope of Supply	System includes 60 KWp Solar Module, GI modular support, 60 KW grid interactive Inverter
Solar Panel Wattage	545 Wp
Battery Support	
Power Saving PM (Kwh)	7,200* Units
Money saved PM / Year (EB unit cost assumed @9.00 Rs.)	Rs. 64,800.00 / Rs 7,77,600.00
Warranty	05 year for the system
Approx. system cost	INR
Approx. system cost after depreciation benefits/Subsidy	INR (Theoretically final investment cost if avail AD benefits)
ASIC cost	@ 2% per annum after 01 year
Payback with AD benefits	3 Years
Life time Income	INR

Solar Power System University Campus – 60KWh at the Khandari Campus



Chhalesar

Picture	Fixed Axis 
Capacity	70 KW
Out put Units (KWp)	280 Units
Application	Solar power back up for existing electrical appliances viz., Tube lights, Fans, EPABx Computers, Printers etc., HVAC, Pumping etc.
Scope of Supply	System includes 70 KWp Solar Module, GI modular support, 70 KW grid interactive Inverter
Solar Panel Wattage	545 Wp
Battery Support	200Ah 240V LIFEPO4
Power Saving PM (Kwh)	8,400* Units
Money saved PM / Year (EB unit cost assumed @9.00 Rs.)	Rs. 75,600.00 / Rs 9,07,200.00
Warranty	05 year for the system
Approx. system cost	INR
Approx. system cost after depreciation benefits/Subsidy	INR (Theoretically final investment cost if avail AD benefits)
ASIC cost	@ 2% per annum after 01 year
Payback with AD benefits	3 Years
Life time Income	INR

Solar Power System University Campus – 70KWh at the Chalesar Campus

Taken together, GRIHA-compliant construction, campus-wide solar generation, LED retrofitting, sustainable mobility, plastic-free operations, and continuous plantation and awareness activity these measures map closely onto the Times Higher Education Impact Rankings' SDG 7 evaluation criteria of research output, institutional energy measures, energy-use intensity, and community outreach. They reflect a comprehensive and practical institutional approach to Affordable and Clean Energy, with continuous efforts in renewable energy adoption and energy conservation positioning the University as a progressive, environmentally conscious institution as it approaches its centenary year in 2027.



Rainwater harvesting system in University Campus

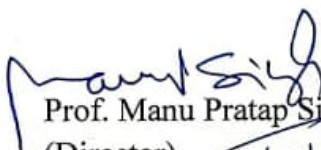


Dr. Bhimrao Ambedkar University, Agra
(Formerly: Agra University)
(A+ Grade, NAAC Accredited)

Date: 12/01/2026

TO WHOM IT MAY EVER CONCERN

Different departments of Dr. Bhimrao Ambedkar University, Agra have its own electric grid power supply connection as per their requirements.


Prof. Manu Pratap Singh
(Director)
12/01/2026
Director
Institute of Engineering & Technology
Dr. B. R. Ambedkar University
Khanderi Campus, Agra


Ajay Mishra
PCS
(Registrar)
Registrar
Dr. B. R. A. University, Agra

University Measures Towards Affordable and Clean Energy Affordable and clean energy is one of the top priorities at University. Our commitment is reflected in our teaching and research on clean and alternative energy sources. On campus, the University has made significant progress towards environmental sustainability through clean energy projects, waste management practices, energy conservation initiatives, and collaborations with stakeholders to positively impact the broader community. By focusing on sustainable, affordable, and clean energy, we address the urgent need to combat climate change and manage the world's increasing energy demands. Energy research remains one of our core priorities, and through our educational and research efforts, with external stakeholders, we are advancing forward-thinking approaches to clean energy. Energy-Efficient Renovation and Building Have a policy in place for ensuring all renovations or new builds are following energy

efficiency standards Response: Newly constructed buildings are energy efficient and GRIHA Compliant University has implemented standards and practices in the construction of its new buildings to ensure they are energy-efficient and sustainable, significantly reducing carbon footprint by supporting clean energy initiatives. The Indian Green Building Council (IGBC) developed the GRIHA (Green Rating for Integrated Habitat Assessment) system to evaluate the environmental performance of buildings across India. This system seeks to promote the design and construction of buildings using sustainable and energy-efficient methods. University's newly constructed building is GRIHA-certified, which indicates that it incorporates sustainable features and follows environmentally responsible practices. GRIHA emphasizes several key elements in its assessment. To minimize energy consumption, the building incorporates energy-efficient technologies such as insulation, solar panels, and energy-saving lighting systems. Water resources can be managed more effectively, rainwater harvesting systems(Fig 4), and water-efficient fixtures. When planning and selecting the building's site, special attention should be given to accessibility to public transit, waste management systems, and green spaces, all of which help reduce pollution and create a healthier environment. The choice of building materials should consider the life cycle impact, prioritizing low carbon, sustainable resources and minimizing waste production. Additionally, the building should ensure excellent thermal comfort, natural lighting, and indoor air quality to provide a healthy and comfortable environment for occupants. GRIHA-certified university buildings incorporate these principles to create healthier spaces for staff and students, reduce their environmental impact, and promote sustainable development

7.1 Research on Clean Energy

7.1.1 Affordable and Clean Energy: CiteScore

Dr. Bhimrao Ambedkar University (DBRAU) demonstrates sustained scholarly engagement in research advancing affordable and clean energy solutions, contributing 26 peer-reviewed publications directly aligned with SDG 7. The research portfolio spans photovoltaic and solar cell engineering — including perovskite, organic, and thin-film heterojunction solar cells — alongside energy storage (supercapacitors), bioenergy systems, photoelectrochemical hydrogen generation, and building-integrated photovoltaic (BIPV) envelopes, reflecting DBRAU's engagement across the clean energy value chain.

Metric	Value
Total publications	26
Publications with Citations > 5	8
Proportion above 5 citations	30.8%
Average citations	9.3
Highest citations recorded	55 (Bhardwaj et al., Diamond and Related Materials, 2020)

Citation counts for these outputs range from 0 to 55, with a cumulative total of 242 citations and an average of 9.3 citations per paper. Eight publications (30.8% of total output) have received more than 5 citations each, indicating that nearly a third of DBRAU's clean energy research has achieved above-average global visibility. The most cited work, "Surfactant Decorated Polypyrrole-Carbon Materials Composites Electrodes for Supercapacitor" (Bhardwaj et al., Diamond and Related Materials, 2020), has recorded 55 citations. Other strongly cited contributions include research on Cu₂O/TiO₂ heterojunction solar cells in Solar Energy (31 citations) and CZTSe solar cell studies in Optik (34 citations), highlighting DBRAU's footprint in solar photovoltaic materials research. Several outputs are already indexed for 2025–2026, reflecting an active and expanding research pipeline in emerging areas such as biphasic cerium oxide nanostructures and metal telluride-based supercapacitors.

7.1.2 Affordable and Clean Energy: FWCI

DBRAU's research outputs related to SDG 7 have also demonstrated noteworthy global citation performance when measured through Field-Weighted Citation Impact (FWCI), a metric that normalizes citations against the world average for similar publications, subject areas, and publication years. FWCI values across the university's relevant publications range from 0.1 to 17.55, reflecting a mix of niche, foundational studies and globally competitive, high-impact contributions. Of the 30 publications assessed for FWCI, 18 (60%) recorded scores above 1.0

— the threshold indicating citation performance exceeding the world average — pointing to a substantial share of DBRAU's clean energy research punching above the global benchmark for its field.

The average FWCI across these outputs falls in the range of approximately 2.5 to 3.0, meaning DBRAU's clean energy publications are, on average, cited nearly three times more frequently than comparable research worldwide. The standout contribution is "Agriculture Waste Management and Bioresource: The Circular Economy Perspective" (2023), which recorded an FWCI of 17.55, making it an exceptionally high-impact publication by global standards. Other strong performers include research on Environmental Pollution, with an FWCI of 7.14, further reinforcing the depth of DBRAU's contribution to sustainability-linked energy and resource management research.

Taken together, DBRAU's citation and FWCI profiles position it as a meaningful and increasingly visible contributor to the global clean energy research landscape, combining foundational device-level innovation with high-impact applied research in sustainability and circular economy approaches, reinforcing the university's alignment with the objectives of SDG 7: Affordable and Clean Energy.

Metric	Value
Total publications corresponding to SDG 7: Affordable and Clean Energy	26
Publications with FWCI > 1	18
Proportion above 1.0	60%
Average FWCI (overall)	≈ 2.5 – 3.0
Highest FWCI recorded	17.55 (Agriculture Waste Management and Bioresource: The Circular Economy Perspective, 2023)

7.1.3 Affordable and Clean Energy: Publications

University researchers have published 26 papers (<https://dbrau.ac.in/university-research-publications/>) related to SDG 7 (Affordable and Clean Energy), reflecting a sustained and

diverse research effort in the field of clean and renewable energy. On average, each paper has been cited around 9 times, and 8 of the 26 papers — roughly one in three — have received more than 5 citations. The most-cited paper, on supercapacitor electrodes published in 2020, has been cited 55 times, underscoring the strong scholarly impact of the University's work in this area.

This body of research spans several core themes within clean energy technology. Solar photovoltaics account for the largest share of the output, with studies covering perovskite, organic, chalcogenide, and transition-metal-dichalcogenide solar cells, as well as device modelling and performance optimisation using simulation tools such as SCAPS-1D. A second major theme is energy storage, including supercapacitor electrode materials and metal telluride-based storage systems. The remaining publications address photoelectrochemical hydrogen generation, bioenergy production, thermo-catalytic conversion of waste into energy, and materials for building-integrated photovoltaic systems.

Taken together, this consistent and well-cited publication record demonstrates that the University's contribution to SDG 7 extends well beyond its campus energy infrastructure, positioning it as an active contributor to clean-energy research and knowledge generation at the national and international level.

No .	Authors	Research Paper / Title	Year	Journal / Source	Citations	DOI
1	Gardner S.; Thomas L.M.; Singh B.P.; Gardner B.S.	Photovoltaic Thermal Air Collectors: Recent Advances in Performance Enhancement and Solar Thermal Applications	2025	Thermal Engineering , 72(8), 638–656	0	10.1134/S0040601524600251
2	Kumari N.; Ranjan R.; Srivastava N.; Tiwari R.N.; Sharma A.K.; Srivastava N.	Performance optimization study of lead-free CsSnGeI ₃ based perovskite solar cell heterostructure with different inorganic electron transport layers: A numerical simulation approach	2024	Journal of Physics and Chemistry of Solids, 190, 112003	21	10.1016/j.jpcs.2024.112003
3	Baghel A.; Singh D.; Kumar A.	A Literature Review on the Advancements in Hybrid Perovskite Solar Cells	2024	Proceedings – 1st International Conference on Electronics, Communication and Signal Processing	0	10.1109/ICECSP61809.2024.10698100
4	Sharma B.; Mathur A.S.; Singh I.K.; Singh B.P.	Performance optimization of non-fullerene acceptor organic solar cell by incorporating carbon nanotubes as flexible transparent electrode	2022	Results in Optics, 9, 100315	7	10.1016/j.rio.2022.100315
5	Deshmukh T.B.; Agarwal A.; Mendhe A.C.;	Prototype symmetric solid-state supercapacitor designed through	2025	Chemical Physics	9	10.1016/j.cpl.2025.142070

	Thosare M.; Sankapal B.R.	Co ₃ Fe ₄ (PO ₄) ₆ /MWCNT electrodes		Letters, 870, 142070		
6	Sharma B.; Mathur A.S.; Rajput V.K.; Singh I.K.; Singh B.P.	Device modeling of non- fullerene organic solar cell by incorporating CuSCN as a hole transport layer using SCAPS	2022	Optik, 251, 168457	39	10.1016/j.ijleo .2021.168457
7	Prakash O.; Verma K.D.; Upadhyay L.; Dhanapandian S.; Suthakaran S.; Dixit A.; Kashyap V.K.; Prakash D.; Arikrishnan J.	Biphasic cerium oxide nanoparticles: a dual- functional approach for dielectric and supercapacitor applications	2025	Ionics, 31(10), 10993– 11020	4	10.1007/s115 81-025- 06643-0
8	Mathur A.S.; Singh B.P.	Computational approach for synthesis of perovskite solar cells	2021	Perovskite Materials for Energy and Environmen tal Applications , pp. 1–36	2	10.1002/9781 119763376.c h1
9	Mathur A.S.; Amita; Singh B.P.	Temperature stability analysis of non-fullerene thin-film organic solar cell with kesterite as a hole transport layer	2026	Functional Materials, 33(2), 246– 255	0	10.15407/fm3 3.02.246
10	Chauhan H.; Jain S.; Kumar P.; Gupta A.; Asthana M.; Mahajan S.	Systems biology approaches in bioenergy research	2026	Emerging Technologie s in Yield Optimization and Production of Biomass	0	10.1016/B97 8-0-443- 40488- 7.00008-3

				Feedstock, pp. 153–185		
11	Tiwari R.; Botle A.; Dubey S.; Singh P.P.	A critical review of opportunities, challenges and environmental assessment in global bioenergy production	2026	Journal of the Iranian Chemical Society, 23(1), art. 32	0	10.1007/s137 38-025- 03321-w
12	Bharti Sharma; Mathur A.S.; Sharma G.; Sharma S.; Singh B.P.	Device Modelling of ITIC- OE Organic Solar Cell by High Band Gap Carbon Nanotubes as Transparent Conductive Electrode	2025	Applied Solar Energy, 61(4), 394– 402	0	10.3103/S00 03701X2560 0468
13	Mathur A.S.; Singh B.P.	Performance simulation of metal chalcogenide Sb ₂ S ₃ solar cells using SCAPS- 1D	2025	MRS Advances, 10(19), 2320–2324	1	10.1557/s435 80-025- 01383-9
14	Mathur A.S.; Singh P.P.; Upadhyay S.; Yadav N.; Singh K.S.; Singh D.; Singh B.P.	Role of absorber and buffer layer thickness on Cu ₂ O/TiO ₂ heterojunction solar cells	2022	Solar Energy, 233, 287– 291	31	10.1016/j.sol ener.2022.01. 047
15	Tiwari R.; Rajouriya K.; Botle A.; Singh P.P.; Taneja A.	A technical review of the thermo-catalytic conversion of plastic wastes for energy production and its environmental effects	2026	Journal of the Iranian Chemical Society, 23(6), art. 161	0	10.1007/s137 38-026- 03459-1
16	Singh S.; Jain V.P.; Singh V.K.; Jaiswar G.	Tailoring photovoltaic properties through As ₂ O ₃ and GaN doping in silicon monoxide	2026	Journal of Materials Science: Materials in Electronics,	0	10.1007/s108 54-026- 16925-6

				37(9), art. 596		
17	Mathur A.S.; Singh B.P.	Study of effect of defects on CdS/CdTe heterojunction solar cell	2020	Optik, 212, 164717	26	10.1016/j.ijleo .2020.164717
18	Sharma B.; Singh B.P.	Incorporation of Carbon Nanotubes in Non- Fullerene Acceptor Organic Solar Cells: A Review	2023	Applied Solar Energy, 59(4), 441– 458	3	10.3103/S00 03701X2360 0364
19	Mathur A.S.; Singh B.P.	Simulation Study of the Photovoltaic Performance of WS ₂ Based Transition Metal Dichalcogenide Solar Cell	2023	Applied Solar Energy, 59(6), 851– 856	1	10.3103/S00 03701X2460 0061
20	Agarwal A.; Pande S.A.; Sankapal B.R.	Metal tellurides: Proof of concept toward current trends for high- performance supercapacitor applications	2026	Journal of Energy Storage, 142, 119538	4	10.1016/j.est. 2025.119538
21	Mathur A.S.; Kumar R.; Amita; Kumar A.; Singh B.P.	Simulation of PBDB- T/ITIC-based organic solar cell using SCAPS-1D	2025	MRS Advances	0	10.1557/s435 80-025- 01506-2
22	Baghel A.; Singh D.; Kumar A.	Applications of Machine Learning in Exploration of the Perovskite Solar Cells	2024	2024 IEEE Students Conference on Engineering and Systems	1	10.1109/SCE S61914.2024 .10652432

23	Kumar P.; Yadav K.; Satsangi V.R.; Sharma S.B.; Upadhyaya S.C.	Effect of silicon doping in nanostructured hematite thin films for photoelectrochemical hydrogen generation	2025	International Journal of Modern Physics B, 39(19), 2550171	1	10.1142/S0217979225501711
24	Singh D.; Buddhi D.; Rajput P.; Singh K.Y.; Mahor H.S.; Kushwaha P.K.	Phase change materials in building integrated photovoltaic (BIPV) envelopes: A strengths, weakness, opportunities and threats analysis	2025	International Journal of Modern Physics B, 39(11), 2540041	3	10.1142/S0217979225400417
25	Bhardwaj P.; Singh S.; Kharangarh P.R.; Grace A.N.	Surfactant decorated polypyrrole-carbon materials composites electrodes for supercapacitor	2020	Diamond and Related Materials, 108, 107989	55	10.1016/j.diamond.2020.107989
26	Mathur A.S.; Dubey S.; Nidhi; Singh B.P.	Study of role of different defects on the performance of CZTSe solar cells using SCAPS	2020	Optik, 206, 163245	34	10.1016/j.ijleo.2019.163245

7.2 University Measures Towards Affordable and Clean Energy

7.2.1 Energy-Efficient Renovation and Building

All newly constructed buildings at DBRAU are designed to be energy-efficient and GRIHA (Green Rating for Integrated Habitat Assessment) compliant, incorporating insulation, solar panels, and energy-saving lighting systems as standard features. These buildings are further supported by sensor-based automation, with motion sensors and timer-based switches installed in common areas such as libraries, washrooms, and corridors, alongside equipment configured to operate in power-saving mode, together helping to minimise idle electricity drain across the campus. Building on this foundation, the University plans to develop solar-powered smart buildings in a phased manner, starting with the installation of solar panels combined with Battery Energy Storage Systems (BESS) on the roofs of select buildings such as the Library, administrative blocks, and departmental buildings, with successful pilot projects to be expanded further. Research on PV-BESS integration supports this direction, showing that pairing lithium-ion batteries with PV systems addresses intermittency and improves overall sustainability, with optimised tilt-angle configurations achieving performance ratios of up to 0.755, and a 10-degree tilt angle in BIPV systems yielding consistent energy output. Priority buildings identified for these pilot projects include the Library, given its high energy consumption and extended operating hours; the administrative buildings as the central energy management hub; and the Computer Centre, which already serves as a site for solar energy training programmes.



Dr. Bhimrao Ambedkar University, Agra

A State University of Uttar Pradesh (Formerly: Agra University, Agra)

www.dbrau.ac.in

Solar Facility Benefits Installed at Institute of Basic Sciences

Picture	Fixed Axis 
Capacity	60 KW
Out put Units (KWp)	240 Units
Application	Solar power back up for existing electrical appliances viz., Tube lights, Fans, EPABx Computers, Printers etc., HVAC, Pumping etc.
Scope of Supply	System includes 60 KWp Solar Module, GI modular support, 60 KW grid interactive Inverter
Solar Panel Wattage	545 Wp
Battery Support	
Power Saving PM (Kwh)	7,200* Units
Money saved PM / Year (EB unit cost assumed @9.00 Rs.)	Rs. 64,800.00 / Rs 7,77,600.00
Warranty	05 year for the system
Approx. system cost	INR
Approx. system cost after depreciation benefits/Subsidy	INR (Theoretically final investment cost if avail AD benefits)
AMC cost	@ 2% per annum after 01 year
Payback with AD benefits	3 Years
Life time Income	INR

Digitally Signed By: Registrar



Dr. Bhimrao Ambedkar University, Agra

A State University of Uttar Pradesh (Formerly: Agra University, Agra)

www.dbrau.ac.in

Solar Facility Benefits Installed at Chalessar Campus

Picture	Fixed Axis
	
Capacity	70 KW
Out put Units (KWp)	280 Units
Application	Solar power back up for existing electrical appliances viz., Tube lights, Fans, EPABx Computers, Printers etc., HVAC, Pumping etc.
Scope of Supply	System includes 70 KWp Solar Module, GI modular support, 70 KW grid interactive Inverter
Solar Panel Wattage	545 Wp
Battery Support	200Ah 240V LIFEPO4
Power Saving PM (Kwh)	8,400* Units
Money saved PM / Year (EB unit cost assumed @9.00 Rs.)	Rs. 75,600.00 / Rs 9,07,200.00
Warranty	05 year for the system
Approx. system cost	INR
Approx. system cost after depreciation benefits/Subsidy	INR (Theoretically final investment cost if avail AD benefits)
AMC cost	@ 2% per annum after 01 year
Payback with AD benefits	3 Years

RAJEEV KUMAR
Digitally Signed By: Rajeev



Dr. Bhimrao Ambedkar University, Agra
(Formerly: Agra University)
(A+ Grade, NAAC Accredited)

Date: 12/01/2026

TO WHOM IT MAY EVER CONCERN

Different departments of Dr. Bhimrao Ambedkar University Agra are equipped with generator facility of 62.5 KVA power backup purposes.


Prof. Manu Pratap Singh
(Director)
12/01/2026

Director
Institute of Engineering & Technology
Dr. B. R. Ambedkar University
Khandwa Campus, Agra


Ajay Mishra
PCS
(Registrar)

Registrar
Dr. B.R.A. University, Agra

7.2.1 Energy-Efficient Renovation and Building

Upgrade Buildings to Higher Energy Efficiency



Alongside new construction, DBRAU is upgrading its existing building stock to higher energy-efficiency standards through a phased lighting retrofit and audit-driven renovation programme. Under this initiative, 4,200 conventional tube lights have already been replaced with LEDs, accounting for approximately 70% of all conventional bulbs and tube lights across the campus, with 458 remaining 36W tube lights identified by the 2022–23 Energy Audit Report for replacement in the near term. This LED transition, combined with solar PV and solar geyser installations, has contributed to annual electricity savings exceeding 14.54 lakh kWh. LED fixtures were selected for their significantly higher efficiency — 80–90% more efficient than incandescent bulbs, with a lifespan of 25,000–50,000 hours compared to 1,000–2,000 hours for conventional bulbs — along with negligible heat emission, which

reduces cooling load, and minimal maintenance requirements. The Energy Audit further recommends replacing electronic equipment older than 3–5 years to sustain efficiency gains, and progress on the lighting upgrade is tracked through a lumen-per-watt efficiency KPI as the campus moves toward its target of a fully LED-lit environment, reinforcing the broader goal of raising the energy performance of existing buildings alongside new, GRIHA-compliant construction.

DBRAU ENERGY AUDIT- <https://dbrau.ac.in/wp-content/uploads/2024/04/Agra-UST-Energy-Audit-Report-2022-23.pdf>



DR. BHIMRAO AMBEDKAR
UNIVERSITY, AGRA

ENERGY AUDIT REPORT

2022-2023

PREPARED BY
EHS ALLIANCE SERVICES

CERTIFICATE



CERTIFICATE

PRESENTED TO

**DR. BHIMRAO AMBEDKAR UNIVERSITY,
AGRA**

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

ENERGY AUDIT

INITIATIVE CARRIED OUT BETWEEN YEAR 2020-2023

The energy-saving initiatives carried out by the institution have been verified in the report submitted and were found to be satisfactory.

The efforts taken by management and faculty towards all types of energy used in the institution and sustainability are highly appreciated and noteworthy.

A handwritten signature in blue ink, appearing to read 'H. D. Singh'.

SIGNATURE



28.06.2023

DATE OF AUDIT

EHS ALLIANCE SERVICES, PLOT A-72, SURYA VIHAR, GURUGRAM, 122001
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Done at Dr. Bhimrao Ambedkar University, Agra on the 13/04/2024 in two originals.

.....
Head
 Department of Microbiology & Botany
 School of Life Sciences,
 Dr. Bhimrao Ambedkar University,
 Agra.

For Gang Green Gases
Partner
M/S Gang Green Gases

.....
Dean, K. AGNIHOTRI
 Faculty of Life Sciences,
 Dr. Bhimrao Ambedkar University,
 Dr. Bhimrao Ambedkar University,
 Khandari Cg. Agra-202002

.....
Director, IQAC
 Director / Member Secretary
 Internal Quality Assurance Cell
 Dr. Bhimrao Ambedkar University
 Agra

.....
Registrar
 Dr. B. A. University, Agra
 Dr. Bhimrao Ambedkar
 University, Agra

Witnesses: MoU signed in the presence of following two persons.

Witness 1
 Name and Signature
 (Dr. Sunil Kumar)

Witness 2
 Name and Signature
 (Dr. Anil Kumar)

Witness 1
 Name and Signature
 SUNIL KUMAR.

Witness 2
 Name and Signature
 (Dr. Anil Kumar)

7.2.3 Carbon Reduction and Emission Reduction Process

DBRAU's approach to carbon and emission reduction is structured around a phased Net-Zero campus roadmap with time-bound renewable energy targets and measurable milestones. In Phase 1 (Years 1–2), the University will complete the LED transition by replacing the remaining 458 tube lights, expand solar PV capacity to 300 kWp, install motion sensors across all common areas, and implement a real-time energy management system spanning all buildings. Phase 2 (Years 3–5) targets achieving the full 500 kWp solar PV capacity, installing Battery Energy Storage Systems (BESS) for round-the-clock solar reliability, implementing waste-to-energy micro-biogas plants, and establishing solar-powered e-vehicle charging stations. In Phase 3 (Years 6–10), the University aims to achieve carbon-neutral campus status, scale solar capacity to meet 100% of campus energy demand, deploy AI-based energy management systems, and reach Net-Zero emissions through a combination of renewable energy generation and carbon offset mechanisms.





Priya and Abhishek of MFA making 7 ft. diameter Globe Sculpture



**Globe of 7 ft diameter and 8 ft height by Priya Bhadoria and team
Cost Worth Rs. 4 Lacs**

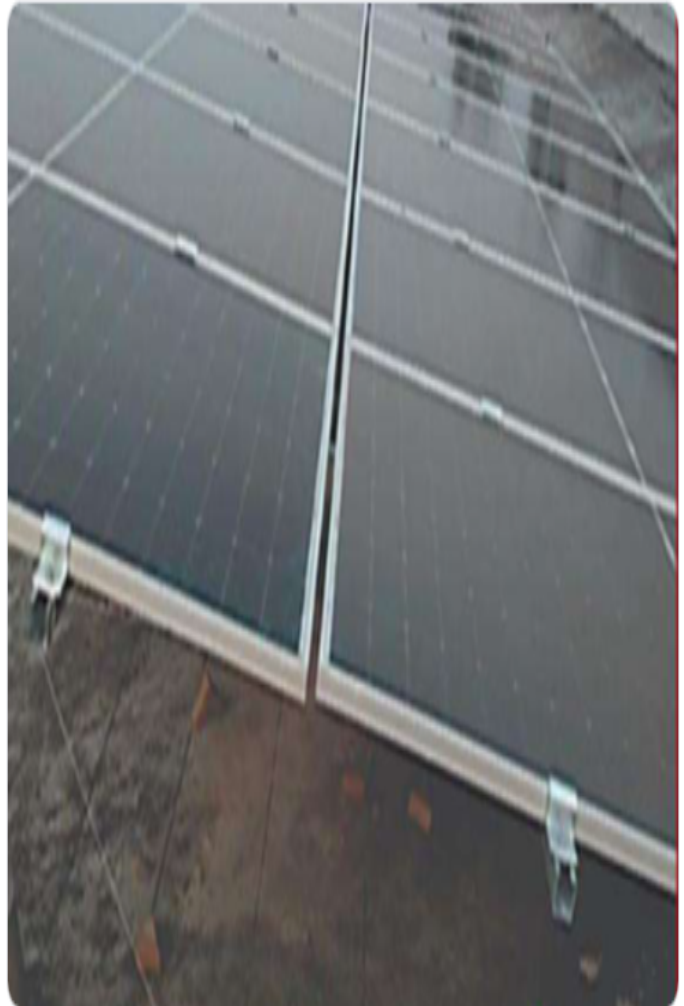
Progress against this roadmap is tracked through a defined set of KPIs: the total solar generation contribution, measured as the percentage of solar-generated units against total commercial grid draw; a carbon offset metric expressed in equivalent metric tons of CO₂ reduced annually; a lumen-per-watt efficiency indicator tracking progress toward a fully LED-lit campus; and a comprehensive annual energy audit reporting on energy and carbon performance. This audit process is reinforced by NAAC's mandate requiring all Higher Educational Institutions to submit annual Green, Environment, and Energy Audit Reports from academic year 2019–20 onwards, with DBRAU's own 2022–23 Energy Audit — prepared by EHS Alliance Services — mapping energy intensity per square meter, calculating CO₂ emissions and offset metrics, and identifying further optimisation opportunities such as motion sensor installation and solar lighting for open areas. Together, this roadmap and audit framework give DBRAU a structured, measurable pathway from its current renewable energy base toward long-term carbon neutrality.

7.2.4 Plan to Reduce Energy Consumption

DBRAU's approach to carbon and emission reduction is structured around a phased Net-Zero campus roadmap with time-bound renewable energy targets and measurable milestones. In Phase 1 (Years 1–2), the University will complete the LED transition by replacing the remaining 458 tube lights, expand solar PV capacity to 300 kWp, install motion sensors across all common areas, and implement a real-time energy management system spanning all buildings. Phase 2 (Years 3–5) targets achieving the full 500 kWp solar PV capacity, installing Battery Energy Storage Systems (BESS) for round-the-clock solar reliability, implementing waste-to-energy micro-biogas plants, and establishing solar-powered e-vehicle charging stations. In Phase 3 (Years 6–10), the University aims to achieve carbon-neutral campus status, scale solar capacity to meet 100% of campus energy demand, deploy AI-based energy management systems, and reach Net-Zero emissions through a combination of renewable energy generation and carbon offset mechanisms. Energy-Audit-Report-2022-23 (<https://share.google/ruOAccnwB7Gffvh8a>)

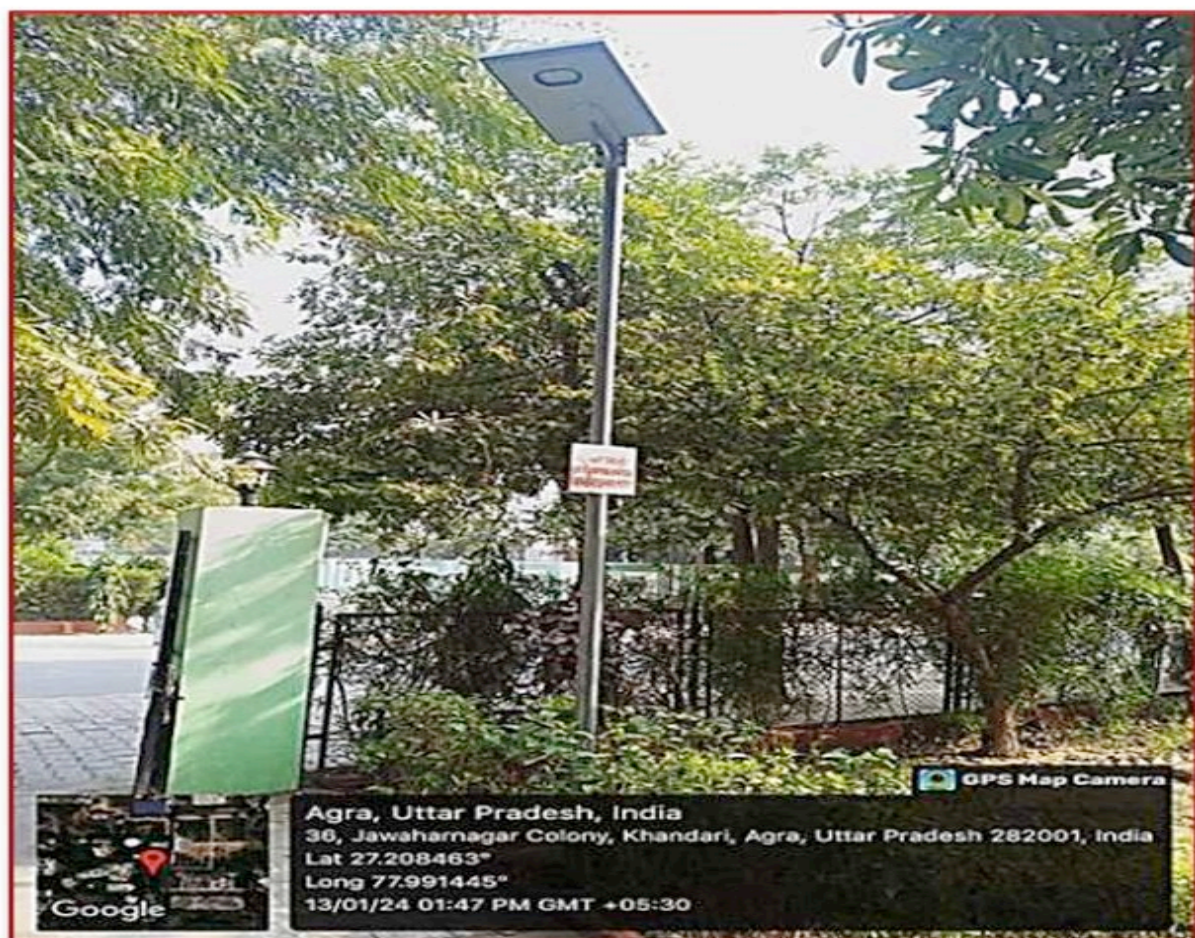
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installation and solar lighting for open areas. Together, this roadmap and audit framework give DBRAU a structured, measurable pathway from its current renewable energy base toward long-term carbon neutrality.



Current Renewable Energy Status

- **Solar PV Capacity:** 130 kWp operational, 500 kWp planned
- **Solar Energy Generation:** 130 kWh total (60 kWh Khandari + 70 kWh Chhalesar)
- **LED Transition:** 70% of conventional bulbs and tube lights replaced with LEDs
- **Annual Electricity Savings:** More than 14.54 lakh kWh from solar PV, solar geysers, and LED replacement



Sensor-Based Energy Conservation in University

Proposed Net-Zero Roadmap

Phase 1 (Years 1-2):

- Complete LED transition (remaining 458 tube lights)
- Expand solar PV capacity to 300 kWp
- Install motion sensors in all common areas
- Implement real-time energy management system across all buildings

Phase 2 (Years 3-5):

- Achieve 500 kWp solar PV capacity
- Install BESS for 24/7 solar reliability
- Implement waste-to-energy micro-biogas plants
- Establish solar-powered e-vehicle charging stations

Phase 3 (Years 6-10):

- Achieve carbon-neutral campus status
- Expand solar capacity to meet 100% of campus energy demand
- Implement AI-based energy management systems
- Achieve Net-Zero emissions through renewable energy and carbon offset mechanisms

KPIs for Monitoring

- **Total Solar Generation Contribution:** Percentage of solar-generated units versus total commercial grid draw
- **Carbon Offset Metric:** Equivalent metric tons of CO₂ reduced annually
- **Lumen-per-Watt Efficiency:** Progress toward 100% LED campus
- **Annual Energy Audit:** Comprehensive energy and carbon performance reporting

Energy Conservation and Efficiency Measures

100% LED Transition

- **Policy Provision:** The university mandates a complete phased replacement of all conventional fixtures. All administrative buildings, laboratories, lecture theatres, and streetlights must exclusively utilize high-efficiency LED lights and low-radiation appliances.

(<https://dbrau.ac.in/recent-notices/>)

Current Achievements:

- **LED Replacement:** 4,200 conventional tube lights replaced with LEDs
(<https://dbrau.ac.in/recent-notices/>)
- **Replacement Percentage:** Approximately 70% of conventional bulbs and tube lights replaced
(<https://dbrau.ac.in/recent-notices/>)
- **Remaining Conventional Lights:** 458 (36W) tube lights identified for replacement
(<https://dbrau.ac.in/recent-notices/>)
- **Annual Savings:** More than 14.54 lakh kWh from LED replacement combined with solar PV and solar geysers (<https://dbrau.ac.in/recent-notices/>)

Green E-Mobility Support

Policy Provision: Establish dedicated solar-powered e-cycle and e-vehicle charging stations featuring off-grid battery storage to secure 24/7 reliability. (<https://dbrau.ac.in/recent-notices/>)

Current Mobility Infrastructure:

- **Battery-Operated Vehicles:** Provided for differently-abled students' transportation, luggage transport, and guest services (<https://dbrau.ac.in/recent-notices/>)



- **Bicycle Promotion:** University encourages students and staff to utilize bicycles, allowing them to be kept on campus premises (<https://dbrau.ac.in/recent-notices/>)



- **Restricted Automobile Entry:** Private fossil-fuel combustion vehicles face strict restriction guidelines inside core campus boundaries (<https://dbrau.ac.in/recent-notices/>)
- **Pedestrian-Friendly Pathways:** Covered and tiled pathways enhance walking experience, promoting pedestrian-friendly environment (<https://dbrau.ac.in/recent-notices/>)
- **Parking Facilities:** Available at entrance of each institute to discourage vehicle entry into core campus (<https://dbrau.ac.in/recent-notices/>)

E-Mobility Research:

DBRAU faculty research supports e-mobility development:

- **Lithium Battery Thermal Management:** Purushottam Kumar, Prateek Arora, and B.P. Singh (2026) published research on "Study of thermal effects and management in lithium batteries for electric vehicles" in Advances in Applied Research (<https://dbrau.ac.in/university-research-publications/>)

- **Patents:** University patents include innovations relevant to e-mobility and renewable energy systems (<https://dbrau.ac.in/patents/>)

Charging Infrastructure Development:

The policy provision for solar-powered e-cycle and e-vehicle charging stations with off-grid battery storage aligns with:

- University's existing solar PV infrastructure expansion plans
- Integration of BESS for 24/7 reliability
- Research expertise in lithium battery thermal management

4.1.4 Solar-Powered Smart Building Initiative

- **Policy Provision:** The University may develop solar-powered smart buildings in a phased manner by installing solar panels with Battery Energy Storage Systems (BESS) on roofs of selective buildings like Libraries, administrative buildings, or departmental buildings. Successful pilot projects can be expanded in a phased manner. (<https://dbrau.ac.in/recent-notice/>)

Current Energy-Efficient Buildings:

- **GRIHA Compliant Construction:** Newly constructed buildings follow energy efficiency standards and GRIHA (Green Rating for Integrated Habitat Assessment) compliance (<https://dbrau.ac.in/recent-notice/>)
- **Energy-Efficient Technologies:** Buildings incorporate insulation, solar panels, and energy-saving lighting systems (<https://dbrau.ac.in/recent-notice/>)
- **Sensor-Based Automation:** Motion sensors and timer-based switches installed in common areas (<https://dbrau.ac.in/recent-notice/>)
- **Power-Saving Mode:** Equipment configured for optimized energy consumption (<https://dbrau.ac.in/recent-notice/>)

BESS Integration:

Research on PV-BESS integration provides technical guidance:

- **PV-BESS Performance:** Studies demonstrate that integrating lithium-ion batteries with PV systems addresses intermittency issues and enhances sustainability
- **Performance Ratio:** PV-BESS systems with optimized tilt angles achieve performance ratios of 0.755, indicating efficient energy conversion

- **Tilt Angle Optimization:** 10-degree tilt angle with BIPV systems achieves consistent energy outputs

Pilot Project Opportunities:

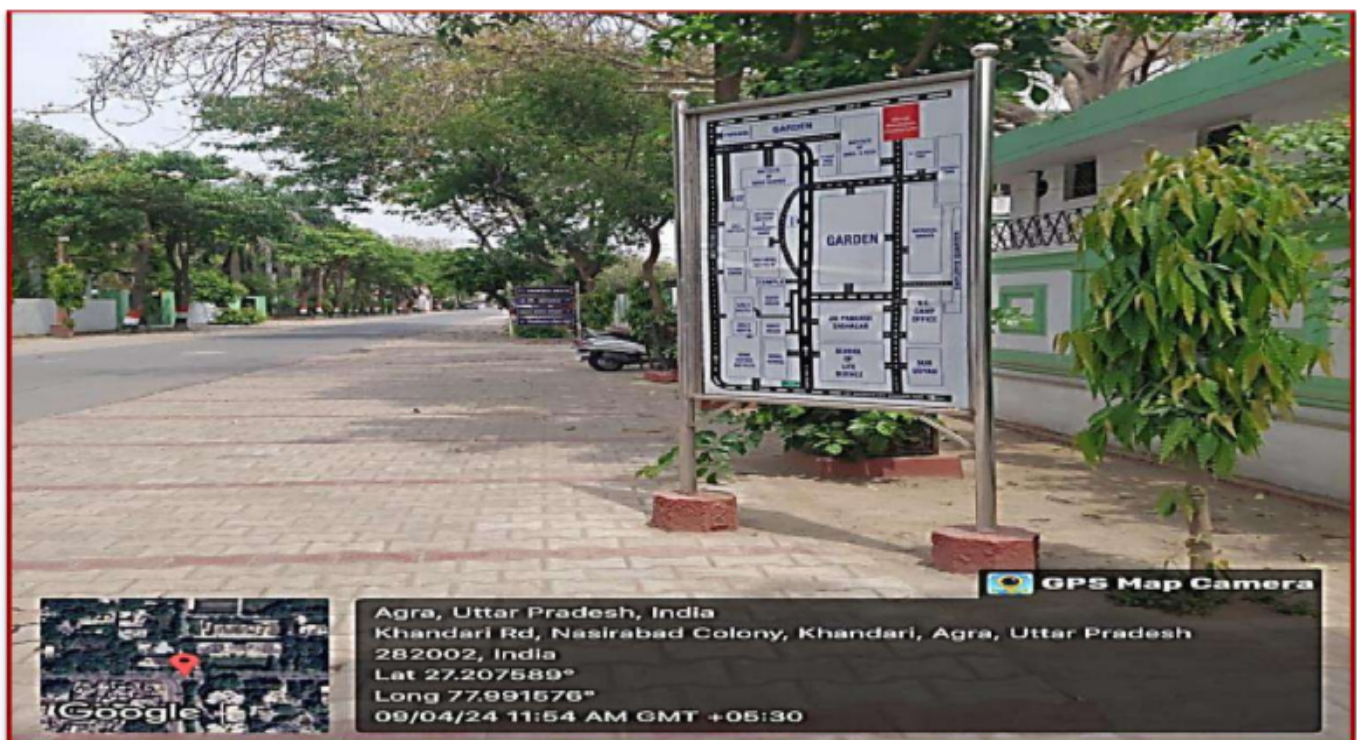
Priority buildings for solar-powered smart building pilot projects:

- **Library:** High energy consumption, extended operating hours
(<https://dbraulibrary.org.in/index.php>)
- **Administrative Buildings:** Central energy management hub (<https://dbrau.ac.in/>)
- **Computer Centre:** Site of solar energy training programmes, demonstrating technology integration (<https://dbrau.ac.in/>)
- **Departmental Buildings:** Institutes of Engineering and Technology, Sciences, Life Sciences with research activities (<https://dbrau.ac.in/>)





Pedestrian Friendly Pathway at different locations of the University





Chhaleshar Campus



Sanskriti Bhawan, Civil Lines Campus



Paliwal Campus



Khandari Campus

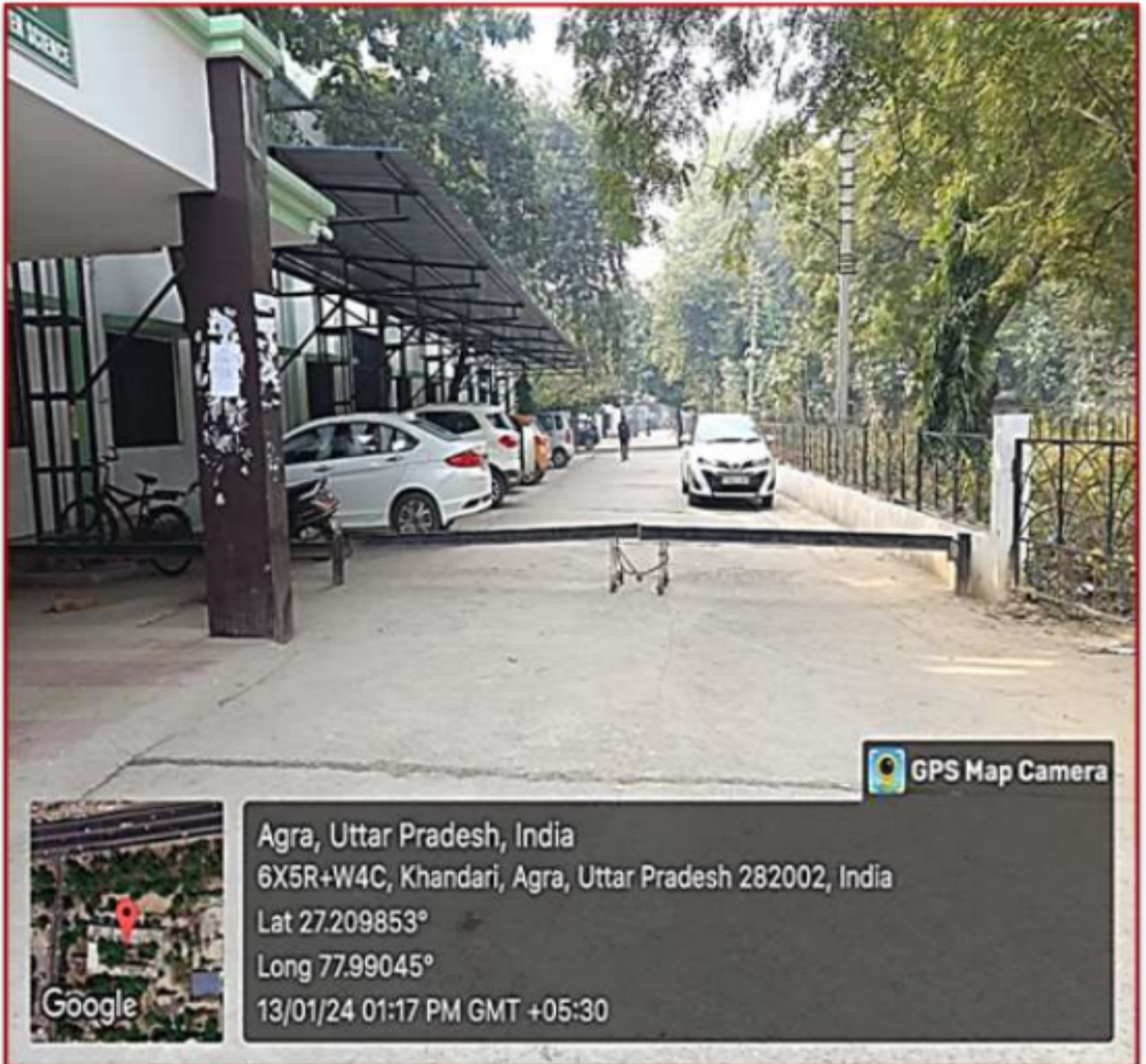


Sultan Ganj Campus



Gopal Kunj Residential Campus





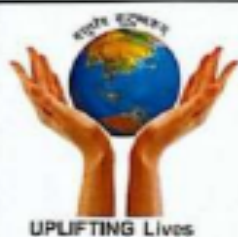
Restricted entry of vehicles

7.2.5 Energy Wastage Identification

DBRAU identifies energy wastage through a combination of institutional audits and real-time monitoring infrastructure. The University's annual Green, Environment, and Energy Audit, mandated by NAAC for all Higher Educational Institutions from academic year 2019–20 onwards, is conducted by certified third-party bodies to mathematically map energy intensity per square metre and flag areas for continuous improvement. The 2022–23 Energy Audit Report, prepared by EHS Alliance Services based on detailed input data and analysis, identified several specific sources of wastage and inefficiency: 458 remaining conventional 36W tube lights still awaiting LED replacement, opportunities for motion sensor installation in common areas such as libraries, washrooms, and corridors, the need for solar lighting in open areas including parking and grounds, and electronic equipment older than 3–5 years that should be replaced to restore efficiency. Basic real-time monitoring is currently supported by sensor-based switches and automated systems, which help detect and reduce idle electricity drain by automatically controlling lighting in unoccupied common areas. Building on this, the University proposes a more comprehensive Campus Energy Management System capable of building-level metering to monitor electricity consumption in real time, automated alerts for buildings exceeding energy consumption thresholds, data-driven recommendations for load balancing and peak demand management, and monitoring of solar generation against grid consumption, feeding into an annual reporting dashboard for energy audit and carbon performance. Together, these audit findings and monitoring mechanisms give DBRAU a systematic basis for pinpointing where energy is being wasted and prioritising corrective action across lighting, equipment, and building-level consumption.



Proposed Energy Management System Features



Prosocial Foundation

A DIVISION OF HUMAN RIGHT SERVICES

CERTIFICATE

This certificate is proudly presented to:

Dr. Bhimrao Ambedkar University Agra , UP

has been honoured with the "Best Clean & Green Campus Award" for maintaining cleanliness and greenery at the university campus and offering an eco-friendly environment



PROSOCIAL FOUNDATION

A DIVISION OF HUMAN RIGHT SERVICES

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for maintaining the cleanliness and greenery at
the university campus and offering an eco-
friendly environment to all the stakeholders.



Awards for Green and Clean campus from Prosocial Foundatio

7.2.6 Divestment policy

Dr Bhimrao Ambedkar University, Agra has formally adopted a Policy on Ethical Divestment and Responsible Resource Management, approved by the IQAC and notified by the Director of IQAC, with its next scheduled review in 2027–28. The policy applies university-wide, covering all departments, financial resources, institutional assets, and partnerships, and takes effect from the date of its approval by the Executive Council. <https://www.dbrausdg.in/policies>

By formally linking resource management to ethical and sustainability criteria rather than treating divestment as an informal or ad hoc consideration, the policy gives DBRAU a documented governance instrument that can be extended to address fossil-fuel-linked assets, procurement, and investment decisions in future reviews. Its periodic review cycle, next due in 2027–28, also provides a built-in mechanism for the University to strengthen or formalise energy- and climate-specific divestment criteria as its SDG 7 roadmap matures.

ABOUT POLICY

Policy on ethical divestment and responsible resource management

 POLICY DETAILS

1. Short Title and Commencement

This Policy shall be known as the Policy on Ethical Divestment and Responsible Resource Management of Dr. Bhimrao Ambedkar University, Agra. It shall come into effect from the date of its approval by the Executive Council and shall apply to all University departments, financial resources, institutional assets, and partnerships.

2. Preamble

- Dr. Bhimrao Ambedkar University, Agra is committed to responsible governance, sustainable resource management, and ethical utilization of institutional resources to support long-term institutional development.
- In alignment with Sustainable Development Goal (SDG) 16: Peace, Justice and Strong Institutions, the University promotes transparency, accountability, employee welfare, and environmentally responsible management of assets.
- The University encourages responsible divestment of obsolete assets, community engagement, and collaborative partnerships with industry, alumni, and other stakeholders to strengthen institutional growth and societal development.

3. Purpose

The purpose of this policy is to establish a transparent framework for ethical divestment, responsible disposal and redistribution of institutional resources, promotion of employee welfare, and development of strategic partnerships that strengthen the University's academic, social, and environmental ecosystem.

4. Objectives

- To ensure responsible, transparent, and sustainable management of university assets by promoting their optimal utilization, reuse, donation, recycling, and environmentally responsible disposal.
- To strengthen institutional development through alumni and industry participation, employee welfare initiatives, and accountable resource management that supports sustainability and community engagement.

7.3 Energy Use Density

The Energy Use Density (EUD), also referred to as the Energy Performance Index (EPI), serves as a critical key performance indicator for assessing the overall energy efficiency and sustainability of the university's built environment. This parameter measures the intensity of annual electrical energy consumption relative to the total built-up facility area across the campus. By normalizing energy usage against spatial dimensions, the university can effectively baseline its operational performance, identify potential energy waste, and track long-term progress toward resource conservation goals.

During the academic evaluation period of 2022–2023, Dr. Bhimrao Ambedkar University recorded a cumulative campus-wide energy consumption of 8,44,538 kWh, incorporating both utility grid supply and renewable solar power generation. Normalizing this total consumption against the overall built-up area yields the final Energy Use Density metric for the institution.

Establishing a precise Energy Use Density enables the university to benchmark its facilities against national energy efficiency standards set by the Bureau of Energy Efficiency (BEE) for institutional buildings. Furthermore, tracking this parameter provides actionable insights for optimizing lighting systems, HVAC operational hours, and equipment utilization. Maintaining a low energy density supports the university's commitment to reducing its carbon footprint, lowering operational expenditures, and aligning with eco-friendly campus directives mandated by NAAC and global sustainability frameworks.

Energy Performance Index (EPI)	Values
Annual energy consumption during year 2022-23	= 8,44,538 kWh
Campus Built up area	= 4930051.1 sqm
EPI	=8,44,538 / 4930051.1
	0.1713041067667kWh/sqm/year

7.4 Energy and the Community

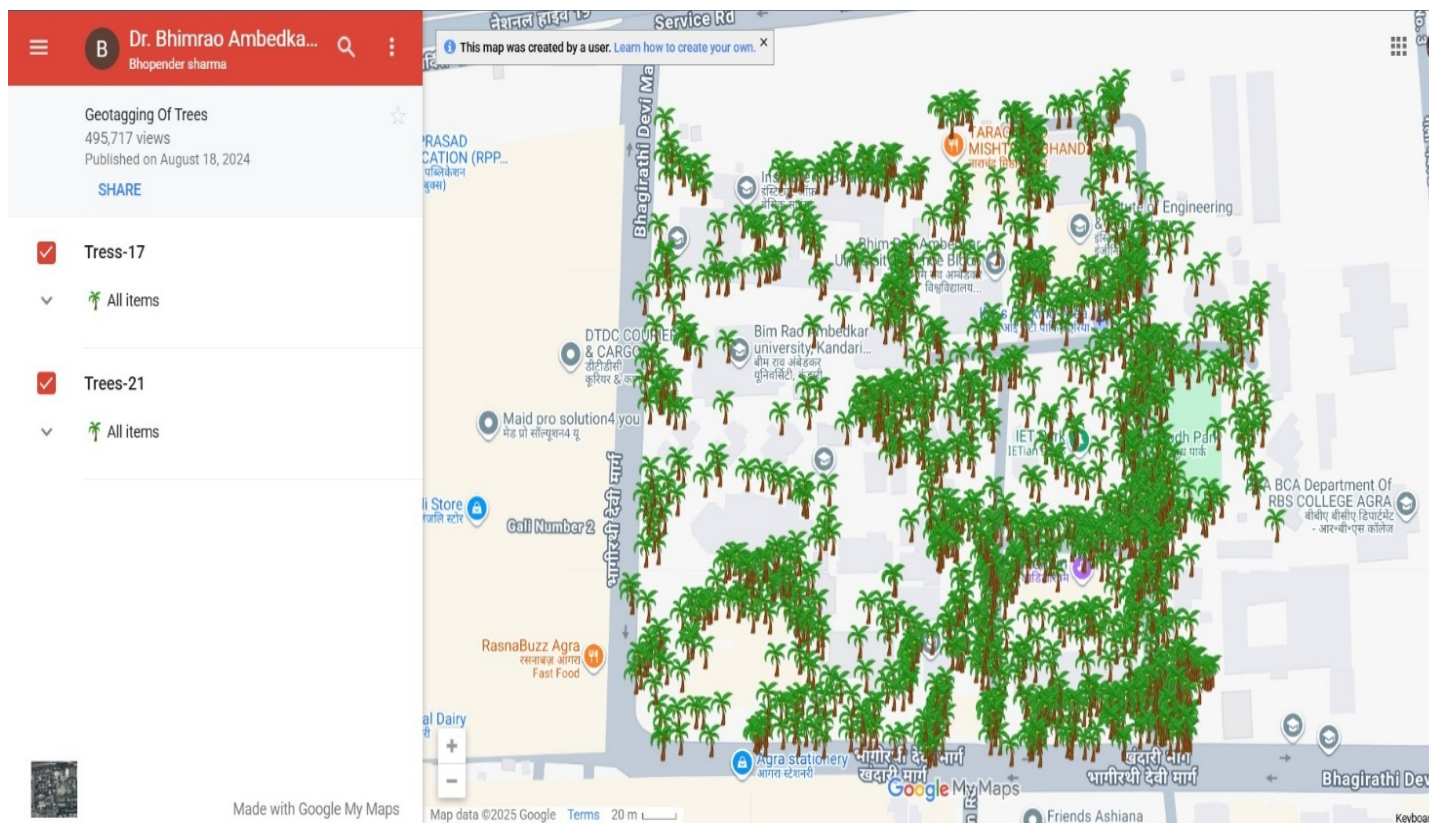
7.4.1 Local Community Outreach for Energy Efficiency

r. Bhimrao Ambedkar University, Agra, consistently demonstrates a strong institutional commitment to social responsibility by extending its sustainability and energy conservation efforts beyond the physical boundaries of its campuses. Through well-structured community engagement drives, outreach programs, and educational campaigns, the university actively promotes awareness regarding energy efficiency, environmental conservation, and clean energy transition among surrounding rural and urban populations, local residents, and the broader academic community.

The institution's holistic "Green Campus" and environmental stewardship initiatives incorporate a wide array of sustainable practices, including extensive tree plantation drives, biofuel production from organic kitchen waste, rooftop rainwater harvesting collaborations, and regular solar energy awareness workshops. These outreach activities serve to educate students, staff, and neighboring communities on practical methods for reducing electricity consumption, minimizing carbon emissions, and adopting eco-friendly energy habits in daily life.

To lead by example in sustainable energy deployment, the university has integrated significant operational rooftop solar photovoltaic systems (60 kW at the Khandari Campus and 70 kW at the Chhalesar Campus) alongside eco-friendly mobility solutions, such as the deployment of battery-operated vehicles for internal transportation and the active promotion of bicycle usage across campuses.

In recognition of these continuous efforts toward promoting energy management, eco-friendly infrastructure, and sustainable resource conservation, Dr. Bhimrao Ambedkar University was honoured with the prestigious Best Clean & Green Campus Award by the Parijat Foundation. Through these sustained outreach and operational initiatives, the university plays a vital role in fostering regional environmental consciousness and directly contributes to advancing the objectives of United Nations SDG 7: Affordable and Clean Energy.





7.4.2 Promote A Public Pledge Toward 100% Renewable Energy

As part of its strategic commitment to environmental sustainability, Dr. Bhimrao Ambedkar University, Agra, actively leads advocacy drives for a progressive transition toward 100% renewable energy. This initiative directly aligns with United Nations **Sustainable Development Goal 7 (SDG 7: Affordable and Clean Energy)**, which calls for substantially increasing the share of renewable energy in the energy mix, doubling the rate of improvement in energy efficiency, and promoting clean energy technology.

To fulfill the targets of SDG 7, the university has embedded clean energy protocols into its core administrative framework through its Policy on Green Clean Campus. The institution commits to systematically expanding its on-site solar energy infrastructure across its Khandari, Paliwal Park, and Chhalesar campuses. By expanding rooftop solar photovoltaic (PV) capacity and utilizing net-metering systems, the university progressively replaces fossil-fuel-based grid electricity with clean, self-generated solar power, lowering carbon emissions while ensuring a reliable clean energy supply.

Achieving the goals of SDG 7 requires combining clean energy generation with active energy efficiency practices. To foster this culture, Dr. Bhimrao Ambedkar University regularly organizes public energy pledges, rallies, and oath-taking ceremonies on key occasions such as National Energy Conservation Day and World Environment Day. During these events, university leadership, faculty, researchers, and students publicly commit to actively supporting the campus-wide transition toward clean and renewable energy sources, practicing strict energy conservation by utilizing energy-efficient LED lighting and optimizing equipment usage, and spreading awareness about affordable clean energy options within local communities and affiliated colleges.

In line with SDG 7's mandate to enhance scientific research and upgrade technology for clean energy, the university actively supports research projects focused on alternative clean fuels. Departments within the School of Life Sciences engage in research on organic waste utilization for bioenergy and biogas production, while initiatives such as student-led solar e-cycle development further highlight practical applications of clean energy technology within the campus ecosystem.



By combining public pledges, academic research, and visible solar infrastructure, Dr. Bhimrao Ambedkar University serves as a regional advocate for SDG 7. Through outreach activities in the Agra region, the university educates surrounding communities on the adoption of decentralized solar systems and clean energy habits, driving collective action toward an affordable, clean, and sustainable energy future.



SDG 7: Affordable and Clean Energy | Dr. Bhimrao Ambedkar University, Agra

7.4.3 Energy Efficiency Services for Industry

Dr. Bhimrao Ambedkar University, Agra, actively bridges academic expertise with regional industrial development by offering technical consultancy, knowledge-sharing, and energy management support to local industries and industrial clusters across the Agra and western Uttar Pradesh regions. Recognizing the critical need for sustainable industrial growth under **SDG 7 (Affordable and Clean Energy)**, the university leverages its academic departments, research faculties, and technical expertise to promote energy-efficient operational practices and clean technology adoption among local manufacturing, foundry, and small-to-medium enterprise (SME) units.

Through specialized workshops, expert advisory interactions, and technical awareness drives, university experts engage with industry stakeholders to encourage energy audit adoption, power factor optimization, and the integration of energy-efficient machinery. Faculty and researchers provide insights into switching to renewable energy sources, such as rooftop solar installations and bio-energy alternatives, helping local enterprises reduce operational carbon footprints, lower energy overhead costs, and meet statutory environmental compliance standards. Furthermore, by fostering collaborative research, industrial training programs, and clean-tech innovation, Dr. Bhimrao Ambedkar University serves as a vital knowledge hub, accelerating energy efficiency improvements and supporting sustainable industrial transformation across the regional economic ecosystem.



7.4.4 Policy Development for Clean Energy Technology

Dr. Bhimrao Ambedkar University, Agra, has established institutional policy frameworks to drive clean energy adoption, carbon footprint reduction, and sustainable infrastructure development. The university’s strategic governance centers around its overarching *Policy on Green Clean Campus*, which mandates environmental accountability, energy conservation, and clean technology integration across all academic, administrative, and residential campuses.



आगरा, दाता संदेश। डॉ. भीमराव आम्बेडकर विश्वविद्यालय आगरा में वैश्विक तकनीकी कंपनी कूट के साथ संभावित तकनीकी एवं शैक्षणिक सहयोग को लेकर एक महत्वपूर्ण बैठक एवं दस्तावेज आदान-प्रदान कार्यक्रम आयोजित किया गया। कार्यक्रम में दोनों संस्थानों के मध्य भविष्य में तकनीकी शिक्षा, स्किल डेवलपमेंट, नवाचार एवं इंडस्ट्री-एकेडमिक सहयोग को बढ़ावा देने पर विस्तृत चर्चा हुई।

इस अवसर पर विश्वविद्यालय की कुलपति प्रो. अशु रानी ने कहा कि विश्वविद्यालय विद्यार्थियों को आधुनिक तकनीकी ज्ञान एवं वैश्विक स्तर के अवसर उपलब्ध कराने के लिए निरंतर प्रयासरत है। उन्होंने

खोरे ईई तथा नॉर्थ रीजन हेड क्लूल विशेष रूप से उपस्थित रहे। दोनों अधिकारियों ने विश्वविद्यालय की शैक्षणिक एवं नवाचार आधारित गतिविधियों की सराहना करते हुए भविष्य में संयुक्त परियोजनाओं, तकनीकी प्रशिक्षण कार्यक्रमों एवं डिजिटल शिक्षा के क्षेत्र में सहयोग की संभावनाओं पर प्रकाश डाला।

इस दौरान कुलपति प्रो. आशु रानी जी के साथ आईबीएम प्रतिनिधियों द्वारा अनुबंध से संबंधित दस्तावेजों का आदान-प्रदान भी किया गया। कार्यक्रम में विश्वविद्यालय के कुलसचिव सहित अन्य गणमान्य सदस्य उपस्थित रहे। कार्यक्रम का संचालन डॉ. प्रज्ञा काबरा द्वारा प्रभावशाली ढंग से किया गया विश्वविद्यालय परिवार ने इस पहल

Through this framework, the university enforces strict building and renovation standards. All newly constructed and upgraded campus infrastructure is required to follow energy efficiency guidelines and align with Green Rating for Integrated Habitat Assessment (GRIHA) standards. These architectural policies ensure the incorporation of passive building insulation, optimized natural lighting, energy-efficient LED fixtures, smart electrical distribution, and mandatory rooftop rainwater harvesting systems.

Table : Institutional Patents for Clean Energy Technology

Title	Patent / Registration No.	Key Inventors
Solar powered sea water desalination apparatus	390046-001	Avnish Kumar et al.

Title	Patent / Registration No.	Key Inventors
Novel instrument of reaction progress tool with heating mantle	388821-001	Dr. Ravi Shekhar
Online banking & wireless security monitoring devices	397468-001 / 395202-001	Prof. V.K. Saraswat

In addition to infrastructure design, the policy framework prioritizes renewable energy deployment. The university mandates the progressive expansion of rooftop solar photovoltaic systems across campuses, such as the operational installations at Khandari (60 kW) and Chhalesar (70 kW), to replace conventional grid electricity with clean solar power. The policy also mandates periodic institutional Green Audits and Energy Audits to assess energy utilization patterns, eliminate operational inefficiencies, and maintain compliance with national conservation targets. Complementing these measures, clean transportation policies encourage the use of campus bicycles and battery-operated vehicles while restricting fossil-fueled vehicular access. By embedding these clean energy protocols into official policy, Dr. Bhimrao Ambedkar University advances the objectives of United Nations **SDG 7 (Affordable and Clean Energy)** and serves as an institutional role model for sustainable regional development.

7.4.5 Assistance to Low-Carbon Innovation

Dr. Bhimrao Ambedkar University, Agra, actively fosters an ecosystem for low-carbon innovation, sustainable technologies, and green. The university provides comprehensive technical, infrastructural, and advisory support to students, research scholars, local innovators, and early-stage startups working on clean-tech solutions, renewable energy adoption, and carbon-reduction initiatives.

Through its dedicated **Vivekananda Incubation Foundation (VIF)**, located at the Institute of Engineering & Technology on the Khandari Campus <https://dbrau.ac.in/vif/>, the university serves as a dynamic launchpad for startups driving sustainable transformation. Supported by government innovation funds, the incubation center offers physical workspace, seed funding access, industry mentorship, and specialized equipment to entrepreneurs in key sustainability sectors such as renewable energy, sustainable agriculture, and waste-to-energy valorization. VIF guides innovators through every

phase of growth, from initial ideation and prototype development to intellectual property management and commercial market entry, accelerating the deployment of low-carbon products and services.



Complementing its incubation services, the university’s academic faculties—including the Institute of Engineering & Technology, School of Life Sciences, and Environmental Science departments—provide vital technical assistance and research capacity for green innovation. Through academic-industry collaborations, the university supports pilot-scale research on converting organic kitchen and agricultural waste into clean biogas, significantly reducing waste-related emissions while generating renewable fuel. Additionally, student-led engineering initiatives focus on clean mobility, such as developing solar e-cycle systems and prototype electric transport solutions designed to minimize fossil-fuel reliance. University faculty also mentor young innovators in designing energy-efficient IoT devices, LED-based optimization systems, and smart energy monitoring tools. By integrating academic research with institutional incubation, Dr. Bhimrao Ambedkar University plays a pivotal role in empowering eco-entrepreneurs and advancing low-carbon technologies across the regional ecosystem.

7.5 Low-Carbon Energy Use

Dr. Bhimrao Ambedkar University, Agra, prioritizes low-carbon energy transition as a core component of its environmental sustainability and campus decarbonization agenda. In line with United Nations **SDG 7 (Affordable and Clean Energy)**, the institution actively reduces its reliance on fossil-fuel-generated grid power by expanding on-site renewable energy generation, implementing energy-efficient building standards, and integrating green transportation.



Solar energy serves as the foundation of the university’s low-carbon energy mix. Rooftop solar photovoltaic (PV) power systems are operational across major campus locations, including a 60 kW system at the Khandari Campus and a 70 kW system at the Chhalesar Campus. These systems generate clean, emission-free electricity directly consumed by administrative blocks, laboratories, and academic departments. Under the university’s Solar Campus Expansion Program, plans are underway to scale up rooftop and ground-mounted solar PV installations with smart-grid and net-metering facilities across all campuses to further reduce grid dependency.

7.5.1 Low-Carbon Energy Use

Dr. Bhimrao Ambedkar University, Agra, prioritizes a low-carbon energy transition as a fundamental pillar of its sustainability framework, directly supporting United Nations **SDG 7 (Affordable and Clean Energy)**. The institution actively minimizes its dependency on non-renewable grid power by increasing on-site clean energy generation and optimizing campus-wide electricity consumption.

Solar energy forms the backbone of the university’s clean energy portfolio, featuring operational rooftop photovoltaic systems such as the 60 kW facility at the Khandari Campus and the 70 kW installation at the Chhalesar Campus. These solar arrays generate clean electricity to power administrative, research,

and classroom blocks. To further diversify its clean energy mix, the university's School of Life Sciences collaborates on bioenergy initiatives, utilizing organic kitchen and agricultural waste to produce renewable biogas.

Complementing renewable generation, the university enforces strict energy efficiency measures. Campus infrastructure adopts Green Rating for Integrated Habitat Assessment guidelines, incorporating energy-efficient LED lighting, natural day-lighting, and smart electrical fixtures to lower operational demand. Furthermore, the university promotes low-carbon transportation options, including battery-operated campus vehicles, bicycles, and student-designed solar e-cycles, ensuring a holistic, energy-efficient operational model that advances the global targets of SDG 7.

Metric / Domain	Current Status & Achievements	Target / Planned Expansion
Solar Generation Capacity	~130 kWp operational (60 kWh Khandari, 70 kWh Chhalesar)	Scale up to 500 kWp total capacity
Energy Efficiency	4,200 conventional tube lights replaced with LEDs (~70%)	100% LED replacement (458 remaining tube lights)
Electricity Savings	> 14.54 lakh kWh saved annually via clean energy & LEDs	Continuous load optimization & BESS deployment
Carbon Footprint Impact	~1,192 metric tons CO ₂ offset annually via power savings	Phased Net-Zero campus transition
Academic & Community Integration	Mandatory 3-credit Green Practices course; NIESBUD training	Expanded AI-driven energy management research