



NATIONALENGINEERING COLLEGE
(An Autonomous Institution – Affiliated to Anna University Chennai)
K.R.NAGAR, KOVILPATTI – 628503

SUSTAINABLE DEVELOPMENT GOALS – 7

AFFORDABLE AND CLEAN ENERGY



Ensure Access to Affordable, Reliable, Sustainable, and Modern Energy for All



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7.1 Overview

Expanding access to affordable and clean energy is central to reducing environmental impact while supporting continued growth and development. For institutions, this means rethinking how buildings are designed, powered, and maintained, with an emphasis on efficiency and renewable sources rather than assuming energy consumption must keep growing unchecked.

7.2 Direction for an Energy Efficiency Policy

National Engineering College, Kovilpatti (autonomous) is working toward a formal Policy for Energy Efficiency to govern future construction and renovation projects on campus. Once framed, the policy is intended to embed sustainable practices into the institution's built environment, reduce energy consumption, and limit the environmental footprint of ongoing operations.

Key elements planned for the policy include:

Design and Planning: Following applicable regional energy-efficiency standards, and using orientation, insulation, shading, and passive design techniques to reduce dependence on artificial lighting and cooling.

Lighting: Installing energy-efficient LED lighting in new and renovated spaces, supported by daylight-harvesting and occupancy-based lighting controls.

HVAC Systems: Designing heating, ventilation, and air-conditioning systems around efficiency requirements, with routine maintenance, heat-exchange technologies, and energy-recovery systems to minimize waste.

Renewable Energy Integration: Assessing the feasibility of on-site renewable energy generation such as solar installations during any new construction or renovation.

Monitoring and Evaluation: Installing energy-performance monitoring systems to track consumption and verify that efficiency targets are being met over time.

Through this policy, National Engineering College aims to ensure that every renovation and new building on campus contributes to a greener, more energy-conscious institution treating



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energy efficiency not as an isolated initiative but as a standing requirement for all future infrastructure development.

7.3 Courses

The Mechanical Engineering department offers a structured basket of elective courses that collectively address multiple targets under SDG 7, Affordable and Clean Energy. The table below maps each course to its corresponding SDG 7 target(s).

S.No	Course Title	Corresponding Target STG Description	Course-SDG Alignment
1	Renewable Energy Sources	Ensure universal access to affordable, reliable, and modern energy services	Trains students to design accessible, cost-effective energy solutions using diverse renewable sources
2	Solar Photovoltaic Energy Conversion	Increase substantially the share of renewable energy in the global energy mix	Builds core technical competency in solar PV technology, conversion efficiency, and deployment
3	Energy Efficient Buildings	Double the global rate of improvement in energy efficiency	Develops skills in energy-efficient building design and demand-side energy management
4	Energy Conservation in Industries	Double the global rate of improvement in energy efficiency	Equips students with industrial energy auditing and conservation practices
5	Hybrid and Electric Vehicles	Enhance international cooperation for access to clean energy research, technology, and investment	Exposes students to emerging clean mobility technologies and innovation-driven energy systems
6	Energy Engineering	Expand infrastructure and upgrade technology for sustainable energy services	Extends clean energy knowledge across disciplines, broadening SDG-aligned technical literacy institution-wide

This curriculum mapping demonstrates the department's commitment to embedding sustainability outcomes within technical education, in alignment with NBA's expectation of



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program educational objectives (PEOs) and program outcomes (POs) reflecting societal and environmental responsibility.

The syllabi of the open elective course Energy Engineering is given below.

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23ID01E	ENERGY ENGINEERING	L T P E C	
		3 0 0 0 3	
COURSE OUTCOMES			
Upon completion of this course, the students will be able to			
Theory Component			
CO1: Demonstrate the operation of solar thermal and solar photovoltaic systems.			
CO2: Demonstrate the operation of wind energy system.			
CO3: Use the concepts of various bio-energy conversion techniques for power generation.			
CO4: Illustrate the concepts of other conventional and nonconventional power plants.			
CO5: Demonstrate the concepts of hydrogen and fuel cell technology			
CO1	Demonstrate the operation of solar thermal and solar photovoltaic systems	L:9	
Sun - Earth Geometry, solar radiation, Solar Collectors - Application of solar thermal systems. Direct Electricity Conversion - Types of Solar cell - Solar Photovoltaic system and types.			
CO2	Demonstrate the operation of wind energy system	L:9	
Wind energy potential, Principle of wind energy conversion; Basic components, types and their constructional features; design considerations: wind data and site selection.			
CO3	Use the concepts of various bio-energy conversion techniques for power generation.	L:9	
Biomass: sources, characterization, principles of energy transfer technologies. Biogas: Feedstock, types of Biogas plant - parameters affecting biogas production.			
CO4	Illustrate the concepts of other conventional and nonconventional power plants	L:9	
Layout of Hydel - thermal - Nuclear - Gas turbine - Diesel - MHD - Geo thermal - OTEC - Tidal Power Plants			
CO5	Demonstrate the concepts of hydrogen and fuel cell technology	L:9	
Energy carrier: Types - Hydrogen: generation, storage, transport and utilization - thermal energy storage: Principle and utilization - Fuel cells: Technologies, types and applications.			
L:45; TOTAL:45 PERIODS			

The Civil Engineering department offers the course Energy Efficient Buildings as elective courses to students to build their knowledge and technical competence in sustainable urban infrastructure and energy-conscious building design, preparing them to address the growing challenges of urbanization and resource efficiency in the built environment.

The syllabus of the course is given below.



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23CE30E

ENERGY EFFICIENT BUILDINGS

L T P E C
3 0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: Explain Energy Demand and Efficient Systems
- CO2: Explain Energy Use Solutions in Building Systems
- CO3: Apply Heat Flow Principles and Optimize Glazing and Shading Systems
- CO4: Acquire knowledge of ECBC Guidelines and Green Building Strategies
- CO5: Explain Energy Economics and Efficient Building Technologies

CO1: Explain Energy Demand and Efficient Systems

9

Introduction and need for energy efficiency – Overview of energy efficiency in Vernacular buildings - Energy conservation through site planning, design and development - Energy - Past & Present scenario of World; National Energy consumption Data - Environmental aspects associated with energy utilization

CO2: Explain Energy Use Solutions in Building Systems

9

Factors that affect energy use in buildings - envelope factors, air- conditioning systems factors, Building management systems -Artificial lighting-Day lighting – Sources and concepts Daylight apertures

CO3: Apply Heat Flow Principles and Optimize Glazing and Shading Systems

9

Introduction to periodic heat flow in building- Glazing types, properties, glass layers, external and internal shading devices-Thermal performance of Building sections – Orientation of buildings

CO4: Acquire knowledge of ECBC Guidelines and Green Building Strategies

9

Passed in the Board of studies meeting held on 21.11.2025 & Approved in the 24th Academic Council meeting dated 13.12.2025
R.E. - Civil Engineering *R-2023 Curriculum and Syllabus*

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Overview of Energy Conservation Building Code (ECBC) -Concepts of green buildings - sustainable site, water efficiency, materials and resources, energy and atmosphere, indoor environmental quality, and innovation in design- case studies and examples. – Green Building Rating System- BREEAM, LEED, IGBC, GRIHA.

CO5: Explain Energy Economics and Efficient Building Technologies

9

Energy Economics –Net Present Value, Life Cycle Costing –Energy Service Companies ESCO concept- Case studies on the energy efficient techniques and technologies adopted in buildings

7. 4 Extended Activities

The Social Awareness Cell, established in 2015, has since served as one of the institution's structured channels for extending its energy-related knowledge to the wider community, reflecting a long-standing institutional commitment to translating classroom learning on energy and sustainability into tangible public engagement well before it was formally aligned with SDG-linked reporting.

As part of the institution's Sustainable Communities and Partnership initiatives, the Cell conducts community-facing programmes that engage students in tree-plantation drives, awareness campaigns, and other outreach activities across schools and villages. Through these efforts, the



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institution translates classroom learning on energy and sustainability into tangible public engagement, in line with SDG 7's emphasis on expanding access to reliable and modern energy services. The objectives are

- To create awareness among the public.
- To conduct social awareness camps in schools and villages to inculcate electrical energy usage, conservation, and safety.
- To become more responsible and committed towards social realities.

The content delivered during these camps draws directly on the institution's own operational practices in electrical energy management. The Electrical Maintenance Department is responsible for operating and maintaining the campus electrical distribution network in compliance with the safety standards prescribed by the Chief Electrical Inspector to Government (CEIG), and for conducting regular energy audits and conservation measures across the campus, including the installation of rooftop solar power systems with a combined capacity of 360 kW. By grounding school and village-level awareness sessions in this first-hand experience of safe electrical practices, load management, and renewable energy adoption, the Social Awareness Cell extends the institution's own energy-conservation culture into the surrounding community, furthering SDG 7's goal of ensuring access to affordable, reliable, sustainable, and modern energy for all.



**Electricity Safety tips and measures during rainy season,
Nalattinputur Panchayat, Kovilpatti**



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Electricity energy conservation awareness program, K.R.Saradha Govt. Higher Secondary School, Kovilpatti

7.5 Energy Reviews and Audits

National Engineering College conducts periodic energy reviews and audits covering its electrical distribution network, UPS systems, and air-conditioning infrastructure, so that consumption patterns are understood and conservation opportunities are acted upon rather than left unaddressed. These reviews have directly informed conservation outcomes such as the reduction of maximum electrical demand from 750 kVA to 500 kVA, alongside the replacement of 80% of campus lighting with energy-efficient LEDs and 20% of ceiling fans with BLDC variants, in keeping with SDG 7's target of doubling the global rate of improvement in energy efficiency.

As part of this process, the Electrical Maintenance Department carries out scheduled preventive maintenance and audit checks on the campus's Online UPS systems, which together provide a total backed-up capacity of 513 kVA to ensure uninterrupted power for computer-based activities in laboratories, offices, and other academic facilities, as well as on air-conditioning units installed across the campus. The UPS and AC maintenance reports for 2025–26, reproduced below, form part of the institution's ongoing record of this preventive maintenance cycle.



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National Engineering College, K.R.Nagar, Kovilpatti - 628503 Computer Science and Engineering Department														
UPS & Batteries Preventive Maintenance Checklist					Month: <u>May 2026</u>					Total: 110 KVA				
S.No	Capacity	Location	No of Batteries	D.O.P Battery	Daily	Weekly			Monthly	Once in two months	Once in six months	Remarks	Lab Technicians (Name)	Lab-Incharge (Sign)
					Switch on ups with very minimum load/without load when mains powers goes off.	Clean all batteries & terminals	Checkup distilled water	Refill Water	Checkup DC voltage in all batteries	Checkup specific acid gravity	(Disconnect, clean and connect all terminal leads)			
1	10 KVA Numeric UPS-HPK	CVR	20	20.04.2023	01.05.2026 26.05.2026	19.05.26	19.05.26	19.05.26	19.05.26			-	L.Pandit	
2	5 KVA Powerline UPS	CVII	10	04.12.2023	02.05.2026 26.05.2026	19.05.26	19.05.26	19.05.26	19.05.26			-	L.Pandit	
3	10 KVA Numeric UPS-HPL	API	20	01.02.2014	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			Ups Fan is noisy	L.Pandit	
4	10 KVA Numeric UPS-HPL	ICL-1	20	11.11.2025	02.05.2026 26.05.2026	-	26.05.26	26.05.26	26.05.26			Battery Stand table Damage	L.Pandit	
5	10 KVA Numeric UPS-HPL	ICL-2	20	30.08.2022	02.05.2026 26.05.2026	-	26.05.26	26.05.26	26.05.26			Ups Battery 1 has Problem Stand Cable Damage	L.Pandit	
6	10 KVA Powerline UPS	AI&DL	20	05.06.2024	02.05.2026 26.05.2026	-	26.05.26	-	26.05.26			Sometimes Ups auto disconnects	L.Pandit	
7	5 KVA Powerline UPS	DRDO	10	02.12.2024	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
8	10 KVA Numeric UPS-HPL	RM Lab	20	09.04.2022	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
9	5 KVA Numeric UPS-HPL	RM Lab	10	25.08.2025	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
10	10 KVA Numeric UPS-HPL	CISCO Lab	20	04.09.2023	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
11	5 KVA Numeric UPS-HPL	CISCO Lab	10	25.08.2025	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
12	10 KVA Numeric UPS-HPL	CCC Lab	20	11.12.2014	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
13	10 KVA Numeric UPS-HPL	CCC Lab	20	22.10.2020	02.05.2026 26.05.2026	25.05.26	25.05.26	25.05.26	25.05.26			-	L.Pandit	
Signature of supervisor														

Signature of supervisor:

Problem
 Iel 1 - Ups Battery stand table Damage
 Iel 2 - Ups Battery 1 has a Problem
 Iel 3 - Battery stand table Damage
 Dmn - Sometimes Ups automatic off.

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UPS maintenance report (25-26)



National Engineering College, K.R.Nagar, Kovilpatti - 628503																																						
Computer Science and Engineering Department																																						
MAY - 2026																																						
S.NO	Equip	Place	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Technician & Attender	Incharge Sign			
1	AC 1	Seminar Hall 2tr blue star				✓																													G.P	L.P N.M L.P		
2	AC 2					✓																																
3	AC 3					✓																																
4	AC 4					✓																																
5	AC 5			✓																																		
6	AC 6			✓																																		
7	AC 7			✓																																		
8	AC 8			✓																																		
9	AC 1	DISCO Lab 2tr Voltas												✓																							G.P	
10	AC 2													✓																								L.P
11	AC 3													✓																								N.M
12	AC 4													✓																								
13	AC 1	HIF LAB 2tr - Voltas							✓																													G.P
14	AC 2							✓																														L.P
15	AC 3							✓																														N.M
16	AC 1	HOO Room 1.5-V																																				
17	AC 1	DRDO Lab 2tr Carrier																																				
18	AC 1	Adroid Soft Lab 1.5-Voltas												✓																							G.P	
19	AC 1	IP Lab 1.5-Voltas												✓																							N.M	
20	D-AC 1	AIRTEL Lab 8.3 Fujitsu																																				
21	D-AC 2	AIRTEL Lab 8.5 Fujitsu																																				
22	D-AC 1	ICL-1 Lab 1.5 Blue Star																																				

National Engineering College, K.R.Nagar, Kovilpatti - 628503																																			
Computer Science and Engineering Department																																			
May - 2026																																			
S:NO	Equip	Place	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Technician & Attender	Incharge/Sign
23	D-AC 2	ICL-2 Lab 8.5 Blue Star																																	
24	D-AC 1	APJ Lab 8.5 Daikin																																	
25	D-AC 2	CVR Lab 8.5 Blue Star																																	
26	AC 1	G3 Staff Room Carrier																																	
27	AC 1	CCC Lab 2tr														✓																			Gp
28	AC 2	CCC Lab 2tr														✓																			L P
29	AC 3	CCC Lab 2tr																✓																	R.D
30	AC 4	CCC Lab 2tr																	✓																N.M
31	AC 5	CCC Lab 2tr																		✓															
32	AC 6	CCC Lab 2tr																			✓														

V.C. → 11/6/26

HOD/CSE



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AC Maintenance Report (25-26)

In addition to the UPS and AC maintenance reports, the institution maintains manual energy meter reading registers for its main distribution panels, recording periodic consumption readings that support cross-verification of the digital monitoring data referenced in Section 7.7 and provide a documented basis for ongoing energy review.

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Department : CSE

Energy Meter Reading
Month: JUNE 2026

Panel - II

Date	Morning	Evening	Total Units/Day
	9.00am – 9.30am	5.15pm – 6.00pm	
30.05.2026		2237.02	
01.06.2026	2238.22	2239.24	2.22
02.06.2026	2239.48	2240.03	0.79
03.06.2026	2240.28	2240.77	0.74
04.06.2026	2241.02	2241.57	0.80
05.06.2026	2241.82	2242.45	0.88
06.06.2026	2242.68	2243.29	0.84
07.06.2026	Sunday		
08.06.2026	2245.24	2246.07	2.78
09.06.2026	2246.31	2247.17	1.10
10.06.2026	2247.32	2247.68	0.51
11.06.2026	2247.98	2248.45	0.77
12.06.2026	2248.69	2249.03	0.58
13.06.2026	2249.23	2250.26	1.23
14.06.2026	Sunday		
15.06.2026	2252.05	2252.78	2.52
16.06.2026	2253.01	2253.63	0.85
17.06.2026	2253.85	2254.47	0.84
18.06.2026	2254.69	2255.26	0.79
19.06.2026	2255.51	2256.12	0.86
20.06.2026	2256.48	2257.36	1.24
21.06.2026	Sunday		
22.06.2026	2259.12	2259.72	2.36
23.06.2026	2260.05	2260.52	0.80
24.06.2026	2260.74	2261.37	0.85
25.06.2026	2261.61	2262.14	0.77
26.06.2026	2262.37	2263.07	0.93
27.06.2026	2263.33	2263.82	0.75
28.06.2026	Sunday		
29.06.2026	2265.54	2266.04	2.22
30.06.2026	2266.27	2266.91	0.87
	Total :		29.89

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Energy Meter Reading Panel II (2025-2026)



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Department : CSE

Energy Meter Reading
Month: June 2026

Panel - I

Date	Morning	Evening	Total Units/Day
	9.00am – 9.30am	5.15pm – 6.00pm	
30.05.2026		542725	
01.06.2026	543055	543165	440
02.06.2026	543240	543387	222
03.06.2026	543459	543646	257
04.06.2026	543720	543863	217
05.06.2026	543939	544093	230
06.06.2026	544193	544361	268
07.06.2026	Sunday		
08.06.2026	544546	544647	286
09.06.2026	544719	544816	169
10.06.2026	544890	545115	299
11.06.2026	545187	545425	310
12.06.2026	545498	545686	261
13.06.2026	545756	545890	204
14.06.2026	Sunday		
15.06.2026	546080	546290	400
16.06.2026	546384	546607	317
17.06.2026	546687	546872	265
18.06.2026	546952	547138	266
19.06.2026	547236	547419	281
20.06.2026	547493	547530	111
21.06.2026	Sunday		
22.06.2026	547721	547916	386
23.06.2026	548003	548218	302
24.06.2026	548294	548454	236
25.06.2026	548571	548766	312
26.06.2026	548848	549035	269
27.06.2026	549111	549302	267
28.06.2026	Sunday		
29.06.2026	549496	549706	409
30.06.2026	549792	550019	313
		Total	7294

V.L.
HOD CSE 11/06/26

Energy Meter Reading Panel I (2025-2026)



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7.6 Direct service to Local industries

The Mechanical Engineering department undertook a consultancy project titled Energy and Green Auditing.

Industry Name	V. O. Chidambaram College, Thoothukudi.
Type of Service	Energy and Green Auditing
Duration	2021-22
Amount Received	15,000
Outcome	The Energy and Green Audit enabled V. O. Chidambaram College to identify energy-saving opportunities and adopt more sustainable practices, directly supporting SDG 7's goal of promoting affordable, efficient, and clean energy use.

This initiative generated a revenue of ₹15,000 and reflects the department's engagement in extending its technical expertise for institutional and community benefit through energy assessment and sustainability services.

The audit involved a systematic assessment of the college's energy consumption patterns, identification of areas of energy wastage, and evaluation of opportunities for improving energy efficiency across campus facilities. The green auditing component further examined the institution's environmental practices, resource utilization, and sustainability measures, providing recommendations to reduce the overall energy and ecological footprint of the campus.



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7.7 Energy consumption plan

Energy Generated and Consumed – Year-wise Data

Academic Year	Total Electricity Consumed (kWh)	Total Renewable Energy Installed (kWp)	Total Renewable Energy Generated (kWh)	Total Built-up Area (Sq. ft.)
2025-26	1787887.000	270.000	322500.000	796323.000
2024-25	1828384.000	180.000	201798.000	796323.000
2023-24	1744313.000	100.000	145167.000	—

National Engineering College has progressively expanded its renewable energy installed capacity and annual generation over the reporting period, nearly tripling its installed solar capacity while its built-up area has remained consistent, reflecting a deliberate and sustained shift toward clean energy adoption. This expansion in renewable capacity has been achieved even as overall electricity consumption has risen only marginally, indicating improved energy efficiency alongside reduced dependence on grid electricity. Taken together, these trends demonstrate the institution's measurable and continuing commitment to clean energy adoption, in direct support of SDG 7. This widening gap between renewable capacity growth and consumption growth indicates that an increasing share of the institution's energy demand is being met from on-site solar generation rather than the grid, consistent with the energy audits, LED and BLDC fan replacement drives, and demand-reduction measures described above. Energy Conservation Activities Undertaken

- Regular energy audits conducted, resulting in reduction of maximum demand from 750 kVA to 500 kVA through energy conservation activities and annual installation of solar panels, despite an increase in connected load.
- Installation of solar water heaters to reduce electricity consumption used for heating water.



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- Implementation of an automatic water pump on/off system based on water level control to avoid energy wastage.
- Scheduled preventive maintenance carried out on all energy-consuming equipment to sustain efficiency.
- Replacement of conventional lighting with energy-efficient LED fixtures across 80% of campus installations, and of conventional ceiling fans with BLDC variants across 20% of installations, as part of the institution's ongoing energy-efficiency upgrade programme.

National Engineering College's renewable energy capacity is distributed across major academic and administrative blocks, allowing generation to be matched to demand at the point of consumption. The block-wise rooftop solar installed capacity is summarised below.

Block / Location	Installed Capacity (kW)
Science & Humanities (S&H) Block	50
Computer Science & Engineering (CSE) Block	50
Information Technology (IT) Block	80
Library Building	90
Electrical and Electronics Engineering (EEE) Block	90
Mechanical Engineering Block (Under Progress)	90

Together with the 90 kW installation under progress at the Mechanical Engineering Block, the institution's total rooftop solar capacity is set to reach 450 kW, further strengthening the upward trend in renewable energy generation recorded in the table above.



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Solar Water Heater, Boys Hostel



Digital Energy Meter for Real-Time Power Consumption Monitoring, CSE Block



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Energy-Efficient LED Lighting Installation, Main Block

7.8 Carbon Management

National Engineering College promotes sustainable development through the adoption of renewable energy systems, energy-efficient infrastructure, and environmentally friendly practices to reduce conventional energy consumption and carbon emissions. As part of its commitment to green energy initiatives, solar photovoltaic (PV) power plants with a total installed capacity of 360 kW have been established across the campus. In addition, a 90 kW solar power plant at the Mechanical Engineering Block is currently under progress, which will further enhance the institution's renewable energy generation capacity. The solar installations have been strategically located at the various campus buildings.

These initiatives contribute significantly to energy conservation, reduction in electricity costs, and the creation of a sustainable and eco-friendly campus environment. National Engineering College continues to strengthen its green energy infrastructure to support environmental stewardship and sustainable development goals.



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Environmental Benefits Earned as on 28.07.2026



CO₂ REDUCTION

1458 ton



**EQUIVALENT PLANTING OF
TREE**

48973



STANDARD COAL SAVED

573 ton



Rooftop Solar Photovoltaic Installation, National Engineering College Campus



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Solar Power Infrastructure, National Engineering College Campus



AC Distribution Board (ACDB) — Solar Power Integration

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