



VIT[®]

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SDG 7 Affordable and Clean Energy

Annual Report 2018-19

**7 AFFORDABLE AND
CLEAN ENERGY**



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

Vellore Institute of Technology

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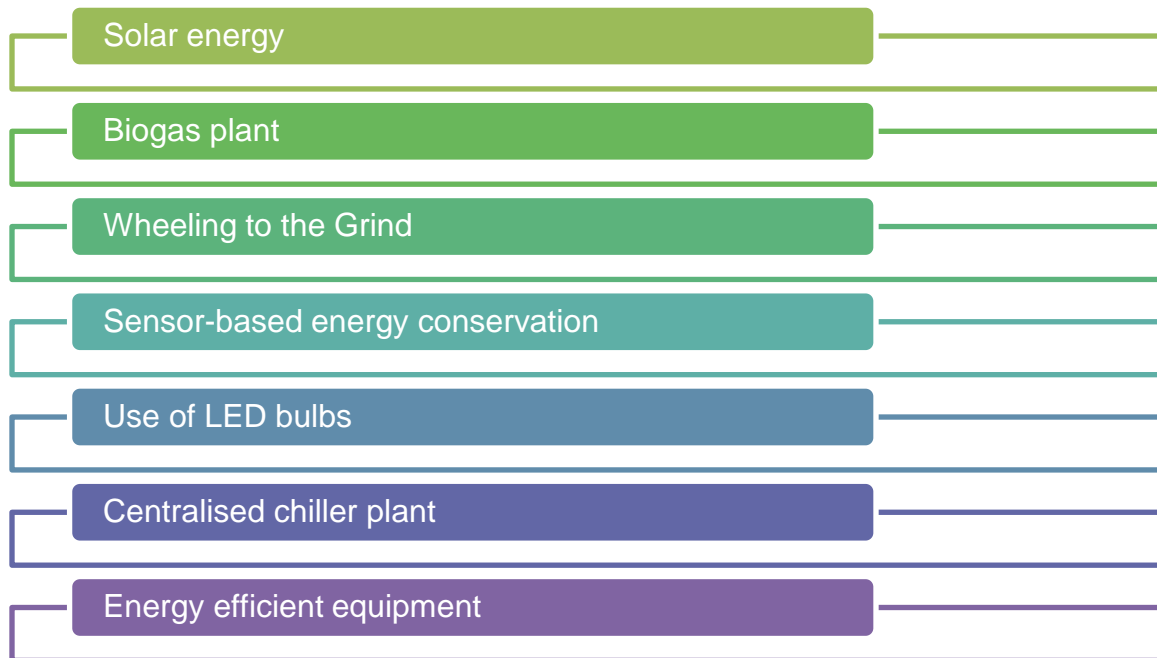
Report of VIT-Vellore Campus

GOAL 7: Affordable and Clean Energy...

Preamble

Renewable energy solutions are becoming cheaper, more reliable and more efficient every day. Our current reliance on fossil fuels is unsustainable and harmful to the planet, which is why we have to change the way we produce and consume energy. Implementing these new energy solutions as fast as possible is essential to counter climate change, one of the biggest threats to our own survival.

Vellore Institute of technology (VIT) has facilities for alternate sources of energy and energy conservation measures like



A. Installation of solar projects

In the year of 2003, 8.25 kW Solar panels were installed at a cost of INR 5 million, fully funded by VIT. In 2015, a 500 kW which can produce approximately 2500 units daily was set up. Another 625 kW of rooftop solar PV was installed in 2018 September.

Recently, November 2020, VIT also established 1000 kW of rooftop solar PV system with remote energy monitoring facility ie. solar energy monitoring lab. A fully operational 10 kW solar dish Stirling engine power plant (INR 8 million), which is recognised as the most efficient technology, was imported from Germany. The working gas is either Helium or Hydrogen. A 80000 litre solar water heater installed in the academic and Hostel campus meets the pre-heated water demand on campus. Most of the hostel buildings are equipped with solar water heaters. The undergraduate students of VIT, in association with the University of Strathclyde, United Kingdom, have installed an off-grid photovoltaic (PV) solar system in a community college near VIT.

Centralised Chiller Plant of 5500 Tons of refrigeration

In VIT hostels and academic block 85 % of split and windows ACs are replaced by centralised chiller water based cooling for the rooms, meeting halls, laboratories and auditoriums from 2019. This unit consumes only 55 % electrical energy when compared to conventional ACs. This is another milestone at VIT in terms of energy saving measures.

Replacement of conventional lightings with LEDs

All the newly constructed hostel blocks are installed with 10 W LED lamps and the hostel toilets and corridors are installed with 20 W and 15 W LED lamps respectively. A few of the washrooms/ restrooms in the academic buildings are equipped with occupancy sensor based LED lights. All the streetlights and pathways lights are replaced with LED of lesser wattage when compared to conventional light sources like metal halide and sodium vapour lamps. Biodiesel heavy vehicles and solar powered cars in campus Since 2012, busses operating within the campus are powered with 30% biodiesel. These vehicles have covered more than 60,000 km without any breakdown. A Laboratory model glass unit produces the biodiesel. At present, Pongamia and Jatropha oil are used for biodiesel production. Works are in progress to use Sterculia and Vilosa seeds too. Apart from the seeds, even the use of kitchen waste for biodiesel production has become a thrust area of research.

A solar powered (255W x 4 solar panels) 12 seater car equipped with a pair of 3.7 kW DC motor, christened as the 'Green Energy Vehicle', is fully operational (nearly 8 hours a day) during the working hours.

As a part of the energy awareness and conservation programme, VIT hosts numerous workshops and training sessions on a regular basis. Energy Conservation week is a regular practice inline with Energy conservation day- December 14. During this week 3rd and 4th days were observed as 'No Air Conditioner' and 'No Automobile' days of the VIT campus respectively.

ASME's International Human Powered Vehicle Challenge with more than 400 participants provided an opportunity for the students to develop practical and sustainable modes of transportation.

Link: <https://vit.ac.in/about/Sustainability/EnergyConservationProgramme>

B. Promoting sustainable practices

VIT has established the CO₂ Research and Green Technologies Centre, which is a unique and advanced research laboratory, to carry out research on Carbon Capturing (better)-and Utilization – CCU, whereas many other leading research institutions are concentrating on Carbon Capturing and Storage – CCS. The centre was inaugurated on 15th Feb 2010 by Dr. Farooq Abdullah, Hon'ble Minister for New and Renewable Energy (MNRE) Govt. of India.

The green facade drape subway walls are yet another unique feature in VIT. They absorb the entire atmospheric pollutants spewed by the vehicular emissions. The on-going research activities on these green drapes have proved their atmospheric cleansing capability. A physical green drape on high-rise buildings can save considerable amount of building's annual energy consumption. The green drapes can serve as excellent acoustic dampers too.

The School of Electrical Engineering (SELECT), in association with the School of Electronics Engineering (SENSE), has developed low cost energy efficient systems, in particular, energy efficient light automation devices, which are fully functional in some of the new laboratories and hostels.

C. Quality audits on environment and energy

The objective is to make Vellore Institute of Technology, Vellore as energy efficient by means of using renewable energy, energy efficient technologies and appliances by proper Energy Audit. An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. This will involve the analysis of energy consumption of Vellore Institute of Technology by knowing the different loads that are in use, their ratings, their consumption, the consumption pattern and providing alternatives to reduce the energy consumption and thereby reducing the cost spent on electricity bills and also reduce the harmful effects on the environment due to conventional way of power generation. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. Thus by the help of this audit the institution is made both energy and cost efficient.

1. Energy audit report:

http://naac.vit.ac.in/naac/c7/716/Proofs/Energy_audit_report.pdf

2. Policy document on environment and energy usage:

http://naac.vit.ac.in/naac/c7/716/Proofs/Policy_document.pdf

3. Beyond the campus environmental promotion activities:

http://naac.vit.ac.in/naac/c7/716/Proofs/Beyond_the_campus_environmental_activities.pdf

E. Green campus initiatives include:

- Restricted entry of automobiles
- Use of Bicycles/ Battery powered vehicles
- Pedestrian Friendly pathways
- Ban on use of Plastic
- landscaping with trees and plants

1. Energy conservation week -2019:

http://naac.vit.ac.in/naac/c7/715/Proofs/Energy_Conservation_Week.pdf

2. Value Added Program on Energy audit: <https://vit.ac.in/school-electrical-engineering-select/value-added-program-energy-audit>



3. Circular on restricted entry of automobiles:
<http://naac.vit.ac.in/naac/c7/715/Proofs/Circular.pdf>
4. Use of Bicycles/ Battery powered vehicles:
<https://vit.ac.in/about/Sustainability/TransportationPolicy>
5. Circular on Ban on use of Plastic:
http://naac.vit.ac.in/naac/c7/715/Proofs/Plastic_free_campus.pdf

F. Research Publications: Affordable and Clean Energy

Publications : 288
Citations : 3442

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Report of VIT-Chennai Campus

Preamble

The main targets under this SDG are:

- To ensure access to affordable, reliable and modern energy services
- To increase substantially the share of renewable energy in the global context
- To facilitate clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil-fuel technology

Policies / Major decisions taken regarding the SDG

The sprawling VIT Chennai Campus is an energy efficient campus. The institute has won the accolade of green rated infrastructure. Solar panels are installed in abundance for efficient energy storage and conversion.



A Green Campus



SOLAR-WIND Powered LED Street Light

Academic Details pertaining to the SDG

The School of Electrical and Electronics Engineering (SELECT) offers B. Tech and PhD in Electrical Engineering. A wide range of research specialisations such as Power systems, Power Electronics, Control Engineering, Electric Vehicles, Power Converters

for Renewable power generation system, Controllers for grid integration, Special machines and drives for Industrial applications, Micro grid, Internet of Things, Robotics, Wireless power transfer system, Industrial Automation and deregulated power system is carried out by a diverse and versatile team of faculty members and students in the school. In addition to this, School of Advanced Sciences (SAS) and VIT School of Law (VISOL) offer course on Environment Sciences, CHY1002 and LAW1102 respectively which impart sound knowledge on sustainable energy conservation and management to the students.

Major events organised Conferences / Workshops / Symposium

- a) Professional Development program organized by the Institute for teaching and non-teaching staff

S. No	Title of the Programme	Date		No of days	No of participants attended
		From	To		
1.	Recent trends in controllers for renewable energy systems	19-11-2018	01-12-2018	12	20
2.	Nonlinear Controller design for Conventional Power Networks and Microgrids	14-12-2018	14-12-2018	1	18
3.	DC-Microgrids Opportunities and Challenges	15-12-2018	15-12-2018	1	22
4.	Design of Algorithms and Programming with dsPIC Microcontroller for High Power Electronics	09-02-2019	09-02-2019	1	39
5.	Power Electronics Applications to Renewable Energy and Microgrid	15-02-2019	15-02-2019	1	15
6.	One Day Workshop on Impact of Electric Vehicles on the Automotive Value Chain In Collaboration with ASM Chennai	04-05-2019	04-05-2019	1	58
7.	Power Electronics Converters for Renewable Energy System	04-06-2018	09-06-2018	5	19

b) FDPs attended by Faculty: The Institute provides financial assistance to faculty for attending FDPs within and outside the Institute.

S. No	Name of faculty	Name of the event	Date		FDP/ workshop / seminar	Name of Inst.	No of days
			From	To			
1.	Sri Ramalakshmi P	Two day FDP on real time simulations of renewable energy systems	8/1/2018	9/1/2018	FDP	VIT	2
2.	Lavanya V	FDP on Real Time Simulation on Renewable Energy Systems	8/1/2018	9/1/2018	FDP	VIT	2
3.	Nithya Venkatesan	Indo Korea Joint Workshop Wave and Ocean Thermal Energy Conversion	21/02/2018	23/02/2018	Workshop	VIT	2
4.	Velmathi G	A Two days International level hands -on Workshop on Smart Microgrids and Energy Storage using Homer	9/3/2018	10/3/2018	Workshop	VIT	2
5.	Krithiga S	A Two days International level hands -on Workshop on Smart Microgrids and Energy Storage using Homer	9/3/2018	10/3/2018	Workshop	VIT	2
6.	Binu Ben Jose D R	FDP on Design of Renewable Energy Systems	22/03/2019	22/03/2019	FDP	Outside VIT	1
7.	Meera P S	Two day National seminar case studies of Power Management Strategies for Microgrid	29/4/2019	30/4/2019	Seminar	Outside VIT	2

S. No	Name of faculty	Name of the event	Date		FDP/ workshop / seminar	Name of Inst.	No of days
			From	To			
8.	Lavanya V	National seminar case studies of Power Management Strategies for Microgrid	29/4/2019	30/4/2019	Seminar	Outside VIT	2
9.	Krithiga S	Modelling and Simulation of Stand-alone and Grid-Connected Solar Photovoltaic Systems	3/5/2019	4/5/2019	Workshop	Outside VIT	2
10.	Angalaeswari S	Modelling and Simulation of Stand-alone and Grid-Connected Solar Photovoltaic Systems	3/5/2019	4/5/2019	workshop	Outside VIT	2

Lectures organised to enhance students' awareness

S. No	Name of Faculty	Title of Lecture	Date
1.	Joseph Daniel	Recent Trends in Solar Concentrators	8/11/2017
2.	Saleel Ismail	Energy Efficiency for Current and Future, Career Planning	7/2/2018
3.	Krithiga S	PV Technology and Systems	15/2/2018
4.	Shyam Kumar	Energy conservation and sustainable development in CPCL	21/2/2018
5.	Peer Fathima A	Energy Innovations A disruptive force for a better world	24/2/2018
6.	Gunabalan R	Recent trends in Solar concentrators	23/3/2018
7.	Angeline Ezhilarasi	Renewable Energy and Electric Vehicles - Future and Careers	23/8/2018

S. No	Name of Faculty	Title of Lecture	Date
8.	Sri Revathi B	Renewable Energy Sources and ocean renewable energy research	31/8/2018
9.	Gunabalan R	Induction generator for renewable energy applications	26/10/2018
10.	Vaidehi V	Energy Harvesting Cognitive Radio Network	20/12/2018
11.	Krithiga S	Renewable Energy sources	6/2/2019
12.	Gunabalan R	renewable energy and its applications	18/2/2019
13.	Vaithilingam C	Renewable Energy Penetrations - Smart Grid	14/3/2019

Extension activities relevant to SDGs (Reaching out Local Communities)

- a) **ENFUSE**- VIT student chapter sixth batch was inaugurated on 19/09/2018 at VIT Chennai by Dr A. Peer Fathima, Professor, School of Electrical Engineering, VIT and faculty coordinator and Mr S. Ramalingam, Chairman (Retd) CPCL, ENFUSE President. Mr S. Ramalingam delivered a special lecture on 'Energy Management-Emerging Challenges' for the benefit of the members. The meeting was attended by 52 students, who were later registered for membership. The event also included distribution of prizes to the winners of quiz programme held previously.



b) **VIT IAEMP** (Indian Association of Energy Management Professionals) Student Chapter was inaugurated at VIT Chennai on 23/02/2018 followed by two days National Level Workshop on 'Energy Management and Conservation'. The objective of the event was to create awareness related to energy among the youngsters.

c) **Ideathon on Energy Conservation and Management-** VIT IAEMP Student Chapter conducted its most awaited 12 hour ideathon on energy conservation and management in the campus on 14-12-2018 and 15-12-2018. The event was inaugurated by the Chief Guest Dr Apel Mahmud from Daikin University, Australia. The participants cracked clean energy solutions to some of the toughest problems given to them in the event.



d) **Energy Ambassador Program (EAP)-** is an interface among students, researchers, and professionals powered by IAEMP student chapter in VIT Chennai. The objective of the programme is to educate the students about the issues related to energy, its key aspects, and the various constraints involved in energy management via energy auditing.