2021

SDG-13: Take urgent action to combat climate change and its impacts

STATUS REPORT 2021 JAN- DEC 2021

CENTRE OF EXCELLENCE IN ENERGY SCIENCE AND TECHNOLOGY

Shoolini University

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Executive Summary

Shoolini University has prepared a well-researched National Document on the Implementation of United Nations Sustainable Development Goals (UNSDGs) in Higher Education Institutions in collaboration with Association of Indian Universities (AIU). Under this initiative a number of steps in awareness, education, research and transfer of technology have been taken to combat climate change and its impact by 2025. The use of renewable energy sources, reduction in the use of fossil fuels in transportation, community cooking, building design and construction have been taken. As per THE Global Impact Rankings announced in 2022 Shoolini University has bagged top No.2 global ranking for SDG 7 and No.6 in SDG 6 to related SDG-13. This report presents the status of implementation of UNSDG-13 and governing policy at Shoolini University, Solan, Himachal Pradesh, India during 2021 (Jan-Dec 2021).

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1. Introduction

As per the UN SDG-13 the main task is to take urgent action to combat Climate change and its impacts. The climate change has resulted in warmest decade, forest fires, droughts, floods, changed weather patterns, droughts, floods, changing sea levels and a number of other climate disasters affecting agriculture, food security, economy and lives of people all over the world. Thus, there is need for higher education institutions (HEIs) to combat the climate change by creating awareness, imparting education, action oriented research and policy initiatives. In this context, the Shoolini University has taken a number of steps to combat climate change and its impact by a number of measures like utilising renewable energy sources, reduction in the use of fossil fuels in transportation, community cooking, agriculture practices in developing appropriate drought resistant plant varieties.

This report presents the status of implementation of United Nations Sustainable Development Goal (SDG)-13 and governing policy at Shoolini University, Solan, Himachal Pradesh, India for the year 2021.

Shoolini University has established a Centre of Excellence in Energy Science & Technology (CEEST) in 2019 which is led by **Prof. Shyam Singh Chandel, Director who has been ranked among *top 2% scientists worldwide in the field of Energy as per Stanford University, USA ranking based on Career long research in 2020,2021,2022 continuously for the last three years***

Website links :

2020: https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000918

2021:https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/3

2022:**https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw**

Achievement of Centre of Excellence in Energy Science and Technology: 12 Rank in Energy in India 2021

Education in Energy & Climate Action

CEEST has introduced education at B.Tech (Renewable Energy Technology), Master in Energy Technology. Master in Climate Science and Sustainable Development and Ph.D in Energy, Renewable Energy and Climate Change concerns and, Sustainable development. **CEEST was ranked 12th in India for Energy and Climate related Research by SCIMAGO Institutes Rankings 2021**. The Centre's Scientists have a large number of publications in quality research journals. A large number of patents have already been filed through the same.

Website link: https://shooliniuniversity.com/center-of-excellence-in-energy-science-and-technology.

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Figure 1: CEEST was ranked 12th in Energy Research in Indian Universities as per SCIMAGO Rankings 2021

SCIMAGO Ranking Link:

https://www.scimagoir.com/rankings.php?country=IND&year=2015&area=2100&ranking=Overall&sector=Higher%20educ.

1.2 Research in Energy and Climate Action

A large number of research papers in these areas have been published in top ranking Journals which has led to top No.2 global ranking for SDG 7 & No.6 in SDG 6 for the University as per THE Global Impact Ranking in 2022.

Evidence:

SDG-7 Rank: https://www.timeshighereducation.com/rankings/impact/2022/affordable-and-clean-energy

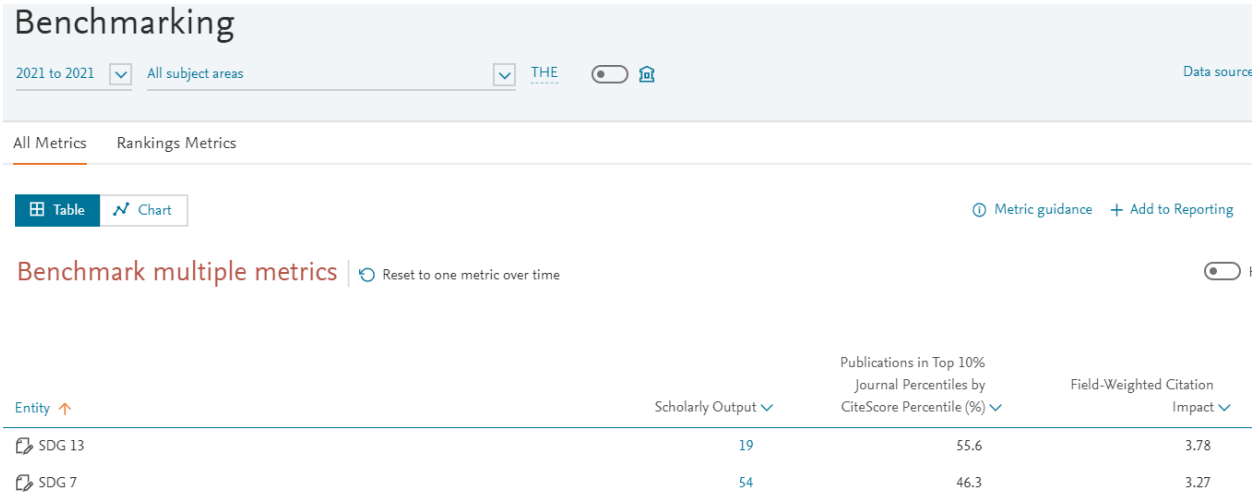
SDG-6 Rank: https://www.timeshighereducation.com/rankings/impact/2022/clean-water-and-sanitation

Research in Energy & Climate Action: FWCI metrics related to SDG-7 and 13 of Shoolini University:

SDG 7 FWCI: 3.27

SDG 13 FWCI :3.78

Evidence: SCIVAL



Entity	Scholarly Output	Publications in Top 10% Journal Percentiles by CiteScore Percentile (%)	Field-Weighted Citation Impact
SDG 13	19	55.6	3.78
SDG 7	54	46.3	3.27

Highlighted research of Centre of Excellence in Energy Science and Technology in 2021

https://solarbuildermag.com/news/better-solar-pv-output-prediction-model-shoolini-university-researchers-say-they-have-one/

(List of Research Publications related to SDG 7 and 13: Refer to Annexure-I.)

CEEST has catalysed the action on sustainable Development goals in the University by preparing a National Document on the Implementation of UN SDGs in Higher Education Institutions in India in collaboration with Association of Indian Universities (AIU) during 2021.

Already, a governing 'Energy and Environment Policy' has been formulated in 2019 to set the roadmap and required actions to make the University carbon neutral by 2025. The scientists are working in priority research areas on Climate change in Energy, especially use of renewable energy applications in Agriculture, Sciences, Engineering, Biotechnology, Food technology and Pharmacy. The main objective of these initiatives is to develop the University as a sustainable education and research hub and township to be model for the higher education Institutions in India.

2 Combating Climate Change Impact

According to UN, the global CO_2 emissions have risen by 6% in 2021, the highest ever recorded value. Climate funding fell short by USD 100 billion, indicating that not enough action is being taken in-spite-of commitment towards the same. It is estimated that over 700 million people will be displaced by 2030 due to droughts and sea levels are expected to rise 30-60 cm by 2100. The United Nations Sustainable Development Goal - 13 aims to combat climate change and urges a global effort to take urgent action to lower the environmental impact and switch to sustainable technologies and practices.

Shoolini University has been one of the early movers in adoption and implementation of SDGs in campus and had created the Energy and Environment policy in 2019 and set targets to be fully carbon neutral by 2025 through various measures like use of photovoltaic power, biogas, sustainable building materials, use of passive solar architecture, waste recycling, waste water recycling and purification, waste to energy, tree plantation in the campus, protecting adjoining Cir Pine forest from forest fires thus protecting the environment. Several measures have already been undertaken by the university which are highlighted in this report.

3 Towards Carbon Neutral Sustainable Campus through Mandatory Energy and Environment Policies

The Energy and Environment Policies align Shoolini University to achieve carbon neutral sustainable Campus by 2025 and main highlights of the policy are as follows:

Action plan:

- Installation of solar PV on grid and standalone power generation system in the university premises.
- Installation of solar water heating systems in the university premises.
- Installation of Concentrated Solar Technology based community Steam Cooking Systems for Hostels to save conventional fuels and building integrated cooking system.
- Installation of Solar Street lights for saving conventional electricity in the university campus.
- Installation of Bio-gas plants to generate power from the bio-residues like kitchen waste, cow dung or other wastes generated in the campus premises. Focus will be given to implementation of Biomass Gasification, Pyrolysis in the campus.
- Installation all energy efficient electrical or electronic devices/equipment/masonries in other to save energy in the campus.
- Measures to reduce vehicular pollution in the Campus. Restriction of heavy vehicles inside the campus during day time. For night movement of heavy vehicles necessary permission required from the competent authority.
- Promotion of shared Cab/Taxi and personal cars during office hours. Encourages faculty and students to use public transport.
- Promotion of electric vehicles/Carts in the university campus or not allowed to buy 1200 CC above cars for official uses.
- Initiation of regular annual tree plantation during ***Van Mahotsav*** (Forest Festival) in the campus and surrounding areas for CO_2 emission reduction.
- Installation of bamboo based and regular waste collection dustbins instead of plastic dustbins in the university campus. This generates income to local bamboo basket makers artisans also
- Implementation of waste recycling and waste treatment plant in the campus .

(For Energy policy refer to Annexure-II)
(For Environment policy refer to Annexure-III)

4 Disaster Management Policy

The university has an official Disaster Management Policy which is publicly available and directs all concerned activities of the university to take into account sustainable practices, energy efficiency and climate change mitigation. ***(Copy of the Disaster Management Policy is enclosed).*** The university has been conducting awareness activities on disaster management since 2019. The university also has a dedicated Centre for disaster management research.

Related links are as follows:

https://www.facebook.com/people/Disaster-Management-and-Climate-Change-Shoolini-University/100066612164487/?ref=page_internal&mt_nav=0

https://shooliniuniversity.com/research-centre-in-disaster-management

5 Lowering GHG Emissions by Solar Energy Production and Consumption

Under its Energy policy, Shoolini university has installed a 400 kWp rooftop photovoltaic power plant in the campus to partially meet its energy requirements. As an follow up , all the new buildings are planned to be constructed as energy efficient and solar PV grid integrated plants are planned. The electrical energy used by the university in 2021 was 10,77,700 kWh (3,880 GJ) and out of which 3,41,476 kWh (1229 GJ) was produced by the solar plant.

Figure 2: 400 kWp PV power plant installed in the university

6 Designing and constructing Low carbon footprint buildings-use of environment friendly Building materials

Under the mandatory Net Zero Energy and Passive Solar housing Policy, the university has developed a Yogananda Ville with a number of solar huts in the campus using sustainable building materials like wood, bamboo, slate, stone, mud, stabilized mud blocks etc. shown in figure-3 to 9.

Figure 3: Wooden huts /houses in Yogananda Ville at Shoolini University.

Figure 4: Bamboo and slate Roof E-Studio for online lectures constructed during Covid times

Figure 5: Living with Nature-Eco friendly Bamboo Tree Houses in the campus for student interaction

Figure 6: Use of Traditional and Climate responsive Building Materials -Two storeyed houses .

Figure 7: Sustainable building in Yogananda Ville at Shoolini University.

Figure 8: Sustainable Building and Electric Vehicle for transportation in Yognanda Ville in Shoolini University

Figure 9: Guest house in Yogananda Ville built with sustainable materials and low carbon footprint

7 Climate Responsive - Green Campus with Vegetation Coverage

The university has ensured that adequate area is kept under trees, plants, and flowery plantation cover for an environment friendly green campus. As a measure of maintaining a clean and green campus separate dustbins for biodegradable and non-biodegradable wastes have been fixed in every part of the university campus. The University has been declared as "Zero single use plastic" Campus as per the policy initiative taken in 2021.

Figure 10: Aerial view of Green Campus various academic blocks of Shoolini University with visible tree plantations and photovoltaic power plants installed.

8 Reducing Carbon emissions and fossil fuel consumption for Green Fossil fuel free transportation in the campus -use of electric carts

Non-polluting electric vehicles are used for in-campus transport as shown in figure-11.

Figure 11: Electric vehicles used for transport within the university campus to reduce carbon emissions.

9 Use of non-polluting Concentrated solar thermal cooking system and Biogas : An alternative to LPG, Coal ,Kerosine fuels

As a step from divestment from use of liquid petroleum gas (LPG) for cooking the university has installed a solar thermal cooking system that provides for cooking food for 500 students. Also, a 1.5 m^3 biogas plant is installed in the agricultural farm in the university that is used for cooking food by the employees working in the farm.

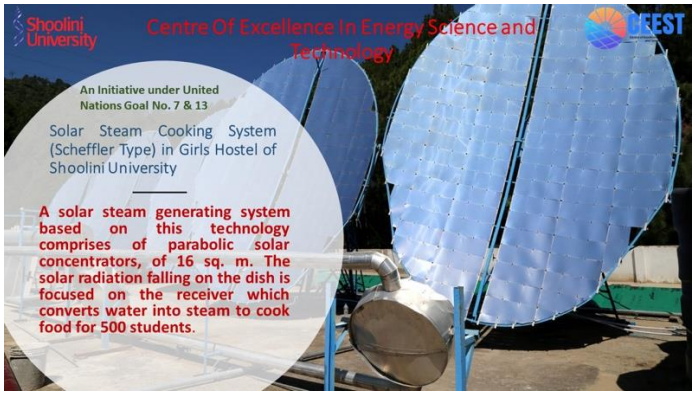


Figure 12: Steam cooking system for 500 students at Girls' hostel rooftop at Shoolini University

Figure 13: Biogas system installed in agricultural farm at Shoolini University

10 Reducing conventional electricity consumption by installing solar streetlights and LED lights in the campus

Solar streetlights are installed throughout the campus for lowering the dependence on conventional electricity and utilising clean energy sources. Also 90% of the university lights have been replaced with energy efficient LED lights.

Figure 14: Utilizing clean Solar energy -Solar street lights installed in the university Campus(left) and use of energy efficient LED lights inside the university buildings (right)

11 Monitoring solar, wind, and other Climate data for research

CEEST has installed a high quality automatic weather station on the roof top of the library building that monitors Global Solar Irradiance, Wind Speed, Wind Direction, Temperature, Relative Humidity, Rain fall data as well as photosynthetic active radiation which are critical for research and development of new Energy technologies, Climate Change related hence contributing towards research and development SDG-7 and SDG-13. The data are being used in boosting the reliable research and development of renewable energy technologies, by utilization of the renewable resources, and making plans for the sustainable township.

Figure 8: CEEST Automatic weather station installed at Shoolini University.

12 Wastewater Treatment and recycling plant

A Sewage Treatment Plant of capacity 3,50,000 lpd and Effluent Treatment Plant of 50,000 lpd capacity, are installed in the campus for the treatment of sewage water and waste water coming from the hostels and research laboratories respectively (figure-15). Recycled water is used for irrigation of gardens, fields and lawns.

Figure 15: Sewage and waste water treatment plant at Shoolini University

13 Conferences, Webinars and other activities related to the promotion of SDGs

Shoolini University conducts conferences, webinars and awareness programmes throughout the year to contribute for the fulfilment of SDGs. The university works with NGO 'Healing Himalayas' https://healinghimalayas.org/ to carry out various activities for environment action and sustainability. ***(Some of these activities are listed in Annexure-IV to VI).***

13.1 Existence of Programmes

The university has conducted workshops and a webinar series in the field of energy and environment management, clean energy and energy efficiency among the local community. CEEST faculty is also engaged in delivering lectures in external organizations to spread awareness and share knowledge regarding SDG-7,13 related technologies and issues. Details are provided as follows:

1) All India VC's Conference Related to SDG in collaboration with Association of Indian Universities (AIU) hosted by Shoolini University 26-27th Nov. 2021

The university actively promotes UN SDGs and is evident from the various programmes, courses and conferences conducted by the university. As a recent example, the North Zone Vice Chancellors (VCs) Conference sponsored by Association of Indian Universities and hosted by Shoolini University in November 2021 for promotion of role of Higher Education Institutes for implementing SDGs in their campuses and nearby region as well as with collaboration with the government and the industry. The conference was also streamed live on you tube and hosted over 150 VCs and large number of other participants from all over the country (List of research papers, conferences, webinars etc. Provided in Annexure-I, IV,V and VI).

News Link:
https://shooliniuniversity.com/news/north-zone-vcs-conference-opens-at-shoolini-university,
https://www.tribuneindia.com/news/chandigarh/over-150-vcs-to-attend-north-zone-aiu-meet-342796

Conference Link:
Day-1: *https://www.youtube.com/watch?v=eaurDVo0hhs*
Day-2: *https://www.youtube.com/watch?v=P3VIjrpkVeQ*

2) Centre of Excellence in Energy Science and Technology also conducts webinars related to SDG-7,13 and energy and Environment related topics:
https://www.facebook.com/ShooliniCEEST/
https://shooliniuniversity.com/center-of-excellence-in-energy-science-and-technology

13.2 Webinars conducted by CEEST's Webinar Series during 2021 are listed as follows:

SN	Speaker	Topic	Date & Time
1	Dr. Vivekanand	How Bioenergy and Circular Economy can work together	4th March 2021

	Malaviya National Institute of Technology MNIT Jaipur, Rajasthan, India		11:00PM-12:00PM
Video Link:	https://www.facebook.com/ShooliniCEEST		
2	Arpit Sharma, Aranca Mumbai Pvt. Ltd., India	Sustainable Energy and Environmental Issues and Solutions	11th March 2021 4:00PM-5:00PM
Video Link	https://www.facebook.com/ShooliniCEEST		
3	Dr. Aneesh Prabhakar, Malaviya National Institute of Technology MNIT Jaipur, Rajasthan, India	Testing Standards and Regulations in Li-Ion Batteries in Electric Vehicles	18th March 2021 4:00PM-5:00PM
Video Link	https://www.facebook.com/ShooliniCEEST		
4	Dr. Pawan Rekha, Malaviya National Institute of Technology MNIT Jaipur, Rajasthan, India	Sustainable Energy and Environmental Issues and Solutions	25th March 2021 4:00PM-5:00PM
	https://www.facebook.com/ShooliniCEEST		

13.3 Industrial Motivational Campaign on Alternate Materials for Single use Plastics by CEEST-MSME Technology Incubation Centre for Action for Climate Change and Environment Protection

13.4 Campaigns for Action for Climate Change and Environment Protection

- Campaigns organized by the students for clean city by cleaning the campus, surrounding areas, river, jungle, etc. a cleanathon was conducted at Potter Hills, Shimla on March 7, 21, a cleaning drive at Shimla on August 14, 2021, Gun Ki Ser- Clean-up on August 29, 2021.

- Campaigns organized by the students for Green City. The volunteers of NSS & SFY Club Shoolini University volunteered for the activity planted trees near the university campus. Tree plantation and Cleaning Drive on October 02, 2021.

- Campaigns organized by the students for Clean Water by Cleaning of Natural Water Resource. the area around water spring by removing all the plastic material thrown nearby. Volunteers removed and destroyed weed around the water resource and planted some herbal and useful trees around the water resource. Volunteers of NSS Shoolini University went to nearby village to clean the natural water resource on October 16, 2021.

Links for other energy and environmental awareness activities:

- *https://www.facebook.com/ShooliniCEEST/*

- https://shooliniuniversity.com/blog/world-environment-day-shoolini-takes-the-stage-to-raise-awareness/

- https://www.pinterest.com/pin/ceest--631700285229620703/
- https://www.instagram.com/p/CR1C8WZL-E7/

Working with NGOs for Climate Action and Environment Protection

The university works with NGO 'Healing Himalayas' https://healinghimalayas.org/ to carry out various activities for environment action and sustainability. Some of the activities related to the same are given below:
https://thenewshimachal.com/2021/08/cleanliness-drive-3-5-mt-solid-waste-collected-from-shimla/

https://alumni.shooliniuniversity.com/f/healinghimalayas-shooliniuniversity-8271
https://twitter.com/healinghimalaya/status/1106466213939560448

https://www.youtube.com/watch?v=lq_Dxf5h9dw

https://www.instagram.com/healinghimalayas/?hl=en