



**MANAV RACHNA
UNIVERSITY**

Declared as State Private University vide Haryana Act 26 of 2014



PROGRESS REPORT 2022-23

Manav Rachna University

Declared as State Private University vide Haryana
Act 26 of 2014





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1. Preamble

Having been conceived on the lines of the SDG- 7 on affordable clean energy, Sahrita thrives on the peaceful cohabitation of the mankind with its natural environment to build upon an ecosystem that is nurtured on the foundations of faith in the bylaws of Mother Nature. The claws of human growth and development have started to dig deep into the sustainability and impeding the equilibrium which was once shared between mankind and nature. By embracing effective smart campus strategies, MRU ensures staying on the due course of sustainability and relevance, thereby enhancing the experience for students, faculty, administrators, and researchers, as well as for the surrounding community in which we all coexist. At present, as the world wobbles on the broken trajectory of fatiguing natural resources, melting glaciers, rising temperatures and bleak support systems for human race after constant exploitation, MRU under Sahrita ushers an optimism to restore the lost balance through its persistent endeavours. Sahrita, hence, becomes a ray of hope in reinstating the lost balance by thriving on the golden principle of



saving for our future generations with the efforts of our digitally native students.

2. Aim and Scope

The aim of the SOP on Energy Conservation includes establishing guidelines and procedures to ensure that energy is conserved and used efficiently throughout the campus and to identify and prioritize energy conservation initiatives based on the potential for cost savings and environmental impact. Various measures adopted by the university include:

- To create awareness and educate staff, contractors, and visitors about the importance of energy conservation and how to achieve it.
- To promote the use of renewable energy sources and encourage the adoption of energy-efficient technologies and practices.
- To establish roles and responsibilities for all staff, contractors, and visitors to ensure compliance with the SOP and to promote a culture of energy conservation on campus.
- To conduct an energy audit to identify areas of high energy consumption and potential areas for improvement and to establish procedures and



practices that encourage energy conservation, such as turning off lights and equipment when not in use.

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- To establish roles and responsibilities for all staff, contractors, and visitors to ensure compliance with the SOP and to promote a culture of energy conservation on campus.
- To conduct an energy audit to identify areas of high energy consumption and potential areas for improvement and to establish procedures and practices that encourage energy conservation, such as turning off lights and equipment when not in use, setting thermostats to energy-saving temperatures, and using energy-efficient equipment and appliances.
- To provide training and education to faculty, staff, and students on the importance of energy conservation and how they can contribute to the effort through workshops, seminars, and other forms of communication.
- Implement energy-saving technologies, such as LED lighting, motion



sensors, and energy-efficient Heating, Ventilation, and Air Conditioning (HVAC) systems, to reduce energy consumption and costs.

Following practices promoting a culture of energy conservation are followed. It is the responsibility of all the stakeholders to comply with these guidelines and to adopt energy-efficient practices.

- Switch off all energy-consuming equipment, including lights, personal computers, and other equipment, and air conditioners of offices, classrooms, and laboratories, when not in use.
- Close doors and windows of air-conditioned rooms in the building to prevent loss of warm/cool air and conserve energy.
- Use daylighting in rooms and offices during work rather than constant overhead lighting to reduce energy usage.
- Prohibit the use of personal electric heaters in offices or any other areas of the building as they consume a significant amount of energy.
- ACs should only be operated when necessary and at optimal temperatures to save energy and reduce costs.
- Replace the conventional CFLs and other light bulbs with energy-efficient



LEDs in classrooms, laboratories, offices, and other areas of the university.

- Use motion sensors/timers to automatically control lighting in areas where occupancy is intermittent or irregular.
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- Use motion sensors/timers to automatically control lighting in areas where occupancy is intermittent or irregular.
- Report temperature issues promptly to address them to minimize energy wastage and maintain a comfortable environment for students, faculty, and staff.
- Purchase energy-efficient/Star-rated electrical and electronic equipment and appliances to ensure energy conservation and minimal energy use.
- Promote practices like carpooling, and the university transport/bus service and public transportation system and sharing the related information on the university website, etc. to make it easier for students and employees to use these services. Provide convenient bicycle parking facilities on campus as an alternative means of transportation.

Encourage walking as an alternative to driving for short distances within the campus by providing clear and safe pedestrian pathways.



3. Introduction

Sustainable Development Goal 7 (SDG 7) aims to "ensure access to affordable, reliable, sustainable, and modern energy for all." Energy is essential for economic development, poverty reduction, and overall well-being. It powers industries, provides lighting, fuels transportation, and supports modern living. However, the world faces significant disparities in energy access, especially in low-income countries. The goal of SDG 7 is to transition to sustainable energy solutions, reduce the environmental impact of energy production, and ensure that everyone, regardless of geographic location or income level, has access to reliable and clean energy sources.

- Current Scenario on Affordable and Clean Energy

The global energy landscape is characterized by a heavy reliance on fossil fuels, which are responsible for significant greenhouse gas emissions and environmental degradation. Although renewable energy sources such as solar, wind, and hydropower have grown in importance, they still account for a small fraction of total global energy consumption. According to the International Energy Agency (IEA), about 759 million people worldwide still lack access to electricity, and 2.6 billion people rely on traditional biomass for cooking, which



has serious health and environmental implications. In many parts of the world, especially in sub-Saharan Africa and rural areas, energy access is limited, and there is a heavy dependence on non-renewable energy sources.

At the same time, many developed countries are making strides toward energy transitions by investing in cleaner and more sustainable energy systems. However, the transition to affordable and clean energy remains uneven, and global energy consumption continues to increase. As energy demands rise, ensuring that the world's population has access to reliable, clean, and affordable energy becomes a complex and pressing challenge.

Challenges in Achieving Affordable and Clean Energy

- **Energy Inequality:** Many people, especially in rural and remote areas, lack reliable access to electricity. This disparity is most evident in developing countries, where energy infrastructure is either insufficient or non-existent.
- **High Costs of Clean Energy Infrastructure:** The initial investment required for renewable energy technologies such as solar and wind power can be prohibitively high for low-income countries or communities, making the transition to clean energy challenging.



- **Fossil Fuel Dependency:** Many countries, particularly in the developing world, still rely heavily on fossil fuels for their energy needs. Transitioning away from fossil fuels to cleaner energy sources requires significant policy changes, infrastructure investments, and technological innovations.

Strategies and Interventions

- **Investing in Renewable Energy Sources:** Increasing investment in solar, wind, hydro, and other renewable energy sources is essential for reducing reliance on fossil fuels. Governments and international organizations must incentivize the adoption of renewable energy through subsidies and grants.
- **Promoting Energy Efficiency:** Implementing energy-saving technologies in industries, homes, and transportation can reduce overall energy demand. Policies to promote energy-efficient appliances and construction materials will help lower the carbon footprint.
- **Improving Energy Storage Solutions:** Advancing battery technologies and other energy storage systems will help mitigate the intermittency of renewable energy sources like solar and wind. Investments in energy storage infrastructure are key for maintaining a reliable energy supply.



On December 10, 2022, the Manav Rachna Centre for Peace and Sustainability (MRCPS), in collaboration with the Dr. OP Bhalla Foundation and Green Warriors, launched the "Switch Me Off" initiative to raise awareness about energy conservation. The event coincided with National Energy Conservation Day and aimed to encourage responsible energy usage across the Manav Rachna University (MRU) campus. A Sticker/Tag design competition was held earlier, where students created designs for door tags reminding people to switch off lights and fans when leaving rooms. The initiative was well-received, with many faculty members pledging to contribute to energy-saving efforts by being mindful of their energy consumption. This event supported Sustainable Development Goal 6, which focuses on clean water and sanitation, emphasizing the need for responsible resource usage.

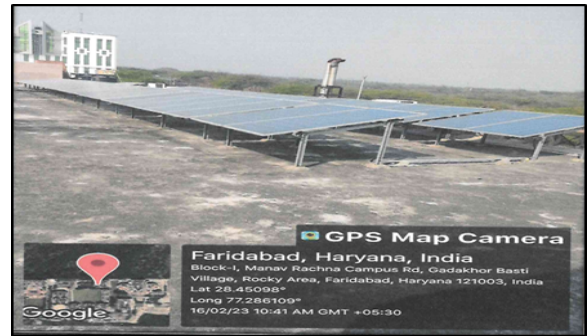
Manav Rachna University has different facilities for alternate sources of energy and energy conservation measures:

- ❖ Solar energy
- ❖ Biogas plant
- ❖ Wheeling to the Grid

- ❖ Sensor-based energy conservation
- ❖ Use of LED bulbs/power-efficient equipment



Solar Panel (Roof Top K-Block)



Solar Panel (Roof Top L-Block)



Water controller sensor



VRV AC system in classroom



Sensor based light



LED Light in block



Manav Rachna University (MRU) has implemented a range of innovative initiatives focused on energy conservation and the use of alternative energy sources. These efforts align with the university's commitment to sustainability, reducing carbon emissions, and promoting environmental stewardship. By integrating renewable energy technologies and energy-efficient systems, MRU is setting an example of how educational institutions can lead the way in adopting green practices.

- I. Solar Energy Initiative:** MRU has installed solar photovoltaic panels on campus to harness the power of the sun and reduce its reliance on grid electricity. The solar plant has a capacity of 68.8kWP, and it produces approx. 3000 unit power generated using solar power in University. Solar energy is used to meet a significant portion of the university's energy needs during daylight hours.

Impact:

- **Renewable Energy Generation:** Solar power helps reduce the university's carbon footprint by providing a clean source of energy.
- **Cost Savings:** Solar energy reduces electricity costs by supplementing the



campus's power requirements.

- **Environmental Benefits:** Solar power generation has no direct emissions, making it an environmentally friendly choice.

II. Biogas Plant

Initiative: MRU has set up a biogas plant to process organic waste, such as food scraps and agricultural residue, and convert it into biogas. Manav Rachna University has a biogas plant on campus, which produces biogas from a mixture of food waste, agricultural residues, and animal manure. The biogas plant has a capacity of 2 cubic meters, and it produces approximately 2.8 gms of biogas per week. The biogas is stored in a gas holder. This biogas is used for cooking and electricity generation, contributing to the university's energy needs.

Impact:

Waste-to-Energy: The biogas plant helps recycle organic waste and convert it into useful energy, promoting a circular economy.

Reduction of Landfill Waste: The plant helps reduce the amount of organic waste sent to landfills, minimizing methane emissions.



Sustainable Energy Source: By utilizing biogas, MRU decreases its dependence on conventional fossil fuels.

III. Wheeling to the Grid

Initiative: Through wheeling, MRU feeds excess energy generated from renewable sources, such as solar, back into the national grid. This system allows the university to contribute to the broader energy grid while also receiving credits or compensation for the energy supplied.

Impact:

- **Optimized Energy Use:** Surplus energy is not wasted but is fed back to the grid, maximizing the utility of the energy produced.
- **Promotion of Renewable Energy:** By sharing its renewable energy, MRU helps support the use of clean energy at a national scale.
- **Financial Benefits:** Wheeling to the grid provides economic returns, helping reduce the university's overall energy expenditure.



IV. Sensor-Based Energy Conservation

Initiative: MRU has installed sensor-based systems throughout the campus, including motion sensors for lighting and occupancy sensors for heating, ventilation, and air conditioning (HVAC) systems. These sensors automatically regulate energy usage based on occupancy, ensuring that energy is not wasted.

Impact:

- **Energy Efficiency:** Sensor-based systems significantly reduce energy consumption by ensuring lights and HVAC systems are only in use when necessary.
- **Cost Reduction:** Automated energy management systems help lower electricity bills.
- **Smart Energy Management:** These systems contribute to a more sustainable and efficient energy consumption model on campus.

V. Use of LED Bulbs and Power-Efficient Equipment

Initiative: The university has made a transition to LED bulbs and energy-efficient equipment throughout the campus. LED lights consume less electricity and have a longer lifespan than traditional incandescent or



fluorescent lights. Additionally, MRU uses energy-efficient appliances and equipment to reduce power consumption.

Impact:

- **Lower Energy Consumption:** LED bulbs and energy-efficient appliances consume significantly less power, reducing the overall electricity demand.
- **Extended Equipment Lifespan:** LED bulbs and energy-efficient devices have a longer operational life, reducing the frequency of replacements and resource use.
- **Cost Savings:** These energy-efficient solutions contribute to significant long-term savings on electricity bills.

Manav Rachna University's energy conservation measures and use of alternative energy sources reflect its commitment to sustainability, resource efficiency, and environmental responsibility. The university's initiatives help reduce its reliance on conventional energy sources, lower greenhouse gas emissions, and promote the use of clean, renewable energy. These efforts not only contribute to the global fight against climate change but also provide practical learning opportunities for students, enabling them to experience sustainable technologies



and solutions firsthand. Through these initiatives, MRU demonstrates that educational institutions can play a pivotal role in fostering energy efficiency, advancing renewable energy adoption, and setting a sustainable example for the broader community. These practices also align with national goals for energy conservation and sustainable development, promoting a greener, more energy-efficient future.

4. Audit Certificates

This certification indicates that MRU has undergone rigorous assessments of its energy consumption, environmental impact, and sustainability efforts across campus operations. The audits evaluate the university's practices in energy efficiency, resource management, waste reduction, and environmental conservation, verifying that MRU meets or exceeds recognized standards in these areas.

The certification includes three primary components:

- **Energy Audit:** Focuses on assessing the university's energy consumption patterns and identifying opportunities for energy savings through



improved efficiency and the adoption of renewable energy sources.

- **Green Audit:** Examines the implementation of sustainable practices across campus, such as the use of green building materials, sustainable landscaping, waste management strategies, and eco-friendly technologies.
- **Environmental Audit:** Provides a comprehensive evaluation of the university’s overall environmental impact, including its carbon footprint, waste management systems, water conservation practices, and broader sustainability initiatives.
- By obtaining this certification, MRU demonstrates that it is not only committed to reducing its environmental footprint but is also taking concrete steps toward creating a more energy-efficient and sustainable campus.





- Energy Audit Analysis
- Energy Consumption

2021-22				
Month	Grid Units	Solar Units	Total Units	Amount
July 2021- June 2022	14,33,627	94,652	15,28,279	95,33,616.2
2022-23				



Month	Grid Units	Solar Units	Total Units	Amount
July 2022 - June 2023	851445	94964	946409	56,62,109

Table: Comparison of Electricity consumption and Total bill amount

Diesel Consumption

S. No.	Particular	Session	
		2021-22	2022-23
1	Diesel Consumption (in litres)	18165	13000

- **Analysis of DG Sets**

S. No.	Particular	Session	
		2021-22	2022-23
1	DG Set Capacity	1500 kVA	250 kVA
2	Operating hours during testing	0.50 hrs	0.50 hrs



3	% loading	63.58%	62.78%
4	Energy Generation	35.73kWh	34.96 kWh
5	Load	91.34 kVA	91.14 kVA
6	Fuel consumption during testing	10 ltr	10 ltr
7	Specific energy generation	3.34 kWh/litre	3.28 kWh/litre

- **AC System**

Energy Efficiency Ratio (EER): EER is a measure of the efficiency of smaller chillers and rooftop units. It's calculated by dividing the cooling capacity (Btu/h) by the power input (watts) at full-load conditions. A higher EER indicates a more efficient unit.

Cooling Effect

- The cooling effect is quantified in tons of refrigeration (TR).
- 1 TR is equivalent to 12,000 Btu/h.



- There are various Split AC units installed in different areas of Manav Rachna University. The following table provides details about the installed units:

S. No.	Particular	Session	
		2021-22	2022-23
1	Energy Efficiency Ratio (EER)	2.04	2.07

- **Fan Analysis**

S. No.	Identification	Session	
		2021-22	2022-23
1	Total No. of ceiling Fan	1567 No.	1703 No.
2	Total No. of ceiling Fans (50W)	NA	720 No.
3	Total No. of ceiling Fans (60W)	1297 No.	856 No.



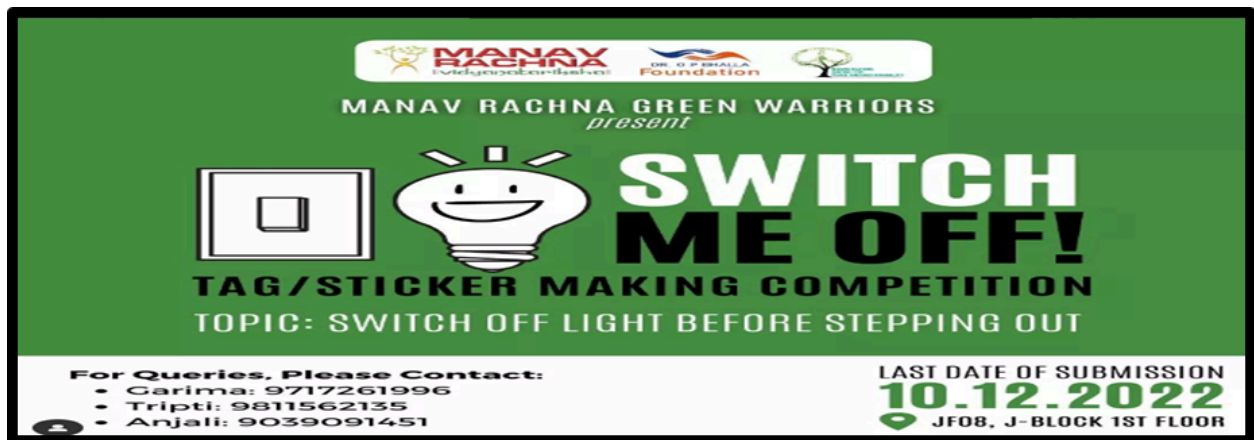
4	Total wattage of 50 W ceiling Fans	NA	36000 Watt
5	Total wattage of 60 W ceiling Fans	94020 Watt	51360 Watt
6	Total wattage of BEE 5 star rated Fans (30W)	47010 Watt	21600 Watt
7	Total saving in Wattage after replacement	47010 Watt	65760 Watt
8	Operating hours per day	8 Hrs	8 Hrs
9	Operating days per annum	180 Days	196 Days
10	Energy Charges per unit in Rs.	6.65 INR	6.65 INR
11	Saving in Rs./annum	450167.76 INR	685693 INR
12	Investment INR	4701000 INR	394000 INR
13	Payback Period: Months	10.44 Years	5.75 Years



- The energy audit demonstrates that the university has made substantial strides in energy efficiency, renewable energy adoption, and operational improvements. Continued focus on energy-efficient upgrades, particularly in air conditioning, lighting, and solar energy, will lead to further cost savings, environmental benefits, and long-term sustainability.

5. Event Reports

SWITCH ME OFF: DISTRIBUTING TAGS FOR SAVING ELECTRICITY AT DEPARTMENTS



Purpose:

The initiative aimed to raise awareness about the importance of energy conservation among the Manav Rachna community.



About the event:

On the occasion of National Energy Conservation Day, Green Warriors, in collaboration with Dr. OP Bhalla Foundation and Manav Rachna Centre for Peace & Sustainability, organized the "Switch it Off" energy conservation initiative. The primary objective of this initiative was to raise awareness about energy conservation and encourage responsible energy usage within the Manav Rachna University (MRU) campus. Sticker or Tag Designing Competition (December 5, 2022): The initiative commenced with a Sticker or Tag Designing Competition. Students were tasked with creating informative door tags reminding people to turn off lights before leaving a room. The winning design was selected for reproduction and distribution. The competition winner was Anushka Priya from the Faculty of Applied Health Sciences, whose design was chosen for mass production.

Energy Conservation Day (December 14, 2022): On National Energy Conservation Day, volunteers from Green Warriors and the MRU campus actively participated in the initiative. They distributed the door tags in staff rooms and offices across the campus. These tags served as visual reminders for faculty and staff members



to switch off lights and fans when leaving a room. The initiative received positive feedback from the faculty and staff members at MRU, who appreciated the efforts to promote energy conservation. Many of them pledged to take responsibility for conserving energy by ensuring lights and fans were switched off when rooms were unoccupied.



Students distributing cards and making staff aware



VISIT TO NATIONAL INSTITUTE OF SOLAR ENERGY (NISE)



Date: March 6, 2023

Venue: National Institute of Solar Energy, Faridabad

Purpose:

On the occasion of World Sustainable Energy Day, the team from Manav Rachna Centre for Peace & Sustainability & Dr. OP Bhalla Foundation organized an educational visit to the National Institute of Solar Energy (NISE) in Gurgaon. The aim of the visit was to provide students with insights into solar energy solutions, renewable resources, and the importance of sustainable energy practices.



About the event:

Introduction to NISE: The visit began with an introduction to NISE, emphasizing its role as an R&D facility specializing in solar energy solutions. NISE's focus on designing solar-powered equipment to address electricity, food storage, and water management challenges was highlighted.

Insights into Renewable Resources: The scientists and experts at NISE provided valuable insights into India's renewable energy potential, especially in the context of the ongoing coal crisis. They explained how harnessing renewable resources like solar energy could play a pivotal role in addressing energy needs while minimizing environmental impact.

Solar-Powered Equipment: During the visit, students had the opportunity to witness various solar-powered equipment used for electricity production and storage. They were given practical demonstrations of how these technologies operate and contribute to sustainable energy practices.

Motivation for Sustainable Practices: The visit aimed to instill a sense of responsibility among students. They were motivated to consider the importance of sustainable energy practices and how the present generation plays a crucial



role in preserving planetary resources.

The educational visit to the National Institute of Solar Energy provided students with a deeper understanding of sustainable energy solutions and the significance of renewable resources. By witnessing the practical applications of solar-powered equipment, students were inspired to contribute to the goal of sustainable and environmentally friendly energy practices. Such visits are essential in nurturing future leaders who are committed to addressing energy challenges while safeguarding the environment.



Learning about solar panels

PLANTATION DRIVE AT GOVT. SCHOOLS



Date: August 27, 2022

Venue: Govt School NIT-3, Govt School Sirohi

Purpose:

The primary objective of the Annual Mega Plantation Drive was to create awareness about the importance of afforestation and environmental conservation. By distributing 3000 plants, the initiative aimed to contribute significantly to increasing green cover in the region.

The Green Oath taken by the participants emphasized the need for individual



and collective efforts in preserving the environment.

About the event:

Manav Rachna Green Warriors, in collaboration with Dr. OP Bhalla Foundation and Manav Rachna Centre for Peace and Sustainability, conducted their Annual Mega Plantation Drive. This initiative aimed to contribute to environmental conservation and raise awareness about the importance of afforestation and a clean environment. The drive involved the distribution of 3000 plants to various educational institutions and communities.

The Annual Mega Plantation Drive organized by Manav Rachna Green Warriors, in collaboration with Dr. OP Bhalla Foundation and Manav Rachna Centre for Peace and Sustainability, was a commendable effort to promote environmental conservation.

By distributing a large number of plants and encouraging participants to take a Green Oath, the initiative not only contributed to a greener environment but also inspired individuals to be responsible stewards of nature. Such endeavors play a vital role in fostering a sense of environmental responsibility and sustainability within communities and educational institutions.



Motivating school students to water the plants in school and distributing prizes for games



Distributing plants and taking environment pledge with students

A plantation drive linked with energy conservation is a holistic approach to addressing environmental and energy challenges. Through careful planning, strategic tree planting, and community involvement, this initiative can reduce



energy consumption, improve local climates, and foster a more sustainable future. The integration of green infrastructure can play a pivotal role in mitigating climate change and ensuring more resilient, energy-efficient communities.

PRESENTATION OF PROJECTS TO SUPPORT SUSTAINABILITY

Date: April 11, 2023

Venue: G block Mandala. Manav Rachna University

Purpose:

The primary aim of the "Leaps Hub Challenge" presented at Youth Sustainathon is to foster innovative projects that support a sustainable future. Through the Leadership and Entrepreneurship program initiated by the Global Peace Foundation in Kenya, this event aims to guide highly motivated students in acquiring the knowledge and skills necessary to start a business or establish a social enterprise. By focusing on employability and work readiness skills, such as CV development, job interview presentation, and office etiquette, the program empowers young innovators to become self-reliant. The event aspires to nurture



and celebrate these forward-thinking individuals by providing them with a platform to present their innovative projects, gain mentorship, and compete for recognition and cash prizes.

About the Event:

The "Leaps Hub Challenge" is an integral part of the Youth Sustainathon, a unique event that brings together inter-college students and young entrepreneurs from diverse academic backgrounds and regions. The initiative of Leap Hubs, led by the Global Peace Foundation, operates as a comprehensive leadership and entrepreneurship program designed to prepare students for the dynamic world of business and social entrepreneurship.

The event kicked off on Day 1 of the 2023 Global Peace Leadership Conference, hosted at Manav Rachna University. Selected teams comprising students from Netaji Subhash University of Technology, Manav Rachna International Institute of Research and Studies, Manav Rachna University, and Symbiosis Law School in Delhi, Haryana, and Uttar Pradesh, along with their respective schools, participated in the competition.

These young talents showcased a diverse range of projects, each focused on



addressing critical societal and environmental issues. Some of the projects included innovations in diabetic care, lung cancer treatment, a vehicle breathalyzer designed to disable the car when alcohol is detected, a nitrogen biosensor for identifying environmental hazards, and a compact chimney for safe and cost-effective ventilation of kitchen cooking units.

The event brought together academicians, venture capitalists, and civil administrators who served as the jury, evaluating the projects based on their feasibility, innovation, and potential impact. Cash prizes were awarded to the winning entries, recognizing the exceptional efforts and forward-thinking solutions presented by these young innovators. The 'Leaps Hub Challenge' stands as a testament to the power of youth-driven innovation and its potential to shape a more sustainable and prosperous future.

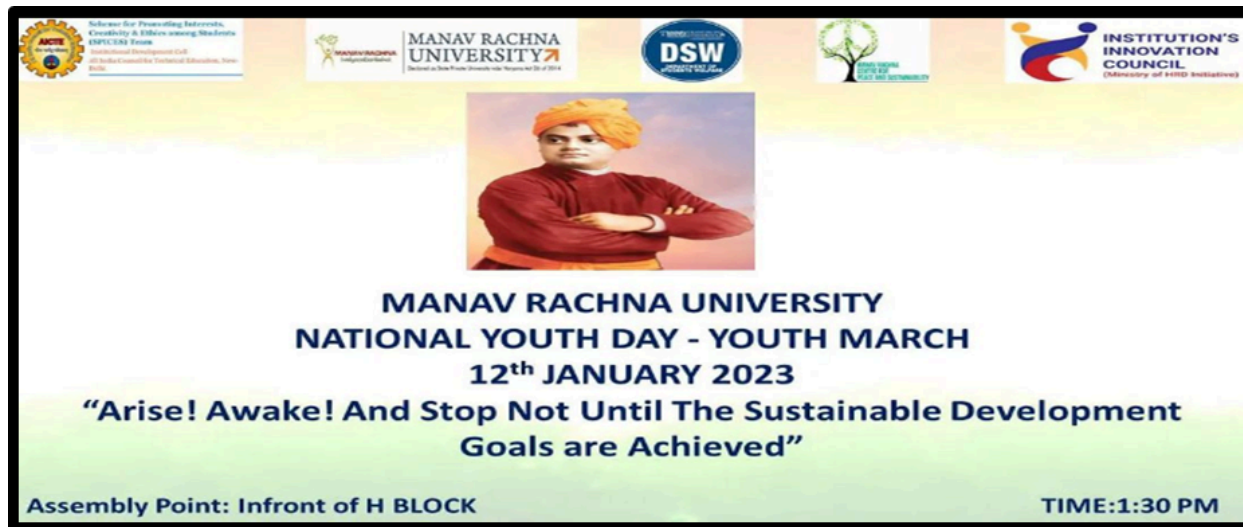




Students presenting their ideas



YOUTH MARCH FOR SUSTAINABILITY



Purpose:

The Youth March aimed to commemorate National Youth Day and celebrate the spirit of youth by channelling it towards meaningful goals. It sought to inspire the younger generation with the teachings and philosophy of Swami Vivekananda and motivate them to actively contribute to sustainable development.

About the event:

On January 12, 2023, in celebration of National Youth Day, Manav Rachna University, in collaboration with the Department of Student Welfare and the



Manav Rachna Centre for Peace & Sustainability, organized a significant event known as the "Youth March." The primary objective of this Youth March was to motivate, encourage, and unite young individuals, inspiring them with the learnings of Swami Vivekananda, and focusing their energy on achieving Sustainable Development Goals (SDGs) for a greener and better future.

The Youth March organized by Manav Rachna University in collaboration with the Department of Student Welfare and the Manav Rachna Centre for Peace & Sustainability was a remarkable and impactful event. It celebrated the spirit of youth and sought to channel it towards the inspirational teachings of Swami Vivekananda and the pursuit of Sustainable Development Goals. The event's success was a testament to the enthusiasm and commitment of young participants who actively engaged in discussions, activities, and marches to promote a greener and better future.

This Youth March served as a reminder that young individuals are a driving force for positive change in society. By harnessing their energy, passion, and commitment, we can address pressing global issues and work towards a more sustainable and harmonious world. The collaboration between educational



institutions and departments dedicated to student welfare and sustainability underscores the importance of nurturing the next generation's potential to lead and inspire change.



The Youth March for Sustainability focusing on Energy Conservation presents an exciting opportunity to mobilize young people globally to take action on one of the most important issues of our time. Energy conservation is key to achieving sustainability, mitigating climate change, and preserving our planet for future generations.

By uniting under the banner of energy conservation, young people can demand policies that promote energy efficiency,



renewable energy adoption, and sustainable energy practices across all sectors of society. Together, they can inspire real change, not just through their voices, but through their actions. This march will ignite the youth-driven movement towards a world where energy is used wisely, efficiently, and sustainably—ensuring a cleaner, greener, and more energy-resilient future for all.

PLANTATION DRIVE IN FRONT OF HOSTEL, SECTOR 21

Purpose:

The aim of the collaborative plantation drive at Sector 45, Faridabad, was to foster a greener, sustainable tomorrow by uniting volunteers from the Dr OP Bhalla Foundation, MRCPS, and students from DSW-MRU in creating a vibrant Green Belt.

About the event:

On the 17th of July, 2023, a remarkable collaboration unfolded between the Dr OP Bhalla Foundation and the Centre for Peace and Sustainability, culminating in a spectacular plantation drive at Sector 45, Faridabad. This eco-centric initiative



took root just outside the newly inaugurated Off-Campus Hostel, as volunteers from the Foundation, the MRCPS, and passionate students from DSW-MRU converged to create a vibrant Green Belt in the heart of the community.

The day was not only marked by the physical act of planting trees but also by an uplifting address from Dr NC Wadhwa, whose words resonated with the gathering. His insightful discourse emphasized the paramount significance of Tree Plantation, inspiring all present to take a heartfelt Green Oath—a commitment to nurturing our planet and safeguarding its precious environment.

The event was graced by esteemed personalities, including the Dean-DSW-MRU and the dedicated Team Foundation. Their presence added an extra layer of significance to the occasion, reinforcing the collective commitment towards a greener, sustainable tomorrow. As we march forward together on this journey, let's carry the spirit of tree planting and environmental stewardship with us. Together, through such initiatives, we can continue to make a positive difference in the world around us.



Planting saplings

A Plantation Drive focused on Energy Conservation not only contributes to global climate goals by enhancing carbon sequestration but also creates a more energy-efficient environment at the local level. By strategically planting trees, we can reduce the need for energy-intensive cooling, mitigate climate change, and promote a sustainable energy future.

The integration of green spaces into urban areas, schools, homes, and businesses enhances the natural environment while reducing the strain on energy systems. Trees are a natural, low-cost solution to energy conservation that can lead to long-term savings, improved air quality, and a more resilient climate.

By aligning plantation drives with energy conservation, we are not just planting trees; we are planting the seeds for a more sustainable, energy-efficient world.

RAREFIED: POSTER & SLOGAN COMPETITION ON ENVIRONMENT



Title: Rarefied: Poster & Slogan Competition on environment

Date: June 1, 2022

Purpose of the event:

The event titled "Save the Vanishing Treasures" was initiated with a clear purpose: to raise awareness about the alarming decline in biodiversity and the endangerment of various species.

About the Event:

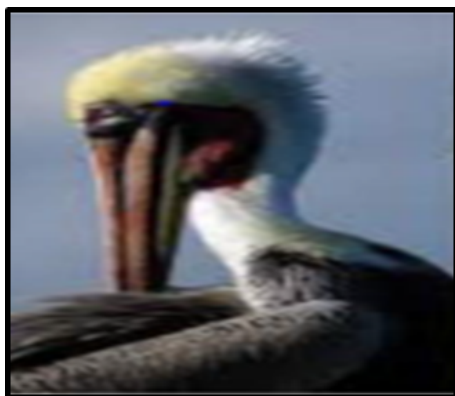
The event was designed to engage participants in a creative exploration of the theme "Save the Vanishing Treasures." Participants were encouraged to

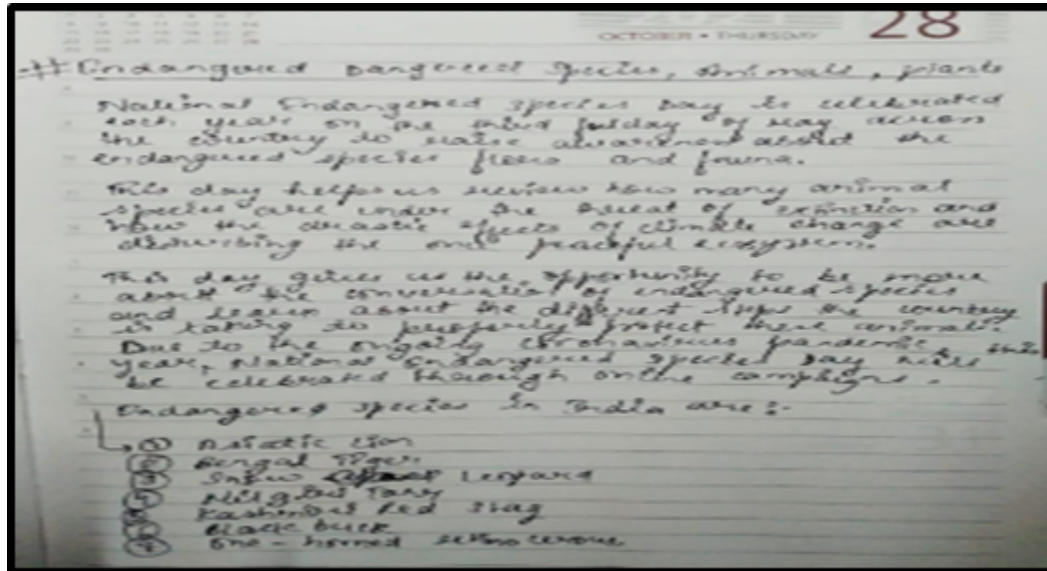


contribute either a picture related to the given themes or a written piece about a species in any creative form that resonated with them. The event's themes encompassed the following:

Endangered Species of Animals, Birds, and Plants in the Surroundings: Participants were tasked with identifying and showcasing species within their surroundings that are currently classified as endangered. This theme prompted individuals to delve into their local ecosystems and draw attention to species facing critical threats.

Unique Birds, Animals, Vegetables, and Fruits in the Surrounding Area: This theme encouraged participants to explore and celebrate the uniqueness of the natural world in their vicinity. From distinctive wildlife to indigenous plant varieties and local produce, participants had the opportunity to shed light on the lesser-known but valuable treasures of their surroundings.





The Rarefied Poster & Slogan Competition on Environment, mapped with Energy Conservation, serves as an excellent platform to engage people, especially youth, in spreading the message of energy efficiency and sustainability. Art and creativity can communicate complex ideas in simple, visually appealing ways that resonate with a wide audience.

By focusing the competition on energy conservation, participants not only raise awareness but also inspire action—whether it's turning off lights, switching to energy-efficient appliances, or pushing for policies that promote renewable energy. Through this initiative, we can encourage the adoption of more



energy-conscious lifestyles and take meaningful steps toward a more sustainable, energy-efficient future.

SUSTAINATHON INTERCOLLEGE



Date: April 11, 2023

Purpose:

The primary purpose of the Sustainathon, organized by Manav Rachna University in collaboration with the Global Peace Foundation, was to empower and educate students on two interconnected pillars of a better world: sustainability and global peace leadership.



About the event:

The Sustainathon cum Global Peace Leadership Conference, held at the prestigious Le Meridien Hotel in Delhi and organized by Manav Rachna University in collaboration with the Global Peace Foundation, was a dynamic and transformative event. Over the course of three days, it provided a vibrant platform for students, scholars, and experts from diverse backgrounds to converge and engage in meaningful discussions and activities.

Hon. Dr. Amit Bhalla sir addressed students first regarding sustainability.

With a focus on sustainability and global peace leadership, the event featured inspiring keynote speeches, interactive workshops, thought-provoking panel discussions, and student presentations. Attendees had the unique opportunity to explore innovative solutions to some of the world's most pressing challenges, share their research and ideas, and connect with like-minded individuals committed to creating a more sustainable and peaceful world.

The event was not only an educational experience but also a celebration of the collective efforts to drive positive change and leave a lasting impact on society and the environment. The Sustainathon Org organized by Manav Rachna



University in collaboration with the Global Peace Foundation was a resounding success. The event facilitated valuable discussions, knowledge sharing, and networking opportunities, all of which contribute to the broader goal of fostering a sustainable and peaceful world.

We would like to extend our gratitude to Dr. Markendey Rai, Dr. Hyun Moon, and all the delegates who made this event possible. Their wisdom and insights have left a lasting impression on the students and will undoubtedly contribute to a brighter, more sustainable future.





By mapping sustainability, global peace leadership, and energy conservation together, we create a powerful framework for addressing the root causes of conflict and promoting long-term global peace. This integrated approach not only reduces environmental degradation but also lays the foundation for a world where energy access, resource management, and conflict resolution are handled in ways that promote equality, cooperation, and peace. Through shared goals, strategic partnerships, and a commitment to energy conservation, the global community can work toward a more peaceful, prosperous, and sustainable future.



POETRY WRITING ON ENVIRONMENT DAY



Purpose:

The primary purpose of the online poetry competition was to commemorate World Environment Day by inspiring participants to contemplate and creatively express their thoughts and emotions concerning environmental issues. The event aimed to engage individuals in creative dialogue and artistic expression to promote environmental awareness.

About the event:

On June 11, 2023, the Manav Rachna Centre for Peace and Sustainability



organized an online Poetry Competition in celebration of World Environment Day. The event aimed to raise environmental awareness and encourage creative expression through poetry, providing participants with a platform to reflect on and express their thoughts and emotions related to environmental issues. This report outlines the event, its participants, themes, and outcomes.

The World Environment Day Poetry Competition successfully provided a platform for participants to express their perspectives on critical environmental issues through the art of poetry. The event generated significant interest and engagement, with participants expressing gratitude for the opportunity to contribute creatively to the environmental cause.

Winners:

The following participants were recognized for their outstanding contributions:

1. Ekta Goyal: Ekta's poem beautifully captured the essence of environmental conservation and touched the hearts of the judges with its profound message.
2. Vivek Singh: Vivek's poetry showcased a deep understanding of climate change and its global implications, earning him a well-deserved place among the



winners.

3. Simran Chhabra: Simran's poetic expression stood out for its poignant portrayal of the importance of preserving nature and biodiversity.

The World Environment Day Online Poetry Competition organized by the Manav Rachna Centre for Peace and Sustainability was a resounding success. It effectively achieved its goal of promoting environmental awareness and fostering creative expression among participants. The event served as a testament to the power of poetry in conveying important messages about environmental conservation. The winning entries and the enthusiastic participation of individuals from diverse backgrounds underscored the urgency of addressing environmental issues and highlighted the role of art in advocating for a sustainable future.

The Poetry Writing on Environment Day event, mapped with energy conservation, is a creative way to inspire action and reflection. Poetry allows us to engage with environmental issues on an emotional level, turning abstract ideas into tangible, powerful messages that can spark change. By connecting the art of poetry with energy conservation, we can not only raise awareness but also



move people to adopt more sustainable energy practices and work toward a greener, more sustainable future.

SUSTAINI-VERSE REEL COMPETITION ON NATURE



Purpose:

The aim of the "SustainiVerse: Reel Making Competition for fostering Peace & Sustainability" by the Manav Rachna Centre for Peace and Sustainability was to inspire creative expression, raise awareness, and promote positive action for global peace and eco-consciousness through impactful short video reels.



About the event:

From August 10th to 13th, 2023, the Manav Rachna Centre for Peace and Sustainability (MRCPS) orchestrated a noteworthy event titled "SustainiVerse: Reel Making Competition for fostering Peace & Sustainability." This unique competition, held with the theme "Peace & Sustainability," provided a creative platform for individuals to use short video reels as a medium to promote eco-consciousness, global peace, and unity.

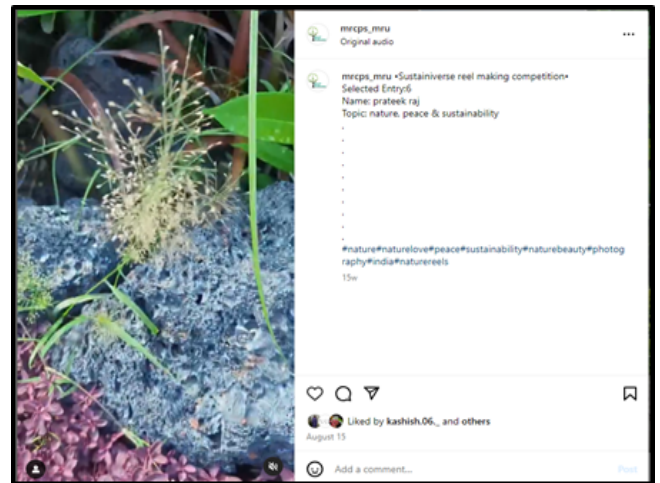
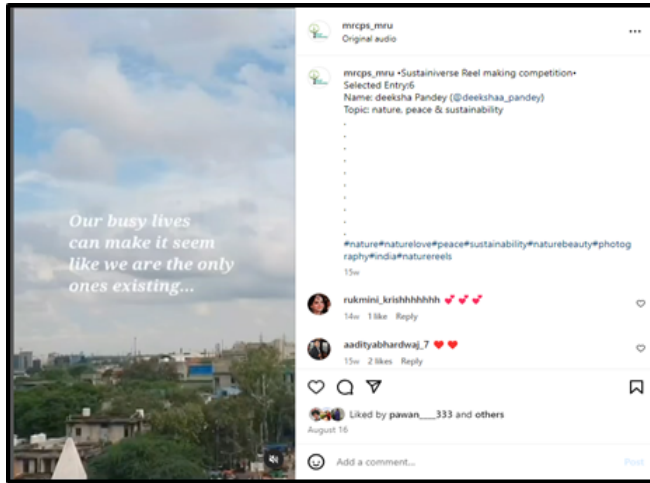
The competition aimed to inspire participants to channel their creative talents towards producing compelling video

reels that convey the significance of peace and sustainability. These reels were designed to raise awareness and motivate positive action, contributing to the creation of a more environmentally responsible and harmonious world. SustainiVerse showcased its commitment to empowerment by leveraging social media, intending to feature selected entries on MRCPS's official Instagram handle on August 14th. The winner would be determined based on the engagement received through likes and comments until midnight on August 16th, fostering a global connection and a sense of shared purpose.



In addition to the recognition of creative efforts, SustainiVerse offered participants the opportunity to earn "CLAN POINTS FOR ALL," introducing a friendly competitive element that encouraged teamwork and made the event more engaging and enjoyable. The top three winning entries were promised exciting prizes, while all participants would receive a certificate of participation, acknowledging their valuable contribution.

In conclusion, the SustainiVerse Reel Making Competition emerged as a remarkable initiative by MRCPS, emphasizing the power of creative expression in contributing to the causes of peace and sustainability. By fostering unity and inclusivity, the event conveyed the message that building a better, more sustainable world is a collective responsibility, with every individual capable of making a meaningful difference. The competition's emphasis on community, recognition, and engagement marked a significant step towards a greener and more harmonious future.



Responses from students

POSTER MAKING ON ENVIRONMENT DAY



Purpose:

The purpose of the World Environment Day Poster Making Competition,



organized by the Manav Rachna Centre for Peace and Sustainability, was to raise awareness and foster a sense of responsibility for environmental conservation. The event aimed to educate participants and the general public about the importance of maintaining a clean and pollution-free environment, inspiring individuals to take action and be responsible stewards of our planet.

About the event:

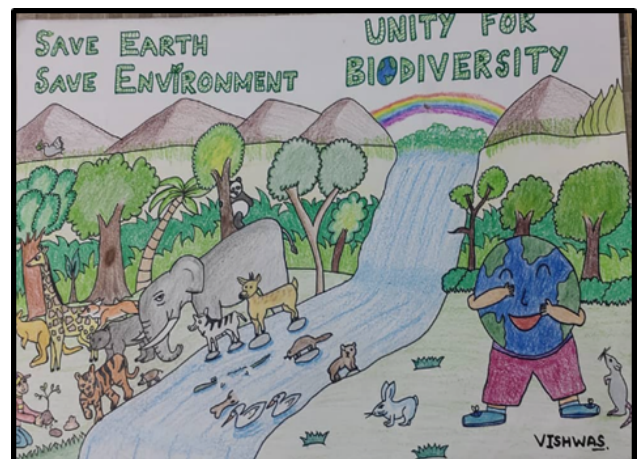
The World Environment Day Poster Making Competition, hosted by the Manav Rachna Centre for Peace and Sustainability, was a dynamic and impactful event that harnessed the power of creativity to address one of the most pressing global challenges of our time: environmental conservation. The competition provided a unique platform for individuals to express their concerns and aspirations for the environment through the medium of art. It encouraged participants to delve into their artistic reservoirs and visualize a world where the environment is free from pollution, vibrant, and sustainable.

Participants from various backgrounds and age groups gathered to create posters that conveyed their deep-seated commitment to protecting our planet. The event allowed them to explore a broad spectrum of themes, from celebrating



the beauty of nature to highlighting the urgent need for action in the face of environmental threats. These diverse interpretations and creative expressions enriched the competition, emphasizing the multi-faceted nature of the environmental issues we confront.

The World Environment Day Poster Making Competition was more than just a creative contest; it was a vibrant and collective statement about the significance of preserving the Earth for generations to come. The event's success demonstrated that art can be a powerful tool for inspiring change and unity, and it reiterated the shared responsibility we all hold in keeping the environment clean and safe from pollution.



Submissions from participants



ROLE OF FLOW STRUCTURES IN HEAT TRANSFER ENHANCEMENT FOR SUSTAINABLE ENERGY SYSTEMS

MANAV RACHNA UNIVERSITY
Declared as State Private University vide Haryana Act 26 of 2014

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

Organizes
ALUMNI TALK
on

Role of Flow Structures in Heat Transfer Enhancement for Sustainable Energy Systems

Dr. Naveen Sharma,
Asst. Prof.
NSUT, Delhi

Venue - HF-03

TUESDAY
25 JULY, 2023

TIME
11:30 AM

DEPARTMENT OF MECHANICAL ENGINEERING

Date: 25th July 2023

Dr. Naveen Sharma is an Assistant Professor at the Department of Mechanical Engineering, Netaji Subhas University of Technology, New Delhi. He received his PhD in Thermal Engineering from Indian Institute of Technology Roorkee (2018), M. Tech. in CFD & HT from NIT Hamirpur (2011) and BE in Mechanical Engineering from MDU university (2009). He has over 4 years of teaching and research experience in the field of Mechanical Engineering. He has authored/co-authored over 40 international publications including, journal articles, conference proceedings, and book chapters. Dr. Sharma is actively involved with the use of



optical techniques, namely Liquid Crystal Thermography and Particle Image Velocimetry in heat transfer and fluid flow research. He shares his experiences of research and the best possible ways to begin with it.

He initiated the session by Emphasizing on the fact that heat transfer efficiency is critical in reducing energy consumption in industrial processes, which contributes to the development of sustainable energy systems.

He highlighted how advanced flow structures, such as vortex generators and turbulence promoters, can significantly enhance heat transfer rates, reducing the need for excess energy input. The session also covered how these techniques are being integrated into sustainable technologies, such as solar thermal systems and waste heat recovery, to improve overall system efficiency and reduce carbon footprints. Additionally, he pointed out the potential for innovation in fluid dynamics to drive the next generation of energy-efficient systems in various industries.

The meeting was opened to questions from students and faculty towards the end of the talk. After this Prof. (Dr.) Ajit delivered the vote of thanks to the speaker, wishing him for a bright future.



Faculty presenting token of appreciation



6. Research/Patent/Book Chapter/Conference/FDP/Other activities

RESEARCH PUBLICATIONS

S.no.	Author	Research paper title	Year of publication	Link of paper
1	Shruti Gulihar, Sandeep Kumar, Mukesh Jewariya, Volume 137, article number 851, (2022)	Attosecond-XUV pulse generation using laser-based high-harmonic generation in argon gas	2022	https://link.springer.com/article/10.1140/epjp/s13360-022-03062-2
2	Vishal Thakur, Sandeep Kumar, and Niti Kant, Volume 33, Issue 03 (June 2024)	Self-focusing of a Bessel Gaussian laser beam in plasma under density transition	2022	https://doi.org/10.1142/S0218863523500388



3	Shefali Arora, Subhajit Nandy, Mamta Latwal, Ganesh Pandey, Jitendra P. Singh, Chae Keun H,	Synthesis and spectroscopic characterization of Zinc ferrite nanoparticles	2022	https://doi.org/10.12989/anr.2022.13.5.437
4	Weon Cheol Lim, Jitendra Pal Singh, Jonghan Song, Tae-Yeon Seong, Keun Hwa Chae,	Structural, optical, and magnetic properties of Ag ⁺ , Mn ⁺ and Ar ⁺ ions implanted ZnO thin films: effect of implanaton dose and stopping energy	2022	https://pubs.rsc.org/en/content/articlelanding/2022/ra/d2ra05430b
5	Jitendra Pal Singh, Keun Hwa Chae, Dinakar Kanjilal, Fadei Komarov,	Ion implantation in multifunctional materials	2023	https://doi.org/10.1016/j.matlet.2023.134347
6	Vivek Sharma, Sandeep Kumar, Niti Kant, Vishal Thakur	Excitation of the Laser Wakefield by asymmetric chirped laser pulse in under dense plasma	2023	https://link.springer.com/article/10.1007/s12596-023-01326-3
7	Hemaunt Kumar, Puneet Negi, Jitendra Pal Singh, RC Srivastava,	Tuning of structural, electrical and transport behaviour of	2023	https://www.sciencedirect.com/science/article/abs/pii/S02728



	Subia Ambreen, K Asokan, Volume 49, Issue 16, 15 August 2023, Pages 27294-27302	cobalt nanoferrite by dysprosium ions substitution		8422301550 X
8	Mayora Varshney, Aditya Sharma, KD Verma, Volume 178, 2023 - Issue 11-12: Annual Meeting 2023 at National Institute of Aerospace, USA	Crack Formation and Optical Properties in 175 MeV Au ¹³⁺ Ion Beam Irradiated CeO ₂ Thin Films	2023	https://doi.org/10.1080/10420150.2023.2253482
9	Pankaj Kumar, Aditya Sharma, Priyanka Bishnoi, Ankush Vij, Sandeep Kumar, Hyun-Joon Shin, KH Chae, BH Lee, SO Won, Volume 83, pages 463-470, (2023)	Synthesis and characterization of ZnGa ₂ O ₄ : Cr ³⁺ +Ge ³⁺ compounds with tunable photoluminescence properties	2023	https://link.springer.com/article/10.1007/s40042-023-00888-6
10	Gursimran Kaur, Puneet Negi, Ruhit	Tailored TiO ₂ Nanostructures for Designing of	2023	https://doi.org/10.1016/j.nanoso.202



	<p>Jyoti Konwar, Hemaunt Kumar, Nisha Devi, Gagandeep Kaur, Manpreet Kaur, Rakesh Sharma, Prakash Chandra Sati, Vinod Kumar, Pankaj Sharma, Jitendra Pal Singh, Ajar Nath Yadav, Volume 36, October 2023, 101056</p>	<p>Highly Efficient Dye Sensitized Solar Cells: A Review,</p>		<p>3.101056</p>
11	<p>Vivek Sharma, Sandeep Kumar, Niti Kant, Vishal Thakur, Volume 53, article number 157, (2023)</p>	<p>Effect of Frequency Chirp and Pulse Length on Laser Wakefield Excitation in Under-Dense Plasma</p>	2023	<p>https://doi.org/10.1007/s13538-023-01370-1</p>
12	<p>Vivek Sharma, Sandeep Kumar, Niti Kant, Vishal Thakur, Volume 55, article number 1150, (2023)</p>	<p>Enhanced laser Wakefield acceleration by a circularly polarized laser pulse in obliquely magnetized underdense plasma</p>	2023	<p>https://link.springer.com/article/10.1007/s11082-023-05333-3</p>



13	<p>Shaffy Garg a b, Sanjeev Gautam a, Jitendra Pal Singh c, Mandeep Kaur b, Anshu Gupta d, Ramcharan Meena e, Suvankar Chakraverty d, Young Hwa Jung f, Navdeep Goyal ,Volume 349, 15 October 2023, 134738</p>	<p>Dissolution of Mg (OH)₂ by swift heavy ion irradiation in CoFe₂O₄/MgO/ZnF e₂O₄ multilayer thin films</p>	2023	<p>https://www.sciencedirect.com/science/article/abs/pii/S0167577X23009230</p>
14	<p>Rajesh Kumar, Jitender Kumar, Ramesh Kumar, Akshay Kumar, Aditya Sharma, SO Won, KH Chae, Mukhtiyar Singh, Ankush Vij, 129, 712 (2023)</p>	<p>Monoclinic to Cubic Structural Transformation, Local Electronic Structure, and Luminescence Properties of Eu-Doped HfO₂</p>	2023	<p>https://doi.org/10.1007/s00339-023-06997-0</p>



15	Mohit Kumar, Hitendra K. Malik, Sandeep Kumar, volume 51, Issue 12, 3446 - 3453	Optimization of Electron Bunch Characteristics in Bubble Wakefield: Role of Different Linear Upward Density Ramp Profile.	2023	10.1109/TPS.2023.3329827
16	Sumita Mukherjee, Prinima Gupta, Pinki Sagar, Neeraj Varshney, and Manoj Chhetri	A Novel Ensemble Earthquake Prediction Method (EPM) by Combining Parameters and Precursors	2022	https://www.hindawi.com/journals/js/
17	Anju Mishra, Laxman Singh, Mrinal Pandey, Sachin Lakra	Image based early detection of diabetic retinopathy: A systematic review on Artificial Intelligence (AI) based recent trends and approaches	2022	https://www.iospress.com/catalog/journals/journal-of-intelligent-fuzzy-systems
18	Manoj Kumar, Susmita Ray, Dileep Kumar Yadav	Moving human detection and tracking from thermal video through intelligent surveillance system for smart applications	2022	Multimedia Tools and Applications Home (springer.com)



19	Anju Mishra, Laxman Singh, Mrinal Pandey, Sachin Lakra	Image based early detection of diabetic retinopathy: A systematic review on Artificial Intelligence (AI) based recent trends and approaches	2022	https://www.iospress.com/catalog/journals/journal-of-intelligent-fuzzy-systems
20	Sanjeet Kumar, Urmila Pania, Neha Nandal	A systematic study of artificial intelligence-based methods for detecting brain tumors	2022	https://www.igi-global.com/journal/international-journal-software-innovation/64245
21	Dr Yojna Arora Chirag Varshney, Priyal Mkttal,	Systematic Review of the association between Cancer Related Dementia and Mality: Systematic Review and Meta Analysis	2022	https://www.ijircst.org/
22	Smriti Mishra, Abhishek Yadav, Prashant Bhardwaj	An Experimental Analysis of Natural Heat Transfer between Rectangular Solid and Perforated Fins Having Different Perforation Characteristics	2023	https://doi.org/10.5109/6781094



23	Kunal Gaur, Sahil Chauhan, Gianender Kajal	Productivity Analysis of Pyramid Solar Still Using Phase Change Material and Hybrid Nanofluid	2023	https://link.springer.com/chapter/10.1007/978-981-99-1894-2_53#:~:text=For%20solar%20stills%20with%20hybrid,only%20nanofluid%20using%20solar%20stills.
24	Kunal Gaur,Sahil Chauhan, Ajit, Naveen Sharma	Performance Enhancement of Pyramid-Shaped Solar Still Using Phase Change Material with Porous Material	2023	https://link.springer.com/chapter/10.1007/978-981-99-2279-6_32
25	Ajit Katiyar, Naveen Kumar Gupta	Effect of different aluminium oxide based nanofluid concentrations on the efficiency of solar water desalination system	2023	10.18186/thermal.1242844
26	Naveen Sharma,Shaik Noushad,G.Shiva Ram Kumar Reddy, Ajit	Productivity Improvement of Solar Still Using Cemented Blocks	2023	https://link.springer.com/chapter/10.1007/978-981-99-2279-6_



				36
27	Ajit, Harshit Pandey, Naveen Kumar Gupta	Analysis of solar water desalination of hybrid nanofluids: an experimental study	2023	https://doi.org/10.18186/thermal.1400984
28	Nidhi Goswami Sahil Raj, Deepthi Thakral,	Intrusion Detection System for IoT-based Healthcare Intrusions with Lion-Salp-Swarm-Optimization Algorithm Metaheuristic-Enabled Hybrid Intelligent Approach	2023	https://www.espublisher.com/journal/s/article/details/933

PATENTS

S.no	Author	Patent Title	Year of publication	patent No.	Link of patent



1	<p>Jaiparkash, Deepti Maihuri, Shiv Kumar Dixit, Haider Abbas</p>	<p>Synthesis and utilization of Graphene Sheet with periodic vacancy for Hydrogen storage</p>	<p>13-10-20 23</p>	<p>2023110 64446A</p>	<p>https://drive.google.com/file/d/1PVjApH9r7spjl6XhJk4-cdkGbwIyu6o/view?usp=drive_link</p>
2	<p>Ajit & Gianender Kajal</p>	<p>Solar powered sea water desalination apparatus</p>	<p>27.11.202 2</p>	<p>374692- 001</p>	<p>https://search.ipindia.gov.in/IPOJournal/Journal/Patent</p>



BOOKS & BOOKS CHAPTER

S.no.	Author	Book Chapter Title	Year of publication	Link of Book/Book Chapter
1	Jitendra Pal Singh	Book Edited: Ferrite Nanostructured Magnetic Materials: Technologies and Applications	2022-2023	https://www.sciencedirect.com/book/9780128237175/ferrite-nanostructured-magnetic-materials
2	Jitendra Pal Singh	Book Edited: Oxides for medical applications	2022-2023	https://www.sciencedirect.com/book/9780323905381/oxides-for-medical-applications



3	Jitendra Pal Singh	Book Edited: Defect induced magnetism in oxide semiconductors	2022-2023	https://www.sciencedirect.com/book/9780323909075/defect-induced-magnetism-in-oxide-semiconductors
4	Jitendra Pal Singh	Book Edited: Applications of nanostructured ferrites	2022-2023	https://www.sciencedirect.com/book/9780443188749/applications-of-nanostructured-ferrites
5	Jitendra Pal Singh	Book Edited: Sol-gel method	2022-2023	https://www.intechopen.com/chapters/87637



6	Jitendra Pal Singh	Book chapter: Zinc ferrite nanoparticles and their biomedical applications	2022-2023	https://doi.org/10.1016/B978-0-323-90538-1.00014-5
7	Jitendra Pal Singh	Book chapter: Mossbauer study of Ferrite nanostructure	2022-2023	https://doi.org/10.1016/B978-0-12-823717-5.00036-X
8	Jitendra Pal Singh	Introductory chapter: Sol-Gel synthesis	2022-2023	https://www.intechopen.com/chapters/87637



9	<p>Aditya Sharma, Mayora Varshney, H.J. Shin, Keun Hwa Chae and Sung Ok Won</p>	<p>Book title: Defect-Induced Magnetism in Oxide Semiconductors chapter title: Magnetism in disordered HfO₂ nanoparticles and thin films</p>	2022-2023	<p>https://www.sciencedirect.com/science/article/pii/B9780323909075000087?via%3Dihub</p>
10	<p>Aditya Sharma, Ksh. Devarani Devi , Weon C. Lim , Keun Hwa Chae</p>	<p>Book title: Ferrite Nanostructured Magnetic Materials Technologies and Applications Chapter title: Ion implantation in ferrites</p>	2022-2023	<p>https://www.sciencedirect.com/science/article/pii/B9780128237175000449</p>



11	Jitendra Pal Singh	Book Edited: Special issue edited in Journal of Magnetism and Magnetic materials	2023-2024	https://www.sciencedirect.com/special-issue/10WC5G298QH
12	Jitendra Pal Singh	Book Edited:Advanced Synthesis and Medical Applications of Calcium Phosphate	2023-2024	https://www.routledge.com/Advanced-Synthesis-and-Medical-Applications-of-Calcium-Phosphates/Nanda-Singh-Gautam-Yi/p/book/9781032419633



13	Jitendra Pal Singh	Book Edited: Calcium Based Materials: Processing, characterization and Applications	2023-2024	https://www.routledge.com/Calcium-Based-Materials-Processing-Characterization-and-Applications/Nandam-Yi/p/book/9781032419558
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CONFERENCES ORGANISED

S.N o.	Title	Link of the Report	Date
1	International conference on "Futuristic materials ICFM-2022", organised by department of Physics, MRU, Faridabad.	<u>Report ICFM 2022-23.pdf</u>	08-12-2022 to 09-12-2022



2	International Conference on "Energy Materials and Rechargeable Batteries-2023", organised by Physics department, MRU, Faridabad.	<u>ICEMRB-2023.</u> <u>pdf</u>	19-12-2023 to 22-12-2023
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CONFERENCES ATTENDED

S.N o.	Title	Link of the Report	Date
1	3rd International Conference on "Emergent Converging Technologies and Biomedical Systems (ETBS 2023)" at Jaypee University of Information Technology, Wagnaghat Solan, Himachal Pradesh	https://drive.google.com/file/d/1pFHqP-w7sEsVkJ4zNANcVfE6HxxEw3yy/view?usp=sharing	15th-17th May, 2023.



FDP ATTENDED

S.No.	Title	Link of the Report	Year
1	FDP on "Research Scope in Electric Vehicles (In collaboration with ANSYS)" conducted by Electrical Engineering Department, NITTTR Chandigarh	https://docs.google.com/spreadsheets/d/1TPNOP8TcX16kcHoaafpQowVPB_WSEoTv/edit?gid=1863912529#gid=1863912529	2022-23
2	FDP on "Sustainable Development Goals: Challenges and Opportunities" Conducted by Electrical Engineering Department, NITTTR Chandigarh	https://docs.google.com/spreadsheets/d/1TPNOP8TcX16kcHoaafpQowVPB_WSEoTv/edit?gid=1863912529#gid=1863912529	2022-23
3	FDP on Pneumatic, Hydraulic and PLC System	https://docs.google.com/spreadsheets/d/1TPNOP8TcX16kcHoaafpQowVPB_WSEoTv/edit?gid=1863912529#gid=1863912529	2022-23



CURRICULUM MAPPING

S.No.	Course Code	Course Title	Mapping Details
1	PHH205B-T	Thermodynamics	<p>This course provides understanding of thermodynamic cycles that is crucial for designing efficient energy systems (e.g., power plants, heat engines, and renewable energy technologies). Improved efficiency in these systems leads to more sustainable and affordable clean energy solutions. Students can apply this knowledge to improve energy conversion devices and optimize renewable energy systems</p>
2	PHH205B-P	Thermodynamics Lab	<p>This course provides understanding of thermodynamic cycles that is crucial for designing efficient energy systems (e.g., power plants, heat engines, and</p>



			renewable energy technologies). Improved efficiency in these systems leads to more sustainable and affordable clean energy solutions. Students can apply this knowledge to improve energy conversion devices and optimize renewable energy systems
3	PHH504B	Physics of Electronic Devices	The course promotes understanding the physics of semiconductors and other materials helps create more energy-efficient electronic devices
4	PHH605B	Synthesis and Characterization Techniques	Course promotes advanced problem-solving skills related to Clean water, energy harvesting, Advanced materials synthesis, and a deeper understanding of complex physical systems, contributing to students' preparedness for higher education and research careers.



5	ECE103B	Basics of Electronics & Electrical Engineering	Digital electronics, Energy efficient circuits
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7. Summary

Sustainable Development Goal 7 (SDG 7), which aims to ‘ensure access to affordable, reliable, sustainable, and modern energy for all,’ is one of the 17 United Nations (UN) SDGs that form the foundation of the global development agenda. Access to energy is not just fundamental to daily life but is a driver of economic development, poverty alleviation, and social well-being. While the global energy system is rapidly transitioning toward sustainability, much remains to be done, particularly in ensuring that all people, including those in underserved areas, have access to affordable and clean energy. Manav Rachna University, as centre of knowledge, research, and innovation, is pivotal in achieving SDG 7, playing multiple roles in advancing clean energy technologies, education, policy advocacy, and sustainable campus operations.



- **Research and Innovation in Clean Energy**

MRU is at the forefront of research and technological innovation, and their contributions to advancing clean and affordable energy are indispensable. This is particularly important as the world faces urgent challenges in shifting from fossil fuel-based energy systems to more sustainable, renewable sources such as solar, and biomass. It has the capacity to drive groundbreaking research that can create new energy solutions or improve existing technologies.

- **Renewable Energy Technologies:** MRU is a key player in the development and optimization of renewable energy systems. They conduct research on solar power, biogas, biomass, and other renewable sources, focusing on increasing energy efficiency, lowering costs, and scaling up deployment. For example, MRU may also work on improving the efficiency of solar cells that are more cost-effective and efficient at capturing wind energy.
- **Energy Storage Solutions:** One of the key challenges with renewable energy is its intermittency. Solar energy, for instance, is only available during the day. MRU plays a critical role in addressing this challenge through the development of energy storage technologies, such as advanced batteries



and other innovative solutions that can store excess energy when demand is low and supply it when demand peaks. This helps ensure a stable, reliable energy supply, even from renewable sources.

- **Smart Grids and Energy Efficiency:** The advancement of smart grids is another area where MRU are making a significant impact. Smart grids are digital networks that allow for real-time monitoring and management of energy use. MRU are involved in designing and testing smart grid systems that integrate renewable energy sources into the existing power grid and optimize energy use across commercial, and industrial sectors. In addition, MRU contributes to energy efficiency research that focuses on reducing energy consumption without compromising performance or comfort, such as through the development of energy-efficient appliances, lighting, and buildings.

- **Education and Capacity Building for Clean Energy Solutions**

Education is one of the most direct ways MRU can contribute to SDG 7. By integrating clean energy into their academic programs, MRU can equip future generations of professionals, policymakers, engineers, and scientists with the knowledge and skills necessary to tackle global energy challenges.



- **Curriculum Development:** MRU can design interdisciplinary courses that combine renewable energy technologies with environmental science, policy, economics, and business. These programs help students understand the multifaceted nature of the energy sector and prepare them to develop, implement, and manage sustainable energy solutions. Additionally, MRU can offer specialized courses on energy systems, energy storage, and energy transition strategies, contributing to the global pool of expertise needed for the energy sector's transformation.
- **Public Engagement and Awareness:** Beyond formal education, MRU are important spaces for public awareness and outreach. MRU can organize workshops, public lectures, and awareness campaigns to educate the broader community about the importance of clean energy. These activities help to demystify renewable energy technologies and promote their adoption at the local and regional levels. By engaging with policymakers, industry leaders, and the public, MRU contribute to building a collective understanding of the energy transition and the benefits of clean energy.
- **Training and Professional Development:** MRU can also provide training programs for professionals already working in the energy sector. These



programs can focus on upgrading skills in emerging energy technologies, energy efficiency practices, and sustainability standards. By offering short-term courses, workshops, and certification programs, MRU ensure that current energy professionals remain at the cutting edge of technological advancements and industry best practices.

- **Sustainable Campus Operations and Practices**

MRU, as large institutions, consume significant amounts of energy, making it essential for them to adopt energy-efficient practices and transition to renewable energy sources on their campuses. This can help reduce their environmental impact while setting an example for students, staff, and the surrounding community.

- **Energy-efficient Infrastructure:** MRU can integrate energy-efficient technologies into their infrastructure by designing new buildings that comply with green building standards, such as LEED (Leadership in Energy and Environmental Design). Retrofitting older buildings with energy-efficient systems-such as LED lighting, advanced HVAC systems, and better insulation also reduces energy consumption.



- **Renewable Energy Installations:** MRU is investing in on-campus renewable energy installations. Solar panels on rooftops, wind turbines on university grounds, or geothermal systems for heating and cooling can provide clean energy to power campus operations. These installations not only reduce the carbon footprint of the university but also serve as teaching tools, allowing students and staff to learn about renewable energy technologies in a real-world setting.
- **Carbon Neutrality and Sustainability Goals:** MRU has set ambitious targets to achieve carbon neutrality by reducing its greenhouse gas emissions and investing in carbon offset programs. By committing to these goals, MRU demonstrates leadership in sustainability, inspires students and other institutions, and contributes to the global effort to combat climate change. These commitments are often accompanied by detailed sustainability action plans that guide energy use, waste management, water conservation, and other key areas of campus life.
- **Community Engagement and Collaborative Projects**
MRU is often deeply embedded in their local communities, which presents an opportunity for them to extend the benefits of clean energy to those who need it



most. MRU is also engaged in collaborative projects with governments, NGOs, and the private sector to improve access to energy in underserved regions.

- **Energy Access Projects:** MRU can collaborate with local governments or international organizations to develop and implement clean energy projects in rural or remote areas. For example, university researchers may design solar microgrids for villages that are not connected to the national grid. These microgrids provide a reliable and affordable source of electricity, improving the quality of life for residents and fostering local economic development.
- **Capacity Building for Local Communities:** In addition to deploying clean energy technologies, MRU can help build local capacity by offering training programs for community members. These programs can teach people how to install, maintain, and repair renewable energy systems, ensuring that the communities can manage their energy infrastructure independently and sustainably. MRU can also train local energy entrepreneurs, enabling them to create businesses that provide energy solutions or services to their communities.
- **Collaboration with Industry and Governments:** MRU often partners with



industry leaders and governments to influence energy policy and market development. By conducting policy research, sharing knowledge, and providing evidence-based recommendations, MRU helps shape energy regulations that support the growth of renewable energy markets. These collaborations also promote the exchange of best practices and ensure that MRU contributes meaningfully to both local and global energy transitions.

- **Policy Advocacy and Global Cooperation**

MRU play an influential role in shaping national and international energy policies. Their research on energy systems, climate change, and sustainability informs policy discussions and can drive the adoption of policies that promote clean and affordable energy.

- **Policy Research and Analysis:** MRU is involved in energy policy research, providing governments and international organizations with valuable insights on energy markets, governance, and regulation. For instance, university-led studies may inform the creation of subsidies for renewable energy projects or the establishment of carbon pricing mechanisms that incentivize low-carbon technologies.



- **Global Networks and Cooperation:** Through international collaborations, MRU contribute to global efforts aimed at achieving SDG 7. MRU are active in global forums and networks that promote clean energy solutions, such as the Sustainable Energy for All initiative and the Global Green Growth Institute. By sharing research, knowledge, and best practices across borders, MRU helps foster a global community committed to achieving affordable and clean energy for all.

SDG 7-(Affordable and Clean Energy)-is a cornerstone of the global sustainable development agenda. Manav Rachna University, as an institution of research, education, and innovation, is a crucial driver of progress toward this goal. Through groundbreaking research, innovative technologies, and active engagement with communities and policymakers, MRU play an essential role in transitioning the world to a cleaner, more sustainable energy future. By adopting energy-efficient practices on campuses, educating future leaders, and advocating for effective energy policies, MRU is also uniquely positioned to contribute to the achievement of SDG 7, ensuring that clean, affordable, and reliable energy is accessible to all.