National Workshop on Advances in Nuclear Energy for Sustainable Environment

NWANESE 2025

UNDER UNSECO CHAIR ACTIVITY

Sponsored By MSF/SAF

25TH JULY 2025
PONDICHERRY UNIVERSITY

IN ASSOCIATION WITH
IGCAR- KALPAKKAM

EVENT COMPENDIUM

Organized By
Department of Green Energy Technology
Madanjeet School of Green Energy Technologies
PONDICHERRY UNIVERSITY

PONDICHERRY UNIVERSITY

(A Central University established by an Act of Parliament No. 53 of 1985)
Accredited with A+ Grade by NAAC – Vth Cycle

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NWANESE 2025

புதுவைப் பல்கலைக்கழகம்
(மத்திய பல்கலைக்கழகம்)
पांडिच्चेरी विश्वविद्यालय
(केंद्रीय विश्वविद्यालय)
PONDICHERRY UNIVERSITY
(A Central University)

பேராசிரியர் ப. பிரகாஷ் பாபு
துணை வேந்தர்
आचार्य प. प्रकाश बाबू
कुलपति
Prof. P. PRAKASH BABU
VICE - CHANCELLOR

டாக்டர். அம்பேத்கர் நிர்வாக கட்டிடம்,
ஆர். வெங்கட்ராமன் நகர்,
डॉ. अंबेडकर प्रशासनिक भवन
आर.वेंकटरामन नगर,
Dr. Ambedkar Administrative Building
R. Venkataraman Nagar,
காலாப்பட்டு, புதுச்சேரி,
कालापेट पुदुच्चेरी,
Kalapet, Puducherry - 605 014.

July 23, 2025

FOREWORD

I am pleased to extend my warm greetings and best wishes on the occasion of the **One-Day National Workshop on** ***'Advances in Nuclear Energy for a Sustainable Environment***,' scheduled for **25th July 2025**. This important and timely event is organized by the Department of Green Energy Technology, Madanjeet Singh School of Green Energy Technologies, Pondicherry University, under the UNESCO Chair on Renewable Energy and Environment for Sustainable Development (RCESD), in collaboration with the Indira Gandhi Centre for Atomic Research (IGCAR).

In an era where balancing environmental sustainability with growing energy demands is imperative, nuclear energy emerges as a promising, clean, and reliable source. Fostering knowledge exchange and collaboration on innovative advancements and responsible practices in this field is therefore crucial. This workshop provides a valuable platform for experts, researchers, and policymakers to engage in meaningful dialogue on emerging technologies, research frontiers, safety considerations, and sustainable applications of nuclear energy. The insights and discussions generated here will undoubtedly strengthen our collective commitment to environmental stewardship and energy security.

I extend my sincere appreciation to Prof. R. Arun Prasath, Convenor of the workshop, for his visionary leadership and dedicated efforts in fostering this meaningful collaboration between IGCAR and Pondicherry University under the esteemed UNESCO Chair on RCESD. I also commend the invaluable support of his team, whose commitment and spirit of collaboration have been pivotal in successfully organizing this important event. I am confident that the outcomes of this workshop will have a meaningful impact and pave the way for continued collaboration between IGCAR and Pondicherry University. I extend my best wishes for the success of this initiative and for engaging and productive deliberations throughout the workshop.

23/7/25

(P. PRAKASH BABU)

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सी. जी. कऱ्हाडकर
प्रतिष्ठित वैज्ञानिक एवं निदेशक

C.G. KARHADKAR
Distinguished Scientist & DIRECTOR

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GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
INDIRA GANDHI CENTRE FOR ATOMIC RESEARCH
KALPAKKAM 603 102, TAMIL NADU, INDIA

July 24, 2025

PREFACE

I am extremely delighted that Pondicherry University in association with IGCAR is organizing the One-Day National Workshop on, "Advances in Nuclear Energy for Sustainable Environment" on 25th July, 2025 under the auspices of the UNESCO Chair activity. It gives me great pleasure to extend a hearty welcome to all the participants. This workshop reflects collective commitment to advancing nuclear energy as a key enabler of a cleaner, safer and more sustainable energy and environment in the future.

In the wake of global warming by fossil fuel consumption over the last century and growing energy demands a varied energy mix is required in India due to the country's fast expanding economy and population, which is also driving up energy consumption. A road to energy security and a decreased need on fossil fuels is provided by nuclear energy, a dependable and low-carbon source; as highlighted in the "Viksit Bharat" vision.

I take this opportunity to express my sincere appreciation to the entire faculty from IGCAR for sharing their insights at this workshop. Their involvement greatly enhances the academic rigor of the event, emphasising IGCAR's steadfast commitment to the advancement of nuclear science. It also highlights IGCAR's dedication to cultivating meaningful collaborations within the research communities, while simultaneously showcasing India's progress in nuclear technology and policy.

The topics address different aspects of Nuclear Energy, focusing on Fast Breeder Reactors, its indigenous technology development, engineering and radiation safety. The environment assessment, dosimetry and emergency preparedness of nuclear facilities at Kalpakkam is another important area that is covered. Finally, the opportunities and challenges in materials research for sustainable nuclear energy is also deliberated.

I extend my gratitude to the Honourable Vice Chancellor of Pondicherry University, Prof. Prakash Babu, for his support in advancing initiatives that link scientific innovation with sustainable development. I also commend Prof. R. Arun Prasath, UNESCO Chairholder and Convenor of this workshop, for his dedication to clean energy solutions and for fostering the vital collaboration between IGCAR and Pondicherry University. This partnership promises to be a strong foundation for future research, knowledge exchange, and capacity-building, benefiting both institutions and the broader scientific community.

I extend my best wishes for the success of this workshop and hope it sets the stage for continued collaboration and future initiatives that support IGCAR and Pondicherry University's shared mission of sustainable energy development. May today's discussions inspire meaningful contributions toward clean, secure, and inclusive energy solutions, both nationally and globally.

24.7.25

C.G. Karhadkar

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France Marquet
Madanjeet Singh Foundation
Principal Trustee, MSF

Puducherry 25.07.25

Honourable Vice Chancellor, Pondicherry University, Prof. Prakash Babu, Director Prof. K. Tharanikkarasu, Registrar (i/c) Prof. Rajneesh Bhutani, and UNESCO Chairholder Prof. R. Arun Prasath.

It is an honour for me to be invited to represent the Madanjeet Singh-South Asia Foundations to this National Workshop on Advances in Nuclear Energy for a Sustainable Environment.

I must apologise because unfortunately due to previous commitments I will not be able to attend the conference.

Although our founder UNESCO Goodwill Ambassador Madanjeet Singh's career was in the Indian foreign service, he was basically a scientist, who wrote his thesis on Chemistry and more precisely on the use of rare sands in nuclear energy.

After seeing the horrific and devastating consequences of Hiroshima and Nagasaki explosions, he went against the military use of nuclear energy but admired XXth century French researcher Marie Curie winner of two Nobel prizes, one in chemistry and the other in physics, that changed the understanding of radioactivity and heralded the use of radiation in medicine.

May your meeting and research guide incite more young ladies to pursue their careers in this crucial development of sciences.

Thank you, Prof Arun Prasath, your team and the distinguished delegates of the Department of Atomic Energy and the Indira Gandhi Centre for Atomic Research, Kalpakkam. I want to express my sincere gratitude to the Honourable Director Shri C.G. Karhadkar for approving Prof. Arun Prasath's proposal to organize this inaugural event. I am confident that many more such events will follow in the future. I also thank Shri S. Vijayaraghavan and Dr. S. Chandrasekaran, who were instrumental in facilitating this meeting and helped bring this event to fruition.

I thank all the experts from IGCAR: Shri T. Rajkumar, Shri Ram Kumar Maity, Dr. C. V. Srinivas, Dr. S. Chandrasekaran, Shri Sanjay Kumar Das, Dr. S. Tripurasundari for opening a new era of collaboration in an essential field.

In the name of my fellow trustees and myself I wish you a fruitful day of exchange.

Thank you,

France Marquet

46 Bd des Invalides 75007 Paris, France
madanjeetsaf@gmail.org

Foreword

I warmly thank the organizers and participants of the National Workshop on Advances in Nuclear Energy for Sustainable Environment, held on 25 July 2025. This important event is part of the UNESCO Chair initiative at Pondicherry University, in partnership with IGCAR, Kalpakkam. Facing the twin crises of climate change and energy insecurity, we must remember that scientists long warned of the dangers of unsustainable resource use. By the 1970s, the impacts of pollution, overpopulation, and fossil fuel dependency were well documented. Climate change was no surprise. It was ignored for too long. We didn't lack knowledge. We lacked the will to act. Today, we face the consequences: deadly floods, persistent droughts, food insecurity, and displacement, burdens that fall hardest on the most vulnerable. The clean energy transition demands sustained investment in infrastructure, energy storage, education, and innovation. Every delay increases the cost, both economically and environmentally. A short-term mix of fossil fuels, nuclear, and clean energy may be a transitional necessity, but cannot serve as the final destination. Fossil fuels drive emissions. Fossil and nuclear power place a high strain on eco-hydrological resources. The long-term challenge of nuclear waste disposal remains unresolved, which limits its claim to sustainability. The future must be powered by truly clean and affordable energy. Peak oil likely occurred around 2007. Fossil fuel demand, however, may peak only by the 2030s, and its decline will be uneven unless supported by coordinated action. This requires more than technology. It demands education, awareness, and science-informed policies.

This is where institutions like UNESCO play a pivotal role in advancing climate and energy literacy, and in building scientific capacity, offering technical support to Member States, and fostering multi-stakeholder collaboration. Through initiatives such as the UNESCO Chair Programme, and the Green School Quality Standard, UNESCO supports countries in making science-based decisions for best environmental practices for climate resilience. Dialogue between scientific communities and policymakers is essential. Without it, scientific insights remain underutilized. Policies must correspond to environmental realities. Strengthening this bridge can ensure that knowledge translates into action. Public-private partnerships are essential in scaling clean technologies. The energy sector, which has long benefited from fossil and nuclear energy, must take a leadership role in accelerating clean energy. We missed the opportunity to act decisively in the 1970s. We are at risk of missing it again, particularly with respect to achieving Sustainable Development Goal 7 (Clean & Affordable Energy). Science and education are essential elements of our energy future. Let us lead with knowledge, act with responsibility, and build a future with clean and affordable energy as a joint global commitment. I commend Prof. R. Arun Prasath, UNESCO Chairholder at Pondicherry University, for his tireless work in advancing clean energy education. His leadership under the UNESCO Chair Programme deserves our sincere appreciation. I am confident this workshop will inspire meaningful exchange and collaboration toward realistic clean and affordable energy solutions.

Dr. Benno Böer

CHIEF OF NATURAL SCIENCES
UNESCO, SOUTH ASIA
REGIONAL OFFICE, NEW DELHI

PONDICHERRY UNIVERSITY

DEPARTMENT OF GREEN ENERGY TECHNOLOGY
MADANJEET SCHOOL OF GREEN ENERGY TECHNOLOGIES

PREFACE

I am pleased to welcome you all for this "One-Day National Workshop on Advances in Nuclear Energy for a Sustainable Environment, NWANESE, July 25th, 2025. The event is organized by the Department of Green Energy Technology under the UNESCO Chair activity and sponsored by MSF/SAF in collaboration with the Indira Gandhi Centre for Atomic Research (IGCAR) with the generous support from South Asia Foundation via Madanjeet Singh Foundation.

As we know, the global energy demand is rising, carbon and related emissions are increasing, and climate change is worsening. As countries around the world work to reduce carbon emissions, clean, affordable, and reliable energy is more important than ever. Nuclear energy is a proven low-carbon option and should play a key role in the energy transition along with renewable energy. India's Nuclear Energy Mission aims for 100 GW of nuclear power from the current 8.2 GW for Viksit Bharat 2047! As we aspire to become a developed nation, enhancing our per capita energy consumption is essential to raise living standards, support high-value industries, well-being, education, healthcare, and overall quality of life. This workshop is being organized at the right time, in line with global and national efforts to fight climate change and ensure fair access to energy for all. I am sure that the outcomes from this important event will contribute meaningfully to shaping national policy, fostering academic-industry linkages, and inspiring the next generation of energy scientists for nuclear energy. I thank the distinguished speakers from the IGCAR and all the participants for your commitment.

I look forward to a productive and inspiring day of learning on nuclear energy for sustainability to support a sustainable path for progress.

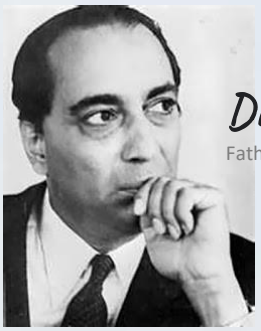
Professor R. ARUN PRASATH
UNESCO Chairholder - RCESD
Convenor of NWANESE 2025

About NWANESE 2025

The One Day National Workshop on Advances in Nuclear Energy for Sustainable Environment hosted by Department of Green Energy Technology, Madanjeet School of Green Energy Technologies (UMSGETS), Pondicherry University and sponsored by MSF/SAF with profound collaboration with Department of Atomic Energy, Indira Gandhi Centre For Atomic Research (IGCAR), Kalpakkam – Node under UNESCO Chair activity focus on the role of Nuclear energy in addressing climate change and promoting a sustainable energy future, as well as showcasing India's advancements in nuclear technology and policy. NWANESE-2025 will promote knowledge-sharing among researchers, scientists, industry professionals, and students and also seeks to enhance public awareness of nuclear energy's role in sustainable development. By bridging academic expertise with technological implementation, the event aspires to catalyse innovation, cultivate interdisciplinary collaboration, and strengthen India's transition to a low-carbon, energy-secure economy.

Topics

Nuclear engineering
Advances in Nuclear Reactor Technology for Clean Energy
Environment Assessment, Nuclear Emergency Preparedness
Health, radiation safety &Waste management
Safety Engineering & research
Materials for Nuclear industry, Thin films, Smart materials



Dr. Homi J. Bhabha
Father Of The Indian Nuclear Programme

About IGCAR

Indira Gandhi Centre for Atomic Research

Founded in 1971, **IGCAR** plays a pivotal role in advancing **India's fast reactor technology**. The centre has achieved milestones such as the successful operation of the **Fast Breeder Test Reactor (FBTR)**. In addition to fast reactor development, IGCAR is engaged in multidisciplinary nuclear research spanning materials science, safety systems, thermal hydraulics, radiation shielding, and fuel cycle technologies. It also supports strategic programs in defence, space, and high-performance computing.

In alignment with its climate policy, India declared a **net-zero emission** target by **2070** at **COP26**, reinforcing the strategic role of nuclear energy not only in electricity generation but also in applications such as industrial process heat, seawater desalination, and green hydrogen production.

Shri C G Karhadkar
Current Director, IGCAR

In the global pursuit of sustainable and clean energy solutions, **nuclear energy** stands out as a **reliable and low-carbon** source of electricity, capable of delivering **large-scale**, **uninterrupted baseload power**. As nations intensify efforts to meet their climate commitments and achieve net-zero greenhouse gas emissions, nuclear energy is increasingly seen as an indispensable solution to mitigate climate change and meet **Sustainable Development Goals (SDGs)**, especially SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

India, under the vision of **Dr. Homi J. Bhabha**, has adopted a unique and long-term strategy through its **three-stage nuclear power programme**. This roadmap is designed to maximize the utilization of domestic resources, particularly **thorium**, of which India holds around 12–18% of the world's known reserves. While thorium is fertile rather than fissile, it has the potential to play a vital role in future advanced reactors, enhancing energy security and sustainability.

Stage I focuses on **Pressurized Heavy Water Reactors (PHWRs)** fuelled by natural uranium. These reactors serve dual purposes: they generate electricity and breed plutonium-239, which becomes the input material for the next phase.

Stage II involves **Fast Breeder Reactors (FBRs)** that convert fertile uranium-238 into additional fissile material, significantly improving fuel efficiency and enabling a closed fuel cycle. A critical project in this stage is the **500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam**, developed by the **Indira Gandhi Centre for Atomic Research (IGCAR)**. As of 2024, the PFBR is in the advanced stages of commissioning and is expected to become a cornerstone of India's breeder-based nuclear strategy.

Stage III, currently in the research and development phase, envisages **Advanced Heavy Water Reactors (AHWRs)** that use uranium-233 bred from thorium-232, aiming to establish a self-sustaining thorium fuel cycle. This would enable India to tap into its vast thorium reserves, minimizing dependence on imported uranium.

Supporting this national mission, under the **UNESCO Chair on Renewable and Clean Energy for Sustainable Development,** the **Department of Green Energy Technology (DGET)** at **Pondicherry University**, in collaboration with **IGCAR, Department of Atomic Energy (DAE)**, is organizing the National Workshop on **Advances in Nuclear Energy for Sustainable Environment (NWANESE-2025)** on **25 July 2025** at the Cultural-Cum-Convention Centre, Pondicherry University, Puducherry. The workshop aims to provide a multidisciplinary forum focused on the role of nuclear energy in combating climate change and enabling a sustainable future. Eminent experts from IGCAR share cutting-edge insights into India's current progress and future direction in clean nuclear energy.

NWANESE
2025

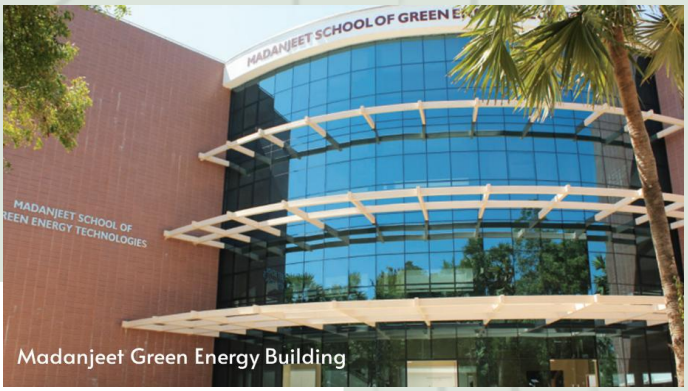
About Pondicherry University

Pondicherry University, established in 1985 is an Indian Central University is one of the most sought-after campuses amongst the students from across the nation as a destination for the Higher Education and Research. Pondicherry University has 15 Schools, 38 Departments, 11 Centres and 1 Chair offering over 144 PG, PG-Diploma/ certificate & Research programmes with a student strength of 7000 including foreign students. Currently the University has more than 130 funded research projects including SAP & FIST Projects from various agencies like UGC, DST, CSIR and DBT. The University has two-off campuses, one located in Port Blair (Andamans) with two Departments viz., Ocean Studies and Marine Biology and Coastal Disaster Management and another Post-Graduate Centre at Karaikal. Fresh green sprawling campus spread over 880 acres, features great Instrumentation & Resource facility, 100% Wi-Fi connectivity with 100% power back-up, 24x7 Library facility, 22 well-furnished hostels, Round the clock medical facility, Placement Cell, Community Radio (Puduvai Vaani) and Study India Programme.

ACCREDITED WITH GRADE A+ NAAC

Department of Green Energy Technology

The Department of Green Energy Technology was established in 2010 under the aegis of Madanjeet School of Green Energy Technologies with a vision to promote education and research in Renewable and Green energy. DGET offers M. Tech in Green Energy Technology which is supported by South Asia Foundation and Ph.D. in the field of renewable energy & related subjects. The Ministry of New and Renewable Energy has recognized and approved the Department as a Nodal Centre in the fields of all clean energy sources. DGET has proficient faculties to teach, offer consultancy and take up research work in several core areas of energy.



Madanjeet Green Energy Building

DGET has several MOUs with leading academic institutions and industries specializing in energy. In 2024, under the effort of DGET, the Madanjeet School of Green Energy Technologies was recognized as UNESCO Chair on Renewable and Clean Energy for Sustainable Development. DGET is constantly evolving and excelling in various fields of energy technologies, both in research and product development.

UNESCO CHAIR ON

Renewable and Clean Energy for Sustainable Development

Professor R. Arun Prasath holds the established UNESCO chair on "Renewable and Clean Energy for Sustainable Development (RCESD)" in the UNESCO Madanjeet School of Green Energy Technologies (UMSGET) at Pondicherry University (2024-2028). The official inauguration of the 16th prestigious UNESCO chair in India was held on 10th December 2024 to promote green and clean energy technologies. The UNESCO chair at Pondicherry University was achieved through collaborative efforts involving the Ministry of Education, Govt of India, UNESCO, Madanjeet Singh Foundation, the South Asia Foundation. Additionally, Prof. R. Arun Prasath's extensive international experience in research and his extensive out-reach sustainable practices such as promotion of solar campus at PU campus, Invest in Our Planet Earth, Sustainable Campus Campaigns, Green Campus Auditing, Sustainability@PU, Net-zero Pondicherry University, has been instrumental in securing this chair.

This initiative is part of the broader UNITWIN/UNESCO Chairs Programme, which aims to enhance institutional capacities through international cooperation and knowledge sharing among higher education institutions. The UNESCO Chair will serve as a platform to promote research, education, and capacity-building in sustainability, renewable energy, and community development. To work with governments, schools, colleges, universities, industries, NGOs, businesses, researchers, technology developers and environmentally conscious individuals working towards the promotion of renewable energy, also It will actively engage in fostering global partnerships, advancing knowledge-sharing, and supporting innovative practices that align with UNESCO's mission to build peace through education, science, and culture. This achievement marks a new chapter for Pondicherry University in its ongoing journey toward academic excellence and sustainable development.

unesco
Chair on Renewable and Clean Energy for Sustainable development

https://rb.gy/s72tiq

Professor R. Arun Prasath

UNESCO – Chairholder
Department of Green Energy Technology
Madanjeet School of Green Energy Technologies
Pondicherry University

- UNESCO Chairholder to promote "Renewable and Clean Energy for Sustainable Development," which was established with the support of UNESCO Madanjeet School of Green Energy Technologies (UMSGET) and his international partners at Pondicherry University (2024-2028).
- Active member in promoting renewable energy and sustainability at the Pondicherry University campus. "Solar Campus Master Plan" initiative for Pondicherry University, Invest in Our Planet Earth, Sustainable Campus Campaigns, Green Campus Auditing, Sustainability@PU, Net-zero Pondicherry University

unesco
Chair on Renewable and Clean Energy for Sustainable development

R. ARUN PRASATH is a Professor and currently heads the Department of Green Energy Technology at Pondicherry University. He received the prestigious DAAD fellowship (1999-2001) for his doctoral research work at the Max-Planck Institute for Polymer Research, Mainz, GERMANY. He worked as a material researcher in several prestigious institutes, as a research associate at the Indian Institute of Science, Bangalore, INDIA (2002-2004), a postdoctoral researcher at the University of Strathclyde, Glasgow, UNITED KINGDOM (2004-2006) and at University of New South Wales, Sydney, AUSTRALIA (2006-2008), and as a senior researcher in Ghent University (2008-2010), BELGIUM with special fellowship named BOF and received the prestigious RAMAN fellowship to work at University of Wyoming, UNITED STATES OF AMERICA in the year 2014-15. Currently, he is leading a research group on energy materials and sustainability. He extensively focuses on materials synthesis, characterization, and application in solar energy, bio-energy, batteries, fuel cells, and other green and clean energy technologies. He has authored over 60 peer-reviewed journal articles, proceedings, and book chapters and is a co-inventor in 3 International patents and 2 European patent applications to his credit. He has presented more than 80 oral presentations at various conferences, seminars, courses, and invited talks, mainly on research progress and outreach on renewable energy technologies. He was involved as PI/Co-PI in projects funded by DST-SERB, MNRE, and ICSSR. He has guided several students on their PG degree projects, and some Ph.D. students have obtained their doctoral degrees under his guidance on material development for solar cells, bio-energy, battery, and fuel cells.

He serves as an executive council member for the Energy Science Society of India, a founding member of ANGIRAS -Network of Indian Alumni from German Universities for Sustainable Solutions, and a member of the Indian Society of Geomatics (ISG) - Pondicherry Chapter. He has more than 22 years of teaching and research activity, -including industrial research. He also serves as chairman of green audit for Pondicherry University campus and as a member of QS Sustainability Ranking and Times Higher Education World University Rankings for the campus to the SDGs-7 goal of "affordable and clean energy." In addition, he is a member of several university administration activities that promote sustainability. He is actively involved in outreach and promotion of solar energy technologies;- his team project proposal on Pondicherry University for a solar campus in 2012 has contributed to promoting Solar Energy on the campus with a current installed capacity of ~3 MWp in 2021, -making it one of the largest affordable and clean energy generation in an educational institution in India which caters to ~30% of the current University's energy requirement and helps offset several thousand tons of carbon emission annually. His involvement in the promotion of renewable energy and sustainability is highly appreciated.

Organising Committee (Pondicherry University)

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Pondicherry University

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Pondicherry University

Prof. D. Lazar
Finance Officer (i/c)
Pondicherry University

Prof. B.M. Jaffar Ali
Dean, MSGET
Pondicherry University

CONVENOR – NWANESE 2025

Dr. R. Arun Prasath
UNESCO Chairholder
Head & Professor, DGET

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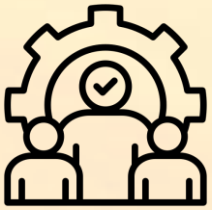
Assistant Professor

Dr. Krishna Kumar Jaiswal
Assistant Professor

Dr. S. Sivasankari
Assistant Professor

Dr. Krishna Villa Harika
DST-Inspire faculty



NWANESE 2025

PROGRAM ADVISORY COMMITTEE

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SAF Secretary, New Delhi

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Pondicherry University

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National Workshop on Advances in Nuclear Energy for Sustainable Environment

NWANESE-2025

Sponsored By MSF/SAF

Madanjeet School of Green Energy Technologies (UMSGETS)
Department of Green Energy Technology
PONDICHERRY UNIVERSITY
in Collaboration with
Indira Gandhi Centre for Atomic Research (IGCAR)- Kalpakkam -
Department of Atomic Energy, GOVERNMENT OF INDIA

PROGRAM SCHEDULE

25.07.2025 **CCC Auditorium**

TIMING	EVENTS	
8:30 AM – 9:20 AM	REGISTRATION	
9:20 AM – 10:30 AM	INAUGURATION	
10:30 AM – 11:00 AM	HIGH TEA	
11:00 AM – 11:45 AM	**Shri T. Rajkumar** SO/G, RCAD, RDG, IGCAR	***A perspective on Nuclear energy & Role of Fast Breeder Reactors***
11:45 AM – 12:30 PM	**Shri Ram Kumar Maity** SO/G THS, MHD, RDG, IGCAR	***Development of Fast Reactor Technology in India***
12:30 PM – 1:30 PM	LUNCH BREAK	
1:30 PM – 2:15 PM	**Dr. S. Tripurasundari** Head, SSSD, MSG, IGCAR	***Opportunities and Challenges in Materials Research for Sustainable Nuclear Energy***
2:15PM – 3:00 PM	**Shri Sanjay Kumar Das** Head, SED, FRTG, IGCAR	***Engineering Safety of Nuclear Power Plants (NPPs)***
3:00 PM – 3:15 PM	TEA BREAK	
3:15 PM – 4:00 PM	**Dr. C. V. Srinivas** Head, EAD, SQRMG, IGCAR	***Environment Assessment of Nuclear Energy***
4:00 PM – 4:45 PM	**Dr. S. Chandrasekaran** Head, HISD, SQRMG, IGCAR	***Radiation Safety Aspects in India: Practices, Policies, and Progress***
4:45 PM – 5:00 PM	VALEDICTORY SESSION	

CLICKED MOMENTS

NWANESE - 2025

CLICKED MOMENTS

NWANESE - 2025

MEDIA RELEASES

/ செய்திகள் / Kalvimalar / News / PU, IGCAR host national workshop on nuclear energy for sustainable development

PU, IGCAR host national workshop on nuclear energy for sustainable development

UPDATED : ஜூலை 26, 2025 12:00 AM
ADDED : ஜூலை 26, 2025 09:42 AM

Puducherry: Pondicherry University (PU) and the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, jointly organized a national workshop on "Advances in Nuclear Energy for a Sustainable Environment" (NWANESE-2025) under the UNESCO Chair activity. The event, hosted by the university's Department of Green Energy Technology, was inaugurated by Vice Chancellor Prof. P. Prakash Babu, who stressed the need for nuclear safety, public awareness, and the role of nuclear technology in societal development. The workshop explored the growing significance of nuclear energy in India's clean energy transition and climate action efforts. Prof. R. Arun Prasath, Head, DGET and UNESCO Chairholder, delivered the welcome address and outlined the Government of India's nuclear energy roadmap under “Viksit Bharat 2047.” He noted that India aims to expand its nuclear power capacity from 8 GW to 100 GW by 2047, targeting 500 GW of non-fossil fuel energy by 2030 and achieving net-zero emissions by 2070.

தினமலர்
DINAMALAR
National Tamil Daily

Eminent scientists from IGCAR, including Shri T. Rajkumar, Dr. S. Tripurasundari, and Dr. C.V. Srinivas, delivered technical sessions on nuclear advancements. Dean (i/c), MSGET, Prof. B. M. Jaffar Ali, highlighted the integration of nuclear with other renewables to ensure energy security. The event drew over 300 participants, including scientists, faculty, and students, and featured messages from UNESCO representatives. The workshop served as a platform for policy and research dialogue, emphasizing nuclear energy's critical role in India's sustainable development goals.

https://www.dinamalar.com/news/kalvimalar-news-en/pu-igcar-host-national-workshop-on-nuclear-energy-for-sustainable-development/56530

MEDIA RELEASES

Experts see bigger role for nuclear energy to attain sustainability goals

Published - August 01, 2025 10:17 pm IST - PUDUCHERRY

THE HINDU BUREAU

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Experts who addressed a recent workshop have advocated for exploring an expanding role for civilian nuclear power in India's clean energy transition and meeting its sustainability targets. The speakers were participating in the "National Workshop on Advances in Nuclear Energy for Sustainable Environment (NWANESE-2025) held under the auspices of the Pondicherry University's Department of Green Energy Technology with the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, under UNESCO Chair initiative. They called for increasing use of nuclear energy domain for energy diversification and fulfilling the nation's sustainability objectives, particularly in the context of climate change. Presiding over the inaugural, Pondicherry University Vice-Chancellor P. Prakash Babu underscored the crucial importance of nuclear safety, the need for increasing public awareness, and the vital societal applications of nuclear technologies. B. M. Jaffar Ali, Dean (i/c), MSGET, highlighted the synergies between nuclear, hydroelectric, solar, and wind power sources to ensure India's energy security and progress toward decarbonisation. A panel of nuclear scientists and experts from IGCAR, including T. Rajkumar, Ram Kumar Maity, S. Tripurasundari, Sanjay Kumar Das, C. V. Srinivas, and S. Chandrasekaran delivered technical talks over sessions.

R. Arun Prasath, Head and UNESCO Chairholder, stressed the urgency of climate action and outlining India's clean energy roadmap. The Government of India's Nuclear Energy Mission under "Viksit Bharat 2047," aims to scale up nuclear capacity from 8 GW to 100 GW by 2047, he said.

THE HINDU

Mr. Arun said the country's India's energy transition is guided by a multifaceted commitment to sustainability and climate responsibility. Noting that India had made remarkable progress in green energy, now obtaining nearly 35% of its energy from renewable sources—well above the global average, he said the country faced rapidly growing energy demands while aiming to generate 500 GW of non-carbon-based energy by 2030.As part of its global climate commitments, India has pledged to meet 50% of its total energy requirements from renewable and clean sources, and has submitted Nationally Determined Contributions (NDCs) to reduce carbon emission intensity by 35% by 2030, compared to 2005 levels. This was in addition to the commitment to achieving net-zero carbon emissions by 2070. France Marquet, Principal Trustee, Madanjeet Singh Foundation and Benno Boer of the UNESCO Regional Office, New Delhi, shared their messages for the event. The event brought together more than 300 participants including faculty members, scientists, research scholars, and UG/PG students, the press note said.

Published - August 01, 2025 10:17 pm IST

https://www.thehindu.com/news/cities/puducherry/experts-see-bigger-role-for-nuclear-energy-to-attain-sustainability-goals/article69882842.ece

MEDIA RELEASES

சிறப்பு சேவைகள் மற்றும் கட்டுரைகள்

நீடித்த வளர்ச்சிக்கு அணுசக்தியின் அவசியம்: தேசிய பயிலரங்கில் புதுச்சேரி பல்கலைக்கழக துணைவேந்தர்

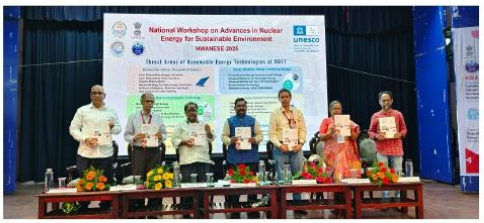
Posted On: 25 JUL 2025 5:38PM by PIB Chennai

பசுமை எரிசக்தி தொழில்நுட்பத் துறை, புதுவைப்பல்கலைக்கழகம் மற்றும் இந்திரா காந்தி அணு ஆராய்ச்சி மையம், கல்பாக்கம் ஆகியவை, யுனெஸ்கோ இருக்கையின் ஆதரவுடன், 'நீடித்த வளர்ச்சிக்கான அணுசக்தி பயன்பாட்டின் முன்னேற்றங்கள்' என்ற தேசிய பயிலரங்கு நடைபெற்றது.

புதுச்சேரி பல்கலைக்கழகத்தின் கலாச்சார மற்றும் மாநாட்டு மையத்தில் நடைபெற்ற இந்தப் பயிலரங்கில் நாட்டின் தூய்மை எரிசக்தி உற்பத்தியில் அணுசக்தியின் பங்களிப்பு, பருவநிலை மாற்றம், எரிசக்தியை பல்வகைப்படுத்தல், தேசிய நிலைத்தன்மைக்கான நோக்கங்கள் ஆகிய அம்சங்களை பரிசீலிக்க உதவுகிறது.

இந்தப் பயிலரங்கின் முதலாவது அமர்வில் தலைமை உரையாற்றிய புதுச்சேரிப் பல்கலைக்கழகத்தின் துணைவேந்தர் பேராசிரியர் பி. பிரகாஷ் பாபு, அணுசக்தி பாதுகாப்பின் அவசியத்தை எடுத்துரைத்தார். அணுசக்தி குறித்த விழிப்புணர்வை ஏற்படுத்த வேண்டியதன் அவசியம் குறித்தும் அவர் வலியுறுத்தினார். அணுசக்தி தொழில்நுட்பங்களின் பயன்பாடுகள் குறிப்பாக மருத்துவம், குடிநீர் சுத்திகரிப்பு, வேளாண்மை, எரிசக்தி உற்பத்தி போன்ற துறைகளில் அதன் பயன்பாடு குறித்து விரிவாக எடுத்துரைத்தார்.

இத்தகைய அவசியமான சூழலில் இதுபோன்ற பயிலரங்கை ஏற்பாடு செய்ததற்காக பசுமை எரிசக்தி தொழில்நுட்பத் துறை மற்றும் யுனெஸ்கோ அமைப்பின் முயற்சிகளுக்கு அவர் பாராட்டு தெரிவித்தார்.



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MEDIA RELEASES

Special Service and Features
Posted On: 25 JUL 2025 5:38PM by PIB Chennai

Pondicherry University and IGCAR Jointly organize National Workshop on Nuclear Energy for a Sustainable Environment

Posted On: 25 JUL 2025 5:38PM by PIB Chennai

The Vice Chancellor of Pondicherry University Prof. P. Prakash Babu inaugurated the National Workshop on Advances in Nuclear Energy organized by the Department of Green Energy Technologywith IGCAR under UNESCO Chair activity. The Department of Green Energy Technology (DGET), Pondicherry University, in collaboration with the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, successfully inaugurated the National Workshop on Advances in Nuclear Energy for Sustainable Environment (NWANESE-2025) under the auspices of the UNESCO Chair activities. The event was held at the Cultural-Cum-Convention Centre, Pondicherry University. NWANESE-2025 aimed to explore the expanding role of nuclear energy in India's clean energy transition, particularly in the context of climate change, energy diversification, and the nation's sustainability objectives. The inaugural session was presided over by Prof. P. Prakash Babu, Hon'ble Vice Chancellor of Pondicherry University. In his presidential address, Prof. Babu emphasized the crucial importance of nuclear safety, increasing public awareness, and the vital societal applications of nuclear technologies. He commended the efforts of DGET and UNESCO for organizing such a timely and intellectually significant event. In his felicitation address, Prof. B. M. Jaffar Ali, Dean (i/c), MSGET, underscored the synergies between nuclear, hydroelectric, solar, and wind power sources to ensure India's energy security and progress toward decarbonization.

The workshop featured a distinguished panel of nuclear scientists and experts from IGCAR, Shri T. Rajkumar, Shri Ram Kumar Maity, Dr. S. Tripurasundari, Shri Sanjay Kumar Das, Head, Dr. C. V. Srinivas, and Dr. S. Chandrasekaran delivered technical talks throughout the day. The session was further enriched by messages of goodwill from Madam France Marquet, Principal Trustee, MSF, and Dr. Benno Boer of the UNESCO Regional Office, New Delhi. Prof. R. Arun Prasath, Head and UNESCO Chairholder, delivered the welcome address, highlighting the urgency of climate action and outlining India's clean energy roadmap. He discussed the Government of India's Nuclear Energy Mission under "Viksit Bharat 2047," which aims to scale up nuclear capacity from 8 GW to 100 GW by 2047. Prof. Arun noted that India has made remarkable progress in green energy, now obtaining nearly 35% of its energy from renewable sources—well above the global average. He emphasized the country's India's energy transition is guided by a multifaceted commitment to sustainability and climate responsibility. The country faces rapidly growing energy demands while aiming to generate 500 GW of non-carbon-based energy by 2030. As part of its global climate commitments, India has pledged to meet 50% of its total energy requirements from renewable and clean sources, and has submitted Nationally Determined Contributions (NDCs) to reduce carbon emission intensity by 35% by 2030, compared to 2005 levels. Further, India has announced its target of achieving net-zero carbon emissions by 2070. These goals are deeply aligned with the country's commitment to advancing the United Nations' 17 Sustainable Development Goals (SDGs), especially those related to clean energy (SDG 7), climate action (SDG 13), and sustainable industry and innovation (SDG 9). Prof. Arun also spotlighted the development of Bharat Small Modular Reactors (SMRs) and reaffirmed DGET's commitment to advancing clean energy education and research. The event brought together more than 300 participants including faculty members, scientists, research scholars, and UG/PG students. The workshop proved to be a robust platform for the convergence of policy, research, and technology—reinforcing the message that nuclear energy is poised to play a pivotal role in India's journey toward net-zero emissions. The Department of Green Energy Technology, Pondicherry University, and IGCAR, Kalpakkam, inaugurated the NWANESE-2025 workshop on nuclear energy for a sustainable environment.

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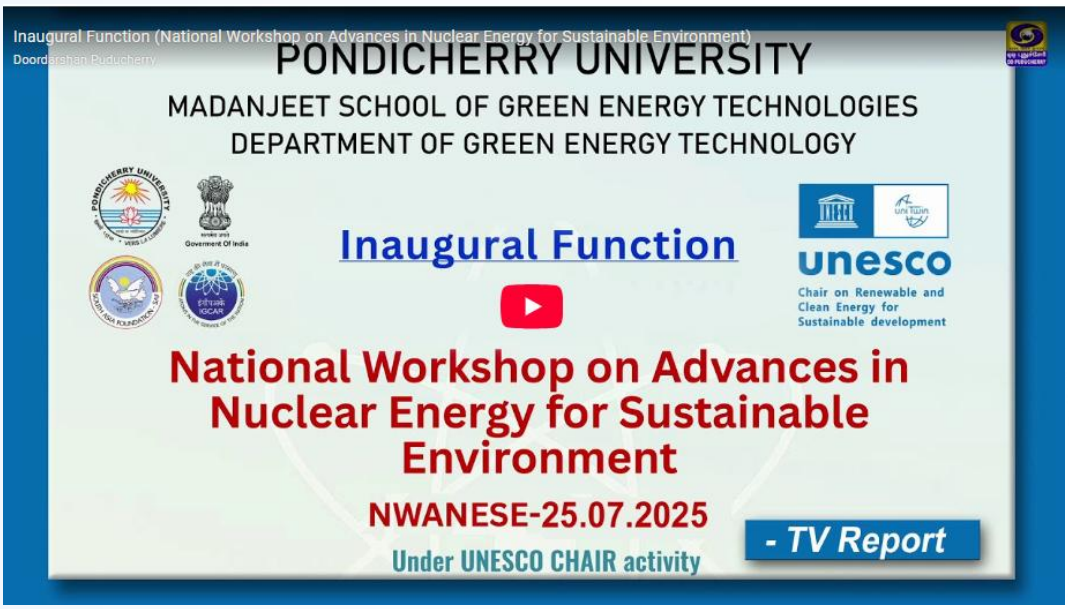
MEDIA RELEASES



https://www.youtube.com/watch?v=o7qHAtt3310

https://www.youtube.com/watch?v=vI-dpHyi5Wc

PROGRAM REPORT

NWANESE-2025

National Workshop on Advances in Nuclear Energy for Sustainable Environment

25th July 2025 | Pondicherry University

The *National Workshop on Advances in Nuclear Energy for Sustainable Environment (NWANESE-2025)* was successfully conducted on **25th July 2025** at **Pondicherry University**, organized by the **Department of Green Energy Technology, Madanjeet School of Green Energy Technologies**, under the **UNESCO Chair activity**, in association with **IGCAR-Kalpakkam** and with generous support from **South Asia Foundation(MSF/SAF)** and **UNESCO-Chair on Renewable and Clean Energy for Sustainable Development**. The workshop aimed to foster dialogue and knowledge sharing on the role of nuclear energy in combating climate change and achieving sustainability.

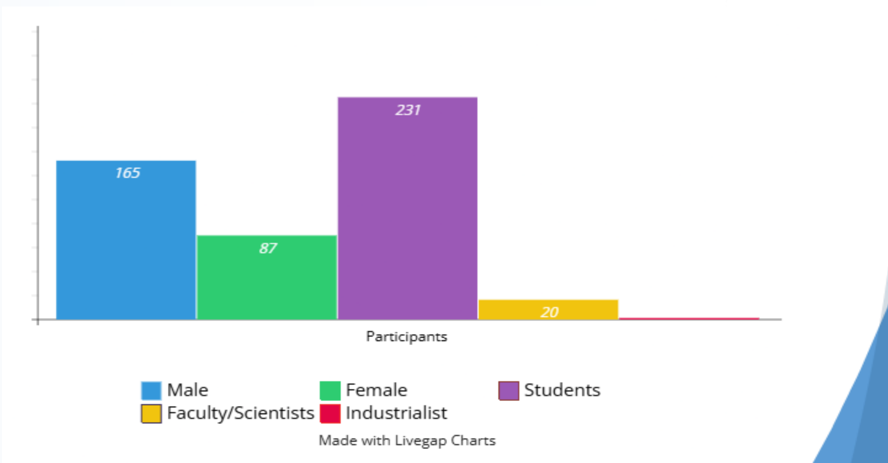
252 PARTICIPANTS

50 SPOT-REGISTERED DELEGATES

154 EXTERNAL PARTICIPANTS

48 INTERNAL PARTICIPANTS

The workshop featured **six distinguished invited speakers** from IGCAR and they delivered insightful technical talks on fast breeder reactors, materials research, safety engineering, radiation safety, and environmental assessment in the nuclear domain. Dignitaries from **UNESCO-INDIA**, **SAF-Madanjeet Foundation**, **UNESCO Chair**, **IGCAR** and the **Vice Chancellor of Pondicherry University** graced the event. Participants hailed from reputed institutions. The event marked a significant step toward engaging youth, researchers, and academicians in India's clean nuclear energy mission and in aligning with global sustainable development goals.



Expert Talks

ABSTRACTS

NWANESE - 2025

A Perspective on Nuclear energy & Role of Fast Breeder Reactors

T. Rajkumar, D. Naga Sivayya, Sriramachandra Aithal

Shri T. Rajkumar
SO/G, Reactor Core & Assembly Division (RCAD), Reactor Design Group (RDG) – IGCAR

Brief Biodata: **Shri T. Rajkumar** has graduated in Mechanical Engineering from Periyar University. He is from the 50th batch of BARC Training School at IGCAR Campus. He has completed his M. Tech degree in Mechanical Engineering from Homi Bhabha National Institute, Mumbai. He joined IGCAR in 2007 and is presently working as Scientific Officer–G in Core Engineering Section of Reactor Design Group, IGCAR. He is specialized in Fast Reactor core subassembly design, fuel pin modeling, hydraulic studies and metal fuel performance studies. He has received DAE Young Engineer Award in 2014 and also got three Group Achievement awards in 2010, 2012 & 2013. He has around 11 Publications in International /National Conferences.

Nuclear power is a low-carbon source of energy, because unlike coal, oil or gas power plants, nuclear power plants practically do not produce CO_2 during their operation. Nuclear reactors generate close to one-third of the world's carbon free electricity and are crucial in meeting climate change goals. India's available energy resources warrant nuclear power as the long-term solution for meeting the ever-increasing energy demands and also due to environmental concerns. Nuclear power along with renewable energy has been recognized as the major resource for the future. Accordingly, Department of Atomic Energy (DAE) has evolved a plan for a challenging nuclear capacity addition. The plan is based on a three-stage nuclear power program harnessing the domestic nuclear resources i.e. employing its natural uranium and Thorium reserves. In the first stage, the Indian nuclear power program is based on Pressurized Heavy Water Reactors (PHWRs), which use natural uranium as fuel and heavy water (D_2O) as both coolant and moderator. The objective is to utilize India's limited uranium reserves efficiently and to produce plutonium-239 for use in the second stage. Fast Breeder Reactors (FBRs) form the second stage of the program linking the first phase with natural Uranium and third phase with Thorium fuels. Breeder Reactors convert fertile material (U-238) into fissile plutonium-239, thereby generating more fuel than they consume. Emphasis has been on the indigenous technology especially through fast breeders, is significant and challenging, considering the India's growth projections for long term sustainability.

Indira Gandhi Centre for Atomic Research (IGCAR), instituted in 1971 at Kalpakkam, is involved in the mission of developing the technology of FBR. Multi-disciplinary laboratories are established in the centre around the central facility of the 40 MWt Fast Breeder Test Reactor (FBTR). The FBTR, which went critical in 1985, has given valuable experience in the operation of sodium systems including steam generators, and has served as a test bed for various experiments and fuel irradiation program. Presently, the construction of indigenously designed MOX fuelled 500 MWe Prototype Fast Breeder Reactor (PFBR) is in an advanced stage of commissioning. The design of PFBR incorporates several state-of-art features and is foreseen as an industrial scale techno-economic viability demonstrator for the Indian FBR program. Beyond PFBR, the plan is to build one twin unit having two reactors with MOX fuel at Kalpakkam, incorporating improved and simplified design features. For future, metal fuelled fast reactors with high breeding ratios are planned. This paper further discusses about core design & safety aspects of a typical FBR.

Development of Fast Reactor Technology in India

Ram Kumar Maity*, M. Rajendrakumar, K. Natesan

Dr. Ram Kumar Maity
SO/G, Thermal Hydraulics Section (THS), Mechanics & Hydraulics Division (MHD), Reactor Design Group (RDG)- IGCAR
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India's fast reactor program is poised for significant expansion in the coming years, driven by the growing need for clean and sustainable energy. As the country strives to reduce its carbon footprint while addressing rising energy demands, fast breeder reactors present a viable pathway for the efficient utilization of indigenous nuclear fuel resources. Given the limited availability of domestic uranium, a nuclear program based solely on thermal reactors using indigenous fuel would face inherent constraints. Therefore, the successful development and deployment of fast reactor technology is crucial towards ensuring long-term energy security for the nation.

Starting with a 13.2 MWe experimental reactor viz. the FBTR, the program is expected to take a significant leap with the commissioning of the 500 Mwe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam. The program would undergo expansion in the near future with the deployment of additional experimental and commercial fast breeder reactors as shown in Fig.1. The Indira Gandhi Centre for Atomic Research (IGCAR) was established in 1971 as the Reactor Research Centre (RRC) to lead India's efforts in fast reactor technology. Over the decades, IGCAR has developed a multidisciplinary program encompassing scientific research and advanced engineering, with a primary focus on the development and deployment of fast breeder reactor technology. Through sustained research and development efforts, India has achieved mastery in several critical areas essential to fast reactor systems, including fuel behavior, liquid metal thermal hydraulics, high-temperature structural mechanics, fast reactor physics, and materials science. The present paper provides an overview of these key technological developments and outlines the future directions for India's fast reactor program.

Brief Biodata: **Dr. Ram Kumar Maity** graduated from Pondicherry Engineering College in the year 2006 and joined the BARC training school (IGCAR Campus) in the year 2007. Subsequently he graduated from the second batch of the BARC Training School at the IGCAR campus and joined IGCAR in 2008 as a Scientific Officer. He holds a M.Tech from Homi Bhabha National Institute (HBNI), Mumbai and a Ph.D. in Mechanical Engineering from the Indian Institute of Technology Madras, Chennai. His areas of work include thermal-hydraulic design and analysis of various systems of liquid metal-cooled fast reactors. He has worked extensively on the systems and components of both primary and secondary heat transport systems, with a specialization in pool thermal hydraulics for Indian fast reactor designs. Dr. Maity has generated valuable data supporting the design of critical components such as intermediate heat exchangers, sodium pumps, electromagnetic pumps, steam generators, sodium valves, and core subassemblies. He has also contributed to several studies aimed at the commissioning activities of PFBR and continues to play an active role in ongoing initiatives. As part of his work profile, Dr. Maity has developed expertise in the use of important commercial codes and has actively contributed to the development of in-house codes. He has 5 Journal publications and 24 conference proceedings to his credit.

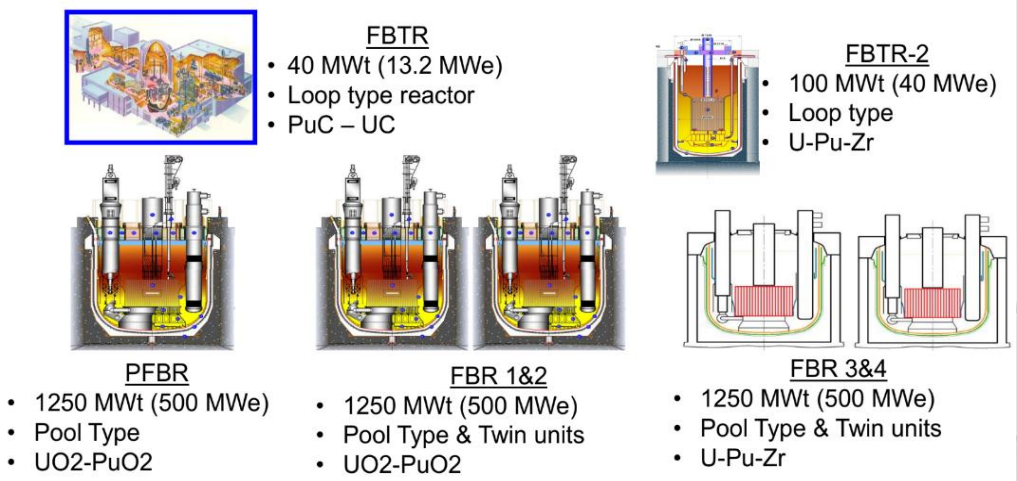


Fig. 1. India fast reactor program – The present and Future

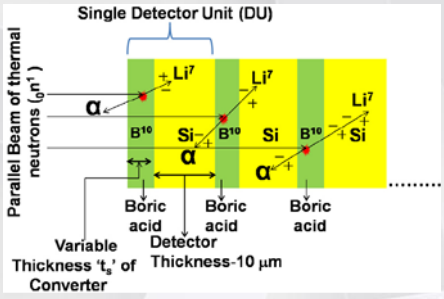
Opportunities and Challenges in Materials Research for Sustainable Nuclear Energy

Dr. S. Tripurasundari

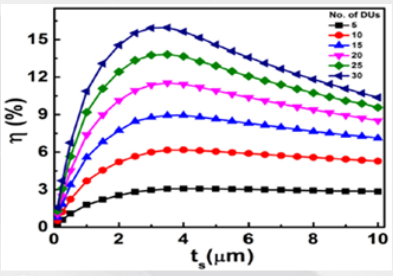
Head, Surface & Sensors Studies Division (SSSD), Material Science Group (MSG)- IGCAR

The talk will encompass a brief overview of context of the importance of nuclear energy towards sustainable development, followed by the nuclear reactors types and evolution in making them more viable in terms of cost effectiveness, safety, security and fuel cycle front. The nuclear power plants that supply clean electricity based by nuclear fission of fissile atoms have certainly brought huge benefits to mankind in an effort to lessen global warming. However, there are challenges related to infrastructure integrity, materials aging due to prolonged exposure to extreme conditions of radiation, temperature etc. The role of thin films/coatings, electronic devices, nanomaterials towards being radiation tolerant and the role of defects and damage and their consequence in mitigating/aggravating several problems will be discussed. As for post irradiation examination of irradiated materials, to understand radiation-property correlation, the role of radiation resist glasses will be touched upon [1]. The role of simulation towards urgent need to design solid state neutron detectors for monitoring safe operation of nuclear reactors will be outlined [2]. IGCAR has undertaken a work on repair and rectification of defunct HPGe detectors of DAE so as to offer seamless operation of reactors and this aspect will also be touched upon.

Brief Biodata: **Dr. S. Tripurasundari** completed her bachelor's degree in physics from University of Madras and Masters degree in Physics from Indian Institute of Technology, Madras. She then joined the 34th batch of BARC Training School. She joined the Materials Science Laboratory and worked with Secondary ion Mass spectrometry. Eventually, she completed her doctorate in Physics from University of Madras. She is working in the area of thin films and multilayers. She has specialized in the optical studies of materials using spectroscopic ellipsometry. She has undertaken in-depth study on crystalline to amorphous transition in single crystal silicon upon ion irradiation using spectroscopic ellipsometry, has studied refractive index of several thin films, multilayers, buried layers, ultra thin films, metal to insulator transitions, thermo-optic behavior etc. She has also worked on microcantilevers for essentially detecting humidity among others and provided the first experimental evidence to show that even uncoated microcantilevers can be used very effectively for sensing humidity. She had undertaken in-depth study on effect of irradiation on silicon PIN diodes as prototype for electronic devices and showed rectifying to ohmic behavior beyond a threshold of thermal neutron irradiation fluence. Her work on humidity dependence on Silicon PIN diode provided useful insights into protocols set for measurement of electrical characteristics. She has studied effect of neutron irradiation on materials using GEANT4 simulations too to monitor their behavior. She was also involved in the design, development and demonstration of solid state thermal neutron detector carried out in collaboration with IISc, Bengaluru. She is credited with leading a task force that is engaged in repair and rectification of non-functional High Purity Germanium detectors in DAE. She is currently heading Surface & Sensors Studies Division of the Material Science Group, IGCAR.



Planar stack configuration of detector



Variation of detection efficiency with thickness

References

1. Sitendu Mandal, Srikrishna Manna, Kaushik Biswas, Sourav Nag, Balram Ambadeb, Ceramics International 49 23878–23886 (2023)
2. Manoj KumarParida, S. Tripurasundari, K. Prabakar, Nuclear Inst. and Methods in Physics Research, A 951 162978 (2020)

Engineering Safety of Nuclear Power Plants

Sanjay Kumar Das, E. Hemanth Rao and B. K. Sreedhar

Shri Sanjay Kumar Das
Head, Safety Engineering Division (SED), Fast Reactor Technology Group (FRTG)- IGCAR

India's commitment to achieving net-zero emissions by 2070 has accelerated the deployment of clean energy technologies. In this evolving energy landscape, nuclear power stands out as a reliable, zero-emission source of baseload electricity, offering critical support to renewable energy sources and contributing to grid stability [1]. With its minimal ecological footprint and near-zero greenhouse gas emissions, nuclear energy is a key pillar in India's sustainable development strategy [2]. The safe and reliable expansion of nuclear energy hinges on advanced reactor designs, robust safety systems, and stringent regulatory oversight [3]. The primary goal of reactor safety is to maintain system integrity under all anticipated and postulated events, while practically eliminating the risk of radioactive release to personnel and the public [4].

At the core of nuclear safety is the defense-in-depth philosophy [5], a multi-layered approach that integrates redundant and diverse safety systems to prevent, control, and mitigate potential accidents. Essential safety components such as the Reactor Protection System (RPS), Emergency Core Cooling System (ECCS), containment structures, and decay heat removal systems are designed with conservative margins and fail-safe mechanisms to ensure resilience under all scenarios. Furthermore, modern reactors incorporate passive safety features that operate without human intervention or external power, significantly enhancing reliability, particularly during severe accidents.

The Safety Engineering Division at IGCAR, is at the forefront of advancing the safety of Fast Breeder Reactor (FBR) program. Ongoing R&D efforts focus on validating both engineered and passive safety systems and developing next-generation safety devices aimed at safeguarding reactor cores and the surrounding environment [6].

Brief Biodata: **Shri Sanjay Kumar Das** is Mechanical engineer, graduated from University of Poona in 1991. He has worked in thermal power plant turnkey projects for 5 years, before joining IGCAR in 1996.

He is leading a team responsible for experimental R&D related to severe accidents and sodium safety of sodium cooled fast reactor. These activities are focused on studying the consequences of postulated incidents through realistic experimental simulation, to ascertain the design safety margins and validate engineered safety features. Outcome of these safety studies are vital towards reinforcing the design and accident mitigation strategies of fast reactor.

He is a recipient of 'Excellence in Science, Engineering and Technology' award and few 'Group Achievement' awards from DAE. He has many journal and conference papers to his credit.

Shri Sanjay Kumar Das is currently heading Safety Engineering Division of Fast Reactor Technology Group, IGCAR.

References

1. A report on the role of Small Modular Reactors in the energy transition by Niti Ayog, 2023
2. Nuclear Energy's Role in Sustainability and Environmental Protection in India, D K Aswal, Anirudh Chandra, Current Natural Sciences & Engineering 1 (5), 2024
3. International Energy Agency, Nuclear Power in a Clean Energy System, IEA, 2019.
4. Safety of Nuclear Reactors, Nicholas R. Brown, Seok Bin Seo, Encyclopedia of Nuclear Energy, 2021, Pages 456-464
5. IAEA INSAG Series Documents
6. https://www.igcar.gov.in/sed.html

Environmental Aspects of Nuclear Energy

Dr. C. V. Srinivas
Head, Environment Assessment Division (EAD), Safety, Quality & Resource Management Group (SQRMG)- IGCAR

Global warming caused by green house gas emissions is a burning issue with serious consequences on earth's climate and environment as well human health. Sustainable development of economy, energy and society requires reliable and clean energy with no air pollution. Among all sources nuclear energy provides an affordable, reliable low-carbon source of power with no air pollution. Fast Breeder reactors provide a long term solution of energy. This talk gives an overview of the environment assessment program at IGCAR for monitoring the radioactivity releases from nuclear facilities for meeting regulatory compliance. This includes continuous monitoring of radioactivity in air, water, soil media, monitoring the internal and external doses of occupational workers, dispersion modelling for public dose assessment for operational releases, radiological impact assessment for anticipated /hypothetical releases, decision support systems for nuclear and chemical emergencies, and development of retrospective dose estimation methods.

Brief Biodata: **Dr. Venkata Srinivas** is a Senior Scientist at Indira Gandhi Centre for Atomic Research, Kalpakkam. He completed M.Sc in Meteorology in 1989, and Ph.D from Andhra University, Visakhapatnam in 2001. He was a Post-Doctoral Research Fellow at Department of Meteorology, Jackson State University during 2006-2008. He is specialized in Atmospheric Science, dispersion modeling. He has developed Emergency Response decision support systems for nuclear & chemical emergencies based on weather prediction and atmospheric dispersion models. He has contributed in radiological dispersion modeling, impact assessment for operational and accidental releases, effectively used dynamical atmospheric models and observations to study a range of phenomena such as boundary-layer rolls, mesoscale and topographic flows, convective storms and tropical cyclones (TC) for their realistic prediction/ simulation. He is heading the Environmental Assessment Division, IGCAR and coordinating the activities of Radiation dosimetry, bio-diversity, natural radioactivity measurements and environmental assessment. He has also established a C-Band Polarimetric Doppler Weather Radar and Mid-Tropospheric Wind Profiler facilities at IGCAR for Atmospheric Studies in collaboration with ISTRAC-ISRO. He has pursued several research projects. He has contributed over 150 publications in peer-reviewed international journals and 7 Book-Chapters. He is also a Professor of Homi Bhabha National Institute and guided 8 Ph.Ds and 10 M.Tech/ M.Sc students. Dr.Srinivas is currently heading Environment Assessment Division (EAD), Safety, Quality & Resource Management Group (SQRMG), IGCAR.

Radiation Safety Aspects in India: Practices, Policies, and Progress

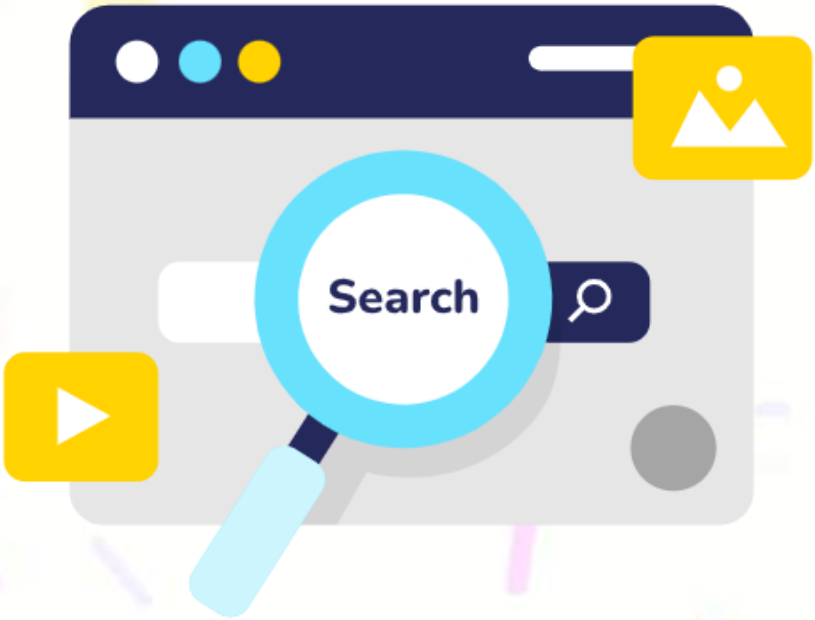
Dr. S. Chandrasekaran
Head, Health and Industrial Safety Division (HISD), Safety, Quality & Resource Management Group (SQRMG) – IGCAR

Radiation safety in India has evolved significantly in response to the expanding applications of ionizing radiation in energy, medicine, industry, and research. This paper reviews the institutional framework, regulatory mechanisms, and operational practices that ensure radiation protection across diverse sectors. Key initiatives by the Atomic Energy Regulatory Board (AERB) and the Department of Atomic Energy (DAE) are highlighted, with emphasis on compliance with international standards, indigenous safety culture, and progressive legislative measures. Advances in personnel monitoring, waste management, training, emergency preparedness, and public outreach are discussed, demonstrating India's commitment to maintaining high safety standards. The technical talk also examines challenges and outlines future strategies for strengthening radiation safety governance in the context of emerging technologies and increasing public engagement.

Brief Biodata: **Dr. S. Chandrasekaran** is Head of the Health and Industrial Safety Division at IGCAR, Kalpakkam. Since joining IGCAR in 2000, he has been involved in radiation shielding design and criticality safety for fast reactor fuel cycle facilities. His expertise includes radiation transport calculations, Monte Carlo simulation techniques, and uncertainty analysis.

He has led a comprehensive dose mapping study along the 750 km east coast of Tamil Nadu and has played a key role in radiation safety awareness programs in schools and colleges across the state. He was instrumental in organizing the Dr. A.P.J. Abdul Kalam Science Yatra (IISF-2017) and the 2025 Science Yatra from Kalpakkam to Kaiga.

With over 145 publications in peer-reviewed journals and conferences, Dr. Chandrasekaran is a Fellow of the Tamil Nadu Academy of Sciences and a two-time recipient of the DAE Group Achievement Award (2015, 2017). His current research interests include environmental radioactivity monitoring, impact assessment, and the application of statistical methods in dose evaluation.



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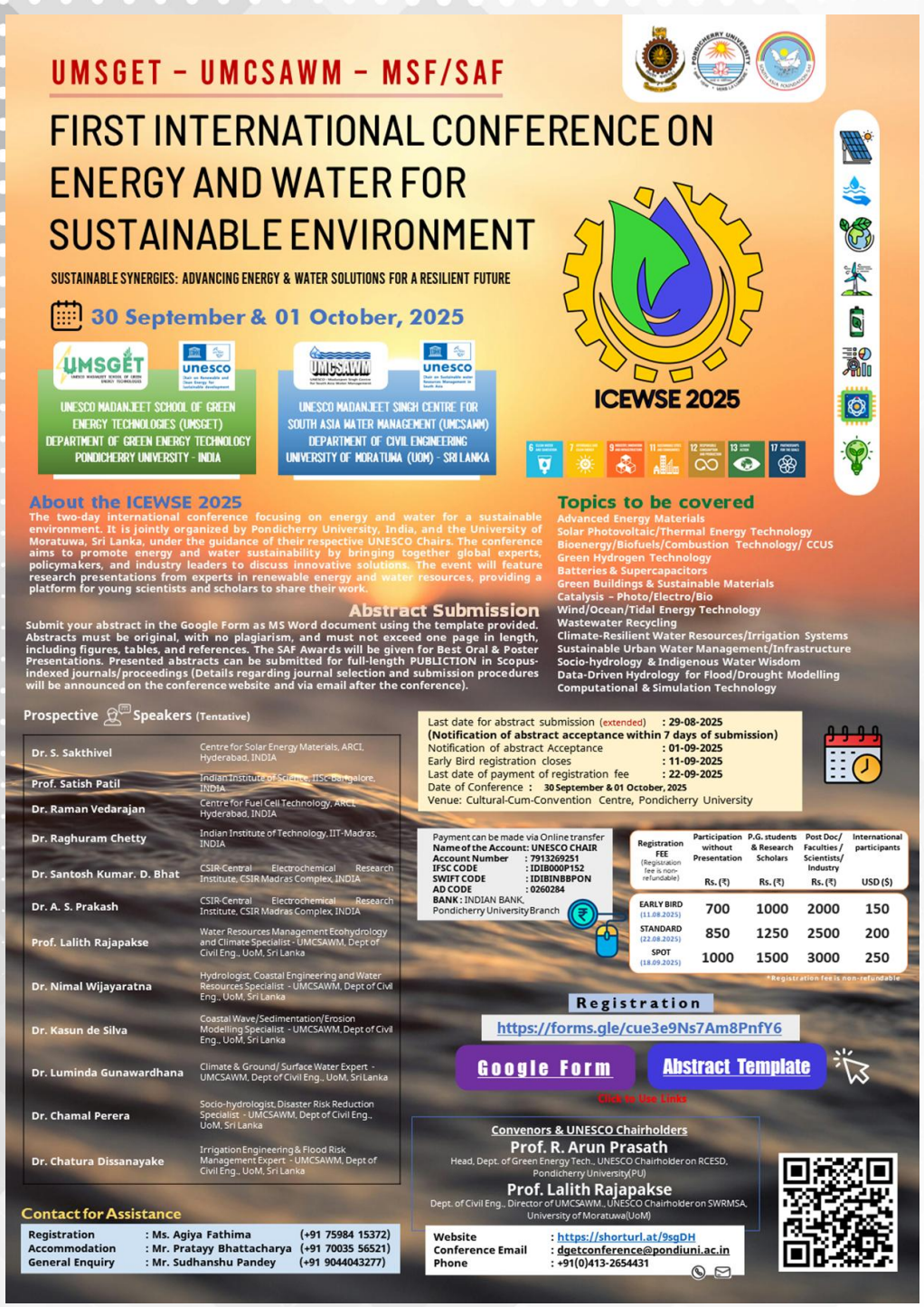

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