जन जागरूकता ई-संवाद पत्र

कुडनकुलम न्यूक्लियर पॉवर प्रोजेक्ट

मई 2026 अंक – 167

इस अंक में:

तैयारकर्ता एवं संपादक:

जाशी केबी ,
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टीएलडी प्रयोगशाला
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पुनरीक्षणकर्ता :

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संजीव भारद्वाज ,
प्रशिक्षण अधीक्षक एवं अध्यक्ष,
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जारीकर्ता:

अशोक भाटिया,
स्थल निदेशक,
कुडनकुलम न्यूक्लियर पॉवर प्रोजेक्ट

प्रिय पाठकगण ,

भारत का नाभिकीय क्षेत्र स्वच्छ, विश्वसनीय एवं संधारणीय ऊर्जा की ओर राष्ट्र की प्रतिबद्धता को प्रतिबिंबित करते हुए लगातार महत्वपूर्ण उपलब्धियां हासिल कर रहा है। द्वितीय भारतीय ईंधन चक्र सम्मिश्र के लिए प्रचालन लाइसेंस की मंजूरी, कुडनकुलम इकाई-5व6 के लिए मुख्य नियामक अनुमोदन, स्वदेशी रिएक्टरों के पुनरारंभ की ओर प्रगति, तथा प्रगत प्रौद्योगिकियां में बढ़ती निजी क्षेत्र की रूचि जैसे लघु मॉड्युलर रिएक्टर नाभिकीय परिदृश्य में महत्वपूर्ण विकास को चिह्नित करते हैं।ये उपलब्धियां हमारे ऊर्जा सुरक्षा को मजबूत करती हैं और भारत के विस्तारित नाभिकीय कार्यक्रम और प्रौद्योगिकीय क्षमताओं में विश्वास को सदृढ़ करती हैं। पढ़कर आनंदित हों...

अध्यक्ष, जन जागरूकता समिति

मई 2026 के विशिष्ट बिंदु

1. केकेएनपीपी स्थल पर 37 और स्थल के बाहर 03 जन संपर्क कार्यक्रम आयोजित किए गए
2. 1,384 घंटों का जन संपर्क 2,789 लोगों से संपर्क
3. 5,024 जन जागरूकता प्रकाशन वितरित किए गए

केकेएनपीपी का जलवायु परिवर्तन के न्यूनकरण में योगदान

जलवायु परिवर्तन आज वैश्विक पर्यावरण मुद्दों में सर्वाधिक महत्वपूर्ण है। नाभिकीय विद्युत न्यूनतम कार्बन प्रौद्योगिकियों में से एक है जो बढ़ती हुई आबादी एवं सामाजिक-आर्थिक विकास के लिए विद्युत उत्पादन करते हुए ग्रीन हाउस गैसों (जीएचजी) के उत्सर्जन (अधिकतर CO_2) में कमी लाती है। CO_2 के उत्सर्जन में कमी लाने में केकेएनपीपी का योगदान (दिनांक **31 मई 2026** को) अब तक इस प्रकार है।

कुल उत्पादित विद्युत इकाई	129,155 मिलियन यूनिट
केकेएनपीपी द्वारा कुल CO_2 उत्सर्जन में कमी	110,943,873 टन

नोट: कोयले एवं नाभिकीय ऊर्जा के औसत जीवन चक्र ग्रीन हाउस गैस उत्सर्जन क्रमश: 888 एवं 29 (टन/गीगावाट घंटा) है।

Public Awareness e-Newsletter

Kudankulam Nuclear Power Project

May 2026 Issue –167

In this issue:

Dear Readers,

India's nuclear sector continues to achieve significant milestones, reflecting the nation's commitment to clean, reliable, and sustainable energy. The operating licence granted for the second Indian fuel cycle complex, key regulatory approvals for Kudankulam Units 5 and 6, progress towards restarting an indigenous reactor, and growing private-sector interest in advanced technologies such as Small Modular Reactors mark important developments in the nuclear landscape. These achievements strengthen our energy security and reinforce confidence in India's expanding nuclear programme and technological capabilities. Read on happily!

-Chairman, PA Committee

Spotlight of May 2026

1. **37 on-site & 03 Off-site outreach programme organised**
2. **1,384 hours of Public Outreach, reached 2,789 people**
3. **5,024 PA Publications distributed**

KKNPP 's contribution to climate change mitigation

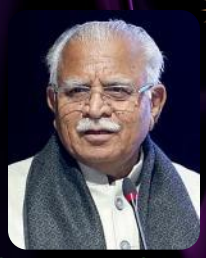
Climate change is the foremost global environmental issue today. Nuclear power is one of the low carbon technologies that can contribute to reducing greenhouse gas (GHG) emissions (mostly CO_2) while generating electricity for growing populations and socioeconomic development. KKNPP's contribution in preventing the CO_2 emissions till now (**As on May 31, 2026**) is given below.

No.of units of electricity generated	129,155 Million Units
Total CO_2 emissions avoided by KKNPP	110,943,873 Tonnes

Note: Average lifecycle GHG emissions for Coal & Nuclear is 888 & 29 (tonnes/GWh) respectively.

Centre targets nearly 300 GW power generation capacity by next year

"India is boosting its power generation capacity, focusing on nuclear energy. To meet rising consumption driven by industrial growth, data centres, electric vehicles and households, the Centre plans to increase power generation capacity from the current 283 GW to nearly 300 GW next year. Nuclear power would play a key role in India's long-term energy security. While the country currently generates around 8 GW of nuclear power and has another 9 GW under construction, the government has set a target of achieving 100 GW by 2047 through policy reforms and greater private-sector participation."



Shri Manohar Lal Khattar

Union Minister for Housing and Urban Affairs and Power

Source: economictimes.indiatimes.com dated May 31, 2026 & Wikipedia

Snap shot

A glimpse of **Indian spot-billed ducks** near Anuvijay Township, Chettikulam.

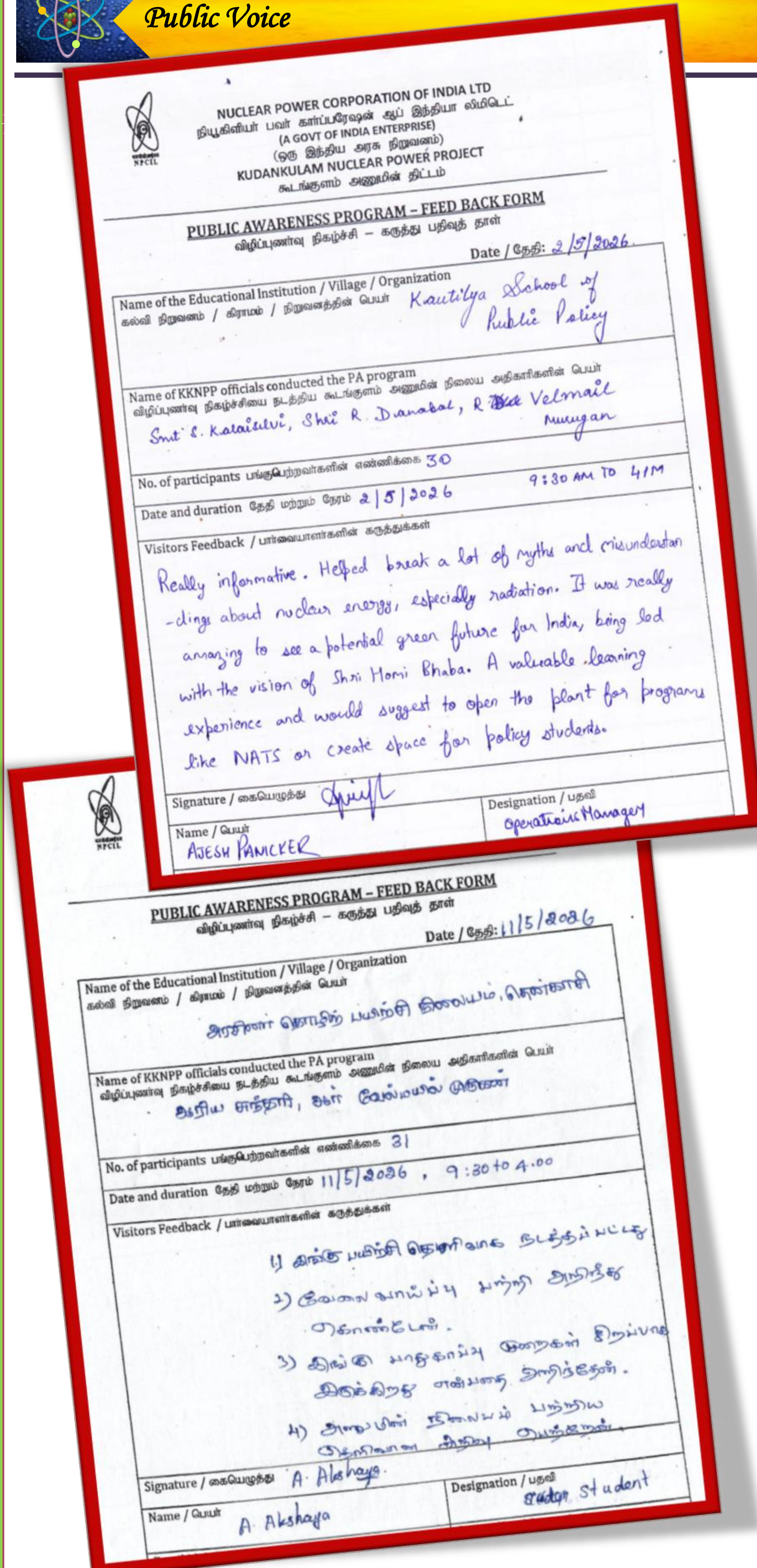
Photography by
Sh Rathina Pandi
Senior Technician/H
MMU, KKNPP

Scientific classification	
Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Anseriformes
Family:	Anatidae
Genus:	Anas
Species:	A. poecilorhyncha
Binomial name:	
Anas poecilorhyncha	

Source: en.wikipedia.org

Public awareness Site visits:

Site visit commences with a visit to Nuclear Information Centre(NIC) and a structured lecture programme is conducted for about one hour on nuclear energy & safety features of KKNPP with relevance to the events at Fukushima and also addresses the queries mainly related to protection of marine organism and handling of waste. They are then taken to Model room for familiarization of site layout, simulator facility to visualize the functioning of safety systems and health physics training facility to understand the concept of radiation safety during normal operation & abnormal situation. Subsequently they are taken to the Intake structure and Desalination plant. This programme concludes with a feedback session. Two of the feedback received from the visitors are given in this section.



NPCIL

NUCLEAR POWER CORPORATION OF INDIA LTD
நியூக்ளியர் பவர் கார்ப்பரேஷன் ஆப் இந்தியா லிமிடெட்
(A GOVT OF INDIA ENTERPRISE)
(ஒரு இந்திய அரசு நிறுவனம்)
KUDANKULAM NUCLEAR POWER PROJECT
கூடங்குளம் அணுமின் திட்டம்

PUBLIC AWARENESS PROGRAM – FEED BACK FORM
விழிப்புணர்வு நிகழ்ச்சி – கருத்து பதிவுத் தாள்

Date / தேதி: 2/5/2026.

Name of the Educational Institution / Village / Organization
கல்வி நிறுவனம் / கிராமம் / நிறுவனத்தின் பெயர்: Kautilya School of Public Policy

Name of KKNPP officials conducted the PA program
விழிப்புணர்வு நிகழ்ச்சியை நடத்திய கூடங்குளம் அணுமின் நிலைய அதிகாரிகளின் பெயர்: Smt S. Kalaiselvi, Shri R. Dhanabal, R Velmail Murugan

No. of participants பங்குபெற்றவர்களின் எண்ணிக்கை 30

Date and duration தேதி மற்றும் நேரம் 2/5/2026 9:30 AM TO 4PM

Visitors Feedback / பார்வையாளர்களின் கருத்துக்கள்

Really informative. Helped break a lot of myths and misunderstandings about nuclear energy, especially radiation. It was really amazing to see a potential green future for India, being led with the vision of Shri Homi Bhaba. A valuable learning experience and would suggest to open the plant for programs like NATS or create space for policy students.

Signature / கையெழுத்து [signature]

Designation / பதவி: Operations Manager

Name / பெயர்: AJESH PANICKER

NPCIL

PUBLIC AWARENESS PROGRAM – FEED BACK FORM
விழிப்புணர்வு நிகழ்ச்சி – கருத்து பதிவுத் தாள்

Date / தேதி: 11/5/2026

Name of the Educational Institution / Village / Organization
கல்வி நிறுவனம் / கிராமம் / நிறுவனத்தின் பெயர்: அரசினர் தொழிற் பயிற்சி நிலையம், தென்காசி

Name of KKNPP officials conducted the PA program
விழிப்புணர்வு நிகழ்ச்சியை நடத்திய கூடங்குளம் அணுமின் நிலைய அதிகாரிகளின் பெயர்: [illegible], திரு வேல்மயில் முருகன்

No. of participants பங்குபெற்றவர்களின் எண்ணிக்கை 31

Date and duration தேதி மற்றும் நேரம் 11/5/2026, 9:30 to 4.00

Visitors Feedback / பார்வையாளர்களின் கருத்துக்கள்

1) இங்கு பயிற்சி தெளிவாக நடத்தப்பட்டது
2) வேலை வாய்ப்பு பற்றி அறிந்து கொண்டேன்.
3) இங்கு பாதுகாப்பு முறைகள் சிறப்பாக இருக்கிறது என்பதை அறிந்தேன்.
4) அணு மின் நிலையம் பற்றிய தெளிவான அறிவு பெற்றேன்.

Signature / கையெழுத்து A. Akshaya.

Designation / பதவி: ~~student~~ student

Name / பெயர்: A. Akshaya

NPCIL Mission:

To develop nuclear power technology and to produce Nuclear Power as a safe, environmentally benign and economically viable source of electrical energy to meet the increasing needs of country.

Nuclear Energy is Inevitable For a 'Viksit Bharat'

"Setting up 100 GWe of nuclear capacity by 2047... is a minimum mission statement for the long road to Viksit Bharat. India cannot rely indefinitely on mined uranium and imports. Recycling fuel and introducing thorium are necessary for long-term energy security. India has large thorium reserves. Thorium-based fuel cycles can reduce uranium dependence and improve long-term sustainability."

Dr Anil Kakodkar
Eminent nuclear scientist, India

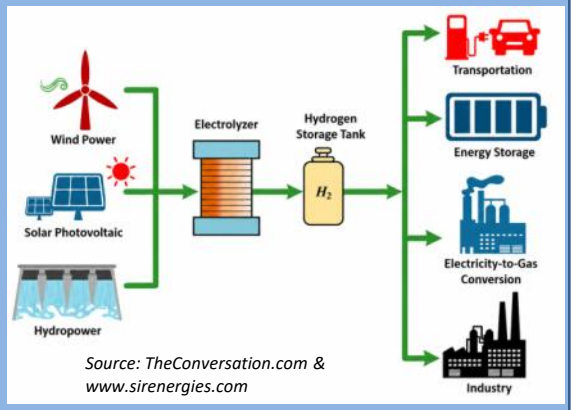
Source: WNA, www.aiche.org

Electricity and Energy Storage

(Source: World Nuclear Association)

In November 2016 the European Commission acknowledged energy storage as a key flexibility instrument required in the future. It proposed a new definition of electricity storage to include "deferring an amount of the electricity that was generated to the moment of use, either as final energy or converted into another energy carrier" such as gas. This brought power-to-gas (**P2G**) concepts within the regulatory definition of energy storage so that excess power from intermittent renewables can by electrolysis be turned into hydrogen which can be added to the normal gas distribution network (up to 20%, though much less allowed in most countries), or sold directly.

Electrolysers could thus be providing ancillary grid services for which they are paid. The redefinition of P2G from simply a load to storage has implications for both electricity grids and reducing CO2 arising from gas. P2G electrolysers can be seen as part of the grid, not simply end users.



Source: TheConversation.com & www.sirenergies.com

ITM Power, which develops electrolysers for P2G systems, proposes to build a number of hydrogen refuelling stations for fuel cell cars in the UK, with these having some grid balancing function. In March 2017 it had four in operation, with hydrogen production timed to absorb excess power from the grid. The UK government wants 65 hydrogen refuelling stations by 2020. Each has 200 to 250 kW capacity, so a number of them are needed to be able to bid for enhanced frequency response (minimum 3 MW). Polymer electrolyte membrane (PEM) electrolysers are now available at about €1 million per MW, with smaller footprint and more rapid response than alternatives, enabling grid balancing and energy storage. Some 4.7 TWh of renewable electricity was curtailed in Germany in 2015. Hydrogen storage at scale and its long-range transmission is envisaged as being by conversion to ammonia, which in practical terms is more energy-dense.

To be continued in Jun 2026

OPERATIONAL REACTORS

Country	MWe #	No. of Reactors
ARGENTINA	1636	3
ARMENIA	416	1
BELARUS	2220	2
BELGIUM	2056	2
BRAZIL	1884	2
BULGARIA	2006	2
CANADA	12714	17
CHINA	58812	60
CZECH REP	3963	6
FINLAND	4369	5
FRANCE	63000	57
HUNGARY	1916	4
INDIA	7430	21
IRAN	915	1
JAPAN	12631	14
KOREA	25609	26
MEXICO	1552	2
NETHERLANDS	482	1
PAKISTAN	3262	6
ROMANIA	1300	2
RUSSIA	27969	34
SLOVAKIA	2308	5
SLOVENIA	688	1
SOUTH AFRICA	1854	2
SPAIN	7123	7
SWEDEN	7012	6
SWITZERLAND	2973	4
UKRAINE	13107	15
UAE	5348	4
UK	5883	9
USA	96952	94
Total	**379405**	**415**

 # Net Electrical Capacity

Source: https://pris.iaea.org/PRIS
www.nucnet.org

Nuclear Database

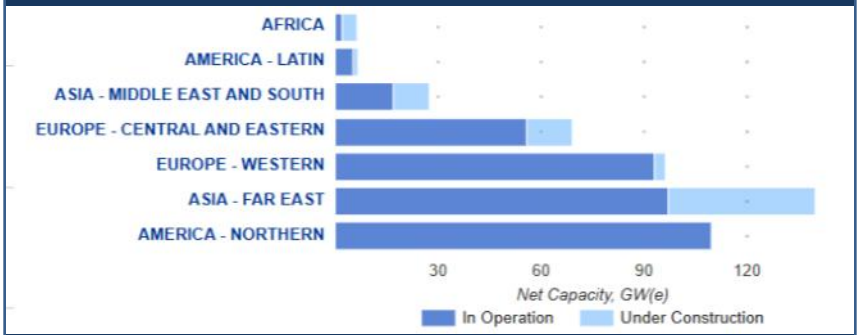
Updated as on Jun 04, 2026

Source: https://pris.iaea.org/PRIS

Current Status:

NUCLEAR POWER REACTORS IN OPERATION	415
TOTAL NET INSTALLED CAPACITY	379 405 MWe
NUCLEAR POWER REACTORS UNDER CONSTRUCTION	73
REACTOR-YEARS OF OPERATION	20 705

Regional Distribution of Nuclear Power Plants:



New connections to the grid: (Year 2026)

SANAO-1 (1117 MW(e), PWR, CHINA) on 12 March)
- ❖ Construction Start Date : 31 Dec, 2020
- ❖ First Criticality : 14 Feb, 2026
- ❖ Gird Connection : 12 Mar, 2026

Source: www.nucnet.org & www.neimagazine.com

TAIPINGLING-1 (1116 MW(e), PWR,CHINA) on 13 Feb)
- ❖ Construction Start Date : 26 Dec, 2019
- ❖ First Criticality : 03 Feb, 2026
- ❖ Gird Connection : 13 Feb, 2026

Tata Power CEO confirms interest in small modular reactors 13 May

The CEO of Indian company Tata Power has told shareholders it is advancing its plans for small modular reactors. Praveer Sinha said the company was in the process of preparing detailed project reports, in collaboration with Nuclear Power Corporation of India Ltd, for two 220 MWe reactors, which could be ready in six months from now. Tata is one of six companies that expressed interest under a request for proposals issued by NPCIL in 2024 to finance and build a proposed fleet of Bharat Small Reactors.

Source: www.world-nuclear-news.org

Concrete poured for BREST-OD-300 turbine foundation 19 May

Concrete has begun being poured for the foundation of the turbine and generator for the BREST-OD-300 lead-cooled fast neutron reactor in Seversk in Russia's Tomsk region. The foundation will be constructed using 36 spring elements, which will reduce the vibration load from the operating turbine unit on the foundation columns and adjacent process equipment. It is designed to withstand severe earthquakes. The BREST-OD-300 fast reactor is part of Rosatom's Proryv, or Breakthrough, project to enable a closed nuclear fuel cycle.

Source: www.world-nuclear-news.org

Nuclear News

Second Indian fuel cycle complex gets operating licence 01 May

The Atomic Energy Regulatory Board has issued an operating licence for the NFC-Kota fuel plant at Rawatbhata in Rajasthan. The Nuclear Fuel Complex (NFC) is an industrial unit of India's Department of Atomic Energy (DAE) which manufactures fuel for India's pressurised heavy water reactors in its safeguarded facilities at Hyderabad. According to World Nuclear Association information, the Hyderabad facilities produce 1500 tonnes of pressurised heavy water reactor (PHWR) fuel per year, as well as about 25 tonnes of fuel per year for India's two small boiling water reactors at Tarapur. NFC-Kota is a second PHWR fuel plant which submitted its application for an operating licence for the facility to the AERB on 17 March after the completion of hot commissioning activities, proposing the production of 500 tonnes per year of finished UO2 (uranium dioxide) fuel bundles for use in 700 MWe PHWRs.

Source: https://dae.gov.in & www.world-nuclear-news.org

Key AERB approval issued for Kudankulam 5 and 6 05 May

India's Atomic Energy Regulatory Board has issued permission for the installation of major equipment, including the reactor pressure vessel, steam generators and coolant pumps, at Kudankulam nuclear power plant units 5 and 6. The Major Equipment Erection permission was issued on 1 May to Nuclear Power Corporation of India (NPCIL) "after satisfactory completion of multi-tier safety review of design of the units against safety requirements specified by AERB as well as assessment of the progress of the civil construction activities so far, under the earlier permission issued in April 2021 for 'first pour of concrete'", the Atomic Energy Regulatory Board (AERB) said.

Source: www.world-nuclear-news.org

Indian reactor set to restart as private sector plans progress 12 May

As India's nuclear regulator gives the go-ahead for the second unit at India's oldest nuclear power plant to restart operations after major refurbishment work, NTPC, India's largest integrated power company, is ready to submit its first feasibility study for a nuclear project to the Department of Atomic Energy. The Atomic Energy Regulatory Board (AERB) has announced that it approved the restart and continued operation of unit 2 at the Tarapur power plant in Maharashtra on 7 May and operate for a further 10 years following the completion of the refurbishment undertaken by Nuclear Power Corporation of India Limited (NPCIL).

NTPC - which recently signed a non-binding memorandum of understanding with France's EDF to explore cooperation in developing new nuclear power projects in India - is set to submit the first feasibility study for a nuclear project for approval by the Department of Atomic Energy (DAE), which would pave the way for NTPC to begin work on its first standalone nuclear project in India.

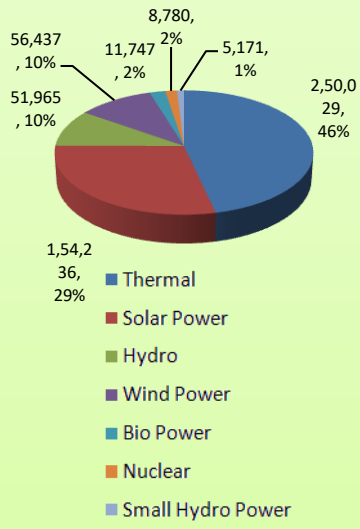
Source: www.world-nuclear-news.org

QUICK FACTS

All India Installed Capacity as on May 2026

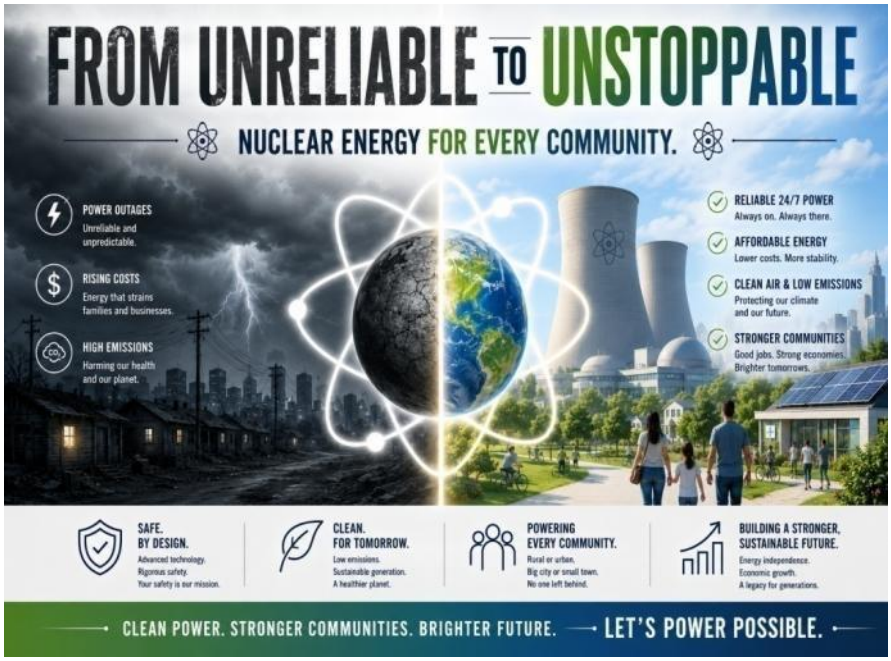
- India's total category-wise installed capacity has reached approximately **538,364 MW**.
- Thermal power continues to hold the largest share at 250,029.13 MW, while solar power maintains its strong position as the leading renewable source at 154,235.77 MW. The remaining grid mix is comprised of wind power (56,436.59 MW), large hydro (51,964.66 MW), bio-power (11,746.53 MW), nuclear energy (8,780.00 MW), and small hydro power (5,171.36 MW).

Category wise Installed Capacity (MW):



Source: https://npp.gov.in/

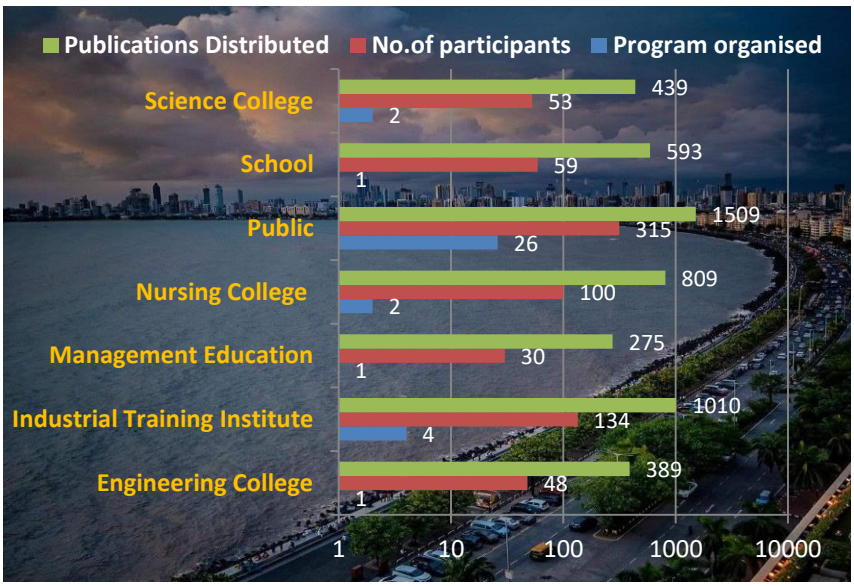
Nuclear Slogan



PA activity conducted at KKNPP Site

At site

As a part of public awareness programme, visits of Public from districts such as Tirunelveli, Kanyakumari and Tuticorin and also from Kerala to KKNPP were organised. The visitors of KKNPP were provided with a detailed information on nuclear power generation and its safety principles.



Few glimpses from Site Visit

At site

Kautilya School of Public Policy, Hyderabad (02 May)

Joy University, Vadakkankulam (05 May)

Global College of Nursing, Nattalam, Kanyakumari (06 May)

Government ITI, Pettai, Tirunelveli (07 May)

Few glimpses from Site Visit

At site

Malankara Catholic College, Kaliyakkavilai (08 May)

Ithaya Jyothi College of Nursing, Caussanelpuram (14 May)

Government ITI Tiruchuli, Virudhunagar (15 May)

Inplant Trainees Kudan kulam (19 May)

Few glimpses from Site Visit

At site

Oxford Central School, Kollam
(20 May)

Sri.P.M. Sankara Subbiah Memorial Private I.T.I V.M.Chatram
(26 May)

Members from Kerala State Electricity Board Ltd (KSEB) Kollam
(26 May)

Nuclear Terminology

Lexicon

RA-10

The **RA-10** is a state-of-the-art **30 MWt (thermal) open-pool multipurpose research reactor** currently being completed by the National Atomic Energy Commission (CNEA) of Argentina at the Ezeiza Atomic Centre in the Buenos Aires province.

Designed to replace the aging 10 MW RA-3 reactor, the RA-10 is one of Argentina's most significant investments in science and nuclear technology.

Key Technical Features :

- **Type :** Open-pool research reactor
- **Thermal Power:** 30 MW
- **Fuel:** Low-enriched uranium silicide (LEU)
- **Moderator & Coolant:** Light water (H_2O)
- **Reflector:** Heavy water (D_2O)
- **Operating Cycle:** Continuous operation for about 29.5 days
- **Two independent shutdown systems** for safety

Key Applications & Strategic Objectives

1. Medical Radioisotope Production:
The reactor is designed to resolve domestic supply needs and position Argentina as a massive global player, targeting up to 20% of the worldwide demand for Molybdenum-99 — the precursor to Technetium-99m used widely in nuclear medicine imaging. It will feature a production capacity exceeding 2,000 Ci/week.

2. Neutron Transmutation Doping (NTD) Silicon:
It will irradiate ultra-pure silicon ingots (up to 80 tons per year), catering to roughly 40% of the global market for high-power semiconductor and power-electronics manufacturing.

3. Nuclear Fuel & Advanced Materials Qualification:
RA-10 will allow CNEA to test, validate, and qualify new nuclear fuels and materials under high-flux irradiation, reinforcing their domestic power reactor program.

See left

More on RA-10

4. Neutron Beam Research:
The reactor will feed the Argentine Neutron Beam Laboratory (LAHN), making it a premium regional hub in Latin America for advanced neutron scattering techniques utilized in materials science, structural biology, and biochemistry.

Project Status & Timeline
Current Progress: Global project completion sits past 85%. Civil structural works are completely finished, and the critical core component—the complex Zircaloy reflector tank—was successfully installed inside the reactor pool
.
Testing Phase: Pre-operational Testing (POT) of core fluid-handling and ventilation systems started mid-2025. Recent milestones include testing the primary and secondary cooling system pumps.

Commissioning: Official functional nuclear commissioning and first criticality phases are scheduled to begin around September 2026.

Source: WNA, www.argentina.gob.ar

As a part of PA outreach activity, Seminars, Workshop, Lectures and exhibitions were conducted at Educational Institutions and Organizations.

PA lecture at St.Xavier's Catholic College of Engineering Nagercoil

The 24th Graduation Ceremony was organized at St.Xavier's Catholic College of Engineering (Autonomous), Nagercoil, Kanyakumari district with great enthusiasm and academic spirit.

Date: May 02, 2026

Sh Merlin Kumar P, SME (Elect. Maint.), Kudankulam Nuclear Power Project 3&4, attended the function as a distinguished guest. He conferred degrees upon the graduating students and delivered an inspirational address encouraging them to pursue excellence, build confidence, and contribute meaningfully to society and nation-building through dedication, continuous learning, and positive values.

PA outreach programme conducted outside KKNPP:

Outside KKNPP

Date	Name of the Institution	No. of participants	Publications distributed
02 May	St.Xavier's Catholic College of Engineering (Autonomous), Nagercoil	1400	-
25 May	NCC Camp at NVKS HSS, Attoor, KK District	500	-
29 May	Association of Third World Studies South Asia Chapter (ATWS - SAC), Kerala	150	-
	Grand Total	**2050**	**-**

Few glimpses

PA lecture at St.Xavier's Catholic College of Engineering (Autonomous), Nagercoil On May 02, 2026

No. of participants	**1400**

PA lecture at NCC Camp at NVKS HSS Attoor KK District

As part of ATC Camp, organized by the 11 Tamil Nadu Battalion NCC at NVKS Higher Secondary School, Attoor, an awareness lecture on the "Peaceful Uses of Nuclear Energy" was conducted.

Date: May 25, 2026

Shri A. V. Sathish, OIC, Nuclear Information Centre, KKNPP delivered an inspiring and motivational address to the cadets. He highlighted the role of nuclear energy in national development, clean energy generation, healthcare, agriculture, and scientific advancement.

PA Lecture At Government College for Women, Trivandrum

As part of the 28th Annual Conference and International Seminar of the Association of Third World Studies – South Asia Chapter (ATWS-SAC), held at Government College for Women, Thiruvananthapuram,

Date: May 29, 2026

Shri A.V. Sathis, OIC, Nuclear Information Centre, KKNPP delivered a lecture on "Powering the Global South: Nuclear Energy, Climate Action and Sustainable Development." He highlighted the role of nuclear energy in sustainable development and inspired around 100 academicians, researchers, and students.

Few glimpses

Outside KKNPP

PA lecture at at NVKS Higher Secondary School, Attoor on May 25, 2026

No. of participants: 500

PA lecture at at Government College for Women, Thiruvananthapuram on May 29, 2026

No. of participants: 150

Did you know?

India ranks 3rd in global renewable energy capacity

India now ranks third globally in installed renewable energy capacity. A new report by Morgan Stanley says India's renewable energy transition will help reduce external dependence, but its success will depend on how quickly the country localises critical segments such as solar cells, wafers, and polysilicon.

According to data from the Ministry of New and Renewable Energy, **domestic solar module capacity has nearly doubled, from 38 gigawatts in March 2024 to 74 gigawatts in March 2025. Solar cell capacity has also increased from 9 gigawatts to 25 gigawatts**.

However, the report notes that India still relies heavily on imports for key upstream components. In the financial year 2025, India imported around 35 million solar modules worth about 1.6 billion US dollars, with an estimated 60 to 80 per cent sourced from China.

Overall, **non-fossil fuel capacity in India has now crossed 50 per cent of total installed capacity, reaching 262.7 gigawatts**. Solar and wind energy account for the bulk of recent additions.

Source: https://newsonair.gov.in

Feature article

Nuclear Energy and Sustainable Development

Source: World Nuclear Association

The environmental pillar

Waste:

Unlike nuclear energy, some energy sources dispose of wastes to the environment, or have health effects which are not costed into the product. These implicit subsidies, or external costs as they are generally called, are nevertheless real and usually quantifiable, and are borne by society at large. Their quantification is necessary to enable rational choices between energy sources. Nuclear energy provides for waste management, disposal and decommissioning costs in the actual cost of electricity (i.e. it has internalized them), so that external costs are minimized.

The social pillar:

Human health – air pollution

Air pollution arising from the use of carbon-based fuels for energy is one of the biggest threats to human welfare. The World Health Organization estimates that about 7 million people die prematurely each year as a result of air pollution exposure.

To be continued in Jun 2026

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Nuclear Trivia

Trivia

Do all stars generate energy using the same fusion reaction used in experimental fusion reactors on Earth?

The Earth Baseline: Deuterium-Tritium (D-T) Fusion

On Earth, experimental fusion reactors—like tokamaks (such as ITER) and stellarators—almost exclusively target the Deuterium-Tritium (D-T) reaction.

$$D + T \rightarrow {}^{4}He + n + 17.6\ MeV$$

❑ **The Reactants:** Deuterium (^2H or D, a hydrogen isotope with one neutron) and Tritium (^3H or T, a hydrogen isotope with two neutrons).

❑ **Why we use it:** The D-T reaction has the lowest required cross-section temperature and the highest reaction rate at achievable pressures. It requires a plasma temperature of roughly 150 million degrees Celsius (about 10 times hotter than the core of the Sun) to overcome the electrostatic repulsion between the nuclei.

Source: Wikipaedia, www.helionenergy.com, www.energyencyclopedia.com, next.101.school

No, most stars mainly use the proton–proton chain. Stars like the Sun primarily fuse ordinary hydrogen through the proton–proton chain, while D–T fusion is mainly used in experimental fusion reactors because it is easier to ignite on Earth.

Stars primarily use different fusion pathways depending on: Their mass , Core temperature & Age.

Main Fusion Reactions in Stars

1. **Proton–Proton Chain** (Most Common), Used by stars like the Sun:

$$4^1H \rightarrow^4 He + Energy$$

Hydrogen nuclei (protons) eventually fuse into helium. This dominates in:

- Small stars
- Medium stars
- Sun-like stars

2. CNO Cycle (Massive Stars)

In hotter, larger stars roughly 1.3 times more massive than Sun :

$$^{12}C \rightarrow^{12} C$$

Carbon acts as a catalyst to fuse four protons into a single Helium-4 nucleus. The net reaction is still:

$$4^1H \rightarrow^4 He + Energy$$

but through a more complex cycle involving: Carbon , Nitrogen & Oxygen . This dominates in: Massive stars & Hot stellar cores.

3. Helium Burning

When hydrogen runs low, stars begin helium fusion: **Triple-Alpha Process**

$$3^4He \rightarrow^{12} C + Energy$$

This creates carbon.

4. Advanced Fusion in Massive Stars

Very massive stars fuse heavier elements step by step:

Carbon - Neon - Oxygen - Silicon

Eventually producing: ^{56}**Fe** (iron)

Fusion beyond iron no longer releases energy efficiently.

See left