



जनवरी 2026

इस अंक में:

- नाभिकीय नारे
- तकनीकी सत्र
- नाभिकीय आंकड़ा
- नाभिकीय समाचार
- शब्द कोश
- आपको मालूम है?
- विशेष आलेख
- नाभिकीय सामान्य ज्ञान

तैयारकर्ता एवं संपादक:

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पुनरीक्षणकर्ता :

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जारीकर्ता:

सतीश कुमार भा,
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कुडनकुलम न्यूक्लियर
पावर प्रोजेक्ट

प्रिय पाठकगण ,

भारत ने विद्युत की बढ़ती मांग, जलवायु के साथ सामंजस्य, तथा नाभिकीय ऊर्जा के लिए सशक्त कदम के साथ विकसित भारत की ओर अग्रसर होते हुए राष्ट्रीय विद्युत नीति मसौदा (एनईपी) 2026 की घोषणा किया। इस नीति का लक्ष्य निजी भागीदारिता को प्रोत्साहित करना, उन्नत तथा लघु माइक्रूलर रिएक्टरों तथा हरित वित्तपोषण- भारत के स्वच्छ ऊर्जा संक्रमण के प्रमुख कुंजी के रूप में नाभिकीय ऊर्जा को रेखांकित कर 2047 तक 100 गीगा वाट नाभिकीय क्षमता स्थापित करना है। पढ़कर आनंदित हों...
अध्यक्ष, जन जागरूकता समिति

जनवरी 2026 के विशिष्ट बिंदु

1

केकेएनपीपी स्थल पर 33 और स्थल के बाहर 02 जन संपर्क कार्यक्रम आयोजित किए गए

2

1,236 घंटों का जन संपर्क, 1,565 लोगों से संपर्क

3

6,288 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 CO₂) में कमी लाती है। CO₂ के उत्सर्जन में कमी लाने में केकेएनपीपी का योगदान (दिनांक 31 जनवरी 2026 को) अब तक इस प्रकार है।



कुल उत्पादित विद्युत इकाई

123,391
मिलियन यूनिट



केकेएनपीपी द्वारा कुल CO₂ उत्सर्जन में कमी

105,992,825
टन

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

Public Awareness e-Newsletter

Kudankulam Nuclear Power Project

January 2026

Issue -163

In this issue:

- Nuclear Slogan
- Technical session
- Nuclear Database
- Nuclear News
- Lexicon
- Did you know?
- Feature article
- Nuclear Trivia

Snap shot



A glimpse of **Indian paradise flycatcher** at KK Site

Photography by
K B Jashi
OIC, TLD Lab
KKNPP

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Passeriformes
Family:	Monarchidae
Genus:	Terpsiphone
Species:	<i>T. paradisi</i>

Binomial name:

Terpsiphone paradisi

Source: en.wikipedia.org

Dear Readers,

India has unveiled the Draft National Electricity Policy (NEP) 2026, charting a path toward Viksit Bharat with higher electricity demand, climate alignment, and a strong push for nuclear energy. The policy targets 100 GW nuclear capacity by 2047, encourages private participation, advanced and small modular reactors, and green financing—marking nuclear as a key pillar of India's clean energy transition. Read on happily!

-Chairman, PA Committee



Spotlight of January 2026

1

33 on-site & 02 Off-site outreach programme organised

2

1,236 hours of Public Outreach, reached 1,565 people

3

6,288 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 CO₂) while generating electricity for growing populations and socioeconomic development. KKNPP's contribution in preventing the CO₂ emissions till now (As on Jan 31, 2026) is given below.



No. of units of electricity generated **123,391** Million Units



Total CO₂ emissions avoided by KKNPP **105,992,825** Tonnes

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

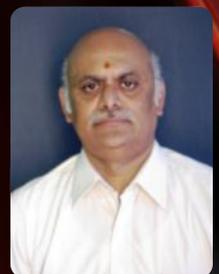
Kudankulam reactors have generated over 1.22 lakh million units as of December 2025

“ The first two 1,000 MW VVER reactors of Kudankulam Nuclear Power Project (KKNPP), have generated over 1.22 lakh million units of electricity till December 2025.

Regarding the construction of reactors 3 & 4 and 5&6, the overall physical progress was 83% and 41% respectively as of December 2025.

KKNPP was very keen on the development of its neighbourhood and ₹132 crore had been spent so far for infrastructure developments in education, medical, water supply, clean energy, and various other public utilities under its Corporate Social Responsibility (CSR) programme.

”



Sh. S. Thirunavukkarasu
Station Director, KKNPP 3&4

Source: www.thehindu.com dated 26 Jan 2026

77th Republic day celebrations at Anuvijay Township

KNP parivar celebrated the 77th Republic day at KK site and at Anuvijay Township on Jan 26, 2026.

Sh S. Thirunavukkarasu, Station Director, KKNPP 3&4 unfurled the national flag and addressed the gathering.

Press clippings

Press clipping with headline: 3, 4 உலைகள் அமைக்கும் பணிகள் 83 சதவீதம் நிறைவு. Includes a small photo of a construction site.

Press clipping with headline: கூடநகுளத்தல. Includes a photo of a group of people in uniform.

Press clipping with headline: இதுவரை 1.22 லட்சம் மெகாவாட் மின் உற்பத்தி. Includes a photo of a group of people.



Republic day celebrations at KK Site



Republic day celebrations at Anuvijay Township





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.



PUBLIC AWARENESS PROGRAM - FEED BACK FORM
 விழிப்புணர்வு திகழ்ச்சி - கருத்து பதிவுத் தாள்

Date / தேதி: 7/1/2026

Name of the Educational Institution / Village / Organization
 கல்வி நிறுவனம் / கிராமம் / நிறுவனத்தின் பெயர்
 Suguna PJP School

Name of KKNPP officials conducted the PA program
 விழிப்புணர்வு திகழ்ச்சியை நடத்திய க.க.நகரம் அலுவலர் தலைவர் அறிவிப்புகளின் பெயர்
 A.V. Sathish T. Ravishankar

No. of participants பங்கேற்பாளர்களின் எண்ணிக்கை 47

Date and duration தேதி மற்றும் நேரம் 7/1/2026 9:30 - 4:00

Visitors Feedback / பங்கேற்பாளர்களின் கருத்துக்கள்
 This trip to the biggest nuclear power plant of India was extremely educational and engaging. It made me understand higher order concepts very easily. The teachers did a very good job in making these tough concepts seem very easy-I would like to thank all the teachers who gave me this opportunity to improe. my knowledge.

Signature / கையொப்பம் Horner

Name / பெயர் Harumesh hanna

Designation / பதவி Student

PUBLIC AWARENESS PROGRAM - FEED BACK FORM
 விழிப்புணர்வு திகழ்ச்சி - கருத்து பதிவுத் தாள்

Date / தேதி: 09/01/2026

Name of the Educational Institution / Village / Organization
 கல்வி நிறுவனம் / கிராமம் / நிறுவனத்தின் பெயர்
 A.V.J. Govt. Hr. Sec. School, Ithamachi - 627652

Name of KKNPP officials conducted the PA program
 விழிப்புணர்வு திகழ்ச்சியை நடத்திய க.க.நகரம் அலுவலர் தலைவர் அறிவிப்புகளின் பெயர்
 1. சூ. சந்திரசேகர்
 2. சூ. விவேக சாஸ்திரி

No. of participants பங்கேற்பாளர்களின் எண்ணிக்கை 42/8

Date and duration தேதி மற்றும் நேரம் 09/01/2026 9:30 to 4:00

Visitors Feedback / பங்கேற்பாளர்களின் கருத்துக்கள்
 இரண்டு நாளைக்கு முன்பு எங்கள் பள்ளியில் கருத்து பதிவுத் தாள் க்குள் சிறிய அளவில் கட்டப்பட்டது. இரண்டு நாளைக்கு முன்பு கருத்து பதிவுத் தாள் க்குள் சிறிய அளவில் கட்டப்பட்டது. இரண்டு நாளைக்கு முன்பு கருத்து பதிவுத் தாள் க்குள் சிறிய அளவில் கட்டப்பட்டது. இரண்டு நாளைக்கு முன்பு கருத்து பதிவுத் தாள் க்குள் சிறிய அளவில் கட்டப்பட்டது.

Signature / கையொப்பம் N.Parameshtwaran

Name / பெயர் N.Parameshtwaran

Designation / பதவி student



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.

Meta announces 'landmark' agreements for new nuclear

“State-of-the-art data centres and AI infrastructure are essential to securing America's position as a global leader in AI. Nuclear energy will help power our AI future, strengthen our country's energy infrastructure, and provide clean, reliable electricity for everyone. These projects are going to create thousands of skilled jobs in Ohio and Pennsylvania, add new energy to the grid, extend the life of three existing nuclear plants, and accelerate new reactor technologies.”



Joel Kaplan

*Chief Global Affairs Officer
Meta*

Source: <https://world-nuclear-news.org> 09 Jan 2026



Technical session

Electricity and Energy Storage

(Source: World Nuclear Association)

Electricity cannot itself be stored on any scale, but it can be converted to other forms of energy which can be stored and later reconverted to electricity on demand. Storage systems for electricity include battery, flywheel, compressed air, and pumped hydro storage. Any systems are limited in the total amount of energy they can store. Their energy capacity is expressed in megawatt-hours (MWh), and the power, or maximum output at a given time, is expressed in megawatts of electric power (MW or MWe). Electricity storage systems may be designed to provide ancillary services to a transmission system including frequency control, and this is the chief role of grid-scale batteries today.

Of course, very effective storage of energy is achieved in fossil fuels and nuclear fuel, before electricity is generated from them. While the focus here is on storage after generation, particularly from intermittent renewable sources, any proper consideration of the question needs also to encompass nuclear fuel for power generation as a more economical option with relatively little materials requirement.

Pumped storage involves pumping water uphill to a reservoir from which it can be released on demand to generate hydroelectricity. The efficiency of the double process is about 70%. Pumped storage comprised 95% of the world's large-scale electricity storage in mid-2016, and 72% of the storage capacity added in 2014. Pumped hydro has the advantage of being long-term if required. Battery storage, however, is being deployed widely. More than 6 GW of grid-scale battery storage was added in 2021, reaching close to 16 GW connected to electricity networks at the end of that year, according to the International Energy Agency (IEA). Building-scale power storage emerged in 2014 as a defining energy technology trend. This market has grown by 50% year-on-year, with lithium-ion batteries prominent but redox flow cell batteries show promise. Such storage may be to reduce demand on the grid, as back-up, or for price arbitrage. In 2015 battery storage costs were around \$400/kWh of contained energy, and 1.6 GW was installed or planned. The cost dropped to \$141/kWh in 2021 before rising to \$151/kWh (in 2022 prices) according to Bloomberg NEF's annual battery price survey.



Updated as on Feb 07, 2026

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

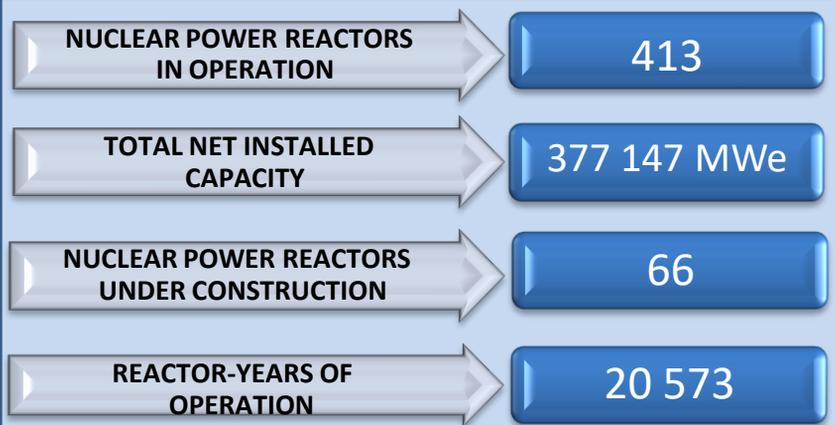
OPERATIONAL REACTORS

Country	MWe #	No. of Reactors
ARGENTINA	1641	3
ARMENIA	416	1
BELARUS	2220	2
BELGIUM	2056	2
BRAZIL	1884	2
BULGARIA	2006	2
CANADA	12714	17
CHINA	56446	58
CZECH REP	3963	6
FINLAND	4369	5
FRANCE	63000	57
HUNGARY	1916	4
INDIA	7550	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	7008	6
SWITZERLAND	2973	4
UKRAINE	13107	15
UAE	5348	4
UK	5883	9
USA	96952	94
Total	377147	413

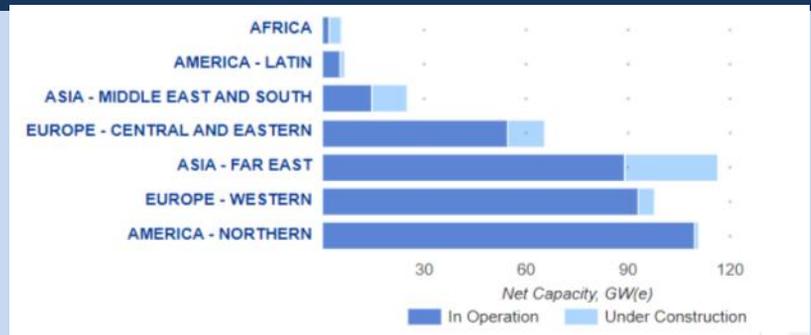
Net Electrical Capacity

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

Current Status:



Regional Distribution of Nuclear Power Plants:



New connections to the grid: (Year 2025)

RAJASTHAN-7 (700 MW(e) *, PHWR, INDIA) on 17 March 2025

- ❖ Construction Start Date : 18 Jul, 2011
- ❖ First Criticality : 19 Sep 2024
- ❖ Grid Connection : 17 Mar 2025

ZHANGZHOU-2 (1126 MW(e), PWR, CHINA) on 22 November

- ❖ Construction Start Date : 04 Sep, 2020
- ❖ First Criticality : 03 Nov 2025
- ❖ Grid Connection : 22 Nov 2025

KURSK 2-1 (1200 MW(e), PWR, RUSSIA) on 31 December

- ❖ Construction Start Date : 28 Apr, 2018
- ❖ First Criticality : 22 May, 2025
- ❖ Grid Connection : 31 Dec, 2025

* Gross Electrical Capacity



Indian government releases draft energy policy Jan 27



India's Ministry of Power has released a draft energy strategy which aims to transform the country's power sector to meet the goals of the Viksit Bharat development strategy - and aligns with nuclear energy goals set out in the 2025-26 Budget and the recently enacted SHANTI bill. The Draft National Electricity Policy 2026, once finalised, will replace India's first National Electricity Policy (NEP) which dates back to 2005. That policy addressed fundamental challenges for the power sector, including demand-supply deficits, limited access to electricity, and inadequate infrastructure.

Source: www.world-nuclear-news.org

Joint study validates SMR use for chemical plants Jan 20



A two-year study by Oak Ridge National Laboratory and NuScale looked at the performance and profitability of coupling a NuScale Power Module with a US chemical facility to provide nuclear-generated steam and electric power - and shows pairing NuScale's nuclear technology with a heat augmentation system to be both profitable and reliable. The study showed that the NuScale integrated energy system could meet the chemical plant requirements of 1.3 million kg/h of process steam, at 400°C, and 4.1 MPa, while also providing 73 MW of electric power.

Source: www.world-nuclear-news.org



Nuclear News

First Kursk II unit connected to the grid

Jan 02



The first new VVER-TOI power unit at the Kursk II nuclear power plant in Russia has been connected to the grid and reached a capacity of 240 MW on 31 December. The power unit's capacity will be gradually increased in steps, with safety tests and checks, to 35-40%. This will be followed by a lengthy period of increasing it to 100%. The VVER-TOI pressurised water reactor has a capacity of 1,250 MW - higher than previous generations of VVER reactors. Rosatom says the service life of the main equipment has doubled, and it features a mix of passive and active safety systems and includes a core meltdown localiser. The construction of the Kursk II power plant will more than replace the capacity of the four RBMK-1000 units at the Kursk plant as they come to the end of their lives. The first unit was shut down after 45 years of operation in December 2021 and the second unit followed in January 2024. The original design life for the four RBMK-1000 reactors at the plant was for 30 years but had been extended by 15 years following life extension programmes.

Source: www.world-nuclear-news.org

First mobile sorption unit launched by Rosatom

Jan 09

The construction and installation of the first mobile sorption unit at the Verkhne-Uksyanskaya deposit of the Dalmatovskoye uranium deposit is aimed at ensuring optimised uranium production, Rosatom says. The mobile sorption unit, installed by Rosatom



mining division company JSC Dalur, consists of container-type modules including mobile sorption columns, solution and sorbent tanks and an electrical substation and control room. It can be relocated between sites rapidly and is focused on remote areas, with Rosatom saying its main advantages are "mobility, rapid commissioning, and a significant reduction in capital expenditures compared with traditional stationary facilities". Dalur was the first company in Russia to mine uranium using the in-situ recovery (ISR) method - also known as in-situ leaching (ISL). It involves minerals being recovered from ore in the ground by dissolving them in situ, using a mining solution injected into the orebody. The solution is then pumped to the surface, where the minerals are recovered from the uranium-bearing solution.

Source: www.world-nuclear-news.org

NASA, DOE aim for nuclear reactor on moon by 2030

Jan 16



The US government space and energy agencies have renewed their commitment to work together to develop a fission power source for use on the surface of the Moon and future missions to Mars. NASA and the US Department of Energy (DOE) said they have recently signed a memorandum of understanding to solidify their collaboration and advance the "vision of American space superiority" set out in an Executive Order signed by US President Donald Trump on 18 December. As well as "returning Americans to the Moon by 2028" - through the Artemis Program - this order includes deploying nuclear reactors on the Moon and in orbit, including the development of a lunar surface reactor by 2030, as a priority.

Source: www.world-nuclear-news.org



QUICK FACTS

India's Per Capita Electricity Consumption

As of early 2026, India's per capita energy consumption has seen a significant surge, reflecting the country's rapid industrialization and improving rural electricity access.

According to the latest data from the Ministry of Power and the Draft National Electricity Policy (NEP) 2026, the current figures are as follows:

Current Statistics (FY 2024–25) Per Capita Electricity Consumption: Approximately **1,460 kWh to 1,538 kWh**.

This represents a nearly 53% increase from 957 kWh in 2013–14.

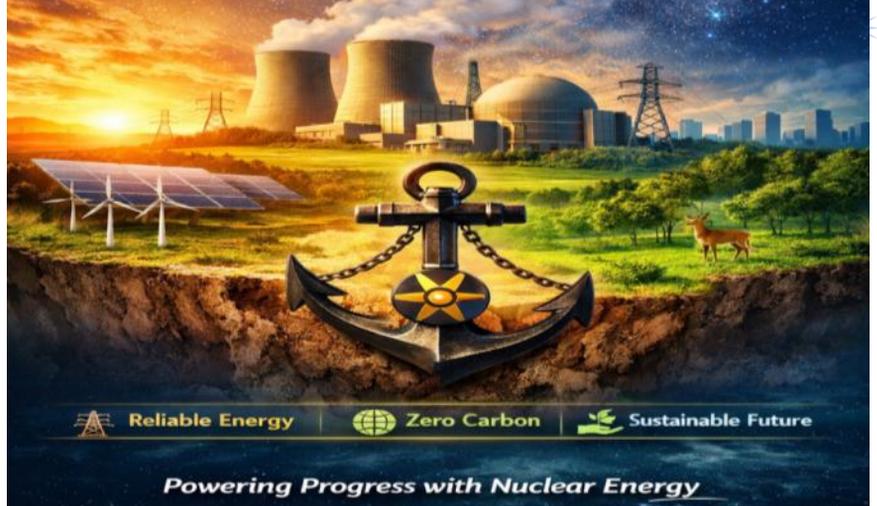
Significant Growth in Installed Capacity: India's total installed power generation capacity has surged by 104.4%, increasing from 249 GW as of March 31, 2014, to **509.743 GW** as of November 30, 2025. Generation Capacity Addition during January–November 2025 is 55.57 GW.

Source: www.pib.gov.in



Nuclear Slogan

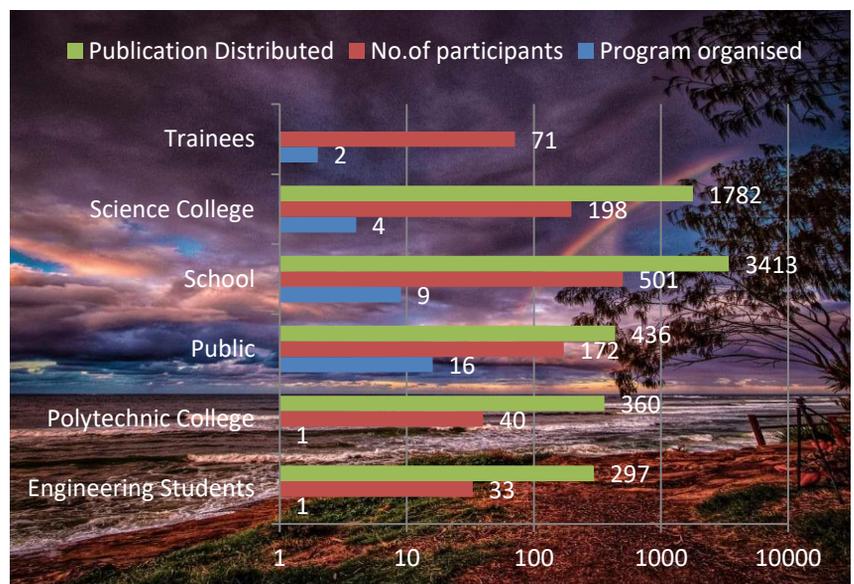
Nuclear:
The Grid's Anchor.
The Planet's Future.



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

**Staffs from AVK
International Residential
Sr.Sec.School (CBSE)
Sankarankovil
(Jan 02)**



**Visit of Deputy Collectors,
Tirunelveli
(Jan 02)**



**Government Polytechnic
College Pala, Kottayam
(Jan 03)**





Few glimpses from Site Visit

At
site

**Government Polytechnic
College Pala, Kottayam
(Jan 03)**



**CISF Officials, Kudankulam
(Jan 05)**



**St.Joseph's Matric
Hr.Sec.School, Mulagumoodu
(Jan 05)**



**Government High School,
Therku Karunkulam
(Jan 06)**





Few glimpses from Site Visit

At
site

**Inplant Trainees,
Kudankulam
(Jan 06)**



**Suguna PIP School,
Coimbatore
(Jan 07)**



**S.R. Govt. Hr. Sec. School,
Nanguneri
(Jan 09)**



**BHEL Official with family
Members, Kudankulam
(Jan 09)**





Few glimpses from Site Visit

At
site

**Government Higher
Secondary School,
Tharuvaikulam
(Jan 12)**



**Visit of TNEB Officials
Tirunelveli
(Jan 12)**



**S.R. Govt. Hr. Sec. School,
Nanguneri
(Jan 14)**



**Officials from Southern
State Load Dispatch Centre
Chennai
(Jan 19)**





Few glimpses from Site Visit

At
site

**Atomic Energy Central
School, Kudankulam,
Anuvijay Township
(Jan 19)**



**Hindu Nadar's Hr. Sec.
School, Kadambur
(Jan 20)**



**Inplant Trainees,
Kudankulam
(Jan 20)**





Few glimpses from Site Visit

At site

**Mar Ivanios College,
Thiruvananthapuram
(Jan 21)**



**Retired Engineers from
LPSC, ISRO
Thiruvananthapuram
(Jan 22)**



**PGP College of Engineering
and Technology, Namakkal
(Jan 23)**



**Members from KSEB
Engineer's Association, Kerala
(Jan 24)**





Few glimpses from Site Visit

At
site

**Padmasree Central School
Pathanamthitta
(Jan 27)**



**Manonmaniam Sundaranar
University, Tirunelveli
(Jan 28)**



**Noorul Islam Centre for
Higher Education,
Kanyakumari
(Jan 29)**



**Sri Vidya Mandir Arts &
Science College
(Autonomous), Krishnagiri
(Jan 30)**



More on Theranostics**Advantages**

- Targeted therapy → less damage to healthy tissue
- Patient-specific treatment planning
- Better treatment response monitoring
- Reduced side effects

Role in nuclear medicine:

❖ One of the fastest-growing areas

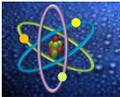
❖ Integrates:

- Radiochemistry
- Imaging
- Molecular biology
- Oncology

Unlike Chemotherapy, theranostics allows patient-specific dosimetry, which makes theranostics:

- Safer
- Quantifiable
- Scientifically personalised

Theranostics is a nuclear medicine approach that combines diagnosis and targeted therapy using the same molecular probe labelled with different radionuclides.

**Theranostics**

Theranostics = Therapy + Diagnostics

Theranostics represents a paradigm shift in nuclear medicine by integrating molecular imaging and targeted radionuclide therapy into a single personalised framework, enabling precise diagnosis, optimised treatment, and improved patient outcomes.

How theranostics works?**1. Diagnostic step**

A diagnostic radionuclide is attached to a targeting molecule
Imaging (PET / SPECT) shows where the disease is

2. Therapeutic step

A therapeutic radionuclide is attached to the same targeting molecule
Delivers targeted radiation to diseased cells

☑ “See it → Treat it → Monitor it”

Common radionuclide pairs

Diagnostic	Therapy	Target
⁶⁸ Ga	¹⁷⁷ Lu	Neuroendocrine tumors
⁶⁴ Cu	⁶⁷ Cu	Prostate / cancers
¹²³ I	¹³¹ I	Thyroid
^{99m} Tc	¹⁸⁶ Re / ¹⁸⁸ Re	Various tumors

Core principle:

If a molecule can find the disease for imaging, the same molecule can deliver therapy.

This moves medicine from “one-size-fits-all” to precision medicine.

Major clinical applications:

- Cancer treatment
- Prostate cancer (PSMA-based therapy)
- Neuroendocrine tumors
- Cardiology
- Neurology (emerging)
- Personalized oncology

Source: Wikipedia, <https://jnm.snmjournals.org/>,
pubmed.ncbi.nlm.nih.gov/, <https://snmmi.org/>

See left

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

PA Lecture at Sankar Polytechnic College

Staff orientation programme on “Advancing NDT awareness” was organized at Sankar Polytechnic College, SankarNagar, Tirunelveli.

Date: Jan 21, 2026

Sh Saravanan S, SO/F, QA, KKNPP delivered an awareness lecture during the event. A total of 150 individuals participated in the event.

PA Lecture at Govt.HSS Ottayalvilai KK Dist.

A Science Exhibition was successfully organized by the Government Higher Secondary School of Kanyakumari District.

Date: Jan 27, 2026

The event was further enriched by the participation of Sh Vijayakumar B OIC, ESL, KKNPP who delivered an inspiring and informative lecture. The exhibition fostered a spirit of inquiry, creativity, and enthusiasm among the students, making the event both educational and memorable.



PA outreach programme conducted outside KKNPP:

Outside KKNPP



Date	Name of the Institution	No. of participants	Publications distributed
Jan 21	Sankar Polytechnic College, SankarNagar	150	-
Jan 27	Govt.HSS Ottayalvilai, KK Dist.	400	-
Grand Total		550	-

Few glimpses

PA Lecture at Sankar Polytechnic College, SankarNagar, Tirunelveli district on Jan 21, 2026



PA Lecture at Govt.HSS Ottayalvilai KK Dist. on Jan 27, 2026





Nuclear Energy and Sustainable Development

Source: World Nuclear Association



Did you know?

India Unveils Draft National Electricity Policy 2026

► The Government of India has released the Draft National Electricity Policy (NEP) 2026, outlining an ambitious roadmap to transform the power sector in line with the Viksit Bharat vision.

► The policy targets a sharp rise in per capita electricity consumption—from 1,460 kWh today to over 4,000 kWh by 2047—while aligning with India’s climate goals, including net-zero emissions by 2070.

► Notably, the draft policy positions nuclear energy as a clean, reliable, and strategic pillar of long-term energy security, with a goal of expanding nuclear capacity to 100 GW by 2047.

► It proposes private sector participation, deployment of small modular and advanced reactors, eligibility for green bond financing, and repurposing retired coal plant sites for nuclear power.

► Together with the recently enacted SHANTI Act 2025, the policy signals a major shift toward a low-carbon, secure, and investment-friendly energy future for India.

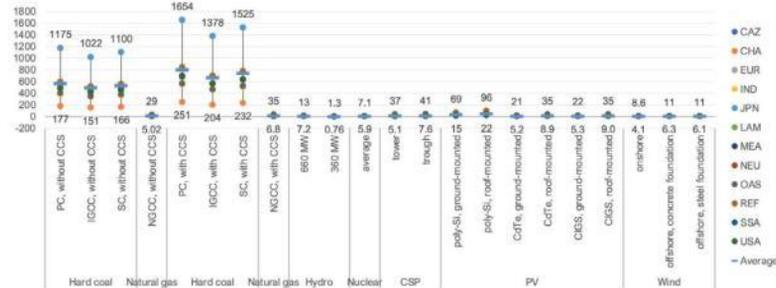
Source: www.pib.gov.in

The environmental pillar

Ecosystem protection

The main impacts of power production on ecosystems are eutrophication (*i.e.* increased concentrations of chemical nutrients, primarily nitrogen and phosphorus, that damage water quality by causing oxygen depletion) and acidification (*i.e.* increased concentrations of acidic chemicals – caused by the absorption of atmospheric CO₂ – that damage water quality, harming shellfish and coral, and leading to excessive algal growth).

Among power producing technologies, fossil fuels have by far the greatest potential to cause both acidification and eutrophication. CO₂ released into the atmosphere during the combustion of fossil fuels dissolves into the oceans, increasing their acidity; and the mining, extraction, transport, waste treatment and emissions associated with fossil fuel use contribute to their high eutrophication potential. By contrast, both the acidification and eutrophication potential of nuclear power are estimated to be among the lowest of all available generation technologies.



Lifecycle eutrophying emissions for 2020, in grams of phosphorus equivalent per MWh (source: Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources, UNECE (March 2022))





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Which isotope is used as the standard to measure nuclear fuel burnup?

What is nuclear fuel burnup?

In simple terms, **nuclear fuel burnup** is a measure of how much energy has been extracted from a specific amount of nuclear fuel. Think of it like the "fuel economy" or the "odometer" of a nuclear reactor.

Analogy: If your car's fuel efficiency is measured in miles per gallon, a reactor's efficiency is measured in energy-days per ton of uranium.

By measuring the amount of ^{148}Nd in spent fuel and knowing its fission yield, we can calculate:

- ❖ Total number of fissions
- ❖ Total energy extracted
- ❖ Burnup (MWd/tU or GWd/tHM)

Source: Wikipedia, WNA,
www.gen-4.org

The standard isotope used to define and measure nuclear fuel burnup is:

□ **Neodymium-148 (^{148}Nd)**

☑ **Why ^{148}Nd is the burnup standard:**

^{148}Nd is used in the Nd-148 burnup method, which is the international reference technique for burnup determination.

Key reasons:

- ❖ Stable (non-radioactive) → easy to measure accurately
- ❖ Cumulative fission product → produced directly in fission
- ❖ High and well-known fission yield (from U-235, Pu-239, etc.)
- ❖ Not volatile → does not escape fuel during irradiation
- ❖ Not significantly transmuted during reactor operation

How it's measured

The process is known as ASTM E321. Scientists take a small sample of the dissolved spent fuel and use Mass Spectrometry to count the ^{148}Nd atoms. By comparing the amount of Neodymium to the amount of remaining Uranium and Plutonium, they can calculate the exact percentage of heavy metal atoms that were fissioned.

Its concentration increases linearly with number of fissions, making it an excellent "fission counter".

Principle (in simple terms)

Burnup \propto Amount of ^{148}Nd formed

In PHWR, PWR, BWR, fast reactors, etc., ^{148}Nd is used for accurate burnup determination during post-irradiation examination (PIE). For routine purposes, nuclear fuel burnup is calculated from reactor thermal power measurements.