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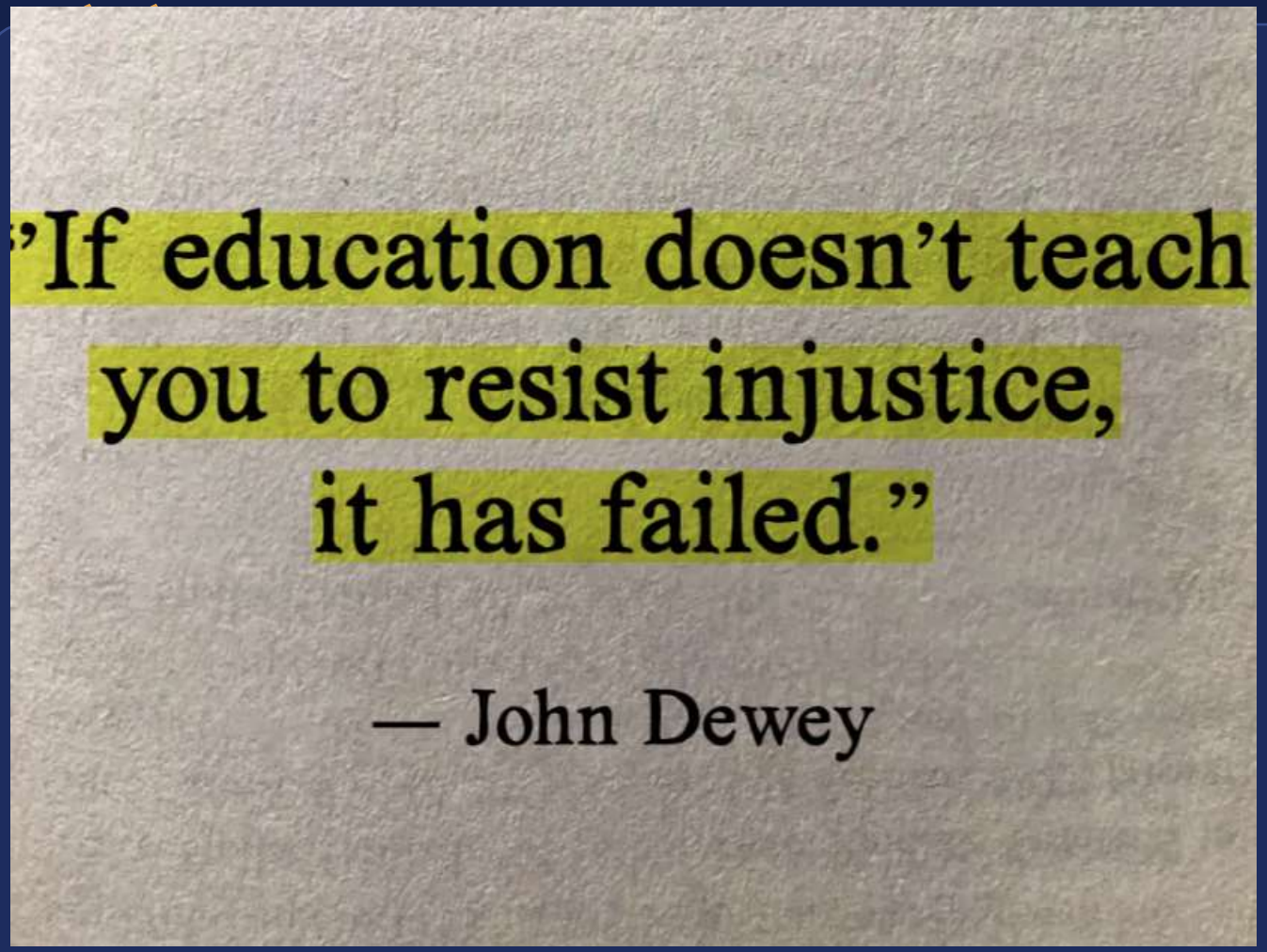
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By Bhunesh Sir

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it has failed."
— John Dewey

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आज के समसामयिक मुद्दे — The Hindu • Indian Express • Financial Express — 6 articles + exam PYQs + MCQs + Myth Buster

1. **Amazon to invest $7 bn more in India renewables by 2030**
   अमेज़न का $7 अरब निवेश

2. **Reliance to invest ₹15,000 cr in ~100 biogas plants**
   रिलायंस के 100 बायोगैस संयंत्र

3. **Voyager 1 one light-day from Earth – a marvel of science**
   वॉयेजर 1 एक प्रकाश-दिन दूर

4. **Bhutan, Mahindra among five Earthshot Prize winners**
   अर्थशॉट पुरस्कार विजेता

5. **Bangladesh connects Rooppur nuclear plant to grid**
   बांग्लादेश का पहला परमाणु संयंत्र

6. **IIT Delhi back in global top 200 of QS Sustainability Rankings**
   IIT दिल्ली शीर्ष 200 में


12

Business

INBRIEF

India may limit leveraged stock bets to curb volatility

DRI searches Cipla's office, depot over imported drugs

BPCL set to tap local debt market after 4-year hiatus

1

...zon to invest ...billion in India renewables by 2030

amazon

Reliance plans to invest about $1.6 bn in new biogas plants

IOC gets govt. nod for commercial supply of SAF from Panipat

IN-SPACe picks three firms to develop 3D reconstruction of Indian cities

RBI's reply to Tata Sons triggers debate over suo motu power

Digital lender Fibe to tap repeat borrowers

NMDC eyeing 24 MT pellet capacity: CMD

'AI to reshape, not replace, jobs in India's design and manufacturing sectors'

Govt. working on standards for low-speed e-2 wheelers

THE HINDU • 18 NOV 2026

Page 12 · Business

पृष्ठ 12 · व्यापार (also FE p1)

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **Amazon $7 bn | अमेज़न**

Amazon to invest $7 bn more in India renewables by 2030

अमेज़न का $7 अरब निवेश

Amazon to invest $7 billion in India renewables by 2030

The fresh investment is in addition to the $4 billion already contracted in renewable energy investments in the country, the e-com company says

The Hindu Bureau
BENGALURU

Amazon on Tuesday announced plans to invest an additional $7 billion in renewable energy projects in India by 2030, significantly expanding its clean energy portfolio as it seeks to support the country's energy transition.

The investment will be over and above the $4 billion already committed to renewable energy projects in India, making Amazon one of the country's leading corporate purchasers of carbon-free energy, the Washington-based technology and e-commerce major said in a statement.

"Our renewable energy investments in India reflect years of sustained effort, planning, and collaboration across the industry. This additional investment of $7 billion underlines our long-term commitment, helping bring additional wind and solar capacity online while contributing to India's energy security and long-term renewable energy ambitions," said Kara Hurst, Chief Sustainability Officer, Amazon.

By expanding access to renewable energy at scale, Amazon aims to help meet India's growing electricity demand, strengthen energy security and support the country's target of achieving net-zero emissions by 2070, Mr. Hurst added.



Amazon aims to help meet India's growing electricity demand and support its target of achieving net-zero emissions by 2070. REUTERS

Four new projects

Amazon also announced four new utility-scale wind and solar projects with a combined capacity of 934 megawatts (MW). These include a 234 MW wind farm in Karnataka, its largest wind project contracted in Asia so far; a 200 MW hybrid wind and solar project, also in Karnataka; a 300 MW solar project in Madhya Pradesh; and a 200 MW solar project in Rajasthan.

Secured through power purchase agreements (PPAs), the projects form part of Amazon's existing $4 billion contracted investments in India.

Once operational, its contracted renewable energy projects will have a combined capacity of more than 2 gigawatts (GW), generating electricity equivalent to the annual consumption of over 3.5 million Indian households.

Welcoming the fresh investment, Union Minister for New and Renewable Energy Prahlad Joshi said, "Such investments play an important role in advancing India's clean energy ambitions, strengthening energy security and supporting sustainable economic growth."

"They also demonstrate the growing confidence of global companies in India's renewable energy sector and its potential to attract long-term investment, create economic opportunities and accelerate the country's energy transition," he added.

Amazon said its investments in India would also contribute to its global target of reducing the carbon intensity of electricity powering its operations by 63% by 2030, against a 2019 baseline.

TAKES TOTAL CONTRACTED AND PLANNED INVESTMENTS TO $11 BN

Amazon adds $7 billion to India's clean energy push

SAURAV ANAND
New Delhi, November 17

AMAZON ON TUESDAY announced an additional investment of $7 billion in India's renewable energy sector by 2030, taking its total planned and contracted investments to $11 billion, as the e-commerce major looks to secure clean electricity for its expanding operations amid growing power requirements from digital infrastructure and logistics.

The proposed investment comes at a time when rapid expansion of data centres, cloud computing and e-commerce infrastructure is increasing electricity demand from large technology companies. For Amazon, securing renewable power is also central to reducing the carbon footprint of its operations as it expands its presence in India.

The company, however, did not disclose project-wise allocation of the additional investment or specify how it would be deployed.

The additional commitment is over and above the $4 billion Amazon has already contracted for renewable energy projects in India. The company on Tuesday also announced four wind and solar projects with a combined capacity of 934 megawatt (MW) across Karnataka, Madhya Pradesh and Rajasthan. These projects are part of its existing contracted portfolio and have been secured through power purchase agreements (PPA).

Continued on Page 9

GREEN ENERGY BET

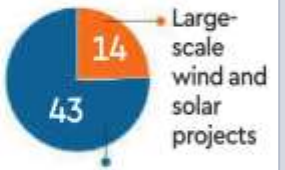
- $11 bn — Amazon's planned and contracted RE investments by 2030
- $4 bn — Already contracted investment
- $7 bn — Additional investment planned

2 GW+ Contracted renewable energy capacity in India

934 MW Capacity added through 4 new projects



57 projects
Amazon's renewable energy portfolio in India

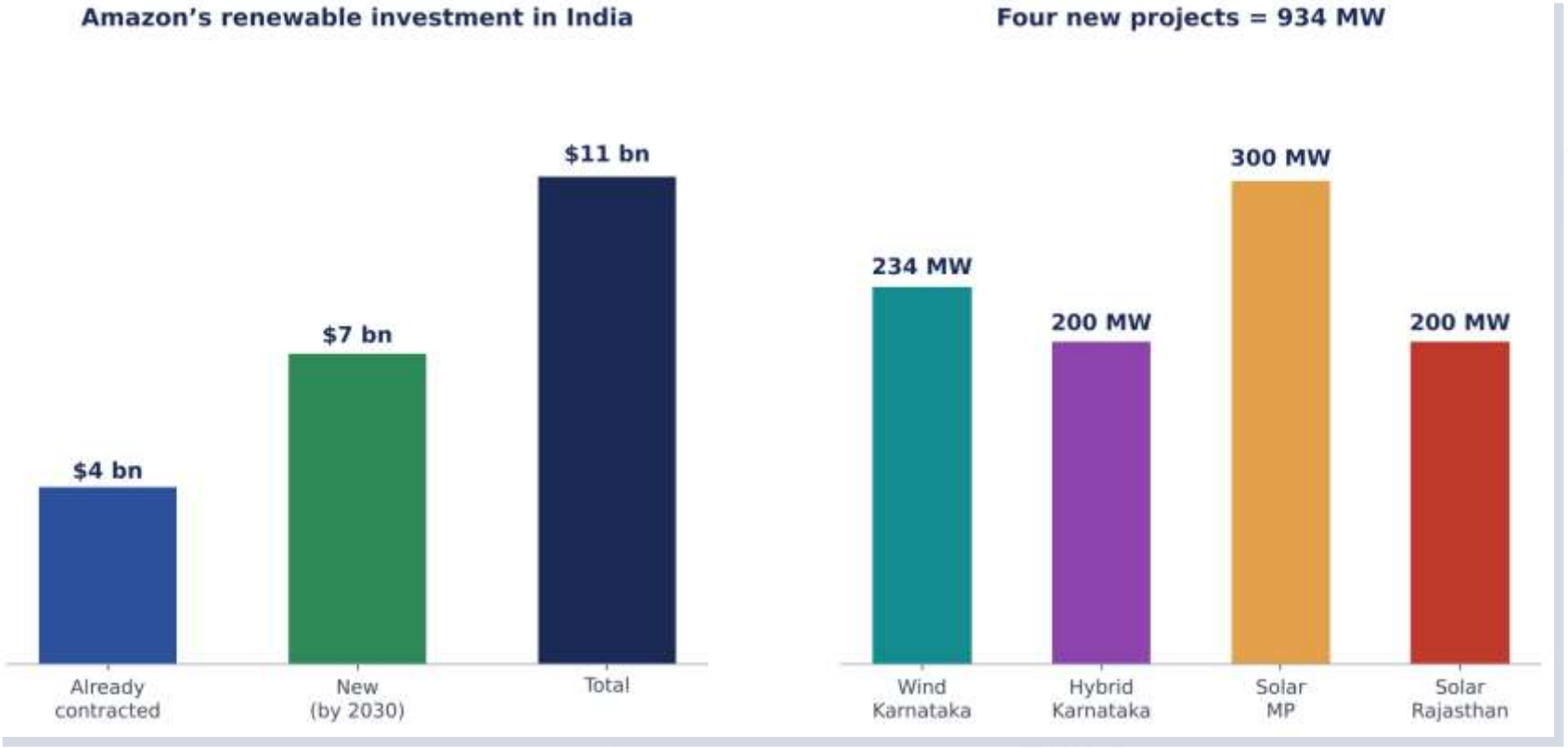


Solar installations across Amazon's facilities

»INSIDE« RELIANCE LINES UP ₹15,000 CR TO EXPAND BIOGAS CAPACITY PAGE 7

Amazon to invest $7 bn more in India renewables by 2030 — Map & Diagram

अमेज़न का $7 अरब निवेश — मानचित्र व आरेख

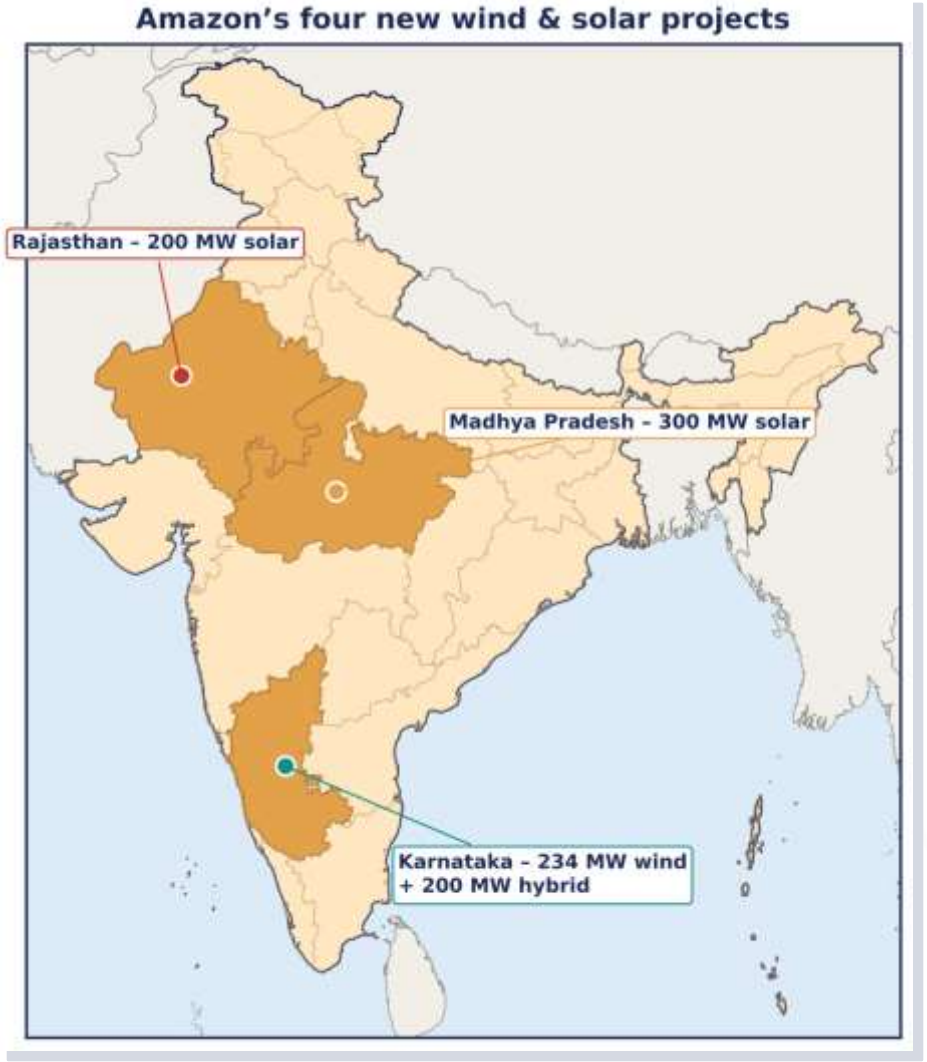


Read the visual
चित्र को समझें

- Project-wise split of new money **not disclosed**
  विवरण नहीं
- A mix of **wind, solar & hybrid**
  पवन, सौर, हाइब्रिड
- All four in **south, west & central** India
  क्षेत्र

Amazon to invest $7 bn more in India renewables by 2030 — Map & Diagram

अमेज़न का $7 अरब निवेश — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Karnataka – strong **Deccan wind** corridor
  पवन गलियारा
- Rajasthan – highest **solar radiation** in India
  सर्वाधिक धूप
- MP – home to the **Rewa** ultra mega solar park
  रीवा

Amazon to Invest $7 Billion in India Renewables by 2030

ई-कॉमर्स कंपनी अमेज़न 2030 तक भारत में नवीकरणीय ऊर्जा परियोजनाओं में अतिरिक्त $7 अरब लगाएगी – पहले से अनुबंधित $4 अरब के ऊपर; कर्नाटक, मध्य प्रदेश और राजस्थान में 934 MW की चार नई पवन व सौर परियोजनाएँ भी घोषित

Clean energy
स्वच्छ ऊर्जा

1 The pledge | घोषणा

- Additional **$7 billion** by **2030**
  $7 अरब
- Over and above **$4 billion** already contracted
  $4 अरब
- Now a leading **corporate buyer** of carbon-free power
  बड़ा ख़रीदार

2 Key numbers मुख्य आँकड़े

934 MW 4 new projects नई परियोजनाएँ	**234 MW** Largest Amazon wind farm in Asia एशिया में सबसे बड़ा
2 GW+ Total contracted कुल अनुबंधित	**3.5 mn** Homes' yearly power घरों के बराबर

3 Why now | अभी क्यों

- **Data centres, cloud & e-commerce** need more power
  डेटा सेंटर
- Cut the **carbon footprint** of operations
  कार्बन कमी
- Backs India's **net zero by 2070**
  नेट ज़ीरो 2070

Amazon to invest $7 bn more in India renewables by 2030 — in depth (1/2)

अमेज़न का $7 अरब निवेश — विस्तार से (1/2)

4 Global goal वैश्विक लक्ष्य

- Cut **carbon intensity** of its electricity by **65%**
  65%
- By **2030**, against a **2019** baseline
  2019 आधार
- CSO **Kara Hurst**: “long-term commitment”
  कारा हर्स्ट

5 Government view | सरकार

- MNRE Minister **Pralhad Joshi** welcomed it
  प्रह्लाद जोशी
- Shows **confidence of global firms** in Indian RE
  वैश्विक भरोसा
- Boosts **energy security** & jobs
  ऊर्जा सुरक्षा

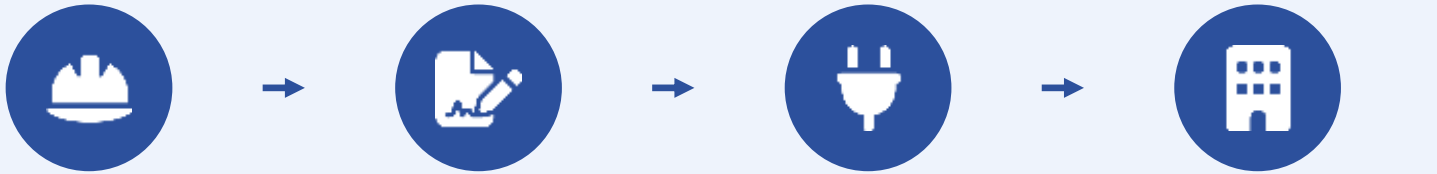
6 Amazon’s portfolio पोर्टफ़ोलियो

- **57** projects in India
  57 परियोजनाएँ
- **14** large wind & solar farms
  14 बड़े
- **43** solar installations on its own facilities
  43 छत-सौर

Amazon to invest $7 bn more in India renewables by 2030 — in depth (2/2)

अमेज़न का $7 अरब निवेश — विस्तार से (2/2)

7 How a corporate PPA works | PPA कैसे



8 Did you know? क्या आप जानते हैं?

- **Hybrid** plants share land & transmission lines
  हाइब्रिड
- Wind blows at night, sun shines by day – smoother supply
  स्थिर आपूर्ति

Amazon to invest $7 bn more in India renewables by 2030 — background (1/2)

अमेज़न का $7 अरब निवेश — पृष्ठभूमि (1/2)

9 India's clean targets लक्ष्य

Goal लक्ष्य	Target समय
Non-fossil capacity गैर-जीवाश्म	500 GW by 2030
50% non-fossil share 50% हिस्सा	Reached in 2025
Emission intensity cut उत्सर्जन तीव्रता	45% by 2030 (vs 2005)
Net zero नेट ज़ीरो	2070

10 Rules that help सहायक नियम

- **Green Energy Open Access Rules, 2022**
  ओपन एक्सेस
- Lets consumers of **100 kW+** buy green power
  100 kW+
- **Green Energy Corridor** – new transmission lines
  हरित गलियारा

11 Data centres & power डेटा सेंटर

- Need **24×7** reliable electricity
  चौबीसों घंटे
- Push for **round-the-clock** (RTC) green tenders
  RTC
- Plus **battery storage** to fill gaps
  बैटरी भंडारण

Amazon to invest $7 bn more in India renewables by 2030 — background (2/2)

अमेज़न का $7 अरब निवेश — पृष्ठभूमि (2/2)

12 India's renewable mix | नवीकरणीय स्रोत

Solar सौर	Wind पवन	Hydro जल	Bio-power जैव ऊर्जा
Largest share सबसे बड़ा	South & west दक्षिण-पश्चिम	Himalaya हिमालय	Bagasse etc. खोई

13 Key institutions प्रमुख संस्थाएँ

- **MNRE** – nodal ministry
  MNRE
- **SECI** (2011) – runs RE auctions
  SECI
- **IREDA** (1987) – RE finance
  IREDA

Amazon to invest $7 bn more in India renewables by 2030 — Static GK

अमेज़न का $7 अरब निवेश — स्थैतिक सामान्य ज्ञान

14 RE landmarks प्रमुख स्थल

Place स्थान	Fact तथ्य
Bhadla (Raj.) भड़ला	Among world's largest solar parks
Pavagada (Kar.) पावागड़ा	Big solar park, 2 GW+
Gujarat गुजरात	Top wind-power State

15 International Solar Alliance ISA

- Launched at **COP21, Paris (2015)** by India & France
  2015
- HQ: **Gurugram**
  गुरुग्राम
- Vision: **One Sun One World One Grid**
  OSOWOG

16 Amazon facts | अमेज़न

- Founded **1994** by **Jeff Bezos**, Seattle
  1994
- Cloud arm: **AWS**
  AWS
- **Climate Pledge** (2019) – net zero by **2040**
  2040



FINANCIAL EXPRESS • 18 NOV 2026

Page 7 · Companies

पृष्ठ 7 · कंपनियाँ (also TH p12)

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **Reliance biogas | रिलायंस बायोगैस**

Reliance to invest ₹15,000 cr in ~100 biogas plants

रिलायंस के 100 बायोगैस संयंत्र

COMPANY PLANS TO ESTABLISH NEARLY 100 CBG PLANTS BY 2030

RIL lines up ₹15K cr for biogas units

SAURAV ANAND
New Delhi, November 17

RELIANCE INDUSTRIES PLANS to invest around ₹15,000 crore ($1.6 billion) to establish nearly 100 compressed biogas (CBG) plants by 2030, stepping up its investment in domestic bioenergy as India looks to reduce dependence on imported fossil fuels.

The conglomerate aims to produce about 5 million cubic metres of gas daily from agricultural residue by 2030, Vikas Rathi, chief financial officer of Reliance's Bio Energy Business, said at the 14th CII Bioenergy Summit on Tuesday.

Reliance currently operates 45 biogas plants across 10 states, producing 350 tonne per day. However, these facilities are operating below capacity. The company plans to add another 10 plants by March 2027, taking its total daily output to 1,100 tonne, equivalent to approximately 1.5-2 million cubic metres of gas.

"We have CBG plants in 10 states. Wherever agro-residue is available, we will set up the plants," Rathi told reporters.

Reliance supplies biogas to city gas distribution companies catering to households and small industries.

Highlighting the challenges in scaling up production, Rathi said uninterrupted availability of agricultural residue remains critical to the sector's expansion. He stressed the need for "sustainable availability of agro-residue throughout the year" and called on states to undertake district-wise mapping of feedstock supplies to prevent competition between CBG developers. Rathi also sought greater involvement of farmers and farmer-producer organisations, investment in agricultural residue collection machinery and promotion of organic manure produced at biogas facilities.

Reliance's FY26 annual report had recorded 35 operational CBG plants, producing more than 270 tonne daily. The firm said its green fuel supplies served over 40,000 vehicles daily through approximately 270 retail outlets, including those of other distributors. The expansion comes as India targets increasing the share of natural gas in its energy mix to 15% by 2030 from about 6.2%.

Addressing the summit, Union Minister Nitin Gadkari said bioenergy could reduce petroleum imports while generating additional income for farmers and creating employment.

GREEN ENERGY PUSH

- Reliance currently operates 45 biogas plants across 10 states
- It plans to add another 10 plants by March 2027, taking its total daily output to nearly **1.5-2** mn cubic metres



- It aims to produce about **5 mn** cubic metres of gas daily from agricultural residue by 2030
- Reliance supplies biogas to city gas distribution companies catering to households and small industries

Reliance plans to invest about $1.6 bn in new biogas plants

Reuters
NEW DELHI

Reliance hopes to produce about 5 million cubic metres per day of gas using agricultural residue

India's Reliance Industries plans to set up about 100 compressed biogas plants by 2030 costing about ₹150 billion ($1.6 billion), the chief financial officer of its Bio Energy Business said.

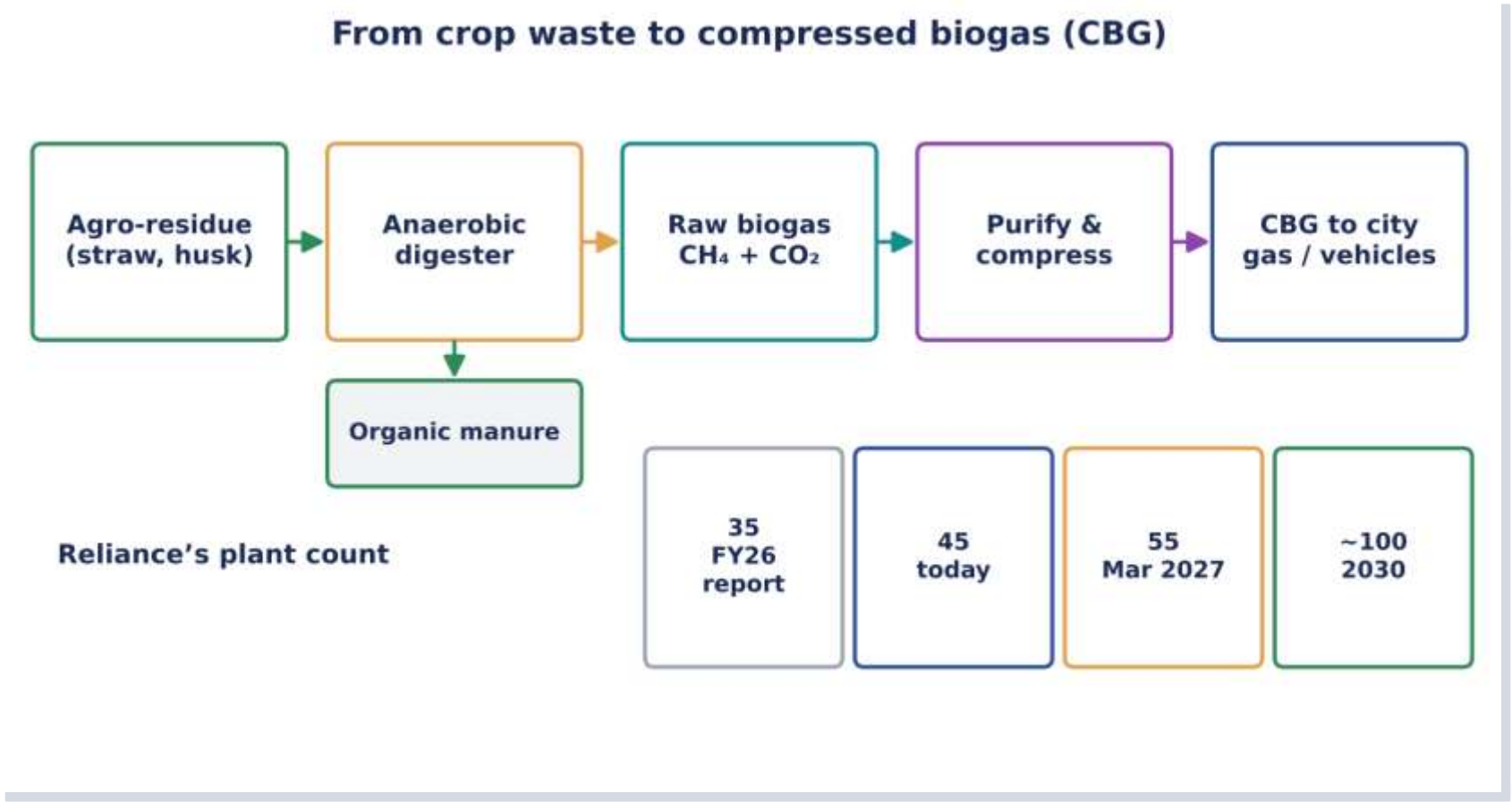
The conglomerate hopes to produce about 5 million cubic metres per day of gas using agricultural residue by 2030, Vikas Rathi said at an industry event. He said Reliance is currently producing 3,50,000 metric tonnes per day of biogas from 45 plants, which are operating at lower capacity.

The company plans to add 10 more plants by the end of March 2027, raising the overall output to 1.1 million metric tonnes, equivalent to about 1.5 million to 2 million cubic metres per day.

Reliance sells biogas to distribution companies supplying gas to households and small industries.

Reliance to invest ₹15,000 cr in ~100 biogas plants — Map & Diagram

रिलायंस के 100 बायोगैस संयंत्र — मानचित्र व आरेख

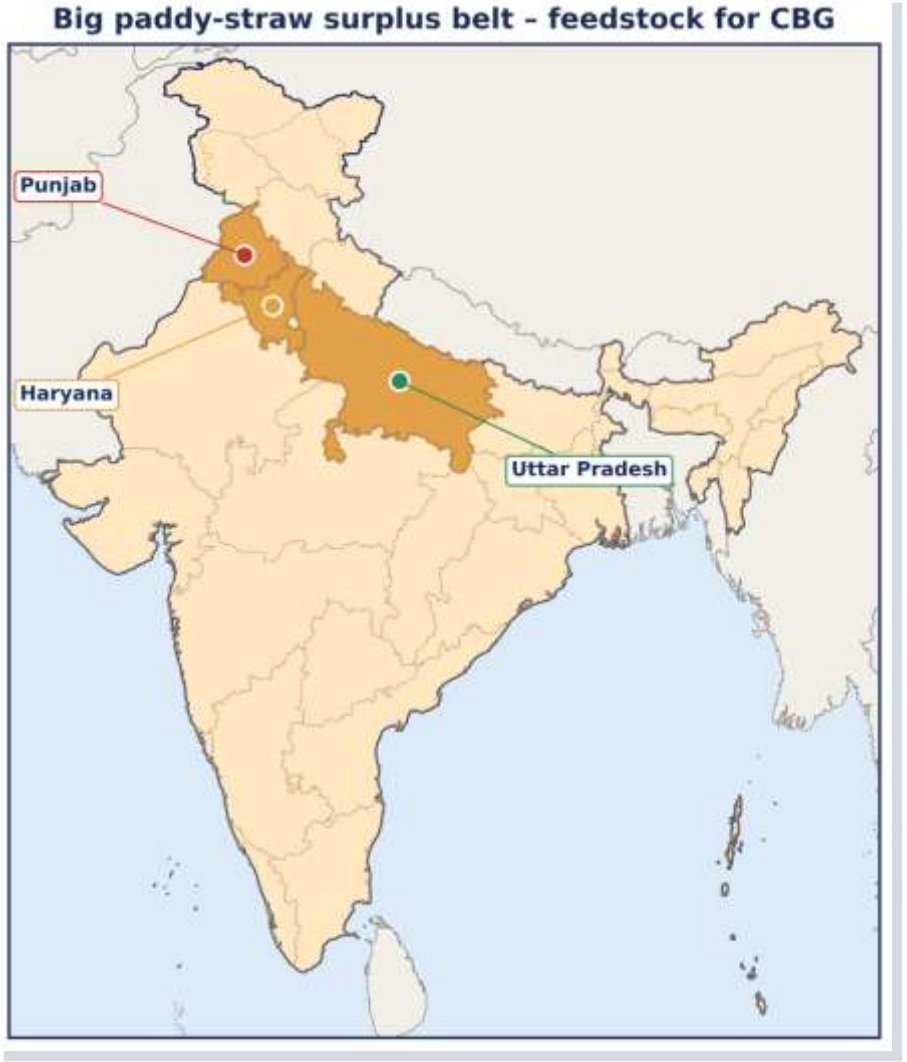


Read the visual
चित्र को समझें

- Digestion happens **without oxygen**
  ऑक्सीजन रहित
- CBG is chemically like **CNG**
  CNG जैसी
- Leftover slurry becomes **organic manure**
  जैविक खाद

Reliance to invest ₹15,000 cr in ~100 biogas plants — Map & Diagram

रिलायंस के 100 बायोगैस संयंत्र — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Punjab & Haryana follow a **rice–wheat** cycle
  धान–गेहूँ
- Short gap between harvest & sowing → **straw burning**
  पराली जलाना
- CBG plants give straw a **market price**
  पराली का दाम

RIL Lines Up ₹15,000 Crore for ~100 Biogas Plants by 2030

रिलायंस इंडस्ट्रीज़ 2030 तक लगभग ₹15,000 करोड़ ($1.6 अरब) लगाकर क़रीब 100 संपीडित बायोगैस (CBG) संयंत्र लगाएगी – कृषि अवशेष से रोज़ 50 लाख घन मीटर गैस बनाने का लक्ष्य; आयातित जीवाश्म ईंधन पर निर्भरता घटाने की दिशा में

Compressed biogas
CBG

1 The plan | योजना

- **~100 CBG plants** by **2030**
  100 संयंत्र
- Investment **₹15,000 crore** ($1.6 bn)
  ₹15,000 करोड़
- Target: **5 million m³ of gas a day** from crop residue
  50 लाख घन मीटर

2 Where it stands | वर्तमान

45 Plants in 10 States संयंत्र	**350 t** Daily output now दैनिक उत्पादन
1,100 t Daily by Mar 2027 मार्च 2027	**1.5–2 mn m³** Gas equivalent गैस

3 Who said it | किसने कहा

- **Vikas Rathi**, CFO, Reliance Bio Energy
  विकास राठी
- At the **14th CII Bioenergy Summit**
  CII सम्मेलन
- Sells gas to **city gas distribution** firms
  CGD कंपनियाँ

Reliance to invest ₹15,000 cr in ~100 biogas plants — in depth (1/2)

रिलायंस के 100 बायोगैस संयंत्र — विस्तार से (1/2)

4 The big hurdle बड़ी चुनौती

- Need **year-round** supply of agro-residue
  सालभर अवशेष
- Asks States for **district-wise feedstock mapping**
  ज़िला मानचित्रण
- To stop developers **competing** for the same straw
  प्रतिस्पर्धा

5 Role of farmers | किसान

- Involve **farmer-producer organisations**
  FPO
- Invest in **residue-collection machines**
  मशीनें
- Promote **organic manure** from plants
  जैविक खाद

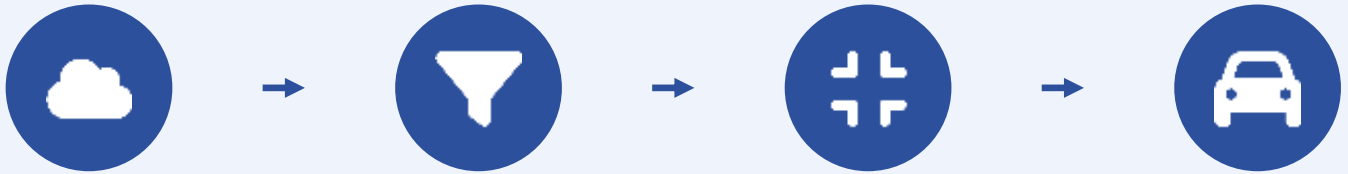
6 Bigger picture बड़ी तस्वीर

- FY26 report: **35 plants**, 270 t a day
  FY26
- Green fuel to **40,000 vehicles** daily via ~270 outlets
  40,000 वाहन
- Gas share in energy: **6.2%** → **15%** by 2030
  15% लक्ष्य

Reliance to invest ₹15,000 cr in ~100 biogas plants — in depth (2/2)

रिलायंस के 100 बायोगैस संयंत्र — विस्तार से (2/2)

7 Biogas to CBG | बायोगैस से CBG



Biogas बायोगैस	Scrub शुद्धि	CBG CBG	Use उपयोग
55–65% methane मीथेन	Remove CO_2, H_2S CO_2 हटाएँ	≥90% methane 90%+	Like CNG CNG जैसा

8 Did you know? क्या आप जानते हैं?

- India imports nearly **half** its natural gas as **LNG**
  आधी गैस आयात
- Gadkari: bioenergy can cut **petroleum imports** & create jobs
  गडकरी

Reliance to invest ₹15,000 cr in ~100 biogas plants — background (1/2)

रिलायंस के 100 बायोगैस संयंत्र — पृष्ठभूमि (1/2)

9 Government push सरकारी पहल

Scheme योजना	Aim उद्देश्य
SATAT (2018) सतत	5,000 CBG plants
GOBARdhan (2018) गोबरधन	Cattle & farm waste to energy
CBG blending duty CBO	1% FY26 → 5% FY29
Nat. Bioenergy Prog. NBP	MNRE support

10 Why CBG matters | महत्व

- Cuts **gas imports** आयात कम
- Reduces **stubble burning** & winter smog धुआँ कम
- Captures **methane** from rotting waste मीथेन नियंत्रण

11 Biofuel generations जैव ईंधन पीढ़ियाँ

- **1G** – food crops (sugarcane, maize) पहली
- **2G** – crop residue, cellulose दूसरी
- **3G** – algae तीसरी

Reliance to invest ₹15,000 cr in ~100 biogas plants — background (2/2)

रिलायंस के 100 बायोगैस संयंत्र — पृष्ठभूमि (2/2)

12 Natural-gas chain | गैस शृंखला

Source स्रोत	Pipeline grid पाइपलाइन	CGD सिटी गैस	PNG & CNG घर, वाहन
Wells, LNG, CBG कुआँ, LNG	Trunk lines मुख्य लाइन	City networks शहर	Homes, cars उपभोग

13 Biofuel policy
जैव ईंधन नीति

- **National Policy on Biofuels, 2018** (amended 2022)
  2018 नीति
- **E20** petrol target pulled ahead to **2025-26**
  E20
- Encourages **2G ethanol & CBG**
  2G, CBG

Reliance to invest ₹15,000 cr in ~100 biogas plants — Static GK

रिलायंस के 100 बायोगैस संयंत्र — स्थैतिक सामान्य ज्ञान

14 Fuel gases | ईंधन गैसें

Gas गैस	Main part मुख्य घटक
CNG / CBG सीएनजी	Methane (CH_4)
LPG एलपीजी	Propane + butane
Biogas बायोगैस	Methane + CO_2
Producer gas प्रोड्यूसर	CO + N_2

15 Methane facts | मीथेन

- ~**28×** CO_2's warming over 100 years
  28 गुना
- **Global Methane Pledge** (2021) – India hasn't joined
  मीथेन संकल्प
- Big sources: **paddy, livestock, landfills**
  स्रोत

16 Reliance facts | रिलायंस

- Founded by **Dhirubhai Ambani**
  धीरूभाई
- **Jamnagar** – world's largest single-site refinery
  जामनगर
- Chairman: **Mukesh Ambani**
  मुकेश अंबानी



SCIENCE 7

1 oyager 1, one light-day away from earth today, is a marvel of science

THE GIST

BIG SHOT

WHAT IS IT?

LineShine stays defending champ

THE HINDU • 18 NOV 2026

Page 7 · Science

पृष्ठ 7 · विज्ञान

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **Voyager 1 | वॉयेजर 1**

Voyager 1 one light-day from Earth – a marvel of science

वॉयेजर 1 एक प्रकाश-दिन दूर

Voyager 1, one light-day away from earth today, is a marvel of science

Measurements lying in the shadows of their successors can find new lives in the light of new theories. The Voyager 1 mission's longevity made that more apparent, allowing successive generations of researchers to find more uses for its data even as it continues to collect new information

Vasudevan Mukunth

Today, the Voyager 1 spacecraft will be one light-day away from the earth. This means a signal travelling at the speed of light will take one full day to go from the earth to Voyager 1, and signals from the spacecraft will similarly take one day to reach receivers on the earth.

This is a tremendous distance – almost 26 billion kilometres. Since February 17, 1998, Voyager 1 has been the farthest any space mission has been from us. And it keeps going at 61,000 km/hr. But even at such breathtaking speed, Voyager 1 is still barely out of the solar system. Each star's gravitational and magnetic fields extend out for billions of kilometres around them, bending the destinies of multiple worlds to their stellar will.

It is no surprise then that Voyager 1 has itself been defined by superlatives for providing a sense of the influence of our own sun: the first, the farthest, and indeed the oldest space mission still going.



THEGIST

Voyager 1's one unexpected discovery came when its ultraviolet spectrometer, designed to study UV light, was found to be unintentionally detecting galactic cosmic rays; scientists later realised the instrument was providing useful data on cosmic rays

When the spacecraft came close to Saturn, its instruments collected data scientists subsequently used to test one of Albert Einstein's predictions; this result was notable for providing independent confirmation, albeit to a weaker degree than ideal, of a concept in fundamental physics

Voyager 1's radio signals revealed detailed structures in Saturn's rings and helped

Voyager 1 one light-day from Earth – a marvel of science

वॉयेजर 1 एक प्रकाश-दिन दूर



An artist's rendering of Voyager 1 barrelling through space. AP

Pleasant surprise

When NASA launched Voyager 1, the Soviet Union was still a country, the Berlin Wall divided Germany, apartheid was law in South Africa, and neither the World Wide Web nor smartphones existed. Voyager 1 itself has changed during its mission: its operators switched off its cameras in 1990, replaced its ageing components with backups, and, by 2026, left only two of its ten science instruments online. Yet the superlatives have often obscured the important scientific contributions these instruments have themselves made.

For example, scientists were in for a pleasant surprise when they found that one of the instruments onboard Voyager 1 was actually tracking galactic cosmic rays even though it was not designed to. The ultraviolet spectrometer's purpose was to study ultraviolet light, released by grains of dust scattering sunlight in space and by the atmospheres of distant planets. The detector also registered noise from other sources, including from Voyager's nuclear power source, and scientists routinely subtracted it from the data to reveal the ultraviolet signals.

But in 2014, researchers reported in the journal *Astronomy & Astrophysics* that the background noise was actually created by cosmic rays – high-energy particles coming from beyond the solar system. They reanalysed this data collected between 1992 and 2013 and compared them to other instruments elsewhere that were tracking cosmic rays, and concluded the ultraviolet spectrometer onboard Voyager 1 was indeed sensitive to cosmic rays within a small energy range.

Little surprises

The team also sought independent evidence in this data to check whether Voyager 1 had reached or crossed the heliopause, the boundary of the region dominated by the solar wind, in 2012, although the implications went further.

For example, the spectrometer's unexpected readings raised questions about the part of space immediately inside the heliopause, where the solar wind seemed to flow more slowly. After more study, scientists proposed that the wind braked due to interactions between the subatomic particles it contained and the electrically neutral atoms from interstellar space. The proposal remains unconfirmed but nonetheless offered a new way to investigate the possibility that the heliopause may look different in different directions.

Voyager 1 has sprung many little surprises of similar nature that have often skipped the public eye. For another example, when Voyager 1 came close to Saturn, its instruments collected data scientists subsequently used to test one of Albert Einstein's predictions: that the frequency of electromagnetic radiation, such as light, changes when it passes through a gravitational field.

In a study published in *Physical Review Letters* in March 1990, researchers confirmed the prediction with 1% accuracy – a rare instance of an interplanetary mission contributing to fundamental physics. To be fair, the Voyager 1 result also depended on an assumption that radiation around Saturn did not interfere with the spacecraft's frequency reference.

Second, the NASA Gravity Probe A experiment had already confirmed Einstein's prediction in 1976, that too within a better accuracy of 0.02%. The finding based on Voyager 1 was nonetheless interesting because it was independent: based on wholly different instruments and from within a distinct planetary environment. Physicists seek such differences because there are alternative theories of gravity that, on paper, predict varying effects in varying conditions, and differences in the observed data could challenge theories that do not predict them.

Stepping stones

In the same visit to Saturn, scientists also used the radio signals Voyager 1 could emit to study the planet's rings. Specifically, as the spacecraft moved behind the rings, its signals bound for the earth travelled through the rings first. And by studying how the signals were scattered and weakened, scientists could piece together the distribution of materials in the rings.

Thus they discovered fine structures such as narrow gaps between the rings and wave-like undulations in their density, and determined that the particles making up the rings were at best 10-20 metres wide in certain regions.

Operators repeated the same technique with Saturn's moon Titan, which is the only moon in the solar system with a substantial atmosphere, and the only other planetary body to have liquids on its surface. When the Voyager 1 radio transmissions travelled through Titan's atmosphere, scientists were able to measure its temperature and pressure.

Both sets of findings were stepping stones for the landmark NASA Cassini mission, which studied the Saturnian system up close from 2004 to 2017. The data also informed plans for the mission's Huygens probe, which descended through Titan's atmosphere in 2005.

Measurements lying in the shadows of their successors can find new lives in the light of new theories. The Voyager 1 mission's longevity made that more apparent, allowing successive generations of researchers to find more uses for its data even as it continues to collect new information.

As it pulls farther away from the earth, its signals will grow dimmer and its instruments will eventually fall silent, but the scientific life of its observations will keep going.

(mukunth.v@thehindu.co.in)

Saturn's rings and helped measure the temperature and pressure of Titan's atmosphere; these findings laid the groundwork for the later Cassini-Huygens mission

Voyager 1, One Light-Day from Earth, Is a Marvel of Science

नासा का वॉयेजर 1 आज पृथ्वी से एक प्रकाश-दिन (लगभग 2,600 करोड़ किमी) दूर पहुँच रहा है – प्रकाश की गति से चला संकेत भी एक दिन में पहुँचेगा; 49 साल पुराना यह मिशन अब भी विज्ञान को नई खोजें दे रहा है

NASA
नासा

1 The milestone | उपलब्धि

- **One light-day** away – almost **26 billion km**
  2,600 करोड़ किमी
- Signal needs **a full day** each way
  एक दिन
- First human-made object this far
  पहली बार

2 Records | रिकॉर्ड

1998 Farthest mission since सबसे दूर	**61,000** km/h speed गति
49 yrs Oldest active mission सबसे पुराना	**2 of 10** Instruments still on उपकरण चालू

3 Ageing craft | बूढ़ा यान

- Ageing parts swapped for **backups**
  बैकअप
- Still **barely out** of the Sun's influence
  सूर्य का प्रभाव
- Signals will grow **dimmer**, instruments fall silent
  धीमे संकेत

Voyager 1 one light-day from Earth – a marvel of science — in depth (1/2)

वॉयेजर 1 एक प्रकाश-दिन दूर — विस्तार से (1/2)

4 Surprise 1: cosmic rays
ब्रह्मांडीय किरणें

- **UV spectrometer** picked up **galactic cosmic rays**
  UV स्पेक्ट्रोमीटर
- Found in a **2014** study of 1992–2013 data
  2014 अध्ययन
- Helped check the **heliopause crossing (2012)**
  हीलियोपॉज़

5 Surprise 2: Einstein
आइंस्टीन

- Tested **gravitational redshift** near Saturn
  गुरुत्वीय रेडशिफ़्ट
- Confirmed to **1% accuracy** (1990)
  1% सटीकता
- Independent of **Gravity Probe A** (1976, 0.02%)
  स्वतंत्र पुष्टि

6 Saturn & Titan
शनि व टाइटन

- Radio signals revealed **gaps & waves** in rings
  वलय
- Ring particles **≤10–20 m** in places
  कण आकार
- Measured **Titan's air** – paved way for **Cassini-Huygens**
  कैसिनी

Voyager 1 one light-day from Earth – a marvel of science — in depth (2/2)

वॉयेजर 1 एक प्रकाश-दिन दूर — विस्तार से (2/2)

7 Leaving the Sun's bubble | सूर्य का बुलबुला

Solar wind
सौर पवन
Supersonic
तेज़

→

Termination shock
टर्मिनेशन शॉक
Slows down
धीमी

→

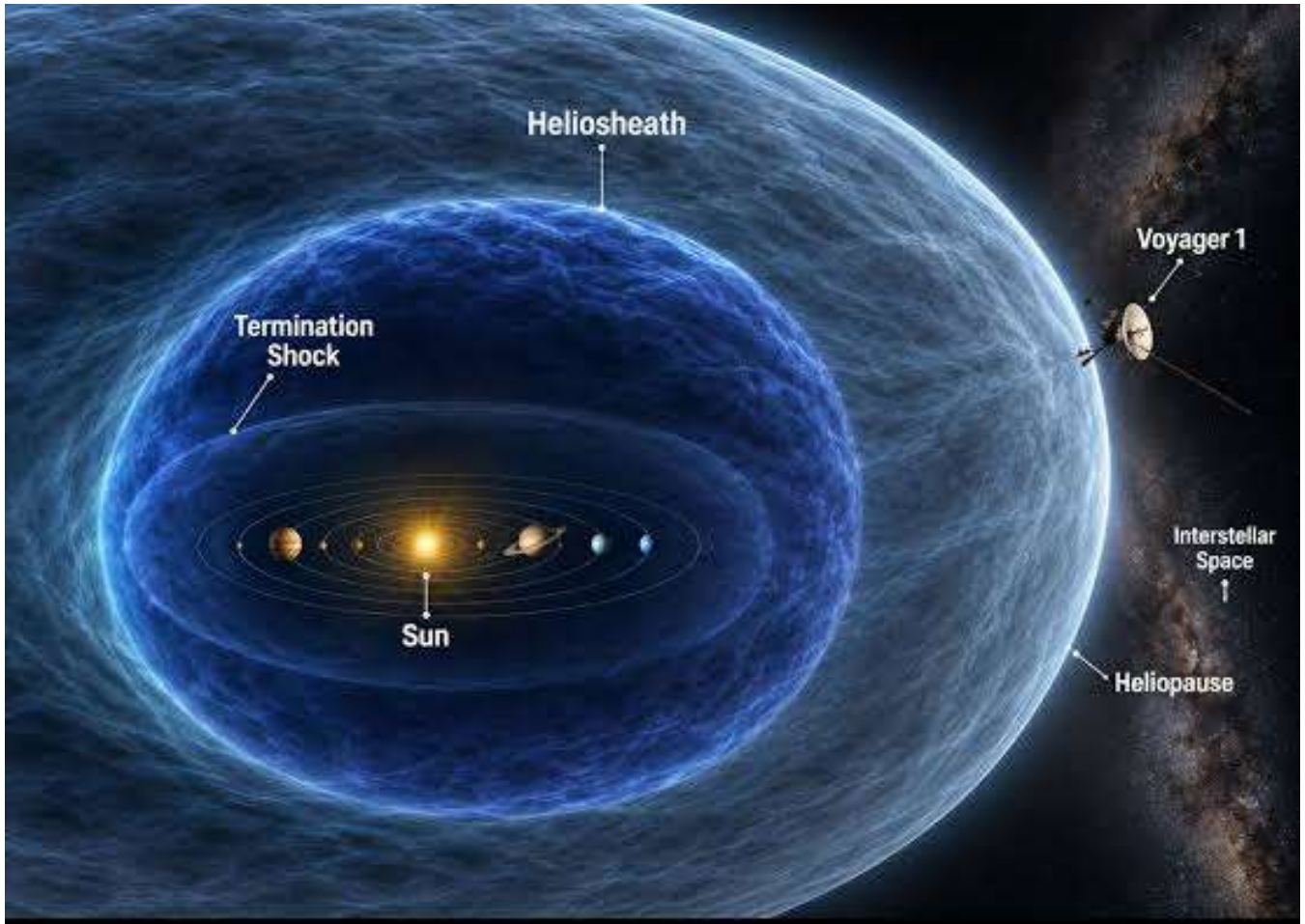
Heliopause
हीलियोपॉज़
Edge
सीमा

→

Interstellar
अंतरतारकीय
Beyond
पार

8 Did you know? क्या आप जानते हैं?

- Carries the **Golden Record** – sounds & images of Earth
  गोल्डन रिकॉर्ड
- The record team was led by **Carl Sagan**
  कार्ल सागन



VOYAGER 1 HAS LEFT THE SUN'S BUBBLE

After over 45 years in space, Voyager 1 crossed the heliopause and is now traveling through interstellar space.

Voyager 1 one light-day from Earth – a marvel of science — background (1/2)

वॉयेजर 1 एक प्रकाश-दिन दूर — पृष्ठभूमि (1/2)

9 Space distances अंतरिक्ष दूरी

Unit इकाई	Equals बराबर
1 AU खगोलीय इकाई	~150 million km
1 light-day प्रकाश-दिन	~25.9 bn km (~173 AU)
1 light-year प्रकाश-वर्ष	~9.46 trillion km
1 parsec पारसेक	~3.26 light-years

10 Voyager 2 | वॉयेजर 2

- Launched first – **August 1977**
  अगस्त 1977
- Only craft to visit **Uranus (1986) & Neptune (1989)**
  यूरेनस, नेपच्यून
- Entered interstellar space in **2018**
  2018

11 Titan | टाइटन

- **Saturn's** largest moon
  शनि का सबसे बड़ा
- Only moon with a **thick atmosphere**
  घना वायुमंडल
- Has **lakes of liquid methane**
  मीथेन झीलें

Voyager 1 one light-day from Earth – a marvel of science — background (2/2)

वॉयेजर 1 एक प्रकाश-दिन दूर — पृष्ठभूमि (2/2)

12 Einstein's big ideas | आइंस्टीन

Special relativity विशेष	General relativity सामान्य	Grav. redshift रेडशिफ़्ट	Grav. waves तरंगें
1905 1905	1915 1915	Tested 1976 परीक्षण	Detected 2015 2015

13 India in deep space | भारत

- **Mangalyaan** – Mars orbit, first try (2014) **मंगलयान**
- **Chandrayaan-3** – near lunar south pole (2023) **चंद्रयान-3**
- **Aditya-L1** – Sun observatory at L1 **आदित्य-L1**

Voyager 1 one light-day from Earth – a marvel of science — Static GK

वॉयेजर 1 एक प्रकाश-दिन दूर — स्थैतिक सामान्य ज्ञान

14 Outer planets बाहरी ग्रह

Planet ग्रह	Known for विशेषता
Jupiter बृहस्पति	Largest planet
Saturn शनि	Least dense, bright rings
Uranus यूरेनस	Rotates on its side
Neptune नेपच्यून	Fastest winds

15 Power far from the Sun ऊर्जा स्रोत

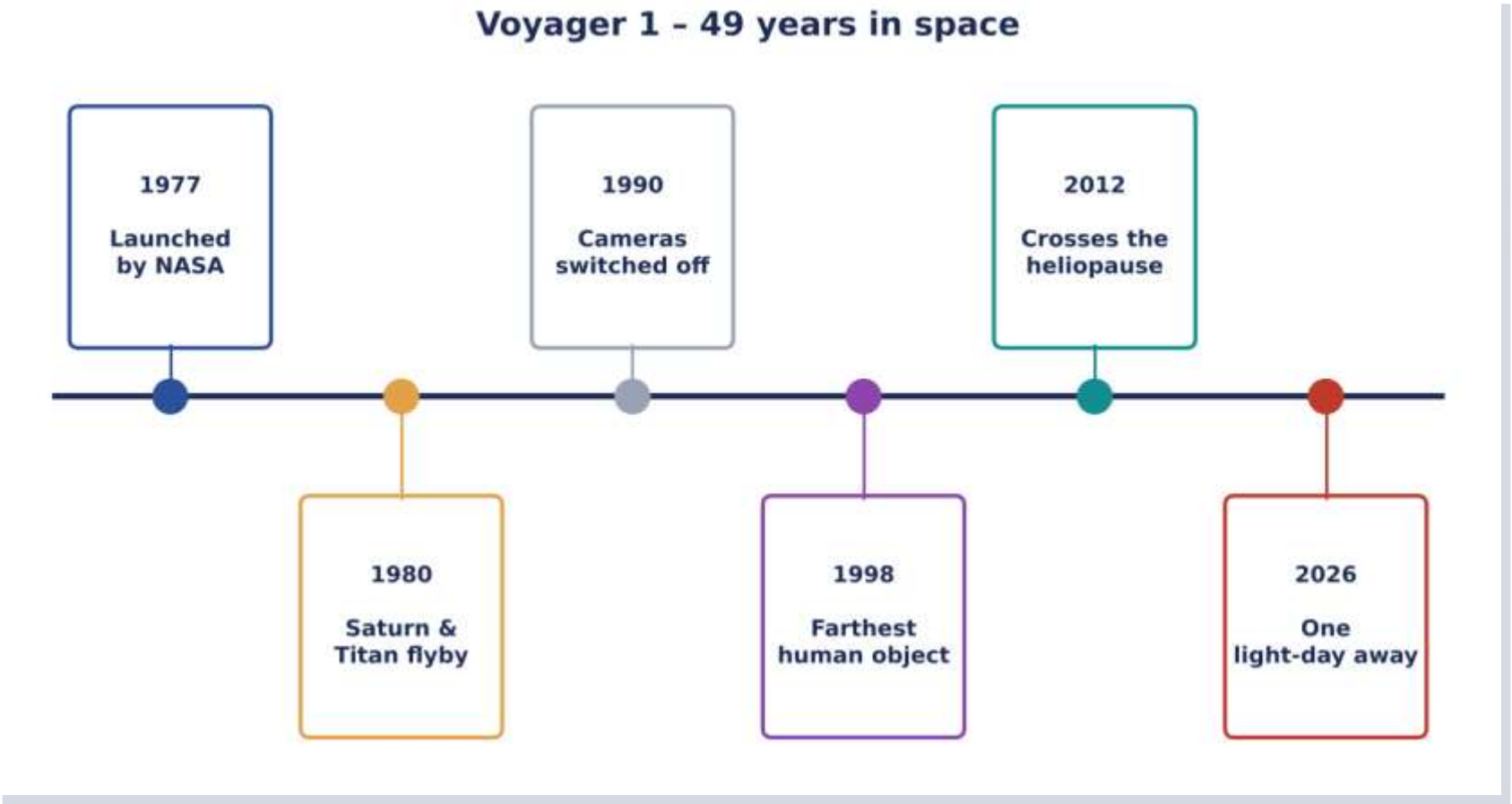
- Uses an **RTG** – nuclear battery
  RTG
- Heat from **plutonium-238** decay
  प्लूटोनियम-238
- Sunlight too weak for **solar panels**
  सौर पैनल नहीं

16 Speed of light प्रकाश की गति

- **~3 lakh km per second**
  3 लाख किमी/से.
- Sunlight reaches Earth in **~8 min 20 s**
  8 मिनट
- Moonlight: **~1.3 seconds**
  1.3 सेकंड

Voyager 1 one light-day from Earth – a marvel of science — Map & Diagram

वॉयेजर 1 एक प्रकाश-दिन दूर — मानचित्र व आरेख

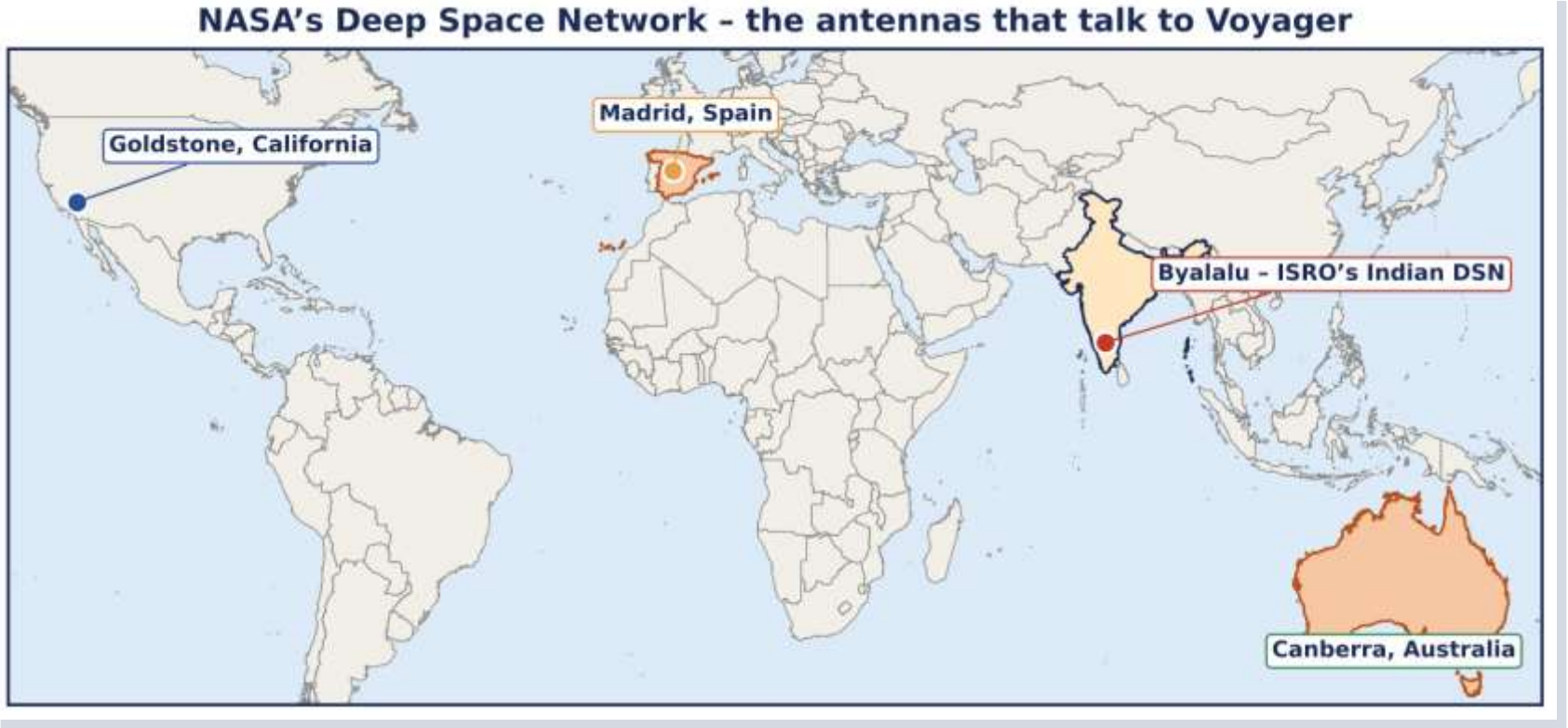


Read the visual
चित्र को समझें

- Launched **16 days after** its twin Voyager 2
  16 दिन बाद
- Flew past **Jupiter in 1979**
  बृहस्पति 1979
- Took the **"Pale Blue Dot"** photo in 1990
  पेल ब्लू डॉट

Voyager 1 one light-day from Earth – a marvel of science — Map & Diagram

वॉयेजर 1 एक प्रकाश-दिन दूर — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Three sites **~120° apart** give round-the-clock contact
  120° दूरी
- Only **Canberra** can reach Voyager 2 in the south
  कैनबरा
- ISRO's **IDSN** tracks Chandrayaan & Mangalyaan
  IDSN



THE INDIAN EXPRESS • 18 NOV 2026

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पृष्ठ 8 · राष्ट्र (also TH p6)

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **Earthshot winners | अर्थशॉट विजेता**

Bhutan, Mahindra among five Earthshot Prize winners

अर्थशॉट पुरस्कार विजेता

Bhutan among five winners of Prince William's Earthshot Prize

Ishika Gupta
Mumbai, November 17

THE SIXTH edition of the Earthshot Prize, led by Britain's Prince of Wales, Prince William, honoured five winners for their climate leadership and innovative environmental solutions at a ceremony at Jio World Convention Centre on Tuesday. Each winner was awarded £1 million.

In the Protect and Restore Nature category, Bhutan won for its National Protected Areas Network, backed by a policy requiring at least 60 per cent of the country to remain under forest cover permanently. Accepting the award, Princess Chimi Yangzom Wangchuck of the Royal Government of Bhutan said the country's vision for environmental conservation dated back to the 1970s.

"... We are trustees of this planet and need to ensure a future where both humanity and nature can flourish," she said.

In the Clean Our Air category, Mahindra Last Mile Mobility was recognised for its efforts to electrify three-wheelers. The company has sold over four lakh electric three-wheelers in recent years, helping avoid more than 1.80 lakh tonnes of carbon dioxide emissions. Its CEO, Suman Mishra, said the recognition underscored that economic progress and climate action could coexist.



Prince William drives an electric autorickshaw with Princess Kate in the backseat, in Mumbai on Tuesday. AKASH PATIL

The Revive Our Ocean award went to Niue Ocean Wide Trust for its Ocean Conservation Commitments (OCCs), a financing model based on shared responsibility for conserving and sustainably managing Niue's ocean territory. Coral Pasisi, vice-chair of the trust and co-architect of the initiative, said the model aimed to support conservation at scale, with a target of covering 127,000 square kilometres of ocean territory. The organisation aims to sell its OCCs by 2028.

In the Build a Waste-Free World category, PFAS-Free France was recognised for pushing legislative action to restrict harmful per- and polyfluoroalkyl substances (PFAS) in products like cosmetics, footwear and waterproofing materials.

Denmark-based Ørsted won the Fix Our Climate category for its transition from fossil fuels, including coal, to renewable energy, with a focus on offshore wind power. Rasmus Errboe, group president and CEO of Ørsted, said the company's ambition was to build the world's largest offshore wind farm, capable of powering more than three million homes.

The winners were selected by the Earthshot Prize Council.

Addressing the gathering, Prince William highlighted the growing consequences of climate change, including recurring heatwaves and floods, and said communities that had contributed the least to the crisis often bore its heaviest burden. "When solutions succeed in India, they have the power to inspire progress around the world. Change is not only possible; it is already happening," he said.

The ceremony was hosted by filmmaker Karan Johar.

Gen Z is the torchbearer for global change: Prince William

At the 2026 Earthshot Prize ceremony, Britain's prince reflects on achievements of the finalists and the global movement behind environmental innovation; Bhutan, Mahindra Last Mile Mobility were among the five winners of this year's awards

Vinaya Deshpande Pandit
Yohaan Varghese
MUMBAI

Young people from around the world are not waiting for someone else to find the solution, they are the torchbearers of the global movement for change, Britain's Prince William said here on Tuesday.

He was speaking at the 2026 Earthshot Prize awards ceremony, which was held in India for the first time.

Winners of the Earthshot Prize were declared under five categories in a glittering ceremony. The awardees include the Himalayan Kingdom of Bhutan and Mahindra Last Mile Mobility.



Prince Williams and Princess Catherine with the winners of the 2026 Earthshot Prize in Mumbai on Tuesday. EMMANUAL YOGINI

'Shaping the future'

"They (Gen Z) are bringing fresh ideas and showing what is possible when optimism is matched with action. Their ideas, their energy, and their determination are helping to shape the future," he said.

"India is a nation of extraordinary innovation, ambition, facing immense environmental pressures, yet moving ahead with determination. Not because the challenge is simple, not because the path is easy. But because millions of people have decided that progress simply cannot wait," he said.

During his address, Prince William reflected on the achievements of this year's finalists and the growing global movement behind environmental innovation.

The ceremony was attended by environmental innovators, philanthropists, business leaders, government representatives and global figures from sport, entertainment and culture.

Mahindra Last Mile Mobility won the Earthshot Prize in the 'Clean Our Air' category. Accepting the award, the company's CEO, Suman Mishra, said it showed how urgent optimism worked. The company has won £1 million for its efforts, which have resulted in more electric three-wheelers plying on India's roads.

In the 'Revive Our Oceans' category, Niue Ocean Wide Trust was chosen for protecting the oceans, especially the vast Pacific region.

Coral Pasisi, vice chair and co-architect of Ocean Conservation Commitments, expressed gratitude for indigenous, people-led sustainability efforts being honoured.

"It is collective responsibility in action. We want to protect the oceans that protect us all," she said while accepting the award.

The Earthshot Prize to Protect and Restore Nature was awarded to Bhutan for the country's work in protecting the Himalayan forests, which help the water systems that sustain 1.6 billion people downstream across South Asia.

While accepting the award, Bhutan's Princess Chimi Yangzom Wangchuck said: "Long before environmentalism become a global priority, Bhutan made a national commitment. 60% of our land must remain under forest cover at all times. A duty enshrined in our Constitution. Deeply honoured to accept this prize."

The Earthshot Prize in the 'Build a Waste-free World' category was declared for PFAS - Free France. The initiative is a national, cross-party movement to ban toxic forever chemicals in consumer products and to make polluters pay for the clean-up.

"This victory belongs to all those who stood by us and said, 'We will not be poisoned in silence'. Thank you," said Nicolas Thierry, French politician and lead spokesperson of the firm, while accepting the award.

Orsed was declared the winner in the 'Fix Our Climate' category for transforming its business from coal-intensive utilities to renewable energy.

The ceremony was hosted by director Karan Johar. Among the celebrities who took to stage were British actress and musician Simone Ashley, actor and previous Earthshot Awards presenter Rami Malek, Indian cinema stars Alia Bhatt and Sonam Kapoor, and cricket legend Sachin Tendulkar.

Bhutan, Mahindra among five Earthshot Prize winners — Map & Diagram

अर्थशॉट पुरस्कार विजेता — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Winners picked by the **Earthshot Prize Council**
  परिषद
- Two Asian winners: **Bhutan & India**
  दो एशियाई
- Prize money helps **scale up** solutions
  विस्तार

Bhutan, Mahindra among five Earthshot Prize winners — Map & Diagram

अर्थशॉट पुरस्कार विजेता — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Winners from **Asia, Europe & the Pacific**
  तीन क्षेत्र
- Bhutan lies between **India & China**
  भारत-चीन के बीच
- France & Denmark – both **EU members**
  यूरोपीय संघ

Bhutan, Mahindra Among Five Winners of Prince William's Earthshot Prize

मुंबई में पहली बार हुए छठे अर्थशॉट पुरस्कार समारोह में भूटान (प्रकृति संरक्षण), महिंद्रा लास्ट माइल मोबिलिटी (स्वच्छ वायु), नियू (महासागर), PFAS-मुक्त फ़्रांस (कचरा-मुक्त विश्व) और डेनमार्क की ऑर्स्टेड (जलवायु) को £10 लाख-£10 लाख मिले; प्रिंस विलियम बोले – Gen Z बदलाव की मशालवाहक

Earthshot 2026
अर्थशॉट 2026

1 The ceremony | समारोह

- **6th** edition – first held in **India**
  भारत में पहली बार
- **Jio World Convention Centre**, Mumbai
  मुंबई
- William: "**Gen Z is the torchbearer** for change"
  Gen Z

2 Bhutan's win | भूटान

- For its **National Protected Areas Network**
  संरक्षित क्षेत्र
- **60%** land under forest – a **constitutional duty**
  संवैधानिक कर्तव्य
- Himalayan forests feed water for **1.6 bn** people
  1.6 अरब लोग

3 Mahindra LMM | महिंद्रा

4 lakh+ E-3-wheelers sold ई-तिपहिया	**1.8 lakh t** CO_2 avoided CO_2 बचत
£1 mn Prize पुरस्कार	**Clean Air** Category श्रेणी

Bhutan, Mahindra among five Earthshot Prize winners — in depth (1/2)

अर्थशॉट पुरस्कार विजेता — विस्तार से (1/2)

4 Niue Ocean Wide Trust | नियू

- **Ocean Conservation Commitments** – a financing model
  वित्त मॉडल
- Aims to cover **1,27,000 km²** of ocean
  समुद्री क्षेत्र
- To sell all OCCs by **2028**
  2028

5 PFAS-Free France | PFAS-मुक्त फ़्रांस

- Cross-party drive to ban **"forever chemicals"**
  स्थायी रसायन
- In **cosmetics, footwear, waterproofing**
  उत्पाद
- **Polluter pays** for the clean-up
  प्रदूषक भुगतान

6 Ørsted | ऑर्स्टेड

- Danish firm moved from **coal to renewables**
  कोयले से हरित
- Focus on **offshore wind**
  अपतटीय पवन
- Plans world's largest offshore farm – **3 mn+ homes**
  30 लाख घर

Bhutan, Mahindra among five Earthshot Prize winners — in depth (2/2)

अर्थशॉट पुरस्कार विजेता — विस्तार से (2/2)

7 William's message | संदेश

Gen Z
युवा
Not waiting
इंतज़ार नहीं

→

Optimism + action
आशा + कर्म
Fresh ideas
नए विचार

→

India
भारत
Can inspire world
प्रेरणा

→

Change
बदलाव
Already happening
जारी

8 Did you know? क्या आप जानते हैं?

- Bhutan is one of the world's few **carbon-negative** countries
  कार्बन-नकारात्मक
- It measures progress by **Gross National Happiness**
  सकल राष्ट्रीय ख़ुशी

Bhutan, Mahindra among five Earthshot Prize winners — background (1/2)

अर्थशॉट पुरस्कार विजेता — पृष्ठभूमि (1/2)

9 Bhutan at a glance भूटान

Fact तथ्य	Detail विवरण
Capital राजधानी	Thimphu
Currency मुद्रा	Ngultrum (pegged to ₹)
King राजा	Jigme Khesar Namgyel Wangchuck
System व्यवस्था	Constitutional monarchy

10 What are PFAS? PFAS क्या हैं

- **Per- & polyfluoroalkyl substances**
  फ़्लोरीन यौगिक
- Do **not break down** in nature
  टूटते नहीं
- Used in **non-stick pans, fire-fighting foam**
  नॉन-स्टिक

11 E-3-wheelers in India ई-तिपहिया

- India is a top market for **e-rickshaws**
  ई-रिक्शा
- **PM E-DRIVE** (2024) subsidises e-3-wheelers
  पीएम ई-ड्राइव
- Replaced **FAME-II** (2019)
  FAME-II

Bhutan, Mahindra among five Earthshot Prize winners — background (2/2)

अर्थशॉट पुरस्कार विजेता — पृष्ठभूमि (2/2)

12 India's offshore wind | अपतटीय पवन

Gujarat coast गुजरात	Tamil Nadu coast तमिलनाडु	Target लक्ष्य	VGF (2024) VGF
Potential site संभावित	Potential site संभावित	30 GW by 2030 30 GW	First 1 GW पहला 1 GW

13 Niue | नियू

- Self-governing, in **free association with New Zealand**
  न्यूज़ीलैंड से जुड़ा
- One of the world's largest **raised coral islands**
  प्रवाल द्वीप
- Population under **2,000**
  2,000 से कम

Bhutan, Mahindra among five Earthshot Prize winners — Static GK

अर्थशॉट पुरस्कार विजेता — स्थैतिक सामान्य ज्ञान

14 Forest cover | वन आवरण

Country देश	Forest goal / status स्थिति
Bhutan भूटान	≥60% by Constitution
India target भारत लक्ष्य	33% (Forest Policy)
India now भारत अभी	25.17% forest + tree (ISFR 2023)

15 Denmark | डेनमार्क

- Capital: **Copenhagen** कोपेनहेगन
- World's first offshore wind farm – **Vindeby, 1991** विंडबी
- Leader in **wind energy** पवन ऊर्जा

16 Global chemical rules रसायन संधि

- **Stockholm Convention** (2001) – persistent organic pollutants स्टॉकहोम
- Lists PFAS like **PFOS & PFOA** PFOS, PFOA
- Also **Rotterdam** & **Basel** conventions रॉटरडैम, बेसल


14 World

LONDON
U.K. sanctions Israeli firms helping build settlements in West Bank

BRUSSELS
NATO allies to discuss U.S. troop levels with Pentagon strategy chief

WASHINGTON
Measles is no longer considered eliminated in the U.S. and Mexico

MANAMA
Nabeel Rajab, prominent Bahraini human rights activist, dies at 62

Iran targets Bahrain, criticises 'fabricated' dirty-bomb report

Israel set to select new Speaker in Parliament

Federal court in U.S. dismisses fixed terms for student visas

Masked fury

Jensen Huang signals interest in returning to Nvidia as its CEO

British Prime Minister Burnham delays tabling of options for U.K.-EU relations

1

adesh connects nuclear power to national grid on a trial basis

THE HINDU • 18 NOV 2026

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पृष्ठ 14 · विश्व

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **Rooppur nuclear plant | रूपपुर**

Bangladesh connects Rooppur nuclear plant to grid

बांग्लादेश का पहला परमाणु संयंत्र

Bangladesh connects nuclear power plant to national grid on a trial basis

Press Trust of India
DHAKA

Bangladesh's first nuclear power plant at Rooppur in the country's northwest Pabna district began supplying electricity to the national grid on a trial basis on Tuesday, according to officials.

The 2,400 MW Russian-assisted facility is expected to meet more than 10% of Bangladesh's electricity demand once fully operational, helping the country diversify its energy sources.

"We have become the 33rd country in the world to produce and generate nuclear power," Science and Technology Minister Fakir Mahbub Anam told presspersons at the plant site.

The development comes as the South Asian nation of 170 million people grapples with a fuel crisis triggered by the conflict in West Asia.



An aerial view of the Rooppur Nuclear Power Plant near the Padma river at Ishwardi in Bangladesh's Pabna district. AFP

The plant comprises two units, each with a generation capacity of 1,200 MW, officials said, adding that the first unit has begun supplying 350 MW of electricity to the national grid. According to the Science and Technology Ministry, the initial connection would last between eight and 10 hours, during which engineers would conduct tests on the plant's turbine, generator and grid stability.

The first connection would last between eight and 10 hours, during which engineers would conduct tests

The unit would subsequently be disconnected for further technical tests and could be reconnected after about 28 hours for another four to six hours to complete additional operational checks.

Under an agreement with the Russian contractor, the first unit will undergo a 10-month trial operation before beginning commercial electricity generation at full capacity, the Ministry said.

Construction on the facility began in 2017 during the administration of ousted Prime Minister Sheikh Hasina, following a 2015 agreement with Moscow.

Bangladesh Connects Rooppur Nuclear Plant to National Grid on Trial Basis

बांग्लादेश के पहले परमाणु बिजलीघर रूपपुर (पाबना ज़िला) ने मंगलवार को परीक्षण के तौर पर राष्ट्रीय ग्रिड को बिजली देना शुरू किया; रूस की मदद से बना 2,400 MW का संयंत्र पूरी तरह चालू होने पर देश की 10% से अधिक बिजली माँग पूरी करेगा

Bangladesh
बांग्लादेश

1 The milestone | उपलब्धि

- Bangladesh's **first nuclear plant**, Rooppur
  पहला संयंत्र
- In **Pabna district**, north-west Bangladesh
  पाबना
- Started feeding the grid on **trial** on Tuesday
  परीक्षण

2 Key numbers मुख्य आँकड़े

2,400 MW Total capacity क्षमता	**2 × 1,200** Units इकाइयाँ
350 MW First supply पहली आपूर्ति	**10%+** Of national demand माँग

3 33rd nuclear nation 33वाँ देश

- Minister **Fakir Mahbub Anam**: "**33rd country**"
  33वाँ
- Nation of **170 million**
  17 करोड़
- Hit by a **fuel crisis** from the West Asia conflict
  ईंधन संकट

Bangladesh connects Rooppur nuclear plant to grid — in depth (1/2)

बांग्लादेश का पहला परमाणु संयंत्र — विस्तार से (1/2)

4 The testing | परीक्षण

- First link: **8–10 hours** – turbine, generator, grid checks
  8–10 घंटे
- Reconnect after **~28 hours** for 4–6 hours
  28 घंटे
- Unit 1: **10-month trial** before commercial run
  10 माह

5 History | इतिहास

- **2015** agreement with Moscow
  2015 समझौता
- Construction began **2017** under **Sheikh Hasina**
  2017
- Near the **Padma** at **Ishwardi**
  ईश्वरदी

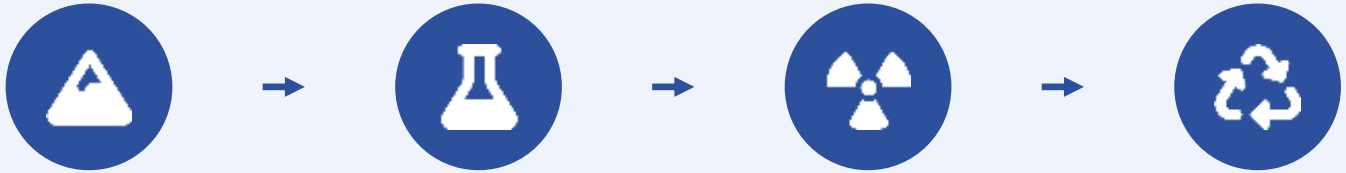
6 Russia & India रूस व भारत

- Built by Russia's **Rosatom**
  रोसाटॉम
- Russia supplies fuel & **takes back spent fuel**
  ईंधन वापसी
- India joined via a **India–Russia–Bangladesh** pact (2018)
  त्रिपक्षीय

Bangladesh connects Rooppur nuclear plant to grid — in depth (2/2)

बांग्लादेश का पहला परमाणु संयंत्र — विस्तार से (2/2)

7 Nuclear fuel cycle | ईंधन चक्र



Uranium ore यूरेनियम	More U-235 U-235	Fission विखंडन	Store / reprocess पुनर्संसाधन

8 Did you know? क्या आप जानते हैं?

- In South Asia, **India & Pakistan** already run nuclear power
  भारत, पाक
- Rooppur uses **Gen III+** VVER-1200 design
  तीसरी+ पीढ़ी

Bangladesh connects Rooppur nuclear plant to grid — background (1/2)

बांग्लादेश का पहला परमाणु संयंत्र — पृष्ठभूमि (1/2)

9 India's nuclear power भारत

Fact तथ्य	Detail विवरण
First plant पहला	Tarapur, 1969
Largest सबसे बड़ा	Kudankulam (Russian VVERs)
Capacity क्षमता	~8.8 GW
Target लक्ष्य	100 GW by 2047

10 Three-stage programme त्रि-चरणीय

- **Stage 1** – PHWRs on natural uranium
  चरण 1
- **Stage 2** – fast breeders (PFBR, Kalpakkam)
  चरण 2
- **Stage 3** – **thorium** reactors
  चरण 3

11 Reactor types रिएक्टर प्रकार

- **PWR/VVER** – light water
  हल्का जल
- **PHWR** – heavy water; India's mainstay
  भारी जल
- **FBR** – fast neutrons, breeds fuel
  फ़ास्ट ब्रीडर

Bangladesh connects Rooppur nuclear plant to grid — background (2/2)

बांग्लादेश का पहला परमाणु संयंत्र — पृष्ठभूमि (2/2)

12 Who runs India's nuclear sector | संस्थाएँ

Atomic Energy Act अधिनियम	DAE परमाणु ऊर्जा विभाग	NPCIL एनपीसीआईएल	AERB एईआरबी
1962 1962	Under PM प्रधानमंत्री	Runs plants संचालन	Safety सुरक्षा

13 India–Bangladesh power | ऊर्जा सहयोग

- India **exports electricity** to Bangladesh
  बिजली निर्यात
- Adani **Godda** (Jharkhand) – **1,600 MW** for Bangladesh
  गोड्डा
- Cross-border grid links
  ग्रिड जुड़ाव

Bangladesh connects Rooppur nuclear plant to grid — Static GK

बांग्लादेश का पहला परमाणु संयंत्र — स्थैतिक सामान्य ज्ञान

14 Bangladesh | बांग्लादेश

Fact तथ्य	Detail विवरण
Capital राजधानी	Dhaka
Currency मुद्रा	Taka
Independence स्वतंत्रता	1971
Big rivers नदियाँ	Padma, Jamuna, Meghna

15 Uranium in India
यूरेनियम

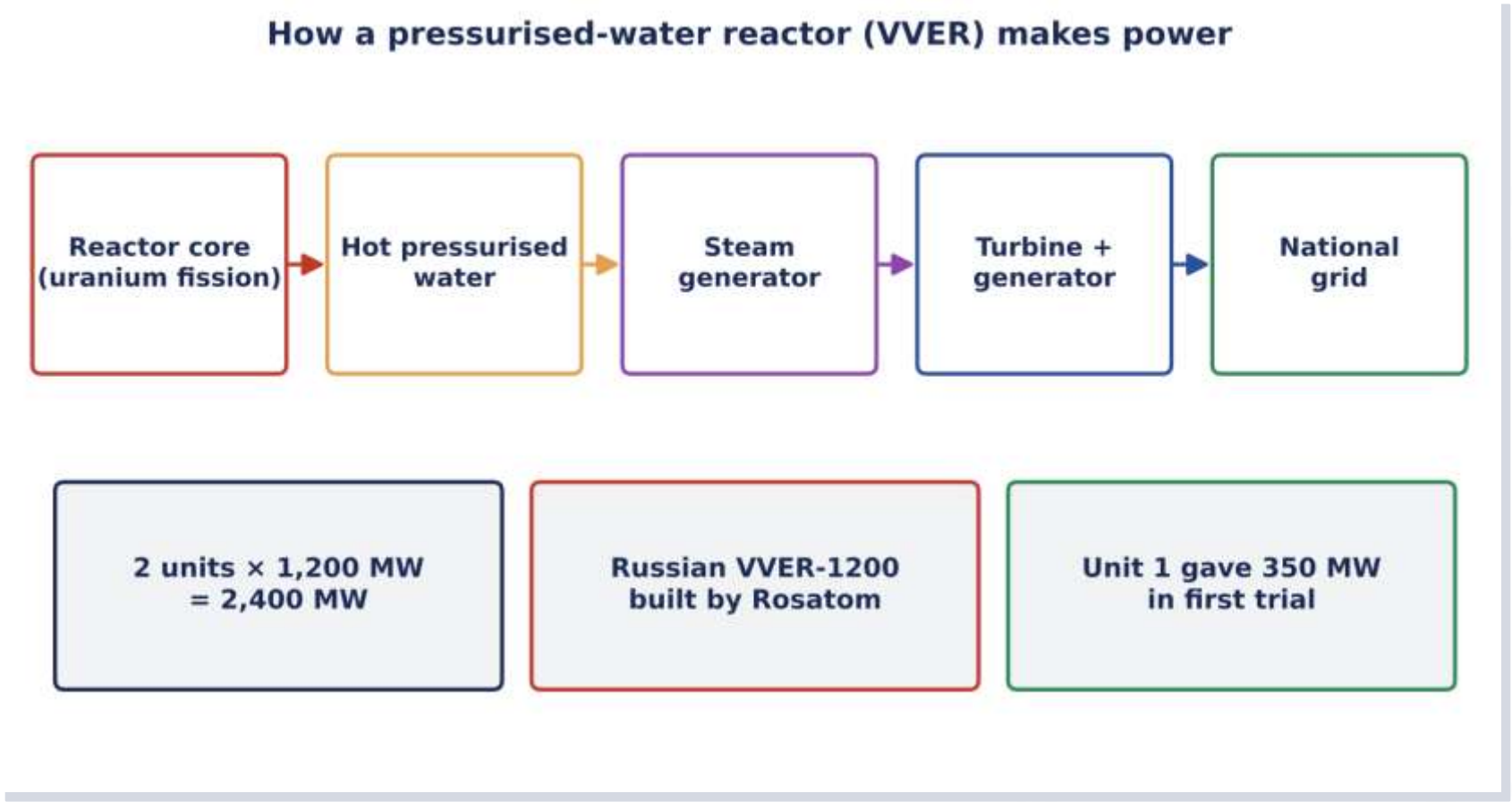
- **Jaduguda** (Jharkhand) – first mine, **1967**
  जादूगोड़ा
- **Tummalapalle** (A.P.) – large deposit
  तुम्मलपल्ले
- Mined by **UCIL**
  UCIL

16 IAEA | आईएईए

- Set up **1957**, HQ **Vienna**
  वियना
- **Nobel Peace Prize 2005**
  नोबेल 2005
- DG: **Rafael Grossi**
  राफ़ेल ग्रॉसी

Bangladesh connects Rooppur nuclear plant to grid — Map & Diagram

बांग्लादेश का पहला परमाणु संयंत्र — मानचित्र व आरेख

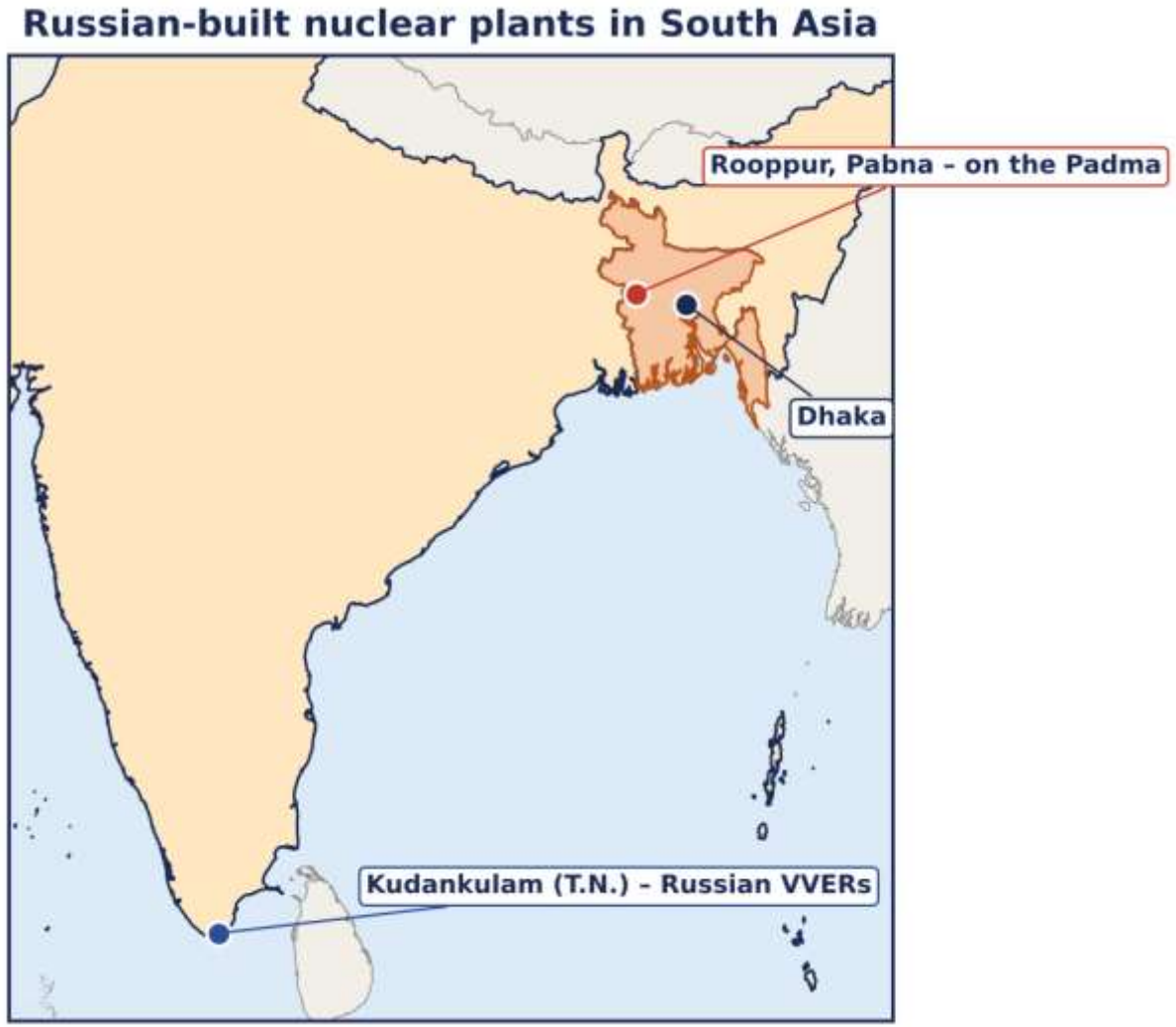


Read the visual
चित्र को समझें

- Water acts as both **coolant & moderator**
  शीतलक, मंदक
- Two **separate loops** keep radioactivity inside
  दो लूप
- No CO_2 while running – **low-carbon** power
  कम कार्बन

Bangladesh connects Rooppur nuclear plant to grid — Map & Diagram

बांग्लादेश का पहला परमाणु संयंत्र — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Rooppur stands on the **Padma** (Ganga)
  पद्मा नदी
- Kudankulam also runs **Russian VVERs**
  कुडनकुलम
- About **140 km** from Dhaka
  140 किमी


FINANCIAL EXPRESS NATION 21

DECLINE IN NEW ADMISSIONS EXTENDS BEYOND INDIA

Fresh enrolments in US fall, but more Indians enter workforce

PROGRESS REPORT

Dhoni hangs up gloves, puts on CSK mentor cap

AN IPL CAREER WITH MANY FIRSTS FOR KING NOT

5,439 Runs
278
38.30 Average
137.45 Strike rate

1 Ihi back in global top 200 Sustainability Rankings

INDIAN INSTITUTIONS GAIN

Manipal Cigna HEALTH INSURANCE

EXPERT KI SUNO SAHI CHUNO

FINANCIAL EXPRESS • 18 NOV 2026

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पृष्ठ 21 · राष्ट्र

Articles covered from this page | इस पृष्ठ से लिए गए लेख

1 **IIT Delhi in QS top 200 | IIT दिल्ली**

IIT Delhi back in global top 200 of QS Sustainability Rankings

IIT दिल्ली शीर्ष 200 में

IIT Delhi back in global top 200 in QS Sustainability Rankings

MANU KAUSHIK
New Delhi, November 17

THE INDIAN INSTITUTE of Technology Delhi (IIT Delhi) has returned to the global top 200 in the QS World University Rankings — Sustainability 2027, even as Indian institutions continue to lag in areas such as health and wellbeing, impact of education and governance.

The institute climbed 11 places to rank 194th, up from 205th last year. It last featured in the global top 200 in the 2025 edition, when it climbed to 171st from 426th in 2024.

Of the 99 Indian institutions ranked this year, 38 improved their positions, 19 retained their ranks and 34 slipped. Eight institutions made their debut. This translated into a net improvement of 4% for India, while the US, the UK and mainland China recorded declines.

IIT Kharagpur ranked second among Indian institutions at 224th, followed by the University of Delhi at 237th. IIT Bombay slipped 32 places to 267th, while Vellore Institute of Technology climbed 59 places to 293rd. The QS rankings assess universities across three broad categories — social impact, environmental impact and governance. Social impact and environmental impact carry a weightage of 45% each, while governance accounts for the remaining 10%.

Among Indian institutions featuring in the global top 500, Jawaharlal Nehru University recorded the biggest improvement, climbing 192 places to 432nd. In all, 13 Indian institutions featured in the global top 500, up from 12 last year and five in the inaugural edition in 2023.

Globally, Sweden's Lund University retained the top position for the second straight year. ETH Zurich climbed nine places to secure the second spot.



INDIAN INSTITUTIONS GAIN

World sustainability ranking	2026	2027
Lund University, Sweden	1	1
ETH Zurich	11	2
University of Toronto	2	3
University of British Columbia	5	4
The University of New South Wales	7	5
Indian Institute of Technology Delhi	205	194
Indian Institute of Technology Kharagpur	236	224
University of Delhi	241	237
Indian Institute of Technology Bombay	235	267
Vellore Institute of Technology	352	293

Source: QS World University Rankings

Class24

IIT Delhi Back in Global Top 200 in QS Sustainability Rankings

QS विश्व विश्वविद्यालय रैंकिंग – सस्टेनेबिलिटी 2027 में IIT दिल्ली 11 स्थान चढ़कर 194वें स्थान पर पहुँचा और फिर शीर्ष 200 में लौटा; भारत के 99 संस्थानों में 38 ने सुधार किया, जबकि स्वास्थ्य, शिक्षा के प्रभाव और शासन में भारत अब भी पीछे

QS Sustainability 2027
QS

1 The headline | मुख्य ख़बर

- IIT Delhi **194th**, up **11** from 205th
  194वाँ
- Back in the **global top 200**
  शीर्ष 200
- In **QS World University Rankings – Sustainability 2027**
  QS

2 India's tally | भारत

99 Indian institutions ranked संस्थान	**38** Improved सुधार
34 Slipped गिरावट	**8** Debutants नए

3 Other gains अन्य उपलब्धियाँ

- **JNU** – biggest jump, **+192** to **432nd**
  JNU
- **13** Indian entries in top 500 (5 in **2023**)
  13 संस्थान
- India **+4%** net; US, UK, China **declined**
  भारत आगे

Class24

IIT Delhi back in global top 200 of QS Sustainability Rankings — in depth (1/2)

IIT दिल्ली शीर्ष 200 में — विस्तार से (1/2)

4 Global toppers
विश्व शीर्ष

- **Lund University**, Sweden – No. 1 again
  लुंड
- **ETH Zurich** up nine to **No. 2**
  ETH ज़्यूरिख़
- Then **Toronto, UBC, UNSW**
  टोरंटो, UBC, UNSW

5 How it's scored | मापदंड

- **Social impact – 45%**
  सामाजिक प्रभाव
- **Environmental impact – 45%**
  पर्यावरणीय प्रभाव
- **Governance – 10%**
  शासन

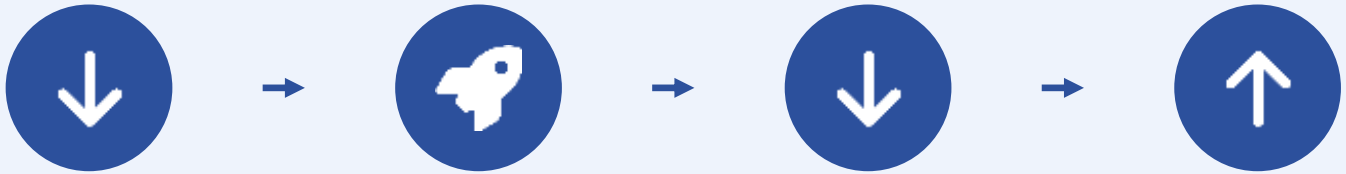
6 India's weak spots
कमज़ोरियाँ

- **Health & wellbeing**
  स्वास्थ्य व कल्याण
- **Impact of education**
  शिक्षा का प्रभाव
- **Governance**
  शासन

IIT Delhi back in global top 200 of QS Sustainability Rankings — in depth (2/2)

IIT दिल्ली शीर्ष 200 में — विस्तार से (2/2)

7 IIT Delhi's ride | IIT दिल्ली का सफ़र



8 Did you know? क्या आप जानते हैं?

- **QS** = Quacquarelli Symonds, a **London** firm
  लंदन
- The Sustainability ranking began only in **2023**
  2023 से

IIT Delhi back in global top 200 of QS Sustainability Rankings — background (1/2)

IIT दिल्ली शीर्ष 200 में — पृष्ठभूमि (1/2)

9 India's own rankings भारतीय रैंकिंग

Framework ढाँचा	Detail विवरण
NIRF एनआईआरएफ	Launched 2015 by Education Ministry
First NIRF list पहली सूची	2016
Overall No. 1 शीर्ष	IIT Madras (repeatedly)

10 Institutes of Eminence प्रतिष्ठित संस्थान

- Scheme launched **2017**
  2017
- Up to **10 public + 10 private**
  10+10
- More **autonomy** to reach world rankings
  स्वायत्तता

11 NEP 2020 goals NEP 2020

- Higher-ed **GER 50% by 2035**
  GER 50%
- One regulator – **HECI**
  HECI
- **Multidisciplinary** universities
  बहुविषयक

IIT Delhi back in global top 200 of QS Sustainability Rankings — background (2/2)

IIT दिल्ली शीर्ष 200 में — पृष्ठभूमि (2/2)

12 IIT story | IIT इतिहास

IIT Kharagpur
खड़गपुर

1951 – first
पहला

→

IIT Bombay
बॉम्बे

1958
1958

→

IIT Act
अधिनियम

1961
1961

→

Today
आज

23 IITs
23 IIT

13 Sustainable Development Goals SDG

- **17** goals of the UN **2030 Agenda**
  17 लक्ष्य
- Adopted in **2015**
  2015
- QS sustainability scores track **SDG** work
  SDG आधार

IIT Delhi back in global top 200 of QS Sustainability Rankings — Static GK

IIT दिल्ली शीर्ष 200 में — स्थैतिक सामान्य ज्ञान

14 Global ranking bodies वैश्विक रैंकिंग

Ranking रैंकिंग	Country देश
QS क्यूएस	UK
Times Higher Education THE	UK
ARWU (Shanghai) शंघाई	China
US News यूएस न्यूज़	USA

15 IIT Delhi | IIT दिल्ली

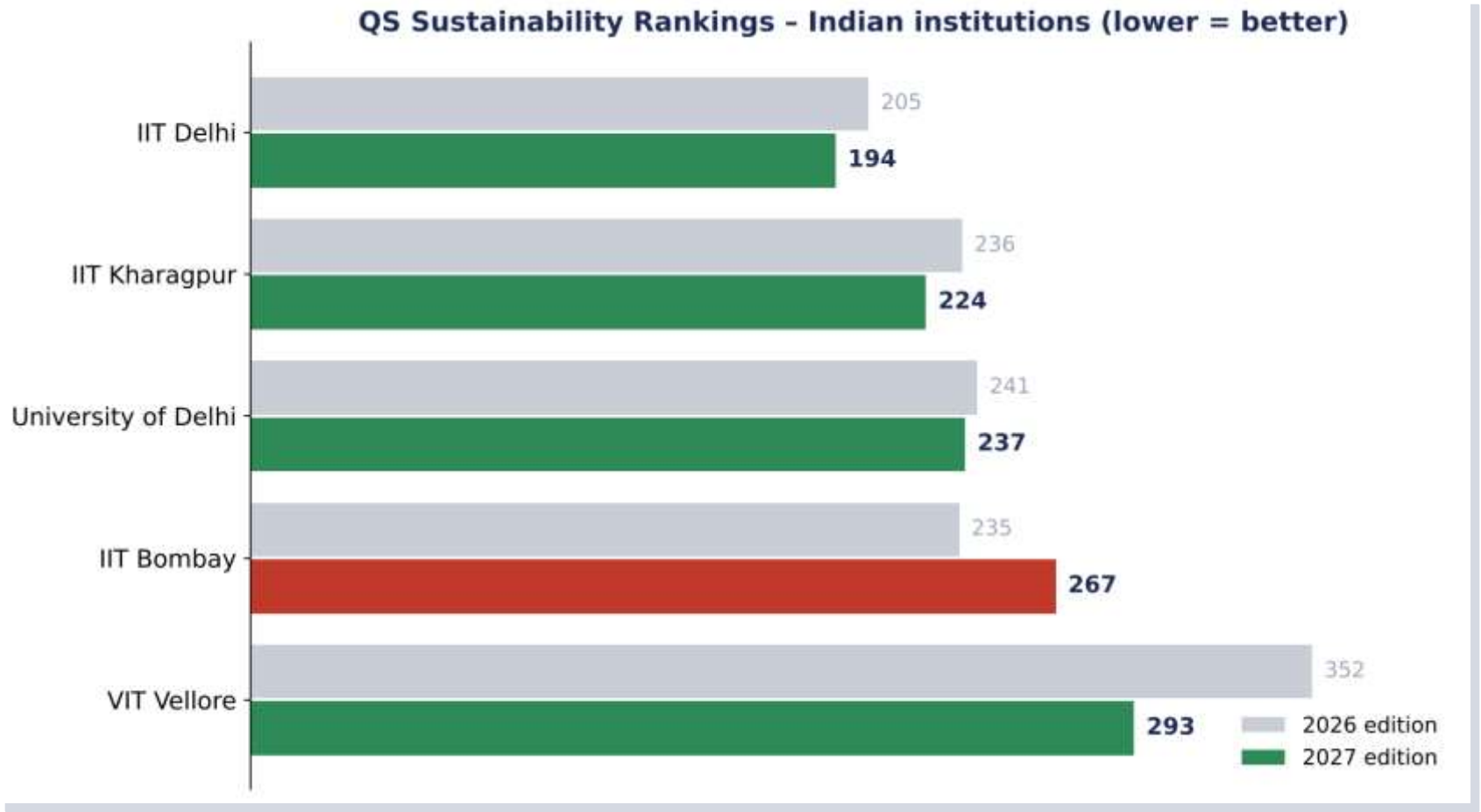
- Set up in **1961**; became an IIT in **1963**
  1961
- Campus at **Hauz Khas**, New Delhi
  हौज़ ख़ास
- Overseas campus in **Abu Dhabi** (2024)
  अबू धाबी

16 The toppers शीर्ष संस्थान

- **Lund University** – founded **1666**, Sweden
  1666
- **ETH Zurich** – Einstein's alma mater
  आइंस्टीन
- **Toronto** – Canada's top university
  टोरंटो

IIT Delhi back in global top 200 of QS Sustainability Rankings — Map & Diagram

IIT दिल्ली शीर्ष 200 में — मानचित्र व आरेख

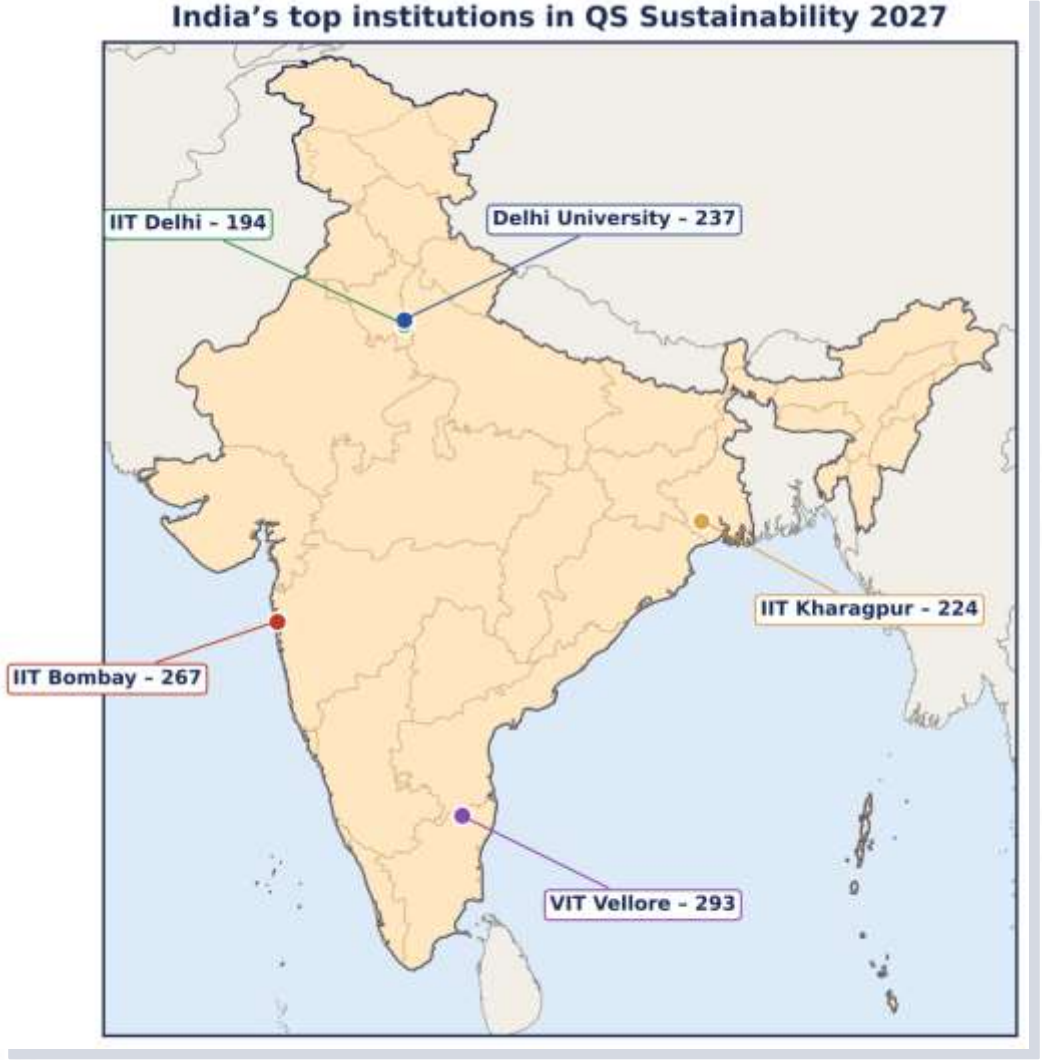


Read the visual
चित्र को समझें

- **IIT Bombay** – the one big faller (−32)
  IIT बॉम्बे गिरा
- **VIT** made the biggest jump here (+59)
  VIT +59
- **Delhi University** – top non-IIT Indian entry
  DU

IIT Delhi back in global top 200 of QS Sustainability Rankings — Map & Diagram

IIT दिल्ली शीर्ष 200 में — मानचित्र व आरेख



Read the visual
चित्र को समझें

- Two of India's top three are in **Delhi**
  दिल्ली
- A **private** university (VIT) in the top 300
  निजी
- IITs remain India's **sustainability leaders**
  IIT आगे

Asked in Exams — guess the answer! | पहले स्वयं उत्तर सोचें

RRB NTPC 2025 – UG CBT-1
3 Sep 2025 (Shift 1) • Topic: Amazon renewables

Which renewable energy source has the largest installed capacity in India as of the year 2025?

(a) Solar energy
(b) Hydro power
(c) Wind energy
(d) Geothermal energy

RRB Group D 2025 – CBT
30 Dec 2025 (Shift 2) • Topic: Amazon renewables

At the Eighth Session of the International Solar Alliance (ISA) Assembly held at Bharat Mandapam in October 2025, which of the following initiatives was launched to address solar waste and promote circularity in the solar sector?

(a) SURYA
(b) SUNRISE
(c) JYOTI
(d) PRABHA

Asked in Exams — guess the answer! | पहले स्वयं उत्तर सोचें

CUET UG 2025 – Biology
2025* • Topic: Reliance biogas

Biogas is mixture of:

(a) Hydrogen sulphide, nitrogen and methane
(b) Hydrogen sulphide, hydrogen and methane
(c) Hydrogen sulphide, carbon dioxide and hydrogen
(d) Methane, hydrogen sulphide and carbon dioxide

NDA & NA (I) 2025 – GAT
13 Apr 2025* • Topic: Rooppur / nuclear

The joint venture to develop nuclear power facility in India (ASHVINI) is between:

(a) NPCIL and NTPC
(b) TMC and VECC
(c) HWB and BARC
(d) IGCAR and NTPC

Asked in Exams — guess the answer! | पहले स्वयं उत्तर सोचें

RRB Group D 2025 – CBT
21 Aug 2026 (Shift 1) • Topic: IIT Delhi rankings

According to the QS World University Rankings 2026, which of the following Indian institutes became the highest-ranked Indian institution globally by improving its rank from 150th in 2025 to 123rd?

(a) JNU
(b) IIT Delhi
(c) IIT Bombay
(d) IISc Bengaluru

RRB NTPC 2025 – Graduate CBT-1
25 Mar 2026 (9:00 AM shift)* • Topic: IIT Delhi rankings

According to the NIRF Rankings 2025 released in September 2025, which institute secured the top overall position?

(a) AIIMS Delhi
(b) IISc Bengaluru
(c) IIT Madras
(d) IIT Bombay

Answers & Explanation | उत्तर व व्याख्या

RRB NTPC 2025 – UG CBT-1

3 Sep 2025 (Shift 1) • Topic: Amazon renewables

Which renewable energy source has the largest installed capacity in India as of the year 2025?

(a) Solar energy
(b) Hydro power
(c) Wind energy
(d) Geothermal energy

Answer: (a) — Solar overtook hydro & wind.
सौर ऊर्जा।

RRB Group D 2025 – CBT

30 Dec 2025 (Shift 2) • Topic: Amazon renewables

At the Eighth Session of the International Solar Alliance (ISA) Assembly held at Bharat Mandapam in October 2025, which of the following initiatives was launched to address solar waste and promote circularity in the solar sector?

(a) SURYA
(b) SUNRISE
(c) JYOTI
(d) PRABHA

Answer: (b) — Recycles end-of-life solar panels.
SUNRISE।

Answers & Explanation | उत्तर व व्याख्या

CUET UG 2025 – Biology

2025* • Topic: Reliance biogas

Biogas is mixture of:

(a) Hydrogen sulphide, nitrogen and methane
(b) Hydrogen sulphide, hydrogen and methane
(c) Hydrogen sulphide, carbon dioxide and hydrogen
(d) Methane, hydrogen sulphide and carbon dioxide

Answer: (d) — Mainly CH_4 + CO_2, traces of H_2S.
विकल्प D।

NDA & NA (I) 2025 – GAT

13 Apr 2025* • Topic: Rooppur / nuclear

The joint venture to develop nuclear power facility in India (ASHVINI) is between:

(a) NPCIL and NTPC
(b) TMC and VECC
(c) HWB and BARC
(d) IGCAR and NTPC

Answer: (a) — Anushakti Vidhyut Nigam Ltd.
NPCIL और NTPC।

Answers & Explanation | उत्तर व व्याख्या

RRB Group D 2025 – CBT

21 Aug 2026 (Shift 1) • Topic: IIT Delhi rankings

According to the QS World University Rankings 2026, which of the following Indian institutes became the highest-ranked Indian institution globally by improving its rank from 150th in 2025 to 123rd?

(a) JNU
(b) IIT Delhi
(c) IIT Bombay
(d) IISc Bengaluru

Answer: (b) — Overtook IIT Bombay (129th).
IIT दिल्ली।

RRB NTPC 2025 – Graduate CBT-1

25 Mar 2026 (9:00 AM shift)* • Topic: IIT Delhi rankings

According to the NIRF Rankings 2025 released in September 2025, which institute secured the top overall position?

(a) AIIMS Delhi
(b) IISc Bengaluru
(c) IIT Madras
(d) IIT Bombay

Answer: (c) — Seventh year running.
IIT मद्रास।

Test Yourself — Q1–4 | स्वयं को परखें

Q1 **Amazon's 234 MW wind farm – its largest in Asia – is in:**
अमेज़न का 234 MW पवन फ़ार्म कहाँ है?

(a) Gujarat
(b) Tamil Nadu
(c) Karnataka
(d) Rajasthan

Q2 **The International Solar Alliance is headquartered at:**
अंतरराष्ट्रीय सौर गठबंधन का मुख्यालय:

(a) Paris
(b) New Delhi
(c) Gurugram
(d) Bengaluru

Q3 **The main component of compressed biogas (CBG) is:**
CBG का मुख्य घटक:

(a) Ethane
(b) Methane
(c) Propane
(d) Hydrogen

Q4 **The SATAT initiative relates to:**
SATAT पहल किससे संबंधित है?

(a) Solar pumps
(b) Compressed biogas
(c) Electric buses
(d) Green hydrogen

Test Yourself — Q5–8 | स्वयं को परखें

Q5 One light-day is roughly:
एक प्रकाश-दिन लगभग:

(a) 2.6 billion km
(b) 26 billion km
(c) 260 billion km
(d) 26 million km

Q6 The only spacecraft to have visited Uranus and Neptune is:
यूरेनस और नेपच्यून तक पहुँचा एकमात्र यान:

(a) Voyager 1
(b) Voyager 2
(c) Cassini
(d) New Horizons

Q7 Bhutan won the 2026 Earthshot Prize in which category?
भूटान ने किस श्रेणी में अर्थशॉट जीता?

(a) Clean Our Air
(b) Fix Our Climate
(c) Protect & Restore Nature
(d) Revive Our Oceans

Q8 Rooppur Nuclear Power Plant is being built with help from:
रूपपुर परमाणु संयंत्र किसकी मदद से?

(a) France
(b) Russia
(c) USA
(d) China

Test Yourself — Q9–10 | स्वयं को परखें

Q9 **India's first nuclear power plant was at:**
भारत का पहला परमाणु बिजलीघर:

(a) Kudankulam
(b) Kalpakkam
(c) Tarapur
(d) Rawatbhata

Q10 **Which university topped QS Sustainability Rankings 2027?**
QS सस्टेनेबिलिटी 2027 में शीर्ष:

(a) ETH Zurich
(b) University of Toronto
(c) Lund University
(d) IIT Delhi

Answer Key — Q1–5 | उत्तर व व्याख्या

1-c **Karnataka** — Plus a 200 MW hybrid there.
कर्नाटक।

2-c **Gurugram** — Launched at COP21, 2015.
गुरुग्राम।

3-b **Methane** — ≥90% methane.
मीथेन।

4-b **Compressed biogas** — Launched 2018.
CBG।

5-b **26 billion km** — ≈173 AU.
2,600 करोड़ किमी।

Answer Key — Q6–10 | उत्तर व व्याख्या

6-b **Voyager 2** — 1986 & 1989.
वॉयेजर 2।

7-c **Protect & Restore Nature** — For its protected areas network.
प्रकृति संरक्षण।

8-b **Russia** — Rosatom, VVER-1200.
रूस।

9-c **Tarapur** — 1969.
तारापुर।

10-c **Lund University** — Second straight year.
लुंड विश्वविद्यालय।

Myth Buster of the Day — Science | आज का भ्रम-भंजन

MYTH | भ्रम

"Voyager 1 has left the solar system."

वॉयेजर 1 सौरमंडल से बाहर निकल चुका है।

FACT | तथ्य

Partly true. In 2012 Voyager 1 crossed the heliopause – the edge of the bubble of solar wind – and entered interstellar space. But the Sun's gravity reaches far beyond that: the icy Oort Cloud, still part of our solar system, begins hundreds of times farther out. At one light-day (about 173 AU), Voyager 1 is, as The Hindu puts it, "barely out", and it will take an estimated 300 years just to reach the inner Oort Cloud.

आंशिक रूप से सही। 2012 में वॉयेजर 1 ने हीलियोपॉज़ – सौर पवन के बुलबुले की सीमा – पार की और अंतरतारकीय अंतरिक्ष में पहुँचा। लेकिन सूर्य का गुरुत्व इससे बहुत आगे तक फैला है: बर्फ़ीला ऊर्ट बादल, जो अब भी हमारे सौरमंडल का हिस्सा है, सैकड़ों गुना दूर से शुरू होता है। एक प्रकाश-दिन (लगभग 173 AU) पर वॉयेजर 1 "बमुश्किल बाहर" है और भीतरी ऊर्ट बादल तक पहुँचने में ही लगभग 300 वर्ष लगेंगे।

Leaving the Sun's wind is not the same as leaving the Sun's family. | सौर पवन से बाहर निकलना सूर्य के परिवार से बाहर निकलना नहीं है।

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