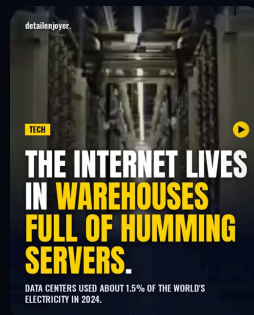
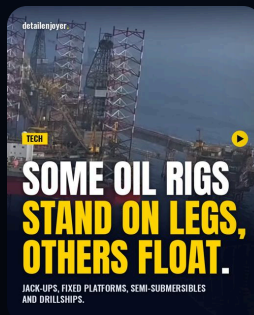




COLLECTION · COL-07

POWER AND ENERGY

Waves, solar mountains, wind turbines on airships, offshore rigs, footsteps, reactor pools, a car built to waste less fuel, a 582-ton fusion magnet, plasma squeezed by its own current, the world's largest hydropower dam, solar panels that float and an icebreaker driven by two reactors.



INSIDE

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DID YOU KNOW?

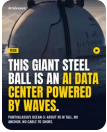
15 case files · 30 quiz questions · by DetailEnjoyer

ABOUT THIS COLLECTION

15 case files on where power comes from, and how to use less of it. Panthalassa's Ocean-3 nodes are 85 m steel floating data centers that make their own power from waves and send AI results to shore by satellite. **DD-022** JR East's power-generating floor at Tokyo Station turns passengers' footsteps into electricity using piezoelectric discs, about 600 per square meter. **DD-014**

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- 01



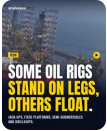
THIS GIANT STEEL BALL IS AN AI DATA CENTER POWERED BY WAVES.

Ocean-3
DD-022 · Tech · This giant steel ball is an AI data center powered by waves.
- 02



IN GUIZHOU, SOLAR PANELS COVER WHOLE MOUNTAINS.

Guizhou Solar
DD-032 · Tech / Locations · In Guizhou, solar panels cover whole mountains.
- 03



SOME OIL RIGS STAND ON LEGS, OTHERS FLOAT.

Offshore Oil
DD-033 · Tech · Some oil rigs stand on legs, others float.
- 04



THE INTERNET LIVES IN WAREHOUSES FULL OF HUMMING SERVERS.

Data Centers
DD-029 · Tech · The internet lives in warehouses full of humming servers.
- 05



THESE FLOOR TILES TURN FOOTSTEPS INTO ELECTRICITY.

Footstep Power
DD-014 · Tech · These floor tiles turn footsteps into electricity.
- 06



THIS BLUE GLOW IS PARTICLES OUTRUNNING LIGHT IN WATER.

Cherenkov Glow
DD-020 · Science / Tech · This blue glow is particles outrunning light in water.
- 07



IN 1993, FORD BUILT A CAR AS SLIPPERY AS A FIGHTER JET.

Probe IV
DD-002 · Tech / Cars · Ford's 1983 Probe IV concept car (built with Ghia) had a drag coefficient of about 0.15.
- 08



CHINA FLEW A WIND TURBINE 2,000 METERS UP.

Airborne Wind Turbines
DD-050 · Tech / Science · China flew a wind turbine 2,000 meters up.

09



Hefei Fusion

DD-738 · Tech / Science · A 582-ton superconducting magnet built for fusion research.

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(Z) Pinch Me

DD-741 · Science / Tech · A plasma squeezed by its own current.

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Three Gorges

DD-643 · Locations / Tech · The world's biggest power plant.

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Floatovoltaics

DD-608 · Tech / Nature · Solar farms that float.

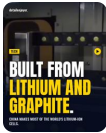
13



Uranium Ural

DD-579 · Tech · Two reactors, three propellers.

14



Energizer

DD-236 · Tech / Science · Lithium-ion batteries start with lithium, cobalt, nickel and graphite.

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Type I

DD-263 · Science / Space · The Kardashev scale ranks civilizations by the energy they use.



Collection Quiz and Answer Key

30 questions from every case file

Every quick fact has a stable ID (for example DD-022-F01) and comes from a case file with its sources listed. Online edition with videos and slides: <https://detailenjoyer.com/collections/power-and-energy/>



DD-022 TECH · 1 OF 15

OCEAN-3

Ocean-3 is Panthalassa's series of wave-powered, floating AI computing nodes. Each one is an 85 m plate-steel structure shaped like a golf ball on a tee. As it bobs, seawater is driven up an internal tube to spin a turbine, which powers onboard GPUs. The nodes have no anchor and no power cable. They steer themselves, and they send results to shore by satellite. Pilot units were planned for the northern Pacific in 2026, with commercial deployments targeted for 2027.

QUICK FACTS

DD-022-F01

Panthalassa's Ocean-3 nodes are 85 m steel floating data centers that make their own power from waves and send AI results to shore by satellite.

DD-022-F02

Ocean-3 nodes have no anchor and no shore cable. They are self-propelled, and their CEO compares them to a giant Roomba.

THE WRITE-UP

A data center that floats. Ocean-3 is Panthalassa's series of autonomous nodes. They are designed to run AI inference computing at sea, powered by electricity they make from ocean waves.

About 85 meters of steel. Each node is about 85 m tall and made of plate steel, close to the height of Big Ben. New Scientist describes it as shaped like 'a golf ball sitting on a tee'.

How the waves make power. The 'tee' is a long tube open at the bottom. As waves lift and drop the node, seawater is pushed up the tube into the hollow, air-filled sphere, where it spins turbines. That electricity runs the onboard GPUs and satellite equipment.

No anchor, no cable. The nodes are self-propelled and aren't tethered to the seabed or connected to shore by a cable. They get towed out and then propel themselves to their station. CEO Garth Sheldon-Coulson calls it 'like a little Roomba, except it's enormous'.

Answers by satellite. Instead of sending power to shore, each node computes on board and sends its results (inference tokens) to customers by satellite link.

\$140 million from Thiel and others. On May 4, 2026, Panthalassa announced a \$140 million Series B led by Peter Thiel. The money will finish a pilot factory near Portland, Oregon, and speed up Ocean-3 deployment.

Prototypes first, pilots next. Earlier prototypes (Ocean-1 in 2021, then Ocean-2 and Wavehopper in 2024) proved power generation, propulsion and computing at sea. The Ocean-3 pilot series was planned for the northern Pacific in 2026, with commercial deployments targeted for 2027.

REEL VS. RECORD

- **Timing caveat:** the Reel describes Ocean-3 as if it's already running. In reporting through Aug 2026, the Ocean-3 pilots were still planned for the northern Pacific in 2026, with commercial deployments targeted for 2027. I couldn't confirm that a node has processed AI workloads offshore yet. [Panthalassa press release; Ars Technica; Fast Company]
- **Minor:** '85-meter-tall' matches most outlets. Ars Technica (citing the FT) says 'about 85 meters in length'. It's the same figure for the vertical node. [Ars Technica; New Scientist; Latitude Media]
- **Minor:** sources describe 'an internal turbine' (DCD, Latitude) or 'turbines' (New Scientist). The Reel's 'across turbines' is fine.

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Permalink: <https://detailenjoyer.com/case/ocean-3/> · Last updated Aug 25, 2026



GUIZHOU SOLAR

Guizhou, in southwest China, is a land of karst peaks. Its thin soils erode easily, leaving bare rock, a problem known as 'rocky desertification'. Since the 2010s the province has covered those barren hills with solar panels. The first gigawatt-scale base, at Guanling, connected its first 1,050 MW phase to the grid on December 29, 2023, on about 20,000 mu (roughly 1,300 hectares) of deeply desertified land. Puding followed with a 600 MW project in 2025. Many sites are 'agrivoltaic': chilies, herbs, taro and vegetables grow in the shade beneath the panels.

QUICK FACTS

DD-032-F01

Guizhou's first gigawatt-scale solar base went live on December 29, 2023, on hills so eroded by 'rocky desertification' that crops had failed there.

DD-032-F02

At Guanling, Guizhou, the solar arrays were laid out in the shape of an ichthyosaur, a prehistoric 'fish-dragon'.

THE WRITE-UP

Karst country. Guizhou's karst landscape of limestone peaks, caves and few surface streams is beautiful but fragile. Soil erodes easily and leaves bare rock, a condition called rocky desertification.

Barren hills, bad farmland. In 2005 rocky desertification affected 37,600 km² of Guizhou, falling to 15,500 km² by 2022. Villagers in Puding had tried walnuts and camphor trees on their bare hills, and both failed in droughts.

The first gigawatt base. The Panjiang solar base in Guanling connected its first 1,050 MW phase to the grid on December 29, 2023. It's planned for 1,330 MW on about 20,000 mu (roughly 1,300 hectares) of deeply desertified land.

A dragon made of panels. At Guanling, the panel arrays were laid out across the hills to form the shape of an ichthyosaur (fish-dragon), a nod to the area's fossils.

More mountains, more megawatts. Puding's 600 MW first phase, on about 11,000 mu, was due for full grid connection in May 2025, and Guizhou Energy Group is building more gigawatt-scale bases.

Crops in the shade. Many projects are agrivoltaic. In Qianxinan, chilies, taro, pumpkins, tobacco and cabbages grow under the panels, and Xinhua describes herbs and vegetables thriving beneath arrays on rocky slopes.

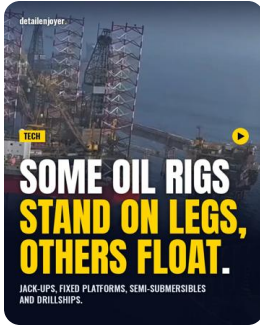
REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about Guizhou's mountain solar farms (captions 0.8–9.0 s). [Guizhou government; Xinhua]
- **Specificity:** the 'thin soil, erosion, and harsh terrain' are the result of karst rocky desertification, where erosion strips soil down to bare limestone. Official project reports cite it directly. [Guizhou government; China Daily 2020, 2023]
- **Nuance:** 'land that was previously considered poor for agriculture.' Many of the solar sites now also grow crops under the panels (agrivoltaics), so the land isn't simply swapped from farming to power. [China Daily 2024; Xinhua 2026]
- **Context:** these are large utility projects, not scattered panels. Guanling alone is planned at 1,330 MW, and Puding at about 600 MW. [Guizhou government; Guizhou Energy Administration; Guizhou DRC]
- **Footage note:** the exact site isn't identified in the Reel. The blue color grade is the uploader's edit, and the panels' real color is dark blue-black. [visual observation]

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Permalink: <https://detailenjoyer.com/case/guizhou-solar/> · Last updated Apr 3, 2026



DD-033 TECH · 3 OF 15

OFFSHORE OIL

Offshore oil and gas uses two kinds of structures. Fixed platforms are steel jackets pinned to the seabed with piles, compliant towers, and similar designs that sit over a field for decades. Mobile offshore drilling units (MODUs) move from well to well. Jack-ups stand on legs lowered to the seabed in water up to about 450 ft. Semi-submersibles float on flooded pontoons and are held by anchors or thrusters, and drillships work in 2,000–10,000 ft of water using dynamic positioning. The Reel's own footage shows red-hulled jack-ups bridged to production platforms, a type it never names.

QUICK FACTS

DD-033-F01

Jack-up rigs lower their legs to the seafloor and lift their entire hull out of the water to drill, in seas up to about 450 ft deep.

DD-033-F02

Modern drillships hold position over a well in up to 10,000 ft of water with computer-controlled thrusters instead of anchors.

THE WRITE-UP

Rigs vs. platforms. Offshore drilling uses either a rig on a production platform or a mobile offshore drilling unit (MODU). MODUs fall into two groups: bottom-supported units (jack-ups, barges) and floating units (semi-submersibles and drillships).

Fixed platforms. Conventional fixed platforms sit on steel jackets secured into the seabed with steel piles. They're very sturdy but too costly beyond about 1,500 ft of water. Compliant towers flex with the sea and reach 1,500–3,000 ft.

Jack-ups: rigs on legs. A jack-up is towed to the site with its legs raised, then lowers them to the seafloor and lifts its hull clear of the water. It's the standard shallow-water rig, used in depths up to about 450 ft.

Semi-submersibles. Semis float on pontoons that are partly flooded to sit low and stable in the water. They're held in place by anchors, by thrusters (dynamic positioning) or both, and they're used extensively in rough waters like the North Sea.

Drillships. Drillships are ship-shaped rigs that drill through a moon pool in the hull. Modern ones use dynamic positioning, with computer-controlled thrusters, to hold position in 2,000–10,000 ft of water.

Bridged complexes. Many fields link several platforms with walkways that carry people and utilities between them. The Reel's footage shows jack-ups and production platforms joined this way.

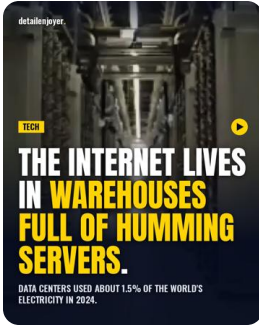
REEL VS. RECORD

- **Confirmed from the frames:** the Reel is a general explainer about oil rigs and offshore rig types (captions 0.8–20.9 s). [USCG; BSEE]
- **Omission:** the Reel skips jack-ups, the most common shallow-water rig, even though its footage (0–15 s) shows red-hulled jack-ups with lattice legs beside fixed platforms. [USCG MODU types; NPC paper]
- **Imprecise:** 'fixed platforms anchored to the seabed.' Conventional fixed platforms are steel jackets secured with piles driven into the seabed. Anchors and mooring lines hold floating units. [USCG fixed platforms; BSEE]
- **Terminology:** 'rigs ... used to drill for and extract.' Drilling rigs drill the wells, and production platforms handle extraction and processing. Some platforms carry their own rig, but they're separate jobs. [NPC paper; BOEM]
- **Confirmed:** semi-submersibles and drillships are held by anchors or dynamic positioning, and modern drillships rely on DP. [USCG; NPC paper]

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Permalink: <https://detailenjoyer.com/case/offshore-oil/> · Last updated Apr 5, 2026



DD-029 TECH · 4 OF 15

DATA CENTERS

Data centers are the buildings where the internet physically lives: racks of servers, storage and network gear, plus the power and cooling plant that keeps them running around the clock. In 2024 they used about 415 TWh of electricity, roughly 1.5% of the world's total, according to the IEA. In the U.S. they used 4.4% in 2023, and that share could reach 6.7–12% by 2028, according to Lawrence Berkeley National Laboratory. AI is the main driver of the growth, and the hottest AI chips now draw more than 1,000 W each, which is pushing operators toward liquid cooling.

QUICK FACTS

DD-029-F01

Data centers used about 415 TWh of electricity in 2024, roughly 1.5% of the world's total, and the IEA expects that to more than double by 2030.

DD-029-F02

Top AI chips now draw more than 1,000 watts each, which is why new data centers are switching to liquid cooling.

THE WRITE-UP

What's inside. A data center houses three kinds of IT equipment: servers, storage and networking gear. It also has the cooling and electrical infrastructure that keeps them running. Berkeley Lab's national estimate models all of these together.

1.5% of the world's electricity. The IEA estimates data centers used about 415 TWh in 2024, around 1.5% of global electricity. The U.S. accounted for 45% of that, China 25% and Europe 15%.

The U.S. picture. U.S. data centers used 58 TWh in 2014 and 176 TWh in 2023, which is 4.4% of national electricity. Berkeley Lab projects 325–580 TWh by 2028, or 6.7–12% of U.S. electricity.

AI is the accelerator. The IEA expects global data-center demand to more than double to about 945 TWh by 2030, slightly more than Japan uses today, with AI as the biggest driver.

Built never to go dark. The Uptime Institute rates facilities in four tiers. Tier II adds redundant (N+1) generators, UPS batteries and cooling. Tier III can be maintained without shutting down. Tier IV keeps two fully independent systems so that any single failure is tolerated.

Why liquid cooling. Leading AI chips now draw more than 1,000 W each, too much for air alone. The IEA's efficiency program says liquid cooling is a prerequisite for high-density AI racks and can cut cooling energy by roughly 30–40%.

Power and water trade-offs. Renewables and natural gas are both growing to meet data-center demand. Cooling also involves trade-offs: evaporative towers use less electricity but consume water, while dry coolers save water but use more power.

REEL VS. RECORD

- **Confirmed from the frames:** this is a general explainer about data centers, not a profile of one facility. Its footage is stitched from three accounts (ikassem85, i.linkstop and ccna_200_301). [frames]
- **Imprecise:** 'house thousands of servers'. Facilities range from small server rooms to hyperscale campuses, so 'thousands' undersells the largest and oversells the smallest. [LBNL 2024]
- **Nuance:** 'redundant power supplies, backup generators, battery systems ... so services remain online'. The level of redundancy varies by design tier. Tier I sites have no redundant capacity and must shut down for maintenance. [Uptime Institute; Uptime tier paper]
- **Incomplete:** 'renewable power integration'. The IEA says renewables and natural gas are both major sources for the new demand, so it isn't a renewables-only story. [IEA Energy and AI]
- **Confirmed and quantified:** AI is driving growth. Global data-center electricity is projected to rise from ~415 TWh (2024) to ~945 TWh (2030). [IEA Energy and AI; IEA executive summary]

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Permalink: <https://detailenjoyer.com/case/data-centers/> · Last updated May 16, 2026



DD-014 TECH · 5 OF 15

FOOTSTEP POWER

Starting in 2006, JR East tested a 'power-generating floor' at Tokyo Station's ticket gates. Piezoelectric discs inside the floor turn the pressure and vibration of passengers' footsteps into electricity. The best trials made up to about 940 kilowatt-seconds a day. That's only about a quarter of a kilowatt-hour, enough for displays or a ticket gate but not for the station. In 2008 Soundpower tested a similar mat at Shibuya Station that lit a holiday display. The Reel's glowing tiles look like Pavegen's, which work differently: they use electromagnetic generators, not piezo crystals.

QUICK FACTS

DD-014-F01

JR East's power-generating floor at Tokyo Station turns passengers' footsteps into electricity using piezoelectric discs, about 600 per square meter.

DD-014-F02

Footstep-power floors make only small amounts of energy. Tokyo Station's best day was about 940 kW·s, roughly a quarter of a kilowatt-hour.

THE WRITE-UP

Tokyo Station's power floor. JR East has tested a 'power-generating floor' at Tokyo Station since 2006. The 2008 trial at the Yaesu North gates covered about 90 m² of ticket gates and stairs.

Piezo discs underfoot. The floor holds piezoelectric elements, 35 mm discs like those in loudspeakers, about 600 per square meter. They turn the pressure and vibration of footsteps into voltage.

How much power?. The 2008 trial made over 500 kW·s a day on weekdays, peaking at 766 kW·s. A later test peaked at about 940 kW·s a day, or 4.3 W·s per person passing through. A full day's output is roughly a quarter of a kilowatt-hour.

What it's for. JR East wants to use the power for station equipment such as automatic ticket gates and electronic displays. It estimated the output could light a 100 W bulb for about 80 minutes a day.

Shibuya's holiday mat. In 2008 Soundpower Corp. installed a piezoelectric mat at Shibuya Station. A 60 kg person makes about 0.1 W in the second it takes to step across it, and the mat lit a holiday light display.

Not all 'footstep tiles' are piezo. Pavegen's glowing tiles, like those in the footage, compress 5–10 mm. They drive small electromagnetic generators that make about 3–5 W·s per step, which Pavegen says scales better than piezo.

REEL VS. RECORD

- **Mislabeled visuals:** the glowing triangular and square tiles in the footage look like Pavegen tiles. Pavegen uses electromagnetic induction, not piezoelectric materials. The narration's piezo description fits Japan's JR East and Soundpower floors, not the tiles shown. [Pavegen; JR East]
- **Nuance:** 'installed in train stations' should read 'trialled'. JR East ran time-limited demonstration experiments (2006, 2008, 2008–09) and has not rolled out a permanent system. [JR East; NIES/J-GLOBAL; Takefuji]
- **Confirmed:** piezo charge under compression, small amounts of power, and use for LED/electronic displays and low-power devices. [JR East; Japan for Sustainability; Telegraph; WIRED]

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Permalink: <https://detailenjoyer.com/case/footstep-power/> · Last updated Jun 20, 2026



CHERENKOV GLOW

Cherenkov radiation is light given off when a charged particle moves through a medium like water faster than light travels in that medium, which in water is about 75% of its vacuum speed. Nothing beats light in a vacuum. The particle's wake of polarized molecules builds into a cone-shaped 'shockwave' of light, much like a sonic boom. In reactor pools, high-energy electrons make the water glow blue. The glow isn't radioactive itself, and inspectors use it to check spent fuel.

QUICK FACTS

DD-020-F01

The blue glow in nuclear reactor pools is Cherenkov radiation: electrons moving faster than light travels in water (about 75% of c).

DD-020-F02

Cherenkov radiation is like a sonic boom for light, and IAEA inspectors use the glow to verify spent nuclear fuel.

THE WRITE-UP

Faster than light, but only locally. Cherenkov radiation is emitted when a charged particle, usually an electron, moves through a medium such as water faster than light travels in that medium. Nothing outruns light in a vacuum.

Water slows light to 75%. In water, light travels at only about 75% of its vacuum speed, so energetic particles can move faster than light there while still staying below c .

A wake of polarized molecules. A passing charged particle polarizes the medium around it. Normally those disturbances cancel out and fade. But when the particle is faster than light in the medium, they pile up into a single cone-shaped wavefront (a 'Mach cone').

A sonic boom for light. The effect is the light version of a sonic boom: a 'shockwave' of light from something moving faster than waves can travel in that medium.

Why reactor pools glow. In pool reactors, fission products release beta particles (high-energy electrons) into the surrounding water. Those electrons produce the blue glow. It's not the fuel itself shining, and it's not fluorescence.

Why it's blue. Cherenkov photons are mostly high-frequency, short-wavelength light, which looks blue or violet to the human eye.

The glow itself is harmless light. Cherenkov radiation is just visible light, so the glow itself isn't radioactive.

Used to check spent fuel. Because the glow's intensity tracks how much radioactive decay is going on, IAEA inspectors use Cherenkov viewing devices to verify spent fuel in storage pools.

REEL VS. RECORD

- **Note:** No factual errors found. The 75% figure, the 'faster than light in the medium, not in a vacuum' point, polarization, the cone-shaped wavefront and the sonic-boom analogy are all supported. [DOE; IAEA; Wikipedia; HKO]
- **Nuance:** 'electrons produced by nuclear reactions'. In reactor pools these are mostly beta particles from the decay of fission products. [Wikipedia; IAEA]
- **Nuance:** 'eerie blue glow'. The emission is strongest at short wavelengths, which is why it looks blue or violet. [DOE; Wikipedia]

SOURCES

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5. Cherenkov radiation (Heidelberg University, Institute for Theoretical Physics seminar notes): https://www.thphys.uni-heidelberg.de/~wolschin/eds14_3s.pdf

Permalink: <https://detailenjoyer.com/case/cherenkov-glow/> · Last updated Aug 21, 2026



DD-002 TECH / CARS · 7 OF 15

PROBE IV

Ford's 1983 Probe IV concept car (built with Ghia) had a drag coefficient of about 0.15.

QUICK FACTS

DD-002-F01

The Probe IV was a 1983 concept car built by Ford with the design house Ghia.

DD-002-F02

Ford's 1983 Probe IV concept car had a drag coefficient of about 0.15.

DD-002-F03

The Probe IV was created to showcase futuristic automotive design and advanced aerodynamics, using lightweight materials and a smooth, wide tunnel-shaped body.

DD-002-F04

The Probe IV's extremely low drag emphasized fuel efficiency during an era of rising energy concerns.

THE WRITE-UP

1983 Ford concept. The Probe IV was a 1983 concept car from Ford, built with Ghia.

Cd $\approx$ 0.15. Its drag coefficient was about 0.15.

Permalink: <https://detailenjoyer.com/case/probe-iv/> · Last updated Apr 13, 2026



AIRBORNE WIND TURBINES

The footage shows the helium-filled aerostats of Beijing-based SAWES Energy Technology (Linyi Yunchuan). The S1500 prototype flew at 1,500 m in Hami, Xinjiang, on September 19–23, 2025. The S2000 is a 60 × 40 × 40 m ducted airship of nearly 20,000 m³ carrying 12 turbines. On January 5, 2026, in Yibin, Sichuan, it climbed to 2,000 m in about 30 minutes, generated 385 kWh and fed it into the local grid through its tether, which the company calls a world first. Because wind power rises with the cube of wind speed, steadier high-altitude wind promises more energy from lighter hardware. The S1500's 1.16-tonne generating system compares with more than 10 tonnes for a conventional turbine. The company rates the S2000 at up to 3 MW; that figure is a claim, not yet a measured output.

QUICK FACTS

DD-050-F01

On January 5, 2026, China's helium-lifted S2000 airborne turbine rose to 2,000 m and fed 385 kWh into the grid on its first flight.

DD-050-F02

Wind power rises with the cube of wind speed, which is why engineers are trying to fly turbines into stronger winds.

THE WRITE-UP

S1500 in the desert. In September 2025, SAWES flew a buoyant aerostat with 12 turbine-generators at 1,500 m in Hami, Xinjiang, in the first field deployment of a megawatt-scale buoyant high-altitude wind system.

S2000 on the grid. On January 5, 2026, in Yibin, Sichuan, the S2000 rose to 2,000 m in about 30 minutes, generated 385 kWh and fed it into the local grid. The developer calls it the first high-altitude wind device formally connected to a grid.

An airship that's a turbine. The S2000 is 60 m long, 40 m wide and 40 m high, with a volume of nearly 20,000 m³. Its 12 turbines sit in a duct between the helium envelope and a ring wing that funnels the wind.

Why go up. Wind power scales with the cube of wind speed, so stronger, steadier winds aloft give more energy and a better capacity factor. The S1500's generating system weighed 1.16 tonnes, against more than 10 tonnes for a conventional turbine.

Power down the tether. A helium aerostat lifts the lightweight generators, and electricity comes down a tethered cable. Target uses include off-grid sites such as border outposts and supplementing ground-based wind farms.

Claims vs. measurements. The S2000 is rated at up to 3 MW. The S1500's 1.135 MW steady-state output came from a PSCAD/EMTDC simulation, not a field measurement.

REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about Chinese airborne wind turbines (captions at 0.8–2.4 s). The footage shows SAWES's helium aerostats (S1500/S2000), which carry ducted turbines and send power down a tether. [Global Times; IET 2026]
- **Unnamed:** the Reel never names the project. It's SAWES Energy Technology (Beijing Linyi Yunchuan); the S2000 flew at 2,000 m on January 5, 2026, about two weeks before this Reel was posted. [Global Times; Interesting Engineering]
- **Generic:** the Reel lists 'tethered drones, kites, or balloon-supported platforms', but the Chinese projects in the footage are buoyant helium aerostats, not kites or drones. [IET 2026; Global Times]
- **Hype check:** megawatt figures are ratings or simulations. The S2000 is rated at up to 3 MW, the S1500's 1.135 MW came from a computer simulation, and the measured result was 385 kWh on the S2000's maiden flight. [IET 2026; Global Times]
- **Supported:** winds aloft are 'stronger and more consistent'. Power rises with the cube of wind speed, and steadier winds improve the capacity factor. [IET 2026; Global Times]

SOURCES

1. World's first urban-use MW-class high-altitude wind turbine completes test flight (Global Times, Jan. 2026): <https://www.globaltimes.cn/page/202601/1352372.shtml>
2. Airborne wind power system generates 385 kWh at 2,000 meters in maiden flight: developer (Global Times, Jan. 2026): <https://www.globaltimes.cn/page/202601/1352884.shtml>
3. Lu et al., Successful Field Testing of the World's First Buoyant Megawatt-Scale High-Altitude Wind Energy System (IET Energy Internet, 2026): <https://digital-library.theiet.org/doi/pdf/10.1049/ein2.70024?download=true>
4. World's first megawatt-level airborne 'windmill' feeds power to grid (Interesting Engineering): <https://interestingengineering.com/energy/worlds-first-megawatt-airship-rises-6560-ft>
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Permalink: <https://detailenjoyer.com/case/airborne-wind-turbines/> · Last updated Jan 21, 2026



HEFEI FUSION

On June 27, 2026, the Institute of Plasma Physics in Hefei (ASIPP) completed and accepted a toroidal field superconducting magnet for CRAFT, China's Comprehensive Research Facility for Fusion Technology. The magnet weighs 582.4 t, measures $21 \times 12 \times 3.3$ m, operates at 98 kA and stores 120 GJ. Sixteen such coils would produce 6.5 T at the plasma center and a 14.5 T peak. ASIPP says it has 1.3 times the volume and three times the stored energy of an ITER TF magnet, making it the world's largest fusion-reactor superconducting magnet.

QUICK FACTS

DD-738-F01

The Hefei TF magnet operates at 98 kA and stores 120 GJ.

DD-738-F02

ASIPP says it has three times the stored energy of an ITER TF magnet.

THE WRITE-UP

Completed in June 2026. On June 27, 2026, the toroidal field (TF) magnet, the largest component of CRAFT, completed its final manufacturing steps and passed acceptance testing. CRAFT is a national research facility in Hefei for testing key fusion-reactor systems.

The numbers. A single TF magnet measures 21 m long, 12 m wide and 3.3 m high and weighs 582.4 t. It operates at 98 kA and stores 120 GJ. Sixteen such magnets would produce 6.5 T at the plasma center and 14.5 T at the coils.

Compared with ITER. According to ASIPP, the magnet has 1.3 times the volume and three times the stored energy of an ITER TF magnet. The institute describes it as the world's largest fusion-reactor superconducting magnet.

What it does. Toroidal field magnets create the field that confines plasma at hundreds of millions of degrees and reduces particle damage to the vessel walls. They must run reliably for 60 years at very low temperatures, high currents and high radiation.

How it was tested. The project took six years. Conductor samples were tested thousands of times at 4.2 K, with cycles at 100 kA and 12 T. A high-temperature-superconducting central solenoid coil also completed full-parameter testing the same day.

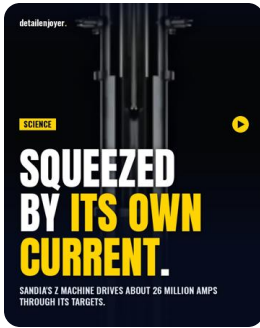
REEL VS. RECORD

- **Missing context:** the magnet was built for CRAFT, China's fusion-technology test facility in Hefei, not an operating reactor. It passed acceptance on June 27, 2026.
- **Precision:** 98 kA is the magnet's operating current rather than an 'up to' maximum. Conductor samples were tested at 100 kA and 12 T.
- **Attribution:** 'world's largest' and the comparison with ITER (1.3 times the volume, three times the stored energy) are claims made by the developer, ASIPP.
- **Missing context:** sixteen such TF coils would produce 6.5 T at the plasma center and a 14.5 T peak field.
- **Missing context:** the coil is designed for a 60-year life under extreme cold, high current and radiation. A high-temperature-superconducting central solenoid coil passed full-parameter testing the same day.

SOURCES

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Permalink: <https://detailenjoyer.com/case/hefei-fusion/> · Last updated Sep 11, 2026



(Z) PINCH ME

In a Z-pinch, current flowing along the axis of a plasma or a metal target creates a circular (azimuthal) magnetic field, and the resulting Lorentz force drives the material inward. Sandia's Z machine stores up to 22 MJ and discharges it as a pulse of about 100 nanoseconds, with currents of about 26 million amps (up to about 30 MA). That gives magnetic pressures of about 100 Mbar at a 1 mm radius. On Z, the targets are usually wire arrays or metal liners that vaporize into plasma. The Reel's footage is credited to Zap Energy, a company developing a different, sheared-flow Z-pinch approach to fusion.

QUICK FACTS

DD-741-F01

Sandia's Z machine runs at about 26 million amps per shot.

DD-741-F02

Magnetic pressure on Z reaches about 100 Mbar at a 1 mm radius.

THE WRITE-UP

The pinch. Current flowing along an axis, conventionally called z, creates a magnetic field that circles it. The force between that current and that field pushes the conductor inward. This is why it's called a 'Z-pinch'.

The Z machine. Sandia's Z is the world's largest pulsed-power accelerator. It stores up to 22 MJ and discharges it in a pulse of about 100 nanoseconds, with peak power around 80 TW and current up to about 30 MA.

Typical shots. In about 200 shots a year, Z uses currents of about 26 million amps and produces X-ray output of about 2.7 MJ at peaks of about 350 TW.

Magnetic pressure. At 26 MA and a radius of 1 mm, the magnetic pressure is about 100 Mbar, roughly 100 million atmospheres. That is enough to implode a target to far higher pressures.

What gets pinched. On Z, the load is usually a cylindrical array of fine wires or a metal liner, which vaporizes into plasma and implodes. Z is used for radiation science, material properties and fusion research.

REEL VS. RECORD

- **Precision:** Z runs at about 26 MA, peaking near 30 MA, in pulses of about 100 nanoseconds. 'Tens of millions' is right but vague.
- **Missing context:** on Z, the current usually flows through wire arrays or metal liners that vaporize into plasma, not through a pre-existing plasma column.
- **Scale:** the magnetic pressure is about 100 Mbar (about 100 million atmospheres) at 26 MA and 1 mm.
- **Footage:** the credited source is Zap Energy, a fusion company with its own sheared-flow Z-pinch design, which is different from Sandia's Z machine.
- **Missing context:** Z is also the world's most powerful X-ray source (about 2.7 MJ per shot) and is used for weapons-effects testing and material science, not only fusion.

SOURCES

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3. Sandia (OSTI): Pulsed power Z-pinch program at Sandia: <https://www.osti.gov/servlets/purl/2002391>
4. Wikipedia: Z-pinch: <https://en.wikipedia.org/wiki/Z-pinch>

Permalink: <https://detailenjoyer.com/case/z-pinch-me/> · Last updated Sep 17, 2026



DD-643 LOCATIONS / TECH · 11 OF 15

THREE GORGES

The Three Gorges Dam crosses the Yangtze at Sandouping, near Yichang in Hubei province, China. By installed capacity it's the world's largest power station: 22,500 MW from 32 main 700 MW generators plus two 50 MW units that power the plant itself. The concrete gravity dam is about 2.3 km long, 2,309.5 m along its axis or 2,335 m by another measure. Its maximum height is 181 m, and its crest sits at 185 m above sea level, which is where the Reel's '185 m' comes from. The reservoir normally holds water at 175 m.

Construction formally began in December 1994. The dam body was finished in 2006, and Guinness dates the last main generator to July 4, 2012. The whole project wasn't certified complete until 2020, after the ship lift and other works. Output depends on river flow. The design target is 88.2 TWh a year, and in 2020 it set a world record of 111.8 TWh for a single hydropower plant. Besides power, the project is meant for flood control and navigation, through a five-step double ship lock and a ship lift that raises vessels up to 113 m. According to Reuters, about 1.3 million people were relocated to make way for the reservoir.

QUICK FACTS

DD-643-F01

Three Gorges has 22,500 MW of installed capacity.

DD-643-F02

It generated a record 111.8 TWh in 2020.

THE WRITE-UP

Biggest by capacity. Thirty-two 700 MW generators and two 50 MW units add up to 22,500 MW, the most of any power station.

How tall. The dam's maximum height is 181 m. Its crest is at 185 m above sea level.

When it was finished. The last main generator came online in 2012, but the whole project was certified complete in 2020.

Record output. In 2020 it generated a record 111.8 TWh, against a design target of 88.2 TWh a year.

The human cost. About 1.3 million people were relocated to make way for the reservoir, according to Reuters.

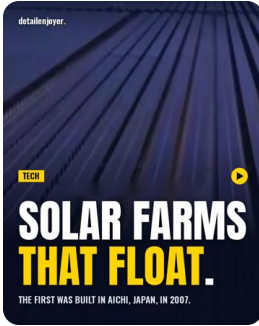
REEL VS. RECORD

- **Note:** 'Standing 185 m tall': 185 m is the crest's elevation above sea level. The dam's maximum height is 181 m (about 594 ft).
- **Note:** 'Completed in 2012': the last main generator came online in 2012 (Guinness gives July 4, 2012). The dam body was finished in 2006, and the whole project was certified complete in 2020.
- **Note:** 'Nearly 100 TWh annually': output varies with river flow. The design target is 88.2 TWh, and the record is 111.8 TWh (2020).
- **Note:** 'Largest hydroelectric power station': true by installed capacity (22,500 MW). Itaipu held the annual-output record until Three Gorges passed it in 2020.
- **Missing:** the dam is also built for flood control and shipping, and about 1.3 million people were relocated for its reservoir (Reuters).

SOURCES

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Permalink: <https://detailenjoyer.com/case/three-gorges/> · Last updated Aug 26, 2025



DD-608 TECH / NATURE · 12 OF 15

FLOATOVOLTAICS

Floating solar, also called floating photovoltaics (FPV) or floatovoltaics, puts solar panels on pontoons or purpose-built floats on reservoirs, lakes, ponds and other calm water. According to the World Bank's 2019 market report, the first FPV system was built in 2007 in Aichi, Japan. The first commercial installation was a 175 kWp array on a winery's irrigation pond in Napa Valley, California, in 2008. The report says the platform is held in place by anchoring and mooring to the bank, to the bottom, to piles, or a combination. Besides saving land, the report lists possible benefits: reduced evaporation from reservoirs, better energy yield because water cools the panels and there's less dust, and the option of using existing power lines at hydropower dams. It also notes that the size of these performance gains has yet to be confirmed by larger installations across multiple regions and over time. Wikipedia reports installed capacity grew from about 3 GW in 2020 to 13 GW in 2022. It cites a World Bank estimate of 6,600 large bodies of water suitable for floating solar, with more than 4,000 GW of technical capacity if 10% of their surface were covered. Some footage shows panels on fixed posts over shallow water, a closely related approach that is included as illustration.

QUICK FACTS

DD-608-F01

The first floating solar system was built in Aichi, Japan, in 2007.

DD-608-F02

Floating solar platforms are anchored to the bank, the bottom or piles.

THE WRITE-UP

On the water. Floating solar puts PV panels on floats on reservoirs, lakes and ponds, sparing land.

First in Japan. The first system was built in 2007 in Aichi, Japan. The first commercial one, in 2008, was on a California winery pond.

Held in place. Platforms are anchored and moored to the bank, the bottom, piles or a combination.

Extra perks. Possible benefits include less evaporation and cooler, cleaner panels, though the World Bank says the gains still need confirming at scale.

Growing fast. Installed capacity grew from about 3 GW in 2020 to 13 GW in 2022.

REEL VS. RECORD

- **Note:** 'Anchored to the bed or shore': or to piles, or a combination of these, according to the World Bank.
- **Note:** 'Bodies of water like reservoirs, lakes, or slow-moving rivers': most installations are on calm, man-made water such as reservoirs and irrigation ponds. The World Bank's potential estimates focus on man-made freshwater reservoirs.
- **Note:** 'Leverage unused water surfaces': also, the water cools the panels and they shade the water, which may raise output and reduce evaporation. The World Bank says the size of these gains still needs confirming at scale.
- **Note:** 'Reducing land competition with agriculture': the first commercial system (2008) was put on a winery pond specifically to avoid taking land from grapevines.
- **Missing:** the first floating PV system was built in Aichi, Japan, in 2007, and capacity reached about 13 GW worldwide by 2022.

SOURCES

1. World Bank Group, ESMAP and SERIS (2019), Where Sun Meets Water: Floating Solar Market Report: <https://documents1.worldbank.org/curated/en/670101560451219695/pdf/Floating-Solar-Market-Report.pdf>
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Permalink: <https://detailenjoyer.com/case/floatovoltaics/> · Last updated Jul 5, 2025



DD-579 TECH · 13 OF 15

URANIUM URAL

Ural is a Project 22220 nuclear-powered icebreaker, the third ship of the class after Arktika and Sibir. It's operated by Atomflot, part of Russia's state nuclear corporation Rosatom, and registered in Murmansk. Baltic Shipyard in Saint Petersburg laid its keel on July 25, 2016, and it was launched on May 25, 2019. Its reactors had already been lifted aboard while it was on the slipway. Delivery was planned for 2020 but slipped to 2022 because of delays with its domestically made steam turbines. After sea trials in October 2022, its flag was raised on November 22, 2022, and on December 2 it left Murmansk on its first icebreaking mission, to the Kara Sea. The ship is 172.7 m long and 34 m wide. Two 175-megawatt RITM-200 pressurized-water reactors, fueled with uranium-235 enriched to up to 20%, make steam for two turbogenerators. Their electricity drives three 20-megawatt motors, each turning a 6.2 m four-bladed propeller, for 60 megawatts in total. At full power in deep water, the design calls for breaking level ice 2.8 m thick at a steady 1.5 to 2 knots. By taking on or pumping out ballast water, the crew can vary the draft between about 9 m and 10.5 m. That lets the same ship work the deep Northern Sea Route and the shallow estuaries of Siberian rivers such as the Yenisei. The name had been chosen once before, for the last Arktika-class icebreaker in 1989, which was renamed 50 Let Pobedy during construction. The footage shows Ural's red, white and blue superstructure and dark-blue hull, marked 'УРАЛ' and 'РОСАТОМФЛОТ', moving through snow-covered ice at dusk.

QUICK FACTS

DD-579-F01

Ural's two RITM-200 reactors power three 20-megawatt propeller motors.

DD-579-F02

Ural is designed to break level ice 2.8 m thick.

THE WRITE-UP

Third of its class. Ural is the third Project 22220 icebreaker, built at Baltic Shipyard and run by Rosatom's Atomflot.

2019 to 2022. It was launched on May 25, 2019, and entered service on November 22, 2022, after turbine delays.

Reactors to propellers. Two RITM-200 reactors make steam for generators that power three 20 MW propeller motors.

2.8 m of ice. At full power, it's designed to break level ice 2.8 m thick at 1.5 to 2 knots.

Two drafts. Ballast lets it ride at about 9 m for river estuaries or 10.5 m for the open Arctic.

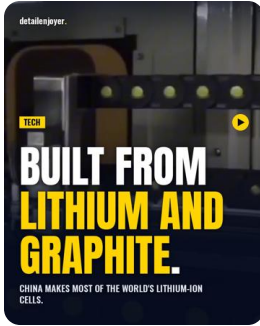
REEL VS. RECORD

- **Note:** 'Launched in 2019 and commissioned in 2022': correct. It was launched on May 25, 2019, and its flag was raised on November 22, 2022. Delivery was two years late because of steam-turbine delays.
- **Note:** 'Cut through ice up to 2.8 m thick': that's the design figure for level ice at a steady 1.5 to 2 knots, at full power in deep water.
- **Note:** 'Keep the Northern Sea Route navigable year-round': that's the class's purpose, as part of a larger fleet. One ship alone doesn't keep the whole route open.
- **Note:** 'From 9 to 10.5 m': correct for the working range. The official minimum draft is a little lower, about 8.65 m.
- **Missing:** the reactors run on uranium-235 enriched to up to 20%. They make steam for two turbogenerators, and the electricity drives three 20 MW motors.

SOURCES

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Permalink: <https://detailenjoyer.com/case/uranium-ural/> · Last updated May 24, 2025



DD-236 TECH / SCIENCE · 14 OF 15

ENERGIZER

Lithium-ion batteries power phones, laptops and electric vehicles. Making them starts with mining and refining materials such as lithium, nickel, cobalt, manganese and graphite. These become the anode (usually graphite) and cathode (a lithium metal oxide), which are coated onto foils, combined with a separator and electrolyte, and sealed into cells. Cells are charged for the first time, aged and tested, then assembled into modules and packs. China dominates production, with most of the world's cell manufacturing capacity in the early 2020s. The footage shows battery factories and assembly lines, with the presenter.

QUICK FACTS

DD-236-F01

Lithium, nickel, cobalt and graphite are key.

DD-236-F02

The anode is usually graphite.

THE WRITE-UP

Raw materials. Lithium, nickel, cobalt and graphite are key.

Electrodes. The anode is usually graphite.

Cells. Electrodes, separator and electrolyte are sealed into cells.

Formation. Cells are charged, aged and tested.

China. China leads cell production.

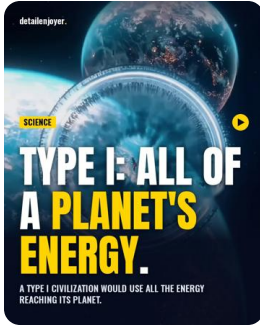
REEL VS. RECORD

- **Note:** The Reel's figures (over 5 billion lithium-ion batteries a year, and a 72% share of production for China in 2020) vary by source and year, so I didn't repeat them as facts.

SOURCES

1. Wikipedia: Lithium-ion battery: https://en.wikipedia.org/wiki/Lithium-ion_battery
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Permalink: <https://detailenjoyer.com/case/energizer/> · Last updated May 20, 2024



TYPE I

The Kardashev scale was proposed in 1964 by the Soviet astronomer Nikolai Kardashev to classify civilizations by energy use. A Type I civilization uses energy on the scale of all that reaches its home planet from its star, about 10^{16} to 10^{17} watts for Earth; Type II uses the full output of its star; Type III that of a galaxy. Carl Sagan suggested a sliding scale, on which humanity rates about 0.7. The footage shows animated planets and energy imagery, with the presenter.

QUICK FACTS

DD-263-F01

Kardashev proposed the scale in 1964.

DD-263-F02

Type I uses all energy reaching its planet.

THE WRITE-UP

1964. Kardashev proposed the scale in 1964.

Type I. Type I uses all energy reaching its planet.

Type II. Type II uses its whole star.

Type III. Type III uses a galaxy.

Humanity. Sagan rated humanity about 0.7.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Kardashev scale: https://en.wikipedia.org/wiki/Kardashev_scale

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COLLECTION QUIZ

Test Your Knowledge: 30 questions from Power and Energy. Answers are on the next page.

1. Roughly how tall is a Panthalassa Ocean-3 node? (DD-022 · Ocean-3)

- A. About 8.5 m
- B. About 25 m
- C. About 85 m
- D. About 850 m

2. How does Ocean-3 make its electricity? (DD-022 · Ocean-3)

- A. Solar panels on the sphere
- B. Seawater forced up its tube by the waves spins turbines
- C. A small diesel generator
- D. A power cable from shore

3. Which Chinese province is famous for solar panels blanketing whole mountains? (DD-032 · Guizhou

Solar)

- A. Hainan
- B. Guizhou
- C. Heilongjiang
- D. Jiangsu

4. What is 'rocky desertification'? (DD-032 · Guizhou Solar)

- A. Sand dunes spreading
- B. Erosion stripping soil to bare rock
- C. Rocks falling from cliffs
- D. Desert heat cracking rocks

5. What kind of rig lowers its legs to the seafloor and lifts its hull out of the water? (DD-033 · Offshore

Oil)

- A. Drillship
- B. Jack-up
- C. Semi-submersible
- D. Tension-leg platform

6. What keeps a conventional fixed platform in place? (DD-033 · Offshore Oil)

- A. Anchors
- B. Thrusters
- C. Steel piles driven into the seabed
- D. Its own weight on sand

7. Roughly what share of the world's electricity did data centers use in 2024? (DD-029 · Data Centers)

- A. 0.1%
- B. 1.5%
- C. 10%
- D. 25%

8. Which country used the most data-center electricity in 2024? (DD-029 · Data Centers)

- A. China
- B. India
- C. United States
- D. Germany

9. Which Japanese station tested a 'power-generating floor' at its ticket gates? (DD-014 · Footstep Power)

- A. Tokyo Station
- B. Osaka Station
- C. Sapporo Station
- D. Kyoto Station

10. What turns footsteps into electricity in JR East's floor? (DD-014 · Footstep Power)

- A. Solar cells
- B. Piezoelectric discs
- C. Tiny wind turbines
- D. Thermoelectric plates

11. In water, light travels at roughly what fraction of its speed in a vacuum? (DD-020 · Cherenkov Glow)

- A. About 25%
- B. About 75%
- C. About 99.9%
- D. About 150%

12. Cherenkov radiation is often compared to which everyday effect? (DD-020 · Cherenkov Glow)

- A. A rainbow
- B. An echo
- C. A sonic boom
- D. Static electricity

13. What was the Probe IV concept car's drag coefficient? (DD-002 · Probe IV)

- A. About 0.60
- B. About 0.45
- C. About 0.30
- D. About 0.15

14. In what year did Ford build the Probe IV concept? (DD-002 · Probe IV)

- A. 1983
- B. 1963
- C. 1999
- D. 2008

15. What lifts China's S2000 airborne wind turbine? (DD-050 · Airborne Wind Turbines)

- A. Rotors like a helicopter
- B. A helium-filled aerostat
- C. A kite
- D. A rocket

16. How high did the S2000 fly on its January 2026 test? (DD-050 · Airborne Wind Turbines)

- A. 200 m
- B. 2,000 m
- C. 20,000 m
- D. 50 m

17. How much does the Hefei TF magnet weigh? (DD-738 · Hefei Fusion)

- A. About 58 t
- B. 582.4 t
- C. 5,824 t
- D. 58,240 t

18. What is its operating current? (DD-738 · Hefei Fusion)

- A. 98 A
- B. 980 A
- C. 98 kA
- D. 98 MA

19. What current does Sandia's Z typically use? (DD-741 · (Z) Pinch Me)

- A. About 26 million amps
- B. About 26 amps
- C. About 2,600 amps
- D. About 26 billion amps

20. How long is a Z pulse? (DD-741 · (Z) Pinch Me)

- A. About 100 nanoseconds
- B. About 1 second
- C. About 1 minute
- D. About 1 hour

21. What is Three Gorges' installed capacity? (DD-643 · Three Gorges)

- A. 22,500 MW
- B. 2,250 MW
- C. 225 MW
- D. 225,000 MW

22. What is the dam's maximum height? (DD-643 · Three Gorges)

- A. 181 m
- B. 81 m
- C. 281 m
- D. 18 m

23. Where was the first floating solar system built? (DD-608 · Floatovoltaics)

- A. Aichi, Japan
- B. Nevada, USA
- C. Bavaria, Germany
- D. Gujarat, India

24. Which is NOT a way floating solar platforms are anchored? (DD-608 · Floatovoltaics)

- A. Helium balloons
- B. To the bank
- C. To the bottom
- D. To piles

25. How many nuclear reactors does Ural have? (DD-579 · Uranium Ural)

- A. Two
- B. One
- C. Four
- D. Six

26. How many propellers does Ural have? (DD-579 · Uranium Ural)

- A. Three
- B. One
- C. Two
- D. Four

27. Which metal gives these batteries their name? (DD-236 · Energizer)

- A. Lithium
- B. Lead
- C. Zinc
- D. Iron

28. What is the anode usually made of? (DD-236 · Energizer)

- A. Graphite
- B. Copper
- C. Silicon dioxide
- D. Gold

29. Who proposed the scale? (DD-263 · Type I)

- A. Nikolai Kardashev
- B. Carl Sagan
- C. Enrico Fermi
- D. Frank Drake

30. What does it measure? (DD-263 · Type I)

- A. Energy use
- B. Population
- C. Intelligence
- D. Age

ANSWER KEY

1. **C. About 85 m** Now You Know: Each node is about 85 m of plate steel, close to the height of Big Ben. (DD-022)
2. **B. Seawater forced up its tube by the waves spins turbines** Now You Know: As waves lift and drop the node, seawater is driven up the tube into the sphere, where it spins turbines. (DD-022)
3. **B. Guizhou** Now You Know: Guizhou in southwest China has built large solar bases on its karst hills. (DD-032)
4. **B. Erosion stripping soil to bare rock** Now You Know: On fragile karst, soil erodes away, leaving barren limestone. (DD-032)
5. **B. Jack-up** Now You Know: A jack-up stands on legs in shallow water, up to about 450 ft. (DD-033)
6. **C. Steel piles driven into the seabed** Now You Know: Its steel jacket is secured into the seabed with piles. (DD-033)
7. **B. 1.5%** Now You Know: The IEA estimates about 415 TWh, roughly 1.5% of global electricity. (DD-029)
8. **C. United States** Now You Know: The U.S. accounted for about 45%, ahead of China (25%) and Europe (15%). (DD-029)
9. **A. Tokyo Station** Now You Know: JR East tested it at Tokyo Station's Yaesu North gates. (DD-014)
10. **B. Piezoelectric discs** Now You Know: Piezoelectric elements (35 mm discs, about 600 per m²) convert pressure and vibration into voltage. (DD-014)
11. **B. About 75%** Now You Know: Light slows to about 75% of its vacuum speed in water, so fast particles can outrun it there. (DD-020)
12. **C. A sonic boom** Now You Know: It's a 'shockwave' of light, the optical version of a sonic boom. (DD-020)
13. **D. About 0.15** Now You Know: The Probe IV's drag coefficient was about 0.15. (DD-002)
14. **A. 1983** Now You Know: The Probe IV was a 1983 Ford concept car. (DD-002)
15. **B. A helium-filled aerostat** Now You Know: It's a buoyant, ducted airship tethered to the ground. (DD-050)
16. **B. 2,000 m** Now You Know: It took about 30 minutes to reach 2,000 m. (DD-050)
17. **B. 582.4 t** Now You Know: 582.4 t. (DD-738)
18. **C. 98 kA** Now You Know: It operates at 98 kA. (DD-738)
19. **A. About 26 million amps** Now You Know: Z shots run at about 26 MA. (DD-741)
20. **A. About 100 nanoseconds** Now You Know: Energy is discharged in about a 100 ns pulse. (DD-741)
21. **A. 22,500 MW** Now You Know: 32×700 MW plus 2×50 MW. (DD-643)
22. **A. 181 m** Now You Know: Its crest is at 185 m above sea level. (DD-643)
23. **A. Aichi, Japan** Now You Know: In 2007. (DD-608)
24. **A. Helium balloons** Now You Know: Per the World Bank report. (DD-608)
25. **A. Two** Now You Know: Two RITM-200 reactors. (DD-579)
26. **A. Three** Now You Know: Each is driven by a 20 MW electric motor. (DD-579)

- 27. **A. Lithium** Now You Know: Lithium-ion. *(DD-236)*
- 28. **A. Graphite** Now You Know: Carbon. *(DD-236)*
- 29. **A. Nikolai Kardashev** Now You Know: In 1964. *(DD-263)*
- 30. **A. Energy use** Now You Know: Of civilizations. *(DD-263)*

NOW YOU KNOW!