

Science & Technology Briefs

Rosatom To Build More Floating Nuclear Power Plants

Russia's state nuclear corporation, Rosatom, is committed to building four new floating nuclear power stations over the next six years to power mining ventures in Siberia's far Northeast. The new waterborne facilities will be similar to the *Akademik Lomonosov*, which Rosatom connected in 2019 to Pevek, a remote port in Chukotka on the East Siberian Sea, after spending more than a decade constructing it.

The four new plants will be deployed to the nascent Baimsky copper mining project, also in Chukotka, by the end of 2026. Under the \$2 billion plan, Rosatom will construct the plants at St. Petersburg's Baltic Shipyard, each centered on a pair of 55 MW RITM-200 reactors, the type featured in Russia's new-generation nuclear icebreakers.

Three plants will supply power to the mining sites. The fourth will be in reserve, rotated in when any of the first three require refueling or maintenance, Rosatom's CEO Aleskei Likhachev told TASS last week. He said that this fourth plant could also act as a reserve unit for the *Akademik Lomonosov*, whose older KLT-40 reactors require refueling every 12 years.

Once the first two floating nuclear plants are at their working location on Chaunskaya Bay in the East Siberian Sea, they will be connected to power lines spanning 400 km to the Baimskaya mine. The third unit should be connected at the end of 2027, increasing the total power supply to about 330 MW.

LaRouche's Discovery in the Science of Physical Economy

What was Lyndon LaRouche's fundamental discovery in economics? LaRouche himself explained it in 1993: "The central feature of my original contribution to the Leibniz science of physical economy, is the provision of a method for addressing the causal relationship between, on the one side, individuals' contributions to axiomatically revolutionary advances in scientific and analogous forms of knowledge, and, on the other side, consequent increases in the potential population-density of corresponding societies."

LaRouche developed a pedagogical [graph](#) to point students in the right direction. If a society's rates of growth of monetary and financial aggregates rise hyperbolically as the physical economy declines, that system will sooner or later blow out. All modern schools of economics other than the Leibniz school of physical economy—otherwise known as the American System of economics—and that of Pobisk Kuznetsov in Russia focus exclusively on the two upper curves, thinking problems can be foreseen and solved by monetarist manipulations.

LaRouche used this scientific approach to issue nine economic forecasts between 1956 and 1994, each of which was uniquely accurate, where every other living economist failed. Then, in July 25, 2007, on the eve of the 2007-2008 crash that others said would never happen, LaRouche told a stunned international webcast audience: "The world monetary financial system is actually now currently in the process of disintegrating. There's noth-

ing mysterious about this; I've talked about it for some time. It's been in progress; it's not abating. What's listed as stock values and market values in the financial markets internationally is bunk! These are the purely fictitious beliefs. There's no truth to it; the fakery is enormous. There is no possibility of a non-collapse of the present financial system—none!"

Sun's Electric Field More Fully Understood

In a study published July 14 in *The Astrophysical Journal*, physicists at the University of Iowa report the first definitive measurements of the Sun's electric field, and how the electric field interacts with the solar wind, the fast-flowing current of charged particles that collides with Earth's magnetosphere, affecting all activities on Earth and its biosphere—from triggering the beautiful auroras, to the weather and climate, to the functioning of man's satellites and telecommunications.

From data acquired by the Parker Solar Probe's passing within 0.1 astronomical units (AU)—14.5 million km—from the Sun, the physicists were able to calculate the distribution of electrons within the Sun's electric field, and then discern the size and scope of the Sun's electric field more clearly than before.

That field arises from the interaction of protons and electrons generated when hydrogen atoms are stripped apart in the intense heat generated by fusion deep within the Sun. "Electrons are trying to escape, but protons are trying to pull them back. And that is the electric field," said Jasper Halekas in *Iowa Now*, a university newsletter. Halekas is a co-investigator for the Solar Wind Electrons, Alphas, and Pro-

tons (SWEAP) instrument aboard the Parker Solar Probe, launched in August 2018.

“If there were no electric field, all the electrons would rush away and be gone. But the electric field keeps it all together as one homogenous flow. We can now put a number on how much of the acceleration [of the solar wind] is provided by the Sun’s electric field. It looks like it’s a small part of the total. It’s not the main thing that gives the solar wind its kick. That then points to other mechanisms that might be giving the solar wind most of its kick.”

New Record in Inertial Confinement Fusion at Lawrence Livermore

In a major breakthrough, researchers at the U.S. National Ignition Facility on Aug. 8 used an array of powerful lasers to heat and compress a tiny pellet containing a deuterium-tritium (D-T) isotope combination, to yield a record 1.35 megajoules of energy in one ten-billionth of a second. This energy output is around 70% of the 1.9 megajoule level needed to exceed the energy input. The National Ignition Facility is part of the Lawrence Livermore National Laboratory.

“This result is a historic step forward for inertial confinement fusion research,” said LLNL Director Kim Budil. “For me it demonstrates one of the most important roles of the national labs—our relentless commitment to tackling the biggest and most important scientific grand challenges and finding solutions where others might be dissuaded by the obstacles.” It represents one of the most significant steps since serious work on inertial confinement fusion began in the 1960s.

This experiment’s yield of 1.35 megajoules is eight times the NIF’s previous record yield of 170 kilo-

joules, established only six months ago in February 2021, and 25 times the yield from experiments carried out in 2018.

The NIF operates the world’s largest and most powerful laser. The laser pulse starts in the 900-foot, ten storey NIF complex, in the Master Oscillator Room, as a weak laser pulse of about 1 billionth of a joule. It is then sent through a sequence of chambers, where it is amplified in stages by a quadrillion times in total—all in a few millionths of a second. The amplified beam is split into 192 beamlines all focused on a fuel pellet the size of a pea. The pellet’s surface is ionized by the driver beam, and ablation of the ionized material generates a large inward shock wave that compresses the inner layers of the D-T fuel. That produces the fusion reaction.

NIF still has significant work to do on a few fronts. Just as one example, NIF’s lasers have the ability to discharge about once a day, whereas sustained fusion requires it to ionize and compress pellets a few times a second.

But Lawrence Livermore’s Aug. 8 accomplishment is an appreciable step, and a cause for optimism. This is the time to make fusion a crash program and national mission, and the underpinning of a new economic platform.

BRICS Space Agencies To Build Remote Sensing Satellite Constellation

Three weeks before the heads of state of the BRICS nations (Brazil, Russia, India, China, South Africa) are scheduled to meet virtually on Sept. 9, the leaders of those nations’ space agencies met Aug. 18 and signed a cooperation agreement to build the BRICS Remote Sensing Satellite Constellation.

A posting from August 20 in *Geospatial World*, an industry news website, which covered the meeting,

quoted a [statement](#) of the China National Space Administration explaining that the agreement would enable “cooperation among BRICS space agencies to build a ‘virtual constellation of remote sensing satellites’” as a data-sharing mechanism consisting of satellites already placed in orbit by the BRICS space agencies. These include the CBERS-4 (built jointly by Brazil and China), Russia’s Kanopus-V type, India’s Resourcesat-2 and 2A, and China’s GF-6 and ZY-3/02. Ground stations located in Cuiabá, Brazil, the Moscow region, India’s Shadnagar–Hyderabad region, China’s Sanya, and South Africa’s Hartebeesthoek will receive data from those satellites.

China to Build Wind Tunnel for Speeds Up to Mach 30

China is now building a wind tunnel that will simulate flight speeds of up to Mach 30, a facility of importance for the construction of hypersonic missiles. Construction will complete in 2022. Dubbed the cradle of China’s next-generation aircraft, the JF-22 hypervelocity wind tunnel can simulate a top speed of 10 km a second, or 30 times the speed of sound at an altitude of 40-100 km, China Central Television (CCTV) reported on August 23.

The JF-22 will be the world’s most advanced hypervelocity wind tunnel, CCTV reported, explaining that it will contribute to the development of hypersonic and aerospace aircraft programs. Hypersonic aircraft, flying at Mach 5-10 could travel to any location in the world within one or two hours and reduce the launch cost of satellites and spacecraft by 90%, according to Jiang Zonglin, a research fellow at the Institute of Mechanics of the Chinese Academy of Sciences and the leader of the project.