EDUCATION

Engineering Graduates

Russian and foreign National Nuclear Research University (MEPhI) graduates were awarded higher education diplomas on March 12.

74 out of 173 graduates are from Russia, 62 from Vietnam, 35 from Turkey, and two from Mongolia. It is the first time that students from Turkey and Mongolia have graduated from MEPhI. All Turkish graduates will be employed at the Akkuyu NPP to be built by Rosatom in the Mersin Province (Turkey).

Rosatom's Alexey Likhachev attended the diploma awards ceremony. "Now you have an opportunity to grow professionally because the education you received is rightfully considered one of the best in the world, and the nuclear industry and science are developing rapidly both in Russia and abroad. I am sure that you will find your place in life," he said in his address to the graduates.

MEPhI Rector Mikhail Strikhanov, Kaluga Region Governor Anatoly Artamonov, and ambassadors of Turkey, Mongolia, Vietnam, Jordan and Zambia to Russia also attended the ceremony.

As of the end of 2016, there were 1,240 foreign students in MEPhI (excluding post-graduate students), or 17.76% of total count. According to Times Higher Education (THE), MEPhI ranks 159th in the list of 200 most international universities of the world.

The ranking is based on four key criteria, which are the share of international staff (teachers and researchers), the share of international students, the share of research papers co-authored with foreign researchers, and international reputation of the university.

For reference: Established in 1942, the National Nuclear Research University (MEPhI) is a 'core' university of Rosatom.

ECONOMY

Tianwan 3 Transferred to Customer

Tianwan Unit 3 constructed under the supervision of Rosatom's ASE Group was transferred to the customer, Jiangsu Nuclear Power Corporation (JNPC).

"A preliminary acceptance report for Unit 3 was signed at the 25th Alignment Meeting held on the Tianwan NPP site in China," said Alexei Bannik, ASE Director for Chinese Projects.
The signing of the document signaled the beginning of a 24-month warranty period. Representatives of ASE stressed that all of its contractual obligations regarding the second phase of the Tianwan project were fulfilled on time.
The second phase includes construction of Units 3 and 4 with VVER-1000 reactors. The nuclear plant design was developed by ASE's subsidiary Atomproekt based in St. Petersburg. Tianwan NPP Unit 3 generated its first electricity on December 30, 2017. Two other VVER-1000 reactor units at Tianwan have been operating for more than ten years.

Nuclear Center in Mongolia

Rosatom will advise Mongolia on a nuclear science and technology center project. A memorandum to this effect was signed in Moscow by Rosatom and the Nuclear Energy Commission of Mongolia.

According to the document, Rosatom will assist Mongolian experts in developing technical solutions and specifications for a national nuclear science and technology center (NSTC). "The memorandum also provides for the development of a road map for the NSTC project," a representative of Rosatom said. To achieve these goals, the parties will establish joint working teams.
The document was signed by Rosatom's Deputy CEO Nikolai Spassky and Gunaajav Manlaijav, Secretary of the Nuclear Energy Commission of Mongolia. The signing ceremony took place on the margins of a meeting organized by the Russian-Mongolian Intergovernmental Commission.

Million Kilowatt Hours from Leningrad-II

Leningrad NPP 2 Unit 1 with a Generation 3+ VVER-1200 reactor was connected to the national power grid early on March 9.

"This new, super-powerful unit generated its first electric power, marking the end of the construction phase and the start of full-scale operation," Rosatom CEO Alexei Likhachev, who was present at the grid connection ceremony, commented on this remarkable event.
Upon the connection, the reactor ran at 35% of its rated capacity (240 MWe or 240,000 kWe), which is the minimal level for electric power generation. As required

by Russian industry regulations, the unit ran at the minimal capacity for 4 hours. This was enough time to generate 1 million kilowatt hours of energy.
"The grid connection has proven to be a success, with all the systems and equipment running smoothly. Having supplied the first kilowatts of power, we completed the grid connection phase and are ready to proceed with operating the unit in a pilot mode," Vladimir Pereguda, Director of Leningrad NPP, commented on the results.
In February, Russia brought online Rostov Unit 4 with a VVER-1000 reactor. Unit 1 at Leningrad-II serves as a reference unit for a number of NPPs at various stages of project implementation, including Belarus, Hanhikivi 1 and Paks-II.

Green Light to Investment

Standard & Poor's raised AtomEnergoProm's credit rating to the investment grade level of BBB- with a stable outlook.

The short-term rating of AtomEnergoProm was also upgraded to A-3 although it had long stood at BB+.
These upgrades are associated with the previously announced improvement in Russia's sovereign credit rating, which was raised to BBB-. It is the first time ever that AtomEnergoProm has matched the Russian Federation in terms of its creditworthiness.
According to S&P, the rating upgrade was supported by the company's vertically integrated business model, monopoly position on the Russian civil nuclear market, large portfolio of contracts, and financial stability.
AtomEnergoProm consolidates civil assets of the Russian nuclear industry.

Additive Manufacturing Systems

Rosatom's TVEL Fuel Company manufactured a pilot second-generation 3D printer to go into serial production by the end of 2018.

A pilot version of the second-generation 3D printer was manufactured at TVEL's production site in Novouralsk (Sverdlovsk Region, Russia). Centrotech, a subsidiary of TVEL, is preparing to start serial production of these printers.
According to the plan, production will begin by the end of 2018. The Russian-designed printer is expected to cost 20% less than its foreign counterparts.
The decision to develop industrial 3D printing technologies at Centrotech was made at the level of Russia's state-owned nuclear corporation Rosatom. Centrotech will also manufacture consumables for 3D printers, such as fine metal powders.
To develop additive manufacturing within the Russian nuclear industry, TVEL established Rusatom Additive Technologies (RusAT) that will take up this task.

Printing Implants

Pilot production of 3D-printed medical implants will start in Russia in 2020, RusAT CEO Alexei Dub told Russian news agency TASS.

"We plan to start pilot production of implants for medical purposes in 2020. By the same year, we will develop our own 3D printing software, the so-called virtual printer," Alexei Dub said.
He explained that RusAT would virtually establish an absolutely new industry to be

based on the existing Russian-designed solutions for 3D printing. “There is no need to improve conventional products or mechanisms because we can use the latest technologies to create totally new items, for example in bionic design, that will have the same or better functionality but weigh ten times less,” he explained.
The goal set for RusAT is to increase its revenues to 50 billion rubles by 2025 and win over 1.5% of the global additive manufacturing market in software development, powders, 3D printing equipment, printing services, and 3D integration.

Winning the Fiber Market

In 2017, Rosatom’s UMATEX Group captured 50% of the Russian carbon fiber market and exported 320 tons of fiber. Alexander Tyunin, CEO of UMATEX Group, announced this during the presentation of the Composite Materials Project to Russian Minister of Industry and Trade Denis Manturov.

According to Alexander Tyunin, composite materials will find broader use in the nuclear industry, gas-powered vehicles and production of sports goods in Russia.
But for these prospects to materialize, it is necessary to streamline the certification process for composite materials and legally oblige manufacturers to use Russian-made composites provided that such materials are competitive – Alexander Tyunin asked Denis Manturov to support this initiative.
“I will give instructions to accelerate the certification procedure. As for exports, we have all the administrative tools needed. We only have to apply them correctly to your project,” Manturov replied.
UMATEX Group is Russia’s largest and a top 10 global producer of carbon fiber products. The company has set an ambitious goal of fully substituting imported composite materials with Russian products.

PUBLIC EVENT

ATOMEXPO 2018 Starts Media Accreditation

Media accreditation for the ATOMEXPO 2018 international forum opened on 14 March, event operator Atomexpo LLC informs.

ATOMEXPO 2018 will be held on May 14–16 in the Main Media Center in Sochi (Russia). Any foreign-registered media may apply for accreditation. Applications can be filed until May 8 on the Atomexpo website. Incomplete or incorrect applications will not be accepted.
The forum will explore the theme of «Global Partnership for Joint Success». Round tables and panel discussions will be centered around three topics – «Digital Future and Industry 4.0», «New Power Engineering», and «People of the Nuclear Industry». The three-day business program of the Forum will comprise over 20 events. One of the round tables, «Development of Competencies by Newcomer and Growing Nuclear Countries», will discuss the experience of the UAE and Belarus in developing their nuclear infrastructure, the IAEA’s practices in assessing national nuclear infrastructures, and various issues facing

the countries creating their nuclear regulatory frameworks. The round table «Success through Globalization: from Contract to Partnership» will concentrate on new trends in nuclear engineering. Another round table discussion, «Green Investments: Creating Possibilities and Expanding Horizons», will be dedicated to experiences in financing green energy projects. During the round table session «Promising Future for Small Solutions», industry experts, engineers and potential customers will have an opportunity to explain and understand why small reactor technologies gain popularity, what hinders success of small reactor projects and what the opportunities of mutually beneficial partnership in this area are. Advantages of a closed nuclear fuel cycle for environmental safety and sustainability will be discussed at the relevant round table. Other items on the agenda will be new types of fuel, molten salt reactors, recycled products, radioactive waste fractioning, and nuclear waste transmutation technologies. The round table «International Scientific Cooperation and Advanced Research Infrastructure as Basis for Innovations in Nuclear» will be devoted to the development of Generation IV reactor technologies, fast neutron reactors, ICR MBIR (Russia) and JHR (France) international projects, and priority research areas after 2025.

The anniversary Forum will include a special event – ATOMEXPO AWARDS, the first ceremony to recognize outstanding contributors to the global development and expansion of the nuclear industry for the good of mankind. The awards ceremony will be held on May 14, the opening day of the Forum.

Power Storage: Focus on Trends

Authored by the Nuclear Asia expert platform

In December 2017, news went viral about another record-setting energy storage project as Tesla installed and switched on the world's largest battery in South Australia. Tesla's CEO Elon Musk promised to build the battery in Hornsdale in 100 days or give it to the customer for free. Tesla delivered on the promise, and its 100 MW/129 MWh battery facility joined the list of records that have been broken every several months over recent years. Power storage projects are mushrooming. According to the U.S. Department of Energy, there are more than 1,300 operating power storage facilities in the world, with their total capacity reaching almost 180 GW. So, what is happening in this energy sector?

As you probably know, renewable sources of power are unstable in operation and therefore require compensators to be included in energy systems. Other power generating sources were usually used for this purpose, but they cannot keep pace with the swift growth of green energy. Besides, using coal-fired, nuclear of hydro power capacities to mitigate voltage fluctuations in renewable energy systems becomes increasingly less efficient. This has created a new market niche for power storage systems that are capable of replacing conventional generators in fighting the side effects of renewable energy sources. The growing number of electric cars and a pursuit of energy efficiency have also necessitated the use of power storage systems.

People have long been familiar with technologies to store and convert electricity into other forms of energy and back, and some of them have been used commercially for about a century. A distinctive feature of the current boom in power batteries is rapid development of various storage solutions enabling fast delivery of standardized, modular, yet flexible systems of almost any storage capacity to any customer at any geographic point at increasingly more affordable prices. In other words, we are witnessing a revolution in the power storage industry, which looks very much similar to the boom in digital electronics in the 1980s. It was a time when neither

personal computers, nor mobile communications were new inventions. The new thing about them was that they became mass, wide-spread products and found new applications. The same is happening now in the power storage industry.

Energy storage systems can be categorized by the mode of action (physical principles applied to electricity conversion) into mechanical (including gravitational, kinetic and pneumatic), thermal, electrochemical and condensing. Certain systems either combine several modes of action or are quite exotic, and they have not gained widespread use. These include solutions that use super conductors, hydrogen energy, etc. as a component of storage systems.

The most widespread are gravity batteries that store energy by lifting a physical body to a certain height with electricity and release the accumulated energy when the body returns to the original level. They include pumped-storage plants (PSP), which are a modification of the well-known small hydro power plants with a water reservoir. The first pumped-storage plants were built in the early 20th century and now account for nearly 95% of all power storage systems in operation globally. PSPs are however large or very large facilities with a capacity of up to several gigawatts, as a rule. They require a large altitude difference and can only be built on very specific site. Resent PSP modifications can remove these limitations to a certain degree only.

Pneumatic accumulators use energy of compressed air (or, seldom, another gas) that passes through a turbine and increases its performance. Kinetic (flywheel) systems accumulate energy by moving a heavy rotor, usually a number of relatively small flywheels. Thermal storage systems accumulate heat to be later used to generate electricity. Certain models accumulate cold, not heat, to be used in refrigerators and therefore decrease electricity consumption by refrigerating facility. Electrochemical batteries store energy via ionization (energy is released when the process is reversed). Their hybrid modifications may also use other physical principles. Electrochemical batteries usually consist of several parallel low-voltage accumulators (1 to 4 volts, depending on the technology). Batteries used in electrochemical storage systems are divided into lithium-ion, lead-acid, sodium-sulfur, redox-flow, vanadium-redox, zinc-bromine and other types. The first three modifications are the most widespread.

Explosive growth is shown mostly by energy storage systems alternative to PSP. A real boom in ‘new’ batteries began early in the current decade and has been gathering pace since then. Over recent years, storage capacity in certain sectors has been growing 40–50% annually. The research and development frenzy in this industry segment is attributable to several converging trends: global greenhouse gas reduction efforts have stimulated an explosive growth of renewables, contributed to energy efficiency improvements, and created a market for electric cars.

These developments have made producers modernize and optimize their storage solutions. Electrochemical systems are simultaneously in demand on three different markets (electric cars, power generation, and energy saving solutions). This is why this technology demonstrates the fastest growth. There are over 700 electrochemical storage systems in operation globally. Their aggregate installed capacity is about 2 GW, with 1 GW more in the construction phase. Investments in the segment exceed 1 billion US dollars annually.

Electrochemical storage systems are also growing in scale and capacity. Individual batteries are connected together to form extra large storage systems comparable to medium-capacity power units or water turbines. As such, they can be used by small retail consumers as stationary

power sources over a relatively long time period.

Market demand also pushed forward the development of some other storage solutions, which are not used in electric cars or households. These are flywheel, pneumatic and other accumulators, and their use is growing. Since each type of storage system has its strengths and weaknesses, a specific, emerging market trend is to combine different technologies into hybrid storage systems.

The storage market development produces a reverse effect and brings about substantial changes in the power generation segment. First, storage systems are often made part of renewable power generation facilities to damp output fluctuations, thus improving their overall performance. Second, as power batteries gain popularity with end consumers, they (in combination with other solutions) secure massive participation of consumers in controlling power supply, which is seen by many countries as an important contribution to the power market development.

Foundation of the Future

Russian nuclear corporation Rosatom sees international energy projects as a priority. Africa's energy market, which has been neglected by Russian companies since the collapse of the Soviet Union, seems now to be the fastest growing. Russia is gradually returning to the continent, with Rosatom at the forefront. Viktor Polikarpov, Vice President of Rosatom Central and Southern Africa, speaks to Rosatom Newsletter about the prospects and nuances of working in the region.

— How promising is the African market for nuclear technologies and solutions?

— This market has a huge potential. Africa's GDP grows 5 to 7% per annum. There are 1.2 billion people living in Sub-Saharan Africa. Increasing by 3% annually, this figure will rise by a half by 2025, while the share of young people in the region will be the world's highest. Africa is facing an acute shortage of electric power. Out of 54 countries in our area of responsibility, 25 are hit by an energy crisis. About 630 million people have no access to electricity. African countries are on their way to industrialization, urbanization is going on, and the middle class – some 300 million people – is growing. They want to live a decent life.

With only 120–180 kWh generated annually per capita, Africa lags far behind more economically developed countries. Just compare: 7,500 kWh is generated per capita in Europe and 15,000 kWh in the USA. Sub-Saharan Africa – not counting the South African Republic – has only 27 GW of installed capacity. With South Africa included, the total installed capacity is about 68 GW. That means the region needs at least 90 GW more. Africa is developing, and we see no other alternative than nuclear. Although the local climate offers a plenty of opportunities for renewables, everyone understands that without nuclear energy it will be impossible to supply enough power for these countries to meet their ambitious goals. If we look at South Africa, 95% of its power generation is coal-fired. The country has no sufficient water or gas resources. This is the reason why it will have to embark on nuclear sooner or later.

— What is the current demand for nuclear construction in Africa?

— We expect 4 to 5 power units to be built in the region by 2035. South Africa with its nuclear plant at Koeberg is the only nuclear country on the African continent by now. We are considering the possibility of building nuclear power plants in Nigeria, Ghana and Kenya.

Uganda has also expressed its willingness to build a nuclear plant by 2035.
Another potential customer is Zambia, which has also announced its plans to build a nuclear power plant. We have already signed a set of documents with Zambia on the construction of a nuclear science and technology center to help the country embark on nuclear. It took us as little as two years to move from preliminary discussions to agreements.
I would like to stress that our relationships with African countries are based on long-term cooperation.

— What power projects other than nuclear plants are carried out by Rosatom?

— We are promoting small hydro plants produced by Ganz, a Hungarian subsidiary of Rosatom's AEM. These plants can find a very good market in Africa. Containerized hydro power plants are a quick and cheap solution as they can be easily delivered and installed. We plan to deliver the first hydro installations to Africa as early as next year. Our first commercial contract signed in January 2018 provides for a small hydro plant to be built at Mpompomo Falls in the province of Mpumalanga, 300 km away from Johannesburg.

— Rosatom operates in many areas that require nuclear technologies. Which of them, apart from the power industry, have the greatest potential in Africa?

— Cancer is a pressing issue in the region. Nearly 12.5% of adults under 75 – around 100 million people – have cancer. Countries like Ghana and Nigeria report about 20,000–25,000 cases of cancer every year, and many of the patients are children, while relevant medical centers are rare. As I said, Zambia has decided to establish a nuclear science and technology center. It will also have a medical facility.
Another area of interest is irradiation of food products. The continent produces much food like fruit and vegetables. Unfortunately, about 40% of them perish, and Africa keeps starving. Our offer is to set up irradiation centers which will, firstly, extend the shelf life of food products and, secondly, increase their export potential. Many countries like Uganda, Kenya and South Africa export coffee, tea and spices. Their shelf life must be long enough to be delivered to Europe and other regions, and this is where an irradiation center might come into play. African countries are well aware of those problems and ready to spend their money on isotopes. South Africa operates Safari-1, a research reactor fabricating isotopes, and we collaborate with them in this area. We also focus on staff training. For instance, Zambia sent 40 students to Russia to study nuclear science over the last two years. The speed of nuclear power development in Zambia is unprecedented. The country is working on workforce training, creating the nuclear infrastructure, and amending its regulatory framework accordingly. All this is preliminary for implementing a national nuclear program.

— Nuclear projects are always long-term and need political stability.

Africa has become more stable politically in the 21st century. For example, Ghana, Nigeria, Uganda, Kenya and Zambia are democratic countries and have been such for more than 50 years. Recent history shows that opposition has come to power by way of election, not war. Victories of the opposition may be challenged, but only before court. Political stability is crucial for the countries choosing nuclear. The latest example is Ghana where the opposition has taken over. Both the old and new governments have been positive about nuclear energy. If we take a look at Ghana's history, it declared independence in 1960. As early as 1961, Ghana and the USSR signed their first agreement to build a research reactor. And now we are actively discussing new projects with our partners.

– Many Rosatom Group companies would like to work in Africa. How can

they enter this market? By winning tenders?

– Tenders are held but have local specifics. Our key responsibility is to support Russian companies in selling their products and services on the local market.

– Could you give more details on the specifics of doing business in Africa?

– I have worked in European and American companies. Doing business in Africa is totally different. First, it is about personal relations. It can take years until you win trust and recognition as a partner. This is the reason why our business is developing slower than we would like it to. This somewhat irritates Europeans who want everything to be done fast – get off the flight, hold a meeting, sign documents and fly back. It is never like that in Africa.

Second, the European mentality tends to be logical while Africans have an emotional perception of things. There is an African saying that goes: you must impress rather than express. It means that an impression you make is more important than logic you demonstrate. Africans are emotional, impressionable and very sensitive. Those who work here should be in love with Africa and have an understanding of its culture.

A refusal in the African culture is perceived as an insult, and Africans never say no for this reason. At times, the talks may seem a success while the deal is rejected in fact and the contract will never be signed. Any pressure will return a soft smile and a formal consent but no business relationships in the future.

We are here to keep abreast of the situation after our colleagues' visits and find out what is happening in reality. We need to understand what our African partners think and what should be done to be a success on this market. Sincerity plays a great role. You should not conceal problems if they arise. Africans take them and react to them adequately. But if you start dodging issues and making things up, they just break off contacts with you. Africans like jokes. You should keep a sense of humor in everything. It is appreciated as is a non-standard approach or informal communication.

– What do you think is the main achievement of Rosatom's regional office in Africa?

– It is too early to draw a bottom line. We are building a foundation for Rosatom's activities in the region. Let us say, we have settled down, signed a number of documents and launched projects to establish nuclear centers. We are expanding the available product range, doing market research for Rosatom and its subsidiaries, and implementing extensive educational programs. And yes, our work is a success. Young Generation in Nuclear, a non-governmental organization recently established in South Africa, pushes forward the idea of developing nuclear energy. At present, its membership totals 330 students who will work in the African nuclear industry in the future. Activities of the Young Generation in Nuclear cover Kenya, Uganda and Tanzania. I would not believe five years ago that such a movement could appear in Africa. Young people want to study nuclear technology and promote nuclear energy. This is key to success of our nuclear programs in Africa.

FOR REFERENCE

In 2014, Rosatom opened a regional office in Johannesburg (South Africa). Its area of responsibility covers Sub-Saharan Africa, or 54 countries. By now, the office has built contacts with Zambia, Nigeria, Ghana, Congo, Kenya, Uganda, Tanzania, South Africa, Namibia, and Ethiopia.

Many of these countries have signed framework agreements or memoranda of understanding with Rosatom. The framework agreement signed between Russia and Nigeria in 2012 resulted in a contract signed in 2017 to develop a nuclear station construction project and a multi-purpose research reactor project. A contract to construct a science and technology center was also signed between Russia and Zambia.

Creating clean energy economies means being open to technology

Ben Heard – Executive Director, Bright New World

How do we create clean energy economies? Different nations have different assets, challenges, opportunities and limitations. The right path will depend on both physical attributes of geography, geology, topography and climate, as well as social attributes in their governance, education, and industrial capabilities.

All nations must also decide how they will relate to technology. Will they be inclusive? Or discriminatory? The cost of arbitrary discrimination will vary from place to place, but it never confers benefit; it can only make the challenge harder. When the United Nations Environment Program actively blocked the possibility of any discussion of nuclear technology at the Sustainable Innovation Forum in Bonn, observers were justifiably shocked. Nuclear technology is proven to be the reliable, scalable low-carbon technology. It can operate all over the world, almost irrespective of the physical attributes of the host. Removing it from discussion makes achieving a clean energy economy harder for nearly every nation in the world.

The impact of different approaches to technology is evident in the circumstances of three different nations: Finland, Germany and Costa Rica.

Consider the tropical developing nation of Costa Rica, population 4.5 million. It has gained plaudits recently for an electricity supply that has been close to 100% renewable. Costa Rica has mountainous topography and high rainfall, as well as volcanic geography and tropical sunshine. This permits a hydroelectric sector, an important contribution from shallow geothermal resources and a relatively reliable contribution from solar technology.

But the achievement of '100% renewable' has also been enabled by the fact that over 20% of the population lives in poverty. Costa Rica's per capita electricity consumption is just ~2000 kWh per year, compared with ~7000 kWh per year for Germany and ~15000 kWh for Finland. Might Costa Rica quadruple the supply of renewable electricity, for an industrial economy that offers German standards of living? Perhaps achieving this with equivalent reliance on hydroelectricity will negotiating the environmental and social costs of damming free flowing rivers in tropical environments. It would also leave the reliability of Costa Rican electricity hugely exposed to drought in a time of rapidly changing climate. This is no hypothetical. The last time drought stressed the Costa Rican electricity supply was just 2014.

Costa Rica could, instead, further grow the economy to alleviate poverty using nuclear power along with indigenous renewable resources. This requires a posture of technological openness. The notion is yet to be seriously tested. There could be major repercussions on the fortunes of that nation if it preferences the 'renewable-only' branding over developing a more diversified and secure electricity supply.

Germany, the largest economy in Europe with over 80 million people, possesses stronger social attributes than Costa Rica: a wealthy and educated population, strong governance and a huge industrial sector. It lacks the reliable renewable assets of hydroelectricity and volcanic geothermal power. Germany has instead focused on two variable sources of power: wind and solar energy. Germany may have spent over €200 billion to date to exploit these resources, under the policy known as Energiewende, at an

extraordinary rate of subsidy that has now exceeded €25 billion per year.

Yet German electricity became virtually no cleaner in the last six years, thanks to self-imposed technological discrimination. Germany has paired its unprecedented investment in renewables with a priority to close not dirty, polluting lignite, but reliable, non-emitting nuclear power. To date, approximately 10,000 MW of nuclear capacity has been prematurely removed from the German electricity supply. Energiewende has been equivalent to the German national football team deliberately scoring an own-goal after every successful attack.

The main difference is that many Germans appear to be cheering their team's stupidity. Under current policy settings, there is virtually zero prospect of German electricity getting cleaner for at least another twenty years. Germany still relies on 10,700 MW of nuclear power, all destined for closure. Ten thousand more own-goals.

Then there is Finland. Like Costa Rica, it brings strong renewable assets to the challenge in the form of hydro power, wind power, and a well-managed forestry sector for biomass. Like Germany, it has strong social assets in the form of education and governance. Unlike Germany, it is technologically open and undiscriminating in the challenge of cleaning the energy supply. The difference is telling. Finland has an electricity supply that is markedly cleaner than Germany's, paired with living standards that are markedly higher than Costa Rica's. Thanks to the impending growth in nuclear generating capacity, Finland is likely to match the cleanliness of Costa Rica's electricity supply in the near future, with far less exposure to a changing climate, and without the need to chop down more forests and damn more rivers. Finland is now exploring the realm of 'deep decarbonisation', examining the application of advanced, high temperature, small nuclear reactors for cleaning the industrial, commercial and residential heat sectors, and even making clean fuels for transportation. Neither Germany nor Costa Rica are close to embarking on this genuine climate change leadership.

The irony is that there is nothing special about Finland's leadership. Because while mountains, rainfall and solar resource are non-transferable, an openness to technology most certainly is. It's just culture expressed in politics. In principle, any nation could do it.

Yet in practice, so few nations actually are. So, maybe I am wrong…somehow, Finland is quite special after all.

High-Rise Building in Rooppur

The first ever high-rise building appeared in Rooppur. It is a 20-story Green City residential development for Russian engineers involved in the construction project.

People are already moving in, Bengal Time reports. Other residential buildings are under construction in Rooppur to accommodate several thousands of local construction workers.
"The life in Rooppur was quiet and slow-paced just 5–6 years ago. Like in other towns and villages, locals went to bed in the evening and worked at daylight. The situation is totally different now," explains Saiful Alam Babu Mandal, Rooppur's representative in the Pabna District Council and Secretary General of Awami League's local office.
The modern 20-story building impresses the local community and makes them proud, and they are looking forward to the moment when the nuclear power plant in their town will generate the first electricity, the newspaper says.

For reference:
The first nuclear power plant in Bangladesh is based on the same design that is used for Novovoronezh II in Russia and will have VVER-1200 reactors. This Generation III+ design is fully compliant with international safety standards. The Rooppur project follows the defense-in-depth concept that provides for multiple defense levels and mitigation of accidents and human error, thus securing environmental safety. The containment of Russian reactors is able to withstand severe natural disasters, which is extremely important for a country facing regular hurricanes and floods.

Equipment for Kudankulam

Russia manufactured and shipped two high-pressure preheaters to be installed at the machine hall of Kudankulam Unit 3.

The preheaters were manufactured at ZIO-Podosk plant – subsidiary of AtomEnergoMash (Rosatom). Installation will be performed by representatives of the manufacturer. Each reactor unit will have four high-pressure preheaters. According to the delivery schedule, the equipment will arrive at Kudankulam in April. The two preheaters will be first delivered to the Saint Petersburg sea port and then transported by ship over the Baltic and Mediterranean Seas, through the Suez Canal and over the Red Sea to the Indian Ocean.
AtomEnergoMash will supply core equipment (steam generators, reactor coolant pumps, pressurizers, main circulation pipes and auxiliary pumps) for the nuclear islands and machine halls of Kudankulam Units 3 and 4.

Worth a Thousand Words

Delegation from Bangladesh visited Novovoronezh-II. Headed by Tuhida Bulbul, Deputy Minister of Science and Technology, delegates were demonstrated Unit 2 under construction and Unit 1 in operation. Some of them were district council members from Pabna, a home district for the Rooppur Nuclear Power Plant.

The delegation visited the control room and cooling towers of Novovoronezh-II Unit 1, took a look at the plant from the viewing platform, and learned about staff training at the plant's Training Center for Personnel.
"Novovoronezh impressed us with innovative technology. We paid much attention to safety systems because Rooppur NPP will be constructed to the same design as this nuclear plant. The project itself and the operational practices, which we saw here, have demonstrated once again that we made the right decision to build a Russian-designed nuclear power plant in Bangladesh," Tuhida Bulbul said.
The Rooppur Nuclear Power Plant will have two Generation 3+ VVER-1200 reactors with a total capacity of 2,400 MW. Novovoronezh-II is the reference plant for Rooppur.

IN BRIEF

Helping with HR

Indian companies will help with professional training of Bangladeshi workers who will take part in the construction of Rooppur NPP.
A memorandum to this effect was signed by Nikolai Spasskiy, Rosatom Deputy CEO for International Relations, S. M. Saiful Hoque, Ambassador of Bangladesh to Russia, and Pankaj Saran, Ambassador of India to Russia.
The document enables Indian companies to take part in construction, installation and delivery of non-critical materials and

equipment for the nuclear power plant in Bangladesh.
“Rosatom is an international company and a global leader in civil nuclear technology. We are open to cooperation in nuclear projects. This Memorandum has proven it once again,” Nikolai Spassky said.