



Conexão
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Communication and nuclear energy

Highlights of the Nuclear Communication
2025 event

Brazilian Nuclear Program

Potential, strategies,
and possible paths

COP30

Event will be decisive
in consolidating
nuclear's presence in
the climate debate

Renewable nuclear energy

Continuous, clean, and safe supply
for future generations

Interview with Congressman Reimont Otoni

Role of the Legislative Branch in modernizing
the sector's legal framework

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THE PLACE OF NUCLEAR ENERGY IN THE GLOBAL AND NATIONAL DEBATE



In the midst of preparations for COP30 and the imminent Nuclear Legacy — an emblematic ABDAN event — we are invited to reflect on the role of nuclear energy in the context of the global energy transition and the building of an ambitious Brazilian green agenda. After all, can we continue to ignore or underestimate nuclear energy as a protagonist of the clean and resilient matrix that our future demands?

Nuclear energy, contrary to what many still imagine, is not limited to scarce resources. With

an almost inexhaustible potential, it offers a reliable and continuous source of electricity, capable of sustaining the growth of digital and industrial society for decades. In addition to being clean and safe, its production drastically reduces greenhouse gas emissions, consolidating itself as a strategic pillar of a modern, resilient, and sustainable energy matrix.

The energy challenge of data centers, the flexibility of depleted fuel, and the strategic role of communication are among the topics that stimulate our reflection: are we ready to expand a realistic, responsible, and bold vision?

Uranium, absent from traditional critical minerals lists, echoes an urgent need for a strategic review of the production chain in Brazil, a country endowed with vast reserves and technological capacity to master the entire nuclear fuel cycle.

The pre-COP30 emerges as an opportunity to place Brazil at the forefront, provoking debates that address the urgency of sustainable, innovative, and sovereign development. It is not only about technology, but about leadership and political courage to face social and paradigm resistance.

The Nuclear Legacy, an event we are preparing for October, will serve as a stage to accelerate this dialogue with the public and private sectors and civil society, establishing commitments that may consolidate Brazil on the map of nations that dare to build a bright and powerful tomorrow.

May this edition serve as a reflection: so that the reader not only consumes content, but also challenges their certainties. Are we embracing nuclear energy boldly enough, or do we still hesitate in the face of the unknown?

May ABDAN, representing the voice of the sector, be an inspiration for this future to happen under the sign of knowledge, pragmatism, and optimistic hope, always with eyes firmly set on the green agenda that admits no setbacks. ■

Celso Cunha
President of ABDAN

NUCLEAR ENERGY: THE FORCE BEHIND THE DATA CENTERS OF THE FUTURE

SMRS EMERGE AS A SAFE, LOW-EMISSION ALTERNATIVE TO SUSTAIN THE DIGITAL INFRASTRUCTURE OF THE FUTURE

The explosive growth of the digital economy has made data centers the backbone of global connectivity — and, at the same time, an unprecedented energy challenge. Today, these facilities account for about 1.3% of the world's electricity consumption, equivalent to the demand of entire countries such as Argentina or Sweden. In Ireland, for example, data centers already represent 18% of national consumption. And this figure is expected to increase in the coming years, driven by cloud services, artificial intelligence, and the expansion of 5G. With more connected devices, intelligent systems, and real-time processing, global energy demand is projected to double by 2030. This accelerated growth requires solutions that combine capacity, sustainability, and continuous availability.

Experts warn that the current power infrastructure may not be able to keep pace with this demand. In this context, nuclear energy — particularly through Small Modular Reactors (SMRs) — is emerging as a promising solution to ensure clean, continuous, and scalable supply for these digital giants.

According to consultants Carlos Leipner and Karla Kwiatkowski, SMRs bring essential advantages for data centers: high reliability, zero carbon emissions during operation, reduced land use, and the possibility of installation close to consumer hubs — which reduces transmission losses and increases efficiency. In addition, these reactors can be deployed in a distributed manner, mirroring the decentralization of the data infrastructure itself. This strengthens local energy security and reduces the risk of systemic interruptions.

“While renewable sources such as solar and wind depend on weather conditions, SMRs provide firm power, operating more than 90% of the time with stability and predictability,” explain the authors. For facilities that cannot tolerate interruptions, such as hyperscale data centers, this represents operational security and the elimination of costs associated with diesel generators or redundant systems.

The reliability of SMRs also reduces dependence on large-scale batteries, which still face challenges related to

cost, space, and environmental sustainability, especially when based on lithium.

SMRS AND DIGITAL INFRASTRUCTURE

SMRs are built using modular designs and standardized components, which shortens deployment timelines (3 to 5 years) and reduces initial investment compared to conventional nuclear plants. Relevant initiatives are already underway in countries such as the United States, Canada, China, and Finland. In Brazil, although no projects have yet been initiated, the subject is gaining increasing attention from policymakers and the private sector. The expectation is that, with regulatory evolution and accumulated international experience, Brazil will advance rapidly in adopting SMRs, particularly in remote regions or areas with limited electrical infrastructure.

The integration of SMRs with data centers is no longer a distant scenario. Companies such as Google, Amazon, and Microsoft have already announced significant investments in partnerships with nuclear technology developers. Kairos Power, for instance, plans to build seven reactors for Google by 2035, while Amazon has set a goal of 5 GW of nuclear capacity by 2039 with support from X-energy. This

DATA CENTERS ALREADY CONSUME AS MUCH ENERGY AS ENTIRE COUNTRIES — AND NUCLEAR POWER COULD BE THE KEY TO ENSURING A CLEAN, CONTINUOUS, AND SCALABLE SUPPLY FOR THIS EXPANDING SECTOR.

movement reflects a paradigm shift: technology giants are beginning to act as protagonists in the energy sector, seeking autonomy and sustainability for their global operations.

Experts also highlight that SMRs can enable efficiency gains through cogeneration. The residual heat generated by nuclear fission can be harnessed in server cooling systems, such as absorption chillers or liquid cooling solutions, further reducing the energy footprint. This thermal integration is particularly advantageous in warmer regions, where cooling accounts for a significant share of total data center energy consumption.

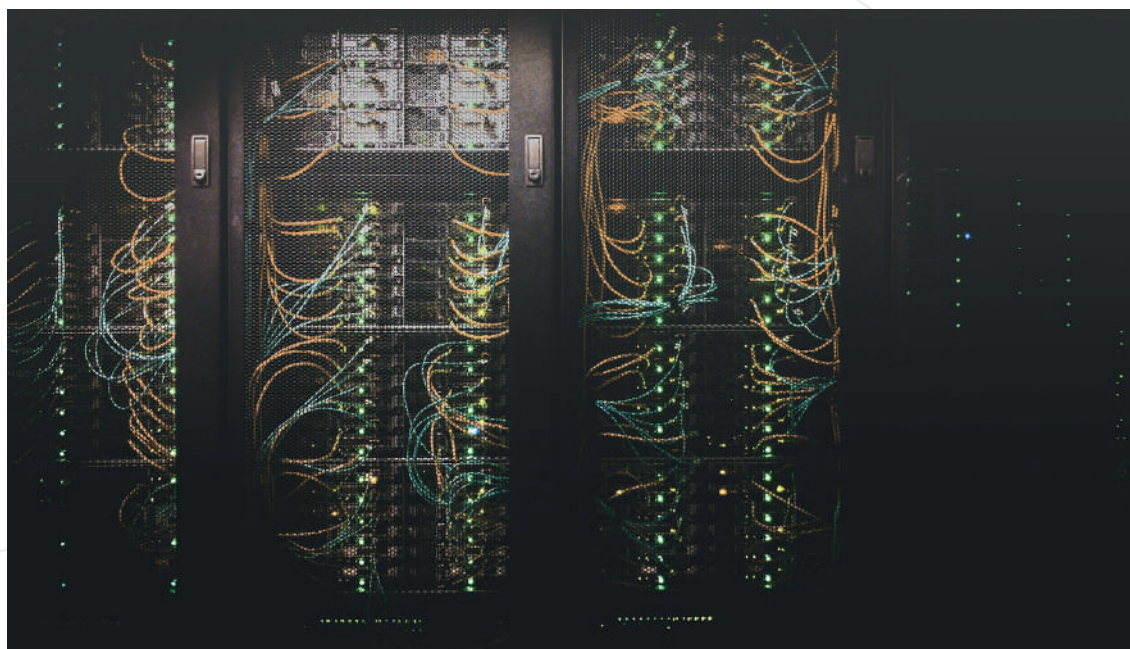
From an environmental standpoint, nuclear power has one of the lowest life-cycle greenhouse gas emissions per kWh produced: about 12 g of CO₂, compared to 490 g from natural gas and 820 g from coal. This makes it a strategic ally for companies committed to decarbonization targets, at a time when regulatory and reputational pressures on the digital sector are intensifying. Recent analyses point out that companies that fail to adopt concrete measures to reduce emissions risk facing sanctions, loss of competitiveness, and even barriers to accessing sustainable investments. Nuclear energy thus positions itself as a decisive differentiator.

Leipner and Kwiatkowski are cautious, however: the economic viability of SMRs still needs to be proven on a large scale. Despite robust government support in the United States and Canada, the first

commercial units require new regulatory frameworks, innovative business models, and financing adapted to the profile of non-traditional clients, such as data centers themselves. These obstacles, however, are not insurmountable. As the first projects are consolidated and deliver results, the learning curve should bring down costs and facilitate replication in other markets.

In Brazil, the current regulatory framework — centered on Eletronuclear and CNEN — does not yet provide conditions for the entry of new operators and the diversification of nuclear applications. Establishing specific public policies for SMRs — focused on technological innovation, energy security, and sustainability — is regarded as a necessary step to open this market and attract technology companies to the nuclear agenda. Coordination among government, the private sector, and research institutions will be crucial to move SMRs from plans into the core of the country's new energy matrix.

The advancement of SMRs may therefore represent more than an energy transition: it could reposition nuclear power as a cornerstone of digital infrastructure and the green economy. A future in which servers and reactors coexist side by side seems increasingly feasible — and perhaps inevitable. By combining innovation, resilience, and sustainability, SMRs point to a promising path in which digital transformation will not clash with the planet's limits but, on the contrary, help preserve them. ■



NUCLEAR ENERGY: CLEAN AND RENEWABLE

WITH TECHNOLOGICAL ADVANCES AND SOLID TECHNICAL ARGUMENTS, EXPERTS DEFEND THE INCLUSION OF NUCLEAR ENERGY IN THE GROUP OF RENEWABLE SOURCES

When the term “renewable energy” is mentioned, the collective imagination usually evokes images of wind turbines, solar panels, and hydroelectric dams. However, according to specialists, this list can — and should — also include a powerful, reliable, and extremely low-carbon source: nuclear energy. This proposal may seem bold at first glance, but it is gaining ground in international forums and scientific debates, supported by robust data and successful experiences in several countries.

More than just another renewable energy source, nuclear power must be recognized as an almost inexhaustible solution for global electricity supply, capable of providing security, stability, and high energy density for generations, relying on resources whose availability and efficiency place this model in a strategic position for the planet’s sustainable future.

For decades, nuclear power was considered “non-renewable” because it uses mineral resources such as uranium and thorium. This understanding, however, is increasingly being questioned in light of technolog-

ical advances and the climate emergency. “If we fully exploit the potential of new-generation reactors, we will have enough energy to supply the planet for tens of thousands of years,” says Leonam Guimarães, Technical Director of the Brazilian Association for the Development of Nuclear Activities (ABDAN). The durability of nuclear fuel and the reuse of radioactive waste challenge the traditional concept of renewability, broadening the understanding of what truly matters for long-term sustainability.

This perspective is reinforced by the development of fast reactors and closed fuel cycles, capable of reusing waste and multiplying the efficiency of available uranium. Furthermore, current stocks of depleted uranium and the abundant thorium reserves in various regions of the world support the thesis: for practical purposes, nuclear energy is indeed renewable. Even in conservative scenarios, existing resources would be sufficient to supply the planet for centuries, without the need to explore new reserves with high environmental impact.



WE HAVE ENOUGH ENERGY TO POWER THE PLANET FOR THOUSANDS OF YEARS,” SAYS LEONAM GUIMARÃES, TECHNICAL DIRECTOR OF ABDAN.

SMALL FOOTPRINT, GREAT IMPACT

One of the main arguments for reclassifying nuclear energy is greenhouse gas emissions. The Intergovernmental Panel on Climate Change (IPCC) acknowledges that nuclear power emits less CO₂ per megawatt-hour generated over its life cycle than photovoltaic solar power. From an environmental standpoint, nuclear energy can therefore be even more advantageous than sources traditionally classified as “green.”

The comparison also extends to land use. A nuclear power plant, with continuous operation and high energy density, can supply an entire city with a fraction of the land area required by solar farms or wind parks. This reduces conflicts over land use and impacts on biodiversity — a decisive advantage in a world where the availability of suitable land for large-scale energy projects is increasingly limited. Moreover, smaller land occupation favors projects in already anthropized areas, avoiding deforestation or population displacement.

WINDS OF CHANGE IN THE GLOBAL SCENARIO

The reclassification of nuclear energy as a renewable source is not just an academic discussion. It has direct implications for public policies, investments, and access to green financing. The European Union, for example, included nuclear power in its sustainable taxonomy, enabling ESG-oriented investments and participation in auctions with special conditions. This recognition has attracted new funding and international cooperation, showing that the global market is prepared to incorporate nuclear into the climate agenda.

Countries such as France, Canada, and the United States continue to strengthen their nuclear capacity — including the adoption of Small Modular Reactors (SMRs), which increase safety, reduce costs, and accelerate deployment. In Brazil, projects such as Angra 3 and the Brazilian Multipurpose Reactor (RMB) place the country on the path of developing nuclear solutions with multiple purposes: from energy generation to applications in medicine and industry. SMRs, in particular, represent a strategic in-

novation, allowing deployment in remote areas or isolated grids, with high safety standards and reduced environmental impact.

For Celso Cunha, President of ABDAN, it is time to broaden the concept of renewable. “Renewable is not only what regenerates in a few days, but also what guarantees continuous, clean, and safe supply for future generations,” he argues. This new perspective may be decisive in accelerating the global energy transition, ensuring stability without compromising sustainability.

WHY THIS DEBATE MATTERS NOW

- Reclassifying nuclear energy as renewable could bring immediate practical consequences;
- Access to fiscal incentives and environmental subsidies;
- Eligibility for clean energy auctions and financing through green bonds;
- Inclusion in climate targets and decarbonization commitments;
- Strengthening of social acceptance of nuclear technology.

In summary, this redefinition could unlock investments, stimulate innovation, and expand the role of nuclear energy in combating the climate crisis.

With growing pressure for reliable sources and the urgent need to reduce emissions, the world is moving toward a more pragmatic vision of what it means to be “renewable.” “It is a change in perspective. Energy sustainability requires security, low emissions, economic viability, and firm supply. And in this regard, nuclear power stands out,” adds Guimarães. Redefining the concept of renewable energy thus becomes a powerful tool to align science, politics, and the market around viable, long-term solutions.

A NEW ERA, NEW CONCEPTS

Recognizing nuclear power as renewable is not just a matter of terminology. It is a strategic step toward a more balanced and technologically advanced energy matrix, consistent with the challenges of the 21st century. Science, data, and international experience all support this path — it is up to policymakers and society to move forward together and overcome old taboos.

Fully integrating nuclear energy into sustainable development strategies could mark a new era in global energy geopolitics, strengthening national autonomy and ensuring a true balance between economic growth and environmental preservation.

If the future is to be digital, electrified, and decarbonized, nuclear power has everything it takes to be at the center of this equation: renewable, both in practice and in vision. ■

URANIUM: CENTRAL TO THE FUTURE, YET ABSENT FROM THE LIST OF CRITICAL MINERALS

THE ABSENCE OF A REFERENCE FRAMEWORK FOR URANIUM CREATES GAPS THAT MAY COMPROMISE THE COUNTRY'S ABILITY TO FULLY HARNESS THIS STRATEGIC RESOURCE

Although Brazil possesses one of the world's largest uranium reserves and the mineral plays a decisive role in energy security and decarbonization, uranium does not appear on official lists of critical minerals compiled by governments and international organizations. This omission raises concern among experts, as it may limit public policies and investments aimed at consolidating the role of nuclear power in the transition toward a clean, secure, and sovereign global energy matrix.

The concept of "critical mineral" generally refers to resources considered essential to the economy whose supply faces risks, whether geopolitical, technological, or environmental. Lithium, cobalt, and rare earths, for example, dominate these lists as they are indispensable for manufacturing batteries, electric vehicles, and digital technologies. Yet the exclusion of uranium creates a paradox: one of the most

strategic resources for a low-carbon future is underestimated precisely at the moment when the world most needs it.

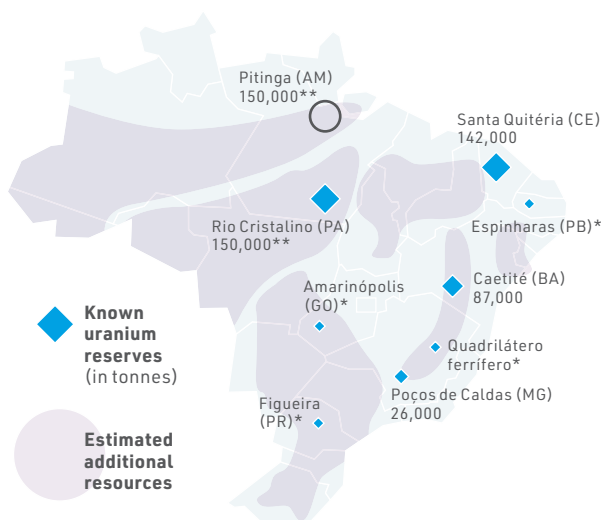
According to Leonam Guimarães, Technical Director of ABDAN, ignoring uranium in public policies undermines Brazil's positioning as an energy power. "The absence of uranium on these lists contributes to a distorted perception of its real importance. If we want to ensure energy sovereignty and attract investment, we need recognition consistent with the strategic role of nuclear energy," he emphasizes.

INTERNATIONAL CONTEXT

In the United States and the European Union, uranium is increasingly gaining recognition. The European Commission has included it in recent debates on the security of supply of critical raw materials. Canada, in turn, officially designates uranium as a strategic mineral for its economic

URANIUM RESERVES IN BRAZIL

Strategic potential and regulatory gaps



*no information. **additional potential of the reserve.

Source: Department of Mineral Planning and Policy – MME, NT2E and ABDAN



WHAT BRAZIL ALREADY HAS

- Full technical mastery of the nuclear fuel cycle
- Consolidated infrastructure
- Among the 10 largest reserves worldwide
- Developed national technological capacity
- Strategic geopolitical position



WHAT NEEDS TO ADVANCE

- A long-term, state-level **nuclear policy**
- A modern **regulatory framework** for the nuclear sector
- **Legal certainty** for private investments
- Expansion of national **nuclear infrastructure**
- **Partnerships** with specialized foreign companies

and energy future. In Brazil, however, the lack of such recognition hinders the creation of incentives, financing, and institutional support for mining and enrichment projects.

This omission is even more serious in light of growing global demand. The International Atomic Energy Agency (IAEA) projects that uranium demand will rise by up to 28% by 2030 and more than double by 2050, driven by the expansion of nuclear power plants and Small Modular Reactors (SMRs). Without policies to stimulate exploration, production, and technological development, Brazil may fail to seize the opportunity to consolidate itself as a global supplier at a decisive moment.

NATIONAL POTENTIAL

Brazil holds the seventh largest uranium reserve in the world, concentrated mainly in the states of Bahia and Ceará. The country also has full mastery of the nuclear fuel cycle — from ore extraction to enrichment and fuel rod production — a capability possessed by only a few nations. This technological capacity gives Brazil a unique opportunity: to transform uranium into a driver of industrial development, technological innovation, and geopolitical influence.

However, for this potential to materialize, uranium must be recognized as a critical mineral. Such recognition would enable access to financing lines, encourage public-private partnerships, and support the creation of a stable regulatory framework. It would also contribute to reducing stigma and increasing social acceptance of nuclear energy, still surrounded by misinformation and outdated taboos.

THE RISK OF NEGLECT

Without inclusion on critical mineral lists, uranium risks being overshadowed by other resources that attract more political and financial attention. This could create a paradox: Brazil, despite its abundant reserves and technological capacity, might remain dependent on imported inputs or fail to benefit from the global demand surge.

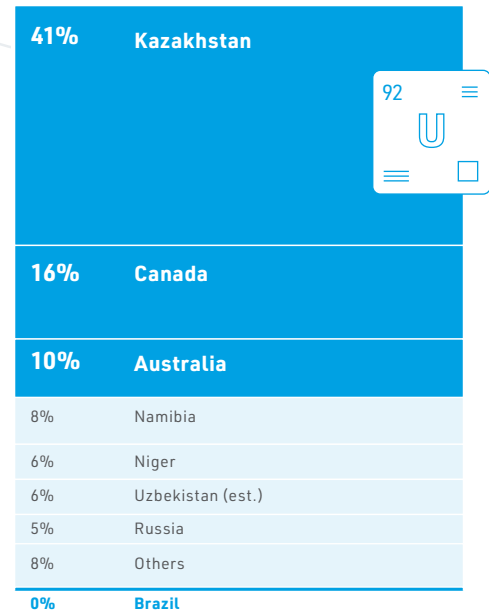
For specialists, the time has come for Brazil to reassess its strategic priorities. “We need to place uranium at the center of the national development agenda — not as a secondary mineral, but as a strategic pillar of the clean and sovereign energy matrix we aim to build,” Guimarães argues.

WHAT BRAZIL ALREADY HAS AND WHAT NEEDS TO MOVE FORWARD

Brazil already has abundant uranium reserves, mastery of the entire nuclear fuel cycle, and highly qualified human resources. These assets put the country in a privileged position to consolidate itself as a global leader in the sector. However, there are still significant challenges: greater investment in mining and enrichment infrastructure, mod-

CUMULATIVE URANIUM PRODUCTION

Between 2013 and 2022



Although it is among the world's **10 largest uranium reserves**, it is not included in the ranking of the main global producers.

Source: World Nuclear Association (WNA)

ernization of legislation to provide agility and legal certainty, expansion of public-private partnerships, and the establishment of stable policies that encourage innovation and attract international capital.

Experts emphasize that, without progress on these fronts, Brazil risks wasting its potential and becoming a secondary player in a market that is decisive for the global energy transition.

CONCLUSION

The absence of uranium from critical mineral classifications is not merely a semantic detail; it has real and far-reaching consequences for Brazil's energy and industrial future. Recognizing its value and incorporating it into priority policies is an essential step to align the country with global trends and secure leadership in the nuclear sector.

At a time when the world is accelerating its transition toward low-carbon economies, neglecting uranium could prove to be a strategic mistake with lasting consequences. Conversely, its inclusion in critical mineral lists would open the door to new investments, technological progress, and international partnerships, positioning Brazil as one of the leaders of nuclear energy in the 21st century. ■

REIMONT DEFENDS THE EXPANSION OF NUCLEAR MEDICINE AND THE COMPLETION OF ANGRA 3

THE CONGRESSMAN STATES THAT IT IS NECESSARY TO STRENGTHEN CNEN AND ENSURE ENERGY SECURITY WITH NATIONAL SOVEREIGNTY

Nuclear medicine and electricity generation by nuclear reactors have been gaining increasing prominence on legislative agendas and in debates about the future of health, science, and Brazil's energy matrix. In view of this scenario, Federal Deputy Reimont Otoni (PT-RJ), an active member of parliamentary fronts related to health and energy, has advocated strengthening the institutes linked to the National Nuclear Energy Commission (CNEN) and expanding public access to the peaceful applications of nuclear technology.

In an exclusive interview with Conexão Nuclear, the congressman discussed the need to bring nuclear medicine to Brazil's interior, support domestic production of radiopharmaceuticals, and consolidate the Angra 3 plant as a key element for Brazil's energy sovereignty. Reimont also assesses the potential of small modular reactors (SMRs) and the role of the Legislature in modernizing the sector's legal framework. Below is the full interview:

1 – Nuclear medicine guarantees excellent benefits for patients and professionals. In your view, how can we ensure that the expansion of nuclear medicine also reaches the country's most remote and underserved regions?

Nuclear medicine is a powerful tool for diagnostics and treatment, especially in oncology, cardiology, and neurology. To ensure access throughout the national territory, including the most remote regions, it is essential that the State lead this process with public investment, decentralization of infrastructure, and partnership with universities and regional hospitals. SUS must be the guarantor channel of this expansion, with the localization of the technology, the train-



ing of professionals, and the creation of regional centers for the production and distribution of radiopharmaceuticals.

2 – You have advocated strengthening CNEN and nuclear medicine in the country. What concrete measures do you intend to support in Congress to expand the population’s access to this type of technology?

In Congress, I support strengthening CNEN’s budget and that of its institutes, such as IEN and IRD, which are strategic for radiopharmaceutical production and for radiological safety control. I intend to support proposals that ensure ongoing public investment, technical training programs in partnership with federal institutes and universities, and the restructuring of the inputs supply chain—especially to reduce external dependence. We must make nuclear medicine a State policy aimed at people’s well-being.

3 – Is Congress ready to modernize the legal framework of the nuclear sector, including the participation of the private sector specifically in the nuclear medicine segment?

Congress has been debating this issue seriously, and there is willingness to move forward, provided that any modernization of the legal framework respects national sovereignty and the State’s strategic role. In the case of nuclear medicine, partnership with the private sector can be beneficial, but it must be regulated with clear criteria, legal certainty, and rigorous health surveillance. Law 14,514/2022, which allows INB to partner with the private sector in the mining area, can serve as a basis for thinking about similar models, always with public control guaranteed.

4 – Brazil still depends on importing inputs for diagnostic imaging. How can the Legislature contribute to domestic production of radiopharmaceuticals?

The Legislature can and should act on several fronts. First, by approving funding and incentive programs for domestic production—both within CNEN’s institutes and in partnerships with public research centers. Second, by streamlining and modernizing procedures for research and production of radioisotopes, without compromising safety. And third, by encouraging the recovery of the country’s industrial capacity in this sector, with public procurement

**“
THE COMPLETION OF
ANGRA 3 REPRESENTS
A REINFORCEMENT OF
OUR ENERGY MATRIX
AND A FIRM STEP
TOWARD NATIONAL
SOVEREIGNTY AND
THE STABILITY OF
SUPPLY.
”**

guaranteed by SUS and the promotion of innovation through Sectoral Funds.

5 – Is there political room in Brazil to support innovations such as small modular reactors (SMRs)?

Yes, there is room—and there is a need. Small modular reactors (SMRs) can play an important role in Brazil’s energy transition, especially to serve isolated regions, Petrobras operational bases, and future low-carbon industrial zones. What we need is a clear regulatory framework, safety assurance, transparency in projects, and public participation in decision-making. The Workers’ Party is committed to energy sovereignty and to decarbonizing the matrix, and SMRs, if well planned, can contribute along this path.

6 – What is your assessment of the future of the Angra 3 plant and the role it can play in Brazil’s energy security in the coming years?

Completing Angra 3 is a strategic urgency. The plant represents not only a reinforcement of our energy matrix but also a firm step toward national sovereignty and the stability of supply. Today, Angra 1 and 2 already account for more than 40% of the electricity consumed in the State of Rio de Janeiro. With Angra 3, this percentage would reach 70%. It is a clean and stable source that reduces our dependence on fossil fuels. I will continue working so that Congress ensures the legal, financial, and institutional means for this project to be completed with responsibility and celerity. ■

BRAZIL AND THE RENEWAL OF THE NUCLEAR PROGRAM

POTENTIAL, STRATEGY AND POSSIBLE PATHS.

Amid the global race for clean and secure energy sources, Brazil faces a window of opportunity to establish itself as a strategic player in the world nuclear market. The country not only has one of the largest uranium reserves in the world, but also masters the entire nuclear fuel cycle, from mining to enrichment.

Despite this, production remains limited and structural challenges undermine the expansion of the sector. To understand the possible paths for the renewal of the Brazilian nuclear program, Conexão Nuclear heard from Aquilino Senra, a professor at COPPE/UFRJ, and Admiral Alexandre Rabello de Faria, Director-General of Nuclear and Technological Development of the Navy (DGDNTM), and analyzed data presented by Anderson Barreto Arruda, Director of the Department of Mineral Planning and Policy of the MME, during the NT2E event, promoted by ABDAN.

According to Professor Aquilino Senra, the key is to transform the Brazilian nuclear program into a State policy. “Today, with each new government, the program is reviewed. Each one sings their little verse and leaves. This creates instability. We need predictability and continuity,” he argues.

He also points to the urgent need to modernize the legal framework in a way that allows technological advances, reduces legal uncertainties, and enables national and international partnerships. “We are stuck with a model that jams decisions. Companies in the sector don’t know whether they can or cannot do something, which causes delays. This needs to change.”

URANIUM: A SLEEPING GIANT

According to data presented by Anderson Barreto Arruda (MME) at ABDAN’s NT2E, Brazil has 295 thousand tonnes of measured U_3O_8 (about R\$ 302 billion in value), ranking 7th in the world in reserves. Even so, the country accounts for less than 1% of global uranium production.

MAIN BRAZILIAN URANIUM RESERVES

- Caetité (BA): 87 thousand tonnes
- Santa Quitéria (CE): 142 thousand tonnes
- Poços de Caldas (MG): 26 thousand tonnes
- Additional potential:
 - Pitinga (AM): 150 thousand tonnes
 - Rio Cristalino (PA): 150 thousand tonnes

MODULAR REACTORS (SMRS)

Small modular reactors (SMRs) have been identified as the future of nuclear energy around the world. According to Aquilino Senra, these technologies allow for diverse applications—mining, oil and gas, desalination, and data centers—and can operate even in remote areas.

“The question that no one has answered yet is: who is going to operate SMRs in Brazil?” he asks. “We cannot expect data centers or mining companies to have the structure for that. We need prepared operators—and that requires a new legal framework.”

He warns that delays in licensing can discourage interest from the productive sector. “A process of two or three years is unfeasible. Agility is essential.”

THE VOICE OF ACADEMIA

Another central point raised by Senra is the strategic role of universities. “Brazil has trained entire generations of highly qualified nuclear engineers. But today many go into the financial sector or leave the country due to a lack of prospects in the nuclear sector.”

According to him, a national plan is urgently needed to connect academic training capacity with the country’s industrial and energy strategy. “Without this, we are wasting knowledge and talent that took decades to develop.”

THE NAVY’S NUCLEAR PROGRAM

The Brazilian Navy plays a central role in the process of re-



WHAT BRAZIL ALREADY HAS

- Full mastery of the nuclear fuel cycle: mining, conversion, enrichment, and fabrication.
- Installed infrastructure: INB, Nuclep, Eletronuclear
- Significant uranium reserves in different regions.
- Technological capability developed locally (e.g., the Navy's centrifuges).
- Stable and strategic geopolitical position.

WHAT NEEDS TO ADVANCE

- Definition of a State nuclear policy.
- Updated and modern legal framework.
- Openness to partnerships with foreign companies.
- Legal certainty to attract investment.
- Operationalization of SMRs and expansion of infrastructure.
- Strengthening of human-resource training.

newing the Brazilian nuclear program. Admiral Alexandre Rabello de Faria, Director-General of Nuclear and Technological Development of the Navy, recalls that the National Defense Strategy assigns the Navy responsibility for the nuclear sector, including the development of naval propulsion. “The Navy’s Nuclear Program has consolidated, on an industrial scale, the complete mastery of the nuclear fuel cycle, a milestone that guarantees the country autonomy in producing the fuel that supplies its plants,” he states.

According to him, innovation and strategic independence are pillars of technological advancement, especially in areas where “no country transfers technology—it must be developed.” This expertise opens doors to national and international partnerships, with spillovers of knowledge to academia, industry, and society.

Regarding the Brazilian Multipurpose Reactor (RMB), Rabello emphasizes that it is a structuring project, essential to ensure self-sufficiency in the production of radioisotopes for medicine and industry, as well as to create jobs and stimulate related sectors.

The synergy between Defense, Science and Technolo-

gy, and the productive sector is, for him, “fundamental and unavoidable” to consolidate the national nuclear industry. Partnerships with universities and research institutes train specialized human resources, while industry transforms this knowledge into products and services, strengthening the economy and reducing external dependence.

In the field of small modular reactors (SMRs), the Navy sees potential for direct contribution, leveraging LAB-GENE’s experience to develop modular and safe solutions aligned with international standards.

To shield the Brazilian Nuclear Program from political discontinuities, the Admiral advocates “long-term planning, budget predictability, and effective integration among State agencies, industry, and academia.” He stresses that nuclear energy is safe, non-polluting, and strategic: “Brazil cannot give up this wealth and this potential.”

The conclusion is clear: Brazil has everything it needs to occupy a prominent role in the new global nuclear era, but it must act quickly. As Aquilino Senra puts it, “we need a national project. And that is not the role of a government—it is the role of the country.” ■



WHAT TO EXPECT FROM COP30 IN BRAZIL?

THE NUCLEAR SECTOR SEEKS TO EXPAND ITS PARTICIPATION IN THE DEBATE ON SUSTAINABLE AND LOW-CARBON ENERGY SOLUTIONS.

In November 2025, Brazil will host, for the first time, an edition of the United Nations Climate Change Conference (COP), COP30, which will take place in the city of Belém, in the State of Pará. Holding the conference on Brazilian soil represents a unique opportunity for the country to take a leading role in global debates on energy transition, decarbonization, and sustainable development. The nuclear sector is mobilizing to occupy spaces for discussion and to show the potential of the technology as a fundamental part of the path toward carbon neutrality.

Alice Cunha, nuclear engineer and vice president of the International Youth Nuclear Congress (IYNC), highlights that the participation of nuclear in the last editions of the COP has grown, although it still faces resistance. “At COP26, in Glasgow, opposition to nuclear technology was evident. But at COP28, in Dubai, there was an important change in perception, with several countries signing a declaration to triple nuclear capacity. At COP29, in Baku, we saw even more nations joining this commitment.”

According to Alice, who has participated in four editions of COP as a representative of youth nuclear organizations, the event will be decisive to consolidate the presence of nuclear in the climate debate. “Our challenge is to ensure that nuclear energy is included in the discussion as part of a set of sustainable solutions. We still see many documents and negotiations that talk only about renewables, excluding nuclear. But it is a mistake to think of opposition between sources: they need to work together.”

The engineer also emphasizes the importance of COP30 for its focus on the implementation of the NDCs (Nationally Determined Contributions), climate commitments made by countries under the Paris Agreement. “Nuclear technology can help several countries achieve these targets, especially in the Global South, where many nations still do not even have full access to energy. There is no real energy transition without inclusion.”

Among the attributes of the source, Alice highlights the low carbon footprint of nuclear generation, its high energy density, the lower use of mineral resources, and the possibilities of applications in other areas beyond electricity, such as food irradiation, environmental monitoring, water desalination, hydrogen production, and serving isolated

communities with SMRs (Small Modular Reactors).

“The inclusion of nuclear in COP discussions is not only necessary, it is urgent. It is a technology that can contribute both to mitigation and to adaptation to climate change. The effort needs to exist and civil society, including the nuclear sector, must mobilize actively to ensure this space.”

In the engineer’s view, holding COP30 in Brazil will also allow bringing to the center of the agenda issues such as just transition, food security, the inclusion of vulnerable communities, and climate justice.

“The event can be a showcase to show what we have to contribute as a region and as a technology.”

Meanwhile, ABDAN president Celso Cunha highlights that nuclear energy will be the “beating heart of the energy transition” and the “backbone” for the expansion of data centers and artificial intelligence networks in Brazil. He emphasizes the need for unity in the sector and criticizes institutional obstacles that hinder the advancement of nuclear projects in the country. Regarding COP30, Cunha defends that nuclear energy is a cutting-edge technology, innovation, and autonomy, positioning Brazil as a protagonist in the global energy transition. The Association defends nuclear energy as an almost inexhaustible source and essential for Brazil’s energy security and decarbonization, especially in the context of COP30.

THE ROLE OF NUCLEAR ENERGY IN THE GLOBAL AND REGIONAL ENERGY TRANSITION

Nuclear energy has been gaining increasing recognition as an essential component for decarbonization and energy security, a theme highlighted by sector leaders. Among them, Carlos Leipner, vice president of the Board of Trustees of the Brazilian Association for the Development of Nuclear Activities (ABDAN), highlights a substantial change in the inclusion of the nuclear theme in the Conferences of the Parties. “Until COP26, few considered nuclear energy as part of the dialogue on climate change. At that event, in Edinburgh, we saw the first signs; at COP27, in Egypt, the presence became more significant, with several dedicated events and participation of the International Atomic Energy Agency,” he explains.

According to him, COP28, held in Dubai, was a milestone, when more than 30 countries signed a declaration



"ABDAN DEFENDS NUCLEAR ENERGY AS AN ALMOST INEXHAUSTIBLE SOURCE AND ESSENTIAL FOR BRAZIL'S ENERGY SECURITY AND DECARBONIZATION."

that considered nuclear energy indispensable for the success of the energy transition by mid-century, even proposing the tripling of global nuclear generation.

For Brazil, hosting COP30 is a unique opportunity to highlight its potential in the clean energy matrix. Leipner recalls that the Latin American region, although it has a mature nuclear industry in countries such as Brazil, Mexico, and Argentina, is often underestimated on the global stage. "The Latin American nuclear sector is vibrant and contributes not only to sustainability but also to regional energy security," he says.

He emphasizes that, despite the growth of renewables and the fact that the Brazilian matrix is already mostly clean, nuclear energy is fundamental to meet growing demands and hard-to-electrify segments, such as long-distance transport and heavy industrial processes, where high-temperature heat generation from nuclear is vital.

The importance of nuclear has also intensified in the face of recent crises. Leipner points out that the conflict between Ukraine and Russia highlighted energy vulnerabilities, especially in Europe, stimulating a global reconsideration of the role of nuclear energy not only as a clean source but as safe and reliable. "Several European countries are reviewing their strategies, reversing plant closures, and expanding plans for new units," he observes.

For Brazil, this vision reinforces the need to preserve natural resources, reduce external dependencies (such as gas imports), and consolidate nuclear in its matrix.

An innovation that promises to stand out in the debate is the advancement of Small Modular Reactors (SMRs). "At COP30, we will have the chance to show that these projects are materializing — reactors under construction in Canada, the United States,

and Europe, such as General Electric's BWRX-300, close to entering operation," he exemplifies.

He stresses that although the first ones may not have competitive costs, modularity will allow production at scale and significant reduction in operating and construction costs in the coming decades.

Regarding what Brazil can learn from global best practices, Leipner highlights the maturity of the Brazilian nuclear sector, which has a complete fuel cycle and consolidated operational experience in Angra 1 and 2. However, he emphasizes the importance of strengthening the national regulatory agency and expanding international and business partnerships, especially in the development and supply of the production chain for SMRs. "COP30 could be the stage for Brazil to expand its international insertion in this emerging market and leverage its local industry," he suggests.

Finally, addressing one of the main challenges of the sector, public perception and communication, Leipner believes the situation has improved, especially in regions near nuclear facilities, where the community recognizes the economic and social benefits. He also highlights the fundamental role of the new generation of young professionals, more articulate and digitally connected, to disseminate a clear and positive message about the reliability, sustainability, and safety of nuclear energy. "These young people can be the best ambassadors of nuclear energy in Brazil for the public and policymakers," he concludes.

With COP30 on the horizon, Brazil and Latin America have the possibility to demonstrate their potential and advance in integrating nuclear energy into global strategies to combat climate change, consolidating a role that, according to Leipner, "should no longer be seen as optional, but as indispensable for a sustainable, safe, and low-emission energy matrix." ■

DEPLETED FUEL AND ITS ROLE IN THE ENERGY STRATEGY

HOW BRAZIL CURRENTLY ADDRESSES THE ISSUE AND WHAT TO EXPECT IN THE FUTURE



Depleted fuel, also called spent fuel, is the nuclear material after going through the fission process inside reactors, when it is no longer economically viable to generate energy. Bruno Estanqueira Pinho, coordinator of the Technical Directorate of Eletronuclear, explains that the company stores this fuel in two main ways: first, in special pools inside the Angra 1 and Angra 2 plants — “wet” storage — and, after a time, in dry storage casks, technologies that ensure the necessary safety and radiological protection. This practice is aligned with the Brazilian strategy of safely retaining the spent fuel until a government decision is made on its reuse or final disposal.

When depleted nuclear fuel is recycled, the process becomes a closed cycle, making the most of resources and reducing waste. This continuous reuse elevates nuclear energy to the category of an almost inexhaustible source, capable of reliably supplying a modern and sustainable energy matrix for decades.

SCENARIOS FOR SPENT FUEL IN BRAZIL

In the current context, the strategy of storing spent fuel is sufficient for the operation of the Angra 1 and Angra 2 plants until 2045. However, with encouraging plans for the expansion of the nuclear sector in the country, including the possible resumption of Angra 3 works, insertion of new plants in the National Energy Plan 2050, and the implementation of emerging technologies such as Small Modular Reactors (SMRs), it becomes essential that Brazil decides, in the medium term, the destination of spent fuel.

There are three possible paths for the management of this material: maintaining storage and direct disposal, or opting for reprocessing, which can be done inside or outside the country, followed by the disposal of the generated waste, which is significantly smaller in volume. The ideal decision considers multiple criteria, such as safety, environmental impact, physical protection, costs, and

technological infrastructure. A recent 2024 study based on a multicriteria methodology indicated that, for Brazil, the best alternative would be to send the spent fuel for external reprocessing, returning only the waste for final disposal.

EXPANSION OF THE DRY STORAGE UNIT (UAS)

The installation of the UAS in Angra was a milestone for the safe management of spent fuel. Currently, the UAS has a capacity for 72 casks, sufficient for the end of Angra 1's useful life, expected in 2044, and to operate Angra 2 until 2034. Expansion of the UAS may be necessary by 2033 to ensure the continuous operation of Angra 2 if no definitive decision is made by then. The main challenge is that such a decision needs to be taken at least five years before the current capacity is exhausted, to avoid the high costs arising from the construction of new facilities.

ECONOMIC POTENTIAL OF SPENT FUEL REUSE

Despite the name "spent fuel," the material still contains more than 90% of the original stored energy. However, direct use is unfeasible in Brazil's current park, since reprocessing would be necessary to recover uranium and plutonium and manufacture new fuels (such as MOX), used in specific types of reactors not present in the country. In the short and medium term, the feasibility of reuse is low, given that Brazil has only two reactors in operation and vast uranium reserves, whose mining is less costly than reprocessing spent fuel. However, the significant cost of storage can be reduced by sending the fuel to countries with technological capacity for reprocessing, returning to Brazil only the waste for final disposal.

Internationally, countries such as France, Japan, Russia, and the United States have reprocessing technologies, although not all make regular use of them due to costs that can be higher than the direct use of new fuel.

CHALLENGES AND OPPORTUNITIES IN PUBLIC POLICY AND INNOVATION

With the advance of green taxonomy and the growing demands for sustainability, Brazil has room to improve its communication and public policies on nuclear waste. Efficient management and reprocessing of spent fuels contribute to sustainability, reducing waste and optimizing resources. In addition, reprocessing can open the way for new businesses, including transport, radiological protection, logistics, and operational support, generating jobs and enabling the use of innovative technologies not yet developed in the country.

Bruno Estanqueira Pinho highlights that, for Brazil, investing in nuclear technology beyond power generation means investing in economically, technologically, and environmentally responsible development. This window of opportunity is strategic and requires timely decisions so that the Brazilian nuclear sector is competitive and aligned with the best global practices.

CENTENA PROJECT AND RADIOACTIVE WASTE MANAGEMENT IN BRAZIL

During this year's NT2E, the largest business and technology fair in the nuclear sector in Latin America, Clédola Cássia Oliveira de Tello, a researcher at the Nuclear Technology Development Center (CDTN), presented the CENTENA Project and Radioactive Waste Management in Brazil, conducted by CDTN of CNEN, an important milestone for radioactive waste management in Brazil.

Its main objective is to design, build, and operate a Nuclear and Environmental Technology Center for the disposal of low- and intermediate-level waste, in addition to promoting research, development, and innovation in nuclear waste management technologies.

Located on a preferential site already selected, CENTENA will feature facilities for processing and packaging waste, radiochemical laboratories, and areas for disposal in surface repositories with a maximum estimated capacity of 60,000 cubic meters. The unit will serve not only the current needs of Brazilian nuclear plants but also the removal and management of waste from future plant decommissioning.

Legally, the project is based on Law 10.308/2001, which assigns CNEN responsibility for the management and disposal of radioactive waste, as well as on the rules of the the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) and the International Atomic Energy Agency (IAEA), ensuring a solid regulatory framework for environmental and nuclear licensing.

Currently, the project is in the site characterization phase and essential environmental studies to obtain licensing, with licensing and construction scheduled for 2028 and the start of operation planned for 2030–31. Among the challenges are the safe handling of waste, study of soil behavior, and the concrete barriers used in disposal containers to ensure durability and isolation of radioactive materials.

In addition to the positive impact on the safety and sustainability of the nuclear sector, CENTENA represents an opportunity for technological advances and strengthening of the national research infrastructure in nuclear waste management. ■

NUCLEAR ENERGY, FLEXIBLE, YES, SIR

THE NEW ROLE OF THE SOURCE IN THE DYNAMIC POWER SYSTEM

For a long time considered synonymous with continuous and stable generation, nuclear energy has taken on a new identity in modern power systems: that of a flexible source. Advances in control technologies, the growing insertion of intermittent renewables, and the demands of stability and energy security have driven the adoption of a new logic for the use of nuclear energy. The source that was once a symbol of baseload now adapts to meet demand fluctuations with agility and precision.

To understand this new role of nuclear energy, we spoke with electrical engineer Paulo de Tarso, from Framatome, one of the world's leading suppliers of reactor technology. He explains how the flexible operation of the source has evolved and what it represents for the future of the energy matrix — in the world and in Brazil.

FROM BASELOAD TO FLEXIBLE: THE TRANSFORMATION OF NUCLEAR OPERATION

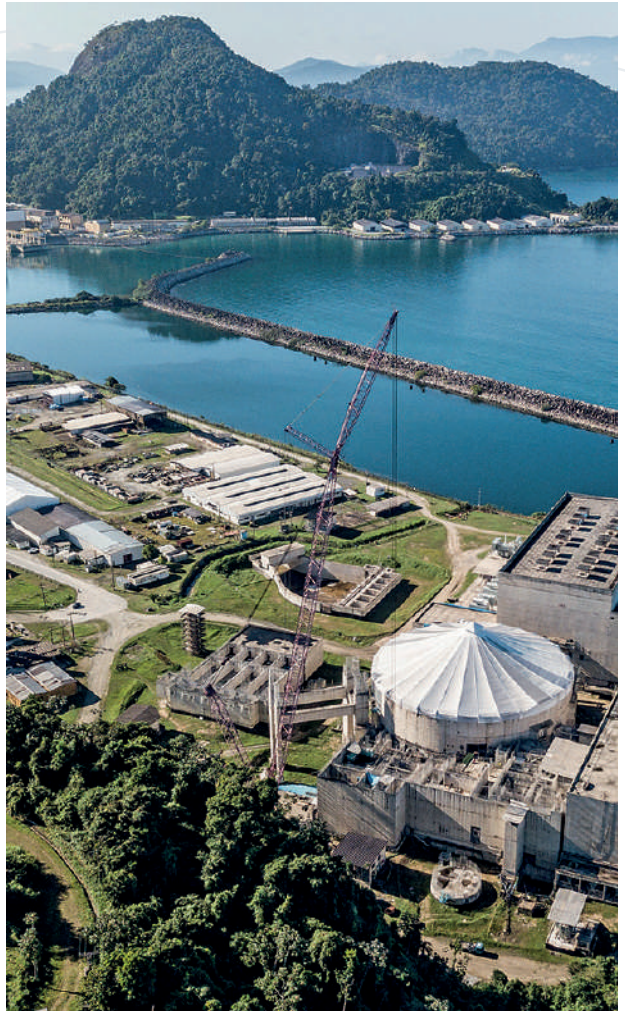
Historically, nuclear plants were designed to operate in a baseload regime, that is, generating electricity continuously and stably, at maximum power. “This model was preferred because the participation of nuclear energy in countries’ electricity matrices was relatively small, and operating at nominal power was simpler and more economically efficient,” contextualizes Paulo de Tarso.

However, the power sector has been undergoing profound transformations. The growth of intermittent sources such as solar and wind required nuclear plants to develop the ability to adjust their output in real time, following demand variability. This ability, known as load following, has become a strategic differentiator.

“The need to make power generation flexible arose from economic demand — such as the reserve energy market — and technical demand — such as frequency regulation. More recently, this need has been driven by the integration of intermittent sources into the power system,” says the specialist.

TECHNOLOGIES THAT ENABLE FLEXIBILITY

Flexible operation requires more than good will — it depends on technology. And it is at this point that advances have been decisive. According to Paulo de Tarso, Framatome plants (Generations II and III) are already designed with characteristics that allow this operation. “In plants with digital instrumentation and reactor control technology, it is possible to implement functionalities for flexible operation.”



NUCLEAR ENERGY CAN OPERATE AS BASELOAD OR FLEXIBLY, REPLACING THERMAL POWER PLANTS.

The development of advanced digital control systems such as ALFC — Advanced Load Following Control — allows the reactor to respond quickly to load variations. In addition, modernization of the balance of plant (BoP), fine adjustment of reactor reactivity, and fuel optimization are also fundamental to ensure efficiency, safety, and equipment durability.

THE ROLE OF NUCLEAR IN A MATRIX WITH HIGH PENETRATION OF RENEWABLES

With the growth of intermittent sources, the role of nuclear energy is strengthened as a firm, reliable, and now also dynamic source. “Nuclear plants have large electric generators with high rotating mass, which contributes to frequency regulation and system stability,” emphasizes the engineer.

Countries such as France and Germany have already used their nuclear plants to follow load variation since the 2010s. In France, where the share of nuclear energy in the matrix is significant, plants are constantly activated to offset renewable generation variations.

“International experiences show that it is possible to have load flexibility of up to 500 MW with ramps of 40 MW/min, as observed at the Philippsburg and Neckarwestheim plants in 2009,” highlights Paulo de Tarso. The ALFC system was successfully implemented in plants in Germany and Switzerland, and there is already a technological basis to apply this model in Brazilian plants as well.

SMRS: THE NEXT GENERATION OF NUCLEAR FLEXIBILITY

The evolution does not stop with large traditional reactors. Small Modular Reactors (SMRs) emerge as a promise for generation even more adapted to the new logic of the sector.

“SMRs are designed from the ground up with a focus on flexibility, modularity, and inherent safety.

They incorporate diverse modes of operation to meet specific load demands, in addition to advanced digital technologies for control and quick response,” he states.

Technical challenges still exist — such as material wear, corrosion, and impacts on fuel — but they are increasingly studied and mitigated with new solutions. There are also economic and regulatory barriers: there is still a lack of a pricing model that values the flexibility of the nuclear source and specific rules for its dynamic operation.

OPPORTUNITY FOR BRAZIL

The Brazilian scenario presents ideal conditions to take advantage of this transformation. With a strongly hydroelectric matrix, impacted by prolonged droughts, and a growing insertion of variable renewables, the country needs firm, clean, and flexible sources.

“The dependence on hydroelectric plants imposes challenges that affect generation predictability. In addition, there is growing pressure to reduce the use of fossil-fueled thermal plants. In this context, nuclear energy is a strategic ally,” points out Paulo de Tarso.

In addition to not emitting greenhouse gases, nuclear energy can operate as baseload or flexibly, replacing polluting thermal plants more efficiently and at lower environmental cost. The Angra 2 and 3 plants already have digital instrumentation systems, which would allow the implementation of ALFC with the necessary adaptations.

The completion of Angra 3 and the expansion of the national nuclear program are therefore key pieces to building a safer, more resilient matrix aligned with climate commitments.

VALUING FLEXIBILITY

For this model to prosper, however, it is necessary to economically recognize the contribution of nuclear flexibility to the system. “It is essential that pricing models consider the operational and safety benefits provided by nuclear plants. We need economic parameters that encourage this mode of operation and value the role of the source in system stability,” defends Paulo de Tarso.

The future of the power sector requires solutions that combine sustainability, reliability, and adaptability. And nuclear energy, with its new flexible face, shows that it is ready to meet this challenge — yes, sir. ■

THE ROLE OF COMMUNICATION IN ADVANCING BRAZILIAN NUCLEAR TECHNOLOGY

JOURNALISTS AND EXPERTS GATHER TO DISCUSS HOW THE PRESS INFLUENCES THE IMAGE AND FUTURE OF THE NUCLEAR SECTOR

In a scenario where the nuclear sector is regaining more space in global energy and sustainability agendas, Nuclear Communication 2025, promoted by the Brazilian Association for the Development of Nuclear Activities (ABDAN), brought together on August 25, at Fecomércio RJ, journalists, representatives of international agencies, and sector experts for an unprecedented debate on nuclear energy communication in Brazil.

Focused on dialogue between the press and the technical sector, the event aimed to contribute to more accurate and contextualized journalistic coverage on strategic issues such as energy security, climate transition, innovation, and geopolitics. The meeting also sought to combat misinformation still common about nuclear energy and its peaceful uses in the country.

“Nuclear Communication is an initiative born from ABDAN’s commitment to transparency and technical literacy. Bringing the press closer is essential to dismantle myths and consolidate a narrative more faithful to the potential of nuclear energy,” highlighted Celso Cunha, president of the association, in the opening of the event.

Celso recalled that public perception of nuclear energy improves when there is quality information. He cited research showing how acceptance of the source rose from about 30% nationally to more than 70% in municipalities near Angra after greater community interaction. “This shows that education, knowledge, and population participation are essential. The role of communication and journalism is precisely to help overcome fear with information,” he said.

THE PRESS AT THE CENTER OF THE NARRATIVE

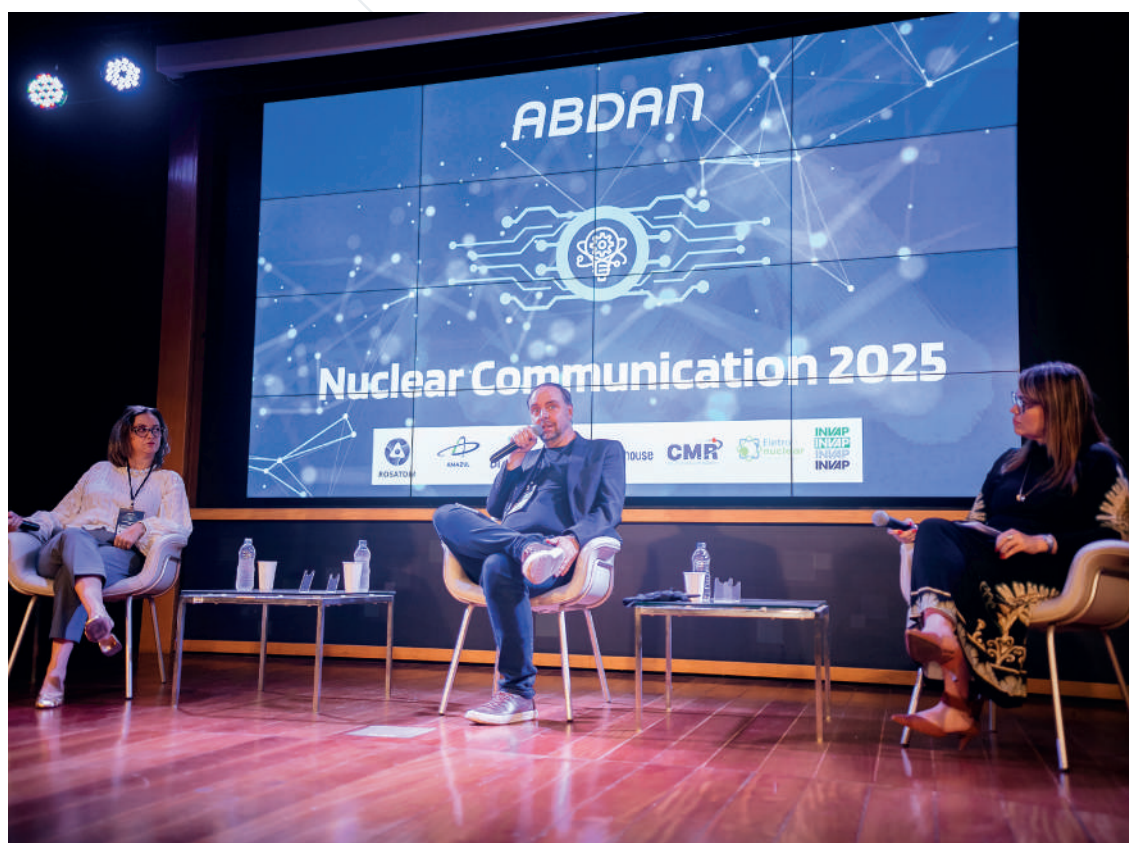
In the opening panel, names from specialized journalism — such as Gabriel Chiappini (Agência Eixos), Maurício Godoi (Canal Energia), and Maria Clara Machado (MegaWhat) — debated the role of the press in building the sector’s image, mediated by Alexandre Canázio, editor of Canal Energia. They shared behind-the-scenes insights on coverage of topics such as Angra 3, SMR projects, and the growing presence of nuclear energy on the political agenda.

Gabriel Chiappini stressed that, as with agribusiness, nuclear energy needs to be brought closer to people’s daily lives. “The nuclear sector has a very large information gap with the public. This creates misinformation and fear — and fear is a terrible advisor. Communication’s role is to show how nuclear is present in everyday areas like health and innovation, and also how it can contribute to the future with SMRs, data centers, and green hydrogen.”

Maria Clara Machado drew attention to the journalistic challenges regarding the subject. “Nuclear energy, because it is stable and predictable, ends up being a victim of its own success. Often it doesn’t become news precisely because it works well. But that is our role as the press: to translate a complex, technical sector and seek new ways to tell this story, including getting it into the mainstream media. After all, despite existing for decades, many people still don’t know how nuclear generation works.”

WHEN THE GAME IS POLITICAL

Mediated by Juliana Castro, editor of JOTA, the second panel discussed how nuclear energy fits into the country’s political and institutional disputes,



addressing both communication challenges and the need for greater public and parliamentary engagement.

Congressman Júlio Lopes, president of the Nuclear Parliamentary Front, stressed the difficulty of attracting new audiences to the subject, defending that the agenda needs to be brought closer to people's reality.

"Even here it is difficult to attract new people, because often there is no interest in this subject. It is unacceptable that in 2025 we still have 26 million Brazilians inhaling wood smoke in their homes, when we have all the technology and capacity to offer clean alternatives. That is why I always insist on these issues that show the direct impact of nuclear technology on people's quality of life."

Federal Congressman Reimont Otoni brought a more philosophical and ecological perspective on the role of nuclear energy, reconciling sustainability and development.

"Defending nuclear energy is understanding that it can improve quality of life, increase sovereignty, and contribute to development. After all, we have all already been exposed to nuclear applications, whether in a medical exam, in food preserved by radiation, or even in everyday technologies. It is not about self-destruction, but about progress allied with care for the planet."

In Jean Castro's view, CEO of Vector Government Rela-

tions, political articulation is indispensable for nuclear to gain strategic space in Brazil.

INTERNATIONAL VISION

The international perspective was brought by Argentine journalist Damián Cichero, editor of the International section of *El Economista*. He reinforced that nuclear energy is also synonymous with sovereignty.

"Recent geopolitical tensions have shown how much energy dependence can cost a country. Today we see France benefiting from its nuclear park, while Germany faces difficulties. Nuclear energy is not only clean, with no greenhouse gas emissions, but it also ensures autonomy and stability. With the arrival of Small Modular Reactors (SMRs), cheaper and more flexible, we have a unique opportunity for Latin America. Brazil, in particular, is already consolidating itself as a future nuclear power."

AI, COMMUNICATION, AND THE NEW ENERGY DEMAND

Closing Nuclear Communication, the fourth panel discussed the revolution brought by artificial intelligence (AI), the new energy demand driven by data centers, and the role of communication in building trust for the nucle-



ar sector, mediated by Ana Carolina Hildebrandt, Director of Agência A+.

Fernando Madureira, Technical Director of the Brazilian Data Center Association (ABDC), stressed that energy availability is central to the digital industry.

“In the data center sector, the goal is to achieve seven ‘nines’ of availability — that is, at most 3 seconds of downtime per year. Five minutes offline already represent huge losses. This shows how much we need stable sources, and nuclear positions itself as the most suitable to ensure this continuity. In addition, there is the ecological issue: the carbon footprint of nuclear energy is half that of conventional electricity and a quarter that of solar. However, we still suffer from a lot of misinformation, similar to nuclear, and we need to face this narrative challenge.”

The view of institutional communication was brought by Alessandra Cecco, communications advisor at AMAZUL. For her, artificial intelligence should also be used as an ally in the process of demystifying nuclear energy.

“AI can support not only operations but also institutional communication, helping to combat fake news and better translate for society the role of nuclear energy. There is still a huge gap: people do not know the everyday application of the technology. We need to tell this story different-

ly, showing that nuclear is not tragedy, but development, sovereignty, and quality of life.”

Cristiane Pereira, ABDAN’s Communication and Marketing Manager, reinforced the importance of an integrated communication strategy to expand the sector’s reach.

“Our challenge is to burst the nuclear bubble. We have been working with journalists, universities, and companies to build narratives that dialogue with society and government. We are not here to compete with solar or wind, but to add and strengthen the system. Communication has a decisive role in showing this and repositioning nuclear in the energy debate,” reinforced Cristiane.

The panel concluded that the convergence between artificial intelligence, communication, and nuclear energy opens a strategic front for Brazil. The growing digitalization of the world and the explosion of energy consumption by data centers position nuclear as a key source to ensure reliability and sustainability for the future.

More than just an institutional event, Nuclear Communication 2025 also functioned as a free workshop for journalists who do or do not cover the sector. The goal was to bring the nuclear sector closer to the press, offering tools and basic knowledge to improve coverage quality and stimulate new story ideas. ■

WORLD ATOMIC WEEK

ROSATOM ORGANIZES GLOBAL FORUM FOR THE 80TH ANNIVERSARY OF THE NUCLEAR INDUSTRY

From September 26 to 30, 2025, Moscow will host the World Atomic Week (WAW) — an international forum dedicated to the 80th anniversary of the nuclear industry. The event will bring together a business program, youth festival, and specialized exhibition, gathering experts, sector leaders, and delegations from various countries to discuss the future of nuclear energy and its technologies.

THE MAIN NUCLEAR FORUM OF THE YEAR

The World Atomic Week will bring to Moscow delegations from more than 100 countries. Among the guests are heads of state, representatives of international organizations, executives of major companies, scientists, and experts involved in the development of nuclear programs. The organizer is the Russian state corporation Rosatom, one of the leading players in the global nuclear industry today. Among the confirmed guests is the IAEA Director General Rafael Grossi, who emphasized the importance of dialogue on the future of peaceful nuclear energy in such forums.

The forum will be dedicated to the 80 years of the Russian nuclear industry: the count began on August 20, 1945, when the Special Committee for the Use of Atomic Energy was created in the Soviet Union. Over these decades, Russia has made decisive contributions to the sector: from the commissioning of the world's first nuclear power plant in Obninsk (1954) and the creation of the nuclear icebreaker fleet, to the invention of the tokamak and the long experience with fast reactors. The Director General of the Rosatom state corporation, Alexey Likhachev, highlighted the global scope of this milestone: "Today, the Russian nuclear industry sets the pace in the world market for nuclear technologies. We lead the construction of nuclear power plants abroad and the development of new solutions for the energy of the future — from small reactors to fourth-generation energy systems."

BUSINESS PROGRAM AND THEMATIC TRACKS

The business forum of World Atomic Week will take place on September 25 and 26, under the slogan "Everything begins with the atom." A plenary session and more than 40 debates on key sector development topics are scheduled. Discussions will be organized into eight thematic tracks:

- Clean energy: role of nuclear energy in the green transition, Small Modular Reactors (SMRs), floating nuclear plants, balance between nuclear and renewables.
- Industrial innovations: robotization, new materials and

composites, lithium-ion technologies.

- Ecology: management of spent nuclear fuel, elimination of environmental liabilities, clean water.
- Nuclear medicine: radiopharmaceuticals, international cooperation in radioisotopes, development of medical tourism.
- Digital advancement: artificial intelligence in industry, digitalization of the lifecycle of facilities, quantum technologies.
- Mobility: logistics of the future, the Northern Sea Route.
- Habitable environment: nuclear cities, electric vehicles, sustainable territorial development.
- Science and education: controlled nuclear fusion, training of professionals, participation of women and youth in advanced technologies.

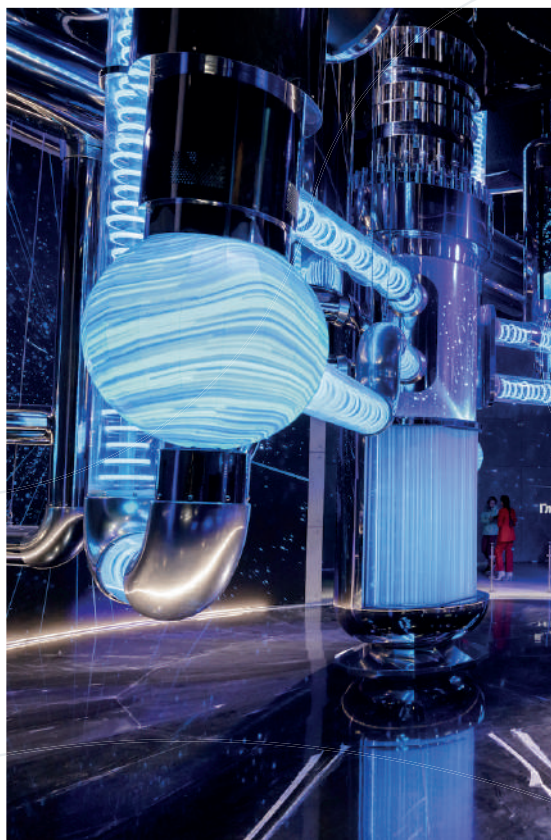
The program will also include scientific debates and strategic sessions with renowned nuclear physicists. Discussions will address perspectives for nuclear energy in the context of the global energy transition, the development of SMRs, the advancement of nuclear fusion, as well as new waste management and safety technologies.

Each track will also include the vision of the new generation: students and young specialists from Rosatom's partner universities and international institutions, including finalists of the Global HackAtom from Latin America, Europe, Asia, and Africa. Their presence connects the experience of experts with the creative energy of the new generation of engineers and researchers.

EXHIBITION OF NUCLEAR ACHIEVEMENTS

Parallel to the business program, the World Atomic Week will present a specialized exhibition with solutions in nuclear energy, new types of reactors, nuclear fuel management, nuclear medicine, agriculture, and space applications. Technical visits will also be organized to operating facilities and research centers of the Russian nuclear industry.

The main venue of the exhibition will be the renovated "Atom" Pavilion at VDNH — Moscow's most emblematic exhibition park, which during the Soviet period was the great showcase of national achievements. Inside, there is a permanent exhibition on nuclear technologies, with multimedia installations, interactive areas, and large models that illustrate the entire nuclear cycle — from fuel to decommissioning — as well as safety culture, medical radioisotopes, and new materials.



YOUTH FESTIVAL AND HACKATOM COMPETITION

The first half of the week will be dedicated to the youth program: interactive lectures and science shows, meetings with renowned scientists, as well as a street program with music, sports activities, virtual reality areas, and food courts featuring cuisine from the Russian “atomic cities” — small towns that grew around nuclear research centers and industries. For a long time they were closed to the public, but it was precisely in them that unique communities of engineers and scientists were formed, creating a special atmosphere of innovation.

One of the main highlights of WAW’s youth program will be the first final of the international student championship Global HackAtom 2025. This year, national stages were held in Brazil, Bolivia, Hungary, Indonesia, Kazakhstan, Myanmar, Namibia, Russia, Rwanda, and Uzbekistan. The finalists will travel to Moscow to propose solutions in a 24-hour hackathon for practical challenges of the nuclear industry, in addition to learning about the opportunities of Russian nuclear education and the country’s culture.

For Brazil, participation is especially significant. In May, the national stage of HackAtom was held in São Paulo, bringing together students from 14 universities. The

winning team was Tupi Tech, from Rio de Janeiro (Instituto Militar de Engenharia – IME), which will represent the country for the first time in the world final in Moscow. For young Brazilians, it is an opportunity to step onto the international stage, work side by side with colleagues from different countries, and contribute to the future of nuclear technologies.

OPPORTUNITIES FOR BRAZIL AND LATIN AMERICA

For countries developing nuclear programs, participation in World Atomic Week means access to technologies, contact with industry leaders, and exchange of experiences. An important element will be the work of the BRICS Nuclear Energy Platform, created in 2024 as an independent space for dialogue between companies, regulators, and specialists. Platform sessions discuss best regulatory practices, new financial instruments, localization of production, and talent training. In May 2025, a meeting was held in Rio de Janeiro, during the NT2E fair, focusing on sustainable financing of nuclear projects.

For Brazil, the WAW agenda is directly linked to national plans. The government intends to significantly increase the share of nuclear energy in the electricity matrix. Currently, the country operates two units of the Angra plant, while the fate of the third unit is still under debate. The topic of Small Modular Reactors (SMRs) also sparks interest — the Minister of Mines and Energy, Alexandre Silveira, mentioned the possibility of cooperation with Rosatom in this area. The use of floating nuclear plants, already tested in the Russian Arctic, to supply remote regions of the Amazon, today dependent on diesel thermal plants, is also being considered.

In addition to power generation, the region has great interest in other areas: nuclear medicine (Rosatom already supplies Brazil with a significant part of the radioisotopes used in oncology centers), application of irradiation technologies in agriculture, and combating climate change. Other Latin American countries are also advancing: Bolivia, for example, is building in El Alto, with Rosatom’s support, the region’s first Nuclear Technology Center.

INVITATION TO PARTICIPATE

The World Atomic Week 2025 will be a meeting point for experts, researchers, and companies building the future of nuclear technologies. Join the discussions and international exchange of experiences.

Registration and program details are available on the official forum website: <https://en.worldatomicweek.com/>

See you in Moscow at the World Atomic Week! ■



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