**THE NUCLEAR SECURITY CONCERNS ON THE RECENTLY DEVELOPTED BRAZILIAN NATIONAL NUCLEAR POLICY**

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**Abstract**

# Inside of the Brazilian Republic Presidency, the National Security Cabinet is responsible for two important assignments: The coordination of the Brazilian Nuclear Program Protection System (Sipron), responsible for the actual Brazilian nuclear safety and security concerns, and the Brazilian Nuclear Program Development Committee (CDPNB), which is a multiministerial collegiate responsible for the future of the Brazilian nuclear sector. Among plenty of tasks, the Committee is up to proposing solutions on many issues and helping the development of our nuclear sector.

# The Brazilian nuclear sector, which began its activities in 1960, was still in the need of a National Policy to present the principles, guidelines and goals for the development of the sector. In this sense, a multiministerial technical group was created, within the scope of the CDPNB, to analyze the main strategic issues on our country and increase the synergy among the involved sectors.

# As a final product, a draft of the Brazilian National Nuclear Policy was presented and further on approved by the President that released it by a Decree, on December 5th, 2018. This Policy brought important progress by raising important themes involving nuclear safety and security and bringing them to the highest Brazilian Executive level. So many contributions started to appear pointing out solutions to current obstacles on the development of the Brazilian nuclear sector.

# The main principles defined on our National Nuclear Policy are: the use of nuclear technology for peaceful purposes; the observance of conventions, agreements and treaties; nuclear safety and security; the full knowledge of nuclear fuel cycle; the use of nuclear technology for national development and social welfare and directions to ambientals prevention.

# The main objectives of the Brazilian National Nuclear Policy are: to keep the knowledge about nuclear technology; to comply with national energy sector decisions, pointing to nuclear power generation; to ensure the safe use of nuclear technology; to strength the planning and the response to emergency situations and safety/security events; to promote society consciousness about the benefits and the safe use of nuclear technology; to expand the medical use of nuclear technology; to reinforce Brazilian commitments on nuclear disarmament and non-proliferation; to update and keep the structure of the Brazilian Nuclear Sector, avoiding overlapping and conflicting tasks; to encourage research, development and innovation; to promote cooperation between ST&I Institutions, as well as with users; to foster research and exploration of nuclear ores; to boost the national production of nuclear ores and their byproducts; to guarantee the strategic geological resource and the strategic stock; to pursue autonomy on the production of nuclear fuel in industrial scale; to foster self-sufficiency in radioisotopes and their export; to promote professional training and to keep human resources on our nuclear sector; to encourage technical, scientific and industrial training; to foster planning and execution of projects, in order to optimize the use of human resources and to guarantee the safe management of radioactive waste.

# The construction of the Brazilian National Nuclear Policy is a case of success on a multiministerial effort, by the Brazilian National Security Cabinet guidance. Also share the International Atomic Energy Agency (IAEA) contribution to achieve the efficiency of Brazilian nuclear security and safety, by establishing comprehensive guidance and supporting us building technical capacity, including education and training. A National Nuclear Policy must be the first step on the evolution of a nuclear security regulation. Its promulgation can legitimizes and reinforce several and necessary actions to be undertaken and allows to restructure the governance of a State nuclear sector.

**Key Words:** stakeholders engagement; nuclear security regime; Nuclear Policy

# 1. SCOPE OF THE TOPIC

Brazil has been implementing a very comprehensive Nuclear Security Regime in tantamount with NSS 20 Fundamentals much earlier than its publication in 2012. National laws, a legislative and regulatory framework, national and local response plans are examples of the nuclear security governance in the country. Moreover, most of the nuclear security international treaties and conventions that Brazil has signed have already been internalized as national laws by the Congress. In the last decades, the nuclear security Brazilian legislation has been improved and permanently updated according to the domestic and international security context.

Brazilian Nuclear Sector has recently undergone important changes with the reactivation of the Brazilian Nuclear Program Development Committee (CDPNB), that has the mission of advising directly the President of the Republic, through a high level collegiate, on the establishment of guidelines and goals for the development and the following up of the Brazilian Nuclear Program, in order to contribute to the national development and to the promotion of brazilian society welfare. One of the CDPNB's products was the decree 9600, 5th december 2018.

 The purpose of this paper is to present the evolution of the brazilian nuclear legislation and the impact of the decree 9600, 5th december 2018 in the Brazilian Nuclear Security Regime.

2. THE BRAZILIAN NUCLEAR POLICY

The Law 4118, 27th August 1962 (1), represented the beginning of the structuring of the Brazilian nuclear sector, establishing the Union monopoly on: a) survey and mining of nuclear ores; b) trade in nuclear ores and concentrates; c) the nuclear elements and their compounds; d) the physical and fertile materials; e) the artificial radioisotopes and radioactive substances; f) the nuclear products; g) the production of nuclear materials and their industrialization.

In addition, that law reorganized of the National Nuclear Energy Commission, qualified as a national authority.

The Law 5740, 1st December 1971(2) authorized the creation of a public company to carry out nuclear fuel cycle activities, including prospecting and exploration of radioactive ores and the construction of plants for the processing of that ores. The ultimate goals of that company were: to conduct mineral research and the mining of nuclear ores and associated; promote the development of nuclear technology by conducting research, studies and projects relating to the treatment of nuclear ores and associated materials; build and operate ore treatment facilities.

The Law 6189, 16th December 1974 (3) was very important, because updated the existing legal framework.

The Brazilian Federal Constitution of 1988 (4) states in articles 21 and 177 that the Federal Government has the exclusive competence for managing and handling all nuclear energy activities, including the operation of nuclear power plants. The Federal Government holds also the monopoly for the survey, mining, milling, exploitation and exploration of nuclear minerals. All these activities shall be solely carried out for peaceful uses and always under the approval of the National Congress.

3. THE BRAZILIAN NUCLEAR SECURITY REGIME

The Brazilian Nuclear Security Regime objectives are to establish and maintain conditions to:

(a) Protect against unauthorized removal of nuclear material in use and storage, and during transport;

(b) Ensure the implementation of rapid and comprehensive measures by the State to locate and recover missing or stolen nuclear material;

(c) Protect against sabotage of nuclear facilities and sabotage of nuclear material in use and storage, and during transport;

(d) Mitigate or minimize the radiological consequences of sabotage.

According to Handbook on Nuclear Law Implementation Legislation (5,6), from the most basic perspective, nuclear security legislation needs to reflect a number of basic elements, including:

(a) A physical protection regime for nuclear and other radioactive material and related facilities;

(b) Provisions regarding authorization (licensing), inspection and enforcement measures relevant to nuclear material and nuclear facilities (and other radioactive material);

(c) Measures for the prevention and detection of, and response to, incidents of theft or other unauthorized acquisition of or illicit trafficking in nuclear and other radioactive material or sabotage of related facilities;

(d) Criminal offences for violations of applicable laws and regulations, with stringent penalties, particularly for malicious acts;

(e) National arrangements necessary to implement international cooperation in protecting radioactive material, recovering stolen or lost material and dealing with offenders.

The Brazilian nuclear and radioactive legislative and regulatory framework is composed of around 80 (eighty) regulations, grouped as follows:

a) Group 1: 30 (thirty) regulations for Nuclear Facilities;

b) Group 2: 4 (four) regulations for Nuclear Material Accounting and Control, Physical Protection and protection against fire;

c) Group 3: 15 (fifteen) regulations for radiological protection;

d) Group 4: 8 (eight) regulations for Material, Mining and Nuclear Mining;

e) Group 5: 5 (five) regulations for Radioactive Material Transport;

f) Group 6: 7 (seven) regulations for Radioactive Facilities;

g) Group 7: 5 (five) regulations for Personnel Certification and Registration;

h) Group 8: 4 (four) regulations for Radioactive Material waste;

i) Group 9: 2 (two) regulations for decommissioning of nuclear facilities;

j) There is a regulatory framework concerning Computer Security and Information Security established by the Institutional Security Cabinet that applies to the nuclear security regime.

The System for the Protection of the Brazilian Nuclear Program is a State organization created in 1980 with the competence to integrate all organizations with nuclear safety and security responsibilities.

Considering that nuclear safety and security are a national security issue in Brazil, the National Security Cabinet (GSI as the acronym in Portuguese) became the focal point in the System with a central role in coordinating actions among the various stakeholders involved in protecting and developing the Brazilian Nuclear Program.

It important to point out that the GSI is an essential structure in the Presidency of the Republic and the GSI Chief is Minister of State reporting directly to the President of Brazil.

Regarding nuclear safety and security responsibilities, one of the main GSI tasks is the coordination of committees which provide arrangements at the Political and Strategic levels. These arrangements are the basis for protocols and procedures at the operational and tactical levels. These committees are integrated by civil defense and law enforcement responders, operators, Intelligence Agency and the nuclear regulator. They are responsible for evaluating and certificating contingency plans through training and exercises.

 Also, Brazil recognizes the importance and value of NSS 13 INFCIRC 225 Rev 5. Despite the fact that it’s not a legally binding document its recommendations and best practices have been incorporated into the Brazilian nuclear security regime. INFCIRC 225 Rev 5 has shaped the nuclear security architecture of all competent authorities in Brazil.

In summary, these are the elements of Brazil Nuclear Security Regime:

1 - State responsibility;

2 - Identification and definition of nuclear security responsibilities;

3 - Legislative and regulatory framework;

4 - International Transport of Nuclear Material and other Radioactive Material;

5 - Offences and Penalties including Criminalization;

6 - International Cooperation and Assistance;

7 - Identification and Assessment of Nuclear Security Threats;

8 - Identification and Assessment of Targets and Potential Consequences;

9 - Use of Risk informed Approaches;

10 - Detection of Nuclear Security Events;

12 – Sustaining a Nuclear Security Regime.

Brazil has signed all the Conventions about nuclear safety and security and participates in all international initiatives to combat terrorism. While Brazil considers nuclear security as the responsibility of each State, it addresses the issue as a strong and reliable link in the international security chain.

4. NUCLEAR PROGRAM DEVELOPMENT COMMITTEE - NATIONAL NUCLEAR POLICY DECREE 9600, 5TH DECEMBER 2018 AND THE BRAZILIAN NUCLEAR SECURITY REGIME

In the Federal Government, the Brazilian Nuclear Sector is composed of several Ministries, Agencies, Companies and Institutions distributed in several areas, such as (fig. 1):

* Ministry of Science, Technology, Innovation and Communications (MCTIC):
1. The National Commission of Nuclear Energy (CNEN) and structures subordinated to it, among which stand out:
2. The "Nuclear Industries of Brazil" (INB);
3. The Institute of Energy and Nuclear Research (IPEN); and
4. Nuclebras Heavy Equipment (NUCLEP).
* Ministry of Mines and Energy (MME):

Eletronuclear is a subsidiary of Eletrobras and has the purpose of operating and building thermonuclear plants in Brazil. It operates the thermonuclear plants of Angra I and II and is responsible for the construction of the Angra III Plant, all located at the Almirante Álvaro Alberto Nuclear Power Plant - CNAAA in Angra dos Reis - RJ.

* Ministry of Defense (MD):
1. The Institute of Advanced Studies / Department of Aerospace Science and Technology (IEAV / DCTA), subordinate to the Aeronautical Command;
2. The Technological Center of the Army, subordinate to the Command of the Army; and
3. The Navy Technological Center in São Paulo (CTMSP) and the Naval Agency for Nuclear Safety and Quality (ANSNQ), both members of the General Directorate of Nuclear and Technological Development of the Navy (DGDNTM), subordinate to the Navy Command.
* Ministry of Foreign Affairs (MRE):

The Brazilian Permanent Mission to the International Atomic Energy Agency (IAEA), located in Vienna, Austria.

* Ministry of the Environment:

The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), the agency responsible for the environmental licensing of nuclear and radioactive facilities in the national territory.

* Ministry of Health:

The various structures related to Nuclear Medicine and Radiology.

* Ministry of Education:

Universities responsible for training human resources for the Nuclear Sector.

* The National Security Cabinet of the Presidency of the Republic (GSI / PR), which coordinates the following colleges:

Brazilian Nuclear Program Development Committee (CDPNB); and

System for the Protection of the Brazilian Nuclear Program (Sipron).



Figure 1: Brazilian Nuclear Sector

Brazilian Nuclear Program Development Committee (CDPNB) dreated by the Decree of July 2nd 2008 and modified by the Decree of June 22nd 2017, CDPNB is coordinated by the National Security Cabinet of the Presidency of the Federative Republic of Brazil and has the mission of advising directly the President of the Republic, through a high level collegiate, on the establishment of guidelines and goals for the development and the following up of the Brazilian Nuclear Program, in order to contribute to the national development and to the promotion of brazilian society welfare.

The CDPNB is made up of members of the Brazilian nuclear sector and has become an important tool for leveraging projects and raising issues in the nuclear sector to the decision-makers of the Brazilian Government.

The Brazilian nuclear sector, which begans his activities in the 1960 year, needs, until today, of the law framework that will present the principles, guidelines and objéctives for the development of this sector.

In this sense, a technical group was created, within the scope of the Development Commíttee of the Brazilian Nuclear Program, with the purpose of analyzing the main issues and increase the synergy among the main actors of this sector. As a final product, the technical group presented a draft of a brazilian National Nuclear Policy, which was approved by the President of the Republic and released through the Decree number 9600 in December of 2018.

The Brazilian Nuclear Policy has the purpose to guide the planning, actions and nuclear and radioactive activities in the entire national territory, in compliance with national sovereignty and contributing to development, protection of human health and the environment. This Policy brought important progress by raising important themes involving nuclear safety and security and bringing them to the highest Brazilian Executive level. So many contributions started to appear pointing out solutions to current obstacles on the development of the Brazilian nuclear sector.

Besides that, Nuclear Policy was designed based of strong stakeholder engagement, broad debate among the institutions involved in the nuclear sector, involvement of experts, academia, various ministries and the presidency of the republic, with a focus on building an efficient and lasting policy.

The proposal of Nuclear Policy is to guide planning, actions and nuclear and radioactive activities in the homeland, according to the national sovereignty, focusing on the development and on the protection of the human health and of the environment.

The principles of Brazilian Nuclear Policy are: the use of nuclear technology for peaceful purposes; the observance to conventions, agreements and treaties; nuclear safety and security; the full knowledge of nuclear fuel cycle and the use of nuclear technology for national development and society welfare.

Among the guidelines of Brazilian Nuclear Policy we can highlight the international cooperation for peaceful use of nuclear technology.

Among the objectives of Brazilian Nuclear Policy we can highlight: to ensure the safe use of nuclear technology; to strenghten the planning and the response to emergency situations and to safety/security events; to reinforce brazilian commitments on nuclear disarmament and non-proliferation; to update and keep the structure of the Brazilian Nuclear Sector, in order to guarantee integration and efficiency, avoinding the overlaping of conflicting dutties; to promote professional training and to keep human resources on nuclear sector; to encourage technical, scientific and industrial training; to raise the interaction between industry and ST&I institutions and to guarantee the safe management of radioactive waste.

In this sense, Brazilian Nuclear Policy strengthened the Nuclear Security Regime. A National Nuclear Policy must be the first step on the evolution of a nuclear security regulation. Its promulgation can legitimizes and reinforce several and necessary actions to be undertaken and allows to restructure the governance of a State nuclear sector.

The principles, guidelines and objectives of Nuclear Policy will be used to guide the plans of the Nuclear Security Regime.

The operation of CDPNB has shown that the cooperation and effort of stakeholders of the nuclear sector can build effective solutions to the issues. In addition, the involvement of government decision-makers makes it possible to implement these solutions. The construction of the Brazilian National Nuclear Policy is a case of success on a multiministerial effort, by the Brazilian National Security Cabinet guidance.

5. CONCLUSION

The Brazilian nuclear sector is experiencing an important moment of restructuring and the Brazilian Nuclear Program Development Committee has been the driving force of these changes.

The construction of the Brazilian Nuclear Policy was an example of stakeholder involvement in building solid foundations for the development of the nuclear sector. The principles, guidelines and objectives of this Policy will be used to guide the plans of the Nuclear Security Regime.

Brazil has signed all the Conventions about nuclear safety and security and participates in all international initiatives to combat terrorism. While Brazil considers nuclear security as the responsibility of each State, it addresses the issue as a strong and reliable link in the international security chain.

 The Brazilian government brought to the Presidency of the Republic level the nuclear affairs, by the Brazilian National Security Cabinet guidance. In this sense, we recognize that the International Atomic Energy Agency (IAEA) contribution is important to achieve the efficiency of Brazilian nuclear security and safety, by establishing comprehensive guidance and supporting us building technical capacity, including education and training. All the work developed reflects the maturity of the Brazilian Nuclear Sector.

Brazilian Nuclear Policy will allow the improvement of nuclear safety regulation. Its promulgation legitimizes and strengthens the Nuclear Safety Regime.

**REFERENCES**

[1] BRAZIL, Federal Law nº 4118, 27th August 1962. Creation of the Nuclear Energy National Commission. Available at <http://www.planalto.gov.br/ccivil_03/LEIS/L4118.htm>. Access on November 20th, 2019.

[2] BRAZIL, Federal Law 5740, 1st December 1971. Creation of a public company to carry out nuclear fuel cycle activities. Available at <http://www.planalto.gov.br/ccivil_03/leis/1970-1979/L5740.htm>. Access on November 20th, 2019.

[3] BRAZIL, Federal Law nº 6189/1974. Creation of the Nuclear Energy National Commission Law. Available at <http://www.planalto.gov.br/ccivil_03/LEIS/L6189.htm> Access on November 20th, 2019.

[4] BRAZIL. Constitution (1988). Constitution of the Republic Federation of Brazil: promulgated on October 5th 1988. Available at <https://www2.camara.leg.br/atividade-legislativa/legislacao/Constituicoes_Brasileiras/constituicao1988.html>. Access on November 20th, 2019.

[5] Handbook on nuclear law / C. Stoiber … [et al.]. Vienna: International Atomic Energy Agency, 2003.

p. ; 24 cm. STI/PUB/1160 ISBN 92–0–105703–2.

[6] Handbook on nuclear law: implementing legislation/Carlton Stoiber … [et al.]. Vienna: International Atomic Energy Agency, 2010. p.; 24 cm. STI/PUB/1456 ISBN 978–92–0–103910–1