

TOGZHAN KASSENOVA

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NUCLEAR KALEIDOSCOPE

AN EVOLVING IDENTITY



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Carnegie Endowment for International Peace
1779 Massachusetts Avenue, NW
Washington, DC 20036
Phone: +1 202 483 7600
Fax: +1 202 483 1840
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TABLE OF CONTENTS

ABOUT THE AUTHOR	v
ACKNOWLEDGMENTS.....	vii
SUMMARY	xi
INTRODUCTION	1
BRAZIL, THE REGION, AND THE WORLD	7
GHOSTS OF THE PAST	17
THE NAVY'S NUCLEAR PROGRAM AFTER MILITARY RULE	27
NUCLEAR ENERGY AND NUCLEAR INDUSTRY	41

BRAZIL ON THE INTERNATIONAL STAGE.....51

GLOBAL NUCLEAR POLITICS: THE TEHRAN DECLARATION 69

CONCLUSION 87

NOTES 91

GLOSSARY 101

CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE 107

TIMELINE: THE EVOLUTION OF BRAZIL’S NUCLEAR PROGRAM..... 110

ABOUT THE AUTHOR

TOGZHAN KASSENOVA is an associate in the Nuclear Policy Program at the Carnegie Endowment. She currently works on issues related to the role of emerging powers in the global nuclear order, weapons of mass destruction nonproliferation, nuclear security, and strategic trade management.

Kassenova serves on the UN secretary general's Advisory Board on Disarmament Matters.

Prior to joining the Carnegie Endowment, Kassenova worked as a senior research associate at the University of Georgia's Center for International Trade and Security in Washington, DC, as a postdoctoral fellow at the James Martin Center for Nonproliferation Studies, and as an adjunct faculty member at the Monterey Institute of International Studies. She was previously a journalist and professor in Kazakhstan.

Kassenova is the author of *From Antagonism to Partnership: The Uneasy Path of the U.S.-Russian Cooperative Threat Reduction* (2007). Her latest publications include "Iran Nuclear Talks in Kazakhstan: Remember When Diplomacy Worked," "A Regional Approach to WMD Nonproliferation in the Asia-Pacific," "Global Non-Proliferation and the Taiwan Dilemma" (*Global Asia*, March 2012), and a contribution on Kazakhstan's nuclear disarmament and nonproliferation policy in *Slaying the Nuclear Dragon: Disarmament Dynamics in the Twenty-First Century* (University of Georgia Press, 2012).

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- 1** Aramar Experimental Center (Centro Experimental Aramar)
- 2** Navy Technology Center in São Paulo (Centro Tecnológico da Marinha em São Paulo, CTSMF)
- 3** Nuclear and Energy Research Institute (Instituto de Pesquisas Energéticas e Nucleares, IPEN)
- 4** Uranium Concentrate Unit (Unidade de Concentrado de Urânio, URA)
- 5** Nuclear Fuel Factory at Resende (Fábrica de Combustível Nuclear/INB Resende)
- 6** Nuclear power plant Angra 1
- 7** Nuclear power plant Angra 2
- 8** Nuclear power plant Angra 3 (under construction)

SUMMARY

THERE IS NO SHORTAGE OF INTERNATIONAL COMMENTARY on Brazil's nuclear policy, especially its advanced nuclear fuel cycle and nuclear submarine program. But remarkably little attention is paid to Brazilian voices on these issues. Brazilians paint a picture of an emerging power seeking nuclear independence and searching for its role in the global order.

THE STATE OF BRAZIL'S NUCLEAR PROGRAM

- Currently, Brazil mines and mills uranium, produces nuclear fuel, operates two nuclear power plants, and is building a third.
- The Brazilian navy is key in the nuclear field. It developed uranium conversion and enrichment technology, and, since the late 1970s, it has been working on developing a nuclear-powered submarine.
- Rivalry with Argentina was among the drivers of Brazil's nuclear program. Today, the two countries work together in a bilateral nuclear safeguards regime to verify their nuclear activities are peaceful.

- Brazil has not signed an IAEA Additional Protocol on nuclear safeguards, primarily because it is reluctant to accept additional nonproliferation obligations as long as nuclear-weapon states do not achieve meaningful progress toward nuclear disarmament.
- Demonstrating Brasília's potential to be an active player in global nuclear politics, Brazil and Turkey persuaded Iran to sign a 2010 joint declaration outlining a nuclear fuel swap, though the deal fell through.

UNDERSTANDING BRAZIL'S POLICY DRIVERS

Negative past experiences help explain why Brazil seeks nuclear independence.

Brazil struggled to obtain nuclear technology from abroad, prompting Brasília to develop domestic capabilities.

The nuclear industry is more ambitious than the government. Industry representatives believe Brazil could industrialize uranium conversion and enrichment if the government prioritizes the effort.

The nuclear submarine program has multiple drivers. Brazil is pursuing development of a nuclear submarine to protect its coast and offshore natural resources and to stave off potential enemies approaching from the sea. Naval bureaucratic interests also drive the program. But above all, this quest reflects Brazil's desire to bolster its international standing.

Brazil will forcefully defend its interests on the global nuclear scene. Brasília's assertive nuclear policy is indicative of the tensions intensifying within the global nuclear order between nuclear-armed and non-nuclear-weapon states, between disarmament and nonproliferation, and between nonproliferation and peaceful uses of nuclear energy. Brasília, for the foreseeable future, will criticize the unfairness of the nuclear order while attempting to carve out a role for itself in it.

For Brazil, the nuclear order is a microcosm of the world order. Brazil sees the global nuclear order and the world order more broadly as unfair and antiquated.



“Brazil is not for beginners.”

—BRAZILIAN MUSICIAN ANTÔNIO CARLOS JOBIM

INTRODUCTION

“BRAZIL IS NOT FOR BEGINNERS,” quips a Brazilian analyst when barraged with questions about his country’s nuclear policy decisions. Why is Brazil building a nuclear submarine? Why does Brazil want its own uranium enrichment capacity? Why is Brazil reluctant to sign the International Atomic Energy Agency (IAEA) Additional Protocol? Why did Brazil try to broker a nuclear deal with Iran?

The motivations behind Brazil’s policy choices are complex, confusing, and occasionally contradictory. For a country whose importance in the global nuclear order is potentially significant, remarkably little is understood about the domestic drivers behind Brazil’s decisions in this area.

In fact, attempting to analyze Brazil’s nuclear policy is like peering through a kaleidoscope: many elements are constant but the relationships between them and their prominence evolve over time. The elements include a naval nuclear program, high-tech economic development and modernity, a search for self-sufficiency, and a desire to demonstrate that Brazil is a state that matters in the world. These parts of Brazil’s nuclear kaleidoscope shift in relation to socioeconomic and historical factors that reflect the country’s ever-changing identity.

Today, Brasília is actively involved in nuclear matters. Brazil is moving toward industrializing the process of producing nuclear fuel, including uranium enrichment—its nuclear

fuel cycle. It is endowed with significant uranium resources, which can be both used in its domestic fuel cycle and monetized on the global nuclear market. Brazil operates nuclear power plants and plans to build more. It is the first non-nuclear-weapon state to work on a nuclear-powered submarine.¹ In 2010 Brazil, together with Turkey, ventured into the nuclear politics spotlight by attempting to broker a deal between Iran and the West

For a country whose importance in the global nuclear order is potentially significant, remarkably little is understood about the domestic drivers behind Brazil's decisions in this area.

over Tehran's nuclear program. And it is one of only a handful of countries to have enshrined in its constitution a commitment not to develop nuclear weapons.

International scholars recognize Brazil's importance in the nuclear field. There is no shortage of commentary on what Brasília seeks to or should do. These "external" narratives appear in the inter-

national media and high-profile publications. As far as the past goes, the main themes revolve around Brazil's pursuit of a nuclear-weapons program in the 1970s and an alleged arms race with Argentina driving the two countries to develop their respective nuclear programs. Looking into the future, external observers pay attention to Brazil's reluctance to embrace the IAEA Additional Protocol, which would give the IAEA greater access to Brazilian nuclear facilities. Observers also question the purpose of developing a nuclear-powered submarine.

"Brazilian" voices are less heard, outside of official statements, and are quite different from the external observers. Whereas the commonly accepted external view is that Brazil pursued a nuclear-weapons program, Brazilian political, technical, and intellectual elites still debate whether the country undertook such an effort. When conversations in Brazil touch upon the influence of regional dynamics on the country's nuclear program, the emphasis is on the broader competition between two countries rather than an arms race between Brazil and Argentina. While policy and expert elites debate whether Brazil should sign the IAEA Additional Protocol, a discussion about the merits and challenges of a nuclear submarine program is almost nonexistent in the public domain.

The aim here is to present these lesser-known Brazilian perspectives as accurately as an outsider can feasibly do. To help fill the void, the author had numerous conversations over two years with Brazilian policy experts, academics, former and current officials, and representatives of the nuclear industry. Unless otherwise noted, this report draws on personal interviews conducted in Brasília, Rio de Janeiro, São Paulo, Campinas, and Washington, DC, in 2012–2013. Critical analysis and external voices provide counterarguments or

highlight notable gaps in perceptions between Brazilian and external viewpoints, but by and large the objective is to relay *Brazilian* views.

And Brazilians paint a picture of a country still adapting to its emerging power status. Their Brazil is searching for its role in the global nuclear order. It is eager to establish itself as independent and self-sufficient in the nuclear realm to the extent possible given the limits of today's nuclear framework.

Brazil's story in many ways is held together by leaders' desire to forge a uniquely Brazilian way in becoming a global player—and this emerging identity influences many of its nuclear decisions. The country's burgeoning role in South America provides it with clout and confidence, which are necessary stepping-stones toward greater influence internationally.

Brazil's most important neighbor in the region is Argentina, the only other South American country generating nuclear

power. In the nuclear realm, these two countries' pasts and futures are interconnected in many ways. For instance, the two formed an agency to verify the peaceful nature of their nuclear activities—the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC)—and its operations affect not only bilateral relations but also the security environment of the region as a whole.

Behind its drive to build its own self-reliant nuclear industry and identity is Brazil's negative experience with dependence on foreign suppliers for fuel and technology. Brazil initially began developing its nuclear sector in the 1950s under a democratic civilian government, but the country's first real strides in the field occurred under the military regime that ruled from 1964 to 1985.

These military roots have a sustained influence on today's nuclear program. Brazil is the only non-nuclear-weapon state in which the military leases uranium enrichment technology to the civilian nuclear program, and the navy drives technological advances in the nuclear field. And as the only non-nuclear-weapon state pursuing a nuclear-powered submarine, Brazil's choices will be significant for the global nuclear order and regional security because they will set a precedent for nuclear safeguards on naval fuel and impact the power balance in the region.²

Brazil's nuclear program centers on that pursuit of a nuclear submarine as well as its civilian nuclear industry. The country's commercial nuclear fuel cycle is growing, with efforts under way to industrialize uranium conversion and enrichment capacities (natural uranium has to be converted into gaseous form— UF_6 —before it can be enriched and

Brazil is searching for its role in the global nuclear order.

processed into nuclear fuel). And Brazil has ambitions to expand the share of nuclear in its energy mix. Yet these ambitious plans may not come to fruition, as Brazilians are debating both the desirability and the feasibility of nuclear expansion.

Brazil is seeking to shape the broader nuclear order as well. A good example of its outward turn was its attempt, along with Turkey, to broker a nuclear deal with Iran in 2010. That experience sheds light on how Brazil views itself and its role in the international system.

The premise of Brazil's stance on the global nuclear order is that the order is unfair, that it benefits the nuclear-weapon states, and that it puts undue pressure on countries that do not possess nuclear weapons. A lack of progress toward nuclear disarmament and questionable policy choices of nuclear states provide Brazil with an opportunity to claim that non-nuclear-weapon states should not be expected to do more for the health and strength of the global nuclear order. Nuclear justice and the fight against "double standards" are at the heart of Brasília's beliefs and rhetoric. Brazil would prefer for the global nuclear order to be remade, but if such an overhaul does not happen, it wants to be at the high table. It seeks a greater role for itself in the global nuclear order, whether or not that order is just.

Brazil has the potential to play a prominent role in the global nuclear order. But whether and how Brazil will use that potential remains to be seen. Understanding how Brazilians think about and debate the nuclear future of their country and the global nuclear order provides insight into Brasília's path forward.



“Proving to our neighbors Brazil’s
benign motives in the nuclear field
comes with an economic price.”

—BRAZILIAN DIPLOMAT

BRAZIL, THE REGION, AND THE WORLD

HEMISPHERE'S HEGEMON

Brazil's comparatively peaceful history, its unique standing in the Southern Hemisphere, and the ambitions that flow naturally from that standing are important factors in Brazil's views of the region and the world.

Brazil has had a fortunate history, and that past helps explain important features of its confidence as a country. Since Brazil gained independence from its European colonizers in the early nineteenth century, it has enjoyed relative remoteness from most international drama. It has not been a full participant in any major wars since 1870, when together with Argentina and Uruguay it fought and defeated Paraguay. Brazil had limited participation in World War I and World War II, and it experienced smaller skirmishes domestically and in the region, but its statehood was never under a direct threat.

Being the biggest player in the hemisphere is another important source of Brazil's exceptionalism. Brazil stands out in its South American neighborhood due to the size of its territory, language, and growing economy. It is the largest country in South America and Latin America. In fact, it is the fifth largest country in the world in terms of both territory and population. It occupies almost half of the South American continent, and it is home to a multicultural and multiracial population of almost 200 million people.

Brazilians are the only people in predominantly Spanish-speaking South America whose language is Portuguese. Until recently, Brazil's economy was faring relatively well compared to other major economies hit by economic crisis, and Brazilian companies are ambitiously expanding into regional markets.

Brazil's regional ambitions flow naturally from the potential it carries, and it has been the driving force in regional initiatives. In 1991 Brazil, together with Argentina, Paraguay, and Uruguay, founded the region's common market, Mercosur. Regional integration championed by Brazil continued with the establishment in 2008 of the Union of South American Nations (UNASUR), which includes twelve countries and "united" Mercosur with the Andean Community of Nations.

In 2008, Brazil branched into the common defense arena, with President Luiz Inácio Lula da Silva proposing that UNASUR form the South American Defense Council. The council's primary mission was to serve as a venue for dialogue and cooperation in the area of defense and conflict resolution. According to Rodrigo Moraes, a Brazilian analyst with the Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada, IPEA), a government-affiliated think tank, the council was also designed to streamline cooperation between national militaries and extend such cooperation to the broader political agenda.³ Unlike the Inter-American Defense Board of the Organization of American States, which counts the United States, Mexico, and other countries in the Americas among its members, the council is limited to South American nations.⁴

While Brazilian and international experts often question the efficiency of these regional organizations, the experiences of Mercosur and the South American Defense Council highlight Brazil's will and capacity to lead regional initiatives.

This regional context both informs Brazil's ambitions internationally and determines how far the country can reach globally—to expand its role in the global institutions, Brasília needs regional support. But such support has not come easily.

BRAZIL AND ITS NEIGHBORS: MUTUALLY CAUTIOUS

Brazil's neighbors appear both wary and envious of Brazil's growing might, especially its consistent economic infiltration of the region. In 2012, seven out of the twenty largest acquisitions of Latin American companies investing in the region were undertaken by Brazilian firms.⁵ In Argentina alone, Brazilian companies have been among the three top investors in recent years, along with companies from the United States and Spain.⁶ Brazilian capital builds new production lines and buys industrial facilities in Argentina.⁷

Disputes involving Brazilian companies in neighboring countries are not uncommon. In a commercial controversy that turned political, the Ecuadorian government expelled Brazilian Odebrecht, which is building a dam in Ecuador, from the country between 2008 and 2010 after accusing it of breaching a contract.⁸ Brazil's oil giant Petrobras operates in Bolivia, Peru, Uruguay, and Venezuela. It was the largest company in Bolivia in 2006, and it generated 15 percent of the country's GDP. The Bolivian government expropriated some of the Petrobras facilities in 2006,⁹ and the same year, it made Eike Batista, then one of the Brazil's richest businessmen, *persona non grata* for violating environmental law.¹⁰ In Paraguay, Brazilian farmers, dubbed *Brasiguaios*, own extensive farms in the most fertile parts of the country. Their numbers reportedly reach around 400,000, and their access to land and controversies over citizenship, rights, and payment of taxes are a source of tension.¹¹

There is criticism that Brasília cares about the region primarily in terms of its uninterrupted rise to prominence in the international arena. U.S. experts on Latin America Ralph Espach and Joseph Tulchin summed up the sentiment: "Brazil desires a stable, peaceful and economically vibrant South America so that Brasília can focus its diplomatic efforts on establishing its role as a great power."¹² Indeed, some of Brazil's policies give credibility to this assessment. Brazilian analysts note that their country does not provide enough public goods to the region. For example, the National Development Bank of Brazil finances infrastructure projects in the region only if implementing companies have headquarters and administrative offices set up in Brazil.¹³

Brazil is confronted with a delicate balancing act: it has to provide leadership and investment in the region without appearing overbearing or threatening to its smaller neighbors. Some in Brazil believe that on occasion this forces Brasília to act against its own immediate interests. For example, when Bolivia seized Petrobras's refineries in 2005, Brazil's response was relatively mild. As one Brazilian diplomat explained, "Brazil balks at resorting to a more muscular attitude toward its neighbors in order not to jeopardize the South American integration process."

Another example of Brazil's balancing act concerns Paraguay's attempt to renegotiate conditions of use for the Itaipu Dam, a binational hydroelectric facility located on the Brazil-Paraguay border. The original agreement states that generated electricity should be split equally between the two countries and any surplus electricity should be sold to the other party at a fixed price. Paraguay uses only 5 percent of its 50 percent share and sells the rest to Brazil. The 2009 dispute centered on the price Brazil should pay for electricity it buys from Paraguay. Ultimately, Brazil agreed to raise its annual payment to Paraguay from \$120 million to \$360 million.¹⁴ A Brazilian military official stated with regret that Brazil lets its neighbors push it around in a quest to avoid making enemies.

This concern extends to nuclear policy as well, and the criticism can frustrate Brazilian government officials. As one diplomat noted, “when it comes to Brazil’s trade with Argentina and Uruguay, these guys always complain.” He added, “proving to our neighbors Brazil’s benign motives in the nuclear field comes with an economic price.” In his view, Argentina raises concerns about Brazil’s nuclear policy as an economic bargaining chip for concessions from Brazil within Mercosur.

ARGENTINA’S APPREHENSION

Argentina, Brazil’s natural rival in the region, has been the most outspoken critic of Brazil’s unchecked growth and ambitions, particularly in the nuclear arena. Despite cooperation that includes working together in a bilateral nuclear safeguards regime—the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC)—the relationship can be tense. Argentine observers share that occasional ambiguous statements by some Brazilian officials on the value of nuclear weapons, while dismissed by the Brazilian establishment, make some in their country uneasy. Prominent Argentine academic Juan Gabriel Tokatlian represents a commonly shared sentiment. He argued that Brazil’s national interests might at some point trigger the development of a nuclear-weapons program:

For example, a coalition of civilian government officials, nuclear scientists, corporate contractors, armed services, think tanks, and leading personalities from different political orientations may provide the impetus for such [an] undertaking. It is at this level that Argentina follows the debate on nuclear issues in Brazil with particular attention. Seen from Buenos Aires, it is evident that there is not yet any hegemonic constellation of forces geared towards the building up of nuclear weapons. Yet it is also true that the episodic and public manifestations of voices in favor of nuclear weapons in Brazil generate genuine worries in Argentina, both in the government and among interested citizens.¹⁵

In one of the most publicized cases of a worry-inducing statement from a Brazilian official, in 2009 the then vice president and former minister of defense, José Alencar, told Brazilian newspaper *O Estado de São Paulo* that nuclear weapons could provide Brazil with a deterrent and result in more “respectability” from the international community.¹⁶ Other sources of discomfort for some in the Argentine establishment are Brazil’s nuclear submarine program, involvement in the Iranian nuclear crisis, progress on its uranium

enrichment capacity, and adamant refusal to sign the International Atomic Energy Agency (IAEA) Additional Protocol and give the IAEA greater access to Brazil's nuclear sites.¹⁷

Argentine experts refer to “certain misunderstandings” in safeguards inspections as another matter of concern. One such misunderstanding took place in 2004, when Brazil did not allow IAEA inspectors visual access to the centrifuges at the uranium enrichment facility at the Nuclear Fuel Factory at Resende. Brazil argued that it had to protect proprietary technological and commercial information. The ultracentrifuges that the IAEA inspectors came to inspect were partly shielded by panels.¹⁸

While some Argentine diplomats and officials express caution about Brazil's progress in the nuclear field, scientists and ABACC inspectors demonstrate greater comfort with their neighbor's nuclear policy. The difference in attitudes is especially noticeable on the question of the IAEA Additional Protocol. Argentine scholars note that their government would prefer that Brasília sign the protocol so that it could follow suit, yet scientists, especially those associated with the ABACC, believe that ABACC safeguards provide enough confidence to Argentina about Brazil's nuclear activities, according to historian Rodrigo Mallea.

The Brazil-Argentina nuclear relationship, characterized by its duality—a partnership with a healthy dose of skepticism—is representative of the broader bilateral relationship. Argentine scholar Federico Merke suggests that Argentina's take on Brazil's regional and global projection is ambiguous and has both cooperative and competitive dynamics. According to Merke, these contradictory dynamics are visible in the two most important arrangements for the countries' cooperation—Mercosur (in the trade arena) and the ABACC (in the nuclear arena).

Argentina's downward trajectory adds to the country's uneasiness about its growing neighbor. Merke explains that due to its own past regional achievements Argentina refuses to passively accept the idea of a powerful Brazil. It attempts to balance Brazil's growing role within the limits of its power by, for example, withholding support for Brazil's quest for a permanent seat at the United Nations (UN) Security Council. However, Argentine scholars admit that at the end of the day, both the government and the population recognize and respect Brazil's success and realize that Argentina is simply not in a position to match Brazil's growing influence.

FROM A REGIONAL TO A GLOBAL LEADER?

Brazil has been increasing its involvement in international affairs, aiming to be seen as a “soft power” nation that gets what it wants through attraction rather than through

coercion.¹⁹ Celso Lafer, Brazil's former foreign minister, with a nod to another former prominent Brazilian diplomat Gelson Fonseca Jr., explained how Brazil's foreign policy has evolved in the twenty-first century:

if the country was previously able to construct, with reasonable success, its possible degree of autonomy through a relative distancing from the world, then at the turn of the millennium this autonomy, necessary for development, can only be achieved through active participation in the elaboration of norms and codes of conduct for the governance of [the] world order.

Lafer added that “multilateral fora constitute, for Brazil, the best chessboards for the country to exercise its competence in the defense of national interests.”²⁰

From Brazil's point of view, the value system that underpins its foreign policy serves as an asset when it comes to global politics. Its approach is based on respect for other developing countries, a desire and ability to help others, prioritization of development, and an emphasis on the democratization of world institutions, such as the UN, the World Bank, the International Monetary Fund, and the World Trade Organization (WTO).

Through its international engagement, Brazil has created development benefits for fellow developing countries. It undertakes these efforts in an attempt to see more democratic and just governance structures in the fields of the environment, healthcare, and multilateral trade in particular. Fundamentally, as Brazilian academics and experts point out, these efforts are also about promoting Brazil's own national interests and getting itself a seat at the global governing institutions.

Brazil has played a prominent role in negotiations on global environmental and sustainable development issues, hosting large multilateral forums, such as Rio+20 and the UN Conference on Environment and Development. Brasília has invested heavily in helping developing countries deal with public health challenges.²¹ In the realm of multilateral trade, Brazil has become one of the key players in the Doha Development Round, the WTO's forum for negotiating global trade issues. And in 2013, Brazil's Roberto Carvalho de Azevêdo became the WTO's secretary general.²²

Over the last decade Brazil has also been investing politically and economically in cooperation with developing countries, known as South-South cooperation. Brazil believes that global financial and political institutions fail to adequately represent the rising South.

Brazil has pursued South-South cooperation through a range of multilateral groupings. A trilateral dialogue between India, Brazil, and South Africa (IBSA) was launched in 2003, and it acts as forum for three regional leaders to develop common positions

on international issues and to promote South-South cooperation in all its forms. Cooperation under IBSA covers a number of areas, from defense and energy to trade and health, just to name a few. Brazil is a member of the BRICS along with Russia, India, China, and South Africa. Launched in 2009, the BRICS are large and fast-growing economies that seek greater representation for emerging and developing economies in international financial institutions.

Brazil is no longer satisfied with being on the outskirts of global politics. Brasília argues the country has reached a point where the size of its economy, the pace of its development, its role in the region, and its international credentials have to be formally acknowledged by the international order. It seeks that acknowledgement by pursuing acceptance in the exclusive club of UN Security Council permanent members. The level of priority the government assigns to achieving this permanent seat fluctuates, but Brazil believes that it should become a new permanent member of the Security Council if the body is ever reformed.

In its quest to raise its international profile, Brazil has taken the lead on a number of UN-led peacekeeping missions over the last two decades. A total of 27,000 Brazilian personnel have served on such missions.²³ Most notably, Brazil has played a leadership role in the UN Stabilization Mission in Haiti, providing military and political personnel to the mission since 2004. It also led the military command of the mission.²⁴

Some Brazilian observers outside of government find a permanent seat on the UN Security Council of questionable utility because even if Brazil gets a seat, it would not have veto power. The majority of Brazilian experts interviewed share the opinion that if Brazil manages to get a permanent seat at the UN Security Council, it would only be able to support the positions of major powers. But joining only to validate major powers is not desirable. As a former Brazilian ambassador noted, “If Brazil gets a permanent seat, it cannot vote according only to the U.S. interests. Brazil hopes to have a role as a consensus builder. The population would simply laugh at the government if we only rubber-stamped U.S. decisions.”

For those within the Brazilian establishment who believe their country should have a permanent seat, the most important benefit is an opportunity to influence from within, to provide consultation before any military action in Latin America, and to represent the region’s interests at the council. There is irony in the latter point since Brazil struggles to secure support for its bid from key countries in the region—Argentina,

Brazil is no longer satisfied with being on the outskirts of global politics.

Like a majority of non-nuclear-weapon states, Brazil views the nuclear order as an unfair arrangement based on an unfulfilled bargain of the Treaty on the Non-Proliferation of Nuclear Weapons between nuclear “haves” and “have-nots,” a promise of the five recognized nuclear-weapon states to work toward disarmament and of all other signatories not to develop nuclear weapons.

Mexico, and Colombia. Regional support—or lack thereof—will affect Brazil’s chances for a permanent seat.

For Brazil, the global nuclear order is a microcosm of the global world order. Brazil believes both the global nuclear order and the world order must become more equitable. Like a majority of non-nuclear-weapon states, Brazil views the nuclear order as an unfair arrangement based on an unfulfilled bargain of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) between nuclear “haves” and “have-nots,” a

promise of the five recognized nuclear-weapon states to work toward disarmament and of all other signatories not to develop nuclear weapons.

Brazil’s discontent with the global nuclear order represents a view shared by too many countries to ignore. And Brazil, more than any other similarly minded country, has the potential to impact the international nuclear regime in both positive and negative ways.



“In a crisis, we are on our own.”

—BRAZILIAN ANALYST ANTONIO JORGE RAMALHO

GHOSTS OF THE PAST

BRAZIL'S NUCLEAR POLICY TODAY cannot be analyzed in a vacuum or without looking back at its past. And two threads from the past are pivotal in Brazil's evolving nuclear identity. First, the negative experiences Brazil had with restrictions on transfers of nuclear technology from abroad help explain its search for independence in the nuclear field today. And second, the relationship between Brazil and Argentina has been especially formative. It evolved from a rivalry that fueled nuclear programs to a relationship that could accommodate a bilateral nuclear safeguards system, a key component of Brazil's nuclear policy today.

A FRUSTRATING NUCLEAR HISTORY

The country has been eager to develop its nuclear sector since the 1930s, and in 1951 the Brazilian government established the National Research Council tasked with coordinating the development of nuclear energy. Alvaro Alberto, Brazil's representative to the Atomic Energy Commission at the United Nations, who promoted the development of nuclear energy in Brazil, was appointed to lead the council.²⁵ The council was later renamed the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico, CNPq).

In its quest for nuclear technology Brazil turned to the international community. In 1953–1954 Brazil attempted to acquire components of uranium enrichment technology from West Germany and France but did not succeed. The United States blocked attempts to transfer three ultracentrifuges from West Germany to Brazil, acting on its concerns about the potential for nuclear proliferation.²⁶ Plans to import nuclear technology from France did not materialize either because Brazil was experiencing domestic political turmoil; in 1954, the then president, Getúlio Vargas, who had negotiated the transfer, committed suicide. For a brief period the Brazilian government reverted to seeking cooperation with the United States under the Atoms for Peace program, which allowed for the export of nuclear technology and material from the United States to third countries. In 1955 Brazil and the United States signed an agreement on building a nuclear research reactor in Brazil, the first one in Latin America.²⁷

In 1967 the then Brazilian president, Marshal Artur da Costa e Silva, and his military government made the formal decision to develop a full nuclear fuel cycle.²⁸ Brazil was interested in developing the nuclear sector for a multitude of energy, industrial, and scientific purposes. The government argued that the rising oil prices in the early 1970s pushed Brazil to look for diverse sources of energy, including nuclear. However, the former secretary of state of science and technology, José Goldemberg, maintains that the military government only used the oil crisis of 1973 as a cover.²⁹ Another factor in Brazil's push was Argentina's progress in the nuclear field, which itself stemmed from a desire to maintain technical equivalence with Brasília. But above all, Brazil saw nuclear technology as a symbol of modernity that would provide the country with both international recognition and self-confidence.

In 1971 Brazil's National Nuclear Energy Commission (Comissão Nacional de Energia Nuclear, CNEN) reached an agreement with the U.S. company Westinghouse and the U.S. Atomic Energy Commission, the sole U.S. provider of enrichment services, to build Brazil's first nuclear power plant, Angra 1. Under the terms of the contract, the United States guaranteed that it would supply the plant with nuclear fuel produced with uranium enriched at the Oak Ridge National Laboratory.

Brasília attempted to renew the contract with Westinghouse after 1973 but sought to acquire the full fuel cycle, including the capacity to enrich uranium. Brazil had not signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) at that point, which was a matter of concern for the United States. In compliance with U.S. nonproliferation policy, Westinghouse denied those requests but offered to develop more nuclear reactors on the condition that Brazil would continue to rely on U.S. nuclear fuel.³⁰

In May 1974, India conducted a nuclear test, triggering a review of U.S. nuclear policy. In the aftermath of the test, the chairman of the U.S. National Security Council

Under Secretaries Committee recommended in a secret memo to the U.S. president, Richard Nixon, that “the most effective approach to slowing down the spread of nuclear weapons is for the advanced nuclear industrial states to tighten controls on weapons-usable material and related production capabilities.” More specifically, the memo urged Washington to “restrict the spread of independent national uranium enrichment and chemical reprocessing facilities.”³¹

Around the same time, bureaucratic battles within the United States over its enrichment services went into overdrive. The White House’s goal was for the enrichment business to be privatized to ease the burden on the government. To reach this goal, the White House pushed the U.S. Atomic Energy Commission to make enrichment services more commercially viable. The commission was ordered to play by new rules of supply: if in the past countries had received a guarantee from the United States of the fuel supply for the life of an imported reactor, now they would have to commit to purchasing enriched uranium at specified dates.

The limited window during which importing countries could secure supplies resulted in an artificially inflated demand. On top of this, privatization battles stalled the Atomic Energy Commission’s expansion of its enrichment capacity. All this caused the commission to hit a ceiling for enrichment-services orders.³² As a result, the Atomic Energy Commission suspended the signing of new contracts to supply enriched uranium to third countries and classified existing contracts to supply fuel to 45 foreign reactors as “conditional” due to the projected inability of U.S. enrichment plants to meet demand,³³ including two contracts in Brazil. These changes in U.S. policy encouraged countries to become more self-sufficient and less dependent on the United States for these nuclear materials.³⁴

As part of the change, the Atomic Energy Commission withdrew the fuel guarantee for Angra 1—a kiss of death for Brazil’s negotiations with Westinghouse to sign a \$10 billion contract to supply Brazil with up to twelve nuclear reactors.³⁵ The fuel crisis was both “bad and good” according to Brazilian observers. As the first Brazilian secretary of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) Carlos Feu Alvim noted, “we became aware of the importance of autonomy.”

Brazil became even more determined to acquire a full nuclear fuel cycle and subsequently looked for partners elsewhere, engaging in negotiations with France and West Germany. France allegedly offered to work on a gaseous diffusion plant for uranium enrichment.³⁶

In 1975 Brazil and West Germany signed a major agreement on nuclear cooperation. West Germany committed to building up to eight nuclear reactors in Brazil and to transfer full nuclear-fuel-cycle technology to Brazil. Under the agreement, Brazilian specialists would train in West Germany. Washington, concerned about Brasília’s intentions in the nuclear field, put heavy pressure on Bonn to cancel the transfer of sensitive fuel-cycle technology.

Bonn did not give in to Washington entirely, but the only uranium enrichment technology West Germany agreed to transfer to Brazil was the “jet-nozzle” method, in its early stages of development and far from being industrialized. Similarly, in response to pressure, Brazil agreed to put all relevant facilities under international safeguards.

Notably, attempts to dissuade West Germany from cooperating with Brazil came not only from the United States but from the Soviet Union as well. According to a *Der Spiegel* article at the time, the Soviets pressured Bonn not to transfer enrichment and reprocessing technology to Brazil.³⁷

Brazil had high hopes for its cooperation with West Germany. According to Norman Gall, a U.S. journalist based in Latin America, the commanding general of the First Army in Rio de Janeiro called cooperation with West Germany a “decisive step that reinforces the country’s sovereignty.” And Brazil’s foreign minister, Antonio Azeredo da Silveira, pointed to Brazil’s new technological and political status as a result of the nuclear agreement.³⁸

The U.S. president, Jimmy Carter, who assumed office in 1977, took an even tougher stance on nonproliferation than his predecessors. Under Carter, Washington further strengthened the U.S. policy designed to prevent Brazil’s acquisition of nuclear technology from West Germany. Silveira called the U.S. position “radical.”³⁹ In a letter to Brazilian President Ernesto Geisel, he lamented that Carter “decided to promote a real revolution in the treatment of the question [of cooperation between Brazil and Western Germany].” He deplored the “high intensity” of U.S. diplomatic efforts to disrupt cooperation, “the predictable effort to revise the NPT,” and “the mobilization of the international press.”⁴⁰

The Silveira letter indicates that the U.S. side suggested that Brazil should indefinitely postpone uranium enrichment and reprocessing in exchange for a guaranteed fuel supply.⁴¹ Silveira noted in his letter to Geisel:

The possibility of guaranteed supply of nuclear fuel in exchange for the indefinite postponement of uranium enrichment and reprocessing, besides being inefficient (because it encompasses only the part of the Brazilian program already agreed with the FRG [West Germany]) its progress is also unpredictable, since one cannot imagine how the international reality may evolve, politically or economically, and neither what conditions might be imposed, in the future, on such supplies. Paradoxically, in accordance with the American proposal of indefinite postponement, Brazil would have made huge investments at the cost of sacrifices that I do not need to characterize, only to find itself, at the end of the process, in a permanent situation of dependence.⁴²

Brasília was defiant and committed to pursuing cooperation with West Germany. The following statement from a Brazilian official from the Ministry of Mines and Energy summarized the position his country adopted:

Our nuclear program will continue, at least to the extent it depends on us, against all internal and external pressures. The Germans know that we acted with seriousness in signing the agreement. We do not want the atomic bomb. We want to be independent, to construct our future, and to prevent (the effects of) any future world petroleum and energy crisis. Brazil will not give way.⁴³

A declassified memo from Silveira to Geisel reveals that Brazilian diplomats anticipated both negative and positive incentives from the United States aimed at disrupting this Brazilian-German agreement. While the diplomats prepared a comprehensive menu of possible tactical moves Brazil could make in response to United States, they also recognized it was unrealistic to expect that the U.S. government could “be convinced by the Brazilian arguments, regardless of how smoothly they [were] presented.”⁴⁴

U.S. efforts aside, it became obvious that cooperation with West Germany would not bring Brazil closer to acquiring a full nuclear fuel cycle. While the two countries worked well in reactor construction, serious problems plagued the development and adoption of West Germany’s enrichment technology. According to Alvim, “Germany’s jet-nozzle technology did not work well and, in the best scenario, would be uneconomical. The Brazilian scientists were against it.”

The U.S. Nuclear Non-Proliferation Act, signed into law in 1978, provided yet another indication that Brazil would have a tough time trying to develop its nuclear sector while relying on its foreign partners. The act imposed further restrictions on countries wishing to import nuclear technology from the United States because it required recipient states to adopt nuclear safeguards.

The U.S. policy of discouraging transfers of nuclear technology, including attempts to disrupt Brazil’s deal with West Germany, left a lasting impression on Brazil’s political elites and scientists. Brazilian scholar Paulo Wrobel wrote that Brazil viewed these efforts “as attempts at denying industrializing countries access to the socio-economic benefits of nuclear energy and technology.”⁴⁵ Even decades later, Brazilians still refer to the problems they experienced as a result of fuel disruptions and U.S. pressure on West Germany. According to Latin America experts Ralph Espach and Joseph Tulchin, the “interference in the country’s industrial and technological development touched a deep nerve in Brazilian sensibilities and provided evidence to the nationalists of both right and left who viewed the United States as a self-interested rival, not a partner.”⁴⁶

Problems with fuel supply from the United States, unsuccessful cooperation with the Germans on the jet-nozzle enrichment of uranium, and consolidation of tougher U.S. nonproliferation policies under Carter only further solidified the resolve of Brazilian political, military, and technical elites to develop an independent nuclear fuel cycle.

BRAZIL AND ARGENTINA: RIVALRY NOT ARMS RACE

Rivalry with Argentina was another important reason for Brazil's push in the nuclear field. The second largest country in South America after Brazil, Argentina's rapid economic development and achievements in science and education in the early twentieth century made it the only counterweight to the hemisphere's hegemon. Buenos Aires launched efforts to develop the country's nuclear sector in the 1950s. Like Brazil, Argentina at first relied on foreign partners to obtain nuclear technology, primarily the United States and Germany. Both countries had to deal with restrictions on imports of nuclear technology from supplier countries.

By the early 1970s Argentina's nuclear program was well ahead of Brazil's. Argentina operated six major centers for nuclear research, and by 1974 it put into operation Latin America's first nuclear power plant.⁴⁷ Four years later, Buenos Aires announced plans to construct a pilot reprocessing plant in Ezeiza. Eventually, Argentina would construct a gaseous diffusion enrichment plant at Pilcaniyeu, and during its period of military rule (starting in 1978), it pursued a secret nuclear program.

Brazil and Argentina are often depicted as having been involved in a regional arms race.⁴⁸ However, a new generation of scholars, especially from the region, emphasizes that in fact it was a regional rivalry—not an arms race—that helped drive the nuclear quest in both countries.⁴⁹ The two states watched each other's progress in the nuclear field with keen interest, neither wanting to fall behind in the development of their respective nuclear sectors. All the while, neither country perceived the other as a serious threat. Indeed, underneath the rivalry, Argentina and Brazil shared a belief that having an independent nuclear fuel cycle was important.

In this respect, Argentina's reaction to Brazil's cooperation with West Germany in the nuclear field is emblematic of the bilateral relationship. Archival material analyzed by historians Rodrigo Mallea and Carlo Patti confirms that while Buenos Aires did not want to see its neighbor surpass it in nuclear sophistication, Argentina supported Brazil's efforts to develop an independent nuclear fuel cycle as a matter of principle.⁵⁰ Patti quotes the then Argentine ambassador to Canada, Esteban Takacs, who affirmed in a conversation with his Brazilian counterpart that the Argentine government should officially support Brazil in its agreement with West Germany. Takacs apparently said that if the United

States successfully impeded cooperation between Brazil and West Germany, Argentina's nuclear program would be next.⁵¹

THE MILITARY'S PARALLEL PROGRAM

Similar to Argentina's experience, by the late 1970s, the Brazilian military, disillusioned with the outcomes of cooperation with West Germany, persuaded the government to establish a secret nuclear program that ran parallel to the official civilian nuclear program.⁵² With coordination support from CNEN, all three branches of the Brazilian military were engaged in this effort.⁵³ The air force launched a program on laser enrichment, justifying it as necessary for developing special air vehicles. The army attempted to develop a graphite-gas reactor, citing its need for metallic uranium and graphite. The development of such a reactor might have meant that the army explored ways to produce plutonium by means of that reactor. Separately, Brazil's Nuclear Energy Research Institute (Instituto de Pesquisas Energéticas e Nucleares, IPEN, at the University of São Paulo) conducted research on reprocessing technology for spent fuel in a project known as Celeste.

But the navy's pursuit of uranium enrichment and a nuclear submarine program was the most determined and sustained effort of the entire parallel nuclear program. The Brazilian Navy launched two projects under the parallel program: Ciclone (Cyclone) for developing a fuel cycle and Remo (Row) for developing naval nuclear propulsion.

The navy's nuclear-fuel-cycle efforts were driven by the ambition to build a nuclear-powered submarine. Sixty engineers and 120 technicians worked on the navy's portion of the parallel program. However, the navy shrouded the program in secrecy, and only four-star admirals were aware of all its elements, according to João Roberto Martins Filho, a Brazilian defense analyst.

The navy implemented the initial stage of its fuel-cycle project at an impressive speed, carrying out its work at IPEN. By 1981 the navy had built two centrifuges for uranium enrichment, and by 1984 it ran nine centrifuges at IPEN. According to Filho, "the navy built the centrifuges very rapidly because they were sensing the military regime was coming to an end."

There is no consensus within Brazil about whether the government or the military had weaponization plans and how far those plans were taken. Analysis written by non-Brazilians argues that Brazil was pursuing a nuclear-weapons program.⁵⁴ Some experts in Brazil agree with that assessment, and Brazilian media claim that the leadership considered building a weapon.⁵⁵ But Brazilian historians, who recently received an opportunity to study primary documents on the evolution of Brazil's nuclear policy and the driving forces behind it, offer a more nuanced picture.

Documents from the late 1970s and 1980s indicate that some branches of the military were interested in weaponization, but there was no political decision to build a bomb. According to Brazilian historian Matias Spektor, the military offered Brazil's top leadership a weaponization option on at least three occasions but did not receive a "green light" to proceed. Archival evidence obtained by Patti and Mallea indicate that those weaponization offers came from some groups within the air force, but not the navy—the branch of Brazilian military that turned out to be most successful in the nuclear field.

The air force's and the army's projects eventually fizzled, but the navy's program continued, unabated by the dramatic changes in the political landscape of Brazil.

RAPPROCHEMENT WITH ARGENTINA

Meanwhile, Brazil and Argentina were moving closer to one another. By the mid-1980s Brazil and Argentina disclosed their secret programs and started cooperating in the nuclear field, most importantly in the area of nuclear safeguards. Solidifying their nuclear relationship, in 1985, Brazil's first civilian president, José Sarney, and Argentine President Raúl Alfonsín signed the Joint Declaration on Nuclear Policy. The agreement addressed the challenge of nuclear technology restrictions head-on: "Such cooperation will enable both countries to be in a better condition to face the growing difficulties arising in the international supply of nuclear equipment and materials."⁵⁶

The commonly accepted narrative holds that a change from military dictatorships to democratically elected civilian governments in both countries was the key to the nuclear rapprochement.⁵⁷ But in fact, the foundation for rapprochement was laid earlier, as new studies based on previously unavailable archival documents demonstrate. Mallea documents a series of attempts by Argentina first and then Brazil to engage in bilateral cooperation in the nuclear field starting in the late 1960s, when both countries were ruled by their militaries. Those attempts failed, mostly due to unresolved disputes over natural resources.⁵⁸

A dispute over the La Plata River basin, one of the world's largest river basins and shared by Argentina, Bolivia, Brazil, Paraguay, and Uruguay, was at the heart of Brazil-Argentina tensions. In 1966 Brazil and Paraguay agreed to build the Itaipu Dam on one of the rivers contributing to the La Plata River basin. They sealed their intention with the Treaty of Itaipu in 1973. Argentina, as an outside party, had serious concerns about the dam's environmental consequences and impact on Argentina's own water resource development.⁵⁹ In 1979 Brazil, Argentina, and Paraguay settled the dispute by signing the Itaipu-Corpus Multilateral Treaty on Technical Cooperation.

By 1980 bilateral nuclear cooperation became possible not least because the two countries resolved the dispute over the dam. Subsequently, Brazil and Argentina signed the Cooperation Agreement for the Development and Application of the Peaceful Uses of Nuclear Energy. The two South American countries thus established the groundwork for a nuclear rapprochement before Brazil's military regime transitioned from power in 1985.

Other factors, beyond the dam dispute, were important as well. Former Argentine diplomat Julio Carasales lists a whole range of domestic reasons for the rapprochement: among them favorable national political circumstances, economic difficulties, the advent of civilian leadership, positive presidential leadership, and the active role of foreign ministries.⁶⁰ Brazilian interviewees also remind that Brazil's last president in office during the military rule—João Batista de Oliveira Figueiredo—had a strong personal attachment to Argentina, where he spent part of his youth. His father, General Euclides Figueiredo, was exiled in Argentina for ten years for attempting to overthrow the dictatorship of President Getúlio Vargas.

And external factors played a decisive role in the two countries' pull toward cooperation in the nuclear field. Brazil and Argentina believed cooperation would help them overcome external suspicion about the goals of their nuclear programs. They were similarly united in their discontent that the key nuclear suppliers, especially the United States, imposed restrictions on the transfer of nuclear technology and made it difficult for the two countries to develop their nuclear sectors.



“Brazil wants to know how to do things, rather than being forever dependent on foreign technology.”

—FORMER SENIOR BRAZILIAN DIPLOMAT

THE NAVY'S NUCLEAR PROGRAM AFTER MILITARY RULE

WHILE BRAZIL'S DOMESTIC POLITICAL SITUATION and its regional environment underwent a major transformation, the navy's nuclear-fuel-cycle and nuclear submarine projects remained constant components of Brazil's nuclear landscape. Even after the military government transitioned out of power and the first civilian president took office in 1985, the military retained significant authority, and the navy continued work on uranium enrichment and the nuclear submarine programs. Under subsequent civilian governments, the navy's program persisted, and its survival was never jeopardized despite fluctuating funding levels.

In the early 1990s the second civilian government of President Fernando Collor de Mello fully disclosed and shut down the parallel nuclear program. Despite that fact, and that Collor reduced funding for the nuclear submarine program, his appointment of Admiral Mario César Flores, one of the main supporters of the submarine program, as the minister of the navy guaranteed enough funding for the program to survive. Under Presidents Itamar Franco (1992–1994) and Fernando Henrique Cardoso (1995–2003), the submarine program's funding was cut further. Yet, despite Brazil's economic woes and the decline in funding, the nuclear submarine program was kept afloat.

When Luiz Inácio Lula da Silva became president in 2003, he reemphasized the importance of the nuclear submarine program. Politically, Lula's endorsement of the submarine program removed some of the tarnish left over from the military regime. Projects associated

with the military dictatorship tend to be viewed in a negative light; since Lula came from a nonmilitary background, his support meant quite a lot. A Brazilian academic who studied the evolution of the submarine program, João Roberto Martins Filho, said, “When Lula came to power, the program became clean. The Left had sympathy for it.”

By 2005, engineers from the navy and a company specializing in building heavy components for nuclear equipment—Nuclebrás Equipamentos Pesados SA (NUCLEP)—manufactured a reactor pressure vessel for installation in the land-based submarine reactor prototype.

Lula deepened support for the submarine program during his second term. In 2007, he visited the navy’s Aramar Experimental Center together with the man behind the navy’s original enrichment program, Othon Pereira da Silva.⁶¹ The Aramar Experimental Center, located in Iperó, houses nuclear-fuel-cycle-related facilities; it is a part of the Navy Technology Center in São Paulo (Centro Tecnológico da Marinha em São Paulo, CTSMF). Lula announced that he would authorize the equivalent of \$63 million per year (1 billion Brazilian reais for the period of eight years) to revitalize the program. The navy welcomed the promised money that would come in addition to its own budget.

In September 2008, Brazil established the General Coordination Program for the Development of a Nuclear-Powered Submarine with a projected annual budget of \$250 million.⁶² In December, Brazil and France signed a cooperation agreement to develop conventional and nuclear submarines. According to the agreement, Brazil and France would build four diesel-electric submarines, and France would provide assistance with developing the non-nuclear components of one nuclear submarine.⁶³ According to official statistics, in 2008 the Brazilian government authorized approximately \$300 million for building a shipyard and a naval base for the submarines.⁶⁴

In August 2012 the government created a public enterprise, the Blue Amazon Defense Technologies (Amazônia Azul Tecnologias de Defesa, Amazul) to develop a nuclear submarine.⁶⁵ And in March 2013 President Dilma Rousseff inaugurated the naval shipyard where engineers will build conventional submarines and, eventually, nuclear submarines.⁶⁶ A joint construction company—Itaguaí Naval Construction (Itaguaí Construções Navais)—created by Brazil’s Odebrecht and France’s DCNS will build the submarines. It is expected that that the land-based submarine reactor prototype will be ready by 2015–2016, and Brazil will commission the first nuclear submarine by 2025, with plans to eventually build six of them.⁶⁷

The most intriguing part of Brazil’s nuclear submarine program is the component outside of Brazilian-French cooperation: the naval propulsion reactor to be built by the Brazilians. The reactor is expected to become operational in 2014.⁶⁸ Naval engineers are working on a prototype reactor for naval propulsion at the Navy Technology Center at the University

of São Paulo. According to Brazilian media and experts, the prototype nuclear propulsion reactor will be installed in a 9.8-meter hull, fitted for a PWR (pressurized water reactor) loop-type system.

From the nonproliferation point of view, the type of fuel Brazil chooses for its nuclear submarine is important. Nuclear submarines can run on low-enriched uranium (LEU), uranium enriched up to 19.9 percent, or highly enriched uranium (HEU), uranium enriched to at least 20 percent. The United States and the United Kingdom use uranium enriched to more than 90 percent in their submarines, while Russia uses uranium enriched to more than 20 percent. France moved from using HEU to LEU in its submarines, and China reportedly uses LEU to power its fleet. Production of 20-percent-enriched uranium in non-nuclear-weapon states is generating some controversy in the nonproliferation field because once uranium is enriched to 20 percent, most of the isotope separative work needed to reach 90 percent enrichment (weapons grade) is done.

All indications are that Brazil will power its submarines with fuel produced from uranium enriched to 18–19 percent, a figure mentioned in an interview a few years ago by the then chairman of Brazil's National Nuclear Energy Commission (Comissão Nacional de Energia Nuclear, CNEN), Odair Gonçalves.⁶⁹ As a matter of principle, Brazilian technical experts stress that it is Brazil's sovereign right to decide what type of fuel to use.

The navy enriches uranium up to 5 percent at Aramar Experimental Center in Iperó. However, according to Leonam dos Santos Guimarães of Eletronuclear, a Brazilian company that builds and operates nuclear power plants, if Brazil were to request it, operations involving enriching uranium up to 20 percent could be authorized by the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the International Atomic Energy Agency (IAEA) under special safeguards arrangements. Such operations took place on a few occasions to produce fuel for a research reactor IEA-R1 at Brazil's Nuclear Energy Research Institute (Instituto de Pesquisas Energéticas e Nucleares, IPEN).

The navy leases uranium enrichment technology to a state-owned company overseeing the civilian nuclear fuel cycle—Brazilian Nuclear Industries (Indústrias Nucleares do Brasil, INB)—for use at the Nuclear Fuel Factory at Resende (INB Resende).

WHY DOES BRAZIL WANT A NUCLEAR SUBMARINE?

External observers are perplexed by Brazil's nuclear submarine program. Why does Brazil seek nuclear-powered and not just conventional submarines? What types of threats does Brazil seek to deter? Critically, some of them ask whether Brazil's end goal is to develop

a latent nuclear-weapon capability and the nuclear submarine project is the first step. Brazilians react to this slew of “why” questions with “why not?” to use Guimarães’s trademark phrase.

The external observers who ask questions about Brazil’s nuclear submarine program should accept the fact that multiple factors drive the Brazilian program and they are not always connected. Sometimes, they are even contradictory. Brazil’s quest for a nuclear-

Brazil’s quest for a nuclear-powered submarine appears to be a net result of different groups pursuing the same objective for different reasons.

powered submarine appears to be a net result of different groups pursuing the same objective for different reasons.

The driving forces behind Brazil’s nuclear submarine program can be divided into three major categories: strategic, bureaucratic, and technological. But above all,

Brazil’s quest for a nuclear submarine reflects a desire to attain a greater place in the international system. The program is indicative of how Brazil perceives the outside world and how it perceives itself within the system.

Strategic Drivers

Conversations with Brazilian experts and texts of doctrinal documents, taken at face value, provide a slightly confused picture of the main strategic drivers behind the nuclear submarine program. Several themes emerge: protection of the coast, protection of natural resources in off-shore waters, protection against an undefined enemy, and protection against the most likely potential aggressor—the United States. Protection of natural resources is questioned by some in Brazil as the navy’s effective talking point and not a real mission for the nuclear submarine. It is not clear whether the navy’s actual strategic thinking revolves more around an undefined threat or a potential threat from the United States. The latter seems to feature prominently in expert discourse. However, U.S. anti-submarine warfare capabilities and the fact that they could negate potential Brazilian nuclear submarine power raise questions about whether the rationale for Brazil’s nuclear submarine program can ever be about deterring a potential U.S. threat.

Protection of the coast, meanwhile, emerges as an undisputable and overarching rationale for the program. The Brazilian Navy launched its nuclear submarine program almost forty years ago in a strategic environment quite different from the current one. Thus, qualitative changes in the international system may have shifted the strategic drivers of the nuclear submarine program. However, Brazilian analysts point out that Brazil’s

unchanging military imperative will always be to prevent potential aggressors from threatening Brazil's coastline, even though the international context changes. This is because Brazil has an 8,000-kilometer-long coast and 70 percent of its population lives within 200–300 kilometers of the coastline. Brazil's National Defense Strategy (2008) stated: "The priority is to ensure the means to deny the use of [the] sea to any concentration of enemy forces approaching Brazil from the sea."⁷⁰ Or, in the words of Rodrigo Moraes, a Brazilian defense analyst: "the battles should be fought far away from the coast, as Brazilian population, economic activities and energy sources are concentrated along the coast or off the coast and for that reason nuclear submarines would be very important."

The focus on defending Brazil's naval surroundings is natural and ineluctable for several other reasons. The country is the largest and most powerful on the South American landmass, so none of its neighbors is likely to pose a major threat by land. Larger powers, which could theoretically threaten Brazil, would need to come by sea, as the colonial powers did centuries before.

Defending Brazil's waters has become even more important because of large oil reserves off Brazilian shores, the discovery of which the government announced in 2007. Brazil's oil company Petrobras found significant oil reserves in the pre-salt layer between the states of Santa Catarina and Espírito Santo. Petrobras also discovered oil of higher quality in the Santos Basin,⁷¹ and preliminary estimates indicate the amounts might compare in size to all reserves ever previously discovered by Petrobras.⁷² Brazilian experts believe that pre-salt explorations will make Brazil a major oil exporter in five to ten years.⁷³

Brazilian observers often say that Brazil is concerned that rich natural resources in the seabed off of its coast might attract unwanted attention from foreign powers. Martins Filho notes that the "protection of oil and other resources at sea is at the heart of the defense rationale of the submarine program." According to him, the navy used this narrative to influence the National Defense Strategy, but he cautioned that this particular explanation could be qualified more as "an effort of propaganda," not the primary purpose for the nuclear submarine.

External observers question whether a nuclear-powered submarine is the best tool to protect offshore oil platforms.⁷⁴ A former U.S. diplomat and navy veteran Paul Taylor suggests that "a fleet of small, fast surface ships could be built for the price of a single nuclear submarine and would also present a visible deterrent to anyone attempting to jeopardize Brazilian control of the platforms."⁷⁵

It is not totally unheard of for a country to seek naval military capabilities without reference to a particular country that might threaten it. In the brief period after the Cold War and before the September 11 attacks on the United States, Washington did not have an obvious peer rival. American strategists and defense industry leaders argued that the United States should pursue a "capabilities-based" strategy rather than a "threat-based"

one.⁷⁶ Similarly, in the post–Cold War period Brazilian naval thinking started to shift away from concepts of “hypotheses of war” with any particular country in favor of the concept of “strategic vulnerabilities.” The core of the new concept is the emphasis on all points in which a country is vulnerable to any external enemy.⁷⁷ As a Brazilian expert remarked: “It is impossible to predict who the enemy in twenty to thirty years will be,” and a Brazilian government staffer explained: “We want to prepare ourselves in case anyone wants to harm Brazil.” A government could desire the capability to conduct long, quiet underwater patrols and, potentially, deter an adversary’s navy from encroaching on its zone of economic control even without a particular foe in mind.

But in Brazil’s case, the sense of naval threat is more real than that. Brazilians remember vividly Argentina’s experience with Great Britain in the 1982 Falklands/Malvinas War when a British nuclear submarine sank an Argentine cruiser, killing more than 300 Argentine sailors. Many in Brazil believe that one submarine decided the war. Though the Brazilian Navy launched the nuclear submarine program a decade before the war, Argentina’s experience is often cited today as an example of why Brazil needs a nuclear submarine. In the words of Guilherme Camargo, a Brazilian nuclear engineer, “the Malvinas War forever marked Brazil.” Brazil supports Argentina’s sovereignty over the islands, which makes Argentina’s experience in the war an even more disturbing event in the eyes of Brazilians.⁷⁸

Brazilian defense observers point out that Brazil has concerns about a potential military presence of the North Atlantic Treaty Organization (NATO) in the South Atlantic. Inconclusive debates within the Alliance on whether it should expand its security cooperation to areas outside of the North Atlantic triggered those concerns. Brazil’s former defense minister Nelson Jobim addressed the issue head-on in 2010, voicing concerns about NATO’s ability to “interfere anywhere in the world on the pretext of counter-terrorism, humanitarian actions, or prevention of threats to democracy or environment.” Jobim warned that the South Atlantic was “a strategic area of vital interest for Brazil and argued that “the South Atlantic has security questions which are very different from those in the North Atlantic.”⁷⁹

Brazil’s concerns about NATO are an extension of its concerns about the United States. No doctrinal document explicitly refers to the United States as a threat. However, the Brazilian academic community openly talks about its government’s concern over a potential threat from its northern neighbor. There is a common perception in Brazil that one government staffer summarized as follows: “if a country with a nuclear submarine capacity decides to explore Brazil’s seabed, the Brazilian Navy would not be able to deal with it without a nuclear submarine capacity of its own.”

A potential military threat from the United States features prominently in public opinion as well. In 2011 a Brazilian government think tank, the Institute of Applied

Economic Research (Instituto de Pesquisa Econômica Aplicada, IPEA), conducted a public opinion poll on matters of national defense among more than 3,700 Brazilians. According to the poll, when answering a question on which country might represent a military threat to Brazil over the next twenty years, over 37 percent of respondents named the United States (more than any other country).⁸⁰ In the same poll, more than 45 percent of respondents believed there was a threat of foreign military aggression in the region rich in pre-salt resources.⁸¹

It appears that two factors add to Brazilians' anxiety about their northern neighbor. First is the U.S. nonadherence to the United Nations (UN) Convention on the Law of the Sea. The United States signed the agreement relating to the implementation of the convention in 1994,⁸² but the U.S. Congress has yet to ratify it.⁸³ The convention "protects states' control over special economic zones stretching up to 200 nautical miles from the baselines from which the breadth of the territorial sea is measured."⁸⁴ As a former senior Brazilian diplomat noted, "ratification of the convention by the United States and its compliance with it would mean a greater sense of security not only for Brazil but for the rest of the world." But not everybody in Brazil agrees that U.S. ratification would make any difference. A former Brazilian Navy officer described the view that ratification "will not make any country feel more secure ... taking into account the fact that the United States has achieved an unprecedented feat of dominating all the world's oceans."

Another source of uneasiness for some in Brazil and in the region more widely has been the reestablishment of the U.S. 4th Fleet in July 2008, fifty-eight years after its last operation.⁸⁵ The 4th Fleet is responsible for U.S. Navy ships, aircraft, and submarines operating in the Caribbean, Central, and South America and the surrounding waters under the U.S. Southern Command.⁸⁶

When the United States announced the reestablishment of the 4th Fleet, South American governments expressed concern about potential U.S. involvement in their internal affairs and about U.S. power projection in the region. Brazil's President Lula openly questioned U.S. motives in the region and even sent his defense minister, Nelson Jobim, to Washington to demand an explanation for the reestablishment of the 4th Fleet. Brazilian media reported that the Brazilian Federal Senate requested a meeting with Jobim on the subject.⁸⁷ The details of the conversations between Jobim and his U.S. counterparts are not readily available, but it appears that after an initial spike in alarming rhetoric, Brazilian officials chose to de-emphasize concerns about the 4th Fleet.⁸⁸ When the media suggested the increase in Brazilian defense spending in 2009 was a response to the U.S. reactivation of the 4th fleet, Minister of Strategic Affairs Roberto Mangabeira Unger stated that "We do not work based on enemies or threats; only on capacities we need."⁸⁹ Meanwhile, the Brazilian expert community and especially the media continued to be less sanguine.

Brazilian experts note additional reasons for their uneasiness over U.S. intentions in the region. Shortly before the United States reinstated the 4th Fleet, Brazil made its largest oil discovery in thirty years. According to one Brazilian defense analyst, the timing prompted Brazilian analysts to make a connection between Brazil's discovery and the resurrection of the 4th Fleet. Brazilian media reported that the head of Brazil's oil regulator, the National Agency for Petroleum, Natural Gas, and Biofuels or ANP, openly shared his concern that the United States would contest Brazil's rights over oil reserves in the exclusive economic zone off Brazil's coast. In response to Brazil's worries, the U.S. Navy official in charge of the U.S. Southern Command, Admiral James Stavridis, reaffirmed that "the United States will respect the territorial seas and exclusive economic zones of nations of the world."⁹⁰

According to retired U.S. Colonel Jay Cope, a senior research fellow at the Institute for National Strategic Studies, the surprise reestablishment of the 4th Fleet was purely an internal U.S. Navy administrative move, not an operational one. No ships were assigned; it was a redesignation of a peacetime planning headquarters. As an independent unit within the U.S. Navy, the 4th Fleet became a stronger voice in resource decisions that affect naval support of the U.S. Southern Command's mission. Cope admits that a failure to communicate the rationale behind the move in advance both domestically and in the Americas more broadly "played into the region's suspicions." According to Cope, "while it was explained well afterward, not everyone wanted to listen."

Concerns about the 4th fleet may not last for much longer. The fleet was on the chopping block because of across-the-board cuts in the U.S. federal budget. In January 2013, U.S. Chief of Naval Operations Jonathan Greenert stated that the navy might "stop all

deployments to the Caribbean and South America" if sequestration goes into full effect.⁹¹ And, indeed, by July, the U.S. Southern Command had zero combatant ships in the region.⁹² Regardless of whether cuts remain, this shows the low priority the U.S. government assigns to the 4th Fleet from a military point of view.

A fleet of nuclear-powered submarines will be less useful for specific defense tasks such as protection of fixed sites but might contribute to Brazil's more elusive goal of power projection in the South Atlantic and the world.

As for the discourse in Brazil, the strategic rationales for pursuing a

nuclear-powered submarine are diverse and sometimes contradictory. From an outsider's point of view, a fleet of nuclear-powered submarines will be less useful for specific defense tasks such as protection of fixed sites (oil rigs and platforms) but might contribute to Brazil's more elusive goal of power projection in the South Atlantic and the world.

Bureaucratic Drivers

Security threats alone do not explain the persistence of the nuclear submarine program, especially given that the threat assessments have changed from the late 1970s when the program began. The Falklands/Malvinas War frequently brought up by Brazilian experts as a motivation for their country's nuclear submarine program happened after the navy launched the program. Brazil's impressive natural resources, which the navy claims the nuclear submarine would protect, were discovered well after the submarine program was launched. What has remained consistent is the navy's commitment to the program.

The navy has a lot invested in the undertaking. Development of a nuclear submarine is without a doubt the navy's primary project and the "sole project for many navy engineers," as Moraes noted. It is only natural that the navy promotes the idea that Brazil is vulnerable to sea-based threats. As historian Matias Spektor said, "Threat perceptions as codified in the national security strategy documents highlight the challenge of securing the South Atlantic, which is largely consistent with the navy's quest for political support and budgets for the submarine program."

The navy calls the territorial waters "Blue Amazon," referencing a sense of vulnerability and determination to protect Brazil's territory that the inland Amazon forests evoke. This narrative, connecting Amazon forests and Brazil's sea riches, resonates with the public. Amazonia, an area uniquely rich in biodiversity, has always been a source of much attention from foreign observers. The interest has mainly come from groups that are interested in protecting the environment and sustainability but also from those set on exploiting Brazil's natural resources, such as rubber.

The Brazilian Navy has been impressive in its communication strategy and has ensured that Brazil's leadership viewed building a nuclear submarine as one of the most important national projects. As a result, both military and civilian governments have supported the program. The navy has successfully married the defense and development needs of Brazil in the field of nuclear power. Unusual for a doctrinal defense document, Brazil's National Defense Strategy lists development of uranium deposits and nuclear power plant construction along with fuel-cycle development for nuclear-submarine purposes as strategic tasks, transcending "the limits of defense and development."⁹³

The Brazilian Navy has ensured that Brazil's leadership viewed building a nuclear submarine as one of the most important national projects.

The navy's interest in driving a technologically challenging project fits into the broader role that the Brazilian military has historically played in science and technology development in areas such as aeronautics, engineering, and telecommunications.⁹⁴ Some of Brazil's most successful technological projects originated from the military. The military adopted French air traffic control technology CINDACTA (Centro Integrado de Defesa Aérea e Controle de Tráfego Aéreo or Integrated Air Traffic Control and Air Defense Center) and with time, the Brazilian commercial market fully absorbed the technology. Embraer's regional jets built with Italian Aeritalia and Aermacchi were spin-offs of a military project on ground-attack aircraft produced by AMX, a joint Italian-Brazilian venture.

Technology, Modernity, and Prestige

Any discussion with Brazilians on the motivations behind Brazil's nuclear submarine program turns to questions of modernity, technological independence, and prominence.

Both the nuclear submarine program and Brazil's nuclear power program more broadly fit into the country's quest for modernity. Academic Emanuel Adler highlights the role of the ideology of development and industrialization that drove Brazil's push for modernization.⁹⁵ The nuclear sector, in Adler's view, suffered from the inability of promoters of nuclear independence to agree on the best path for Brazil to achieve that aim. For example, different groups held different opinions about whether Brazil should have chosen a shortcut to nuclear independence by relying on foreign partners (cooperation with Germany) or chosen to make a more time-consuming investment in developing an indigenous nuclear sector. While there was difference on means, there was agreement on ends. The overarching ideological emphasis in Brazil has always been on achieving technological and economic independence.

Despite the fact that Adler's work is from the late 1980s and concerns Brazil's nuclear sector more broadly without any focus on the navy's projects, it provides a useful framework for assessing Brazil's current nuclear policy. In his analysis, "the general ideological consensus about industrialization as the way to progress, . . . the proliferation of antidependency ideas during the 1950s and 1960s in places of intellectual and political influence, . . . the basic nationalist views of scientists, and . . . the ad hoc alliance between the military and technocrats in pursuit of a common nationalist goal" were important ingredients for the country's success in science and technological field.⁹⁶ These factors serve as a useful backdrop for understanding Brazil's continuing search for technological independence.

Developing its own highly advanced technological programs appears to be very important to Brazil. Academic literature in the country on defense matters notes that since the 1970s

“naval thinking was concentrated on the tendency of the new order to consolidate what was configured as a kind of technological apartheid.”⁹⁷ Brazil’s 2012 National Defense White Book singled out nuclear submarine development as a key driver of national technological progress.⁹⁸ The 2008 National Strategy of Defense lists the development of a nuclear-powered submarine among the country’s projects that “require technological independence in terms of nuclear energy.”⁹⁹ As a former senior Brazilian diplomat noted, “Brazil wants to know how to do things, rather than being forever dependent on foreign technology.” Brazilian elites who think about nuclear issues point to the examples of Japan and Germany as models for Brazil. Both Japan and Germany succeeded in their nuclear technological advancement.

Brazil is seeking two types of technology in particular: uranium enrichment and submarine building. In the eyes of the military, the government, and industry, uranium enrichment technology carries a double value for Brazil. The country requires nuclear fuel to power both nuclear plants and nuclear submarines. The navy’s nuclear submarine project provided the most natural justification for the fuel-cycle-related work. That was partly the reason why the navy managed to sustain support for its work and eventually to successfully develop the technology, unlike the air force and the army who were forced to give up their pursuit of laser enrichment and graphite reactor technologies.

For many Brazilians, a nuclear submarine is also a status symbol. It is a sign of a technologically advanced, geopolitically important country. Brazilians often compare their country’s nuclear submarine program to the efforts of other economic powerhouses and regional leaders. Brazilian experts point out that Brazil stands alone among the world’s ten largest economies as a country that “does not possess, store or is, in some way, protected by nuclear weapons.”¹⁰⁰

Brazilians also point out that out of the large and fast-growing BRIC economies, Brazil is the only country that does not have a nuclear submarine.

During the 2013 inauguration of the submarine shipyard at Itaguaí, President Dilma remarked that

Brazil was entering “the select club of countries with nuclear submarines: the United States, Russia, France, Britain and China.”¹⁰¹ She called modernization of the navy a “strategic demand,” and the navy commander Julio Soares de Moura Neto said he hoped that Brazil would have a naval force commensurate with the country’s importance on the international scene.¹⁰²

For many Brazilians, a nuclear submarine is a status symbol. It is a sign of a technologically advanced, geopolitically important country.

THE CHALLENGES

Despite the support, questions persist as to whether the sought-after nuclear submarine will materialize any time in the foreseeable future. The program faces financial, political, and technical challenges. Financing has been the major constraint throughout the years, and on many occasions the nuclear submarine program drew to a standstill because of a lack of resources.

Some observers are skeptical that the enormous financial resources required for a successful program will remain available. Brazilian academic Eduardo Viola doubts Brazil will get a nuclear submarine on the navy's schedule: "The surplus for military spending does not exist anymore, after the economic peak during Lula's second administration. The constituencies for non-military spending are much stronger." Indeed, the Brazilian government is facing immense economic issues, including the areas of healthcare, education, and public transportation, and the Brazilian people are not afraid to take to the streets to protest the government's policies, as the massive protests in major cities of Brazil in June 2013 demonstrated.

There is some debate within Brazil and externally about the country's technological capacity to build a nuclear submarine. Some doubt that Brazil will succeed in designing the nuclear propulsion part of the submarine and producing nuclear fuel.

Brazilian technical experts do not agree with such skepticism. A former Brazilian Navy engineer explained that Brazil has been there before: "In the 1970s, there was skepticism about the country's capacity to design and build commercial and military airplanes and now look at Embraer and all its planes." Those representing Brazil's technical community argued that the problem lies with management: "Technologically we have the capacity." Analysts who question the government's commitment to the program echo this sentiment. As one Brazilian strategic analyst put it succinctly: "If the government was serious about the submarine program, there would be a nuclear submarine already."

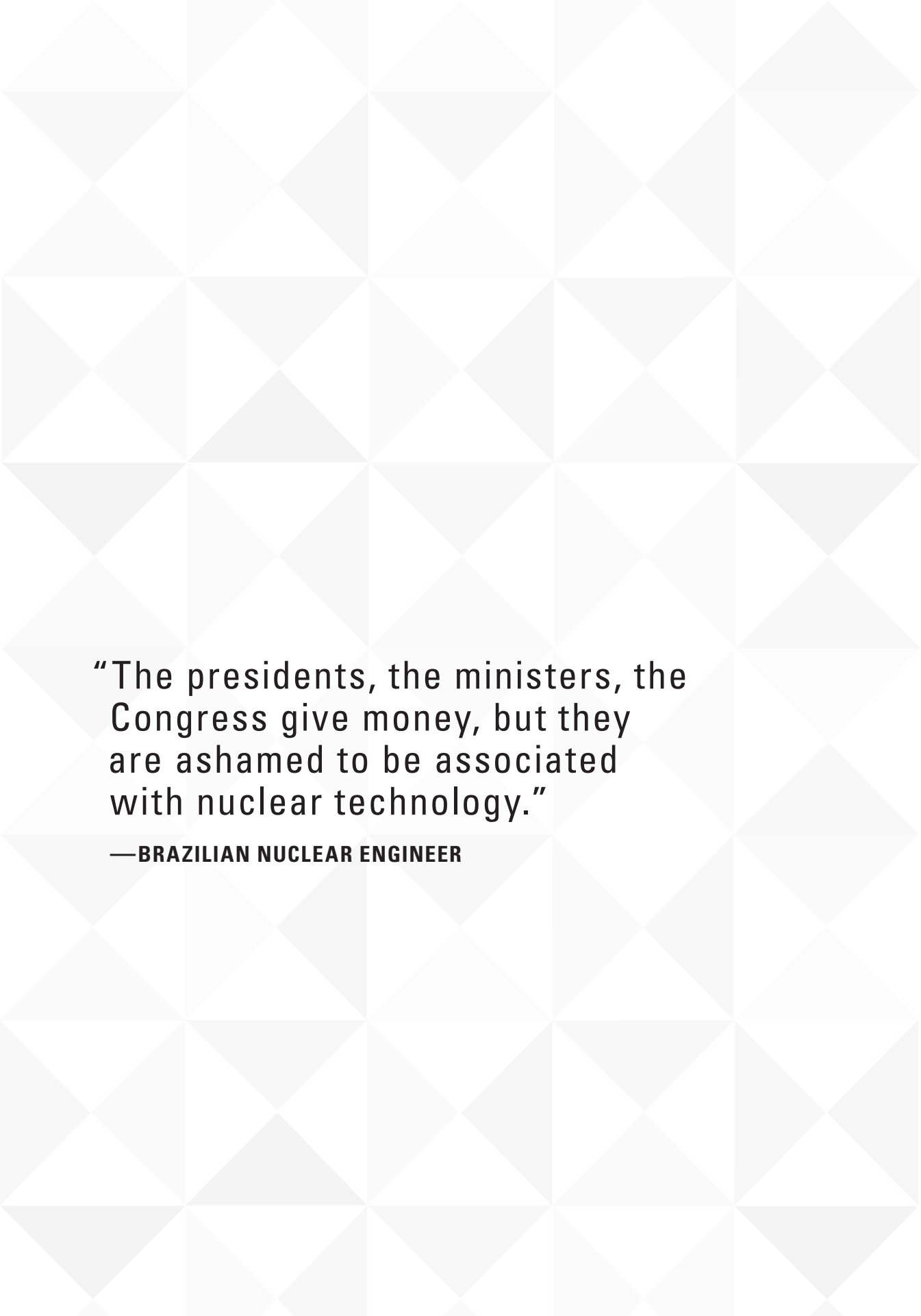
One of the more interesting and critical challenges the Brazilian government will have to address, if it successfully builds a nuclear submarine, is the implementation of safeguards on submarine fuel. This is necessary to provide the international community with confidence that no nuclear material will be diverted for non-peaceful purposes. As the first non-nuclear-weapon state to develop a nuclear submarine program, Brazil, together with the IAEA, will have to develop a safeguards system for which no precedent exists.¹⁰³

From Brazil's point of view, the challenge is how to implement safeguards without disclosing sensitive information (for example, the location of the submarine). Conversations with international technical experts reveal a potential scheme for an appropriate safeguards mechanism. For example, under regular IAEA safeguards the inspectors would check the fuel before it was loaded into a submarine reactor. After that the reactor would

be sealed. An international safeguards expert suggests, each time the submarine resurfaces and enters the port, the IAEA should be notified in advance and verify the seals are in place. Whenever refueling of the submarine reactor becomes necessary, the inspectors should be present.

However, Brazil's operation of a nuclear-powered submarine implies that for security reasons there would be no continuity of safeguards because there would be periods when a submarine was at sea.

The navy's efforts in the nuclear field are closely interlinked with Brazil's civilian nuclear industry. And the gains the navy has made in uranium enrichment technology contribute to Brazil's quest for an industrialized nuclear fuel cycle.



“The presidents, the ministers, the Congress give money, but they are ashamed to be associated with nuclear technology.”

—BRAZILIAN NUCLEAR ENGINEER

NUCLEAR ENERGY AND NUCLEAR INDUSTRY

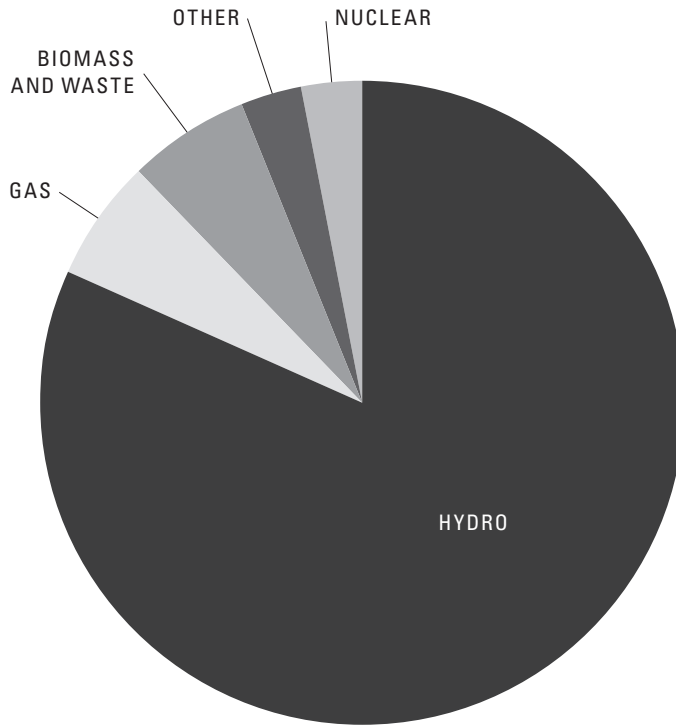
DEVELOPMENT OF NUCLEAR ENERGY to generate electricity is yet another component of Brazil's nuclear kaleidoscope. The issue of nuclear energy generates an interesting dynamic: the political leadership allows the nuclear sector to develop, but it does not openly support nuclear power. Whether and how soon Brazil will expand the role of nuclear in its energy mix is a subject of debate. Regardless of the outcome of that discussion, the Brazilian nuclear industry believes Brazil needs the industrial capacity to produce nuclear fuel for nuclear power plants—a self-sufficient nuclear fuel cycle.

The civilian development of a nuclear fuel cycle is closely connected to the military's program. Even today, the commercial nuclear sector depends on Brazil's navy, which continues to control uranium-enrichment technology.

SHARE OF NUCLEAR IN ELECTRICITY PRODUCTION

In Brazil, electricity production is highly dependent on hydroresources (see figure 1). More than 80 percent of its electricity comes from hydro, 6 percent from gas, 6 percent from biomass and waste, and 3 percent from nuclear.¹⁰⁴ There are two operating nuclear power plants, Angra 1 and Angra 2, with Angra 3 under construction. The total net capacity of Angra 1 and Angra 2 is 1,988 megawatt electrical (MWe).¹⁰⁵

FIGURE 1. Breakdown of Electricity Production in Brazil by Energy Source, 2011



Source: "Breakdown of Electricity Generation by Energy Source," Shift Project Data Portal, 2011, www.tsp-data-portal.org/Breakdown-of-Electricity-Generation-by-Energy-Source#tspQvChart

The extent to which Brazil will expand nuclear power production in the coming decade is not clear. Two policy documents guide energy development in the country: the National Energy Plan and an annual Decennial Energy Plan. According to the National Energy Plan 2030, adopted in 2007, and an annual Decennial Energy Plan 2020, adopted in 2011, the government planned to build between four and eight additional reactors by 2030. It is notable that the annual Decennial Energy Plan 2021 was not published in 2012, the year after Japan's Fukushima Daiichi nuclear disaster. A new Decennial Energy Plan 2022 was released in late 2013, and its description of future expansion of nuclear power includes references to Angra 3 only.¹⁰⁶

Work on Angra 3 originally started in 1984. After just two years and despite the fact that 70 percent of the equipment was already at the site, work on the plant was suspended.¹⁰⁷ It appears that the decision was made to concentrate limited resources on the completion

of Angra 2.¹⁰⁸ After twenty years, the government has committed to completing construction of Angra 3. It projects that the plant will become operational in 2018 and will add 1,405 MWe of electricity.¹⁰⁹

Plans for additional nuclear power plants after Angra 3 are uncertain. At the very least the Fukushima accident affected Brazil's nuclear energy plans in terms of pacing. While industry representatives tend to downplay its effect, delays with decisions on building a new fourth reactor are clearly linked to the nuclear disaster in Japan.

Within days of the Fukushima accident, representatives of the Brazilian National Nuclear Energy Commission (Comissão Nacional de Energia Nuclear, CNEN) and the nuclear industry took to the Brazilian media to argue that Fukushima should not alter Brazil's nuclear power plants. The National Nuclear Energy Commission's chairman at the time, Odair Gonçalves, stated that European countries reevaluated their nuclear power plans "for reasons more political than technical." He added that "there is nothing to indicate any need to change the Brazilian nuclear program."¹¹⁰ Leonam dos Santos Guimarães from Eletronuclear called those countries' decisions "purely emotional."¹¹¹

Industry has taken steps to allay safety concerns. Nuclear power plant operators in Brazil carried out new stress tests to check preparedness for crisis scenarios, such as heavy flooding. In 2012 Eletronuclear reported it was implementing safety upgrades to nuclear power plants, an anticipated investment of \$250 million by 2015.¹¹²

VARIED OPINIONS

How Brazil should develop its energy sector is not a mundane question for a country that has a history of energy crises. Two episodes proved to be especially traumatic.

In 2001 the country suffered an unusually long drought, which made its dams temporarily inoperable. The drought forced the government to cut electricity consumption by 20 percent in order to avoid the collapse of the grid. In addition to everyday sacrifices ordinary citizens endured, industrial output suffered and Brazil's economic growth rate stumbled.¹¹³ In 2009, short circuits at the Itaipu hydroelectric plant that supplies 20 percent of Brazil's electricity left tens of millions without power. Brazil's main cities—Rio de Janeiro and São Paulo—went completely dark.¹¹⁴

In early 2013 when rains fell below normal levels and reservoirs started to dry out, Brazil feared it would have another energy crisis.¹¹⁵ The political opposition drummed up concerns about an impending crisis and used it as an opportunity to criticize the government's energy policy.

In general, public acceptance of nuclear energy in Brazil is low due to associations with the military regime and the Fukushima disaster, explained a Brazilian diplomat. According to Eduardo Viola, an academic at the University of Brasília, Brazil’s environmental community, which by the second half of the 2000s had begun to accept nuclear power, became more vocal after Fukushima and again firmly opposed nuclear energy.

Domestic politics also has a major bearing on the nuclear industry. According to Brazilian observers both within and outside industry, nuclear issues are tricky for President Dilma Rousseff. The portrait that arises from discussions with them is of a president who has been opposed to nuclear power since her time as minister of mines and energy (2003–2005) and who is conscious of the negative public views on nuclear energy. As she rose through the ranks and acquired decisionmaking power on nuclear matters (as Luiz Inácio Lula da Silva’s chief of staff and later as president), she seems to have accepted the idea that Brazil needs nuclear energy but has remained careful not to support it openly. Industry representatives note that while Dilma authorized completion of Angra 3, she discouraged any promotion of Brazil’s nuclear industry in 2012 at Rio+20, a United

Nations gathering of thousands of government officials, scientists, nongovernmental organization representatives, and media to discuss sustainable development.

The Brazilian nuclear industry’s frustration with the political leadership throughout the decades

is palpable. As one industry representative summed up: “The presidents, the ministers, the Congress give money, but they are ashamed to be associated with nuclear technology.”

Those in the nuclear industry argue that the government should learn from its experience in the 1970s, when leaders made decisions on power plant construction during an energy crisis. They argue that the government should invest in expanding a nuclear power capacity now, when the country is not in the middle of an energy crisis, and ensure a smooth transition from constructing Angra 3 to additional power plants. Guilherme Camargo, a nuclear engineer with Eletronuclear, highlighted the importance of a continuous sequence of construction of nuclear power facilities because it allows engaging skilled manpower without interruption. According to him, “it is detrimental not to have an overlap in the construction process.”

Specialists outside of government and industry debate whether Brazil should expand nuclear energy production. On one side are those who believe that Brazil should move

Public acceptance of nuclear energy in Brazil is low due to associations with the military regime and the Fukushima disaster.

away from depending so heavily on water resources and increase the share of thermo-electricity, primarily by expanding nuclear energy. Brazil is expected to reach the limit of its hydroelectricity potential by 2030,¹¹⁶ and, Guimarães said, nuclear industry representatives warn that by the second half of 2020 there will not be enough hydroresources.

Some scholars argue for Brazil to move away from hydroelectricity for environmental reasons. Brazilian scholar José Eli da Veiga has warned that Brazil's reliance on hydroelectric power risks inflicting permanent damage to the basins of several rivers, including in the Pantanal (tropical wetland), a region that boasts a lavish but fragile ecosystem.¹¹⁷

At the same time, important voices in Brazil's domestic debate oppose further expansion of nuclear energy. Brazil's former secretary of state of science and technology José Goldemberg, for example, represents the view that instead of building new nuclear power plants, his country should invest in new technologies. He argues that in Brazil hydroelectric expansion still has a lot of space to grow and that electricity generation can also benefit from sources such as biomass, wind, and solar.¹¹⁸

NUCLEAR FUEL CYCLE FOR POWER PROGRAM

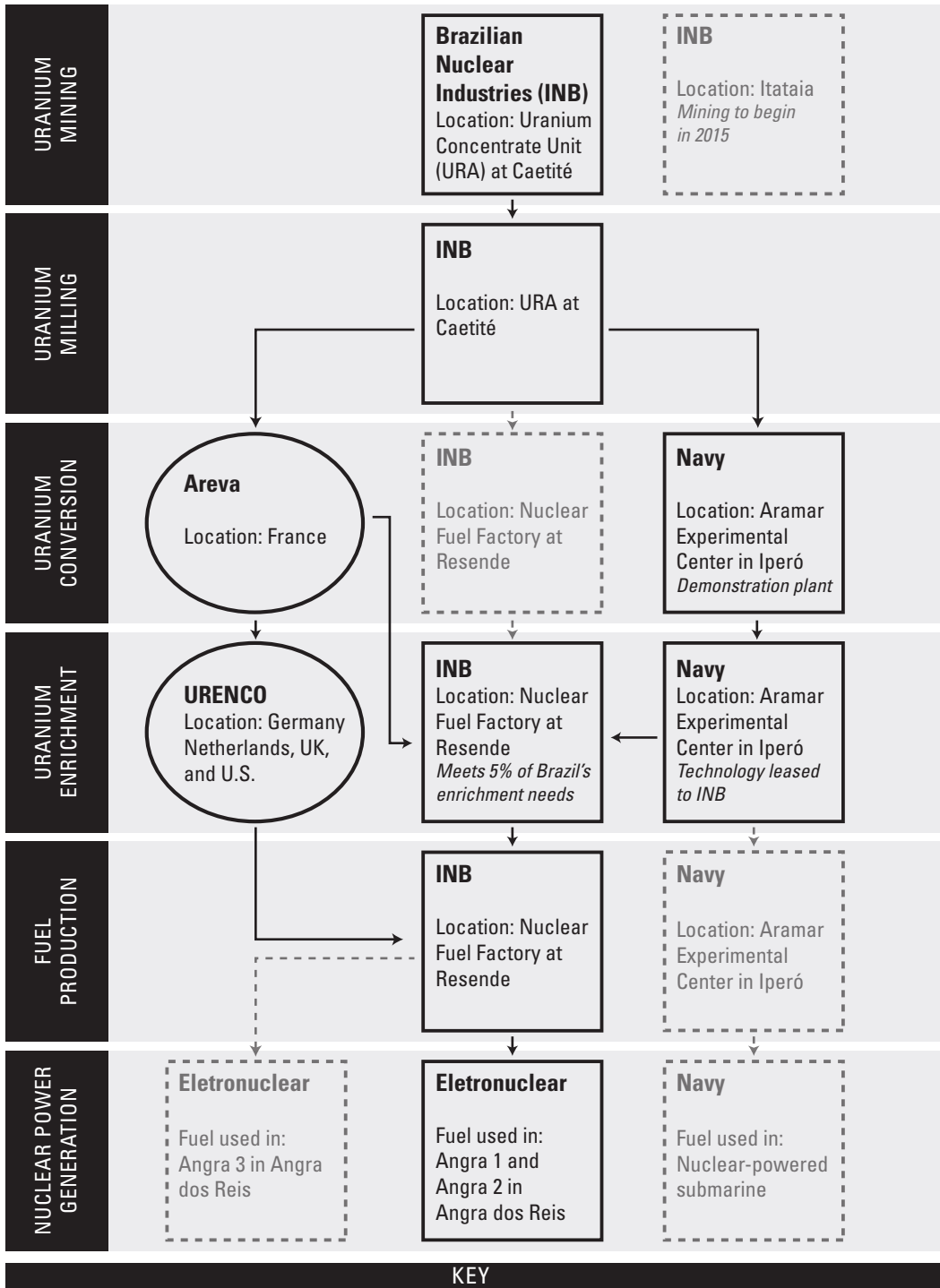
Whether or not Brazil chooses to expand the share of nuclear energy in the future, it already has advanced nuclear-fuel-cycle capabilities (see figure 2). These capabilities can strengthen the country's position in the global commercial nuclear market. But the fuel cycle also has inherent proliferation challenges because of the dual-use nature of advanced nuclear technologies.

The multistage nuclear fuel cycle includes uranium mining and milling, conversion, enrichment, and production of fuel pellets and fuel assemblies.

Brazil is well positioned when it comes to the first stage. The country is endowed with abundant uranium resources and has mined for the resource since 1982. Brazil's uranium reserves are estimated at between 277,000 and 1.1 million tons, which represents 5 percent of the world's total.¹¹⁹ The country has three major uranium mines—Caldas, Caetité, and Itataia—with Caetité currently in operation. Production at Caetité will be increased to meet the future demand from Angra 3. The government planned to start exploring another site, Itataia, in 2012,¹²⁰ but the start date was moved to 2015 due to licensing issues.

Brazil has technology for conversion and enrichment, which involves converting uranium to its gaseous form and then increasing the concentration of U_{235} in natural uranium (0.7 percent) to higher levels, typically 3–5 percent, to fuel nuclear power reactors. But

FIGURE 2. Brazil's Nuclear Fuel Cycle



the country is yet to industrialize both uranium conversion and enrichment. As of 2014, Brazil relies on foreign partners for its uranium conversion and enrichment needs.

Canada's Cameco provided uranium conversion services for the country until 2009, when Brazil switched to France's Areva. The Brazilian technical community is of the opinion that the country could have stopped relying on foreign partners for conversion if it had not been for financial constraints and a lack of investment in domestic capacity.

Brazilian Nuclear Industries (Indústrias Nucleares do Brasil, INB), which runs the production of nuclear fuel for power nuclear plants, is developing a project that will build a uranium conversion facility. The INB expected to start operating that facility by the end of 2012, but as of early 2014 those plans had not materialized.¹²¹ Meanwhile, the navy built a demonstration plant for uranium conversion at the Aramar Experimental Center, where it plans to industrialize conversion capacity for the needs of the nuclear submarine program.

Brazil has some domestic capacity to enrich uranium, and it is the only non-nuclear-weapon state in which expansion of uranium enrichment capacity for civilian nuclear power is dependent on the military. The navy owns the enrichment technology and leases it to the INB. The navy builds the uranium enrichment centrifuges, which the INB spins at the Nuclear Fuel Factory at Resende, without having access to the technology itself. Uranium enrichment at Resende is separate from the navy's own enrichment facility at the Aramar Experimental Center, built for producing submarine fuel.

By 2012, the INB had hoped to have ten centrifuge cascades installed that would enrich enough uranium to fully meet the fuel needs of Angra 1 and 20 percent of Angra 2's needs.¹²² In reality, as of 2012, only three cascades were in operation,¹²³ and the INB produced 2,293 kilograms of low-enriched uranium (enriched to 4 percent).¹²⁴ That covered only about 5 percent of Brazil's enrichment needs, according to Eletronuclear's Guimarães. The INB Annual Report for 2012 notes that the Navy Technology Center had difficulties in manufacturing and installing ultracentrifuges and points to shortcomings in state financing. Out of 70 million reais (\$30.4 million) requested by the INB, the organization received 33.2 million reais (\$14.4 million) from the state budget, less than half of the amount it requested.¹²⁵

As a result, Brazil has continued to rely on Europe's Urenco for enrichment services. Similar to sentiments about conversion, technical experts complain that if the government had committed greater financial resources, Brazil could have industrialized its enrichment capacity a long time ago. In 2011 Alfredo Tranjan Filho, the INB's president at the time, stated that Brazil's self-sufficiency goal would be delayed by three years, to 2018. He said Brazil would reach the goal in 2018 if there were funds to start building a factory of centrifuges to enrich uranium in 2012. The total necessary funding, 133 million reais (the equivalent of \$62 million) was not guaranteed.¹²⁶

Brazil has the capacity to implement the final stages of fuel fabrication—producing fuel pellets, loading the pellets into fuel rods, and bundling the fuel rods together into fuel assemblies. At the Nuclear Fuel Factory at Resende, the INB has the capacity to produce 160 metric tons of fuel pellets and 280 metric tons of fuel assemblies annually.¹²⁷

Beyond the production cycle, all countries operating nuclear power plants have to deal with the issue of spent-fuel management. Spent fuel can either be reprocessed—nuclear material is extracted from spent fuel, and the reprocessed material can then be used in the production of new nuclear fuel—or stored without being recycled. Reprocessing decreases the volume of remaining waste for disposal.

From a nonproliferation point of view, reprocessing technology is sensitive because it allows for plutonium, potential weapons material, to be separated from highly radioactive components of spent fuel. Among non-nuclear-weapon states, only Japan operates a facility to reprocess its spent fuel.

Brazil does not reprocess spent nuclear fuel, although it operated a laboratory-scale plutonium separation facility at its Nuclear Energy Research Institute (Instituto de Pesquisas Energéticas e Nucleares, IPEN).¹²⁸ The facility, named Celeste, was decommissioned and dismantled more than ten years ago, said Guimarães. For now the country stores its nuclear waste in reactor spent-fuel pools.

In accordance with Brazilian legislation, the government has to identify a long-term solution for intermediate-level and low-level radioactive waste generated by Angra 1, Angra 2, and Angra 3 before Angra 3 becomes operational. CNEN is responsible for the site selection, design, construction, and operation of the waste depository. According to Guimarães of Eletronuclear, there are currently two options under consideration: a repository for storing waste exclusively from Angra plants or a repository for waste from all Brazilian facilities working with nuclear and radioactive material. The site for a low- and intermediate-level radioactive waste depository is expected to be chosen in 2014 and start operation by 2018.

As for the highly radioactive waste, CNEN, in cooperation with Eletronuclear, is developing a new design for an above-the-ground long-term storage site. Guimarães noted that such a site will not be necessary in the immediate future and will perhaps be required by the end of the next decade. This facility will be designed for safe storage for up to five hundred years. It is expected that the site will begin operation by 2030, after a feasibility plan is completed in 2015 and a prototype is developed by 2020. According to Guimarães, the decision on permanent storage of highly radioactive waste depends on the future decision of Brazil on fuel reprocessing: “the decision will take into account the political and economic situation twenty to fifty years from now, when the useful life of these nuclear power plants expires.”



“On nuclear issues Brazil is non-aligned
even to the Non-Aligned Movement.”

—**BRAZILIAN DIPLOMAT**

BRAZIL ON THE INTERNATIONAL STAGE

BRAZIL'S PURSUIT OF AN INDEPENDENT NUCLEAR FUEL CYCLE and its frustration over restricted access to nuclear technology provide some explanation of its stance on the global nuclear order. And its nuclear ambitions—industrialization of the nuclear fuel cycle, pursuit of a nuclear-powered submarine, expansion of nuclear power program—make it a noticeable player in the nuclear arena.

Given the country's growing weight in the global order, it is of value to understand how Brasília interprets and interacts with relevant international treaties, mechanisms, and instruments in pursuit of its nuclear policy objectives. Once again, Brazil is becoming frustrated and disillusioned with the nuclear order while attempting to forge a cohesive nuclear identity and seeking to have a greater say in the order as it evolves.

TOO LITTLE DISARMAMENT, TOO MUCH NONPROLIFERATION

In Brazil's eyes, the existing nuclear order based on the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is unfair and unsustainable. During the 2012 NPT Review Conference, the head of Brazil's delegation, Ambassador Antonio Guerreiro, lamented that it is

simply not admissible that more than 20 years after the end of the Cold War nuclear weapons still continue to be an integral part of military and security doctrine.... Waiting for a Kantian universal and perpetual peace to commit to foreswear atomic weapons simply runs counter to the ultimate objective of the NPT which is the total and irreversible elimination of nuclear weapons. We should all realize that the present discriminatory, and even invidious, state of affairs is unsustainable in the long run.¹²⁹

Brazil's own experiences with two multilateral instruments in particular—the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Tlatelolco Treaty) and the NPT—deserve attention. The Treaty of Tlatelolco established a nuclear-weapon-free zone in Latin America and the Caribbean. Brazil's road to full adherence to this treaty was not a straight one. Freedom to conduct peaceful nuclear explosions was

paramount to Brasília, and Brazil's view on this issue determined its priorities in negotiating the treaty.

Brazil is becoming frustrated and disillusioned with the nuclear order while attempting to forge a cohesive nuclear identity and seeking to have a greater say in the order as it evolves.

Argentina's policies in respect to peaceful nuclear explosions were similar, and the two countries succeeded in inserting a clause into the Tlatelolco Treaty to allow peaceful nuclear explosions. According to Argentine scholar Rodrigo Mallea, Brazil's

and Argentina's positions on peaceful nuclear explosions created some ambiguity for each other on whether one of them would follow the path of India's "peaceful" nuclear test of 1974. A revelation that Brazil's air force dug deep shafts at the Cachimbo mountains presumably for testing purposes indicated that, at least on the Brazilian side, the air force was interested in developing some type of detonation capacity. By 1991 both countries formally renounced peaceful nuclear explosions in a bilateral agreement. However, the Tlatelolco Treaty continues to explicitly allow them.

Although Brazil signed and ratified the Tlatelolco Treaty in the 1960s, the treaty did not enter into force for Brazil at that point. The text stipulated that a number of conditions had to be met, such as ratification by all state parties, before the treaty could enter into force and become binding for all the signatories. At the same time, there was a provision allowing each individual country to waive said conditions; in case of the waiver, the treaty would enter into force for that particular country.¹³⁰ Brazil did not waive those conditions. Both Brazil and Argentina had doubts about the scope of safeguards to be applied under the treaty, whether all Latin American countries would adhere to the treaty, and

whether nuclear powers would sign the relevant protocols to the treaty. Only in 1994 did Brazil fully embrace the Tlatelolco Treaty.

Brazil was a latecomer to the NPT. In fact, among non-nuclear-weapon states it was the second-to-last to join the treaty in 1998, followed by Cuba in 2002. The draft treaty the United States and the Soviet Union offered the international community in the mid-1960s did not sit well in Brazil, Argentina, and India, to name a few.

Brazil argued the treaty would entrust nuclear powers with protecting non-nuclear-weapon states from a nuclear attack, which went against a fundamental need of each country to be able to defend itself. Brasília was taken aback that two superpowers drafted the treaty without consulting others; was critical of the imbalance between the obligations of the nuclear and non-nuclear-weapon states underpinning the NPT; and did not foresee any significant political loss from not signing the treaty.¹³¹

Historian Carlo Patti cited Brazilian government documents that summarize Brazil's policy: Brasília could not accept restrictions on the development of peaceful nuclear explosions, the use of which it considered valuable in "mining, opening of ports, canals, and earthmoving." Brazil and Argentina were eager to insert the same provision on these explosions that they were able to embed in the Tlatelolco Treaty into the NPT. Brazil noted disapprovingly that two nuclear powers—France and China—were not planning to sign the treaty. Beyond these problems, the draft treaty's fundamental flaw, in Brazil's view, was a lack of commitment to global nuclear disarmament.¹³²

Brazil's eventual adherence to the NPT in 1998 did not have unanimous support within the country. Influential voices argued that Brasília should have maintained principled opposition to a treaty it saw as fundamentally unfair. From a practical point of view, they reasoned, Brazil had already made equivalent commitments. It adhered to a nuclear-weapon-free zone in Latin America (under the Tlatelolco Treaty); it had a safeguards regime with Argentina and the International Atomic Energy Agency (IAEA); and it had a prohibition against pursuing nuclear weapons enshrined in its Constitution.

Brazilian experts who question their country's decision to sign the NPT are not a negligible minority. Thomaz Guedes da Costa, who in the 1990s worked on defense and strategic issues within the Brazilian government, believes that signing the NPT might have been a strategic mistake. He maintains that Brazil received neither substantive technological nor political gains from joining.¹³³ Antonio Jorge Ramalho, a prominent Brazilian analyst and an adviser to the government on defense issues, held a similar position: "We did not get anything positive out of signing it; and it is going to be hard to resist the implications. We will be pressed to adhere to the [IAEA] Additional Protocol." Ramalho added: "Brazil was in a unique position not to sign the NPT. It alone could argue a principled position not to sign it. Brazil had always denounced the Treaty's discriminatory substance and renounced going nuclear."

The proponents of joining the NPT contended that adherence to the near-universal treaty would provide Brazil with greater access to peaceful nuclear technology. They maintained that Brasília would gain political benefits from not being an NPT holdout in the company of a handful of nuclear-armed countries—Israel, India, and Pakistan.

Since it has been part of the NPT, Brazil's most practical contribution to the cause of global nuclear disarmament has been its role in developing a list of practical steps toward nuclear disarmament and successfully securing the support of all NPT parties for it. Brazil and the other members of the New Agenda Coalition—Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa, and Sweden—pushed through the adoption of the 13 Practical Steps, a paragraph of the Final Document of the 2000 NPT Review Conference. Non-nuclear-weapon and nuclear-weapon states agreed on a number of objectives, such as early entry into force of Comprehensive Nuclear Test-Ban Treaty, negotiation of the Fissile Material Cut-Off Treaty, and commitments of nuclear-weapon states to take irreversible steps toward disarmament. In the words of a Brazilian diplomat, the significance of the 13 Practical Steps was in that “for the first time we accepted that you could push different walls, not one wall, toward disarmament. Different directions, different paces.”

The optimism surrounding adoption of these steps gradually dissipated due to a lack of forward movement on implementing them. Except for arms reductions agreed upon by the United States and Russia that did not alter the strategic balance, there have been no significant successes in the field. Whether the Comprehensive Nuclear Test-Ban Treaty will enter into force remains vague. Unless China, Egypt, India, Iran, Israel, North Korea, Pakistan, and the United States ratify or in the case of some, sign and ratify, the treaty, it will not enter into force. There is no confidence that the United States will move on treaty ratification any time soon, which means that China will continue to delay its own ratification as well. Negotiations on the substance of the Fissile Material Cut-Off Treaty have not even started. None of the nuclear-weapon states have unequivocally undertaken to totally eliminate their nuclear arsenals.

Brasília's disillusionment with these prospects for nuclear disarmament is palpable. When asked whether Brazil might spearhead any renewed push for practical steps toward disarmament, a former senior Brazilian diplomat responded:

Brazil cannot do much more than denouncing the shortcomings of the current nuclear order and developing its technological capabilities in a transparent way, making clear its peaceful intentions. Any dent in Brazil's credibility in this regard will be detrimental to its capacity to act constructively.

When U.S. President Barack Obama delivered a high-profile speech in Prague in 2009 promoting the goal of a world free of nuclear weapons, it was expected that the governments of the non-nuclear-weapon states would support the sentiment contained in Obama's vision. However, in Brazil there was little enthusiasm about the speech. For those in Brazil who follow the disarmament debate, Obama's agenda set expectations too high, and the objectives were not met, which has created a great deal of frustration.

A former senior Brazilian official elaborated on the reasons behind the less than flattering assessment of Obama's Prague speech and vision on nuclear matters:

Why did he [Obama] have to use a formulation like “a world free of nuclear weapons” instead of supporting outright the goal of [nuclear] disarmament, which appears in all multilateral documents since the United Nations Charter? Does that mean there must be absolute nonproliferation before any progress on disarmament is possible, as the nuclear weapon states have been proposing? What is the meaning of “we will keep our nuclear weapons as long as they exist?” Isn't that a prescription for indefinite or perpetual possession? How is it possible to square reductions with increased funding for modernization?

The same former diplomat explained that neither Brazil nor any other country expects that the United States would or should disarm unilaterally. But he stressed that formulating the U.S. position as “we will keep our nuclear weapons as long as they exist” shifts the responsibility away to other nuclear-weapon states.

There is some sympathy in Brazil for the domestic pressures on the White House when it comes to nuclear policy. The Obama administration's funding for the modernization of the U.S. nuclear complex in exchange for the ratification of the U.S.-Russian treaty on arms reductions—New START—was accepted as inevitable: “Obama had no choice,” a former senior Brazilian diplomat had to agree. But a Brazilian observer added: “those who promoted modernization succeeded in further strengthening the view that the United States seeks to maintain its incontrovertible supremacy in the means of waging a war.”

Conversations with Brazilians create a dual image of Obama: a “decent human being who gave in to the pressures of domestic politics and lobbying.” A sense of disappointment stretches beyond the Prague speech and its aftermath (or a lack thereof); Obama's rhetoric on the standoff with Iran over Tehran's nuclear program fuels their concern. Obama warned that “all options were on the table,” thus not excluding military action, to prevent Iran from obtaining a bomb. A former Brazilian ambassador offered:

We had hopes about Obama. If Obama says, all options are on the table when he talks about Iran, if that kind of guy cannot remain true to his beliefs, if the system is so strong, it makes us worry: What does the American government stand for? Up to which point can an intelligent president hold off the radicals?

The disillusionment with prospects for nuclear disarmament in Brazil is not centered only on the United States. As one Brazilian interviewee pointed out, “we can make comments about the United States because it is a much more open country than any other nuclear-weapon state.” He added:

We know something of the ongoing debate in the UK about Trident, something about French stubbornly clinging to their nuclear weapons, a little bit about Russia’s military doctrines but we know very little about China, Israel, Iran.... Criticizing the United States should not be mistaken for anti-Americanism. We simply know more about them than about the others, and after all, they are the big pachyderm.

But if there is one label Brazilians want to avoid at all costs, it is naiveté in the discourse on nuclear disarmament. In his formal statement on behalf of Brazil at the NPT Preparatory Committee meeting, Guerreiro alluded to that concern:

Brazil is not as naive as to be deluded that nuclear weapons can be dismantled irreversibly overnight.... But we need to see light at the end of the tunnel. A temporal horizon with timelines, however flexible, will be a significant contribution to whittling away the long-term unsustainability of an order based upon the entitlement of a few and the disfranchisement of many.¹³⁴

Critics within Brazil observe that to some extent the Brazilian establishment find themselves in a convenient spot. The demands for nuclear disarmament set the bar too high and allow Brazil to dismiss any additional nonproliferation commitments.

In the discourse on nuclear disarmament and nonproliferation, Brazil positions itself as being on higher moral ground. From Brazil’s point of view, it is a champion of disarmament and nonproliferation. Brazilians are genuinely surprised when their country’s credentials in this regard are even remotely questioned. They point out that their country remains a non-nuclear-weapon state in a world in which powerful countries promote double standards. In the eyes of Brazilians, the most obvious case of that is U.S. policy

toward India. Yet a closer examination of Brazil's own policy toward India reveals that it struggles to maintain a principled position.

BRAZIL AND THE U.S.-INDIA NUCLEAR DEAL

Brazilians frequently use the decision of the U.S. government to sign a nuclear cooperation agreement with India as the example of what is wrong with the global nuclear order. Under the 2008 U.S.-India nuclear deal, the United States agreed to sell nuclear goods and technology to India, a country that possesses nuclear weapons but remains outside of the global nuclear nonproliferation regime as it is not party to the NPT.

The announcement that the United States and India would pursue cooperation in the nuclear field came in 2005, at a summit between President George W. Bush and Prime Minister Manmohan Singh in Washington, DC. For nuclear collaboration to come to fruition, the United States had to change its policies and laws blocking full cooperation with India.

In the United States, there were mixed opinions on the possible collaboration. Supporters of the U.S.-India deal argued that such cooperation would serve U.S. interests. The relationship with Washington would empower New Delhi, a natural partner of the United States in the region, and that would help counterbalance China's rising might. India, a rising economic power and the world's largest democracy, required expansion of nuclear energy to sustain and grow its economy. And as far as the global nuclear order was concerned, supporters' thinking went, the rules-based nonproliferation regime could not prevent "bad actors" from proliferating. The way to deal with them was to remove or constrain them with means other than norms and rules. India was not a bad actor and not a threat to the United States or the international system, so rules could be bent for its sake. India was a *de facto* nuclear-armed state and its continued exclusion from the global nuclear order was unnatural.¹³⁵

U.S. critics of the deal saw many problems with it, including its questionable impact on the nonproliferation regime. The main supposed nonproliferation gain from the deal was India's commitment to place civilian nuclear facilities under the IAEA safeguards. But it was up to India to determine which facilities it considered civilian. India's access to foreign supply of nuclear material for its civilian nuclear program meant it could increase the stocks of material for weapons purposes. The U.S.-led selective bending of the rules of the nonproliferation regime to accommodate India was bound to chip away at the strength of the regime as a whole.

In the ensuing three years, proponents of the U.S.-India deal both within and outside of the United States focused on preparing the U.S. Congress and the Nuclear Supplies

Group, the leading multilateral nuclear export control arrangement, to accommodate the change of rules for India. By August 2008 the IAEA approved a safeguards agreement with India. By September the same year, the Nuclear Suppliers Group, after heavy lobbying by the United States, granted India an exception from its rules that had previously prevented nuclear cooperation with New Delhi.

Highly controversial in the United States and internationally, the deal became a major irritant for Brazil. Many in Brazil view the U.S.-India agreement as a way for India to slide into the nuclear power club through a back door.

Critically, Brazilians, similar to other developing nations, do not criticize India, a fellow developing country, for seeking and obtaining unobstructed access to nuclear technology. Developing countries view the current nonproliferation regime as promoting technology denial, and in that sense they perceived that India secured a victory over the regime.

What Brazilians disapprove of is U.S. policy. They look at the deal through a broader prism of problematic policies of the United States and major Western countries. A common perception in Brazil is that the West is inconsistent in its policies toward countries that are either outside of the NPT (India, Israel, North Korea) or disregard it (Iran). As one Brazilian government staffer noted, “The United States closes its eyes on Israel and India. The message that it sends is that it is better to have nuclear weapons. There are plenty of incentives to be outside of the regime.... Luckily, Brazil is not interested [in acquiring nuclear weapons].”

While officials and experts in Brazil criticized the United States for its inconsistent non-proliferation policy, Brasília used the new dynamic that the Bush-Singh announcement created to rekindle its own cooperation with India on nuclear energy. In October 2007, Brazil, India, and South Africa, members of a trilateral dialogue IBSA, agreed in a joint declaration “to explore approaches to cooperation in the peaceful uses of nuclear energy.”¹³⁶

Brasília supported New Delhi’s position in the Nuclear Suppliers Group debate over whether to exempt India from restrictions on civilian nuclear cooperation.¹³⁷ Decisions within the group are taken on the consensus basis. A formal vote of “no” from any member would have prevented India getting an exemption from the rules that stipulate no nuclear trade with non-NPT states that do not accept full-scope safeguards.

Why did Brazil choose to support India within the Nuclear Suppliers Group? Over the last decade, with the arrival of Luiz Inácio Lula da Silva, Brazil and India have developed a strong bilateral relationship. The two countries grew even closer in the course of the WTO trade negotiations under the Doha Round. A former Brazilian diplomat noted that Brazil had to show solidarity with India in the name of IBSA. And they are also fellow partners in another constellation of emerging economies, the BRICS.

Brazil hopes to play a prominent role in global nuclear commerce, and India represents a potentially important market. For example, India's experience in using thorium in nuclear reactors has been of particular interest to Brazil, which holds the world's third largest thorium reserves (India has the world's largest). No less importantly, Brazil sees India's case as an example of a mismatch between the nuclear order and reality, as becomes clear in conversations with Brazilians. While India is formally outside of the NPT, it is too important to ignore. The latter is the same argument the Bush administration promoted in support of the U.S.-India deal.

The word Brazilians in and out of the government used most often in relation to their position toward India was "pragmatic." In their view, the exception for trade with India within the Nuclear Suppliers Group was bound to

happen. An individual privy to the debate concluded: "You cannot have an idealistic foreign policy. India would go forward anyway... I knew the Americans would force countries like Norway to comply with the Nuclear Suppliers Group exception for India. That was the reality. The pressure was on." In Brazil there is a feeling that India "got it right." Despite being a regime outsider, India managed to have the United States praise its nonproliferation record. India succeeded in getting a nuclear trade deal with the United States, and even more importantly, it got U.S. support for its bid for a United Nations Security Council permanent seat.

The opinion that India's nuclear arsenal helps its quest for a permanent seat is widespread in Brazil. A Brazilian diplomat concluded, "By supporting a nuclear-armed India and not supporting Brazil, the United States is sending a wrong signal to the rest of the world."

The way the Brazilian government handled the India nuclear case underscores the selectivity of its policies. Brasília opposed the U.S.-India nuclear deal and used it as an opportunity to criticize the United States. Meanwhile, it supported the exemption for India within the Nuclear Suppliers Group to showcase its solidarity with New Delhi.

This selectivity attests to a broader tension that seems to exist in Brazil's identity and which is not unique to Brazil. On the one hand, Brasília strives to take the moral high ground and promotes values of nuclear disarmament. On the other, whenever national interests interfere with any principled position, the former takes precedence. In this sense, Brazil acts like other states that it routinely criticizes, including the United States.

A common perception in Brazil is that the West is inconsistent in its policies toward countries that are either outside of the NPT (India, Israel, North Korea) or disregard it (Iran).

More broadly, this example demonstrates that a failure of established powers to universally adhere to global nuclear norms leads to an overall corrosion of the system and makes it easier for emerging powers to be cynical in their own policies. As one Brazilian official summed up in reference to the U.S.-India nuclear deal, “if Americans want to weaken the nonproliferation regime, it is up to them.”

THE IAEA AND THE QUESTION OF SAFEGUARDS

Brazil’s relationship with the international nonproliferation system in general and the safeguards regime in particular is complicated. As a country with significant quantities of nuclear material, Brazil’s participation in the international system of nuclear safeguards is essential. The country’s record in this regard deepens the understanding of how Brazil views the nonproliferation regime and the threat of proliferation as well as how its policies might affect the regime in the future.

Brazil and the IAEA Additional Protocol

The effectiveness of the nonproliferation regime depends on a transparent and efficient method of generating confidence that unauthorized weapons-related activities can be detected in time to allow the international community to react accordingly. The IAEA safeguards system remains the bedrock of the regime. States, including Brazil, sign comprehensive safeguards agreements with the IAEA to provide the first layer of confidence. Under such agreements, the IAEA can verify that what states report to the IAEA about their nuclear material and nuclear activities is correct and truthful.

It became glaringly obvious in the early 1990s that the IAEA needed to strengthen the safeguards system and expand the reach of its verification capabilities beyond facilities and material *declared* by states. Then, the IAEA failed to detect *undeclared* nuclear activities in Iraq and North Korea in a timely manner.

The IAEA promoted a system of strengthened safeguards by developing an Additional Protocol. Under an Additional Protocol, the IAEA receives greater access to countries’ nuclear facilities and can conduct more intrusive inspections. All facilities involved in fuel-cycle activities as well as any sites where nuclear material may be present become subject to inspection. That allows the IAEA to verify that not only all declarations made by states are truthful but that there are no undeclared activities or undeclared facilities.

Brazil is among a handful of countries with significant nuclear activities that have not signed an Additional Protocol. The list includes Algeria, Argentina, Egypt, Syria, and

Venezuela. International nonproliferation practitioners argue that Brasília would contribute to the confidence of the international community if it were to adhere to the Additional Protocol.

Brazil's strong distaste for signing the IAEA Additional Protocol is one of the most visible areas of tension between the country and the international nonproliferation regime. A mixture of normative and practical reasons drives Brazil's opposition.

As a matter of principle, Brazil is reluctant to accept any additional nonproliferation measures as long as nuclear-weapon states do not achieve meaningful progress toward nuclear disarmament. By opposing the IAEA Additional Protocol, Brazil demonstrates its objection to the global nuclear order that promotes too much nonproliferation and too little disarmament. Like most non-nuclear-weapon states, Brazil detests the fact that nuclear "have-nots" are expected to adopt more and more stringent nonproliferation measures while nuclear "haves" keep nuclear weapons at the heart of their defense and national security strategies.

Brazil's normative position is reinforced by a number of other drivers, including those based on national interests. There is concern within Brazil that the principles of the Additional Protocol (unannounced inspections, complete access to all facilities in the country) are not compatible with Brazil's nuclear submarine program. For example, some Brazilian experts quote a provision under the Model Additional Protocol that allows the IAEA to request complementary access to safeguarded material with two to twenty-four hours' notice, depending on the particularities of a site. Because the information on the location of the submarine is sensitive, such provisions would be problematic. A Brazilian technical expert suggested that if Brazil signs the IAEA Additional Protocol, there will have to be some form of exception for the submarine program.

A former IAEA official believes that some provisions of the Additional Protocol would not be relevant to a potential safeguards arrangement that can be worked out between Brazil and the IAEA specifically for submarine fuel. In his opinion, having inspections on short notice might not be critical in the case of the nuclear-powered submarine as long as Brazil has ratified the Additional Protocol for all its remaining nuclear activities and adheres to specific safeguards conditions for submarine fuel.

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At least some in Brazil maintain that by signing the Additional Protocol and opening its facilities to intrusive inspections, the country will become vulnerable to industrial

espionage. Concern about proprietary information was the official reason behind Brazil's refusal to allow IAEA inspectors visual access to uranium enrichment centrifuges at the Nuclear Fuel Factory at Resende in 2004.¹³⁸ But Pierre Goldschmidt, a former head of the IAEA's department of safeguards, pointed out that "normally all the sensitive parts of a centrifuge are hidden inside its casing." He argued that Article 7 of the Model Additional Protocol reiterates the rights of states to protect proprietary or commercially sensitive information by giving them an opportunity to request "managed access." He added, "to my knowledge, IAEA inspectors have never leaked proprietary technical information about centrifuges or other items."¹³⁹

Finally, Brazil maintains that safeguards implemented on the basis of Brazil's bilateral agreement with Argentina and the Quadripartite Agreement between Brazil, Argentina, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), and the IAEA, are sufficient to reassure the international community of Brazil's commitment to nonproliferation. A number of Brazil's prominent technical experts, including the ABACC's former secretary Carlos Feu Alvim, believe that the IAEA Additional Protocol is not fully compatible with the ABACC system and if two countries sign it, "its application would practically result in abandoning the bilateral system."¹⁴⁰

The Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials

The experience of the ABACC since its inception, its evolution, and the challenges it faces provide an interesting angle from which to look at Brazil's nuclear policy and its impact on the global nuclear order.

Establishing a bilateral mechanism to conduct safeguards inspections was a creative way for Brazil and Argentina to keep an eye on each other's nuclear activities and to mitigate mistrust from the international community about said activities. The bilateral agreement Argentina and Brazil signed in 1991 for the exclusively peaceful use of nuclear energy established the ABACC. The Quadripartite Agreement, which entered into force in 1994, provided the framework for full-scope safeguards in both countries. At the time of the ABACC's creation, neither Brazil nor Argentina had ratified the NPT.

The unique strength of the ABACC rested with its ability to safeguard military facilities in Brazil and Argentina to which the IAEA did not have access before the Quadripartite Agreement came into force. The ABACC applied safeguards to both civilian and military facilities but prioritized military sites inaccessible to the IAEA. Alvim, who was appointed by the Brazilian government to the ABACC at its inception, recalled: "In the beginning, it was very comfortable. The IAEA was not there and it was happy the ABACC was." According to Alvim, getting access to military facilities was a challenge

for the ABACC, but it developed a safeguards methodology acceptable to the navy. He added, “it was not an easy discussion.” The IAEA later accepted the same methodology but only after a long negotiation.

The Nuclear Suppliers Group recognized safeguards implemented by Argentina and Brazil with the help of the ABACC as sufficient to allow Brazil and Argentina to engage in trade of the most sensitive nuclear technology—that associated with uranium enrichment and reprocessing. Until 2011, Nuclear Suppliers Group guidelines stated that members should exercise restraint with transferring these technologies. In 2011, the group adopted more specific criteria guiding transfers, one of which was that enrichment and reprocessing technology could only be transferred to countries that have ratified the IAEA Additional Protocol. The important deviance from this rule was to allow enrichment and reprocessing transfers to countries “implementing appropriate safeguards agreements in cooperation with the

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IAEA, including a regional accounting and control arrangement for nuclear materials, as approved by the IAEA Board of Governors.” The latter is a direct reference to the ABACC safeguards.¹⁴¹ Indeed, the Nuclear Suppliers Group agreed to this provision at the insistence of Brazil and Argentina in order to obtain the required consensus for the adoption of new formal rules for the transfer of sensitive technologies.

Both the official establishment and the expert community in Brazil argue that the new Nuclear Suppliers Group language recognizes that the ABACC’s safeguards are sufficient. The Brazilian Foreign Ministry issued a statement that said:

The [Nuclear Suppliers Group] decision has particular importance, in that the NSG has begun to recognize the Quadripartite Agreement signed by Brazil, Argentina, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the International Atomic Energy Agency as an alternative criterion to the Additional Protocol to the IAEA safeguards agreements.¹⁴²

But the Nuclear Suppliers Group language has an important caveat. It allows transfers of sensitive technology to countries with regional safeguards agreements *pending* adoption of

the Additional Protocol. That implies it is not a permanent arrangement. However, conversations with Brazilian experts and official statements indicate that they do not view this arrangement as temporary. When *Arms Control Today* interviewed an unidentified Brazilian official on whether “pending” language meant that eventually Brazil and Argentina would sign the Additional Protocol, he responded: “We do not see an obligation deriving from this [language].”¹⁴³

Brazil’s existing safeguards arrangements rooted in the bilateral context are critical to the nonproliferation regime and they constitute an important source of confidence building. The experience of Brazil, Argentina, and the ABACC provides a valuable lesson on how to strengthen regional and international security.

But the existing safeguards are not equivalent in scope to the Additional Protocol. Additional Protocols provide the IAEA with access to all facilities involved in the fuel cycle. Countries that sign the Additional Protocol also allow the agency “complementary” access to facilities on short notice (two to twenty-four hours, depending on the particularities of a site). Such extended access allows the IAEA to act on any questions or inconsistencies in a country’s declaration of its nuclear activities,¹⁴⁴ and to verify the absence of undeclared activities and material. But the ABACC does not have authority to take those actions in Brazil and Argentina. Without the Additional Protocol or an alternative sufficient arrangement, the ABACC’s authority is limited to verifying activities and material *declared* by the governments of Brazil and Argentina.

While Brasília maintains it will not sign the Additional Protocol in the foreseeable future, opinions within the Brazilian establishment on the issue vary. The general perception is that the Defense Ministry, especially under the leadership of its former minister Nelson Jobim, has been the source of the strongest opposition to Brazil signing the Additional Protocol, while the views within the Foreign Ministry have been more varied and flexible.

Brazil and the Future of Safeguards

There is a budding debate within Brazil on whether some alternative arrangement to the Additional Protocol can be worked out. Alvim proposed several steps to build confidence in the area of safeguards.¹⁴⁵ Among them are acknowledgement by Brazil and Argentina of the need to verify the absence of undeclared nuclear material and undeclared installations; a focus on nuclear material and the use of the environmental detection tools; and the application of safeguards to the entire nuclear fuel cycle (as under the IAEA Additional Protocol). In accordance with a proposed scheme, detection of prohibited material as a result of environmental sampling at declared facilities would trigger a more detailed and wider application of sampling at additional facilities.

Importantly, Alvim promotes the idea of making the region free of nuclear material that could be directly used in weapons. In his opinion, such a step could obviate the risk of nuclear weapons development and the corresponding need for the Additional Protocol. Alvim proposed that Brazil and Argentina establish a ban on separated plutonium (Pu_{239}), a limit of 20 percent enrichment for uranium in their territory, and a limit of 30 percent enrichment for the industrial processing of uranium. The higher enrichment ceiling of 30 percent would mitigate false alarms. As Alvim explained, the production of uranium enriched to 20 percent would almost inevitably produce some amount of higher-grade enriched uranium due to imprecisions and instabilities in the process. Swipe sampling analysis would assure that no weapons-grade material was present, and with no nuclear-weapons material there can be no nuclear-weapons program. According to Alvim, “if you can demonstrate that there is no indication of possession by Brazil or Argentina of HEU [highly enriched uranium] or weapons-grade plutonium, we will not need to apply Additional Protocol–type safeguards. It will be an important confidence-building measure, both regionally and internationally.”

Whether some of these ideas will gain traction within Brazil remains to be seen. Suggested steps focus on verifying activities at declared facilities. If this conversation ever develops further, one of the more challenging issues would be how to verify that no state is in fact enriching or reprocessing at *undeclared* facilities.

ABACC officials argue that their organization has untapped potential at the national, regional, and international levels. They believe that if Brazil and Argentina would consider extending the ABACC’s mandate to include other tools to verify the nuclear fuel cycle, enhancing the role of the organization as a regional system, they have the capacity to carry out that mandate. On the regional level, the ABACC has room to expand. Some international experts suggest that the ABACC can include other neighboring countries, and according to ABACC experts, such a move would quell suspicion that Brazil and Argentina might be conspiring under ABACC cover. Yet, ABACC experts also caution that bringing in more countries would be challenging.

ABACC officials believe the IAEA could take greater advantage of the ABACC’s accounting, reporting, and verification capacity to avoid duplication of efforts. They also noted:

In five to ten years, when the IAEA would have an increased workload, it would have to rely more on the states and the regional systems. The regional systems have more value than state systems because we have more independence from the state.

On the international scene, the discussion on the future of safeguards has focused on ways to detect and deter undeclared nuclear material and activities. The IAEA is seeking

to adapt the safeguards system and is promoting a state-level approach for safeguards. The state-level approach rests on the notion that the IAEA should move away from applying a one-size-fits-all safeguards' implementation formula because it has become, in the words of the IAEA's former official in charge of safeguards, Herman Nackaerts, "too predictable and too mechanistic."¹⁴⁶ That is, emphasis should be placed on evaluating any given state as a whole and not the disparate pieces of data on individual facilities. At the heart of such evaluation would be information derived from various sources: among them data from the state itself, from IAEA inspections and visits, from commercial satellites, and from intelligence provided by other countries. The level of safeguards scrutiny would depend on the overall profile of the given country, as assessed by the IAEA. Importantly for Brazil, such an approach would extend to all countries, with or without the Additional Protocol.

The idea of a state-level approach for safeguards is not new, but recently, discussions about it have heated up considerably in IAEA circles. In 2012, Brazil, as well as others, demanded more information from the IAEA on what a state-based approach would entail. The vagueness of the information available at that point was not the only matter for concern for Brazil. In his official statement at the 2012 IAEA General Conference, Brazilian ambassador Laercio Antonio Vinhas expressed Brazil's reservations about the concept itself:

We should proceed with caution when it comes to increasing the safeguards burden on the non-nuclear-weapon States that are fulfilling their [NPT] treaty obligations in good faith. Exceptional cases of non-compliance have required exceptional approaches, but they cannot, as is often the case, be subsequently applied across the board and purport to become the standard verification practice.

In 2013, acting on a demand from states for more information, the IAEA offered a report entitled "The Conceptualization and Development of Safeguards Implementation at the State Level" to the IAEA Board of Governors. Brazil's Ambassador Vinhas, in his statement at the IAEA 2013 General Conference, noted that the report fell short of expectations. He also highlighted Brazil's concerns triggered by the report, and the IAEA's handling of sensitive information was among them:

A crucial issue raised by the first report ... is the handling of sensitive information, including that coming from open sources and third parties. Decisions taken in the mid-90s are no longer suitable in a world where the advances in communications and cyber technologies have been allowing for frequent cases of manipulation, fabrication, access to commercial and technological information.... it is high time for [the IAEA] to review

the existing rules and procedures to ensure the protection of information, its use in a secure, credible and impartial manner, and the [IAEA] Secretariat's accountability to Member States.¹⁴⁷

Vinhas echoed his earlier statement from 2012 and Brazil's remaining concerns about the imbalance inherent in the nonproliferation regime. He noted that the report did not address the nuclear-armed states and argued that the IAEA must promote "the equitable and full implementation of the mutually reinforcing goals of nuclear non-proliferation and nuclear disarmament."¹⁴⁸

The question of safeguards will only increase in importance over the next few years for Brazil as the country develops safeguards for its nuclear submarine program for which no precedent exists. Together with Buenos Aires, Brasília will have to make decisions on the future role of the ABACC. Since Brazil has not sig-

The question of safeguards will only increase in importance over the next few years for Brazil as the country develops safeguards for its nuclear submarine program for which no precedent exists.

naled that it will be signing the IAEA Additional Protocol anytime soon, the internal discussion on ways to provide confidence to the international community about the peaceful nature of its nuclear activities might become more prominent. And Brazil will continue to be a vocal participant in the debate on the future of international safeguards.



“They poured cold water on us.”

—**BRAZILIAN GOVERNMENT STAFFER ON THE
U.S. REACTION TO THE TEHRAN DECLARATION**

GLOBAL NUCLEAR POLITICS: THE TEHRAN DECLARATION

IN MAY 2010, Brazil, together with Turkey, stole the headlines of major world newspapers. Brasília and Ankara persuaded Tehran to sign the Tehran Declaration (officially, the Joint Declaration by Iran, Turkey, and Brazil) outlining a nuclear fuel swap—Iran's low enriched uranium (LEU) would be exchanged for foreign fuel to be used in the Tehran Research Reactor. The idea behind the swap, tried in several iterations before by Western players, was that reducing the amount of enriched uranium in Iran would reduce the risk of proliferation.

In January 2014 Iran started rolling back some of its sensitive nuclear work as a result of an interim agreement with P5+1—the five permanent members of the United Nations (UN) Security Council plus Germany—reached in November 2013. Until then, Iran has been advancing its nuclear program, including in the sensitive field of uranium enrichment, and key Western states believe that in doing so, Iran has been seeking a nuclear weapons capability. The International Atomic Energy Agency (IAEA) has found Iran to be in noncompliance with international nuclear safeguards. Meanwhile, Iran successfully pushed the international discourse away from its own safeguards violations toward a broader debate on states' rights to access or develop peaceful nuclear energy. The latter debate is naturally of concern to many developing countries, which see peaceful nuclear technology as critical for their economic development and energy security.

The deteriorating strategic situation in the lead-up to the swap deal—the buildup of Iran’s nuclear program, the push from the key Western countries for international sanctions, and the fears of a potential Israeli military attack on Iran—made it critical for all sides to pause and build confidence in order to de-escalate the standoff. Ensuring Iran could not build a bomb in a relatively short time became the goal of the states concerned.

A window of opportunity opened in June 2009 when Iran informed the IAEA that it was interested in procuring fuel for its research reactor. The P5+1 used the opening to negotiate a deal with Iran.

In October 2009, Iran and the P5+1 agreed “in principle” to the following: Iran would ship out about 1,200 kilograms of its LEU at or below 5 percent enrichment in return for 120 kilograms of fuel for the Tehran Research Reactor. The amount of 1,200 kilograms represented roughly 80 percent of Iran’s total LEU stockpile at the time. All of the 1,200 kilograms of LEU from Iran had to be shipped in one batch before the end of 2009; Russia was designated to enrich Iran’s LEU to produce about 120 kilograms of 20-percent-enriched uranium; France would produce the fuel rods for Tehran’s reactor and supply them to Tehran approximately one year after the conclusion of the agreement.¹⁴⁹

Brazil was not a party to the deal but according to Celso Amorim, Brazil’s former foreign minister, since fall 2009 Brazil received U.S. envoys who engaged Brasília on the Tehran issue. Their goal was to obtain Brazil’s support in persuading Iran to agree to a nuclear-fuel-swap agreement. One of the U.S. envoys, according to Amorim, pointed to an important development in U.S. thinking: recognition of the fact that Iran had the capacity to enrich uranium on its own. Amorim recalled: “I agreed with him because . . . as long as you don’t accept the fact that Iran will have enrichment as other countries, you won’t have an agreement.”¹⁵⁰

In the end, a final agreement on the swap was not reached, partly due to domestic politics in Iran. Influential Iranian political figures, rivals of the country’s then president Mahmoud Ahmadinejad, strongly opposed the proposed deal and convinced the ultimate decisionmaker in Iran’s politics—the supreme leader, Ayatollah Ali Khamenei—to reject the proposal.

Ahmadinejad’s team remained keen to pursue the fuel-swap route, as did the international community. But the Iranians ultimately needed better conditions than those hashed out in 2009, since accepting the same deal they walked away from would put Tehran in an uncomfortable position domestically. The P5+1 was naturally skeptical about engaging with Tehran on the swap agreement after the disappointment of 2009.

It is in this context that Brazil and Turkey moved to negotiate their own deal with Iran on similar terms. Amorim, now Brazil’s defense minister, provided Brasília’s account of

events in his public statements and interviews. His narrative is of central importance because he was one of the key players in the development of what would become the Tehran Declaration.¹⁵¹

NEGOTIATING WITH THE IRANIANS

After the P5+1 attempt fell through, Brazil tried to persuade Iran to agree to a fuel swap. Turkey was pursuing similar goals, and eventually the Brazilians and Turks united their efforts.

According to Amorim, at the start, Iranians were opposed to all substantive components of the deal that the Brazilians and Turks promoted. The Iranians thought that 1,200 kilograms of LEU was too large an amount to give up; they wanted to receive fuel for their reactor when they provided their LEU, not at some point in the future; and they wanted to keep LEU on their territory or at an interim location, a free trade zone in the Gulf on an island called Kish.¹⁵²

Two months before the Tehran Declaration, U.S. Secretary of State Hillary Clinton went to Brazil and discussed the Iran issue with her Brazilian counterparts.¹⁵³ The public remarks delivered by Clinton and Amorim showed significant divergence of opinion on how to proceed.

Amorim believed there was room for a negotiated solution with Iran and noted that a fuel-swap agreement pursued by Brazil and Turkey was feasible. Without openly condemning the U.S. preference for a new round of sanctions on Iran, Amorim noted: “More often than not, sanctions tend to have a negative effect.” He reminded the media about the Iraq experience.

Clinton, meanwhile, did not trust Iran’s will to engage in meaningful negotiations:

The door is open for negotiation. We never slammed it shut. But we don’t see anybody even in the far-off distance walking toward it. We see an Iran that runs to Brazil, an Iran that runs to Turkey, and an Iran that runs to China, telling different things to different people to avoid international sanctions, which we think are the best way to avoid problems like conflicts and arms races that could disrupt the stability, the peace, and the oil markets of the world.

The U.S. secretary of state left no doubt that the United States was pursuing sanctions against Iran through the UN Security Council and added that in her opinion, “it’s only after we pass sanctions in the Security Council that Iran will negotiate in good faith.”¹⁵⁴

Meanwhile, on April 12–13, 2010, the only direct interaction on the issue between the Brazilian, Turkish, and U.S. leaders took place. U.S. President Barack Obama hosted a Nuclear Security Summit in Washington, DC, which both Brazilian and Turkish leaders attended. Turkish officials shared with Obama some of their ideas about how to engage Iran. Amorim reported that Obama’s reaction was perceived as “not too good” but noted it could be attributed to Obama “being busy with the summit.”

A few days later, on April 20, three weeks before the Tehran Declaration was signed, Obama sent a letter to Brazil’s President Luiz Inácio Lula da Silva to follow up on the Iran discussion. Amorim viewed the letter as Obama’s way of saying that the “same conditions [as in the October 2009 attempt] were still good.”

As Amorim put it: “The letter clarified a blurred picture to us.” Brasília interpreted it as a call for action. In Amorim’s words:

Until then the Iranians were refusing the deal. After the letter we decided that we had to put all our diplomatic efforts into making the Iranians agree. We were given an impression that while the essence of the deal was not perfect, it was satisfactory. Of course, we knew that the U.S. would continue to put pressure on the question of amounts and the 20 percent enrichment, but Obama implied the deal would be a confidence-building measure. It would have created a situation in which discussion would become possible.

Obama’s letter was vague enough to be read and interpreted differently by different people. Those in Brazil who believed in the idea of brokering a deal with Iran could focus on the fact that Obama described Iran’s request for fuel for its Tehran Research Reactor as “an opportunity to pave the way for a broader dialogue.” They could pick up the following excerpt from Obama’s letter as well: “Iran’s agreement to transfer 1,200 kg of Iran’s low enriched uranium (LEU) out of the country would build confidence and reduce regional tensions by substantially reducing Iran’s LEU stockpile.”¹⁵⁵

The letter did not contain any new conditions for a deal with Iran. Obama’s letter did not address the fact that after the 2009 P5+1 attempt to engage Iran in a fuel-swap agreement, Iran started enriching uranium to 20 percent. The letter did not directly disqualify the

amount of 1,200 kilograms of LEU as too little to make the swap worthwhile in light of the fact that since October 2009, Iran had increased its stockpile. More importantly, the U.S. president specifically referred to the swap scheme that would have Turkey as the recipient of Iran's LEU, a scheme that did not get Iran's support when it was first offered by the IAEA in November 2009. And the following words from Obama undoubtedly sounded like a call for action: "I would urge Brazil to impress upon Iran the opportunity presented by this offer to 'escrow' its uranium in Turkey while the nuclear fuel is being produced."¹⁵⁶

However, to an uninvolved observer, the letter could have been meant to caution Brazil and Turkey about Iran's intentions without appearing dismissive of Brazil's and Turkey's attempts at diplomacy. The text sounded more like a recap of the past attempts to engage Iran and less like an encouragement of the specific Brazilian-Turkish initiative. In his letter, Obama was pessimistic about Iran's intentions in its interaction with Brazil and Turkey. Referring to earlier attempts to engage Iran he said "instead of building confidence Iran has undermined confidence, . . . That is why I question whether Iran is prepared to engage Brazil in good faith, and why I cautioned you during our meeting [during the Nuclear Security Summit in Washington, DC]." Moreover, Obama reiterated that the United States would pursue sanctions.

Not everyone within the U.S. government thought such an ambiguous letter was a good idea. Some argued for sending a clear message to Brazil and Turkey that, in Washington's opinion, the 2009 P5+1 offer was outdated because of Iran's continued accumulation of enriched uranium and should no longer be pursued. As a former senior U.S. official shared: "We should have given them the respect of honesty rather than a polite letter." But as the official explained, the White House believed that "it could not walk away entirely from the offer and appear to be uninterested in a deal."

Still, the Brazilians, together with the Turks, pressed onward. In the last push toward the Tehran Declaration, after months of talks, negotiators from the three countries spent seventeen hours in nonstop discussions in Tehran. Amorim recalled with a smile that at one point his staff thought he had been kidnapped. Even when the time for an evening reception came, key individuals continued to hash out the deal locked in a negotiating room.

After complex and controversial negotiations, Brazil and Turkey agreed with Iran on the following: Iran would ship 1,200 kilograms of its 5 percent LEU to Turkey in exchange for 120 kilograms of fuel for the Tehran Research Reactor from the Vienna Group (made up of United States, Russia, France, and the IAEA). The Tehran Declaration spelled out the steps in basic terms. Iran would deposit 1,200 kilograms of LEU in Turkey, and pending a positive response from the Vienna Group, Iran and the Vienna Group would further spell out the delivery of 120 kilograms of fuel supplied by the Vienna Group to Iran.¹⁵⁷

PERILS OF DIPLOMACY



From L to R: Brazilian President Luiz Inacio Lula da Silva, Iran's President Mahmoud Ahmadinejad, and Turkish Prime Minister Recep Tayyip Erdogan pose for a picture with their hands together after the Islamic republic inked a nuclear fuel swap deal in Tehran on May 17, 2010, under which 1,200 kilos of low enriched uranium will be shipped to Turkey, potentially ending a standoff with world powers gearing for new sanctions against Tehran. The agreement, under which Iran will in turn receive nuclear fuel for a Tehran reactor, was signed in the Iranian capital by the foreign ministers of Iran, Brazil, and Turkey. ATTA KENARE/AFP/Getty Images

The celebratory photo of the leaders of Brazil, Turkey, and Iran on May 17, 2010, in Tehran could have become a historic shot. It could have signified a major breakthrough in the standoff between Iran and the West and the beginning of a qualitatively different role for emerging powers on the international security scene.

But it was not. The United States, the other members of the Vienna Group, and somewhat surprisingly a majority of Brazilian strategic thinkers dismissed the Tehran Declaration.

The swiftness and harshness with which the United States brushed the Tehran Declaration aside surprised Brasília. The day after Brazil and Turkey secured Iran's agreement and signed the Tehran Declaration, on May 18, Washington announced that it secured the support of Russia, China, and the rest of P5 on a draft resolution to impose a new round of sanctions against Iran. And the P5 sent the draft resolution for consideration to the rest of the Security Council the same day.¹⁵⁸ To the Brazilian government, that was the opposite of giving diplomacy a chance.

Amorim admitted that Brazil knew the United States was pursuing both tracks—a diplomatic solution and sanctions—and, in his words, “maybe when Lula went to Iran,

the sanctions track became more feasible.” Indeed, U.S. observers confirm, support of Russia and China for a new round of sanctions was not a given until the last moment. Nonetheless, as Amorim added, “it is not that at any point anything changed. This is what is intriguing. Even for me.”

The fact that the United States shored up Russian and Chinese support for a new round of sanctions led Brasília to unpleasant observations. Amorim pointed to exceptions that were made for Russian and Chinese companies in the application of sanctions as one explanation for the two countries’ support.¹⁵⁹ Another conclusion Brasília made, according to Amorim: “Russia and China [as the other established powers] do not like new kids on the block.”

The context in which the Tehran Declaration had been conceived may have impaired its success from the very beginning. The challenges of dealing with substantive issues resulted in a ten-paragraph document that was thin on the actual implementation of the arranged swap. Unlike the 2009 attempted deal, it did not (and could not) spell out specifics regarding which countries would supply Iran with reactor fuel or during which period.

The Tehran Declaration did not address the fact that Iran started enriching uranium to 20 percent after the failure of 2009 negotiations. This development was a significant proliferation concern because once uranium is enriched to 20 percent, most of the isotope separative work needed to reach weapons-grade 90 percent enrichment is done. The Tehran Declaration also did not reflect the fact that while in 2009 the negotiated 1,200 kilograms of 5 percent LEU represented 80 percent of Iran’s stock, it now accounted for just over 50 percent of Iran’s LEU holdings.¹⁶⁰

In other words, while the essence of the Tehran Declaration was close to the attempted deal in 2009, the immediate value of the agreement was significantly diminished by changed circumstances.

According to Amorim, Brazil and Turkey in no way ignored the important steps necessary for resolving a standoff with Iran, such as sorting out the issue of 20 percent enrichment. But as Amorim underscores, the goal of the Tehran Declaration was to start building trust so that in the future, the international community’s goals could be reached. Amorim added that he talked to Ahmadinejad in late 2009 before Iran started enriching to 20 percent levels. He asked Ahmadinejad to postpone starting enrichment at this level, and Ahmadinejad agreed to delay it by two months. Amorim noted with regret: “The West did not pay much attention.”

Writing together in the *New York Times*, Brazil’s Amorim and Turkey’s foreign minister, Ahmet Davutoğlu, emphasized that solving all problems “was never the purpose of the original agreement.” Rather, the efforts to engage Tehran in early 2010 were designed to “provide essential confidence-building, the key missing component.”¹⁶¹ Moreover,

Amorim noted that the Tehran Declaration delivered on all key components that Obama referred to in his letter to Lula: “The letter asked for four things: quantity, place, time, and a written commitment by Iran. The Tehran Declaration solved all these issues.”

Beyond the issues of the increased amount of LEU and Iran’s new capability to enrich uranium to 20 percent, certain parts of the Tehran Declaration were bound to be problematic for the United States and key Western states. For example, Brazil and Turkey proclaimed their appreciation of “Iran’s commitment to the [Treaty on the Non-Proliferation of Nuclear Weapons] NPT and its constructive role in pursuing the realization of nuclear rights of its Member States.” The declaration included a provision allowing the return of all of Iran’s LEU from Turkey if the declaration’s provisions were “not respected.” Noting that the declaration called for the international community to refrain from “measures, actions and rhetorical statements that would jeopardize Iran’s rights and obligations under the NPT,” such a provision meant that Iran could have easily decided to walk away from the deal under the pretext of jeopardizing rhetoric coming from the outside.¹⁶²

WHY DID THINGS GO WRONG?

The Tehran Declaration resulted in an unpleasant diplomatic situation, despite relatively close communication between Brazil, Turkey, and the United States in the run-up to the negotiated deal. With a benefit of hindsight, one can speculate about why that happened.

The United States, on one side, and Brazil and Turkey, on the other, had different views on how to proceed with Iran. Brazilian leaders were keen to engage with Iran for a whole host of diplomatic, strategic, and economic reasons. Fundamentally, they believed that a new round of sanctions would damage the prospects for a negotiated solution between Iran and the West and, in the worst case scenario, lead to military action in the Middle East.

Unlike Brazil, the United States perceived that sanctions would push Iran to negotiate. When interviewed in 2013, a former U.S. official said: “Sanctions worked. That is why we have [the current, relatively moderate Iranian president, Hassan] Rouhani. That is why we have progress in negotiations with Iran,” referencing more recent developments.

In the run-up to the Tehran Declaration, Washington no longer believed a fuel-swap deal would provide enough confidence to the international community. As a former U.S. official shared, “by 2010, the swap deal from 2009 was not acceptable.” He added with regret that the United States should have withdrawn the 2009 proposal in early 2010 so as to “not confuse anyone.”

If Washington was not interested in resurrecting the 2009 swap agreement, why was its position so ambiguous? It appears that Washington did not expect either Brasília and Ankara to carry their deal-brokering ambitions as far as they did or Tehran to agree to the swap. At the same time, Obama's White House did not want to appear dismissive of diplomatic options. As a former U.S. official admitted, "we were not talking to Iranians. Brazilians and Turks did. It was a valuable channel of communication."

Pursuing these different objectives likely explains why the United States ended up sending mixed messages. But in the end, it was the content of the Tehran Declaration and the timing of sanctions that made it unacceptable to the United States.

Brasília likely knew there was some risk. Amorim admitted: "I would not deny that [U.S. National Security Advisor James] Jones may have told me that 1,200 kg [of LEU] might not be enough. We were not sure what the United States would think if Iran would offer everything. There was some confusion." But if Brazil and Turkey obtained Iran's agreement, they probably hoped the positive news would create new facts on the ground. In turn, they likely hoped that the new landscape could alter the P5+1's perception of how to deal with Iran. Communication from Washington was vague enough that Brasília could selectively interpret signals it was receiving and make the calculation that attempting to negotiate a solution with Iran was worth a try.

All in all, Brazil's effort was significant in many ways. Its attempt to be an intermediary in a complex international impasse reflected the

Brazilian leadership's intent to expand its role in the international security arena, reaching beyond the realms of multilateral trade, the environment, and global health. The Tehran Declaration also crystallized two broader trends: the growing ambition and potential of emerging powers to play an ever-increasing role in the global nuclear order and the increasing evidence that neither emerging powers nor the established powers are completely prepared for this evolving trend.

In the end, it was the content of the Tehran Declaration and the timing of sanctions that made it unacceptable to the United States.

REACTIONS IN BRAZIL

The most unexpected fallout for the Brazilian government landed at home. The majority of Brazil's intellectual community not associated with the government criticized Brazil's engagement with Iran. Many viewed Brasília's initiative through a wider lens of Iran's stances and actions, not as a nuclear diplomacy effort. The critics disapproved

of Brasília's attempts to engage a government that did not respect human rights and a president who regularly made anti-Israel statements. It irked Brazilians that Lula treated Ahmadinejad with warmth. To most, even in terms of geography, Iran was too far away to get involved with.

In the run-up to and following the Tehran Declaration, many prominent figures took to Brazilian media to criticize the government's actions. Brazil's former secretary of state of science and technology José Goldemberg published an op-ed in one of Brazil's major newspapers warning that Lula ran a "serious risk of making the wrong choices, compromising the position of the country." Goldemberg, who was the key figure in Brazil's decision to fully disclose its parallel nuclear program in 1990, was unapologetic: "Brazil has engaged in a dangerous game, which, in practice, encourages Iran to enrich uranium at high levels, keeping open the possibility of building nuclear weapons, and that will further disturb an already complicated situation in the Middle East." He lamented that Brazil was about to exhaust the trust it earned from the international community for its nonproliferation record by "endorsing activities and dubious intentions of Iran."¹⁶³ Weeks before the Tehran Declaration, Celso Lafer, who had twice served as Brazil's foreign minister, argued that the alignment with Iran was damaging Brazil's credibility.¹⁶⁴

After the Tehran Declaration was announced, Demétrio Magnoli, an author of textbooks on international relations and geopolitics and a frequent commentator on Brazil's leading television channel, O Globo, argued that Brazil had been naive and driven by ideology and the interests of the Workers' Party, of which Lula is a member.¹⁶⁵ A few weeks after the declaration, the presidential candidate from the main opposition party, José Serra, harshly criticized the Brazil-Iran relationship.¹⁶⁶ In parliament, senators from the opposition criticized Brasília's attempt to broker the deal as well.¹⁶⁷ Former president Fernando Henrique Cardoso argued that by attempting to broker a deal with Iran, Brazil tried to play a game for which it did not have enough leverage.¹⁶⁸ Brazilian media personalities were overwhelmingly critical of the initiative. Elio Gaspari, a well-known pundit and a contributor to O Globo, even went as far as calling Lula's policy toward Iran "amoral."¹⁶⁹ Critics in Brazil saw Lula's engagement with Iran as an extension of his close relationship with Venezuela's Hugo Chávez and Bolivia's Evo Morales.

Notably, Brazilians worried that their country's relations with Iran added a reason for the international community to be wary of Brazil's own nuclear program. As Reinaldo Azevedo, a columnist with one of Brazil's major newspapers *Veja*, lamented, this distrust "grows because of the country's stupid position toward Iran."¹⁷⁰

When asked about the deal today, a view frequently shared by Brazilian observers is that the attempt to engage Iran on the nuclear issue was not well thought-out. They believe that those who spearheaded the effort did not envision a scenario in which the P5 agreed on a new set of sanctions against Iran. Experts in this camp do not necessarily condemn

the attempt to engage with Iran but criticize the government for failure to carry out an adequate risk assessment of their actions.

On the record, Brazilian officials do not exhibit any regret about Brazil's attempt to bring Iran and the West to the negotiating table. One of the officials noted that the timing was right—Iran enriched a relatively small amount of uranium and it needed to refuel its research reactor—and only Brazil and Turkey could have negotiated a credible solution. Brazilian government staffers point out that Brazil succeeded in bringing Iran to the negotiating table and that was what the P5+1 needed to spur movement, given that negotiations had been stalled for months. Outside of the government, a minority of Brazilian experts praised Brasília's attempt to broker a deal as a noble effort and a logical step. Privately though, at least some government and military officials regret that the engagement with Iran did more harm than good to Brazil.

The deal's critics and supporters in Brazil agree on one thing: Brasília did not expect and did not deserve such an abrupt dismissal of its effort from the Western powers, specifically the United States. Several interviewees commented on the tone with which the United States referred to the Brazilian-Turkish diplomatic effort, including Clinton's statement the day after the Tehran Declaration in which she said that it was "not sufficient for Iran to stand at a press conference and make a declaration."¹⁷¹ Many viewed the whole episode as another example of the established powers not willing to let new actors onto the stage. As a Brazilian diplomat noted, the established powers "find it hard to accept changes occurring in the world political order and the rise of new players."

Brazil's immediate partners also did not offer support for the country's effort. Fellow members of the BRICS remained silent on the Tehran Declaration. "India could, at least, do something," lamented a former Brazilian diplomat. Given Brazil's relationship with India within the BRICS and IBSA as well as Brazil's support for India within the Nuclear Suppliers Group, his disappointment with the lack of support from New Delhi is not surprising.

Curiously, international nuclear policy experts reacted to Brazil and Turkey's endeavor more positively than their colleagues in Brazil. This author conducted a survey among nuclear policy experts from a diverse set of countries on how they viewed the Tehran Declaration.¹⁷² The majority agreed that the attempt was worthwhile, despite the reservations some interviewees had about timing and the failure of the two countries to realize that by the time their deal was offered, it was no longer sufficient.

A majority of those surveyed viewed the Brazilian-Turkish initiative in the broader context of the relationship between nuclear-weapon and non-nuclear-weapon states and between established and emerging powers. Two common themes emerged.

The first concerns the importance of new actors in nuclear negotiations with Iran. Non-Brazilian nuclear policy analysts stressed the importance of having alternative actors seek outcomes that are difficult to achieve working only with the traditional players. Brazil's non-nuclear-weapon-state status makes it an important actor in this sense. As one respondent summed up, "it is a very positive thing for non-nuclear-weapon states to play a proactive role in addressing nonproliferation challenges; their participation can change the political dynamic of the situation dramatically."

The second noticeable theme evinced by non-Brazilian nuclear policy experts was the reluctance of the United States and other established powers to allow emerging powers to engage in innovative diplomacy with Iran. For example, a U.S. nonproliferation expert who participated in the survey noted, "Washington was clearly not interested in either having non-Western powers involved in the process in the long-term, or making significant concessions to Iran." Some experts wished the Obama administration had been more willing to take advantage of the opportunity that the Brazilian-Turkish intervention represented.

DEEPER DRIVERS OF THE BRAZILIAN INITIATIVE

Brazilian officials point to several drivers of the government's pursuit of a deal, including Brazil's negative view on sanctions in general, its belief in its "soft power," and its ability to talk to any state with which Brazil was ready to engage, particularly isolated actors like Iran. The personalities factor played a role as well—Lula and Amorim were heavyweight players ready to take a bold diplomatic initiative.

Echo of Iraq

Throughout its diplomatic history, Brazil has maintained a skeptical view on the utility of sanctions. The experience in Iraq only further strengthened the skepticism. Amorim, who served on the UN Security Council Iraq panel, provided this unforgiving assessment: "the sanctions were having no result from the point of view of the weapons of mass destruction, but certainly were creating havoc in the civilian population in Iraq... it's not that sanctions are useless and they may not be used, but... you have to calibrate them in a proper way."¹⁷³

Iraq's experience almost certainly played at least some part in Brasília's desire to steer the standoff on Iran toward a diplomatic solution, making a strong impact on Amorim's views in particular. The history of international sanctions, an unnecessary war in Iraq, the U.S. heavy hand in spearheading the Iraq intervention, and Washington's influence on multilateral organizations all weighed heavily on Brazil.

The sanctions debate hit closer to home as well. In 2002, an unusual diplomatic scandal erupted involving the Bush administration and the Brazilian head of the Organization for the Prohibition of Chemical Weapons (OPCW), José Bustani. Bustani was seeking to make the Chemical Weapons Convention universal by trying to persuade Iraq to sign it. Iraq's membership in the convention would allow the OPCW to carry out inspections in the country. The Bush administration was opposed to such attempts and claimed that inspections for weapons of mass destruction in Iraq were a UN Security Council matter. In no uncertain terms, the U.S. State Department claimed that Bustani "would supplant the UN inspection regime in Iraq and undercut the Security Council."¹⁷⁴ Bustani, as well as other international diplomats, argued that the United States feared that OPCW inspections might interfere with U.S. attempts to secure a UN Security Council resolution for a military operation in Iraq.¹⁷⁵

John Bolton, then a U.S. undersecretary of state, reportedly mobilized U.S. government power to remove Bustani from his position.¹⁷⁶ The media reported that the United States threatened to withhold half of its OPCW dues if Bustani were not removed (the U.S. share amounted to 22 percent of OPCW's annual budget).¹⁷⁷ Under pressure from the United States, 48 OPCW state-parties voted to remove Bustani, 43 abstained, and seven voted against the measure.¹⁷⁸

In 2005, a UN tribunal condemned the removal of Bustani from his post and called the dismissal "unlawful." The tribunal awarded Bustani his unpaid salary plus more than \$60,000 in damages, which Bustani promised to donate to the OPCW technical aid fund. Episodes like this stay in the minds of diplomats and they naturally affect the way situations are viewed from Brasília.

Soft Power and the Right to Enrichment

Brasília's belief in the virtues of its "soft power" also contributed to its ambition to become a broker between Iran and the West. Brazil had successfully influenced developments in the areas of multilateral trade and global health and so felt ready to try out its "soft power" skills in the nuclear realm.

The stalemate between Iran and the established powers presented Lula and Amorim with an interesting and worthwhile diplomatic challenge. Representing a "country with no enemies," in the words of Brazilian defense analyst Rodrigo Moraes, the Brazilian leadership felt it was in a unique position to bring all parties to the table. As Amorim put it: "Brazil has this unique characteristic which is very useful in international negotiations: to be able to put itself in someone else's shoes, which is essential if you are looking for a solution."¹⁷⁹

Brazilian nongovernmental experts add other explanations. Brazil had anxiously observed the standoff between Iran and the international community over Tehran's nuclear program because Brasília is especially sensitive when it comes to the question of uranium enrichment. Brazilian experts note that their government is apprehensive that Brazil could be the next country to face scrutiny over its program and have its uranium-enrichment rights "denied."

From an outsider's point of view, Brazil cannot be further away from Iran simply due to the fact that the IAEA discovered that Tehran's program had "possible military dimensions." Brazil, meanwhile, was never accused of violating its nonproliferation obligations.

Some in Brazil believe defending Iran's right to enrichment is counterproductive and that Brazil would be better off distancing itself from Iran. In the words of one senior technical expert, "If Brazil would have shown it did not accept the attitude of Iranians, they would have gained trust from the rest of the world, including toward its enrichment program."

Looking East

Brazil's broader policy toward the Middle East and Iran outside of the nuclear context provides an additional explanation of the motivation behind the deal. When Lula became president, the Middle East region rose to the top of Brazil's foreign policy agenda. Amorim explains that Brazil's commitment to deepening relations with the Middle East was long overdue and has been a part of the broader goal of deepening South-South relations.¹⁸⁰

Brasília is eager to develop economic relations with Iran, which, Amorim noted, is "roughly the same size as Turkey and Egypt, and bigger than any other country in our region, with the exception of Mexico and Brazil herself." He continued, "Iran is a very attractive market for our exports and a potential recipient of Brazilian investments in the field of energy, mining, and transportation material."¹⁸¹

In fact, Brazil's state-owned oil company Petrobras received offshore exploration rights from the Iranian government in 2003. Petrobras spent \$178 million in its search for oil but in the end came to the conclusion that the explored area did not have commercially viable oil fields. Food is among Iran's top imports from Brazil, with Iran among Brazil's major markets for beef exports. In 2011, it even briefly became Brazil's largest importer of beef.¹⁸²

Personalities Matter

The initiative to thrust Brazil onto the center stage of international diplomacy cannot be explained without paying particular attention to the role of Lula and Amorim. In a way,

the former president and his foreign minister embody the spirit of Brazil, a country that has been searching for *grandeza* (greatness). They combine qualities—talent, vision, and self-confidence—that propelled them down paths that their immediate predecessors and successors would not have followed. It is unlikely that less ambitious and less confident leaders would have undertaken a diplomatic feat such as the Tehran Declaration.

Both Lula and Amorim stand out in Brazilian politics as ambitious, popular, and charismatic politicians who were instrumental in changing how Brazil is viewed internationally and how it views itself. Many of Brazil's forceful steps in the foreign arena are associated with a Lula-Amorim tandem.

Lula's ambitious policies abroad provided a major confidence boost to Brazilians. During Lula's two terms in office, Brazil made major strides on the international scene and Lula himself became one of South America's most recognized presidents. Spain's *El País* and France's *Le Monde* named him the Man of the Year in 2009, with *Le Monde* crediting him with "renovating" Brazil,¹⁸³ and *Time* named him the most influential leader in 2010.¹⁸⁴

Lula had many "firsts" as president. He was the first Latin American leader received by Obama at the White House. He was the first Brazilian head of state to visit the Middle East in an official capacity. And he was the first non-Muslim leader received by Iran's supreme leader. Under Lula, Brazil had both active presidential diplomacy and a strong emphasis on foreign policy.

Celso Amorim carried out Lula's foreign policy, and the Tehran Declaration is largely seen as Amorim's brainchild. The seasoned diplomat holds the record for being the longest-serving Brazilian foreign minister. Similar to Lula, Amorim collected praise from international media with *Foreign Policy* calling him the world's best foreign minister in 2009 and featuring him in its Top 100 Global Thinkers in 2010.¹⁸⁵

But in fact it is their self-confidence that rattled critics of the Tehran Declaration within Brazil. Some Brazilian observers do not shy away from accusing Lula and Amorim of being overly ambitious, seeking limelight at the expense of Brazil's reputation, and being driven by "left-wing ideology." Critics of the Tehran Declaration and Brazil's Iran policy call both men reckless.

BEYOND THE TEHRAN DECLARATION

In the aftermath of the Tehran Declaration, the Brazilian government was left to fend off critics at home who argued that the government wasted the country's political capital. Meanwhile, the U.S. government's actions reinforced the position of those who saw the

whole affair as a blunt dismissal of emerging powers. Turkey found itself in an odd position vis-à-vis its strategic ally. And the Iran nuclear challenge remained unsolved.

Many Brazilians believe that the United States has not endorsed Brazil's quest for a permanent seat on the UN Security Council as "punishment for trying to broker a deal with Tehran." While the United States has many reasons to shy away from supporting Brazil's bid and had done so long before 2010, Brasília's disappointment with the lack of U.S. support is now linked to Washington's irritation with the Tehran Declaration.

Another source of frustration for many Brazilians is what they perceive as an uneven attitude toward Brazil and Turkey in the aftermath of the declaration. As a prominent academic based in Brasília, Eduardo Viola, put it: "The United States was harsher on Brazil than on Turkey. Turkey is a military ally of the United States. The way they communicated their disappointment was different. The United States recognized that Turkey had an existential stake and Brazil interfered in something too far away." "The United States treated Turkey differently because it has strategic interests there," remarked a Brazilian expert on defense matters, João Roberto Martins Filho.

As a consequence of the Tehran Declaration debacle, it is unlikely that Brazil will proactively seek a role in solving the Iranian crisis in the short-term future, in large part because of Brazil's current president, Dilma Rousseff, who took office in 2011.

Lula was extremely popular and was ready to push the envelope in terms of his policies at home and abroad. "He had room for maneuvering and he was daring," remarked one of Brazil's former senior diplomats. Dilma, Brazilian experts explain, is more of a technocratic leader, primarily focused on domestic, especially economic, issues. Unlike Lula, she has not exhibited strong ambitions for Brazil in the foreign policy arena.

Further evidence that Dilma's government is unlikely to show any interest in anything similar to Lula's Tehran Declaration is her views on Iran in general, beyond the nuclear issue. While Lula believed that Brazil should attempt to engage Iran and influence it from the position of a friendly country, Dilma takes a harder line. Even before she officially became president, in 2010 she spoke out against Brazil's abstention from a vote on human rights abuses in Iran. In an interview with the *Washington Post* she explained: "I am not the president of Brazil [today], but I would feel uncomfortable as a woman president-elect not to say anything against the stoning. My position will not change when I take office. I do not agree with the way Brazil voted."¹⁸⁶

Brazil's votes in the UN under Dilma provide a glimpse into the differences between the perspectives of the two administrations on Iran. Brazil's voting record on human rights issues in the UN from 2005 to 2010 (during Lula's administration) earned it a reputation as a fence-sitter. Scholars who analyzed Brazil's patterns of voting concluded that Brazil generally tended to vote in support of democracy or human rights if it furthered "its own

goals of consolidating regional leadership, protecting business interests, or winning a seat on the UN Security Council.” But in cases related to Cuba, Iran, Venezuela, and Syria, Brazilian diplomats quoted principles of nonintervention and “soft balance” and tended to have a position different from key Western powers.¹⁸⁷ In the most visible difference from the Lula era, Brazil under Dilma voted in favor of a UN resolution to appoint a special rapporteur to investigate human rights violations in Iran.¹⁸⁸

Brazil’s votes on the UN resolutions specific to Iran sanctions indicate a shift as well. In June 2010 Brazil voted against the UN Security Council resolution to impose a fourth round of sanctions against Iran—an unsurprising vote after the Tehran Declaration experience. The same 2010 resolution established a panel of experts to support the Iran Sanctions Committee. In 2011, under Dilma’s government, Brazil voted in favor of extending the mandate of that panel of experts for another year.

Notably, on his last tour of Latin American countries in January 2012, then president Ahmadinejad did not receive an invitation to visit Brazil. The same month a major Brazilian newspaper *Folha de São Paulo* published excerpts from an interview with one of Ahmadinejad’s top advisers—Ali Akbar Javanfekr—who publicly accused President Dilma of “destroying years of good relations.”¹⁸⁹

There has been a change in the dynamic in the relationship between the presidential administration and the Foreign Ministry as well. According to Brazilian observers, with Dilma’s arrival, the Foreign Ministry lost some of its autonomy and issues of nuclear politics were moved down the list of Brazil’s foreign policy priorities.

The temptation for the Brazilian leadership to be active on the foreign policy scene diminished further because of the domestic economic situation. In June 2013 more than a million Brazilians took to the streets in antigovernment protests. A bus-fare hike that triggered the initial protest unleashed a flood of popular discontent against corruption, the poor state of healthcare and education, and inefficiency of local governors. The government was taken by surprise by the largest popular uprising in the last twenty years.

All this means that it is highly unlikely that Brasília will venture out to the very forefront of global nuclear politics anytime soon. The fallout from the Tehran Declaration, the different leadership style of Dilma compared to Lula, and the domestic situation in Brazil all speak against it. Yet, Brazil’s own steady progress in the nuclear field will continue, and the country’s role in the global nuclear order will grow.

CONCLUSION

AT BASE, A QUEST FOR INDEPENDENCE, self-sufficiency, technological progress, and greater recognition animates Brazil's nuclear policy. Those drivers explain Brazil's persistence in developing a full nuclear fuel cycle, building a nuclear submarine, and expanding the share of nuclear power in its energy mix, as well as its attempts to play a more active role in global nuclear politics. Once Brazil's leaders decided in the 1950s to develop an advanced nuclear sector, there was no turning back. Despite various setbacks, the country has stayed on this path.

Anyone who tries to understand the vigor with which Brazil's pursues an independent nuclear fuel cycle should not forget to look at the country's past. The conception that technologically advanced countries have sought to deny technology to developing countries is very much at the forefront of Brazilian thinking. The problems that Brazil experienced with importing nuclear fuel and nuclear technology decades ago still color its positions on nuclear issues today.

The nuclear submarine program happened to be the vehicle for advancement of Brazil's nuclear fuel cycle. Different groups in Brazil, including politicians, the expert community, and the navy, are united behind the effort. Brazilians compare their nation with the permanent members of the United Nations Security Council in discussions about their nuclear submarine program.

To avoid energy crises that plunge the country into the darkness, Brazil seeks to diversify its energy sources by expanding nuclear power. This is true even though political leaders are often ambivalent about the nuclear sector. Despite political reluctance to pursue

The conception that technologically advanced countries have sought to deny technology to developing countries is very much at the forefront of Brazilian thinking.

nuclear energy in the post-Fukushima age, Brazil is willing to consider this energy source to avoid future crises.

Internationally, the Brazilian establishment and the expert community see today's global nuclear order as unfair and antiquated, like the global order more broadly.

Distrust of established powers, especially those with nuclear-weapons programs, permeates Brazilian views on global nuclear issues. Nonproliferation demands placed on non-nuclear-weapon states are seen as particularly unfair in the context of insufficient progress toward nuclear disarmament. Brazil is also suspicious that the nonproliferation regime is part of a greater scheme by nuclear countries to leave developing countries forever behind as far as nuclear technologies are concerned. A sign of these sentiments, Brazilians detest the fact that anyone would have doubts about the peaceful nature of their nuclear ambitions or would demand more from Brazil in terms of its nonproliferation policy.

While no country likes external pressure, countries react differently in response to coercion. Some ignore the pressure; others adopt flexible positions in order to avoid antagonizing their (usually more powerful) interlocutors. While external pressure played a role in Brazil's joining the Nuclear Non-Proliferation Treaty in the 1990s, in recent years, the country has become more militant in resisting any pressure from outside in the nuclear field. The ongoing tug-of-war between Brazil and the United States over the adoption of the International Atomic Energy Agency (IAEA) Additional Protocol provides a prime example. External pressure on Brazil to sign the protocol has made the issue almost synonymous with defending Brazil's sovereignty within the domestic conversation, which proved to be a counterproductive result for the international nonproliferation regime.

Brazil's potential to play a more prominent role in global nuclear politics manifested itself most forcefully in the 2010 Brazilian-Turkish effort to forge a nuclear-fuel-swap deal with Iran. That initiative and its aftermath left a contradictory legacy. On one hand, Brazil made others look at its international prowess differently. At the very least, Brazil's bold attempt at brokering a complicated international standoff made observers curious about Brazil's potential. On the other hand, the negative fallout from the Tehran Declaration left a strong impression on Brazil, and it does not appear likely that Brasília will venture into the Iran-nuclear mix again anytime soon.

That is not to say that Brazil will stop forcefully defending its interests on issues of direct relevance to its own nuclear program. Quite the opposite—Brazil will likely become more assertive, arguing that unless there is sufficient progress toward disarmament, countries like Brazil should not be expected to take on any further nonproliferation obligations. In that respect, Brazil's distaste for the IAEA Additional Protocol and concerns about proposals to change the approach to international safeguards (that is, the debate on the state-level approach) will likely persist.

Brazil's case is a perfect example of the type of tensions that are intensifying within the global nuclear order: those between nuclear-armed and non-nuclear-weapon states, between disarmament and nonproliferation, and between nonproliferation and peaceful nuclear energy. These tensions are not new, but they are becoming harder to ignore. In the past, established nuclear powers could more easily dismiss complaints from non-nuclear states about the lopsided order, but the non-nuclear states have gradually become more active and vocal, pushing the order to evolve and making outright dismissal more difficult.

If Brazil industrializes its nuclear fuel cycle, develops a nuclear-powered submarine, and continues to expand its nuclear sector, its nuclear policy choices and stances on the global order will be difficult to ignore. For the global nuclear order to be sustainable, it is crucial that countries like Brazil feel they have a stake in its future. If Brasília continues to view the order as an utterly unfair arrangement, this will not be achieved.

The last three decades have constituted a period of dramatic transformation. Brazil has transitioned from military rule to democracy, from one of the least developed countries in the world to one of the largest economies, from an inward-looking nation to one with regional and global ambitions. Its growing regional and global clout makes it more outspoken and more ambitious in global nuclear politics but at the same time the country still lacks full confidence.

Bruises from the fallout of the Tehran Declaration would not be so severe if not for doubts within Brazil that the country is not ready for a leadership role. The country longs to be respected and fears being labeled “naive.” This duality reveals a nation that is still in the process of establishing its place on the global scene. Brasília, for the foreseeable future, will face the paradox of criticizing the unfairness of the nuclear order while attempting to carve out a role for itself in it.

For the global nuclear order to be sustainable, it is crucial that countries like Brazil feel they have a stake in its future.

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GLOSSARY

TREATIES, ORGANIZATIONS, AND FACILITIES

Additional Protocol	An agreement that grants the International Atomic Energy Agency greater access to countries' nuclear facilities and allows the agency to conduct more intrusive inspections.
Aramar Experimental Center (Centro Experimental Aramar)	Part of the Navy Technology Center. It is located in Iperó, São Paulo, and houses the navy's nuclear-fuel-cycle-related facilities.
Blue Amazon Defense Technologies (Amazônia Azul Tecnologias de Defesa, Amazul)	A public enterprise created by the Brazilian government in 2012 and tasked with developing the navy's nuclear program, including construction of a nuclear-powered submarine.
Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC)	A binational agency created by the governments of Brazil and Argentina to verify the peaceful use of nuclear materials.
Brazilian Nuclear Industries (Indústrias Nucleares do Brasil, INB)	Brazil's state-owned nuclear-fuel-cycle company, reporting to the Ministry of Science, Technology, and Innovation.

BRICS	An acronym for an association of Brazil, Russia, India, China, and South Africa, established in 2009.
Eletronuclear	Brazil's state-owned company that builds and operates nuclear power plants.
Getulio Vargas Foundation (Fundação Getulio Vargas, FGV)	A higher-education institution and think tank that leads a project on Brazil's nuclear history.
IBSA Dialogue Forum	A trilateral dialogue between India, Brazil, and South Africa, established in 2003.
Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada, IPEA)	A Brazilian government think tank affiliated with the Strategic Affairs Secretariat of the Presidency. Among other issues, it provides policy analysis on defense matters.
International Atomic Energy Agency (IAEA)	An intergovernmental organization that promotes the safe, secure, and peaceful use of nuclear energy. Among its activities, the IAEA develops nuclear safety standards and verifies through inspections that states comply with their nonproliferation commitments.
Mercosur	An agreement that unites the markets of Argentina, Brazil, Paraguay, Uruguay, Venezuela, and Bolivia.
National Nuclear Energy Commission (Comissão Nacional de Energia Nuclear, CNEN)	The Brazilian government agency responsible for formulating nuclear energy policy; the research, development, promotion, and implementation of services in the area of nuclear technology; and the regulation of nuclear energy use. CNEN is overseen by the Ministry of Science, Technology, and Innovation.
National Research Council, later renamed National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico, CNPq)	A council established in 1951 to coordinate the development of nuclear energy in Brazil.

Navy Technology Center in São Paulo (Centro Tecnológico da Marinha em São Paulo, CTSMP)	The site of research and development for the navy's nuclear program, with a focus on a nuclear-powered submarine. Located on the campus of the University of São Paulo, the CTSMP includes the Aramar Experimental Center in Iperó.
Nuclear and Energy Research Institute (Instituto de Pesquisas Energéticas e Nucleares, IPEN)	Established in 1956 for research and development in the field of nuclear energy, IPEN is associated with the University of São Paulo and is overseen by CNEN.
Nuclear Fuel Factory at Resende (Fábrica de Combustível Nuclear/ INB Resende)	A facility, operated by the INB, where nuclear-fuel-cycle-related operations are conducted.
Nuclear Suppliers Group (NSG)	A multilateral nuclear-export-control arrangement that establishes guidelines for the transfer of nuclear-related materials and technology.
Nuclebrás Equipamentos Pesados SA (NUCLEP)	A state-run company specializing in building heavy components for nuclear equipment.
Quadripartite Agreement	An agreement between Brazil, Argentina, the ABACC, and the IAEA that provides a framework for full-scope nuclear safeguards in Brazil and Argentina. It was signed in 1991 and entered into force in 1994.
South American Defense Council	A body of the Union of South American Nations made up of the defense ministers of the union's twelve member states.
Treaty on the Non-Proliferation of Nuclear Weapons (NPT)	A major international treaty designed to promote nuclear nonproliferation, the peaceful use of nuclear energy, and nuclear disarmament.
Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Tlatelolco Treaty)	An agreement that established a nuclear-weapon-free zone in Latin America and the Caribbean.
Union of South American Nations (UNASUR)	A South American bloc created in 2008 to promote regional integration.
Uranium Concentrate Unit (Unidade de Concentrado de Urânio, URA)	INB's mining and milling facilities at Caetité, Bahia.

KEY BRAZILIAN PLAYERS

Álvaro Alberto	Former director of the National Research Council (1951–1955)
Antonio Azeredo da Silveira	Former foreign minister (1974–1979)
Artur da Costa e Silva	Former president (1967–1969)
Celso Amorim	Former foreign minister (1993–1995, 2003–2011) and current defense minister (2011–present)
Celso Lafer	Former foreign minister (1992, 2001–2002) and commerce minister (1999)
Dilma Rousseff	Current president (2011–present)
Fernando Collor de Mello	Former president (1990–1992)
Fernando Henrique Cardoso	Former president (1995–2003)
Getúlio Vargas	Former president (1930–1945, 1951–1954)
Itamar Franco	Former president (1992–1994)
Ivan da Silveira Serpa	Former minister of the navy (1992–1995)
João Baptista de Oliveira Figueiredo	Former president (1979–1985)
José Alencar	Former vice president (2003–2011) and defense minister (2004–2006)
José Goldemberg	Former secretary of state for science and technology (1990–1991), secretary of state for education (1991–1992), and acting secretary of environment (1992)

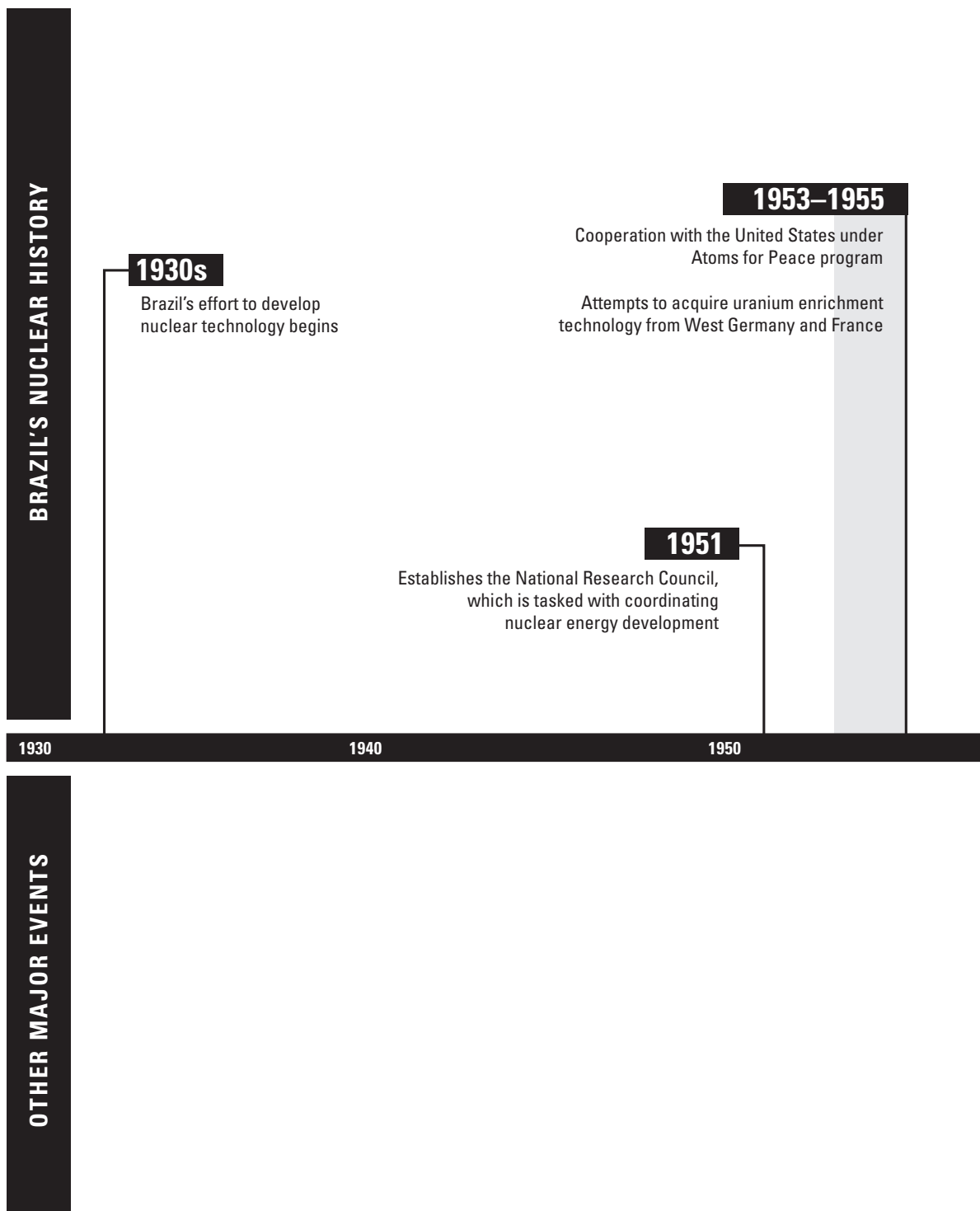
José Sarney	Former president (1985–1990) and vice president (1985)
Laercio Antonio Vinhas	Current permanent representative to the Comprehensive Test Ban Treaty Organization and resident representative to the IAEA
Luiz Inácio Lula da Silva	Former president (2003–2011)
Mario César Flores	Former minister of the navy (1990–1992)
Nelson Jobim	Former defense minister (2007–2011)
Othon Pereira da Silva	Coordinator of the navy’s uranium enrichment program at its inception
Rex Nazaré Alves	Former head of CNEN (1982–1990)

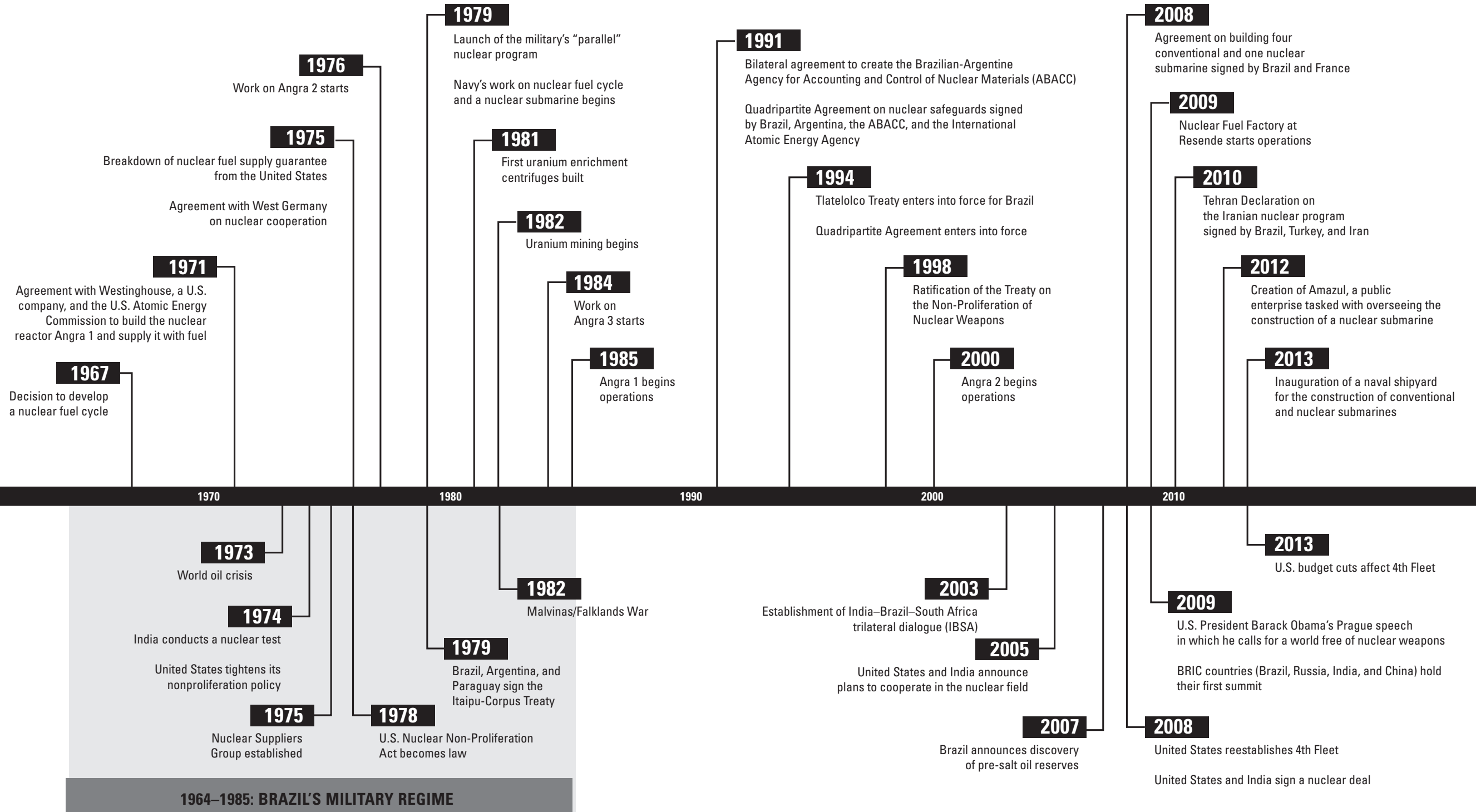
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THE EVOLUTION OF BRAZIL'S NUCLEAR PROGRAM





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