
HISTORY

Rethinking Nuclear Cooperation in Argentina's and Brazil's Competition for Prestige, 1972–1980

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This article advances several arguments about scientific and diplomatic collaboration on peaceful nuclear energy technologies between Argentina and Brazil. First, although 1972–1980 is generally viewed as an acrimonious period in the neighbors' bilateral relationship, nuclear energy officials in these South American countries made significant and unexpected progress toward technical cooperation, motivated by a shared geopolitical position. Furthermore, technological differences between the two nuclear energy programs, and experts' ideas on their potential implications for agreement between key officials, opened potential avenues for diplomatic cooperation. Finally, this article illuminates a surprising quality of diplomatic behavior of the military dictatorships in Brazil and Argentina. Against the backdrop of the Cold War, Argentina and Brazil shared nearly identical stances on the unfettered right to pursue advanced nuclear technology. In combination with increased technical cooperation, this ideological alignment supported a landmark bilateral presidential summit in 1980 on nuclear energy collaboration.

Este artículo avanza varios argumentos en torno a la colaboración científica y diplomática en tecnologías pacíficas de la energía nuclear entre Argentina y Brasil. Primero, aunque se entiende el período 1972–1980 típicamente como una época dominada por conflicto en la relación bilateral entre los países vecinos, funcionarios en el sector nuclear en estos países sudamericanos de sorpresa encontraron una cooperación mutua, motivados por una posición geopolítica compartida. Segundo, las diferencias tecnológicas entre los dos programas nucleares, abrieron posibilidades para una colaboración diplomática más profunda. Tercero, este artículo recalca una calidad sorprendente del comportamiento diplomático de las dictaduras militares en Sudamérica en los años 70: Argentina y Brasil compartían posiciones casi idénticas sobre el derecho sin restricciones para proseguir la tecnología nuclear avanzada. Combinada con la aumenta en cooperación técnica, este alineamiento ideológico brindó apoyo a un cumbre bilateral al nivel presidencial en 1980 sobre la colaboración en el campo de energía nuclear.

In March 1972, the president of Argentina, General Alejandro Agustín Lanusse, visited his counterpart in Brazil, General Emílio Garrastazu Médici, for a highly anticipated summit. One of Brazil's most popular news magazines, *Veja*, stated that the encounter was a potential "opportunity for an accord between the two ancient and persistent rivals" (Darnton 2012, 121). That meeting in Brasília, however, resulted in little more than empty declarations of abiding friendship between the two Southern Cone countries, while failing to break an impasse on plans for massive hydroelectric energy installations (Brazil's Itaipu Dam and Argentina's Corpus Christi Dam) that had defined the neighbors' relationship since 1966.¹ But scarcely eight years later, another Argentine-Brazilian presidential summit, again between two generals as heads of state, had a markedly different result. On May 17, 1980, Carlos Pastor and Ramiro Saraiva Guerreiro,

¹ The signing of the Ata de Iguacu (Iguacu Act) between Brazil's and Paraguay's ministers of foreign affairs on July 22, 1966, declared mutual interest in exploiting the hydroelectric potential of a shared section of the Paraná River between the Sete Quedas waterfall and the Iguazu River watershed. According to Oelsner (2005, 140), Argentine diplomats had begun to argue in 1967 for an idea called "prior consultation." Prior consultation recognized sovereign nations' rights to construction works in their own territories, but sought to ascribe responsibility for any consequences to countries downstream on a shared river, like the Paraná, to the country responsible for construction.

respectively the foreign ministers of Argentina and Brazil, signed a landmark agreement pledging bilateral cooperation to develop and apply peaceful uses of nuclear energy. Eight identified areas for cooperation included the exchange of nuclear technology experts and academic faculty between the two nations, as well as binational working groups “to carry out concrete studies and projects for scientific research and technological development.”²

This article discusses and analyzes an important and unexpected historical factor in the difference between these two presidential summits. Here, I show that Argentine and Brazilian nuclear energy officials and engineers took cautious, but unmistakable, steps toward bilateral technical cooperation across a variety of civilian nuclear development projects between 1974 and 1980. Recently declassified documents illuminate how nuclear officials took advantage of the opportunities for collaboration, afforded by fundamental technological differences between the two programs, years earlier than nuclear history and international relations experts had previously believed. These technical exchanges of information about nuclear technologies marked an important move by officials in both countries’ nuclear agencies, then by diplomats and foreign ministries, and lastly among political leadership. I envision and argue that this story is a “bottom-up” process instead of one so often told from the top down. Long before the formal agreement of 1980 on mutual assistance for peaceful nuclear development, nuclear officials in Argentina and Brazil began the process of translating shared rhetoric about the importance of autonomous nuclear development into active collaboration.

In the mid and late 1970s, a gradual increase in limited nuclear technology cooperation also fits within the historical and diplomatic context of Argentina-Brazil relations, especially when juxtaposed with the intractability of the hydroelectric dam construction dispute. As Roberto Ornstein, head of international affairs at Argentina’s nuclear energy commission from 1979 to 1995, noted, “Diplomats from one and the other side were never opposed to each other; what they did was to play with the possibility of reaching an agreement, particularly when Itaipu became a roadblock ... and sought to arrive at agreements in strategic fields, such as the nuclear area” (Mallea, Spektor, and Wheeler 2015, 64). I argue here, in line with Ornstein’s statement, that nuclear cooperation between technical experts and later corresponding negotiation between diplomats served as a figurative pressure relief valve during the peak of the Itaipu crisis, called by one Brazilian ambassador “the most difficult [issue] for Brazil in the 20th century” (Mallea, Spektor, and Wheeler 2015, 51). Nuclear technology development was a quieter and less visible process than contentious hydroelectric dam plans and the rerouting of rivers. Even between the neighborly rivals, nuclear plans did not have the same potential to contest or alter national borders or impinge on sovereignty or territory.

What makes nuclear cooperation remarkable between Brazil and Argentina is indeed the historical, regional, and global context in which it occurred. In 1974, the two neighbors were entering the eighth year of a highly contentious dispute over hydroelectric energy installations, specifically about how much proposed dams would be allowed to change the levels of rivers that ran through both nations’ territories. Later in the decade, the two nations faced an increasingly implacable global nuclear nonproliferation regime. United States president Jimmy Carter led other nuclear supplier countries in an effort to isolate and punish the South American rivals for nuclear technology developments viewed as dangerous steps toward building nuclear weapons. Working against these almost impossible odds, nuclear program officials and engineers quietly built the foundation for one of the twin pillars of a broader rapprochement between the neighbors at the end of the decade. The 1979 Tripartite Itaipu-Corpus Agreement brought a peaceful resolution to the hydroelectric dam dispute between Argentina, Brazil, and Paraguay, while the 1980 Agreement on Cooperation on Peaceful Uses of Nuclear Energy pledged Brazil and Argentina to collaborate on a broad variety of civilian nuclear technology development projects. This Agreement on Cooperation marked the first formal diplomatic breakthrough on the future of the continent’s most advanced nuclear energy programs.

Scholars of Argentine-Brazilian relations are nearly unanimous in underscoring the importance of these 1979 and 1980 agreements on contentious energy issues to the overall bilateral relationship of these two countries encompassing more than half of South America’s people, land, and economic might.³

² Ley no. 22.494, “Aprobación del ‘Acuerdo de Cooperación entre el Gobierno de la República Argentina y el Gobierno de la República Federativa del Brasil para el desarrollo y la aplicación de los Usos Pacíficos de la Energía Nuclear,’” Buenos Aires, September 10, 1981, <http://servicios.infoleg.gob.ar/infolegInternet/anexos/205000-209999/206224/norma.htm>.

³ An incomplete list of these authors would certainly include Alessandro Candea (2010, 212), who identified the hydroelectric and nuclear agreements as a “qualitative leap”; Andrea Oelsner (2005, 158): “the turning point on which all later changes in the relationship rested”; Andrew Hurrell (1998, 534): “a tremendously significant shift in the historical pattern of rivalry and geopolitical competition”; and João Resende-Santos (2002, 89), who claimed that the two agreements “established the first institutional structures of what is today one of the world’s most durable security regimes.”

Until recently, though, researchers have not had access to the documents that help explain the complex relationship between these two agreements, particularly in the nuclear energy field. Declassification of materials concerning nuclear energy development and diplomacy, though more common on the Brazilian side than the Argentine, has supported pioneering scholarly work that elucidates the relationship between the two nations' plans for nuclear development and hydroelectric energy, and more precisely illustrates the wider-ranging effects, particularly in the nuclear area, on bilateral relations.⁴

Though the nuclear technology rivalry between Argentina and Brazil did not seem to have the same potential to spiral into open conflict as did the river-level dispute, it nonetheless complicated the bilateral relationship for four reasons: the neighbors' historical competition for primacy in South America, Cold War geopolitics, potential military use of advanced nuclear technology, and the centrality of national security doctrine in decision makers' analyses of developments and events (Barletta 2000, 102–104.) Since Argentina's and Brazil's presidents created organizations to foster nuclear energy development in 1950 and 1951, respectively, military and political leaders in each country folded South America's "atomic age" into a multidimensional contest for regional and international prestige and recognition as a genuine world power. In two decades of national nuclear technology development before 1970, Argentina's and Brazil's trajectories and degrees of success widely diverged, opening a significant gap. Luiz Felipe Lampreia noted that among his countrymen in Brazil, "a feeling that Argentina had an edge" had taken hold by the early 1970s, and that this perception "had an important strategic impact" (Mallea, Spektor, and Wheeler 2015, 59–60).

The technical aspects of Brazil's and Argentina's divergent paths through the challenges of the geopolitics of the 1970s and advanced nuclear energy development, as each government embarked on what Emanuel Adler called "the quest for technological autonomy," have been cogently and incisively compared by several authors, including political scientists Etel Solingen and Michael Barletta.⁵ Historians of science Ana Maria Ribeiro de Andrade (2006, 2012) in Brazil and Diego Hurtado de Mendoza (2014) in Argentina have authoritatively detailed the technological decision-making process to develop nuclear energy in their respective countries. Togzhan Kassenova (2014) and Jacques Hymans (2006) explore the politics and psychology underlying nuclear development policies in Brazil and Argentina, respectively; their work joins other recent scholarship in challenging a reflexive and facile assumption that the South American neighbors opposed nonproliferation measures simply because they wanted to develop weapons.⁶ Perhaps the author closest to my interests and argument here is Isabella Alcañiz, whose dissertation places a binational epistemic community in the fundamental role of articulating nuclear policy alternatives to high-level politicians (2004). In her more recent research (2016), she has maintained her focus on institutionalization and the state's central role in gathering skilled bureaucrats with specialized knowledge and expertise, augmented through nuclear cooperation across national borders, and harnessed toward overarching state security and development goals.

While drawing on the scholarship above, my analysis in this article is set apart both by its topical and chronological focus. I examine informal and formal diplomatic efforts by nuclear agency heads and other officials in Argentina and Brazil to build bilateral nuclear cooperation, and do so in a decade from which evidence of effective, if tentative, informal nuclear diplomacy has only recently become available.⁷ Argentina and Brazil shared a resolute position and record of concrete policy decisions in favor of technological

⁴ Differences in declassification policy and availability of declassified materials were mentioned in author's interview of the Argentine ambassador Gustavo Ainchil in October 2014. Political scientists and international relations specialists Matias Spektor, Carlo Patti, and Rodrigo Mallea, among others, have led much of the innovative work coming out of Brazil and Argentina that is based on these declassified documents. A 2012 panel in Rio de Janeiro convened most of the actors at the heart of nuclear development and bilateral diplomacy in the decades between 1960 and 1990 and resulted in Mallea, Spektor, and Wheeler's 2015 publication *The Origins of Nuclear Cooperation: A Critical Oral History of Argentina and Brazil*.

⁵ Adler (1987) explains how Brazil enjoyed relative success vis-à-vis Argentina in constructing a domestic computer industry, while the Argentines created more favorable political and organizational conditions for a thriving nuclear energy program. The work of Argentine scientific and technological policy scholar Mariana Versino, including her 2006 PhD dissertation (Universidade Estadual de Campinas, Brazil) and Versino, Thomas, and Lalouf (2008), details the history of INVAP, the Argentine nuclear and aerospace technology maker responsible for many of the successes Adler describes. Solingen (1995) and Barletta (1997, 2000) are among works that elucidate the ramifications of the opposite technical decisions made by Brazil (light water/enriched uranium reactors) and Argentina (heavy water/natural uranium reactors.)

⁶ While Kassenova and Hymans approach the questions of autonomous nuclear development in the two nations from divergent angles and approaches, both exemplify this international corrective effort in recent scholarship on nuclear energy in South America.

⁷ For example, João Resende-Santos (2002) corrected the chronology of what little scholarship existed at the time on South American regional cooperation by dating serious efforts to 1979. In my view, however, he fell into a familiar pattern of error—near universal

autonomy, particularly in nuclear energy development. Especially during the negotiation of the 1967 Treaty of Tlatelolco, the world's first regional nuclear nonproliferation agreement, Brazilian and Argentine delegations insisted on the right to conduct "peaceful nuclear explosions." They also inserted a complicated provision that made the treaty's path to enter into force much more difficult and generally sought to preserve a maximal degree of freedom for future nuclear development within their own borders. At many times between 1974 and 1980, this shared support for technological autonomy facilitated meaningful progress toward peaceful collaboration in the nuclear energy field instead of stoking the fires of rivalry, albeit among a limited number of actors at high levels within each country's nuclear program. In fact, alignment on nuclear technology policy between Brazil and Argentina not only appeared to belie centuries of a contentious relationship, but also served as a diplomatic buffer for a much more acrimonious dispute on hydroelectric energy.

A Centuries-Old Competition for Prestige Enters the Nuclear Age

Argentina's nuclear technology race for prestige with Brazil made a potentially volatile addition to a bilateral relationship that I envision as a centuries-long sine wave, explained by Alessandro Candéas (2010) and Monica Hirst (2011) as an alternation between periods of cooperation and rivalry. Argentina's nuclear policy before the 1970s had historically been "coherent and continuous, characterized by a single and centralized direction," with only four directors of its national nuclear energy agency (CNEA, the Comisión Nacional de Energía Atómica) during the same period that the politically volatile country had sixteen presidents (Oelsner 2005, 153). Perhaps even more importantly, Argentina's nuclear program established precedents that led to successful autonomous nuclear development, where "process turned out to be more important than outcome." Argentine scientists and engineers learned to build their own research reactors, carry out the feasibility study for the nation's first nuclear power plant, and required local industry to participate in construction and implementation of major international nuclear transfer contracts (Adler 1988, 73–74).

In contrast, the Brazilian nuclear energy program suffered from a lack of the public and scientific community support enjoyed by Argentina. Brazil's national nuclear commission was one of many organizations and institutions, including the three branches of the armed forces, working on dispersed nuclear activities, "pushed and pulled by various groups of civilian and military decision makers, research institutes, and state enterprises with clashing ideologies" (Adler 1988, 76). Furthermore, the Brazilian scientific community was sidelined by military rulers in 1967–1968 when they ended a promising domestic nuclear development program and imported an American Westinghouse nuclear power reactor instead (Adler 1988, 77). Presidents Artur da Costa e Silva and Emílio Médici placed their bets on a continued supply of enriched uranium to fuel the Westinghouse light-water reactor, but this was a misguided decision with dire consequences that would materialize in the 1970s.

By the 1970s, the most tangible evidence of Argentina's lead in nuclear development was its Atucha I power plant, a 340-megawatt Siemens reactor purchased from West Germany that ran on natural (unenriched) uranium and used deuterium oxide (heavy water) as the moderator required to sustain the nuclear chain reaction, which produces tremendous amounts of energy. Argentine officials, in contrast to their Brazilian neighbors, had chosen natural uranium reactors, believing uranium enrichment to be a technology "beyond the reach of countries like ours."⁸ The feasibility study for Atucha I, completed in 1964, mentioned its potential to reduce Argentina's dependence on petroleum. Eleven years later, in the height of the oil crisis, the nation's nuclear planners cited a potential \$1 billion (in 1975 US dollars) savings from bold moves toward nuclear power, with its newly operating plant already providing approximately 6 percent of its total electricity demand.⁹ Construction of the reactor began in 1968. By 1970, a forward-thinking CNEA engineer, Jorge Cosentino, had asked the manager of the reactors division to carry out a study on methods of heavy water production around the world (Conde Bidabeheré 2000, 30). Cosentino, mindful of the dictates of technological autonomy toward domestic production of all possible inputs to the

in scholarship at the time—in labeling the nuclear energy competition between the neighbors as "the race to be the first to acquire nuclear weapons" (Resende-Santos 2002, 95).

⁸ Quotation from Eduardo Santos, "Charla pública 1.0.ppt," PowerPoint presentation on Pilcaniyeu uranium enrichment project, February 24, 2010, slide 5. Santos was president of CNEA in the mid-1990s and generously shared with me a copy of his digital archive of documents on Argentina's secret uranium enrichment project, rapprochement with Brazil, and some of the first safeguards agreements made by Argentina, Brazil, and the IAEA after 1991. Note that the option of purchasing enriched uranium from the United States or European suppliers, as Brazil opted to do, is not even mentioned here.

⁹ Santos, "Charla pública"; Hurtado de Mendoza 2014.

nuclear energy program, could also foresee a future where heavy water supply might be selectively limited for its proliferation potential, as Argentina's power reactor would produce plutonium as a by-product of its operation. (The Pu-239 isotope is a key component in many nuclear fission weapons as it is both widely available and easily fissionable.)

In the early 1970s, Argentina's lead in the quest for nuclear energy over Brazil had been blunted by Brazil's front-runner status in hydroelectric energy. Brazil and Paraguay agreed in 1966 to explore the hydroelectric potential of diverting the Paraná River to build a large dam. In 1970–1971, an Italian-American consortium concluded viability studies for the proposed Itaipu Dam, and planned its location to be fewer than ten miles from Argentina's border (see **Figure 1**). Worse yet for Argentine authorities, the proposed Brazilian/Paraguayan dam would be constructed only a few miles from Argentina's planned Corpus Christi dam.¹⁰ This proximity ignited an especially bitter diplomatic disagreement about the planned height of the two hydroelectric dams (Resende-Santos 2002, 96). In 1973, Argentina's press and political class launched a full-scale condemnation of Brazil's hydroelectric energy plans for the Itaipu Dam (Yergin 2008). In an especially fitting plot twist to the story of bilateral energy disputes in the Brazilian-Argentine rivalry for prestige, Argentina's military dictator Jorge Rafael Videla would appoint Oscar Camilión as ambassador to Brazil in 1976. Camilión's efforts to change the Brazilian public's image of Argentina would depend heavily on a strategy of currying favor with influential journalists in the Brazilian press.

Marcelo Sánchez Sorondo of Argentina's Justicialist Liberation Front threatened to “destroy the Washington-Brasília axis to avoid the implementation of Brazilian hegemony in Latin America” and urged

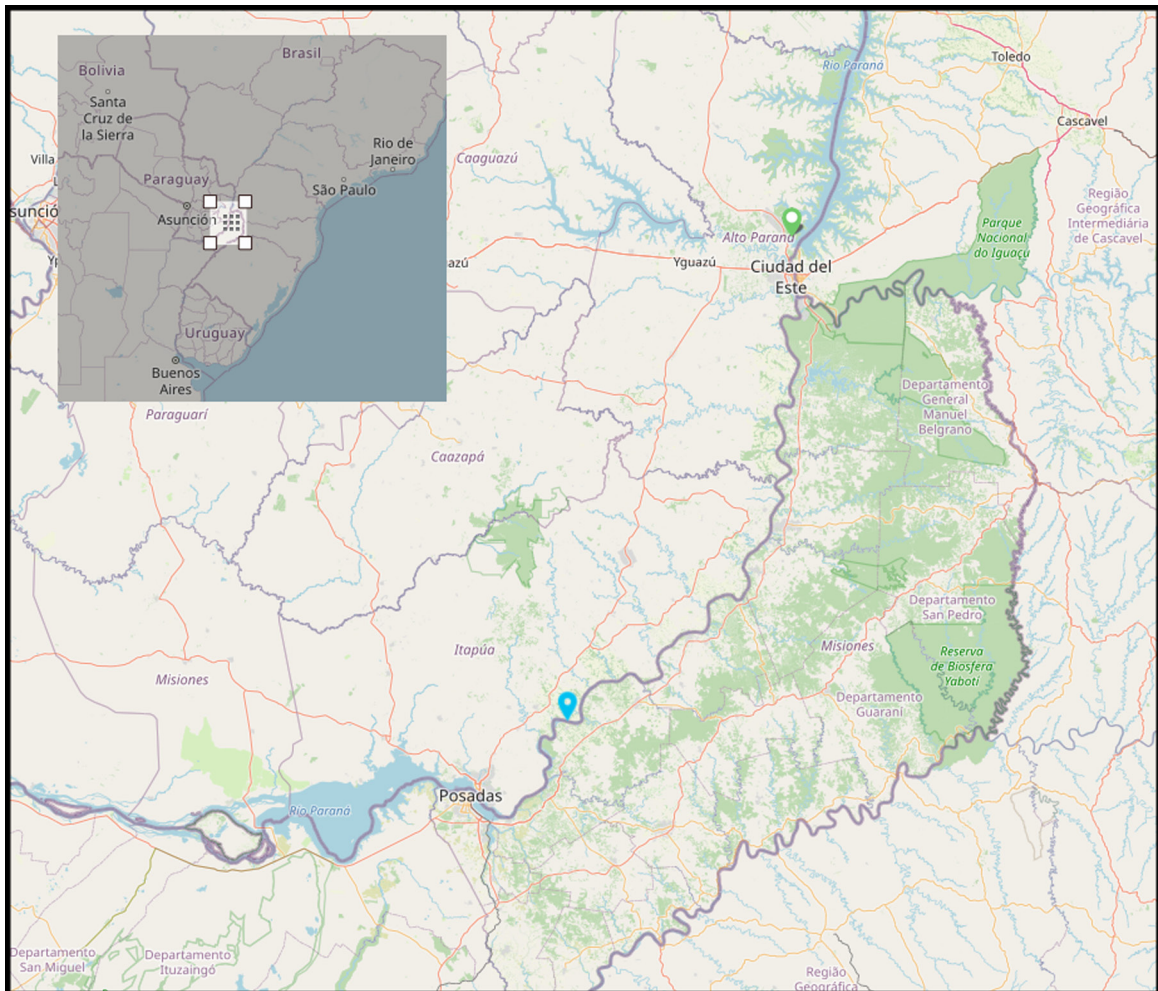


Figure 1: Map of proposed Itaipu (green pin) and Corpus (blue pin) hydroelectric dams.

¹⁰ Though the Corpus Dam was at the heart of Argentina's concerns about Brazilian hydroelectric energy plans in the 1970s, it was never built. Argentina opted to build the Yacyretá Dam instead, in cooperation with Paraguay, with construction beginning in 1983 and the project opening in 1994.

Argentine leaders to take action to block Brazil and Paraguay from constructing the massive dam on the Paraná River.¹¹ The Itaipu Dam was more than an ambitious expansion of Brazil's energy capacity toward hydroelectric power; to Argentina, it had become the embodiment of clear and present danger, as a resurgent Brazil gained influence and economic power at the expense of its less-fortunate neighbor. By the mid-1970s, the "Brazilian miracle" was in full blossom, with annual economic growth rates approaching 10 percent. Argentina's response to its neighbor's economic boom was, in part, to dig in and make its position on the Itaipu conflict even more intransigent, in order to seek a "durable settlement that would preserve its latitude and influence in the region" (Resende-Santos 2002, 97).¹² Brazilian officials derided their Argentine critics as "emotional," spurring the Argentine diplomat Alberto Pugnalin to write a private memo to his embassy in Brazil. There, he assailed officials in Brasília for taking "frankly paternalistic postures toward its neighbors with little or no disguise."¹³ The neighborly rivalry thus incorporated a new complication: while Brazil envied and feared Argentina's nuclear energy advancement in the year before the Atucha power plant would begin operation, Argentina considered Brazil's demographic and economic might, concretized in the planned Itaipu Dam, a palpable threat to its own regional influence and security. "Itaipu was so emotional and so hard to understand, inasmuch as it was not a simple sum of hydroelectric projects that should be technically coordinated," said Oscar Camilión in 2012 (Mallea, Spektor, and Wheeler 2015, 57). The Itaipu dispute carried the weight of a centuries-old rivalry for prestige and continental leadership, a catastrophic spike in oil prices that threatened industrial development, and contentious implications for questions of sovereignty, national territory, and the fate of shared waterways.

On May 18, 1974, a shocking development in a South Asian rivalry reverberated in Brazil and Argentina. India successfully conducted a nuclear explosion at Pokhran in the northwestern state of Rajasthan. The device was fueled by approximately fifteen kilograms of plutonium produced in a Canadian-designed reactor, CIRUS, with heavy water provided by the United States (Ghaswala 1974, 782). Mario Bâncora, head of the Reactors Division of the national nuclear energy commission of Argentina, complained that "the only thing the Indian bomb did for us was complicate our lives terribly" (Hurtado de Mendoza, 2009, 6). The Indian nuclear test would not only affect Argentina's nuclear program, as the United States abruptly halted Brazil's supply of enriched uranium in response to India's test. The US Atomic Energy Commission (AEC) withdrew its fuel guarantee for Brazil's first nuclear power reactor, the Westinghouse-built Angra I, as part of tighter controls against a repeat of India's apparent development of nuclear weapons (Kassenova 2014, 19). Brazilian nuclear officials, however, had been hedging their bets on American supplies of enriched uranium for some time after the 1968 decision in favor of a light-water power reactor. West Germany appeared to be a potential partner with Brazil in uranium enrichment and supply efforts since 1971, when a preliminary contract was drawn up with German firms for a gaseous diffusion enrichment plant to be built in Brazil's São Francisco River Valley.¹⁴ The Indian nuclear explosive test unexpectedly facilitated Brazil's and Argentina's slight inward turn toward collaboration with each other. Each country's courting of European and North American technology partners continued, however, alongside these incipient neighborly efforts.

The Engineers

The history of quiet cooperation between Argentine and Brazilian nuclear officials and high-ranking scientific and technological personnel began within the context of diplomatic acrimony around the Itaipu and Corpus hydroelectric dam plans and construction projects. Additionally, officials in both countries were still grappling with uncertainty and concern over the longer-term effects of India's surprise nuclear test, especially in other developing countries with relatively advanced nuclear energy programs. With this inauspicious background clouding South American and global energy relations, Argentine nuclear engineer Jorge Cosentino extended an unexpected invitation to Brazil's Superior War College delegation in June 1974. Cosentino, the director of the Atucha I power plant, then newly in operation, received the

¹¹ Alberto A. Pugnalin, "Comentarios periodísticos sobre Itaipu," March 21, 1973, Departamento América del Sur, Caja AH/0361, Archivo Ministerio de Relaciones Exteriores y Culto, Buenos Aires, Argentina.

¹² Luiz Augusto de Castro Neves, Brazilian ambassador to Argentina 1971–1974, recalled that Argentine journalist Mariano Grondona had written an article in *La Nación* in 1973 arguing that Brazil had acquired "a greater economic dimension than Argentina," and its advantages over Argentina in geographical size and population would create a multiplier effect that would soon widen the economic gap. In Neves's retelling, Grondona at least hinted that Argentina should "compensate for [Brazil's greater economic might] qualitatively," including militarily, and advocated research toward the possibility of an Argentine nuclear weapon (Mallea, Spektor, and Wheeler 2015, 76–77).

¹³ Pugnalin, "Comentarios periodísticos sobre Itaipu."

¹⁴ Antônio Azeredo de Silveira, "Report from the Brazilian Foreign Ministry to President Ernesto Geisel, 'Subject: The Indian Nuclear Test,'" May 21, 1974, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/121350>.

military delegation from Brazil as his guests and expressed his sincere interest in exchanging technical information and experience with Brazilian nuclear officials and technicians.¹⁵ I argue that this offer marked the beginning of persistent, durable efforts toward collaboration between individuals and small groups within each country's nuclear energy hierarchies.

On his tour of Atucha I, Cosentino explained the technological intricacies of Argentina's reactor to his visitors, who learned that CNEA had imported 327.08 tons of heavy water from the United States and West Germany to operate the reactor. The engineer continued by discussing the plutonium that was a byproduct of Atucha I's operation, noting that the entire power production facility was under safeguards, so plutonium produced there could not be diverted to use in a weapon.¹⁶ As reassurance, he added that there were no plans to reprocess the plutonium to use as nuclear fuel. Cosentino invited Brazilian technicians "without any reservation" to come learn "whichever details they wished to know" about the Argentine program, and told them that he hoped the two countries would come to cooperate more closely on nuclear energy matters because of the "two distinct experiences" of running power programs based on natural vs. enriched uranium.¹⁷

Luiz Augusto de Castro Neves, then Brazil's ambassador to Argentina, had spoken with this delegation of his countrymen before their trip to Atucha I. The successful experience of Cosentino's power plant tour for the Brazilian military personnel in June 1974 soon engendered other similar visits designed to educate Argentine or Brazilian officials, military personnel, scientists, and technicians about the basic details of the other country's civilian nuclear program. Neves signals that while the stated purpose might have been didactic, these visits played a more important role of building solidarity and a common ideology regarding nuclear development. "In a certain way," Neves stated, "at the international community, Brazil and Argentina were sitting side by side on the defendants' bench. There was a clear perception that we had somehow to act jointly" (Mallea, Spektor, and Wheeler 2015, 75).

During the mid-1970s, however, Brazilian nuclear power was still stuck in the planning phase. In 1975, Brazil's national nuclear energy commission, called CNEN (Comissão Nacional de Energia Nuclear), turned over its leadership of the stalled nuclear power program to a state enterprise created to direct the construction and operation of its power plants obtained from West Germany (Adler 1988, 80; República Federativa do Brasil 1982). This entity, called Nuclebrás, would be responsible for implementing the massive nuclear transfer agreement between the transatlantic partners. The agreement promised to Brazil two large nuclear power reactors, a heavy components facility, a pilot nuclear fuel element fabrication plant, jet-nozzle uranium enrichment capability, and a small fuel reprocessing plant (Lowrance 1976, 151–152). Roberto Ornstein hypothesized that a lingering competition between the two national nuclear energy commissions drove Brazil's hurried, no-expense-spared efforts to partner with West Germany. "It seemed logical to us that Brazil would make an effort of that magnitude [its nuclear technology transfer agreement with Germany] since in fact, it was a little behind with respect to the development that Argentina had attained in that field" (Mallea, Spektor, and Wheeler 2015, 63).

The Ambassadors and the Diplomats

In March 1976, the brutal Proceso de Reorganización Nacional military dictatorship seized power in Argentina. Jorge Rafael Videla, the junta's first president, famously declared that "one who spreads ideas contrary to Western and Christian civilization" was as much a terrorist as someone with a revolver or a bomb (Rebossio 2013). The general who would order the detention, torture, and murder of thousands of supposed communist subversives and sympathizers with the political left also sought improved relations with Brazil. For Videla, this was a tactical move to minimize losses from the Itaipu hydroelectric dispute through direct negotiations with Brazil and possibly Paraguay (Oelsner 2005, 142). Videla's conciliatory posture toward Brazil was encouraged by Argentina's influential economic minister José Alfredo Martínez de Hoz. Furthermore, the junta named a more conciliatory ambassador to Brazil, Oscar Camilión, then replaced hard-liners in the Ministry of Foreign Affairs with the "pragmatic" choice of Carlos Washington

¹⁵ "Telegram, Brazilian Embassy in Buenos Aires, 'Visit of an Embassy Employee to the Nuclear Center [at] Atucha,' July 1, 1974, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/116856>.

¹⁶ The safeguards agreement does not specifically mention plutonium, but it is covered in the requirement for an accurate inventory of "nuclear material that is being or has been produced in the Nuclear Facility" in Part V, Inventory and Notifications, Section 8 (a), and Part V, Section 10, Reports on Produced Nuclear Material, as "any special fissionable material produced during the period covered by the report." IAEA Information Circular 168, October 3, 1972, <https://www.iaea.org/publications/documents/infcircs/text-agreement-between-agency-and-argentina-application-safeguards-atucha-power-reactor-facility>.

¹⁷ "Telegram, Brazilian Embassy in Buenos Aires, 'Visit of an Embassy Employee to the Nuclear Center [at] Atucha.'"

Pastor in 1978. Videla's selection of Camilión, in particular, as a relatively moderate voice and Brazil expert, would prove to be a breakthrough in the nuclear and hydroelectric energy disputes troubling the bilateral relationship between Argentina and Brazil (Resende-Santos 2002, 99). Camilión's ameliorating effects on his neighbors were perceived almost instantly. "Oscar Camilión came to Brazil in May 1976 and met with a classic posture of military regimes to keep secrets ... [but he] seduced the Brazilian press thoroughly" within a year of his appointment, according to Brazilian foreign ministry official Luiz Felipe Lampreia (Mallea, Spektor, and Wheeler 2015, 59).

Luiz Felipe Lampreia immediately stepped into sensitive territory at the Brazilian foreign ministry, pulled between the Argentine regime's desire to improve relations with Brazil and his own boss's distaste for Oscar Camilión as the face of that effort (Spektor 2010, 247). Yet Camilión's strained relationship with Brazilian foreign minister Antônio Azeredo da Silveira did little to deter him from behind-the-scenes work on nuclear affairs through overtures to Brazilian military and political officials (Mallea, Spektor, and Wheeler 2015, 67–68). In early 1977, these meetings began to bear fruit when Camilión told Brazilian naval admiral (and the armed forces' vice chief of staff) José Calvente Aranda of Argentina's "complete solidarity" with Brazil and its desire to strengthen the two nations' bonds of friendship. The Argentine ambassador then surprised his interlocutor with the news that Videla wished to visit Brazil, a revelation by Argentina's head of state that caught even his own foreign ministry off guard. The dispute over Itaipu, Camilión maintained, had passed its peak of contention, took on lesser importance in the context of a presidential visit, and might have been a matter best left within Argentina's internal politics, removed from the complex bilateral relationship entirely.¹⁸

Camilión's plans for improving the relationship between Argentina and Brazil nearly foundered due to the foreign policy of Brazil's president, General Ernesto Geisel. The Geisel government's *abertura* policy aimed to defuse foreign relations tensions as part of a broader goal to marginalize the military's extremists and restore the professionalism of the armed forces. However, the Brazilian president's foreign policy orientations were far from ideal for major improvements in relations with Argentina. Working with foreign minister Antônio Azeredo da Silveira, Geisel sought to isolate Argentina by forging agreements with every other neighbor of Brazil, beginning with Uruguay, Paraguay, and Bolivia, then concluding the Amazon Cooperation Treaty in 1978 with Brazil's western and northern neighbors (Bethell and Castro 2008, 208). The Amazon treaty represented an effort, in part, to counteract Argentina's closer relationship with the Andean Pact countries (Colombia, Ecuador, Bolivia, and Peru) as Brazil sought to mend its relations with neighbors that it had largely spurned in the 1960s in favor of building closer relations with the United States (Ferris 1981, 159).

In late 1976, any significant agreement between Argentina and Brazil on nuclear technology development still appeared to be impossible, despite Argentina's overtures. Paulo Nogueira Batista, president of Brazil's national nuclear power company Nuclebrás, wrote in November 1976 that he had spoken with Brazilian officials,¹⁹ who were entirely unreceptive to Argentina's proposal of a joint declaration on nuclear energy, made during the twenty-first IAEA conference in Rio de Janeiro two months prior; Mallea, Spektor, and Wheeler 2015, 78, 202). The Brazilian nuclear transfer agreement with West Germany still occupied a great deal of diplomatic attention, making the others in the room—notably diplomats Paulo Cabral de Mello and Luiz Felipe Lampreia—hesitant to support efforts toward a prospective nuclear energy cooperation agreement that might be better channeled into the extant German collaboration. An intra-Latin American agreement between the region's two leading nuclear energy programs might limit the potential of CNEN, an agency that sought international significance but had put weighty expectations into the German agreement as applied to Nuclebrás.

There was also skepticism about the financial benefit to Brazil of a potential neighborly agreement on nuclear technology. Brazil's ministers and nuclear officials did not believe that its neighbor Argentina, another country advanced in nuclear technology with a protectionist economy, would provide a sufficient market for future Brazilian nuclear exports. Brazilian Minister of Mines and Energy Shigeaki Ueki directed the diplomat Paulo Cabral to communicate that his ministry would not support any nuclear agreement with Argentina and that the Brazilians would only listen to proposals initiated from the Argentine side. Paulo Nogueira Batista's detailed notes on potential blocks to Argentina's efforts to mend relations are striking for

¹⁸ "Letter to Hugo de Andrade Abreu on a Conversation Between Vice-Chief of Staff of the Armed Forces Jose Calvente Aranda and Argentine Ambassador Oscar Camilión," March 22, 1977, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/123284>.

¹⁹ "Notes from President of Nuclebrás Paulo Nogueira Batista to the Brazilian Ministry of Foreign Relations," November 24, 1976, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/123283>.

two reasons. They do not mention the Itaipu dispute, nor a growing history of technical cooperation in the nuclear area between 1974 and 1976. Instead, they focus exclusively on nuclear energy policy differences between Brazil and Argentina, and conflicting foreign alignments and commitments, arguing that the time for a joint declaration on nuclear policy had not yet arrived.²⁰

However, the stymied efforts toward greater technical cooperation in the nuclear area between Argentina and Brazil might have revived as a result of Jimmy Carter's election as the new president of the United States in November 1976. Months before the election, Carter had been campaigning against Brazil's nuclear transfer deal with West Germany as a potential proliferation threat, and in October 1976 proposed that the United States block West Germany's sale of a spent fuel reprocessing plant to Brazil (Patti and Spektor 2020, 84). Carter's foreign policy priorities, in addition to nuclear nonproliferation, included curtailing support for governments engaged in human rights abuses. Both Videla's and Geisel's military regimes were guilty of widespread torture, "disappearances" and indefinite detention of political dissidents, and indeed thousands of extrajudicial killings of Argentine and Brazilian citizens.

Even by early 1977, Argentina's ambassador Oscar Camilión, undeterred by the Geisel administration's cold shoulder toward Argentina, sought to refocus Brazilian-Argentine diplomacy away from the waning Itaipu dispute toward nuclear technology development, adding that any agreement between the two nations would "strengthen the position of both countries and remove the stain of any insinuation with respect to the fabrication of the bomb."²¹ While Carter's election in the United States may well have pushed Argentina and Brazil toward closer nuclear technology cooperation, Camilión soon received another unintentional boost from a foreign power seeking to hold Argentina in check. Most of the Videla government's diplomatic attention and urgency turned away from Brazil and toward Chile, as brinkmanship with Argentina's western neighbor over transit and fishing rights in the Beagle Channel reached crisis levels between 1977 and 1979.

Interlude: Parallel Nuclear Projects and the Quest for Enrichment

In February and March 1978, a double blow arrived from Vienna, then Washington, threatening Brazil's and Argentina's prospects for autonomous development of nuclear technology and control of the full fuel cycle. Information Circular 254 from the International Atomic Energy Agency in Vienna tightened safeguards against nuclear technology theft or sabotage and increased the number of sensitive technologies that would "trigger" automatic safeguards.²² Across the Atlantic, US president Jimmy Carter signed the Nuclear Nonproliferation Act (NNPA) into law on March 10, 1978. The NNPA required safeguards on all nuclear facilities in any country to which the US would transfer technology or fuel for civilian energy programs, as well as a commitment by that country not to develop or acquire nuclear weapons. Many scholars and nonproliferation experts criticize the NNPA for having the opposite effect from its intention, but this was not the first time that US nonproliferation policy had been counterproductive (Squassoni 2008, 64). In 1978, the NNPA's specificity and scope posed a grave dilemma to Argentine and Brazilian nuclear officials and engineers: either accept safeguards or begin autonomous efforts to enrich and reprocess nuclear fuel. Roberto Ornstein plainly stated that "the decision to develop the uranium technology of gaseous diffusion was a consequence of Carter's policy." Nearly forty years after Carter's election, Ornstein's fellow nuclear officials and diplomats from both Argentina and Brazil assembled in Rio de Janeiro were unequivocal about the effects of Carter's NNPA restrictions on launching covert uranium enrichment efforts in the Southern Cone (Mallea, Spektor, and Wheeler 2015, 64, 68–69, 72, 87).

Argentina's secret uranium enrichment project officially began June 14, 1978, when CNEA leaders first proposed a remote test laboratory to agency president Carlos Castro Madero. Pilcaniyeu, the site chosen for the eventual enrichment facility, is a hamlet of under one thousand inhabitants located approximately forty miles east of the ski resort town of San Carlos de Bariloche, along a ribbon of highway that traverses the southern third of Argentina's mountainous Rio Negro Province. In this remote mountain laboratory,

²⁰ "Notes from President of Nuclebrás Paulo Nogueira Batista to the Brazilian Ministry of Foreign Relations."

²¹ "Letter to Hugo de Andrade Abreu from Brasília."

²² The tightening of safeguards on these sensitive or potentially proliferative nuclear technology installations was particularly onerous to Brazilian and Argentine authorities: "Suppliers should transfer trigger list items only when covered by IAEA safeguards, with duration and coverage provisions in conformance with the GOV/1621 guidelines." Another section of this IAEA circular titled "Safeguards triggered by the transfer of certain technology" specifically named Argentina's and Brazil's coveted reprocessing facilities, enrichment, and heavy-water production as items on the "trigger list," and thus subject to the restrictions listed. International Atomic Energy Agency, "Information Circular 254: Communications Received from Certain Member States Regarding Guidelines for the Export of Nuclear Material, Equipment, or Technology," February 1, 1978, <https://www.iaea.org/publications/documents/infcircs/communications-received-certain-member-states-regarding-guidelines-export-nuclear-material-equipment-or-technology>. Annex A of the same information circular, on pages 12–15, contains the "trigger list" in full detail.

technicians would attempt to produce uranium hexafluoride (UF₆) as an eventual input to the isotopic diffuser. Their most daunting technical challenge was to build the membranes of the gaseous diffusion machinery to withstand the corrosive effects of UF₆ gas, a difficult engineering process still classified by the United States. In four years, technicians working at Pilcaniyeu had accumulated five hundred kilograms of uranium hexafluoride gas to provide the stream for diffusion.

One final challenge still remained: enriching the uranium hexafluoride on a scale larger than successful early tests. In February 1981, a pilot enrichment plant using a twenty-step cascade and diffusion membranes built by the Argentine engineers successfully enriched a one-gram sample of uranium. By 1985, Argentina's nuclear engineers enjoyed enough success with industrial-scale enrichment that they could plan to supply both Atucha I and II power reactors with their own low-enriched uranium.²³

Argentina's home-grown approach to covert uranium enrichment had little in common with how Brazil tackled the same technical challenges of autonomous nuclear development outside international safeguards. The NNPA of 1978 had reignited simmering discontent stoked by disappointment in the West Germany deal among Brazil's scientific and technical communities and military forces. In 1979, the military gained approval from new president João Figueiredo to develop the full nuclear fuel cycle through a secret "parallel program," in which each of the three branches of the armed forces tried to develop a different method of uranium enrichment technology. The navy's small cadre of engineers and technicians worked on the parallel program, successfully constructing two uranium enrichment centrifuges based on a Soviet "Zippe" model (Kassenova 2014, 23). The Brazilian Navy's most significant engineering challenge was creating maraging steel from a small imported sample, after carbon steel and stainless steel prototype rotors had failed. Maraging steel, produced through an intricate heat treatment process, must be used in enrichment centrifuges because standard steel is not resistant to corrosion from the uranium hexafluoride gas that passes through the centrifuge (Kemp 2017, 14). Reportedly, Brazil's national steelworks took a great deal of convincing to agree to produce this metal that has no other viable commercial purpose. Brazil actually achieved enrichment success on an industrial scale before Argentina, in March 1982; by 1985, Brazil had a third-generation gas centrifuge in operation and was testing a cascade of nine machines at the Iperó facility in São Paulo State (Kemp 2017, 14). After 1983, in the politics of global nuclear nonproliferation, there was no going back for Argentina and Brazil. Of the world's fifteen countries possessing uranium enrichment facilities, these two, Argentina and Brazil, would come under even greater pressure to show the world that they had no intention of building a bomb.

The Presidents

Backing up a bit in time to track political developments in Argentina and Brazil that paralleled the secret uranium enrichment projects, in 1979, the neighbors' nuclear energy relationship grew significantly closer when a new military president, João Figueiredo, took power in Brazil and demanded a prompt resolution to the Itaipu Dam dispute. Videla's three years of efforts to improve relations with Brazil found a willing partner in Figueiredo. The new Brazilian head of state had lived in Argentina as a child after his father was exiled from Brazil for conspiring against Getúlio Vargas's government, leading rebel soldiers in the Constitutionalist Revolution of 1932. His fond feelings for his childhood home, in part, led him to reshuffle diplomatic positions in Paraguay and Argentina as he recentered Brazil's foreign policy on Latin America, particularly with the country's closest geographical neighbors (Oelsner 2005, 144). In this way, Figueiredo's first meaningful foreign relations personnel changes after taking office mirrored Videla's charm offensive from Argentina in 1976, when the general-president prioritized improved relations with Brazil. Figueiredo's personal commitment to resolving the Itaipu dispute in the first year of his presidency, however, apparently did not require a lot of work on his part, as Luiz Augusto de Castro Neves noted that "the essence of the [Itaipu] agreement was practically ready by the end of the administration" of his predecessor in office, Ernesto Geisel (Mallea, Spektor, and Wheeler 2015, 65). Oscar Camilión praised Figueiredo's "global vision" of a good relationship with Argentina being "worth more than five meters more or less in the [water] level of Itaipu." Figueiredo's military credentials carried an important weight in reassuring concerned sectors of the Brazilian armed forces that rapprochement with Argentina was both possible and necessary (Mallea, Spektor, and Wheeler 2015, 99).

It is beyond any doubt that among the two energy disputes at the core of the bilateral relationship in the 1970s, the Itaipu dispute would have to be resolved before any meaningful agreement could be reached on nuclear energy and technology. Neves and Camilión, two of the actors at the center of both negotiations,

²³ Santos, "Charla pública."

agreed wholeheartedly on this point. The Brazilian called the 1979 Tripartite Treaty resolving river levels the event that “opened the gates for cooperation,” while his Argentine counterpart stated that “until the question of Itaipu was resolved it would not be possible to go ahead in other things” (Mallea, Spektor, and Wheeler 2015, 77).

In August 1979, a mere two months before Argentina, Brazil, and Paraguay would formally agree to resolve the Itaipu/Corpus dispute, Argentina’s ambassador Héctor Subiza proposed a draft agreement on nuclear energy cooperation. Subiza wrote three primary reasons why the timing might finally be auspicious in Brazil for a potential agreement with Argentina. First, the official Brazilian nuclear program, under its partnership with West Germany, was in a state of “deceleration,” so many of the country’s nuclear technicians and installations were suddenly available and underutilized. Second, a large part of the criticism of Brazil’s nuclear program from within, such as the disappointment and disillusion of the scientific community and military officials described above, had its source in doubts that West Germany would actually carry out its promised transfers of technology. Now that the political, scientific, and military sectors of Brazil had given up on the disappointing West Germany deal, Subiza seemed to say, Brazil might be more open to new nuclear cooperation partners. Finally, after 1976, Brazil had carried the intense weight of American pressure to change the terms of its 1975 agreement with West Germany, as only Argentina seemed to offer even lukewarm support of Brazil’s nuclear autonomy goals, drawn from “the circumstantial partnership of interests.”²⁴ Brazil needed regional allies on nuclear energy, and Subiza indicated that Argentina was ready to play that role, particularly (albeit rather cryptically) if an agreement could be reached on “specific aspects of the fuel cycle,” a seeming reference to enrichment or reprocessing efforts. Of course, these projects were already under way in secret autonomous development at Pilcaniyeu in Argentina and in Brazil’s “parallel program.”

In the last five months before the signing of the peaceful nuclear cooperation agreement, the presidents of the two countries’ nuclear energy commissions took some of the initiative back from the presidents of Brazil and Argentina. In this way, the 1974–1980 history of nuclear cooperation has a circular shape, led at first by highly placed engineers in the nuclear hierarchies, then by foreign ministries and ambassadors through the endgame of the Itaipu negotiations, then the military presidents of the neighboring countries, and lastly, by nuclear engineers again, who had ascended to the head position in each country’s nuclear energy agency. In January 1980, CNEA president Carlos Castro Madero indicated his willingness to visit Brazil along with his colleagues Jorge A. Coll, his secretary-general, and Roberto Ornstein.²⁵ The Argentine nuclear energy commission president believed that the Carter administration in the United States would soon gain support from other key Western countries on strict nonproliferation measures, and thus sought to convince global leaders that neither nation possessed a military nuclear energy program nor harbored hopes of creating one (Mallea, Spektor, and Wheeler 2015, 84).

In February 1980, thirteen years of unsuccessful attempts to forge a nuclear cooperation agreement between Argentina and Brazil finally began to turn the tide when Carlos Castro Madero presented a list of possible technological specialties or areas “to be analyzed by the competent authorities” among his Brazilian hosts.²⁶ Castro Madero noted his good relationship with the Brazilian nuclear energy leaders, as well as the approximation of the two countries’ positions on nuclear development in the international arena. He closed his overtures, echoing Camilión’s words a few years before, with a strong recommendation to formalize a bilateral peaceful nuclear energy use agreement to “undo the American accusations of a supposed arms race between Brazil and Argentina.”²⁷ Nuclear authorities in both countries floated the possibility of NUCLEP, Brazil’s heavy nuclear equipment manufacturing company, serving as a partner in manufacturing and supplying some components of Argentina’s second power reactor, Atucha II. At the end of the visit, Castro Madero extended an invitation to his highest-level Brazilian hosts—the presidents of CNEN and its incorporated firms Nuclebrás and Furnas—to visit Argentina in March.²⁸

²⁴ “Memorandum, Héctor A. Subiza, Head of the Latin American Department of the Argentine Foreign Ministry, ‘Cooperation with Brazil in the Nuclear Field,’ August 23, 1979, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/116861>.

²⁵ “Cable on Meeting between CNEA President Carlos Madero and Brazilian Ambassador Carlos F. Duarte,” January 28, 1980, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/122302>.

²⁶ “Telegram No. 146 from Brasília to Brazilian Embassy in Buenos Aires, ‘Nuclear Energy. Brazil-Argentina Cooperation. Visit by President of CNEA,’ February 12, 1980, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/123325>.

²⁷ “Cable on Meeting between CNEA President Carlos Madero and Brazilian Ambassador Carlos F. Duarte.”

²⁸ “Telegram No. 146 from Brasília to Brazilian Embassy in Buenos Aires, ‘Nuclear Energy. Brazil-Argentina Cooperation. Visit by President of CNEA.’”

Yet Paulo Nogueira Batista, the president of Nuclebrás, was upset by a long list of topics that Castro Madero had left with his Brazilian hosts in Rio in early 1980. Batista derided his Argentine counterpart's ideas as "out of rhythm with the format and depth of its treatment of quite a heterogeneity of topics" and argued that five potential projects deserved greater study. Argentina would share three materials and technologies with its neighbor under Batista's plan: heap leaching techniques for uranium treatment, a "leasing" agreement for transferring its uranium concentrates to Brazil, and manufacture of Zircaloy tubes for Brazil's nuclear installations. Brazil, in exchange, would send to Argentina heavy nuclear components for its Atucha II power reactor, and enrich uranium up to 20 percent for its neighbor's research reactors. Batista reiterated that both countries remained committed to the long-term goal of "broad autonomy" in the nuclear sector, but he sought to fine-tune the proposed plan for cooperation to help both nations "optimize their investments and reduce dependency on third-party countries."²⁹

The first meaningful document toward cooperation between Brazil and Argentina on peaceful nuclear energy use had then been officially passed from the nuclear energy commission heads and their leading technical experts to the diplomats and ambassadors who would hash out the specifics of the accord.

A few months after the Tripartite Agreement among Argentina, Brazil, and Paraguay that drew the Itaipu Dam dispute to a close, President General João Figueiredo, the first Brazilian head of state to visit Argentina in forty-five years, and his Argentine counterpart, Jorge Rafael Videla, began working with their foreign ministers to hammer out the first nuclear cooperation agreement between the neighbors (Mallea, Spektor, and Wheeler 2015, 35). Nuclear planning officials Orpet Peixoto (Brazil) and Sónia Fernández Moreno (Argentina) used the phrase "classic political will" to describe the 1980 agreement between the presidents, which stated that "the Parties will cooperate toward the development and application of peaceful uses of nuclear energy, according to the needs and priorities of their respective national nuclear energy programs."³⁰ This act of political will was supported by six years of continuous effort by nuclear officials and the heads of CNEN and CNEA to improve the bilateral relationship, furthering each country's aspirations to technological autonomy. Often aided by official diplomatic personnel or ambassadors, these informal diplomats formed a transnational epistemic community that planned and carried out nuclear energy development policy from 1974 to 1980. In doing so, these scientists and technological experts played a central role in strengthening the foundations of South America's most important bilateral relationship.

When Argentine and Brazilian nuclear officials, political leaders, and high-ranking military perceived an increased seriousness and scope of the attack on their technological autonomy from forces outside the continent, most notably the US-led nonproliferation measures of 1977–1980, they responded much more as allies than adversaries, recognizing that a serious threat to their neighbor's nuclear development, and to sovereignty in a broader sense, was little different from to one to their own.³¹

In this context, the absence of any nonproliferation provisions in the 1980 Agreement on Cooperation on Peaceful Uses of Nuclear Energy can be better understood. Before that date, each country's nuclear officials, military officers, and political/diplomatic classes were acutely aware of secret uranium enrichment projects under way in their own countries, and likely suspected that similar efforts were under way in the other nation.³² The historical nature of the neighbors' relationship had been as "rivals rather than mortal enemies," and even in the most hard-line, nationalist sectors of the military, nuclear energy's potential for civilian industrial development was prioritized above potential military uses (Barletta 2000, 101–107). Therefore, Presidents Videla and Figueiredo, and the Argentine and Brazilian military and nuclear sectors, saw no need

²⁹ "Report from the President of Nuclebrás Paulo Nogueira Batista to Foreign Minister Saraiva Guerreiro, "Trip to Buenos Aires," March 23, 1980, 3–4, Wilson Center Digital Archive, <https://digitalarchive.wilsoncenter.org/document/123328>.

³⁰ Ley no. 22.494, "Aprobación del 'Acuerdo de Cooperación entre el Gobierno de la República Argentina y el Gobierno de la República Federativa del Brasil para el desarrollo y la aplicación de los Usos Pacíficos de la Energía Nuclear,'" Buenos Aires, September 10, 1981.

³¹ Matias Spektor, Nicholas Wheeler, and Dani Nedal detail the two schools of thought on nuclear programs in the larger context of the Argentina-Brazil relationship (Mallea, Spektor, and Wheeler 2015, 32–33). An older school, but one with adherents in the present decade, holds that Argentina and Brazil were locked in a security dilemma dynamic with each other, and an incipient nuclear arms race was somehow thwarted. A revisionist school argues the opposite: though quite advanced, neither country's nuclear energy capabilities were anywhere near those required to build weapons, and potentially proliferative steps like uranium enrichment were taken out of common opposition to US nonproliferation policy, not from a desire for the bomb.

³² Mallea, Spektor, and Wheeler (2015, 36) note that Brazilian Ambassador Neves, an early-career diplomat in the National Security Council, said "there was surprise" about the official 1983 announcement from Argentina about their successful enrichment of uranium. They mention that Brazilian intelligence may have known before this date, but it is highly likely that at least a suspicion of the uranium enrichment project in top military and political circles of Argentina's capabilities—and vice versa—had taken hold before the official announcement.

to reassure *each other* that they would not pursue nuclear weapons. The 1980 nuclear agreement was a crucial step from limited technical cooperation toward a mutual pledge to renounce nuclear weapons and create a rigorous bilateral inspection agency and safeguards agreement, but this latter measure was still eleven years away.

Conclusion

As Brazil's and Argentina's long-standing rivalry for prestige adapted to the complexities of global Cold War politics and to the complications of advanced nuclear technology programs, the decision by nuclear engineers and officials to pursue technical cooperation in 1974 would alter the bilateral relationship for years. Once again, it is useful to juxtapose the hydroelectric energy dispute with the competition for nuclear technology development. In the second half of the 1970s, diplomats could make meaningful progress in nuclear policy, an important strategic area, at times when hydroelectric negotiations ground to a halt. Though both Brazilian and Argentine policy and decision-makers believed advanced nuclear energy technology to be crucial for economic and industrial development and for regional and global prestige, nuclear energy negotiation did not open the Pandora's box of conflicts about sovereignty, territory, and zero-sum thinking that the Itaipu dispute did. Lastly, nuclear energy cooperation and planning during this period showed Argentines and Brazilians that their geopolitics and history were far more shared than divergent. Motivated by an unyielding belief in technological autonomy as a sovereign right of nations, but secure in the knowledge that their nations had not been on opposite sides of an armed conflict since 1828, Brazilian and Argentine politicians and diplomats could muster little more than a shrug when each nation announced its successful uranium enrichment project. Indeed, between the failed presidential summit of 1972 and the Agreement on Cooperation on Peaceful Uses of Nuclear Energy of 1980, the geopolitical and technological imperatives for cooperation in the nuclear area had overcome the bureaucratic interests within the armed forces buttressing the historical competition for prestige between Argentina and Brazil (see Darnton 2012). In their place, leading technical and diplomatic personnel developed an innovative collaboration, urging us to rethink the alliances and priorities of Brazilian and Argentine leadership in this period.

Perhaps the "sine wave" theory of Argentine-Brazilian relations alternating between cooperation and rivalry must be refined a step further. Between 1974 and 1980, nuclear technology cooperation between the region's two most advanced programs became more frequent and broader in scope, while an opposing trend of rivalry in hydroelectric energy planning peaked and retreated. The 1980 Agreement on Cooperation on Peaceful Uses of Nuclear Energy emerged after six years of growing technical collaboration in the nuclear field and was ultimately made possible by the diplomatic breakthrough on Itaipu. The agreement gave the force of law to an undeniable trend. As contact and confidence between the two nuclear programs continued to increase during the 1980s, and governments returned to civilian control in the middle of that decade, both countries would prepare to renounce nuclear weapons and anticipate reciprocal inspections on all nuclear facilities in 1991. The competition for prestige, at least in the nuclear field, would finally be transformed into a continuing peace.

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