

II- Contemporary Perspective

Achievement of Nuclear Fuel Enrichment: Comparing Iran and Brazil's Policies*

RAHMAN G.BONAB†

Abstract: More than a year passes from the beginning of industrial scale enrichment in Brazil. The issue was faced with opposition on the international scene, but Brazil finally managed to reach the sensitive enrichment technology without creating tensions with the international community. Certain experts compare the Brazilian issue with Iran and claim that Brazil's actions can serve as a possible role model for the Islamic Republic of Iran's attempts to maintain national fuel cycle. This brings about a good example for a comparative approach to this case which indicates the dual standard of some Western states towards civilian use of nuclear energy by developing countries.

Introduction

Although there are many differences between Iran and Brazil, they have some similarities in terms of development, regional situation and attempts to have nuclear fuel cycle. Since few countries

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† Rahman G.Bonab is Director of Arms Control Studies in the Center for Strategic Research, Tehran.

have tried to have national fuel cycle to produce electricity, it is easy to compare the process and problems of seeking electricity through this way. The Brazilian nuclear case, inter alia, may be useful for studying and raising points for Iran political decision makers.

Does Brazil's Case Has any Similarities with Islamic Republic of Iran's Dossier?

When the Islamic Republic announced it would start industrial scale enrichment of uranium, attentions were immediately focused on Brazil/Iran comparisons; why should Brazil have enrichment and Iran be denied the right? The comparison was serious to the extent that Brazilian President Loula ordered the delay of bringing online of Rosende enrichment facility in the south of Rio de Janiro. Brazilians themselves, adamantly refrain from making comparison between their country and Iran, however a closer look at the type of activities and the issues thereof for Brazil demonstrates prominent similarities between the two countries nuclear cases that we will point to below.

Relatively Long Record of Nuclear Activity: Brazil in the 1930s and Iran in the 1960s began their nuclear activities and such activities have been faced with many ups and downs in both countries' cases. Brazil primarily through a contract to purchase a reactor from the US in the 1950s began its nuclear activities; a move that the Shah's regime in Iran took up in 1960. Like Iran, Brazil through concerns of overdependence on the US turned to other countries to obtain reactors whose outcome was signing of a contract for construction of two to eight reactors and taking charge of the complete nuclear fuel cycle from Germany in 1975. (Gall, 1976) Brazil's contracting company was KVV Siemens; the same company that had been contracted by Iran to Build Bushehr reactor in 1976. At that time many experts contested West Germany and Brazil's agreement and considered it as proliferation of nuclear weapons. The contract between West Germany and Brazil was not implemented in the 1980s due to the financial crisis in Brazil, and the contract between Iran and Germany was not enforced due to the advent of the Revolution, Iraq's invasion

of Iran, events of the 1980s and Germany's retreat from the agreement. Equally both countries fearful of the US pressures, did not expose certain sections of their nuclear activities and were thus accused of possessing nuclear weapons' programs by the US.

Efforts to Indigenize Nuclear Technology: Brazil and Iran in the 1980s began their efforts to set up indigenous nuclear technology. Unlike countries like Libya, Iran and Brazil enjoy qualified human resources and possess the capability to advance complex nuclear technological questions. Brazil called on domestic experts, like Iran, in order to solve the technical difficulties related to centrifuges. At present, Brazil claims that through indigenous developments has managed to alleviate the problem of friction between the rotors and centrifuge outer casings whose result has been increases in speed and efficiency of centrifuges. It is said that this achievement derives from installation of electromagnetic bearings in the centrifuges (Guizzo, 2006). Brazil's current centrifuges are derived from URENCO that is claimed were obtained via certain German companies. It is interesting that Brazil in the 1970s and early 1980s benefitted from the "Aerodynamic jet nozzle" or the Becker method, obtained from Germany but realized later that enrichment would not be possible through such methods and putting them aside turned to gas centrifuge procedure. The current Brazilian centrifuges are of the SUPERCRITICAL type (spinning speeds of 90 thousand rotations per minute and their height is around two meters that assists the efficiency of centrifuges). Achieving this technological advancement is the result of Brazilian nuclear scientists. In Iran also, despite foreign pressures, Iranian scientists succeeded in indigenizing the enrichment know-how. Thus reducing dependence on the outside world has been and continues to be one of the fundamental common axis of nuclear policies of both countries.

Refusal of the Additional Protocol: Iran and Brazil did not accept the inspections stipulated in the additional protocol and consider it a violation of national sovereignty and contrary to protection of nuclear technological secrets. Brazil had announced before 2005 that the

results of the 2005 NPT review would play an important role in the acceptance or abstention of adherence to the additional protocol. Brazil currently claims that the country is in the process of reviewing the technological aspects of the additional protocol. Brazil believed that the IAEA should use the 'Rosende' facilities verification procedure that was also used in 'Aramor' pilot enrichment program; but the IAEA did not accept and hence differences between the two sides began in 2004 (Guizzo, 2006). At that time Bush's claims based on the US policies in limiting access to uranium enrichment technology for countries that have not reached trade enrichment levels, concerned Brazil and hence the country went in pursuit of reaching agreement with the IAEA. It is interesting to note that Brazil along with Argentina in the centre for accounting and control (ABACC) that had been established in 1991 by both countries, had devised a method for inspections and verification that was used by the IAEA in its inspections of 'Rosende' installations upon which the agency accepted that Brazil should cover up certain parts of its enrichment installations.

One of the Brazilian worries is that through joining the additional protocol, IAEA would seek to review the minor details of the country's secret programs in the 1980s. (Coming to Terms with Brazil's Nuclear Past, 2005) Brazil has announced for this reason that since it has ratified and adhered to the NPT in 1997, it bears no responsibility to answer for its activities in the 1980s. Brazil will probably join the additional protocol to expand and preserve its nuclear fuel cycle and so it can increase its confidence building measures with the international community.

The Existence of Remaining Issues between the two Countries and the IAEA: Brazil, like Iran, has certain unresolved issues with the IAEA whose most important ones include:

- 1) Chronology of past nuclear activities;
- 2) Source of enriched uranium;
- 3) Source of Brazil's centrifuges; and
- 4) The alleged military nuclear programs.

Brazil has answered a portion of the latter issues and has declared its imported 20% enriched uranium but has not clarified its source. On secret programs Brazilians state that country has no desire for possession of nuclear weapons due to the changes in political order and the coming to power of the non-military and in a sense democratization of the country's political structures. (Alvim, 2004) While Brazil's amended Constitution has reduced international suspicions on its pursuit of military nuclear programs, Iran also announced in 2007 that it has agreed to a "working plan" with the IAEA to solve the remaining issues between Iran and the agency.

❖ **Regional Importance of Both Countries:** As one of its foreign policy's pillars of in the post-cold war, the US has tried to prevent the emergence of regional hegemonic powers, especially in sensitive regions of the world. Brazil and Iran both possess the capability to transform into regional hegemons and access to the strategic enrichment technology can simplify the process. The US used Argentina for many years in order to balance Brazil and Argentine nuclear activities were indeed one of motivators for Brazil's continuation of its own nuclear program. By the end of the Cold War and the downfall of the Soviet Union, the US became the main extra-regional player in Latin America and hence part of its concerns over Latin America was alleviated. Meanwhile, except for certain cases of challenges, Brazil did not confront US in Latin America throughout 1990s. The Middle East got more importance to the US for various reasons following to the Cold War and it tried to strengthen its position in the region. One of major differences between regional exigencies facing Iran and Brazil relates to the existence of occupying regime of Israel in the Middle East and its animosity with Iran. In the meantime, tensions between Brazil and Argentina have been reduced and the two countries' rapprochement as well as establishment of an accounting and control office in Brazil, mitigated the US concerns over Brazil's nuclear ambitions to a certain extent. However the hostility between Iran and Israeli regime has resulted in the US pressure to prevent Iran from becoming a regional power; a power that can create challenges for the position and security of Israel.

❖ **Claims of Uneconomic Nature of the Enrichment:** The enriched uranium market in the world due to oversupply in the past few years has turned into a biased market. The sales in this market have amounted to \$5 billion and Brazil is hopeful to gain a share of this market in the future. If Brazil manages to enrich its mined uranium completely domestically, its foreign savings will amount to \$12 million and this is while it is claimed that Brazil has spent \$180 million on the construction of Rosende enrichment centre. Therefore importing nuclear fuel for Brazil is supposedly better economical than domestic enrichment. Despite the claims, Brazil points out the need for clean energy in the future; while it has brought both its power stations on line to take away any pretext from the West.

It is interesting that Brazil, like Iran has inked contracts with foreign countries in order to provide the fuel for the two power stations. Likewise, Iran and Brazil both believe that we are faced with a kind of renaissance of nuclear power stations and the number of countries who wish to build new power stations or bring the old stations back on line increases on a daily basis. Thus the market for enriched uranium in the world will be profitable in the future and Brazil, taking into accounts its ample uranium reserves, must prepare itself for entering into the marketplace. Westerners make similar claims about Iran. Iran, like Brazil states that in the future in order to provide secure fuel supplies for nuclear power stations requires a domestic nuclear fuel cycle. Past experience also demonstrates that fuel supplies and construction of power stations can be stopped due to political concerns.

❖ **Limiting of Enrichment levels:** Iran and Brazil have announced that they enrich uranium merely for power plant fuel purposes meaning less than 5%. Both countries' plants in (Natanz and Rosende) have been designed for Low Enriched Uranium (LEU), while High Enriched Uranium (HEU) production requires rearrangement of the plants that are both under IAEA supervision. Hence in contrasts to what is claimed, deviation toward military uranium production at Natanz and Rosende would not be an issue

that could be kept hidden from view. As a confidence building measure, Iran even proposed in March 2005, to limit the level of enrichment coupled with open nuclear fuel cycle that even counted a step forward further than Brazil's actions but the West did not accept the proposal.

❖ **Entry to the Industrial Enrichment Stage:** Brazil inaugurated in 1991, an enrichment pilot program with 500 centrifuges in Aramor and hence between the pilot program and industrial enrichment program a 15 year hiatus took place in Brazil. In contrast to Brazil, the US and Europe have not agreed to a pilot program in Iran to the present day.

The time period between pilot and industrial scale programs in Iran did not exceed a few months and Iranian officials considered their action a suitable reply to the UNSC resolutions. Previously, one of Iran's proposals was the acceptance of its pilot enrichment plant by the West in return for an extended period of time between the pilot stage and Iran industrial enrichment activities; that was also rejected by the West. One of Brazil's concerns is that Western pressures prevent the country from entering the industrial scale production and thus lack of ability to enter the world's enriched uranium markets. Therefore Brazil tries through appeasement -like signing the additional protocol- to take away this obstacle. Brazil has sold 800kg of low enriched uranium to Argentina and this is while UNSC resolution 1737 has banned the purchase of enriched uranium from Iran.

❖ **Emphasis on Enrichment Rights in Each Country's Soil:** Brazil and Iran both consider domestic enrichment on their soils as stipulated in article 4 of the NPT. Despite this, Brazil exported its mined uranium for enrichment apparently for better confidence building, since it possessed the capacity to enter domestic enrichment in the 1990s. In the same way, Brazil brought its power stations online prior to enrichment activities and took away the pretext from the West so it could not be questioned as to why it possesses enrichment facilities without power stations. On the opposite side, Iran refused

enrichment in partnership with Russia on Russian soil that harped back to the lack of confidence between Iran and the West; while the lack of confidence between Brazil and the West is not to that extent.

❖ **Existing Differences between Nuclear Policies of Brazil and Iran:** Naturally, differences between countries and their behaviors outnumber their similarities. In an initial view Brazil, a country in Latin America is completely different than Iran, in terms of culture and history. But since both countries live in a common international system and according to structural realists or neo-realists, they accept its requirements, their nuclear demeanors become similar accordingly. Here we merely point out the differences that have resulted in advancement of Brazil's industrial enrichment with less political tensions.

❖ **The International Status of the Two Countries:** Brazil could be considered among the winners of globalization in post-Cold war period because of its notable and extensive economic market and assumption of compatible policies in order to acquire a major power status. The country along with India, Japan and Germany are looking for possession of a permanent seat at the UNSC. This has promoted the Brazil's regional power on the international arena and big powers view Brazil and India as their potential powerful allies. Therefore, according to some realist theories, the element of power has led to different US behavior toward Brazil than Iran; although Brazil does not enjoy close relations with the US like Japan, but still its values run along the same lines as those of the West and are not considered a challenge for them. While values that emanate from Islamic Republic of Iran are major challenges for the US within Islamic world as well as the Middle East. Although Iran and Brazil both began their drive to increase their power in the 1070s, imposition of an eight year war on Iran resulted in a kind of delayed action in the process of Iranian prowess.

❖ **The Regional Position of the Two Countries:** Brazil competes with Argentina in its adjacent region but animosity does not exist between them. In addition, the South America in comparison to the Middle East does not possess inexpensive oil being so much strategic for America and multinational companies to grasp. Alongside the oil, Middle East is faced with the security problems emanating from founding of Israeli regime: a player that has major influence in the US Middle East foreign policy and many analysts consider Israel's animosity toward Iran as the most essential catalyst of the US opposition to Iran's peaceful Nuclear energy program.

The Middle East security environment due to the long Arab-Israeli altercation has always been prone to the possibility of war between regional and extra regional players. From this angle the US and Europe look more from a security point of view at Iran's nuclear activities than an industrial or economic perspective. Should the Brazil/Argentine situation be compared with Iran and Turkey- or Saudi Arabia and Iraq- in the Middle East, the US pressure applied to Iran's neighbors prevents the expansion of regional cooperation between Iran and the latter countries. Only in the last few years due to the Turkish independence of action as opposed to the US, Iran/Turkey relations and cooperation have been on the rise. From another direction, contrary to Argentina, Turkey has not possessed extensive nuclear activities and Iran may want to assist. Along the same lines in comparison with the regional agreement of Teltelko ridding the region of nuclear weapons in 1967, the Middle East region despite consistent emphasis of Iran and the UN lacks such an agreement whose most important reasons is the Israel's abstention to reveal information on its nuclear arsenal and take disarmament measures accordingly.

The result is that Brazil due to the favorable nature of regional conditions has benefited the most for confidence building and advancing its nuclear programs; while Iran has not been able to use the regional conditions in an optimum manner in order to advance its own nuclear program.

❖ **Iran-Western Relations:** West have taken a tense relationship with Iran over the last three decades, but Brazil from the

time of coming to power of the non-military political establishment in the 1980s decade has moved toward convergence with market oriented economy and Western values and at least has not created a challenge for the West. Brazil, like India does not enjoy the backing of a great power in its entirety; but at the same time it has not challenged the great powers' interests. Iran even unlike Pakistan has not enjoyed the US, and unlike North Korean has not the Chinese support. In other words Islamic Republic of Iran tries to achieve the nuclear fuel cycle without traveling along Western orbit directionally, but Brazil through having placed itself in such an orbital revolution realize such goals; it is natural that Islamic Republic of Iran's task would be far more arduous than Brazil's.

Iran's relations with the West over the last three decades have been consistently coupled with lack of mutual confidence. Should we look at Iran's confidence building proposals in March 2005 in order to possess a fuel cycle we come across the depth of this lack of confidence. Within such confines, while Brazil succeeded in possessing a nuclear fuel cycle without accepting any preconditions, Iran proposes the permanent presence of IAEA inspectors in Iran, possession of an open nuclear fuel cycle, low level enrichment, ratification of the additional protocol, and domestic ratification of domestic laws banning nuclear weapons; but the West takes none of the proposals. Lack of confidence is a two way issue and while Iran is witness to lack of trust from the West, it cannot like Brazil delay industrial enrichment for fifteen years or agree to the export of uranium for enrichment outside of its territorial soil. The US and Europe have opposed even a pilot enrichment program in Iran, so it is natural that Iran's behavior be different to that of Brazil.

Conclusion

Among the eight countries that have reached industrial scale nuclear enrichment and are NPT members, the Brazil's case has the greatest similarity with Islamic Republic of Iran's activities in this field. In part, problems facing Brazil in reaching the fuel cycle and enrichment is similar to the difficulties that Islamic Republic of Iran is

encountering with, such as unresolved issues with the IAEA, claims of lack of economic justification for domestic enrichment, the US opposition to empowerment of both countries and lack of ratification of the additional protocol. Despite these similarities, a few factors set some differences between Iran and Brazil in course of their nuclear activities that include:

1. Apparent increase in Brazil's compatibility with current international system;

2. Lack of serious challenges from the West for Brazil;

3. Brazil's geographical position whereas it locates in an economic and non-security intensive environment. It can be said from this perspective that the future direction of Islamic Republic of Iran's nuclear dossier, particularly from a realization of domestic nuclear fuel cycle technology, more than any other factor, will be affected by two level of international (the type of relations with great powers) as well as regional challenges. Brazil's experience demonstrates that West has encountered Iran with prejudice and has not let Iran to benefit its regional capacities in order to increase confidence building measure and advance its peaceful nuclear technology. Hence Iranian diplomacy has to concentrate on regional aspects as well as international arena.

Efforts to establish regional supervisory organizations, negotiations with neighboring countries in order to build confidence, signing of various cooperation agreements with such countries and regional conferences are among actions that can ease the process of Iran's achievement of the nuclear fuel cycle in the future by way of confidence building.

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