The Carter Administration and its Non-Proliferation Policies: the Road to INFCE

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ABSTRACT

The scope of this article is tracing back, with a keen chronological reconstruction, the path that President Carter undertook with his Non-Proliferation policy, outlining the difficulties he faced in managing the complex trade-off between curbing nuclear proliferation (trying to refurbish the Non-Proliferation Treaty) without damaging US image as a reliable supplier of nuclear fuel. The reconstruction will be organized around three chronological stages: a) the first phase (from the Presidential Campaign to the indefinite deferral of FBR), the second phase (managing Allies' complaints while trying to support alternative cycles and reactors to the LMFBR) and the third phase (the road to INFCE and its conclusion). It will include a specific part on the efforts that the Carter administration made to prevent, unsuccessfully, the spreading of sensible technologies (like plutonium fueled power plants) in Brazil and in Japan (Tokai-Mura complex). The debate over the safety of Tokai-Mura power plants proves to be extremely actual right after the emergency shutdown of the reactor and the structural damages to the cooling system of the plant caused by the terrible quake/tsunami that interested Northern Japan in March 2011.

Prologue: the role of FBRs before Carter's Non Proliferation Policy

> The Carter Administration began with a natural gas crisis and ended with the Iranian hostage crisis. From start to finish, energy issues crowded its agenda.
> (Walter A. Rosenbaum)

As the initial quote perfectly stresses, Carter's somewhat idealistic pursuit of a

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national energy policy defined his presidency. As John C. Barrow would later note, on no other issue did Carter risk so much of his political capital, and on no other issue did Carter experience his greatest triumphs and most embarrassing defeats (Barrow, 1998). In Carter energy policy, it is possible to see the strengths of Carter's leadership, his enthusiasm to tackle inherently difficult national problems without regard to the political costs and his conception of the presidency as a leadership for the public good (Hargrove, 1988). Conversely energy policy also revealed the weaknesses of the president's management, his difficulty in building political coalitions, his inability to guide his party and inspiring confidence in his ability to lead the nation.

Hence, the aim of this essay is tracing back, with a keen chronological reconstruction, the path that President Carter undertook with his Non-Proliferation policy, outlining the difficulties he faced in managing the complex trade-off between curbing nuclear proliferation (trying to refurbish the Non-Proliferation Treaty) without damaging US image as a reliable supplier of nuclear fuel. The reconstruction will be organized around three chronological stages: a) the first phase (from the Presidential Campaign to the indefinite deferral of FBR), the second phase (managing Allies' complaints while trying to support alternative cycles and reactors to the LMFBR) and the third phase (the road to INFCE and its conclusion).

A serious enquiry could not start notwithstanding some preliminary remarks on the importance that FBR had on the whole US Energy Policy before Carter took the oath of office on January 20, 1977. From its inception in the fifties, the Fast Breeder Reactor technology has often been described as a means to provide self-fueling energy machines to a world that was quickly running out of uranium. It was seen as a holistic answer to all the energy needs of the forthcoming century: the United States started up the world's first breeder reactor in 1951 and followed with an operational pilot plant in 1963, the 20-megawatt-electric (MWe). The process reached its peak when in 1971 President Nixon established the *Liquid-Metal Fast Breeder Reactor* (LMFBR) as the nation's highest priority research and development effort. Meanwhile, the French, the British, the Germans and the Russians were proceeding with their own original plans of nuclear innovation: the 250-MWe Phenix, the 250-MWe Prototype Fast Reactor (PFR), the 21-MWe KNK II and the 350-MWe Bystrye Neitrony (BN-350) all came critical in the end of the seventies, showing the

US' scientists that their monopoly on nuclear enrichment technology sales was definitely broken.[1]

Because of grave international concern about proliferation (the so-called *Indian Syndrome* fed by the US intelligence reports about Pakistani secret enrichment plans) President Ford started taking preventive measures against the spread of the FBR techs introducing the "Conditional Contracts Formula". Then, during the electoral campaign, he announced that the US government would henceforth not regard reprocessing and plutonium recycle as a necessary part of the fuel cycle, adding that the commercialization of such activities in the US would be deferred until the government was satisfied that the proliferation hazards of the "plutonium economy" could be dealt with.[2] This reconstruction starts here.

1. The First Phase: From the Development of NPP to FBR Indefinite Deferral

The first occasion that candidate Jimmy Carter, a former nuclear engineer in the Navy, had to talk about nuclear issues was the UN sponsored Conference on Nuclear Energy and World Order, held in New York on May 13, 1976.[3]

Starting the conference, the presidential candidate showed soon the milestones of his Non-Proliferation Policy (NPP), portraying himself as no friend of nuke, claiming that there were good renewable alternatives to new reactors and that nuclear energy and weapons proliferation were "inherently twinned".[4] So the NPT was no more conceivable as a one-way street, as Nixon and Ford perceived it. A major undertaking of the nuclear weapon states would have been providing special nuclear power benefits to treaty members, particularly to the developing nations. According to Carter the advanced countries, indeed, had not done enough in this respect to convince Treaty signatories that they were better off inside than outside the Treaty. As a further part of the two ways street there was a clear obligation on weapon states to control and reduce the arms

[1] Report, *Alternative Breeding Cycles for Nuclear Power: an analysis*, prepared for the Subcommittee on Fossil and Nuclear Energy research, development and demonstration of the *Committee on Science and Technology*. Us House of Representatives, 95th Congress, Second Session, Volume VI, October 1978, p. 40.

[2] *Letter to the Honorable Gov. Jimmy Carter from Sen. J.O. Pastore,* June 16, 1976, Jimmy Carter Library Files, Subject Files, Atomic and Nuclear Energy, box 1976, six pages letter.

[3] Nuclear issues in the presidential campaign: three steps toward nuclear responsibility, in *Bulletin of Atomic Scientists*, October 1976, p. 8–14.

[4] *Ibidem.*

race. Progress toward SALT and a five year moratorium on all nuclear tests including the peaceful nuclear explosions would have rectified the situation.

However, on the domestic side, the fracture with the former presidents proved not to be so large: Carter admitted that to cope with the expansion of civilian nuclear industry the US should have strengthened the international safeguards system, bearing the costs of expanding IAEA. Since the safeguard system at that time did not provide adequate assurances against national enrichment possibilities being used for military purpose, Carter claimed the necessity to discourage the sale of reprocessing and enrichment facilities, even if safeguards were acceptable to recipients. Moreover the candidate from Plains announced his commitment to persuade other supplier nations to subordinate their commercial interest to non-proliferations concerns, assuring the developing countries at the same time, about the reliability of the US as a supplier of enriched uranium on January 1977, the nation was gripped by both a record cold wave and the most severe natural gas shortage in its history. Because of the economic chaos created by fuel shortages and the skyrocketing of energy prices, the period 1976-1977 should have been an ideal moment for the formulation of a new energy policy. Virtually all economists, experts, businessmen and politicians agreed that the nation had to change its energy consumption habits and reduce its dependence on petroleum. To develop the specific details of this new energy plan, Carter turned to James R. Schlesinger, a Ph.D economist who had originally made his name as a specialist on the economics of national security, who became Presidential Adviser for energy matters. Schlesinger, as proved by his activity in a past presidential cabinet, was a strong supporter of FBR: he was convinced that the new technology could play a crucial role in a new rationalized energy policy, helping the US to avoid the suicidal dependence on fossil fuels, and at the same time reducing the complaints of the environmentalist democrats building less power plants but with a bigger capacity (and the feature of producing plutonium at a greater rate than they consumed). However, the spread of FBRs evoked the ghost of proliferation of weapon grade plutonium, a very sensitive issue at the Department of Defense, headed by Brown.

In order to remove any incomprehension, the president called all his advisers in the *Situation Room* asking them a clear analysis of the nuclear perspectives of the US in the short term and an overall evaluation of them in the framework of the long term non-proliferation policy endorsed by the president. The

results of the evaluation were included in the so-called *Presidential Review Memorandum, NSC-15 on Nuclear Proliferation*:

1. Assess the current status of US nuclear fuel assurance policies, reprocessing policies, including alternatives to reprocessing, and possibilities for the handling and disposal of nuclear wastes.
2. Review the decisions announced by President Ford in the statement of October 28, and identify the policy options required to implement those decisions.
3. Provide a review of the current status of major ongoing negotiations with and among foreign nations concerning proliferation.
4. Analyze the strengths and liabilities of bilateral negotiations, the London Suppliers group, and the IAEA as institutions for implementing US non-proliferation goals.
5. Identify current US nuclear export requirements and examine what new requirements might be applied to current and future export agreements, and what measures must be taken to insure US credibility as a nuclear supplier state.[5]

The meeting held the day before the oath was a crucial event for the development of the NPP: Schlesinger started working hard to ensure a good funding for the new institution created by the President, the DOE (the United States Department of Energy), a Cabinet-level department of the United States government concerned with the policies regarding energy and safety in handling nuclear material. Its responsibilities included the nation's nuclear weapons program, nuclear reactor production for the United States Navy, energy conservation, energy-related research, radioactive waste disposal, and domestic energy production. DOE's plans for improving the management of nuclear energy were really remarkable: fast breeder reactors were the most important element in the R&D budget of the new institution, and they were seen as the inescapable substitutes of the precedent generation of nuclear reactors.

The Department of Defense, afraid of the consequences of the spreading of weapon grade plutonium harshly criticized the new institution approach. The most divisive issue in the Presidential Cabinet was granting permission for the reprocessing of US-origin spent fuel, as Nye stressed out in an article on this

[5] *Presidential Review Memorandum, NSC-15, to the Vice President, the Secretary of State and Defense on Nuclear Proliferation*, 01/21/1977, in Presidential Review Memorandums (PRW) internet link http://www.fas.org/irp/offdocs/prm/prm15.pdf [visited 03/20/2009].

matter. Using the conclusions on FBR sent by blue ribbon panel of scientists headed by Philip Handler (later the document will be known as the Ford-Mitre Study on FBR), Harold Brown showed the President why an indefinite deferral of FBR was necessary at that time:

> Although nuclear power is an important energy source, the United States and the world are not critically dependent on it for future energy supplies or economic development, and it can contribute to the immediate energy problem.
> - Increased energy costs, with or without nuclear power will not have a fundamental effect on the growth of the economy or employment, and need not affect basic life style compared with that expected at constant energy costs.[...] Even viewed optimistically the cost advantages of nuclear power will have little significance on overall economy (small fraction of 1% of GNP) in this century.
> - Nuclear power new technologies can serious complicate proliferation problems if plutonium is introduced into the fuel cycle as a result of plutonium recycle in LWR, plutonium breeders, or reprocessing for waste management. [...] Plutonium, reprocessing and recycle has little, if any, economic significance and should be postponed indefinitely.
>
> The commercialization of the Liquid Metal Fast Breeder Reactor should therefore be deferred and the breeder program recast a long range insurance program against very high future energy costs.[6]

Harold Brown's initiative surely contributed to the Presidential decision that arrived on March 24. On that day Carter signed his Non Proliferation Policy, deferring indefinitely FBRs, authorizing R&D just on alternative designs of plutonium, and proposing an International Nuclear Fuel Cycle Evaluation Program. Here is part of the text of the *Presidential Directive/NSC-8 on Nuclear Proliferation*:

> It shall be a principal US security objective to prevent the spread of nuclear explosive, or near explosive, capabilities to countries which do not now possess them. To this end US non-proliferation policy shall be directed at preventing the development and use of sensitive nuclear power technologies which involve direct access to plutonium, highly enriched uranium or other weapons usable materials in non-nuclear weapons states, and at minimizing the global accumulation of these materials.

[6] Letter, *to the President from the Director of the National Academy of Sciences Philip Handler. Subject: Nuclear energy policy study group*, 02/24/1977, Jimmy Carter Library Files, Subject Files, Atomic and Nuclear Energy, box 1977/I.

1.Specifically the US will seek a pause among all nations in sensitive nuclear developments in order to initiate and actively participate in an intensive International Nuclear Fuel Cycle Re- Evaluation program (IFCEP later INFCE) whose technical aspects shall concern the development and promotion of alternative, non sensitive nuclear fuel-cycle.

2. For its part the United States Government will:

a) Indefinitely defer the commercial reprocessing and recycle of plutonium in the US.

b) Restructure the US breeder program so as to emphasize alternative design to the plutonium breeder, and to meet a later date for possible commercialization.

3. It shall also be US policy to strengthen the existing non-proliferation regime [...] Therefore the US will announce his intention to terminate nuclear cooperation with any non nuclear weapons state that [...] terminates or materially violates international safeguards or any guarantee it has given to the US.[7]

On April 7th Carter announced an indefinite postponement of the program for breeder reactors, including commercial reprocessing and plutonium recycling, promising that the United States would offer nuclear fuel supply contracts and guarantee the delivery of nuclear fuel (uranium) to other countries. The bill was heavily oriented toward a technological approach to non-proliferation. It assumed that reprocessing was the decisive problem and had to be solved primarily through technological alternatives. The redefinition of the only available technical process (Purex) as a "non- peaceful" process (because it was originally designed to produce plutonium for bombs) amounted to a dangerous unilateral reinterpretation that could have been a potential interference into existing arrangements.[8]

2. The Second Phase: External Consequences of NPP

Restraining the use of energy derived from nuclear power at home and discouragement of nuclear proliferation abroad emerged as the keynotes of Carter

[7] *Presidential Directive/NSC-8, to the Vice President, the Secretary of State and Defense and others. On Nuclear non-proliferation policy*, 03/24/1977, On the Carter Library website at the link: http://www.jimmycarterlibrary.org/documents/pddirectives/pd08.pdf [visitato il 20/03/2009].

[8] *Memorandum from Eizenstat/Schirmer to the President. Subject: Re: US attitude toward reprocessing abroad, and proliferation issues,* 04/19/1977, Jimmy Carter Library Donated Historical Material, White House Central File – Subject File, National Security – Defense – ND-18. Box ND-48: General ND 16/CO 172 1/20/77 through Executive.

nuclear policy. Milestone of Carter's domestic policy was sometimes a Conservative ethic: use less, pay more. His foreign policy follow up of the same, was contained in a special message to the Congress on 26 April 1977 calling for a swift action on a legislative package that would ban exports of nuclear reprocessing plants, ban new agreements to export weapon-grade uranium and plutonium and make necessary direct presidential approval of any sale of weapon-grade uranium greater than 15 kilograms.

The presidential hopes for exercising effective control over the world nuclear market were based upon the fact that most of the emerging suppliers of nuclear tech continued to be customers of US nuclear materials. One of the first acts of pressure exerted by the Carter administration was to block the shipment of enriched uranium to its pilot customers abroad. No supplies of US nuclear materials had reached Europe since July 1976 and 660 kg stockpiled for delivering to Europe were blocked pending Carter's policy initiative.

Abroad, Carter's decision came to be viewed as an independent attempt to legislate the results of issues which need to be negotiated with other countries, not unilaterally. In the short run eleven pilot plants were threatened by closure due to the lack of fuel just in Europe, while in the long run, countries like Japan, with little indigenous energetic resources were likely to suffer. Here is what Robert Fri (Acting Administrator of ERDA) wrote to Brzezinski:

> I believe that the President must be forthrightly alerted to the fact that several of the proposals in the Presidential Review Memorandum are likely to place the US in a adversary position with a number of other nations which simply do not believe that reprocessing can be deferred. (West Europeans and the Japanese remain strongly committed to the breeder).
> [...] Thus if one accepts the premise that a successful non-proliferation policy has to be broadly acceptable we will have to tailor our evolving non-proliferation strategy to deal with a variety of differing situations and foreign perceptions.
> [...] with regard to reprocessing, I believe it would be seriously damaging in terms of our relations with Japan, the UK and France for the U.S: to take a position in categorical opposition to the Tokai-Mura facility in Japan, the scale-up of the UK Windscale facility or the French operation at la Hague.[9]

[9] *Letter from Energy Research and Development Administration Director to Zbigniew Brzezinski, Special Assistant for National Security on Nuclear Proliferation*, 03/23/1977, obtained by FOIA, released 1/26/1998 under provisions of E.O. 12958 by R. Soubers, National Security Council, from the National Security Archive Foundation of Washington DC, Collection: nuclear non-proliferation, number 01424, 4 pages.

The most rapid challenge to Carter NPP came when the policy was still *in fieri*. After his inauguration, Carter sent Vice President Walter Mondale around the world to prove the uninterrupted American commitment to old friends and allies. In Bonn, however, a shadow was cast over an otherwise harmonious event by the vice president's urgent request that the Germans stop the planned selling of nuclear reactors and enrichment and re-processing technology to Brazil, in exchange for access to Brazilian uranium (the so-called *German-Brazilian Deal*). This agreement led to the most serious clash in U.S.-German relations since the war, because after all, the deal was concluded in what was traditionally regarded an American zone of influence (Potthoff & Miller 2006).

Both West Germany and Brazil, not surprisingly, insisted on implementing an agreement that was in conformity with international obligations and to which the previous American government had given its approval. Through an unfortunate coincidence, the last steps in the implementation of the German-Brazilian deal occurred just at the moment when the Carter administration was formulating its own nuclear policy. As a result, the two countries which had every interest, as partners, in the improvement of nonproliferation policy, were locked in an antagonistic quarrel. At the industrial level, leading US reactors salesman in Iran, Argentina and Yugoslavia spread rumors that the financial difficulties of the Kraftwork Union (KWU) the West German consortium responsible for the basic design of reactors, would prevent it from making promised deliveries; at the political level, the US Government proposed alternatives to Brazil that would answer its requirements for a full fuel cycle, providing US reactors at a lower price (Gugliamelli 1976; Gall 1976).

By March 1977, the situation changed, when the two delegations (US-FRG) came to realize that they agreed on goals even if they differed on views on proliferation. The American side became aware that pressing the Germans to renounce the sensitive technology part of the deal would have been counterproductive, damaging relations with a major ally and undermining the administration's attempt to reopen the proliferation debate through a cooperative international dialogue. The Germans, for their part, decided that if they did not go ahead with the Brazilian deal, their own credibility would be undermined; moreover, there was widespread feeling in Bonn that deferral could deliver a fatal blow to any effort to improve the nonproliferation system in cooperation with the major Third World countries.

It was probably this growing dialogue with the German side, as well as the critical reactions from other countries, that introduced a note of caution into Carter's own statement of April 7. The president insisted that "we are not trying to impose our will on those nations like Japan, France, Britain, and Germany which already have reprocessing plants in operation." Along with the announcement of the deferral of reprocessing and the breeder program in the United States, the American government proposed to open an international dialogue evaluating the fuel cycle from the point of view of energy and nonproliferation (INFCE) and the Germans were the first to accept the proposal.

Aside from the US allies, even the Third World countries reacted negatively to the April 1977 statement of the new American policy. A joint memorandum worked out by the participants in a conference at Persepolis in Iran-without U.S. governmental participation reflected this reaction:

> The essential point is that most countries look upon nuclear power as the only route to energy independence. For those countries which do not have large resources of uranium, this independence will come only with the breeder reactor . Any suggestion that reprocessing and recycling are unacceptable strikes at the very root of this motivation for adopting nuclear power, and naturally is viewed with alarm. The Carter statement is regarded by some as an implication of unilateral abrogation of international agreements. This perception, on the one hand, weakens the confidence of other nations in the U.S. promises of nuclear fuel supply, and on the other hand may weaken the effectiveness of the existing agreements and may even cause some NPT signatories to reconsider (Kaiser 1978).

But the hurdles on the road of INFCE were not finished. On May 6 1977, in front of delegates from 60 countries attending a IAEA meeting in Salzburg, André Giraud (General Administrator of the French Energy Agency) announced that France had devised a new way to enrich uranium that eliminate the risk of use for nuclear weapons. By claiming such an invention, the French disproved the US assumptions that nuclear technology would inevitably lead to weapons proliferation, and expressing the will to offer commercially this technology, they started presenting themselves as a more reliable supplier than the US. The announcement of the A-fuel breakthrough came with a general refusal of US position on fast breeders. While all the European delegations and the Japanese one were strongly in favor of the Liquid Metal Fast Breeder Reactors (LMFBR), the US delegation was isolated supporting the technological shift to

Light Water Breeder Reactors (LWFBR) or Gas-Cooled Fast Breeder Reactors (GCFBR) both based on a thorium/uranium-233 cycle.[10] The isolation position of the US delegation in Salzburg showed the President the difficulties on the road to INFCE, a meeting that could have been a political fiasco without a large consensus of the allies on a common platform on nuclear non-proliferation.

In order to circumvent such a result, between June and July Carter reverted to the single-bargaining strategy, trying to turn the Japanese opposition to his Non-Proliferation Policy in support of INFCE. Japanese sensitivity, at that time, stemmed from the fact that they had built a reprocessing pilot plant at Tokai-Mura under the assumption that previous American practices would continue. The Japanese sought assurances that the US would allow them to continue to operate the plant. Before leaving for a diplomatic mission in Tokyo, here is what Brzezinski wrote to the President:

> Tokai is bound to appear as an exception to our general standpoint against reprocessing. The key issue is thus how an exception can be made with as little damage as possible to our non-proliferation objectives.[...] Limiting damage to non-proliferation objectives will depend on what political measures accompany any technical solutions.[11]

As Brzezinski confides in his memoirs, in Tokyo the US delegation gave the required assurances to its Japanese counterpart, but asking in return their commitment to a productive participation in INFCE:

> I supported my staff's recommendation that the Japanese be given assurances with two conditions: that operation be geared to actual needs, which were quite small, and that no new initiatives be taken during the course of INFCE. Since we have made a dramatic change in non-proliferation policy, I felt we had to respect agreements made under the previous administration. (Brzezinski 1983)

[10] *Memorandum from Robert Fri to Brzezinski. Subject: ERDA Report: US nuclear nonproliferation policy reactions at IAEA Salzburg Conference, May 2-13 1977*, written by Office of International Affairs, US Energy Research and Development Administration, May 24, 1977, 06/02/1977, White House Central File – Subject File National Security – Defense – ND-18, Box ND-49: Executive ND 18 4/1/77 – 4/30/77 through Executive, ND 18 11/16/27 – 12-31-77.

[11] NLC-98-269, (July 12, 1977) p. 1, quoted in Costello, Ch. S. III (2003). Nuclear Nonproliferation: A Hidden but Contentious Issue in US-Japan Relations During the Carter Administration (1977-1981). *Asia Pacific: Perspectives 3*, (1), 1-7. San Francisco: University of San Francisco Center for the Pacific Rim.

However, After the German-Brazilian Deal, the Tokai issue became a dangerous second "exception" that raised a fundamental question about the motivations of US concerns about proliferation. Was Carter concerned about proliferation *per-se* or the President was just implementing a dangerous "selective proliferation" in light of US strategic interests?

3. The Third Phase: INFCE

The confrontational approach that was driven by events threatened to isolate the United States and promised further damages to a regime that Carter was trying to refurbish. So it became necessary to avoid the polarization of two hostile groups, one focused on London (LSG) and the other on Vienna (IAEA). In order to meet these various policies the president decided to speed up the efforts on the International Nuclear Fuel Cycle Evaluation Program. While officially INFCE was given a predominantly technical rationale, INFCE became a means of attracting broad participation into what was really part of a political process of stabilizing the basis for the international regime. The most important point was that INFCE could have focused other countries' attention on a U.S. question: non-proliferation.

At the organizing conference, held in Washington in October, it was agreed that INFCE was to be a technical and analytical study and not a negotiation, and that its results would not be binding on the participants. It was also agreed that all interested states and all the relevant international bodies might participate and that the evaluation would have been carried out in a spirit of objectivity, with mutual respect for each country's choices and decisions in this field.

The evaluation was based on three premises. The first was that:

> The participants were conscious of the urgent need to meet the world's energy requirements and that nuclear energy for peaceful purpose should be made widely available to that end.[12]

A second premise was that the participants:

> were convinced that effective measures can and should be taken at the national level and through international agreements to minimize the danger of prolifera-

[12] *International Nuclear Fuel Cycle Evaluation, Remarks at the first plenary session of the organizing conference*, 10/19/1977, Public Papers of the President of United States: Jimmy Carter 1977-1981, Published by the Office of the Federal Register, National Archives and Record Service General Service Administration, 1977 Book 2 – June 25 to December 31.

> tion of nuclear weapons without jeopardizing energy supplies or the development of nuclear energy for peaceful purposes.[13]

And the final one:

> The participants recognised that special consideration should be given to the specific needs and conditions in developing countries.[14]

Eight working groups were established, chaired by countries that volunteered to assume the responsibility: the activity of the working groups was coordinated by a Technical Coordinating Committee (TCC) which met nine times. Here is the list of the working groups:

- Working Group 1: Fuel and Heavy Water Availability (Co-Chairmen: Canada, Egypt, India);
- Working Group 2: Enrichment Availability (Co-Chairmen: France, Federal Republic of Germany, Iran);
- Working Group 3: Assurances of Long-Term Supply of Technology, Fuel and Heavy Water and Services in the Interest of National Needs Consistent with Non-Proliferation (Co-Chairmen: Australia, Philippines, Switzerland);
- Working Group 4: Reprocessing, Plutonium Handling, Recycle (Co-Chairmen: Japan, United Kingdom);
- Working Group 5: Fast Breeders (Co-Chairmen: Belgium, Italy, USSR);
- Working Group 6: Spent Fuel Management (Co-Chairmen: Argentina, Spain);
- Working Group 7: Waste Management and Disposal (Co-Chairmen: Finland, Netherlands, Sweden);
- Working Group 8: Advanced Fuel Cycle and Reactor Concepts (Co-Chairmen: Republic of Korea, Romania, USA).[15]

The working groups held 61 meetings in 174 days in which a total of 519 experts, representing 46 countries and 5 international organisations, participated and produced more than 20.000 pages of documents. 59 states and 6 international organisations took part in the final conference, and indeed, 66 states participated overall in the study in one way of another.[16]

[13] *Ibidem.*
[14] *Ibid.*
[15] *Final Communique of the Organizing Conference of INFCE*, Washington, October 21 1977.
[16] International Fuel Cycle Evaluation, *INFCE Summary volume*, IAEA, Vienna, 1980, pp. 3840.

It is impossible to discuss here all the results of INFCE. Politically, as Karl Kaiser pointed out (Kaiser 1978), the debate on a revision of the basic rules of non-proliferation and the access to nuclear energy technology was at last where it should have been much earlier: in an international forum that included all concerned parties. The evaluation represented a vast effort, bringing together a large amount of scientific, technical, political, and economic expertise, to evaluate the entire fuel cycle. So INFCE surely improved the climate of nuclear diplomacy, identifying, as suggested by Philip Gummett (1981), where on the relatively technical (as opposed to political) end of the non-proliferation spectrum it is worth expanding effort and where not. To confirm that vision it is worth recalling what Joseph Nye, Carter's Adviser on Nuclear Proliferation, said in one of his articles on the matter:

> INFCE provided a two-year period in which nations could reexamine assumptions and search for ways to reconcile their different assessments of the energy and nonproliferation risks involved in various aspects of the nuclear fuel cycle (Nye 1981).

However the limits of INFCE were quite evident from the final statements of the Third World Countries Delegations. They continued to feel discriminated, with a restricted access to nuclear technology and in permanent underdeveloped state. Even the near-nuclear nations expressed their doubts, underlining the discrepancy between the large amount of money spent for vertical proliferation, and the relatively small amount spent for reactors to satisfy the Third World energy needs. So INFCE became, for them, just an occasion for the US to present again what they called "the discriminatory rhetoric" proposed in the NPT. As a confirmation of this approach is possible to read the last lines of the Pakistani statement at the INFCE final meeting:

> The incentives towards a proliferation spring from insecurity and the political climate in which we live [...] We must go on to the heart of the matter which is security perception of nations. In order to strengthen the non-proliferation regime we must not forget that there is an urgent need for controlling unrestricted vertical proliferation which poses an ever present awesome threat to human survival.[17]

Similar grievances carried over into the NPT Revision Conference in August 1980, where was impossible even agree on a final common declaration. In

[17] *INFCE Final Meeting*, Pakistani statement.

conclusion what can be learned today from the mistakes of INFCE is that technology can lead to proliferation, but proliferation has important non-technological origins as well. These origins in INFCE were neglected. According to the motto "*there are no sensitive technology, only sensitive countries*" the Third World countries' delegations tried to shift the attention from the need to study the technological aspects of nuclear cycles on the necessity to analyze the uniqueness of each concrete case of potential proliferation. INFCE with his exasperated tension to multilateralism and his exaggerate focus on the technological dimension, failed in curbing nuclear proliferation. But as Philip Gummett later noted (Gummet 1981), paradoxically INFCE had the merit for suggesting to the US nuclear diplomacy of the future a more country-specific approach, an useful means to deal with the threats of proliferation in today's interdependent world.

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