Chapter III

NUCLEAR EXPORT POLICIES AND THEIR IMPLICATIONS
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The nuclear fuel cycle in all the underdeveloped countries with significant nuclear power programmes is "open-ended". In other words, the nuclear power programmes of the underdeveloped countries are dependent -- for a few or many components of the nuclear fuel cycle -- on the nuclear supplier countries. In this Chapter, an analysis of the nuclear export policies of the major suppliers of nuclear material, equipment and technology will be attempted. The significance and implications of the nuclear export policies for the underdeveloped countries will also be analysed. The nuclear export policies of a supplier country are structured around two important determinants: the economic and commercial compulsions of nuclear industry, and the non-proliferation goals of the supplier country. The nuclear export policies of most supplier countries are a resolution of these two countervailing forces. The scheme of this Chapter would be to identify the characteristics of the world nuclear industry and to present the export policies of the major nuclear supplier countries.

The abundant literature on civil nuclear power, nuclear non-proliferation, nuclear trade and nuclear world order appears generally as a debate between the United States nuclear industry and the United States Government on the one hand, and between the US and Western Europe on the other. However, the changing perceptions of nuclear power and nuclear
non-proliferation, and the prevailing confusion are due to four major developments in the early to mid-1970s, all involving the underdeveloped countries. The 1973 oil crisis, resulting from the policies of the Organisation of Petroleum Exporting Countries (OPEC), heightened the perceived need for nuclear power, energy security and energy independence. The 1974 Indian nuclear explosion rocked the hitherto stable nuclear non-proliferation regime by indicating that a nuclear weapon option could be developed as a 'spin-off' from a civil nuclear energy programme. The 1975 FRO-Brazil nuclear deal involving the sale of the entire nuclear fuel cycle to a Third World country further destabilised the nuclear non-proliferation regime and reinforced the determination of some nuclear supplier countries to curb the transfer of nuclear technology. The proposed sale of nuclear reprocessing plants by France to Pakistan and South Korea further strengthened the fears and concern of the protagonists of non-proliferation. Despite this central involvement of the Third World in the world nuclear problems, so far there has been no systematic attempt at providing a Third World approach to the problem. The endeavour here would be to provide such an approach.

NATURE OF WORLD NUCLEAR INDUSTRY

The civil nuclear industry grew out of the military programmes of the 1940s and early 1950s, and developed in embryonic form amid restrictions on the international exchange of materials, equipment and technological know-how. The military programmes themselves were a cooperative effort of
the government, private industry and the universities. As far as the United States was concerned, with the "Atoms for Peace" programme of 1953, the restrictive attitude was largely reversed and concomitantly nuclear technology was partly handed over to the private industry. From the mid-1950s to the early 1970s, the link between civil and military nuclear programmes became less pronounced and trading restrictions were lifted, allowing worldwide diffusion of nuclear technologies, particularly those originating in the United States. Aggressive marketing of the light water reactor (LWR) technology by the US reactor manufacturers, their willingness to license it to leading firms in Europe, and the favourable commercial and political terms attached by the US to the supply of enriched uranium, combined to establish the LWR and its attendant fuel cycle as the dominant mode of nuclear power generation in the Western world.

A number of developed nations, during this period consolidated their nuclear industries, while renouncing all claims to nuclear weapons by accepting IAEA safeguards, or later by ratifying the Nuclear Non-Proliferation Treaty (NPT). They were ready to accept a large degree of dependence on existing supplier countries in return for assistance to their

2 Ibid.
civil programmes. West Germany and Japan, which had no weapons programmes and therefore, no substantial fuel cycle experience, took particular advantage of the liberal trading climate and established civil nuclear industries based on fuel cycle and reactor technologies from the United States. France and Sweden also abandoned the reactor designs they had initially developed, in order to gain the commercial advantages offered by the US reactor and fuel cycle systems.

While the favourable climate lasted, countries had comparative freedom in the development of their fuel cycles. Steps were taken to establish enrichment and reprocessing plants with little interference from abroad. This was the period during which the United States maintained its post-war dominance of the Western world and there was little perceived risk attached to the spread of nuclear technologies (although enrichment technology continued to be strictly controlled by its possessors). However, the perceptions of these risks changed significantly in the early to mid-1970s, and the period of "Renaissance" in international nuclear relations came to an end. Fears of the consequences of horizontal

5 The latest to abandon indigenous reactor line in favour of US LWR technology is Britain. See *Nature* (London), January 3, 1980, p. 3.


proliferation led the United States to attempt to impose new and sweeping restrictions on civil nuclear trade. While continuing to sanction the export of nuclear reactors, it sought to prevent the spread of enrichment and reprocessing capabilities. France and West Germany, which had by then established sizeable nuclear industries, made a determined bid to capture export markets, by offering for sale a wider range of fuel cycle technologies in addition to reactors. Thus, while the United States was endeavouring to restrict nuclear trade, other countries, with different perceptions and motives, were seeking to promote it. This led to an inevitable clash of interests among the supplier countries and between the supplier and recipient countries over the terms under which nuclear commerce should take place. This process has been described as the "erosion of confidence" in peaceful nuclear relations.

Features of Production in Nuclear Industry

In general, nuclear industry has four parts: the uranium mining industry; the fuel cycle industry (front end and back end); the reactor industry; and the fuel cycle equipment industry. Nuclear research and development (R & D) is also essential to the development of nuclear industry in relation to the gradual improvement of existing fuel cycles and reactor

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designs and, in particular, as the parent of future generations of nuclear technologies. The electricity supply industry interacts and overlaps with the nuclear industry, but is not strictly a part of it.

Lonnroth and Walker have succinctly described the basic productive characteristics of nuclear industry. First, the nuclear industry is one of the most technologically advanced, and has been developed against a background of intensive scientific research. It has relied on heavy front-end investments in R & D and technical demonstration. Nuclear industry is one that benefits from the support of an advanced scientific and industrial infrastructure as exists in a handful of Western countries and the Soviet Union. The exceptional complexity of the industry also requires a high degree of organisational ability. As seen in Chapter I, it is not easily transplanted into underdeveloped countries that lack technology, industrial skills and experience, managerial ability, etc. Further, "as in other high technology industries, the combination of accumulated experience and technical advance tends to reinforce the gap between those possessing and not possessing developed nuclear industries".

Second, the nuclear industry embraces a variety of industries with different productive characteristics: a mining industry, process/flow industries (the fuel cycle),

11 Ibid., p. 9.
and capital goods industries (reactor and fuel cycle equipment supply). Its scientific and technological base is similarly varied, encompassing mineral extraction techniques, chemicals and chemical process plants, electrical and mechanical engineering, special materials and so on. In this the nuclear industry is an ad hoc assembly of industries.

Third, although the nuclear industry has everywhere been conceived on a vast scale, it is concentrated on serving a single market -- electricity generation. It is an unusually self-contained, single-minded industry. It lacks major opportunities for product diversification that can bring economies of scale, extend commercial base and spread commercial risks. It is therefore, "peculiarly sensitive to conditions within the electricity supply industry, the pivot around which the nuclear industry rotates, and in many respects the key decision-making unit".  

Fourth, the nuclear power plant is at the heart of nuclear technology. The nuclear-specific part of the power plant is the nuclear steam supply system (NSSS). Typically, nuclear power plant equipment accounts for between 20 per cent and 25 per cent of the total cost of a power plant (the remainder being taken up mainly by construction costs and interest charges) and is divided approximately equally between NSSS and non-specific (although adapted) equipment -- turbine generators, switchgear, instrumentation and so on. There is

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12 Ibid., p. 7.
13 Ibid., p. 9.
interdependence between the NSSS and fuel cycle characteristics, making it costly for a country to switch from one reactor type (and hence fuel cycle) to another.

Fifth, exceptional lead-times are encountered in nuclear technical development and plant installation. It needs outlays of large quantities of venture capital with a view to long-term requirements, and as such benefits to an unusual degree from stability of expectations and hence of policies. It also follows that this is an industry that takes a long time to reach maturity and to bring a satisfactory return on historic investment.

Locus of Ownership and Control in Nuclear Industry

In most countries, the development of a civil nuclear industry has initially been directed by the state. The industry's military implications, scale, technological novelty and safety requirements have tended to make the state, and not private industry, the prime mover in establishing it as a commercial entity. But the private enterprise has been involved from the start in nuclear production as a recipient of government contracts and subsidies. Governments have directed and financed initial R & D and demonstration programmes. They have acted as catalysts in creating and bringing together the many organisations in both private and public sectors that can in concert function as a coherent

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14 For elaboration of this aspect, see Richard K. Lester, Nuclear Power Plant Lead-Times (New York, 1978).
nuclear industry.

Governments exert influence over today's nuclear industries directly through ownership and provision of finance, and indirectly through legislation, regulation and a variety of less formal channels. However, the form and extent of this influence differs considerably from country to country. The corporate structure adopted in a given country for nuclear production reflects the compromise struck between national independence and international dependence, the productive characteristics of the industry, the presence or absence of a military nuclear programme and, in particular, inherited traditions of industrial organisation.

In a simplified form, the patterns of ownership in the nuclear and electric utility industries in the eight supplier countries are displayed in Table I. These pertain to 1979, and represent the consequences of an evolutionary process that occurred mainly during the period of expansion in the 1960s and early 1970s. As one would expect, the entire industry is completely state-owned in USSR. The United States comes closest to total private ownership model (although enrichment is state-owned, but privately operated for historical military reasons). Between these two extremes, there is a spectrum, with Japan and West Germany tending towards private ownership, France and UK tending towards state-ownership. Sweden lies somewhere in the middle, and the Canadian industry has a pattern of ownership peculiarly its own.
### Table I

**Patterns of Ownership in the Nuclear and Electric Utility Industries**

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<th>USA</th>
<th>Japan</th>
<th>Germany</th>
<th>Sweden</th>
<th>Canada</th>
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<td>Fuel Fabrication</td>
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<tr>
<td>Electricity utilities</td>
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<td>Architect Engineering</td>
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<td>Reactor supply</td>
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<tr>
<td>Reprocessing</td>
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<td>S</td>
<td>P*</td>
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- **S** = State (Central Government) ownership
- **(S)** = State (Provincial Government) ownership.
- **m** = Mixed private and state (central and/or provincial) ownership
- **m* = Mixed ownership, in the sense that some institutions are privately, others publicly owned, e.g., USA where 77 per cent of electricity is generated by private utilities and 23 per cent by public utilities.
- **P** = Private ownership
- **P* = Private ownership with significant utility shareholdings
- **?** = Undecided
- **-** = Not relevant

One reason for the smaller capitalist countries having substantial state-ownership in their nuclear industries is that the costs and risks of nuclear production were considered too great, and the domestic market too limited for relatively smaller systems of private enterprise to bear. However, there is a significant sub-contracting of component manufacture by nuclear plant suppliers to the private sector in all capitalist countries.

The following points of detail should be noted in relation to Table I.

- In the USA, some of the largest utilities (TVA, Duke Power, etc.) perform their own architect engineering; others rely on the services of private firms. Elsewhere architect engineering is performed mainly by reactor suppliers (where utility industry is fragmented) or by utilities (where it is large and concentrated.

- The French and British nuclear industries are similar in structure, with state-owned enterprises covering the fuel cycle (Cogema and BNFL), and reactor suppliers that are owned partly by the state, partly by private enterprise.

- In all countries except the UK, reactor suppliers are involved in fuel fabrication.

- Germany has set up ad hoc companies to run each activity within the fuel cycle — enrichment (Ironit),

15 Lonnroth and Walker, n. 10, p. 11.
LWR fuel fabrication (PFV), and reprocessing and waste disposal (DWMK). Ownership of these companies is shared by utilities and private concerns involved in nuclear production.

- The Canadian nuclear industry has been developed largely within the province of Ontario and has been promoted by Atomic Energy of Canada, Limited (AECL), owned by the federal government, and Ontario Hydro (owned by provincial government). Of the heavy water plants in operation, three are owned by Ontario Hydro and two by AECL.

- As multinational firms are involved in uranium mining, it was not possible to depict patterns of ownership in Table I. The uranium mining industry is mainly in private hands (except in Canada) although governments in uranium supplying countries have historically played important roles in trying to stabilise the industry.

Decisions about the ownership and coordination of nuclear industries were largely taken in the period when market prospects were good and commercial profitability appeared to be just over the horizon. But the difficult political and economic conditions that have prevailed since the early 1970s have given a distinct advantage to those supplier countries in which governments exert strong control over, and share risks with nuclear industries, and a distinct disadvantage to those

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16 Ibid., pp. 11-13.
countries in which risks are borne by private enterprise and where there is limited policy coordination.

ANALYSIS OF NUCLEAR EXPORT POLICIES

There is a conflict between the commercial interests in selling civil nuclear technology and the political interest in not spreading nuclear weapons potential, as far as the supplier nations are concerned. Some of the earlier Western writings on nuclear exports have been criticised as reflecting a "preoccupation with the market", at the international level and ignoring the domestic factors.

The export policies of supplier states are determined at two levels -- international and domestic. At each level economic and politico-military factors bear upon the nuclear export policy. The economic factors encompass both the international and domestic nuclear markets, the nuclear industry, technology, and such commercial interests as trade

17 Ibid., pp. 16-17.
20 Edward Wonder, "Nuclear Commerce and Nuclear Proliferation: Germany and Brazil, 1975"., Orbis (Philadelphia, Pa.), vol. 21, no. 2, Summer 1977, p. 278.
and investment. Politico-military factors include the dangers of proliferation as well as proliferation-inspired diplomatic interaction among supplier and customer governments. Wonder's answer to those who impute an imperative character to international factors, and to the market in particular, is that different suppliers have reacted to those factors in different ways. He points out that while Canada was willing to jeopardise its nuclear business for the sake of non-proliferation, Germany was not. To explain these, one must consider domestic factors such as the character of the nuclear industry, dynamics of the political economy, and bureaucratic politics at the governmental level.

In the analysis of the nuclear export policies of the five major nuclear supplier countries -- the United States, Canada, France, West Germany and the Soviet Union -- we would trace the complex interaction of domestic, international, economic and politico-strategic factors in determining the specific nuclear export policies. Economic forces naturally tend to favour exports and dominate policy unless compelling political considerations dictate otherwise. The size and structure of domestic and international reactor and uranium markets and the level of manufacturing and mining capacity impart a powerful export orientation to the nuclear industries in the supplier countries. While politico-strategic fears of nuclear weapons proliferation inhibit nuclear exports,

21 Ibid.
22 Ibid., pp. 280-1.
politico-strategic pressures for energy security, energy independence, and the use of high technology exports for expanding political influence, tend to encourage nuclear sales. The relative weights attached to economic and politico strategic considerations are conditioned not only by extraordinary events abroad, such as the Indian nuclear explosion of May 1974, but also by the nature of the domestic nuclear policy-making process, the visibility of nuclear export issues in the domestic political arena, and the strengths and weaknesses of domestic political economy. The balance between economic and politico-strategic interests is generally a fine one but can take drastic and dramatic shifts.

NUCLEAR EXPORT POLICY OF THE US

The United States, the first state to acquire nuclear weapons, was always keenly interested in their non-proliferation. At the same time being the first one to develop commercial nuclear technology, the economic motive to promote civil nuclear technology was also strong. Being the principal actor of international nuclear politics, the US policies have to a large extent shaped the world nuclear politics.

Evolution of the Policy

In the post-War period, the American government became committed to the development of nuclear energy for peaceful uses. Civil applications of nuclear science were judged to be essential to continuing work on the atomic bomb, since nuclear scientists tended to justify their work on the latter in terms of their contribution to the former. American industry was initially reluctant to become involved in nuclear projects, given the scant prospects for immediate industrial applications and rigid governmental controls. But ample government financial support, especially in R & D, helped overcome the industry's initial diffidence. This same government investment in nuclear R & D helped to create a permanent government interest in promoting the commercialisation of nuclear energy in order to redeem the promises made to the private sector and to redeem the government's own considerable commitment.

The creation of the Atomic Energy Commission was crucial. The emergence of an effective and expansive bureaucratic actor assured that the interests of nuclear energy would be pursued within the government. And the political support of important

24 For example, it was considered essential for morale purposes that the Los Alamos Laboratory conduct research on the "constructive applications of nuclear energy" while pursuing its main objectives of weapons design and research. Richard C. Hewlett and Oscar G. Anderson, Jr., The New World: 1939/1946 (University Park, Pa., 1972), p. 626.

25 Ibid., p. 629.

26 For an analysis of American pattern of government ties with private industries in comparison with other countries, see, J.E. Hodgetts, Administering the Atom for Peace (New York, 1964), pp. 90-98.
Congressional leaders concentrated in the Joint Committee on Atomic Energy, provided a critical link between private interests and bureaucratic policy. Although these different sources of nuclear policy were often at odds with each other, there was also a minimal agreement on a common goal of promoting nuclear energy as a viable commercial alternative to coal and oil power generation. Despite persistent differences, the agreement of disparate groups on this general goal was sufficient to give American nuclear policy in the 1950s and early 1960s a certain coherence and effectiveness. It was this policy that allowed the United States to establish itself as the dominant force in the world nuclear energy market.

These domestic interests are sufficient to account for the government's attempts to promote the commercialisation of nuclear energy, but not its internationalisation. Indeed, in the wake of the rejection of the Baruch Plan in 1945 and the passage of McMahon Act in 1946, the trend was in the opposite direction. Under the policy of nuclear secrecy, nuclear sharing with Great Britain and Canada was terminated and the United States consciously sought to preserve its nuclear monopoly through a policy of restricted access to nuclear technology. But the policy of nuclear secrecy was a failure. By 1953, the acquisition of near strategic deterrence by the Soviet Union, the nuclear test by Great Britain in 1952, and the gradual lessening of international tension led the United

27 Baker, n. 23, p. 287.
28 Ibid.
States to realise that the era of American nuclear supremacy was fading and that a change in policy was necessary.

On December 8, 1953, President Eisenhower proclaimed his "Atoms for Peace" Programme before the United Nations. Under the proposal the US, the USSR and other governments with a nuclear capability were to make joint contributions from their stockpiles of fissionable materials to an International Atomic Energy Agency (IAEA) which would have the responsibility for the storage and security of these elements until the IAEA could devise methods to allocate them to "provide abundant electrical energy to the power-starved areas of the world".  

The "Atoms for Peace" proposal was a result of the convergence of an arms control rationale and domestic political interests. "It became a tenet of American policy that the spread of nuclear technology was inevitable and therefore it was wise to seek control that which could not be prevented". "Atoms for Peace" was designed to spread American controls internationally by spreading American nuclear technology and hardware. The political support generated for the proposal in the US rested on the compatibility of the US Government's international political objectives with the nuclear industry's commercial interests. The "Atoms for Peace" plan besides giving a major role for the development of a private commercial nuclear industry, sought to ensure a captive world nuclear

30 Baker, n. 23, p. 291.
market to the US nuclear industry, which was getting jittery about the early British successes in nuclear exports. Under the "Atoms for Peace" programme bilateral agreements were concluded with 43 nations between 1955 and 1958, involving the transfer of research and power reactors subsidised by the United States Government, in addition to exchange of technology and personnel. Where the most obvious tensions arose between the policies of international commercial promotion and arms control, the tension was dissipated in favour of commercial promotion. Thus when the countries of the European Atomic Community (EURATOM) refused both direct American inspection and international inspection under the IAEA, the US allowed them the right of self-inspection.

Arms control and commercial promotion have at best been convergent interests but never really the logical ends and means of a coherent policy, and the very growth of commercial nuclear power was to exacerbate the problem of nuclear proliferation later. Despite the failure of nuclear power to emerge as economically competitive without government subsidies until the late 1960s, an international nuclear market emerged as a result of the American policies. Thus by the 1960s there was

31 Ibid., pp. 292-4.
32 For details, see Donnelly and Rather, n. 3.
34 Donnelly, n. 4, pp. 75-76.
35 Ebinger, n. 33, p. 13.
an international nuclear market with the US LWR based on enriched uranium as the major reactor type, propped up by the US monopoly for the supply of enriched uranium. With the commercial interests of the United States thus achieved the arms control objective was to be buttressed by the Treaty on the Non-proliferation of Nuclear Weapons (NPT), which while promising promotion of nuclear energy for peaceful purposes, would require non-nuclear nations to renounce nuclear weapons.

The secure situation, however, was not to last very long. Even as the NPT regime emerged in 1970, it was rocked by a number of developments. Although the oil crisis of 1973 boosted the hopes of the US nuclear industry for a "take-off", the results were exactly the reverse due to the decreasing rise in electricity demand in the US, and growing environmental opposition to nuclear power and after 1974, a "nuclear recession" set in the US domestic market. A number of reactor orders were either deferred or cancelled. US reactor manufacturers were faced with an effective moratorium on new reactor ordering since the mid-1970s and a deteriorating commercial position in external markets. In the nuclear reactor industry of the United States, with an installed capacity of 25-30 gigawatts per annum, the domestic nuclear ordering rate throughout the 1970s was only 12.0 GW/a and export ordering was only


This left considerable excess capacity making nuclear exports all the more essential for the reactor manufacturers.

The second major factor was the loss of American monopoly over the world reactor and enrichment supplies. The emergence of France and Germany as competitors to US LWR industry and the development of indigenous enrichment capacities in Europe (URENCO & EURODIF) undermined the American hegemony over the world nuclear market. The trend towards indigenous enrichment was in part aided by the failure of the United States in providing assured enriched uranium supplies, to enact its 1971 multilateralisation initiative which would have pledged help to the European allies in building a multinational enrichment plant. This confirmed European fears as to the future reliability of the United States as a supplier of enriched fuel. The American allies feared that the Nixon Administration's policy of turning over uranium enrichment to the private sector would (i) raise the US prices for enrichment service; (ii) perpetuate the US dominance in supplying these services and (iii) have serious ramifications on the growth of an independent European nuclear industry.

39 Joskow, n. 6.
The other developments were the nuclear explosion by India in 1974, the sale of complete nuclear fuel cycle to Brazil by West Germany in 1975 and the proposed French sale of a reprocessing plant to Pakistan and South Korea in 1976. These three events taken together gave a severe jolt to the US non-proliferation policy.

The Ford Administration attempted to grapple with the various nuclear issues which emerged. It began negotiations with other nuclear suppliers, which led to the formation of the Nuclear Suppliers Group (NSG) or the London Club in late 1974. President Ford also commissioned a major review of the nuclear export policy during mid-1976. Even while negotiations were going on with other nuclear suppliers, the US Government on October 28, 1976 startled the international nuclear community with the announcement that it no longer viewed reprocessing "as a necessary and inevitable step in the nuclear fuel cycle" and that the United States would engage in reprocessing and plutonium recycling in the future "only if they are found to be consistent with our international objectives". The change in the US position on plutonium recycling and commercial reprocessing, which were always taken for granted as the logical steps in nuclear development all over the world, aroused concern abroad that the United States was once again moving to sabotage the effective

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42 Ebinger, n. 33, p. 60.

development of an independent European and Japanese nuclear industry. In addition, although the administration placed a moratorium on reprocessing and plutonium recycling, the October 1976 announcement made no reference to the US breeder reactor programme. This omission exacerbated the fears of Europeans and Japanese.

The deterioration in the intra-alliance nuclear relations was also aided by a vocal American Congress calling for a vigorous nuclear non-proliferation policy. In the US Congress, numerous pieces of legislation designed to establish legal criteria -- adherence to the IAEA safeguards, firm control over transfer of the US technology to third parties, a pledge not to detonate peaceful nuclear explosions -- were introduced to regulate American nuclear exports.

Among these various pieces of legislation was the Percy-Glenn Bill to redistribute power among the Energy Research and Development Administration (ERDA), the Nuclear Regulatory Commission (NRC) and the State Department in order to reduce the influence of the alleged pro-industry bias of


ERDA in nuclear export decisions. There was a legislation offered by Senator Clarence Long to curtail the US Export-Import Bank funding of nuclear export sales. There was also an amendment by Senator Symington to the Foreign Assistance Act of 1961, to reduce or eliminate military and economic aid to countries obtaining enrichment and/or reprocessing technology unless they agreed to implement fullscope safeguards and, if possible, to put these facilities under multilateral control.

From the viewpoint of the Europeans and Japanese, the above Congressional initiatives "bordered on madness". They took an equally dim view of such ill-conceived ideas as the Ribicoff proposal for joint US-Soviet Cooperation to cut-off enriched fuel supplies to France, Germany and Japan to force them to change their nuclear policies.

The Carter Initiative

At this stage Jimmy Carter took over as the President of the United States. Even during his presidential campaign, Carter had made nuclear energy an issue, and adopted positions unfavourable to the development of nuclear energy. Carter had

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Ebinger, n. 33, p. 62.

Ribicoff, n. 19.

made opposition to the German-Brazil deal a campaign issue and had forced a strong non-proliferation plank into the Democratic Party platform. He had also attacked the Ford Administration's signing in 1976 of the US-Brazilian Memorandum of understanding which recognised Brazil's emergence as an important actor in the international arena and hence bestowed tacit recognition on Brazil's nuclear aspirations.

After Carter assumed office, the Ford-Mitre Report on Nuclear Energy came out in March 1977 and this formed the foundation of Carter's nuclear policy. The Report recommended the indefinite deferring of commercial reprocessing, postponing decision on commercialisation of breeder beyond the end of the century, maintain adequate enrichment capacity to meet worldwide requirements, and prevent export of facilities to reprocess or enrich uranium. Above all the study group recommended the discarding of promotional approach to nuclear energy, encouraging countries to make realistic assessments of their energy needs and options, and dissuading them from exercising their nuclear energy option.

On April 7, 1977, President Carter in a major policy statement on nuclear issues put forward the following seven-

51 William Perry and Sheila Kern, "The Brazilian Nuclear Program in a Foreign Policy Context", Comparative Strategy (New York), vol. 1, nos. 1 & 2, pp. 53-70.

point programme which incorporated the Ford-Mitre recommendations:

- indefinite deferral of domestic reprocessing and recycling on the grounds that they were not essential to a viable nuclear programme;

- deferral of the introduction of fast breeders into commercial use and greater priority to more proliferation-resistant breeder technologies;

- refocussing of nuclear R & D efforts on more proliferation-resistant fuel cycles;

- expansion of enriched uranium production to allow the United States to recapture its pre-eminent role as a reliable and secure supplier of enriched fuels, thus reducing the incentives for other states to acquire their own enrichment facilities;

- reform of the nuclear export licensing process to provide greater confidence that American nuclear fuel export contracts would not be delayed or disrupted;

- prolonged embargo on the US export of enrichment and reprocessing technology; and

- continuation of international negotiations with both suppliers and recipients on means to achieve energy needs without undermining non-proliferation objectives.

53 US Information Communication Agency (USICA), Executive Order by President Carter on His Decisions Regarding Nuclear Power Policy, April 7, 1977 (New Delhi, 1979).
With the Nuclear Non-proliferation Act (NNPA) of 1978, these measures of April 1977 were taken a step further and incorporated into a comprehensive legislation designed to provide for more efficient and effective control over the proliferation of nuclear explosive capability. The main purposes of the Act are:

- to provide mechanisms for fuel supply assurance and the establishment of more effective international controls over the transfer and use of nuclear facilities and technology, including the establishment of common international sanctions;
- to take actions which would confirm the reliability of USA in meeting its commitments as a supplier of nuclear facilities and fuels to nations which adhere to effective non-proliferation policies;
- to encourage nations which have not ratified NPT to do so; and
- to cooperate with other nations in identifying and adapting suitable technologies for energy production, in particular, alternative options to nuclear power.

In pursuance of these aims, the Act laid down specific criteria for the approval of exports of facilities for peaceful nuclear uses. These included:

- application of IAEA safeguards to all materials and facilities;
- an assurance not to use materials, facilities or nuclear technology for any nuclear explosive device or for the research or development of such devices;
- the maintenance of adequate physical security measures;
- no retransfer of materials, facilities or technologies without prior approval of the United States;
- no reprocessing of materials or alteration of spent fuels of US origin without prior approval; and
- no export of sensitive technology.

To implement the above conditions, the Government was to renegotiate all existing bilateral nuclear cooperation agreements. The stipulation that the nuclear programmes of the non-nuclear weapon powers should come under fullscope safeguards, was to take effect 18 months after the passage of the NNPA in March 1978. Besides, these specific measures the broad non-proliferation strategy of US was outlined by Carter's "non-proliferation czar" Joseph Nye:

- making the safeguards system more effective by insisting on comprehensive safeguards, through
expansion of IAEA's role and wider acceptance of the NPT;

- self-restraint in the transfer of sensitive technology and materials that can contribute directly to weapons;

- creation of non-proliferation incentives through fuel assurances and assistance in the management of spent fuel with the United States expanding its role as a reliable supplier of nuclear materials and facilities;

- building consensus about the future structure and management of nuclear fuel cycle by instituting an International Fuel Cycle Evaluation (INFCE) forum;

- taking steps to ensure that domestic nuclear policy is consistent with international objectives by banning the growth of plutonium reprocessing in breeder reactor programmes;

- taking steps to reduce any security or prestige motives that states might have to develop nuclear explosives including US security guarantees, sale of conventional arms to countries with security problems, encouragement of nuclear free zones, discouraging nations which attach special status to nuclear weapons states and punitive action against those who go nuclear.

Response to Carter's Policy

Except for the diehard protagonists of nuclear non-proliferation, the world reaction to the new American nuclear policy was adverse. The American nuclear industry was also critical of the new policy. While agreeing with the non-proliferation goals, the industry felt that the only way to maintain hegemony over world nuclear situation was by continuing to be a major nuclear supplier. Further, adopting unilateral measures of restricting exports and deferral of reprocessing and the breeder, would only loosen the already slipping control of US nuclear industry. The self-denial of the US policy was neither helping the goal of nuclear non-proliferation nor the commercial interests of the domestic nuclear industry.

The West European and Japanese opposition was a reflection of their vulnerable energy position and of their lack of technological flexibility. Their reprocessing and in the case of France, the breeder programme represented a substantial investment of technical, organisational, financial and political resources. While the American move on plutonium was meant to be a dramatic testimony to its sincerity about non-proliferation, its allies viewed it as evidence of the superior overall energy position of the US, its technological endowment, financial strength, and also as

revealing a "residual strain of political Don Quixotism". The Europeans and the Japanese could not afford to precipitously cancel expensive projects previously publicised as essential to national welfare. The Europeans could reluctantly accept restrictions on nuclear market, but could not accept solutions to nuclear non-proliferation which jeopardised their own energy security, energy independence and high technology development.

The nuclear customers of the US became apprehensive about the complex web of new conditions in export processes and subsequent arrangements of the US nuclear export policy. The new policy required coordination between the NRC, the Department of State, Defence, Commerce and the Arms Control and Disarmament Agency (ACDA). Without the guidance of previous experiences or the existence of precise definitions and clear procedural details, the process of license and approval lacked predictability. Changes in the personnel or policies of any of the numerous government entities involved


were also bound to create uncertainties.

Carter's Policy and the Third World

The new American policy on nuclear exports has been widely viewed in Third World as manifestation of "atomic colonialism" and an anti-technological crusade. There was resentment in Latin America at Carter's attempts to torpedo the Brazilian nuclear deal with West Germany. Pakistan also resented the successful American effort at sabotaging the reprocessing deal with France. At the Persepolis (Iran) Conference on the Transfer of Nuclear Technology which took place just after the announcement of Carter's policy, the Third World nuclear community severely castigated Carter's policy as "negative and discriminatory". The American nuclear export policy was bitterly criticised by India and Yugoslavia, as a design to perpetuate US nuclear technological dominance and monopoly, and as harmful to the development of nuclear energy for peaceful purposes in the Third World.


61 For a report of the Conference, see Nuclear Power and its Fuel Cycle (Vienna, 1977), vol. 6, pp. 645-64.


Despite American efforts at convincing the Third World that the American nuclear policy is "consistent with the real interests of the developing countries", it was unacceptable to the Third World. It has also been argued that that the US was in fact engaged in "selective proliferation" by encouraging countries like Israel and South Africa to acquire nuclear weapon capability, while placing the peaceful nuclear energy programmes of developing countries under severe restrictions.

The American policy successfully forced the cancellation of French reprocessing deals with Pakistan and South Korea. Although the US could not block the sale of complete nuclear fuel cycle to Brazil, it could get assurances from France and Germany that no further reprocessing plants will be exported. The US policy also succeeded in persuading the other major uranium exporters -- Canada and Australia -- to follow a tough nuclear export policy similar to that of US. The absence of a second Indian nuclear explosion and the slowdown in the rate of proliferation were seen as successes of Carter's policy. The United States also

64 Charles K. Van Doren, "President Carter's Nuclear Nonproliferation Policy Toward Developing Countries: Problems and Prospects", in Jae Kyu Park, ed., Nuclear Proliferation in Developing Countries (Seoul, 1979), p.3.

65 For this theory of selective proliferation, see Swadesh Rana, "Towards Selective Proliferation: President Carter's Nuclear Non-Proliferation Policy and Developing Countries", IDSA Occasional Paper No. 2 (New Delhi, 1980).

66 Lewis Dunn, "Half Past India's Bang", Foreign Policy (Washington, D.C.), no. 36, Fall 1979, pp. 71-89; Joseph S. Nye, Jr., "We Tried Harder (and Did More)", ibid., pp. 101-4.
successful in bringing about some general understanding among the nuclear suppliers. However, due to the French and German opposition, the NSG guidelines did not include the condition of fullscope safeguards. INFCE, the other international initiative of US, finally came out with conclusions which were more favourable to the European positions on reprocessing and breeders.

The American administration faced a number of difficulties in implementing the nuclear policy. They included: (i) "unilateralist" impression of American policy; (ii) concerns that the new nuclear policy violates American obligations under the NPT to provide free access to technology; (iii) doubts about reliability of American supplies; (iv) reluctance by many states to renegotiate agreements for cooperation with the United States because of their perception that the US was seeking to change, unilaterally, binding international commitments. There was a lack of effective policy coordination and implementation, causing serious problems.

Two cases -- both alleged proliferants -- India and Pakistan, where the changed American policy was sought to

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68 USICA, Excerpts from President Carter's Annual Non-Proliferation Progress Report To Congress, January 1979 (New Delhi, 1979), pp. 6-7.

be applied, it had to be compromised. For more than three years, there has been a running controversy going on between India and the United States over the supply of enriched fuel (LEU) to Tarapur power station. The inordinate delays and uncertainty of LEU supplies have caused considerable problems for the Indian nuclear power programme, and has also resulted in the plant running at a reduced capacity. Despite many twists and turns the positions of US and India have been irreconcilable. While US pressed for fullscope safeguards, India refused to budge. However, the USA succeeded in obtaining a pledge from the Janata Government that India would not go in for any more nuclear explosions, even for peaceful purposes. This policy was reversed in 1980, by Mrs. Indira Gandhi who told the Parliament she did not rule out further PNEs.

During 1978-79, the domestic opposition in the US to Tarapu fuel shipments was growing. The Carter Administration


71 On July 13, 1977, the Indian Prime Minister, Morarji Desai declared in the Lok Sabha, that India would not undertake any more nuclear explosions. Times of India, July 14, 1977.

72 Times of India, March 14, 1980; see R.R. Subramanian, "India and PNEs: The Changed Mood in 1980", Strategic Analysis (New Delhi), vol. 4, no. 1, April 1980, pp. 30-34.
pleaded for the shipments on the ground that the grace period under MNPA of 18 to 24 months for renegotiation of agreements was not yet over. President Carter also argued that the denial of the shipments "would seriously undermine our efforts to persuade India to accept fullscope safeguards, and would seriously prejudice the achievements of other US non-proliferation goals". Joseph Nye told the Congress that the Administration had indications from the Indian Prime Minister, Morarji Desai, that India would accept fullscope safeguards if there was a comprehensive nuclear test ban treaty between at least the USA, UK and USSR, and if they make serious efforts at reduction of nuclear weapon stockpiles with a view to eventually eliminate them. And the Administration succeeded in getting the fuel shipments to Tarapur released.

With the expiry of grace period under MNPA on March 10, 1980, the tussle between the Carter Administration, the NRC and the Congress came to a head. In India, there was considerable resentment against the delay in the supply of fuel to Tarapur and the fact that the Nuclear Fuel Complex at Hyderabad was lying idle. In an aide-memoire sent to Washington in early

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March 1980, the new government led by Mrs. Gandhi made it clear that fuel shipments had already been delayed unduly and that any further delay would amount to denial and a unilateral abrogation by US of the Tarapur agreement. In such an event, the *side-memoire* added that India would be free to make alternative arrangements for fuel and reprocess on its own the spent fuel from Tarapur, which under the agreement, can be reprocessed only with US concurrence. At the same time the *side-memoire* reaffirmed that India would continue to adhere to the safeguards embodied in the Tarapur agreement, and that the nuclear materials obtained from the US would not be used for any explosive purposes.

President Carter approved the export of fuel on May 7, 1980. The US Nuclear Regulatory Commission on May 16 unanimously decided that the export would be contrary to the provisions of NNPA and barred the export. The US State Department unsuccessfully argued that the fuel shipment to India should be "grandfathered" from the provisions of 1978 NNPA, because the Indian application for shipments was received in 1977. The State Department also argued that there


77 Subash Chakravarti, "US Obliged to Supply N-Fuel to Tarapur", *Times of India* (New Delhi), March 20, 1980; see also *Nuclear Engineering International*, vol. 25, no. 300, June 1980, p. 5.

78 *Times of India* (New Delhi), May 3, 1980.

79 *Nuclear Engineering International*, vol. 25, no. 301, July 1980, p. 3.
were overriding national security concerns, and the NFPA allows the President to waive proliferation considerations in such cases.

Carter responded to the NEC, by overriding its decision and allowing the export, leaving the Congress 60 days to veto his decision. The proponents of the export argued that in the world situation after Soviet intervention in Afghanistan, US could ill afford to drive India into the Russian camp. The opponents argued that India was already in the Russian camp and that the US non-proliferation policy would be in shambles if India is allowed to go scot-free in spite of its non-

80 Nuclear News (Hinsdale, Ill.), vol. 23, no. 9, July 1980, pp. 50-51.
81 "The exports will avoid the risk of a claim by India that the United States has broken an existing arrangement between the two governments and has thereby relieved India of its obligation to refrain from reprocessing the fuel previously supplied by the United States.

"Supply of this fuel will also ensure the continuation of safeguards and other US controls on disposition of US-origin fuel that has been supplied to India.

"Approval of these exports will help strengthen ties with a key South Asian democracy at a time when it is particularly important for us to do so. Insecurity in South and Southwest Asia has been greatly heightened by the crisis in Iran and the Soviet invasion of Afghanistan. We must do all we reasonably can to promote stability in the area and to bolster our relations with States there, particularly those that can play a role in checking Soviet expansionism."

confirmity with the non-proliferation regime. While the House of Representatives overwhelmingly voted in favour of denying the export, the Senate by a thin margin of two votes, was against the denial of export. Thus India came perilously close to the loss of nuclear fuel supply to Tarapur power station. In 1981, under the Reagan Administration, it became clear that the United States and India would like to terminate the agreement on the supply of fuel to Tarapur.

In the case of Pakistan, the compromise on nuclear non-proliferation goals was blatant. As reports of Pakistan's clandestine enrichment plant began to surface, the US Government announced in April 1979, that the US was invoking the Symington Amendment to Foreign Assistance Act, to cut-off economic aid to Pakistan, because of Pak enrichment efforts. However, the US sanctions were limited. Food aid was not terminated, and though military grants were stopped, equipment


85 International Herald Tribune (Paris), April 7-8, 1979; see also the statement of Thomas R. Pickering of US Department of State in "US Reviews Nonproliferation Progress in South Asia", USICA, Backgrounder (New Delhi), May 11, 1979.
purchases were not proscribed; and "Pakistani decision-makers might hope for a revision of US Policy and Laws (which mandate such a cut-off) once the storm blows over".

With the Soviet intervention in Afghanistan, the hopes did indeed materialise. Pakistan was perceived as extremely important by the US in its now radically changed view of global strategic environment. "In the wake of the Soviet intervention in Afghanistan, the Symington Amendment was being seriously questioned by the United States with powerful factions in the State Department, Pentagon and the Congress demanding the release of generous economic and military aid to Pakistan".

In January 1980, it was disclosed that the United States was offering US $400 million as military and economic aid to Pakistan. President Carter's National Security Adviser, Zbigniew Brzezinski argued that: "Obviously the threat from Soviet Union to Pakistan has altered the emphasis in our relationship with Pakistan. Until Pakistan was threatened we were naturally more preoccupied with the issue of non-proliferation. We remain concerned with it but we feel that the security aspect of our relationship with Pakistan has to be given more immediate attention." Even as Pakistan refused


88 Times of India (New Delhi), January 15, 1980.

89 Quoted in Indian Express (New Delhi), January 17, 1980.
the proposed aid, the US State Department made it clear that Pakistan can purchase military equipment from the US or other Western countries. Under the Reagan Administration with its tough posture towards the Soviet Union, the importance of Pakistan increased and it is being seen as a "frontline state". There is also an attempt to do away with the Symington Amendment to resume easy supply of arms to Pakistan.

The heightened US perception of the "Soviet threat" and the creation of an atmosphere of a "new cold war" after the Soviet intervention in Afghanistan, were the chief factors responsible for compromising the professed non-proliferation goals in favour of broader strategic considerations. Having made a highly emotive issue of non-proliferation, the US was perhaps being forced to realise that non-proliferation goals would have to be sacrificed or accommodated within the broader strategic requirements of the US foreign policy.

The congruence of the US commercial and political interests of nuclear technology which could exist until early 1970s could no longer be sustained, because of the heightened fears of nuclear proliferation. President Carter tilted heavily in favour of political interests at the expense of domestic nuclear industry. In the unilateral way in which the new policy was sought to be implemented, the US while

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90 Business Standard (Calcutta), May 23, 1980.

91 N. Ram, "Aid to Pak: Senate Panel Paves Way", The Hindu (Madras), May 16, 1981.

92 For a comprehensive analysis of the new cold war, see the issue on "New Cold War" of Strategic Analysis, vol. 4, nos. 5-6, August-September 1980, pp. 137-239.
losing the support of its nuclear industry, could not, however, secure support of its important allies - Western Europe and Japan. In implementing a grand and sweeping policy on nuclear technology, the United States was crippled by the absence of nuclear technological hegemony.

The US nuclear export policy, unrealistic as it was, when confronted with realpolitik had to be compromised. But the compromise was not in favour of nuclear commercial interests, but of larger political and strategic goals. The besieged nuclear industry, however, attempted to reassert its interests. Sections of Carter Administration, led by Gerard C. Smith, US ambassador at large on non-proliferation, were lobbying for softening US posture on reprocessing and breeders. Smith himself resigned in November 1980 due to differences on nuclear non-proliferation policy.

Insofar as the Third World was concerned, President Carter has forced the American nuclear policy wheel a complete circle. While the "Atoms for Peace" plan of 1953, ended the era of nuclear secrecy and heralded the age of promotion of nuclear energy, Carter's 1977 programme sought once again to curb nuclear energy development. Eisenhower


promised abundant energy for the power-starved areas of the Third World and declared the atom was a great boon for the benefit of all mankind. Carter sought to restrict nuclear technology for a few and promised to assist the Third World in the development of non-nuclear energy sources.

For India and a few others which had advanced nuclear energy programmes, the US attempt to renegotiate existing cooperation agreements and to restrict nuclear energy development were politically anathema and unacceptable. Even those countries which had signed the NPT in the hope of gaining access to nuclear technology were also not above US suspicion. Most Third World countries, including traditional US allies, began to turn away from the US as a nuclear supplier, and looked towards Western Europe. Argentina and Brazil have already done so, and Mexico, South Korea and others are attempting to diversify their sources of nuclear supply.

CANADA'S NUCLEAR EXPORT POLICY

Canada is not only a major exporter of natural uranium but also of Candu nuclear reactors, technology and allied services. Even before President Carter's strong initiatives on nuclear non-proliferation in 1977, Canada took unilateral initiative as early as 1974 to renegotiate existing nuclear agreements and improve the scope of IAEA safeguards.

The India Factor

The chief stimulus for the unilateral Canadian initiative was the Indian nuclear explosion of May 1974. The Canadian reaction to India's nuclear explosion was sharp and bitter. The general feeling in Canada was that India has entered the nuclear club on "Canada's shoulders". Further, the "impression that India has broken a trust with Canada by exploding a nuclear device has entered the lexicon of Canadian popular myths. In fact no agreements have been broken by the Indian government." Bindon and Mukerji argue that the Canadian nuclear industry benefited considerably from the Indian commitment to the Canadian technology even before it was proven. The Indo-Canadian deal (1956) for the CIRUS reactor gave the infant nuclear industry of Canada £7.5 million of contracts, assistance in keeping the skilled teams together, and manufacturing experience that would contribute to building the industrial "learning curve". Besides providing an

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97 Robert Gillette, "India: Into the Nuclear Club on Canada's Shoulders", Science, June 7, 1974, pp. 1053-5. Gillette concludes his article by saying: "From the Canadian point of view it has begun to look like a case of technological charity gone sour".

98 George Bindon and Sitoo Mukerji, "How Canada's and India's Nuclear Roles Have Been Sadly Misrepresented", Science Forum (Toronto), vol. 10, no. 1, February 1977, p. 3.

99 For an "authorised version" of the history of Canadian nuclear development, see Wilfred Eggleston, Canada's Nuclear Story (London, 1966). See also, Peter de Leon, A Comparative Analysis of High Technology Programs: The Development and Diffusion of the Nuclear Power Reactor in Six Nations (Santa Monica, Ca., 1978).
immediate boost for the industry in Canada, CIRUS was a "loss-leader" that gave Canada a foothold in future nuclear sales.

In 1961, Canada and India undertook a study for the construction near Delhi of a 200 MW reactor, similar to the first Candu reactor at Douglas Point. In August 1962, Indian government gave the go ahead for construction of the nuclear station -- to be called Rajasthan Atomic Power Project (RAPP). India made this commitment to commercial Candu before any operating experience had been gained even on the Candu demonstration plant, one half year before the nuclear components for the first commercial Candu at Douglas Point had been delivered and four and a half years before Douglas Point was to generate its first electricity. The Indian purchases shortened the time toward maturity and provided continuity to development. And if the Canadian decision (to press with Candus) had been taken without the RAPP contracts on line, it is questionable whether the dramatic improvement in operating reliability of Candus would have been realised. Therefore, by the RAPP contracts, India offered an important subsidisation to the building of the 'learning curve' of the Canadian nuclear industry and was a full risk-sharing partner in Candu technology. There seems to be no justification for the rather self-righteous posture of Canada regarding India.

100 Bindon and Mukerji, n. 98, pp. 4-5.
101 Ibid.
102 Ibid., p. 6.
But the shock of the Indian nuclear explosion was real, and it compelled a complete re-evaluation of Canada's policy on nuclear exports. The firebreak between military and civilian uses of nuclear energy seemed to have been breached. The non-proliferation regime so laboriously established seemed on the verge of collapse. The transfer of Canada's most advanced technology, conceived in a seemingly ideal partnership between a rich nation and a poor one, had been put to sorry use. The unkindest cut of all was the effect on Canada's image as a "peace-maker". The "White Knight" of the Western World had contributed to nuclear proliferation and world insecurity, not through cynical arms sales but through sheer naivete.

**Evolution of the Canadian Nuclear Policy**

As an immediate response to the Indian nuclear explosion, Canada suspended all nuclear aid to India and announced a renegotiation of existing nuclear cooperation agreements. In December 1974, Canada announced its new safeguards policy. It demanded explicit assurances from customers that Canadian supplied nuclear material, equipment and technology would not be used for any nuclear explosion, peaceful or otherwise. The new policy included the following:

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principles:
- all nuclear material and equipment would be covered by safeguards over the lifetime of that material and equipment;
- future generations of fissile material produced from or with Canadian supplied material would similarly be safeguarded;
- binding assurances would be required that Canadian supplied material or equipment would not be used to produce any sort of nuclear explosive device;
- safeguards would extend to any equipment making use of Canadian technology;
- all nuclear material and any material subsequently generated from it would be bound by the same restrictions regardless of its origin, if it were produced or processed in facilities supplied by Canada.

With the "nightmare" of the Indian peaceful nuclear explosion hanging over Canadian conscience, the basic thrust of the new policy was to demand binding commitments that Canadian supplies will not serve the development of "any nuclear explosive for whatever purpose". Further, financial assistance for nuclear projects would be provided


106 Statement by the Canadian Secretary of State for External Affairs, MacBachen, at the NPT Review Conference, May 1975; from International Canada (Toronto), vol. 6, no. 5, May 1975, p. 29.
only for parties to the NPT. The new policy contained fresh departures in safeguards thinking. The new conditions implied that a customer is prevented from replicating imported technology beyond the reach of safeguards, as India had done with its own series of Candu-type reactors. The point at which modified designs cease to be Canadian was not defined. The last condition listed above implied that, for example, uranium from Niger used in an Argentine Candu reactor would be treated as if it had been mined in Canada. The guiding principles were those of "contamination and pursuit", whereby Canadian material or equipment attract safeguards to themselves and to anything produced by or from them.

Canada attempted to apply these criteria retroactively through renegotiation of contracts already signed. It also demanded prior consent over the transfer of uranium, nuclear equipment and technology or by-products across national boundaries, as well as on enrichment and recycling of uranium and plutonium.

On December 1976 Canada further stiffened its nuclear export policy. From that time shipments of Canadian reactors

107 Ibid.

108 Statement of the Canadian Secretary of State, MacEachen, placing the renegotiated nuclear agreements with Korea and Argentina, in the Canadian House of Commons, on January 30, 1976; from International Perspectives (Ottawa), January-February 1976, p. 15.

109 Some of the 'inconsistencies' of Canada's position before it imposed fullscope safeguards were examined in Albert Legault, "Nuclear Policy Should be More Open and Less Ambiguous", International Perspectives (Ottawa), January-February 1976, pp. 8-13.
and uranium to non-nuclear weapon States would be "restricted to those [states] which ratify the Non-Proliferation Treaty or otherwise accept international safeguards on their entire nuclear programme". Under the earlier policy, Canada had required that the nuclear assistance it had provided would not be used for explosive purposes. But this did not cover the nuclear technology a country received from other suppliers or the nuclear technology that a country developed on its own. The new policy was to close this "gap". In order to back up its position Canada placed a year long embargo on uranium exports during 1977.

Canada along with two other major uranium producers, USA and Australia, formulated a common policy of safeguards on exports of nuclear technology and materials in parallel with discussions going on at the Nuclear Suppliers Group. Besides, Canada was also encouraging the activities of an international uranium cartel. Thus the Canadian nuclear export policy had a two-fold aim. First, to use its position

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111 International Canada, vol. 8, no. 4, April 1977, p. 83.

112 The Canadian Minister of Energy, Mines and Resources said in the House of Commons on June 9, 1977 that "there is no secret about the fact that Canada was engaged in a producers group or producers club aimed at providing a stability of price for uranium..." The Minister also confirmed that Canadian government had invited private companies producing uranium to participate in the cartel. See, International Canada, vol. 8, nos. 7 & 8, July/August 1977, p. 175.
as a major producer of uranium to pressurise the uranium-dependent countries of Western Europe and Japan to defer reprocessing of plutonium and also pursue a more stringent policy of nuclear exports safeguards. Second, to pressurise the Third World countries into either signing the NPT or accepting fullscope safeguards.

To the West Europeans and the Japanese, Canadian nuclear policy demonstrated two major things: (i) There was a continual danger that the non-proliferation consensus embodied in the IAEA was open to abrupt change. (ii) The nuclear energy strategies and overall energy planning of West European countries and Japan would be linked more closely to the non-proliferation policies of major uranium exporting nations.

The impact of Canadian nuclear policy on the Third World countries was more disastrous. It resulted in delays and increase in costs of the nuclear programmes and also outright denial of technology. The Canadian abrogation of nuclear cooperation with India since 1974 resulted in considerable delays in the growth of Indian nuclear programme. Attempts were made by both sides to come to some understanding during 1976, on nuclear cooperation. But the talks broke down on account of Canada's insistence on fullscope nuclear safeguards. India was not prepared to accept safeguards on reactors other than RAPP, which were already under international safeguards.

The main purpose of Canadian negotiations was to ensure that "the withdrawal of Canada from nuclear cooperation with India should not produce a collapse of the safeguards, and that India should carry out a responsible policy as a potential exporter of nuclear technology, material and equipment".

Canada's nuclear relations with Pakistan were also strained. In late 1974 it decided to withhold the delivery of equipment for a nuclear fuel fabrication plant, the contract for which was signed two years earlier. Further, Canada did not renew contracts for export of natural uranium once the five year agreement to supply fuel for the Karachi Nuclear Power Plant (KANUPP) expired at the end of 1975. It restricted the supply of spare parts and heavy water to KANUPP, as part of an attempt to renegotiate the bilateral nuclear cooperation agreement of 1959 and the KANUPP agreement of 1965. Canada also pressurised France not to sell a reprocessing plant to Pakistan. Canada and Pakistan could not reach an understanding. The existing agreements were unilaterally terminated by Canada in December 1976.


118 Ibid.

119 Ibid. See also ibid., vol. 7, no. 11, November 1976, p. 254.

Domestic Dynamics of Canada's Nuclear Policy

In implementing a very tough nuclear export policy, Canada was primarily guided by nuclear non-proliferation concerns. Yet there were domestic and commercial factors which counteracted on this policy. Canada's attempt at using its uranium resources to further its non-proliferation policy was not successful. As a result of Canadian uranium policies, its major customer countries in Western Europe and Japan, began to diversify their sources of supply. Moreover, there was a general slowdown in the growth of nuclear power all over the world, and the uranium requirements did not rise according to earlier expectations. This made the Canadian producers a worried lot. The Canadian government was also under pressure to sell its strategic stockpile of uranium as a way of putting more money into the deficit-ridden federal bill. These factors considerably reduced the efficacy of using uranium as an instrument of non-proliferation policy.

The Canadian reactor industry is also under pressure to export reactors. There is already an excess capacity in the electricity supply system and a relatively low rate of electricity demand growth is anticipated in the 1980s. Against an installed capacity of 3 GW/a in the Canadian nuclear reactor manufacturing industry, the domestic ordering throughout the 1970s was only 1 GW/a. In the 1980s, nuclear reactor ordering is expected to be around 0.5 to 1 GW/a.

121 The Statesman (New Delhi), November 6, 1979.
122 Lonnroth and Walker, n. 10, p. 67.
leaving around 2.5 to 2 GW/a of excess capacity. Hence the fortunes of the Canadian reactor industry in the 1980s will depend to a considerable degree on capturing a significant share of the export markets.

If export orders are not secured in sufficient numbers serious under-utilisation of capacity could develop in sections of the Canadian reactor industry in the early to mid-1980s. There could be casualties among component suppliers if orders are not forthcoming soon. There were about 31,000 direct jobs and a total of 85,000 direct and induced jobs in Canada's nuclear industry in 1977. If no new orders are obtained by early 1980s, employment in the private engineering sector of the industry could be eliminated and layoffs could be common in the manufacturing industry, and many hundreds of highly skilled jobs might be lost. Thus the Canadian nuclear industry's need to export nuclear reactors is quite strong.

The Candu has a number of advantages. Its aspects of safety, on-load refuelling, and natural uranium fuel make it quite attractive. The Candu can also be adapted to advanced fuel cycles, has better fuel burn-up, higher net capacity factor, and is relatively easier to adapt in a country with

123 Ibid.
124 Ibid., p. 82.
126 Ibid.
limited industrial capability. Further with the increasing concern about energy security and energy self-sufficiency, the unpredictability of enriched uranium supplies from the US had highlighted the advantages of Candu. The Three Mile Island accident of the US PWR was also seen to improve the prospects of Candu. With the early successes of Candu exports to India, Pakistan, Argentina and South Korea, the Canadians seemed well-entrenched in nuclear reactor exports. With the dramatic shift in emphasis of the nuclear export policy towards non-proliferation after the Indian nuclear explosion, the dream of Candu exports began to fade. Canada's position on nuclear safeguards and nuclear proliferation was seen a serious obstacle to nuclear exports. The loss of sale in Argentina in 1979-80 was the most glaring example.

The Atomic Energy of Canada, Limited (AECL) with the largest experience in natural uranium reactors, lost the sale in Argentina to KWH of West Germany. The sale worth US $1.5 billion and 15,000 man-years of employment was lost because of Argentina's "distrust of Canada as a nuclear trading partner".


130 Financial Times (London), May 2, 1979.

131 For a detailed analysis of early Canadian attempts at Candu exports, Morrison and Wonder, n. 105, pp. 17-23.


The German price was considerably more than the Canadian price. In spite of a better technology and a lower price, the Canadians lost out to Germans. The main reason for the failure of Canada was its insistence on fullscope safeguards, and reluctance to transfer nuclear technology. West Germany did not insist on fullscope safeguards, was willing to transfer nuclear technology, and even arranged for the sale of a heavy water plant through a Swiss company.

The Task Force on Candu exports, set up by the Canadian Government recommended strong export drive with good governmental backing, increased association of private sector, and use of uranium sales to further Candu exports. While there was considerable pressure building up for exports, they became increasingly difficult because of the non-proliferation policy of Canada. Another set of contradictory factors was that while most of the potential customers were the Third World countries like Argentina, Mexico, Venezuela, South Korea, etc., there was considerable domestic opposition to nuclear sales to the Third World countries.

An unfavourable domestic market coupled with the obstacle of non-proliferation policy in penetrating export markets, could confront the Canadians with a choice of increasing the exports at the cost of the non-proliferation

135 A Report by the Task Force on Candu Export Marketing, n. 128.
136 For details of the domestic debate on nuclear exports, see Morrison and Wonder, n. 105, pp. 73-78.
policy, or to abandon the indigenously developed system of Candu. In Canada, where the Candu reactor system has been its biggest and most successful achievement in high technology, it would be difficult and painful to give up the Candu. As it makes renewed efforts to push the export sales of Candus, it would be very difficult for Canada to achieve exports of nuclear reactors and also maintain its stand on nuclear non-proliferation.

The principal motivations for Canada's early nuclear export policy were clearly commercial. After the Indian nuclear explosion, the concern about nuclear non-proliferation became the dominant and overriding factor, bordering almost on fetishism. The domestic opposition to nuclear reactor exports was vigorous and strong. The policy shift was a response to the mounting attacks of political opposition and mass-media, and was intended to purge the widespread feeling in Canada of anger (and, in some cases, guilt) over the alleged abuse of Canadian nuclear assistance. While the new export policy could mute domestic opposition to some extent, it led to considerable loss of goodwill and political influence in West Europe and the Third World, besides the loss of revenue from the decline of reactor sales.

137 Ibid., p. 5.


139 There is considerable pressure building up in Canada for a more flexible nuclear export policy, and the Government is reported to be reviewing the present policy. See Nucleonics Week, vol. 22, no. 16, April 16, 1981, p. 7; Ibid., vol. 22, no. 17, April 30, 1981, pp. 7-8.
A curious question remains to be answered. Why was Canada, more than the US, driven towards the imposition of restraints -- strident and stringent -- on its nuclear exports? As a middle power, without global security commitments and with no direct threat to its own security, Canada could be expected to emphasise economic interests in its export policy. France and Germany, both more involved with security problems than Canada, maintained an export policy dominated by concerns for their nuclear industry.

The reasons may be found in the particular circumstances. France and Germany are both more vulnerable to the disruption of energy supplies and count more heavily on the contribution of nuclear power to the diversification of their energy sources. Their nuclear industries are strong and have a more effective voice in government than that of Canada. Moreover, their security concerns tend to be focussed on the European theatre, where proliferation is not a threat. Access to energy and resources is an essential element of their security policy. They have tended to use nuclear technology as a bridgehead to the Third World to ensure both energy security and resource security. It may be precisely the freedom from immediate security and energy supply concerns that allows Canada the luxury of worrying about peace, order and good government in more general, global terms. The strong tradition of high minded internationalism in foreign policy, widespread resentment at what was considered an abuse of Canadian nuclear assistance, and the degree to which criticism of nuclear policy
in Canada focussed on the reactor export programme were also unique.

NUCLEAR EXPORT POLICY OF FRANCE

Evolution of Policy

Since the mid-1970s, France has become one of the most important actors of the world nuclear energy politics. During this period France launched an ambitious domestic nuclear energy programme, demonstrated impressive technological advances in crucial areas such as the fast breeder and reprocessing, and achieved considerable export successes. It is the only country that can offer on the world market the totality of services in the nuclear fuel cycle: enrichment (Eurodif); nuclear plants (Framatome); reprocessing (Cogema); and fast breeder (Novatome). Coupled with this new industrial potential there was since 1976 a foreign nuclear policy designed to give France a decisive international influence.

The apex body of French atomic energy programme, the Commissariat a l'énergie atomique (CEA), was set up in 1945. Lacking wartime experience, it had to build up the basic science and technology related to nuclear industry. The initial emphasis was in military aspects, but after 1951 interest in civil nuclear industry developed. The CEA developed an indigenous reactor but abandoned it in favour of

140 Morrison and Wonder, n. 105, p. 107.
PWR technology of US Westinghouse. The French Framatome became a licensee of Westinghouse and began to manufacture PWRs domestically. It has been decided to make Framatome entirely French-owned by buying off the shares of Westinghouse.

The remarkable success of the French nuclear industry can be seen in the fact that by 1980, France took lead in the EEC nuclear power production, when its production increased by 46 per cent from that of 1979 (January-June). The French nuclear industry has been less encumbered by domestic political opposition. Its vigorousness has been a source of envy to other developed countries. The French fast breeder reactor programme has also been very successful.

As the overall French nuclear policy evolved in the post-war world, it was beset with certain ambivalences. In the name of national independence, France defended the right of every nation to build its own bomb, and hence the French refusal to sign the NPT. However in the name of international security France spoke out against the further spread of nuclear weapons and promised to conduct itself as if it were a party to the NPT. The Gaullist attitude towards nuclear proliferation

had three main features: (i) rejection of the American position, including in particular the technical-control measures which were regarded as both ineffective and incompatible with national sovereignty; (ii) basic acceptance of the principle of non-proliferation insofar as it did not interfere with France's national nuclear programme, both in the civilian and military sectors; and (iii) concentration on the problem of Germany, which the Gaullists saw as directly linked to France's security.

Response to Post-1974 Developments

The new political, technological and strategic factors which began to emerge by 1974 brought to the fore three fresh contradictions in French nuclear policy. First, the "nth country problem" no longer presented itself in European terms but had shifted to the Third World. On the one hand, this facilitated a rapprochement with West Germany and an increased nuclear cooperation among them. On the other hand, the development of a French non-proliferation policy directly aimed at Third World seemed "inconsistent with the mondialiste destiny" toward which Valery Giscard d'Estaing, the new president, oriented French diplomacy. Thus the first contradiction was: How is a strategy of non-proliferation, which necessarily discriminates against the Third World, compatible with the

148 Ibid., p. 956.
image of a "link" between the industrialised North and the underdeveloped South, which Giscard's France liked to maintain?

Second, France which formerly had played only a marginal role in the international nuclear-energy market, was now, through its ambitious and successful nuclear programme, drawn into the proliferation controversy. Having become, along with West Germany, an important exporter of nuclear technology, France under Giscard had to depart from the comfortable ambivalence with which the Fifth Republic had been able to protect itself because of the weakness of its own nuclear industry.

Third, France now had, in contrast to the 1960s, its own large nuclear-energy programme. A stringent non-proliferation policy could, therefore in a very concrete sense entail important economic costs: loss of export income, uncertainties and threats to fuel supply, delays in the construction of new installations as a result of increased safeguards, and the risk of losing technological advantages which France enjoyed in the area of fast breeders and reprocessing. In particular, the question of nuclear exports was pressing. Even from the early period, France recognised the value of exports to sustain a high technology programme domestically. In 1968, the so called PEON Commission of French Government, called upon the Government and nuclear industry to move aggressively into the export market. It argued that exports were essential if the domestic industry

149 Ibid., pp. 956-67.
was to produce nuclear facilities at costs competitive with US and German firms. From mid-1970s the need to export became quite acute. The French nuclear industry has an installed nuclear reactor manufacturing capacity of 7 GW/a. During 1970-79, only 3.4 GW/a of capacity was ordered in the domestic market and about 0.6 GW/a ordered abroad. In the 1980s, the total ordering from nuclear industry is expected to be around 3-4 GW/a. Thus there is an excess capacity of about 3-4 GW/a and exports are thus essential for the viability of the nuclear industry in France.

After the Indian nuclear explosion, when the NSG was formed, France's participation was delayed and hesitant. But France also acquiesced in the forced cancellation by the United States of the French South-Korean reprocessing contract. At the same time France was encouraging export of PWRs to South Africa and Iran, research reactors to Iraq and Iran, and a reprocessing plant to Pakistan. President Giscard, during his visit to Washington during May 1976, ignored the US warnings about selling nuclear technology to the developing countries.

150 de Leon, n. 99, p. 213.
152 Ibid., pp. 64-65.
153 Lellouche, n. 147, p. 958.
There was also a spectacular public dispute between Prime Minister Jacques Chirac and the US Secretary of State Henry Kissinger over the French-Pakistan agreement.

By the end of 1976, a more coherent nuclear policy was formulated by France. This new policy was set up in three major steps. The first was the formation of the Council of Foreign Nuclear Policy in September 1976. President Giscard was to personally head the body. The second was the declaration on October 11, 1976, which explained France's new foreign nuclear policy. France argued against nuclear cartelisation and also against backing out on safeguards or offering reprocessing plants as inducements for nuclear sales. It was also against modifying the technical nature of the IAEA by allowing it to exercise judgement on political desirability of nuclear sales contracts. France was opposed to turning the NSG into a permanent body. It was also against a moratorium on export of reprocessing technology. Third, there was an order on December 16, 1976, which discontinued until further notice the export of reprocessing facilities.


158 *Nucleonics Week*, vol. 17, no. 43, October 21, 1976, p. 5; see also "Statement by the High Council on Foreign Policy: Nuclear Export Policy, October 11, 1976", *Documents on Disarmament*, 1976, n. 155, p. 669.

The Secretary of State Kissinger expressed satisfaction of the new French policy. In France, there was criticism of Giscard's policy as succumbing to US pressure and the President was forced to deny the charge of Atlantisme. However, the export policy statement of October 11, 1976 was so vaguely formulated as to allow any future modification of French policy. Indeed, it was not clear whether Paris intended to give priority to the idea of an understanding among the supplier nations or to the principle that France must remain master of its own nuclear export policy. After more than two years of hesitation and confusing public statements, the French government apparently decided in August 1978 to cancel the reprocessing plant contract signed with Pakistan. It is significant that the French decision to "cancel" the deal was announced by Pak President Zia ul Haque who referred to a letter dated August 9, 1978 from President Giscard.

Though France's nuclear policy, perhaps deliberately, was confusing on the exports of reprocessing plants, it was quite clear on the issue of fullscope safeguards. The opposition of France, along with Germany, to fullscope safeguards resulted in their non-inclusion in the NSG guidelines. The consensus at the NSG was that there should only be a "restraint" on sale of sensitive technologies (enrichment and

160 Nucleonics Week, vol. 17, no. 43, October 21, 1976, p. 5.
161 Lellouche, n. 147, p. 960.
162 Ibid.
reprocessing) and not actual embargo on such sales.

The French, along with the Germans, had three major arguments against the US non-proliferation policy. First, any change in the international rules under which nuclear technology transfer should take place can only be changed by consensus and not unilaterally (as was being done by the US and Canada). Second, if technology is denied under safeguards, the customer countries would tend to make it themselves, without any safeguards. Third, if and when states go nuclear, they would do so for political reasons and that the civilian route to nuclear weapons was the most expensive and time consuming. Underlying these arguments was the concern of France for the problems of energy security and energy independence. Andre Giraud, the French Industry Minister, argued that the "United States can afford the luxury of non-proliferation security that hinders the peaceful use of nuclear energy" because the US had a relatively comfortable energy situation. Giraud pressed forward the argument that carefully increased Western support for nuclear energy could actually improve the climate for preventing the spread of nuclear weapons. "We must be more liberal in our approach to peaceful nuclear power and avoid creating a mood of

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discrimination against non-nuclear countries". Even as it argued that nuclear proliferation was a political problem, France claimed that it had developed relatively proliferation proof technologies that can provide 90 per cent security against the diversion of nuclear fuel supplies or equipment for military purposes by offering protection in key areas of vulnerability: nuclear fuel, reactor choice and reprocessing. France attracted attention at the Salzburg Conference of 1977 by presenting a "peaceful" uranium enrichment process which can produce enriched fuel, called "Caramel", (7 per cent enriched) unusable in weapons.

According to Giraud who announced it, the French technique would discourage creation of weapons in these ways: high enrichment would take 30 years; there would be no way to arrange the plant to enrich quickly; too-high enrichment could lead to criticality stopping the whole system. As far as the reactor type was concerned, France considered the US PWR as the most proliferation-resistant. Reprocessing, in the French view, could be handled in sealed installations, called, "tunnel factories", where high internal radioactivity prevents human access.

166 Quoted in ibid.
167 Ibid.
168 International Herald Tribune (Paris), May 7-8, 1977.
169 Ibid.
170 Fitchett, n. 165.
French Nuclear Policy and the Third World

The practical implementation of the French nuclear policy reverted eventually to the mondialiste framework of French diplomacy. "As a pioneer in the North-South dialogue, France has in effect gradually distinguished itself from other members of the London Group, having gone so far as to publicise existing differences of opinion among the supplier nations". Further, there emerged at the Persepolis and Salzburg Conferences of 1977, "a French nuclear doctrine which called itself 'moderate' and 'Third World friendly' and which detached itself from Washington's 'maximum confrontation' thesis". France gradually shifted from the idea of indispensable cooperation among the export nations to the renewed public criticism of the US position. The US was blamed for the climate of mistrust, which would only accelerate nuclear proliferation.

It is doubtful if the claim of France to be "Third World friendly", stands close scrutiny. The main prop of the French nuclear export policy is the commercial interest and perhaps, a genuine fear that technological denial to the Third World would lead to a technological "autarky" in the Third World. It appears that the French denial of reprocessing plants to Pakistan and South Korea was based more on commercial considerations and less on concern for non-proliferation. The reprocessing of spent fuel on French

171 Lellouche, n. 147, p. 961.
172 Goldschmidt, n. 7, pp. 21-36.
soil would earn much more for the French nuclear industry than
the export of small installations at relatively low prices which would only weaken the French monopoly in this field.

The "Third World friendly" thesis was exposed in France's dealings with Iraq. A French consortium Cersag had won a turnkey contract worth £290 million to set up a nuclear research centre for peaceful purposes at Baghdad. The centre was to include an "Osiris" research reactor which uses highly enriched uranium. The reactor while being manufactured in France was blown up allegedly by Israelis, with perhaps French complicity. France suggested that the rebuilt research reactor could be run on the low enriched Caramal fuel. When Iraq, France's second largest supplier of oil, insisted on the original contract being fulfilled, France relented. In supplying nuclear technology to Iraq, France gained in terms of oil supplies, and sale of arms and industrial projects.

Problems have come up in the Indo-French cooperation in the construction of the Fast Breeder Test Reactor (FBTR) at Kalpakkam. The Indian DAE ran into problems over acquisition of highly enriched fuel for the FBTR. The indication that

176 Ibid., March 21, 1980.
177 Times of India (New Delhi), May 15, 1979.
178 Ibid.
179 Patriot (New Delhi), May 8, 1979.
French fuel is not available for the FBTR came from an official Indian announcement that the DAE was making attempts to "develop an alternate indigenous fuel for FBTR". The reasons for the supply problems included the questions of price and safeguards.

France's "Third World friendliness" is further exposed in its exploitation of uranium resources from its former colonies in Africa. In order to diversify its uranium supply sources France has considerably stepped up its investment in African uranium. France, while commercially exploiting its former African colonies for uranium, is also gaining tremendous advantages -- commercial, industrial and political -- by supplying elementary nuclear technology (under safeguards, of course) to oil exporting nations like Iraq. France's concern with oil supplies was also reflected in its wooing Mexico, the new oil exporter, with cooperation in nuclear energy. The commercial interest in selling nuclear reactors was the dominant factor in the French nuclear export policy. Unlike in USA and Canada, nuclear non-proliferation was not the overriding concern in France. The nuclear commercial interest in France was reinforced by the political and strategic concerns of energy security, energy independence and supply of raw materials.

180 Ibid.


182 Nuclear Canada (Toronto), vol. 18, no. 5, May 1979, p. 6.
NUCLEAR EXPORT POLICY OF WEST GERMANY

Since the early 1970s, the Federal Republic of Germany (FRG) emerged as one of the most important exporters of nuclear technology. Though Germany is lagging behind in the development of fast breeders and reprocessing, it is a major exporter of nuclear power plants (KWU), enriched uranium (as a partner of URENCO), fuel fabrication (KWU), uranium mining, milling and processing technology (Urangesellschaft). The German deal with Brazil, in 1975, to supply the entire nuclear fuel cycle, brought the FRG into the centre stage of nuclear proliferation controversy.

Growth of German Nuclear Industry

The Germans adopted the American LWR from the outset. The firms, AEG and Siemens, which were called upon to make these reactors under American license took an active part in research and construction. Siemens and AEG, the leading German electric equipment makers, made modifications in power station projects constructed under American license and they gradually released themselves from the patent system. The autonomy took concrete form in 1969 in the creation of KWU consortium in which AEG and Siemens had equal shares. (Later Siemens took over the AEG shares also.) The KWU is now in a position to supply the two types of American LWR (PWR &

183 Burn, n. 142, pp. 98-103.
BWR) and also the natural uranium-heavy water reactors (PHWR).

Germany, along with the UK and Netherlands, formed the enrichment venture URENCO, based on centrifuge process. Besides the centrifuge process, the Germans also developed the "jet nozzle" process for uranium enrichment. In the field of reprocessing Germany along with France and the UK formed a loose marketing and technology exchange organisation called United Reprocessors. The construction of its own commercial reprocessing facility is being delayed because of domestic environmental opposition and litigation.

Unlike France, West Germany was a signatory to the NPT. Like other non-nuclear weapon states, which signed the NPT, Germany thought that uninhibited access to nuclear energy technology, under safeguards, was vital in a treaty which sought to inhibit proliferation through the control of civil nuclear technology and the renunciation of nuclear weapons. "Not unlike the circumstances that would develop later, West Germany was in the forefront of the debate over Article IV of the NPT, which guaranteed access to nuclear energy technology". Within West Germany, one of the major concerns in the debate on NPT was that the signing of NPT

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184 For details of the growth of the German reactor industry, see de Leon, n. 99. See also, Henry R. Hau, National Politics and International Technology: Nuclear Reactor Development in Western Europe (London, 1974).

185 Nuclear Proliferation Factbook, 1977, n. 29, p. 197.


187 Kaiser, n. 164, p. 84.
should not hamper either the full development of civil nuclear potential in Germany or the exports of nuclear reactors.

**West German Nuclear Deal with Brazil**

In the post-1974 period, with the drastic changes in American nuclear policy inhibiting the spread of civil nuclear technology, the divergence between West German and American nuclear policies became glaring. The West German-US conflict over nuclear export policy came into sharp focus with the signing of Brazil-Germany deal in 1975. Under the agreement, Germany sold the entire nuclear fuel cycle to Brazil including reprocessing and uranium enrichment. The components of the deal were:

- **Reactors**: Two 1,250 MW reactors by 1985 and an option for six more by 1990, with Brazilian share of the construction and component manufacture to progressively reach 90 per cent by 1990;

- **Fuel Fabrication**: A pilot plant, and then a commercial plant. The Brazilian Nuclebras to do 70 per cent of the work;

- **Reprocessing**: Construction of a pilot plant under a technical-assistance agreement between Nuclebras and German companies;

- **Uranium Enrichment**: A small demonstration plant by 1981, later expanding to commercial size. Nuclebras will do 75 per cent of the work;

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Uranium Exploration and Mining: Intensified exploration of Brazilian territory. German utilities are guaranteed a significant portion of whatever is found. Nuclebras holds 51 per cent of a joint company.

There was a strong opposition to this deal from the US. The New York Times called the deal "nuclear madness" and argued that it was a "reckless move that could set off a nuclear arms race in Latin America, trigger the nuclear arming of a half dozen nations elsewhere, and endanger the security of United States and the world as a whole." The US feared that the deal would set a precedent that could open up a widespread demand for fuel-cycle technologies as a means to national nuclear autarky as well as threats to shop elsewhere if demands were not met.

In response to the US criticism, the FRO pointed out that the agreement incorporated the most advanced safeguards mechanisms. Brazil agreed not to use any equipment or materials supplied on a cooperative basis, or any of the relevant technological information, or any derivative information, to manufacture any sort of nuclear explosive device, even a peaceful one. Brazil further undertook to subject all equipment, materials and know-how supplied under

189 For details, see Norman Gall, "Atoms for Brazil: Dangers for All", Foreign Policy, no. 23, Summer 1978, pp. 165-201.


191 Gall, n. 189.
the agreement to the IAEA safeguards and not to re-export such items without the permission of the FRG. The technology safeguards in the agreement were that Brazil may not copy a German supplied facility or technology except under IAEA safeguards. Thus the agreement covered the so-called reiteration-of-technology problem.

West Germany also pointed out that it did not violate any of its responsibilities under the NPT. Article III of the NPT states that fissile material, or nuclear technology for the processing, use, or production of such materials, must be subject to certain safeguards. In the case of exports to non-parties to the NPT, the transferred material or technology must be subject to IAEA safeguards. In such cases, all peaceful facilities need not be safeguarded, unlike those of a treaty member. (It must be noted here that there are no unsafeguarded facilities in Brazil.) The Germans were correct in pointing out that they have fulfilled their legal obligations and that with technology safeguards, they have gone one step further. FRG maintained that its adherence to the NPT amply demonstrated Germany's intention not to contribute to proliferation, and that the NPT did not legally require Germany to engage in self-denial if the requirements of the treaty are met. The German interpretation of the NPT was

192 Helmut Schmidt, the West German Chancellor pointed out that US Vice-President Mondale, on his visit to Bonn in early 1977, "specifically confirmed" that West Germany had fulfilled its treaty obligations. Quoted in International Herald Tribune (Paris), February 2, 1977.

193 Wonder, n. 20, p. 291.
criticised as "both literalist and minimalist". But it was pointed out that this interpretation of the NPT was not a German invention. It reflected an international agreement that could not be changed through unilateral action by one or a few countries.

West Germany was resentful of the overbearing way in which the US tried to scuttle the deal with Brazil. Likening the US approach to that of a Roman pater or a Mafia Godfather, a senior official of West Germany pointed out: "The structure of the international community of States is very different from that of the Roman family, or any other family I know of. There may be a few Godfathers around, but there are no children that have to obey their pater".

The German interpretation of the NPT had, however, a corollary. Chancellor Schmidt discussing the Brazilian agreements, defended the sale on the grounds that the relevant question was not whether a country like Brazil should obtain such technology but when it will. Like France, West Germany argued that nuclear technological denial would lead to indigenous nuclear development in the developing countries, and there would be no prospects for control. Given the ineluctability of the spread of technology, Germany argued that technological denial would be self-defeating.

194 Ibid.
195 Kaiser, n. 164, p. 89.
197 Wonder, n. 20, pp. 291-2.
Under pressure from the United States, the Germans relented along with France in December 1976, and announced that in future reprocessing plants would not be sold. The Brazilian deal was to stay. West Germany also refused to make fullscope safeguards a precondition for any nuclear sale. Though the US pressed for fullscope safeguards and ban on sale of sensitive technologies the Germans have not accepted. The German sale of natural uranium reactors to Argentina in 1980 was a case in point. FRG won the contract in the face of stiff opposition from the US and Canada, West Germany did not insist on fullscope safeguards and was willing to arrange for a heavy water plant through the Swiss. Germany was also willing to transfer the technology of reactor component manufacture.

Determinants of German Nuclear Export Policy

The West German nuclear industry has a nuclear reactor manufacturing capacity of 6-8 GW/a. During the period 1970-79, the domestic annual ordering rates have only been around 1.6 GW/a. Further a de facto moratorium on nuclear ordering existed in Germany since the mid-1970s. KWU received in March 1980, its first domestic reactor order

in four and a half years. The virtual moratorium rose out of a host of environmental, legal and regulatory problems. In the light of a search for a political compromise over the role of nuclear power in Germany in the 1980s, an average reactor ordering rate in the region of 1-2 GW/a seems a reasonably balanced expectation. Thus there would be an excess capacity in nuclear reactor production of around 5 GW/a. Export of nuclear reactors would continue to be a major concern for the viability of German nuclear industry. There are about 250,000 highly skilled workers and engineers employed in German nuclear industry. In reactor construction alone about 65,000 jobs are involved. To maintain these technological skills, even in a nuclear industry operating at a reduced level, export of nuclear reactors is highly necessary.

Security of uranium supply has been another consideration of German nuclear export policy. Annual uranium demand in Germany may double over the 1980-85 period, and a recognition of this led to the launching of joint uranium exploration ventures. At the time of Brazilian agreement, Canada and

204 According to Chancellor Schmidt, $13 billion in nuclear industrial investments have been held up because of legal and environmental challenges. See, Getler, n. 202.
205 Lonnroth and Walker, n. 10, pp. 67-68.
Niger supplied 60 per cent of German uranium needs, with South Africa providing the balance. Expectations of uranium shortage in the 1980s, and the growing possibility that Canada would drastically reduce its uranium exports, encouraged an intense search for alternative sources of uranium supply. In the deal with Brazil, the sale of technology was perhaps less important than an assured supply of Brazilian uranium, indicating that uranium supply diversification weighed heavily in the German decision. "This evokes an image of the agreement as barter, technology having been swapped for raw materials".

The very nature of the international nuclear market has forced Germany to include fuel cycle technologies in its reactor sales. The bulk of the Third World nuclear market resides in a few industrialising countries which offer large blocks of orders to single suppliers in return for transfers of the technology necessary to establish indigenous capabilities. The small number of transactions and the large financial stakes involved have intensified competition and, in the German-Brazilian case, encouraged the transfer of sensitive enrichment and reprocessing technology to get a competitive advantage.

Regarding Germany, it has been argued that "commercial export of nuclear technology has ... appeared as natural

207 For details of German uranium procurement policy, see Warnecke, n. 113, p. 101.
208 Wonder, n. 20, p. 296.
209 Ibid., p. 294.
compensatory outlet for an economically vigorous but politically restrained country. Germany has viewed nuclear exports as a means to promote the overall industrial export activity. In its deal with Brazil, Germany visualised that nuclear exports can play a role in "building bridges" over which a much broader range of industrial trade can follow. The balance of trade impact of this larger activity would easily overshadow the gains from nuclear sales. A German official remarked in June 1975 that "the joint gradual development of nuclear industry will act as a stimulus and have a secondary impact on nearly all branches of industry". Thus for an energy-deficient Germany with an export-oriented growth strategy, nuclear exports are of strategic use in buoying up the larger export sector of the German economy. And in an economy quite dependent on exports for its vitality, the pressures to thus employ nuclear exports are very strong.

Technology Transfer to the Third World

More than any other nuclear supplier country, the FRG elegantly articulated a philosophy of transfer of nuclear technology to the Third World. The Germans argued that in a nuclear deal the relationship should go beyond the simple buyer-seller relationship onto a concept of partnership. The FRG also claimed that their nuclear cooperation with

210 Lodgaard, n. 8, pp. 18-19.
211 Quoted in Wonder, n. 20, p. 296.
Brazil and Argentina are "models" of nuclear technology transfer. The claim of "model" nuclear technology transfer is rather dubious. There has indeed been development of indigenous capabilities in minor sectors like nuclear fuel fabrication in Argentina through German cooperation. But it is nowhere near the qualitative level of technology transfer and technology absorption achieved by India in its cooperation with Canada. Brazil and Argentina will not be able to replicate nuclear technology with the same ease. Moreover, the transfer of technology from Germany to Brazil is to be under the auspices of joint firms of Germany and Brazil. The Argentinian case also is to be similar. The concept of joint firms to develop nuclear industry (over the entire nuclear fuel cycle in Brazil, and over reactor component manufacture in Argentina) has been uniquely German in the field of nuclear exports. This concept has been eminently helpful in securing large bulk reactor orders in Brazil and Argentina. At the same time, Germans maintain considerable control over these programmes. German nuclear industry could play a

significant, if not decisive, role in the nuclear decision-making of host countries. And there has been considerable concern in both Brazil and Argentina that this kind of technology import could be dangerous. The FRG, using this philosophy of technology transfer, successfully captured two of the largest nuclear markets in the developing world.

West Germany, while not demanding full-scope safeguards, has insisted on the most advanced form of safeguards, including technology derivative safeguards in the case of Brazil. In the case of Argentina, too, Germany demanded stiff safeguards and has been pressurising Argentina to ratify the Treaty of Tlatelolco. The last measure, if successful, could bring Argentinian nuclear programme under virtual full-scope safeguards.

Like in France, the political and strategic concerns of energy independence, energy security and raw material security have reinforced the commercial interests in selling nuclear technology. Nuclear exports have become imperative both to sustain the domestic nuclear industry, and also to sustain the broader strategy export-led economic growth. In the foreign policy sphere, West Germany is increasingly looking out of Europe, attempting to win new friends and

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213 The Brazilian Physical Society and the Brazilian Society for the Progress of Science issued a statement on July 14, 1975 criticising Brazil's nuclear deal with West Germany. For the statement, see J. Leite Lopes, "Atoms in Developing Nations", Bulletin of the Atomic Scientists, vol. 34, no. 4, April 1978, p. 34.


allies, in the Third World and projects itself as a champion of increased aid and assistance to Third World and as a sympathiser of the demand for a New International Economic Order. From this foreign policy angle too, the nuclear exports to Third World have a crucial role to play.

While the West German nuclear industry could not successfully manage the problems within the domestic market, it has shown great vigour, innovation and adaptation in capturing nuclear export markets. The articulation of an elegant philosophy of nuclear technology transfer, the concept of joint firms, the ability to supply both LWRs and PHWRs, all testify to this. West Germany is also planning to produce small and medium power reactors (SMPRs) of 200-400 MW range to suit Third World markets.

SOVIEJT NUCLEAIR EXPORT POLICY

Soviet Union has become one of the principal actors in world nuclear industrial arena today. Unlike the Western capitalist countries, the Soviet domestic nuclear programme is progressing smoothly without environmental and political opposition. Its breeder reactor programme, like that of France, is far ahead of the US programme. The Soviet Union


218 Lonnroth and Walker, n. 10, pp. 43-47.

is one of the major suppliers of enriched uranium, and an important producer of heavy water. It is also entering the world reactor market with its 440 MW PWR. Besides the East European Socialist countries (except Romania, Albania and Yugoslavia) and Cuba which buy reactors only from the USSR, it plans to sell reactors to Third World countries like Libya.

Evolution of Soviet Nuclear Policy

In the early 1960s, the Soviets enthusiastically supported the transfer of nuclear technology, at least among the socialist countries. A 6.5 MW research reactor and most probably a gaseous diffusion plant for uranium enrichment were given to China around 1955. The Soviet aid seems to have been part of a larger programme designed to demonstrate political solidarity with friendly countries following a Council of Ministers Declaration in January 1955, that atomic aid would be forthcoming. Further the Soviets did not apply safeguards to the research reactors they gave to Czechoslovakia and Egypt. During 1955-56, Soviet Union undertook extensive cooperation with East European countries in both nuclear research and commercial power generation.

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However, certain remarkable changes which took place in the Soviet Union at this period -- symbolised by the 20th Congress of the Communist Party of Soviet Union (CPSU) in 1956 -- affected its nuclear policy as well. The 20th Congress of CPSU "revised" its understanding of the world situation and also the strategy and tactics vis-a-vis imperialism. The 'revision' also included the nature and role of nuclear weapons in the modern world. This was one of the issues in the split with China. It would be impossible here even to barely touch upon the entire gamut of issues raised. The Soviets had come to the conclusion that spread of nuclear weapons capability was undesirable and that Soviet nuclear weapons were good enough to look after the defense of its allies. The new understanding also led to increasing similarity of opinions on nuclear issues with the US. This was reflected in the signing of the Partial Test Ban Treaty (PTBT) in 1963 and the NPT in 1967.

This changed understanding and worsening relations with China led to the termination of nuclear aid to China in 1958. Soviets also slowed down transfers of nuclear energy technology to the East European countries. Many commitments were renegotiated or just left unfulfilled. Hungary never received its 100 MW reactor scheduled to go on-line by 1965. The Soviets stalled on direct technical assistance with the

224 For details see Clemens, n. 221; Morton Halperin, ed., Sino-Soviet Relations and Arms Control (Cambridge, Mass., 1967).

225 Gloria Duffy, Soviet Nuclear Exports (Santa Monica, Ca., 1977), p. 6.
Czech A-1 reactor, a natural uranium-heavy water system, because presumably the high plutonium-production characteristic of the reactor appeared in a different light after the Chinese experience. Of the 30 power reactors exported or on order from the USSR, the Czech A-1 was the first and last heavy water reactor supplied by the USSR. Perhaps the Soviets were favourably inclined in 1955 for the Czech desire to develop heavy water technology to use their vast deposits of natural uranium, and also to ensure Soviet access to the large Czech uranium deposits. However, such trade-offs were not made after 1958.

Besides slowing the transfer of nuclear know-how and limiting reactor exports exclusively to the PWR system, the Soviet Union instituted a striking safeguards measure. It required that all countries receiving reactors from the USSR -- Bulgaria, Czechoslovakia, GDR, Hungary, Poland and Romania at that point -- obtain the uranium fuel for reactors from the USSR and return all spent fuel rods to the USSR for reprocessing. In this way, none of the materials needed for nuclear weapons has been allowed to rest outside the USSR. The friendly socialist countries were not allowed to develop reprocessing and enrichment plants.

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226 Ibid.


228 Duffy, n. 225, pp. 7-9.
This system of control within the bloc was reinforced by the very organisation of research and development in the nuclear energy field constructed by the USSR in the mid-1950s. In March 1956, Soviet Union established the Joint Institute for Nuclear Research, at Dubna near Moscow. The Joint Institute coordinates nuclear research and development in the Comecon countries. The costs of the Joint Institute are borne 47 per cent by the USSR and the rest by other Comecon countries. Throughout the 1950s scientists and technicians from the bloc countries were trained at Dubna. By 1971, more than 1,000 Soviet specialists had helped set up nuclear programmes in the Comecon countries and more than 3,000 bloc scientists were trained at Dubna and elsewhere in the USSR. In addition to the elements of Soviet control over technology supplied through various bodies, the USSR required that recipients of nuclear technology within the bloc to sign the NPT and submit to the safeguards of the IAEA.

Soviet Response to Post-1974 Nuclear Developments

Given its tough attitude on nuclear issues towards socialist countries, it is paradoxical that the USSR refused

229 Arnold Kramish, Atomic Energy in the Soviet Union (Santa Monica, Ca., 1959), p. 188.


to voice apprehensions about India's nuclear explosion of 1974. This, perhaps, is not surprising because as has been noted by an analyst, Soviet nuclear proliferation policy is only an integral part of its broader foreign policy. It was difficult for Soviet Union to criticise India, one of its important friends in the international arena. Lambeth measured varying levels of "proliferation-tolerability" for the USSR -- a high level of concern about the "special case" of West Germany's nuclear potential, a medium degree of concern over the "lesser" revanchist states of South Africa and Israel (and Pakistan since 1980) and low level concern about other countries.

Although the Soviets unlike the Western countries did not oppose the Indian "peaceful nuclear explosion", they grasped the significance of "peaceful nuclear explosions" in the proliferation problem. Without denying the beneficial uses to which nuclear explosions can be put, they began to highlight the difficulties of using PNEs. Soviet

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234 "But when it came to working out concrete projects (of PNEs), it became clear that peaceful nuclear explosions presented great difficulties," so the research must now be carried out into the possible effects of peaceful nuclear blasts on the environment. Some doubts have also been voiced about whether they are justified in economic terms. Small countries in particular, would face especial difficulties. Y. Tomilin, "The Non-Proliferation Problem", International Affairs (Moscow), no. 12, December 1974, pp. 32-33.
scientists began to argue that FNEs should be used only in an emergency, when a problem cannot be solved in any other way and an extensive use of them can be made only when really "pure" nuclear explosive devices, which do not discharge much radioactivity, are developed.

In the post-1974 period, on the vexing issues of plutonium reprocessing, fast breeders, and hazards of nuclear power, etc., the Soviet position was closer to the views of Western nuclear industry and the West European governments, than to the views of US government. The USSR is going ahead with plans for the development of fast breeders. It has also indicated that it would pursue the development of breeders jointly with the socialist bloc countries and would encourage the utilisation of breeders. The Soviet Union signed agreements in 1977 with French to collaborate on breeder research and reprocessing. Soviets gave unstinted support for the growth of domestic nuclear power, in spite of the reports about an alleged nuclear accident. It is building a massive factory -- "Atommasch" to build nuclear power

236 Panasekov, n. 231.
reactors in an assembly-line process. It argued that there were powerful vested interests in Western countries which are 241 against nuclear power growth.

By 1975, the Soviet Union entered into the world nuclear market. Since 1975 it has allowed nuclear sales outside the bloc, where it had made few before. USSR had also become a significant force in the world nuclear fuel market, supplying 55 per cent of EEC's uranium enrichment services in 1977. Gloria Duffy gives the reasons for the 243 Soviet nuclear thrust. First, Soviet Union favours, in principle, the development of nuclear power and encourages its exploitation by resource-poor nations of the Third World. Second, the Soviets clearly wish to step into the vacuum in the supply of nuclear commodities created by

240 The factory, unique in the world, would have an annual capacity of eight 1,000 MW reactors, and the first one was expected to roll out in February 1981, in time for 26th Congress of CPSU. Nuclear Engineering International, vol. 25, no. 307, December 1980, p. 7.

241 "What quarters are interested in having the peaceful application of nuclear energy discredited?" "These are above all, monopolies having something to do with the use of organic fuel, oil monopolies in particular. Having organic fuel and, above all, oil under their control these monopolies are reaping fabulous profits. These quarters are keen on provoking mistrust of a new powerful rival in the energy field, holding up the use of nuclear technology for power generation or at least limiting its scale." V. Yemelyanov, "The Atom for Peace and Progress", International Affairs (Moscow), no. 2, February 1980, p. 91.

242 Horst Manderhausen, Europe's Changing Energy Relations (Santa Monica, Ca., 1976), p. 45.

confusion in the major capitalist countries over the future of nuclear power. Third, the Soviets are quite aware of serving as the "butt of vituperation", along with the US, for the non-aligned nations, which repeatedly charged the Super Powers with violation of Article IV of NPT. "The Soviet's limited nuclear sally is no doubt an attempt to show the good faith of the USSR in contradistinction to the United States, which is becoming evermore reticent to engage in the dispersal of nuclear technology, peaceful or otherwise. The Soviets are careful to guard their exports so a proliferation event cannot be attributed to them, but are demonstrating that they are nonetheless ready to share." Fourth, similar to the West Europeans and the US nuclear industry, the Soviets argued that US policies rather than making the nuclearisation of Third World countries more controllable, were actually rendering it less manageable by creating insecurity of supply of nuclear goods, which will only prompt non-nuclear states to seek nuclear autarky.

Though the Soviets have favoured a smooth nuclear trade, they strongly criticised the transfers of enrichment and reprocessing technologies. "The trend in some non-nuclear countries, including those who are at the initial stage in the development of their atomic power industry, to build up an industry for uranium enrichment and the processing of irradiated fuel with plutonium extraction may be fraught

244 Ibid., p. 15.
with danger in terms of nuclear weapons proliferation." The Soviet Union criticised the "nuclear deal of the century" between Germany and Brazil as signalling a "destructive trend" and that proliferation of uranium enrichment technology would make "control over the non-proliferation of nuclear weapons ... virtually impossible". It was also reported that the Soviets put considerable pressure on the French to cancel the reprocessing deal with Pakistan.

At the meetings of the Nuclear Suppliers Group in London, during 1976 and 1977, the Soviet Union sought more stringent controls over nuclear exports than other suppliers, several times rejecting guidelines offered by the US as "minimal requirements". The USSR, it was believed, argued for comprehensive IAEA safeguards or fullscope safeguards on the recipient nations long before US favoured this position.

Although the Soviets favoured tougher controls than those accepted at the NSG, the Soviets did not go beyond the accepted NSG rules in its implementation of nuclear export policy. That is unlike the United States and Canada which unilaterally imposed restrictions tougher than the NSG guidelines, the Soviets only implemented the rules arrived at by consensus. The Soviet conditions on nuclear exports were


246 *Pravda*, April 17, 1977; Quoted in Duffy, n. 225, p. 20.

247 Ibid.

248 Ibid., p. 18.
the following:

In delivering nuclear materials, equipment and technology to states not in possession of nuclear weapons, the Soviet Union insists that the recipients should accept the IAEA guarantees with respect to Soviet nuclear exports, and give definite official assurances that the material, equipment and technology obtained will not be used to manufacture nuclear explosive devices. In the event of any reexport of these materials or equipment assurances must be given that their deliveries will be effected on the same terms as those on which they have been received as a result of the initial export. 249

The Soviet conditions are thus short of insistence on fullscope safeguards. The Soviets noted that the technology safeguards of the NSG were "a significant step forward in strengthening the non-proliferation regime". The Soviets regretted that the NSG guidelines have not gone far enough to include fullscope safeguards. They also broadly supported proposals for internationalisation of the fuel cycle, including regional reprocessing centres.

249 Zhelezov, n. 245, pp. 50-51.
250 Ibid., p. 51.
251 "The Soviet Union wants even firmer control established over nuclear exports. First and foremost the exporters need to agree on ... the application of IAEA guarantees to the complete nuclear fuel cycle in any non-nuclear recipient country, or, in other words, to the whole nuclear activity of that country.... Unfortunately, far from all the exporters of nuclear materials and equipment share this approach. Any indulgence with respect to control over nuclear exports would only play into the hands of the capitalist monopolies, which willy-nilly help spread nuclear weapons in their drive for superprofits." Ibid., p. 52.
252 Enrico Jaceria, "Big-Power Discord Spurs Proliferation", International Herald Tribune (Paris), April 5-6, 1980.
Soviet Nuclear Policy and the Third World

The Soviets were always critical of the Western policy of technology denial to Third World countries. The Soviets stepped in to export any technology denied to a Third World country -- witness export of steel technology to India in the 1950s. However, on the question of nuclear technology the Soviet policy is very similar to that of the US, and more stringent than the West Europeans. However, the Soviet policy is more subtle and less obtrusive than that of the US. For example, even while the Soviets were demanding fullscope safeguards in the NSG, they did not unilaterally implement them like the US and Canada.

Moreover, Soviet view of nuclear proliferation depends on the nature of the specific Third World country involved. The Soviets are wary of appearing hostile to an important ally like India. In their export of much needed heavy water to India, the Soviets did not demand fullscope safeguards. Gloria Duffy interpreted the Indo-Soviet accord on heavy water sale for RAPP as an application of "tight safeguards uniformly to all their [Indian] reactors for an indefinite period of time as a condition of this single sale of heavy water". Ashok Kapur suggested that India's unwillingness to publish the agreement as evidence of the embarrassing acceptance of "partial fullscope safeguards".

253 Duffy, n. 225, p. 27.

Both Duffy and Kapur seem to be mistaken that the Soviet export of heavy water to India would either lead to fullscope safeguards or the partial fullscope safeguards. The Indian agreement with IAEA places under safeguards (i) the heavy water supplied by the Soviet Union; (ii) the RAPP I and RAPP II reactors and (iii) "Any nuclear material, including subsequent generation of special fissionable material, produced, processed or used by the use of heavy water supplied by the Soviet Union to India". India was anyway willing to continue the Rajasthan reactors under international safeguards even after Canadian termination of aid. The Soviet supply of heavy water only ensures that the spent fuel (with its plutonium content) generated from use of heavy water is also safeguarded. The outcome thus only amounts to "creeping partial safeguards". In May 1980, the Government of India clarified that Soviet supply of heavy water would not lead to fullscope safeguards, while other alternative suppliers were demanding fullscope safeguards. In its supply of heavy water to India, the Soviets without violating any international rules of nuclear exports, were able to build a better image as a nuclear supplier in India, precisely at a time when India was


256 Power, n. 70, p. 585.

257 Economic Times (New Delhi), May 16, 1980.
encountering serious problems in the supply of enriched uranium fuel from the United States. It was a fine balancing act between its non-proliferation goals and the political and strategic necessity of Indian friendship.

The Soviet nuclear export policy, unlike the Western countries, is not determined by the resolution of commercial and political interests. This is obviously because of the lack of a private nuclear industry, in search of nuclear exports for its viability. The state-owned nuclear industry is vigorous, diversified and steadily advancing in a planned way. The Soviet nuclear export policy was always guided by political considerations. The liberal nuclear export policy to socialist allies was drastically reversed with the change in the Soviet understanding of nuclear weapons in 1956. Its policy with socialist allies was very stringent. With other countries, it was based on the political assessment of the specific countries. In the post-NPT period, the Soviet proliferation concern was with countries such as Israel, South Africa and Pakistan, all close partners of the US alliance.

system. The Soviets, while demanding stricter nuclear export conditions, adhered to the common consensus in dealing with friendly countries like India, and avoided being branded with the US, as hampering nuclear technological development in the Third World.

At the Second Review Conference of the NPT in 1980, the Soviets were reportedly "gleeful" at the non-aligned attack on the West for enabling South Africa and Israel to acquire nuclear weapons; see Philip Towle, "Nuclear Non-Proliferation: Deadlock at Geneva", The World Today (London), vol. 36, no. 10, October 1980, pp. 371-4. But the Soviets reiterated their firm commitment to NPT; see E. Vampilov, "Non-Proliferation Review Conference", New Times, no. 39, September 1980, pp. 6-7.