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To cite this article: Mustafa Kibaroğlu (2007) Iran's nuclear ambitions from a historical perspective and the attitude of the West, *Middle Eastern Studies*, 43:2, 223-245, DOI: [10.1080/00263200601114083](https://doi.org/10.1080/00263200601114083)

To link to this article: <https://doi.org/10.1080/00263200601114083>



Published online: 02 Feb 2007.



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Iran's Nuclear Ambitions from a Historical Perspective and the Attitude of the West

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Iran's desire to develop a full-fledged nuclear fuel cycle is not new. Its strategic relations with the United States, and the leading European nations such as France and (West) Germany in the 1960s and 1970s gained Iran the capability to develop considerable technological infrastructure and accumulate valuable scientific expertise in the nuclear field. But the achievements of Iran in the nuclear field under the Shah came to a temporary halt with the dramatic changes of the Islamic revolution in 1979. Despite the deterioration of its relations with the West under the rule of the Imam, Iran soon resumed its efforts to develop significant nuclear capabilities. There were serious difficulties because of the US policy of denying the transfer of nuclear technology and material. This study aims to highlight the changing approach of Western countries toward Iran's quest for nuclear power under the Shah and the Imam.¹

Iran owes a significant proportion of the elaborate scientific and technological capabilities that most Iranians are proud of today to its close strategic relations with the US. The special relationship that was established between the Shah of Iran and successive US Presidents elevated Iran from an occupied backward country to a major player in the Middle East.² However, there were difficulties in this relationship emanating from the desire of the Shah to arm Iran with the most sophisticated weaponry so as to feel secure against 'external threats', which the US Presidents thought were miscalculated, if not exaggerated. Because of Iran's strategic importance, US Presidents ultimately yielded, albeit reluctantly, to the demands of the Shah Reza Pahlavi and to some extent that helped lay the ground for developing a nuclear infrastructure, which was inherited by the Imam Khomeini and his followers.

The history of US–Iranian relations goes back to December 1943 when Franklin D. Roosevelt, Winston Churchill and Josef Stalin met in Tehran to devise a strategy against Nazi Germany and Imperial Japan. When the Second World War came to a close, the United States recognized the importance of Iran and the 'Northern Tier' as evidenced in the 'Pentagon Talks' on the Middle East that began in October 1947 between the US and Britain.³ In these talks, the US explicitly acknowledged the importance of the Middle East for Western interests, particularly the strategic value

of oil reserves, as well as the necessity of containing Soviet expansionism in the region, and the possibility that the American government might have to make full use of its political, economic and military power to support such a policy.⁴

Hence, Britain and the US agreed that 'the independence of Iran, Turkey, Greece and Italy would have to be preserved to protect vital American and British security interests in the Eastern Mediterranean'.⁵ Accordingly, the US policy toward Iran placed primary emphasis on 'strengthening Iran's orientation toward the West and preventing the domination of Iran by the Soviet Union'.⁶ US security concerns were heightened due to the reports of manoeuvres of the Red Army along the Iranian border at the outbreak of the war in the Korean Peninsula in June 1950.⁷ Even though Iran would not receive a formal guarantee from the US in terms of a bilateral security agreement against possible Soviet aggression, 'it would be assured of US assistance compatible with American resources'.⁸

By the end of 1950, the domestic political situation in Iran was alarming due to the weakness of the economic and social structure in the country. In March 1951 the *Majlis* (Iranian Parliament) pressured the Shah to appoint Mossadeq, leader of the National Front, as Prime Minister.⁹ Mossadeq soon nationalized Iran's oil industry, expropriating the property of the Anglo-Iranian Oil Company. In response to radical moves by the Mossadeq government, the British shut down the oil refinery in Abadan, withdrew their personnel, and organized an international boycott of Iranian oil, which caused a dramatic drop in oil production as well as in the oil revenues of Iran.¹⁰ Soon after, the domestic situation in Iran deteriorated as a result of the worsening economic situation, which prompted the Truman administration to take steps to ensure that Iran did not fall under communist control, which included military, economic, and technical assistance.¹¹ In the two years that followed, the pace of events in Iran led to the erosion of loyalty to Mossadeq among his supporters, including the young officer corps, thereby strengthening the hands of the Shah to dismiss him by signing a *firman* (royal order) to that effect in August 1953.¹²

The events that took place in the short-lived Mossadeq era 'provided the US with opportunity to renew its support for Iranian independence, to help build a strong, stable government, and to strengthen the weakness in the Northern Tier'.¹³ President Dwight Eisenhower thought his administration would achieve these objectives by providing technical and economic assistance to Iran, as his predecessor Truman did.¹⁴ In addition to that, military aid was regarded as necessary to improve army morale, cement army loyalty to the Shah, and consolidate the Shah's regime.¹⁵

While focusing on Iran, the Eisenhower administration had also turned its attention to the security situation along the entire Northern Tier. In June 1953, after a trip to the Middle East, US Secretary of State John F. Dulles suggested the formation of a multilateral regional security arrangement that would help contain the Soviet Union. Efforts in this direction culminated in the signing of the Baghdad Pact on 24 February 1955 by Turkey and Iraq, to join Great Britain and Pakistan. Iran joined the Baghdad Pact later, in October of the same year. Although initially disappointed with the decision of the US not to join the Pact, Iran soon enjoyed its increasing strategic importance for the US administration in the aftermath of the Suez Canal crisis in 1956, which was a landmark event and a turning point in the history of the Middle East.¹⁶ The Suez Canal crisis also signified the beginning of the rise of the US and the fall of Great Britain as the dominant power in the region.¹⁷

In this context, what was later known as the 'Eisenhower Doctrine' authorized the US President 'to aid non-communist Middle Eastern nations threatened by armed aggression from any country controlled by international communism' as well as 'to use armed forces to assist any such nation or group of nations requesting assistance'.¹⁸

Iran's first acquaintance with nuclear science and technology goes back to these years when the US intensified its assistance to Iran in the economic, military and technical fields, including nuclear science and technology. It was also the years when the US wanted to have its share in the burgeoning nuclear market where especially Britain and Canada were quite active. There was a stumbling block, though, to the US companies entering the market. In June 1946 the US Congress had adopted the Atomic Energy Act (or the MacMahon Act), which prevented any American cooperation with other countries. Thus, the Act had to be amended, and the first of such amendments took place in 1954. The 'Atoms for Peace' speech of President Dwight Eisenhower before the United Nations General Assembly on 8 December 1953 paved the way for such a development.¹⁹

Accordingly, as part of the intensifying relations, the US and Iran signed the Agreement for Cooperation Concerning Civil Uses of Atoms in 1957 after a period of negotiation of about two years.²⁰ In 1959, the Shah ordered the establishment of the Nuclear Research Centre at Tehran University and began negotiating with the US on the purchase of a 5 megawatt (MW) thermal research reactor for the Centre.²¹ In the beginning the research was mostly limited to post-graduate education and research activities in basic nuclear science and techniques.²² Later on the Centre received a budget from the government and started to establish some laboratories for radiation measurement and radiation chemistry. Eventually, American Machine and Foundry (AMF) supplied with Iran a pool-type 5 MW (thermal) reactor and its fuel in September 1967. The US also supplied Iran some new laboratories of standard type, of which the most important was a radioisotope production unit.²³

Aside from laying the technological ground throughout the 1960s, the scientific infrastructure of Iran was steadily growing with hundreds of Iranian students attending universities in Western European countries as well as the United States, and technicians mastering their skills in traineeship programmes abroad. As of the early 1970s there was a major of trained scientists and technologists back into Iran.²⁴ With other Iranian universities establishing nuclear research and technology related departments, by the time the Shah announced his ambitious nuclear power programme in 1974, there was a relatively good scientific base in the country.²⁵

The historic statement made by the Shah in March 1974 declaring the goal of establishing 23,000 MW (electric) nuclear power capacity to become operational within the following 20 years did not come as a surprise. It was indeed a culmination of a series of developments that had taken place in Iran as well as the rest of the world over the previous decade. First of all, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was finally opened to signature in July 1968 after decade-long negotiations.²⁶ Iran became one of the first signatories of the NPT and the *Majlis* ratified the Treaty in February 1970, which entered into force in March 1970. In the meantime, on 13 March 1969, the Agreement between the US and Iran on

Cooperation Concerning Civil Uses of Atom of 1957 was extended for another ten years, and the first announcement regarding Iran's intention to build nuclear reactors was made on 18 December 1972, when Iran's Ministry of Water and Power began a feasibility study on constructing a nuclear power plant in southern Iran.²⁷

Many researchers, be they Iranian or non-Iranian, those who support Iran's nuclear aspirations or oppose them, often make reference to the encouragement given to the Shah by US President Nixon to embark on a large-scale nuclear energy programme. Accordingly, most of these analysts hold the Nixon administration responsible either to blame for, or to justify Iran's current capabilities and engagements in the nuclear field. It is true that President Nixon's visit, followed by his Secretary Kissinger's visit that resulted in the signing of 'US-Iran Nuclear Cooperation Agreement', fuelled the Shah's desire to embark on nuclear power projects. However, focusing on this short episode in US-Iranian relations may be misleading in interpreting the motivations of the states in boosting the volume of bilateral relations and expanding the scope of cooperation in the nuclear field.

It is useful to analyse the pace of events leading to President Nixon's visit to Tehran in order to see the underlying psyche of the Shah, who, under the pressure of 'external threats' to his monarchy, persistently asked successive US Presidents to extend strong commitments for the security of his country and to be generous in terms of arms sales. Despite the Shah's continual demands for binding commitments, US administrations were rather reluctant to provide Iran with formal positive security guarantees. Such an undertaking was thought to limit the US influence with Arab states.²⁸

During the Shah's first official visit to America, in November 1949, President Truman and Secretary of State Acheson explained the US support for Iran as set forth in the National Security Council (NSC) 54 decisions. Further, they told the Shah 'Iran could best ensure its internal stability by strengthening its social and economic structure'.²⁹ Similarly, when the Shah was unwilling to discuss multilateral security arrangements within the context of the Baghdad Pact until Iran's defence capability was improved, the Eisenhower administration reminded the Shah that the 'Eisenhower Doctrine' would serve as the commitment that he wanted.³⁰ Again, when the Shah visited Washington in June 1958, increasingly concerned about Soviet penetration of the Middle East, President Eisenhower assured him that 'the US would treat a Soviet attack on Iran as an attack on the free world' rather than agreeing to bilateral binding security commitments.³¹

The Kennedy administration also viewed Iran as an essential element in the 'Northern Tier' bulwark against Soviet expansion.³² But when, during his visit to Washington in April 1962, the Shah focused again on 'external threats' to his country from the Soviets in Afghanistan, to the Kurds in Iraq, President Kennedy asserted that 'Iran's forces were adequate to feel secure, but Iran's problems were internal and that reforms were needed'.³³ Yet, a year later, the Shah continued to dwell on external threats to his regime, conveying his concerns about Egyptian control of Iraq, and the Arab Federation centred in Cairo, which he saw as posing the threat of a 'new imperialism' in the Middle East.³⁴ Again, President Kennedy dismissed any reason for apprehension over the projected Arab Federation, and

deflected the Shah's request that 'there be prestocked in Iran [US] military equipment sufficient for two or three divisions for possible future use in a mutual defence effort'.³⁵

Under the pressure for reforms both from inside and outside, the Shah finally launched the 'White Revolution' in 1962, which was essentially a programme of economic and social change.³⁶ Concomitantly, the Shah also embarked on large-scale investment projects to establish a heavy industrial infrastructure, such as steel and coal as well as metallurgy, and petro-chemical plants. His desire was to diversify the oil-dominated Iranian industrial base and to establish a basis that would be necessary for rapid industrial, economic, and social development. The Shah first sought the assistance of Western European nations as well as the US by the late 1950s. However, he felt 'humiliated when the Europeans undermined the capabilities of Iran, on the grounds that Iranians did not have the necessary basic skills and manpower to achieve the Shah's objectives. Then the Shah turned his face to the Soviets who were more than willing and capable to assist Iran's development projects'.³⁷ The Shah then pledged to the Soviet Union in 1962 that his country would not allow the use of Iranian territory for foreign military bases.³⁸ The Soviets accepted this pledge, and the two countries began to cooperate on a number of economic, commercial and technical issues.³⁹

Confident from the initial success of the 'White Revolution' and the prospects of industrial development, the Shah wrote President Johnson in January 1964 asserting that 'the five-year Military Assistance Program approved in 1962 [was] inadequate for requirements of the changing situation in the area' and if these were not met, the Shah was 'prepared to turn elsewhere'.⁴⁰ But President Johnson replied to the Shah stressing that 'the program was practical and adequate and that a substantial Arab threat to Iran was unlikely'.⁴¹ A year later, during the summer of 1965, the Shah visited the Soviet Union.

After more than a decade of heavy reliance on the US for economic and military assistance, the Shah sought alternative sources for arms purchase. In his discussion with the American Ambassador about his trip to Moscow, the Shah expressed his belief that from then on 'Iran would have to stand on its own feet militarily and economically' and he spoke critically of Iran's relationship with the US, particularly of what he viewed as 'endless wrangling over economic aid and US resistance to providing more military to Iran, even on a cash purchase basis'.⁴² The Shah would no longer accept the US direction or US contentions that he faced no threat in the Gulf. He was intent on buying military equipment to meet what he perceived as the security threat to Iran. While he preferred to buy this equipment from the US, he was prepared to go elsewhere in the absence of an early favourable response from Washington.⁴³

The American Ambassador to Tehran observed that 'the Shah was tired of being lectured to by American officials on the priority of Iran's economic progress over the development of its military potential'.⁴⁴ As a result of the American Ambassador's efforts, the US and Iran began negotiating on a revision of the 1964 Memorandum of Understanding, and the US offered Iran sophisticated military equipment, contingent on measures to be taken to ensure it would not be compromised.

A 'National Policy Paper' on Iran prepared by the US Department of State noted that 'the US strategy should be to respond as fully as positively as it could, consistent with maintaining special US bilateral arrangements with Iran, to the Shah's thrust toward a fully independent national posture in the country's foreign relations'.⁴⁵

A major breakthrough in the US–Iran cooperation in the nuclear field came with the historic visit of President Richard Nixon to Tehran in May 1972. The visit was a result of a fundamental shift in power relations that took place in the Persian Gulf paving the way to the 'Nixon Doctrine' of 1969 outlining the 'US intent to place greater emphasis on initiatives by regionally influential states to assure stability and security of their respective regions'.⁴⁶ When in January 1968 the British government announced that it would withdraw its forces from the Persian Gulf by the end of 1971, Iran sought a new assertive role in the region. Therefore, the Shah again pushed for more US military equipment and expressed Iran's need for increased oil revenues to finance the military development programme, and hinted at an 'arms for oil' deal with the US.⁴⁷

When compared to his predecessors, President Nixon was more inclined to satisfy the needs of the Shah as much as possible, of course owing much to the dramatic conjunctural changes in the Middle East. In early 1970, the Nixon administration recognized that 'the US had strategic interests in both Iran and Saudi Arabia' and that stability in the Gulf 'would depend on their cooperation in the face of the growing threat of Arab radicalism encouraged by the Soviet Union'.⁴⁸ This approach of the US would later be known as the 'Twin Pillar' policy for maintaining stability in the Persian Gulf, according to which President Nixon also recognized the preponderance of Iranian power in the area. In May 1972, with President Nixon's visit to Iran, the US–Iranian relationship began to approach one of 'partnership between near equals'. The President was advised by his staff to 'assure the Shah that the US envisioned Iran carrying a large share of the responsibility for security of the Persian Gulf'.⁴⁹ The US wanted to enhance the Shah's strength in order to deter Soviet designs on the region. In a matter of months, Iranian military purchases amounted to over \$2 billion.⁵⁰

Notwithstanding the highly positive mood in US–Iran relations during the 1970s, the scale of the Shah's arms purchases was generating increasing concern in the US Department of Defence. Secretary Schlesinger informed the President of his concerns, expressing doubt about whether the policy of supporting an apparently open-ended Iranian military build-up would continue to serve long-term US interests. In the previous three years, Iran had contracted to purchase \$9.1 billion worth US weapons, equipment, and support and training services through the Foreign Military Sales programme. Secretary Schlesinger was concerned that the 'extensive acquisition of military material, based on limited absorptive capacity may lead to failure and ultimate recriminations against the US, deserved or not'.⁵¹ Hence he urged 'an early review of US defence and security interests in Iran' covering the following ten years, which would result in cutting down the amount of arms and equipment that the Shah had wanted, such as the advanced early warning aircrafts (AWACS).⁵² In a nutshell, the US had to strike a balance between the alternative options in its policy toward Iran. On the one hand, a policy of all-out support for the Shah without reservation was thought to leave the US without flexibility in a period of dynamic change. But, on the other hand, a policy of withdrawal of support would

deprive the US of important political and strategic assets without any offsetting gains in Iran or elsewhere. Hence, such choices were thought to be unrealistic. Moreover, the Shah was no longer seen to be as dependent on the US as he had been in the past, and his increasing independence was not seen as militating against the interests of the US.⁵³

The early 1970s witnessed dramatic events in world politics such as the Arab–Israeli war of 1973 (Yom Kippur) during which Israeli politicians reportedly discussed in the *Knesset* (Israeli Parliament) resorting to the ‘nuclear option’ due to the devastating blow they had to bear from the combined surprise attack by Egypt and Syria.⁵⁴ Israeli ‘victory’ in the Yom Kippur War, thanks to the timely intervention of the US, and the recapture of the territories that had been temporarily lost to Egypt in the Sinai Peninsula and to Syria in the Golan Heights caused much anger and resentment among the Arab nations, including the oil-rich monarchies that protested at American support for Israel, and reduced their oil supplies to the US and other Western nations.⁵⁵ Concerted action by the oil producing countries under the guidance of OPEC skyrocketed oil prices overnight. The influx of large sums of dollars into the country due to exports of oil after the crisis is believed to have created incentives for the Shah to expand the scope of large-scale nuclear energy projects.⁵⁶

The Shah had originally envisioned Iran to have 10,000 MW(e) installed nuclear capacity by 1990. However, a 1974 study by the Stanford Research Institute concluded that Iran would need 20,000 MW(e) capacity by 1994. Hence, in March 1974, the Shah announced plans for establishing 23,000 MW(e) nuclear power capacity ‘as soon as possible’.⁵⁷ To achieve this goal, the Shah established the Atomic Energy Organization of Iran (AEOI) in 1974. According to Dr Akbar Etemad, the first President of the AEOI appointed by the Shah,

the decision to launch a nuclear power programme was simply made by the Shah. The Prime Minister was consulted and his position was very favourable. The Government as such was not very much involved at the beginning. Nevertheless, its first move in this field was to prepare and introduce to Parliament a law on atomic energy, the [AEOI], its governing bodies, and the control of the Government over nuclear activities.⁵⁸

The boost in US–Iranian relations was still powerful in the early years of President Ford who took office in the aftermath of the 1973 Yom Kippur war and the ensuing OPEC crisis. On 3 March 1975, Iran and the United States signed a 15 billion dollars agreement for the construction of eight nuclear power reactors having a total capacity of 8,000 MW(e).⁵⁹ In May 1974, the Chairman of the US Atomic Energy Commission travelled to Tehran to talk to Iranian officials about the possibility of establishing multinational uranium enrichment and reprocessing facilities in Iran. The scope of cooperation would be further expanded with the visit of the Secretary of State Henry Kissinger in November 1974.

Aside from US investment in Iran’s nuclear programme, Iran proposed to invest \$2.75 billion in a uranium enrichment facility in the US. The Ford administration

agreed to the proposal and decided 'to set the fuel ceiling at a level reflecting the approximate number of nuclear reactors planned for purchase from the US suppliers to cover Iran's full nuclear reactor requirement under the proviso that the fuel represents Iran's entitlement from their proposed investment in an enrichment facility in the US'.⁶⁰ The US was equally willing to let Iranians invest in establishing a spent fuel reprocessing facility in Iran, preferably as a multinational facility, but this was not thought to be a condition.

Prior to the visit of the Shah to the US, Secretary Kissinger wrote a briefing memo to the President in which he stated that their objectives should be 'to assure the Shah of the firm determination of the US to continue, and expand, the special relationship; to demonstrate their intention to play a responsible and active role in world affairs which was responsive to the needs of the friends of the US'.⁶¹ In brief, the Ford administration wanted 'to keep the Shah firmly, unreservedly, and confidently on the side of the US'.⁶²

More specifically, on the issue of nuclear power, Kissinger informed the President Ford that a negotiating team had recently completed another round of talks in Tehran and considerably narrowed the differences between the two countries on the terms for the Agreement for Cooperation in the Civil Uses of Atomic Power, and that a new draft agreement had been submitted to the government of Iran. According to Kissinger, 'the outstanding issue [was] over granting authority for the [Government of Iran] to reprocess US-derived plutonium'.⁶³ The Iranians welcomed, in principle, the concept of establishing a multinational reprocessing plant in Iran. However, they wanted the approval of the US sooner, rather than later, that the US spent fuel material would be reprocessed in Iran.⁶⁴ Accordingly, Secretary Kissinger told President Ford that 'the negotiations in Tehran [had gone] well and there [could] be vast collaboration between the two countries with regard to nuclear power'.⁶⁵ Kissinger was pleased to see Iranian receptivity to the multinational concept for reprocessing. Yet he advised President Ford that the US would be prepared to give further consideration to Iran's position on reprocessing nuclear fuel, in case he failed in his meeting with the Shah to obtain multinational participation in a reprocessing plant.⁶⁶ Around the same time, the Massachusetts Institute of Technology (MIT) signed a contract with Iran for providing training for Iranian nuclear engineers. By then, the AEOI had a staff of about 150 nuclear physicists, about half of whom were from Argentina. In 1976, the Shah increased the budget of the AEOI from US\$31 million to US\$1 billion.⁶⁷ On 12 April 1977, Iran and the US signed an agreement to exchange nuclear technology and cooperate on nuclear safety.

President Jimmy Carter pursued pretty much the same policy of cooperation in the nuclear field with Iran. In his visit to Tehran on 31 December 1977 and 1 January 1978, President Carter reached a new agreement according to which the US granted Iran 'most favoured nation' status for spent fuel reprocessing. The draft of the US–Iran Nuclear Energy Agreement, which was supposed to facilitate cooperation in the field of nuclear energy as well as to govern the export and transfer of equipment and material to Iran, was signed on 10 July 1978 in Tehran. One of the key issues in the negotiations involved the manner in which the US would exercise its approval rights over the disposition of spent fuel and the desire of Iran for non-discriminatory treatment in this regard. The US–Iran Agreement would be the first such bilateral agreement submitted to Congress under the general framework of the Nuclear

Non-Proliferation Act of 10 March 1978.⁶⁸ But the Islamic Revolution of February 1979 put everything in the area of nuclear cooperation between the US and Iran on hold.

In addition to Iran's strategic relations with the United States, the role that France and West Germany (hereafter Germany) in particular have played in the expansion of its nuclear infrastructure as well as raising a cadre of Iranian professionals and scientists cannot be underestimated.

In 1974, Iran signed contracts with the French company Framatome to build two 950 MW(e) pressurized water reactors and the site preparation work began in Darkhovin on the Kharoon River near Ahvaz, the southern tip of the border with Iraq. In 1975, Iran purchased a 10 per cent share in Eurodif, a joint venture uranium enrichment company of France, Belgium, Spain and Italy. Iran's contract with Eurodif envisaged a supply of about 270 tons of uranium enriched to 3 per cent in U-235.⁶⁹ It was estimated that the Iranian share in this large enrichment plant at Tricastin in France would provide Iran with sufficient quantities of low enriched uranium (LEU) fuel for its national programme at least until the mid-1990s.⁷⁰ In connection with these contracts, a significant number of Iranian students, scientists and technicians went to France to advance their skills and knowledge in nuclear engineering, nuclear physics and other related branches.

On the other hand, Germany and Iran reached an agreement in 1976 for the establishment of six nuclear power reactors in Iran, the first two of which were to be built by the German Kraftwerk Union (KWU) in Bushehr, each housing Siemens 1,300 MW(e) reactors. Iran also concluded nuclear fuel contracts with Germany the same year, and with France in 1977.⁷¹ There were also negotiations between Germany and Iran over selling uranium enrichment technology to Iran.⁷² Aside from cooperation in the technology transfer, there was also a huge programme for training Iranian nuclear scientists in Germany. According to Professor Erwin Haeckel, senior researcher in the German Council on Foreign Relations, 'as of the late 1970s, there were hundreds of Iranian students in German universities studying nuclear physics, and nuclear engineering'.⁷³ Hence, Haeckel argued, 'if Iran is regarded to be able to carry out a massive nuclear program, there is a heavy footprint of German cooperation. We cannot gauge easily what contribution we made, but a heavy legacy has to be taken into account'.

In the 1970s, due to a lack of coherence in the nuclear non-proliferation strategies of the West, and the disharmony in their export control policies, a number of aspiring states such as Pakistan, South Africa, Argentina, Brazil, Iran and Libya exploited to the utmost the opportunity to gain access to sensitive technologies. There were a number of reasons for such an outcome that have ultimately led to the nuclearization of a large number of these countries. One was the decision of the Nixon administration in July 1974 to suspend the supply of low enriched uranium that would mean literally cutting off the supply of fuel for nearly all light water reactors (LWR) in the world outside the communist countries.⁷⁴

One consequence of the US action was to give new impetus to Western Europe's and Japan's programmes for developing their own fuel producing technologies and merchandising them abroad. These technologically advanced states were already undertaking projects for the construction of enrichment as well as reprocessing plants.⁷⁵ The commercial incentive to find customers abroad was powerful.

It sharpened the competitive edge of the challenge to the dominant US reactor manufacturers. Europeans showed themselves ready to sell sensitive enrichment and reprocessing technologies to sweeten the terms of reactor deals or simply to satisfy consumer wants.⁷⁶ These transactions disturbed the US because of European suppliers' seeming reluctance to impose strict conditions of sale, especially the requirement that all of the recipients' nuclear facilities be placed under safeguards.⁷⁷

In the late 1970s, the US government launched an International Nuclear Fuel Cycle Evaluation (INFCE) to devise measures which could 'minimize the danger of proliferation without jeopardizing energy supplies or the development of nuclear energy for peaceful purposes'. The hope was that some alternative to a plutonium-producing fuel cycle would be found. However, in 1980 INFCE concluded that although certain measures could make misuse of the fuel cycle more difficult, there was no technical way to produce nuclear energy without at the same time using or producing materials that could be used in nuclear weapons.⁷⁸

From Germany's standpoint, as a non-nuclear-weapons state (NNWS), the Social Democrats in power had insisted that it was allowed to develop, produce and operate technologies encompassing the whole nuclear cycle. Nevertheless, there was a conflict between the US and Germany over nuclear export policies. The US was able to establish a new standard requiring any further transfers of sensitive technologies such as enrichment and reprocessing to be discussed in advance within the newly established Nuclear Suppliers Group (NSG).⁷⁹ But Germany was producing cutting-edge nuclear technologies and was anxious to sell to whoever might be suitable.⁸⁰ According to Professor Krause, Director of the Institute for Security Studies at the University of Kiel, there was a general sense that the transfer of such technologies by Germany and Japan as well as France could lead to an erosion of the Nuclear Non-Proliferation Treaty.⁸¹

The German ambition of mastering and controlling the whole nuclear cycle paved the way to the establishment of the joint URENCO enrichment plant in the Dutch city of Almelo by Germany, Britain and the Netherlands.⁸² The conflict with the US over nuclear exports was debated in scholarly and political circles in Germany primarily as a case of a transatlantic dispute reflecting the growing maturity and self-assertiveness of Germany. For the first time, the German government had openly defied the US and it seemed that nuclear non-proliferation policy and nuclear export controls were areas where Germany was ready to invest political capital.⁸³

On the other hand, France's behaviour regarding nuclear non-proliferation was ambivalent. France had not taken part in the negotiations of the NPT, nor did it sign when the Treaty opened to signature in 1968, but declared that it would behave as if it had signed. Yet France refused to take part in the meetings of the Zangger Committee⁸⁴ set up by NPT parties to spell out the list of materials and equipment that, under Article III of the Treaty, could only be supplied under safeguards to non-nuclear-weapons states. According to Professor Bertrand Goldschmidt, who was one of the founders of French Atomic Energy Agency, although the French attitude toward nuclear non-proliferation moved closer to that of other major industrial powers by agreeing to EURATOM⁸⁵ inspections, the French policy of abstention from the NPT and the development of an independent nuclear force won broad national consensus in the late 1970s. The problem of horizontal proliferation and the dangers for world stability have never had the same importance or caused the same

deep anxiety for the French public, official circles, or media as it has in countries like the US, Canada, and Sweden. The French public, satisfied with the policy of nuclear exports conforming to the NPT, never queried the official decision not to sign the Treaty.⁸⁶

Americans viewed the Western Europeans' record of non-proliferation policies as doubtful. They believed that the Western Europeans were the major stumbling blocks on the road towards a successful conclusion of the NPT. In the same vein, the Europeans were viewed by the Americans as continually subordinating non-proliferation to narrow vested interests since the 1970s, such as the German–Brazilian deal, and Belgium's negotiations with Libya. Americans also believed that it was the Europeans who prevented an agreement on a watertight export policy among supplier nations that would have restricted exports to countries accepting full-scope safeguards and put a total ban on the transfer of sensitive technologies.⁸⁷

However, when looking at the same issues from the European perspective, Professor Harald Muller, Director of Peace Research Institute Frankfurt, argues that 'two categories of states were affected by non-proliferation: the superpowers trying to maintain world order, and those countries in or very close to the proliferating region. Western Europe fell in neither category'.⁸⁸ It was far enough even from the nearest possible proliferation spot (i.e., the Middle East), and it was dependent on world trade for its welfare. The higher dependence on exports and imports has led Europeans always to embrace a more comprehensive understanding of security than its Atlantic partner did. Economic security for Europe was (and still is) as important a component of national security as the military one. Unless proliferation presented a challenge to world order, as trading nations, Europeans would not share a deep interest in its limitation.⁸⁹ Hence, Muller argues 'the problem was the fears of Western European countries, and eventually the European Community, about their position in the world politics', and whether Europe could

meet the American challenge and remain a first-rate economic power in the world economy. Or, would the NPT emerge as an instrument as well as a sign of Europe's second-rate status, except for France and the United Kingdom as nuclear-weapons states? Because, trade for Europe was not only instrumental in promoting their economic welfare, but also a key tool in fostering foreign policy goals, far more would be at stake than pure economics.⁹⁰

Iran's nuclear science and technology transfer from the US and the Europeans came to a sudden halt with the Islamic Revolution of February 1979 sealed with the return of Imam Khomeini from exile to Tehran. The immediate impact of the Revolution was the need to consolidate the new order in the country. Then almost immediately Iran was involved in a war against Iraqi forces under Saddam Hussein, who launched a large-scale offensive in September 1980. The Revolution caused a dramatic change in Iran's disposition in the world political arena vis-à-vis foreign and security policy matters; and after the 'hostage crisis' in the US Embassy in Tehran, Iran would no longer be seen as an ally of the US.⁹¹ On the contrary, 'hostility' would best characterize the nature of their bilateral relations. The US not only stopped cooperating with Iran in the nuclear field, but also pursued a 'policy of denial' by putting pressure on other countries not to transfer nuclear technology to

Iran. This radical shift in attitude indicates that, from the perspective of the US, especially in the nuclear field, what was good for the Shah was not good for the Imam.

The fundamental guiding principle of revolutionary Iran's foreign policy was Imam Khomeini's slogan '*Na Sharq, Na Gharb, Faqat Jumhuri-ye Islami*' – 'neither East, nor West, only the Islamic Republic [of Iran]'.⁹² In the early years of the Revolution, almost anything Western was rejected, and the nuclear projects were no exception. According to Dr Haleh Vaziri, an Iranian scholar,

Ayatollah Khomeini's return from exile to Tehran on 1 February 1979 ushered in a brief but intense *anti-modernization* phase in Iran's domestic and foreign policies. The clerics rejected the Shah's plans to finance the rapid modernization of the civilian and military infrastructures with Iran's oil revenues. In fact, they reduced oil exports, allowed much of the American military hardware purchased by the Shah to fall into disrepair, purged the armed forces of suspected opponents and did not impede the flight of many scientists who had worked on Iran's nuclear projects.⁹³

Vaziri also notes that, during the 'Cultural Revolution' of spring 1980, the nascent nuclear infrastructure languished; the work on the Bushehr nuclear reactors and at the Darkhovin nuclear reactor site was halted in 1979.⁹⁴ On the same issue, the president of the AEOI under the Shah's regime, Dr Akbar Etemad, notes, 'as regards the AEOI, there was a tendency to destroy everything within it, and many people – professional and otherwise – had a say in the matter. The destructive forces of the Revolution inside and outside the AEOI succeeded in bringing nearly all the projects to a halt; all the major projects were cancelled or left dormant'.⁹⁵

Once the revolutionary dust settled, the Iranian clergy attempted to resume the nuclear projects. There were a number of reasons why they started to take a more positive approach to the nuclear projects. One reason was the Iraqi offensive against Iran, especially the massive air strikes on ports and oil refineries on the Persian Gulf. The initial trauma of Iraq's attack and the subsequent brutality of combat showed the clerics that modern military technology, especially weapons of mass destruction, could make a decisive difference in war. According to Dr Vaziri,

the first four or five years of the Iran–Iraq War shocked the clerics into realizing the value of modern military technology. The use of such technology – and perhaps even nuclear weapons capability – would have deterred Iraq's initial aggression against the Islamic Republic and flouting of the international laws of war conduct. From the clerics' perspective, the Reagan administration not only had opposed their hegemonic aspirations but also allied with Iraqi Ba'ath [in the effort] to defeat Iran. Had the Islamic republic possessed nuclear weapons capability, the US may have thought twice about interjecting its navy into the Persian Gulf and engaging Iranians.⁹⁶

The severe energy crisis in the post-revolutionary period was another reason why the top Iranian clergy changed their attitude to nuclear projects. The construction of power plants was given high priority. The clerics 'realized that they had killed the

goose which laid the golden egg' by destroying the AEOL.⁹⁷ They decided to revive the organization with a new president who would resolve the issues with the German Kraftwerk Union in order to resume building the Bushehr nuclear power plant.

Initially, Khomeini had had strong reservations about the nuclear projects on the grounds that they would make Iran dependent on foreign technology. However, in the early 1980s, President Ali Akbar Hashemi Rafsanjani finally got the blessing of the Imam Khomeini to go ahead with them. He asked the French and German companies to resume constructing nuclear power plants. The German firm KWU that had been building the Bushehr plant refused, probably in response to pressure from the US. Nor did the French company Framatome agree on two 950 MW(e) reactors at Darkhovin, or on the construction of the Esfahan Nuclear Research Centre. President Hashemi Rafsanjani recalls that at that point they realized that the West was not going to give sensitive technology to Iran.⁹⁸

Iran turned its face to other potential suppliers such as Pakistan, Argentina, Spain, Czechoslovakia, China and the Soviet Union. In 1987, Iran signed a nuclear cooperation agreement with Pakistan; according to this, 39 Iranian nuclear scientists and technicians would advance their skills in Pakistani nuclear facilities, reactors and laboratories.⁹⁹ That same year, in May, Iran signed an agreement of US\$5.5 million with Argentina for the supply of uranium enriched to 20 per cent and for the training of Iranian scientists at the Jose Balaserio Nuclear Institute. Building on an active economic relationship with Sweden, the Iranians approached Swedish firms about completing the Bushehr plant. Similarly, Iran had maintained active political and economic relations with India, and asked its assistance in various fields, including the completion of the Bushehr power plant.¹⁰⁰ Despite Iran's relentless efforts to resume work at the nuclear sites, none of them came to fruition.¹⁰¹ Then, China and Russia appeared as viable alternatives for nuclear assistance.

In 1984, in the midst of the war with Iraq, the Esfahan Nuclear Research Centre was opened; this demonstrated the Islamic regime's determination to pursue the nuclear aspirations inherited from the Shah's regime. With Chinese assistance, fuel fabrication and conversion facilities, which are crucial for uranium enrichment, were also built at Esfahan. In 1991, China and Iran announced an agreement to supply Iran with a 20 MW research reactor from China.¹⁰² In September 1992, President Rafsanjani negotiated with Chinese President Zeming for the purchase of one or two 330 MW(e) reactors; a tentative agreement to buy one such reactor was announced by the Iranian Defence Minister during the visit to Beijing. This announcement led to immediate US protests to China resulting in the deferral of the sale. After a decade-long effort to revitalize their long-stalled nuclear power projects and to expand the scope of scientific and technological infrastructure, Iran was left with Russia as the only major potential supplier. Iran had held earlier talks with Russia in the late 1980s and had even agreed in principle to cooperate in the nuclear field. President Rafsanjani remembers taking the initiative and talking with Gorbachev about the completion of the Bushehr power plant. But their agreement was delayed by dramatic changes that led to the collapse of the communist regime in the Soviet Union, and brought Boris Yeltsin to power as the President of the Russian Federation. President Rafsanjani recalls: 'Russia would support Iran to finish Bushehr in six years and they said they would start from scratch, and we said okay.'¹⁰³ During a visit by Viktor Mikhailov, the Russian Minister of Atomic

Energy (Minatom), at the request of Dr Reza Amrollahi, the President of the AEOI, a Nuclear Cooperation Accord was signed with the Russian firm Zarubezhatomenergostroy on 8 January 1995 in Tehran. Russia and Iran agreed to cooperate in the completion of the construction of Block No. 1 at the Bushehr nuclear power plant; Russia also agreed to train AEOI's scientific personnel as well as 10–20 graduate students and Ph.D.s annually at Russian academic institutions.¹⁰⁴ The Russia–Iran nuclear deal would cost a little less than \$1 billion.

Iran's negotiations with potential nuclear suppliers indicate that almost without exception, they wanted their scientists and technicians trained in the scientifically and technologically more advanced countries; they also wanted uranium enrichment (highly enriched uranium (HEU) production) and spent fuel reprocessing (plutonium separation) facilities. These are clear indications that Iran, under both the Shah and the Imam, wanted to have a complete nuclear fuel cycle that would elevate the country to the status of a nuclear power. It seems that Iran has managed largely to achieve its goal.¹⁰⁵ Regarding Iran's nuclear facilities, Ambassador Ali Ashgar Soltanieh notes,

[T]o a great extent, Iran's nuclear activities in uranium ore processing, uranium conversion and enrichment as well as heavy water production, research reactor designing and manufacturing centrifuge machines are the result of research and development and experience gradually gained during the period of sanctions and lack of cooperation by industrial countries in the area of peaceful uses of nuclear energy.¹⁰⁶

Iran's scientific expertise in the nuclear field is striking. Over the last several decades, a cadre of scientists, technicians and professionals have been developed, initially in Western countries, and later on in Russia, China and Pakistan. Dr Asadullah Sabouri of AEOI says:

[T]he first reactor at the Bushehr nuclear power plant is scheduled to start operation in December 2006 with 300 Iranian engineers and 400 technicians running the reactor. Thanks to close cooperation with Russia and the IAEA [International Atomic Energy Agency], Iran's regulatory infrastructure is enhanced, in the areas of reviewing safety reports, seismic hazard evaluation, reviewing design documents, establishment of quality management systems, and the physical protection of the plant.

Dr Sabouri also notes that 'a decision has been taken at the state level to generate 10–20 per cent of electricity from nuclear energy by installing a 7,000 MW(e) capacity by the year 2021'. He further says 'there is the approval for the construction of a nuclear power plant and site selection studies for 5,000 MW(e) reactors'.¹⁰⁷ As for the level of education in the nuclear field, Dr Mahmood Reza Aghamiri from the Shahid Beheshti University says, 'at present, there are 45 departments in Iranian universities in the nuclear area and there are plans for 80 departments in the medium to long term. There are eight nuclear research centres, which will grow to 15 in the future. And there are 450 post-graduate students (mostly engineers) in the nuclear field; this will grow to 1,500 in the future'.¹⁰⁸

In the early 1990s, the US imposed sanctions when Iran intensified its efforts to expand the scope of its nuclear programme. The so-called 'dual containment' policy of the Clinton administrations tried to prevent Iran (together with Iraq under the Saddam Hussein regime) from acquiring technological and scientific capabilities through imports of dual-use material; this policy had limited effect. One reason for this was the reluctance of America's European allies to adopt a similar hardliner policy to 'contain' Iran. Europeans did not see eye-to-eye with the US on these matters (with the occasional exception of the United Kingdom) mainly because of the lack of evidence that would convince the European leaders of Iran's alleged plans to build nuclear weapons.

The situation has changed significantly with the revelations about Iran's clandestine work on sensitive nuclear technologies, which may have direct bearing on nuclear weapons production. In a press conference in Washington DC on 14 August 2002, the US Representative Office of the National Council of Resistance of Iran revealed the top secret nuclear projects of Iran, namely the uranium enrichment facility in Natanz, and the heavy water production facility in Arak. The discovery of the plants in Natanz and Arak, both of which require demanding technology and sophisticated know-how, suggested that Iran had made considerable progress on these two different routes to nuclear weapons throughout the 1990s, despite the US sanctions. The advanced state of these facilities was very disturbing for the US. Because, while these facilities may be used for peaceful purposes, they may also be used to produce weapons-grade fissile material such as highly enriched uranium and plutonium that are necessary for the manufacture of nuclear weapons. The US made it clear that Iran's effort to build undeclared uranium enrichment facilities in Natanz was a clear indication of the secret intentions of that country to develop nuclear weapons, and thus a violation of both the spirit and the letter of Article II of the NPT.¹⁰⁹ Americans argued that Iran should not be entitled to exercise its rights under Article IV of the same Treaty to develop nuclear technology.¹¹⁰ Accordingly, the US requested Iran to give up its uranium enrichment activities; the US further wanted Iran's nuclear dossier at the Board of Governors of the IAEA to be transferred to the United Nations Security Council (UNSC) so that punitive action could be taken for its violations of the NPT obligations. Iranian authorities denied that they had secret plans to build nuclear weapons or that they had violated their NPT obligations. They acknowledge that they failed to report some of the progress in their nuclear programme to the IAEA in a timely fashion. In private conversations, Iranian officials give lengthy explanations of how 'internal bureaucratic dynamics in Iran have played a role in the failure to provide the IAEA with the design information and all other related data about the facility'.¹¹¹ However, some of them also say that 'they had no other alternative but to build the facility secretly', arguing that 'if they had notified the IAEA that they were building a uranium enrichment facility, the US would have definitely prevented them from finalizing the project'.¹¹²

Iran invokes Article IV of the Treaty in defending its occupation with various nuclear projects including enrichment as well as reprocessing.¹¹³ Iranian authorities argue that nothing in the Treaty should affect the inalienable right of the member states to develop nuclear energy for peaceful purposes, and they flatly reject the US request to stop enriching uranium. Iranian authorities also argue that the IAEA has certified that not notifying the Agency about Natanz was just a 'failure' rather than a

‘violation’ of Iran’s safeguards obligations. Asserting that they were cleared of the allegation of violation, Iranian officials indicate that they expect to be treated like other non-nuclear-weapons states that are party to the NPT; they point out that Argentina, Brazil, Japan and Belgium have enrichment and reprocessing capabilities, but are not subject to accusations of developing nuclear weapons.¹¹⁴

The IAEA played a crucial role in initiating discussion on Iran’s nuclear programme; they called on the Iranian government to sign the Additional Protocol by 31 October 2003 after the revelations of clandestine facilities in Natanz and Arak.¹¹⁵ In general terms, the IAEA is mandated with the task of timely detection of the diversion of significant quantities of fissile material from peaceful to military purposes in the non-nuclear-weapons states that are parties to the NPT. To do this, Agency inspectors must have unfettered access to sensitive sites in suspect countries including Iran. Following the revelation of Iran’s undeclared nuclear facilities, the IAEA Director General Mohammed El Baradei and a group of inspectors have paid frequent visits to Iran and carried out thorough inspections in designated and suspected sites, including parts of the military base in Parchin near Tehran. Since then, a series of reports published by the Agency suggest that ‘Iranian practices up to November 2003 resulted in many breaches of Iran’s obligations to comply with its Safeguards Agreement, but good progress has been made since that time in Iran’s correction of those breaches and the Agency’s ability to confirm certain aspects of Iran’s declarations’.¹¹⁶

Most European nations have been reluctant to get involved in the US–Iran nuclear dispute. However, the Foreign Ministers of three leading members of the EU, namely the United Kingdom, France, and Germany paid a historic visit to Tehran in October 2003 on the eve of the ‘deadline’ set by the IAEA Director General for Iran to sign the Additional Protocol. Since then, ‘EU-3’ and Iran have met periodically to sort out a workable solution to the confrontation between Iran, which claims to have the right to enrich uranium to use in civilian nuclear reactors, and the US, which asserts that Iran could soon become a *de facto* nuclear-weapons state, and thus must terminate its enrichment-related activities. The EU-3 and Iran reached a temporary agreement on 15 November 2004: the Iranian government decided, on a voluntary basis, to continue and extend its suspension that had been in effect for about a year. This suspension included all enrichment related and reprocessing activities, and specifically the manufacture and import of gas centrifuges and their components as well as the work on plutonium separation.¹¹⁷ Iran and the EU-3 also emphasized that suspension of enrichment was not a legal obligation and Iran had rights under the NPT that could be exercised without discrimination.¹¹⁸ In this way, the EU remained true to its longstanding policy of using diplomacy to find solutions to international problems rather than resorting to military force. The US, however, saw this initiative as ‘a waste of time’ and said the EU allowed Iran time to build nuclear weapons. Nevertheless, the EU’s initiative also played into the hands of the US as it kept Iran under pressure and scrutiny that at least caused delays in its nuclear projects; during this time the US focused on state-building efforts in Iraq, which absorb a huge amount of its resources and energy.¹¹⁹ Following the presidential elections in Iran in June 2005 that brought Mahmoud Ahmedinejad to office, the degree of confrontation between Iran and the US, this time also involving the European countries, led to the IAEA Resolution

of 4 February 2006 that paved the way for taking Iran's dossier to the United Nations Security Council.¹²⁰

Notes

This article was written during the author's sabbatical fellowship at the Belfer Center for Science and International Affairs in the Kennedy School of Government at Harvard University in the 2004–05 academic year.

1. This comparison ('the Shah' Reza Pahlavi vs. 'the Imam' Khomeini) is borrowed from the speeches made by Ayatollah Ali Akbar Hashemi Rafsanjani, first at the Palace of the Expediency Council during his reception for the participants of the 'Persian Gulf Security Conference' convened on 1–2 March 2005; and second during his address to the closing session of the 'International Conference on Nuclear Technologies and Sustainable Development' convened on 5–6 March 2005, in Tehran, Iran.
2. For a very detailed analysis of US–Iran relations including chapters from the historical roots of the Pahlavi dynasty to current New Iran Policy see K.M. Pollack, *The Persian Puzzle: The Conflict Between Iran and America* (New York: Random House, 2004).
3. The term 'Northern Tier' is used in the literature of geopolitical studies to denote 'the line of nations from Turkey to Pakistan lying along the southern border of the Soviet Union'. See 'The Evolution of the US–Iranian Relationship: A Survey of US–Iranian Relations, 1941–1979', Top Secret, Report State, *Digital National Security Archive* (hereafter *DNSA*), (Item Number IR03556), Washington, 29 Jan. 1980, <http://www.nsarchive.chadwyck.com>
4. For a discussion on the role of the United States in Middle Eastern Politics, see J.L. Gelvin, *The Modern Middle East: A History* (New York and Oxford: Oxford University Press, 2005), pp.257–67.
5. 'The Evolution of the US–Iranian Relationship', p.8.
6. Ibid.
7. 'The Present Situation in Iran', Memorandum by the Assistant Secretary of State for Near Eastern, South Asian, and African Affairs (McGhee) to the Secretary of State, *DNSA* (Item Number IR00217), Washington, 7 July 1950, p.2.
8. 'The Evolution of the US–Iranian Relationship', p.8.
9. The US administration saw Mohammad Mossadeq as 'intensely nationalist, anti-British, anti-monarchist, and above all obsessed with the goal of nationalizing the AIOC. See 'Draft Statement of Policy on Iran', United States National Security Council (hereafter NSC), Top Secret, Report 107, *DNSA* (Item Number IR00231), Washington, 14 March 1951, p.11.
10. 'The Evolution of the US–Iranian Relationship', p.10.
11. 'A Report to the President by the National Security Council on the Position of the United States With Respect to Iran', Top Secret, NSC Report 107/2, *DNSA* (Item Number PD00258), Washington, 27 June 1951, pp.3–5.
12. An in-depth analysis of the Mossaddeq era in recent Iranian history is beyond the scope of this study. For a comprehensive coverage of the Mossaddeq era and the National Front (some sources cite as Popular Movement) see H. Katouzian, *Musaddiq and the Struggle for Power in Iran* (London and New York: I.B. Tauris, rev. edn, 1999).
13. 'The Evolution of the US–Iranian Relationship', p.22.
14. For an in-depth analysis of US–Iran relations under the Shah's rule, see S. Kinzer, *All the Shah's Men: An American Coup and the Roots of Middle East Terror* (Hoboken, NJ: John Wiley & Sons, Inc., 2003).
15. 'United States Policy Toward Iran', Top Secret, NSC Report 5402, *DNSA* (Item Number PD00379), Washington, 2 Jan. 1954, pp.2–6.
16. Gelvin, *The Modern Middle East*, p.261.
17. On Arab nationalism and the Nasser era, see, for instance, M. Kamrava, *The Modern Middle East: A Political History since the First World War* (Berkeley, Los Angeles and London: University of California Press, 2005), pp.109–11.
18. US policymakers saw advantage in the broad applicability of the Eisenhower Doctrine as opposed to membership in the Baghdad Pact. 'The Evolution of the US–Iranian Relationship', pp.27–8.

19. The United States pursued a persistent policy of utmost secrecy in the nuclear field for almost a decade in the aftermath of the 'Manhattan Project', the code name of the concerted efforts of scientists from a host of countries to build the first atomic bomb all through the first half of the 1940s under the leadership of the Americans. These secret works of the scientists culminated first in the 'trinity test', where the first nuclear device was detonated in the Alamogordo Desert in New Mexico on 16 July 1945 that produced a yield equivalent to the explosion of 19 kilotons of dynamite (TNT). The scientists then built the 'little boy' (i.e., the 15 kiloton uranium bomb that was dropped on Hiroshima) and the 'fat man' (i.e., the 21 kiloton plutonium bomb that was dropped on Nagasaki). See www.childrenofthemanhattanproject.org
20. 'Atoms for Peace Agreement with Iran', *Department of State Bulletin*, No.36, 15 April 1957; cited in M. Sahimi, 'Iran's Nuclear Energy Program. Part V: From the United States Offering Iran Uranium Enrichment Technology to Suggestions for Creating Catastrophic Industrial Failure', *Payvand's Iran News*, 22 Dec. 2004, p.2, <http://www.payvand.com>
21. Sahimi, 'Iran's Nuclear Energy Program. Part V', p.2.
22. See A. Etemad, 'Iran', in H. Muller (ed.), *A European Non-Proliferation Policy: Prospects and Problems* (Oxford: Clarendon Press, 1987), pp.203–27. A. Etemad, a native of Iran, studied electrical and nuclear engineering in Switzerland and France, and served from 1974 to 1978 as the first President of the Atomic Energy Organization of Iran (AEOI).
23. Declassified US documents indicate that the US-supplied nuclear material contained 5.545 kilograms of enriched uranium, of which 5.165 kilograms were fissile isotopes, and 112 grams of plutonium of which 104 grams were fissile isotopes as well as minute quantities (0.9 grams) of Pu-238. The documents also indicate that all the enriched uranium and plutonium for the research reactor has been irradiated and none of these materials have been returned to the US or retransferred to another country. See 'US Supplied Nuclear Material to Iran, September 1967 to May 1976', Non-Classified, Chart State, *DNSA* (Item Number IR03551), Washington, 29 Jan. 1980, p.1.
24. Etemad, 'Iran', p.207.
25. Then, the first task of the AEOI was to bring the trained people together and give them all the facilities and equipment needed to create the infrastructure necessary for launching a nuclear power programme. This was done very quickly by transferring the Tehran University Research Centre to AEOI, *ibid*.
26. Negotiations of the NPT evolved gradually from the prolonged and unsuccessful negotiations on the general and complete disarmament of the 1950s. Already in 1956 it was suggested that measures to prevent the spread of nuclear weapons could be made part of a wider disarmament package. Such measures were seen as a possible supplement to a test ban treaty. As the negotiations on a comprehensive test ban dragged out and ran into trouble because of superpower disagreement on the issue of inspections, there was an increasing awareness of the need for other non-proliferation measures. The first constructive political initiatives that were taken to address this situation were a row of proposals submitted by Ireland to the UN General Assembly and other UN organs, beginning in 1958 and resulting in the adoption of the *Irish Resolution* by a unanimous vote on 4 Dec. 1961. The essence of the resolution was that the nuclear weapon powers should undertake not to transfer nuclear weapons to other states and that the existing non-nuclear-weapons states should voluntarily forgo their right to make nuclear weapons. The main idea was to prevent nuclear anarchy through the establishment of an international treaty that would be subject to inspection and control. But, in spite of the resolution and in spite of the fact that a new negotiating forum was set up at the end of 1961 by the United States and the Soviet Union, and endorsed by the United Nations, there was no real progress in talks on a non-proliferation treaty until well into 1965. There seem to have been many causes of this lack of progress. First, the US administration apparently pursued several lines of policy whose objectives were seemingly incompatible. Second, the members of the North Atlantic Alliance were more and more divided among themselves, with France more and more following its own direction. Third, the Federal Republic of Germany feared that eventual arms control and disarmament agreements would involve far-reaching settlements in Europe and have negative repercussions on German reunification. Finally the first years of the Kennedy administration saw a deterioration of East–West relations, with the Soviet insistence on a peace settlement in Europe such as the erection of the Berlin Wall, the unsuccessful US invasion of Cuba, and the American engagement in Vietnam. In addition, 1963–64 saw a change of political leadership at the highest level in both the United States and the Soviet Union. However, detonation

- of a nuclear device by the People's Republic of China prompted the two superpowers to quickly resolve their differences and work out the final text of the treaty soon after. See C.M. Roberts, *The Nuclear Years: The Arms Race and Arms Control, 1945–70* (New York and London: Praeger Publishers, 1970), pp.68–9.
27. Sahimi, 'Iran's Nuclear Energy Program. Part V', p.2.
 28. 'The Evolution of the US–Iranian Relationship', p.27.
 29. *Ibid.*, p.9.
 30. In a paper adopted by the US National Security Council in Feb. 1957, which addressed Iran's military needs, Secretary of State J.F. Dulles noted that 'he hoped the US could persuade Iran it did not need military forces on the large scale the Shah was still requesting'. See 'History of CENTO' Confidential, Report State, *DNSA* (Item Number IR00508), Washington, 31 March 1964, 114 pp.
 31. The effect of this assurance on the Shah was, however, short lived. A revolution in Iraq just a month later brought a pro-Soviet regime and Arab radicalism to Iran's doorstep. Yet Washington responded to Iran's new concerns with a renewed Presidential assurance of support for Iran and a promise to increase military aid. 'Memorandum of the Conference With the President', Top Secret, Memorandum of Conversation State, *DNSA* (Item Number IR00357), Washington, 30 June 1958, p.2.
 32. *Ibid.*, p.34.
 33. The Shah also conveyed his officers' view that, 'in terms of military aid, Turkey was treated as a wife, and Iran as a concubine'. See 'Memorandum of the Conference with the President', Top Secret, Memorandum of Conversation State, *DNSA* (Item Number IR00448), Washington, 12 April 1962, p.4.
 34. The United Arab Republic (UAR) was established on 1 Feb. 1958 and existed until 1961. The UAR was a union between Egypt and Syria as the first step toward a pan-Arab nation. It was created when a group of political and military leaders in Syria, much concerned about the danger of a communist takeover in their country, sought help from Gamal Abdal Nasser who was a legend of pan-Arab ideology. The UAR had its capital in Cairo under the presidency of Nasser. Hence, the communist threat was soon defeated with the help of a large number of technical and military advisors who were dispatched to Syria from Egypt. But being ruled from Cairo, which treated Syria as a colony, started to cause anger among the Syrians. Eventually, the UAR collapsed in 1961 after a coup d'état in Syria. Yet Egypt continued to use the name until 1971. See, for instance, W.L. Cleveland, *A History of the Modern Middle East* (Boulder, CO: Westview Press, 3rd edn, 1994), pp.301–44.
 35. Letter from the Shah Pahlavi to President Kennedy, 'Confidential Letter', Confidential, Letter, *DNSA* (Item Number IR00478), Washington, 1 June 1963.
 36. The 'White Revolution' stressed land reform, emancipation of women, working class benefits, encouragement of private enterprise, and modernization of government administration. For a discussion on the modernization period (1962–77) see N.R. Keddie, *Modern Iran: Roots and Results of Revolution* (New Haven, CT and London: Yale University Press, 2003), pp.148–69.
 37. Interview with Ambassador (ret.) Alex Rondelli from Georgia, who served as a Soviet translator and interpreter in Iran during the Soviet–Iran rapprochement in the 1960s. Harvard University, Cambridge, MA, USA, 3 April 2005.
 38. It is interesting to note that, in the late 1950s, the US Joint Chiefs of Staff proposed to deploy nuclear weapons in Iranian territory. However, this never materialized because of the opposition of President Kennedy when he took office. Declassified documents point to the fact that 'the JCS has recently indicated that it desired to "assist" the Shah by United States' adherence to CENTO, stationing atomic weapons in Iran, and similar measures'. See G.A. Morgan, 'The Current Internal Political Situation in Iran', Secret, Internal Paper, *DNSA* (Item Number IR00398), 11 Feb. 1961, p.10.
 39. 'The Evolution of the US–Iranian Relationship', p.41.
 40. Letter from the Shah Pahlavi to President Johnson, 'Confidential Letter', Unclassified, Letter, *DNSA* (Item Number IR00499), Washington, 7 Jan. 1964.
 41. Confidential letter from President Johnson to the Shah Pahlavi, 3 March 1964; cited in 'The Evolution of the US–Iranian Relationship', p.40.
 42. 'The Evolution of the US–Iranian Relationship', p.42.
 43. *Ibid.*
 44. 'Letter Expressing Need to Stop Pressuring Shah about Military Requests', Secret, Letter Tehran, *DNSA* (Item Number IR00570), US Embassy, Iran, 19 March 1966, pp.1–5.

45. 'National Policy Paper – Iran', Part One, Secret, Policy Paper State, *DNSA* (Item Number IR00610), Washington, 2 Feb. 1967, pp.1–41.
46. *Public Papers of the Presidents: Richard Nixon*, 1969, pp.544–8; cited in 'The Evolution of the US–Iranian Relationship', p.44.
47. 'Hoveyda Visit', Confidential, Cable State (Outgoing Telegram 284246 to Tehran), *DNSA* (Item Number IR00703), 9 Dec. 1968, pp.1–2.
48. 'Secret Memorandum State', Secret, Memorandum State, *DNSA* (Item Number IR00732), Washington, 10 March 1970.
49. 'Visit of Richard Nixon to the Empire of Iran, May 1972 – Issues and Talking Points', Secret, Briefing Book State, *DNSA* (Item Number IR00767), Washington, 12 May 1972, p.2.
50. 'The Evolution of the US–Iranian Relationship', p.49.
51. Memorandum from Secretary of Defence to the President, 2 Sept. 1975 (Secret); quoted in 'The Evolution of the US–Iranian Relationship', p.57.
52. *Ibid.*, p.58.
53. 'National Policy Paper – Iran', p.15.
54. See for instance, R. Sale, 'Yom Kippur: Israel's 1973 Nuclear Alert', *United Press International*, 16 Sept. 2002, <http://www.upi.com/view.cfm?StoryID=20020916-073128-6494r>. For a scholarly coverage of Israel's nuclear capabilities see A. Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998).
55. Indeed, the end result of the Yom Kippur war, which was also interpreted as 'victory' in the Arab world, would best be characterized as a 'stalemate' rather than victory because there was no net gains in terms of territory by either side. However, the Yom Kippur war was significant in showing both the Arabs and the Israelis that they would not be able to find a solution to their differences by fighting wars. Hence, the 'war fatigue' eventually led the way to the signing of a peace treaty between Egypt and Israel on 26 March 1979 in Washington, the former being the first Arab country to recognize the State of Israel. Conversations with Dr Piki Ish-Shalom, fellow at the Belfer Centre at Harvard University, Cambridge, MA, USA, 27 April 2005.
56. See M. Kibaroglu, 'An Assessment of Iran's Nuclear Program', *The Review of International and Strategic Affairs*, Vol.1, No.3 (Spring 2002), pp.33–48.
57. See *Tehran Magazine*, 18 March 1974, p.2, cited in Sahimi, 'Iran's Nuclear Energy Program. Part V', p.2.
58. Etemad, 'Iran', p.212.
59. The Agreement was signed by Secretary Henry Kissinger for the US and Finance Minister Houshang Ansari for Iran. See, Sahimi, 'Iran's Nuclear Energy Program. Part V', p.4.
60. 'US–Iran Nuclear Cooperation', National Security Decision Memorandum 292, National Security Council, Washington, President Gerald R. Ford's Presidential Documents, 22 April 1975, <http://www.ford.utexas.edu/library/document/nsdmnssm/nssm292a.htm>, p.1.
61. 'Your Meeting with the Shah at Blair House', Confidential, Briefing Memorandum, *DNSA* (Item Number IR00954), Washington, 9 May 1975, p.2.
62. *Ibid.*
63. *Ibid.*, p.9.
64. By pressing for the quick approval of the US, the Shah probably wanted to make sure that with the changing administrations in the US, the decisions with regard to reprocessing in Iran would not change.
65. *Ibid.*
66. *Ibid.*
67. Sahimi, 'Iran's Nuclear Energy Program. Part V', p.5.
68. 'Iran: The US–Iran Nuclear Energy Agreement', Confidential, Briefing Paper State, *DNSA* (Item Number IR01605), Washington, 20 Oct. 1978, p.1.
69. See F. Barnaby, *How Nuclear Weapons Spread: Nuclear-Weapon Proliferation in the 1990s* (London: Routledge, 1993), pp.114–17.
70. Etemad, 'Iran', p.206.
71. See H. Vaziri, 'Iran's Nuclear Quest: Motivations and Consequences', in R.G.C. Thomas (ed.), *The Nuclear Non-Proliferation Regime* (Princeton, NJ: Princeton University Press, 1986), p.311.
72. Barnaby, *How Nuclear Weapons Spread*, p.114.

73. Interview with Prof. E. Haeckel on the sidelines of the Conference on 'Germany and Nuclear Non-proliferation' held in Berlin, Germany, 25–27 Feb. 2005.
74. The US was making an official statement that it could no longer be counted as a reliable fuel supplier for the burgeoning civilian nuclear power industry it had promoted globally. For a detailed analysis see M.J. Brenner, *Nuclear Power and Non-Proliferation: The Remaking of US Policy* (Cambridge: Cambridge University Press, 1981), p.14.
75. Reasons behind building reprocessing spent reactor fuel facilities was to utilize more fully the energy value of LEU and to extend the life of natural uranium resources; and moving forward toward commercialisation of the light metal fast breeder reactors (LMFBR), which promised eventual self-sufficiency and an end to dependence on external sources of natural uranium as well as enrichment services, *ibid.*, p.15.
76. Within the next few months in early 1975, France revealed plans to sell reprocessing plants to South Korea and Pakistan; and Germany entered into a massive deal with Brazil for the transfer of enrichment as well as reprocessing technology, *ibid.*, p.15.
77. *Ibid.*, p.16.
78. See J. Goldblat, *Nuclear Non-Proliferation: A Guide to the Debate* (London: Taylor & Francis, 1985), p.9.
79. The Nuclear Supplier Group has reproduced a set of guidelines that most of the suppliers of nuclear plants and materials agreed to in London on 21 Sept. 1977. That is why this group is equally known as the London Club. This set of guidelines is also attached to communication addressed on 11 Jan. 1978 to the Director-General of the IAEA. These guidelines for nuclear transfer are also labelled as INF/CIRC/254. The initial signatories of the guidelines are; Belgium, Canada, Czechoslovakia, France, the former German Democratic Republic and the Federal Republic of Germany, Italy, Japan, the Netherlands, Poland, Sweden, Switzerland, UK, USA and the USSR.
80. J. Krause, 'German Nuclear Export Policy and the Proliferation of Nuclear Weapons – Another *Sonderweg*?' Paper presented at the conference on 'Germany and Nuclear Non-proliferation', Berlin, Germany, 25–27 Feb. 2005, p.1.
81. In coming to such a conclusion, Prof. Krause refers to a number of American scholars and their works, among them: A. Wohlstetter, 'Spreading the Bomb Without Quite Breaking the Rules', *Foreign Affairs*, No.25 (1976), pp.88–96; T. Greenwood, H.A. Feiveson and T.B. Taylor, *Nuclear Proliferation: Motivations, Capabilities, and Strategies for Control* (New York: McGraw Hill, 1977).
82. The facility employed the Pakistani nuclear scientist Abdel Qader Khan, who was later known for being responsible for the proliferation of the then poorly guarded enrichment technology of URENCO to Pakistan and South Africa, as well as to Libya and Iran more recently, *ibid.*, p.3.
83. *Ibid.*
84. The Zangger Committee, named for its Swiss chair Prof. Claude Zangger, and the Nuclear Suppliers Group shared in common the purpose of limiting the transfer of significant material and technology to states that are suspected of being engaged in clandestine nuclear weapons manufacturing. The Committee started to meet as early as 1970.
85. For a comprehensive study on the emergence and evolution of EURATOM, see D.A. Howlett, *EURATOM and Nuclear Safeguards* (London: MacMillan Press, 1990).
86. See B. Goldschmidt, 'Proliferation and Non-Proliferation in Western Europe: A Historical Survey', in Muller (ed.), *A European Non-Proliferation Policy*, pp.24–5.
87. For a comprehensive account of divergences between Europe and the US on proliferation matters in the 1970s see H. Muller, 'Non-Proliferation Policy in Western Europe: Structural Aspects', in Muller (ed.), *A European Non-Proliferation Policy*, pp.71–97.
88. *Ibid.*, pp.72–4.
89. *Ibid.*
90. *Ibid.*, p.86.
91. On 4 November 1979, Iranian militants and students stormed the US Embassy in Tehran and held hostage some 70 diplomats and citizens of the United States. On 24 April 1980, the United States attempted a rescue mission that failed. On 20 Jan. 1981, the day of President Reagan's inauguration, hostages were released.
92. Persian version of the slogan is borrowed from Vaziri, 'Iran's Nuclear Quest', p.314.
93. *Ibid.*
94. *Ibid.*

95. Etemad, 'Iran', p.214.
96. Vaziri, 'Iran's Nuclear Quest', p.316.
97. Dr. Akbar Etemad notes, 'some government officials even explicitly blamed those who had decided to cancel the Bushehr nuclear power plant project. It was said that one of the causes of the shortages of power was the failure of government to implement the project', which was expected to become operational in the early 1980s. See Etemad, 'Iran', p.214.
98. Rafsanjani made this statement during his address to the closing session of the 'International Conference on Nuclear Technologies and Sustainable Development' convened in Tehran on 6 March 2005.
99. Vaziri, 'Iran's Nuclear Quest', p.318.
100. Etemad, 'Iran', p.216.
101. In the meantime, the Iraqi air force attacked the Bushehr site several times causing serious structural damage. The Iraqi bombings occurred on 24 March 1984; 12 Feb. 1985; 4 March 1985; 12 July 1986; 17 Nov. 1987, 19 Nov. 1987; and 19 July 1988. See A.H. Cordesman, *Iran and Nuclear Weapons* (Washington, DC: Centre for Strategic and International Studies, 2000), p.7.
102. Both countries have stressed that the reactor was intended solely for peaceful purposes, and Iran agreed to allow IAEA safeguards. See the website of Nuclear Threat Initiative (NTI) of the Centre for Non-proliferation Studies at the Monterey Institute of International Studies in Monterey, CA, USA, available online at <http://www.nti.org/db/china/ncaorg.htm>
103. Rafsanjani's address to the Nuclear Technologies conference in Tehran, Iran on 6 March 2005.
104. English translation of the full text of the Nuclear Cooperation Accord can be found in M. Eisenstadt, *Iranian Military Power: Capabilities and Intentions* (Washington, DC: Washington Institute for Near East Policy, 1996), pp.106–7.
105. For a detailed documentation of Iran's nuclear facilities see a compilation by A. Koch and J. Wolf, *Iran's Nuclear Facilities: A Profile* (Monterey, CA: Center for Non-proliferation Studies, 1998). For more up-to-date information including satellite imageries of some of the facilities in Iran, see <http://www.GlobalSecurity.org>
106. Ambassador Soltanieh made this statement during the International Conference on Nuclear Technologies and Sustainable Development convened in Tehran on 5 March 2005.
107. Author's notes from the presentation of Dr Sabouri in a panel on 'Iran's Peaceful Nuclear Program: Requirements and Imperatives', during the International Conference on Nuclear Technologies and Sustainable Development in Tehran on 5 March 2005.
108. Author's notes from the presentation of Dr Aghamiri in a panel on 'Iran's Peaceful Nuclear Program: Requirements and Imperatives', during the International Conference on Nuclear Technologies and Sustainable Development in Tehran on 5 March 2005.
109. Article II of the NPT reads as follows: Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.
110. Article IV of the NPT reads as follows: Paragraph 1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty. Paragraph 2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.
111. These and other similar views were expressed by many Iranians during the Nuclear Technologies conference in Tehran on 5–6 March 2005. The most elaborate explanations came from Ambassador A.A. Soltanieh, Deputy Director General for International Affairs at the Iranian Ministry of Foreign Affairs in charge of devising Iran's nuclear diplomacy.
112. Conversations with Iranian officials and scholars on the sidelines of the conferences in Tehran in March 2005 and in Ankara in Jan. 2006, none of whom wished to be identified.

113. Iran became one of the first signatories of the NPT and the *Majlis* (Iranian Parliament) ratified the Treaty in Feb. 1970, a month before it entered into force.
114. A comprehensive coverage of the essential points representing Iran's official position can be found in a journal published by the Tehran-based Centre for Strategic Studies. See 'Peaceful Nuclear Activity and Our Constructive Interaction with the World: An Interview with Dr. H. Rohani', *National Interest*, Vol.1, No.1 (Winter 2005), pp.5–21.
115. With the experience gained from the inspections in Iraq after the 1991 Gulf War, and the dismantling of South Africa's nuclear weapons capabilities, the IAEA Board of Governors initiated in 1993 a study called 'Programme 93 + 2' with a view to strengthening the NPT's verification mechanism. This study, which was terminated in December 1995, was adopted by the IAEA as INFCIRC/540 also known as Additional Protocol. Unlike the Model Protocol INFCIRC/153 which was drafted in 1971 and must be adopted by all Non-Nuclear-Weapons States Parties to the NPT in order to conclude a Safeguards Agreement with the IAEA, the Additional Protocol need not be adopted. For a discussion on the Additional Protocol and its implications in the context of Iran's nuclear programme see C. Zak, *Iran's Nuclear Policy and the IAEA: An Evaluation of Program 93 + 2* (Washington, DC: Washington Institute for Near East Policy, 2002). Also see T. Hirsch, 'The IAEA Additional Protocol: What It Is and Why It Matters', *The Nonproliferation Review*, Vol.11, No.3 (Fall–Winter 2004), pp.140–66.
116. See 'Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran', Resolution Adopted by the Board 29 Nov. 2004 (GOV/2004/90), p.1.
117. Iran decided in October 2003 'to voluntarily and temporarily suspend its enrichment activities in order to facilitate the Agency's technical verification activities in resolving the outstanding issues stemming from the findings of traces of highly enriched uranium (HEU) in the samples taken from the secretly built pilot scale uranium enrichment facility in Natanz. Iranian authorities claim that the presence of highly enriched uranium as well as low enriched uranium (LEU) was because of the contamination caused by the centrifuges that were imported from a third party but never operated. Conversations with Amb. Ali Asghar Soltanieh on the sidelines of the 55th Pugwash Conference on '60 Years After Hiroshima and Nagasaki' convened in Hiroshima on 24 July 2005, and in a panel on Iran's nuclear program in Ankara on 16 Nov. 2005.
118. See 'Communication dated 26 November 2004 received from the Permanent Representatives of France, Germany, the Islamic Republic of Iran and the United Kingdom concerning the agreement signed in Paris on 15 November 2004', INFCIRC/637, 26 Nov. 2004, p.3.
119. See M. Kibaroglu, 'Good for the Shah, Banned for the Mullahs: The West and Iran's Quest for Nuclear Power', *The Middle East Journal*, Vol.60, No.2 (Spring 2006), pp.207–32.
120. See IAEA Board of Governors Resolution GOV/2006/14 dated 4 Feb. 2006, <http://www.iaea.org>