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Infrastructure Security and Nuclear Power

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Introduction

Nuclear power, national security and covert nuclear weapon programs have been intrinsically linked in the past. Such was the case in India, Israel, South Africa and Pakistan. At least thirteen Middle Eastern countries either announced new plans to explore atomic energy or revived pre-existing nuclear power programs between February 2006 and January 2007. The Middle East and North Africa represent a region with countries (Algeria, Egypt, Syria and Saudi Arabia) representing a wide range of nuclear capabilities.

In view of the ongoing debate about the Iranian nuclear power program, strategic stability in the Persian Gulf depends *inter alia* on the nuclear capabilities of these countries. Coupled with the rampant political instability and national nuclear issues shrouded in a great deal of secrecy, this provides a fertile breeding ground for speculations and hypotheses concerning the potential for covert nuclear weapon programs.

In the following article, the nuclear infrastructure in Algeria, Egypt, Syria, and Saudi Arabia willbe reviewed to provide a basis for an objective assessment of the future risk of these countries engaging in a covert nuclear weapon program.

Algeria

Algeria considers electricity production and desalination by nuclear power an important component in its national energy policy. The country is on the forefront of nuclear science in the Arab community. Thereby it shares similar views with Iran in claiming its right to establish the complete nuclear fuel cycle.

Although Algeria is a constitutional republic, in reality the military complex represents the major power in the national political decision-making process. Due to its increasing revenue from oil and gas, Algeria has a current budgetary surplus of about US$20 billion.

National security is a problem: The country suffers from extensive terrorist activities by extremist groups, such as *Armed Islamic Group* (GIA) and *Al Qaeda in Islamic Maghreb* (AQIM), resulting in over 100,000 dead so far.

The current situation in the country with regard to its nuclear ambitions and capabilities, based on open literature, is characterized in Table 1.

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Table 1: Summary of Nuclear Characteristics of Algeria

Parameter	Characterization
U supply	56,000 tons of uranium deposits in Eglab, Ougarta, southern Tassili, Timgaounine, Tinef, Abankor, Tahaggart 700,000 t phosphate rock /year
Fuel fabrication	UDEC, managed by Unite De Recherché En Genie at Dourera; pilot plant (Argentinean design); fuel elements for a variety of reactors
Reactors	*NUR Multipurpose Reactor* 1MW pool type research reactor (19.75% U 235), provided by INVAP, Argentina (1989), managed by Unite De Recherché En Genie Nucleaire (Urgn) *Es Salam*, located at Ain Oussera near Birin; 15MW heavy-water reactor (3% U 235), provided by: China (1992), managed by Centre De Development Des Systemes Energetiques
Reprocessing	No industrial-scale operations Pilot-scale system supplied by China, managed by: Centre de Development des Systèmes Energétiques Suspected to separate Pu spent fuel since the early 1990s in plant next to the reactor at Ain Oussera, based on satellite photographs
Waste disposal	11 tanks, located at Ain Oussera, supplied by China, managed by Centre de Development des Systèmes Energétiques
Clandestine nuclear program	Construction of heavy water reactor *Es Salam* (U.S. Intelligence, 1991) Intention “to produce military grade plutonium” (CESID, 1998)
Pu production capability	3-5 kg/year
Foreign support	United States, France 2007; Argentina 2008
Official support for Iranian nuclear program	Yes
IAEA assistance	Development of uranium prospecting and analysis Removal and recovery of uranium from phosphoric acid
Main nuclear research facilities	Centre de Recherche et D`Exploration des Matériaux Algiers Centre de Développement de Matériaux Algiers
Discovery of undeclared material	3 kg of enriched uranium, supplied by China
Declared nuclear ambitions	First nuclear power plant in operation by 2020
Signatory to Treaties	NPT (1992), CTBT (1996) IAEA Safeguards State Party to the *Pelindaba Treaty*[1]

Algeria could represent a *proliferation risk* in the future for the following reasons:

- Algeria signed secret nuclear agreements with China and Argentina in the past, enabling it to gain access to advanced nuclear technology.
- IAEA revealed the existence of three kilogram of enriched uranium, which had not been declared by Algeria.
- Algeria joined the NPT[2] only about ten years after it had signed the agreement with China and Argentina.
- Algeria is unlikely to forego the right to enrichment and reprocessing processes in view of its stance on being legally entitled to the peaceful use of nuclear technology.
- Algeria has access to significant uranium supplies either through deposits, or phosphate ore, and has access to over 50 kg of Pu through its civilian reactor at *Es Salam.*
- Algeria has access to state-of-the-art nuclear technology due to technical assistance by the IAEA. Since December 2007 Algeria has benefited further from extensive technology transfers from France in the fields of nuclear research, nuclear electricity production, uranium exploration and exploitation.
- Algeria has excellent trained manpower in nuclear sciences and engineering

In case of a political decision for engaging in a covert nuclear weapon program, Algeria would need to set up an industrial scale reprocessing plant in order to close the national nuclear fuel cycle.

Egypt

Egypt became one of the advocates for a Middle East Nuclear Weapon Free Zone (NWFZ), when Anwar Al-Sadat came to power in the 1970s. If there had indeed been plans for a military nuclear weapon program as reported, these plans were abandoned upon ratifying the NPT in 1981.

Over the past thirty years, Egypt developed a significant nuclear infrastructure, comprised of several thousand scientists and technicians, as well as multiple nuclear research facilities. However, it does not have any power reactor and failed to establish an industrial scale mining, milling, enrichment and reprocessing industry. It operates a functioning fuel fabrication plant for its ETRR-2 reactor. Egypt claims officially that it is not pursuing uranium enrichment. However, there is no information on the type of reactor to be considered (Unat, LEU) in the future or the extent of indigenous manufacture of fuel rods. Furthermore, Egypt has a dual-use nuclear fuel cycle:

1. ETTR-2, 22MW pool type light water reactor, burns enriched uranium and produces plutonium; detection of any any future covert irradiation of uranium targets may pose a problem;
2. Technically covert reprocessing of irradiated targets or fuel at a laboratory scale is possible at its Hot Cell Laboratory and Waste Management Centre (HLWMC).

Egypt has a history of religious fundamentalism linked to terrorism, leading back to the early stages of the *Al Qaeda* organization. In the recent past it has experienced some major terror attacks in tourist centres and its capital.

The current situation in the country with regard to its nuclear ambitions and capabilities, based on open literature, is characterized in Table 2.

Egypt could represent a *proliferation risk* in the future for the following reasons:

- Its national scientific manpower is large and has access to multiple modern nuclear research facilities, addressing the complete nuclear fuel cycle.
- Egypt has significant conventional and unconventional uranium reserves and will be supported by China in uranium mining operations in the future.
- Its ETRR-2 reactor produces about 6 kg of Pu per year and its staff has training opportunities with plutonium extraction at the Hydrometallurgy Pilot Plant and the Hot Laboratory and Waste Management Center.
- Egypt refuses to sign the IAEA Additional Protocol, since two of its nuclear partners (China and Russia) will provide nuclear assistance nevertheless.
- Egypt seeks international nuclear contacts and has been successful with China, France and Australia in the recent past. Egypt aims for a major civilian nuclear program, comprised of ten nuclear power plants. This could either reflect an effort to counter an increasing energy shortage, or it views nuclear power as a prerequisite for achieving parity with Israel in strategic terms.

At present, Egypt has no industrial scale nuclear capabilities, which would enable it to engage in a covert nuclear weapon program in the near term.

Table 2: Summary of Nuclear Characteristics of Egypt

Parameter	**Characterization**
U supply	(a) Heap leach mining in Sinai and Eastern Deserts; (b) Uranium deposits in Gabal Gattar, El Miskat/El Erediya, Um Ara, El Atshan, Wadi Nasib; (c) Phosphate deposits (65 ppm of uranium) in the Western Desert, Nile Valley, and the Red Sea Coast (appr.33 000 t uranium) (d) Egyptian Monazite Sands deposit (3,000 t monazite) at Rosetta Beach (6.05% thorium, 0.46% uranium)
Fuel fabrication	***Nuclear Fuel Research Laboratory at the Nuclear Research Center (NRC), Inshas (***over 0.1 tons of heavy metal/year**)**
Reactors	Research reactor ETRR-1 (2 MW, tank-type VVR, 4.5 kg fuel (enrichment: 10%), USSR) Research reactor ETRR-2 (22 MW, swimming pool-type, light water, up to 30 fuel elements, enrichment 20 % U308), China) Both reactors are located at Inshas; operational since 1962 and 1997, respectively
Reprocessing	No declared reprocessing capability, but Hot Laboratory and Waste Management Center (HLWMC) carries out reprocessing-related activities
Waste disposal	Waste treatment and analysis of irradiated material at Hot Laboratory and Waste Management Center (HLWMC;), Inchas
Clandestine nuclear program	Suspected prior to 1970s
Pu production capability	Approximately 6 kg/year

Foreign support	Since 1960´s China (supply of research reactor) 2008: France (transfer of nuclear technology) 2009: Australia (plans for nuclear power reactor at Dabaa)
Official support for Iranian nuclear program	No
IAEA assistance	Provision of funds to help build 20 MeV cyclotron accelerator Feasibility studies at El-Dabaa for setting up the country's first NPP (2002)
Main nuclear research facilities	Nuclear Research Center and Reactor Engineering Center, Inshas, together with: ***Nuclear Fuel Research Laboratory, Nuclear Chemistry Building, Pilot Milling Facility and*** Cyclotron Facility Nuclear research and training at departments located at Ain Shams University, Cairo University, Mansoura University, Tanta University
Discovery of undeclared material	No
Declared nuclear ambitions	September 2006: Intent to pursue large-scale nuclear power development with the construction of up to 10 plants in the El-Dabaa region
Signatory to Treaties	No participation in the NPT until 1981, but State party to the NPT in 1982 Comprehensive Safeguards Agreement with the IAEA in 1982, but refuses to sign the IAEA Additional Protocol.

Syria

For several decades, Syria has tried to obtain a nuclear power reactor in vain. Having approached the USSR, Belgium, Switzerland, France and China, it ended up with obtaining one research reactor from China only. All of its efforts failed due to external pressure from Israel and the United States on potential suppliers.

At present, Syria's nuclear infrastructure is very limited and consists basically of two major research centres and a cyclotron. The number of nuclear experts and engineers is relatively low, despite continuing technical assistance by the IAEA. Syria ratified the NPT in 1969 and advocates a NWFZ in the Middle East. Syria has no power reactor and is incapable to engage in conversion, enrichment, fuel fabrication or reprocessing capability. Its low-key nuclear research infrastructure, inadequate number of trained staff, and insufficient funds do not permit a large scale nuclear civilian or military initiative.

Despite these severe limitations, Syria has been subject of repeated accusations of operating a covert nuclear weapon program since 1991. These accusations range from unsupported claims by U.S. politicians concerning a covert nuclear weapon program, to hypothesized links with the A.Q. Kahn network, and reports of illicit acquisition of enriched nuclear material from Sweden.

It all culminated in the bombing of a suspected nuclear site at Al-Kibar by Israel in 2007, a facility reportedly with characteristics similar to the nuclear facility at Yongbyon (North Korea).

The current situation in the country with regard to its nuclear ambitions and capabilities, based on open literature, is characterized in Table 3.

Table 3: Summary of Nuclear Characteristics of Syria

Parameter	**Characterization**
U supply	Significant deposits of phosphate rock at Charkia, Knifes, Sawwaneh, and Wadi Qasser Al-Hallabat (60-100 ppm U), with a commercial fertilizer plant and a uranium recovery micro-pilot plant at Homs
Fuel fabrication	No
Reactors	No
Reprocessing	Research reactor SSR-1 (30 kW), mainly used for the production of medical isotopes and research
Waste disposal	Radioactive waste management at Der Al-Hadjar
Clandestine nuclear program	1991: "Credible reports" (by former U.S. Senator Jesse Helms before a Senate committee) that China is engaged in furthering the nuclear weapons ambitions of Syria and Iran remain unsubstantiated 1996: Syria's nuclear research program is at a rudimentary level and appears to be aimed at peaceful uses at this time (testimony of John Deutch, Director CIA, Senate Government Affairs Permanent Subcommittee on Investigations Weapons Proliferation) 2003: CIA analysis: Planned congressional testimony of John Bolton (U.S. undersecretary of state for arms control) addressing WMD program of Syria, is disputed. 2004 CIA analysis: A.Q. Khan (Pakistan) may have provided Syria with nuclear information and equipment; disputed in 2007 by President Bashar al-Assad. 2007: Israeli airstrike on facility near the Euphrates River in the Northeastern region of Dar az Zwar (Al-Kibar), suspected to be the site of a partially completed 25MWth gas-cooled graphite-moderated nuclear reactor with Pu-production capability Prior to 2009: Iraqi nuclear scientists may have escaped to Syria and are collaborating in military nuclear program
Pu production capability	No
Foreign support	1980s: No success in seeking assistance from USSR, Belgium, Switzerland and France to acquire a reactor 1990: US$ 100 million contract with Argentina cancelled 1991: 30kW miniature neutron source reactor (SRR-1), built by China at the Dayr al-Jajar Nuclear Research Center 1998, 1999, and 2003: cooperation agreement with Russia for 25

	MW light water reactor failed to deliver results Prior to 2007: Suspected support from North Korea for undisclosed site at Al-Kibar, matching the technical design of the Yongbyon reactor (North Korea)
Official support for Iranian nuclear program	Yes
IAEA assistance	1970 to present: More than 60 technical projects (isotope production, nuclear medicine and neutron-activation analysis, uranium exploration, uranium extraction from phosphoric acid, construction of a cyclotron facility, development of nuclear research laboratories, preparation for a nuclear power program) 1999: Assistance in establishing radioactive waste management technology and infrastructure 2009: Feasibility study and site selection for first nuclear power plant
Main nuclear research facilities	Der Al-Hadjar Nuclear Research Center and the Scientific Studies and Research Center (SSRC) in Damascus.
Discovery of undeclared material	2004: Suspected link to disappearance of uranium from company *Ranstad Mineral* (Sweden) via Syrian trainee 2009: IAEA inspections revealed the presence of undeclared anthropogenic uranium particles from a hot cell facility at the SRR-1 research reactor in Damascus.
Declared nuclear ambitions	1982: National plan to construct six 600 MWe reactors by the 1990s 2007: Announcement of intent of pursuing nuclear power to satisfy domestic energy demands
Signatory to Treaties	1969 NPT 1992 IAEA Comprehensive Safeguards

Syria could represent a *proliferation risk* in the future for the following reasons:

- IAEA inspections in 2008 raised important questions, such as the discovery of undeclared anthropogenic uranium particles.
- Syria's current path to obtain uranium from significant phosphate deposits, using phosphate fertilizer technology, can be extended to industrial scale activities.
- Syria has engaged previously in WMD activities, such as chemical weapons.
- Syria is suspected to have the capability of illicit procurement of dual-use, nuclear-pertinent technology.
- Syria could be motivated to acquire weapons technology from aboard in view of its unresolved security issues and adversarial relationship with Israel.

Syria has strong political and military links with Iran, and may request assistance in case of a security threat from either the United States or Israel.

Saudi Arabia

Saudi Arabia represents the lowest level of the four States considered in this analysis in terms of nuclear infrastructure. It has no uranium mining or milling industry; its only access to uranium in the near future would be uranium extraction from phosphate deposits. In the long term a limited uranium supply could originate from uranium ore deposits in the Tabuk Basin. Saudi Arabia has no nuclear research or power reactor. The expertise of its nuclear scientists and engineers is limited to laboratory-level work on principles of nuclear energy production, isotope production, and waste management.

Saudi Arabia's wealth, due to having about 25 percent of the world's oil reserves on its territory, resulted in a budgte surplus of US$149 billion in 2008. This puts the country into a globally important strategic position with regard to its reaction to a potentially threatening Iranian nuclear weapon program. Also, Saudi Arabia feels threatened by Israeli-Indian defense cooperation, since this could lead to an escalation of the regional arms race.

Until now nothing indicates any illegal or covert activities in the area of a Saudi nuclear weapon program. In addition, Saudi Arabia signed the NPT and a comprehensive safeguards agreement with the IAEA in 2005. However, it should be noted that this agreement has not entered into force. Saudi Arabia is furthermore exempted from regular IAEA inspections, i.e., IAEA's ability is significantly reduced to verify that Saudi Arabia's nuclear activities are limited and non-military in nature.[3] Furthermore, the country has declared its interest in nuclear energy in August 2009 in order to meet its expanding energy needs in an environmentally responsible manner.

However, Saudi Arabia has been repeatedly subject to claims that it provides significant financial support to the development of an *Islamic Bomb*:[4] $5 billion to Iraq prior to the first Gulf War; and $2 billion to Pakistan. In the recent past,Saudi government reportedly had published a strategy paper, which advocated the procurement of nuclear weapons.[5] Apart form serving as a deterrent this could be useful during negotiations for a NWFZ in the Middle East, a notion which Saudi Arabia has supported since 1999.

The national security situation has been marred by a repeated flare up of terrorist activities, as recent as the assassination attempt by a suicide bomber to kill Prince Mohammed bin Nayef, the Saudi Deputy Interior Minister in charge of the kingdom’s counterterrorism efforts in Jeddah on Augusr 28, 2009.

The current situation in the country with regard to its nuclear ambitions and capabilities, based on open literature, is characterized in Table 4.

Table 4: Summary of Nuclear Characteristics of Saudi Arabia

Parameter	**Characterization**
U supply	Uranium deposit in Tabuk Basin Phosphate deposits (797 million t; 17 to 21 % P2O5) at Al Jalamid, Umm Wu'al area, Al Amud, and Sanam area; processed at fertilizer plants in Al Jubail Industrial City.
Fuel fabrication	No
Reactors	No
Reprocessing	No
Waste disposal	Temporary Radioactive Waste Storage Facility, nr. King Abdulaziz University campus, Jeddah
Clandestine nuclear program	Reportedly Saudi Arabia started a nuclear weapons program in 1975 under the command of the Saudi Minister of Defence, operated from Al-Khari nuclear research centre Financial support for "Islamic Bomb" (Pakistan: $2 billion dollars (1970s and 1980s); Iraq: Up to US$ 5 billion (1985 to 1990))
Pu production capability	No
Reprocessing facility operational	None at industrial scale Atomic Energy Research Institute: Laboratories with potential for reprocessing (*Physical Separation Lab, Chemical Separation Lab, Radio-chemical Lab*)
Foreign support	Cooperation between nuclear researchers at Saudi universities and China, Gulf region (e.g., Iraq, Syria), Pakistan, Africa, Jordan, Germany, Switzerland, Turkey, Taiwan May 2008: U.S. offers to assist in developing nuclear reactors, training nuclear engineers, and constructing nuclear infrastructure
Official support for Iranian nuclear program	No, but avoiding confrontation with Iran over its nuclear program
IAEA assistance	Since 1980 in the areas: safe use of radiation sources in medicine, industry, research, agriculture, and at educational institutions; national system for preparedness and response to radiological emergencies; human health; agriculture; isotope hydrology
Main nuclear research facilities	Nuclear research centre in the military complex at Al-Suleiyel, founded in 1975 Atomic Energy Research Institute (AERI), King Abdulaziz City for Science and Technology

	(KASCT), Jeddah, established in 1988 3MV General Ionex Tandetron Accelerator at Energy Research Laboratory, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran Cyclotron CS-30 at Cyclotron and Radiopharmaceuticals Department, King Faisal Specialist Hospital and Research Centre, Riyadh
Discovery of undeclared material	No
Declared nuclear ambitions	September 2003: Confidential Strategic Review includes potential acquisition of nuclear weapons October 2003: "Saudi Arabian officials went to Pakistan and are negotiating the purchase of nuclear warheads for their land-based missiles," head of Israel Defence Forces' Military Intelligence Maj.-Gen. Aharon Ze'evi, Knesset's Foreign Affairs and Defence Committee on December 2006: Support for Gulf Cooperation Council initiative to develop nuclear energy August 2009: announcement of plan for pilot nuclear plant
Signatory to Treaties	Signatory of the NPT in 1988 Signatory of IAEA Comprehensive Safeguards Agreement; agreement has not entered into force

Saudi Arabia could represent a *proliferation risk* in the future for the following reasons:

- Although it is unable to develop an indigenous nuclear weapon program, it can use its financial resources to purchase a nuclear device, e.g., from Pakistan.
- It has demonstrated before to place national security decisions above international security relations, when it purchased missiles from China after being rejected by the United States to obtain American surface-to-surface missiles.[6]

If Iran should become a nuclear power, Saudi Arabia will face a two-fold nuclear security threat from Israel and Iran and may want to counter with a nuclear weapon system of its own. This could be achieved within a relatively short time, if purchased covertly from abroad.

Conclusions

Algeria, Egypt, Syria, and Saudi Arabia have largely differing nuclear infrastructure, political systems, and levels of national security. They are subject to controls through the IAEA Safeguards mechanism, signatories of the NPT, and advocates of a Middle East free of nuclear weapons. Yet, they all could represent nuclear security risks of different magnitudes in the future.

Algeria, the only African country having experienced nuclear weapon tests on its territory as a French colony, has the most advanced nuclear facilities and well trained staff in the region. Algeria has identified significant indigenous sources of uranium. Its reactor has produced at least

50 kg of Pu hitherto. Algeria has almost closed the nuclear fuel cycle, but does not operate any industrial-level reprocessing yet. Coupled with the official support of the Iranian declaration of its right to reprocessing, it is only a question of when, rather than if, Algeria will intend to close the current technological gap in the nuclear fuel cycle.

The country is suffering from a civil war with a religiously flavoured political component of fundamentalism, eroding national stability. In view of the strong influence of the military it cannot be excluded that Algeria could view the development of a nuclear weapon as a strategic option to strengthen its geopolitical stance in North Africa.

Egypt, by comparison, has a significantly less developed nuclear infrastructure than Algeria, both, in terms of know-how as well as sophistication of nuclear installations. It does have access to a sizeable indigenous uranium supply. However, until recently it has been unsuccessful to develop its nuclear potential, largely due to the lack of foreign assistance in nuclear technology.

Egypt has made a truce-like agreement with the political opposition, the Muslim Brotherhood, which provides for an uneasy calm with the occasional flare up of violent terrorism. It awaits to be seen how this will develop further upon the foreseeable change in leadership upon departure of the current president Hosni Mubarak and the arrival of his likely successor, son Gamal Mubarak.

As a recipient of about US$1.5 billion in financial support from the United States and a recently signed agreement on nuclear cooperation with China and Australia, it may be able to progress significantly in its nuclear ambitions in the future. This is reflected in its recently announced ambitious nuclear power program. Its continuing refusal to sign the Additional Protocol, together with the nuclear strength of its partners China and Russia, could facilitate the political decision of the next leadership to consider a nuclear weapon program as adequate means to match the nuclear dominance of its neighbor Israel. Such a development would require a significantly longer timeframe than in the case of Algeria.

Syria is the least developed as compared to Algeria or Egypt in terms of nuclear infrastructure, size and training of its engineering and scientific nuclear experts, as well as available financial means. It has the potential of developing its uranium resources to an industrial scale, but lacks every other component of the nuclear fuel cycle, other than modest activities at the research level.

Syria's leadership ensures national stability through a tight grip on political power. Its international political activities are characterized by its support of extreme policies abroad, such as Hezbollah in Lebanon and Iranian nuclear policy. So far, it has been unsuccessful in its multiple attempts to gain access to advanced nuclear technology from another country. Yet, in 2007 the widely held view of having only a nascent nuclear program changed in the aftermath of the bombing of the Al-Kibar site, when Syria's response left several questions unanswered about the true purpose of the site. The worst case scenario would indicate the successful establishment of a clandestine acquisition program for advanced nuclear technology from North Korea. Since Syria's relationship with its neighbor Israel is strained, any serious deterioration of this volatile situation could drive Syria's leadership to the decision to increase its efforts (again?) of covert acquisition of advanced nuclear technology outside a civilian nuclear power program. However, in view of the low level of its current nuclear capabilities and significant financial constraints

due to the lack of any significant oil and gas revenues (as compared to Algeria or Saudi Arabia) or external state support (as in the case of Egypt), such a program would take considerably longer to deliver a nuclear device than in the case of Algeria or Egypt.

Saudi Arabia has practically no nuclear infrastructure or manpower which would enable it to develop an indigenous nuclear weapon within a foreseeable timeframe. However, out of the four countries under consideration it has by far the largest financial means at its disposal to simply purchase a ready-made nuclear weapon, if it should see a national security necessity for it. It has made similar decisions in the past, when it reportedly supported Pakistan and Iraq in their covert nuclear weapon programs, and in its purchase of powerful Chinese missile systems. If questions are raised about Iran's true nuclear intention—owner of vast oil and gas reserves but claiming to need a civilian nuclear program to address its energy needs—this official policy should raise even more questions in the case of Saudi Arabia. Not only has it the largest oil reserves on a global scale, it could also provide a significant portion of its energy needs through solar energy.

In summary, provided there is the political will to develop a military nuclear program, adequate financial means and external scientific/technical support, a country like Algeria or Egypt, less likely so Syria, could engage successfully in such an endeavor within the next decade. After all, it took Israel only four years from the completion of the nuclear research facility at Dimona to the first assembly of an improvised rudimentary, but operational, nuclear weapon. In the case of Saudi Arabia there would only be a short time interval between its political decision to become a nuclear power and the actual acquisition of a nuclear weapon. For example, the Kingdom could simply buy a ready-made Pakistani nuclear military device. Seeing that an international nuclear market operated successfully out of Pakistan under the management of A. Q. Khan for years, such an approach could have a reasonably high probability of success.

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2. Treaty on the Non-proliferation of Nuclear Weapons.

3. The Saudi Arabian safeguards agreement contains also an additional Small Quantities Protocol, since it posseses neither large quantities of nuclear materials, nor does it posses nuclear materials in nuclear facilities.

4. Largely based on statements made by Mohammed Khilewi, second-in-command of the Saudi mission to the United Nations, defected in June 1994.

5. The Guardian (2003).

6. In the late 1980s Saudia Arabia purchased 50-60 CSS-2 missiles, 10-15 mobile launchers, and technical support from China (cost: approximately up to US$3.5 billion). China has also offered CSS-6 (range: 600 km) and CSS-5 (range: 1 800 km).

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