NUCLEAR ENERGY RENAISSANCE IN THE WORLD AND ITS IMPLICATIONS IN THE MIDDLE EAST

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ABSTRACT

Nuclear renaissance means different things to different people. Since not only energy dependent states but also oil producing countries are expressing their desire to go nuclear, it is necessary to add a political dimension to explain the awakened dormant interest in nuclear energy particularly in the Middle East. In this vein, nuclearization reflects a desire to display a nation's power versus others to negotiate a fair share not only with adversaries but with allies as well. With regard to international security the key question is whether nuclear expansion will be limited to reactors only, or will it include enrichment and reprocessing facilities. The growing number of countries that do not possess a domestic reactor base but interested in developing enrichment capabilities for export purposes, makes it difficult to justify why other states should not develop such capabilities.

KEYWORDS

Nuclearization, Nuclear Revival, Nuclear Renaissance, Nuclear Proliferation, Additional Protocol, IAEA Safeguard Efforts

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Introduction

Nuclear energy renaissance denotes an increase in research and development programs that have been speeded up all around the world toward a high technology, nuclear powered future.

The most commonly stated reasons of nuclear revival include forecasts of strong growth in electricity demand, increase in oil prices, pressures from climate change and aspirations to provide better energy security. These factors not only need to be clarified but it also seems necessary to add a political dimension to them in order to better grasp the awakened dormant interest in nuclear energy particularly in the Middle East. In this respect, the things that have changed toward the end of the 2005 should be illuminated.

This article aims at analyzing the basic drives behind renewed interest in nuclear energy and discussing whether nuclear renaissance means different things to different people no matter how a similar rhetoric is referred. While explaining the nuclear urge with a special reference to the Middle East and Turkey it elaborates on the challenges ahead in political terms as well as practical.[1]

Nuclear Renaissance

Global nuclear energy capacity is currently about 368 gig watts, with approximately 453 nuclear power reactors operating in 30 states. The United States (103), France (59) and Japan (55) acquire one half of all nuclear power reactors.

Today nuclear energy is back on the policy agendas of many countries. The following table shows the future reactors envisaged in specific plans and proposals and expected to be operating by 2030.

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[1]This article is an edited and annotated version of the presentation delivered by the author at the *Regional Network of Strategic Studies Centers Plenary Meeting*, Doha/Qatar, 2-5 November 2008.

Table 1. Nuclear Power in National Energy Policies

COUNTRY	NUCLEAR ELECTRICITY GENERATION 2007		REACTORS OPERABLE Dec 2008		REACTORS UNDER CONSTRUCTION Dec 2008		REACTORS PLANNED Dec 2008		REACTORS PROPOSED Dec 2008		URANIUM REQUIRED 2008
	billion kWh	% e	No.	MWe	No.	MWe	No.	MWe	No.	MWe	tonnes U
Argentina	6.7	6.2	2	935	1	692	1	740	1	740	123
Armenia	2.35	43.5	1	376	0	0	0	0	1	1000	51
Bangladesh	0	0	0	0	0	0	0	0	2	2000	0
Belarus	0	0	0	0	0	0	2	2000	2	2000	0
Belgium	46	54	7	5728	0	0	0	0	0	0	1011
Brazil	11.7	2.8	2	1901	0	0	1	1245	4	4000	303
Bulgaria	13.7	32	2	1906	0	0	2	1900	0	0	261
Canada	88.2	14.7	18	12652	2	1500	3	3300	6	6600	1665
China	59.3	1.9	11	8587	9	8700	24	24940	76	62600	1396
Czech Republic	24.6	30.3	6	3472	0	0	0	0	2	3400	619
Egypt	0	0	0	0	0	0	1	1000	1	1000	0
Finland	22.5	29	4	2696	1	1600	0	0	1	1000	1051
France	420.1	77	59	63473	1	1630	0	0	1	1600	10527
Germany	133.2	26	17	20339	0	0	0	0	0	0	3332
Hungary	13.9	37	4	1826	0	0	0	0	2	2000	271
India	15.8	2.5	17	3779	6	2976	10	9760	15	11200	978
Indonesia	0	0	0	0	0	0	2	2000	4	4000	0
Iran	0	0	0	0	1	915	2	1900	1	300	143
Israel	0	0	0	0	0	0	0	0	1	1200	0
Italy	0	0	0	0	0	0	0	0	10	17000	0
Japan	267	27.5	55	47577	2	2285	11	14945	1	1100	7569
Kazakhstan	0	0	0	0	0	0	2	600	2	600	0
Korea DPR (North)	0	0	0	0	0	0	1	950	0	0	0
Korea RO (South)	136.6	35.3	20	17716	3	3000	5	6400	2	2700	3109
Lithuania	9.1	64.4	1	1185	0	0	0	0	2	3400	225

COUNTRY	NUCLEAR ELECTRICITY GENERATION 2007		REACTORS OPERABLE Dec 2008		REACTORS UNDER CONSTRUCTION Dec 2008		REACTORS PLANNED Dec 2008		REACTORS PROPOSED Dec 2008		URANIUM REQUIRED 2008
	billion kWh	% e	No.	MWe	No.	MWe	No.	MWe	No.	MWe	tonnes U
Mexico	9.95	4.6	2	1310	0	0	0	0	2	2000	246
Netherlands	4.0	4.1	1	485	0	0	0	0	0	0	98
Pakistan	2.3	2.34	2	400	1	300	2	600	2	2000	65
Poland	0	0	0	0	0	0	0	0	5	10000	0
Romania	7.1	13	2	1310	0	0	2	1310	1	655	174
Russia	148	16	31	21743	8	5980	11	12870	25	22280	3365
Slovakia	14.2	54	5	2094	2	840	0	0	1	1200	313
Slovenia	5.4	42	1	696	0	0	0	0	1	1000	141
South Africa	12.6	5.5	2	1842	0	0	3	3565	24	4000	303
Spain	52.7	17.4	8	7448	0	0	0	0	0	0	1398
Sweden	64.3	46	10	9016	0	0	0	0	0	0	1418
Switzerland	26.5	43	5	3220	0	0	0	0	3	4000	537
Thailand	0	0	0	0	0	0	2	2000	4	4000	0
Turkey	0	0	0	0	0	0	2	2400	1	1200	0
Ukraine	87.2	48	15	13168	0	0	2	1900	20	27000	1974
UAE	0	0	0	0	0	0	3	4500	11	15500	0
United Kingdom	57.5	15	19	11035	0	0	0	0	6	9600	2199
USA	806.6	19.4	104	100845	0	0	12	15000	20	26000	18918
Vietnam	0	0	0	0	0	0	2	2000	8	8000	0
WORLD	2608	15	439	373,676	39	33,018	106	117,825	270	266,275	64,615
	billion kWh	% e	No.	MWe	No.	MWe	No.	MWe	No.	MWe	tonnes U
	NUCLEAR ELECTRICITY GENERATION 2007		REACTORS OPERATING		REACTORS BUILDING		ON ORDER or PLANNED		PROPOSED		URANIUM REQUIRED

Source: “Nuclear Power Reactors and Uranium Requirements 2007-2009”, *World Nuclear Association*, December 2008, <*www.world-nuclear.org/info/reactors.html*>, 5 January 2009.

Interest in nuclear energy signals a revival in support for nuclear power in the West that had started to slow due to the Three Mile Island (1979)[2] and Chernobyl accidents (1986)[3] and growing attractiveness of gas powered turbines after the drop of natural gas prices in the 1990's.

One of the reasons why there is so much attention devoted to nuclear energy currently is the improvement seen in nuclear safety and efficiency. In this regard, the establishment of the World Association of Nuclear Operators (WANO) in 1989 constituted an important step to foster a global nuclear safety culture. It built a transnational network of technical exchange that includes all countries with nuclear power and every nuclear power reactor in the world today is part of this system's operational peer review.[4]

We also observe that sharp increases in oil and natural gas prices, concerns regarding to energy security and climate change have made nuclear energy more attractive. However, nuclear energy is still more expensive than alternative sources of electricity and its revival

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[2]The accident at Three Mile Island 2 (TMI 2) in 1979 occurred at a nuclear power plant near Harrisburg, Pennsylvania, when a reactor leaked small amounts of radioactive gases. It was the result of equipment failure as well as the inability of plant operators to understand the reactor's condition at certain times during the event. A gradual loss of cooling water to the reactor's heat-producing core resulted in the partial melting of the fuel rod cladding and the uranium fuel, and the release of a small amount of radioactive material. Though there were no injuries or adverse health effects to the public from this accident it is often referred to as the worst nuclear accident in American history. See, *The TMI 2 Accident: Its Impact, Its Lessons*, Washington, Nuclear Energy Institute, December 2007.

[3]The Chernobyl accident in 1986 was the result of a flawed reactor design that was operated with inadequately trained personnel and without proper regard for safety. The people lived in areas contaminated were about five million and in more contaminated areas of strict control by authorities were about 400,000. For the radiological consequences of the Chernobyl accident see, L.A. llyin and O.A. Pavlovskij, "Radiological consequences of the Chernobyl Accident in the Soviet Union and Measures Taken to Mitigate their Impact", *IAEA Bulletin*, (4), 1987, pp. 17-24.

[4]For more information about WANO see its official site, <*www.wano.org.uk*>, 14 February 2009.

strongly depends on public sector support and financial backing. Therefore it strongly requires political will of decision makers and their ability to convince their publics that it is worth to making sacrifices and taking risks.

The Strong Growth in Electricity Demand

World net electricity generation is expected to reach the level of 24.4 trillion kilowatts in 2015 and 33.3 trillion kilowatt hours in 2030. Non-OECD developing countries show the strongest growth in electricity demand as they expand their power grids to support sustained robust economic growth. Total electricity generation in the non-OECD countries is expected reach an average of 4.0 percent per year from 2005 to 2030, as compared with a projected average increase of 1.3 percent per year for OECD electricity generation.

The initiation of large scale transportation and energy infrastructure projects which would likely to reshape the international economic and political landscape contributes to the increase of electricity demand. Especially, the commitments made to construct the Bering Strait rail and utility line tunnel which will link Asia and North America is an impressive example of such projects that necessitate vast new power supplies. According to the estimates made, 6.000 nuclear plants by the year 2050 needed for the anticipated industrial growth of the Eurasian Land-Bridge and other Great Projects.[5]

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[5]When the Soviet Union began to disintegrate in 1989-91, Lyndon LaRouche and the Schiller Institute proposed an economic reconstruction plan, first for Europe, and then for Eurasia. In 1989, they put forward the program for the so-called "Productive Triangle: Paris-Berlin-Vienna," and in 1991, the program for the infrastructural and economic integration of Eurasia, known as the Eurasian Land-Bridge, which was elaborated at many conferences and seminars on all continents. It rests on the idea to tie together the whole world with a system of development corridors implies constructing transportation link from Siberia to Alaska, by means of a 6,000 kilometer railroad and a 100 km tunnel under the Bering Strait. See, Helga Zepp-LaRouche, “The Eurasian Land-Bridge is becoming a Reality! A New World Order of Peace through Development Corridors”, <*www.larouchepac.com/node/5301/pdf*>, 14 February 2009.

Moreover, we see that the world's nuclear revival has been centered on Eurasia, China, Russia, and India which are undertaking programs to build dozens of new nuclear plants over the next decades. These nations not only pursue development of new generations of nuclear technology they are also making nuclear energy available to other nations. For example power generation in Russia is to grow 66 % by 2020 while the share of nuclear energy in that power production is planned to be raised to 25 %. Russia not only initiated a major reform of the nuclear sector but also attempted to create International Uranium Enrichment Centers in Russia under the supervision of the International Atomic Energy Agency (IAEA) that welcomes the participation of any nation which respects IAEA (International Atomic Energy Agency) policy and uses the uranium purely for civilian energy generation. Russian efforts to separate military and civilian nuclear facilities generated an enthusiasm towards more cooperation with Russia among the countries which have no nuclear bombs but already have several nuclear plants like Japan.

China is also determined to become a major player in this field which has ongoing cooperation with the United States as well as Russia in building more advanced facilities.[6] One of the aspirations of China is to become independent of foreign conventional fission technology. China's long term goal is to move toward fast breeder reactors. China supports research and development on advanced fuel cycles that will use uranium more effectively and, possibly, thorium. The newly elected US President Barack Obama's proposition to resume exchanges with Chinese nuclear weapons laboratories that were terminated in the 1990s, in order to accelerate bilateral nuclear energy cooperation, constitutes an example how far international cooperation in nuclear market can go.

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[6]On February 28, 2005, Westinghouse Electric Company submitted a bid for a People's Republic of China contract to supply four commercial nuclear reactors Westinghouse's bid to sell nuclear reactors to China was supported by the Bush Administration. For more detailed discussion see, Shirley Kan and Mark Holt, "US-China Nuclear Cooperation Agreement", *Congressional Research Service Report*, 6 September 2007.

India which plans to deploy dozens of nuclear plants attaches high priority to energy independence and sees the development of thorium-based nuclear cycles as the major vehicle towards that goal. India's drive to expand reliance on nuclear energy is closely linked with its desire to find a solution to India's water problems which require the extensive desalination of seawater. Again we see a trend that is similar to what has been happening in US-Chinese relations, prospects for US-Indian cooperation are growing.

In fact, the US' nuclear power assistance to India marked a significant break from decades of the US nuclear policy. In accordance with the *Civil Nuclear Cooperation Agreement* which was signed on March 2, 2006, in New Delhi by George W. Bush and Manmohan Singh, India has to separate its civilian and military nuclear programs over the next eight years in order to gain the US expertise and nuclear fuel to meet it's rapidly rising energy needs. With this agreement India's civilian facilities became subject to permanent international inspections for the first time. The bilateral cooperation between the US and India in the nuclear field is often explained as a result of American desire to develop a distinct relationship with India aimed at weakening the motivation towards a closer relationship between China and India in world affairs. However, there are also some American experts who highlight the risks of that deal, stressing the fact that it would allow India to import uranium to fuel its civilian program and free up its local supplies to fuel the weapons program. Though India only possesses a meager 1% of the global uranium reserves, it is self-sufficient in thorium which possesses 25% of the world's known and economically viable thorium.[7]

Climate Change

Nuclear energy also is increasingly being viewed as a remedy to climate change and energy security since it emits no carbon dioxide and contributes little to greenhouse emissions. This assertion gained further strength whenever James Lovelock who is a scientist

[7]Jim Vande Hei and Dafna Linzer, "US-India Reach Deal on Nuclear Cooperation", *Washington Post*, 3 March 2006.

as well as an environmentalist, published an article claiming that "Nuclear power is the only green solution".[8]

Nowadays, there is a growing interest in the West European countries to consider nuclear reactors as one of the energy options to combat climate change. Even in Germany, where public opinion traditionally opposes to nuclear energy, the coalition government of Chancellor Angela Merkel is thinking to reverse the decision to phase out the country's nuclear plants.[9]

However the extend to which increasing reliance on nuclear energy will solve the problem of greenhouse emissions is not clear yet. According to the forecasts made the nuclear power share in overall energy generation is expected to be doubled by 2030.[10] It is interesting to note that electricity growth will take place in the developing world specifically in China and India which are not bound to Kyoto Protocol reductions.[11] Conflicting growth imperatives prevent the development of a common vision in environmental policies. While the developing nations are inclined to view binding emission limits as impediments to economic growth, industrialized nations are reluctant to reduce the levels of greenhouse gas emissions if the developing nations do not apply.

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[8]For more on the article see, James Lovelock, "Nuclear Power is the Only Green Solution", *The Independent*, 24 May 2004, <*www.independent.co.uk/opinion/commentators/james-lovelock-nuclear-power-is-the-only-green-solution-564446.html*>, 14 February 2009.

[9]According to Merkel who has long championed a three-way mix in electrical power generation - fossil, renewable and nuclear, "The anti-nuclear decision, passed into law by the government of her Social Democrat predecessor Gerhard Schroeder, was absolutely wrong", "Merkel's Conservatives Advocate Return to Nuclear Energy", *Deutche Welle*, 9 June 2008.

[10]*EIA - International Energy Outlook 2008 - Highlights Section*, Report No. DOE/EIA-0484 (2008), June 2008.

[11]*The Kyoto Protocol to the United Nations Framework on Climate Change* entered into force in 2005, establishing legally binding levels for reductions in greenhouse gas emissions of an average to 6 to 8 percent below 1990 levels between the years 2008-2021.

What has to be added to that is the fact that new nuclear reactors will hardly make a difference in the time frame of the Kyoto Protocol since new nuclear power reactors will require 10-15 years to become operational after the decision to build them has taken.

Energy Independence

Many states are uncomfortable because of their dependence on imported energy resources. Their dependence is being used as a tool of pressure by supplier states. The natural gas price dispute between Russia and Ukraine in 2006 which resulted in a temporary cutoff of natural gas supplies to Western and Central Europe is a vivid example of this. In this vein, relative to gas and oil, nuclear reactors are considered a better source which offers greater assurance, lessening their dependency on Russian natural gas and oil.

From the Baltic to Bulgaria, governments in Eastern Europe which were used to be under intense pressure from the European Union to close the unsafe older-generation plants now are increasingly looking toward a revival of nuclear power generation to meet their growing energy demand. The opposition they face continuously accuse the governments because resorting to the easy option of nuclear power accepting the demands of a strong nuclear lobby rather than taking difficult decisions to encourage energy efficiency, cut waste and foster renewable energy sources like the wind from the Baltic Sea.[12]

Nuclear Energy Revival in the Middle East

Today in the Middle East we observe more than a dozen countries without nuclear power considering their nuclear options. These include Algeria, Bahrain, Egypt, Kuwait, Jordan, Libya, Morocco, Oman, Qatar, Saudi Arabia, Yemen, Tunisia, Turkey and United Arab Emirates (UAE). This renewed interest does not only

[12]Judy Dempsey, "Eastern Europe Looks to Nuclear Revival to Meet its Power Needs", *International Herald Tribune*, 29 October, 2008.

stem from individual desires but also comes as part of broader regional calls to develop nuclear power. After the Arab League Secretary-General Amr Mousa stated during the March 2006 league summit in Khartoum that "[t]he Arab world's quick and decisive entry into the field of peaceful use of nuclear power is necessary." in December 2006, the Gulf Cooperation Council (GCC), ordered a GCC-wide study for the development of a "joint program in the field of nuclear technology for peaceful purposes."[13]

For a country like Jordan which meets 95 % of its needs through imports, the call for diversified energy sources is a crucial one. Moreover, while Jordan lacks the hydrocarbon reserves of its eastern neighbors, it has large deposits of uranium which is more than sufficient to provide feedstock for both domestic usage and export. Jordan plans to have one nuclear reactor up and running by 2015, and considers plans to build more by 2030.

However, not only energy dependent states but also oil producing countries are expressing their desire to go nuclear. What are the causes of this sudden interest by more than half the member countries in the Arab League which have the abundance of traditional energy, mainly oil and gas?

Some experts say that the reasons why more than a dozen of Muslim Arab states find the nuclear option as attractive is not because of their energy needs as the primary concern but rather this tendency should be understood as a preventive measure against nuclear Iran. In this vein King Abdullah's words as "The rules have changed on the nuclear subject throughout the whole region. . . . After this summer everybody's going for nuclear programs" is often recalled in an attempt to highlight the implications of the war in Lebanon between Israel and Hezbollah which was perceived as evidence of Iran's growing clout.[14]

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[13]Peter Crail and Jessica Lasky-Fink, "Middle Eastern States Seeking Nuclear Power", *Arms Control Today*, May 2008.

[14]An example to similar kind of analyses see, Joseph Cirincione and Uri Leventer, "Recipe for War; the Middle East's Nuclear Surge", *International Herald Tribune*, 13 August 2007.

It is interesting to note that from 2002 until late 2005, while the international concern about Iran's nuclear file was high, the Arab states in Iran's neighborhood didn't voice any real concern. One possible explanation is that the ability of these states to directly control Iran or convince it to change its course was actually limited. So they have avoided making this kind of statements that might antagonize their powerful neighbor. Secondly, they might have thought that any criticism of a nuclear activity in an Arab or Muslim state is unjust as long as Israel is granted relative immunity in the nuclear realm. Thirdly rising influence of Iran became a fact in the Middle East more as a result of American failure in Iraq than its ongoing nuclear program which continuously raises fears about its real intentions.

In addition to that the following points could be made for the Arab countries: First, the assessment in the Arab states until 2006 was most likely that the US and Europe were working hard to curb Iran's nuclear activity and would hopefully take care of the problem for them. That approach changed toward the end of 2005. The growing realization was that the efforts to stop Iran were not succeeding and that race against time might end with a victory for Iran. It is also worth mentioning that possible bargains between the US, Iran and Israel became important sources of anxiety in the Arab world.[15]

However this does not mean that they support a possible US strike on Iran. On the contrary they are frightened by the fact that if the US strikes Iran, Iraq's "organized chaos" is likely to spill over into neighboring countries. The growing Shiite- Sunni schism in Iraq erupts across already volatile communities in Saudi Arabia, Bahrain and even in Kuwait.[16]

What is more important than their uneasiness with the US and European efforts to curb Iranian uranium enrichment activities, is the

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[15]On these factors see, Emily B. Landau, "Regional Reactions and Responses", *Bitterlemons Middle East Roundtable*, Ed. 11, Vol. 5, 14 March 2007.

[16]Saad Hattar, "The Nuclear Card in a Volatile Region", *Bitterlemons Middle East Roundtable*, Ed. 11, Vol. 5, 14 March 2007.

perception that Iran's influence in Iraq, in Lebanon and in Palestinian politics is growing.

I think the common point of all of these mixed feelings is the fear towards an "uncertain future". As studies on psychiatry point out, ambiguity as an important source of anxiety is more distressing than fear against an adversary and in order to avoid stress, ambiguities are likely to be transformed into fear.[17] We see that no matter how hard the Iranian President Mahmood Ahmedinejad tried to defuse the fears emanating from a shift of power in Iran's favor by projecting an image of "Muslim states resisting imperialist plans to divide them", several states in the Middle East expressed their desire to develop a civilian nuclear energy. In other words, the desire to go nuclear could be better be interpreted as a reaction against uncertainty, aimed at giving messages to Iran, since for most a nuclear capability is not likely to materialize anytime soon (since the nuclear route is very costly in economic terms).

Emotional patterns of the nations however do not only encompass fear or stress against uncertainty, they also involve pride and prestige that are not paid any attention by security centered approaches. Pride, prestige or the desire for status which is a crucial element of national identity makes possession of nuclear power stations in the Middle East, an expression, a display of a nation's potential power versus the others. Iran's nuclear research program which has certainly become a source of national pride for many Iranians has also triggered other Middle Eastern countries desire to acquire nuclear reactors to define an equal power status vis-à-vis Iran.

Turkish Decision to Go Nuclear

Turkey announced the plans to build as many as five atomic energy plants in 2007. The first, to be located on the Black Sea at Sinop, would come on line in 2012. The rise in oil prices and the need

[17] See, Sigmond Freud, *A General Introduction to Psychoanalysis*, New York, Pernma Giants, 1949, p. 345.

for multiple sources of energy are the primary reasons given to explain why Turkey needs nuclear energy an utmost priority.[18]

In this regard we see that Turkey's available energy needs are growing by eight percent every year and Turkey needs to upgrade its current production capacity of 40,000 megawatts to 90,000 until 2020. Turkish government argues that nuclear plants will ease Turkey's costly dependence on natural gas, 90 percent of which arrives by pipeline from Russia and Iran. On the other hand, the arguments of those who are opposed to nuclear energy in Turkey include the following:

- Nuclear waste is an ecological problem, whether it be buried or thrown into the sea.[19]

- Nuclear power plants are dangerous, in case of a leak in a power plant, all living beings would be affected, and ecosystems would be wiped out.

- They require very costly investments (it takes around 5 billion dollars to build one).

- Turkey has other choices; wind and solar energy are alternatives which would make financial and environmental sense.

It also has to be questioned whether Turkish decision originate from a desire to reach a balance with Iran's nuclear capabilities? An affirmative reply is difficult to support because discussions about Turkey's planned nuclear stations started long before the crisis with Iran. Turkey first considered nuclear power in 1965 and has made four previous attempts to start a nuclear power program.[20]

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[18]According to Turkish Energy Minister Hilmi Güler, "to meet Turkey's growing energy demands, nuclear energy is a must rather than a preference" (Dorian Jones, "Turkey's Government Says It is Pursuing Nuclear Energy", *Voice of America (VOA)*, 16 October 2007).

[19]Waste management is limited to radiological wastes in Turkey and there is a facility for interim storage of these wastes. This storage facility has been operating since 1989 in the Çekmece Nuclear Research and Training Center (İstanbul). In this facility compaction, cementation and precipitation processes have been carried out.

[20]Second Turkish attempt was realized in between 1967 and 1970 when a feasibility study was undertaken by a foreign consultant company to build a

Turkey has adopted a cautious approach to define Iran's nuclear activities as an immediate threat. Most important reasons why Turkey is not predisposed to perceive an Iranian military threat are the absence of sovereignty issues and power asymmetries together with the perceived need for mutual cooperation. Turkish-Iranian relations do not involve the most important source of violent conflicts and chronic crises between states which is the disagreement over sovereignty issues. In fact, the situation is just the opposite as the border was agreed in the Kasr-ı Şirin treaty signed in 1639 remained unchallenged since. After Iran's Islamic Revolution two sources of friction in Turkish-Iranian relations appeared. The first one was the Iran's efforts to export its regime and its support for radical religious terror while the second one was its assistance to Kurdish Workers Party (PKK) terrorists. Despite the fact that these problems have caused serious diplomatic confrontation between Ankara and Tehran, the way how they were handled highlights the fact that in the absence of sovereignty issues and military power imbalances two neighbors were not inclined to resort force as an instrument of diplomacy. Besides, any assessment on Turkey's and Iran's power would reveal the similarity in both countries' tangible elements of power (size of territory, population, military power, strategic depth etc.). The same kind of power status which is enjoyed by both Turkey and Iran creates two diverse effects. On the one hand, it contributes to the stability of Turkish-Iranian relations, on the other hand it provides incentives for both countries to compete for influence without

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300-400 MW nuclear power plant which was expected to operationalized in 1977. Because of the problems relating to site selection and other issues, the project did not come to fruition. Later in the Turkish Electricity Authority (TEK) decided to build an 80 MWe prototype plant. This time the project was cancelled in 1974 due to the fact that it could delay the construction of a greater capacity nuclear power plant. Consequently TEK had decided to build a 600 MWe NPP in southern Turkey. Gülnar-Akkuyu location was found suitable for the construction of the first nuclear power plant. In 1976, though Akkuyu was granted a site license as a result of the Swedish government's decision to withdraw a loan guarantee, the project was cancelled. A third attempt was made in 1980. Turkey favored a Build Operate Transfer (BOT) model but refused to give a governmental guarantee of the BOT credit so the Project was cancelled. For a detailed report on Turkey's nuclear profile see, *IAEA Country Nuclear Power Profile of Turkey*, 2003.

resorting to force. Moreover, both parties perceived a clear benefit from cooperation in defending territorial sovereignty of Iraq and preventing the establishment of an independent Kurdish state. Turkey believes that Kurdish aspirations to acquire independence would prompt an internal strife in Iraq and threaten Turkey's internal safety and stability.

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In Iran's view, standing against the Iraqi Kurds' demand for independence is equivalent to standing against the US's plans in Iraq.[21]

While the Turkish nuclear attempts could not be considered as efforts to match the developments in Iran it is also true that Iran offered to the Justice and Development Party government a much more favorable environment than before to take bold initiatives towards obtaining nuclear power stations.

Challenges Ahead

The key question according to several experts is whether nuclear expansion will be limited to reactors only, or will it include enrichment and reprocessing facilities. Pessimism about the proliferation sensitive nuclear fuel cycle technology is growing simply because uranium enrichment and spent fuel reprocessing could provide the essential fissile material for nuclear weapons. Uranium conversion, enrichment and fuel fabrication; the 3 steps after uranium mining that are necessary before fuel can be inserted into a reactor are now concentrated in a handful of countries.

It is unlikely that the states which expressed their desire to go nuclear will pursue a full nuclear cycle in the short and medium run but they may also wish to keep their options open. Although cost and

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[21]S. Gülden Ayman, "İran Nükleer Krizi ve Türkiye", *Avrasya Dosyası, Türkiye-Ortadoğu Özel Sayısı*, Vol. 12 (2), 2006, pp. 25-61.

economies of scale argue against additional enrichment capacity, this may not be enough to dissuade some states from pursuing enrichment.

Reducing the risk of proliferation in the Middle East requires an insurance against plutonium separation and uranium enrichment capabilities and minimization of stocks of plutonium. In this vein, the countries which go nuclear should accept adequate international inspections of these including the adoption of the Additional Protocol, and develop mechanisms to remove the spent fuel from the region. This means that the Middle Eastern countries have to commit themselves for a prolonged period of time to a verified arrangement not to have any enrichment, reprocessing or other sensitive fuel-cycle activities on their territories since traditional safeguards are not adequate to detect countries conducting secret plutonium separation or enrichment efforts.[22]

The efforts of the IAEA have critical importance regarding the management of the nuclear power expansion. On the practical side, additional facilities will mean additional safeguard effort by IAEA inspectors. Although reactors themselves require relatively few inspection days, there will be significant work in helping prepare new nuclear states for nuclear power programs. In case nuclear renaissance results in more states with enrichment & reprocessing, the task of inspecting such facilities could place significant strain on IAEA and the safeguard system.[23]

As we know, while permitting traditional inspections by the IAEA Iraq, Iran, Syria, Algeria, and Libya avoided detection of their clandestine nuclear programs. If new nuclear countries refuse to accept the more intrusive inspections embodied in the Additional Protocol, IAEA cannot provide adequate assurances that a country's nuclear energy program is purely civilian in nature.[24]

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[22]Sharon Squassoni, "Risks and Realities: The New Nuclear Energy Revival", *Arms Control Today*, May 2007.

[23] *Ibid.*

[24]David Albright and Andrea Scheel, "Unprecedented Projected Nuclear Growth in the Middle East: Now is the Time to Create Effective Barriers to Proliferation", *ISIS* (Institute for Science and International Technology) *Report*, 12 November 2008.

However, of fifteen Middle Eastern countries that have expressed interest in nuclear power, fewer than half have signed or ratified the Additional Protocol. Apart from that not all of the countries which signed the Additional Protocol have the Protocol in force. Iran, Iraq, Morocco, and Tunisia have signed it. Iran suspended its compliance with the Protocol in early 2006 in defiance of the UN Security Council. Those which have the Protocol in force include only Jordan, Turkey,[25] Libya, and Kuwait. Egypt announced in 2007 that it would not sign the Additional Protocol.[26]

Proposals offering countries access to nuclear power and thus the fuel cycle range from a formal commitment by these countries to forswear enrichment and reprocessing technology, to a de facto approach in which a state does not operate fuel cycle facilities but makes no explicit commitment, to no restrictions at all. One of the important reasons why states are deterred from developing enrichment and reprocessing is the high technical and financial costs of developing sensitive nuclear technologies. Growing concern about the spread of enrichment technology and optimism about new nuclear technologies that may offer more proliferation-resistant systems also contribute efforts to limit access to the nuclear fuel cycle.

Whether states developing their nuclear programs would find these proposals attractive enough to forgo what they see as their "inalienable" right to develop nuclear technology for peaceful purposes remains to be seen. So far Middle East countries seem to differ in their approach to accept a moratorium on the development of reprocessing and enrichment capabilities. Egypt has rejected such a

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[25]Turkey signed the NPT in 1969 and the Treaty was ratified by parliament on 29 March 1979. The treaty obligations are implemented by license conditions and by controlling the import and export of such materials according to the published Turkish regulations. The IAEA and the Republic of Turkey signed a Safeguard Agreement on 30 June 1981. Turkey accepted the International Safeguards administered by IAEA, and at the same time, its subsidiary arrangements and facility attachments were enforced for all nuclear facilities as a non-nuclear weapons state party to the NPT. The Protocol Additional to the Agreement between the Government of the Republic of Turkey and the IAEA for the Application of Safeguards in Connection with NPT (93+2) was ratified in June 2001.

[26]Albright and Scheel, "Unprecedented Projected…".

moratorium while the United Arab Emirates (UAE) has indicated that it may renounce acquisition of these capabilities and rely on supplier countries for both fuel provision and spent fuel repatriation. Turkey at the Preparatory Committee for the 2010 Non-Proliferation Treaty Review Conference advocated that the right of states to make their own fuel cycle choice must be respected.[27]

There also appeared some countries interested in developing enrichment capabilities like Argentina, Australia, Canada and South Africa which do not have a domestic reactor base that would require the development of an enrichment capability. They are interested for export purposes only. Obviously additional capacity in these countries may not cause alarm, but it will make it increasingly difficult to justify why other states should not develop such capabilities.

So far, the critical question remains, how can access to sensitive fuel cycle activities be restricted without further alienating non-nuclear weapon states in the NPT?[28]

Nuclearization of the Conflict Ridden Middle East

As for the Middle East one question which is often posed is that whether new nuclear states would raise proliferation concerns by virtue of their geographic location because of the existence of terrorist groups in their soil and because of other resources of political instability.

Some scenarios include the possibility of proliferation of nuclear nukes in the Middle East. In this vein, we hear discussions,

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[27]Michael Spies, "Highlights from the Cluster 2 Discussion", *Arms Control Reporter, News in Brief*, the daily NGO newsletter from the Second Session of the Preparatory Committee for the 2010 Nuclear Non-Proliferation Treaty Review Conference, 7 May 2008.

[28]Mary Beth Dunham Nikitin, Jill Marie Parillo, Sharon Squassoni, Anthony Andrews and Mark Holt, "Managing the Nuclear Fuel Cycle: Policy Implications of Expanding Global Access to Nuclear Power", *Congressional Research Service Report*, 1 November 2007.

different answers to questions like do weaker or non-democratic states are more prone to use their nukes irrationally or not? In case such a military proliferation occurs what would be the political and strategic impact of nuclear expansion? Will it contribute to the security and stability in the Middle East particularly to their relations with Iran?

So far Iran seems to have no problems with the idea of nuclearization of the region for peaceful purposes. Israel still is the only nuclear state in the region. How such developments affect Israel's security and their relations with the US? According to an American political scientist Robert Jervis, if American allies go nuclear, some countries will continue to need the US, but not as much in the past because it will reduce American leverage.[29]

So long as nuclear weapons associated with an "independent" and "sovereign" foreign policy there would be an attraction to acquire them. Iran's nuclearization is the most important driving force in this regard. Yet the desire for status does not automatically translate into an attitude favoring acquisition of the bomb. It very much depends upon whether Iran possess it and whether non-proliferation as a norm rather than nuclear arms becomes a symbol of international prestige.

Concluding Remarks

As long as energy demand is a *force majore* for all countries to take radical steps, nuclear energy will remain to be the easy but lethal solution. The recent energy interruption in Europe because of the Russia-Ukraine dispute over unpaid bills, proved that not all countries are patient enough to wait for miracles to happen.[30] Slovakia for example decided to restart its dormant and risky nuclear facilities which were shut down by the EU.[31]

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[29]Drake Bennett , "Give Nukes a Chance-Can the Spread of Nuclear Weapons Make Us Safer?", *The Boston Globe*, 20 March 2005.

[30]David Charter**,** Adam LeBor, and Helen Womack**, "**States of Emergency Declared across Europe over Gas", *UK Sunday Times*, 8 January 2009.

[31]Slovakia, declared a state of emergency on January 6, under which gas deliveries to large clients were reduced. About 1,000 companies were forced to shut or cut production (Dmitry Zhdannikov and Ron Popeski,

The establishment of "Regional Cooperation Systems- RCS" could offer a solution to nuclear energy problem. Countries that are capable of establishing, operating and maintaining nuclear plants may establish energy grids to supply adequate energy for the surrounding countries. This system would be made of countries that they need each other as each would supply one essential part of the system, i.e. raw materials, know-how, technology and the capital.

As the fossil energy era is coming to an end soon, oil producing countries are right to think about the future. Therefore, the European Union should start to establish an RCS for its members. The same system could be established in the Middle East with a partnership between Turkey, Iran and the Gulf States. North Africa is another example.

An energy partnership between conflicting countries (Iran/Arabs, Israel/Arabs, the two Koreas…etc.) could eliminate the possibility of using nuclear energy as a weapon and foster the peace between nations. Undoubtedly it requires a paradigm shift in the minds of national elites which could not be realized easily.

"Worried EU States to Fly to Moscow over Gas Row", *Reuters*, 13 January 2009.