NUCLEAR ENERGY

Is it safety or political will?

DR. ABDULLAH A. DEWAN

NO NONSENSE

In view of the growing need for electricity, the Rooppur Nuclear Power Project (RONUPP) first conceived in 1961 went through numerous national and international feasibility studies and reviews both before and after independence. The latest joint study conducted in 1987-88 by M/s Lahmeyer of Germany and M/s Motor Columbus of Switzerland, reaffirmed the technical, economic and financial viability of the project. In 1997 the IAEA responded positively for providing technical assistance. The same year the government of Bangladesh reviewed the overall situation and decided to go for nuclear power. Hopes were raised only to be dashed.

THE June 12 report in The Daily Star (TDS) that Kuwait has agreed to finance a 450-megawatt power plant in Chittagong and to sell fuel on deferred payments is a hopeful sign for a country mired in and hindered by all encompassing political unrest, economic malaise of poverty and price spiral, poor governance with politicisation, corruption and most importantly, leadership ineptitude.

TDS further reported that Bangladesh buys petroleum products worth $1.5 billion annually. With ever depleting reserves of crude oil and ever increasing global thirst for petroleum products and their price hikes Bangladesh's foreign oil bills will only see an upward trajectory.

Some recent articles in TDS seem to have opened up the debate on nuclear power with renewed interest. Although the article by Khalid Shams (TDS April 29) disappointed me greatly, a May 29 rebuttal (letter to the editor) by Dr. Anwar Hossain (my former colleague and Chairman of BAEC) induced me to write this piece in defense of nuclear power.

Khalid's arguments against Nuclear Power Plant (NPP) are primitive and predated and were aptly applied against the Rooppur Nuclear Power Project (RONUPP) when it was first conceived in 1961. That was 45 years ago. Also much has advanced since the 1979 Three Mile Island and the 1986 Chernobyl NPP accidents. Today NPP's designs are safer than before and there is no new technology to add to make them any safer.

When it comes to deciding on the sources of electricity generation, the rational criteria are physical safety, environmental pollutions, cost economics, production reliability and stability of fuel supply. These criteria place nuclear power ahead of all other known sources of energy supply.

As of May, 2006, there were 441 NPPs generating electricity in 30 countries worldwide and in 11 countries 27 new plants were reported to be under construction. Of these, 103 commercial NPPs are producing electricity in the US. These plants are, on average, 24 years old, and are licensed to operate for 40 years with an option to renew for an additional 20.

Today, NPPs supply about 20% of the US electricity needs each year. NPPs provided some 16% of the world's electricity production in 2004. Countries that harnessed the largest percentage of their electricity in 2005 from nuclear source were: France, 78.5%; Lithuania, 69.6%; Slovakia, 56.1%; Belgium, 55.6%; Ukraine, 48.5%; Sweden, 46.7%; Republic of Korea, 44.7%; Bulgaria, 44.1%; Slovenia, 42.4%; Hungary, 37.2% ;and Finland, 32.9%.

Will the nuclear sceptics tell me why so many countries harnessing nuclear power would risk the health and lives of their citizens?

In the US and elsewhere, a nuclear power plant is protected by multiple safety systems and physical construction using the so-called "defence-in-depth" strategy. This strategy is designed to protect the public from radiological hazards in the event of a reactor malfunction also protects the reactor's fuel and safety systems from attempted sabotage. There are emergency procedures in place specifically for security situations, including automatic shutdown of the reactor in the event of an attack or a serious malfunction.

The dome that houses the nuclear reactor (also the facility where spent fuel is stored) is designed to be impermeable to catastrophes. The structure is built by steel reinforced concrete (4 to 5 feet wide with thin steel liner) coupled with multiple, redundant safety and plant shutdown systems, to withstand the impact of hurricanes, tornadoes, floods, and airborne objects such as wide-body commercial aircraft with a very substantial force. The reactor vessel itself is made of steel that is about six inches thick.

For years, America's commercial nuclear power industry has ranked among the safest places to work in. In 2005, the industry's safety accident rate--which indicates the number of accidents that result in lost work time, restricted work or fatalities--was 0.24 per 200,000 worker-hours. The U.S. Bureau of Labour Statistics ascertained that it is safer to work at an NPP than in the manufacturing sector and even in the real estate and finance industries.

Believe it or not, experts estimated that even if you live next door to a NPP, you would still expose yourself to less radiation each year than you would receive in just one round-trip flight from New York to Los Angeles. Further, to get the same amount of radiation exposure as released from a single diagnostic medical x-ray you would have to live near a NPP for over 2,000 years (yes, over 2000 years).

An NPP cannot explode like an atomic bomb. A bomb converts a large part of its U-235 or plutonium into fission fragments in about 10-8 seconds (that is, 0.00000008 seconds) and then flies apart. This is because a bomb is made of a very compact mass of nearly pure fissionable material, so the chain reaction causing neutrons don't have to travel far to hit another fissionable atom. A power plant is far too big to convert an important part of its fissionable material before it has generated enough heat to fly apart.

People are concerned about both low- and high-level radioactive wastes; the latter, though smaller in volume is somewhat technically problematic. With the rise of nuclear electrification, the volume of spent fuel and other wastes has risen substantially; but is still small and should not be the only deterrent against harnessing nuclear power.

The costs (reactor operations and maintenance plus spent fuel) of producing electricity at a nuclear power plant have been declining over the past decade. In 2004 the average production cost for the U.S. nuclear fleet was 1.68 cents per kwh, down from 3.63 cents in 1987. In addition, there are no unexpected additional costs.

The estimated average electricity production cost in 2004 for nuclear energy was 1.68 cents/kwh (down from 3.63 cents in 1987), for coal-fired plants 1.90 cents, for oil 5.39 cents, and for gas 5.87 cents. Thus NPPs provide low-cost, reliable power at stable prices and are also essential for cutting energy dependence on foreign sources.

The criterion of reliability is measured by capacity factor -- the percentage of electricity actually produced to relative plant capacity (potential amount the plant is designed to produce). The average capacity factor for U.S. nuclear plants was 89.6% in 2005, compared to coal at 72.6% percent, natural gas at a range of 15.6 to 37.7% (depending on the kind of plant), heavy oil steam turbine at 29.8%, hydro at 29.3%, wind at 26.8%, solar at 18.8%, and geothermal at 75.5%. These statistics are compelling evidence that NPPs are stable source of power generation.

Since there is no scepticism on the question of stable nuclear fuel supplies and the fact that today's nuclear power is the most eco-efficient of all energy sources this article skips any further dialogue on these issues.

In view of the growing need for electricity, the Rooppur Nuclear Power Project (RONUPP) first conceived in 1961 went through numerous national and international feasibility studies and reviews both before and after independence. The latest joint study conducted in 1987-88 by M/s Lahmeyer of Germany and M/s Motor Columbus of Switzerland, reaffirmed the technical, economic and financial viability of the project but it failed to come into being for lack of foreign financing.

Subsequently, a number of reactor suppliers have shown interest when a privatisation policy was proposed which included participation in generating electricity through choices of Build, Operate and Own (BOO) or Build, Operate and Transfer (BOT). In 1997 the IAEA responded positively for providing technical assistance. The same year the government of Bangladesh reviewed the overall situation and decided to go for nuclear power. Hopes were raised only to be dashed. Another decade will soon drown in history having not seen the political will releasing RONUPP out of the incubator.

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A petty response to big challenges

M B NAQVI
writes from Karachi

PLAIN WORDS

How is Pakistan going to meet the mountainous challenges it faces both in the political and economic spheres is the question. Nearly all palliatives have been tried and found wanting. Stop-gap arrangements or experiments by novices can make matters worse and it has happened. There is however a way out. The year 2007 is the election year. Let us make it a truly free election. But let it be a preliminary electoral exercise first to get a representative government.

LIKE all military regimes before it, this too has accumulated popular discontent and much opposition. The desire for a true change is patent. The popular aspirations of peace and prosperity have not been met in any recognisable way. The year 2007 is an election year. Let the new elections be as fair and of the same kind as the 1970's were. Care has however to be taken that Yahya Khan's blunder of rejecting the polls' results is avoided.

Nature of challenges the country faces is well known. The political sway of Islamic parties over NWFP and parts of Balochistan is a monumental challenge. One of hasty responses to it has led to an unwinnable war with tribesmen in several Tribal Agencies. Then the quick reversion to the old pre-independence practices were reaffirmed as a new policy after they had been shown to be inadequate and dated. Despite this political retreat, the war has not ended nor does it look likely to.

Two separate kinds of wars are going on in Balochistan. There are the resurgent Taliban who are making the life of Afghanistan's Karzai regime and his NATO troops difficult. This is causing unending complications in Pakistan's external affairs. A sourness has crept in Pakistan's relations with America, Britain and the west as also with Karzai government; the latter keeps accusing Pakistan of what is aggression. This war of its own kind can get these countries into further trouble, if not wisely handled. Incidentally Pakistan has to review its Afghan policy in a thoroughgoing manner; the totally unrealistic dream of dominating large parts of Afghanistan had better be given up. Let us be content with a peaceful, friendly and cooperative relationship with that country on the basis of complete equality, with no interference from Pakistan.

The second war in Balochistan is between Army and its paramilitary ancillaries, on one side, and assorted Balochistan nationalists, on the other. Its intensity waxes and wanes. But what remains constant is tension and fear on both sides. It is totally unacceptable. No one expects the rag-tag Balochistan Liberation Army to triumph over Pakistan Army. But the fratricidal war is simply poison for Pakistan's federal structure.

Dissatisfaction in Sindh is no news. There is little violence but restiveness is pervasive. The ethnic Sindhis are wholly dissatisfied and regard the military regime as a kind of One Unit. The necessity of having to share power in the provincial government with MQM makes them furious. It is still a safe bet that electorally most of Rural Sindh, including smaller cities, is a PPP constituency. The relationship between MQM and PPP remains as explosive as ever. There are fears for the future.

Even if largely non-violent and rather ineffective, the most widespread sentiment in Sindh is one of alienation and people demand more autonomy. Doubtless, MQM has been making energetic overtures to the Sindhis by demanding provincial autonomy even more vociferously than other members of PONAM (Pakistan Oppressed Nations Movement). One foregoes the mention of rather petty jealousies and ethnicities that comprises politics in Punjab. One regards them as no big challenge for the polls or after.

The point is the regime, like all military ones before it, began its life with tall promises of solving Pakistan's major problems. There is no point in repeating those promises; the government propaganda machinery has done its job. The more relevant consideration is what has the regime delivered in over six and a half years? It has only aggravated widespread resentment, dissatisfaction and a desire for real change. That precisely had happened in every case of military rule; this fourth time makes the problem grave. The regime has certainly carried out some reforms in administration, police and district governments.

The nature of the reforms, it now turns out, is as if they had been drafted by undergraduates as an academic exercise. The all-important question of centre-province relationship is at an all time low. Then nature of the regime being basically unitary, its inability to make up its mind on controversial questions shows how serious the differences are even within the ruling circles. Differences in the bureaucracy over the division of Indus waters, money, electricity and other resources are well known. One significant issue is that the regime is unable to act as a well-adjusted government; Kalabagh Dam is an example. The inter-provincial coordination is serving the interests of only sustaining some Ministers or civil servants. Political unity among the Pakistanis is also at an all time low, what with polarizations over ideological questions and regional nationalisms.

Much more important for the common man is what he finds in the market place everyday. Economic reality at the grassroots is no tribute to the regime. The regime has been most strenuously propagandist about its own achievements in economic spheres. Doubtless many demands of the IMF were met. The macro-economic indicators show that the economy had been more or less stabilized compared to the default or near default situation that Nawaz Sharif government forced after 1998. But that stability, circa 2004, is now being eroded rapidly. Three major deficits are beginning to emerge: budgetary, trade and current accounts. The architect of the economic Miracle of Pakistan is Mr. Shaukat Aziz who claims that Pakistan is now all set to takeoff; it is already in the league of countries that return high growths. This was based on last year's achievement of GDP growth of 8.4 per cent. Whether this can again be achieved is not certain. But it is possible. Overall, these are results that have won a respect for Mr. Aziz in the western press and his image is attractive abroad.

But Pakistanis cannot forget what happened to Indian politics. There too the market supremacy represented by globalisation paradigm had led to high success. The BJP government was so fascinated by its own achievements that it fought a general election on the slogan of India Shining. The reality on the ground in India however was different. The countryside had been left out and was poverty stricken; farmers' suicides became a big story that could not but have consequences. The BJP lost the election. The current UPA government in India is faced with a painful dilemma: should it persist with the WTO-favoured paradigm or should it dilute it with measures that Indian Left is suggesting. Pakistan too faces increasing unemployment, an intensity of poverty no matter what its true numbers are. The reality for the majority is poverty, unemployment and sky high prices. This is the same *masala* that cost BJP its rule over India.

Let us forget about India because India has mountainous problems and a mountainous advantage. The advantage it has, and Pakistan does not, is a stable political system of representative democracy. That enables that country to absorb huge shocks and ensures peaceful regime changes through untampered elections. How is Pakistan going to meet the mountainous challenges it faces both in the political and economic spheres is the question.

Nearly all palliatives have been tried and found wanting. Stop-gap arrangements or experiments by novices can make matters worse and it has happened. There is however a way out. The year 2007 is the election year. Let us make it a truly free election. But let it be a preliminary electoral exercise first to get a representative government. That it should, after an interval of, say a year, hold another free election to approve comprehensive reforms that Pakistan actually needs. A whole new social contract is needed. Let that be done after due deliberation and examination by a second truly representative parliament and not by those elected under military's management.

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Georesource exploitation for socio-economic emancipation

DR. AFTAB ALAM KHAN

Why can't we take lesson from Indonesia and Nigeria? The leasing out of offshore of Bangladesh for the purpose was marginally acceptable, but we have dug our own grave by offering the entire onshore of the country to the foreign investors. Nation's entire discovered gas reserve is in the hands of some IOCs. We are absolutely at the mercy of the guests who are dictating and controlling the benefit derivations of host's resources.

GEORESOURCES such as coal, industrial rocks and minerals, oil and gas, are nature's gift bestowed upon a nation. Exploitation of something is making full use of it and deriving benefit therefrom. The prosperity of a nation greatly depends on proper utilization and exploitation of such resources. In Bangladesh the resources are being exploited in a very unfair or selfish way which might lead to a very acute socio-economic crisis in the days to come. Human civilization has gone through various stages like stone age, Iron Age, Fossil Fuel Age, and has entered the Nuclear Age. During every stage of civilisation, exploitation of georesources had played the key role for its survival. New exploitation mechanisms have evolved with the transformations of civilisation.

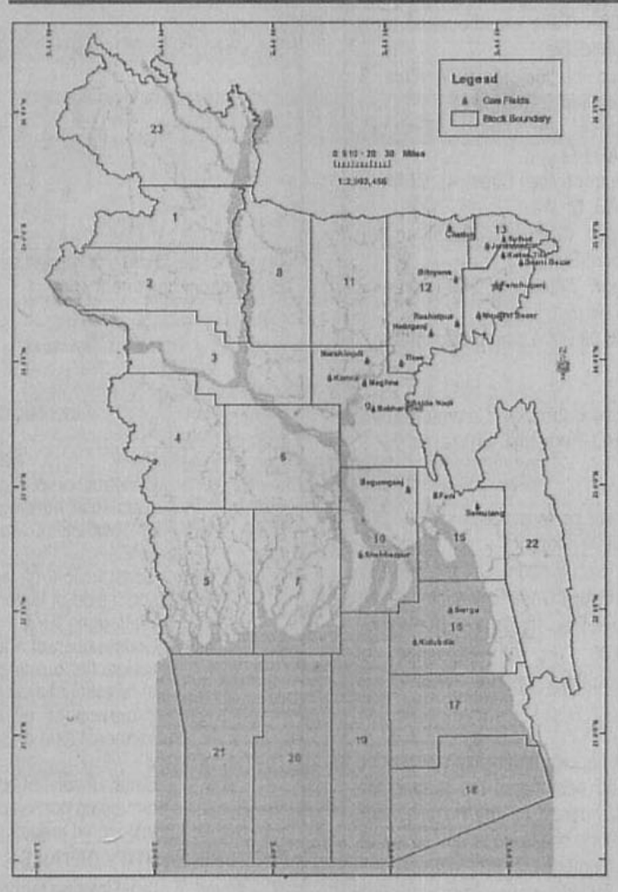
However, "Survival of the fittest" philosophy has been practiced and executed through applying the same mechanism, "power". Therefore, power is the index of survival. The nature of execution of power from physical to nuclear, from autocratic to democratic has also been changed with time. We all cry for democracy, more for democratic rights. Unless, we also cry for democratic duties, the fulfilment of democracy will be hard to achieve. Exploitation scenario, in the name of democracy, will continue to worsen unless a proper "give and take" mechanism is practiced ensuring right to survive for all individuals. Until the coupling between the government and the people is ensured, the sustainable fruitful production with respect to socio-economic emancipation will be hard to achieve.

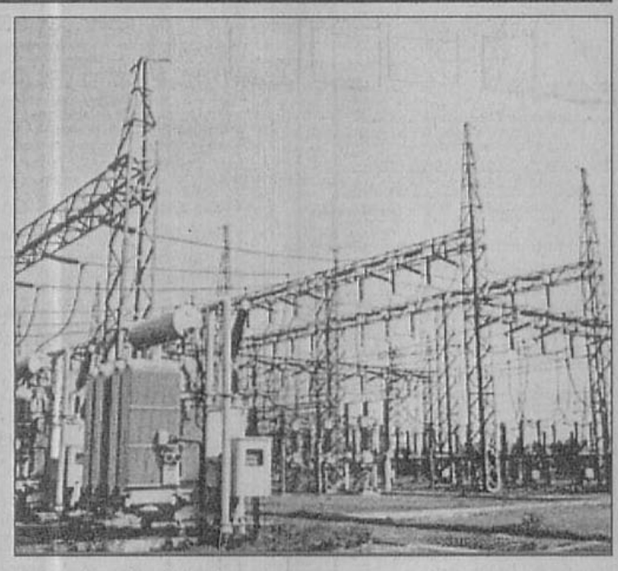
However, the changes in the nature of execution of power always have been based on gaining control of economic power by the powerful -- over the powerless. Here comes the question of socio-economic emancipation for the benefit of humanity. Socio-economic emancipation of the people and of the nation are hard to come by if the socio-economic theories are practiced badly or selfishly.

History of exploitation

Our predecessors found georesources and exploited them. They were aware that these resources have geologic limits, and they knew that some day these resources would be depleted. Depletion was a matter of concern for people, for communities, and sometimes for the entire nation. Now, from vantage points in space and in history, we have begun to see the actual dimensions of the earth and its resources and we have begun to realise how badly we have misused these resources. In the remains of the gold-silver work at Cassandra in Greece, there is evidence that people dug in search of faulted vein segments some time prior to 300 BC. Their Athenian contemporaries, faced with the depletion of silver and lead ore at Laurium, recognised marble near a schist contact and sunk more than 1000 shafts through barren rock, some to depths of 100m, in search of hidden ore bodies. During the sixteenth century, Georgius Agricola, a physician of Chemnitz, Saxony (Germany), published several essays on prospecting, mining, and metallurgy that dominated geologic thought for two centuries.

Oil and gas exploration is also a very old pursuit. The Bible contains many references to the use of pitch or asphalt collected from the natural seepages which are abundant in the Middle East. Herodotus, writing in about 450 B.C., described oil seeps in Carthage (Tunisia), and the Greek island Zachynthus. He gave details of oil extraction from wells near Ardericca in modern Iran. Oil, salt, and bitumen were produced simultaneously from these wells. The first well in the Western world specifically sunk to search for oil appears to have been at Pechelbronn, France, in 1745. Oil and gas production in Illinois, USA began in 1853 when marsh or drift gas was produced from two wells drilled near Champaign. This gas came from rotting vegetation buried in the glacial deposits. At the time, people knew little about where gas or oil came from, or how to search for them. However, the fact is, the control over the exploitation of these valuable resources has never gone to any one outside the region and nation. They have developed every aspect of exploitation thus ensuring interests and benefits of the nation, while we have remained ignorant, therefore, exploited.





A gas turbine plant (above)
Locations of gas fields with PSC blocks (left)

Bangladesh scenario

Bangladesh, geographically, is one of the smallest countries in the world. It is also one of the most densely populated countries. Nonetheless, it is blessed with geologically occurring potential resources like coal, building stones including hard rocks, boulders, gravel, and gas in economically exploitable form. In addition, white clay, glass sand, beach sand containing heavy minerals, and oil have also been found. The prediction of coal deposit in the north-western region of Bangladesh came as early as 1829 when Raniganj coal mine in West Bengal, India was inaugurated. However, the economic deposit of coal in Bangladesh became certain when the then Geological Survey of Pakistan (GSP), now Geological Survey of Bangladesh (GSB) first drilled exploratory wells in Jaipurhat in the year 1962. Subsequently, more discoveries of coal deposits were made by GSB at Boropukuria, Khalaspir, and Dighipara in 1985, 1989, and 1995 respectively. Phulbari coal deposit was discovered by BHP, a foreign mining company in 1999. Boropukuria coal deposit has already entered the production phase, as has the hard rock mining at Madhayapara.

The exploration for oil and gas began as early as 1910. The first phase of the activities continued until 1933 during British colonial rule in India without any success. After the Second World War, the activities for finding oil began in 1951 by major international oil companies like Shell, Stanvac, Pakistan Petroleum Limited, and by the national Oil and Gas Development Company (OGDC) and continued until 1971. Most of the gas discoveries were made during this phase. After the liberation of Bangladesh in 1971, Bangladesh Petroleum Act 1974 was promulgated and six international oil companies such as ARCO, Union Oil, BODC (Nippon Oil), Inanaftaplin (Yougoslav State Oil), Canadian Superior Oil, and Ashland entered in oil exploration in the offshore region of Bangladesh under PSC (production sharing contract) with the Government of Bangladesh. All these companies wound up their activities by 1977 for mysterious reasons. The oil and gas exploration activities gained momentum in the early Nineties with the participation of some other international oil companies, possibly due to very liberal and soft terms extended to them.

However, very little and insignificant discovery, except the Bibiana discovery, was made in the third phase of the venture. This clearly shows our long history of understanding of the role and importance of the georesources in socio-economic emancipation of the nation. Nevertheless, regretfully enough, this simple fact has continuously been ignored for petty interest. Complications arose when, in the name of economic emancipation and to meet exorbitant future projected energy demand, the entire country was indiscriminately leased out for exploration and exploitation of invaluable georesource like oil and gas. How prudent was this? Even our neighbour India, having vast georesources, has never offered its resources to foreign investors to exploit like have done in the past, and are in the process of doing further.

Why can't we take lesson from Indonesia and Nigeria? The leasing out of offshore of Bangladesh for the purpose was marginally acceptable, but we have dug our own grave by offering the entire onshore of the country to the foreign investors. Nation's entire discovered gas reserve is in the hands of some IOCs. We are absolutely at the mercy of the guests who are dictating and controlling the benefit derivations of host's resources. So far PSC "cost recovery phase" of Shangu gas shot-up from US$90 million to US$267 million and purchasing our own gas at international price left a virtually negative profit balance for the country. How can we forget an absolute negative profit balance by giving away our own discovered Jalalabad gas field on a ghost payment of only US$55 million losing billions of dollars? How can we justify giving away Moulvibazar gas fields, Feni and Chatak gas field virtually free without ensuring the minimum interest of the nation? Prof. Wahiduddin Mahmud rightly pointed out, "Foreign direct investment (FDI) brings in the much-needed foreign funds for current investment, but it also creates long-term debt obligation in the form of future repatriation of profits earned by the foreign investors" (The Daily Star, March 22, 2006).

Even before the gas controversy is solved and a mechanism evolved ensuring optimum benefits to the nation's socio-economy, another drama of exploitation has emerged with coal. Even if we ignore all environmental and social flaws of the coal drama, how can the financial flaw be ignored? Dr. Mostafizur Rahman, very interestingly, has shown how a total loss to the tune of about US$37 billion would be incurred if both Phulbaria and Boropukuria coal fields are given to the foreign investors for open-pit venture (The Daily Star, March 29, 2006). It is important to learn the lessons from the mistakes before it is too late. It is high time to reframe and restructure attitude, commitment and vision of exploitation to safeguard nation's interests and well-beings.

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