Fear is the key

DR. NIZAMUDDIN AHMED

> **The more secure we make our buildings, the more unsafe they are. What is then to be done? A positive starting point would be to live in constant fear that fire can and will strike. Survey your building immediately to identify blockages that will hinder escape of users. Assess the risk of your premises by design and usage. Employ more security staff to provide safety such that buildings are not encaged passively. Ensure first-hand fire-fighting measures, such as appropriate extinguishers and equipment to apply water (hosepipe/sprinklers).**

IT is possible by now you have forgotten the fire that struck the 11-storied BSEC Bhaban at Karwan Bazaar on 26 February, claiming four lives; 'only' according to the relieved.

It is possible by now you have again started disposing cigarette butts carelessly. Perhaps once again you have begun enjoying a cup of tea/coffee prepared in any corner of your office premises.

It is possible you have post-poned rehearsing escape from your building, perhaps much higher and more densely populated than the one attacked by fire that harrowing day. You are once again unperturbed with only one staircase in your building.

It is possible that you have not yet ensured a smoke alarm system, fire-fighting apparatus, or sufficient water in your building. Most likely you do not even notice the stacking of furniture and rubbish impending escape along the corridor.

It is possible you have not considered having any trained personnel to marshal an emergency situation, someone who knows how to operate the life-saving apparatus that perhaps decorate your wall. In all probability you still do not know the telephone number of the nearest fire station.

It is possible you are still apathetic to such preventive, precautionary and control measures.

It is however NOT impossible for a fire of devastating dimensions to occur in the very place wherein you are reading this paper. The fact is a fire can strike anyone anywhere and at anytime. It is therefore only advisable that one should be prepared and the best preparation is to live with the constant fear that fire can and will strike you -- in your protected (?) home, in a busy shopping centre, on a crowded train, in a full-house cinema hall, at a merry marriage marquee…

The gruesome experience from the fire at the BSEC Bhaban can possibly be best described as a wakeup call for future calamities, for we have made our buildings more dangerous by going higher and larger in the past decade, more flammable in view of the finish materials and furniture, and more difficult to escape from by making them enclosed for air-conditioning.

Knowing the possible causes of fire can prevent one from starting. Installing safety measures can ensure preparedness. Equipping premises with control measures can build confidence of being able to fight a fire, in case.

There are many causes of fire: (a) smoking materials and matches, (b) defective or improperly operated heating equipment, (c) wilful attack, (d) careless disposal of waste products, (e) defective or improperly installed and operated electrical equipment and services, (f) friction and static sparks, (g) careless handling of flammable liquids and vapours, (h) use of open flame appliances, (i) repairs and alteration hazards, (j) welding, (k) explosion hazard from dust, and (l) exposure from other buildings on fire. Obviously the list is not exhaustive. It never is.

Following a fire one of the first things we do is to raise a finger at a cause, usually the poor 'short circuit', so that the blame apparently is not on a person still alive. But the fact is proper investigation can lead to pinpointing the person whose negligence or adventure led to the flash.

The next time there is a fire, and there will be, it will be relevant to turn the finger towards you, for you are responsible either as building owner, user or architect.

Whatever the cause of a fire starting and expanding, if there is loss of human life due to a fire, the responsibility must lie with either the architect and/or building owner/user because there was no means of escape. That is precisely what happened at the BSEC Bhaban that ill-fated day. The victims could not escape.

It is sometimes the case that the architect has provided alternate route for escape in the design of a building but the owner has tampered with it, but not always. Buildings designed and supervised by architects have been found faulty in terms of design for fire.

Also common is that alternate means of egress exists in a building by design but the owner/user has blocked them in the name of security. The more secure we make our buildings, the more unsafe they are.

What is then to be done? A positive starting point would be to live in constant fear that fire can and will strike. In view of that premise, it is common sense to be cautious and prepared in each individual's or group's undertaking.

How? Survey your building immediately to identify blockages that will hinder escape of users. Assess the risk of your premises by design and usage. Employ more security staff to provide safety such that buildings are not encaged passively. Ensure first-hand fire-fighting measures, such as appropriate extinguishers and equipment to apply water (hose-pipe/sprinklers). Consider the need to contact the fire services. Do you know the telephone number? Wonder how the fire engine will reach your building. Think where from they will get the water to douse a fire.

It is naïve to depend entirely on the fire services to save lives; they cannot, because in a death from a fire accident the victim has first suffocated from smoke; that is within the first couple of minutes. The internationally-accepted general escape time for design for fire is two and a half minutes. People must escape from a fire to a place of safety within that time. Under no circumstances can help from fire services be expected within that time (or even much later) in view of our narrow and congested road, traffic jam, and distance.

Fire services can however protect property and save people who have taken refuge in a designed safe place of a building attacked by fire, as was done so heroically at the BSEC fire, although the roof was not so designed. Every building should have refuge cells located every few floors or even within a floor depending on the height and area. Given the right equipment fire services personnel are trained to rescue people in such situations, but then a building must have alternate routes (horizontally and vertically), fire lift and other control measures.

The discovery of the dead NTV security personnel in the building well after the BSEC fire was doused enlarges on the concept of a mandatory designated Assembly Point for every building. Had the victims of that fire been expected (by previous drill) to assemble at a place away from the building, the security man would have been declared a missing person and an earlier life-saving operation could have been mounted. Unfortunately, our present miscomprehension has cost a valuable life. There could be more in the future.

The threat of fire has to be understood and tackled at individual, family, group, corporate and public levels. The time to wake up and fear the possible devastation of a fire is now.

Behind every fire as well as its control there has to be the action or inaction of a man. That man could be you.

Dr. Nizamuddin Ahmed is Professor, Department of Architecture, BUET.

Jurassic Park for real?

MOHAMMAD A ZAMAN, MD
writes form North Carolina

AS their lungs filled … the patients became short of breath and increasingly cyanotic. After gasping for several hours they became delirious and incontinent, and many died struggling to clear their airways of a blood-tinged froth that sometimes gushed from their nose and mouth. It was a dreadful business. --Isaac Starr, 3rd year medical student, University of Pennsylvania, 1918.

That was a sobering observation by a medical student as the great Spanish Flu pandemic of 1918 swept through the United States killing about 675,000 lives during a short span of a little more than a year. Worldwide toll was estimated to be about 30 to 40 million.

With a tripling of the world-population by now, a similar pandemic is poised to take at least100 million lives. According to experts, another pandemic of 1918-proportion is certain to occur. It is only a matter of when and not if.

As Robert Webster (chairman of the Department of Virology and Molecular Biology at Saint Jude Children's Research Hospital in Memphis, Tennessee) maintains: "All the genes of all influenza viruses in the world are being maintained in aquatic birds, and periodically they transmit to other species ... The 1918 viruses are still being maintained in the bird reservoir. So even though these viruses are very ancient, they still have the capacity to evolve, to acquire new genes, new hosts. The potential is still there for the catastrophe of 1918 to happen again."

Well, by 1918 virus was already discovered, but the flu virus remained elusive until 1933 when it was isolated by three British scientists (Smith, Andrews, and Laidlaw). Since then it remained a latent desire of researcher to see what exactly made that 1918-virus so deadly.

Hultin was a microbiology doctorate student at University of Iowa. In 1950, he was captivated by a casual reference from a professor, that intact samples of 1918-strain can still be preserved in the bodies buried in Alaskan permafrost.

Hungry for a dissertation project, off he traveled to Alaska. In June of 1951, he, two Iowa professors, and a paleontologist dug three feet of Alaskan permafrost and sampled four Inuit (Eskimo) bodies, all with the evidence of pulmonary hemorrhage (bleeding in the lungs), the hallmark of rapid death from influenza alone.

Back in Iowa, high hope turned into ashes -- no live virus. And he could not garner further information from the dead virus for lack of right technology. Anyway, Hultin eventually got into medical school and became a pathologist.

It is yet one more pathologist, armed with the cool new technologies of molecular biology, is needed to do the undone. Armed Forces Institute of Pathology (AFIP) in Rockville, Maryland boasts a staggering three million pieces of preserved human tissue -- dating back to 1862. In 1995 Jeffery Taubenberger, a pathologist at AFIP, driven by the same desire as Hultin, decided to try a rather biblical approach -- "scooping the life out of dead."

After reviewing lung slides of seventy-eight cases of 1918-pandemic-death they looked for biologic remnant of Influenza A virus (a broad family of virus that includes the pandemic 1918-virus) in left-over lung tissues of ten cases. Out of ten only two came back positive for traces of Influenza A virus. One was a 21-year-old private who died in South Carolina. The other was a 30-year-old private who died in Upstate New York. And such was the kismet that they both died on the same day -- September 26, 1918. By adopting painstakingly detailed PCR (polymerase chain reaction) procedures involving many primers (from human, animal, and bird viruses) Taubenberger's laboratory triumphed in sequencing some genes.

When Hultin, now retired and in his 80s, read the published description of the first identified gene segment -- the scientist in Hultin could retire no more. He teamed up with Taubengerger and again went back to Alaska to get a little more frozen tissue. On August 20, 1997 he dissected out lung tissues from a female victim of 1918 pandemic -- and this provided the total material to sequence all the eight genes of the deadly virus.

Next chapter unfolded in New York City. With the sequenced genome information at hand, the researchers at Mount Sinai Medical School, by using a technique -- reverse genetics, bestowed life to Taubengergre's information in the form of "plasmid" (a small ring of DNA independent of the chromosome, but that can replicate).

The Plasmids are then sent to the Centers for Disease Control and Prevention (CDC) in Atlanta, where Tumpey and his team inserted the plasmids in human kidney cells. Plasmids, once inside the cells, assembled themselves in live complete viral particles. So far, about 10 vials are created, each containing about 10 million infectious particles.

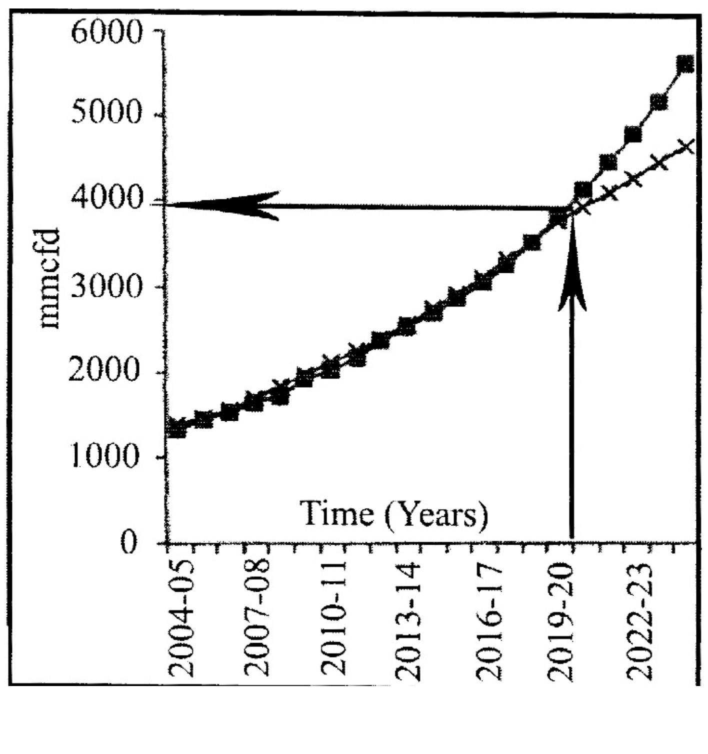
This tremendous feat. Like the PCR technique of Kary Mullis, this is a defining event for life sciences and by inflection, for the entire human kind. It is sort of like playing God. It is Jurassic Park for real ...

Energy crisis: Contemplating some possible way-out

DR. AFTAB ALAM KHAN

BANGLADESH, geographically, is one of the smallest as well as densely populated countries in the world. Nonetheless, it is blessed with natural resources like coal and gas that are of prime importance as raw materials for electricity generation. Nation's economic emancipation greatly depends on the development and use of these energy sources. Electricity is the prime energy source for industrial and other socio-economic developments. Very unfortunately, the present status of electricity generation in the country can benefit only around 19 per cent of the total population, of which only 25 per cent urban population and 10 per cent rural population have access to electricity. Most of the power generation units in the country run on natural gas. Almost 80 per cent of the daily electricity generation is done using gas.

Graph



There are some small scale electricity generation units those run on liquid hydrocarbon. In addition, only one hydro-electricity generation plant at Kaptai generates around 100 megawatt electricity only although it has a capacity for 250 megawatt. However, the contribution of electricity in the national grid from these small units is far below the national demand.

Coal and energy: We use coal in many different ways. One of the most important ways we use coal is to generate electricity. The economic deposit of bituminous coal in Bangladesh was discovered at Jamalganj (Joypurhat) in the year 1962 and subsequently more discoveries were made at Boropukuria, Khalaspir, Dighipara, and Phulbari. Jamalganj has the largest deposit to the tune of 1053 million tons. But coal mining from this field is not economically feasible due to very large depths of occurrence from 640 m to 1158 m. Like wise, Khalaspir and Dighipara have a total deposit of 347 million tons occurring at 250 m to 451 m suggesting for an uneconomical mining venture. However, these two deposits could be mined on extreme necessity.

Boropukuria and Phulbari are the only two coal fields having total deposit of 680 million tons that can produce coal economically. The major constraint that lies with the tonnage of coal recovery in these two fields is the choice of mining method between underground mining and open cast mining. The maximum recovery of coal from underground mining stands to only 20 percent of the reserve while that for open cast mining goes upto 80 percent. An underground mining would produce maximum of 136 million tons of coal from these two mines combined. The total 136 million tons would generate about half giga watt hour electricity during the entire mine life time.

Although, 01 ton bituminous coal has a BTU (British Thermal Unit) equivalent to energy that can generate about seven and half mega-watt hour of electricity, the efficiency of electricity generation by burning coal amounts to maximum of 50 per cent only. Although, an ideal efficiency of electricity conversion from coal burning is 77 per cent, it is very hard to achieve. The bottom line is that the conversion of coal into electricity is very inefficient. The efficiency expressed as a fraction of the temperature of the combustion of coal, and the temperature at which the spent combustion energy is expelled. On the otherhand, 38 million tons of coal is equivalent to 01 TCF (trillion cubic feet) of gas, and 01 MMCF (million cubic feet) of gas can produce approximately 3+ mega watt electricity.

Considering 50 per cent efficiency and gas equivalence of coal, it is estimated that with 500 MW per day generation capacity would serve for about 30 years from these two coal mines. On the otherhand, for the same 30 years of electricity generation would be possible at the rate of about 2000 MW and more per day if an open cast mining venture is undertaken. The above calculation is based on the assumption that the entire produced coal would be used for only electricity generation. Nonetheless, it looks very encouraging and lucrative from energy development perspective; however, there lie enormous flaws and constraints from social and environmental points of view.

Coal and environment: The major problems with the coal mining are its adverse impact on the environment and society. Although underground mining and open cast mining have variable impacts, by and large, both have commons. The major adverse impacts from underground mining are sudden ground subsidence in the mining area and production and drainage of acid mine, commonly known as acid mine drainage. Ground subsidence can cause disaster to habitat and the loss of cultivable lands by water logging. On the otherhand, the prevention of acid mine drainage from contaminating surrounding hydrogeological environment is also a difficult task. Hazard related impacts are mostly sudden water flooding and explosion from gasification inside the mine. Already in Boropukuria mine there happened water flooding, gasification, and ground subsidence. However, the adverse outcomes from underground mining are manageable. Although, an open cast mine can produce more than 80 per cent of coal reserve, the socio-environmental impacts are adversely enormous. Social impacts add greatly to environmental impacts. However, a transparent socio-environmental impact assessment may minimise all the odds.

Natural gas and energy: The use of gas in electricity generation has gained quite a fast momentum in recent time mostly due to its low cost involvement in a more environment friendly way. However, there are incidences of socio-environmental disaster pertaining to natural gas exploitation as envisaged from Magurchara and Tengratila blow-out. Presently, about 80 per cent of daily electricity is produced from natural gas which is about 51 per cent of daily gas production in Bangladesh. The next major gas consumption sector is fertilizer that consumes about 21 per cent of daily gas production. The daily gas production is currently being about 1600 MMFC. Fifty one percent of daily gas production currently can generate about 3200+ megawatt of electricity daily. Our present daily electricity demand is about 5000 megawatt which is projected to 15000 megawatt by 2020.

If we want to generate 15000 megawatt of electricity daily, under the present scenario (51%) of daily gas production, we need to produce about 8500 MMCFD gas by 2020. Do we have such huge reserve that could produce such large amount of gas? However, according to Wood Mackenzie, a reputed energy consultant from UK in Petrobangla, who has calculated gas demand scenario of Bangladesh for 2020, it is about 4000 MMCFD (see graph).

This projected requirement is almost half of what I have calculated. This major anomaly perhaps lies with the understanding between the total requirement and the requirement for electricity generation alone, which needs to be clarified.

Task ahead: It is well understood that using coal as raw material for electricity generation is very cumbersome task both from socio-economic and environmental points of view. The existing socio-economic conditions of the country do not advocate for open cast mining, so underground mining will limit coal production to a maximum of 20 per cent only. Even if we operate underground mining at all the four coal fields, the daily combined coal production would generate electricity to contribute only 10 per cent of the projected demand of 15000 megawatts by 2020. The only way to increase coal contribution for electricity generation is to venture for open cast mining. This needs absolute conscientious support of the people living in the coal mining areas.

To gain people's confidence and support it needs a massive social motivation drive. They will have to be provided guarantee for same living standard and quality, if not better, after resettlement. The environmental odds likely to crop up due to open cast mining must be minimized. Even then the major raw material demand for electricity generation points toward natural gas use. Hence, we are left with no option to explore and produce natural gas more and more.

We have gone through some strong debates in the past as to how much natural gas we do have. The proven gas scenario is not very encouraging although hypothetical scenario stands bright. Except Bibiana field having proven and probable reserve of 2.5 TCF or more, no major discovery has yet been made by the IOCs operating under PSC. Now, I put forward an open question as to what has gone wrong in spite of the fact that we have quite a good number of potential structures? Why those have failed to gain due attention? As for example, about 70 km long and 10-15 km wide Sitakund structure is one of the known largest structures we have. Five wells were drilled, of which four were drilled by PPL (Burmah) maximum up to 1024 m depth, and the fifth one was drilled by Petrobangla up to 4005 m depth. It is very interesting to note that three wells drilled by PPL have detected oil at shallow depth within 1000m. In addition, oil seep at Khaiyachara in Sitakund structure has also been detected. There are enormous gas seepages at Kumira, Barbkund, Labanakhya, and Bariadhala. In spite of all these positive indications, Petrobangla drilled an absolutely dry hole with a total depth of 4005m. All these wells were located in the south central part of the structure and, in addition, the fifth well was drilled in the eastern flank over a major fault.

My recent study revealed that drilling location was not rightly selected. All geophysical and geological evidences strongly suggest that the northern half of the structure possesses an excellent trapping condition. One should bear in mind that Rokhia, Feni, and Semutang gas producing structures are located within 50km around Sitakund structure. Simply, it cannot be justified that Sitakund structure is not a prospective one. Should we go for drilling here? The answer is yes. I would strongly recommend taking a risk of only 30-40 crore Taka while thousands of crore have been wasted in various sectors. We have another gas discovery at Kutubdia. It was discovered in 1977. Although, Shangu field has been developed but Kutubdia has long been ignored. I find no reason why Kutubdia has not yet been developed. Similarly, it is quite a surprise why Halda and Srikail gas discovery has failed to develop.

Dr. Aftab Alam Khan is Professor, Department of Geology, Dhaka University.