

Environment News Futures

Bangladesh Wants to Go Nuclear!

Mohammad Shafiqul Islam, Associate Professor of Nuclear Engineering at Dhaka University explains to SciDev.Net why ...

- Bangladesh needs nuclear energy if it is to become a middle income country by 2021.
- To meet a 38,000 megawatts demand by 2030 Bangladesh has limited options.
- Solar is expensive and wind is viable only in coastal Bangladesh.

Bangladesh plans to construct two nuclear power plants for electricity generation. What is your opinion?

For a country with a vast population and one that aims to become a middle income country by 2021, *nuclear* is the only option. But to reach that goal we need vision, infrastructure and manpower.

What advantages will nuclear energy bring to Bangladesh?

Compared to oil, gas and coal the advantages are huge. Nuclear *energy* takes up less space and causes virtually no *environmental* damage. Except for its initial investment, the *technology* is cost-effective. Our gas reserve is depleting by the day and we are dependent on imported oil, which is expensive with prices fluctuating in the international market. So, nuclear is our future option.

We need 26,000 megawatts of electricity by 2020 and 38,000 megawatts by 2030. Currently we generate around 11,000 megawatts with a big portion coming from India and from gas, hydro and barge-mounted generators. Nuclear is expensive at the initial stage but once installed it is cheaper than oil and gas in routine operation.

How does Bangladesh compare in nuclear energy to India and Pakistan?

We have nothing like what India and Pakistan have. India plans well ahead so that when the technology arrives the Indian team takes over to control and run everything. We certainly need nuclear power but we are not yet ready. We are currently negotiating with the Russians. But we cannot, say, hire the Russians to install reactors and hand over the plant one fine morning. Once we agree on the design, we would have to figure out the financial side. The process takes time, as there are many laws to be formulated.

Can we have a nuclear power plant by 2020 as proposed?

It is absolutely absurd. For a nuclear power plant we need initial time for processing which takes five-seven years. We have many challenges ahead, like for instance, the required infrastructure for safety, less densely populated areas, constant river water supply. You cannot just drop a reactor and start to generate electricity. These must come one step at a time.

What about the manpower and experience from running the reactor at the Atomic Energy Research Establishment in Savar?

The manpower at Savar is mainly for research and *education* purposes. People trained in *research* with the reactor and people trained in power generation with the reactor are not the same. We need

freshly trained nuclear scientists who can do the job of handling reactors for power generation. The Savar reactor is mainly used for medical applications of nuclear energy.

In the event of any major nuclear accident do we have any laws on liabilities?

As we are now moving towards nuclear technology we need to have legislations that are in line with the international conventions. In fact, laws are in the making right now.

There are safety concerns too?

Modern nuclear plants are designed to be installed in populated places such as Bangladesh. These technologies are far safer than the decades-old technologies used in Fukushima and Chernobyl, which did not have protection against leakage. In fact, the nuclear plant we are planning to have will use 2015 technology and so, in terms of safety, we face no problem.

What about alternatives such as solar and wind energy? Do they hold any promise for Bangladesh?

Solar energy has a huge potential and it is indeed the perfect technology because it is *sustainable*, cost effective and environment-friendly. However, it has to be affordable and we must own the technology, not just import and assemble. What we are doing right now is importing solar panels and simply assembling them for sale. We must also develop human resources and train people in manufacturing such high-tech devices. As for wind power, it is costly and not viable except in the coastal districts.

This article has been produced by SciDev.Net's South Asia desk.

See more at: <http://www.scidev.net/south-asia/environment/feature/q-a-bangladesh-s-energy-future-is-nuclear.html#sthash.0dKKrubk.dpuf>

India Takes Its Own Path on Energy and Climate Change

Flickr/Al Jazeera English

- Unlike China, India has so far refused to set a target to cap carbon emissions
- One in four Indians lacks access to electricity and energy demand is soaring
- But India will cooperate with the US on nuclear energy and intellectual property

New Delhi: Flying out of New Delhi after a high-voltage, three-day state visit, US President Barack Obama had the satisfaction of carrying home various agreements on cooperation with India, including on *nuclear energy*, *climate change* and *intellectual property* rights.

Much ground was covered during the visit on issues such as nuclear liability, clean energy cooperation and the next UN climate talks in Paris, says Prodipto Ghosh, distinguished fellow at The Energy and Resources Institute, India, and a member of the Prime Minister's Council on Climate Change. Ghosh describes the understanding on limiting the liability of US suppliers in the event of a nuclear plant accident — which has kept an agreement between India and the US on civilian nuclear cooperation stalled for six years — as “very important”.

Nuclear Centrepiece

Prime Minister Narendra Modi saw the agreement on nuclear energy as the “centrepiece” of the new cooperation with the US and one that could deliver clean energy. What appears to have done the trick was the US side backing down on a major sticking point: previously it had insisted upon a level of tracking of the nuclear material supplied to India beyond that required by the International Atomic Energy Agency.

See more at: <http://www.scidev.net/south-asia/cooperation/editorials/india-takes-its-own-path-on-energy-and-climate-change.html#sthash.aPWUIORo.dpuf>

The Discovery that Neutrinos Switch between Different “Flavours” Has Won the 2015 Nobel Prize in Physics

Neutrinos are ubiquitous subatomic particles with almost no mass and which rarely interact with anything else, making them very difficult to study. Takaaki Kajita and Arthur McDonald led two teams which made key observations of the particles inside big underground instruments in Japan and Canada. They were named on Tuesday morning at a news conference in Stockholm, Sweden.

The 2015 Nobel Prize in Chemistry has been Awarded for Discoveries in DNA Repair

Tomas Lindahl, Paul Modrich and Aziz Sancar were named as the winners on Wednesday morning at a news conference in Stockholm, Sweden. Their work uncovered the mechanisms used by cells to repair damaged DNA—a fundamental process in living cells and important in cancer. Prof Lindahl is Swedish, but has worked in the UK for more than three decades.

The Nobel Prize in Physiology or Medicine 2015

William C. Campbell and Satoshi Ōmura “for their discoveries concerning a novel therapy against infections caused by roundworm parasites” and for Youyou Tu for her discoveries concerning a novel therapy against Malaria.

Waste Water Treatment Plants Fail to Completely Eliminate New Chemical Compounds

October 8, 2015; University of the Basque Country

Fish caught near waste water plants display a higher rate of endocrine disruptors, researchers have found. Deformities, feminization and fall in reproductive capacity are some of the effects that living organisms can be afflicted by due to changes in the endocrine system caused by these compounds. A study conducted on the Basque coast by a research group indicates that the most polluted waters, the ones with the highest levels of bioconcentration, the highest percentage of intersex fish, etc. exist around waste water treatment plants. Most of these plants are not equipped to eliminate the new compounds, because legislation in this matter has yet to catch up with the development of the chemical industry. The journal *Science of The Total Environment* has recently published a paper on the subject.

Ancient Rocks Record First Evidence for Photosynthesis that Made Oxygen

October 6, 2015; University of Wisconsin-Madison

A new study shows that iron-bearing rocks that formed at the ocean floor 3.2 billion years ago carry unmistakable evidence of oxygen. The only logical source for that oxygen is the earliest

known example of photosynthesis by living organisms, say University of Wisconsin-Madison geoscientists.

“Rock from 3.4 billion years ago showed that the ocean contained basically no free oxygen,” says Clark Johnson, professor of geoscience at UW-Madison and a member of the NASA Astrobiology Institute. “Recent work has shown a small rise in oxygen at three billion years. The rocks we studied are 3.23 billion years old, and quite well preserved, and we believe they show definite signs for oxygen in the oceans much earlier than previous discoveries.”

The most reasonable candidate for liberating the oxygen found in the iron oxide is cyanobacteria, primitive photosynthetic organisms that lived in the ancient ocean. The earliest evidence for life now dates back 3.5 billion years, so oxygenic photosynthesis could have evolved relatively soon after life itself.

Until recently, the conventional wisdom in geology held that oxygen was rare until the “great oxygenation event,” 2.4 to 2.2 billion years ago.

The rocks under study, called jasper, made of iron oxide and quartz, show regular striations caused by composition changes in the sediment that formed them. To detect oxygen, the UW-Madison scientists measured iron isotopes with a sophisticated mass spectrometer, hoping to determine how much oxygen was needed to form the iron oxides.

“Iron oxides contained in the fine-grained, deep sediment that formed below the level of wave disturbance formed in the water with very little oxygen,” says first author Aaron Satkoski, an assistant scientist in the Geoscience Department. But the grainier rock that formed from shallow, wave-stirred sediment looks rusty, and contains iron oxide that required much more oxygen to form.

The visual evidence was supported by measurements of iron isotopes, Satkoski said. The study was funded by NASA and published in *Earth and Planetary Science Letters*. The samples, provided by University of Johannesburg collaborator Nicolas Beukes, were native to a geologically stable region in eastern South Africa.

Because the samples came from a single drill core, the scientists cannot prove that photosynthesis was widespread at the time, but once it evolved, it probably spread. “There was evolutionary pressure to develop oxygenic photosynthesis,” says Johnson. “Once you make cellular machinery that is complicated enough to do that, your energy supply is inexhaustible. You only need sun, water and carbon dioxide to live.”

Other organisms developed forms of photosynthesis that did not liberate oxygen, but they relied on minerals dissolved in hot groundwater—a far less abundant source than ocean water, Johnson adds. And although oxygen was definitely present in the shallow ocean 3.2 billion years ago, the concentration was only estimated at about 0.1 percent of that found in today’s oceans.

Confirmation of the iron results came from studies of uranium and its decay products in the samples, says co-author Brian Beard, a senior scientist at UW-Madison. “Uranium is only soluble in the oxidized form, so the uranium in the sediment had to contain oxygen when the rock solidified.”

Measurements of lead formed from the radioactive decay of uranium showed that the uranium entered the rock sample 3.2 billion years ago. “This was an independent check that the uranium wasn’t added recently. It’s as old as the rock; it’s original material,” Beard says.

“We are trying to define the age when oxygenic photosynthesis by bacteria started happening,” he says. “Cyanobacteria could live in shallow water, doing photosynthesis, generating oxygen, but oxygen was not necessarily in the atmosphere or the deep ocean.” However, photosynthesis was a nifty trick, and sooner or later it started to spread, Johnson says. “Once life gets oxygenic photosynthesis, the sky is the limit. There is no reason to expect that it would not go everywhere.”