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# Realistic alternative

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**B**ANGLADESH, in recent times, has been experiencing an energy deficit of about 2,000 MW, which has caused shutdown of hundreds of manufacturing plants across the country. There is hardly any office or factory which is not being affected by power supply interruptions on a daily basis.

The conventional resources of energy generation are starkly inadequate, which is holding back poverty reduction, standard of living, and economic progress. Therefore, economists and energy experts are exploring the feasibility of harnessing renewable energy sources (RES). However, in developing countries like Bangladesh, RES are considered primarily as an option for remote locations where the infrastructure needed to provide supply from the electric grids is prohibitively cost ineffective.

According to a Power Ministry source, the country presently meets 5 per cent of its energy needs from renewables. The government plans to increase it to 10 per cent by 2010 from hydro, solar, wind, and biomass.

The plan includes a 100 MW production target from hydro-sources. Implementation of the Kutubdia wind pilot is also under feasibility review.

A recent study by the power cell of the ministry projected that around 2,200 MW of power could be harnessed from renewable energy sources (RES). At present, the home solar system accounts for 4 MW of power with the future prospect of 300 MW.

Another 2 MW is being generated by wind power which can be dramatically boosted to 1000 MW once wind turbines are installed along the coastline.

The study further claimed that around 600 MW of power could be produced from bio-mass and around 300 MW from co-generation (using the pulp of crushed sugarcane, for example). Various NGOs have helped to install 75,000 home solar systems in remote rural areas under rural electrification and RES programs (see my DS December, 2008 piece, "Green energy").

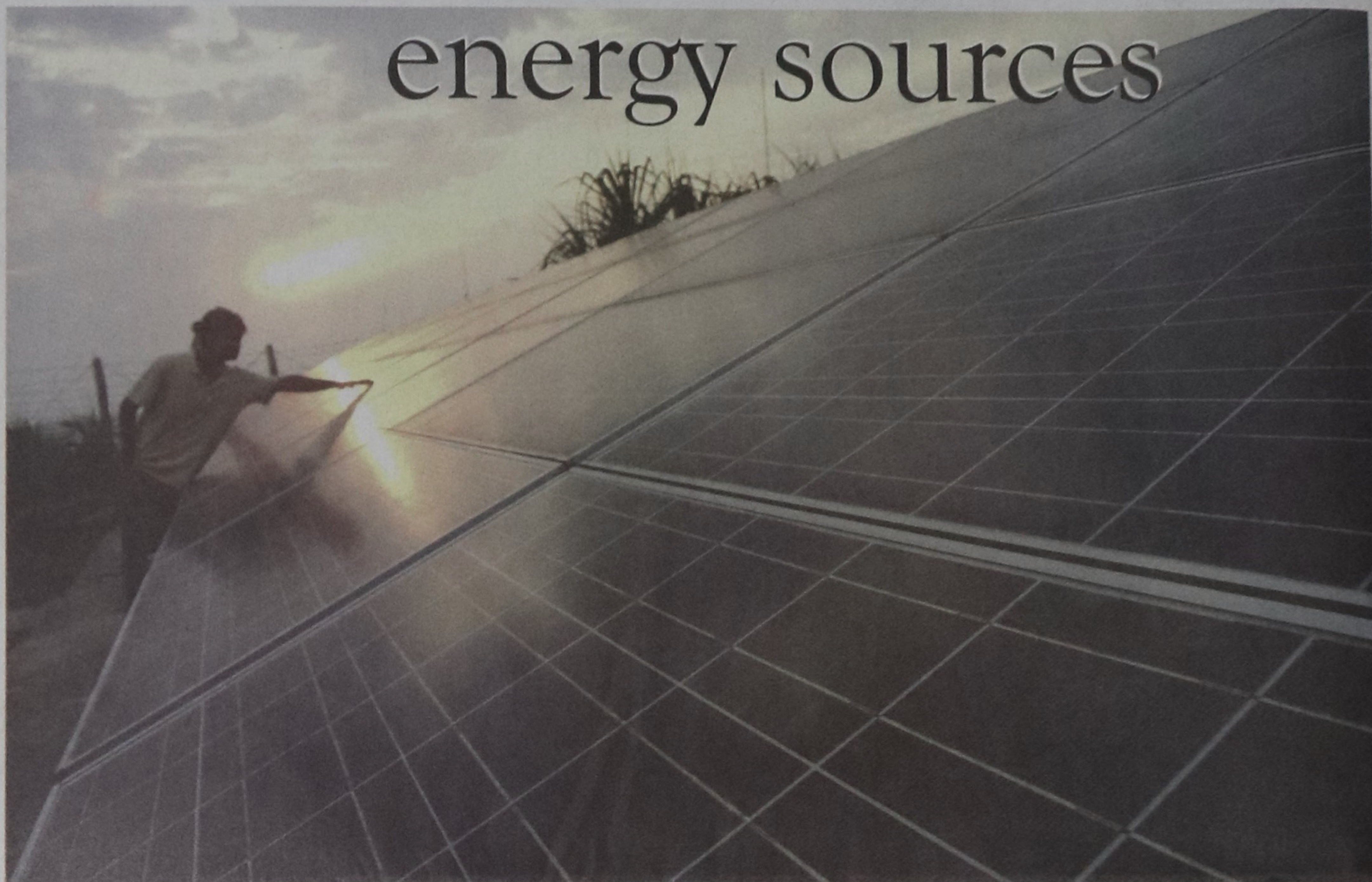
To reach the target of 10 per cent supply of energy from renewables by 2010, the government plans to attract both domestic and foreign investors with incentives, such as corporate exemptions for 15 years, low-interest loans and a cap of 3 per cent on import duty and value-added tax. It is proposed that all investment will originate from private investors and the projected amount of financing would be in the ball park of \$1.5 billion.

A cost comparison of various renewable energy technologies in the US is presented in the table of which solar is the most expensive one. Additional cost reductions will require further technology development, market deployment, scale economies and the establishment of an emissions trading scheme and/or carbon tax -- one that would attribute a cost to each unit of carbon emitted -- reflecting the true cost of energy production by fossil fuels. Under the carbon tax regime the true cost/kWh of these renewable energies would look more appealing compared to traditional fossil fuel energy sources.

Although renewable energy sources offer high promises, they're still out of reach for industrial production. Most experts think the solutions for our present growing energy needs lie in burning gas, coal and nuclear fuel.

Currently the average power generation capacity during peak hours is around 3,800MW and the total domestic gas production is at around 1,780 million cubic feet per day.

Awami League pledged to increase power generation to 5,000MW by 2011 and to 7,000MW by 2013. Experts suggest that to reach the 7,000MW target by 2013 the government would need to install imported coal based power plants since would take years before new domestic fields begin production.



## energy sources

*Renewables energy sources will not bring the country's salvations from the growing energy shortages (can only complement somewhat). Given that open pit coal mining is unacceptable and burning unclean coal will have disastrous ecological imbalances, clean coal technology is not yet available to generate coal energy at an industrial scale, and severe gas shortages will soon hit the country, the energy choice for the future is nuclear.*

Given the shortages, burning of gas for power generation is not feasible to achieve the target.

The present gas shortage is around 250mmcf with the exiting production of 1780mmcf. This shortage is likely to deepen by the year and it will turn severe in 2011, according to Petrobangla officials. Even with massive gas exploration efforts, it will be unlikely that any substantial gas production could be assured within 6 to 7 years.

With regard to coal and oil, the government will have to resolve some contentious coal policy issues vis-à-vis national interests such as demand for the cancellation of the agreement with Asia Energy for the Phulbari coal field and the award of offshore blocks to international oil companies.

Although abundant in supply, coal is also the most polluting and that is a major concern for global warming and climate change. Coal, when burned, emits nitrogen oxides, sulfur oxides, mercury, carbon dioxide, fine particles and other air pollutants. Research is now underway in search of "clean coal technology (CCT)".

General Electric already has an

economic viability of these technologies and the timeframe of delivery, high hidden economic costs in terms of social and environmental damage, and the costs and viability of disposing of removed carbon and other toxic matter (See my DS Sept. 4 article, "Economics and ecology of dirty energy").

Interestingly, nuclear energy is conspicuously absent from the group of renewable energy sources primarily because it isn't considered inexhaustible. However, in 1983, physicist Bernard Cohen proposed that uranium, the primary fuel for nuclear

reaction machineries is environmentally concerning. However, once nuclear reactor starts generating power it is CO2 emission free.

The installation of NPP depends substantially on politics, and this politics has come out differently in different countries. One aspect of this politics is nuclear waste -- that is, disposal of burned up fuels. The other aspect is -- what to do with bomb making material plutonium which is produced as a byproduct of burning uranium. For Bangladesh, the concerns about making nuclear bomb are not an issue but disposition of nuclear waste is.

By design, a NPP cannot blow up like a nuclear bomb. However a lesser blow can occur if it is sufficiently badly designed and operated. The 1986 Chernobyl NPP accident occurred as the reactor reached 150 times its normal power level before its water turned to high pressure steam and blew the plant apart, thus putting out the nuclear reaction. This only took a few seconds. By all accounts, it was a poorly designed nuclear reactor and no other reactor of that design is in operation today.

About one cubic meter of nuclear waste per year is generated by a NPP. This waste consists of the fission products. After about 18 months in the reactor, the burned fuels, which are highly radioactive, are removed from the reactor, and stored in water in an enclosed Olympic size swimming pool. Current estimates show that after 10 years, the fission products are 1,000 times less radioactive, and after 500 years, they will be less radioactive than the uranium ore they're originally extracted from.

Some people argue that the energy required in building NPPs, operating

them, and mine and process the uranium may be so large as to cause a net energy deficit. This argument is nonsensical. The basic fact about nuclear energy is that the input energy is 4.8 per cent of output energy if 'gaseous diffusion' is used to enrich uranium and 1.7 per cent if the 'centrifuge' technology is used.

One can look at the fact this way: if gaseous diffusion is used for uranium enrichment, the energy invested in building the plant is paid off in 5 months, whereas if centrifuges technique are used the pay off time is 4 months. Under any practical circumstances, Bangladesh will not be enriching uranium for power generation -- it will buy enriched uranium from the company that will build the NPP. Therefore, the authorities should look for companies that would supply nuclear fuel that is enriched by the least costly method.

Renewables energy sources will not bring the country's salvations from the growing energy shortages (can only complement somewhat). Given that open pit coal mining is unacceptable and burning unclean coal will have disastrous ecological imbalances, clean coal technology is not yet available to generate coal energy at an industrial scale, and severe gas shortages will soon hit the country, the energy choice for the future is nuclear. My June 22, 2006 DS article, "Nuclear energy: Is it safety or political will?" covers all other rationales why Bangladesh should go for nuclear energy.

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Energy source	2001 costs	Potential future cost
Wind		
48 ¢/kWh		
310 ¢/kWh		
Solar photovoltaic	25160 ¢/kWh	525 ¢/kWh
Solar thermal	1234 ¢/kWh	420 ¢/kWh
Large hydropower	210 ¢/kWh	210 ¢/kWh
Small hydropower	212 ¢/kWh	210 ¢/kWh
Geothermal	210 ¢/kWh	18 ¢/kWh
Biomass	312 ¢/kWh	410 ¢/kWh
Coal (comparison)	4 ¢/kWh	

Integrated Gasification Combined Cycle (IGCC) system that successfully converts coal into a cleaner burning energy source. The IGCC System also makes it easier to separate CO2 and emits less than half of the sulfur oxides, nitrogen oxides, mercury, and particulate matter that would be emitted by a traditional pulverized coal plant. The GE research team is hard at work on inventing the next generation of power systems that will help convert coal into an even cleaner burning fuel.

Concerns exist regarding the eco-

reactor, is effectively inexhaustible, and could therefore be considered a renewable energy. He claims that fast breeder reactors (a design in which the reactor produces its own fuel) fueled by uranium-238 extracted from seawater, could supply energy at least as long as the Sun's expected remaining lifespan of five billion years.

The major concerns over nuclear power plant (NPP) are the dangerous environmental hazards of nuclear waste. Building a nuclear power plant takes several years. During these period CO2 emissions from construc-