

Coal power prices and pollution

Attempts to stop Norochcholai misguided

by PROFESSOR KUMAR DAVID

As Mr. Carlo Fernando has been insisting for decades we need coal power for the next quarter century; thereafter, small conventional nuclear, nuclear fusion or clean coal technology may become available in sizes that the local system can absorb - but that's crystal ball gazing. Liquefied natural gas port terminals may become feasible in appropriate modest sizes, earlier. A certain amount of coal power is necessary during the next decade and its environmental impact can be absorbed. Attempts by pressure groups to stop Norochcholai are misguided though their environmental concerns are commendable.

Generation and investment costs

First about prices; assuming that medium quality, (bituminous, 25 MJ/kg) coal, can be purchased, c.o.f. Norochcholai, at \$50 per short ton (907 kg), and that coal to electricity conversion efficiency is 40% - possible in modern stations - the bare fuel cost of generating one unit (kWh) of electrical energy is Rs. 2.00. The reader can easily play with this number; if the coal price is \$55 per short ton, just raise the power price by 10%; if efficiency is 36% instead of 40%, divide the price by 0.9 and get Rs 2.22 per kWh because as efficiency declines electricity price rises. Long-term fuel prices are hard to predict since oil price is the benchmark that all fossil

fuels track; for the present Rs 2.00 is commonsensical.

This is the barebones fuel cost: add to this plant capital costs, transmission and distribution losses, theft, and overheads such as administration and management. All except theft are strictly proper items, not to be confused with the rip-off prices of compulsory private power purchases that iniquitous politicians and managers short on probity have foisted on the CEB. Turning to investment; a rule of thumb for coal power plant is about \$1 to 1.2 million per MW - the amount mentioned for the 300 MW Norochcholai plant is \$455 million, somewhat above this range but the plant seems to be a gift or soft loan of sorts, hence the numbers are not commercially verifiable. The upper end of my range, \$1.2 million per MW, is more useful.

To work out the capital cost per unit of electricity generated, first think of a house mortgage for 30 years (about the same as the lifetime of a coal plant) and then think of an interest rate - say 9% for international investment deals. So if you took a \$1.2 million, 30 year, 9% loan what would your annual (12 x monthly) mortgage payments be? Simple, look up the mortgage tables; it is \$115,860 per annum. Now, each 1 MW will generate about 6.13 million units of electricity each year - this is called a load factor of 70% - so it works out that the capital cost component of electricity generation is US cents 1.89 or Sri Lanka Rs 1.89 per unit generated. Fuel cost and capital cost added together

therefore amount to Rs. 3.89 per kWh generated.

Not all the power that is generated is sold; some is lost in transmission and distribution and some, charmingly called "non-technical losses" in the subcontinent, is stolen. In 2005, the most recent data available on the CEB web-site, only 81.6% of generated power was sold and there is no reason to believe this ratio is going to change. Hence the cost of electricity per unit sold is 3.89 divided by 0.816 or Rs 4.77.

Debts and overheads

Now comes the hard part - making provision for wages and servicing the CEB's horrendous debt. Right now the CEB's wage bill is about Rs 5 billion per annum and its debt servicing burden is about Rs 10 billion per annum. It sold 6209 million units in 2005 - probably about 7200 million units in 2005 at 8% growth, but hopefully the wage bill did not increase.

This means the CEB needs about Rs 0.69 to pay salaries and Rs 1.38 for debt servicing for each unit of electricity it sells. I think we can assume that these numbers won't change much.

Yes of course coal fired power is not responsible for the debt burden, but it will still have to pay for it. It's like when you inherit a property from your parents, but it is heavily encumbered; tough luck, you still have to pay off the debts.

Adding all this together (4.77+0.69+1.38) the realistic sell-

ing price of coal fired electricity will be about Rs. 6.84 per unit and can be rounded up to Rs. 7 or down to Rs. 6.50; in any case these calculations have been much simplified to ease presentation. The CEB will further increase its debt encumbrances by 2010, when the plant comes on stream, hence debt-service costs will increase. Conversely, investment charges will be lower if the gift component, payment deferral period or low interest rates of the Chinese financing plans are significant; available information is short on transparency.

The bottom line then is this: It is unrealistic for consumers to expect a reduction in electricity bills but the good news is that the CEB can maintain tariffs at about current levels and still be able to service its debt without sinking deeper into the red.

Environmental impact

There have been some statements in the media that coal fired electricity is pollution free - poppycock! Coal is a polluter - much worse than natural gas - but emission reduction technologies such as scrubbers, electrostatic precipitators and catalytic converters can decrease pollution significantly.

All of us, His Grace the Bishop included, had better get together and ensure that the pollution reduction facilities work properly. Environmental legislation should be enacted and a fully empowered regulatory agency and citizens groups established.

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If we reach the standards set by the US Department of Energy under the Clean Air Act we can limit annual emissions from Norochcholai's 300 MW stage below the following levels. (Carbon dioxide, though a green-house gas, is an unavoidable byproduct of burning coal and hence not classified as a pollutant by the US Environmental Protection Agency).

Carbon dioxide	1.5 million tons
Sulphur dioxide	2500 tons
Nitrogenous oxides	1200 tons
Mercury	20 kg

This is acceptable but needs eternal vigilance from environmentalist and the public. Coal fired power is indispensable for some time to come, but must be properly incorporated.