Future Challenges of Electricity Planning

Presented by Asoka Abeygunawardana

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The world's oil reserves are fast depleting and over the last 2 decades the consumption of oil has overtaken the amount of oil discovered/produced. There is a need to search for, and use more, renewable and viable energy alternatives. Sri Lanka's electricity supply has been increasingly dependant on oil. From 1995 onwards the amount of electricity (GWh) generated by oil has been rapidly increasing while that generated via hydro has remained more or less static. In 1986, Sri Lanka used very little oil for its electricity supply. Currently, 60-65% of the electricity is generated by using oil.

According to the energy experts worldwide the world oil consumption peak will be reached within the next ten years due to scarcity of resources and in order to ensure that the average global oil price will continue to rise. The cost of oil will be unbearable for most of us living in the third world as the world is reaching the oil peak.

Therefore the global energy dialogue is shifting away from this finite resource. In this context, the Ceylon Electricity Board (CEB) has selected Coal as the way forward for Sri Lanka. According to the CEB generation expansion plan, to meet the increasing demand, the country will need to keep constructing 300 MW of coal plants each year and it will reach a target of 3300MW of coal power plants by the year 2020. The CEB says that this coal dominant long-term generation expansion is the least cost option for Sri Lanka.

The CEB's long-term generation expansion plan is based on following incorrect assumptions.

- the only energy resources that are available for power generation in Sri Lanka is Hydro, Coal and Oil
- the CEB considers a 10% discount rate for calculations however it has assumed that there will be no oil or coal price increase for the next 20 years.
- the exchange rate will be remain as it is for the next 20 years
- there is no difference between imported items and indigenous resources and there is no effect on exchange rate while importing large amount of coal or oil
- taxes and duties on imports are ignored,
- no Environmental and social costs involved with fossil fuels
- no difference between having number of distributed power plants and having a central power plant despite the fact that distributed power plants have following advantages: less distribution losses, need less power plant capacity, need less transmission line

related capital investment and the possibility of tapping waste heat for industrial applications

- no Carbon trading opportunities renewables
- no benefits after 30 years of operation even though hydro projects last longer as an example Laxapana hydro plants are still producing the bulk of hydro electricity for the country, 50 years on
- Coal power plants can cater only to the Base Load[1] requirements and hence it is essential to have oil power plants to cater to Peak Load[2] requirements. However the CEB assumes that there is no need to consider this combined effect

It is quite obvious that above mentioned assumptions of the CEB are incorrect. Neither renewable energy technologies nor LNG is considered as candidate options for CEB generation planning and with the above assumptions the result of the computer model is simple and predictable, it is only a one horse race and the Coal is the cheapest option.

The world's CO_2 emissions are forecasted to peak in 2015 and it is said that a 2°C increase in the temperature is inevitable and irreversible. Due to equity issues between developing and developed nations, there is a lack of consensus on the amount by which countries need to cut their emissions. The only 'agreed' fact is that world average emissions need to be reduced.

The CEB's generation plan is to establish 3300MW coal power plants over the next 2 decades . This is despite the fact that coal is the largest emitter of CO_2 per kWh amongst the gas and oil alternatives.

In addition, both the Norochcholai 300MW coal power plant and the Upper Kotmale 150MW hydro plant – which had taken considerable time to take off ground - are exceeding the original projects costs. In the case of the Norochcholai plant, the initial estimated cost was US$ 330 million, while the current project costs US$ 450 million (with US$150 million to be taken as a commercial loan). The initial plan for the Upper Kotmale Plant was that the Plant Factor[3] would be 40% and the Capital cost would be US$ 280 million. The current project is to have a Plant Factor of 31% and a Capital Cost of US$ 380 million. This clearly shows that the figures used by the CEB for generation planning is incorrect.

CO_2 emissions in Sri Lanka have been increasing rapidly since 1995. By 2005, CO_2 emissions increased in Sri Lanka by 230% and became third highest in the world. The LNGs (liquefied natural gases) can replace both Coal and Oil plants while emitting less CO_2 (and therefore, being able to claim Carbon Emission Reductions) as it can cater to

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[1] Base Load- the minimum amount of electric power delivered or required over a given period of time at a steady rate.

[2] Peak load – the maximum load during a specified period of time

[3] Plant Factor - the ratio of the total actual energy produced over a specified period of time to the energy that would have been produced if the plant (or generating units) had operated continuously at maximum rating. (Source: http://books.google.com/books?id=9CYS_krSvMUC&pg=PA5&lpg=PA5&dq= plant+ factor+ eneryg +definition&source=web&ots=k0AJk-7_HS&sig=d9JuiCn0SR_TjOUHkguex2cvhKw)

both base load and the peak load and being financially more viable. Areas of use where it would be competitive include transport, fertilizer and cooking as the terminal cost would be shared among the sectors.

Excerpts from the award winning documentary 'An Inconvenient Truth' and presentation of the Happy Life Index and Ecological Footprint matrix were used to drive home the urgency for change in the face of present and future energy problems. The uneven distribution of electricity was also depicted – revealing that the low income households which represent 50% of the consumers consume only 20% of the electricity available domestic sector whereas 20% of the high income consumers consume 50% of total energy available for the domestic sector..

The hydro power electricity units available for the domestic sector is sufficient to cater to the electricity requirements of 75% of the domestic sector consumers. However the CEB has to generate balance 60% by oil power plants due to lifestyles of the affluent people. This leads to increase the average cost of a unit. Hence it is obvious that lower consuming groups have to subsidize the rich electricity consumers. Therefore, equity issues must be dealt with by curtailing consumption patterns of the 'privileged'.

Remarks / comments

A representative of the CEB rejected the statement that 'incorrect assumptions' had been made by the CEB during the coal power project calculations. He defended the planning process of the CEB, saying that in planning, there are always limits to the accuracy of the forecast, however scientifically projected it may be. The CEB does several studies including sensitivity analysis to measure the impact of the discounted value of currency. He also gave a detailed statement counteracting the accusation that the CEB did not take inflation into account when calculating the price of coal and oil. With regards to the exchange rates, he mentioned that there was no exchange rate variance due to the fact that the investment analysis for the long-term generation plan was calculated in US dollars.

Mr. Asoka responded by saying that the CEB official's statement confirmed the points made by him.

Another participant from the CEB Management defended its stance on coal: The data presented was correct, but was interpreted wrong, he said. This is because coal supplies 40% of global energy today. India produces 80,000 of its 120,000 MWs from Coal. Same applies to China and the USA. But as of today, Sri Lanka has not even got one coal plant, because for the past 20 years we have been debating the installation of one. What is the alternative for Coal? Asoka has not been able to propose anything concrete. The CEB plans and policies have been attacked severely, but it is better to have a plan and build on it rather than have no plan at all.

The commentator went on to say that it is true that the global CO_2 emissions are on a rapid increase, but to what extent does Sri Lanka have to compensate for it?

No official of the CEB has ever discouraged Renewable Energy. It is the CEB that did the initial work and research on RE in the country. It is due to the lobbying at the political and grassroots level that delayed the construction of the Upper Kotmale and Norachcholai plants which are currently being constructed. They have prioritized Dendro, Wind and Solar and initiated many projects that provide energy to the people. A pilot dendro plant of 1MW has been established. The CEB has made provisions for people and agencies to privately take up and propose plants. However, due to technology and other gaps, we need to see how appropriate they are to take over the large scale energy supply in the medium term. The speaker believes that coal is so far the only viable option to produce large scale energy for the country. There is an urgent need to shift away from diesel for electricity generation. On average, the global percentage of diesel used for power generation is 7%. In Sri Lanka it is 65%.

He went on to say that RE, change of lifestyles, energy efficiency etc. have become the hot topic and way forward in the West, especially in the United States. But the US is still heavily dependant on coal, and is the greatest polluter and consumer of fossil fuels to date. Are they truly concerned? Why should Sri Lanka forfeit her development in order to try and solve the problems of the world that were not created by her?

Asoka in reply, stressed that Global warming was a real and serious threat. The process is irreversible. It was first acknowledged in the 1980s, but no one heeded the warnings for 10 years. The Kyoto protocol in the 1990s then laid pressure on governments to reduce their carbon emissions by 5%. 10 years later, the proposal was put forth in Bali for Developed countries to reduce by 80%. How then, can we ignore this warning? Shouldn't we take this into consideration when making our plans for the future? Tongue in cheek, the Asoka stated that the it is factually correct in saying that our quota has been used up by the developed world, therefore emission wise, we have no 'allowance' left!

Another representative from the CEB commented on Asoka's inequity theory. Asoka had stated that more than 50% of the country's power is consumed by 20% of rich, high electricity users. Therefore the government subsidies benefit this elite group the most. The commentator agreed with this viewpoint, and proposed that the best way forward would be to introduce a target subsidy, and to charge that 20% elite group the true cost of oil and production. He asked if Asoka and SEMA (Sri Lanka Energy Managers Association) would be willing to take this proposal to the government. Taking into account that most of the big industries belong to the 20% high consumer category, and that an increased energy price would have direct impacts on the price of goods, and therefore on the poor, can the government monitor the price hikes and shoulder the price increase on behalf of the 70% of the population? He believes that SEMA is vested with the power to approach government with such proposals.

In reply Asoka stated that it is up to the CEB and Public Utility Commissions to decide on the revised tariffs. However SEMA will be involved in the discussion process and put these views across to the decision-makers.

The Chairman suggested that a proposal that encompasses all these ideas would be one that considers electricity from hydro to be made available to households that consume less than 30 units, and for anything else to be commercially valued. He suggested that this topic be taken up later, during the Panel discussion.

Dr Siyambalapitiya voiced that Mr Asoka should not condemn the country's entire energy policy in the absolute manner as it proposes to have 10% from Non Conventional Renewable energy sources. He should instead, study it further and rethink his stance on it, as not everything in the policy deserves such heavy criticism.

The Chairman informed the audience that he cannot give time to Mr. Asoka to respond to these statements as it is already late. However he mentioned that Mr. Asoka has asked him to inform the audience that all issues raised by the CEB officials are adequately addressed in the Energy Forum study report which was circulated at the workshop.