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Main Players in the Electricity Industry

Ceylon Electricity Board (CEB)*: The electricity industry is primarily controlled by CEB, the largest electricity company in Sri Lanka, responsible for the major functions of electricity generation, transmission, distribution and retailing.*

Lanka Electricity Company (Pvt.) Ltd. (LECO)*: The only other on-grid electricity company, apart from CEB, responsible for electricity distribution in some limited geographies.*

Ministry of Power & Energy*: Responsible for implementation of government policies relating to the Electricity and Energy sector.*

Public Utilities Commission (PUC)*: Regulates the generation, transmission, distribution, supply and use of electricity in Sri Lanka. It is responsible for determining electricity rates and is supposed to review or revise tariff rates twice a year.*

Independent Power Producers (IPP)*: Private sector companies engaged in the generation of electricity, which is then purchased and distributed by the CEB.*

Power Cuts in Sri Lanka 2012: A Critical Review

In Sri Lanka, at present, the supply of electricity has fallen short of demand. The power cuts currently implemented are the first officially scheduled cuts in almost a decade – the previous cuts were in May 2002.[1] The Minister of Power and Energy Patali Champika Ranawaka, speaking in parliament on August 10, 2012, announced that an exacerbated power crisis was inevitable if the monsoon did not start by mid-September.[2]

- July 2012: CEB announced that 47 main towns in the country would undergo two hour and 15 minute power cuts during the day and 45 minute power cuts in the night for several days – it was attributed to a breakdown in two power plants.
- Early August: CEB announced another round of power cuts of two hours and 15 minutes in 58 major towns in the island and in surrounding areas – it was attributed to yet another breakdown in two power plants.
- No definite time table has been given for completion of repairs.

A Puzzling Development

The present announcement of power cuts is puzzling in light of earlier claims made by the Minister, with which he assured the country that the generation capacity was adequate and there would be no power cuts. These statements were made as early as September 2011[3] and even as recently as July 2012[4] in parliament and at press conferences. His statements took account of the droughts and reiterated that despite the low levels of precipitation in catchment areas, and the serious shortage of hydropower, power cuts would not be imposed.

The main reasons attributed to power cuts are:

(i) Unexpectedly high growth in demand
(ii) Shortage in generation capacity
(iii) Reduced rainfall in catchment areas and
(iv) Breakdown of the Chinese-built coal power station

But these reasons cannot fully explain this volte-face. Data and analysis show that the first two reasons are incorrect. The third and fourth reasons are only partial explanations. The data surfaces an important new causal factor, and it relates to policy decisions that have not been publicly discussed.

[1]http://www.island.lk/index.php?page_cat=article-details&page=article-details&code_title=57646
[2]http://www.power-eng.com/news/2012/08/10/inevitable-power-crisis-if-rains-fail-minister-ranawaka.html
[3]http://www.adaderana.lk/news.php?nid=15896, http://www.sundayobserver.lk/2011/09/04/new15.asp
[4]http://srilankamirror.com/news/225-minister-assures-no-power-cuts

A. Incorrect Explanations:

Explanation 1: Unexpectedly high growth in demand

- The normal expectation is that demand for electricity will grow in line with the GDP. The recorded GDP growth in Sri Lanka is at an average rate of 5.8% from 2000 to 2011. Electricity generation demand grows at a slower rate of 4.8% over the same period.

- The rate of growth in Electricity ***leads*** in the first half of the decade and ***lags*** in the second (see Figure 1). Therefore, growth in demand was ***not*** unexpectedly high in recent years.

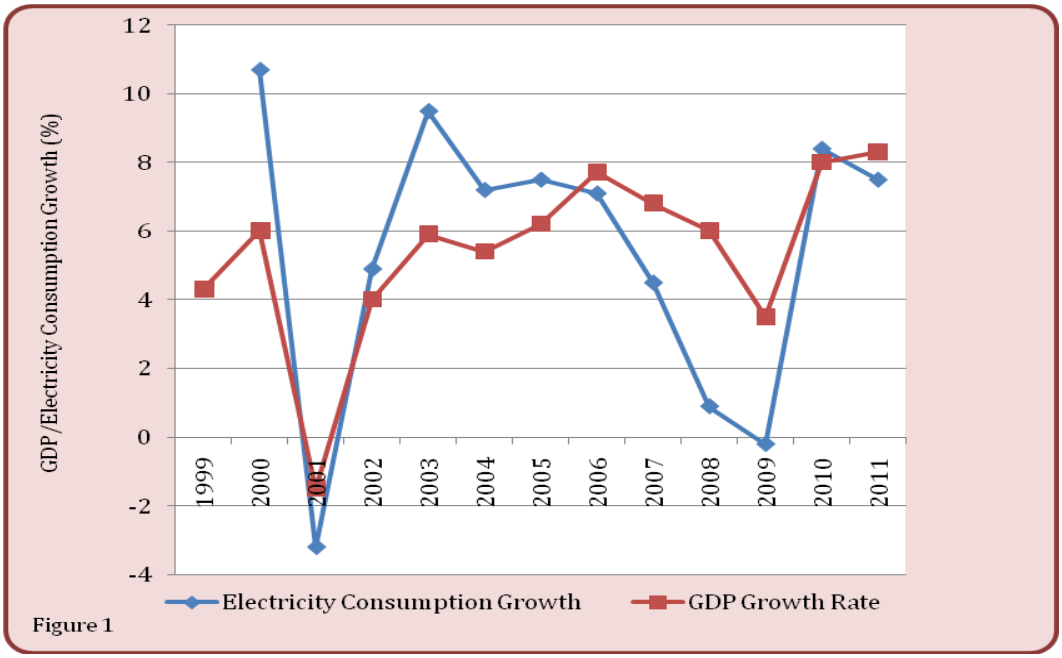


Figure 1

Source: Central Bank Annual Reports, Economic and Social Statistics 2012

Explanation 2: Failing to increase capacity in line with expected demand

- Even if demand was not unexpectedly high, it could have been the case that capacity increases to keep up with the expected demand did not take place as planned. But this explanation also fails.

- In the last decade, the average demand for electricity generation grew at a rate of 4.8% per year. In contrast, the total installed capacity has grown at a higher average rate of 5.3%. Therefore, a shortfall in installed capacity is also ***not*** the cause of the current shortage.

B. Partial Explanations:

Explanation 3: Low precipitation (rainfall)

- In the past ten years, precipitation levels in hydrocatchment areas have been within the level of 25 to 30 thousand millimetres (Except in 2010, which had the highest level of rainfall in the last decade: 34,662 mm). The precipitation levels in 2012 have not been published; but there have been no reports of 2012 being a year of unprecedented low rainfall.

- In 2004, 2006, 2008, and 2011 also, rainfall was at the low end, recording 25,204, 27987, 26351and 25,736 mm respectively (see Figure 2). But the reduced rainfall in these years did not result in a crisis leading to power cuts.

Explanation 4: Breakdown of Chinese built Norochcholai coal power plant

- The much awaited coal power plant in Norochcholai has not functioned as expected. After having malfunctioned over a dozen times this year, it is now reported to be out of commission, and undergoing repairs.

- The reasons for this breakdown are unclear. The government has blamed the contractors, while the contractors have alleged the failure to follow the set maintenance procedures and the failure to abide by the guidelines for using and resting the generators as the cause.[5] The precise locus of culpability is difficult to investigate because unlike in the case of funding provided through multilateral organisations, such as the World Bank, projects funded by the Chinese government are opaque with regard to the contracting terms, performance audits and other such due diligence.

- Figure 2 shows that the present power shortage of 230 MW (0.23 GW) could have been overcome if the 300 MW coal plant was in operation. But this is not a sufficient explanation in that the shortage of power could also have been avoided if total hydropower was functioning at a mere 30 percent of capacity instead of the present 15 percent (CEB controls 1.20 GW of the total hydropower).

Figure 2

Power Generation	Maximum (GW)	August 2012 (GW)
Hydro	1.40	0.20
Oil and Gas	1.40	1.40
Coal	0.30	0.00
Renewables	0.05	0.05
Sub-total	**3.15**	**1.65**
Peak demand	1.88	1.88
Surplus/Deficit	**1.41**	**-0.23**

Source: Ceylon Electricity Board[6], Minister of Power and Energy[7], Reuters[8]

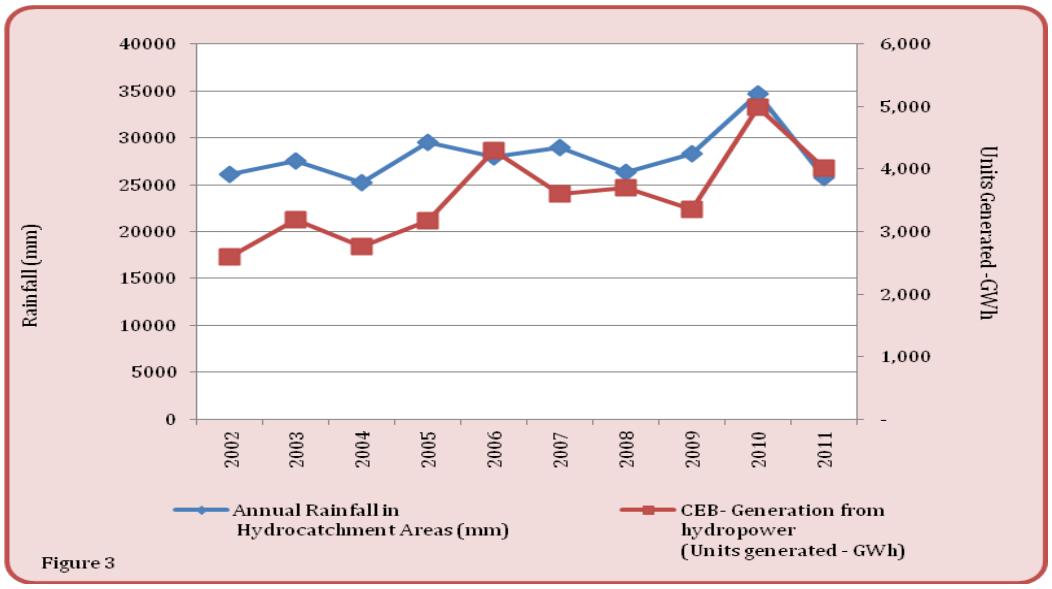
C. Hidden Explanation:

Unprecedented aggressive exploitation of hydropower since 2010

- Rainfall is only one variable accounting for hydropower generation capacity. The other variable is the starting water levels of the reservoirs, which are affected by past exploitation. 2012 began with the water level at about 50 percent, and by mid-August it had declined to about 20 percent.

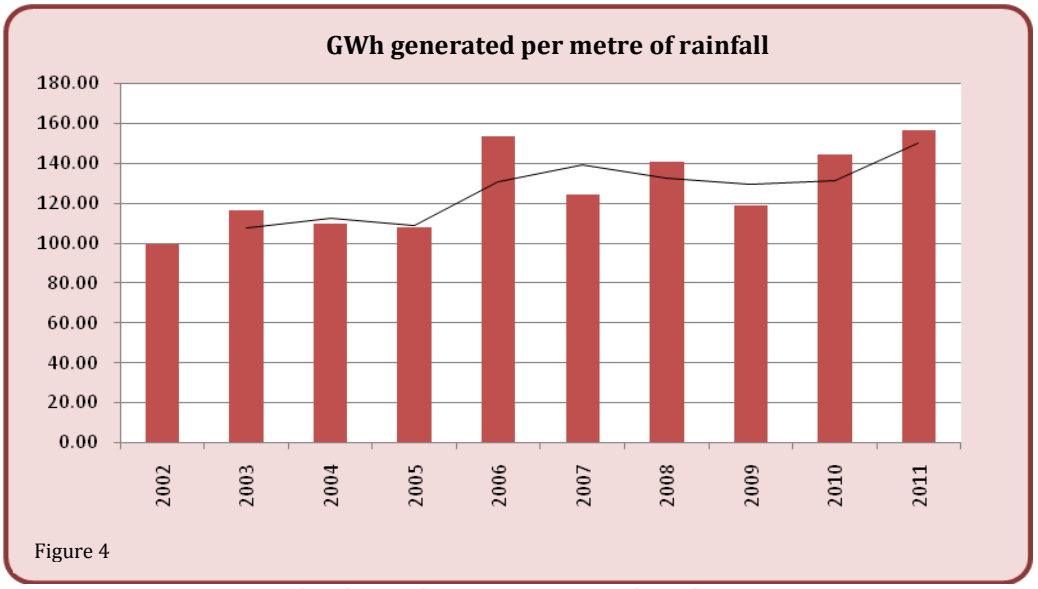
- The data plotted in Figure 3 shows the annual rainfall, and the generation of hydropower by the Ceylon Electricity Board (CEB). In 2011, rainfall was lower than in 2008 and 2009, and yet the exploitation of hydropower was greater in 2011, at 4,018 GWh, in contrast to the 3,700 GWh and 3,356 GWh in 2008 and 2009 respectively. In fact, in 2011, precipitation in the hydro-catchment area was the ***second-lowest*** in the decade, but hydropower exploitation was the ***second-highest*** in the decade.

[5]http://www.lankabusinessonline.com/fullstory.php?nid=553107570
[6]http://www.ceb.lk/sub/publications/getPubFile.aspx?id=28
[7]http://www.island.lk/index.php?page_cat=article-details&page=article-details&code_title=32364
[8]http://in.reuters.com/article/2012/08/15/srilanka-power-cuts-idINDEE87E05320120815



Source: Central Bank Annual Reports, Economic and Social Statistics 2012

- **Aggressiveness of hydropower exploitation** can be measured precisely as a unit of power generated per unit of rainfall. The data plotted in Figure 4 shows that **since 2006, there has been a shift in hydropower exploitation policy**. In the period 2002-2005 average exploitation was almost 108GWh per metre of rainfall. From 2006 to 2011, exploitation became more aggressive; average exploitation increased by almost 30% to over 139 GWh per metre of rainfall.



Source: Central Bank Annual Reports, Economic and Social Statistics 2012

- **The aggressiveness in hydropower exploitation further increased in 2010 and 2011.** Even in the post-2006 aggressive exploitation phase, a year of high exploitation was alternated with a year of lower exploitation. Figure 4 highlights aggressive exploitation in 2006 and 2008, and lower exploitation in 2005, 2007 and 2009. But 2010 and 2011 are consecutive years of very high exploitation, with aggressiveness of exploitation in 2011 being the highest in the decade.

- Therefore, the data suggests that 2012 would have had significantly higher starting water levels if not for a policy of increasingly aggressive exploitation of hydropower in 2010 and 2011. **Higher starting water levels could have increased generation capacity adequately to avoid the present shortage of 200 MW** (see Figure 2).

Sources of Power Generation

Hydroelectricity

One of the main sources of electricity in Sri Lanka; accounted for 45 % of the total installed capacity in 2011. Over the past 10 years, the ***capacity*** *for hydropower has increased by almost 20%. However, actual generation has fluctuated based on rainfall and aggressiveness of exploitation.*

Thermal Power

Largest source of energy in Sri Lanka; accounted for 54% of the total installed capacity in 2011. The increase in thermal power over the past 10 years has been 124%. Thermal power stations in Sri Lanka were run by diesel, oil and fuel oils. In March 2011, Sri Lanka's first coal power plant commenced operations in Norochcholai. A second coal power plant is under construction in Sampur.

Non Conventional Renewable Energy

Consists of small hydropower plants, wind power and solar power.

The Ceylon Electricity Board (CEB) is a statutory corporation managed by the Ministry of Power and Energy. It has a monopoly on electricity sourcing and distribution in Sri Lanka. The CEB is tasked with ensuring an uninterrupted power supply, and also faces the pressure of reducing costs – the CEB remains amongst the most subsidized / loss making institutions of the government (reported to be over 25 billion in 2011).*

* http://www.lbo.lk/fullstory.php?nid=299306085

Increasing the risk-cost ratio

- As analysed above, the policy of exploiting hydropower with increasing aggressiveness cannot be attributed to a shortages in capacity. Neither can it be attributed to a shortfall of rain – 2010 had the highest rainfall in the catchment areas for the last decade. But it could be linked to a policy of reducing costs – hydropower costs considerably less than other sources of power. The Ceylon Electricity Board's Annual Report for 2010 states that the average cost of hydropower generation in CEB plants amounts to Rs.1.17/kWh, whereas thermal power generation amounts to Rs.15.77/kWh.

- Aggressive exploitation of hydropower increases the risk of having to impose power cuts – as has occurred at present. But it also reduces costs. It is clear from the data that a different approach to this risk-cost tradeoff has been adopted since 2006, and the risk factor was further increased in 2010 and 2011.

- Sri Lanka has excess generation capacity as a result of the new Chinese-built coal power plant. **This justifies steps to increase risk through lowered water levels in the pursuit of lower overall costs.** However, even further increase in aggressiveness in 2010 and 2011 may have tipped the balance too far in the direction of over-confidence, and lack of contingency planning.

- The risk calculation may have also failed to account for the increased vulnerability to quality and reliability created by contracting and monitoring procedures that are non-transparent and less accountable due to funding through bilateral closed-door agreements, which contrast with projects supported by multilateral institutions that have higher standards of information disclosure, and face a high-level of global scrutiny.

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