



## POWER TO THE PEOPLE? the real issues for electricity reform

*At the beginning of April the President of CEB Engineers Union stated that even though Sri Lankan consumers are charged among the highest tariffs in the world, the price of electricity would have to be increased by almost 50% if the CEB is to break even and to overcome the huge debt and operating losses it currently incurs.*



*In April, the Head of State declared that the government intends to proceed with plans to restructure the sector, and said that by the end of the year the state power utility will be dismantled into independent government-owned units of generation transmission. A month later, the press reports that the Prime Minister has announced that plans for restructuring the sector have now been put on hold.*

*According to Trades Unions, restructuring will do nothing to bring tariffs down, and may actually increase the costs of supplying power to the country. At the same time, there are calls to invest in new power infrastructure in the country. Especially, many argue, there is an urgent need to build more coal and oil-fired power stations in order to secure an adequate and affordable electricity supply for consumers.*

*It is obvious that Sri Lanka's power sector faces deep-rooted problems. But much of the current debate about electricity supply and pricing merely serves to mask the real issues at stake. Analysis of the evidence points to a number of worrying figures and trends. It suggests, quite simply, that the general public has been misled.*

*The nation's electricity sector is operating at a massive loss, which is being passed on to consumers through higher bills. Simultaneously much of the planned expansion of power facilities seems to be driven by a wish to increase Sri Lanka's already indebted status through investing in high cost and import-dependent thermal plants, rather than by a genuine desire to improve the efficiency of existing facilities, to reduce power piracy, or to provide low-cost electricity to the general public.*

*The time has come to set the record straight. Sri Lanka's 3.4 million electricity consumers have clearly been paying too high a price, for far too long, to subsidise a moribund sector. And as long as there remains no accountability or transparency about the true costs of supplying power, these problems are unlikely to be overcome. Reform or no reform, it is difficult to have any confidence that, under current conditions, electricity prices will in reality come down or that the general public will be provided with improved, more reliable, or lower cost electricity supplies.*

***POWER TO THE PEOPLE? the real issues for electricity reform***  
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## Basic Terms and Calculations Used in this Paper

The basic unit for measuring electricity is **Watts**.

Electricity consumption is usually measured in terms of watt hours. A **kilowatt hour (kWh)** is equivalent to 1,000 watt hours, or one 1,000 watt appliance used for one hour.

- *Electricity bills are charged according to the units (or kWh) of electricity consumed per month. A household who consumes 200 units (kWh) of electricity per month would pay the following bill:*

<i>The first 30 units are charged at Rs 3.00:</i>	$30 \times 3.00 = \text{Rs } 90$
<i>The next 30 units are charged at Rs 3.70:</i>	$30 \times 3.70 = \text{Rs } 111$
<i>The next 30 units are charged at Rs 4.10:</i>	$30 \times 4.10 = \text{Rs } 123$
<i>The next 90 units are charged at Rs 10.60:</i>	$90 \times 10.60 = \text{Rs } 954$
<i>The remaining (20) units are charged at Rs 15.80:</i>	$20 \times 15.80 = \text{Rs } 316$

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*Total monthly bill* = Rs 1,594

Electricity production is usually measured in terms of **Megawatts** (MW = one thousand kilowatts) and **Gigawatts** (GW = one million kilowatts).

- *A power plant with 1 MW installed capacity can generate a megawatt of electricity, or 1,000 kWh, over one hour. Over a period of one year it can generate  $1 \text{ MW} \times 24 \text{ hours} \times 365 \text{ days} = 8,760 \text{ megawatt hours (MWh)}$ , or 8.76 gigawatt hours (GWh). This is equal to 8.76 million units (kWh) of electricity.*

The amount of electricity actually generated can be compared to the total installed capacity of power plants to calculate **percentage capacity utilisation**:

- *A power plant with 1 MW installed capacity working 24 hours a day would generate  $1 \text{ MW} \times 24 \text{ hours} \times 365 \text{ days} = 8,760 \text{ megawatt hours (MWh)}$ , 8.76 gigawatt hours (GWh) or 8.76 million units (kWh) of electricity. It would be working at 100% capacity utilisation.*
- *The same power plant working only 8 hours a day would generate  $1 \text{ MW} \times 8 \text{ hours} \times 365 \text{ days} = 2,920 \text{ megawatt hours (MWh)}$ , 2.92 gigawatt hours (GWh) or 2.92 million units (kWh) of electricity. It would be working at 33% capacity utilisation ( $2,920 \text{ MWh} \div 8,760 \text{ MWh}$ ; or  $8 \text{ hours} \div 24 \text{ hours}$ ).*

The amount of electricity actually available for consumption can be compared to the total amount of power generated to calculate **system losses**:

- *If 1,000 GWh of electricity are generated and 1,000 GWh (or 1,000,000,000 kWh) are actually available for consumption, then there would be 0% system losses.*
- *If 7,612 GWh of electricity are generated and 6,209 GWh (or 6,209,000,000 kWh) are actually available for consumption, 1,403 GWh are lost from the system and there would be 18.4% system losses ( $1,403 \text{ GWh} \div 7,612 \text{ GWh} = 0.184$ ).*



## **Analysis of the real evidence: electricity at a glance**

- Only 35% of the country's total installed capacity is used to generate power:
  - *Only 30% of installed hydropower capacity is used.*
  - *Only 40% of installed thermal power capacity is used.*
- Almost 20% of power generated is “lost” to the system, and does not reach consumers:
  - *Just under 9% of total power generated is lost for “non-technical” reasons — in other words through illicit and unauthorised tapping of power.*
  - *This power piracy accounts for 663 GWh a year, which is enough to power 275,000 households using basic electrical equipment.*
  - *It translates into Rs 5.1 billion of lost revenues.*
- Law-abiding electricity consumers in Sri Lanka already pay the highest tariffs in the region (if not the world):
  - *Through their over-inflated electricity bills they subsidise the losses of CEB of Rs 60-80 billion, a debt which is increasing at between 20-25% a year.*
  - *They also pay for a hidden subsidy to illegal electricity consumers of Rs 5.1 billion, and a Rs 4.5 billion subsidy to LECO.*
- Therefore any forecast increase in power demand will not come primarily from this population and any increase in costs incurred by increasing generating capacity (particularly thermal) will have to be borne by these already over-burdened customers.
- Any increase in thermal generation without an increase in overall demand will be at the expense of existing hydropower generation — which is already running under capacity.



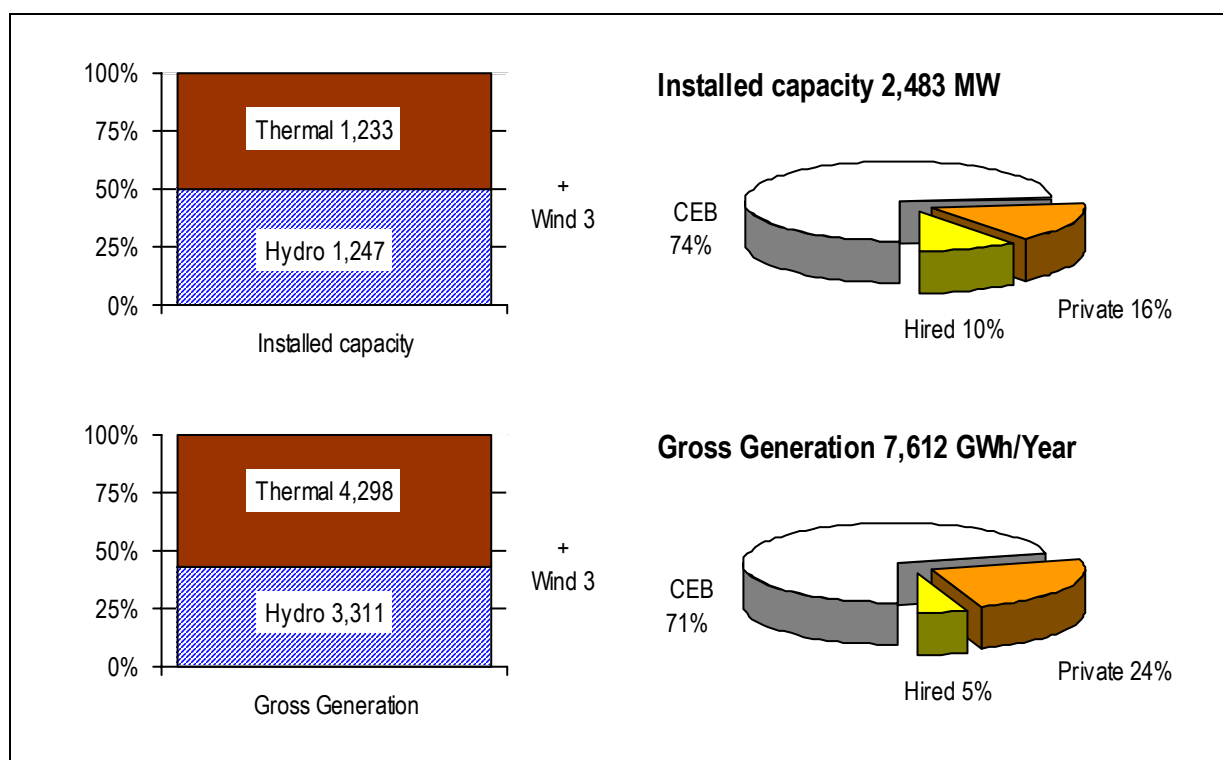
## Electricity in Sri Lanka: the basic statistics from CEB

Almost all electricity in Sri Lanka is generated and managed by CEB. According to CEB's own statistics, supplies depend almost equally on hydropower and thermal sources — both in terms of installed capacity and gross power generation. While households hold the majority (some 2.65 million) of accounts, and consume an approximately equal amount of electricity (about a third) to industrial consumers, average industrial consumption per day is at 200 units almost 100 times as high as domestic consumption. The more electricity consumers use, the higher the unit price they pay for it. Due to their higher average consumption, industrial users contribute almost 40% of CEB's gross annual revenues of Rs 47 billion.

### Where it comes from

According to Ceylon Electricity Board (CEB) 2003 statistics — the latest that are publicly available — the 2,500 megawatts (MW) installed capacity of Sri Lanka's 68 power stations generate a gross power output of just over 7,600 gigawatt hours (GWh) a year.

Of this total, approximately half of installed capacity and gross generation is accounted for by each of hydropower and thermal sources (coal and oil fired plants), with a tiny amount (0.1% or less) coming from wind energy.



The CEB is responsible for the lion's share of power generation in the country: about three quarters of installed capacity and 71% of gross generation. Just over a quarter is supplied from hired sources and private power providers. Hydropower, in particular, is provided almost exclusively through the CEB's large-scale schemes — just 3% comes from small-scale PPP facilities.



### Who consumes it

Of the 7,600 GWh of power that was generated in 2003, just over 6,200 GWh or 82% was sold by CEB to 3 million electricity account holders in the country. Records show that almost 90%, or 2.65 million accounts, are domestic, equating to about two thirds of the households in Sri Lanka. Most of the remainder (10-13% each) are held by Lanka Electricity Co. (Pvt) Ltd's (LECO) 44 accounts (which represent 382,024 separate consumer accounts), and small-scale "general" consumers.

In terms of consumption, domestic and industrial consumers each account for about one third of power consumed, with the bulk of the remainder (15% each) accounted for by sales to general consumers and to LECO.

	No accounts	Annual sales (GWh)
Domestic	2,648,988	1,995
Religious	18,482	35
General	308,024	1,042
Industrial	31,182	2,159
<i>Small</i>	27,593	147
<i>Medium</i>	3,460	1,174
<i>Large</i>	129	838
LECO	44	894
Street lighting	1	83
<b>ALL CONSUMERS</b>	<b>3,006,721</b>	<b>6,209</b>

	Average consumption (kWh/consumer/day)
Domestic	2
Religious	5
General	9
Industrial	190
Small industrial	15
Medium industrial	930
Large industrial	17,798
<b>ALL CONSUMERS</b>	<b>5.66</b>

Average daily consumption rates however vary considerably between different types of account holders. In terms of kilowatt hours (kWh), the average household uses about 2 units of electricity a day. In contrast, industrial account holders consume on average almost 100 times this amount. Although small industries comprise almost 90% or 27,600 of industrial accounts held, they account for just 7% of electricity sales. It is the 129 large industries who buy some 40% of industrial electricity (or 13% of the national total) and each consume an average of almost 18,000 units per day.

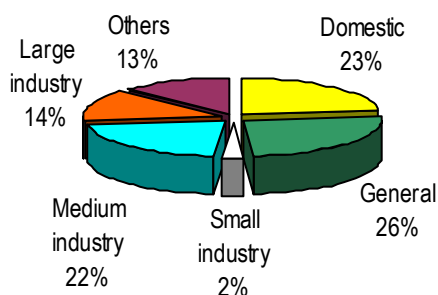
### Tariffs charged and revenues earned

Electricity is priced on a tiered scale. Generally speaking, as consumption levels increase, so the price paid per unit of electricity also rises.

So, for example, a domestic consumer will pay Rs 3 per unit for the first 30 units consumed, rising progressively to Rs 15.80 when monthly consumption exceeds 180 units. For industrial and general purposes, prices are differentiated according to whether consumption takes place at peak or off-peak times, with peak prices (Rs 14-15 per unit) approximately twice as high as off-peak ones.

	Average price (Rs/kWh)
Domestic	5.54
Religious	4.46
General	11.85
Industrial	8.38
<i>Small</i>	7.69
<i>Medium</i>	8.78
<i>Large</i>	7.95
LECO	6.06
Street lighting	7.82
<b>TOTAL</b>	<b>7.69</b>

### Total revenues to CEB Rs 47.71 million



Across all consumers, the average price of electricity is Rs 7.69 per unit, ranging from an average of Rs 5.54 for domestic consumers through Rs 8.38 for industrial consumers to Rs 11.85 for general consumers.

In 2003 the CEB earned more than Rs 47 billion in revenues. Sales to domestic (Rs 11 billion) and general consumers (Rs 12 billion) contributed about a quarter each to this total, and industrial accounts just under 40% (Rs 18 billion).



## The power sector: what's going on?

*The CEB has for the last 5 years been consistently running at a loss, and has accumulated large debts to suppliers. Meanwhile consumers suffer from periodic power shortages, while facing some of the highest prices in South Asia and possibly in the world. To counter these problems, there have been widespread calls (as well as vocal opposition) for the government to invest in new (thermal-powered) electricity generation facilities, to rationalise tariffs, and to complete a process of structural re-organisation which will lay the foundation for the privatisation of the electricity industry.*

### **The current state of the CEB's finances**

Although the CEB is expected to function on "sound commercial principles", it has patently failed to reach this goal. Reportedly running at a profit until 1999 (when it claimed a surplus of Rs 4 billion<sup>1</sup>), the CEB's debts are now estimated to be somewhere between Rs 60 billion<sup>2</sup> and Rs 80 billion<sup>3</sup>. Most of this money is owed to private power suppliers and to the Ceylon Petroleum Corporation for fuel purchased to generate thermal power. The CEB's long-term loan instalments and loan interest comes to around 8 billion rupees annually, and around 50 billion rupees has been borrowed from international organisations through the treasury.

Losses for the financial year 2003/04 are reported to have totalled around Rs 15 billion<sup>4</sup>, suggesting that the CEB's accumulated debt is increasing at 20-25% a year. These already high debts are continuing to spiral upwards as the world oil price rises<sup>5</sup>. Furthermore, obtaining more credit is nearly impossible as the CEB has consistently failed to check its cash flows. One informed source is quoted as stating "We can't pay our bills to Ceypetco or power producers. Earlier we were able to raise money from banks but that's not possible now. We are running on a huge overdraft and we just hold back cheques, without paying our dues"<sup>6</sup>.

### **Calls to increase power supply facilities**

There are widespread calls for Sri Lanka not only to increase the amount of power generated, but also to change its source. The increasing incidence of power shortages and outages has caused particular concern — for example a study carried out for the USAID South Asia Regional Initiative for Energy in 2003 concludes that losses to the country's industrial sector as a result of power interruptions may be as high as \$81 million annually, or just under 1% of GDP<sup>7</sup>.

Explanations for the power shortages are commonly linked to a claim that Sri Lanka has insufficient or unreliable power generating capacity. In particular, it is claimed that power shortages arise because of the country's over-reliance on hydropower and its inability to meet demand during times of drought.

According to the CEB's Generation Planning Report, future power generation will become predominantly fossil fuel based<sup>8</sup>. Stated expansion plans for the decade from 1999 include two hydro power plants of 70 MW and 150 MW, three combined cycle plants of 150 MW each, and 2 coal fired

<sup>1</sup> [LankaNewspapers](#), 8 April 2005, "CEB trade unions push for abolition of Electricity Reform Bill"

<sup>2</sup> [LankaNewspapers](#), 8 April 2005, *ibid*.

<sup>3</sup> Mr Ananda Piyatillake President of CEBEU quoted in [LankaNewspapers](#) 13 April 2005, "Consumers paying world high prices for electricity – CEBEU"; [Lanka Business Online](#) 6 April 2005, "Unplugged".

<sup>4</sup> [Lanka Business Online](#) 4 April 2005, "Backup power"

<sup>5</sup> [SriLankaNewspapers](#), 13 February 2005, "Ceylon Electricity Board sitting on time bomb".

<sup>6</sup> [SriLankaNewspapers](#) 13 February 2005 *ibid*.

<sup>7</sup> Nexant SARI/Energy, 2003, [Economic Impact of Poor Power Quality on Industry: Sri Lanka](#), report prepared for USAID under South Asia Regional Initiative for Energy

<sup>8</sup> CEB Long Term Generation Expansion Plan, Generation Planning Branch, Ceylon Electricity Board.



plants each with a capacity of 300 MW. Apart from a 3 MW wind farm to be installed in the South of the country, no other renewable additions are specified.

Increasing the number of coal and oil-fired plants is frequently held up as a panacea to the country's power supply problems — and there has been a tendency to blame the government for its failure to add to thermal capacity. Repeated demands have been made by both politicians and energy sector specialists, as well as by foreign donors, to build additional coal and oil-fired plants in Sri Lanka in order to provide adequate, cost-effective electricity. These demands are justified as ways to increase the quantity and reliability of power supplied, as well as to slash the price and unit generating cost of electricity. For example only a few weeks ago the Joint Front of CEB Trade Unions claimed that the reasons for CEB's financial losses and for projected power shortages is that the government has not introduced coal-fired generators. These pressures and demands appear to have had some effect. Sri Lanka has recently approved the development of its first coal-fired plant (300 MW) at Norochcholai on the north-west coast.

### ***Debates about the electricity tariff***

Many sources point out that Sri Lanka has among the highest electricity tariff in South Asia<sup>9</sup>, and possibly in the world. For example recent data show that prices range from a low of \$0.04/kWh in Bhutan to a regional high of more than \$0.06 in Sri Lanka, with Bangladesh, India, Nepal and Pakistan lying in between<sup>10</sup>.

As presented in the public media and official statistics, this leads to something of a paradox as to the correct way to resolve electricity pricing issues. To some, the development of new power sources can only act as a force for the good in bringing down power tariffs in Sri Lanka. For example, some weeks ago, the Minister of Power and Energy, Honourable Susil Premajayantha MP stated that once the Norochcholai and Upper Kotmale power generation plants were in operation, electricity could be provided to the consumer at Rs.4.50. It is however not clear whether this statement was a real commitment to decrease electricity tariffs in the near future, or whether it merely reflected a desire to prove that the new plants would be able to generate power at a lower cost than is currently the case.

At the same time, concerns are being raised about the ability of current tariff levels to generate sufficient revenues to cover the costs (and reverse the current losses) incurred to CEB in supplying electricity. It is argued that tariffs are being kept artificially low in comparison to the real costs of provision — one source shows that for the household sector the average selling price of electricity is subsidised to the extent of about 30% of the average price<sup>11</sup>. In a similar vein, the CEB Engineers Union has recently stated that the selling price of electricity in the country would have to be increased by a further 48% just to break even<sup>12</sup>.

### ***Proposals for reforming the electricity sector***

Much larger plans are afoot for the power sector in Sri Lanka, and these underpin current debates about CEB's financial status and operational efficiency, as well as about the source and price of electricity. Major reforms in the energy sector were first proposed, amidst much controversy, 3 years ago when the Electricity Reforms Act No. 28 of 2002 was passed and certain Parts of this Act were given effect by Gazette Notification in the following year.

The bill basically proposes to reorganise the electricity industry to form separate companies to deal with each of generation, transmission and distribution of power (companies which, ironically enough,

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<sup>9</sup> ADB Sri Lanka Country Strategy and Program Update for 2005-2006

<sup>10</sup> USAID, 2003, [Comparing Independent Power Wholesale Electricity Prices in South Asia](#), Work Order #113, Submitted by Advanced Engineering Associates International Inc and Deloitte Touche Tohmatsu, Washington DC

<sup>11</sup> Tilak Siyambalapatiya, 2002, "A review of the energy policy in Sri Lanka and its implementation", [Energy for Sustainable Development](#) VI(1): March 2002

<sup>12</sup> Mr Ananda Piyatillake, President of CEBEU, quoted in [LankaNewspapers](#) 13 April 2005, "Consumers paying world high prices for electricity – CEBEU"



the President has pledged that the government would retain ownership of<sup>13</sup>). Under heavy pressure from donors (and strong opposition from Trades Unions), the President declared last month that the government intends to proceed with these restructuring plans, and that by the end of the year the state power utility will be dismantled into a number of independent units. However more recent press reports, published a month later, state that the Prime Minister has announced that these plans are now shelved<sup>14</sup>.

## Changes in the power sector: setting the record straight

*Although today's debates about electricity are for the most part phrased in 'common-sense' and reasonable terms, many of the issues that are currently being raised are far more complex than they appear at first sight. There are a multitude of vested — and powerful — national and international interests that shape what happens in Sri Lanka's power sector. Failing to consider these motivations, or to make them explicit, leads to the risk of making decisions on the basis of partial — and flawed — information, and leading to outcomes which may be sub-optimal both for the Sri Lankan economy and for the country's electricity consumers.*

### **CEB's subsidised losses and hidden costs**

Despite a rhetoric of accountability, transparency and commercial principles, the CEB has little motivation under current conditions to improve either its financial operations or the transparency of its published statistics. The last audited accounts that were widely published cover the Financial Year 1998-99, and even these 6-year old figures were published only in summary form as part of the CEB's 1999 Annual Report. The CEB's statistics for 2003 do not contain any information regarding the profit or loss incurred by LECO.

At present the CEB's losses are largely covered by subsidies. Those from central government are both direct and implicit (for example through maintaining an overdraft and outstanding loans to CEB from the People's Bank, allowing borrowing from international organisations through the Treasury, stepping in to pay off debts, and encouraging donors to write off a portion of the CEB's debts). More worryingly, they are also largely subsidised by the general public and particularly by household consumers who hold the bulk of electricity accounts, as they are felt through the high bills and tariffs — part of which are used to cover the costs that the CEB bears each year to service their debts.

The costs of generating electricity (already horrifically high) may be even greater than they are represented to be, and the situation far worse than it appears. Power sector development has been largely financed by overseas aid. Neither these "hidden" contributions (through grants and concessional debt and equity) nor the true cost to the country of supplying fuel for thermal power generation, are accurately reflected in CEB's official statistics. This means that the full development costs of power infrastructure are not considered in either the stated costs of electricity provision or in tariff calculations.

### **Investing for private gain**

Current demands to establish new power generating capacity, and especially the emphasis on developing additional thermal plants, must be questioned on several levels. In particular, impressive opportunities for rent-seeking behaviour are allowed by the ways in which power sector investments are currently planned and implemented.

Again, there is much rhetoric and many public statements about working to attract foreign investors to build independent thermal power plants in Sri Lanka<sup>15</sup>. But these claims have to be countered with

<sup>13</sup> [Sri Lankan Internet Newspaper](#), April 1 2005, "President Kumaratunga plans to restructure CEB and CPC".

<sup>14</sup> [Asian Tribune](#) May 9 2005, "Sri Lankan trade unions won the CEB battle".

<sup>15</sup> Energy Information Administration (EIA) of the United States Government. [South Asia Regional Overview](#). October 2004



questions concerning the real costs to the national economy and to electricity consumers that are associated with power sector development as it is presently carried out, as well as the extent to which current plans are likely to improve the reliability and affordability of electricity supplies in the country.

The reality is that many of the current, and past, investments in the power sector are not driven by any real need (or wish) to increase the capacity or reliability of electricity supplies. Most of the equipment and expertise required to construct these new plants depend on foreign imports (thereby upping the import bill and drawing down scarce foreign exchange reserves), as do the crude oil and coal that are required to fire them. As noted by the Economist Intelligence Unit<sup>16</sup>, an international analyst of world economic trends, “oil imports deplete foreign exchange reserves and coal has raised environmental concerns”, and, in relation to Sri Lanka’s trade balance, “of particular concern are the sharp oil price increases that, given Sri Lanka’s increasing dependency on thermal energy, will result in steep rises in the oil bill”.

Such arrangements provide a ready channel for the donor loans and financing that act to increase still further the dependence of the Sri Lankan government and economy on the “international community”. They also allow multiple — and lucrative — opportunities for the kind of patronage and personal gains that inevitably accompany such large infrastructure projects.

### ***Unclear infrastructure choices***

The long-awaited Norochcholai coal-fired plant presents a graphic example of an infrastructure choice that raises many questions — most of which are yet to be answered. Serious doubts have arisen about the choice of location for the plant, particularly in the context that the first choice of site was Mawella in the south. There are also unresolved issues concerning the high costs of infrastructure required to transport coal to the plant, and to carry residues away from it. Even now that a decision has been made to go ahead with the plant, there remains some mystery, and confusion, as to the basis upon which it will be built and operated. According to the Indian newspaper the Hindustan Times “it may be safely said that at this point of time, the NPTC is due to swing the deal”<sup>17</sup> (the NPTC is India’s state-owned National Thermal Power Corporation). At the same time, the Sri Lankan media reports of “Chinese financing for a 300 MW coal power plant in Norochcholai, Puttalam”<sup>18</sup>. For this new infrastructure development, as for many others in the power sector, there appears to be a fundamental lack of transparency (and, some might argue, a basic lack of logic) about the basis upon which decisions have been made.

In the face of repeated demands to build new power plants, and especially to invest in expensive and import-dependent thermal plants, little emphasis is accorded to improving existing power generation facilities. With a rush to raise, and spend, additional funds on electricity infrastructure, there has been much less effort invested in making current power generation more efficient and increasing output from already-existing plants — especially hydropower facilities. It is time to critically analyse projects that have been carried out in the past. The high-profile Victoria Project was initially commissioned in response to the stated need to develop a new large-scale hydropower plant with 420 MW installed capacity. By the time the project was completed, even though costs in Pounds Sterling had overrun significantly, the capacity of the reservoir was reduced by building a shorter dam than originally planned, and only one of the two planned tunnels was built — meaning that installed capacity is now only 210 MW. Even though these changes were justified on the basis that another tunnel would be dug later, enabling the addition of another 210 MW to installed capacity, this has never been undertaken — and appears to form no part of current plans to expand electricity generation.

Yet, again, the overriding focus of future power expansion is on thermal not hydroelectric, and on new not existing, facilities. There has been little political will to explore alternatives to fossil fuel. Renewable sources of energy are given scant attention, and no attempt has been made to channel

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<sup>16</sup> EIU, 2004, Executive Briefing: Sri Lanka, Economist Intelligence Unit, London.

<sup>17</sup> PK Balachandran, April 4 2005, “NTPC could help revive Sri Lanka’s ailing power sector”, [Hindustan Times](#)

<sup>18</sup> [Lanka Business Online](#) 7 April 2005, “Switched Off”



even a fraction of the enormous subsidies given to import dependant fossil fuels into the development of renewable energy sources. In reality, the low tariffs paid for power derived from these sources acts as a deterrent to planned investments.

These selective gaps in what are being considered as the “best” mechanisms to increase installed capacity appear illogical, to say the least. Increasing the efficiency of existing hydropower (or completing projects which have, to date, only been partially finished) would incur minimal additional investment costs, and virtually no extra recurrent costs. Hydropower is a cost-effective mechanism for electricity generation which relies on a cheap and domestically available resource — water. Experts have argued that in particular, expansion of micro-hydro and mini-hydro holds much potential for improving the standard of living for the one third of the population who currently have no access to electricity<sup>19</sup>.

### **Donor-driven reform processes**

Since 2002 there has been vocal public and political opposition to the reforms that are planned for the power sector, as well as much criticism that the entire process and the development of the bill have been carried out in the absence of any degree of transparency or public consultation<sup>20</sup>. It must also be stressed that the statements made by representatives of the Government and the CEB unions regarding restructuring have been without reference to audited accounts.

Such shortcomings in terms of public participation and public interest should come as no surprise. It is important to remember that power sector reform in Sri Lanka, as in most other developing countries, is externally driven. Two large loans to the CEB including \$30 million from ADB and \$70 from Japan Bank for International Cooperation are currently tied to the reform process, and the release of the second tranche of ADB funds has been postponed due to delays in implementing the reform programme that is desired by the donors.

Against a backdrop of donor pressure to reform, and ultimately privatise, the power sector, the real motivations for reorganisation should be questioned. We have, to date, heard remarkably little either about the development and economic rationale for restructuring (will it improve financial efficiency and bring down prices, for example?), or about the costs involved in undertaking these reforms. It is also to be wondered what the ADB and JBIC, who have been pressing so hard for electricity reform (and even pushing to make the release of funds to Sri Lanka conditional on it taking place), will make of the situation if the latest claims that power sector restructuring has been put on hold are true?

## **Supplying power to the country: dismantling the figures**

*Whatever the current debates on power pricing, generation and institutional setups, there clearly remain problems with the tariff and cost levels at which electricity is generated, and sold, to consumers in Sri Lanka. There are also major issues related to the basis upon which such figures are calculated and made public. Review of available data shows that the existing tariff structure is not transparent, and penalises many law-abiding account holders unduly. Law-abiding electricity consumers continue to be put in a situation where they are needlessly subsidising an inefficient sector, in which decision-making is motivated by personal and political gains arising from both domestic and international sources, rather than being driven by the need to provide affordable and accessible power supplies to the general public.*

<sup>19</sup> Ekanayake, J., T. Jayawarma and N. Jenkins, 2002, Sustainable Electricity System for Sri Lanka, Tyndall Centre for Climate Change Research

<sup>20</sup> H. Sriyananda, undated, On the Reform of the Electricity Supply Industry in Sri Lanka. Department of Electrical and Computer Engineering, The Open University of Sri Lanka



### **Calculating consumption**

According to CEB figures, Sri Lanka's 2.65 million domestic consumers together use a total of 1,995 GWh of power a year. This translates into an average daily consumption per household of 2.06 kWh. Using the CEB's own figures of Rs 11 billion in generated revenues, and applying the tiered tariff rate specified by CEB, indicates an average household monthly bill of just over Rs 200. For the case of LECO, which distributes to just under 330,000 domestic consumers, the average daily household consumption per household is 3.34 kWh giving a monthly bill of Rs 340.

These figures, in terms of the consumption rates and corresponding charges they show, are clearly unrealistic. An average of 2.06 kWh per day, or something over 60 kWh per month, is sufficient only to power a few light bulbs of 100 watts each. If this is a true householder average it would mean that there are over a million households connected to the grid which use only one or two light bulbs. Thus, according to the CEB's statistics, either the vast majority of electricity consumers in Sri Lanka use electricity to a bare minimum, or they are seriously under-paying on their accounts.

In reality, running basic electrical equipment (such as household lighting, fridge, iron and fan/s) requires a minimum of 200 kWh a month. To put this in context, even this increased estimate lies below regional averages for Asia (including monthly household consumption of 700-2,000 kWh for Singapore<sup>21</sup> and 250 kWh for Thailand<sup>22</sup>), and is far less than the world average of 2,258 kWh per capita per year (around 2,000 kWh in Europe and up to 4,500 kWh in North America)<sup>23</sup>.

The cost of 200 kWh consumption (at published CEB tariff rates) equates to approximately Rs 1600 per household per month. If all household consumers used electricity at this level, this would mean that in reality the number of domestic consumers would be just one third of figure that is declared by CEB, or 830,000 account holders. It would also mean that the average domestic price paid per unit would be Rs 7.97, not Rs 5.54 as stated by CEB. For a higher-end consumer, running air conditioning and multiple appliances, use would run in excess of 600 units and cost some Rs 8,000 a month, giving an even higher average price of Rs 13.19 per unit.

### **Examining the tiered tariff structure**

Sri Lanka's current tiered tariff structure is justified on the basis of cross-subsidisation. The rationale is that those who are less well-off (and are assumed to consume less electricity) must have a minimum amount of low-cost power, and that those who are better-off (and are assumed to consume more electricity per capita) must pay for this subsidy. The merits and demerits of this type of subsidy are not discussed here.

Rather, the issue to be addressed is whether this type of tariff structure serves also to obscure the true costs and electricity bills of the average consumer. As already mentioned above, CEB's published consumption rates for domestic account holders are clearly unrealistic, and infer either an absurdly low consumption rate (of two light bulbs or so) for the majority of Sri Lanka's domestic consumers or else suggest gross power piracy and under-payment of accounts.

Taking, for example, a household which uses 200 units of electricity, the bill for a 30-day month would be calculated as the first 30 units at Rs 3.00 (Rs 90), the next 30 units at Rs 3.70 (Rs 111), the next 30 units at Rs 4.10 (Rs 123), the next 90 units at Rs 10.60 (Rs 954) and the final 20 units at Rs 15.80 (Rs 316), giving a total of Rs 1,594.

This translates into an average daily consumption of 6.7 units. If the billing cycle includes an extra 7 days then the total consumption would be 247 units, for which the extra 47 units would be charged at the higher rate of Rs 15.80 giving a total bill of Rs 2,331. If the next cycle is reduced by 7 days, the bill for the 23 days would calculate on 153 units consumed and would cost just under Rs 1,000. At the end of 2 months (60 days), the household's total bill would be Rs 3,327, whereas if billing were

<sup>21</sup> Energy Market Authority, Government of Singapore

<sup>22</sup> Thailand National Statistical Office, 2000, Report of the Household Energy Consumption Survey

<sup>23</sup> World Energy Council.



carried out on the same day of every month the total would be twice Rs 1,594 or Rs 3,188 (some 4% lower). Working back using the CEB's figure of 5.54 per unit, this difference of Rs 139 amounts to 25 extra units of electricity.

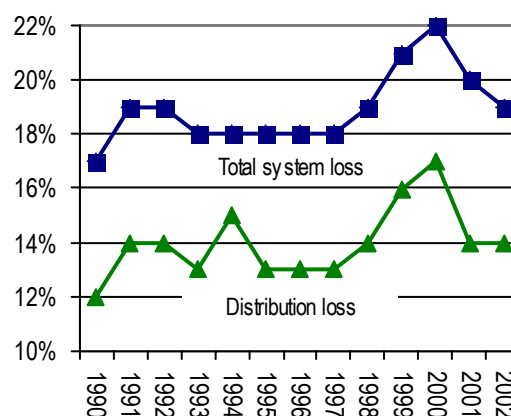
However, as electricity consumption rises, these figures change. For anything above a 250 unit per month consumer, the difference between the two bills becomes significant with larger swings in the billing cycle. The difference lies in whether the consumption per month extends beyond 180 units, and goes into the Rs 15.80 tariff tier.

It is therefore possible to show that rather than the tiered tariff structure acting to the benefit of small domestic consumers, CEB's billing structure actually allows for manipulation because it permits the CEB to show an increase in revenues despite absolutely no change in efficiency. It also allows more units to be released to the black economy if the units sold are estimated on the revenue earned in terms of projections.

### Calculating production and generation losses

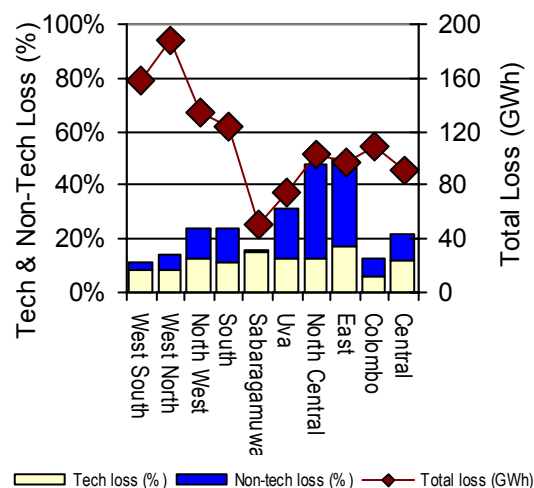
According to CEB figures, average power generation from all sources is just under 21 GWh per day. This means that power plants are operating well under capacity. If we look at actual power output, we find that CEB power stations are together operating an average of only 8 hours a day (averaged over the year — actual daily generation of course varies considerably in reality). In the hydropower sector, this figure is even lower at just over 7 hours a day, or only 30% of capacity.

At the same time there is a notable difference between the amount of power generated and that which is sold. Here, there is a gap of 18% between the 7,612 GWh that is generated by CEB and the 6,209 GWh that actually reaches consumers.



The bulk occurs because of inefficiencies in storage and distribution, and the continued running of unmetered (or unchecked and uncollected) accounts. This issue of power piracy is an important one. In effect, lack of enforcement in tariffs and a situation where it is possible to manipulate the system to gain free or "informally acquired" electricity means that it is law-abiding consumers, who pay their bills through the proper channels, who are absorbing these costs and are in effect subsidising illegal consumption.

Considering also the CEB subsidiary company LECO — which supposedly operates on commercial principles, and is only involved in distribution, gives an even worse record of transmission losses. Adding LECO's difference between power bought of 894 GWh and that sold of 846 GWh gives a total loss of some 1,460 GWh, or 19.15%. In some parts of the country transmission losses run as high as 40-45%, according to the CEB themselves<sup>24</sup>.



<sup>24</sup> Thavaneswaran, T., S. Walpita and A. Wijayatilake, 2004, South Asian Utility Strategies Customer Service and Billing Programs: Ceylon Electricity Board Presentation, South Asia Regional Energy Distribution Utilities Partnership Executive Exchange Program, New Delhi.



Even by CEB’s and LECO’s own estimates, transmission losses are well above accepted levels for comparable facilities and countries of 11-13%<sup>25</sup>, and far above losses recorded for the UK electricity industry of just 1.5%<sup>26</sup>. According to CEB’s own figures, these transmissions losses have been steadily increasing over the last decade<sup>27</sup>.

Transmission losses can be attributed, it is claimed, to both “technical” and “non-technical” losses. “Non-technical” losses comprise illicit and unauthorised tapping of power, billing errors, unmetered supplies and meter errors; applying CEB figures, these can account for up to three quarters of total transmission losses.

Even if Sri Lanka’s power stations operated for only half of the day, or 12 hours — 50% of capacity, and transmission losses were brought down to 12%, the resulting increase in the power supplied would be sufficient to meet not just current demand, but to extend coverage to all households in Sri Lanka and to absorb an increase in consumption of a quarter across the board for all account holders. With a realistic consumption rate that translates to a tariff of Rs 8.50 per unit, it would also increase the gross revenues of CEB by some 71%, to more than Rs 81 billion. This would be sufficient to ensure that CEB did not just break even, but registered a surplus of revenues over expenditures — even at its current high level of costs.

One must question where CEB’s lost revenue, or this hidden subsidy, goes. With transmission losses of 18.44% or 1,404 GWh just for CEB and an average electricity price of Rs 7.69/kWh, the country-wide average of 8.7% “non-technical” transmission losses or 663 GWh translates into lost revenues (or a hidden subsidy) of some Rs 5.1 billion a year. These units cost almost Rs 7 billion to produce. As “non-technical losses” equate primarily to the illicit and unauthorised tapping of power, then illegal electricity consumers (and the corrupt officials who turn a blind eye) presumably figure large in this hidden benefit.

These type of calculations can also be used to illustrate the value of small-scale power generation schemes (such as micro and mini-hydro) to meet household power needs, and to extend the access of Sri Lanka’s rural households to power. A 1 MW power plant running at 45% of capacity (11 hours a day - an acceptable norm) would produce 4,015 MWh of electricity or just over 4 million units of electricity per year.(see box on inside front cover). At a rate of 200 kWh a month (or 2,400 kWh a year) for an average domestic consumer, this would be sufficient to supply the needs of almost 1,700 households. If the CEB’s absurdly low figure of 2.06 kWh per day is used, the number of households would be over 5,500!

### Comparing costs and revenues

It is difficult to get the exact figures for CEB’s operating costs — both because these data are not freely available to the general public, and because such estimates as are quoted tend to vary depending on the source. The CEB claims that electricity costs Rs 10.50 a unit to produce<sup>28</sup>. For the 7,612 Gwh or 7.6 billion units of electricity that it generates each year (including CEB’s own generation as well as power purchased from hired and private operators) this translates into total costs of Rs 79.93 billion.

	Rs billion
Expenditures on fuel	13.75
Expenditures on power purchase	20.00
Capital investments	13.28
Staff	4.80
Other unspecified costs	28.10
<b>TOTAL COSTS</b>	<b>79.93</b>
Gross revenues	47.71
<b>NET REVENUES</b>	<b>(32.22)</b>

<sup>25</sup> Tilak Siyambalapatiya, 2002, “A review of the energy policy in Sri Lanka and its implementation”, Energy for Sustainable Development VI(1): March 2002

<sup>26</sup> DTI, 2003, Transmission Losses in a GB Electricity Market, UK Department of Trade and Industry

<sup>27</sup> Thavaneswaran, T., S. Walpita and A. Wijayatilake, 2004, *ibid*.

<sup>28</sup> Mr Ananda Piyatillake, President of CEBEU, quoted in LankaNewspapers 13 April 2005, “Consumers paying world high prices for electricity – CEBEU”; Lanka Business Online 6 April 2005, *ibid*.



According to the CEB's own statistics, Rs 13.75 billion was spent on fuel used for thermal generation, Rs 20 billion on power purchase from private and hired producers (about Rs 9 per unit purchased), and Rs 13.28 billion capital investments were made during 2003. The CEB employs some 13,500 staff — although no official data are available for spending on staff salaries, these have been estimated to cost the CEB over Rs. 400 million a month<sup>29</sup> or Rs 4.8 billion a year. These explained expenditures on fuel, power purchase, capital investments and staff all total Rs 51.83 billion.

If the total costs of power generation are Rs 79.93 billion according to CEB, then this means that other unspecified costs of Rs 28.10 billion are also incurred. These costs are not explained (although at least part must presumably be comprised of debt, loan and overdraft repayments). In the absence of published accounts (let alone audited and approved ones) readers must draw their own conclusions.

With sales of 6.216 billion units at an average of Rs 7.69 per unit, there is clearly a problem. CEB's stated revenues were Rs 47.71 billion in 2003. Their stated costs were Rs 79.93 billion. So not only is CEB running at a loss of some Rs 32.22 billion, but there are several unexplained or omitted statistics. One unexplained statistic is the unspecified costs of Rs 28.10 billion (US\$ 280 million) in the cost of generation. As has been described in the previous section, on the revenue side, Rs 5.1 billion (US\$ 50 million) is also lost from potential revenues due to "non technical" losses.

The financial and economic wisdom — and motivation — of selling electricity through LECO is also unclear (and, as with CEB, there is no public statement of LECO's costs or audited accounts). For a start, CEB is subsidising LECO (its own subsidiary, and supposedly a commercially-run company!) because it sells them electricity at a price that is far lower than the real costs of generation. By CEB's own claim, electricity costs Rs 10.50 a unit to produce. Yet the average tariff paid by LECO to purchase electricity from CEB is just Rs 6.06 a unit. It costs CEB Rs 9.4 billion to generate the 894 GWh it sells to LECO for Rs 5.4 billion. This leaves a discrepancy of Rs 4.5 billion a year, or a 57% price subsidy.

At the same time, CEB could make higher revenues by selling directly to consumers than to LECO. Looking at the composition of LECO account holders, and using average prices as calculated by CEB themselves for different consumer categories, direct sales to at CEB tariffs would generate some Rs 6.6 billion revenues. But, instead, only Rs 5.4 billion is earned through selling this electricity via LECO — a loss of potential revenues of Rs 1.2 billion, or 22%, a year.

Thus, according to its own statistics, CEB is running at a loss of some Rs 32 billion a year, selling power at an average of only 73% of the cost it takes to produce it, giving away at least Rs 5.1 billion worth of "free" electricity through power piracy, as well as losing revenues of Rs 1.2 billion and providing a self-subsidy of Rs 4.5 billion through the operations of LECO. Yet, according to multiple sources, Sri Lanka has among the highest electricity tariffs in the region<sup>30</sup> — and, according to the CEB Engineers Union, in the world<sup>31</sup>. Surely this does not add up?

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<sup>29</sup> [SriLankaNewspapers](#) 13 February 2005 *ibid*.

<sup>30</sup> ADB *ibid*.

<sup>31</sup> [LankaNewspapers](#) 13 April 2005, *ibid*.



## Electricity in Sri Lanka: questions to be answered

*At the moment the topic of electricity is high on the public and political agenda. Yet, although there are many questions to be asked regarding how power is generated, costed and delivered to consumers — and what the government's future plans are in respect of these matters — these issues do not seem to be being dealt with by the current discourse. It is high time that they were tabled, and resolved.*

EFL therefore requests the Government of Sri Lanka, and especially the Ceylon Electricity Board, to make their intentions clear by explaining and urgently responding to the following questions:

### **Concerning the plans for the power sector:**

- **Who are the intended beneficiaries of the current plans for the power sector?** It would seem that the real winners will not be the general public, and especially domestic consumers, but rather to pander to the whims of overseas donors, domestic political interests and foreign investors, and perpetuate the supply of unbilled units to the “Black Economy”.
- **What is the rationale for focusing on expanding thermal power sources?** It is not yet proven that oil and coal-fired plants genuinely provide a lower-cost source of power as compared to hydropower generation — especially micro and mini-hydro plants.
- **Why is there an overwhelming focus on building new plants, rather than improving the operation of existing ones?** Even though existing facilities are working far under capacity, there is still no mention of efforts or plans to improve their efficiency of operation, to take concerted action to reduce transmission losses, or to complete the investments (such as the Victoria Dam) which have not yet been extended to their full generating capacity.
- **Will investments in new power plants bring down the price of electricity?** It is unclear whether the concern of making electricity more affordable for the general public has actually been a factor in decision-making. Several important concerns have not yet been made explicit, especially a clear statement of the implications of thermal power expansion plans on our country's import bill and foreign exchange reserves.
- **Has there been any solid financial and economic analysis done of different options for increasing power supplies?** It is not yet known which of the options for generating electricity are the most cost-effective, sustainable in economic and environmental terms, are most likely to reduce power supply costs and to decrease electricity tariffs
- **What is the true cost to the country in supplying fuel for the generation of Electricity?**

### **Concerning the electricity production, consumption and tariff structure:**

- **What is the origin of current transmission losses?** Current high levels of transmission losses clearly have a devastating impact on per unit generation costs, and are passed on to account holders through their bills. Yet the question of why these figures are so high has as yet not been answered.
- **What is the real pattern of electricity consumption and prices?** There remain major discrepancies between the average bills paid as calculated from CEB figures, and those which are realistic given household consumption patterns. It is still not clear what the actual levels of electricity consumption are, and the prices paid, by different categories of account holders.
- **What is the level of power piracy?** In relation to transmission losses, and the lack of clarity on average electricity bills, the issue of power piracy remains a major one — although is rarely spoken of, or factored into calculations. It seems that it is still cheaper for people to pay off officials to turn a blind eye, than to declare (and pay for) their true levels of power use. It is also not clear what actions, if any, are being taken to address these problems of power piracy.
- **Why do Sri Lankans face some of the highest electricity prices in the region?** This seems to present a real paradox — especially if, as is claimed, electricity prices are subsidised and kept artificially low. Still, it is unclear what the real costs of supplying power are — in absolute terms, or between different generation sources.



### **Concerning transparency in divulging CEB's figures:**

- **What are the CEB's operating costs, and have these costs been considered in the plans for restructuring?** Statements of CEB's investment and operating costs are not available to the general public (including the LECO component). There remains a large portion of expenditures which are currently unaccounted for and cannot be explained as costs of fuel, power purchase, capital investment or salaries. The extent to which the real capital costs of electricity infrastructure are included in calculations is also unclear.
- **What is the nature of CEB's operating loss?** This is especially confusing given the high tariff rates, and the long history of donor support to capital investments in the power sector.
- **How is CEB's loss funded?** It would seem that CEB losses are largely funded through being passed on to law-abiding consumers and the general public, either through the high bills they face, or indirectly through the taxes they pay which are used to support general public debt.
- **Why are CEB accounts not made public?** The CEB data that are in the public domain are still patchy and partial, and analysis of annual published statistics tends to raise more questions than it answers. It would be unfortunate to have to draw the conclusion that the lack of clarity in available accounts and public statements on power supply and consumption in fact masks more sinister and serious inconsistencies in CEB's accounts and accounting procedures.

## **Empowering the people: a call to address the real issues**

The way in which the current reforms, and debates, in the electricity sector are being phrased would appear to merely serve to mask and further obscure the real issues involved. As long as these questions remain unanswered, and the problems they give rise to are not addressed, no amount of reorganisation, new investments, or tariff restructuring is going to solve them — and may actually serve to perpetuate them.

The lack of transparency and accountability in CEB's behaviour and the information it shares with the public remains a fundamental problem for Sri Lanka's electricity consumers. It also raises questions as to whether the Auditor General's Department (to name just one organ of State) is conspiring to perpetuate this cover-up. Whether or not restructuring is carried out, the State cannot abdicate its responsibilities to serve the general public. And if the government is unable to keep a check on CEB, one must wonder how it can control the companies that will be formed if the power sector is fully privatised. Law-abiding consumers will continue to pay the higher bills that would arise until they are forced to seek alternatives due to unbearable economic hardship.

Although energy in Sri Lanka continues to be subsidised — albeit it in ways that are often hidden, and difficult to discern — there is little evidence that these subsidies are benefiting the people they target (and little hope that they will do so, under current conditions). Rather, they are leading to increased unbilled consumption, reduced efficiency, and increased public spending (including drawing down scarce foreign exchange reserves).

The net effect is clearly unsustainable for Sri Lanka and her citizens.

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