HISTORY REPEATING ITSELF: SRI LANKA'S ELECTRICITY CRISIS

Key Takeaways

1. The country's electricity demand has grown at an average rate of 5% during the last decade. Total net electricity generation was at 16,716 GWh and per capita electricity consumption stood at 687 KWh in 2021.

2. Sri Lanka is no stranger to blackouts and power cuts, and the sector has been grappling with twin crises (capacity crisis and the financial crisis) for decades now. The worst electricity crisis was seen in 1996 when rains failed.

3. The global energy crises of the 1970s led to profound changes particularly in the Western countries. This saw various legislations coming into place, national speed limits being set, strategic petroleum reserves, favouring smaller and fuel-efficient cars and finding alternative sources of power such as solar and wind.

4. The year 1973 became the historic peak year for the US per capita emissions and ever since then the emissions have been declining. Therefore, the response to the 1970s oil shocks gave the world a life-saving head start in mitigating climate change impacts.

5. The current global energy crisis is a byproduct of investing in oil and natural gas, which are depleting resources that require significant amounts of capital. Therefore, it suggests a call to arms for a shift in renewable energy and combatting climate change.

6. Supply-side constraints, weak growth, and tightening of the monetary policy to rein in inflation, can all lead to a 1970s-style stagflationary period in the coming years. Developing economies such as Sri Lanka will have little room to maneuver this other than tapping into sustainable financing mechanisms.

7. Recommendations to integrate more renewable energy to the electricity generation mix in Sri Lanka include; Ensuring Multi-Buyer Model and Power Wheeling; CEB Restructuring and Unbundling; Ensuring Decisions backed by Scientific Study; and Implementing Shorter Planning Cycles.

Introduction

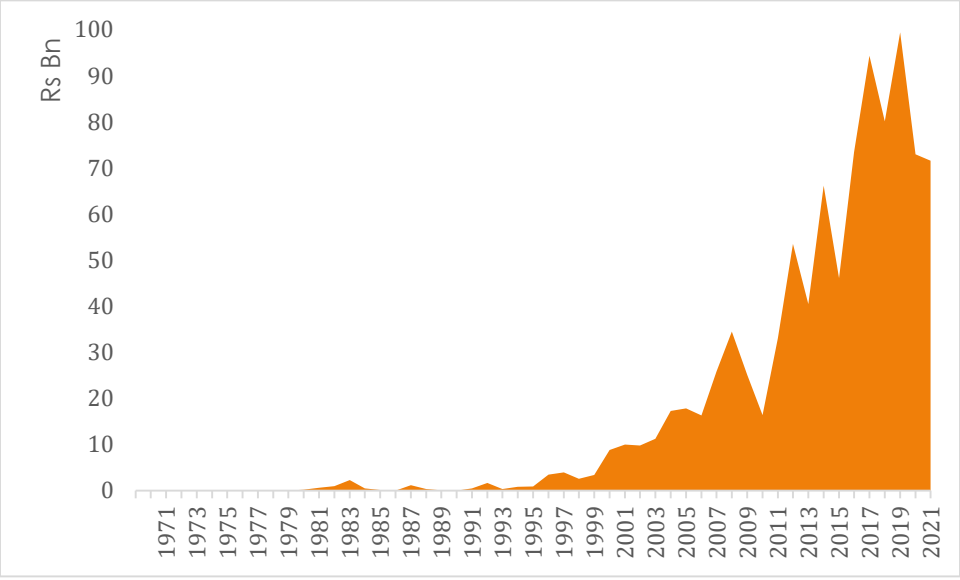
The COVID-19 pandemic and the subsequent economic crisis revealed vulnerabilities in the Sri Lankan economy and weakened its economic state. Given the severity of the challenges faced, the economy is now at a fragile state with many crises at hand. One such crisis is the electricity crisis where sporadic power cuts even extending to 13-hours a day were experienced by the country this year.

Most electricity produced in Sri Lanka is from coal and oil followed by major hydro. During 2019 and 2020, coal and oil contributed to more than 60% of the country's electricity generation mix. However, in 2021, the coal and oil share reduced to 50% with the heavy rainfall received in the catchment areas. Therefore, with the country's heavy reliance on fossil fuel-based electricity generation has led to an inadequate supply of electricity.

The country's electricity demand has grown at an average rate of 5% during the last decade. Total net electricity generation was 16,716 GWh and per capita electricity consumption stood at 687 KWh in 2021. At the end of 2021, Sri Lanka had a total installed capacity of about 4,600 MW (including rooftop solar) of which, the total dispatchable generation capacity was at 3,370 MW while the balance of 1,231 MW from Other Renewable Energy (ORE) were non dispatchable[i].

In recent times, a trend of emergency power purchasing was also seen being added to the country's fuel cost. According to CEB data, LKR 1.2 Bn was spent as emergency power by end 2021 and 2020 had a share of LKR 2.2 Bn. The fuel cost for CEB Thermal generation in 2021 stood at LKR 72 Bn (including emergency power purchases) despite the renewable energy share of electricity generation rising to 50% supported by good weather (refer Figure 01).

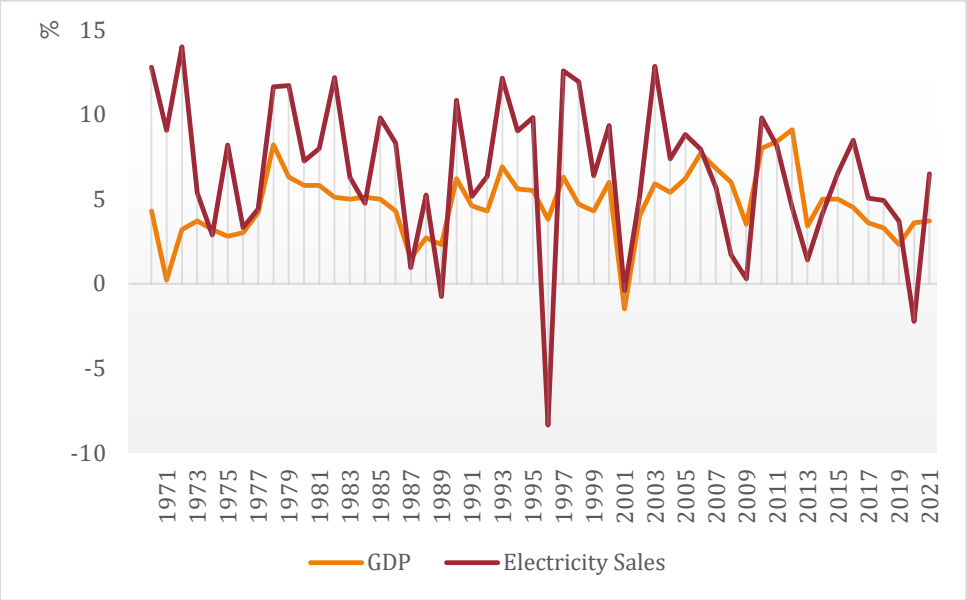
Figure 01: Fuel Cost for CEB Thermal Generation



Source: Ceylon Electricity Board

The electricity sector has a fundamental bearing on the economic development and poverty reduction in Sri Lanka. Historically electricity demand growth rate has shown a direct correlation with the Gross Domestic Product (GDP) growth rate of the country (refer figure 02). Therefore, with the current power outages, we can expect the GDP of the country to follow suit. The 2nd quarter GDP figure for 2022 saw a sharp contraction of 8.4% led by the industrial sector, which was impacted from power outages.

Figure 02: Growth rate of GDP and Electricity Sales



Source: Ceylon Electricity Board

History

Sri Lanka is no stranger to blackouts and power cuts, and the sector has been grappling with twin crises (capacity crisis and the financial crisis) for decades now. The worst electricity crisis was seen in 1996 when rains failed and electricity consumption increased inexorably with the cricket world cup[ii]. Though the CEB had published the Long-Term Generation Expansion Plan (LTGEP)[iii] annually, no power plants were commissioned since 1992 and this was worsened in 1996 with the dry climate[iv]. This led to the country experiencing power cuts in March and extending to eight hours during worst periods. A blackout was also witnessed in May 1996 when the entire country was without electricity for four days[v]. This resulted in GDP growth plummeting to 3.8% from an average GDP growth rate of 5.5% seen in the preceding two years (refer figure 02).

Five years later, in 2001, Sri Lanka was faced, yet again with another electricity crisis following a severe drought and water levels in hydro reservoirs dropping drastically. The magnitude of the crisis was similar to the 1996 crisis with initial one-and-a-half-hour power cuts extending to even seven hours per day.

The year-on-year growth of installed capacity has been below the year-on-year growth of gross generation of electricity since 2015, barring the year 2020. Therefore, the sector has been muddling through significant capacity and financial constraints, which was further exacerbated through the forex shortage, resulting in the current situation of the electricity sector.

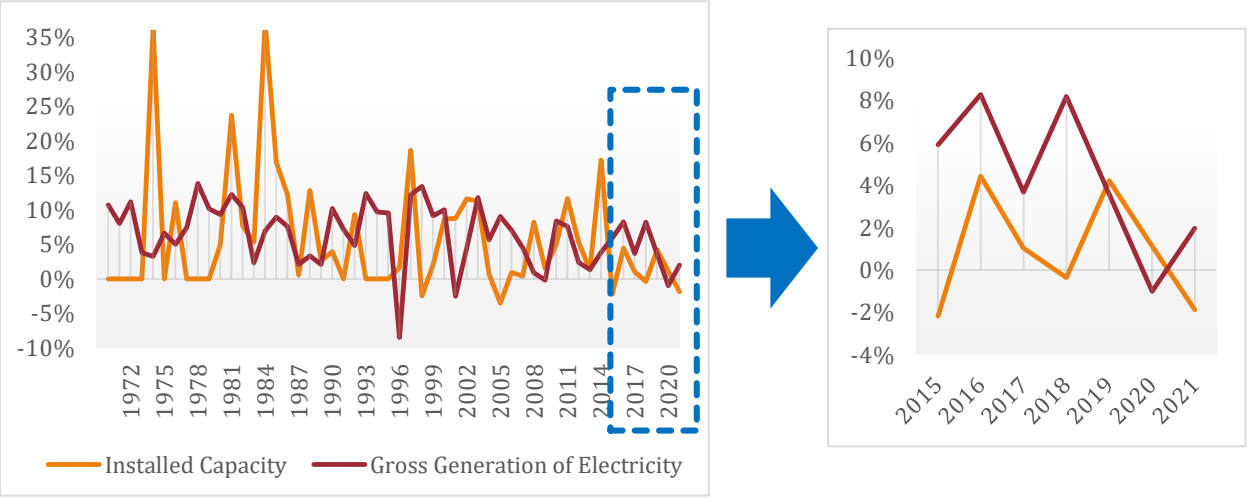
Fast forward to 2016, a three-hour major disruption in power was seen in February followed by a major nationwide blackout in March, which lasted for over eight hours. The CEB being unable to restore supply, started rationing electricity across the country on a staggered basis with seven-and-a-half-hour power cuts (five and a half hours during the day and two hours at night).

In 2019, during late March, the CEB imposed four-hour rolling power cuts on a scheduled basis throughout the country after failing to meet the increased demand for power due a spell of dry weather, and due to limited power generation in an attempt to save water for household and irrigation requirements. While, the drought lowered the hydro-power output, it also highlighted the significant capacity constraint where government failed to build new power plants.

The year 2020 too Sri Lanka experienced a series of electrical blackouts that occurred in August 2020, and lasting for over seven hours. The nationwide blackouts occurred due to a transmission technical failure at the Kerawalapitiya Grid-Substation[vi].

Though the country is now accustomed to blackouts and routine power cuts, these are a reflection of the government's inability to install new plants, and diversify out of hydro and fossil fuels. The years 2016, 2017, 2018 and 2019, saw no new power plants being built, amplifying the capacity constraint in the electricity sector. As shown in figure 03, the year-on-year growth of installed capacity has been below the year-on-year growth of gross generation of electricity since 2015, barring the year 2020, when electricity consumption was low with lockdowns and subsequent blackouts. Therefore, the sector has been muddling through significant capacity and financial constraints, which was further exacerbated through the forex shortage, resulting in the current situation of the electricity sector.

Figure 03: Year-on-Year Growth of Installed Capacity and Gross Generation of Electricity



Source: Ceylon Electricity Board

Global Energy Crisis: Then and Now

Global Energy Crisis in 1970

The 1970s energy crisis occurred when the Western countries, particularly the US, Canada, Western Europe, Australia, and New Zealand, faced substantial petroleum shortages as well as elevated prices. The first of the 1970s panics began in October 1973, when the Organization of Petroleum Exporting Countries (OPEC) raised the crude oil prices by 70%. This, together with an embargo on the US, was part of Arab countries' response to the start of the Yom Kippur War (a weeks-long conflict between Israel and a coalition of Arab states led by Egypt and Syria).

The 1973 oil crisis, particularly in the US, witnessed hours-long lines at gas stations, fuel shortages and panic. Some gas stations posted flags—green if they had gas, red if they didn't and yellow if they were rationing. Some even used odd-even rationing: If the last digit of a vehicle's license plate was odd, it could only fill up on odd-numbered days. Sounds familiar?

Countries such as UK, Germany, Switzerland, Norway and Denmark placed limitations on driving, boating and flying, while the extreme measures such as urging people to only heat one room in their homes during the winter were also seen in the UK.

The oil crises of the 1970s led profound changes in the US. This witnessed various acts of legislation redefining the relationship between fossil fuels and other sources of energy in the US. This included the Emergency Petroleum Allocation Act (passed by Congress in November 1973, at the height of the oil panic) and the Energy Policy and Conservation Act of 1975.

In 1974, the US implemented the first national speed limit, restricting travel on interstate roads to 55 miles per hour. In 1975, the Strategic Petroleum Reserve was created and its first fuel economy standards for the auto industry was set. This was a huge blow to the US automotive industry, which had for decades favoured big cars and was now outpaced by Japanese manufacturers producing smaller and more fuel-efficient models.

As part of the movement towards energy reform, efforts were also made to stimulate domestic oil production as well as to reduce the dependence on fossil fuels and find alternative sources of power such as solar and wind, as well as nuclear power. Federal agencies including NASA too began experimenting with wind and solar energy and exploring new technology to make cars more efficient.

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Therefore, the response to the 1970s oil shocks gave the world a life-saving head start in mitigating climate change impacts.

Today's Global Energy Crisis

The current energy crisis is perceived as potentially worse than the 1970s crisis, since it is cascading across not just oil but also on natural gas and coal. Russia is not just one of world's largest oil exporters, but it is one of the biggest natural gas exporters and a major supplier of coal. This has far-reaching consequences, potentially threatening the economic recovery from COVID-19, exacerbating inflation and fueling social unrest.

This turmoil is not only the result of the Russia-Ukraine conflict but is also the byproduct of investing in oil and natural gas, which are depleting resources that require significant amount of capital just to maintain their production, let alone increase it. Therefore, it suggests a call to arms for a shift in investments catering towards renewable energy and combatting climate change.

The International Energy Agency (IEA) proposed a 10-key action plan, in the face of the global energy crisis. The IEA expects that by adopting to these proposals, governments and citizens in advanced economies and beyond can achieve significant reductions in oil demand in a matter of months and reduce the risk of a major supply crunch. If carried out fully, it is estimated to lower oil demand by 2.7 million barrels a day within four months.

IEA 10 Key Actions

1. **Reduce speed limits on highways by at least 10 km/h**

   Impact*: Saves around 290 thousand barrels of oil a day (kb/d) of oil use from cars, and an additional 140 kb/d from trucks

2. **Work from home up to three days a week where possible**

   Impact: One day a week saves around 170 kb/d; three days saves around 500 kb/d

3. **Car-free Sundays in cities**

   Impact: Every Sunday saves around 380 kb/d; one Sunday a month saves 95 kb/d

4. **Make the use of public transport cheaper and incentivise micro mobility, walking and cycling**
   Impact: Saves around 330 kb/d

5. **Alternate private car access to roads in large cities**

   Impact: Saves around 210 kb/d

6. **Increase car sharing and adopt practices to reduce fuel use**

   Impact: Saves around 470 kb/d

7. **Promote efficient driving for freight trucks and delivery of goods**

   Impact: Saves around 320 kb/d

8. **Using high-speed and night trains instead of planes where possible**

   Impact: Saves around 40 kb/d

9. **Avoid business air travel where alternative options exist**

   Impact: Saves around 260 kb/d

10. **Reinforce the adoption of electric and more efficient vehicles**

    Impact: Saves around 100 kb/d

Note: kb/d = thousand barrels of oil a day

These are short term recommendations and reflect implementation in advanced economies. However, where feasible and relevant these can be used as recommendations for a developing country such as Sri Lanka too.

Way Forward

More than three decades ago, in 1987, an international pact known as the Montreal Protocol made a unanimous agreement to reduce production and consumption of chlorofluorocarbons (CFCs), which was provoking a loss in the ozone layer and had created a hole in it. Today, with the measures adopted by the Montreal Protocol, the ozone layer is recovering and if recovery continues at this rate, by 2050 the hole is expected to be completely closed. Therefore, the Montreal Protocol is considered as one of the great successes of international cooperation in fighting to conserve the environment, and is a clear example of how countries working together can achieve greater heights. The 27th United Nations Conference on Climate Change (UNFCCC - COP 27) scheduled for the first week of November is a similar global initiative, which is striving towards climate change action.

If Sri Lanka, abiding by the Nationally Determined Contributions (NDCs) set in COP21, achieves its 70% renewable energy target in generation mix (as specified in the updated NDCs in 2021), Sri Lanka can not only join hands with other countries who have progressed in climate action but also recover from the many power crises it has witnessed over the years. This can help diversify the electricity generation mix by adding more renewables such as solar and wind to the national grid, thereby minimising the vulnerability to vagaries in rainfall, the continuous strain on the import bill and global oil prices. The renewable energy resource potential in Sri Lanka is substantial and estimated at 133 GW[vii].

Parallels exist between the 1970s energy crisis and the current crisis. The supply side constraints, weak growth, and tightening of the monetary policy to rein in inflation, can all lead to a 1970s-style

The CEB had an operating profit until 1999, but took a downturn subsequently with its financial condition rapidly deteriorating afterwards. With the severe crisis in 1996, the immediate concern of increasing generation capacity to avoid power shortages, was met in 1997 by adding two thermal power plants. As these plants were constructed in haste, considerations such as generation costs and environmental standards took a back seat.

stagflationary period in the coming years. However, unlike advanced economies, developing economies such as Sri Lanka will have little room to maneuver this. Therefore, this calls for tapping into sustainable financing mechanisms to ensure more renewable energy adoption in Sri Lanka. The recently launched UNDP SDG Investor map, which highlighted investment potential of renewable energy in Sri Lanka, is a step in this regard.

Further, the following four recommendations can be looked at, in order to create a conducive environment to integrate more renewable energy to the electricity generation mix.

1. Multi-Buyer Model and Power Wheeling

Amend the CEB Act to reflect multi-buyer mechanisms that will allow peer-to-peer Power Purchase Agreements (PPAs) and enable power wheeling in the country. This is likely to be the most impactful recommendation as this can develop renewable energy at a market-determined price. The current bottleneck of routing all power through a central procurement system introduces time delays that are detrimental to consumers and corporates alike. Power wheeling allows renewable energy developers to use the existing transmission or distribution lines to provide electricity to corporates or prospective buyers on mutually agreed terms. It can pay a toll to the utility (CEB) that maintains the grid and is a common methodology adopted worldwide. It will provide renewable energy developer's an agreed fee for their power generation and will allow CEB to focus on managing and improving the grid. This can improve the overall management and transparency of the sector.

2. CEB Restructuring and Unbundling

The repeating pattern of the power crises suggests that a severe management failure at the national power utility level is present, caused by financial and capacity constraints. Policy decisions on reforming the sector and embarking on a programme to restructure the power sector by unbundling the CEB into separate companies for generation, transmission, and distribution, was seen back in 1998 as well[viii] but with little or no success. The recent proposal to restructure the CEB submitted by the eight-member committee is expected to be submitted to Parliament in November. Therefore, carrying out this long overdue restructuring of the sector and unbundling the CEB must be expedited as the energy sector of the country has a direct correlation with the country's growth and development.

3. Decisions backed by Scientific Study

The CEB had an operating profit until 1999[ix], but took a downturn subsequently with its financial condition rapidly deteriorating

afterwards[x]. With the severe crisis in 1996, the immediate concern of increasing generation capacity to avoid future power shortages, was met in 1997 by adding two thermal power plants. As these plants were constructed in haste, considerations such as lower generation costs and environmental standards took a stand-still, and reflected immature financial and negotiation prowess with allegations of corruption. As a result, the CEB was paying very high average costs of generation for these power plants. The Committee on Public Enterprises (COPE) investigations a decade ago revealed that many of the private power plants were second hand and inefficient, resulting in excessively high consumption of fuel per unit of electricity generated[xi].

4. Shorter Planning Cycles

The LTGEP has been carried out by the CEB for decades. The overdependence of fossil fuel and deep vulnerabilities in the planning and fiscal management of the sector has highlighted the irrelevance of a 20-year generation planning cycle predicated on the concept of base load power, ignoring globally embraced technology developments in energy storage and smart grid management. A national energy generation plan should be based on factors that will ensure economic stability and not be over-dependent on weather and continuous imports. The sector requires pricing predictability over a planning cycle short enough to respond to changes in input pricing, and increasing renewable integration to smooth out volatility of external markets. Therefore, rather than a LTGEP that looks at a 20-year horizon, a shorter-term plan can be explored. Observing the repeated pattern of power outages, it sheds light into the ineffective planning mechanisms available at present. Many power outages were observed in February and March where it's common knowledge that these are dry periods for the country in which monsoon rains are not expected. Therefore, preparing shorter term plans and building in safeguards for the dry seasons is a necessity rather than 20-year plans, which are often not implemented.

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End Notes

[i] As per CEB published data
[ii] Himal, June 1996
[iii] This is a plan prepared by the CEB that presents result of the generation expansion planning studies looking at the next 20 years
[iv] Policy Issues in the Electricity sector of Sri Lanka, November 1996
[v] SL's longest blackout in 26 years today, Daily FT, 2022; Sri Lanka Suffers Worst Blackout in 20 Years, NDTV, 2016
[vi] The 2021 blackouts were not covered due to the controversies around it. The committee appointed to investigate power system failures "has not found sufficient grounds to completely eliminate the allegation that the incidents on December 03 and November 29, 2021 could have been pre-planned, or caused by deliberate action, since material presented to this Committee by relevant branches of the CEB could not explain some key events such as the erroneous 3 operation of end-fault protection and wrong configuration of line protection relay of the Kotmale Biyagama 220 kV transmission line".
[vii] Renewable Energy Development Plan Phase-I 2019-2025 and Renewable Energy Resource Development Plan 2021-2026 (Draft)
[viii] ADB, Sri Lanka Country Assistance Program Evaluation: Power Sector, 2007
[ix] This was the turning point but there have been exceptions such as 2013 when the CEB recorded profits with good rained received in catchment areas
[x] Hapuarachchi, 2014 and State of the Economy, 2001
[xi] State of the Economy, Institute of Policy Studies, 2001

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