

ECONOMIC IMPACT OF POOR POWER QUALITY ON INDUSTRY

SRI LANKA

Nexant SARI/Energy

Sri Lanka has experienced power shortages from time to time since the early 1990s. These are mainly the result of generating capacity shortages and the inability of hydropower plants to meet system demand during times of heavy droughts, which come about every four to five years. The extent of such power shortages has increased in recent years due to growing electricity demand coupled with inadequate additions to thermal capacity. In particular, new generation capacity additions as proposed in the long-term generation expansion plan of the Ceylon Electricity Board (CEB) have not been implemented in accordance with approved time schedules. The resulting power shortages have caused both planned and unplanned power interruptions that have seriously affected the quality of power supplied to consumers. This situation is common throughout South Asia, where the economies are significantly affected by poor power quality.

Under the South Asia Regional Initiative/Energy (SARI/Energy) Project of USAID, Nexant SARI/Energy, the technical assistance contractor, has undertaken to study and assess the economic impact of poor power quality on industry in the South Asia region, comprising the countries of Sri Lanka, Nepal, Bangladesh and India. This technical assessment evaluates the costs to these economies resulting from higher energy costs and environmental impacts of Backup Unit

Generation (BUG) and the loss of production due to poor power quality & reliability.

This report presents the Sri Lanka component of the regional study.

Due to time and budget limitations, the Sri Lanka study was confined to a sample consisting of 150 industrial installations encompassing all subcategories of industries (Classification of the Central Bank of Sri Lanka) that provide a significant contribution to the country's GDP. In addition, the tea and coconut processing industries and the hotel sector also were included in the sample.

The study found that the main economic impact of power interruptions, both planned and unplanned, is the loss of output in the industrial sector. These losses can be as high as US\$ 81 million annually (**0.65%** of GDP) under a typical scenario (300 hours of planned outages) of imposing power interruptions such as those experienced during 2001. Also the impact due to unplanned outages can be as high as US\$ 47 million (**0.38%** of GDP) in a typical year having 100 hours of unplanned outages. This is a significant economic loss especially in comparison to the **4.5 % to 5%** average GDP growth that has taken place in Sri Lanka during the last few years.

The economic losses due to planned and unplanned power interruptions can also be expressed in other forms. One commonly used measure is the economic loss (in US\$) per unit

of supply (kWh); identified as the cost of un-served energy.

Based on this study, the cost of un-served energy for the Sri Lanka system is estimated to be US\$ 0.66 (Rs.59)/kWh for planned interruptions and US\$1.06 (Rs.97)/kWh for unplanned interruptions. These costs are very high in comparison to the cost of power supplied to industry by CEB, which ranges from Rs. 7.0/kWh to Rs 7.5/kWh.

| Interruption Type | Cost of Un-Served Energy |
|------------------------|--------------------------|
| Planned Interruption | US\$ 0.66 (Rs.59)/kWh |
| Unplanned Interruption | US\$1.06 (Rs.97)/kWh |

No installation included in the survey completed for this study complained of significant voltage or supply harmonic problems. However, most commented that high electricity tariffs were affecting their competitiveness in the market.

In addition, it was found that **92%** of the sampled industries have backup unit generating facilities to satisfy either their full or partial demand for power. The total backup generating capacity in Sri Lanka's electricity sector is expected to grow during the next five years as a result of continuing supply interruptions. If the present trend of using such generation facilities continues to hold at the penetration levels found in the sample, this could be as much as 175 GWh per annum. Such a situation results not only in increased energy costs to industry but also results in increased environmental emissions, which would adversely affect the local environment, particularly in urban centres where most of these industries are located.

These findings emphasize the importance of reducing both planned and unplanned

interruptions in the Sri Lanka power system. To achieve this objective the following actions are recommended.

- Streamlining generating capacity additions, including using efficient procurement processes and encouraging private sector participation.
- Strengthening end-user participation in the electricity supply industry so that policymakers and planners consider their needs when taking initial decisions. This can be done by nominating representatives from institutes such as the Chamber of Commerce, Chamber of Industries and Federation of Chambers of Commerce and Industry to different committees dealing with power sector issues.
- Adoption of effective demand-side management strategies while encouraging consumers to use backup unit generation facilities to the maximum extent possible in the short-term, in order to help alleviate the current capacity shortage. This would require short-term incentives in the electricity tariff structure.
- Operate the generation, transmission and distribution system in a more reliable manner through regular maintenance of facilities and with the use of proper operational management systems.
- Inclusion of power quality standards in the draft electricity act so that utilities are obliged to pursue cost-effective options to make sure that the quality of supply is maintained for the benefit of consumers.

It is also recommended that studies to enhance the reliability of the Sri Lanka national power grid, including a study on system planning and operations be undertaken.