

Terms of Reference (Draft)

Techno-economic Feasibility Study on Demand Response Opportunities

Introduction

Public Utilities Commission of Sri Lanka (PUCSL) has started regulating the electricity industry in April 2009, with the enactment of Sri Lanka Electricity Act, No. 20 of 2009. PUCSL has established the key regulatory mechanisms needed to effectively regulate the electricity industry; and issued the licenses to generate, transmit and distribute electricity. In addition, most of the critical regulations have been already recommended for implementation.

Electricity demand varies significantly by time of day as well as by season. Historically, the balancing of electricity supply and demand was performed only by increasing or decreasing the electrical output of power plants, but this often requires large investments in capital-intensive facilities that are infrequently used, or the dispatch of increasingly inefficient (and therefore expensive) generators.

Demand response (DR) was originally developed by electric utilities in order to increase flexibility on the demand side by temporarily shifting or reducing peak energy demand, thereby avoiding costly energy procurements and capacity investments for a small number of hours of need. Although DR resources can provide numerous benefits to power systems, particularly those seeking to integrate a large fraction of renewable generation, DR is a challenging new area for most utilities and grid managers.

Objectives

The objectives of the study include,

1. Use DR resources as equivalents to traditional generation resources to ensure sufficient capacity during peak-load hours.
2. Formulate DR programs that act as spinning and non-spinning reserves to provide resources during system emergencies.
3. DR to provide energy services that primarily enhance efficient price formation, but also enhance reliable operation of the system.
4. To attain environmental benefits, result from DR's ability to facilitate the integration of renewable resources. The flexibility of DR to allow the power system to accommodate higher penetrations of variable resources such as wind and solar.

Scope of work

In this context, PUCSL intends to appoint suitable consultants to conduct a Techno-economic feasibility study on DR Opportunities in Sri Lanka covering the following as a pilot project.

- a. Resources that can act as spinning and non-spinning reserves to provide support during system emergencies and their techno-economic feasibility.
- b. Resources provide ancillary services that include various reserve services, dynamic system regulation, and load-following capabilities that can deliver value to the grid during any hour of the year.
- c. Storage-type resources that can ramp in both directions to reduce load and absorb excess generation that has proven reliable for balancing services (regulation and load-following) at a small scale.

- d. DR to allow the power system to accommodate higher penetrations of variable resources such as wind and solar.

The Consultants will:

- a. Work in close coordination and consultation with, and report on the outputs to the PUCSL;
- b. Conduct consultations with the relevant stakeholders and make presentations to the PUCSL.

Reporting & Time Schedule

	Deliverable	Time schedule
1	Inception report based on the initial fact findings, DR resources, methodology used and time schedule with milestones	8 weeks of the date of award
2	Interim report including opportunities and challenges for DR	14 weeks of the date of award
3	Draft final report including necessary policy and regulatory framework had to be established to govern the treatment of DR and enable it to be compensated in a manner comparable to generation resources.	20 weeks of the date of award
4	Final report including conclusions and recommendations for facilitating optimal DR participation	26 weeks of the date of award
5	Final report incorporating Commission's comments.	30 weeks of the date of award

Payment Schedule

1. 40% payment will be released at the signing of contract as a mobilisation fee.
2. Submission of Inception Report 10% of the contract amount
3. Submission of Interim Report 15% of the contract amount
4. Submission of Draft Final Report 15% of the contract amount
5. Submission of Final Report 15% of the contract amount
6. Submission of Final Report incorporating Commission's comments 5% of the contract amount.

Consultants Experience

The consultants should have,

- extensive experience in grid modernization technologies, tools, and techniques to utilize demand response and help the power industry design, test, and demonstrate integrated, national electric/communication/information infrastructures with the ability to dynamically optimize grid operations and resources and incorporate demand response and consumer participation,
- extensive experience in research, development and deployment of smart grid technologies, distribution system modeling and analysis, transactive energy, consumer behavior modeling, and analysis and high-speed computational analysis capabilities for decision support tools, and
- a thorough knowledge on energy economics, energy policy and similar kind of economic analysis in energy sector.

Note: 1. The consultants must get the prior approval of the Commission for the proposing Load survey mentioning the number of consumers to be covered in each segment.

2. Preference will be given to proposal submission by a consortium of academics from different universities.