Section 2: Executive Summary

The Sri Lankan Government promotes solar power through '*Suriya Bala Sangrahamaya*' and is hoping to develop 1000 MW of PV systems by 2024. Currently solar PV power systems in excess of 100 MW are in operation with roof-top solar modules making a small but significant contribution. However, in some areas, CEB is not allowing to connect roof-top PV modules due to the fears of possible over voltages in lines, overloading of lines and losing the supply security. Even though rooftop PV modules can be looked at as a burden to the last mile networks, if they are properly controlled and supervised they will bring many technical and economic advantages for the last mile networks.

Therefore, in this research network management strategies executed through a Smart Distribution Management System (S-DMS) that integrates different controllable entities within the last mile network is considered to support these networks thus increasing the absorbability of rooftop PV. The management of the following controllable entities through a S-DSM in a coordinated manner will be investigated:

- Smart inverters of rooftop PV systems that can provide grid support through active and reactive power control.
- Smart meters connected to the consumer premises that can make the load flexible by controlling, shifting or switching off some smart and non-critical loads and charging and discharging plug in electric vehicles.
- Smart transformer at the origin of the last mile network that can change its secondary side voltage continuously to manage the network voltages.

The aim of the research is to develop different building blocks of a S-DMS that include the load and solar PV prediction algorithms based on the smart meter measurements; state estimation algorithms to predict the network status ahead of the real time; algorithms to control and manage the smart inverters, smart transformer and demand side; and coordinated control algorithms to minimize network constraints and maximize rooftop PV penetration.