

- e. Fill and maintain the logs with all alarms and incidences in the system for future analysis.

The Load Frequency Control is one of the main tasks in the SCADA, it consists in detecting deviations from the scheduled interchanges with other systems and correct them using the reserves (secondary and later tertiary) in an close loop from the Control Centre.

The main functions to be performed are:

- a. Enter all programs (exporting or importing) with other systems interconnected.
- b. Calculation of the Area Control Error (ACE) or instantaneous difference between the scheduled and real interchanges plus the schedules and real frequency, multiplied by a factor that represents the relative size of the system in comparison with other partners in the synchronous area.
- c. Activate or deactivate power plants to be directly controlled by the Load Frequency Control system.
- d. Send orders to the power plants activated in order to reduce the ACE to zero.
- e. Register all incidences, deviations and the energy deviation from the scheduled hourly programs.

2.4.2.2 EMS functionality

The Energy Management System (EMS) is oriented to perform activities oriented to guarantee the system security and the fulfilment of the security criteria established in the Grid Code or other internal or external codes and rules.

The basic function is the **State Estimator**, which determines the most probable network situation at the time of run. Values received from substations have unavoidable errors, depending on the equipment class or caused by unavailability or damage in measurement equipment.

The State estimator will recalculate the missing values, detect erroneous data and replace them by the most probable one.

The output of the State Estimator is a picture of the system that follows the electric laws (kirchhoff, Ohm...) and can be used as starting point of the remaining security process, among others:

- a. Contingency Analysis
- b. Operator power flow
- c. Optimal Power Flow
- d. Save cases for Operation planning or post-mortem studies