

Major Activities of High Voltage Network Studies Sector

Major activities of Planning Studies Sector

1. Electrical Network Planning studies.
2. Electrical Interconnection studies.
3. Power quality studies.
4. Wind Farms Feasibility Studies -Electrical Configuration of a Wind park Grid Access Codes.
5. Protection system studies and coordination.
6. Electrical Design studies for Power Stations.

Software packages used in conducting the above mentioned activities

- ❖ **PSS/E.33** (Power System Simulator for Engineers).
- ❖ **EDSA** (Electrical Design and System Analysis)
- ❖ **ETAP.11.0.0** (Electrical Transient Analyzer Program)

1- Electrical Network Planning Studies:

- ❖ Load forecast studies.
- ❖ High voltage network planning (500 kV, 220 kV, 66 kV) networks.
 - Static studies
 - ☐ Rehabilitation and expansion of electrical high voltage networks.
 - ☐ Load Flow Calculations Study.
 - ☐ Three Phase and Single Phase Short Circuit Calculations Study.
 - ☐ Contingency analysis.
 - Dynamic studies:
 - ☐ Assess the system stability and establish the stability limits following a set of critical faults on the power system.

2- Electrical Interconnection studies

- ❖ Interconnection of new and existing substations/power stations studies for the power system high voltage Egyptian unified network.
- ❖ Interconnection studies for multi-national power systems (Oman – Yemen).
- ❖ Electric power supply for major industrial projects and new communities.
- ❖ Study the impact of the connection of nuclear power station

3- Power quality studies

- ❖ Power Quality Studies get to the root of the problem by examining
 - ❑ harmonics,
 - ❑ load flow and
 - ❑ power factors.
- ❖ Understanding the source and nature of the disturbances or conditions, solutions can be identified to:
 - ❑ Ensure optimum system performance and efficiency
 - ❑ Reduce total system loading
 - ❑ Improve availability of power
 - ❑ Minimize losses to the production process
 - ❑ Increase plant productivity

4- Wind Farms Feasibility Studies- Electrical Configuration of a Wind park Grid Access Codes

- ❖ Economic wind park network and grid connection.
- ❖ System Studies
 - ❑ Complex Modeling of a Number of Wind Farms.
 - ❑ Flow studies and short circuit calculations, as well as system grounding concept and perform insulation coordination.
 - ❑ Static and dynamic performance - reactive power compensation.
 - ❑ Resonance behaviors driven by the power grid, cables, transformers, reactors, capacitor banks, wind turbines and SVC.
 - ❑ Prove the conformity with the GRID CODE.
 - ❑ Evaluate the overall losses for various scenarios.

5- Protection system studies and coordination

- ❑ A Protection system study analyzes the impacts of short circuits and equipment failures within a facility.
- ❑ Also, Protection system study determines the effects on the facility operation then Informed decisions can be made as to the changes necessary for the system.

6- Electrical Design studies for Power Stations

❖ System and Design Studies

- ☐ Design for the single line diagram.
- ☐ Cable sizing.
- ☐ Earthing.
- ☐ Cable routing.
- ☐ Transformer sizing.
- ☐ Design medium and low voltage switchgear.
- ☐ Harmonics study.

Example of some projects

High Voltage network planning studies:

- ❑ Sharm El-Sheikh and South Sinai High voltage network planning up to the year 2022.
- ❑ Hurgada and Red Sea coast High voltage network planning up to the year 2022.
- ❑ Republic of Yemen High voltage network planning up to the year 2025.
- ❑ Study System analysis for Sultanate of Oman high voltage electrical network and interconnection study for new 132kv grid station of Sultanate of Oman.
- ❑ Cairo High voltage network planning up to the year 2017.

Example of some projects

Interconnection Projects:

- ❑ Interconnection of the first nuclear power station to the Egyptian unified network on 2017/2018.
- ❑ Interconnection study for new 132kV grid station of Sultanate of Oman.
- ❑ Study of Electrical power supply of El-Ezz industrial zone.
- ❑ Interconnection of Italgen wind farm generation to the Egyptian unified network.

Example of some projects

Interconnection Projects:

- ❑ Interconnection of Sonker 66/22 kV substation to the unified power system (UPS) by the year 2015.
- ❑ Interconnection of El-Motawerin 66/11 kV substation at 10th of Ramadan City to the unified power system (UPS).
- ❑ Interconnection and design of El Shabab Power station to the unified network

Focus of some projects

Study of interconnection of Italgen wind with the unified network

- ☐ Assessment impact of the integration of the 120 MW Wind Farm at Gulf El-Zeit with the Egyptian Unified Power System by the year 2013.
- ☐ Perform load flow and short circuit studies for the Egyptian Unified Power System. With and without the 200 MW wind farm by the year 2013.
- ☐ Perform the transient stability study for the Egyptian Unified Power System of the year 2013 including the 200 MW.
- ☐ Prove the conformity with the GRID CODE.

Focus of some projects

Study the first nuclear power station interconnection with the unified network

- ❑ Assess the different proposed alternatives for the 500kV transmission lines for the nuclear power plant interconnection with the Egyptian network in the year 2018.
- ❑ Perform load flow and short circuit studies for the Egyptian grid including the 1200 MW nuclear plant with 4 units for the different proposed alternatives and choose the best alternative.
- ❑ Perform the transient stability study for the planned Egyptian grid of the year 2018 including the 1200 MW nuclear plant with the best chosen alternative.