



CASE STUDY TITLE

Integration of Large Scale Photovoltaic Power Plants as a Largest Solar Power Plant World Wide in Benban - Aswan Governorate South of Egypt

SUMMARY

The main objective of this case study is to show how generating green electricity can be utilized in achieving the national social and economical development. The international standards, mainly IEC standards, are introduced in the Solar Energy Plants Grid Connection Code and the Egyptian Transmission Grid Code. This directly contributes to the achievement of SDG 7.2 "By 2030, increase substantially the share of renewable energy in the global energy mix."

BACKGROUND

The current situation is, we have a solar energy project in the village of Benban in Aswan Governorate considered as one of the largest solar energy projects in the world, the project covers an area of 37 km², and contains 32 solar power stations with a capacity of 1465 MW which can be increased to 2000 MW. The Benban project's production of solar energy is equivalent to 90% of the energy produced from the High Dam.

The volume of investments in the "Benban" project amounted to \$2 billion, and contributes to providing more than 10,000 job opportunities. The project won the Arab Government Excellence Award, as the best infrastructure development project. Four 220/22 kV substations have been completed, three of them are in the stage of operating tests. A 500 kV substation is currently under construction.

Starting from November 2019, the commercial operation of all solar power plant projects for 32 private sector companies has been completed with a feed-in tariff system.

After started its full operation, and because of following the international standards in every step, there wasn't any problem in operation of the project.

AT A GLANCE

COUNTRY

- Egypt

LEVEL

- National

SDG ADDRESSED

- SDG 7 - Affordable & Clean Energy

STRATEGY

Solar Energy Plants Grid Connection Code in addition to the Egyptian Transmission Grid Code and The Egyptian Distribution Network is mainly based on IEC standards.

Some examples of the used IEC standards include IEC 62446, IEC 62305-3, IEC 6227, IEC 62116





RESULTS & IMPACT

international standards support the Egyptian Grid as follows:

- Grid connection requirements, such as grid connection point, solar plant component, grid connection ranges, start-up of the solar plant, power quality, and grid protection.
- Power Operational and maintenance requirements, such as active power control, reactive power control, fault ride through maintenance.
- General administrative connection process, such as application for connection point, solar plant development application, connection agreement; initial tests, clearance for connection, commissioning test and certificate.
- Testing and Commissioning

CHALLENGES & LESSONS LEARNED

The operation of the largest solar power plant introduced certain challenges for the grid, through its impact, such as fluctuations, evacuation of the electricity generated, etc., and that was overcome by using IEC standards in every step in this project.

The main challenge was enhancing the capability of the grid operator (Engineers and Technicians) to be able to deal with the large solar power plant, to synchronize this plant with the grid and understand all the grid code problems, mainly the power quality problems, and that is what has already been done.

POTENTIAL FOR REPLICATION

IEC Standards have a high degree of replicability and the usage of the standards in this case study can be considered in other locations in Egypt or worldwide.

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