

## Case study n°6

# Integration of large scale photovoltaic power plants as a largest solar power plant world wide in Benban – Aswan Governorate – South of Egypt

**Country:** Egypt

**Level:** National

**SDG Addressed:** SDG7 – Affordable and Clean Energy



## 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 that only 50 MW are connected to the grid since March 2018, and the remaining capacity will be operated in two stages and be completed by mid of 2019. After starting its full operation, the impact according to variable generation from this large power plant, the four substations may be disconnected separately or together, and that will cause a big problem to the grid operator (Dispatch centre), that there will be a need to a standby generation from conventional power plant or from Hydro power plant from Aswan High Dam.

## Strategy

Solar Energy Plants Grid Connection Code in addition to the Egyptian Transmission Grid Code and The Egyptian Distribution Network are mainly based

on IEC standards. Some examples of the used IEC standards include: IEC 62446, IEC 62305-3, IEC 62271, IEC 62116.

## Results and Impact

The international standards will support the Egyptian Grid in the following ways:

- Grid connection requirements, such as grid connection point, solar plant component, grid connection ranges, start-up of the solar plant, power quality (harmonics, flickers, voltage unbalance, voltage fluctuations), 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 and Lessons Learned

The operation of the largest solar power plant will introduce certain challenges for the grid through its impact, such as fluctuations, evacuation of the electricity generated, etc. The main challenge is enhancing 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. After finalizing the construction and start of operation of this large power plant, all capacity will be connected to one point, so there will be many case studies and more available data.

## 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.