


CASE STUDY / **GENERATOR INTERCONNECTION STUDIES**

# Comprehensive analysis for interconnection

As renewable energy becomes more predominant in California's generation mix, Pacific Gas & Electric needs a reliable way to effectively interconnect generation customers. Generator interconnection studies provide detailed reliability analysis to inform this process.





## Analyzing impacts to the grid and identifying applicable mitigation or system upgrade options requires an in-depth study.

### Project stats

**Client**

Pacific Gas & Electric

**Location**

San Francisco, California

**Project timeline**

2011-ongoing

**230+**  
active and  
completed generator  
interconnection projects

**35**  
GW total  
requested capacity



### Challenge

Due in part to regulations dictating a high percentage of renewable generation in California, record numbers of interconnection requests have been submitted to California Independent System Operator (California ISO) since 2000. As a nonprofit overseeing the operation of bulk electric power systems and generation of its member utilities, California ISO is responsible for managing successful interconnection planning throughout its systems.

When a private generation customer requests interconnection to a utility, the utility must understand the impacts interconnection will have on its systems. Adverse impacts will require mitigation, and the generation customer will be responsible for covering the costs of any upgrades to the system designed to mitigate these adverse impacts.

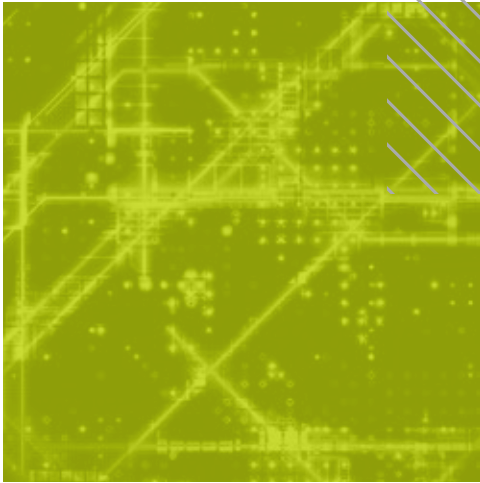
Generator interconnection studies are important to defining the impacts first, showing mitigation upgrades

second and finally providing the utility with a cost associated to those necessary mitigation upgrades. California ISO requires participating transmission owners in its service area to join the interconnection process to perform system impact studies and facilities studies.

### Solution

Pacific Gas & Electric (PG&E) is one of the transmission owners participating in California ISO's generator interconnection procedure, which means the utility is required to perform various system impact studies and facilities studies for multiple interconnection requests.

Since 2011, 1898 & Co. professionals have been serving in a staff augmentation role for PG&E's transmission planning group, assisting with activities in the generator interconnection process for these requests. Currently, we are providing engineering and technical services for the generation interconnection process, as well



as conducting interconnection studies including power flow analysis, transient stability analysis and bus flow analysis for phase I and II of the annual cluster-based interconnection studies.

During these phases, we participate in scope discussions between California ISO, PG&E and the private generation customer. This helps us fully understand the scope of the project, allowing us to confirm necessary assumptions and other requirements for the study. The team then runs the various analyses, focusing on defining the adverse impacts to the system first. From there, we discuss mitigation options and test them with further analysis.

Additional support includes working with PG&E's transmission planning group and coordinating technical reviews and facilities studies among substation engineering, transmission line engineering, system protection and transmission operations groups within PG&E.

### **Heading toward more renewables**

As the studies are completed and interconnections performed, PG&E will move closer to the required renewable generation levels set by the state of California. Through these studies, the organization can be sure that its systems remain stable and reliable for customers across its service area.

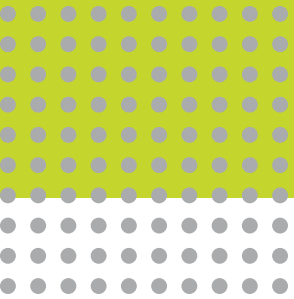
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11534-REG-0819