

The Study of Climate Change Effects on the Performance of Thermal Power Plants in Iran

Authors : Masoud Soltani Hosseini, Fereshteh Rahmani, Mohammad Tajik Mansouri, Ali Zolghadr

Abstract : Climate change is accompanied with ambient temperature increase and water accessibility limitation. The main objective of this paper is to investigate the effects of climate change on thermal power plants including gas turbines, steam and combined cycle power plants in Iran. For this purpose, the ambient temperature increase and water accessibility will be analyzed and their effects on power output and efficiency of thermal power plants will be determined. According to the results, the ambient temperature has high effect on steam power plants with indirect cooling system (Heller). The efficiency of this type of power plants decreases by 0.55 percent per 1°C ambient temperature increase. This amount is 0.52 and 0.2 percent for once-through and wet cooling systems, respectively. The decrease in power output covers a range of 0.2% to 0.65% for steam power plant with wet cooling system and gas turbines per 1°C air temperature increase. Based on the thermal power plants distribution in Iran and different scenarios of climate change, the total amount of power output decrease falls between 413 and 1661 MW due to ambient temperature increase. Another limitation incurred by climate change is water accessibility. In optimistic scenario, the power output of steam plants decreases by 1450 MW in dry and hot climate areas throughout next decades. The remaining scenarios indicate that the amount of decrease in power output would be by 4152 MW in highlands and cold climate. Therefore, it is necessary to consider appropriate solutions to overcome these limitations. Considering all the climate change effects together, the actual power output falls in range of 2465 and 7294 MW and efficiency loss covers the range of 0.12 to .56 % in different scenarios.

Keywords : climate, change, thermal, power plants

Conference Title : ICCCGW 2023 : International Conference on Climate Change and Global Warming

Conference Location : Paris, France

Conference Dates : October 30-31, 2023