

Design of Offshore Wind Power Farm in Jeju Island

김선우, 이재형[†]
한국과학기술원
(jayhlee@kaist.ac.kr[†])

Offshore wind power promises to be an integral part of a clean, robust, and diversified energy portfolio. However, wind power generation has a significant challenge that the geographical characteristics highly affect its efficiency and economics. Therefore, in this research, we suggest a framework that can explicitly take into accounts the spatial variation of winds by integrating the geographical information system analyses into mixed integer linear programming model to determine the optimal design of offshore wind power farm (OWF). The optimization model makes decisions on wind turbine locations, inter-array cable routes, offshore substation locations, and export cable routes. The case study is performed in Jeju Island, South Korea to design the total 325MW optimal OWF according to the regional energy investment plan. As a result, the proposed design framework minimizes the unit capital cost per power generation output. In addition, the results show the potential ways to further enhance the design of OWF considering temporal variabilities of wind.