Feasibility study and micrositing applications for a wind farm: A case study for northwest Turkey

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Turkey has a booming energy demand due to accelerated development in both social and industrial areas. In Turkey, almost all types of renewable energy sources are existent with high potentials but due to economical aspects, these are not utilised as desired. Holding a place in Mediterranean Basin, one of the most effective wind regions of the world, recent studies show that Turkey has over 14 billion kW of wind energy. Based on the promising wind potential, wind energy market is a very fast growing business and it is almost tripled since 2008.

In this case study, an area of 36 km2 is selected in Tekirdag, a city in northwest Turkey, which is surrounded by various industrial clusters that have a huge energy demand. The aim of this research is to investigate the wind energy availability of the proposed site and in case of promising potential, to implement a feasibility study and micrositing for a wind farm. Main stages of the case study include:

• Determining spatial distribution of wind power with WAsP Model
• Simulating wind data with different types of wind turbines and comparing the results
• Modelling annual power output of each turbine individually and investigate how this output is affected by wake losses that are caused by layout of wind farm
• Producing basic financial analysis (implementation costs and income from energy and carbon trading)
• Analysing and discussing the results