

Abstract

Thesis Title: The Study of Opto-Acoustic and Yield Improvement of Wind Farm
at Khaoprabat, Huasai District in Nakhon Si Thammarat Province

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The main objective of this thesis was to study the opto-acoustic and yield improvement of wind farm at Khaoprabat district in Nakhon Si Thammarat province. Vector map which was a combined map between a contour and a roughness maps were prepared using DEM and land-use digital data in order to represent the topography and roughness height at Khaoprabat, Huasai district in Nakhon Si Thammarat province. The vector map used as an input in WAsP 9.0 and GH WindFarmer 4.1 together with the observed wind climate for microscale wind resource mapping. The annual energy production was estimated using the power curve of a wind turbine generator of 1.75 MW. The 5 Vestas V66 1.75 MW wind turbine generators were parked at windy site in the microscale wind map. The optimization was applied in order to locate the site of a wind turbine installation under 2 conditions; the first was the stopping criterion in the optimization was not pre-defined and the second was the stopping a criterion is pre-defined at 10,000 iterations.

The iso-noise map and zone of visual influence (ZVI) around Khaoprabat of 6 km were analyzed in order to study the number of hub visible, horizontal substended angle (HAS) of site and vertical substended angle (VSA) of site as well as shadow flicker with the number of hours for shading in a year.

Results showed that for the case of non-pre-defined stopping criteria, the AEP was 3.4 GWh/year and for the case of pre-defined stopping criteria, the AEP was 8.6 GWh/year indicating that the yield was improved for 152.9%. The iso-noise map showed that the wind turbine generator emitted noise in the range of 20-50 dB. The noise intensity was varied depending on the

distance from the center of a wind turbine. The strength of noise emission is going down while the distance from the wind turbine was increased. Results also showed the ZVI, HSA, and VSA in terms of maps. The shadow flicker map showed that the number of shading in a year was less than 1,000 hr. Finally, these findings could be used as guidelines for an initial environment examination (IEE) and basic information for a wind farm installation in Khaoprabat, Huasai district, Nakhon Si Thammarat province.