



2013 International Conference on Alternative Energy in Developing Countries and Emerging Economies

An Assessment of Offshore Wind Energy Potential on Phangan Island by in Southern Thailand

Warit Werapun^{a,*}, Yutthana Tirawanichakul^b, Watsa Kongnakorn^c, Jompob Waewsak^d

^aFaculty of Science and Industrial Technology, Prince of Songkla University, Suratthani Campus, Suratthani 84100 (Thailand)

^bPlasma and Energy Technology Reserch Laboratory, Department of Physics, Faculty of Science, Prince of Songkla University, Hatyai Campus, 90110 (Thailand)

^cCivil Engineering Department, Faculty of Engineering, Prince of Songkla University, Hatyai Campus, 90110 (Thailand)

^dSolar and Wind Energy Reserch Laboratory (SWERL), Department of Physics, Faculty of Science, Thaksin University, Phatthalung Campus, 93110 (Thailand)

Abstract

This research aims to assess the potential of offshore wind energy in Suratthani province, located in the middle of peninsular Thailand. A 120 m Guy Mast triangle tower was installed at the Phangan Subdistrict Administrative Organization area, Phangan Island. Five weather measurement points including wind speed anemometers, relative humidity detectors and dry bulb ambient air thermometers were placed at heights of 65, 90, 100, 110 and 120 m, while the two wind vane detectors were fixed at 100 and 120 m heights. Data were continuously recorded at 10 min sampling intervals, from December 2011 to November 2012. The average wind speed was 4.28 m/s and the mean wind power density was 85 W/m². The dominant wind direction was from the north. Based on these data, 9 cases of wind farm layout were simulated to assess their performance. The capacity factors of offshore wind farms were in the range of 0.98-2.68. This suggests that the location and layouts simulated would be poorly utilized investments. However, the higher wind speeds of elevated areas of the island should be similarly assessed.

© 2014 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Selection and peer-review under responsibility of the Organizing Committee of 2013 AEDCEE

Keywords : offshore wind energy, modelling, wind energy assessment, Annual Energy Production, Phangan Island

* Corresponding author. Tel.: +6-680- 624- 0045; fax: +6-607- 735- 5453.

E-mail address: waritw2000@yahoo.com

1. Introduction

Renewable wind energy can be converted to electricity by wind turbines. It is a clean and free energy resource, but not all locations are suited for the installation of wind turbines. In general the potential of offshore wind energy is higher than on shore, because of higher wind speeds and less concerns with pollution, visual impact, or conflicts with other land use. However the disadvantages can include expensive marine foundations, and the cost of integration to the electrical network [1]. Offshore wind farms have been rapidly established in Europe because of the limited space available onshore [2,3]. The largest offshore wind farm in the world was built in England, namely Thanet which has a 300 MW capacity. In Denmark, 20% of electricity is produced from wind, whereas in China the first commercial offshore wind project was 102 MW Shanghai Donghai Bridge, with all the 34 turbines connected to the grid since June 2010 [4,5]. In Taiwan a suitable area for offshore wind farm was identified by a graphical information system [6]. Also a southwestern sea-area of the Korean Peninsula has been planned for constructing an offshore wind farm demonstration [7].

In Thailand the Ministry of Energy has set the goal of using 20 % renewable energy in 2022. Last year, during 4-6 December 2012, electricity was off on Samui and Phangan islands due to a problem with a transmission cable; this caused loss of income and business from tourism [8]. On 19 February 2013 it was announced that Thailand could face a power shortage due to scheduled repair and maintenance break in the natural gas production of Myanmar. Thai government is encouraging the population to save energy in household use, to relieve an impending shortage [9].

A 1 km resolution wind resource map of Thailand and GIS based area from selection map shows that many coastal areas along the gulf of Thailand have good wind resource [10]. The gulf of Thailand has many islands, including Tao island where an 0.25 MW wind turbine has already been installed by the Provincial Electricity Authority. Other notable islands include Samui and Phangan. These islands are shown in Figure 1. Phangan island is located in Suratthani province, and is famous for the full moon party. Each year a lot of tourists visit it, and the demand of electricity is increasing. A 33 kV power cable connects Phangan to Samui to supply electricity to this community. In the future a wind turbine installation could be the response to further increases in demand, so an assessment of wind energy potential is motivated.

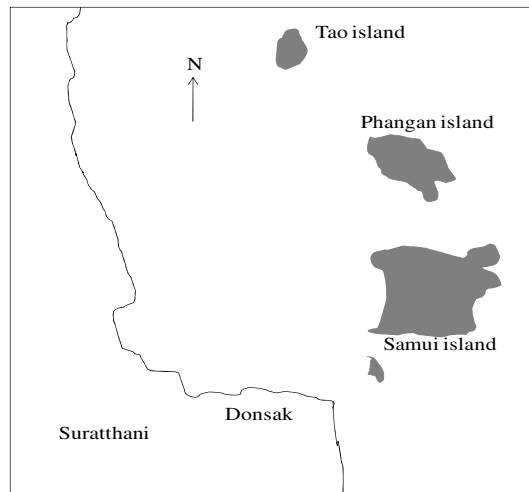


Fig.1. The location of three islands of Thai Gulf

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات