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## Potential of Offshore Wind Energy in Australia

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### Abstract

Offshore wind energy has attracted great attention from numerous committees including governments, academics and engineers and energy companies due to growing activities of renewable energy. Numerous offshore wind farms have been installed in European countries and operating well now. Development of renewable energy is one of priority research goals in Australia. In this paper, based on successful experience in overseas, we establish a set of criteria for the selection of sites for offshore wind farms. With the criteria, we will be able to select an appropriate site for the first offshore wind farms in Australia.

### Introduction

Renewable energy has attracted great attentions from governments, energy industries and academic in the world since oil crisis. It has considerable potential and could theoretically provide a nearly unlimited supply of relatively clean and mostly local energy. Recently, renewable energy supply has been growing strongly; the annual growth for wind energy, for example, has been around 30% recently, from a very low base. In relative terms, on the other hand, the share of modern renewable, including large hydro, in the total primary energy supply has remained around 10% by 2010 [1]. The cumulative global investment in renewable energy increased 23% during 2005–2030 (Figure 1) [2].

The application of wind energy throughout the world is growing fast. Over the past two decades, on-shore wind energy technology has been intensively studied in reduction in costs and is now competitive with fossil and nuclear fuels for electric power generation in many areas worldwide [3]. According to WEO2006, the cost for on-shore wind energy is around five US cents per kW/h, which is competitivable with nuclear power (5.5 cents per kW/h) and coal stream (4.8 cents per kW/h), as shown in Figure 2 [2].

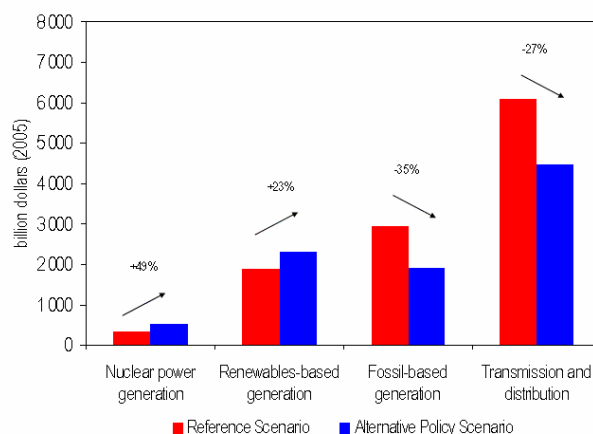


Figure 1: Cumulative global investment in electricity-supply infrastructure, 2005-2030 [2].

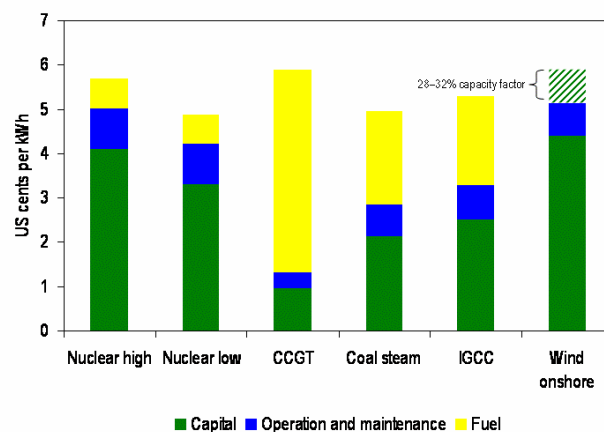


Figure 2: Electricity generating costs [2].

While on-shore wind technology becomes mature, offshore wind energy is at the beginning stage. Off-shore wind farms are different from on-shore installations for several reasons: (i) the wind turbine generators have, on average, larger diameters and rated power (for example, the one in Copenhagen Harbor), (ii) the installation and the maintenance are more expensive, (iii) the submarine electrical connection to shore increases the investment costs [4, 5]. Despite of the high costs compared with on-shore wind farms, off-shore applications allow a increased energy efficiency, due to the higher average wind