



Recent and Future Trends in Utilizing the Renewable Energy Resource - Sea Based Energy Converters

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Natural resources for energy production have been utilized for quite some time, with a lot of consequences arising from this action, e.g. acid rain, contamination of streams etc. On the other hand, industries and societies all over the world demand energy to be readily utilizable. During the past three decades, renewable resources have become more and more utilized, e.g. wind energy, solar energy, and wave energy. During the last fifteen years, the Danish wind turbine industry has been benefiting from this development. At the same time plans for larger on- and off-shore wave energy converting structures have been known. But as this technology has not yet been developed to a commercial level, it has not yet become an important player on the international energy market. This must be seen in the light of the potential worldwide wave energy contribution to energy production which has been estimated to be approx. 10 to 50 % of the world's electrical energy consumption.

From theoretical and experimental research, and in close cooperation between universities and private enterprises, a number of on- and off-shore energy converters have been developed. One of the most promising ones is the Wave Dragon device, representing a sea based wave energy converter of the overtopping type. Deployment of such devices, with dimensions varying according to the expected wave-climate at the deployment site, is most suitable at areas with a water depth of min. 25 m, in order to be able to take advantage of high energy ocean waves. The deployment of a 4 MW power production unit is scheduled to take place in 2008 off the coast of Wales, resulting in a power production equalling approx. 6 GWh/y. With respect to consumption of electrical energy in Denmark in 2005, being at the order of approx. 36 TWh, almost 1,100 such units would have to be deployed in the North Sea to cover the

amount of consumption of electrical energy being covered by other renewable energy resources in Denmark today (approx. 18 % in 2005). It is inevitable that such plans probably would run into opposition by different organizations and stresses the importance of further research in more efficient converter techniques. The same holds true for the development and later deployment of on- or near shore converters, such as the Seawave Slot Cone-Generator (SSG), with a basic 10 by 10 m prototype generating approx. 320 MWh/y.

This talk will focus on presenting recent accomplishments as well as possible future trends within the development of sea based energy converters seen in the light of the need to increase the worldwide use and also efficiency of energy converters in order to meet the future demands of sustainable energy production.