



ON THE INFLUENCE OF RENEWABLE ENERGY ON GLOBAL WARMING

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The growing number of people in the world and climate change underlines the need for a reliable and sustainable energy supply. To solve environmental problems, to meet the need to live in a healthier environment, and to accommodate a growing population, we need to significantly reduce our dependence on fossil fuels. The challenge is to maintain cost-efficiency during energy production. A natural phenomenon, part of our everyday life, can become a source of energy that can change the course of the future. There is a source that has the properties to provide a viable solution to energy challenges: offshore wind energy. In recent years, offshore wind energy has gone from being a secondary source to a global resource by increasing the capacity of turbines from 30 kW to 10 MW in just 30 years and an overall project-level capacity of 5 MW at more than 1 GW. It has simply become the mainstay of the renewable energy industry. The demand for renewable energy has begun to spread globally, but especially in Europe, where CO₂ emissions are very high. According to statistics, CO₂ emissions from burning fossil fuels for European Union member states peaked in 2017, when they had a value of 3.13 GtCO₂ followed by a continuous decrease, reaching 2.6 GtCO₂ in 2020. Studies that have been conducted to outline a global picture of climate change have indicated a dependency relationship between future climate dynamics and CO₂ emissions. To combat global warming, more and more international treaties are calling for prompt action to reduce carbon dioxide emissions so that pollution levels can be limited. These treaties aim to dramatically reduce the gap between the production of energy from conventional sources and energy from renewable sources. In Europe, the European Union has been the first pillar in terms of renewable energy, through EU legislation, which wanted a much more rational integration of renewable sources. In 2009 it implemented the Renewable Energy Directive, which set national targets for all EU member states, this step was seen as a novelty and was a model for other non-EU countries to follow. In addition to the project mentioned above, the EU has addressed a multitude of such projects. Thanks to these projects, the European Union is today a leader in renewable energy, and in the future, a continuous increase in renewable sources is expected. This is a competitive advantage for the EU, to stimulate economic growth and create new jobs. The evolution of the price from 2010 to 2019 for renewable resources outlines a major decrease in their price, especially for the solar energy sector, but also for wind energy, which reached the value of LCOE of \$ 0.115/kWh. Comparing this value with the prices for energy obtained from conventional resources, whose LCOE is estimated at 0.14 \$/kWh we can say that renewable sources have become a pillar to combat global warming, having competitive prices with those of conventional resources. All current and existing wind farms are in shallow water and the predominantly used structure is monopile type, but also the semi-submersible type that can be located at greater depths. In order to increase wind energy production, it is envisaged to reduce the cost of electricity production from wind energy.



In this idea, the DREAM project team conducts various studies aimed at evaluating various energy systems for extracting energy resources from water and wind, based on technologies appropriate to the location environment, as well as the adaptation of technologies for the various locations that serve as an object of study. The main areas where the studies are channeled are those in the coastal area of the North Sea, the Baltic Sea, the Mediterranean Sea, but also the Black Sea which is not yet exploited from an energy point of view. The studies focus on three major periods, past (1999-2019), the near future (2021-2050), and the distant future (2075-2100) considering the RCP4.5 and RCP8.5 climate scenarios. Scenario 8.5 is the most pessimistic, as an increase in temperatures of about 4°C is expected by the end of the 21st century. From the studies carried out so far, there has been a tendency to increase the wind speed for the future by at least 20% compared to the wind speeds of the past. More studies will be conducted in this direction to outline an image of wind dynamics for the future.

Keywords: renewable energy, offshore wind farm, global warming, climate scenarios.

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