

Is wind energy the best pathway to a 100% renewable energy system in Ireland?

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Aim of the Project

The Aim of the project is to carry out an extensive literature review on wind energy and its advantages compared to other renewable energies to determine if this type of energy is the best course of action Ireland can take into a decarbonized energy system. The researcher will explore wind energy systems effect in the environment, its sustainability, its energy production, and its availability in Ireland.

The objectives to be achieved for this dissertation are as follows:

- Carry out a critical literature review on wind energy and how it is implemented on different Grids throughout Europe.
- Environmental impact analysis of wind energy compared to fossil fuels.
- Identify advantages and disadvantages on implementation of wind power in Irelands Grid.
- Comparative analysis of the implementation, legislation and policies of wind energy with other renewable sources to determine which type of energy is best.

Background

The energy sector is in a current state of change and uncertainty. A change is necessary due to the environmental damage and risks associated with conventional energy systems, in order to leave the possibility of the usage of fossil fuel in the future, an alternative “clean” energy sources are being implemented. Results from different studies have stated that a 100% renewable energy system is feasible, but it has to be subjected to a change in the future.

Thus, the analysis of these kind of energies also presents a number of advantages and disadvantages in their utilization.

Advantages	Disadvantages
Reduced greengouse gas emissions	Weather conditions dependence
Reduced fossil fuels consumption	Non-continuity and unpredictability
Reduced energy imports dependence	Acceptance of renewable electricity power system
Innovation and development of economy	Low ability to produce electricity
Increasing employment	Low energy efficiency
Rural development	Low maximum capacity utilization and capacity factor
Reduction of energy scarcity	Relatively high cost of energy production

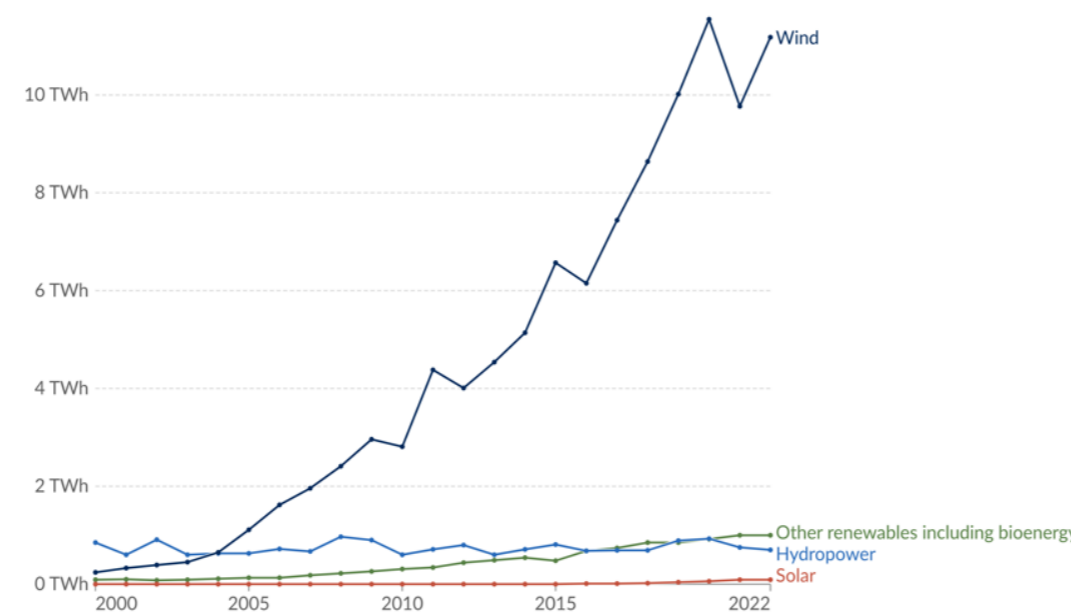
Table: Advantages and disadvantages of Renewable energies

Wind Energy

Several factors have been the key to push energy into a renewable energy future, being the most important ones the attribution to global warming (CO2 emissions), the concern about the reduction of fossil fuels emissions by means of the introduction to emissions limit (Kyoto protocol), and the search for electric security. 90% of those renewables pushed into the system Grid are in the form of solar and wind.

Thanks to the recent interest from countries into a RE production, with the cost of wind turbines dropping 1/3 since 2009. Wind Energy (WE) has been identified as a key element on the path leading into a decarbonize future, this selective process can be attributed due to both high wind resource availability and the high technology maturity in comparison to other renewable energies. Although the origin of wind energy dates from the nineties of the last century, the growth of this technology is beginning to happen in different ways depending on the country.

It has been suggested that wind energy plays a big part in the change for a decarbonized future, with the Global Wind Energy Council suggesting that wind energy could provide up to 20% of the global electricity demand by 2030, another promising scenario for wind energy is the increased interest for an electric transport future, an increased movement to change vehicles and public transport into electric will increase the future demand for electricity and wind energy is the most able to meet this demand.



Graph: Renewable energy generation in Ireland

Wind Energy in Ireland

Wind energy, as stated before, have become one of the most important Renewable Energy sources and Ireland is not the exception, WE has become the biggest Renewable contributor in the fight against conventional energies, but despite all that, this type of energy comes with difficulties that fist need to be addressed, one example is its dependence on nature and location, as in many countries, the distribution of Wind turbines is not evenly spread and are concentrated in certain locations, this is due to the wind resource and the availability that wind has in Ireland. Ireland shows a clear interest into implementing wind energy as a main renewable source on its way to transform Irelands Energy Grid into a 100% renewable energy system. However, this type of energy system is not the only one being implemented in Ireland. Studies have determined that while wind energy’s environmental impact is relatively low compared to other renewables, it also presents other difficulties like intermittency and reliability .

Methodology

The Methodology is focused on the gathering of information from recent studies and researchers familiar with Renewable energy and wind energy, the information gathered helped the researcher to formulate a more informed idea of the dissertation topic. A survey was produced as a method to obtain this new information. Additionally, case studies regarding the importance and effects of wind energy taken part into a system Grid.

The survey used in this dissertation was conducted achieve a more informed view on how Wind energy is used today in Irelands Grid and its future importance into a 100% green renewable energy system.

The Case studies used for this dissertation searched for studies focused on environmental analysis of wind energy, the effects that this wind energy has on an energy system grid, identifying the technical difficulties and advantages that this type of energy brings into a system Grid, and identifying the best implementation path that’s this energy system requires.

Conclusion

Thanks to this project dissertation, the researcher could obtain an insight of Renewables energy as a form of alternative energy generation source where subjects like Renewables, its implementation all over the world, advantages and disadvantages, a comparative study of the different renewables, wind energy, wind energy implemented all over the world, environmental impact analysis, effects on implementing wind energy as a primary source of energy into a system grid and wind energy implementation in Ireland were studied. This project gave the necessary tools to the researcher to formulate an informed analysis of results and information gathered in order to meet its dissertation objectives already put in place before on the Introduction chapter.

As from the findings in the dissertation, the researcher came up with the informed conclusion that Wind energy can be considered as the best pathway on Irelands way to change into a complete decarbonized future because its low environmental impact compared to other renewable energies, however, wind energy alone is insufficient to maintain a decarbonized energy system and needs the implementation of other renewable systems to meet future energy demands.

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