

# An Overview on Wave or Ocean Energy

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**ABSTRACT:** *Marine energies or marine powers (also called as ocean energies, ocean powers, or marines and hydrokinetics energy) refer to energy carry by the tides, ocean or marine temperature variation. The movements of the water in world's oceans create massive stores of the kinetic energies by this kinetic energy some of the energies can use for generates electricity for the manufacturing power house, as well as for transport. This paper focusses on the analysis and full description on the topic wave energy. This paper focuses on the meaning of wave or ocean energy and providing various data and their analysis. The benefits and drawbacks of the ocean or wave energy also provided in this review. Presently, ocean energies are the world biggest remaining sources of the untap renewable energies, holding the important potentials in the decarbonizing futures electricity supply. In facts, tapping's into the energies from ours ocean already begins particularly these of the Europe.*

**KEYWORDS:** *Energy, Ocean, Power, Sea, Wave.*

## INTRODUCTION

Wave energy also called sea waves energy and oceans energy is naturally happening forms of the power derive from force generate from the driving wave at the sea. It's harnessed and produced by the electricity generator which are place on surfaces of ocean. The ocean, cover greater than 70 percent of Earth, has long appreciate as massive renewable energy sources. The energies are store in oceans partially as the thermal energy, partially as the kinetic energy (currents and waves) as well as in the biological and chemical products. Numerous technique for the extracting energies from sea have suggest, most of them can include in the ones of following groupings:

- Wave energy
- Tidal and Marine energy
- Energy from salinity gradients
- Cultivations of the marines biomass
- Ocean thermal energy

Oceans represent massive and mostly untap sources of the energies in forms of the surface wave, salinity gradient, fluid-flow, as well as thermal. Marines and Hydrokinetics (MHK) or marines energy developments in the United States and the internationals water include project using following device[1]:

- Wave powers converter in the opens coastal area with the significant wave.
- Tidal turbine place in the coastal as well as estuarine area.
- In stream turbine in the fast moving river.
- Ocean present turbine in the area of the strong marine's currents.
- Ocean thermals energy converter in the deeps tropical water.

Wave energy is generated by converting the energy within ocean waves (swells) into electricity. There are many different waves energy technologies be developed and trialled to convert wave energy into electricity. Tidal energy comes in two forms, both of which generate electricity:

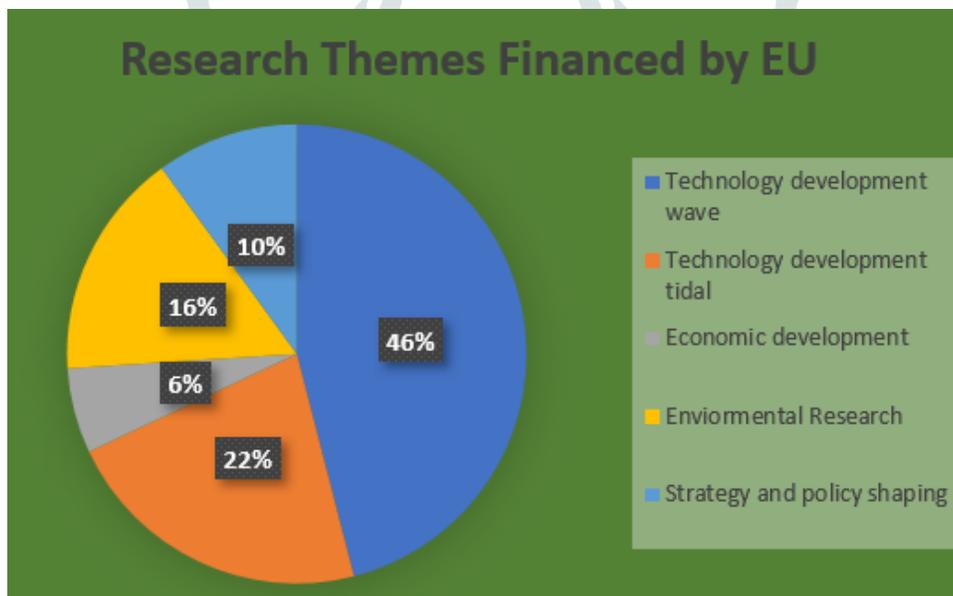
- Tidal ranges systems use the latent energy provided by the height differences between low and high tides to generate electricity. Barrages collect tidal energies from a variety of locations.
- Tidal stream technologies use the kinetic energies of waves streaming in as well as out of the tidal zones to generate electricity (like seashores). Similarly wind turbines, tidal streams systems are arranged in the arrays.

Ocean thermal energy is generated by converting the temperature difference between the ocean’s surface water and deeper water into energy. Ocean thermal energy conversion (OTEC) plants may be land-based as well as floating or grazing .The research theme financed by European Union (EU) funding in 2011 shown in Table 1. The technology developments tidal, technology developments wave, Environmental researches and Strategies as well as policies shaping Economic developments, value in percentage shown in Table 1.

**Table 1: Research Theme Finance by European Union Fund in Year 2011.**

| Research themes Finance by European Union | Values in Percentage |
|---|----------------------|
| Technology developments tidal             | 22                   |
| Technology developments wave              | 46                   |
| Environmental Researches                  | 16                   |
| Economic developments                     | 6                    |
| Strategies and policies shaping           | 10                   |

The oceans energy industries have made important development in current year but still at the very initial stages with the some advance prototypes which are presently be tested. Current challenges includes further developments of technology for prove reliable, robustness and for reduce the cost but also deployments and risks reduction. This’s reflect in current researches theme fund for example by EU (European Union) with 68 percent of funds be direct to the technology developments (Figure 1). Though, others not have technology related knowledges gap and barrier exist.



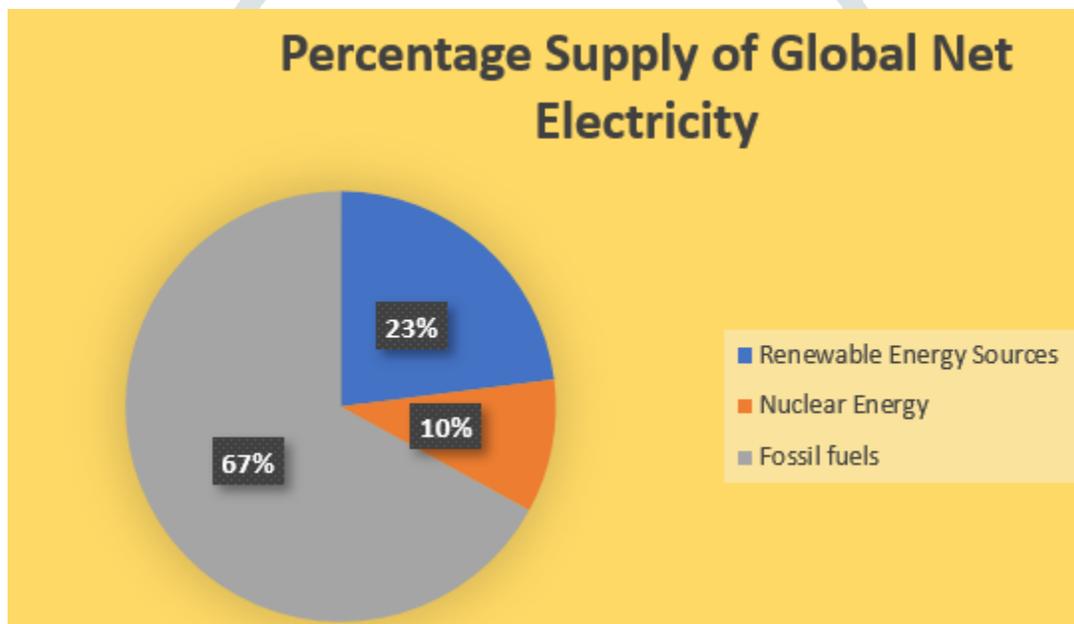
**Figure 1: Pie Chart of Research Theme Finance by European Union Fund in Year 2011.**

In 2<sup>nd</sup> half of 20<sup>th</sup> centuries, there’s general beliefs that 21<sup>st</sup> centuries would ages of the nuclear and renewable energies source. Though, of the today, most worldwide electricity still be generate from the fossil fuel. Besides economic burden, fossil fuels consumption pollutes the environments and accelerates global-warming. Shares of the fossil fuel in the worldwide electricity generations are simply enormous. According to US Energy Information’s. The Table 2 shows the share of different sources for electricity generation (Fossil fuel, Nuclear energy, and Renewable energy sources).

**Table 2: The Shares of the Fossil Fuel in the Worldwide Electricity Generations in Year 2012.**

| Percentage supplies of the worldwide nets electricity | Value in Percentage |
|---|---------------------|
| Fossil fuels  | 67                  |
| Renewable Energies Sources                            | 23                  |
| Nuclear Energies                                      | 10                  |

Administrations International Energies Outlook in year 2016 approximately 67 percent of the global net electricity generation was supplied from fossil fuels (coal, petroleum and natural gas) in the year 2012 . According to the same study, the share of renewable energy sources were only 23% of worldwide nets electricity generations and nuclear energies helps to the produce 10 percent of the electricity generations. This mean slightly greater than the one fifth of worldwide electricity generations was supply from the renewable energies source in 2012. Detail of global net electricity generation in 2012 is shown in Figure 2.

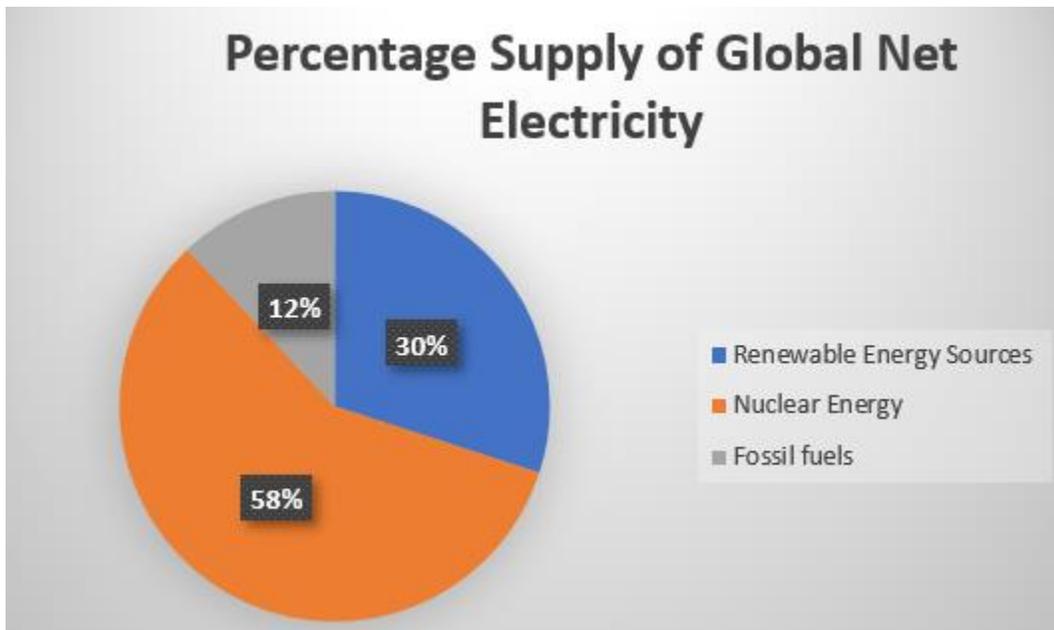
**Figure 2: Pie Chart of the Worldwide Nets Electricity Generations in Year 2012.**

They have lots of way for the electricity production by different sources (Nuclear energy, Fossil fuel, and Renewable energy sources) and their use increasing day by day. As by the estimation the percentages supplies of the worldwide nets electricity generations by various energy source base on the projections for year 2040 is shown in Table 3.

**Table 3: The Percentages Supplies of the Worldwide Nets Electricity Generations by Various Energy Source Base on the Projections for Year 2040.**

| Percentage supply of global net electricity | Value in Percentage |
|---|---------------------|
| Fossil fuels                                | 12                  |
| Renewable Energies Sources                  | 30                  |
| Nuclear Energies                            | 58                  |

Renewable energy source is fastest grow sources of the electricity generations as well as in 2040, nearly 30 percent of worldwide nets electricity generations is project to supply from renewable energies sources. Though that sounds promise it mean that the renewable energies source still not dominates global electricity’s markets in succeeding 25 year. IEO 2016 show that’s in year 2040 approximately 58 percent of worldwide nets electricity generations is project to supply from the fossil fuels (Petroleum, Natural gas, and Coal). It just mean that shares of the renewable energies sources still lesser than the one thirds of the global nets electricity generations and greater than half’s of the global nets electricity generations still be supply from fossils fuel in year 2040. Details of worldwide nets electricity generations projections for year 2040 is shown in the Figure 3.



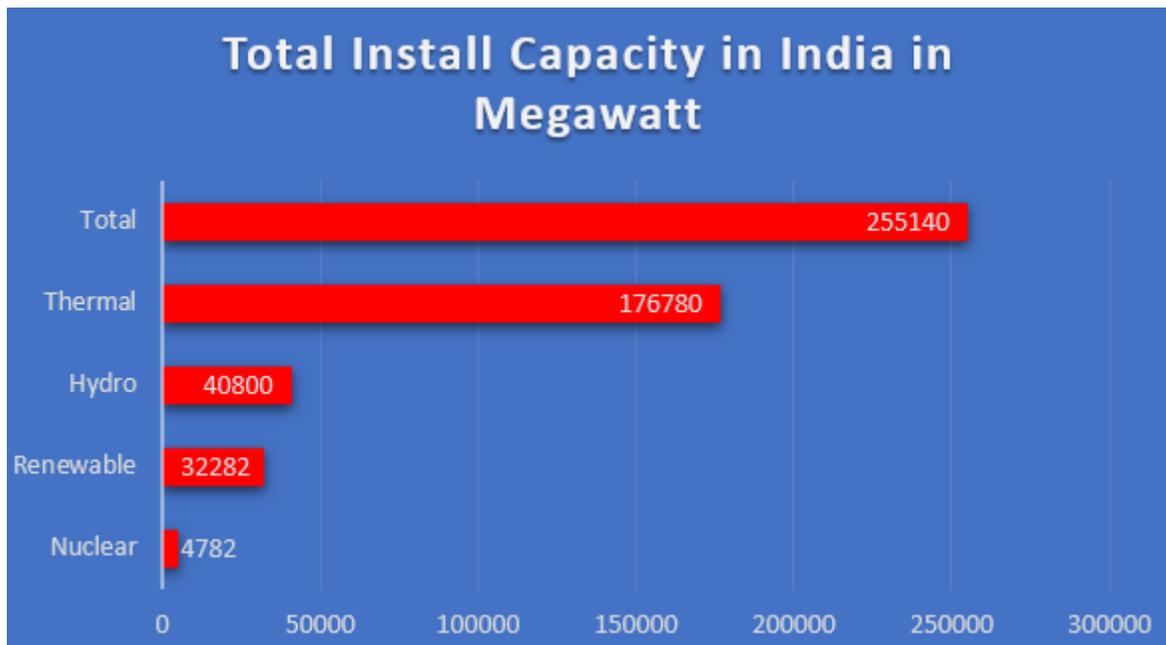
**Figure 3: Pie Chart of Percentage Supplies of the Worldwide Nets Electricity Generations by the Different Energies Source Base on the Projection for Year 2040.**

In India they have lots of sources for the electricity generation such as nuclear source, renewable etc. The total install capacities in the India in megawatt in year 2014 by using different sources (Renewable source, Nuclear source, Thermal source and Hydro source) is given in Table 4 and the value produce total install capacity is 255140 in megawatt in India in 2014.

**Table 4: Total Install Capacities in the India in Megawatt in Year 2014 [2].**

| Source           | Total Install Capacities in the India in Megawatt in Year 2014 |
|------------------|--|
| <b>Renewable</b> | 32282  |
| <b>Nuclear</b>   | 4782   |
| <b>Thermal</b>   | 176780   |
| <b>Hydro</b>     | 40800  |
| <b>Total</b>     | 255140   |

The Figure 4 shows the graphical representation total install capacities in the India in megawatt in year 2014. This graph shows the highest value capacity in India is by thermal energy which is 176780 in megawatt and the highest value capacity in India is by the nuclear energy which is 4782 in megawatt and the value total install capacity is 255140 in megawatt in India in 2014.



**Figure 4: Graphical Representation Total Install Capacities in the India in Megawatt in Year 2014.**

### BENIFITS AND DRAWBACKS OF WAVE ENERGY

Wave energy also called sea waves energy and oceans energy is naturally happening forms of the power derive from force generate from the driving wave at the sea. It's harnessed and produced by the electricity generator which are place on surfaces of ocean. The ocean, cover greater than 70 percent of Earth, has long appreciate as massive renewable energy sources. There are lots of advantages from ocean energy.

#### 1. Advantages:

##### 1.1. Renewable:

Like to the renewable energies source, wave powers are also the renewable. Because this energies source eventually come from the wave crash upon shore of the many country nears populate coastal region, it'll not disappears.

##### 1.2. Environments Friendly:

Integrally, wave energies doesn't creates waste, pollution, and greenhouse gasses when generate as the fossils fuel does. The energies from the wave can takes directly in to the electricity produce machinery as well as used for power generator as well as the power plant nearby. In the today energy power world, sources of the clean energies are hard for find.

##### 1.3. Widely and Abundant Available:

Additional benefits of use this energies are its closeness to the places which can be used it. Lot of the harbors and large cities are the succeeding to oceans and may harness powers of wave for the use. Coastal city tends to well populate, so lot of the people may get the used for wave-energy plant[3].

##### 1.4. Varieties of the Ways for Harness:

Another advantage is there're variability of ways for gathers it. Present gathering method ranges from the installed powers plant with the hydro turbine for seafaring vessel equip with the massive structure that're placed into sea's to gathers wave energy.

### *1.5.Predictable:*

The greatest benefit of wave power over most other renewable energy sources that it's easy to estimate and quantify the amount of energy it will provide. Wave energy is reliable and outperforms other sources that are relying on the sunlight or wind exposure.

### *1.6.Fewer Dependency on the Foreign Oil Companies:*

If the full amount of energy from wave power can be generated, the reliance on foreign firms for fossil fuels can be minimized. It would not only help to reduce emissions, but it will also provide the green job for the millions of the people.

## *2. Disadvantages:*

### *2.1.Cost:*

The cost of constructing a tidal power plant is actually very high. This is due to the fact that they must be very strong in order to survive the impact of the sea. Since tidal barrages are typically constructed of concrete, the initial cost is heavy.

### *2.2.Locations:*

Wave energy cannot be used by landlocked country or city, so it is not a viable renewable energy option for anyone. To do their work, wave energy plants must be situated near or on the coast, and they must be close to towns and other inhabited areas to be of any interest to the public

### *2.3.Environmental Effect:*

People who live near coastal areas may find wave energy generator unappealing, and land-based wave energy generators may create conflicts with local and tourism acceptance. Coastal structures and buildings must adhere to stricter scale and location requirements. There isn't a lot of information on how the wave energy productions impacts marine organisms. However, in the near future, there will be further research and error and trial to develop extra data in this sustainable sector.

## **LITERATURE REVIEW**

The different types of researches on wave energy or ocean energy by different researches are given below: Mehmet Melikoglu studies the fundamental, energy and power potential, technology, equipment, build capacities, annual generations, and futures of the ocean energy sources: wave, tidal, salinity, and temperature gradients are presented as a global update. According to a detailed review, the global yearly capacity of various ocean energy sources is far higher than annual global electricity production. As result, many country around the world are attempting to generate electricity using ocean energy source. However, since most ocean energies technologies still in infancy and there are many technological, environmental, and economic issues to be resolved, this is currently not feasible on a wide scale. As a result, policymakers and the private sector around the world should encourage research and development in ocean energy engineering so that we can use these safe and clean green energy sources to meet our growing worldwide electricity demands. Finally, that research will help universities and industry better understand how to use various ocean energy sources to achieve a more prosperous future[4].

Muhammad Anas Siddiquiet et al. studies if the danger of global climate change exacerbated by the release of greenhouse gases into our environment and the use of fossils fuel reserves diminishes, futures of the electric powers generation is being increasingly concerned. Their research is being carried out in order to discuss the production of electricity using ocean resources (tides and waves). Since the ocean occupies 70 percent of the Earth's atmosphere, energy derived from it is considered a renewable source of energy and the planet's futures power plants. There's lots of research and development going on in the oceans, and lots of the money spent in the ocean energy projects all overs world. Their research provides a concise overview of the history of the tidal power. They also discusses the applications, benefits, and construction features of marines current turbines

currently in operation in Canada's Bay of the Fundy. They've also spoke about converting tidal energies into the electricity by using two rotors turbines to provide shade[5].

Malin Goteman et al. studies in a profitable wave energy systems, several communicating wave energies converters are normally located in park. The park's efficiency is influenced by a variety of factors, including array configuration and system count, and can be measured using various metrics like energy absorptions, electricity qualities, and cost of generated electricity. Since wave energy is now at the point that many large scale installation is being designed, maximizing park efficiency is a hot topic of study, with a number of significant contribution in recent years. Their study is examined in their paper, with an emphasis on assessing the existing states of art, evaluating how practical, accurate, and important the techniques and findings are, and proposing possible research directions.

Markel Penalba et al. studies wave energies converter (WEC) have traditionally been regulated primarily by hydrodynamics in order to capture as much energy as conceivable from the ocean waves. The output of actual powers take off (PTO) systems is usually ignored or greatly simplified as a result of this. Having all of the necessary constraints and dynamics in control dilemma, on the other hand, could significantly alter the control strategy and power performance. As a result, their paper discusses all of the transfer stages from ocean wave to electricity networks, also known as waves to wires models, as well as describes the required elements, as well as their constraints and dynamics, such as grids constraints. Furthermore, their paper identify various controls input for various component of PTO systems, as well as how these input are expressed to the system's dynamics. Hydraulic pneumatic, magnetic, or mechanical transmission systems that drive a rotary electrical generator, as well as linear electric generators, are given as examples[6].

## DISCUSSION

This paper discusses all about the wave or ocean energy. First in this paper they have discussion about the meaning or definition of the ocean or wave energy (which states that waves energy or oceans energy is naturally happening forms of the power derive from force generate from the driving wave at the sea). Then there are some analysis of data which provide different information such as shares of the fossil fuel in the worldwide electricity generations in year 2012 and 2040, total install capacities in the India in megawatt in year 2014, Research Theme Finance by European Union Fund in Year 2011 etc.. This reviews also provides various benefits (such as Environments Friendly, Predictable, and Renewable) and drawbacks (such as high cost for installation, desired locations and effect to environment) of wave or ocean energy.

## CONCLUSION

After studies we find there are lots of advantages or importance from wave or ocean energy such as it is renewable, environment friendly, widely and abundant available etc. and also by analysis of different data by this we find the share of renewable energy sources were only 23% of worldwide nets electricity generations and nuclear energies helps to the produce 10 percent of the electricity generations also India is by thermal energy which is 176780 in megawatt and the highest value capacity in India is by the nuclear energy which is 4782 in megawatt and the value total install capacity is 255140 in megawatt in India in 2014.. Energy extracted from ocean is considered as a renewable source of energy and in future power plant which produces energy from ocean energy covers 70 percent of the surface of Earth and its best future for utilize the ocean energy for energy extraction because it is excess in quantity.

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