Saltwater a viable source of Energy for Sustainable Rural Development

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Abstract

Energy is the base for development in present time. A sustainable renewable energy source is needed to overcome the requirement of special conditions and infrastructure for the development of rural areas. Saltwater is available in abundance and energy can be harnessed directly with ease. The study analysed saltwater energy potential of three salt companies by varying salt concentration at the rate of 1%, 2%, 3%, 4%, 5% and 10 %. The company with higher energy potential was further analyzed at increased concentration of 15%, 20%, 25%, 30%, 40% and 50%. The sustainability of the energy was determined in terms of carbon emission as compared to kerosene lamp widely used in rural areas as a fuel. The energy potential of saltwater energy is low but can be successfully used in rural areas for lightning purpose. The concluded that saltwater energy is a viable, readily available, economical and green source of energy for rural development.

Keywords: Sustainable, Renewable Energy, Rural Development, Saltwater, carbon emission

1. Introduction

The ever-growing population and increasing life standards have resulted in exponential demand for energy. With the concerns over fossil fuel-based energy impact on environment, alternative resources for renewable energy are being investigated. The viable energy source should be readily available in ample quantity, should be economical and can reach masses without the need of any special infrastructure. This has restricted the access to energy in rural and remote areas.

The most abundant source available on Earth beside air is water. Energy from oceans is being harnessed in form of tidal waves and salinity gradient. These systems though produce energy on large scale but need special infrastructure for operation (Andreas, 2016; Helfer, 2013) The aim of study is to harness the energy potential of saltwater through simple and cheaper means, bring down the mass production of energy to individual level, make the energy viable and feasible for mass. Seawater is not accessible to all.

2. Experimental Setup

The experimental setup was made to simplest possible so that successful number of fuel cells can be increased to harness the energy as per the need without skilled labour. This will ensure easy promotion and use of the energy by every individual on earth. Copper (Cu) and Aluminium (Al) were used as Anode and Cathode respectively. Artificial saltwater was created using common table salt from three different companies to determine any major potential different due to varying salt constituents.

3. Result and Discussion

Three salt of different companies were used to create artificial saltwater. The salt company depicting highest energy potential was further analysed at varying salt concentration upto 10%.

Table 1. Voltage Potential for the three salt companies

Salt Conc.	C-1	C-2	C-3
1G	0.834	0.797	0.801
2G	0.841	0.8	0.76
3G	0.761	0.771	0.754
4G	0.771	0.749	0.775
5G	0.777	0.78	0.76
10G	0.751	0.746	0.75

Table 2. Current Potential for the three salt companies

Salt Conc.	C-1	C-2	C-3
1G	0.132	0.111	0.103
2G	0.121	0.083	0.085
3G	0.245	0.123	0.123
4G	0.115	0.09	0.105
5G	0.135	0.113	0.139
10G	0.098	0.108	0.149

The energy potential is higher at lower concentration of saltwater. This may be because of more free space available for the ions to move around and lower rate of corrosion of electrodes at lower concentrations.

4. Carbon Emissions

The carbon dioxide emission from saltwater lamp is considered as Nil due to the fact that there is no burning of fossil fuel i.e. kerosene which resulted in 399600 tCO_2e annually. Even if carbon emission from kerosene lamp is assumed to be equivalent to saltwater energy. The Black Carbon emission (17,760 tonne/ year) emitted from conventional kerosene lamps, will still make saltwater energy greener and sustainable option.

5. Conclusion

The saltwater energy eradicates the need of special conditions and infrastructure which has restricted the use of renewable sources of energy. Salt is a common household item available in most of the households globally, in addition seawater is a natural saltwater. Saltwater energy can be used

The rural and remote areas without access to electricity can benefit the most with saltwater energy development. The use of saltwater energy in rural areas will result extended working hours, remove the restriction to stop working after sunset. This will help in bridging the gap between rural and urban areas. The lifestyle in rural and remote areas will experience much needed improvement. The study concludes that saltwater energy is a viable, feasible and sustainable replacement for current kerosene lamp and a pilot scale study is required to approach this replacement in a real holistic manner.

References

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