

Utilization of Renewable Energy Sources in Fisheries Sector

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Fisheries sector is promising way for employment and income generator to huge chunk of the society. The fisheries sector includes fishing, aquaculture, post-harvest processes and product distribution. India is the second largest fish producing country in the world accounting for 6.56% of global production and contributing about 1% to the country's Gross Value Added (GVA) and over 5.37% to the agricultural GVA during 2017-18 (FAO STAT, 2018). Fish, being an important component of the diet for people throughout the world, has high protein content and nutritional value. The consumption of fish is an essential part of a healthy and well-balanced diet (Moya et al. 2008). Potential health benefits related to fish consumption are due to the presence of protein, unsaturated essential fatty acids, minerals, and vitamins (Sidhu, 2003). Additional health benefits from the consumption of fish or fish oil may relate to polyunsaturated fatty acids (PUFAs), especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) (Sidhu, 2003; Domingo et al. 2007). Fish provide omega-3 fatty acids that could reduce cholesterol levels and the incidence of heart disease, stroke, and preterm delivery (Burger, 2004). It also acts as a mood stabilizer (Silvers and Scott), especially among females (Timonen et al. 2004). The fisheries sector is highly external energy dependent sector which is mainly on fossil fuels. Fossil fuels are dominant form of source of energy used in fishing and these fuels produce CO₂ in the atmosphere which leads to greenhouse effect and other toxic pollutants which are harmful to environment and human kind. Hence, there is need to utilize renewable sources which are inexhaustible in nature and ecofriendly. The depletion of fossil fuel resources and their known adverse effects on the environment have gained the interest in renewable energy resources, such as solar, wind, biomass, wave, and geothermal energy sources. India has set for itself a mitigation of GHG target for 2030.

Fish post-harvest

- It is a highly perishable food product with a very short life span (amount of water contain 80%). During the monsoon season, upto 30% of catch fish would be lost due of lack storage, preservation methods.
- The fish processing refers to the processes associated with fish and fish products between the time fish are caught or harvested, and the time the final product is delivered to the customer.
- The harvested fish should be cleaned and cooled as soon possible due to their strong digestive juices, fish spoil very soon and if not gutted and cleaned promptly may develop off flavor and color.

Application of Solar Energy in fish post-harvest

- ❑ Solar drying is used to enhance the effect of the solar radiation.
- ❑ Compared to the sun drying, solar dryers can generate higher air temperatures and consequential lower relative humidity, which are conducive to improved drying rates and lower final moisture content of the final products.

Utilization of Fish Processing Waste Materials

The valuable products that would be developed from of these fish processing waste materials are

- Fish waste as a material for enzyme production
- for fish protein hydrolysates (FPH) production
- for fish meal production
- for fish silage production
- for collagen and gelatin production
- for fish oil production – This can be used for production of Bio-oil

Production of biogas using fish waste

Anaerobic digestion is a collection of processes by which micro-organisms breakdown biodegradable materials in the absence of air. Oil-free fish waste (cake) can be used in biogas production. The digestate can be used as fertilizer (Yuvaraj *et al.*, 2019).

Production of biodiesel using fish oil

Transesterification is a chemical reaction used for the conversion of triglycerides contained in oils into usable biodiesel. In transesterification process a glyceride reacts with an alcohol in the presence of a catalyst forming fatty acid alkyl esters and an alcohol. It is the basic step that yields biofuel products.

Conclusion

- ❑ An integrated approach to ensure ecosystem integrity and conserve biodiversity
- ❑ Use of solar energy or other renewable energy sources for lighting, refrigeration on board the fishing vessels, and other activities.
- ❑ Use of solar energy in fish post- harvest can reduce losses (Ex: Solar dryer, solar Refrigeration etc.,)
- ❑ Use of renewable energy in aquaculture reduces the production cost and increase the sustainability. & an efficient produced energy can be used for aeration, feed dissension, water pumping, light sources, etc.
- ❑ Every year billion tons of fish waste are dumping on land or hauling into the ocean cause emissions so that waste can be used for production of biofuels & fertilizers.
- ❑ Integrated renewable energy solutions can be used to produce the needed electricity, heat,

steam, hot water and cooling/freezing energy in fish processing industries.

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