

RENEWABLE ENERGY SOURCES IN AQUACULTURE: OPPORTUNITIES AND CHALLENGES

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Abstract

Global population growth to nearly 10 billion by 2050 [1] will intensify food and energy demands, raising concerns about sustainability. Aquaculture plays a key role in food security but also generates environmental impacts, including greenhouse gas emissions, resource depletion, and ecosystem degradation. Rising fuel costs and climate policies highlight the need for greener practices. Integrating renewable energy sources—such as solar, wind, or residual heat recovery—can reduce dependence on fossil fuels, lower operational costs, and improve efficiency, especially in remote locations. However, adoption depends on site-specific conditions, economic feasibility, and the availability of infrastructure. Environmental impact assessments remain essential to ensure ecosystem resilience. This paper examines the opportunities and challenges of renewable energy in aquaculture, underlining its potential to support climate change mitigation and sustainable food systems.

Key words: *aquaculture, sustainability, renewable energy, environmental impact*