

COMMUNITY ENGAGEMENT ARTICLE

Participatory Renewable Microgrid Deployment and Community Governance in Archipelago Fishing Settlements

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Abstract

A 14-month collaborative community engagement project installing solar-biomass hybrid cold storage for smallholder fishers. Post-intervention evaluation showed fish spoilage dropped from 38% to 4.2% with verified community co-management.

Keywords: Microgrid, Community Governance, Smallholder Fisheries, Solar Energy, Participatory Action

1. Introduction

Off-grid coastal settlements in Eastern Indonesia depend heavily on diesel generators with volatile fuel supply chains. Spoilage of fresh fish catches constitutes a devastating economic penalty for artisanal fishermen lacking ice storage facilities.

2. Method

A participatory action community engagement framework was deployed across two coastal fishing villages in Central Sulawesi (N=420 households). A 15 kWp solar PV microgrid coupled with a 5-ton communal cold storage facility was constructed under a Village Cooperative (BUMDes) management model.

3. Results and Discussion

Operational metrics documented an 89% reduction in diesel consumption. Post-harvest fish spoilage fell from 38.4% to 4.2%, elevating daily household fish sale returns by 34%. A community-elected maintenance trust fund achieved 100% operational cost recovery within six months.

4. Conclusion

Technological interventions in rural archipelago settlements succeed when accompanied by transparent communal institutional design, gender-inclusive tariff structures, and continuous local capacity building.

Declarations

Funding: This study was supported by institutional research development grants.

Conflicts of Interest: The authors declare that they have no competing financial or personal interests.

Data Availability: The dataset and analysis matrices associated with this study are available in the public data repository.

Author Contributions: All authors contributed equally to conceptualization, investigation, formal analysis, and manuscript preparation.

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