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«Infrastructure and Construction Project Management»

Postgraduate Diploma Thesis

Energy Communities in Greece: Economic Analysis, Environmental Impact and Strategic Deployment

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Abstract

This thesis investigates the role of Energy Communities (ECs) in advancing Greece's energy transition, focusing on their economic feasibility, environmental contribution, and strategic development potential. Energy Communities represent collective initiatives through which citizens, municipalities, and small enterprises jointly produce, consume, and manage renewable energy, fostering energy democracy, social inclusion, and local sustainability.

The study reviews the European and Greek legislative frameworks, emphasizing the adaptation of the Renewable Energy and Electricity Market Directives into Greek Law 5037/2023, which modernized the national approach by introducing Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs). These entities aim to decentralize energy production, promote community participation, and strengthen local economies.

A techno-economic case study of a virtual net-billing community in Preveza, Epirus, illustrates that such projects can be both economically viable and environmentally beneficial under realistic market conditions. The analysis shows that collective solar initiatives can reduce energy costs for households, enhance energy autonomy, and contribute significantly to emission reduction goals.

A SWOT analysis highlights the multidimensional nature of Greek Energy Communities. Their strengths lie in citizen engagement, social impact, and renewable potential. Weaknesses include administrative complexity, grid access limitations, and fragmented technical support. Opportunities emerge from European funding mechanisms, national recovery programs, and the growing interest of municipalities in sustainable projects. However, threats persist in the form of policy instability, bureaucratic inertia, and limited awareness among potential participants.

Overall, the research concludes that Energy Communities can become a cornerstone of a fair, decentralized, and resilient energy system in Greece, provided that supportive policies and institutional mechanisms are effectively implemented.