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Gabriel Winter-Althaus · Antonio Pulido-Alonso ·  
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# EU Islands and the Clean Energy Transition

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ISSN 2191-5520

ISSN 2191-5539 (electronic)

SpringerBriefs in Energy

ISBN 978-3-031-23065-3

ISBN 978-3-031-23066-0 (eBook)

<https://doi.org/10.1007/978-3-031-23066-0>

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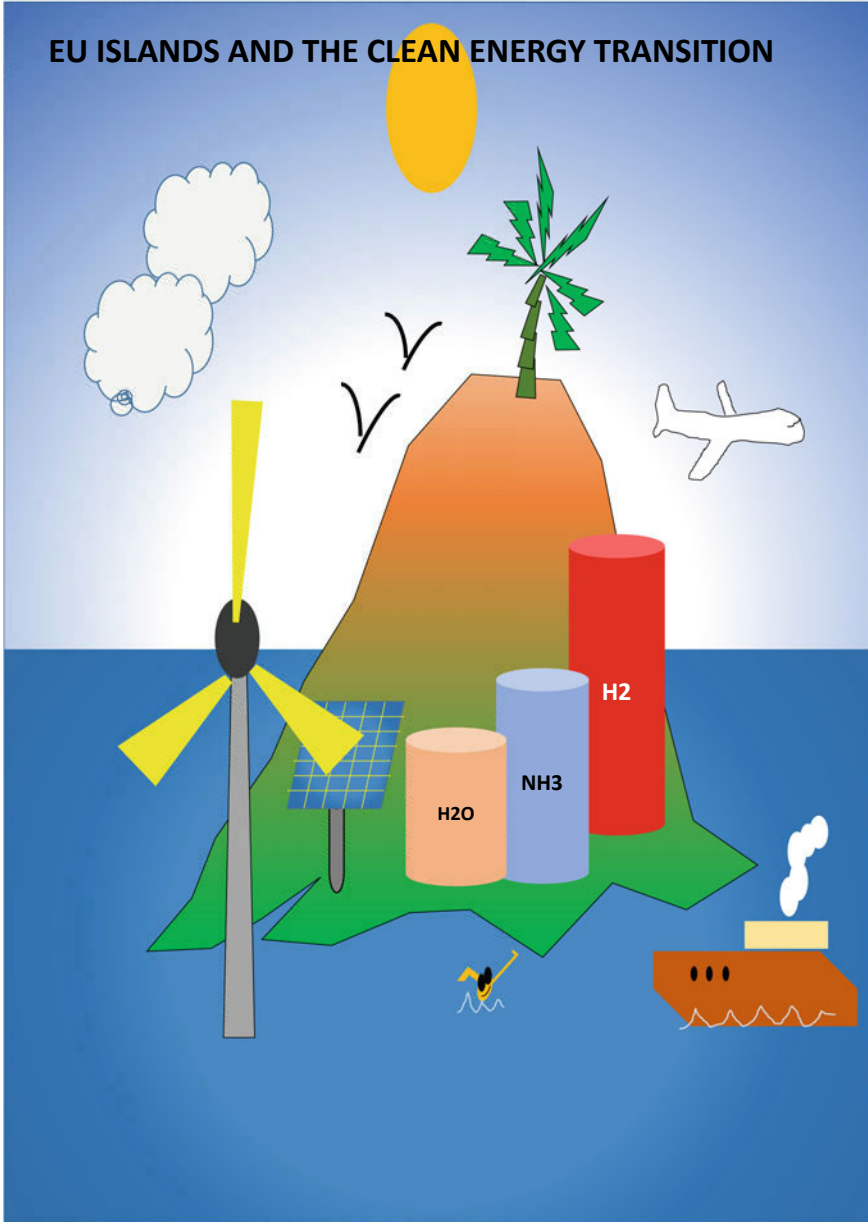
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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# EU ISLANDS AND THE CLEAN ENERGY TRANSITION



# Preface

Isolated energy systems face specific challenges related to their energy supply. These specific challenges include high dependence on imported fossil fuels; a more restricted energy supply due to the absence of electricity and gas interconnections; greater difficulty than continental energy systems in balancing supply and demand; higher energy costs than continental systems due to the use of more expensive fuels and the lower efficiency of power plants. As a consequence of all this, isolated energy systems need specific measures to mitigate this situation. In this sense, the use of renewable energy resources could represent an opportunity to, among other things, secure their energy supply, limit the need to import energy, or reduce the cost of such energy, and achieve the search and difficult decarbonization of these territories. The creation of clean electricity and fuels, such as hydrogen and ammonia, would mark a path toward the decarbonization of society as a whole. The seasonality of natural energy resources (sun and wind) requires seasonal storage, which could be avoided by trading energy abroad using ammonia as a hydrogen carrier energy vector, facilitating the storage and transport of hydrogen.

This book will contextualize the islands of the European Union and their energy systems, as well as review the research projects carried out in these isolated energy systems. Specifically, this book will present the feasibility of using in isolated territories of the European Union schemes based on reverse osmosis desalination plants, electrolyzers, ammonia synthesizer, fuel cells, nitrogen generators, electric batteries, recharging stations for electric vehicles, hydrogen and/or ammonia combustion generators, ammonia crackers, and complementary installations such as tanks, pumps, compressors, and auxiliary elements.

With the production of these green fuels, not only full decarbonization is achieved, but also energy independence and geopolitical influence. The islands have sea (water), therefore hydrogen and oxygen; air (nitrogen); with its movement and the sun, renewable energy is obtained. In short, the use of conventional energy sources would not be necessary.

This work involves a transfer of knowledge and technology in sectors and applications hitherto unexplored. In addition to the social benefit projected to society, it also demonstrates that its implementation is economically viable despite the lack

of aid or economies of scale linked to this technology compared to other technologies that are more widely implemented. It opens up a range of possibilities for new sustainable business models based on hitherto minority energies. Depending on the environmental conditions, the results of exploration and the technical feasibility, but always with a great commercial potential of the innovations presented here, which, if they also had public funding, would achieve greater business development.

In each island, it would be necessary to determine what natural energy resources and what energy demand it has. The islands have an advantage in obtaining water, which is the availability of seawater. Although it can be obtained from the humidity of the air, the energy expenditure would be much higher. In the case of the Canary Islands analyzed here, water is scarce, and an osmosis plant has been considered in the process. In other cases, it may not be. But it will always be possible to connect various flexible production processes, save the variability of resources, and try to find a solution to save seasonality.

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