Re-vitalizing Energy Transition in Touristic Islands

Energy Transition: the key to the future

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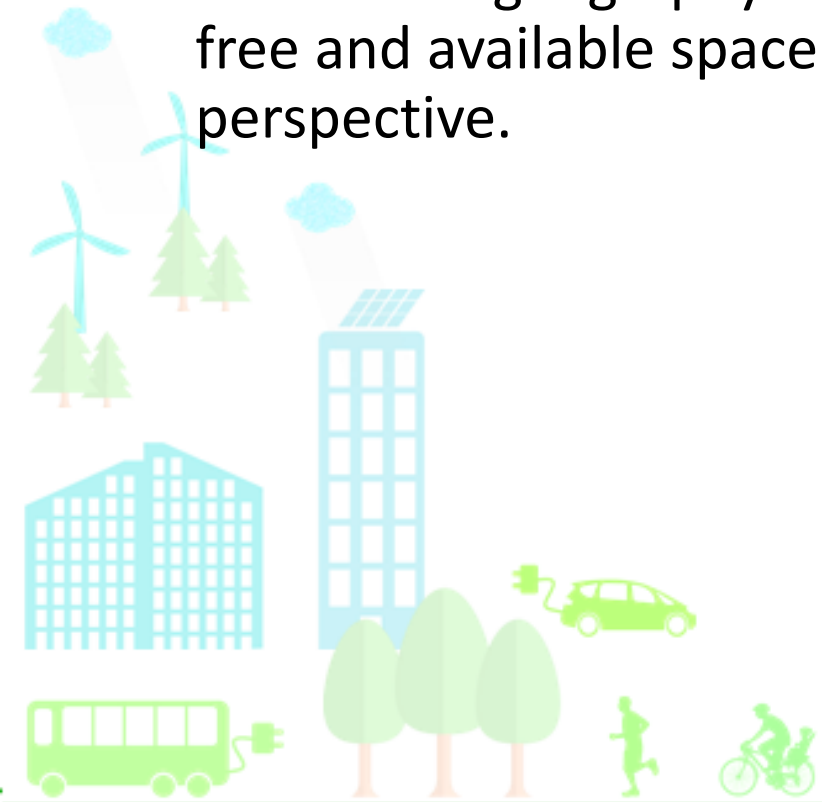
Unit 1 - Introduction

Description

Introductory unit to understand the energy context and the need for an energy transition for the islands.

The role or geography in the restrictions for energy production and supply, the limited free and available space and seasonal high population due to tourism, from the citizens perspective.



Unit 1 - Introduction

Learning Outcomes

Understanding the European and national energy context, and the need for energy transition especially for the islands that are facing restrictions available space, resources and access due to their geographical characteristics, from the citizens perspective.

Island residents

- Because of their distant location and frequently scarcer resources, island residents are particularly exposed to the dangers posed by climate change to their local habitats and means of subsistence.

- They may also find it more difficult than mainlanders to create suitable responses to these concerns.

- At the same time, energy security is a major concern for islands and a major obstacle for planners of the energy and environmental sectors.

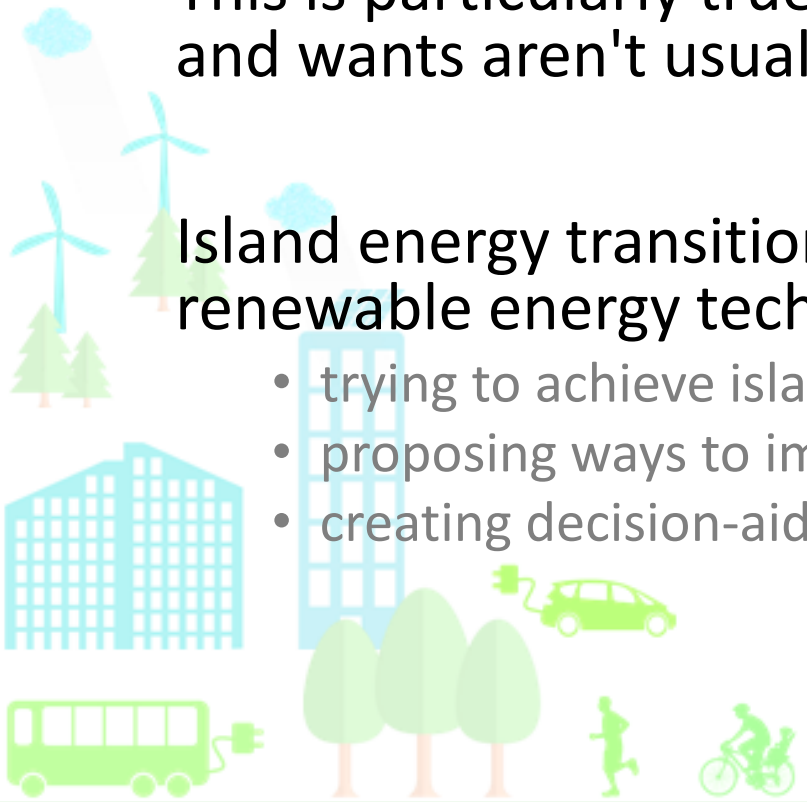
Energy transition research

Energy transition research is not new and is only growing in importance as the effects of climate change intensify.

This is particularly true for island populations and islands, whose demands and wants aren't usually reflected in national policy.

Island energy transition research includes integrating energy storage and renewable energy technologies into current energy structures

- trying to achieve island energy independence
- proposing ways to improve island support for the transition
- creating decision-aid tools to help with energy transition planning.



Energy transition research

Without initially knowing the starting points of the islands' residents' energy awareness and genuine willingness to engage in energy transition activities,

- it is challenging to develop effective policies
- engagement strategies for the energy transition on islands.

The purpose of this research is to ascertain both of these criteria on EU islands while also taking local variables into account and assessing how these conditions interact with the views of the islanders.

Energy shift

One of the biggest challenges on islands is the energy shift.

In addition to being essential, it might provide a significant chance for long-term social and economic advancement.

Recently, a fresh, encouraging trend has arisen in this direction.

Energy communities have grown as a direct result of the insular population's growing knowledge.

Energy shift

The phrase "energy shift" refers to the process of replacing:

- traditional, non-renewable fossil fuels for the production of mechanical, electrical, and thermal power
- with the utilisation of Renewable Energy Sources (RES) for the same purpose, which is reinforced and supported by the so-called "rational use of energy" (RUE).

However, switching to RES from fossil fuel-based infrastructure is unquestionably more than just a technical fix.

Energy shift

Our way of life may be changing as a result of the social ramifications of this transition.

This might lead to decentralised, locally based energy systems with a mix of locally accessible RES sufficient to meet all of society's energy demands, when combined with:

- energy savings through increased energy efficiency
- mindful energy usage.

However, this shift is made more difficult by elements like:

1. entrenched interests in assets with large investment costs and extended lifespans,
2. complicated and unpredictable regulatory frameworks,
3. people's lack of interest in energy.

Energy shift

Through the two crucial Directives on the promotion of the use of RES for energy production and the RUE in buildings, the European Union and its Member States have formally acknowledged the energy transition as an unavoidable necessity, imposed for:

- Social security,
- energy supply security,
- independence,
- Environmental reasons,
- economic reasons.

Clean Energy Transition Agenda

- With the creation of the "Clean Energy for EU Islands" Initiative in 2017, the EU provides strong, multilayered assistance to insular communities, specifically for European islands, to set up and approach an efficient, well-planned, and ultimately successful energy transformation.

- The Clean Energy Transition Agenda (CETA), a strategic roadmap for the transition towards clean energy and energy efficiency, was developed by the Initiative through its Secretariat in 2018.
  - It covers the crucial issue of capacity building and raising awareness, offers a wide range of networking opportunities, and offers support through open calls for technical assistance for specific projects.

Clean Energy Transition Agenda

It is important to note that the process of creating a CETA gives the islands

- more credibility
- access to resources

since they may win over networks of (strong) partners by clearly expressing their goals.

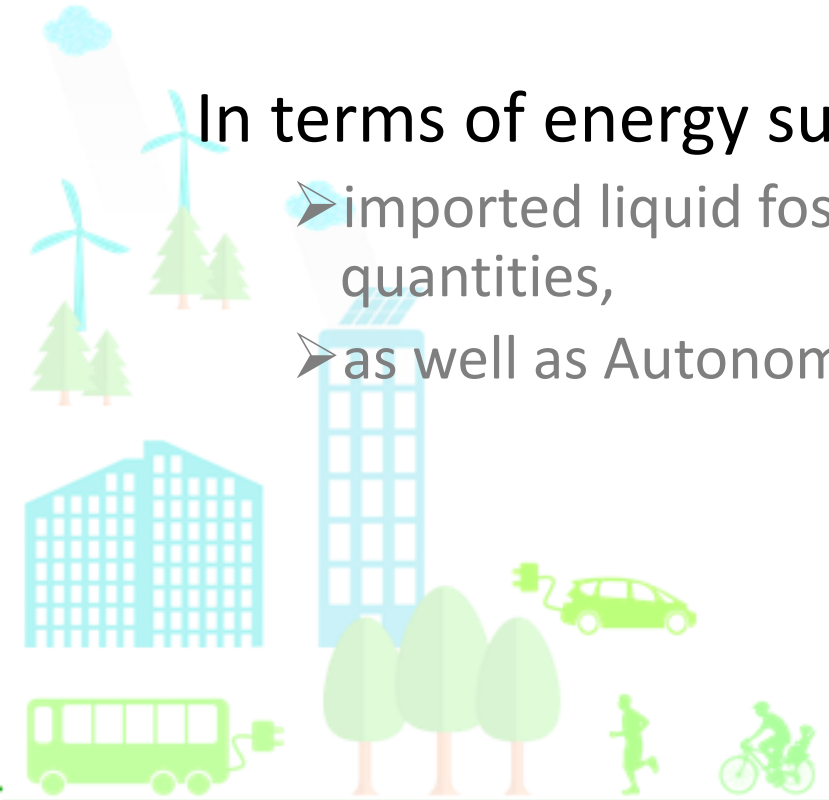
As a result, it is a crucial initial step in the process of the islands' transformation.

Vulnerable social entities

In terms of accessibility, health and social care, the economy, environmental concerns and biodiversity, and energy supply, islands are among the world's most vulnerable geographical and social entities.

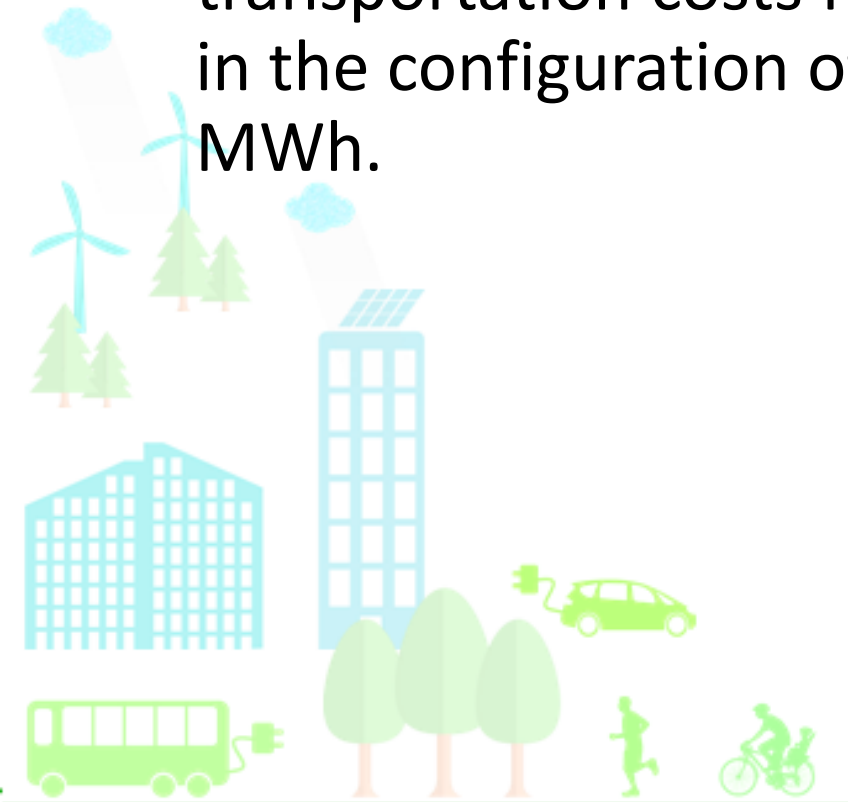
In terms of energy supply, the majority of islands worldwide rely on:

- imported liquid fossil fuels (diesel oil or heavy fuel) that are burned in modest quantities,
- as well as Autonomous Power Plants (APP) that generate electricity.



Vulnerable social entities

In addition to the exceptionally high prices for fuels used in the transportation sector and for heating indoor spaces, the high procurement costs of imported fossil fuels, when combined with the transportation costs from the mainland to the islands, frequently result in the configuration of electricity levelized cost exceeding EUR 300 MWh.



Vulnerable social entities

Islands are extremely vulnerable in terms of the security of their energy supply and the local economy due to their near-total reliance on imported fossil fuels.

However, islands usually have great potential for renewable energy sources, namely:

- Wind
- solar
- biomass (for larger islands).

Through more efficient energy producing processes, commonly known as the (RUE), the phrase "energy transition" refers to the replacement of various final energy uses based on RES with fossil fuels.

Efforts to transition to a more sustainable energy generation and consumption model and to mitigate the effects of climate change are ongoing activities in the majority of industrialised and developing nations.

Within specific directives that encourage the use of energy from renewable sources and the energy efficiency and performance of buildings, it is formally applied to all member states in the European Region as a direct duty.

Due to the unique challenges that frequently arise and are connected with energy-related aspects such as:

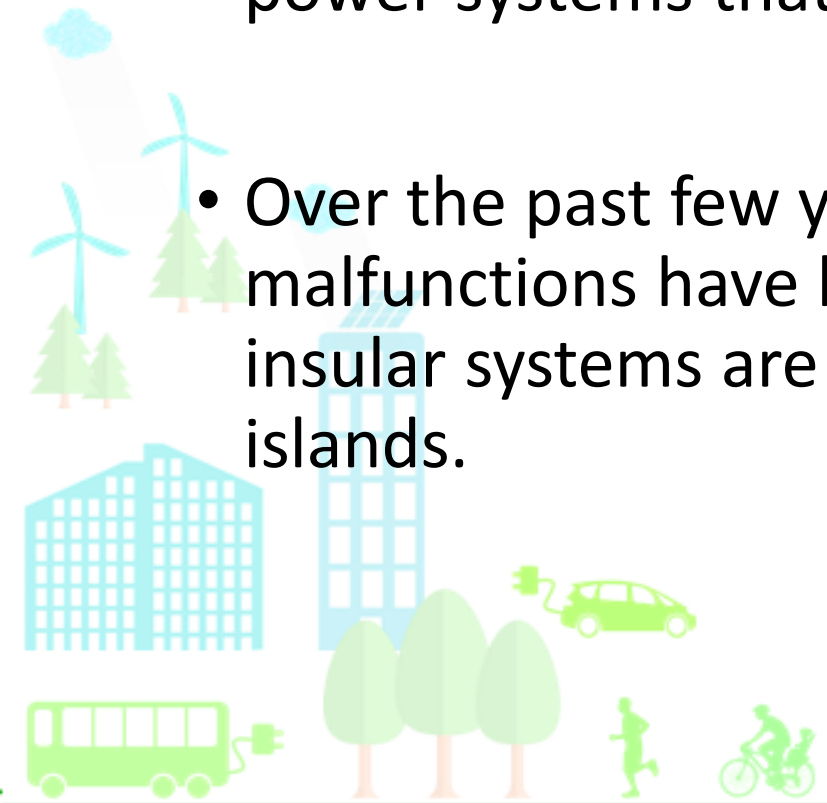
- the security of the energy supply,
- the stability of the electricity grid,
- the seasonality of the energy demands, and most importantly,
- an affordable energy supply cost,

the implementation of energy transition practices has received a lot of attention from all involved stakeholders, especially in insular energy systems. These stakeholders include academia, local and central authorities, the private sector, and local communities.

Insecurity

- Insecurities in the energy supply are frequently caused by the majority of insular territories' lack of conventional energy resources and their substantial reliance on imported fossil fuels. For isolated power systems that are not linked, this is especially crucial.

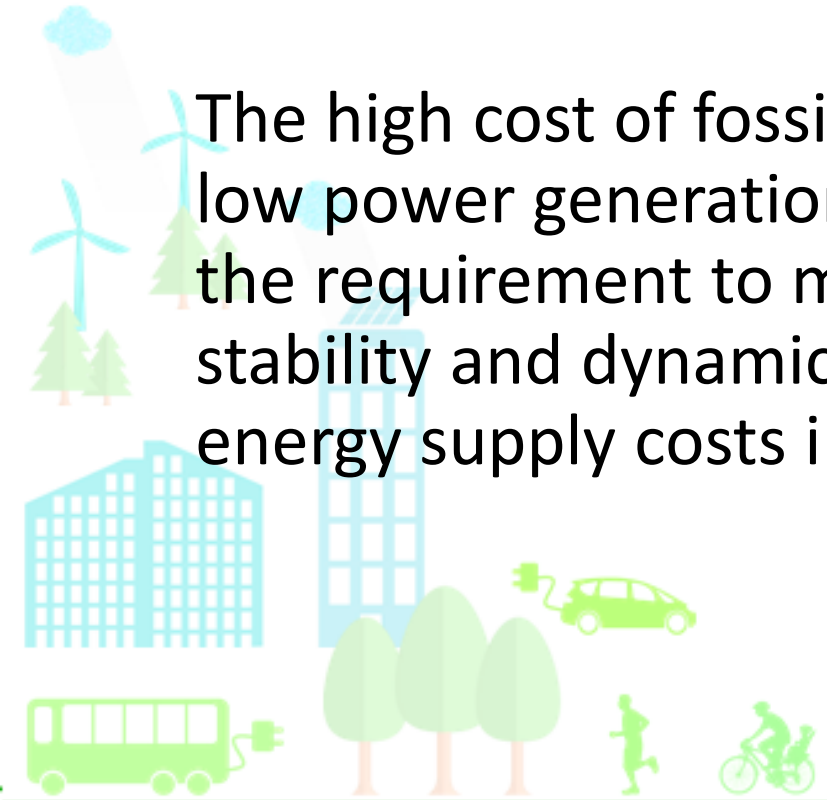
- Over the past few years, numerous interconnection cable failures or malfunctions have been documented, even in circumstances where insular systems are connected to the mainland grid or to nearby islands.



Insecurity

Dependency on imported fossil fuels has a detrimental impact on final energy production and supply prices for all final energy uses on the majority of islands worldwide, in addition to energy security concerns.

The high cost of fossil fuels and transportation, as well as the generally low power generation efficiency of thermal power plants (30–35%) and the requirement to maintain a spinning reserve to guarantee system stability and dynamic security, are the main causes of the high recorded energy supply costs in isolated systems.



Potentials

Conversely, the majority of islands worldwide are distinguished by an exceptionally elevated potential for renewable energy.

Although geothermal reservoirs, biomass, and biomass leftovers have significant potential for energy generation, wind and solar power are the most prevalent renewable sources in these locations.

Potentials

Energy transition based on multiple types of RES is promising, particularly in larger islands where major agricultural and stock farming industries are thriving.

The available RES potential is typically underutilized due to a number of factors, including:

- the lack of necessary infrastructure investments,
- the islanders' lack of awareness and indecision regarding local power production
- the limitations on direct RES penetration into the autonomous insular grids.

Limitations

In addition to the previously mentioned factors, the extensive RES-related installations of large-scale energy production projects can have a significant negative impact on the exceptional natural environment and landscapes, in addition to the excessive use of fossil fuels.

- These strategies, which are usually put out by well-known investors, frequently elicit common sense and result in significant opposition to the implementation of such RES projects.

Limitations

Multi-sectoral assessments are still inadequate since the usage of integrated energy systems must consider all pertinent industries.

Further studies are required to take all of this into consideration because the coupling of sectors means a significant rise in power consumption, and the important element of land availability also effects electricity demand and output.

All of this emphasises how difficult it is for island areas—which are made even more difficult by their nature—to lead the energy transition and accomplish the Sustainable Development Goals (SDGs), in addition to the difficulties faced by municipalities and local regions.

Metrics

Metrics to address energy transition and sustainable development, the primary drivers for climate change mitigation from a bottom-up perspective in relation to

- decarbonisation processes,
- the identification of new actors like aggregators,
- and new approaches to energy management optimisation

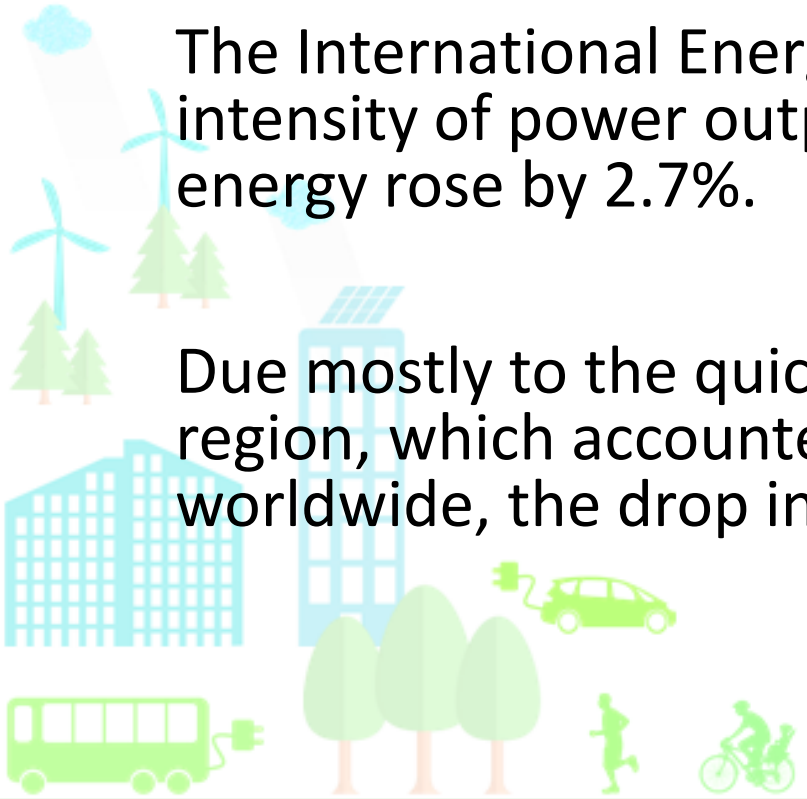
have all been studied and developed in recent years. As a result, the energy transition is now being studied from a comprehensive perspective that includes socio-environmental factors, industry, and policymakers.

Energy and sustainability for islands

The EU is putting up plans to cut emissions and tools to implement policies for climate change adaptation and mitigation in order to meet the challenge of sustainability.

The International Energy Agency reports that while the total carbon intensity of power output fell by 2.0% in 2022, the world's demand for energy rose by 2.7%.

Due mostly to the quick installation of renewable energy sources in every region, which accounted for 90% of the increase in the demand for power worldwide, the drop in carbon intensity has resumed.



Seasonality

Due to their seasonal energy cycles, tourist islands have an even larger problem in adapting to climate change.

Planning and suggesting strategies for effective energy management requires an understanding of the energy context, which is even more crucial on tourist islands where seasonal variations in energy patterns are common.

EU Support

Certain European initiatives offer a framework for islands and for enhancing living standards via sustainable means. Among these initiatives are:

- The European Commission launched the Clean Energy for EU Islands program, which serves as a focal point for the ET of EU islands.
- The island communities get information on policy and regulatory matters as well as recommendations for ET capacity building through this program and its secretariat.

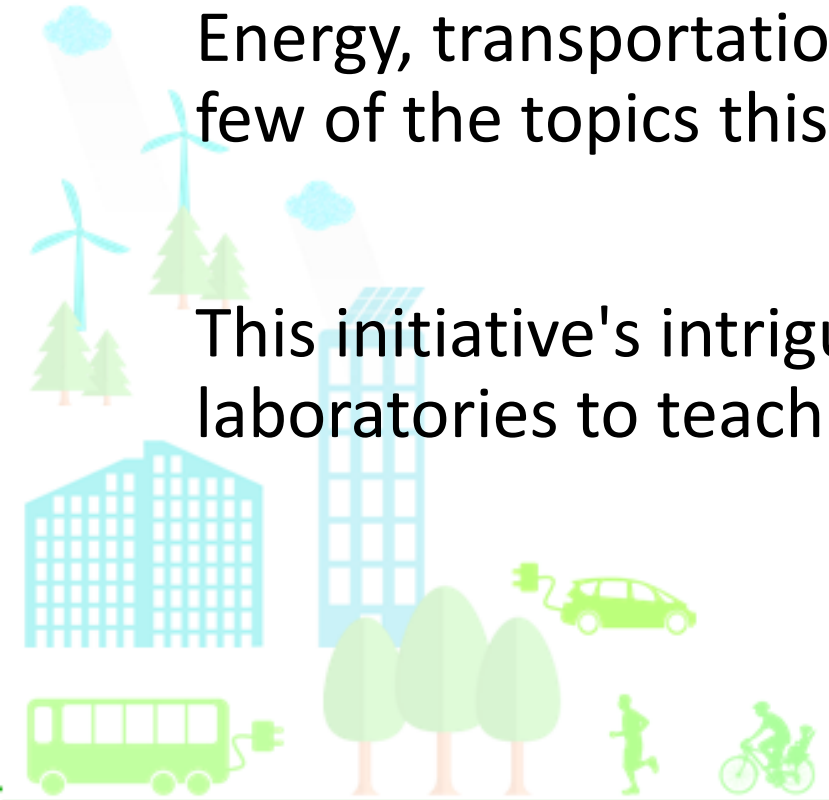
It also offers guidance on the CETA, webinars, self-assessment tools, and other recommendations.

Smart Island Initiative

By promoting sustainability and quickening the shift to energy decarbonisation, the Smart Island Initiative seeks to enhance island life.

Energy, transportation, water, trash, governance, and economics are a few of the topics this program is attempting to address.

This initiative's intriguing feature is that it uses the islands as living laboratories to teach courses and simulate situations.



Socioeconomic facets

A particular focus is being placed on solving the ET by including all individuals, not just policy officials.

To do this, sociological, economic, and political aspects must be taken into consideration in order to establish a favourable environment for the creation and approval of policies.

Various pilot island scenarios are constructed in research on island ET that concentrate on the integration of renewable energies from a technical energy planning point of view.

Other social and economic characteristics of the islands are not taken into account by the primary metrics used to compare their status, which concentrate on technical issues such energy exports, CO2 emissions, and the usage of renewable energy sources.

Perceptions and acceptance of the energy shift by residential consumers

It is crucial to take into consideration the social components of energy which are unaffected and maybe even exacerbated on islands.

Researching, comprehending, and incorporating these regional social factors and perspectives enhances acceptability, which benefits the creation and execution of energy transition policies.

Engagement and acceptance on islands

Engagement has been consistently proven to be useful to the acceptability of energy transition projects and its surrounding planning on islands

However perceptions and understandings of energy transition differ depending on the area and technologies being utilised to effect that change.

Engagement and acceptance on islands

Mixed results were found when the attitudes of inhabitants were assessed to find out how ready they were to use demand response and associated technologies.

While people exhibited significant levels of readiness to modify consumption patterns and to adopt technology that assisted their economic status and the environment, many are unfamiliar with the specific technologies and associated ideas.

It was shown that this ignorance can have a detrimental effect on the residents' acceptance, which emphasised how crucial it is to include them in order to raise awareness and understanding.

Engagement and acceptance on islands

The energy supply of isolated energy systems possesses unique difficulties.

These particular issues include:

(i) a heavy reliance on imported fossil fuels;

(ii) a more limited energy supply because there are no gas and electricity connections;

(iii) a harder time balancing supply and demand than continental energy systems;

(iv) higher energy costs than continental systems because of the use of more costly fuels and less efficient power plants; and

(v) a high degree of demand seasonality.

Engagement and acceptance on islands

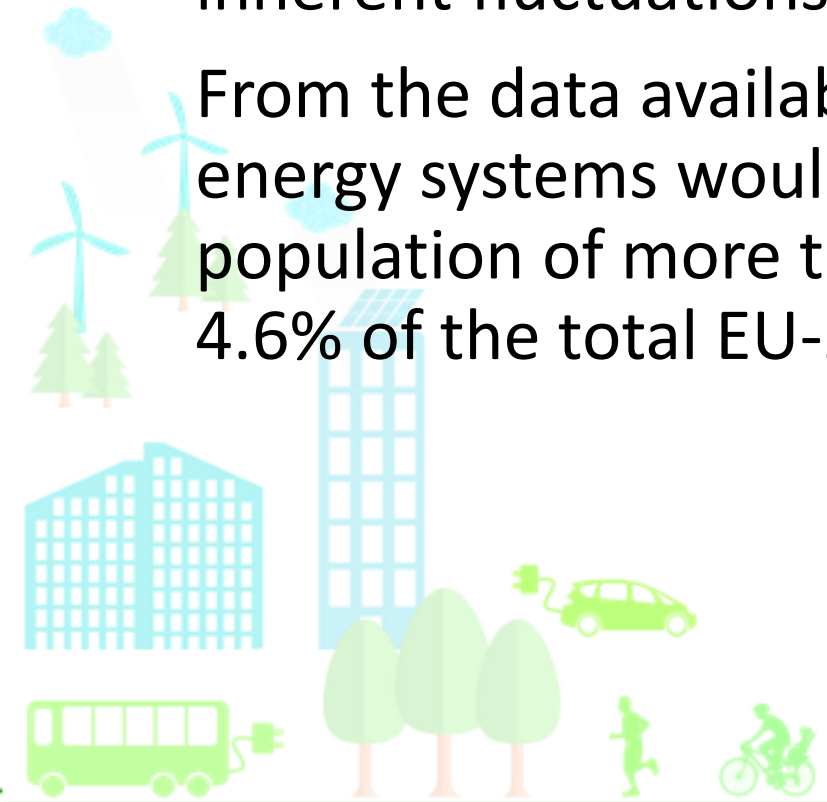
All of this means that isolated energy systems require certain actions to alleviate this condition.

In this regard, using renewable energy sources may offer a chance to ensure their energy supply, lessen the demand for energy imports, or lower the price of such energy, among other benefits.

Isolated power systems

Isolated power systems in the European Union are small systems, in which the integration of distributed generation and renewable energy resources must be carefully balanced and controlled due to their inherent fluctuations.

From the data available so far, it can be estimated that these isolated energy systems would supply, in the European Union alone, a total population of more than 20,500,000 inhabitants, which represents 4.6% of the total EU-27 population.



Isolated power systems

In the European Union, isolated power systems are minute systems, and because of their inherent volatility, the integration of dispersed generation and renewable energy resources needs to be carefully balanced and monitored.

Based on the information that is currently available, it can be calculated that these isolated energy systems would provide for almost 20,500,000 people in the European Union alone, or 4.6% of the EU-27 population.

Isolated power systems

Due to their lack of interconnectivity, these isolated energy systems are

- more fragile and
- less efficient

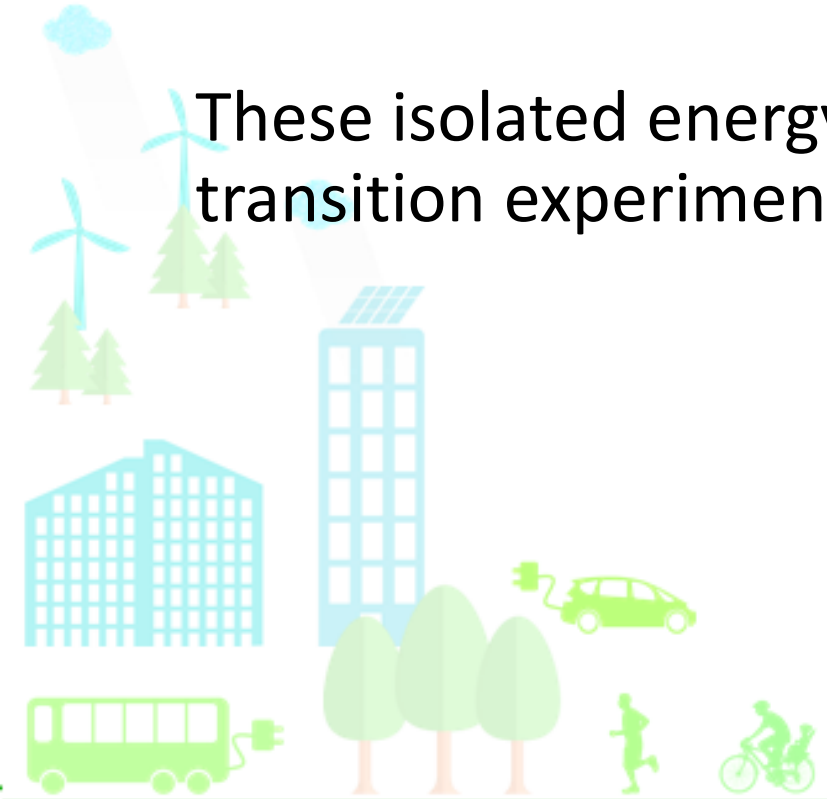
than continental energy systems, and the great majority of them rely on fossil fuels.

- Fuel price volatility and seasonal variations in energy consumption should be included to this, as they introduce further complexity.

Isolated power systems

In this way, employing local renewable energy resources would be more financially feasible due to the high cost of imported oil in small island power systems.

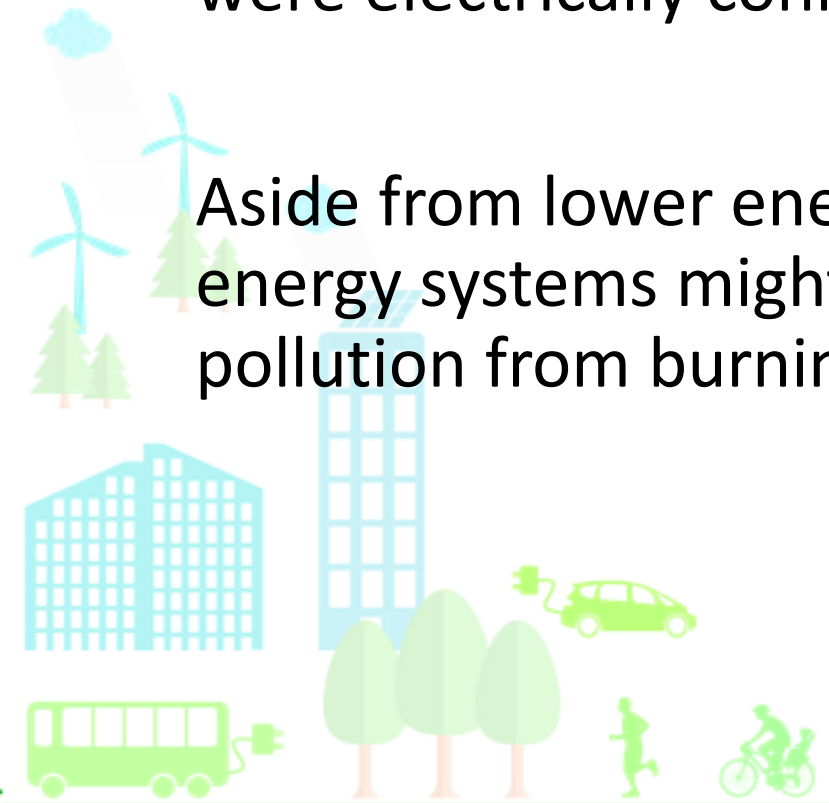
These isolated energy systems are crucial components for the energy transition experiments as a result of the aforementioned.



Concluding remark

There would be several social and economic advantages for the European Union's islands if local energy resources of renewable origin (such solar, wind, or geothermal energy) were used and remote areas were electrically connected.

Aside from lower energy prices, switching to renewables in isolated energy systems might boost eco-friendly travel, reduce air and water pollution from burning fossil fuels, and generate new jobs.



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