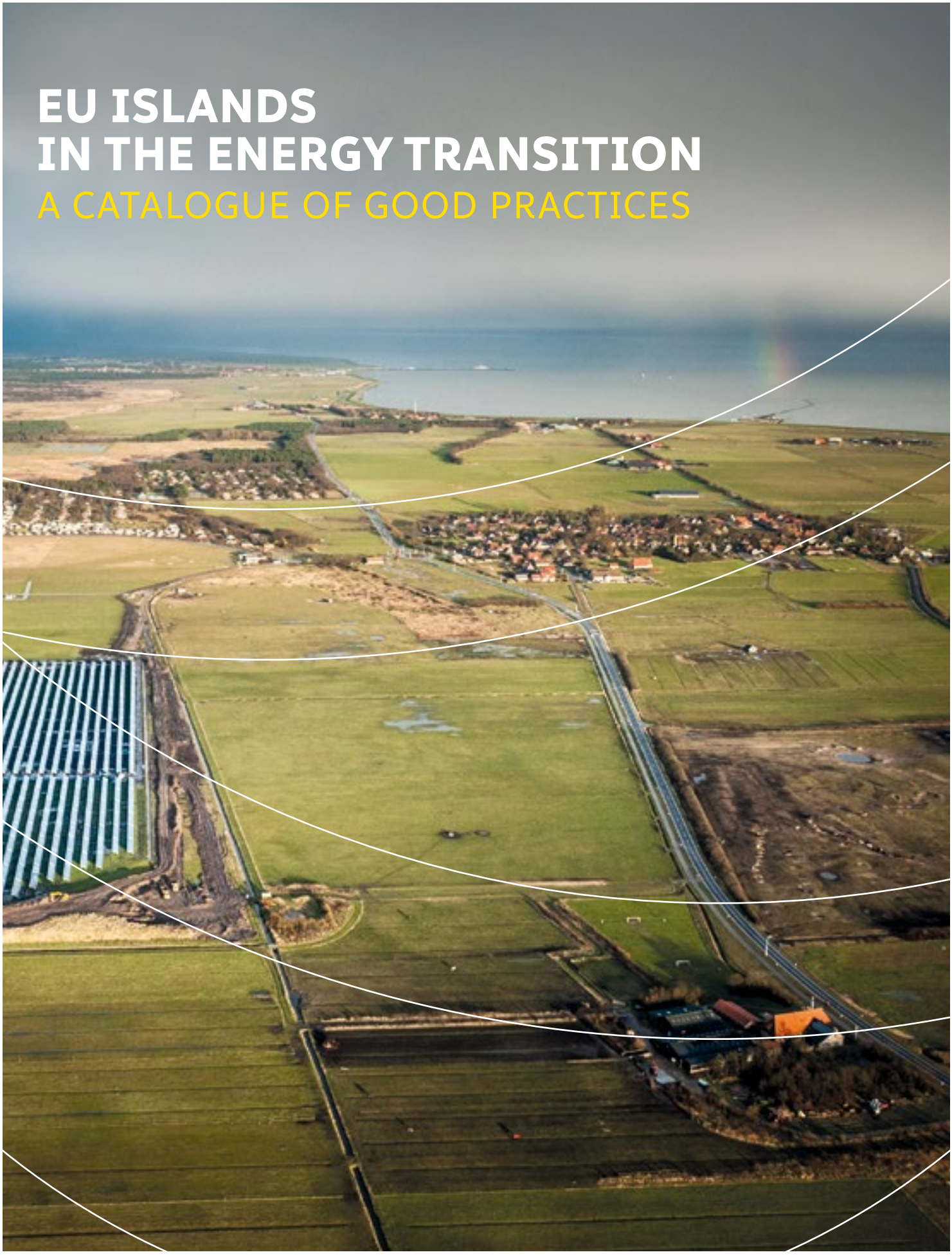
CLEAN ENERGY
FOR EU ISLANDS

EU ISLANDS IN THE ENERGY TRANSITION

A CATALOGUE OF GOOD PRACTICES



Introduction

Islands across the EU have been pioneering the energy transition for more than 20 years, and are today providing an impressive range of inspiring projects for other islands as well as for mainland communities.

While some islands have been able to develop their knowledge over decades, some islands are only just starting their process. To help these islands on their journey, the Clean Energy for EU Islands Secretariat has selected a number of inspiring examples to learn from.

Despite their common features, EU islands vary greatly when it comes to electricity grids, geographic specificities, local population, tourism and other aspects, all of which affect the stability of the energy grid and create energy planning challenges.

The new Clean Energy Package puts citizens at the core of the energy transition, which is particularly interesting to island communities. It allows them to take their fate into their own hands, and work with all relevant stakeholders to accelerate the transition process.

We hope the examples provided in this document will provide you with inspiration for the clean energy transition in your own island community!

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A CATALOGUE OF GOOD PRACTICES

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+32 2 400 10 67 • info@euislands.eu • euislands.eu
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Ameland The Netherlands

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SIZE: *268.50 km²*
POPULATION: *3,683 inhabitants*
TOURISM: *550,000 – 600,000 visitors per year*
INTERCONNECTION: *Submarine power cable (7.4 MW)*
LOCAL AUTHORITY: *Municipality*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

In 2015, Ameland installed the ***biggest solar park in the Netherlands at the time****. The 23,000 solar panels, which are connected to the island's electricity grid, cover a ten-hectare piece of land and produce enough energy to cover the needs of 1,500 households per year (approximately 5.6 mio. kWh, i.e. 20% of the island's total electricity demand). The remaining 80% of demand comes from local businesses. The island has more than 40 fuel cells of 2 kW each that serve as back-up and produce electricity from natural gas. Two holiday parks with a swimming pool are equipped with a small gas-fired cogeneration system, the Nature Center uses a gas heat pump, and more than 100 households have heat pumps. A number of residents are now adding hydrogen to their gas heating, and all of the street lights use energy-efficient LED technology.*

How the transition started

The most important part of the transition are the residents of Ameland, who play an important role in the development of a vision for the future. *The municipality organised public meetings and included the local cooperative in the development of the island's energy plan and different projects. In June 2017 residents, energy companies and the network manager agreed to co-develop an innovative energy system, which should make the island sustainable and self-sufficient. The transition team includes the municipality, the local cooperative (with over 300 members), the private sector (Eneco & GasTerra), academia (Hanze University of Applied Sciences Groningen) and more.*

In 2013, the municipality decided to turn the island's high school into an energy neutral building. *The building has a thermal shell with windows with triple glazing. It uses a balanced ventilation system with CO_2 control to ensure clean air for the children in the school. Due to these measures, the required heating capacity has been reduced by 65%. The roof of the adjacent sports hall is covered with PV panels (total capacity of 75 kW), which covers the school's energy needs. Furthermore,* ***the island's public transport system is completely electrified since 2018****.*

The future of energy transition

Full self-sufficiency will be possible only by an integral approach that puts the needs of residents first. *The plan developed by the community concluded that different technologies need to be combined into a holistic and sustainable energy system. Considerations for making the island energy independent include heat pumps or the use of district heating. The preparation phase of a sewage digester project which will produce the biogas has started and is expected to be finalized in 2023. Hydrogen will be produced from a new solar park connected to a large-scale battery. Ameland further plans to completely switch to electric and hybrid vehicles.,*

More information: ***Ameland Project Report****,*
Ameland energy cooperative

Aran Islands Ireland

© PIXABAY_SKTLLOYD3

SIZE: *46 km²*
POPULATION: *1,300 inhabitants*
TOURISM: *400.000 visitors per year*
INTERCONNECTION:
3 MW sub-sea cable from the mainland
LOCAL AUTHORITY: *Galway County Council*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

The Aran Islands were entirely dependent on diesel generators until their connection to the mainland in the late nineties. In 2016 however, the cable to the mainland was cut, leading to a general power outage in the archipelago. It took several days before temporary generators were brought in, and two months before the cable was reconnected. This event significantly impacted the local economy and everyday life on the islands, and showed the importance of having a stable and resilient electricity system, which is now a priority for the local community. The communities of Árainn and Inis Meáin collectively pay over € 300,000 for their electricity consumption, and € 1 mio. on heating fuels annually. In 2017, transport to and from the island made up 62 % of the islands' total energy consumption, followed by heating (24 %) and transport on the island (8 %). Electricity consumption only accounts for 6 %. More than 75 % of the households use fossil fuels (gas oil, coal and peat) for heating.

How the transition started

The Aran Islands have a history of wind power. In 2002, three 225 kW turbines were installed on Inis Meáin, which covered almost 40 % of the three islands' annual electricity consumption. In 2011, these turbines were decommissioned. As part of the Sustainable Energy Authority of Ireland's Sustainable Energy Communities network, ***the Aran Islands Energy Cooperative commissioned an expert to establish an energy master plan*** *for Árainn and Inis Meáin in 2012. This plan gives an overview of the major energy sources per fuel type, and identifies the most effective solutions for reducing the islands' CO_2 emissions.*

The third island, Inis Oírr, is currently developing its own plan. Since 2012, the cooperative has ***engaged with different stakeholders to improve energy efficiency in homes, public buildings and businesses on the islands****. Islanders received grants from the* ***Sustainable Energy Authority of Ireland*** *to improve comfort and reduce their energy use. An e-mobility project tested 10 electric vehicles on the islands, which encouraged islanders to buy 12 more privately owned electric vehicles and approximately 12 electric bikes.*

The future of energy transition

The Aran Islands were selected as a pilot island by the EU Islands Secretariat in 2019 to develop an island-wide ***transition agenda*** *which involves all relevant stakeholders on the island. The local transition team is aware that* ***to reach the islands' transition goals, the active contribution and consideration of the needs of all island stakeholders will be key****. The Energy Master Plan indicates that in the medium term, wind and solar power have the highest potential to cover local energy demand on the island whilst reaching their decarbonisation goals. To ensure resilience of the grid, the energy cooperative is involved in projects that deploy* ***smart micro grids and battery storage. Wind power has been one of the energy cooperative's priorities, with strong focus on community ownership****, as well as increasing energy efficiency in buildings on the islands. Engaging local ferry companies and the local authority in the transition process will be crucial to achieving the Aran Islands' goals.*

More information: ***Aran Islands Energy Cooperative***

Azores Portugal

© PIXABAY_CSGMACHADO

SIZE: *2,333 km² (archipelago of nine islands)*
POPULATION: *247,400 inhabitants*
TOURISM *800,000 annual visitors*
INTERCONNECTION: *No*
LOCAL AUTHORITY: *19 municipalities*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

The Autonomous Region of the Azores has nine independent electricity producing systems (one per island). Due to the depth of the sea and the diversity of the island area, options for inter-connection are limited. Their energy system today is largely dependent on imported fuels for diesel generators, transport and heating. Electricity accounts for 40% of primary energy use, transport for 47%, and industry for 6%. The archipelago has great renewable energy potential, which has been increasingly deployed in recent years. Currently, renewable energy constitutes 12% of primary energy supply, mainly from geothermal (22%), followed by hydro (4%) and wind (2%).

How the transition started

The largest renewables capacity installed in the entire region is on the archipelago's largest island São Miguel, where 50% of energy is produced from renewable sources. ***The small island of Flores produces 54% of its electricity from renewable energy (hydro and wind) on average, with peak production reaching 100%.*** *Sustainable development has always been a primary goal in the Azores, with one of the landmark actions occurring in 2010 with the Azores Green Islands project together with Massachusetts Institute of Technology (MIT), which provided an important diagnosis and primary objectives. Meanwhile, a* ***GHG emissions inventory*** *was completed through the Azorean Regional Program for Climate Change.*

The future of energy transition

In order to be able to install more renewables capacity, the Azores will need to build ***storage solutions*** *into their grid. The new Graciosa Hybrid Renewable Power Plant with its integrated 6 MW/3.2 MWh energy storage management system will soon be able to supply 1 MW of solar and 4.5 MW of wind power to the local electricity grid, reducing the island's reliance on imported fossil fuels and significantly cutting down on greenhouse gas emissions.*
The archipelago is currently further developing the ***2030 Azorean Energy Strategy****, which is currently undergoing final preparations with the consultation of relevant island stakeholders – representatives of Azores Regional Government, Chamber of Commerce and Industry, academia, citizen organizations, energy auditors, the islands' energy utility, and equipment producers. The strategy will take into consideration the differing needs of the nine islands, and ensure alignment of its goals with the policies of the Autonomous Region of the Azores, Portugal and the European Union. The Azores' strategy considers the following themes: energy efficiency in buildings, transport and industry (providing sector-focused incentives), transport electrification, development of integrated plan for energy saving; solar parks for electricity production (adapted to each island's landscape and infrastructure).*
The main goals of the Azores' energy transition are energy digitalization, social innovation (energy communities), industrial innovation and waste management.

More information: ***Global Islands****,*
European Commission

Gigha UK

© THE SCOTTISH ISLANDS FEDERATION

SIZE: *13.95 km²*
POPULATION: *160 inhabitants*
TOURISM *10,000 visitors per year*
INTERCONNECTION:
Connected via submarine power cable
LOCAL AUTHORITY: *Argyll and Bute Council*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

Gigha is connected to the mainland grid via a subsea cable. 52% of the island's electricity is consumed by industry on the island (Halibut fish farm, water company), 40% by households, and 8% by the public and business sectors. In 2016, electricity constituted 54% of the island's energy demand, complemented by a mix of locally produced wood and imported fossil fuels. ***Four on-site wind turbines with an overall capacity of approx. 1MW allow the island to export clean electricity.*** *One of the main sources of CO_2 emissions on Gigha is the heating sector.*

How the transition started

During the 20th century the island was changing various private landlords and this way of ownership have been stopped in 2002 when the islanders managed, with help from grants and loans from the National Lottery and Highlands and Islands Enterprise, to purchase the island for £4 million. The island is now in the ownership of a development trust called the Isle of Gigha Heritage Trust, which is owned partly by citizens. Since its takeover, the Trust has installed 3 wind turbines on the island known as 'Dancing Ladies' - ***the first community owned, grid connected wind farm in Scotland****. It has been a mainstay of income generation since its installation in 2003, and were paid off within six years. Profit generated by the turbines is passed to the trust which used it for performing housing upgrades and wind turbine maintenance. In 2014, another wind turbine was installed to complement the existing wind farm. The four wind turbines are today a* ***net exporter of electricity and a source of sustainable income generation****.*

Currently, there is a limit to energy export of 1MW, which is preventing the Gigha from fully utilizing its renewable potential. Power that is generated on the island is distributed to consumers on the island, and transmitted to the mainland grid via a subsea cable. Due to regular faults and power cuts in the cable, the islanders suffer power blackouts even when the onsite wind turbines are operating. A comparative study of different scenarios was done to choose the optimum combination of renewables and energy storage device(s) for meeting electricity demands in a low-carbon, cost effective and reliable way, using a software package called HOMER. It estimates the performance of onsite wind turbines and PV panels using local climate data and calculates the lifetime of storage systems using its charge-discharge cycles.

The future of energy transition

Gigha is progressing towards a greener, more sustainable future with an interest in energy autonomy. The Trust fund is planning to replace the existing wind turbines in the next 10 years, and to replace the kerosene and natural gas used in households and the commercial sector with locally produced biomethanol (from livestock farms, dairy farms and food waste). The implementation however will require further consideration and interaction with the local community. Based on a study, other ***possibilities include the installation of solar panels and micro wind turbines, as well as solar water heating systems****. The project was inspired by the Scottish Climate Change Act and the Scottish Energy Strategy.*

More information: ***Grid optimisation of Isle of Gigha****,* ***Isle of Gigha Energy Audit***

Gotland Sweden

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SIZE: *3,184 km²*
POPULATION: *58,595 inhabitants*
TOURISM *1,950,000 passengers per year, 870,000 guest nights per year*
INTERCONNECTION:
Connected via submarine power cable
LOCAL AUTHORITY: *Gotland Municipality*
ENERGY TRANSITION STATUS: *Very advanced*

The Energy Management System

The annual electricity consumption on Gotland is just below 1,000 GWh. Industry is the largest user of electricity with a share of about 40 % of the overall consumption. Gotland has 143 wind turbines with a total installed capacity of 182 MW, which provide around half of the island's annual electricity demand. Apart from wind energy, there's 7 MW of installed solar power and a small share of hydropower. Gotland has a high proportion of RES electricity generation and had managed to maintain the quality and reliability of the electricity system. ***One major challenge however is keeping the right balance between the generated electricity and its demand.*** *Today, Gotland is not synchronously connected to the Swedish national grid, it is connected to the mainland with two DC connections. The current DC cables were built in the 1980's to import electricity into Gotland, and the idea was that one cable would serve as a reserve for the other.*

How the transition started

In the early 1990's, the municipality started the strategic push to turn the island into a sustainable society by 2025. From the beginning, both the municipality as well as later on the Swedish Energy Agency, put great ***emphasis on getting a comprehensive picture of the conditions that exist on the island and the potential to establish a sustainable energy system****. The way to get this overall picture has been to rely on and talk to local stakeholders including public bodies, local businesses, NGO's and citizens. Sustainability on Gotland covers all aspects of the environment including energy, resources, agriculture, waste, radiation but also climate neutrality.*

The transition programme that was made spearheaded the use of ***biofuels from local forestry for heating, renewable energy sources for electricity supply and sustainable transportation****.*

The future of energy transition

Gotland was chosen by the Swedish government as a pilot region for Sweden's future energy system. The transition will require new technical solutions and business models as well as regulatory measures allowing implementation of the technical developments. ***Collaboration between local authorities, citizens, universities and other stakeholders is crucial in this process.*** *Gotland is in the process of researching the best ways to make the better use of the existing grid. The Gotland Region is one of the partners in Horizon 2020 CoordiNet which aims to research innovative network services for the TSO-DSO through* ***demand response, storage and small-scale distributed generation****. As the construction of further wind turbines would have negative impacts on local eagles' habitats, the island is considering new solutions for the future, including but not limited to* ***solar power and small-scale storage capacities****. Gotland is currently further deploying a unique test of* ***dynamic vehicle charging****:* ***Smart Road Gotland****.*

More information: ***Gotland Region***

Krk Croatia

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SIZE: *405.78 km²*
POPULATION: *19,286 inhabitants*
TOURISM *797,849 visitors, 4,681,264 overnight stays*
INTERCONNECTION:
Connected via submarine power cable
LOCAL AUTHORITY: *7 municipalities*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

The island of Krk is connected to the mainland by a submarine power cable. Households account for 78.24% of its total electricity consumption, public and business buildings for 18.56%. Electricity constitutes 42% of Krk's energy consumption, complemented by wood (21%) and fuel oil (32%). Electricity is currently the island's primary energy source for water heating, which is inefficient and expensive.

How the transition started

In 2012, the island published its decarbonisation strategy ***"Krk 0% CO_2 emissions"*** *with the aim of becoming the first CO_2 neutral and energy self-sufficient island in the Mediterranean. A feasibility study on the installation of an* ***anaerobic digestion plant for biogenic waste*** *was produced by a consultancy company. The plant will be financed through public private partnerships and the local energy cooperative. A catalogue of the roofs was further created to investigate the solar PV production potential of the island's roofs, and Krk carried out a study for development of wind mills and unintegrated solar power plants. The implementation of* ***LED technologies reduced electricity consumption from 1.02 mio. kWh in 2010 to just 734,864 kWh in 2018****.*
As 53% of Krk's CO_2 emissions come from transportation, the island installed ***12 chargers for 24 electric vehicles and 8 chargers for 80 e-bikes****, the latter being part of a bike-sharing system. Krk has an energy cooperative since 2012, and the municipalities recently established two companies to manage the energy transition; Island Krk Energy will coordinate the energy transition process, and Smart Island Krk will focus on smart processes and the digitalization of the island's activities. Island Krk Energy has further developed a* ***5 MW solar power plant****, offering co-ownership to local people and businesses.*

The future of energy transition

In 2018, the local authorities on Krk adopted the updated version of their "Zero Emission Development Strategy", pushing for the integrated and sustainable development of the island that goes far beyond in the context of energy. It introduces a ***long-term socio-economic development plan for the island****, with special focus on energy savings through increasing energy efficiency and the share of renewable energy sources (wind, sun and biogas). The strategy foresees about 36.8 MWp of new photovoltaic installations on the roofs over the next twenty years, 4 MWp of photovoltaic installations on the ground, 25.2 MW of wind power and 250 KWel in biogas plants.*
This € 89.65 mio. investment is expected to make Krk energy-independent. The island further plans to establish an education center which will provide information on renewable energy sources, energy efficiency, buildings, electric and efficient transport, water saving and waste separation, and will serve as a ***National knowledge hub for the energy transition****.*

More information: ***Krk Energy Cooperative***

Menorca Spain

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SIZE: *702 km²*
POPULATION: *91.601 inhabitants*
TOURISM *1.440.897 visitors per year (2018)*
INTERCONNECTION:
Connected via submarine power cable
LOCAL AUTHORITY: *Consell de Menorca and 8 municipalities*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

Only 1% of all energy consumed in Menorca is produced on the island, while 99 % of the island's primary energy is imported (mostly oil). The local thermal power station accounts for half of Menorca's oil demand.
This ***dependency on fossil fuels costs the island more than € 200 million per year****. Final energy consumption in Menorca can be divided into three almost equal parts: the residential and service sectors combined, land transport, and all other sectors combined. The island's energy system is currently centralised,* ***highly inefficient (around 70 % of primary energy is wasted)*** *and has a negative environmental impact.*

How the transition started

Coordinated by the Insular Council of Menorca, the Menorca 2030 Strategy was ***co-created*** *with the support of the national, autonomous and local administrations, as well as* ***key socio-economic actors actively involved in the process from the beginning****. The strategy sets out the principles and priorities on energy matters, the steps to be taken and timelines to be followed, governance, support and financing, and constitutes a guide for decision-making in the public and private sectors.*
A first step and determining factor for the establishment of the Menorca 2030 Strategy was a detailed diagnosis of the island's energy situation, emissions produced by the island, and the economic balance of the insular energy system. This process, initiated at the end of 2016 within the framework of Strategic Guidelines for Menorca and coordinated by the Institut Menorquí d'Estudi, built on the sustainability indicators that the Social and Environmental Observatory of Menorca (OBSAM) has been using for more than 20 years to follow the evolution of the Menorca Biosphere Reserve. ***The high level of awareness and concern for the environment, the collection of data, and the leadership of the island council*** *with the financial and political support from the regional government for some activities* ***were instrumental in kick-starting Menorca's energy transition****.*

The future of energy transition

The island plans to increase its share of renewable generation for electrical consumption to 85 % by 2030, reduce fossil fuel consumption by 50 % for transport, and by 30 % for services, industrial and residential buildings. *Key actions identified to achieve this objective include the expansion and reconversion of the Milà area (currently dedicated to waste treatment), which will create a public area of renewable generation through wind, photovoltaic and biogas hybridization. The plan further includes a commitment to* ***promote photovoltaic self-consumption and the installation of renewables in urban areas****; the establishment of* ***local energy markets****; the introduction of* ***smart grids and storage technologies****, and the commitment to energy efficiency in buildings particularly the public sector and through synergies with the private sector (especially in business parks), as well as the tourism infrastructure. Another key element is terrestrial mobility, for which the Strategy proposes an innovative integration of electric vehicles on the island, together with a holistic approach to the reformulation of mobility on an island scale.*

The Menorca 2030 strategy and other relevant documents are available at ***www.cime.es***

Pantelleria Italy

© ILOVEPANTELLERIA.NET

SIZE: *84.53 km²*
POPULATION: *7,759 inhabitants*
TOURISM *55,980 visitors per year*
INTERCONNECTION: *Not connected to the mainland*
LOCAL AUTHORITY: *Municipality of Pantelleria*
ENERGY TRANSITION STATUS: *Starting*

The Energy Management System

Pantelleria is located in the middle of the Strait of Sicily (Mediterranean Sea), 65 km off the coasts of Tunisia. Not connected to the national grid, the island's electricity is produced locally through a 22 MW diesel power plant. Its annual diesel consumption for electricity production is around 9,300 tons. This way of electricity production on small islands ensures high flexibility, but it implies an extremely high environmental and economic impact. The island residents pay 25% more on final consumption of fossil fuels than mainland residents, but they pay the same price on electricity thanks to a public equalizing system (even though producing electricity is more expensive on Pantelleria). The electricity consumption per capita is over 30% higher than the national average (1,500 kWh against 1,200 kWh) mainly due to electric heating, electric boilers, desalination power demand – and electricity demand is growing faster than on the mainland due to increasing tourist presence.

How the transition started

Pantelleria signed the Pact of Islands and Covenant of Mayors, committing the municipality to develop a plan for reducing CO_2 emissions. The island plans to ***increase energy efficiency measures and promote renewable energy production*** *(****mainly sun, wave and wind****), which are abundant on the island. 80% of Pantelleria's surface is a National Park, which makes the energy transition process more challenging: the transition of Pantelleria's energy system therefore puts special attention to environmental aspects. The Municipality received a funding from the Italian Environment Ministry for the installation of a* ***large photovoltaic system on the roof of a warehouse****, and for the* ***electrification of a local public transport bus line****. The Municipality is further developing efficiency measures for public buildings.*

The future of energy transition

The National Park institution has applied for further funding to ***complete the electrification of the local public transport system****; including a large roof PV system which will cover 100% of the electric bus consumption per year. The local electricity producer and DSO SMEDE Pantelleria started an ambitious plan to* ***renew the electricity grid*** *and has begun installing a large PV plant, which will reach an overall capacity of approx. 2 MW upon completion. Finally, Pantelleria had a full-scale Inertial* ***Sea Wave Energy Converter prototype*** *installed in 2015 as part of a pilot project with the Polytechnical University of Turin, which is expected to be transformed into a wave farm off Pantelleria in the next few years. In 2019 several different energy scenarios have been presented to local authorities and citizens – including electricity production from renewables, energy efficiency in buildings and public lighting, solar thermal and heat pumps for hot water production in civil structures, and transport electrification.* ***The participatory process to determine the community's priorities will be completed in early 2020.*** *The local authority is further trying to convince the regional government change a law which currently limits the installation capacity of wind turbines to 20 kW.*

More information: ***Politecnico di Torino****,*
Commune di Pantelleria*,* ***SMEDE Pantelleria****,*
Parco Nazionale Isola di Pantelleria

Samsø Denmark

© VISITSAMSOE.DK

SIZE: *112 km²*
POPULATION: *3,724 inhabitants (2017)*
TOURISM *400,000 visitors per year*
INTERCONNECTION: *Subsea cable to the mainland*
LOCAL AUTHORITY: *Municipality of Samsø*
ENERGY TRANSITION STATUS: *Very advanced*

The Energy Management System

Located 15 kilometers off the Jutland Peninsula in Denmark in the Kattegat Sea, a unique island and its community of 4,000 inhabitants have been pioneers of the island clean energy transition for more than 20 years. Thanks to the common vision and hard work of the local community, the island of Samsø can take pride in its unique title as Denmark's Renewable Energy Island. ***Since 2007, Samsø produces more energy than it uses****, coming from 11 onshore and 10 offshore wind turbines, and supplemented with biomass and solar facilities for heating.* ***Four district heating systems*** *supply 75% of the houses with heating and hot water. Part of the houses outside of the heating districts have replaced old oil furnaces with* ***biomass boilers and solar or heat pumps*** *of their own.*

How the transition started

The willingness to take risks, push local investments and ***build trust among the local community*** *were the main ingredients of Samsø's groundbreaking success. From the very beginning, people on the island were able to shape their own future.* ***Continuous dialogue and attention to people's concerns*** *helped resolve doubts and opposition at several stages in the transition process, with the result that today, the people of Samsø are proud of what they have achieved together.*

The abovementioned installations required an overall investment of approximately € 60 million. The financing model is a combination of private owners, investor groups, the municipal government, local cooperatives and individual residents. ***An unusual aspect of Samsø's energy market is that more than 50% of the wind turbines are locally owned.***
The process was managed by the Samsø Energy Academy, which has since become an institution for energy transition knowledge and solutions around the world.

The future of energy transition

What started with a dream in 1997 had already become a reality by 2007 – but the local community wanted to push the envelope even further. ***Samsø's vision is to be fully independent of fossil fuels by 2030.*** *This will include switching all transportation means to electricity or biogas (the local community recently established their own electric cars' union), establishing a multi-functional biogas plant to produce biogas for transportation, and lowering the need for heating in homes.*

More information: ***Samso Energy Vision 2030****,*
Samso Energy Academy website

Tilos Greece

© GREECE-IS.COM

SIZE: *61,49 km²*
POPULATION: *500 inhabitants*
TOURISM *13,000 visitors per year (four times the actual population during the summer peak)*
INTERCONNECTION: *Connected via submarine power cable with Kos via Nisyros; Tilos last in line*
LOCAL AUTHORITY: *Municipality of Tilos*
ENERGY TRANSITION STATUS: *Advanced*

The Energy Management System

Tilos is a small island in the Aegean Sea. The island's peak demand is close to 1MW while the annual electricity consumption exceeds 3GWh. Until recently, its electricity needs were covered through oil-based power generation, supplied through an 80 km submarine power cable running from the island of Kos via Nisiros on to Tilos. Currently however, the largest share of the island's electricity supply is covered by local renewables through the ***first-ever, fully-licensed battery-based hybrid power station in Greece****, which is owned by EUNICE ENERGY GROUP. The station includes wind (800 kW wind turbine), solar (medium scale PV park of 160 kWp), and* ***an integrated battery storage system*** *of 2.88 MWh/800 kW (with $NaNiCl_2$ batteries), which will be able to support clean energy exports to the island of Kos.*
A large number of local households, commercial stores and public buildings, as well as 8 community-level water pumping stations, are equipped with ***smart meters and demand side management panels****. This interfaced to a Centralized Energy Management Centre together with a back-up diesel generator set, further increasing the flexibility and supply of security of the island. Tilos is equipped with* ***EV-charging infrastructure*** *which can support the charging needs of at least 4 EVs on an annual basis.*

How the transition started

Tilos is known for its strong community spirit and devotion to the environment. As part of the four-year ***TILOS Horizon 2020*** *project, the community turned the island into an* ***energy blueprint for European island regions*** *from 2015-2019. The objective of the project was to switch from the expensive oil-based power supply to* ***high shares of locally produced renewable energy****, as well as demonstrate the interoperability and advanced energy management aspects of a* ***microgrid that relies on wind power, solar power, battery storage and demand response****.*

The future of energy transition

The local community and Municipality have expressed their motivation to undertake a deeper energy transition of Tilos. This includes ***growing clean electromobility*** *throughout the local transport sector (starting with the municipality's car fleet),* ***gradual development of a prosumers' pool*** *on the island (including residential-level PV-battery systems),* ***deeper automation and flexibility of the local electricity distribution grid*** *in order to increase robustness and resilience, while further improving supply of security aspects. The* ***creation of an Energy Academy*** *will foster an academic environment on the island, attracting energy experts and students across the globe. In the future, Tilos aims to* ***integrate the energy and water uses and networks in a fully interoperable system*** *that will allow global optimization of the two sectors.*

More information: ***Municipality of Tilos****,*
Tilos Horizon 2020