



Digital Transformation: Enhancing IoT-driven Solutions for Smart Islands

Smart islands infrastructure framework and KPIs

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Smart Islands

walkability
cycling demand response
deep renovation **renewables** crowd-funding
car sharing low-carbon transport climate mitigation resource efficiency
electric vehicles rain-water harvesting **sustainable tourism** social inclusion climate protection
energy storage **waste2energy** participatory planning **innovation jobs creation** innovative entrepreneurship
smart grids marine technologies **multi-level governance** ecosystems approach **circular economy life quality**
ecosystem approach grey-water recycling smart sensing **living labs** climate adaptation **local ownership** sharing economy
vehicle2grid alternative fuels **prosumers** landscape protection start-ups sustainable agriculture
cold ironing **micro-grids test-beds**
renewable desalination resilience
ICT reuse

It all started with an island network

The Scottish Islands Federation started as a local authority funded network in 2000. Its mission was to assist island organisations to express their points of views, share their experiences and make better representations at local, regional, national and European level on all issues affecting the sustainability of Scottish islands.

Getting together with other island organisations in the EU

In May 2001, the **European Small Islands Network** – ESIN – was set up to bring together Danish, Finnish, French, Irish, Scottish and Swedish small islands. In 2005, ESIN formalised the network and became a Federation.

ESIN now has 11 members, with Estonia, Greece, Italy, Croatia and the Aaland islands joining in. Once a year, members get together for the ESIN AGM, alternating between Brussels and an island host. ESIN is now working closely with other representative organisations: the CPMR's Island Commission and FEDARENE's Island College.

Recognizing islands' specific situation

The islands worked together to get their national and local governments take into account Article 174 of the Lisbon Treaty in their policy making; Article 174 acknowledges the islands ' permanent geographical constraints and asks for specific measures to mitigate these.

ESIN's INTERREG 111C funded project – 'Meeting the Challenges of Small Islands' – aimed to make decision makers understand the smaller islands challenges. Many Scottish Islanders and island organisations took part in this exchange, which looked at a wide variety of themes pertinent to island life, enabling islanders from 6 European countries to share their experiences of sustainable development.

Concluding with a final conference on Islay in November 2006, the exchange results were disseminated to help influence national and EU policies in favour of small islands. You can read the project report [here](#).

Turning challenges into opportunities

The exchanges showed how the islands' geographical isolation can also lead to opportunities:

- They come up with innovative solutions and community-led initiatives to ensure their island remain vibrant and strong.
- They are especially suited to the demonstration of sustainable and integrated solutions, especially regarding waste, the environment, energy, transport, baseline services and cultural products.
- They act as guardians of their natural and cultural environment, preserving the common heritage of their country as well as Europe.

To take advantage of these opportunities, islands need to develop in a way that allows their population to remain sustainable, enabling islanders to live and work on their island as well as attracting new residents.

The first SMART ISLAND Forum – Athens June 2016

The first Smart Islands Forum was hosted in Athens on 21 and 22 June at the initiative of the DAFNI Network of Sustainable Aegean and Ionian Islands and the Aegean Energy Agency.

The Forum gathered representatives of island local and regional authorities and actors from 13 countries, namely Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Malta, Spain, Sweden, the Netherlands and the UK. The UK was represented by Ian Stephen, Leader of the Isle of Wight Council, Camille Dressler from the Scottish Islands Federation and Felix Wight of Community Energy Scotland.

The 42 European island representatives were joined by organizations with an interest in the potential carried by islands including the European Commission, the European Economic and Social Committee, the European Small Islands Federation, the Network of the Insular Chambers of Commerce and Industry of the European Union, the Greek Energy Forum and the German Corporation for International Cooperation (GIZ). The Islands Commission of the Conference of Peripheral Maritime Regions also addressed the Forum

The Smart Islands Initiative - 1

The Smart Islands Initiative, inspired by the Smart Cities and Communities initiative, represents an excellent opportunity for island authorities to devise a place-based, transformative development agenda that taps into islands' competitive advantages, generates local growth and prosperity, and helps the EU meet the goals it has set in a number of policy areas, including climate change mitigation and adaptation, innovation, circular economy, sustainable transport and mobility.

During the Forum island representatives engaged in a collective process of drafting the Smart Islands Declaration, which outlines the aspirations on the role, challenges and potential of islands to become models of a smart, sustainable and inclusive development paradigm.

The Smart Islands Initiative 2

In the coming months Forum participants agreed to have Quadruple Helix actors (Local Authorities and local actors as well as Academic institutions as well as businesses) from respective islands endorse the Declaration in order to ensure all existing synergies are exploited through broad stakeholder engagement.

Last but not least participants discussed the possibility to set up a platform of EU island authorities and actors in Brussels that will advocate in favour of island affairs and facilitate partnerships for the realization of EU projects on islands. The platform was also well perceived as a structure to support the Pact of Islands Secretariat in strong collaboration with the Covenant of Mayors for Climate and Energy.

2nd Smart Islands Forum – Athens - 14 September 2018

22 representatives from 13 European countries with islands that are members to the Smart Islands Initiative met in Athens, Greece on 14 September 2018 to discuss how recent EU policy developments concerning islands can serve them best, in light of the on-going debate around the Union's post-2020 political priorities.

The Smart Initiative is a bottom-up effort of European island authorities and communities. It builds on years of collaboration between European islands and seeks to convey the significant potential of islands to function as laboratories for technological, social, environmental, economic and political innovation.

The Network of Sustainable Greek Islands – DAFNI, with 44 island local and regional authorities from Greece as members, currently coordinates the Smart Islands Initiative.

Why Islands

Islands worldwide step up action to fight climate change, since they are amongst the first to experience the devastating impacts this has on local ecosystems and livelihoods. Meanwhile, insularity implies energy dependency on fossil fuels, high transportation costs, limited economic diversification and access to markets, collectively labelled as island handicaps; yet , there is growing evidence that with the use of cutting-edge technologies complemented by an enabling regulatory and financial framework, islands can reverse this trend, address the challenges they are facing and tap their largely unexploited sustainable development potential.

A New Approach

Islands host locally most of the infrastructures for the management of their resources, while the often-intense seasonal demand for services takes a heavy toll on both infrastructures and resources. In response, the Smart Islands Initiative calls for an integrated approach to the management of natural resources and infrastructures. Drawing inspiration by the Smart Cities concept, the Initiative goes one step further by extending the synergies beyond energy, transport and ICT to also include water and waste, directly addressing circularity in the economy. This new approach suggests that through the deployment of smart, integrated solutions with the use of cutting-edge technologies, islands can transform into smart territories offering higher quality of life to local communities, while helping Europe become a sustainable and inclusive economy.

A New Approach

Island Living Labs

The Smart Islands Initiative portrays islands as ideal test-beds that can host pilot projects and produce knowledge on smart and efficient resource and infrastructure management. This knowledge may be then transferred to mountainous, rural and generally geographically isolated areas but also scaled-up in cities. Adding to this the unique ecosystems, significant social capital and entrepreneurial mindset, islands can embark on local development pathways that optimally combine environmental, social, economic and technological solutions and inspire other insular and mainland areas.

A Collaborative Process

To unlock islands' potential, it is crucial to recognize the role and strengthen the capacities of island authorities. If empowered, these will be in a position to ensure the optimal use of infrastructures and resources, laying the foundation for islands' sustainable growth. Moreover, island authorities should look to join forces with the business community, research and civil society actors to come up with a development agenda that's place-based and help island communities thrive!

Smart Island Declaration

The Smart Islands Declaration is the cornerstone document of the Smart Islands Initiative. It outlines the challenges facing islands as much as the potential these exhibit to usher in a low-carbon, smart, sustainable and inclusive development paradigm.

The Smart Islands Declaration was first drafted by representatives of European islands who attended the 1st Smart Islands Forum in June 2016 in Athens, Greece.

In the Declaration islands make an ambitious call for action and commit to 10 steps through which to become smart, inclusive and thriving societies!

10 ACTION POINTS TOWARDS BECOMING SMART, INCLUSIVE AND THRIVING SOCIETIES

TEN ACTION POINTS

1. Take action to mitigate and adapt to climate change and build resilience at local level
2. Trigger the uptake of smart technologies to ensure the optimal management and use of our resources and infrastructures
3. Move away from fossil fuels by tapping our significant renewables and energy efficiency potential
4. Introduce sustainable island mobility including electric mobility
5. Reduce water scarcity by applying non-conventional and smart water resources management
6. Become zero-waste territories by moving to a circular economy
7. Preserve our distinctive natural and cultural capital
8. Diversify our economies by exploiting the intrinsic characteristics of our islands to create new and innovative jobs locally
9. Strengthen social inclusion, education and citizens' empowerment
10. Encourage the shift towards alternative, yearlong, sustainable and responsible tourism

Energy - 1

We will tap into our significant renewable energy sources including solar, wind, tidal, ocean, wave, and geothermal potential and lead CO₂ emissions reduction efforts to become increasingly energy independent, minimizing fuel imports and subsequent costs and allowing the emergence of new business models favouring decentralized energy production and consumption and the rise of islanders as prosumers.

We will increase the energy efficiency of our building stock (electricity, heating and cooling) and infrastructures (e.g. street lighting, pumping stations), also within protected historic districts, to reduce subsequent CO₂ emissions, through the integration of innovative technologies and practices and the adoption of near zero-cost actions by islanders and visitors, triggering a shift to more responsible energy consumption patterns and more resilient infrastructures overall.

We will prioritize the use of biomass as renewable fuel for heating, cooling and transport and consider energy crops as an alternative to regular crops in islands with significant agricultural production.

Energy - 2

We will promote small islands in particular as test-beds for cutting-edge, sustainable energy technologies, including smart grids, storage and demand-response and by doing so make the operation of electrical grids more flexible, ensure increased penetration of renewables, improve the quality of life of the local population and provide useful insights on how these technologies can be transferred in other islands and geographically isolated territories and scaled up in big cities of continental Europe.

We will exploit existing synergies between sustainable energy and waste, water and transport sectors, underscoring islands' potential to emerge as laboratories for the development of integrated solutions including the production of renewable energy from waste, the use of excess renewable power in shipping and electric vehicles and use of renewable energy for water desalination purposes.

Terna approach - Italy



The “SMART ISLANDS” PROJECT

Perfect test bed for the system of the future

TODAY

All the island's electric demand is supplied by diesel generator



Fossil fuel fired power plants has a big impact in terms of local pollution (NO_x, SO_x, PM10, noise) and global warming (CO₂ emission)



The electricity cost is subject to the commodity price fluctuations



The cost of transportation also contribute to increase the total cost



The fuel supply can be difficult in case of long term insulation



Fuel availability is also linked to political scenario

TOMORROW



Renewable power plants will replace the diesel generation (up to 100%)

Fuel consumptions, costs and local pollution will be cut off (almost by the same percentage)

CO₂ emissions will also be reduced

Fuel consumptions extra reduction can be achieved by the “smart components” of the project



Active demand



e-mobility



Forecast








Enhanced control system



Energy Storage

Terna – smart island energy implementation

 <p>Giglio island Our first Smart Island project</p> <ul style="list-style-type: none"> Electricity consumption: 10,5 GWh/anno Maximum load: 3,5 MW <p>Renewable generation target: 20%</p> <p>Renewable power target : ≈ 2 MW</p> <p>Investment: ≈ 5 mln€*</p>	<p>Giannutri island</p> <p>The First Smart Island in Italy</p> <ul style="list-style-type: none"> Renewable generation target: up to 90%  
 <p>Pantelleria Island The biggest not interconnected island</p> <ul style="list-style-type: none"> Electricity consumption : 44 GWh/anno Maximum load : 8,2 MW <p>Renewable generation target : 20%</p> <p>Renewable power target : ca. 6 MW</p> <p>Investment: ≈ 15 mln€*</p>	<p>Other Italian islands</p>  <ul style="list-style-type: none"> Ustica Favignana Marettimo Lampedusa Ponza

Transport - 1

We will change our modal split towards sustainable transport modes including new ways of using the car (car-sharing, car-pooling), promoting walking and cycling (trails restoration, bike-sharing) and optimizing the design of multi-modal hubs and terminals, towards boosting the sustainable growth of key sectors, i.e. yearlong tourism, logistics, commerce, agriculture and fishing.

We will realize existing synergies between transport and energy, by promoting ferries using alternative fuels such as LNG or hydrogen, balancing intermittent power from renewable energy through cold ironing, promoting electro-mobility, integrating electric vehicles and ferries into islands' smart electric grids ensuring increased penetration of renewable energy at local level and minimizing the use of fossil fuels.

Transport - 2

We will introduce island hopping infrastructure in islands close to the mainland or island archipelagos in particular, using small-scale electric vessels and/or vessels fueled by LNG, methane or hydrogen that can also operate on automatic pilot to reduce environmental and transportation costs and bring tangible benefits to island communities and local markets.

We will promote intelligent transport management and information systems with a view to improving the quality of service provision and help with monitoring and mitigating pollution levels resulting from transport, especially in islands' ports and urban centers.

Water - 1

We will encourage non-conventional water resources management through grey water recycling and rain water harvesting coupled with the introduction of smart technologies for efficient water network upgrading in order to reduce water losses, realise projects on water energy nexus, minimize costs and effectively tackle water scarcity on islands, also exacerbated by climate change.

We will deploy, in anhydrous islands in particular and where it is proved cost-effective, water desalination plants that run on renewable energy and are energy efficient. We will raise awareness among the population on the qualities and need for responsible use of desalinated water.

We will promote the integrated management of our inland water resources, also by making use of traditional sustainable water management practices, in order to improve the quality and availability of freshwater, ensure the long-term health of aquifers and ultimately support the revival of sustainable island-scale agriculture that offers local products of high added value and quality.

Water - 2

We will make use of innovative approaches and tools such as the Ecosystem-based Adaptation and Integrated Coastal Zone Management to ensure the good environmental status of our marine and inland waters, crucial for livelihoods and human well-being and islands' overall resilience.

We will raise awareness on the need to shift to more responsible consumption patterns and thus turn economic activities on islands such as tourism and agriculture more sustainable, enhance ecosystems' resilience and build successful branding strategies, targeting the ever-growing market of responsible and sustainable tourism.

Waste – 1

We will pursue the transition towards zero-waste territories by adopting a circular economy development model through the strengthening of local value chains.

We will put in place smart waste management at island level consisting of small-scale decentralized infrastructure for collecting, sorting, reusing and recycling and adopt innovative technologies including ICT, so as to move away from traditional waste management techniques, improve environmental quality and create jobs locally.

Waste - 2

We will investigate the possibility of promoting, especially in small island archipelagos, the management of waste centrally, on the island that is bigger in size and can support the operation of such a facility, thus creating economies of scale.

We will introduce incentives for waste producers, in order to reduce mixed waste and increase recycling rates.

We will support targeted awareness-raising activities on sustainable consumption targeting islanders, including households and the business sector, and visitors, in order to address increased waste generation during peak tourism season.

Governance

We will work closely with the European Commission in promoting the clean energy transition on islands and to this end we will (a) develop island local sustainable and integrated plans that maximize synergies between infrastructures, i.e. energy, transport, waste, water (b) promote close collaboration between islands, regulatory and financial institutions in sharing best practice with regards to applying proper financial and regulatory tools and best available technologies. We underscore the need for a long-term framework promoting and supporting scalable projects with funding and technical assistance to accelerate the clean energy transition on islands.

We will make use of the Integrated Territorial Investment and Community-Led Local Development tools provided under Cohesion Policy to make public interventions more efficient and tailored to local conditions, also in alignment with private sector activities.

We will reinforce social inclusion through citizen empowerment and broad stakeholder engagement by focusing on participatory planning as well as participatory implementation, so as to ensure proper realization of projects and strategies and foster local ownership.

We will tap into our rich traditional knowledge and culture of collaboration to nurture social innovation and bottom-up governance initiatives.

ICT

We will ensure the uptake of smart and sustainable technologies in our islands, allowing for a more efficient and inclusive management and use of our natural resources and infrastructures.

We will improve the provision of digital services in our islands in order to create new opportunities for citizens and businesses, boost the growth of innovative SMEs and start-ups and facilitate access to markets and sources of funding.

We will tackle the digital divide in island societies and strive to provide all citizens with equal access to information and digital services.

We will incorporate ICT tools in our policy- and decision-making processes to make these more participatory and inclusive.

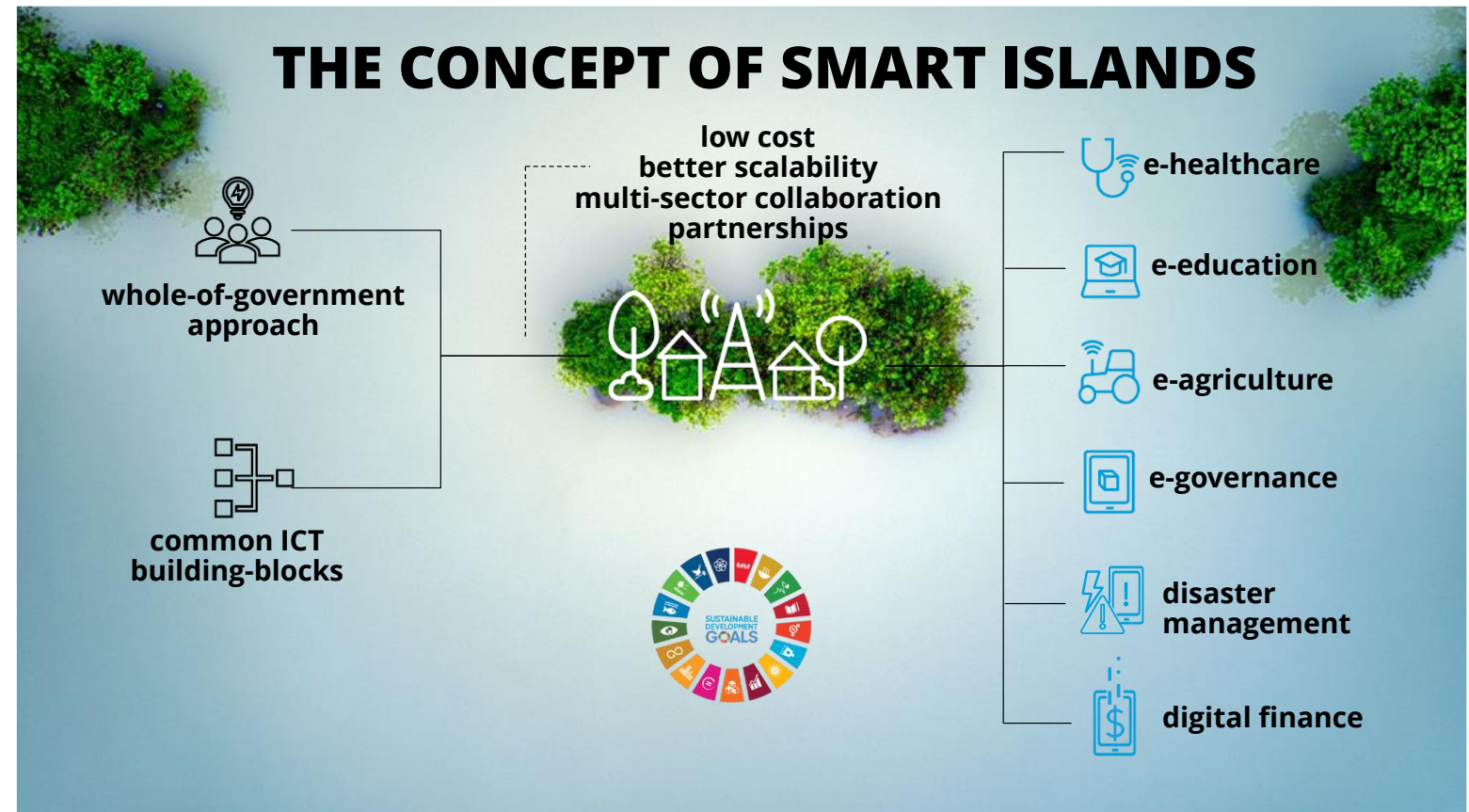
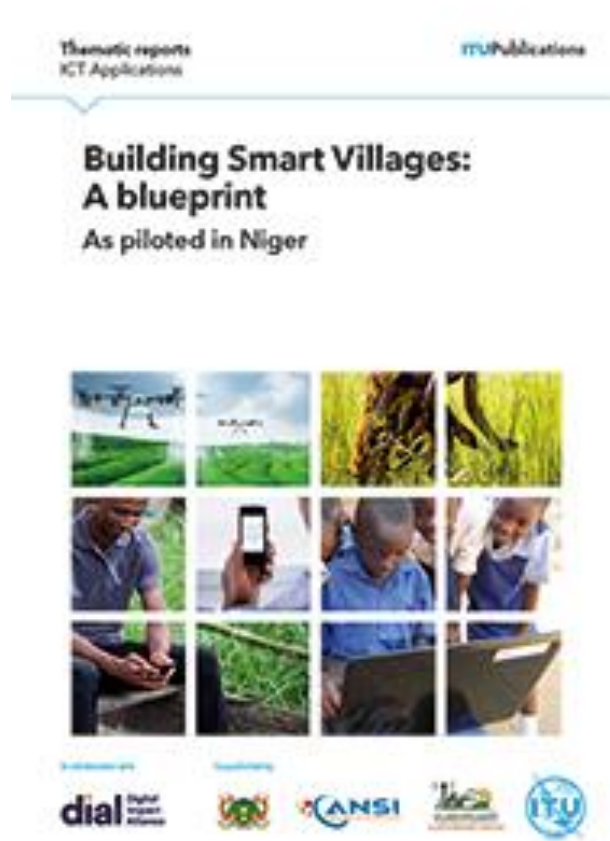
ITU SMART ISLANDS BRINGING DIGITAL EXPERIENCES TO COMMUNITIES - 1

The Smart Islands programme adopts an innovative approach to deliver connectivity and digital services to disadvantaged island communities in a scalable and sustainable manner. It aims to transform rural and coastal communities, improving their livelihood and well-being by connecting them to a range of digitally enabled services. The programme, built on the ITU-led [Smart Villages initiative](#) (piloted in Niger and under development in Egypt and Pakistan), leverages shared services delivery infrastructure capabilities to provide digital services over connected devices (tablet, mobile phone, computer etc.).

ITU SMART ISLANDS BRINGING DIGITAL EXPERIENCES TO COMMUNITIES - 2

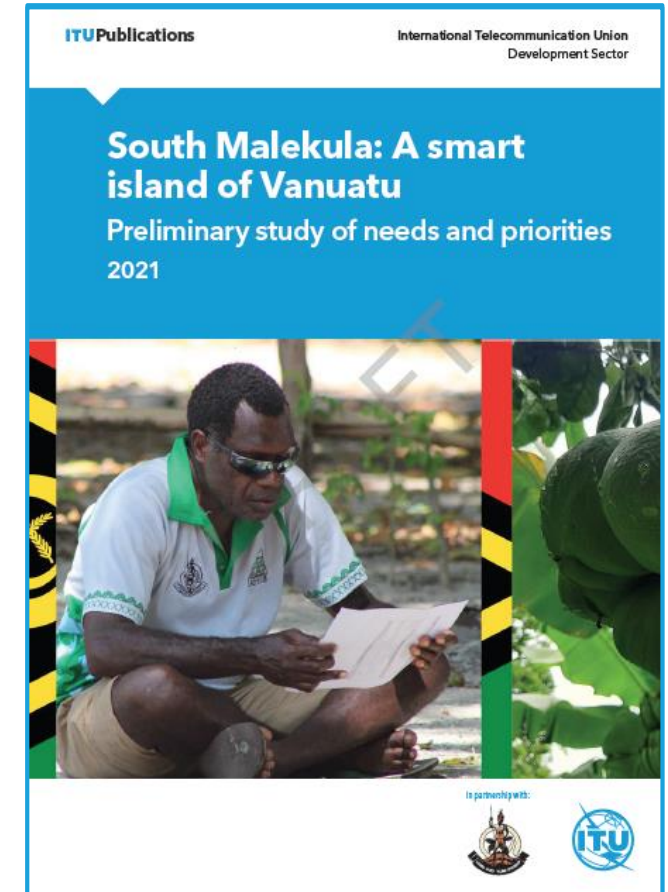
Small Island Developing States (SIDS) face a host of challenges, including geographic isolation, lack of human resources, low availability and quality of infrastructure, and vulnerability to external shocks. In remote areas and in outlying islands, access to information, government services, transport, health, finance, commerce, and education needs prioritized attention. The high costs of electricity and lack of affordable connectivity exacerbate the above challenges for SIDS. Not only does the absence of digital technology contribute to the digital divide, but it also deprives small island communities of the opportunity to leverage digital solutions to obtain better access to essential services. The Smart Islands programme adopts a whole-of-government approach that accelerates progress towards the Sustainable Development Goals (SDGs) through digital transformation.

The Concept of Smart Islands by ITU



Smart Islands in the Pacific - 1

A preliminary needs assessment of South Malekula village in Vanuatu, undertaken by the ITU as part of its support to the Government of Vanuatu, demonstrates the following outcomes that digital connectivity can positively contribute towards: (i) reliable and quality communication; (ii) digital training on the use of smartphone and other devices that improve business activities; (iii) improved educational environment, and (iv) improved health environment with digitally literate health workers. Following this assessment, the Government of Vanuatu has adopted Smart Islands in South Malekula as a national programme.



Smart Islands in the Pacific - 2

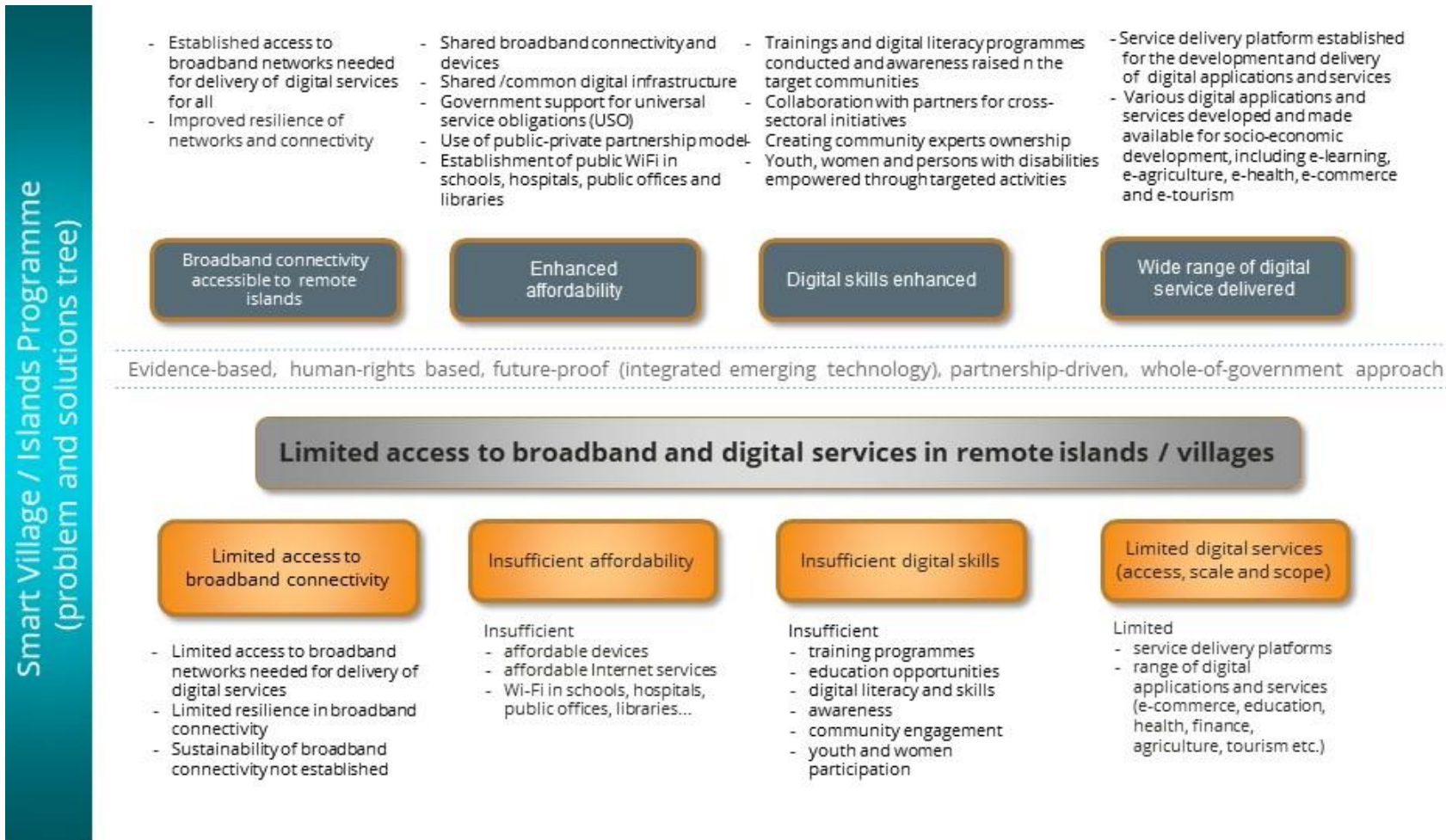
ITU has further received expressions of interest for Smart Islands from Fiji, Kiribati, Republic of Marshall Islands, Federated States of Micronesia, Nauru, Papua New Guinea, Samoa, Tonga, Tuvalu and Vanuatu. ITU is also engaged with UN agencies and other partners and stakeholders, in order to establish and promote a new holistic and inclusive approach to small island development, through the Smart Islands programme. Partnerships for financing of the programme are also being explored with development partners, UN SDG Fund and other international and national agencies.

Smart Islands Solution: Whole-of-government Approach at Community Level

Digital transformation has become a high priority for countries. To meet these ambitions, and to support post COVID-19 socio-economic recovery, an integrated multi-sector approach is required. This approach includes technical assistance and investments in the agriculture, education and health sectors to generate employment, as well as the digitization of services (e-commerce and/or e-government), particularly in the outer islands.

The Smart Islands programme is based on a whole-of-government approach. It is demand-driven, user-centric, flexible, and focused on sustainability, scalability, and multi-sector collaboration. It is designed to manifest digital transformation at the community level with an emphasis on vulnerable populations (women, youth, persons with disabilities, older persons) in order to leave no one behind. The initiative leverages the four pillars of (i) improving broadband connectivity (ii) making broadband affordable (iii) enhancing digital skills and (iv) providing digital services, to impact people's lives based on their local priorities.

Smart Islands Solution: Whole-of-government Approach at Community Level



ITU smart islands programme - 1



Health: the deployment of telemedicine and mHealth services to improve access to diagnosis, while also reducing the cost to the healthcare system. For example, mHealth programmes for diabetes prevention and control could be deployed based on the ITU-WHO joint ‘Be Healthy Be Mobile’ initiative.



Education: access to open and distance learning opportunities will enable capacity building for teachers and education administrators, while also providing equitable access to quality literacy, lifelong learning and skills programmes for children, youth, and adults. Local teachers could improve their qualifications and experiences of their students by using engaging education content, curated and uploaded on digital school units.



Agriculture: e-Agriculture services can support efficient and productive farming capabilities among farmers, making rural communities more resilient from both the economic and nutritional standpoints. A specialized app could be provided that would help farmers better access markets or detect and treat pests in a timely manner, based on the analysis of photos taken by conventional smartphones.

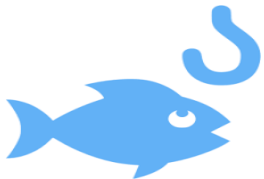
ITU smart islands programme - 2



Multi-hazard early warning and response: ICT systems can support hazard risk monitoring, alert, and provide post-alert guidance and information. For example, an early warning system based on meteorological data analysis algorithms can provide messaging services to prevent potential damage due to hurricanes.



Digital financial services: provide access to much needed digital financial services and accelerate financial inclusion goals.



Tourism and fishing: the applications could support access to e-commerce and e-marketing to improve income opportunities and in turn support livelihoods.

Smart Islands : TEN Case Study

The Smart Islands project is based on the EESC TEN section's own-initiative opinion TEN/558 on Smart Islands, which was adopted on 19 March 2015. The project aims to gather feedback from island communities and to identify best practices introduced on some of the islands, which could suggest similar or adapted solutions for other island communities in the EU. In practical terms, the EESC is identifying remarkable infrastructures and network initiatives developed and often implemented in an interactive way.

The methodology is based on:

- the identification of islands, based on the current definition¹: territories with a minimum of 1km², a minimum distance between the island and the mainland of 1km, a resident population of more than 50 inhabitants, and no fixed link (such as a bridge, tunnel or dyke) between the island and the mainland;
- the location in Europe's oceans and seas: Aegean Sea, Atlantic Ocean, Baltic Sea, Mediterranean Sea, North Sea;
- six fact-finding missions;
- a questionnaire sent to local players.



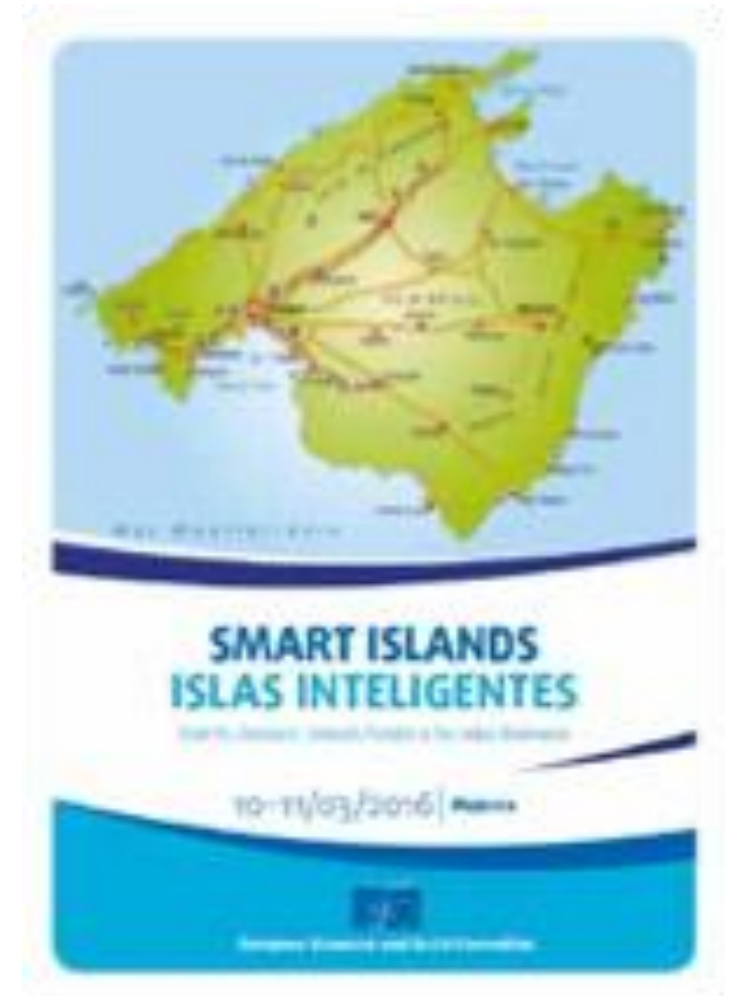
Île d'Yeu

Located in the Atlantic, Île d'Yeu is an island and a municipality, just off the Vendée coast of western France. With a surface area of 23 km², the island has 4 600 inhabitants. Around 10km long with an average width of 4km, its surface area is around 23km². The island's two harbours, Port-Joinville in the north and Port de la Meule, located in this rocky inlet of the southern granite coast, have been famous for the fishing of tuna and lobster. However, the decline of fishing activities is pushing Ile d'Yeu's community toward the development of tourism, renewable energy and the digital economy.



Balearic Islands

The Balearic Islands are located in the middle of the Mediterranean Sea, and have a population of 1.120 million. Majorca is the largest island in the archipelago which has a total surface area of 4492km². The island's capital, Palma, is also the capital of the autonomous community of the Balearic Islands. Since the 1970s, the archipelago's economy has diversified from a model based on subsistence farming to one based on tourism. However, the Balearic Islands are facing saturation of the traditional tourism model. The answer is to diversify tourism by exploiting digital and new technologies. The objective is to make the islands more competitive by boosting the economy using innovation, particularly in the digital economy.



Egadi Islands

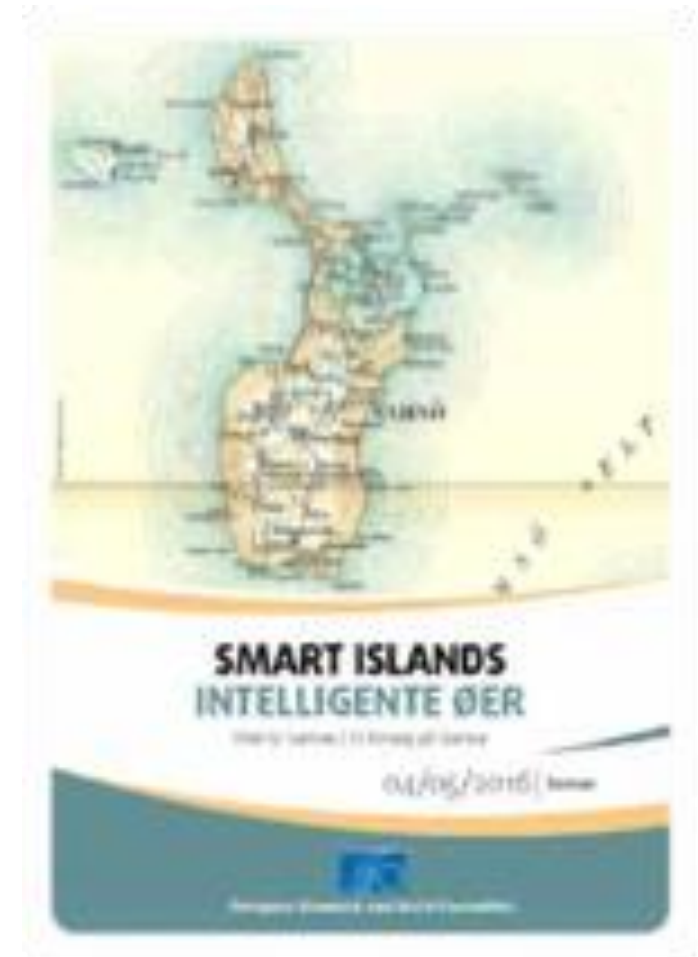
Located in western Sicily, the Egadi Islands are an archipelago of 37.45km² made up of three main islands (Favignana, Levanzo and Marettimo) and two islets (Formica and Maraone). The main municipality, Favignana, includes the three islands of Favignana, Marettimo and Levanzo. Favignana is the largest of the three main Egadi Islands, with a surface area of 19.8km² and a population of 4230 (31st december 2015). The island is famous for its caves of calcarenite rock (locally known as “tufo”) and the ancient fishing technique of “tonnara”, which involved the trapping and “mattanza” (culling) of Bluefin tuna.

Essentially based on tourism and fishing, the economy is driven by the Egadi Marine Protected Area (MPA), established by the government and managed since 2001 by the Municipality of Favignana. It is the largest marine reserve in the Mediterranean and has shaped a local policy which aims to extend the tourist season, repopulate the island and boost the economy.



Samsø Island

Samsø is a Danish island and municipality located 15km off the Jutland Peninsula. Covering an area of 114km², the island was used during the Viking Age. Part of the island is Natura 2000 protected. The population of Samsø fluctuates from 3 700 (winter) to 25 000 (summer). The island is split between the north and the south. Residents use around 1 500 vehicles and have a network of cycle paths. Samsø's economy is based on small-scale fishing, farming (particularly potatoes and asparagus) and tourism. Ten years after the Kyoto Protocol entered into force (1997), Samsø won a national competition, reaching 99,6% renewable energy within ten years. Samsø is meeting its challenges (demography, transport and waste management) through an interactive approach which is already operating very well in the field of energy.



Kythnos Island

Kythnos is a 100km² island and municipality located in the Western Cyclades. Very windy, the island hosts the first wind farm ever installed in Europe. The north of the island is a Natura 2000 protected area. Kythnos economy was driven in the 19th century by mining activities (e.g. iron). Today, its economy is based on small-scale fishing, the diversification of agriculture toward products with Geographical Indications (GIs), and the development of a sustainable tourism model. The island's population is around 2 400, rising to 25 000 during the summer. Remarkably, the local population is increasing. Today, the population is “ready to promote Kythnos”, adopting soft development (as opposed to the excessive tourism activities which prevail in Mykonos, for instance). Kythnos is also on the way to develop a Sustainable Energy Action Plan Master Plan Proposal entitled “Smart Island Kythnos”.



Saaremaa Island

Located between the Gulf of Riga and the Baltic Sea, Saaremaa is the largest of the 2 222 Estonian islands. Measuring 2 673 km², this big island has a population of 33 000, which is shrinking. The island's economy is diverse and generates growth and jobs, as illustrated by the industry. Apart from food, shipyards, small craft building, electrical equipment, plastic products (films for garbage and seals for car air conditioning systems), the municipality estimates that 94 SMEs employ around 1 000 people. In addition, companies from abroad are developing activities. Relatively wealthy, Saaremaa is trying to increase tourism and to improve its accessibility.



Geographical information on the islands

The project focused on Île d'Yeu in France, Mallorca in Spain, Favignana in Italy, Samsø in Denmark, Kythnos in Greece and Saaremaa in Estonia.

These islands represent a sample of islands in the EU. They range in surface area between 23.32km² for Île d'Yeu and 2 714km² for Saaremaa, 38.32km² for Favignana, 99km² for Kythnos, 114.26km² for Samsø, and 208km² for Mallorca. Geographically, the islands are spread across the Aegean, Mediterranean, North and Baltic Seas and the Atlantic Ocean.

Challenges

Despite their differences, all these islands face the same challenges: overcoming the difficulties associated with geographical separation and distance from the mainland; solving the conundrum of public facilities that need to be able to meet peak demand during the tourist season but may be excessive for most of the year (information and communication technologies, energy, transport, waste collection and processing, sewage treatment, etc.); maintaining the demography; organising the necessary educational structures and providing vocational training and jobs for local people; guaranteeing the livelihoods of people working in the tourist industry, who have short seasons and often perform several different jobs; protecting the natural coastal and marine environment that is put under significant pressure at certain times of year; finding the necessary funding to provide public services when the year-round population is often small and ageing; and providing affordable housing for young people when holiday homes, the protection of natural areas and limitations on areas approved for building development all lead to high housing costs.

The size and population of Mallorca mean that it is very different from the other islands visited, with their small size and low population. In general, islands constitute a concentrated version of the economic, social and environmental difficulties encountered on the mainland, albeit exacerbated by their limited size. The solutions proposed vary, but they all satisfy the desire to make the most of technological and environmental limitations, and they all require flexibility, adaptation, inventiveness and hard work.

Information and Communication Technologies (ICT) Emergency Quick Response Code

The Balearic Islands have a long tradition of tourism, which is reflected in its wide range of tourist facilities and services. In August alone at the peak of the tourist season, Mallorca usually has over 13 million tourists. The emergency and police authorities are involved daily in 150 to 200 interventions, of which 50 to 80 can be resolved swiftly. The main problems are lost children, people who have lost their bearings and injured cyclists. In order to promote the Balearic Islands as a destination, the Balearic authorities, including the port authorities, are giving due consideration to the issue of security, combining public, medical and environmental safety.

To improve the security and safety of tourists, the port authorities and the authorities of the Balearic Islands asked the University of Palma to develop an emergency system. A QR code (abbreviation for Quick Response Code) system is being developed for this purpose. The QR code is a machine-readable optical label that contains information about the item to which it is attached. It consists of black modules (square dots) arranged in a square grid on a white background, which can be read by an imaging device (such as a camera or scanner).

Information and Communication Technologies (ICT) Emergency Quick Response Code

In practice, the system has been used from summer 2016 for cruise tourists disembarking for a short period in Palma. The MSC Company will include the QR code in the medical questionnaire shared with the Spanish emergency system (112, hospitals, doctors). The QR emergency system is particularly suitable for groups with special needs (people with disabilities, minors and senior citizens, sportsmen, etc.). 2 045 characters can be stored on the square code. The system is totally safe since the information (identity, medical information, contacts and GPS location) is not stored online but encrypted and printed in the square. The information is only readable using the requisite application and can always be updated by the person providing data about him/herself. Using the QR code is also better than calling an ambulance or the police in all cases, as that will cause a serious disturbance in a tourist area. One challenge is to convince visitors to start using the QR codes on themselves, as this cannot be made compulsory. The project has great potential for island destinations which receive many seasonal visitors, often by cruise ships, who stay for a short time and would not become sufficiently familiar with the destination to be able to help themselves easily in an emergency.

Internet broadband community - Samsø

In 2012 the inhabitants of **Samsø** started to provide high-speed internet themselves, having experienced bad connections with earlier providers and a final provider who went bankrupt. The initiative has been run by the inhabitants themselves, initially on a voluntary basis. This initiative provides a better and cheaper connection than most of the private broadband companies operating in the country. Only in April 2015 was the first paid technician hired. By April 2016, the network had 1199 users, for an island of 3700 year-round inhabitants. The project is supported by the Danish government.

Website for the initiative: <http://net4samso.dk>

Virtual care and services for the elderly population - Saaremaa

On Saaremaa, the VIRTU/ELVI project aims to connect elderly people via the internet. The project started a few years ago as an EU Interreg project and is currently financed and sponsored by one of the nation-wide telecom enterprises (TELIA). The remote care service aims to improve the activity of elderly people and to save public money. The project also helps to maintain links and relations between elderly people and their relatives by increasing internet communication.

On the island, 20 people are connected to the initiative. The system helps people to socialise throughout the year, while the most frequent use is during the winter, when moving around is a bigger challenge for elderly people who often also have impaired mobility. People use VIRTU to avoid being isolated. The system requires a computer, a screen and internet. It can be used for bilateral meetings, group activities (e.g. singing) and to organise 24-hour surveillance. The service keeps people active, when they live in very remote areas or are unable to attend gatherings frequently. Online events are organised for the target group and the feedback has been positive. Users can communicate with each other as well as meet people or get back in touch. The initiative has great potential for sparsely populated areas with limited accessibility, which often include island communities.

Virtual care and services for the elderly population – Estonian islands

On **Estonian islands** and coastal harbours, it is difficult and costly to manage small harbours and provide services, as the numbers of visitors and residents is limited. In response, the authorities are encouraging, improving and expanding the network of harbours. A smart harbour system is being developed as part of solutions involving 50 harbours across Estonia. Information is provided for tourists, including online booking (accommodation and transport). An automated management system has been set up, including mobile payments. This “marine mastermind” model and the concept of “easy port” are particularly suitable for low tonnage vessels, small ports and service suppliers. Saaremaa is also changing its “business model” by receiving more cruise ships. A business label is emerging from the initiative.

The same model could be used for bigger boats and bigger harbours, and is not limited to one country; it can be enlarged and rolled out by other island and coastal communities. It could be a good solution for sparsely populated communities, where manning small harbours is not possible simply because the manpower would not be available.

Website for the initiative: www.marinaahoy.com

Innovation, including energy, transport and environment

Best practice demonstrated during on-site visits

The EESC observed several initiatives, such as the offshore wind farm and reduction of traffic on Île d'Yeu, solar energy on Favignana, energy efficiency and sustainable mobility on Favignana, use of straw from local farms for collective heating systems on Samsø, the introduction of renewable sources of energy in the power mix on Kythnos, the Energy Academy of Samsø, public filtered water fountains to prevent plastic waste on Favignana, and the Marine Protected Area of the Egadi islands.

Offshore wind farm - Île d'Yeu - 1

Together with Île de Noirmoutier, **Île d'Yeu** is planning to build an offshore wind farm. The farm would be built for 25 years of use. Île d'Yeu would be used as a base for construction and the project would create jobs for the islanders, partly since Île d'Yeu would be required to set up a maintenance base for the wind farm (setting up a maintenance base on the island means providing training for islanders and bringing in new skills and therefore new inhabitants/ families to the island).

The wind farm would have 62 turbines and be located 12km out. It would have an output of 496MW, a surface area of 82.5km² and an estimated cost of EUR 2 billion.

The project promoters have been confronted with protests against the farm because of the visual impact from the seashore. There are also concerns about fishing, but scientific experts generally consider that such construction has a positive impact on the renewal of fish stocks. These examples clearly show that dialogue with civil society is vital throughout such projects. People need dialogue and information.

Offshore wind farm - Île d'Yeu - 2

This initiative is necessary for the development of the island, and is backed by Île d'Yeu's excellence in energy, with its successful Yeu 2030 energy transition programme. The goal is to make Île d'Yeu a showcase of excellence in energy with local and renewable energy generation, energy storage (development of hydrogen storage), a smart grid project, etc. Another aspect involves reducing energy consumption by promoting energy-efficient building renovation and energy savings. From an economic point of view, the aim is to develop new markets, make companies more competitive and increase skill levels. Technological innovations in the field of energy transition also need to be accommodated (islands are an ideal test-bed given that input and output flows can be measured accurately).

From a social point of view, considerations involve combating energy poverty and reducing inequality in the face of rising energy costs. This ambitious action programme has received wide acclaim. Île d'Yeu is among 212 French districts lauded for their contribution to green growth ('Territoires à énergie positive pour la croissance verte').

Website for the project: www.iles-yeu-noirmoutier.eoliennes-mer.fr

Solar energy - Favignana

On **Favignana**, energy generation is a challenge. The Egadi Islands are not connected to each other, nor are they connected to the Sicilian mainland. The cost of energy generation is high for the population. Another problem is related to the level of consumption, which differs in summer and winter (households do not use heating systems in the winter, while consumption rockets during the summer due to the use of air conditioning and tourism. The municipality's storage capacity is only 30KW. For the time being, wind energy is not allowed due to a law protecting the landscape. It is impossible to develop a gas plant, unless the municipality builds a methanation unit. One private project to develop a new power plant is in breach of the MPA. Solar power is used as described in the Sun and Stars of the Egadi Islands project.

Website for the project: http://www.comune.favignana.tp.gov.it/po/mostra_news.php?id=174&area=H

Solar Energy - Samsø

Ten years after the Kyoto Protocol entered into force (1997), **Samsø** won a national competition, reaching 99.6% renewable energy within ten years. On this Danish island, wind energy predominates thanks to a combination of offshore and land-based windmills, but there is solar energy as well. The EESC visited a farm, whose owner has begun the transition from traditional farming to energy generation.

The farmer has invested in solar panels which are installed on the stables and barn. In addition, to achieve scale, the farmer has invested in solar panels installed on factories in Germany and Italy, generating energy which is sold and injected into the grids. Shifting from traditional farming remains a challenge in all of Europe's developed countries, which is why the farm has diversified while also contributing to increased use of renewables.

Energy efficiency and sustainable mobility - 1

On Favignana, the “Sun and the Stars of the Egadi islands” project began in 2008, following a call for funding from the Italian Ministry of the Environment. The project has a number of pillars:

- Soft mobility: through the purchase of electric and hybrid vehicles for the city administration, and incentives for local residents and economic operators. In practical terms, financial contributions are granted to encourage the use of mountain bikes, electric bicycles and electric scooters. The initiative is open only to residents and local economic operators (e.g. accommodation and vehicle hire).
- Renewable energy: the public sector has already installed 6.72KW solar panels on the roof of the town hall, and 10.2KW panels on the school roof. Solar thermal energy installations are authorised only if they protect the landscape – the solar panels should not be visible and so spoil the island’s heritage. Households applying for funding will be reimbursed for 30% of the cost of the installation.

Energy efficiency and sustainable mobility - 2

- Recycling of vegetable oil: although the oil can be collected and recycled, residents have not yet started doing so.
- Energy efficiency: public lighting bulbs are being replaced by LEDs. Economic operators are given incentives for any investments in electrical bicycles and heat pumps.

The project is largely aiming to change mindsets, as traditionally the islanders have had little to do with using renewable energy. This initiative is a good start for further projects in renewable energy and innovation. In France, tourists going to **Île d'Yeu** are encouraged to travel by train, bus and ferry.

Access to Île d'Yeu is mainly provided by ferries of the Régie Départementale des Passages d'Eau de Vendée. Soft mobility is encouraged through a system of tariffs aiming to reduce use of personal vehicles (e.g. cars, motorbikes, bicycles).

Website for the maritime transport company: <http://www.yeu-continent.fr/>



Straw-fuelled heating systems - Samsø

In Denmark, energy generation is turning to renewables, even though the country has two coal-fired power plants. For the time being, most energy is supplied by biomass and waste.

Samsø has four public cooperative district systems, three of which are straw-fuelled heating stations and one a station combining woodchip and solar power. One straw-fuelled heating station is a 10-year project with a unit working at local level. The working principle is that 3kg of straw produces the equivalent of 1 litre of oil. Households themselves own the plant and the remote heating water loop.

The system produces very cheap energy. The straw used comes from Samsø's fields, although 20% of the straw is left on the land to regenerate and protect the soil. To be optimised, the straw needs 50% humidity. The straw is stored in the plant and then burnt.

The energy heats a 6km water loop which is connected to households. Ash is stored and spread on the fields as a fertilizer. The initiative is part of Samsø's fossil-free island philosophy. The broad energy mix, including the remote heating option combined with earth-heating, solar panels and wind energy is widely spread and so helps more and more inhabitants mobilise sustainable solutions for energy consumption.



Introduction of renewable sources of energy in the power mix - Kythnos

Kythnos' challenging geography encourages the use of local and renewable sources of energy. Several generation solutions are present on the island. The introduction of renewable energy sources into the power mix of Kythnos grid is key, particularly for an autonomous island supplied mainly by diesel generators. Although the wind and solar potential in these areas is excellent, the strong seasonal fluctuations in demand as well as the technical restrictions were a problem. The Aegean Energy and Environment Agency together with the Municipality of Kythnos are currently promoting the island of Kythnos as a “test-bed” for innovative technologies. This effort builds on a rich history of cutting-edge technology deployment on the island, namely:

- 1982: Installation of the 1st wind park in Europe (5 x 20kW);
- 1983: Installation of a 100kW photovoltaic (PV) system with battery storage (400kWh);
- 1989: Replacement of the wind turbines (5 x 33kW);
- 1992: Inverter installation for the PV system;
- 1998: Installation of a 500kW Vestas wind turbine;
- 2000: Installation of a fully automatic control system (Intelligent Power System);
- 2001: Operation of a PV-powered autonomous microgrid with batteries and diesel generator back- up in the Gaidouromandra area.

Introduction of renewable sources of energy in the power mix - Kythnos

A hybrid power plant system with battery storage and an intelligent management system on Kythnos combines diesel generators, wind turbines and solar panels, with a battery storage unit and a converter to alternating current. In practical terms, the power plant system can produce up to 2.8 megawatts during the summer.

Although the most recent wind turbines are not connected, the system meets the island's demand. When solar energy covers demand, the diesel system is automatically turned off, and vice versa. The electricity is transported, stored and converted. During the winter, the system provides renewable energy for 12 or 13 hours per day. The diesel unit is made up of four diesel generators of 300kW and three of 400kW. A diesel engine is used as a back-up.

Three times a year, a ship delivers oil to the harbour. 16 truck convoys are needed to carry the oil. Energy and a converter are funded by the EU.

Introduction of renewable sources of energy in the power mix - Gaidouromandra

The microgrid of **Gaidouromandra** is a stand-alone system which is not connected to the island's electrical system. PV modules produce electricity which is fed into the local microgrid, powering a number of summer houses and one farm. The excess electricity is stored in batteries while a diesel generator is available as back-up. Inverters and power electronics ("Sunny Boy" and "Sunny Island") which were installed for demonstration purposes maintain the efficient operation of the microgrid. The microgrid is monitored and maintained by CRES, the Greek national entity for the promotion of renewable energy sources, rational energy use and energy conservation.

Furthermore, smart meters are currently being installed in Kythnos, in the context of the "Smart Grids in five Aegean Islands – Development of smart-grid infrastructure in autonomous islands of the Aegean Sea" project, run by the "European Local ENergy Assistance" (ELENA) programme of the European Investment Bank (EIB). The programme is funded through the European Commission's Horizon 2020 programme. Overall, the project will promote smart grids in the five Aegean islands, including Kythnos, in order to improve the quality of electricity provision, foster the penetration of renewable energy in local energy production and make energy loads more flexible through consumption-based measures.

Introduction of renewable sources of energy in the power mix - Gaidouromandra

Building on the above, Kythnos, as one of the five demo sites across Europe for the HORIZON2020 project WiseGRID project, will host a state-of-the-art integrated electricity system that includes:

- electrical vehicle charging stations;
- procurement of electrical vehicles;
- energy storage systems (batteries) for public/municipal buildings;
- equipment for optimising the operation of a desalination plant;
- energy storage systems (batteries) to increase renewable energy penetration in the local energy mix;
- equipment for the flexible and optimal operation of the electricity network.

•*Website for WiseGrid project: <http://www.wisegrid.eu/>*

Website for ELENA programme: <http://www.eib.org/products/advising/elena/index.htm>

Introduction of renewable sources of energy in the power mix - Samsø

Samsø has amassed a great deal of experience with a wide variety of local renewable energy projects, from wind turbines to CO₂-neutral district heating plants, rapeseed oil tractors and solar energy panels. Logically, the Samsø Energy Academy, situated close to the picturesque harbour village and tourist magnet Ballen, developed as a competence centre to spread information about smart solutions in energy.

This experience can be drawn upon through the Academy, and local and foreign researchers and scientists spend time at the Academy performing research based on the easy access to all these energy systems, where windmills, straw-fuelled district heating and thermal solar panel systems and the people who initiated them are close at hand. The Academy also functions as a conference centre where companies, scientists and politicians can discuss renewable energy, energy savings and new technologies. Samsø Energy and Environment Office, Samsø Energy Agency and the Samsø branch office of the Danish Energy Service are located in the Energy Academy. From here, they run a broad spectrum of energy counselling services for commercial and private customers, organise guided energy tours, workshops and seminars and generally promote 'energy tourism' for energy professionals. Being very active in Europe in the area of energy mix, the Energy Academy is also opening its doors to visitors from third countries such as Japan.

Website for the initiative: www.energiakademiet.dk

Website for the project: www.visitsamsoe.dk/en/inspiration/energy-academy/

Public filtered water fountains to prevent plastic waste - Favignana

On Favignana, a micro-filtered water project began in 2014. 300 000 litres of water have been distributed to the island's population through one outdoor fountain. The main objective of the fountain is to reduce plastic waste. Since 2014, it is estimated that the equivalent of 150 000 plastic bottles have been saved.

The project also has a social impact since the water (natural or sparkling) is free for local households, which are entitled to up to ten litres per day. Once extracted, the ground water is micro-filtered. For the time being, the fountain consumes energy supplied locally by a diesel-operated power plant. However, solar panels will soon be installed on the fountain.

The island of Favignana will need additional units to cover local needs.

Marine Protected Area (MPA) – Egadi Islands

Italy intends to develop a network of 54 Protected Marine Areas (MPAs), which will ultimately include all the Italian islands. Currently, the Italian network of MPAs is made up of 27 protected areas. Established by the Ministry of the Environment in December 1991, the **Egadi Islands'** MPA is the largest marine reserve in the Mediterranean (around 54 000 ha), covering around 25% of the sea's vulnerable or protected areas. The size of the area is explained by the interaction of three marine currents, the nutrients and the transparency of the water whose hydro-dynamic conditions facilitate the treatment of waste water. The area includes the islands of Favignana, Levanzo and Marettimo and the islets of Maraone and Formica. The MPA is managed jointly by the government and the local community.

The Egadi islands MPA involves various internationally protected habitats and species included in the Natura 2000 network². One of the most important and best preserved is the *Posidonia oceanica* seabed (almost 8 000 hectares), which contributes to rich biodiversity (fish nursery), mitigates coastal erosion and produces oxygen. The species protected include bottlenose and striped dolphins, sperm whales, storm petrels, sea turtles (especially *C. caretta*), and, above all, monk seals (*Monachus monachus*), repeatedly sighted in the archipelago after being absent from Italy for 60 years. Extensive formations of vermetid reefs (*Dendropoma petraeum*) are common along the coasts.

Marine Protected Area (MPA) – Favignana

In **Favignana**, partnership with local fishermen has been very important in establishing the MPA. Being key partners in the MPA since its establishment in 1991, fishermen are involved in the integrated coastal management system and the promotion of sustainable development. “Guardians of the Sea”, a bottom-up initiative, was developed and based on an approach where fisherman are considered “one of the protected species”. The MPA combats illegal trawling systems by setting up anti-trawling bollards, which reduced infringements by over 80% in five years. The “Guardians of the Sea” initiative has involved 93 fishermen in the protection of the archipelago based on a code of conduct, the reporting of abuses and research. In addition, educational activities have been introduced and financed by the EU LIFE+ programme, together with a monk seal observatory and monitoring with the Joint Research Center (JRC) of Ispra. Finally, the MPA created a label for environmental certification of tourist services used by 70 operators and placed 14 mooring buoys for yachting. In term of funding, the MPA is supported by the municipality, the state, LIFE+, the Structural Funds, entrance fees, merchandising, sponsorship, donations and a fundraising programme. The objective of the MPA is to increase the number of visitors in April, May, June and October. 45 people work for the MPA in the summer. The MPA has become widely known thanks to its practical action in preventing illegal fishing.

Website for the project: <http://www.ampisoleegadi.it/>

Economic development - Shipyards in Saaremaa

On Saaremaa, there are several shipyards which build small vessels, such as Luxury Yacht, Alunaut, Saare Paat and Baltic Workboats. During its “going local” event on Saaremaa, the EESC Smart Islands project could visit Baltic Workboats at Nasva.

In the past, the forerunner of Baltic Workboats was a company that built and repaired fishing vessels. Since breaking away from the original approach, the company has specialised in civil security (e.g. tugboats) as well as small ferries serving smaller islands. The company has already manufactured 100 vessels.

130 workers are employed (architects, engineers, painters, electricians and welders). The company uses modern and high-level materials, particularly to fold and weld metal (argon and semi-automatic system). Waste management is an issue for this industry: although the metal is collected and compressed, waste is shipped to the mainland for recycling. An important aspect of Baltic Workboats is that their design solutions are also developed on Saaremaa, unlike many others which use design solutions developed elsewhere. It was noted here that while the company provides maximum health and safety facilities, the implementation of those provisions needs to be monitored closely.

Website: <http://www.balticworkboats.ee/>

Economic development - Small-craft competence centre island of Saaremaa

Created by the National Business Development Agency (Enterprise Estonia Saaremaa branch) as a business support centre, in cooperation with local entrepreneurs, the centre is connected to an academic institution, Tallinn Technical University. It provides testing materials for small-craft shipyards. 1/10 models are tested in a pool owned by the centre for use by any ship-builders who might need it. It is an important centre for Estonia, since 80% of shipyards are located on the island of Saaremaa.

The centre uses state of the art technologies (3D printers, testing pool, laboratories for testing material durability, etc.). One of the six business clusters set up in Estonia, the small-craft competence centre is working very well and is the only one on an island. Due to the fact that it is run in cooperation with an academic institution which provides the shipyards of **Saaremaa** with a skilled workforce, the centre is likely to remain operational and to develop further.

Website for the centre: <http://www.scc.ee/>

Economic development - E-commerce - Palma de Majorca

In recent years, many big companies (supermarkets) have competed with local commerce and destroyed jobs, particularly in **Palma de Majorca**. The Balearic Islands need measures to avoid new supermarkets developing in the outskirts of big cities, disrupting the business opportunities of small shops in city centres.

The “E-Commerce” project has been developed by the government together with the business community and employer organisations.

The project involves 21 municipalities. However, because of the economic crisis, it is more difficult for small businesses to invest in digital technology. Despite that challenge, many companies have been adopting e-commerce solutions and are rescuing their businesses, which otherwise might be forced to close.

Economic development - Turning a declining market into a landing point

Traditionally, an important economic activity for island communities has been fishing. Although this activity has dwindled sharply, many island communities still have fisheries.

Specialising in small-scale fishing, **Île d'Yeu** is one of the few islands in France to have its own fish market. Although European regulations have significantly curtailed fishery activities, it is still very much a part of the island's economy, with a fleet of about thirty boats. The fish market is situated in Port Joinville and is well equipped with facilities for receiving and processing the fish, electronic sales to destinations far afield, and storage. The fish market on Île d'Yeu is run by the Vendée Chamber of Commerce and Industry (CCI) and employs some thirty people. The decline in sales in recent years has placed a question mark over the future of the only fish market to be held on a European island. The possibility of turning the market into a landing point is currently being discussed: part of the catch would be set aside for Île d'Yeu, with the rest being sent for sale in Sables d'Olonne. This would mean that the sales prices would only be known afterwards. A complex system of compensation would prevent the island from being penalised by this option. This innovative proposal could provide an alternative for the future for a declining market, and at the same time save jobs that are under threat.

Website for the initiative: <http://www.vendee.cci.fr/le-port-de-peche-de-lile-dyeu>

Economic development - Short supply chain - Île d'Yeu

An Economic Interest Group (EIG) has been set up by some of the **Île d'Yeu** fishermen to diversify the private sales points in the Nantes area. This short supply chain is the first Association for the Preservation of Agricultural Smallholdings (AMAP) for fish to be established in France, and the initiative is unique to France.

Website for the initiative: <http://www.amap44.org/cartes-et-annuaires/les-amaap-s-poisson>

Economic development – Circular Economy - Kythnos

Kythnos has a rich tradition of agricultural activities which, despite declining considerably in recent years, are showing signs of revival particularly at the small, family-farm level. Apart from small-scale fishing, subsistence agriculture is essential for the population since the products (vegetables) are an important part of the circular economy.

In cooperation with the local farm cooperative, and together with academic and research bodies, the municipality has taken steps to strengthen the agriculture sector and local produce. Vegetable produce is cooked and served in the island's restaurants, for example. The main produce is cheese (one with a geographical indication); honey (one an award-winner in an international competition) and wine. In general, young farmers are developing initiatives to bring back old production systems and are promoting high quality products (honey, wine, breeding/lamb and cattle).

Economic development – Circular Economy - Saaremaa

Saaremaa has been creating a label – Made in Saaremaa. The aim of the label is to encourage small producers of food, beverages and other goods to advertise and make local production more visible and more attractive for buyers. Other service providers such as hotels and spas can join the label if they are using the labelled products in their service provision.

Currently over 60 producers are using the label. They represent a wide range of products, along with handicraft products, cafés and restaurants. The initiative is backed by the EU Leader local development group.

Website for the initiative: www.ehtne.ee

Scientific initiatives to protect the marine environment Coastal observing and forecasting system –Mallorca. - 1

Oceanography has changed with the emergence of new technologies: whereas previously, work was conducted only by boat, nowadays, observing has shifted from single platform to multiplatform observation. Located in Mallorca, the Balearic Islands Coastal Observing and Forecasting System (SOCIB) is a joint initiative between the Spanish Ministry of Science and Innovation and the Balearic Islands Government.

The infrastructure was the result of public investment, backed by the government of the Balearic Islands and the national government. SOCIB activities are in the field of science and technology and are socially driven. SOCIB is designed to respond to international scientific priorities and to society's increasing need for intensive and quasi real-time monitoring and forecasting of the complex coastal environment. The three basic elements of SOCIB - the observation facilities, the modelling facility and the data centre facility - form a state of the art marine infrastructure that is ready to cooperate on cutting-edge research. This EUR 12 million marine research project located in **Palma** covers the entire Mediterranean basin. Ocean observation is based on physical observation (biological data such as oxygen and fluorescence). SOCIB is performing solid research but responding to social, environmental and economic needs. It has the capacity to provide new data in response to social (jelly fish warnings for tourists), environmental (pollution, oil spills) and economic needs (fishing activities).

Scientific initiatives to protect the marine environment

Coastal observing and forecasting system – Mallorca - 2

SOCIB uses a vehicle with long cables, an Argo profiler, an oceanographic boat, a glider (US patent) and an application and forecasting systems for marine currents. All the information is freely and publicly available. SOCIB is enhancing capacity through big data streaming. Examples of activities conducted: observation of the erosion of Mallorca's beaches, the SASEMAR agreement (Servicio de Emergencia en el mar), meteorological forecasting to identify the state of halieutic resources (Bluefin tuna, jelly fish, sea turtles, mammals), coastal pedology, survey of pollution from the mainland, providing data for hotel chains, sea traffic and maritime safety. Data are also used for recreation (surfing), fishing and research purposes. SOCIB is connected to satellite systems: GALILEO, IRRIDIUM satellite communication and the COPENICUS programme.

SOCIB has been identified by UNEP as an example of good practice. It is part of the new “Medclit: the Mediterranean in one click” programme, developed in cooperation with Fundación Caixa. “Medclit” has the dual objectives of promoting research and bringing the benefits of new marine and coastal observation technologies to society.

Website for the initiative: <http://www.socib.eu> Website for Medclit: <http://www.medclit.es/en/>

Scientific initiatives to protect the marine environment

Protection and study of marine meadows - Egadi islands - 1

In the **Egadi Islands**, the Ge.Ri.N Project (Natural Resource Management Project) carried out by ENEA (the Italian Environmental Agency) with the support of the MPA, focuses on many environmental matrices of potential interest, such as ground water and the coastline. They have a strong impact on the flow of tourists, the accommodation capacity of small islands and sustainable development.

The Egadi Islands' natural resources and distinctive landscape are in fact the key to the economic development of the archipelago, which is heavily dependent on tourism. Their conservation is therefore fundamental. The project's tasks are based on the study of coasts and seabed, hydrogeology and the epidemiological study of the territory. Particular attention has been paid to the management of marine sediments and vegetable beached biomass (the "posidonia banquette"), in order to use them for environmental conservation and compost production.

Scientific initiatives to protect the marine environment

Protection and study of marine meadows - Egadi islands - 2

Posidonia oceanica (commonly known as Neptune Grass or Mediterranean tapeweed) is a species of seagrass endemic to the Mediterranean Sea. It forms large underwater meadows that are an important part of the ecosystem. *Posidonia* is considered to be “the lung of the sea”, since 1m² of the seagrass produces 1.2 litres of oxygen, more than 1m² of Amazonian forest. The seagrass also mitigates the effect of erosion along the coastline. The fruit is free floating and known in Italy as “the olive of the sea” (l’oliva di mare). Balls of fibrous material from its foliage (known as egagropili) wash up on nearby shorelines.

The largest expanse of *posidonia* in the Mediterranean is in the Egadi. The MPA is currently working with the Università degli Studi di Roma “La Sapienza” to develop outdoor furniture made from foliage. An awareness-raising project will be implemented in order to explain the importance of *posidonia* to tourists.

Scientific initiatives to protect the marine environment

Rescue centre for Sea Turtles and Monk Seal Observatory - Favignana

A centre has been established on **Favignana** and provides first aid for injured sea turtles. The centre also operates as a seal observatory. The main work of rescuing and returning sea turtles to their proper environment occurs elsewhere, but the process begins here. The centre has a facility for small operations - preparing the sea turtles for transport to a rehabilitation centre. The rehabilitation centre itself is on Lampedusa (where the turtles are brought via Agrigento). Many sea turtles that have swallowed plastic bags or been injured in other ways have to be transported from Agrigento to Lampedusa by plane. The turtles found around Favignana have to travel back from Lampedusa as they must be released in the same place that they were collected. Various sponsors and programmes have financed the centre, such as the LIFE+ Tartalife project, the Ministry of Environment, Federparchi, and private sponsors – the largest of which is the Rio Mare company – which have also sponsored the monk seal and bollards project. The monk seal centre at Marettimo (Punta Troia castle) is an observatory, as monk seals prefer to avoid people. The first aid centre teaches fishermen what they have to do when they come into contact with injured sea turtles. They have to have a pillow, keep a wet towel over the turtle, and learn how to lift the turtle.

Website for the project: <http://www.tartalife.eu/en/%E2%80%9Ccegadi-islands%E2%80%9D-marine-protected-area>

Scientific initiatives to protect the marine environment Merging Vacations with Scientific Curricula

An interesting case study is due to an idea proposed by a Seyshells citizen, tourists and scuba divers are found of Seyshell Islands, why do not merge these interests with educational improvements.

Why do not establish a PhD course on Marine biology asking the cooperation to International universities ?

This will diversify the offer of Seyshell Islands compared with other scuba divers' paradises.

Smart solutions in governance and social innovation

Methods of cooperation

Samsø has a long tradition of cooperation which was useful for creating opportunities for renewables. This tradition “became a culture”, says the mayor of Samsø. The project which brought Samsø to its current status actually began in 1998 with the wind turbines, before the change in heating systems, the new ferry line and the broadband system. The next project might be the development of a biogas plant to fuel the ferry (for the time being, energy is imported from Rotterdam). Farmers and the local population have been leading the projects from the beginning, somehow forcing the municipality to be involved.

The way of approaching the problems can be considered a type of social innovation, where inhabitants take planning and action into their own hands and create an efficient structure for further development.

Smart solutions in governance and social innovation

SmileGov project - 1

The project was based on the idea that cooperation between different levels of governance of islands (i.e. national, regional and local) can play a key role in reaching the EU's 20-20-20 goals in the area of energy and climate change. Good multilevel cooperation has been identified as one of the key factors in consistent (between different levels) and possibly effective sustainable energy planning at local level. Particularly in island communities, this role has proven to be crucial for the balanced development of the island, resource management, economic growth and quality of life for residents and visitors.

SMILEGOV is based on success stories and close European cooperation, and will strengthen local capacity and work to improve multilevel cooperation in European islands in order to help implement their sustainable energy action plans with a view to achieving the EU's 20-20-20 goals. As regards islands that have not yet been through the sustainable energy planning process towards 2020, capacity building will be offered with the aim of supporting the island's structures and enabling them to develop their own planning and energy projects.

Smart solutions in governance and social innovation

SmileGov project - 2

In order to support this process, clusters of European islands will be set up in the biggest European insular regions: the Atlantic (Canaries, Scotland), the Baltic Sea (Denmark, Sweden, Norway, Finland, Estonia) and the Mediterranean (Italy, Malta, Cyprus, Greece). The formation of clusters of islands and the exchange of knowledge at local and regional level, the identification of strategic guidelines to overcome existing barriers with assistance from advanced islands, as well as the process of learning from the experience of model areas (“learning from the experts”) will guide islands along this path.

Smart solutions in governance and social innovation

The Pact of Islands

The Pact of Islands is a European initiative adopted by the European Parliament that embraces European island authorities that commit to taking concerted action in line with the EU 2020 energy targets through the support and promotion of renewable energy, energy efficiency and sustainable transport projects at local level. The European Parliament supports the role of island communities in the mobilisation against global warming through Declaration 37/2011 which recognises the Pact of Islands as an EU initiative parallel to the Covenant of Mayors.

The Pact of Islands highlights the vulnerability of islands to climate change, stresses the need for energy security and the importance of lowering dependence on imported fuels, while flagging up the high economic, environmental and cultural values of the most popular tourist destinations in Europe: the European islands.

Website for the initiative: <http://www.islepact.eu/html/index.aspx?pageid=1020&langID=3>

Smart solutions in governance and social innovation

Redeveloping the urban environment

In Mallorca, two areas in the centre of Palma need to be redeveloped and adapted to the needs of visitors and inhabitants. One of those is situated around a heritage listed 1970's building, the now abandoned former headquarters of Gesa, while the other is the area of Nou Llevant, currently deemed unattractive by inhabitants and visitors.

Discussion is ongoing at civil society level concerning projects on urban initiatives proposed by civil society. Based on these concerns, an initiative called “District scientific i technologic urban RAMON LLULL 2030”, dedicated to innovation, science and technologies, has been rolled out. On 13, 14 and 15 April 2016, the Ramon Llull 2030 initiative was discussed; this would involve converting the seafront of Palma into an urban scientific development district and attracting talent to the area.

The initiative could be considered a type of social innovation – where possible stakeholders would create a multiplier effect, potentially resulting in more long-lasting and solid outcomes than a solution forced on the local communities.

Recommendations

The site visits to these islands showed that there is an interest in getting to know the various smart solutions that island communities are using today and which have been proposed for further development.

- Despite their geographical diversity, EU islands face identical challenges such as territorial discontinuity, demographic desertification, strong seasonal fluctuation of tourists, energy dependency on fossil fuels (e.g. diesel), waste management, water supply and funding scarcity.
- Islands are answering these challenges by developing innovative projects which can be a model for other territories, particularly in the fields of ICT, the environment, energy, transport, tourism and commerce.
- Islands are living laboratories since they optimise the use and management of local resources and infrastructures.
- The UNFCCC Paris Agreement is paving the way to a transition towards a low carbon economy. Smart islands have already started this journey through local decisions creating synergies between ICT, the environment, energy, transport, tourism and commerce.
- Innovative projects developed in the islands can be replicated in other EU territories such as less favoured areas in rural areas and EU urban territories in difficulty.

General EESC recommendations

- Impressed by the projects implemented by island communities, households and private actors, the EESC recommends that the European Commission list the islands' initiatives in a catalogue which could inspire other EU territories.
- The Eurostat publication "Portrait of the Islands (Eurostat 1994)" proposed a definition of an island³, which has been modified as shown by the fifth Cohesion Report (CEC, 2010). The EESC again calls for this definition to be revised, taking into consideration "smart" indicators. "Smart" indicators will be defined in cooperation with the local population, authorities and civil society representatives.
- Any Member States with islands could dedicate a specific administration to insular territories in order to better address the specific features of these territories.

General recommendations Information and communication technologies

- Island inhabitants should be guaranteed access to affordable high-speed internet, regardless of the size of the island and population.
- ICT technologies should be encouraged to overcome islands' territorial limitations, particularly in the areas of administration, health, education and training, infrastructure, commerce, spatial planning and social issues.
- The use of safe data protection systems, such as QR codes, should be encouraged.
- As regard free wifi, which has become an asset for increasing the attractiveness of islands, local authorities should ensure that the online storage of data is handled at national level so as to ensure effective control of users' personal information⁴.

General recommendations - Energy and transport and the environment

- Decentralised energy production and consumption should be encouraged by Member States since they are a model for islands willing to cut CO2 emissions by reducing their dependence on fossil fuel.
- Renewable energies (such as solar, wind, geothermal and tidal) and energy efficiency (such as smart grid systems, heating systems and public lighting) should be accessible to islanders and encouraged through innovative funding. Funding programmes should support small-scale projects, but private financial institutions should also facilitate the small investments needed by local authorities and/or households.
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- The EESC recommends that island administrations and islanders be encouraged to move toward soft mobility with the development of public maritime and inland transport modes using alternative fuels such as biogas from waste management (methane).
- Waste management is problematic for all islands. The EESC recommends that islands develop waste prevention projects, particularly for plastics which are expensive to recycle.

General recommendations - Tourism development

- The preservation of local architecture and the redevelopment of old factories, docks, buildings or paths can provide local jobs and attract tourists.
- Innovative, accessible and affordable modes of transport to reach the islands and move around on the islands is crucial for sustainable tourism development. Best practices from island communities, such as extensive use of bicycles, electrical vehicles and local policies supporting such developments, should be more widely disseminated among island communities.

General recommendations - Economic development

- To diversify the economy of the islands, the EESC recommends developing market “niches” based on traditional activities, local resources and e-commerce.
- The EESC recommends developing short supply chains, the circular economy and labels based on geographical indications (GIs) to sell high added-value products from the primary sector (seafood, agriculture).

General recommendations - Scientific initiatives

- The EESC draws the attention of the European Commission and the Member States to the fact that islands are territories suitable for testing innovation. As such, islands should be supported in hosting pilot projects, particularly in the fields of ICT, energy, transport, waste and water management, commerce and fisheries.
- The EESC welcomes the development of scientific and educational initiatives in the areas of renewable energy, marine protected areas and marine conservation, and preservation of cultural heritage. These initiatives create jobs and growth, particularly in small islands.

General recommendations - Governance

- The EESC recommends that local authorities use an interactive approach involving residents and civil society when designing and implementing a project.
- The EESC recommends that small islands exchange knowledge and develop cooperation when answering local challenges. On this point, the EESC considers that the Pact of Islands is a powerful initiative, particularly in the fight against climate change.

Conclusions

Identical challenges but varied responses, due to opportunities, history and geographical situation.

Some islands have very similar circumstances, such as Favignana and Île d'Yeu, which used to be major centres for tuna fishing which has virtually disappeared due to European regulations. Mallorca and Saaremaa are industrial. Samsø and Kythnos are betting on energy self-sufficiency.

Development via tourism is a reality, but has to deal with the high degree of seasonality which is emphasised on islands.

The lack of jobs and the need to go to the mainland for secondary and higher education leads to a brain drain of young people and an ageing population, which has implications for all sectors but especially for healthcare demand.

Communication and promotion of islands and their unique aspects are an important factor for development, but circumstances vary widely in this respect, as illustrated by Kythnos, a wind power producing island that is far less well known than other Aegean islands.

The fact remains that attracting tourists, preserving an often exceptional environment, making greater use of ICT and sources of renewable energy, and communicating on the strengths of islands, are the pillars of economic and social development on islands.

The EESC will continue to support islands, in its role as bridge between civil society and the EU.

