2020 Edition



ENERGY, WATER, MOBILITY, CIRCULAR ECONOMY, SUSTAINABLE TOURISM.

The challenges for the smaller islands and best practices from all over the world.



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Introduction

The smaller islands are isolated systems that can become the ideal laboratory to face the most urgent and important environmental challenges over the world. It is possible to apply innovative models in the field of energy, the water cycle and waste. This challenge looks at the protection of the natural and landscape resources of the Italian and Mediterranean islands involving them in ambitious sustainable projects, as they represent a vulnerable ecosystem, in which the impacts related to the increased temperature of the atmosphere and the sea and due to human pressures are linked to the strong tourism activities in the summertime.

The Sustainable Islands Observatory promoted by Legambiente and the CNR-IIA has the purpose of spreading awareness about the dimension of this challenge and pushing to a change in which these islands are becoming a laboratory for environmental innovation. A look will be given to an international Scenario through partnerships with networks and associations that are projected to this direction.

The storytelling of what is happening in the world will be shown through the portal isolesostenibili.it where there are already interventions of great interest made by the Pacific to Atlantic, from the North Seas to Australia, and it will be continuously updated with projects and good practices from all the islands of the world on the themes of energy, water, waste, mobility, sustainable tourism. In fact, the observatory collaborates with the structures of European context, both at the European Commission (through the Secretariat for clean energy for Minor Islands) and at the Member States (for example the DAFNI Association in Greece).

The 27 inhabited Italian smaller islands will be the heart of this report that will try to understand annually where we are on the road to sustainability. The work done until now on these issues by CNR-IIA and Legambiente will be the starting point, but the aim will be to make the observatory an accelerator of actions in the islands, through the exchange of experiences and knowledge, the organization of workshops and events, the dissemination of periodic documents and reports to spread the potential and urgency of a positive change.

Given a look at the islands about the climate change, it is fundamental today to understand how to replace energy production from fossil sources with renewable energy, but also to give other solutions to the management models of water and raw materials in the perspective of the circular economy. In these delicate territories, it is acquiring a great concern the reduction of precipitations and at the same time the greater frequency and intensity of alluvial phenomena and heat waves, the phenomena of intrusion of salt water in the freshwater aquifers, and the ever more serious loss of biodiversity in agriculture and fisheries. There are many islands in the world that are betting on different models of development with zero emissions and with adaptation interventions to the phenomena related to climate change. A direction of intervention that today also represents a great opportunity to attract the growing share of tourism in search of a quality offer in the smaller Italian islands where the landscape and history, biodiversity and gastronomic typicality are at the center (of which the Italian islands are rich) but also the innovation given by solar systems, energy storage systems, material recovery and recycling systems, electric mobility.

The Mediterranean can and must become a protagonist in this process by highlighting local natural resources and stimulating the local economies, involving the communities of residents. The aim of our work is to established the necessity of a positive environmental change, it should be accelerated because of that it general interest, of resident citizens as well as tourists, the environment and the economy.

These challenges are ongoing across Europe; in this regard, the European Commission set up a secretariat in 2018 to facilitate the European transition towards the production of cleaner energy in these isolated contexts and to achieve the objectives of the "Clean Energy For EU Islands" initiative.

In addition, Europe has programmed several calls in the "Horizon 2020" program in recent years to address the specific problems of the islands to finance projects aimed at environmental sustainability and energy transition. Among them, the NESOI project - The European Islands Facility - which aims to finance 60 successful energy transition projects out of the 2400 islands in the EU inhabited, mobilizing over 100 million euros of investments and significantly reducing emissions of C02 and GHG by 2023. At the same time as this initiative, there is another - the European City Facility - aimed, more generically, at financing European development plans for the attraction of financing in the sustainable energy sector, such as for example feasibility studies, engineering analyzes, legal analyzes, social studies, market studies and financial analyzes for a total of 60 thousand Euros per single project.



CHALLENGES FOR THE SMALL ITALIAN ISLANDS

As regards Italian islands these challenges are particularly important and topical because in these places there are all the potential to build models to create energy, water and waste cycles. In fact, the data show how these contexts can be transformed from a current situation of total dependence on the mainland for supplies through ships of diesel for power plants, petrol and diesel for mobility, water for various civil uses and at the same time disposal for waste of all kinds, in innovative models where the focus is on recovery and recycling, on renewable sources and on energy efficiency and water treatment. At the moment the gap to be recovered on each of these issues is truly relevant, as the data and analyzes of this report tell, but the barrier we face is not at all technological and economic; what is holding back the transformation is the lack of political vision and the involvement of those who live in the islands. Therefore, courage and vision are needed from the local, regional administrators, the competent ministries (also the Superintendencies that must favor these processes instead of hindering them) and also by the Central Government. It is also necessary to involve local communities in a process of change where everyone must play their part in promoting innovation and conservation. In the future islands there will be needed for more solar systems and electric cars but also for respect for traditions and enhancement of environmental and historical qualities, such as typical crops (capers, rare vines, lentils, figs and figs of India, etc.) cultivated with wisdom for centuries to adapt to morphological and climatic conditions, unique biodiversity and geological conditions.

Two challenges appear particularly relevant in these contexts. The first concerns the ability to implement these innovations in reality in which tourist is a focal point in the summer months, with peaks in consumption and impacts (if in the islands analyzed there are about 200,000 people permanently living, in the summer season they can increase by 3- 4 times). This condition is certainly complex and influences the policies of the Local Administrators.

The second challenge is to continue these innovations in hyper-constrained territories under environmental and landscape point of view. In fact, we find national parks (Tuscan Archipelago, Pantelleria, Ponza, Tremiti), protected marine areas (Egadi, Pelagie, Tremiti, Ustica, Ventotene, Ischia, Procida, Gorgona), Sites of Community Importance, Special Conservation Zones and Protection Areas Special (Egadi, Pelagie, Capri, Ischia, Tuscan Archipelago, Maddalena, Sant'Antioco, San Pietro, Ponza, Ustica, Eolie, Tremiti), Unesco Sites (Eolie), Oriented Natural Reserves (Ustica, Eolie), Natural Areas of Interest International (Capraia, Giglio, Gorgona, Elba, Maddalena) as well as several nesting sites for migratory birds (IBA).

For these reasons, the islands are truly a strategic field of experimentation for our country, which will have to bet strongly on innovation, the environment and tourism in the coming years.

The objectives to work on in the coming years are very clear and also defined.

The first **is to increase the production of energy from renewable sources** and accompany it with energy efficiency measures in all uses, so as to gradually reduce the power plants from existing fossil sources until they are closed definitively within a few years.

The second **is to close the material cycle**, through a careful chain of separate collection, recovery and reuse that covers all possible materials (paper, plastics, metals, etc.) and the enhancement of the organic fraction for production of compost and biomethane / biogas.

The third **is the creation of a virtuous model of water resource management**; precisely because water is a scarce and most precious resource on the islands and its careful management and recovery is fundamental, and at the same time the absence of a complete treatment of wastewater in islands so extraordinary and with such tourist potential is not acceptable.

The fourth objective is related to **sustainable mobility**, because the smaller islands have accessibility and travel management problems in particular in the months most frequented by tourists and it therefore becomes essential to invest in the innovations and integrations possibilities such as electric and collective mobility, sharing, cycle mobility and pedestrian solutions.

There is still work to be done. Precisely the islands that could become the ground of innovation and closure of the cycles, are currently among the least virtuous territories from the point of view of the management of the territory. Some technologies would allow to reach a complete cycle of energy, water and materials, in large part of the islands it is still the ships that guarantee that the situation does not go into crisis, carrying diesel fuel to burn in old power plants and water and carrying away all kinds of waste , in major part without separate collection. Without forgetting that a large part of the wastewater is put on the sea without a minimum treatment.

However, the deeper the analysis framework on the smaller Italian islands, the better we understand **how we can completely change the scenario. Starting from energy**, focusing on the contribution of sun, wind and other renewables - to be valued according to the contexts - through an innovative management of networks, storage systems and efficient technologies that allow us to respond to the demand for mobility (pushing the electric one and therefore reducing petrol and diesel consumption). At the same way as regards **water**, so it is possible to focus on local recovery and treatment, reduction of losses and waste, installation of seawater desalination plants and treatment and phytodepuration of wastewater. The result would be more innovation and environmental benefits, less spending and travel than ships loaded with diesel fuel, water, waste.

Furthermore, **agriculture**, a sector in which future challenges are more than ever intertwined in attention to water and waste management, today the enhancement of agricultural waste can allow the production in small anaerobic digestion plants, biogas and if useful biomethane and natural fertilizers for agriculture. The same building heritage can become the stage of a widespread redevelopment that will allow to reduce the demand for cooling and heating, with the solarization of the roofs and the seismic safety.



| Island | Municipality | Province | Archipelago | Total Area [km2] | Population |
|------------------|--------------------|----------|-------------|------------------|------------|
| Capri | Capri | ΝΑ | Campano | 10 / | 1/100 |
| | Anacapri | | | 10,4 | 14102 |
| | Ischia | | | | |
| | Barano d'Ischia |] | Flegree | 46,3 | 64126 |
| lachia | Forio | ΝΛ | | | |
| ISUIId | Casamicciola Terme | INA | | | |
| | Lacco Ameno | | | | |
| | Serrara Fontana | | | | |
| Procida | Procida | NA | Flegree | 4,26 | 10481 |
| Capraia | Capraia Isola | LI | Toscano | 19,3 | 407 |
| lsola del Giglio | Isola del Giglio | GR | Toscano | 21,5 | 1436 |
| Gorgona | Livorno | LI | Toscano | 2,25 | 130 |
| | Portoferraio | | Toscano | 224 | 31957 |
| | Porto Azzurro | | | | |
| | Capoliveri | | | | |
| Isola d'Elba | Marciana | | | | |
| | Marciana Marina | | | | |
| | Rio | | | | |
| | Campo nell'Elba | | | | |
| Pantelleria | Pantelleria | ТР | Pelagie | 83 | 7702 |
| Lampedusa | | 4.0 | Pelagie | 20,2 | 6556 |
| Linosa | Lampedusa e Linosa | AG | | 5,4 | |
| Favignana | | TP | Egadi | 19,3 | 4337 |
| Marettimo | Favignana | | | 12,4 | |
| Levanzo | | | | 5,8 | |
| Ponza | Ponza | LT | Pontine | 7,6 | 3376 |
| Ventotene | Ventotene | LT | Pontine | 1,75 | 769 |
| Ustica | Ustica | PA | | 8,2 | 1318 |
| Isole Tremiti | Isole Tremiti | FG | Tremiti | 3,18 | 490 |

tThe 27 Italian inhabited smaller islands analyzed in the report

| Island | Municipality | Province | Archipelago | Total Area [km2] | Population |
|--------------|---------------------|----------|--------------|------------------|------------|
| Lipari | | ME | Eolie | 37,6 | 12821 |
| Vulcano | | | | 21 | |
| Stromboli | Linori | | | 12,6 | |
| Panarea | цран | | | 3,4 | |
| Filicudi | cudi | | | 9,3 | |
| Alicudi | | | | 5,1 | |
| | Leni | | Eolie | 26,2 | 2598 |
| Salina | Malfa | ME | | | |
| | Santa Marina Salina | | | | |
| Sant'Antioco | Sant'Antioco | 011 | Sulcis | 108,9 | 13969 |
| | Calasetta | 30 | | | |
| San Pietro | Carloforte | SU | Sulcis | 51 | 6151 |
| Maddalena | La Maddalena | SS | La Maddalena | 20,1 | 11192 |

Sustainable Islands Report 2020. Based on Municipalities and ISTAT data.





SUSTAINABILITY IN THE SMALL ITALIAN ISLANDS

ENERGY

As regards energy, the situation in the smaller islands today outlines a picture of great backwardness; however, some positive signs can be seen from the new installations of renewable sources. Although on some islands there are some of the most promising sun and wind potentials in Italy, in reality the numbers of installations of plants from renewable sources are among the lowest nationally. The coverage of electricity needs in the islands not interconnected to the national electricity grid is still guaranteed today by oil-fired thermoelectric plants, with companies that control both production and distribution (in 12 islands we find private local companies, on 8 islands Enel Produzione operates).

Up to now the particularity and complexity of supplying the islands has in some way "justified" the paradox of such an inefficient and expensive system; to guarantee the continuity of the service according to ARERA, the average cost of electricity production in the smaller non-interconnected islands is in fact about 6 times higher than the national one ¹.

Every year almost 80 million euros are withdrawn from bills, within the UC4 component of system charges², and paid to local companies.

1 \pounds 0.39 / kWh vs. \pounds 0.065 kWh (DCO 598/2014 / R / eel, ARERA). The higher operating cost of the fossil fuel-based model is linked to the twofold fact that, normally, the power of the diesel generator is not adjustable, therefore to function correctly it must work constantly at a speed close to full power (thus burning more diesel than it actually does necessary, in a reality in which the raw material is already expensive and is moreover burdened by the cost of transport by ship) and cannot be turned off at will in case of low demand, because the cooling and ignition periods are long and risky.

2 The compensation of the higher generation cost incurred takes place in the form of tariff integration for the UNIEM companies, and in the form of recovery of the generation costs for units considered essential for the safety of the electricity system, in the case of Enel. In the first case (UNIEM company), the coverage, up to the reform of the tariff structure desired by the Authority (in force from 1.1.2018) was taken through the item UC4 of the system charges, which all the holders of an electrical contract paid in bill and that with the reform has now merged into the ARIM component (element AUC4RIM). The UC4 revenue withdrawn is equal to about \notin 70 million / year (\notin 66.2 million in 2013, CSEA data), ie less than 1% of the total system charges paid by the average consumer (\notin 0.86 / year per user). In the second case (Enel Produzione), the investment remuneration is equal to about 10 million euros / year, as a reintegration of the generation costs guaranteed to the essential units for the safety of the electrical system. in 2012 the average rate of return on equity for UNIEM companies was 2.43%, while for Enel Produzione the return on investments was 7.76%. The scheme described, for companies operating under a monopoly regime, actually coincides with an incentive to use the fossil source (diesel) which over the years has penalized and displaced the competition of technologies from renewable sources. On the contrary, on a level playing field, clean technology would not only be cheaper economically, repaying the initial investment in just a few years thanks to virtually zero operating costs, but would also bring numerous collateral benefits to the community, also in terms of equilibrium of the dispatching system , thanks to the mix of sources that go into production at different times, to accumulators and active load control methods (smart grids).

In the following table and in the data sheets of the individual islands, the current situation of the smaller Italian islands is described with respect to the diffusion of installed renewable sources and coverage of consumption.

The 20 out of 27 inhabited islands analyzed are still not connected to the national electricity grid (Pelagie Islands, Egadi Islands, Tremiti Islands, Aeolian Islands, Ponza, Ventotene, Ustica, Capraia, Giglio Island, Gorgona). Of the interconnected islands, Capri is the latest addition. The latter was in fact interconnected to the national electricity grid on 27 June 2017 due to the entry into operation of the 150 kV Nova SE Capri - CP Torre Annunziata connection ³ (interconnection communicated by Terna to the Authority).



3 Instead, Terna's work is underway to build the new 150 kV power line from Sorrento to Capri. One of the most critical parts of the work has been completed, namely the laying of the submarine cable that will connect the new electricity station under construction on the Sorrento peninsula with that of Capri. The submarine connection is an integral part of the new power line that Terna is building between Capri and Sorrento, a connection with a total extension of 19 km, of which, in fact, 16 km by sea and 3 by land. The aim of the work is to complete the connection ring of the island of Capri to the national transmission grid, making the electricity grid safer and more efficient.

| Island | Photovoltaic Power installed year 2019 [kW] | Electricity demand coverage by RES ⁴ |
|---|--|---|
| Capri | 20 | interconnected |
| Ischia | 225,14 | interconnected |
| Procida | 41,04 | interconnected |
| Isola d'Elba | 335,43 | interconnected |
| Sant'Antioco | 111,465 | interconnected |
| San Pietro | 17,4 | interconnected |
| Maddalena | 52,5 | interconnected |
| Capraia | 19,62 | 100% |
| lsola del Giglio | 0 | 0,45% |
| Pantelleria | 46,36 | 1,73% |
| Isole Pelagie (Lampedusa e Linosa) | 0 | 0,39% |
| Isole Egadi (Favignana, Levanzo, Marettimo) | 29,16 | 2,44% |
| Ponza | 0 | 1,39% |
| Ventotene | 0 | 4,91% |
| Ustica | 5,985 | 1,32% |
| Isole Tremiti | 0 | 0,64% |
| Isole Eolie (Lipari, Vulcano, Stromboli, Panarea, Filicudi, Alicudi) | 28,955 | 1,10% |
| Salina | 0 | 0,00% |
| Gorgona | ND | ND |

Electricity in the smaller inhabited Italian islands analyzed in the report

Sustainable Islands Report 2020. Based on Municipalities and GSE data.

⁴ The coverage of the electricity demand from RES was calculated by relating the theoretical producibility of RES with the annual production from fossil fuels, as extrapolated from Annex 1 of the MiSE Decree of 14 February 2014. A separate case is the Capraia Island whose energy requirement is 100% covered by a biodiesel plant. The RES data are by Municipality - in the case of islands belonging to the same municipality, the data refer to the Municipality to which the island belongs. In the case of islands comprising several municipalities, the data have been aggregated.

In 2019 933 kW of photovoltaic solar were installed, about 7% of the total that is installed by 31.12.2019 (13013 kW). The largest photovoltaic installations in 2019 are found in interconnected islands, namely lschia, Elba and Sant'Antioco (they exceed 100 kW). Among the non-interconnected islands, Pantelleria is the island with the largest installations both in 2019 and overall (46.36 kW out of 531.556 kW). During the year, no photovoltaic system was installed on six islands and among these, Salina is the one that therefore remains totally without it. Its electricity requirement is therefore still completely covered by fossil sources since there is no other type of renewable source capable of replacing them. However, solar PV remains the most widespread renewable source on the islands, while micro-wind installations are unchanged compared to 2018 (it is present only in Pantelleria and Sant'Antioco).

In relative terms, none of the islands interconnected, except for Capraia, reaches 5% of the coverage of electricity by renewable energy sources. Capraia is the only island not interconnected to have completely abandoned production from fossil sources and to have replaced it entirely with renewable sources, satisfying 100% of the electricity demand thanks to a 3.2 MWe power plant, powered by imported biodiesel resulting from the processing of soybean oil, sunflower and rapeseed. However, to ensure constant supply to the entire island, the second agricultural raw material is transported by sea from the continent. This does not therefore eliminate the logistic (and economic) dependence on the mainland. For the other non-interconnected islands, the maximum coverage value from RES is registered in Ventotene, with 4.91%, followed by the Egadi islands with 2.44% (the only islands with a share greater than 2%). The average is less than 2%.

As regards solar thermal energy, Ischia is the island with the largest installed square meters, 883.34, almost 50% of which are in use in the municipality of Forio. Following, there are the islands of Lampedusa and Linosa with a total of 489.31 sqm and the Egadi islands with a total of 467.66 sqm.

These data highlight a serious delay - although in Lampedusa and Pantelleria, in the Aeolian as in the Egadi there are some of the most significant sunshine factors in Italy - not only in comparison with the islands of the rest of the world, but also compared to what happens in the rest of Italian Municipalities (see Legambiente Renewable Municipalities Report).

WATER

As regards **water** sector, in the Italian islands the problems to be addressed concern the scarcity of the water resources present, which force the islands to depend on the transport through barges or desalination plants for needs, and the total absence or inadequacy of the treatment of waste water.

In the following table and in the sheets of this report, the methods of water supply and waste water treatment in the 27 islands that have been analyzed are described.



| Island | Water supply mode | Wastewater treatment plant | Treatment level |
|---|---|----------------------------|-----------------|
| Capri | Submarine pipelines from the Sorrento peninsula | Yes | Partial |
| Ischia | Underwater pipelines | Yes | Partial |
| Procida | Underwater pipelines | Yes | Partial |
| Capraia | Desalter | Yes | Partial |
| Isola del Giglio | Desalter | No | - |
| Gorgona | Desalination,wells | Yes | Partial |
| Isola d'Elba | Underwater pipeline, wells / water sources | Yes | Partial |
| Pantelleria | Desalter | Yes | Partial |
| Lampedusa | Desalter | Yes | Partial |
| Linosa | Desalter | No | - |
| Favignana | Submarine pipelines from Trapani (EAS), Favignana desalination plant (Sicilacque), private wells, storage tanks and tankers | | - |
| Marettimo | Karst water sources being restored, submarine pipelines from Trapani and tankers | No | - |
| Levanzo | Levanzo Favignana | | - |
| Ponza Mobile Desalter and tankers. Fixed desalter in progress | | No | - |
| Ventotene Desalter and tankers | | Yes | Partial |
| Ustica | Ustica Desalter | | Partial |
| Isole Tremiti | Tankers from Manfredonia. Desalter in completion phase in San Domino | Yes | Partial |
| Lipari | Reverse osmosis desalter partially powered by photovoltaics | Yes | Partial |
| Vulcano Desalter and tankers from Naples or Palermo | | Yes | Partial |

The water in the smaller inhabited Italian islands analyzed in the report

| Island | Water supply mode | Wastewater treatment plant | Treatment level |
|--------------|--|----------------------------|-----------------|
| Stromboli | Tankers | No | - |
| Filicudi | Tankers | No | - |
| Alicudi | Tankers | No | - |
| Panarea | Tankers | No | - |
| Salina | Tankers | No | - |
| Sant'Antioco | Submarine pipeline from the Bau Pressiu dam, wells /water sources | Si | Partial |
| San Pietro | Submarine pipeline from Sant'Antioco | Si | Partial |
| Maddalena | Submarine pipeline from "Liscia" dam (Sassari Provence) | Si | Partial |

Sustainable Islands Report 2020. Based on Municipalities data and European Commission urban waste water website.



One of the most important critical issues in the small islands is the lack of drinking water for the resident population, especially in the summer, a period in which consumption increases both due to the large number of tourists who flock to them and due to the summer weather conditions. The even more widespread solution continues to be transport by ship which, every week in the low season and even several times a day in the high season, commute to the mainland, with a very expensive service⁵. Over time, as an alternative, the use of desalination plants has been implemented in several islands, which, however, often fail to meet the peak summer demand. For a large number of islands, the supply by tankers is still used in the periods of the year with greater tourist turnout while, for some islands of Sicily (all the Aeolian Islands except Lipari), drinking water arrives exclusively in this way throughout the arc of the year.

The Tremiti Islands are waiting for the completion of the desalter that would allow the municipal administration to free itself from the current supply service of drinking water through tankers and the Region to save the sum of almost 2 million euros each year for the supply of water. Despite the approval in 2016 of the preliminary feasibility project, to date there is no news on the construction of the desalter. The delay in construction causes inconvenience to the population and tourists because it is often difficult to cover the water requirement; it happens, in fact, that in some periods of the year, due to marine weather conditions, tankers cannot reach the islands and that in summer, when there are peaks of tourist presence, it is not possible to cover the water requirement .

Good news comes from the Island of Elba where the procedure is underway for the construction of a desalter capable of guaranteeing an hourly production of 6912 cubic meters per day, with a continuous flow of not less than 288 mc/h (80 l/s). This will allow to increase the maximum summer flow rate, in order to produce the water necessary for the ever-increasing tourist presence (on the island a population of over 400,000 people is reached); on the other hand it will be an emergency plan b in the event of a break in the submarine pipeline.

Some islands (Capri, Ischia, Procida, Maddalena) are supplied entirely by submarine pipelines, due to the reduced distance from the mainland. The objective of interventions concerning water resources should be to reduce consumption, recovering waste and losses in the resource distribution network. Furthermore, it should aim to restore and build new

⁵ For example, bringing water by ship to the Tremiti Islands costs approximately € 1 million and 900 thousand / year to the Puglia Region, € 6750 per day, € 10 per cubic meter, equal to 17 times the national average cost of the water service (0.60 € per cubic meter). From 2003 to 2016 the Puglia Region spent 22 million euros. In the Aeolian Islands they reach € 13 per cubic meter of water, although some more efficient companies could already offer the same service today at € 1.05–1.21 per cubic meter. Replacing the water supply via the barge, with reverse osmosis desalination systems powered by a hybrid system can reduce the costs of spending on the water service by 65%. For the Sicilian islands, this equates to a saving of 16.4 million euros compared to the current 25 million euros per year spent on the supply of water (Energy & Strategy, The Green Consulting Group, 2016).

rainwater collection tanks for domestic and agricultural users, an ancient and effective method that has fallen into disuse, together with gray water treatment systems for re-use in all compatible uses. As far as supplies are concerned, a programmatic strategy should be formulated to replace transport by ship with increasingly efficient desalination systems, with low environmental impact ⁶ and powered by renewable sources.

But in the smaller islands the delays about water treatment are also very significant. From a mapping carried out as part of a pilot project of the European Commission (Directorate-General for the Environment) essentially focused on the organization and management of data Directive 91/271/EC⁷ on urban waste water treatment (Urban Waste Water Treatment Directive UWWTD) which prescribes the implementation of sewage networks and treatment plants for the EU28, plus Iceland, Norway and Switzerland, is a still too incomplete and obsolete picture for the smaller Italian islands.

6 One of the environmental barriers to the large-scale diffusion of desalination is the problem of the disposal of the processing brine in sea water, at the end of the cycle, which if not properly diluted causes local hypersalinity, damaging the marine ecosystem (fauna and flora), coming to the bottom. A solution comes from the Venturi project (2009-12), established by the Spanish Ministry of the Environment and coordinated by the Canary Islands Technological Institute. Two prototypes of a new high dilution efficiency diffuser (+ 131%) have been tested by ECOS on Gran Canaria, and the result has been a 99% reduction in the associated environmental impacts. Subsequently, the Brine V + 1 was produced, a system that further increases efficiency and reduces manufacturing costs. ECOS is currently increasing pilot projects for this technology in the Caribbean, Pacific Ocean (Asia) and Mediterranean islands, including the Italian islands. Find out more on http://www.greenin-gtheislands.net/2018/05/30/brine-v1-transforming-the-desalination-industry-in-a-greener-business/?lang=it.

7 The directive requires Member States to provide urban agglomerations with a sewage system and a primary, secondary or appropriate wastewater treatment system depending on the sensitivity of the area and by 2000 or 2005 depending on the number of equivalent inhabitants. Primary treatment means the treatment of urban waste water by means of a physical and / or chemical process that involves the sedimentation of suspended solids, or by other processes following which the B0D 5 of incoming waste water is reduced by at least 20% before discharge and total suspended solids of incoming waste water are reduced by at least 50%. Secondary treatment is a more thorough treatment than primary. The appropriate / more severe treatment is the treatment of urban waste water by means of a process and / or a disposal system that after discharging guarantees the compliance of the receiving waters with certain quality objectives that ensure a high level of environmental protection.



Type of treatment by number of treatment plants

Sustainable Islands Report 2020. Provided by the European Commission urban waste water website.

The survey shows that only 14 of the smaller islands analyzed have at least one wastewater treatment plant. But for 14% of these plants, no information is available, only 37% have primary treatment systems and only 29% have secondary treatment systems. Only the plants of Capri, Elba, Tremiti Islands and Sant'Antioco (Calasetta) are able to eliminate even the nitrogen substances, and those of Elba and Maddalena have dephosphating processes. On the mapped plants, only three are fully compliant with the European directive.

From the questionnaires of the survey carried out by our observatory, it is highlighted: the presence of a municipal sewage treatment plant on the island of Capraia equipped with primary treatment systems and various treatment plants for production activities (number not specified), twenty-four small plants municipal equipped with primary, secondary and tertiary treatments in the island of Elba and, in the island of Gorgona, two plants managed by the Livorno District House detached section of Gorgona, of which a mechanical purifier used by a farm and a phyto -depuratore; the sludge from both treatment systems are transported to the mainland and disposed of by authorized companies.

In Lampedusa, however, the treatment plant of the Municipality of Lampedusa is still confiscated; the Agrigento Public Prosecutor ordered its closure in 2018 after following checks to verify its incorrect operation with pollution levels from faecal bacteria, ten thousand times higher than the legal limits in the area of White Horse. Among the Campanian islands, Capri is the island in better condition with three operating plants (two in the municipality of Capri and one in the one of Anacapri). The only plant in Procida is instead under an infringement procedure for the violation of articles 3 and 4 of Council Directive 91/271 / EEC; in fact, a part of the generated load does not flow to the sewer system nor is it managed through appropriate individual systems (violation of article 3). In addition, the Procidano agglomeration is not compliant with Article 4 as it has not been shown that all the load produced (e.g.) receives adequate secondary treatment. Instead, only three out six of municipalities of Ischia, are equipped with a water treatment plant (Barano d'Ischia, Forio d'Ischia, Ischia); for the municipality of Serrara Fontana the water treatment plant is under construction.

From the available data it is therefore clear that there are still too many islands where there is no wastewater treatment system (Isola del Giglio, Linosa, Favignana, Marettimo, Levanzo, Ponza, Stromboli, Filicudi, Alicudi, Panarea, Salina, or 41% of those analyzed) and where it is therefore assumed that the discharges are poured directly into the sea. In addition, the existing treatment systems together with information about them, are mostly incomplete and inefficient (Capri, Ischia, Procida, Capraia, Gorgona, Elba Island, Pantelleria, Lampedusa, Ventotene, Ustica, Tremiti Islands, Lipari, Vulcano, Sant'Antioco, San Pietro, Maddalena).

It is necessary a plan to remedy at the impact on the health of the waters and on the tourism situation, with careful approaches to favor the completion of the treatment systems of the existing discharges, also adopting innovative types of treatment for the reuse of waste water (such as refining and phytodepuration plants), also for isolated users.



WASTE

In many Italian islands, **waste** is a real environmental priority, because today the numbers of separate collection are low and the only solution adopted is the transfer of waste by ship, when instead it is possible to switch to models of management capable of creating economic and environmental benefits. For the islands, having an integrated management of the waste cycle that does not leave their natural perimeter is a significant but necessary challenge, especially in the summer season, when the number of citizens on the territory quintuple on average. It is therefore of fundamental importance on the part of local administrations to adopt prevention policies to reduce the production of waste at source, implementing information and containment measures, and in parallel to accelerate the separate collection, thus increasing the quality of the waste (and of the secondary raw materials). The goodness of separate collection can start rejection of a second life, as a second raw material, re-introducing it into production cycles or enhancing it as a sustainable energy resource.

The tables and illustrative cards show the absolute values of the production of urban waste and separate collection, the percentage incidence of the latter on the total amount of waste produced and how the waste is collected in the various municipal areas. Overall, the ability to sort waste has increased, between 2010 and 2018, on almost all islands (except in Favignana where information is incomplete). Seven islands, Capri, Elba, Maddalena, Pantelleria, Procida, San Pietro and Sant'Antioco, exceed the separated collection average (SC)of Central Italy by 54% and of Southern Italy by 46%. The island of Sant'Antioco (composed of the homonymous municipality and the municipality of Calasetta) is the most virtuous island with 79% of separate collection, followed by Procida (73%) and Pantelleria (71%). In detail, the Municipality of Sant'Antioco obtained, at the second edition of the EcoForum Sardinia promoted by Legambiente, the prize as coastal Municipality with a percentage of Separate Collection exceeding 75%. In 2018, in fact, the city reached 81.8%, 6.8 percentage points more than in 2017, when the numbers had stopped at 75%. A figure that places Sant'Antioco in an enviable position, if you consider that in Sardinia the average of the differentiated waste is 65.8% and in South Sardinia it is 73.2%.

The bad example is given by Ponza and Ustica with 4 and 5% of differentiated waste. In these two islands, compared to the previous year, we even see a worsening of the incidence of separate waste on the total waste produced (Ponza goes from 6.3 to 3.5% while Ustica from 9.7 to 4.5%).

| Island | Separate collection incidence (%) |
|---|-----------------------------------|
| Sant'Antioco | 79% |
| Procida | 73% |
| Pantelleria | 71% |
| Maddalena | 68% |
| Capri | 60% |
| Isola d'Elba | 58% |
| San Pietro | 55% |
| Ischia | 45% |
| Capraia | 42% |
| Salina | 39% |
| Ventotene | 28% |
| Isola del Giglio | 26% |
| Isole Eolie (Lipari, Vulcano, Stromboli, Panarea, Filicudi, Alicudi) | 21% |
| Isole Tremiti | 21% |
| Isole Pelagie (Lampedusa e Linosa) | 16% |
| lsole Egadi (Favignana, Levanzo, Marettimo) | 15% |
| Ustica | 5% |
| Ponza | 4% |

Separate collection in the smaller inhabited Italian islands analyzed in the report

Sustainable Islands Report 2020. Based on ISPRA data, National Waste Register (2018).

In most of the islands there is an eco-center or ecological platform (except in Gorgona, Tremiti Islands, Ponza and Ventotene), while domestic composting plants are still not widespread, some of them are in Capri, Procida, Capraia, Elba Island , Ventotene and Lipari.

One of the items that certainly remains higher in the budget of the administrations is the transport of unsorted waste to the plants of the mainland, by ship, which adds to the disposal costs. Efficient waste management on the islands, with consequent environmental protection and economic savings for local administrations and citizens, must have as its objectives: the push for separate collection through the door-to-door collection service, which contributes to job creation local and, at the same time, the promotion of home and community composting.



Percentage breakdown of separate collection by product fraction at domestic level

Sustainable Islands Report 2020. Based on ISPRA data, National Waste Rgister (2018)

From the processing of the data (2018) present in the National Waste Register (ISPRA), among the product fractions of separate collection usually collected at home level (organic, paper and cardboard, glass, plastic, metal), in percentage terms the organic fraction it is the one that almost always prevails, exceeding or in any case often approaching, the national value of 49%. In some islands, the quantity of organic fraction collected would allow to open projects for greater enhancement of this material on site, through the aforementioned composting plants (diffused or centralized) and digesters capable of producing biogas and biomethane for energy respectively electric and fuel vehicles.

Good news comes from the Italian islands that have chosen to apply plastic free policies. In fact, almost all the islands have now chosen to ban disposable plastic products through municipal ordinances or regional laws⁸. These initiatives prohibit the sale of disposable shopping bags and containers, along with cutlery, plates and glasses that are not in biodegradable and compostable material.

The Municipality of Sant'Antioco should be added to the list of plastic free island administrations in 2020. It has been officially registered since March 1, 2020 by decree of December 2019.

Virtuous actions of this type demonstrate how environmental impact policies can also arise from smaller territorial entities, without waiting for indications from higher bodies.



8 The Tuscany Region approved with the law 28 June 2019, n.3 the ban on the Tuscan beaches of administration and use of single-use plastic. The same prohibition of administration applies in parks and protected areas. The law also extends the ban to fairs and events organized or financed, even in part, by the Region, local authorities, bodies and companies subject to their supervision. The nine hundred bathing establishments on the Tuscan coast, from the borders with Liguria to the Maremma, are therefore 'plastic free' as early as summer 2019 while the community bans will not start before 2021.

MOBILITY

For islands, the theme of mobility presents a double criticality: on the one hand the connection with the mainland and on the other the local movements, with all problems related to managing summer tourism peaks. In territories with often very limited surface, articulated land morphologies and significant changes in altitude, and a road network usually designed to serve a small population, the exorbitant increase in the number of motor cars in tourist periods involves congestion and very high emission peak. The challenge here also lies in imagining a profound innovation of mobility, which on the one hand aims to give an alternative to private transport through efficient local public transport, while on the other, it promotes forms with zero environmental impact, such as electric vehicles or safe pedestrian and cycle paths. In the meantime, at least to stem the phenomenon of summer congestion, many islands have approved provisions limiting access to private motor vehicles. As for the public service, almost all the smaller Italian islands are equipped with a local public transport system that connects the areas of greatest interest, such as the inhabited centres, the port, and the beaches.

For example, in Capri the public transport system is articulated around a funicular that connects the port to the city centre and, from there, to five bus lines that connect to Marina Grande, Marina Piccola, the centre of Anacapri, the Blue Grotto and the Punta



Carena lighthouse, with some intermediate stops. In addition, among the initiatives for sustainable mobility, 3 electric shuttles were activated in the port area while at the same time completely eliminating the presence of cars and scooters in the area. Moreover, a free bike-sharing service was launched with 15 bikes freely available to tourists in 3 different areas of the port.

In Ponza there are 5 bus lines that connect various sites on the island, including the beaches and the port, every 15 minutes, and it is also possible to rent bicycles, golf cars and electric taxis. In addition, the Ponzese Electricity Company that deals with the production, distribution and sale of energy on the island has included the integration of electric car charging stations arranged in various strategic positions in the plant for the expansion of the electricity production capacity of the current plant. This service will have a dual application, both for the fleet consisting of the work vehicles of the S.E.P. staff and for public use. In the same archipelago, Ventotene has an e-bike sharing service consisting of 10 bikes.

The Municipality of Sant'Antioco has been awarded a loan from the Sardinia Region for the implementation of some environmental protection actions provided for in the Management Plans of the Sites of Community Interest. The intervention will also include the purchase of alternative and sustainable means of transport such as electric bicycles, electric cars and



microcars to be entrusted with the Car Sharing and Car-Pooling service, and the creation of charging stations for electric cars and bikes.

In terms of general programming on the mobility sector, the aim should be to block the access of cars of non-residents in the summer, to enhance public transport and to encourage electric vehicles, especially if integrated into a smart recharging network and powered by renewable sources. The problem of unevenness in many islands can be easily solved through pedal assisted electric bicycles, also associated with punctual charging stations, along the cycle paths.



A SCENARIO OF ENVIRONMENTAL INNOVATION FOR THE SMALL ITALIAN ISLANDS

The data and the analysis of the existing situation confirm both the importance of recovering from delays but also the great existing potential. To reach this potential, it is necessary to give continuity to the policies, to build a control and monitoring room, and to overcome some relevant barriers to relevant innovation in Italian islands. While this situation was somewhat understandable a few decades ago, today it may not still be accepted. Although on all the smaller Italian islands there might be high production potential from renewables, according to all scientific studies, no island does actually reach 6% of electricity consumption from renewable sources, when on average in Italy renewables count for more than 36%. For separate collection, the average values are around 40%; not only can they be doubled, as in the municipalities that have chosen modern and effective forms of door-to-door collection, but collection and recycling systems can be created for some supply chains directly on the islands. For water treatment, even in some smaller islands there is no waste water treatment system, but even in those that have it we are far from optimal management.

To make this prospect possible, a change and acceleration of policies is needed. There are no economic reasons to postpone these interventions, because of incentives and contributions introduced in recent years.

For the installation of renewable sources plants, a Decree of the Ministry of Economic Development for the promotion of renewable sources in the smaller islands was approved in February 2017 (see Annex A).

With the Resolution of 5 November 2018 n.558 / 2018 / R / EFR of ARERA, the regulatory framework for this Ministerial Decree was completed, which defined the energy evolution objectives of the smaller islands, through the development of renewable electricity and thermal sources. On August 7, 2019, the GSE published on its website the "Operating Modes for the recognition of the remuneration envisaged by the Ministerial Decree February 14, 2017 and Resolution 558/2018 / R / EFR" and the "General Conditions of the remuneration service for electricity and thermal energy produced from renewable sources in the non-interconnected minor islands referred to in Ministerial Decree February 14, 2017". For each of the 20 smaller islands, including 14 in Sicily, specific electrical and thermal targets have been identified. For renewable electricity, photovoltaic or not, there is an all-inclusive "basic tariff" on the energy fed into the network, and a premium on self-consumption. With regard to the basic tariff, the producer can choose between a fixed tariff, differentiated only by power class and group of islands, and a variable tariff, indexed to the efficient avoided cost for each island, determined annually within certain limits starting from the



price of diesel. For thermal renewables, solar thermal systems used for domestic hot water or for solar cooling, and heat pumps dedicated to the production of domestic hot water instead of electric water heaters, are eligible for incentives. The incentive for thermal RES provides for remuneration in a single solution, to partially reimburse the expenses incurred, and differentiated for the various types of systems. The role attributed to the GSE provides for the gualification, contracts and the provision of incentives, as well as the related checks. The provision provides for penetration targets for renewable sources by 2020 and introduces incentives for interventions through the recognition of an incentive tariff that should be equal to that enjoyed by companies that manage electricity on the islands, therefore without affecting bills or on the state coffers. The objectives of the provision are: to ensure the progressive coverage of the energy needs from renewable sources, for electricity and heat; to promote energy efficiency; to reduce service costs; to guarantee safety and continuity of supply. The quantitative and temporal objectives and the methods of supporting the investments necessary to achieve them are identified. The first time horizon on which to measure the achievement of the quantitative objectives is at the end of 2020, in line with the European climate-energy framework (Directive 2009/28 / EC). Subsequent decrees will update the objectives to 2030, on the basis of what has been done and based on the evolution of the situation.

As of the 31st December 2019, the projects that asked to access the Ministerial Decree "February 14, 2017" concern 29 plants, exclusively for the production of electricity from photovoltaic solar sources, in 6 non-interconnected islands (Ustica, Lampedusa, Pantelleria, Favignana, Levanzo and Ponza), for a total power of 460 kW. The Ministry for Economic Development's "Energy and Development of the Territories Program 2014-2020" has foreseen a total financial allocation of 120.4 million euros for the islands of the less developed Regions in the context of the thematic objective 4 (Support the transition towards a low carbon economy) of the European Union's Cohesion Policy. The program provides funding according to two lines of action:

- » Action 4.3.1 Realization of smart energy distribution networks (smart grids) and interventions on strictly complementary transmission networks aimed at directly increasing the distribution of energy produced from renewable sources, with a financial allocation of 100 million euros.
- » Action 4.1.1 Promotion of eco-efficiency and reduction of primary energy consumption in public buildings and structures: renovation of individual buildings or complexes of buildings, installation of intelligent remote control systems, regulation, management, monitoring and optimization of energy consumption (smart buildings) and polluting emissions also through the use of technological mixes with a financial allocation of 16 million euros. To date, several projects relating to action 4.4.1 have been presented by the administrations of Capri, Anacapri, Leni, Malfa and Tremiti Islands.

For interventions in the environmental field, the Ministry of the Environment has launched a call to improve the use of water and energy and for climate resilience interventions. As part of the "energy efficiency, sustainable mobility and adaptation to climate change impacts in the smaller islands" call for 2017 (€ 15 million in funding), the Ministry recently communicated to the islands the approval of the projects presented that will therefore be launched in the next months.

In addition, the government has included **a special fund of more than 41 million euros for smaller islands** in the Budget Law which provides for an allocation of 14.5 million euros for the year 2020, 14 million euros for the year 2021, and 13 million euros for the year 2022, with the commitment to strengthen it even more every year. The Fund is intended for 57 smaller islands, corresponding to 39 municipalities.

Another opportunity is linked to the contribution of the landing tax on the smaller islands (see Annex B). Law 221/2015 established for travellers who land on the smaller islands the obligation to pay a landing fee, a form of environmental taxation to replace the tourist tax normally applied by the Municipalities. Article 33 of Law 221/2015, "Environmental provisions to promote green economy measures and to contain the excessive use of natural resources", provides that the Municipalities whose territory falls within one of the smaller islands can establish the amount of the contribution, up to a maximum of 2.5 euros per person (up to 5 euros in Municipalities with environmental assets in need of greater protection, such as volcanoes). The proceeds must be used to finance and support the collection and disposal of waste, recovery and environmental protection, as well as for tourism, culture, local police and mobility interventions.

| Order number | Beneficiaries | Island | Score | Project amount (€) | Loan amount requested (€) |
|-----------------|----------------------------------|-------------|-------|--------------------|------------------------------|
| 1° | Comune di Ventotene | Ventotene | 71,33 | 999.999,01 | 999.999,01 |
| 2° | Città di Capri | Capri | 59,67 | 999.616,13 | 999.616,13 |
| 3° | Comune di Santa Marina Salina | Salina | 55,00 | 800.000,00 | 800.000,00 |
| 4° | Comune di Leni | Salina | 52,50 | 998.304,38 | 998.304,38 |
| 5° | Comune di Isole Tremiti | Tremiti | 52,33 | 1.053.000,00 | 1.000.000,00 |
| 6° | Comune di Capraia Isola | Capraia | 52,00 | 999.878,98 | 999.878,98 |
| 7° | Comune di Lipari | Lipari | 51,83 | 997.021,90 | 997.021,90 |
| 8° | Comune di Malfa | Salina | 51,33 | 999.467,10 | 999.467,10 |
| 9° | Comune di Lipari | Filicudi | 49,50 | 997.412,71 | 997.412 ,71 |
| 10° | Comune di Favignana | Favignana | 48,67 | 998.797,84 | 998.797,84 |
| 11° | Comune di Lipari | Alicudi | 47,33 | 987.690,91 | 987.690,91 |
| 12° | Comune di Lipari | Vulcano | 47,17 | 996.622,36 | 996.622,36 |
| 13° | Comune di Ustica | Ustica | 47,00 | 997.870,04 | 997.870,04 |
| 14° | Comune di Ponza | Ponza | 46,50 | 944.941,49 | 924.941,49 |
| 15° | Comune di Pantelleria | Pantelleria | 43,50 | 999.836,20 | 999.836,20 |

Projects eligible list for funding under the call for proposals "energy efficiency, sustainable mobility and adaptation to climate change in the smaller islands" of the MATTM.




LEGAMBIENTE AND CNR-IIA Proposals

To strengthen ambitious actions in the environmental and climate fields for minor Italian islands, a necessary step is to build a clear framework of guidelines and policies with a definite aim to 2030.

Firstly, a control room for the climate and environmental transition in the smaller islands must be created at the Ministry of the Environment so that interventions and objectives relating to energy, waste, water, sustainable mobility. To date there has been funding for some types of interventions but without continuity or checks on results, in the absence of a shared long-term vision. Today it is essential to define a strategy that involves the different actors involved at national and local level to help projects in overcoming the many difficulties that hinder change, as those same actors have an interest in continuing to manage energy, waste and water.

The main problem that every intervention in the islands encounters is the veto of the super-intendencies for each type of intervention and regardless of size. For this reason, it is necessary to involve the Ministry of Cultural Heritage and the Super-intendencies in the control room and in overcoming these problems through guidelines and protocols. This way it will becomes possible to achieve effective coordination between the Italian islands that will avoid wasting the many opportunities that are being offered at the European level with programs and resources.

The second proposal is for each island to elaborate a plan for climate and environmental sustainability, with clear objectives for 2030 and solutions to reach an energy model focused on renewable sources and capable of facing the challenges for a correct circular cycle management of water and waste. The Ministry of the Environment should finance these plans and participate in their elaboration, in order to identify solutions consistent with the National Energy and Climate Plan, and to help identify national, community and regional funding channels to carry out objectives and interventions concerning renewables, efficiency, water treatment systems and infrastructures, waste recovery and recycling. To reach this ambitious objective, it will be essential to involve the citizens in the transition of the islands, starting participatory processes and training activities as soon as possible to define a common way for the changes that need to be made.

ANNEX A

Low development objectives for the use of renewable energy sources to be achieved by December 31th, 2020 in the smaller non-interconnected islands Ministerial Decree February 14, 2017.

| Island | Power Target [kWe] (Art. 2, paragraph 1, letter b) {1} | Solar Thermal Surface target [m2] (Art. 2, paragraph 1, letter a) {2} | Reduction target for the annual conventional electrical production (Art. 6, paragraph 1, letter a, b, c, d) {3} |
|------------------|---|---|---|
| Capraia | 180 | 250 | 50% |
| lsola del Giglio | 700 | 780 | 50% |
| Ponza | 720 | 870 | 50% |
| Ventotene | 170 | 200 | 50% |
| Tremiti* | 240 | 290 | 50% |
| Favignana | 900 | 1.070 | 50% |
| Levanzo | 40 | 40 | 50% |
| Marettimo | 120 | 150 | 40% |
| Pantelleria | 2720 | 3.130 | 40% |
| Ustica | 280 | 370 | 40% |
| Alicudi | 20 | 20 | 30% |
| Filicudi | 80 | 90 | 20% |
| Lipari | 2110 | 2.520 | 20% |
| Panarea* | 130 | 200 | 20% |
| Salina | 580 | 570 | 20% |
| Stromboli* | 220 | 250 | 20% |
| Vulcano* | 300 | 470 | 20% |
| Lampedusa | 2140 | 2.370 | 20% |
| Linosa | 170 | 210 | 20% |
| Capri | 1000 | 4.850 | 20% |

Annex 1 MiSE Decree 14.02.2017, published on the Official Journal of 18.05.2017.

{1} The types of plant that contribute to the objective are not defined (technological neutrality applies). The new installations are counted, including the electric charging stations, the plants already in production, the upgrades of existing plants, the integrated systems in new buildings or in major renovations (art. 11 Legislative Decree no. 28/2011) and reactivations of existing plants.

{2} Heat pumps also contribute to achieving this goal, only if in place of electric water heaters, based on the formula 1kWe = 2mq.

{3} This objective is valid only in the case of the construction of two innovative integrated systems referred to in Art. 6.

* The objectives for the islands of Panarea, Vulcano, Stromboli and Tremiti have been set at a more contained level because there is concern for the safety of the system due to the high difference between the winter and summer load.

ANNEX B

Landing fee: amount, income and final use.

| Island | Municipality | Amount ad personam | Annual income/Final use |
|--|------------------|--|--|
| Copri | Capri | 2,50 € | Legislation reference 221/2015 |
| Сарн | Anacapri | 2,50 € | Annual income/Final use Legislation reference 221/2015 Legislation reference 221/2015 - Legislation reference 221/2015 20896.5 euro / year - Actions for collection and waste disposal, recover and environmental protection plans. Separate collection and disposal, env ronmental improvement, maintenance cultural promotion, events. Contribution established by the Tusca Archipelago Park Authority and inve- sted by the park on the island for fores or road maintenance. Legislation reference 221/2015 |
| | Ischia | | Annual income/Final use Legislation reference 221/2015 Legislation reference 221/2015 - Legislation reference 221/2015 20896.5 euro / year - Actions for collection and waste disposal, recovery and environmental protection plans. Separate collection and disposal, environmental improvement, maintenance cultural promotion, events. Contribution established by the Tuscar Archipelago Park Authority and inve- sted by the park on the island for fores or road maintenance. Legislation reference 221/2015 |
| | Barano d'Ischia | | |
| la abia | Forio | | |
| Ischia Casamicciola Terme Lacco Ameno Serrara Fontana Procida Procida Capraia Capraia Isola | no | - | |
| | Lacco Ameno | 2,50 € Legislation reference 221/2015 no - 2,00 € Legislation reference 221/2015 2,00 € 20896.5 euro / year - Actions for collection and waste disposal, recovery and environmental protection plans. 1,50 € Separate collection and disposal, environmental improvement, maintenance, cultural promotion, events. 1,50 € Contribution established by the Tuscan Archipelago Park Authority and invested by the park on the island for forest or road maintenance. | |
| Procida | Serrara Fontana | | |
| Procida | Procida | 2,00 € | Legislation reference 221/2015 |
| Capraia | Capraia Isola | 1,50 € | 20896.5 euro / year - Actions for collection and waste disposal, recovery and environmental protection plans. |
| lsola del Giglio | Isola del Giglio | 1,50 € | Separate collection and disposal, envi- ronmental improvement, maintenance, cultural promotion, events. |
| Gorgona | Livorno | 6,00 € | Contribution established by the Tuscan Archipelago Park Authority and inve- sted by the park on the island for forest or road maintenance. |
| Portoferraio Porto Azzurro € 1,50 (low season) - € 5,00 Capoliveri Piombino - Portoferraio / € | | | |
| | Porto Azzurro | £ 150 (low access) £ 5.00 | Legislation reference 221/2015 |
| | Capoliveri | ŧ 1,50 (IOW season) - ŧ 5,00 Piomhino - Portoferraio / € | |
| Isola d'Elba | Marciana | 3,50 Piombino – Rio Marina | |
| | Marciana Marina | e Piombino – Cavo (high | |
| | Rio | stagione) | |
| | Campo nell'Elba | | |

| Island | Municipality | Amount ad personam | Annual income/Final use |
|---------------------|--------------------|--|---|
| Pantelleria | Pantelleria | 2,5 (low season) - 5 euro (high season) | Legislation reference 221/2015 |
| Lampedusa Linosa | Lampedusa e Linosa | 2,50 € | Legislation reference 221/2015 |
| Favignana | | 2,50 € | Legislation reference 221/2015 |
| Marettimo | Favignana | 1,50 € | Legislation reference 221/2015 |
| Levanzo | | 1,50 € | Legislation reference 221/2015 |
| Ponza | Ponza | 2,50 € | Legislation reference 221/2015 |
| Ventotene | Ventotene | 2,50 € | 70000 euro / year - 20% of income is for the Marine Protected Area and the remaining 80% is for tourism interven- tions, including those in support of ac- commodation, as well as maintenance interventions, use and recovery of local cultural and environmental assets, as well as related local public services. |
| Ustica | Ustica | 2,50 € | Legislation reference 221/2015 |
| Isole Tremiti | Isole Tremiti | 2,50 € | Legislation reference 221/2015 |
| Lipari | Lipari | | |
| Vulcano | Lipari | | |
| Stromboli | Lipari | 2,5 (bassa stagione) - 5 euro | Logislation reference 201/201E |
| Panarea | Lipari | (alta stagione) | |
| Filicudi | Lipari | | |
| Alicudi | Lipari | | |
| | | | |

| Island | Municipality | Amount ad personam | Annual income/Final use |
|---|---------------------|--|--|
| | Leni | no | - |
| Island Salina Sant'Antioco San Pietro Maddalena | Malfa | 2,5 (low season) - 5 euro (high season) | Culture. |
| | Santa Marina Salina | 2,5 (low season) - 5 euro (high season) | Tourist services such as museum and info-point, territory cleaning facilities, increase of separate collection, beach cleaning, beach surveillance. |
| Cont'Antiono | Sant'Antioco | no | - |
| SancAntiOCU | Calasetta | Amount ad personamAnnual income/Final usno-2,5 (low season) - 5 euro (high season)Culture.2,5 (low season) - 5 euro (high season)Tourist services such as mus info-point, territory cleaning f increase of separate collection cleaning, beach surveillano-no-1.50€ January, February, Mar- ch, November and December 2.00€ April, May and October 2.50€ June, July, August e September.Legislation reference 221/ 2.50€ form April 1th to September 30th; - € 5,00 from June 1th to August on the smaller islands. | - |
| San Pietro | Carloforte | 1.50€ January, February, Mar- ch, November and December 2.00€ April, May and October 2.50€ June, July, August e September. | Legislation reference 221/2015 |
| Maddalena | La Maddalena | € 0,50 to from October 1th to March 31th € 2,50 from April 1th to September 30th; € 5,00 from June 1th to August on the smaller islands. | Legislation reference 221/2015 |

Sustainable Islands Report 2020. Based on Municipalities data and online sources.



THE ISLANDS



m³









DESALTER **334.548** m³

> **UNDERWATER PIPELINES**



TANKERS



WELLS AND WATER SOURCES



WASTE

PLASTIC FREE POLICIES

COLLECTION METHOD

- ROAD BINS
- **ECOLOGICAL PLATFORM**
- HOME COMPOSTING
- **X** CALL SERVICE
- **ROAD CONTAINERS**



PER CAPITA WASTE OUOTA

URBAN WASTE

Kg/inhabitants*vear

DIFFERENTIATED COLLECTION 6 Kg/inhabitants*year



LOCAL PUBLIC TRANSPORT

3 **BUS IN SERVICE**

- Km

NETWORK

🟅 Km IN THE YEAR 2019





PROTECTED AREAS

CENTRAL AREA AND WESTERN COASTAL ROCKS OF CAPRI ISLAND 388 ha SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

SEABED OF PUNTA CAMPANELLA AND CAPRI 8.491 ha 100 ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTION AREA

SECTOR AND EASTERN COASTAL ROCKS OF CAPRI ISLAND 96 ha **1** ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA



541.000

DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS 528.000



2

LOSSES

WASTE

DRINKING WATER INTO THE MUNICIPAL NETWORKS

m³

m³







TANKERS







PLASTIC FREE POLICIES \checkmark

40%

COLLECTION METHOD

- **ROAD BINS**
- **ECOLOGICAL PLATFORM**
- HOME COMPOSTING
- DOOR TO DOOR
- **CALL SERVICE**



PER CAPITA WASTE OUOTA

URBAN WASTE

UNDERWATER

OM PENISOLA

PIPELINES





MOBILITY





PROTECTED AREAS

TUSCAN ARCHIPELAGO17.887 haNATIONAL PARK56.776 ha TO THE SEA

 TUSCANY ISLANDS
 28.929 ha

 UNESCO BIOSPHERE RESERVE MAB
 1.050.611 ha TO THE SEA

SANCTUARY FOR MARINE MAMMALS 2.557.258 ha TO THE SEA MARINE NATURAL AREA OF INTERNATIONAL INTEREST

GIGLIO ISLAND 2.094 ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

ENERGY

MAIN POWER SOURCE DIESEL GENERATOR SET





STATUS NO PRESENT



DRINKING WATER INTO THE MUNICIPAL NETWORKS 231.000 m³ DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS m³



WATER SUPPLY MODE





UNDERWATER PIPELINES



TANKERS



WELLS AND WATER SOURCES



WASTE

PLASTIC FREE POLICIES

COLLECTION METHOD

- **X** ROAD BINS
- **ECOLOGICAL PLATFORM**

- **CALL SERVICE**
- **ROAD CONTAINERS**



PER CAPITA WASTE OUOTA



DIFFERENTIATED COLLECTION 0 Kg/inhabitants*year 262 Kg/inhabitants*year





PROTECTED AREAS

GORGONA ISLAND-TERRESTRIAL AND MARINE AREA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

14.818 ha 95 ha TO THE SEA

SANCTUARY FOR MARINE MAMMALS 2.557.258 ha TO THE SEA MARINE NATURAL AREA OF INTERNATIONAL INTEREST

ENERGY

MAIN POWER SOURCE DIESEL GENERATORS IN DIFFERENT AREAS OF THE ISLAND

ELECTRICITY PRODUCTION

SOURCES Mwhe/Anno

INSTALLED CAPACITY

COMPANY







RENEWABLES SOURCES -

PHOTOVOLTAIC SYSTEM

kW **ELECTRIC POWER TO 2019**

| | AEOLIAN SYSTEM | | |
|---|----------------|----|--|
| ᠰ | 0 | kW | |

ELECTRIC POWER TO 2019

SOLAR THERMAL m²

SOLAR SURFACE











TURISTI ANNUI

esercizi ricettivi

contributo di sbarco

AREE PROTETTE D'APPARTENENZA

REGNO DI NETTUNO 11.256 ha A MARE AREA MARINA PROTETTA

PINETE DELL'ISOLA DI ISCHIA 66 ha Zona speciale di conservazione

STAZIONE DI CYPERUS POLYSTACHYUS 14 ha Zona speciale di conservazione CORPO CENTRALE DELL'ISOLA DI ISCHIA 1.310 ha Zona speciale di conservazione

RUPI COSTIERE DELL'ISOLA DI ISCHIA 685 ha Zona speciale di conservazione

FONDALI MARINI DI ISCHIA, PROCIDA E VIVARA 6.116 ha 100 ha A MARE Zona speciale di conservazione e zona di protezione speciale

ENERGIA

📝 INTERCONNESSA ALLA RETE ELETTRICA NAZIONALE

FONTI RINNOVABILI -







DEPURAZIONE

TRATTAMENTO ACQUE REFLUE STATO DEPURAZIONE INCOMPLETO

ACQUA POTABILE

ACOUA POTABILE IMMESSA

ACQUA POTABILE EROGATA DALLE RETI COMUNALI

58.000 m³

26%

.984.000

m³

NELLE RETI COMUNALI



MODALITÀ APPROVVIGIONAMENTO IDRICO



IMPIANTO DISSALATORE



NAVI **CISTERNA**



CONDOTTE **SOTTOMARINE**



RIFIUT

PERDITE

POLITICHE PLASTIC FREE \checkmark

MODALITÀ DI RACCOLTA

- CONFERIMENTO IN PIATTAFORMA ECOLOGICA
- **C** COMPOSTAGGIO DOMESTICO
- 🗹 PORTA A PORTA
- **SERVIZIO SU CHIAMATA**



QUOTE RIFIUTI PRO-CAPITE

RIFIUTI URBANI



RACCOLTA DIFFERENZIATA 296 kg/ab*anno

MOBILITÀ

POLITICHE MOBILITÀ SOSTENIBILE \checkmark

TASSO DI MOTORIZZAZIONE 0,4 av/ab







DRINKING WATER INTO THE MUNICIPAL NETWORKS 6.403.764 m³

DRINKING WATER DELIVERED **FROM MUNICIPAL NETWORKS** 2.722.752 m³

LOSSES 57%





UNDERWATER

4.330.393 m³

PIPELINES



TANKERS





WASTE V PLASTIC FREE POLICIES 50.000 **TOTAL URBAN** WASTE 40.000 29.326 t **COLLECTION METHOD** 30.000 **ROAD BINS** 20.000 10.000 **ECOLOGICAL PLATFORM** 58% tons HOME COMPOSTING DOOR TO DOOR PER CAPITA WASTE OUOTA CALL SERVICE





URBAN WASTE



DIFFERENTIATED COLLECTION 532 Kg/inhabitants*year













- **ECOLOGICAL PLATFORM**
- HOME COMPOSTING
- **X** DOOR TO DOOR
- CALL SERVICE
- **ROAD CONTAINERS**



PER CAPITA WASTE OUOTA



DIFFERENTIATED COLLECTION Kg/inhabitants*year







DRINKING WATER INTO THE WATER SUPPLY MODE **MUNICIPAL NETWORKS** 876.000 m³ DRINKING WATER DELIVERED **FROM MUNICIPAL NETWORKS 27_000** m³ LOSSES 17%





UNDERWATER PIPELINES





TANKERS



WASTE

ROAD BINS

DOOR TO DOOR

CALL SERVICE

TRANSPORTE

NETWORK



PER CAPITA WASTE OUOTA

URBAN WASTE

Kg/inhabitants*vear

DIFFERENTIATED COLLECTION 141 Kg/inhabitants*year

PEDESTRIAN STREETS

PEDESTRIAN AREAS





 Image: Martel Contraction
 Image: Martel Contraction

 Image: Martel Contraction
 Status incomplete

 Image: Martel Contraction
 Status incomplete

 Image: Martel Contraction
 Physical plant capacity (a.e.)

 Image: Martel Contraction
 Status incomplete

 Image: Martel Contraction
 Image: Martel Contraction

 Image: Martel Contraction
 Physical plant capacity (a.e.)

 Image: Martel Contraction
 Image: Martel Contraction

 Image: Martel Contraction
 Image: Martel Contracting (Image: Martel Contraction



WATER SUPPLY MODE





UNDERWATER PIPELINES



TANKERS FROM MANFREDONIA



WELLS AND WATER SOURCES



MOBILITY 0,5 av/ab **MOTORIZATION RATE** SUSTAINABLE MOBILITY POLICIES Ž **TYPES OF VEHICLES** TOTAL VEHICLES 228 EURO 2 15,4% EURO 1 4,8% EURO 3 18,4% EURO 0 16,7% EURO 4 25,4% EURO 5 11,4% EURO 6 **7,5%** NC 0.44%



ENERGY

INTERCONNECTION TO THE NATIONAL ELECTRICITY NETWORK

RENEWABLES SOURCES

PHOTOVOLTAIC SYSTEM

869,3 kW ELECTRIC POWER TO 2019 AEOLIAN SYSTEM

U kW ELECTRIC POWER TO 2019 SOLAR THERMAL

WATER TREATMENT

VASTEWATER TREATMENT

INPUT LOAD (A.E) **26.883** **PHYSICAL PLANT CAPACITY** (A.E.) **37.000**

STATUS INCOMPLETE

WATER TREATMENTS **PRIMARY SECONDARY**

MUNICIPAL NETWORKS

3.366.000 m³

DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS **274_000** m³

62%



DRINKING WATER INTO THE WATER SUPPLY MODE





TANKERS

WELLS AND WATER SOURCES



WASTE

LOSSES

PLASTIC FREE POLICIES

COLLECTION METHOD

- **X** ROAD BINS
- **ECOLOGICAL PLATFORM**
- DOOR TO DOOR



PER CAPITA WASTE QUOTA

URBAN WASTE

UNDERWATER

FROM THE "LISCIA" DAM (PROV. SS)

PIPELINES







| INPUT Load (A.E) | |
|----------------------------|--|
| 5.905 | |

PHYSICAL PLANT CAPACITY (A.E.) 5 905







DRINKING WATER INTO THE MUNICIPAL NETWORKS



DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS 376.000 m³

65% LOSSES

WASTE







UNDERWATER PIPELINES

TANKERS



WELLS AND WATER SOURCES



PLASTIC FREE POLICIES Ń

COLLECTION METHOD

- **ECOLOGICAL PLATFORM**
- DOOR TO DOOR
- **CALL SERVICE**



PER CAPITA WASTE OUOTA

URBAN WASTE





MOBILITY





PROTECTED AREAS

CIRCEO 8.484 ha

PONZA, PALMAROLA, ZANNONE, VENTOTENE AND S. STEFANO ISLANDS 17.168 ha 70 ha TO THE SEA SPECIAL PROTECTED AREA

SEABED SURROUNDING PONZA ISLAND 2.207 ha 100 ha TO THE SEA SPECIAL PRESERVATION AREA

| ENERGY MAIN POWER SOURCE DIESEL GENERATOR ELECTRICITY PRODUCTION FOSSIL SOURCES 11.500 Mwhe/Ann | SET INSTALLED CAPACITY o MW | COMPANY Società elettrica Ponzese | |
|---|--|---|--|
| RENEWABLES SOURCES PHOTOVOLTAIC SYSTEM 118,6 kW ELECTRIC POWER TO 2019 | AEOLIAN SYSTEM 0 kW ELECTRIC POWER TO 2019 | SOLAR THERMAL 55,4 m ² SOLAR SURFACE | |
| WATER TREATMENT | | | |

X WASTEWATER TREATMENT

STATUS NO PRESENT


DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS **149.000** m³

LOSSES 68%





DESALTER Mobile

UNDERWATER

PIPELINES



TANKERS

WELLS AND Water Sources



| | MOBILITY | | | | |
|--|---|-------------------------------------|------------------------------|------------|--------------------------------------|
| | SUSTAINABLE MO | BILITY POLICIES | MOTORIZATION RATE 0,5 av/ab | | |
| | TYPES OF VEHICLES | | TOTAL VEHICLES 1.522 | | |
| | | | | | |
| | EURO 0 8,5% EURO 4 34,8% | EURO 1 2, EURO 5 1 | 7% ■ EURO 2 5,2% ■ EURO 6 | 2 12,2% EL | JRO 3 17,6% C 0,07% |



PROTECTED AREAS

KINGDOM OF NEPTUNE 11.256 ha TO THE SEA PROTECTED SEA AREA

SEABED OF ISCHIA, PROCIDA AND VIVARA 8.491 ha 100 ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

ENERGY

V INTERCONNECTION TO THE NATIONAL ELECTRICITY NETWORK

RENEWABLES SOURCES







WATER TREATMENT

WASTEWATER TREATMENT

STATUS INCOMPLETE



DRINKING WATER INTO THE MUNICIPAL NETWORKS 910.000 m³ DRINKING WATER DELIVERED

FROM MUNICIPAL NETWORKS m³

22% LOSSES

WASTE







TANKERS



WELLS AND WATER SOURCES



PLASTIC FREE POLICIES Ń

COLLECTION METHOD

- **ECOLOGICAL PLATFORM**
- HOME COMPOSTING
- DOOR TO DOOR
- **CALL SERVICE**



PER CAPITA WASTE OUOTA

URBAN WASTE

UNDERWATER

PIPELINES



DIFFERENTIATED COLLECTION 447 Kg/inhabitants*year

MOBILITY



MOTORIZATION RATE 0,4 av/ab

TOTAL VEHICLES 4.443







DRINKING WATER INTO THE WATER SUPPLY MODE **MUNICIPAL NETWORKS** 449.000 m³ DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS **265.000** m³









TANKERS

WELLS AND WATER SOURCES



WASTE

LOSSES

PLASTIC FREE POLICIES * \sim *only in the municipality of Malfa

41%

COLLECTION METHOD

- **ROAD BINS**
- **ECOLOGICAL PLATFORM**
- DOOR TO DOOR



PER CAPITA WASTE QUOTA

URBAN WASTE

51



DIFFERENTIATED COLLECTION **199** Kg/inhabitants*year

MOBILITY **0,6** av/ab SUSTAINABLE MOBILITY POLICIES **MOTORIZATION RATE** Ň **TYPES OF VEHICLES/** TOTAL VEHICLES 1.642 EURO 0 13,6% EURO 1 3,7% EURO 2 18,6% EURO 3 19,4% EURO 4 **25,8%** EURO 5 **10,2%** EURO 6 8,6% NC 0,0%



PROTECTED AREAS

COAST AND HINTERLAND BETWEEN PUNTA CANNONI AND PUNTA DELLE OCHE 1.911 ha 16 ha to the sea SPECIAL PROTECTED AREA

9.274 ha 26 haT0 THE SEA SAN PIETRO ISLAND SPECIAL PRESERVATION AREA

ENVIRONMENTAL HISTORICAL PARK OF SARDINIA OTHER AREAS

THE COLUMNS 11 ha NATURAL MONUMENT

LIPU OF CARLOFORTE OASIS 284 ha NATURAL OASIS

ENERGY

INTERCONNECTION TO THE NATIONAL ELECTRICITY NETWORK

RENEWABLES SOURCES

PHOTOVOLTAIC SYSTEM

ELECTRIC POWER TO 2019



ELECTRIC POWER TO 2019

SOLAR THERMAL **4** m² SOLAR SURFACE



WATER TREATMENT

WASTEWATER TREATMENT

INPUT

LOAD (A.E)

8.000

PHYSICAL PLANT CAPACITY (A.E.) 8.000

STATUS INCOMPLETE





DRINKING WATER INTO THE MUNICIPAL NETWORKS 717.000 m³ DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS 348.000 m³

LOSSES 51%







UNDERWATER

FROM SANT'ANTIOCO

PIPELINES



TANKERS

WELLS AND WATER SOURCES







TOTAL AREA

109 Km²

ARCHIPELAGO: SULCIS PROVINCE: SU

RECEPTIVE EXERCISES 65

POPULATION

13.969

LANDING CONTRIBUTION* *Sant'Antioco requires an

DENSITY

128

ab/

Km²

environmental contribution



Calasetta

Sant'Antioco 📀

PROTECTED AREAS

SANT'ANTIOCO, CAPO SPERONE 1.785 ha 20 ha TO THE SEA SPECIAL PROTECTED AREA

PUNTA GIUNCHERA 54 ha 71 ha TO THE SEA SPECIAL PROTECTED AREA

SERRA IS TRES PORTUS (SANT'ANTIOCO) 261 ha 25 ha TO THE SEA SPECIAL PRESERVATION AREA

TAURUS ISLAND 63 ha 79 ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

VACCA ISLAND 60 ha 83 ha TO THE SEA SPECIAL PRESERVATION AREA AND SPECIAL PROTECTED AREA

ENVIRONMENTAL HISTORICAL PARK OF SARDINIA OTHER AREAS

94 ha 60 ha TO THE SEA **IS PRUINIS** SPECIAL PRESERVATION AREA

SANTA CATERINA POND 625 ha SPECIAL PRESERVATION AREA

NORTH OF SA SALINA (CALASETTA) 5 ha SPECIAL PRESERVATION AREA

BETWEEN POGGIO LA SALINA AND PUNTA MAGGIORE 11 ha SPECIAL PRESERVATION AREA



INTERCONNECTION TO THE NATIONAL ELECTRICITY NETWORK

RENEWABLES SOURCES

PHOTOVOLTAIC SYSTEM

kW **ELECTRIC POWER TO 2019**



kW **ELECTRIC POWER TO 2019**





WASTEWATER TREATMENT

WATER TREATMENT

INPUT LOAD (A.E) 20.129 PHYSICAL PLANT **CAPACITY** (A.E.) 22.730

STATUS INCOMPLETE



.

PRIMARY





DRINKING WATER INTO THE MUNICIPAL NETWORKS 2.168.000 m³ DRINKING WATER DELIVERED

FROM MUNICIPAL NETWORKS 100 m³ 8

58% LOSSES

WATER SUPPLY MODE



CONDOTTE

SOTTOMARINE

FROM THE DAM OF **BAU PRESSIU**



TANKERS



WELLS AND WATER SOURCES



WASTE

PLASTIC FREE POLICIES* \sim *only in the municipality of Sant'Antioco

COLLECTION METHOD

- **X** ROAD BINS
- **EXECOLOGICAL PLATFORM**
- DOOR TO DOOR



PER CAPITA WASTE QUOTA

URBAN WASTE









PHOTOVOLTAIC SYSTEM



AEOLIAN SYSTEM





WASTEWATER TREATMENT

INPUT

LOAD (A.E)

3.034

PHYSICAL PLANT Capacity (A.E.)

3.500

STATUS INCOMPLETE





DRINKING WATER INTO THE MUNICIPAL NETWORKS 293.000 m³ DRINKING WATER DELIVERED FROM MUNICIPAL NETWORKS 233.000 m³

LOSSES 20%



UNDERWATER PIPELINES



TANKERS

WELLS AND Water Sources









MOBILITY MOTORIZATION RATE 0,5 av/ab **CYCLE PATHS** Ń SUSTAINABLE MOBILITY POLICIES 4 Km **TYPES OF VEHICLES** TOTAL VEHICLES 350 EURO 0 7,1% EURO 1 **1,4%** EURO 2 10,9% EURO 3 **18,9%** EURO 4 **31.7%** EURO 5 **17.1%** EURO 6 **12.3%** NC 0.57% **3.000** Km² **IU** ELECTRIC BIKES Km lineari SHARING SERVICES PEDESTRIAN AREAS PEDESTRIAN STREETS

Data sources

ISTAT

ASC - Atlante Statistico dei Comuni Parks.it - II portale dei parchi italiani MATTM - Ministero dell'Ambiente e della Tutela del Territorio e del Mare GSE – Gestore Servizi Energetici Terna Decreto MiSE 14.02.2017 European Commission Urban Waste Water Website ISPRA, Catasto Nazionale Rifiuti ACI – Automobile Club d'Italia Questionario inviato ai Comuni Fonti online

The major part of the data, contained in the report, was provided by the municipal database.

In the islands, composed by more than one municipality, the data were aggregated to have an overview of the island (e.g. Capri, Ischia, Elba). In the islands, belonging to the same municipality, the data were referred to the municipality to which they belong (e.g. Pelagie Islands, Egadi Islands, Tremiti Islands, Aeolian Islands).



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BEST PRACTICES

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X

These examples show how it is possible to enhance local natural resources and stimulate the economies of the territory, involving the residents.

To view the entire archive maintained by the working group, please visit the project website **www.isolesostenibili.it/buone-pratiche/**

An alternative and ecological mobility model is in progress at the island of Sant'Antioco

The Municipality of Sant'Antioco got some funds from Sardinia Region about **600 thousand euros.** This financing is going to allow some **environmental protection activities** included in the SIC Management Plans - Stagno di Santa Caterina, Stagno di Porto Botte and Promontorio, Dune and Wetland of Porto Pino, on the other hand it guarantees use, protection and enhancement.

The aim is going to preserve the ecological and environmental specificities of the areas through resource management creating functional links between the wetlands, the beaches of the island, the Intermodal Center of Carbonia, the town of Calasetta and, in particular, the urban area of Sant'Antioco by traditional uses. The action includes the purchase of **alternative and sustainable means of transport** such as pedal-assisted bicycles, electric cars and microcars to be entrusted with the Car Sharing and Car Pooling service, also the construction of stations and / or charging stations for pedal-assisted bicycles and electric cars are planned. All those instruments will be useful for the implementation of adequate programs to spread sustainable knowledge and behavior acts to protect the environment.

The project is going to help the island of Sant'Antioco to build an alternative and ecological mobility model for an island looking forward to having a greener future and it also involves the Municipality of Calasetta.





On the 2020 the island of Sant'Antioco becomes plastic-free

The municipality of Sant'Antioco is plastic-free since March 1st, 2020. Starting on this date, merchants for foodstuffs, such as supermarkets, neighborhood shops, delicatessens, and any other shop authorized, are not allowed to sell any disposable and non-biodegradable plastic material such as plates, glasses (of any size), straws, cutlery, non-biodegradable cotton swabs, drink mixers.

Additionally, the owners of some activities in the municipal area such as bars, pubs, restaurants, pizzerias, sandwich shops, takeaways, rotisseries, ice cream shops and similar activities (including establishments beaches and kiosks), are not allowed to distribute to customers disposable bags, containers and dishes in non-biodegradable material to provide food and drinks.





Desalination and purification for Vulcano and Lipari

Vulcano and Lipari will finally be able to use the **desalination and purification** plants. The regional council has in fact approved the proposal of the Councilor for Energy to allocate 2,6 million euros to allow the commissioning of strategic works for the smaller islands. This resolves a long history that began in 2013 with the award of the tender which, however, has been blocked for several years due to a dispute with the temporary association of companies that had won the contract. The sum allocated by the government will serve to definitively close the dispute that has arisen, thus making the plants come into operation. During the works, in fact, the company had expressed doubts about the contract, assuming additional costs of almost 13 million euros. Hence the decision of the Regional Water and Waste Department to reach a settlement agreement - for three million euros - which also provides, pending the Region to publish the call for final management, the temporary assignment for twelve months of the watermaker of Vulcano and the purifiers of Lipari and Vulcano.

In this way the full use of the works that guarantee drinking water and proper waste management will be ensured and the public coffers will save millions of euros that were otherwise spent to supply the Aeolian Islands with drinking water.

Ischia, the first sustainable port of the Mezzogiorno

Everything is now ready for the **electrification of the quayside** of port's lschia. The project provides the allocation by Enel of a transformer cabin that will allow ships, moored overnight, to supply power from the electrical network to shut down the engines and eliminate noisy emissions. The ferries that will stay at the port at night, in this way, use electricity and turn off the generators on board, **minimizing noise and environmental pollution**. The plant will be built in the port area. The municipal administration has identified the place where the transformer substation will be allocated and the bureaucratic path is already started. The Superintendency has already given a favorable opinion, the Municipality has already allowed the landscape authorization, now only the building permit is missing.



Wave energy for Pantelleria

In August 2019 the first Italian 1:1 scale device, to produce **electricity by wave motion**, was officially inaugurated: the prototype, moored at 800 meters from the coast of the island of Pantelleria and a depth of 35 meters, is the result of ten-year work developed by the Polytechnic of Turin with the support of Enea and Iamc-CNR and financed by the Piedmont Region and the Sicily Region.

The project was born from the awareness of the enormous energy potential of wave motion as a renewable energy source, thanks to the continuity and distribution of the sea on the globe.

The technology is called ISWEC (Inertial Sea Wave Energy Converter). The developed system has a footprint of 8X15 m in plan and a height of 4.5 m, a draft of 3.2 m and therefore emerges from the sea surface for 1.3 m. The power plant is composed of a gyroscopic group housed inside a float moored on the seabed. The interaction between the waves of the sea, the hull and the gyroscopic system allows the formation of electricity to be fed into the grid. At first, the system will not be connected to the island's electrical grid, but it will dissipate on an array of resistances, then a cable will be set and it will be connected to the distribution network.

Through this system (ISWEC), it is possible to produce electricity at a more competitive price than the usual system. Today this technology figure out as a valid complement to the energy mix of the smaller islands, Mediterranean and otherwise, where the connection is not immediate to the continental electricity grid.

Polito and Wave for Energy aim to bring the price of electricity produced by wave motion, through the ISWEC system, in grid parity, i.e. the electricity produced by renewable sources should reach the same price the one generated by traditional sources to become a new renewable energy source.







The FTTH (Fiber to the Home) fiber optic network is finally available to citizens in the municipality of Malfa, on the island of Salina. Thanks to the Open Fiber project which has created, with an investment of **227 thousand euros**, the connection to the network of **633 real estate units and 7 Public Administration offices**.

12 kmq out of 26 kmq of the island's total extension have been completed. The optical fiber was positioned under the Enel cables at a distance of approximately 1.40 m, to reuse as much as possible the existing network of the municipality. **It is an eco-sustainability high-tech solution**; 69% of the existing infrastructure was redeveloped.

The wiring of the municipality of Malfa is a step towards a **Salina Smart Island** with no more connection problems for the Public Administration but also for schools, local contractors and for all the inhabitants who will thus have the advantage not only of living in an earthly paradise from a naturalistic point of view, but also to be able to carry out your activities in a normal way.

The fiber-optic network in Salina is part of a larger project for **ultra-broadband in Sicily** in which thanks to 260 million private investment and 184 million public investment are going to provide the connection to all 390 municipalities on the island.



In the Municipality of Ponza, the Società Elettrica Ponzese S.p.A. is the company in charge of the production, distribution, measurement and sale of electricity. The production is entrusted to a temporary plant in Monte Pagliaro and an emergency station located in Cala dell'Acqua in Le Forna. Another project is the creation of a definitive power plant that provides for the expansion of the electricity production capacity of the current temporary power plant with **the use of a share of production from renewable** (photovoltaic) **sources**.

The new power plant, in addition to seeing the production capacity increased to 8.2 MW through diesel generators, provides for a rational use of part of the thermal energy contained in the cooling water of the engines and in the combustion gases. This recovery will be carried out by means of a Rankine cycle unit (0.R.C.) combined with one of the new engines of the plant or alternatively with two of the existing engines. There is also the possibility of heat recovery through a battery of exchangers to make a significant amount of energy available to other public or private business activities.

The covering surfaces of the technical areas combined with a photovoltaic field on the ground outside the power plant area, will allow **the construction of a photovoltaic system of approximately 500 global kW, integrated with a storage system for the energy produced**.

A new aspect is the integration of the electricity distribution network with charging stations for electric cars used by vehicles of the S.E.P. staff and for public use.





A research project to change the islands of Favignana and Lampedusa into solar smart communities

A research project will be developed between the islands of Favignana and Lampedusa to spread the use of renewable energy and create **a virtuous energy distribution system in small communities**.

The project, financed by the Sicily Region, is called Blockchain for Renewables (BloRin) and it is developed by Exalto in collaboration with Regalgrid S.r.l., the Società Elettrica SEA Favignana S.p.A., the company SELIS Lampedusa S.p.A. and the University of Palermo. It is going to run for two years.

The aim is to create **a platform for the management of solar smart communities for the promotion of interactions between producers / consumers**, the "prosumers". The management platform, which uses Blockchain technology, will allow active control and certification of energy flows between the plants distributed within the experimental smart communities developed during the project as well as allow the management of associated economic flows.

In particular, the island of Lampedusa will be involved in the creation of a micro-grid made up of photovoltaic systems and storage systems, giving the possibility of managing the demand profile of various users, thanks to Demand / Response programs. Once the photovoltaic installations have been completed, the project platform will be used to manage energy exchanges. Users who will not be able to store energy, and therefore consume it, will be able to transfer it to the network or another user.

The island of Favignana is going to use the platform created by BloRin. Thanks to a bidirectional charging infrastructure it will allow to manage the charging systems of electric vehicles, i.e. electric vehicles will be able to absorb energy or to deposit it and transfer it to the network in case of need, optimizing the quality of the network operation.





Pantelleria gardens: agriculture, development of the territory, but also fight against climate change

The new project created by Legambiente and Unipol Group is called "Giardini sul mare". The plan is to implement part of the "Beauty Italy" project **aimed at the recovery and redeve-lopment of areas of our country of inestimable value and beauty on the other hand it aims to enhance the precious landscape-agronomic heritage of Pantelleria.** The project consists of monitoring and recording all gardens of Pantelleria, to make these green places known through itineraries and walks, but also to give useful indications to replicate a Pantelleria garden in similar environments, through a vademecum.

This project suggested by Legambiente, and in collaboration with the Island of Pantelleria National Park Authority and the Department of Agricultural, Food and Forestry Sciences of the University of Palermo, is divided into two phases.

The first one provides a **monitoring and census of the heritage and state of the Pantelleria gardens** (it is estimated in a variable number from 300 to 400) with the geo-location of the artefacts. It will be useful to elaborate a survey protocol to acquire data of physical type (type and geological nature of the materials used and the construction technologies adopted, age assessments, construction condition). A research on the biodiversity in the garden (cultivated species and on the state of cultivation, spontaneous flora or fauna) and a study of the microclimatic characterization of the Pantelleria garden will be edited. Thanks to the wind protection effect, gardens of this type has an effect on the microclimate, amplifying the extent and duration with which the condensation phenomena of water vapor occur, thus contributing to the water needs of the plant cultivated inside. Because of that, Pantelleria gardens represent an example of environmental resource (water deposited by condensation on the surfaces of dry stone walls and vegetation could be exploited). It can become a significant part of the water cycle and compensate for the limited availability of rain or irrigation water not only in Pantelleria, but also in many other Mediterranean Islands.

The other phase of the project will provide to **realize an itinerary through the most significant "gardens" of the island** for some activities such as trekking and walking. The itinerary will be reported and sponsored on the island, a GPX track will be also defined to reproduce it on a virtual map displaying its dimensions and basic characteristics. Finally, a short handbook will be created with the basic indications for replicating a Pantelleria garden in similar environments.



Capraia, the environment's friend

The Municipality of Capraia Island has established an agreement for 10 years with the Tuscan Archipelago National Park and Outdoor Schools Network for the implementation of educational campuses, also included in the school-work alternation. It combines the learning aspects of the biodiversity conservation themes with practical and manual experiences related to the protection and maintenance of the territory.

The network of schools "Outdoor Schools Network", leading by the "Duca degli Abruzzi" High School in Treviso, has organized two environmental education initiatives for high school students in the Park area. The "An Island for Schools" project was activated for two class groups that carried out the recovery of ancient paths and carried out thematic workshops on the Island of Capraia.

Furthermore, Capraia, with the Italian islands of Tavolara, Asinara and Palmaria, was the beneficiary of the "Island Sustainable Community" Project (ISOS) (Réseau d'îles pour le développement) which has the purpose of identifying innovative and sustainable solutions to address critical municipalities issues, such as managing population flows in the tourist season, water and energy supply, waste disposal, mobility and connections with other islands or the mainland. Also the small French islands, located in the Tyrrhenian area of the Mediterranean such as the Isle of Lérins (AM), the islands of Hyères (VAR) and the Lavezzi islands (CORSICA), were involved in the project. The project was funded under the Interreg program. In Capraia, the Tuscan Archipelago National Park has created a public lighting system powered by photovoltaic panels: an area of the urban centre was involved in the project. The installation of devices, used to minimize the impacts on sea birds and other nocturnal animals, and presence sensors to limit consumption were applied.

As part of the same project, bags, in which to put multi-material waste and paper, were made available for residents and tourists or people standing in the port of the island; a simple gesture to improve the separate collection.

IbizaPreservation for the sustainable development of the Balearics

For over 10 years IbizaPreservation has been working to identify, research and support local initiatives that can have a positive impact on the environment and on the community of Ibiza and Formentera. Ibiza generated half a ton of waste per person in 2018 as shown in a recent study of its Sustainability Observatory. A 14% more than anywhere else in Europe and a 25% more in comparison to the quantity produced in 2010. As in many other parts of the world, plastic is a significant waste issue of the Ibiza and Formentera.

For this reason, IbizaPreservation created the **Plastic Free Ibiza & Formentera** movement, an initiative involving more than 25 organizations. It is working with local administrations and companies to try to gradually eliminate disposable plastic, with the aim of eliminating it completely by 2023.

To date, more than 100 companies have already signed up for the "Plastic Free" certification procedure: a star means that a company has removed three disposable plastic items; two stars indicate that it has removed 50%; three stars it means 100% plastic free.

Another project, still in progress, concerns **the protection of the precious Posidonia**, or marine prairie, an aquatic plant thanks to which the Balearic waters remain clear and turquoise. Some of the prairies of Poseidonia are over a thousand years old and the area is recognized by UNESCO as a World Heritage Site. However, pollution and uncontrolled anchoring of boats are destroying them. The main focuses of IbizaPreservation are: to map seagrass, to support boats with an application to guide them in anchoring, to provide information to improve the construction process of underwater pipelines and many other initiatives to better educate people on the crucial role that Posidonia plays in our ecosystem, with the hope of preserving it for many thousands of years yet.



Crete with zero emissions in 2030

The island of Crete, one of the main tourist destinations in Greece, has identified the key actions to become an island in **zero emissions by 2030.**

The Greening the Islands Observatory¹, together with the technical departments of the region and the government of Crete, public service companies, universities, local SMEs, international companies that are members of the Observatory, defined in March 2019 the necessary priorities to develop a new sustainable development strategy for the island.

From the supply point of view **energetic**, Crete has an isolated system and all its consumption is produced locally: there are three thermoelectric plants, fuel oil and diesel, and the renewable energy plants on the island cover the **20-24**% **of the annual energy requirement**. The total renewable capacity of the island is **299 MW**, which includes 200 MW of wind farms, 98 MW of photovoltaic plants, 0,3 MW of hydroelectric energy and 0,5 MW of biogas.

The observatory will work on the implementation of **storage systems** to support the increase in renewable energy. Energy efficiency solutions for hotels, buildings and street lamps will be improved and an information campaign will be planned to increase the acceptance of renewable energy among the population.

For **water management**, solutions will be studied to increase the efficiency of the water network taking into account the seasonal fluctuations in demand due to tourism. Subsequently, a strategy will be developed to prevent situations of water scarcity in case of drought, among the solutions provided are innovative desalination plants.

¹ Greening the Islands is an innovative organization that supports the self-sufficiency and sustainability of islands around the world. The Greening the Islands Observatory is a global initiative that brings together all the stakeholders involved in the process to meet island needs and stimulate the application of innovative solutions in the energy, water, mobility and environment sectors. The GTI Observatory also facilitates the development of shared strategies between governments and businesses.



On **mobility sectors**, policies will be developed to promote the use of electric boats and electric cars and restrictions will be imposed on polluting vehicles in urban areas. Crete is also examining the possibility of developing a V2G (Vehicle to Grid) pilot project as well as creating cycle and pedestrian paths to encourage the use of the bicycle.

As regards the **waste**, the GTI observatory will propose new methods to increase separate waste collection from hotels and markets, and then move on to the collection of domestic organic waste. Biogas plants for the management of organic waste and domestic composting will be evaluated as well as the opportunity for treatment and reuse of biological sludge for agriculture.



In the North Sea, belonging to the archipelago of the West Frisian Islands, there is the island of Ameland which extends for 268,50 km² and is home to 3503 inhabitants.

Thanks to the project "**Cradle-to-Cradle Island**", Launched in 2009, the **mobility sectors** on the island. The main problem to be solved was tourism: in fact, most people (especially families) brought their cars on the ferry, increasing traffic on the island. So the project found an alternative and sustainable solution: the "vrachtfielts", one **modular bicycle**, which responds to different needs, being provided as freight transport, therefore able to also carry the suitcases of tourists. With this project, the island of Ameland has achieved the goal of significantly reducing climate-changing emissions.





Lidö, the Swedish Zero Island

Located in the north-east of Stockholm, the island of Lidö is called Zero Island because **in one year it reduced its emissions by 78**% compared to 2018 levels (from 180 to 40 tons of CO₂ equivalent). The "Zero Island" project is part of a larger one the "Journey to Zero initiatives". Thanks to a program supported by Neste, a Finnish company reorganized human activities by placing the environmental issue as a priority and, subsequently, in one year the island's energy balance was positively changed, applying a series of some practices.

As explained by Neste, **Sweden fixed to become fossil-free by 2045** at National level. The company proposed some solutions to **decrease the environmental impact of every citizen in concrete life** starting from tourist services to produce the least possible number of emissions.

The Zero Cabin, one of the most popular Airbnb destinations, allows for example to live a climate-neutral life experience, while at the Lidö Värdshus restaurant you can try the Zero Menu, a sustainable low-emission menu created by Swedish chef Jonas Svensson which uses seasonal ingredients and does not require long transports.

Fossil fuels, used in agriculture and for land transport, have been replaced by those obtained from renewable sources and solar panels were used for the production of electricity and for heating the water, Each building on the island is equipped with solar panels, air and water heat pumps, LED lights and climatic tents with high energy efficiency. Propane gas once used for cooking has been replaced by biogas.

Everything is on Zero Island is reused or recycled. Food waste is switched into fertilizer for the organic potato field, while the new recycling centre ensures that nothing goes wasted.

The island has become climate neutral and the project does not stop: it will be a place where to educate people on responsible and sustainable choices, where to get in experience on Zero Vacations and, even, where to get married for the first time in zero impact with the Zero Weddings wedding.



Mauritius, regional leader in low carbon development

The territory of the Republic of Mauritius, off the Indian Ocean, covers 2040 km², for 1.331.155 inhabitants.

The **waste treatment** solids is organized in a composting plant in the La Chaumiére area; the process and technology were provided by an Indian company, Excel Industries (India) Ltd. Thus, the plant receives about 300 tons of solid waste per day, which are treated in compost, which is then sold as fertilizer.

On an energetic level the island turns out to be **partially decarbonised** (3,8 MW). In fact, the government has launched a range of policies and incentives to reduce barriers to the adoption of photovoltaic modules on roofs and to encourage energy efficiency measures in the building sector. The project aims to create public and market platforms for **divert investment from fossil to inexhaustible sources**.

In order to make a leap for small-sized installations (<50 kW), a type of tariff compensation mechanism has been developed **Feed-In**, which remunerates the production of energy at a fixed price for a specified time. The expected cost of energy savings for the industrial sector is \$ 3 million a year. As of 2015, they had applied for the Feed-In scheme **400 users private and 80 public, non-governmental and religious**. Based on experience, the extension of the Feed-In system to photovoltaic systems above 50 kW is being examined.







Sustainable waste management on the Cozumel island

It is the third largest island in Mexico, with a surface area of 539 km² and 95.000 inhabitants.

The project of the University of Jena, Germany, in collaboration with the Universities of Quintana Roo (Mexico) and the Litoral University of Argentina, deals with the subject of **waste management** starting from the question "how can sustainable waste management be created by improving socially and environmentally?"

Since 2003, the Mexican government has introduced a waste recycling policy; however, each state has its own specific laws. This is still a study, but of fundamental importance as it is aimed at encouraging the reuse of waste material in Mexico, where less than 20% is currently recycled.

Smart grid: a project in the Azores islands

In February 2020, a **real renewable hybrid power plant** was inaugurated on the island of Graciosa, in the Azores islands. Thanks to this new energy solution, supplied by the Wärtsilä technology group, **the use of renewable energy will increase from 15% to 65%**, to make the best use of clean energy, and meet the energy needs of the over 4,000 inhabitants of the island.

The power plant includes **energy storage technology** that provides a more durable and sustainable power system. Energy storage is in fact necessary to overcome the intermittence of renewable sources, manage the frequency and quality of the power supplied and guarantee backup energy to meet peak demand.

The entire energy management of the island is monitored, integrated and optimized by an advanced energy management software that uses artificial intelligence and machine learning technology to integrate energy generation resources based on load models and weather forecasts.

The electricity supply of the islands presents a series of challenges, in particular the strong dependence on liquid fuels, combined with the growing demand for climate change. The Graciólica project provides for maximum renewable penetration, reduces dependence on imported liquid fuels and reduces greenhouse gas emissions. The Graciosa hybrid renewable power plant has the potential to **eliminate around 190,000 liters of diesel per month**.






After Dorian Hurricane the Bahamas plan the electricity grid by focusing on the energy of the sun

In September 2019, Dorian hurricane hit the northern Bahamas. It was the fifth Atlantic Category 5 hurricane in the past three years. With winds of 185 miles per hour and gusts above 200, Dorian has caused a disaster over 700 islands, from Florida to Cuba, in the heart of that place known as the "Hurricane Alley".

However, the Bahamas have found hope thanks to a pilot project promoted by the Prime Minister of the Bahamas, Hubert Minnis regarding **the construction of photovoltaic micro-grids to restore electricity**. In fact, because of the hurricane, the Marsh Harbor electrical substation was destroyed and also all the connections, the generators were used to supply energy on the islands.

The new micro-grids are small-scale systems, solar fields with accumulation of batteries. They can operate both directly on the main power grid or on a single facility or neighbourhood.



Until now, electricity has been supplied to the inhabited islands of the Bahamas thanks to diesel-powered generating stations, about 30 in total, through the overhead lines.

This new photovoltaic system is hurricane-proof. Unlike other solar projects, in fact, it was designed to withstand winds of 180 miles per hour. The experiment was designed for the island of Ragged where the new system will produce electricity to meet the needs of its approximately 100 residents.

The Bahamian government spends an average of \$ 400 million a year on imported fuels to maintain its power plants and transfers those costs to its citizens who pay three to four times what people in the United States pay for electricity.

The cost of installing the new solar micro-grid on Ragged Island is \$ 3 million, wellspent money that will decrease costs for future electricity generation.

The Bahamas' goal is to produce 30% of its energy from renewable sources by 2030.



The state of Hawaii has committed to produce 100% of its electricity from renewable sources in support of the 17 Sustainable Development Goals (SDGs) to reduce poverty, protect the planet and ensure peace and prosperity for all by 2030.

In one of the seven inhabited islands in the northwest of the Hawaiian archipelago (about 70,000 inhabitants), the island of Kauai, there is a solar power plant that with its 77,000 panels produces at least 10% of the energy needed by the island , 24 hours a day, 365 days a year. The plant, managed by the NGO Kauai Island Utility Cooperative (KIUC), during the sunniest period of the day is probably able to meet 100% of the daytime energy needs , while for the 4 hours of peak evening demand accumulation batteries are used.

The innovation of this solar power plant is the way to overpassing the lack of the space, main issue of Hawaii state where there is a strong competitiveness between farmers, industries and tourism. A partnership between a local sheep farmer and the Kauai Island Utility Cooperative, was established and represents an example of how companies competing for local resources can have mutually beneficial relationships.

Darryl Kaneshiro's 350 sheep graze the grass that grows between the solar panels and that would otherwise hinder their productivity. The contract was awarded by a breeder instead of a company that wanted to eliminate the grass with the machines, finding in that way a more efficient and sustainable way for the environment.





Sustainable Islands Report 2020 Edition

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