

## 100% renewable: a new future for Italian small islands

Italian small islands not connected to the main country grid are good examples of the last century oil based energy systems. Electricity is produced through expensive oil diesel systems and energy is used very inefficiently. This situation is conflicting with a country in which renewable energies in 2014 satisfied 37% of the electric demand and with the situation of high solar potential and in many cases also good wind resources of the small islands.

This incredible situation will however rapidly change. New rules are in fact being approved that will oblige to promote energy efficiency measures and the use of renewable energies. If the new Government decree will be sufficiently strong, it will be possible for the small islands to transform themselves from energy relicts of the past to vanguards of the energy transition.

This Greenpeace report has been prepared also to put pressure on the authorities in order to have valid new energy guidelines for the local utilities.

The study, prepared by Exalto Energy&Innovation, is based on an overview of the present energy situation of the islands and considers a three steps scenario in order to achieve a fossil free energy system. Given the fact that energy consumption is drastically concentrated on electricity and in transport fuel, the energy transition will involve also the introduction of electric vehicles, leading to 100% renewable islands.

Three specific islands are then considered in order to analyze the specific paths that could lead to a fossil free energy system.

### **Obstacles to renewable diffusion**

The first part of the report considers in detail the strong obstacles that are at moment blocking any evolution of the costly and polluting fossil energy system.

The first obstacle is represented by the local monopolistic utilities that, with present rules, are payed for what they spend, a situation that has almost completely eliminated any attempt to improve the efficiency of electricity consumption and to diversify towards renewable energies. By the way, this system costs to the Italian citizens 70 million € each year.

The second obstacle is given by the existing very strict rules that don't allow the installations of solar or wind plants in most of the islands.

Given the evolution of the laws, the improvement of technologies and the change of sensibility of protection authorities, the study considers a possible path for a radical energy transition divided in three steps.

## **First step, 2016-20: The hystorical energy systems rapidly changes**

In this period a particular attention will be given to all the energy efficient measures, beginning with the transformation of the dominant electric hot water production system based on electric boylers, that use 30% of residential electricity, towards a large use of solar water systems and very efficient heat pumps. Also the efficiency of the lighting systems could strongly improve in this period.

On the production side, photovoltaic will see a diffusion both as distributed systems on buidings and as medium size (100-1.000 kW) plants. Storage systems will be considered as part of a national pilot projects.

The local utilities could play a specific role in this transition, but it is also possible that other investors will be involved. This means that the utilities have to change their business model if they want to survive in the new regulated environment.

Regarding the installation of distributed solar thermal and pv systems, a strong information campaign will be necessary in order to involve families and hotel owners in the use of the available incentives.

## **Second step: 50% renewable by 2025-30**

The next decade will see a diversified use of new technologies. Solar thermodynamic could be introduced along with photovoltaic plants, the first (probably medium size) windmills will appear, digesters to produce biogas from organic waste and wave power systems will be installed, and also geothermal plants will be connected to the grid.

Moreover storage will begin to have an important role. All pv distributed plants will be coupled with storage and large size storage systems will be introduced. Electric mobility will rapidly evolve.

The islands that have desalinization plants will use these systems also for a better integration of wind and solar.

## **Third step: 100% renewable by 2030-40**

The last and most difficult jump will lead the energy systems of the islands to be completely independent from fossil fuels.

From the production side, it's possible to introduce in this phase large scale windpower. The possibility to have off-shore floating systems will greatly reduce the opposition for their the authorization.

Transportation will evolve towards 100% electric, helping in this way also to stabilize the grid.

The largest problem will be the storage solutions that will depend on the technological evolution and on the cost reduction of the different available options.

Pumped storage could be a possibility in islands with specific geographic conditions (altitude of hills). Compressed air energy storage (Caes) will compete with hydrogen production, while electro chemical storage will cover a

share of the needs. Some diesel generators will also stay in place for security reasons, using bio-diesel as a fuel.

## **Economic evaluations**

While the new rewarding mechanism is not yet known, an analysis on the attractiveness of investments show that, most of the technologies considered will have an interesting payback time.

Moreover it's important to underline that the extracost for the islands, presently charged on the national bills, will decrease due to the electric demand reduction and to the diffusion of decentralized pv installations.

In the long term, the study considered conservative price reduction (56% for pv and 33% for wind). The evaluation of the costs to implement a smart grid and the storage systems needs a detailed analysis of the specific electric systems. But also this evolution will see dramatic cost reductions.

## **Favignana, Lampedusa and Pantelleria: 3 sicilian islands towards 100 renewable**

The report analyzes in specific three of the larger Italian "small islands" to verify the different de-carbonization paths that could emerge.

- **Pantelleria**

The electricity demand for this island (7.800 inhabitants), 38 GWh/y, will see a medium term reduction due to the launch of energy efficiency programs and an 11% increase in the long term, due also to the electric transformation of the transport system.

Pantelleria has a good geothermal potential, that will allow to cover almost half of the long term demand and will considerably reduce the need of storage systems. In the fossil free scenario, a third of the production will be covered by wind, 18% by solar and 5% by wave power.

- **Lampedusa**

The electricity demand for this island (5.600 inhabitants), 36 GWh/y, will see a medium term reduction due to the energy efficiency programs and a slight increase (+2%) in the long term, due also to the electric transformation of the transport system.

In the fossil free scenario, almost two thirds of the production will be covered by wind, 28% by solar and 7% by wave power.

Both Pantelleria and Lampedusa have desalinization plants that will be useful to stabilize the grid in presence of intermittent renewable production.

- **Favignana**

The electricity demand for this island (3.400 inhabitants), 13 GWh/y, will see a medium term reduction due to energy efficiency programs and an 8% increase

in the long term, due also to the electric transformation of the transport system.

In the fossil free scenario 54% of the production will come from the wind, 40% from solar and 6% from wave power.

## **Conclusion**

The analysis of the existing electric system of the Italian small islands shows the possibility of a transition to a more efficient, resilient and fossil free energy system. The rapidity of this transformation will depend by the ambitiousness of the new rules that the Italian Government is defining, by the possibility to positively interact with the authorities on Culture and Environment, at present very conservative in issuing permits for renewable plants, and by the role that the existing utilities will play.

This evolution will benefit the environment with a reduction of noise and local pollutants, with CO<sub>2</sub> reduction and with the creation of new jobs (300 in the 3 islands considered).

In fact, this is the right moment to push for an energy transition in the small islands that could be very important also as for the development of case studies useful for the national and the European transformation of the electric systems.