

C3P & NASA TECHNICAL WORKSHOP 2007

Berlenga Island Project: Background and Overview

Berlenga Island is a unique Nature Reserve of Portugal. It is, therefore, imperative that Berlenga be preserved and passed on to our children in the same conditions that we received it from our ancestors. However, beyond all the damage that we inflict upon Berlenga's delicate eco-system, it is shocking and entirely unacceptable that both the European Commission and the UN Environmental Program do not recognize Berlenga's right to fly Europe's Blue Flag.

Raw sewage and electric power, today produced by diesel engines, as well as water supply limitations and fuel spill risks are examples of the problems that the Reserve must overcome. The "winter isolation" period, during which merely 2 lighthouse keepers remain on the Island, is a sharp contrast to the "summer invasion" situation, when more than 1000 residents and visitors are on the Island, daily. The associated demand with infrastructure and logistics issues has led to unacceptable situations that our efforts have sought to correct. Failure to establish appropriate and timely corrective actions will most likely lead to an intolerable disruption of the Berlenga Island, as a living eco-system. Implementing a recommended well-structured holistic approach will both alleviate current problems and serve to establish an exemplary "Low Carbon Island" site.

For this purpose, there is an ongoing project called "***Berlenga, A Laboratory for Sustainability***", developed under the auspices of the Secretary of State for Environment and coordinated by the Center for Pollution Prevention, C3P, with the support of NASA and ITB, Inc. from the USA. The C3P-led team will work with other stakeholders, such as the Institute for Nature Conservation and Biodiversity, ICNB, the Municipality of Peniche, the Navy Lighthouse Authority, the utility companies Águas de Portugal, AdP, and Energias de Portugal, EDP, EFACEC, GALP Energia, Portugal Telecom, PT, INESC Porto, INETI, ISQ, Rui Pena, Arnaut e Associados, among others. The Association formed by these entities is working with Berlenga's residents and businesses to define the most critical requirements for the Island Project, in order to maximize the usage of an integrated set of implemented solutions. Potential solutions will be identified and evaluated for their suitability. The identification of requirements, potential solutions and conceptual design for the Island is being defined by consensus among the core team members, and in consultation and approval by the Portuguese Ministry of the Environment. While technical feasibility and environmental benefit will be key drivers for the conceptual design, other factors such as refocusing Island visitation to cultural and educational aspects, are also goals that are on the drawing board. Indeed, it is envisioned that Berlenga could be a "showcase" of long term sustainability and biodiversity, not only for Portugal but for island and isolated or remote communities in general, particularly in developing countries.

As mentioned before, the conceptual design for the Berlenga Island will be holistic in nature. It will address all community needs (environmental, energy, potable and service water, waste treatment, transportation), for each Island zone (fishermen's village and restaurant, fortress, campground, lighthouse). In addition, the overall design will offer solutions covering the gamut from pollution prevention to resource conservation to recycling, incorporating both low-tech and high-tech solutions. The latest commercially available renewable energy technologies will be incorporated in the design to provide, store and supply energy in a sustainable fashion, significantly reducing current demand for diesel fuel. Energy sources may include various combinations of solar, wind, and eventually biomass and wave power. All possible combinations of locations for the renewable energy systems—on Island, in the ocean, and on the nearby mainland—will be evaluated to minimize disruption of the Island's landscape and soundscape. Maximum utilization of existing infrastructures will be considered. The design will be robust, to allow for the possible inclusion of newer, more advanced technologies in the future.

The following technological options are being actively considered:

Within the field of Renewable Energy Technology Options, several Electrical Energy Sources are being considered, such as Solar Power, using small photovoltaic arrays; Wind Power, using technology with the least visual and acoustic intrusion; Biomass, investigating how wastewater treatment sludge can be processed for fuel; and, finally, Wave Power solutions.

In terms of Electrical Energy Storage, Advanced Batteries are being considered, as well as, Hydrogen from electrolyzer.

As for the Electrical Energy Supply, Hydrogen Internal Combustion Engine Generators, Inverters and Fuel Cells are all being evaluated for this Project.

Potable Water Technology Options include Advanced Reverse Osmosis from Seawater and the production of Water from Air via Liquid Desiccants or from Condensation.

Regarding Waste Management Technology Options, Sewage is treated through Biological packaged treatment plants, and Solid Waste through Compaction and Conservation/ source reduction/ restrictions.

One of the Options for Transportation Technology that is still open is related to Multi-purpose electric utility vehicle powered by Advanced battery or Fuel cell.

"Green" Homes/ Buildings Options will be looked into, and the best practices to reduce energy and water requirements will be adopted.

Lastly, the area of Educational Effectiveness Options for showcasing the nature preserve selecting the best practices employed in similar settings in other countries, as well as the most practical technologies for educational purposes. A plan for transfer of most effective methods will be produced and possibly extended to other ICNB managed locations.

This Project should be concluded within 18 months. Therefore, priority will be given to leading edge solutions that have already been tested, and that have a minimum impact on the natural resources of the Island, including its soil and the surrounding sea, as well as both their flora and fauna. This does not mean that the Project isn't open to research projects that can complement or improve the development of future, more modern solutions, as long as they do not interfere with the established calendar. This calendar is the result of an urgent need to apply immediate solutions for the Island's more pressing problems. Moreover, it is restricted to timings that are not easy to overcome, such as the impossibility of working on-site during the months of November through May.

On the other hand, the Project's budget, at 2 to 3 million Euros, is strongly grounded in the uninterested participation of the associated partners in terms of technology, labor, and supply of goods and services. Obviously, this is not enough to cover all expenses, and that is why we are counting on financial contributions from any public or private person or entity that would like to become associated with this Project through sponsorship. Besides, the Project is conceived to work in modules, where priority is given to the solutions to basic problems which are: renewable energy production and storage, production and storage of drinking water, and waste management – compacting solid waste and wastewater treatment.

In the significant group of Partners that has, to date, gathered for this Project, many required areas of scientific and technological expertise are already well represented; and some businesses have clearly and unequivocally reflected their desire to voluntarily integrate environmental concerns into their social goals, through financial donations to this Project.

For the success of this Project we trust in the conscious attitude of Social Solidarity and Responsibility, both collectively and individually, on behalf of these Partners and all others yet to come.

Escola Superior de Tecnologia do Mar

Peniche, November 7th, 2007