



eco-innovation
WHEN BUSINESS MEETS THE ENVIRONMENT

**CIP Eco-innovation
Pilot and market replication projects
Call 2012**

Call Identifier: CIP-EIP-Eco-Innovation-2012

Report on technical advancement and difficulties met D2.1

Ecoponics

Contract ECO/12/332783/SI2.656985

Covering the reporting period from

18/07/2013 to 17/02/2015

Reporting Date

28/02/2015

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Project website: <http://aquaponics.is/ecoponics/>



Technical advancement

The main task of WP2 includes an optimal aquaponics design of the commercial plant at Breen taking into account optimal harvesting at least once a week all-year round, driven by the market need. Focus is on environmentally friendly production and full utilization of all resources. The key to this is a healthy and balanced polyculture system. Thus, the feed is 100% based on sustainable ingredients, no synthetic fertilizers are used for the plant production and no effluent water or waste leave the plant.

During the first period of the EcoPonics project the efforts have been focusing on commercial aquaponics design. The hatchery and fattening units were designed in the new location and in the beginning of 2014 the hatchery was constructed.

The new units have run during 2014 including automatic surveillance and control of the main processes, in order to minimize the possible risks that could affect the production. This includes controlling the quality of the water, the proper and optimal feed, the corresponding maintenance and cleaning of the tanks, as well as a system of plant cultivation for an optimum filtration of the water. These factors are crucial to obtain a system of sustainable and safe production. The design of the system is described in D2.3 Report on design and risk analysis.

The new site is located in Tknika. Tknika is a centre promoted by the Basque Department of Education, Universities & Research, under the direct auspices of the Sub-Department of Vocational Training & Lifelong Learning. Innovation is at the core of Tknika in its ongoing efforts to place Basque Vocational Training at the European forefront. At Tknika there is good space for the production units, as well as a laboratory and hatchery. Tknika has offered BREEN more space than they assigned at the beginning of the project and therefore it will be possible to further expand and improve the installations.

Equipment:

The construction of the installations began in January 2014; the main costs incurred until now and the main suppliers, are:

- Construcciones Iñadi, working in the indoor installation of the hatchery:
 - Fish tanks
 - Hatchery fish tanks
 - Mechanical filtering system
 - Water and heating system for production
 - Aquaponics tanks design and CAM (Computer-aided manufacturing)
 - Installation of RAS and heat (recirculating aquaculture system)
- PcComponentes, computers and components for the control system, in the Check Office.
- Coralleida, profilux control system

The following tasks and installations have been carried out:

In the Hatchery:

- Recirculation and filtering pumps

- Water recirculation system
- Heating system of the water
- Thermal management system
- Aeration system of the water
- Breed Tanks
- Vegetal filtering system
- Controlled artificial lighting for plant growth

Control and handling of products:

- Laboratory for the monitoring of the quality of the feed
- Room for the handling of broodstock

Other:

- Junior and Senior Expert Office
- Control office
- Feed store

Furthermore, Breen has investigated the formulation of the feed for the fish. The feed from the main suppliers on the market has been investigated and alternative protein sources have been analysed.

Commercial fish feed from Skretting (Spain), Biomar (Spain) and Le Gousant (France) have been compared. The process of analysis has been carried out as follows:

- Chemically
- Biologically
 1. Tastefulness
 2. Acceptance
 3. Effectiveness

After that the development of a new fish feed formula without fish protein started using proteins from insects, worms or other sustainable sources.

Breen has also worked on the follow-up of the water qualities in aquaponic productions by analysing the pH, dissolved oxygen, redox, conductivity, temperature, NH₃-N (Ammonia) and NO₃-N (Nitrates) and the photoperiod. The environmental parameters have been related to the optimum choices of plant species and seasonal effects.

Difficulties met

Breen has not met any major difficulties and the project has been running according to the plan. The company has junior and senior experts responsible for the daily running of the system. The work tasks of Breen's employees in the EcoPonics project are listed in Annex.

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of Svinna, Breen, IGGF and HI and can in no way be taken to reflect the views of the European Union.



Co-funded by the Eco-innovation
Initiative of the European Union

Annex: Work-tasks of Breen's employees

Breen has junior and senior employees taking care of the daily running of the system. The employees were responsible for the launching of the technical part of the project and on the other hand the initiation and maintenance of the hatchery and the plant cultivation. This includes also the surveillance and monitoring to keep the system in a good balance. The main work tasks are listed in the following.

-Maintenance and Control of the agricultural system

The Junior Experts, are responsible for the maintenance and control of the agricultural system and work shifts to cover the work to be carried out during the 365 days of the year. Among others, the tasks they realize are:

- Cleaning of the cultivation system
 - Control of parameters
 - PNT (Standardized protocol daily jobs) every day of the year, it makes the control of tasks, 2 times a day, in the morning and in the afternoon.
 - Check temperature of the tanks
 - Check temperature box primary electrical system
 - Check water levels
 - Check entry of water in the tanks
 - Retro laundering filters, mandatory
 - Review profilux alarms
 - Fill feeders
 - Check water level of osmosis
 - Review aquaponia kits
 - Check pc screens if there has been any anomaly
 - Purges, mandatory, in the morning and in the afternoon
 - Feed, mandatory
 - Cleaning meshes, irons floating
 - Minimum night temperature of the greenhouse
 - Review outputs bacterial filters
- And others

-Control the parameters of the water and management of the plant system

The experts are in charge of the control of the parameters of the water and management of the plant system and work together in the tasks. The expert also manages different kind of projects and in this case manages the project EcoPonics. Among others, the tasks they realize are:

- Check irons floating: temperature, pH, electrical conductivity, water exit, pump
 - Ex clay: temperature in the tank, pH, electrical conductivity
 - Water pipes: Temperature, pH, electrical conductivity, water level in the pipes
 - Model-Demo: Temperature, pH, electrical conductivity
 - Review aquaponia kit
 - Review aquaponia kit (fishes)
- And others

-Design of the system of feeding and breeding areas for the hatchery

The Senior Expert is responsible for the design of the system of feeding and breeding areas of the Hatchery.

Among others, the tasks he realizes are:

- Calculation of volumes of biomass
- Protocol of size of food (grain size) in relation to the size of the fish
- Development of planes
- Application for licenses of activity and permissions of works
- Subcontracting, request of budgets, financial and management issues
- Follow-up of work
- Environmental and other reports