

AdriAquaNet

Enhancing Innovation and Sustainability in Adriatic Aquaculture

Deliverable WP 3.2.5 energy saving

Control sheet/Control Document

Legnaro, 30.06.2022

Project number:	10045161
Project Acronym:	ADRIAQUANET
Project Title:	<i>Enhancing Innovation and Sustainability in Adriatic Aquaculture</i>
Start of the project:	01/01/2019
Duration:	42 months
WP/activity:	IMPROVE ENVIRONMENTAL SUSTAINABILITY OF FISH FARMING
Deliverable name:	3.2 Waste Management, Emission Reduction, Renewable Energy And Energy Saving
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Delivery date:	30/06/2022
Status:	Final

1) Introduction (objective and purpose of the deliverable)

Optimizing feeding practices, managing waste effluents and saving energy are major clues to improve the environmental sustainability of marine fish farming. To address these topics, the objective of WP3 consists in testing and setting up novel low pollution feed formulations and feeding plans to be implemented in cage-farmed fish as well as smart technologies for waste treatment and energy saving to be applied in commercial fish farms. **Regarding energy saving (WP 3.2)** the system was implemented on a pilot scale at the partner hatchery PP9 Ittica Caldoli together with novel energy saving processes developed by PP4 for water heating and circulation (i.e. heat pumps and "hybrid" heat pumps, photovoltaic installations).

At PP8 Friskina facilities, the use of electrical boats with photovoltaic battery charging station was implemented through PP4 expertise.

2) Presentation of the deliverable related to the previous progress report

During September and October 2021 an innovative heat-pump heater for water was purchased and assembled to compare its performance with traditional resistor heater (by the assistance of University of Padova PP4 subcontractor and Gas Clima Service external expertise). Different water temperature and power absorption have been continuously monitored. Heat pump showed a significantly higher performance than resistor system and was ready to be tested in Ittica Caldoli (PP9) in 2022. The prototype heat pump water heater system was moved to the Ittica Caldoli plant in January 2022 and adapted to work with an existing water tank. Two days of training were held by experienced technicians to instruct the plant's workers on how to operate the system. The equipment was connected to a photovoltaic power plant (89 kw) bought and installed by PP9.



Picture 1 - Prototype water heater installed in Ittica Caldoli



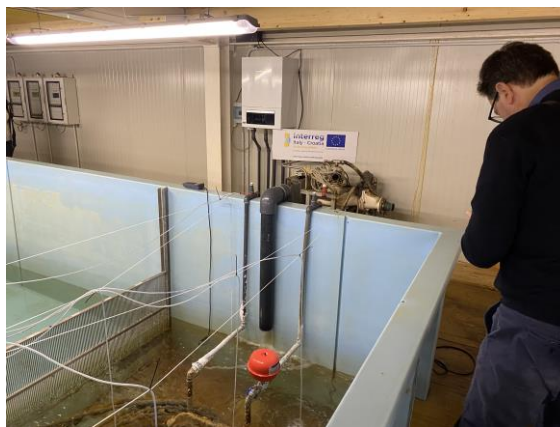
Picture 2 - heat pump equipment

2

Thanks to the good results obtained with the prototype, Ittica Caldoli bought a second heat pump with a rated power of 17 kW and a new heat exchanger about 5 times bigger than the first one. The second version of the system was able to increase the water temperature from 19°C to 23°C in almost all the 10 tanks located in the hatchery, for a total water volume of about 280 m³. The results shown above clearly indicate that the heat pump technology, combined to clean energy production by means of renewable energy sources, is the key to improve the efficiency of water heating for inland mariculture.



Picture 3 - heat pump engine



Picture 4 – final prototype

Two emission free electrical outboards have been purchased by PP4 and supplied to PP8 – Friskina plant in Rogoznica (Split). The top-of-the-line Torqeedo Travel 1103 CL, equipped with an integrated high-performance 915 Wh lithium-ion battery and a built-in onboard computer, have been tested in July 2020. The batteries are recharged by a 50 W solar panel and provide enough reserve capacity for a full day's work without any stress to fish and operators and no pollution in the sea water.



Picture 5 and 6 - emission free electrical outboards

List of equipment

Ref.	Image (photo with the project label on)	Description (name of the equipment and short description of the object)	Station Town and PP where is places
1	See pictures 1 to 4	Heat pump equipment	PP9 Ittica Caldoli Lesina (FG) Italy
2	See pictures 4 and 5	Emission free electrical outboards	PP 8 Friskina Rogoznica (Split)