



EAFRD-funded projects

# The Circle

## From zero impact to a positive impact: Solutions to produce high-quality sustainable food

The Circle moves from zero impact to a positive impact using aquaponics to produce high-quality sustainable food.

The Circle is a company implementing the first commercial aquaponics operation in Italy as a sustainable and competitive development model to produce top-quality sustainable food without negatively impacting the environment. As an agricultural technique and business model, aquaponics guarantees higher yields and more rapid growth of plants under cultivation. The project involves transforming fish organic waste and ammonia into nutrients for plants through a bio-filter without using chemicals. The remaining water cleansed by the plants is then released back to the fish, saving more than 90 % of the water used within the closed system. Additionally, the company was involved in a trial to develop microalgae as a form of fish feed that would allow the system to be even more closed-loop. Having received funding from the Region Lazio RDP in 2017, The Circle installed photovoltaic panels to power the operation, which enabled the operation to become energy self-sufficient and cut its carbon dioxide emissions.



### Location

Roma (Italy)

### Programming period

2014 - 2020

### Priority

P2 - Farm Viability and Competitiveness

### Measure

M06 - Farm and business development

### Funding (EUR)

Total budget 70 000  
EAFRD 30 184  
National/regional 39 816

### Project duration

2017 - 2023

### Project promoter

Mr. Valerio Ciotola

### Contact

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### Website

[www.thecircle.global](http://www.thecircle.global)

## Results

- 135 litres of water saved per kg of product.
- 33,000 kg of avoided CO2 emission into the atmosphere every year.
- Double the amount of yield per hectare compared to conventional production.
- 0% input emissions.
- Zero herbicides, synthetic fertilisers and insecticides used.
- Higher yields and more rapid growth of the plants under cultivation.

## Lessons & Recommendations

The Circle's aquaponics production model is easily transferable thanks to the modular development of its production units that can be placed anywhere as it does not depend on agricultural soil. This type of system also favours the development of a network of highly specialised skilled people.

### ENRD Contact Point

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## Context

Current environmental challenges may pose a threat to food security, including soil erosion, water consumption and pollution levels. Both countries and companies are being called upon to provide tangible and effective answers to these problems. We will need to produce more food with less available space. A company called The Circle adopted a solution to concretely respond to climate change. The company created a sustainable and competitive development model to produce top-quality sustainable food without negatively impacting the environment: aquaponics. Aquaponics is defined by the Food and Agriculture Organization of the United Nations (FAO) as a symbiotic food production system integrating aquaculture (the production of fish) and hydroponics (soil-less production of plants). Thus, aquaponics is a system whereby plants are cultivated in recirculated aquaculture water. The Circle started from the observation that a fish produces organic waste and ammonia that can be transformed into nutrients for plants through a bio-filter without using chemicals, thereby replicating the natural cycle. The remaining water cleansed by the plants can then be released back to the fish, saving more than 90 % of the water used within the closed system. As an agricultural technique and business model, aquaponics guarantees higher yields and more rapid growth of plants under cultivation.

## Objectives

The entrepreneurial idea by a group of four young graduates in industrial biotechnologies was to exceed the idea of zero impact by creating a process that would lead to a positive impact. The goal of the proposed project was to grow the best vegetable varieties by reintroducing fish waste into the production cycle and developing a circular economic value chain.

## Activities

The Circle offers extremely high-quality products, cultivated in an innovative and sustainable manner. Aquaponics is an agricultural technique that combines aquaculture and hydroponics farming. It guarantees higher yields and rapid growth of the plants under cultivation, avoiding pesticides and/or herbicide usage. In aquaponics, water circulates from the fish tank to the plants and fertilises them, but first it passes through a biofilter that turns the fish waste into plant nutrients. The plant roots are then able to absorb the nutrients and to clean the water before it cycles back into the fish tank. The technology used allows The Circle to cultivate entirely without soil, so it's possible to grow food even in contaminated lands.

In 2017, the Rural Development Programme of Region Lazio (2014-2020) also funded the installation of a photovoltaic system with 10 kW power to ensure the containers were energy self-sufficient. As part of the same project, the company conducted an experimental trial, developed in collaboration with the University of Rome "Tor Vergata" and the spin-off AlgaRes, to study the possibility of completely closing the cycle by producing fish feed based on microalgae. A small demonstration pilot was installed near the production facility to produce microalgae to trial. Technological sensors were also developed that constantly monitor the fundamental biological levels, allowing for remote control of conditions, e.g. temperature, and a large reduction in labour input.

The aquaponics method is not only productive, it's highly profitable. The Circle wants and can be at the forefront to meet the market demand for sustainable products and services with a positive impact on the environment. It can also adapt to the evolution of market segments and respond to the needs and purchasing behaviour of consumers. The Circle's reference markets are clear and defined: high-quality restaurants, hotels and mass market retailers. More than 130 restaurants throughout Italy, with a focus in Rome, are choosing The Circle every week as synonymous with sustainability and quality. All production is currently purchased. The Circle is as good example of a new way of making business environmentally aware.

## Main results

The Circle boasts the first commercial aquaponics plant of Italy. This technology reduces water consumption by 90 % per kg compared to conventional land-based agricultural production, which translates into 135 litres of water saved per kg of product. The controlled environment and the closed-loop system minimise CO<sup>2</sup> emissions, as well as the photovoltaic panels that offer a complete renewable energy source for the operation. This results in 33,000 kg of avoided CO<sup>2</sup> emissions every year. Experimental microalgae culture production has proven suitable to guarantee the nutritional intake for the fish, which offers the potential for expansion of the aquacultural part of operation into ornamental and edible fish production. The Circle's aquaponics operation also results in double the amount of production per hectare compared to the norm with zero input of herbicides, synthetic fertilisers and insecticides.

The Circle's aquaponics production model is easily transferable thanks to the modular development of its production units that can be placed anywhere as it does not depend on agricultural soil. This type of system also favours the development of a network of highly specialised skilled people.

## Key lessons

The project involves transforming fish organic waste and ammonia into nutrients for plants through a bio-filter without using chemicals. The remaining water cleansed by the plants is then released back to the fish, saving more than 90 % of the water used within the closed system. Additionally, the company was involved in a trial to develop microalgae as a form of fish feed that would allow the system to be even more closed-loop. Having received funding from the Region Lazio RDP in 2017, The Circle installed photovoltaic panels to power the operation, which enabled the operation to become energy self-sufficient and cut its carbon dioxide emissions.



### Additional sources of information

[www.thecircle.global](http://www.thecircle.global)

This project has been categorised under 'Green futures' by the nominating National Rural Network