ECONOMIC FEASIBILITY STUDY

life ZeoWine

Life ZEOWINE

ZEOlite and WINEry waste as innovative product for wine production

LIFE17 ENV/IT/000427

www.lifezeowine.eu

Sommario

1. LIFE ZEOWINE Economic and feasibility study

The aim of this document is to analyze the economic feasibility of the ZEOWINE product production and application in vineyards in order to support the exploitation of project results by other end users (vineyard managers, vine nurserymen, farm manager, wine growers and table grape producers) and/or stakeholders such as local/regional authorities, governmental institutions, association of entrepreneurs in the viticultural sector, research centres, active in the agricultural and viticultural sector in Italy and Cyprus, the countries involved in the Project, as well as in other regions in Europe where viticulture plays an important role.

The goal of this economic feasibility study is **to multiply the impact of the Project results reached during its implementation and to provide information about the feasibility of the strategies proposed in order to support potential new end-users to replicate and transfer the ZEOWINE soil protection and improvement strategies after its end**, **to reach a wider audience and implement its results in further sites and regions, other than the Project demo sites**.

As foreseen by the project proposal, part of the data collected and processed for the development of the socio-economic impact assessment are here used for the realization of this study as well as part of the decisions, activities and strategies matured by the partnership and reported in the Replicability and Transferability plan.

Specifically, the study is also meant to provide details on:

- application of the protocols tested in the partner companies, with the details of further developments reached both in terms of new plants built during the project with pre-treated cuttings, as well as further extension of the project in other productive vineyards.
- ensure medium and long-term monitoring of the impacts of the protocols on the specific viticultural sector, both at vineyard (soil and plant) and at final productions levels (grapes and wine);

- the strategies for transferring the results of the project into a wider technical-scientific and academic context, also at the European level, benefiting from previous national, European and international cooperation involving project partners;
- the strategies to use partners networks, such as wider consortia of regional/local GDOs wine producers to promote the use of ZEOWINE production and application protocols in other vineyard farms or wider territories.
- the monitoring of regional, national and European calls within which it is possible to develop, in various directions, further thematic, technical-scientific, academic or training initiatives, deriving from the results of this project.

2. Viticultural sector in Europe: impacts of new trends and environmental issues

The European wine production chain is distributed throughout the Mediterranean basin, especially in those countries which traditionally represent the main direct beneficiaries both for internal consumption and for exported production.
Within each country, viticulture is distributed in particular areas usually along rivers, hilly areas, or in plains where it is possible to optimize mechanization and viticultural vocation. Therefore, the economic aspect of the productions has pushed towards the adoption of the mechanization of field operations and has strongly conditioned the development of the areas planted with vines too, abandoning the marginal areas and concentrating them in the most suitable areas or with greater tourist appeal.
Viticulture in European territories is often present in areas with a high degree of anthropization. At a first superficial analysis it is evident that viticulture has positively influenced both economic development and social development, but it is also necessary to keep in mind some critical issues that have recently emerged and connected to globalization, continental trade, and climate change.

In fact, today we are facing a viticultural sector which, while remaining very important for the entire agricultural policy of the Union, appears to have become very fragile due to the enormous loss of soil properties, structure, organic matter and biodiversity caused both by its territorial concentration and by its recent highly intensive and mechanized productive structure.

So, wine production in Europe represents at present an economically very important production sector with an ancient tradition and presence in many anthropized territories of the continent.

The world of wine is going through years of very important changes, full of technical and cultural challenges that affect both the production sector and the consumer population. One of the most delicate aspects, regularly at the center of public opinion criticism, is precisely that relating to the use of mechanical means for field operations and chemical fertilizers and their eco-toxicological impact on soils.

It is increasingly urgent to meet this need for change and reduction of chemical inputs in viticultural soils. From the 1950s onwards, the first major change with the transition from traditional agriculture to industrial agriculture, also known as conventional agriculture today.

The first was characterized by small farms, managed according to a system of productive and ecological balance, by production objectives rarely beyond self-sufficiency, by technical skills deriving from personal experiences and family traditions, and guaranteed by its characteristics a certain maintenance of soil and environment characteristics, properties and biodiversity of crops .

The second was and still is characterized by large farms, with production objectives oriented towards profit and therefore towards the undulating demands of the international market, large monocultures, the use of technical skills in turn conditioned by both production objectives and by the growing availability of technical tools made available by the chemicals and mechanical industry (chemicals for the control of pathogens, synthetic chemical fertilizers, increasingly powerful and efficient

tractors and operating machines).

Industrial or conventional agriculture, despite the enormous impetus that chemical and mechanical means have given it, is actually characterized by a simplified vision of the production system, decidedly indifferent to the balance of ecosystems.

This type of production approach is also referred to as the agriculture of the 3 essential factors (Water, Nitrogen and Agropharmaceuticals) to underline the cornerstones that represent the cultural and technical framework of a certain way of farming which is now rightly considered no longer sustainable.

A first attempt to recover the damage done to ecosystems was made with the introduction of IPM (Integrated Pest Management), an agricultural production system that aims to minimize the use of technical means that have a negative impact on the environment or on the health of consumers.

A further turnaround then began with the advent of organic farming.

This trend reversal takes into account the dramatic worsening of soil fertility, the decrease in biodiversity and the erosion of ecological balances, especially caused by the abuse of either mechanical and chemical means, in particular soil chemical fertilizers.

Among the challenges of the viticultural sector, several environmental issues are to be attentional.

The **climate change** that has been taking place for several years now has led to a reduction in the water availability of Italian and European soils. As a consequence of these climatic variations, the phenological phases of many crops have undergone changes. For vines, for example, there is an advance of 6-8 days for each 1 °C increase during the growing season. The increase in anomalous vintages, with short and intense rainfall, concentrated in a few days a year, is also causing an increase in erosive phenomena, especially in the hillside vineyards arranged upright (orientation of the rows along the line of maximum slope). ***Numerous studies have reported that European-wide vineyards tend to lose more soil than the proposed threshold value of 1.4 t/ha per year as a tolerable threshold for soil loss in Europe***.

Another aspect, which determines the increase in erosion, is the **decrease in organic fertilizations in favour of mineral ones**. The decrease in organic matter especially in intensive monocultures such as viticulture is becoming a consolidated problem in most Italian vineyards. At European level, about 90% of soils show a low (0-2%) or medium (2-6%) organic carbon content. The lowest values are found above all in the soils of southern Europe, where 74% of the territory has less than 2% of organic carbon in the surface layer (0-30 cm). The tillage of the soil destroys its structure (with greater losses of humus due to mineralization), remixes the surface horizons with a homogeneous distribution of the organic substance in the worked layer and alters the soil temperature. ***For vineyards in central Europe a loss in stable carbon (humus) has been estimated of approximately 4 t/ha per year in heavy soils, 6 t/ha in light soils and 8 t/ha in soils rich in skeleton and in slope.***

With reference to the problem related to **soil contamination from phytosanitary treatments**, it is highlighted that copper is the first fungicide used in viticulture which, together with sulphur, represent the backbone of organic viticulture. Since the use of copper in the fight against downy mildew does not induce resistance from the pathogen, it represents an indispensable weapon still used effectively today. However, ***the negative effects associated with the use of copper are also important; in fact, due to repeated treatments, copper accumulates in the ground both due to the drift effect and the fall of the leaves on the ground in autumn and, if present in excess, it is toxic for the vine***.

Another relevant aspect is linked to the problem of **managing winemaking residues**. Grape is the leading fruit crop cultivated in the world (Food and Agriculture Organization of the United Nations, 2017). In 2018 the annual world production of wine was 292 million hectoliters and the world's agricultural land devoted to the production of wine was 7.4 kha (2019 Statistical Report on World viticulture, 2019). The amount of solid organic wastes generated per wine's hectoliter is estimated to be about 25 kg (Lanfranchi et al., 2018), thus the yearly production of residues which requires to be

treated and disposed of represents more than 7 million tons. In view of this, the wastes generated from the winery industry are addressed as a world growing environmental problem. The development of strategies to reduce the consumption of resources (energy, materials, chemicals) and the amount of waste released, by maximizing the recovery and recycling of by-products throughout a product's life cycle is acknowledged as an universal contemporary challenge (European parliament, June 2015).

However, in most grape growing states, grape marc, skin, stalk, and pomace from the winery supply chain are still treated as waste with little or no value; they are usually disposed of in open areas and are a source of environmental pollution due to the emanation of volatile organic compounds (VOC), the increase in chemical oxygen demand (COD), the presence of recalcitrant compounds and the free-run juices percolation (Rondeau et al., 2013).

The separation and enhancement of processing by-products such as stalks, skins, grape seeds and dregs are important imperatives of sustainability. Such organic waste can in fact represent a concrete resource rather than being seen as an annoying cost to manage. Some estimates on the potential residues of the wine sector in Italy indicate an availability of about 2.4 million tons of by-products of winemaking, which are on average 3/4 unused.

3. LIFE ZEOWINE Project

The LIFE ZEOWINE Project (2018-2022) was a demonstration project aimed to improve the protection and management of vineyard soil and the well-being of the vine through the application to the soil of an innovative product "ZEOWINE" deriving from the composting of wastes from the wine sector and zeolite.

Starting from the results of previous experiments, which aimed to evaluate the effectiveness of zeolite and compost in a separate way in other production chains, the

project has defined protocols for the production of ZEOWINE product and its application in productive and in new vineyard plant fertilization.

The activities performed within the project were planned to evaluate and prove the synergy of the positive effects of the application of ZEOWINE on soil and vine plants in terms of:

- **improvement of the vine nutrition management**, reducing dependence from organic and mineral fertilizers and increasing the fertility of soil;
- **improvement of the characteristics of grapes and wines produced** which will better preserve the fruity and vegetable aromas, and will increase the polyphenolic and antioxidant supply;
- **offering a solution to the problem of waste management by closing the company production cycle**, since the production of ZEOWINE starts from wine processing of waste compost with zeolites.

The application of ZEOWINE product in the vineyard, moreover, confirmed the results also in the vineyard, at vine plant and final production levels. Specifically, ZEOWINE application has shown improvement in:

- SOIL ORGANIC MATTER CONTENT: ability to maintain the reserve of nutrients and stabilized organic matter in the soil (carbon sequestration);
- FUNCTIONAL BIODIVERSITY: increase in enzyme activities linked to nutrient cycles and in total microbial activity;
- MICROARTHROPOD BIODIVERSITY: microarthropods particularly adapted to edaphic life (QBs-ar INDEX);
- INCREASE IN WATER RETENTION CAPACITY and AGGREGATE STABILITY of soil;
- REDUCTION OF BIOAVAILABLE COPPER
- BETTER LEAF GAS EXCHANGE CAPACITY
- BETTER PERFORMANCE IN THE MORE STRESSED YEAR (2021): higher stem water potential

- EFFICIENT RIPENING: simultaneity between technological and phenolic maturation
- INCREASE IN YIELD AND IMPROVE QUALITY BOTH AS SUGARS AND POLYPHENOLS

LIFE ZEOWINE has also contributed:

- **to increase the sustainability and competitiveness of the wine supply chain**, implementing nutritional and water efficiency and reducing energy consumption, closing the production cycle of waste material from the supply chain and ensuring higher stability in yields and quality of the grapes, obtaining, product more suited to modern market demands;
- **to improve consumer health protection**, creating ideal growth and development conditions for crops capable of determining improvements in terms of resistance, healthiness and plant production.

Another important result reached during the project was the **successful registration of ZEOWINE as «soil improver»** (Beneficiary in charge: DN360 Reg. n. 03006/21 - 31/05/2022) in the Italian register of fertilizer producers (Regulation CE 2003/2003 and D. Lgs. 75/2010).

4. LIFE ZEOWINE: Results achieved and validity of the solutions proposed

LIFE ZEOWINE production and protocols of application both in the pilot productive vineyards as well as in young/new vineyard plants was based on:

- **the development of ZEOWINE**: production and application protocols through the composting of wastes from viticultural production and zeolite;
- **vineyard soil treatment with ZEOWINE**: application of ZEOWINE compost to productive and young vineyards in areas with different topographic and climatic conditions to demonstrate the effectiveness of ZEOWINE fertilization on selected local varieties of vine plants;
- **the fine tuning of final application protocols** according to the outcomes of the above-mentioned actions.

The implementation of the project allowed to demonstrate that the presence of zeolite in composting process of winery wastes improved the quality of the final compost in terms of:

- electrical conductivity,
- nutrient content,
- phytotoxicity,
- microbial activities and
- physical properties.

In particular, zeolite increased the adsorption of ammonium ions of compost, thus resulting in higher total nitrogen content in zeolite-based compost with respect to control compost without zeolite. The retention of ammonium when natural zeolite is

added in the composting process is a very important aspect to increase the agronomic value of compost and reduce the environmental pollution.

Finally, the py-GC results demonstrated that integration of zeolite in composting process offered the benefit of the higher carbon humification with respect to control compost.

By comparing the two zeolite-based composts (ZEOWINE 1:10 and ZEOWINE 1:2.5), we can conclude that **the ZEOWINE 1:10 compost is the most suitable practical application for improving the winery wastes composting process and, at the same time, for saving on the cost of providing zeolite**.

Considering the production of about 210 tonnes of ZEOWINE during the project (CMM: 22,5 tons first cycle+22,5 tons second cycle+22,5 tons third cycle+15 tons fourth cycle; Col D'Orcia: 64 tons first cycle + 64 tons second cycle) and its application on 0,35 ha of a new plant (CMM) and 3,5 ha of vineyard in production (0,4 CMM + 2,4 Col D'Orcia + 0,3 Tenuta delle Ripalte + 0,4 Tenuta Santo Spirito) with a single application of ZEOWINE at a dose of 30 t / ha, **LIFE ZEOWINE has shown that the production and application ZEOWINE's innovative product is effective and beneficial in the biological and biodynamic viticultural chain and in the improvement of soil quality with reference to the following application parameters:**

- ✓ **ORGANIC SUBSTANCE CONTENT** – Organic carbon increased from 42,6 to 56,7 t / ha; Total Nitrogen from 3.75 to 5.01 t / ha; Humic carbon increased from 8.4 to 15 t / ha; total Potassium from 10 to 12.5 t / ha.
- ✓ **BIODIVERSITY**, in terms of enzyme activities linked to the nutrient cycles, microbial activity and pedofauna. Specifically: QBS-ar index increased from 85 to 117; microbial activity from 880 to 1400 mmmolMUB/kg/h; beta-glucosidase activity from 223 to 349 mmolMUB/kg/h; phosphatase activity from 131 to 158 mmolMUB/kg/h. Such variations indicate an increase of about 45% of the enzymatic activities.

- ✓ **SOIL IDRIC RETENSE CAPACITY** is 13,7%. In the soil treated with ZEOWINE, we registered an increase in the water retention capacity of 1%, corresponding to about 20 m3/ha/year.
- ✓ **SOIL STRUCTURE** The soil aggregate stability increased from 1.5 to 2 %.
- ✓ **REDUCTION OF THE BIOAVAILABLE COPPER**, from 18 to 11 mgCu/kg.

The project, moreover, demonstrated an impact on GHG-Greenhouse Gas Emissions-generated by specific agricultural activities - composting and application of the product itself, which contributes to increasing the ability to fix and maintain the reserve of mineral elements in the soil, reducing the need for fertilization, increasing the water retention capacity of the soil, and reducing the number of soil fertilization processes with consequent reduction of emissions related to the use of agricultural machinery. The total reduction in planned and confirmed GHG is approximately 22 t / ha CO_2 per year. Increased APA content (in grapes of about 50 mg / L, this increase results in a better course of alcoholic fermentation and an aromatic kit of the most complete grapes).

Therefore, we can recap that in terms of Environmental benefits, the project demonstrated and confirmed its impact in reference to:

Improved Environmental and Climate Performance: confirming the expected reduction of GHG (CO_2 and N_2O) and waste reduction

Better use of natural resource, in terms of reduced resource consumption, and reduced water consumption, which was almost double the value expected;

Sustainable land use, agriculture and forestry, in terms of soil surface improved and agricultural land under sustainable management.

The proposed solutions have been shown to have a positive impact on the aspects characterizing the vineyard soil management and the wine production and on other

relevant environmental aspects as recapped in the table below:

ENVIRONMENTAL BENEFITS	VARIATION
Increase in Soil Organic Carbon	+ 30%
Increase in microbial functionality	+50%
Increase in biodiversity (QBS-ar Index)	+38%
Increase in stable aggregates	+33%
Increase in Soil Water Retention Capacity	+ 1% (= 20 m3/ha/year)
Reduction of the bioavailable copper	-40%
Reduction of GHG emissions: CO_2 N_2O	- 16.30% - 13.86%

Furthermore, the vineyard soil management strategies of ZEOWINE have made it possible to maintain and improve the qualitative levels of the productions, without modifying their commercial value.

In fact, with regard to **all the parameters analyzed (productivity of the plants, organoleptic/product characteristics of the grapes and wines), there were positive differences between the productions obtained with pilot vineyard farms method and those obtained with the ZEOWINE application.** .

In fact, although with slightly different values between the 3 vegetative seasons (2019, 2020, 2021) the improvement of ZEOWINE treatments on final productions (grapes and wine) were analyzed for CMM for all the 3 years, and for COL D'ORCIA for 2020 and 2021 and have shown:

- **GRAPE QUALITY**: slow maturity in Zeowine, witnessed by lower sugar content and lower total acidity, which allowed a **better balance between sugar content and anthocyanins**;
- **GRAPE QUANTITY**: higher yield and higher berry weight;
- **WINE CHARACTERISTICS**: higher alcohol content.

The effect of ZEOWINE on the qualitative characteristics was very significant; all the quality parameters have improved following the treatment, indirectly demonstrating an improvement in the characteristics of the wines that will be obtained.

Another important result reached during the project was the **successful registration of ZEOWINE as «soil improver»**.

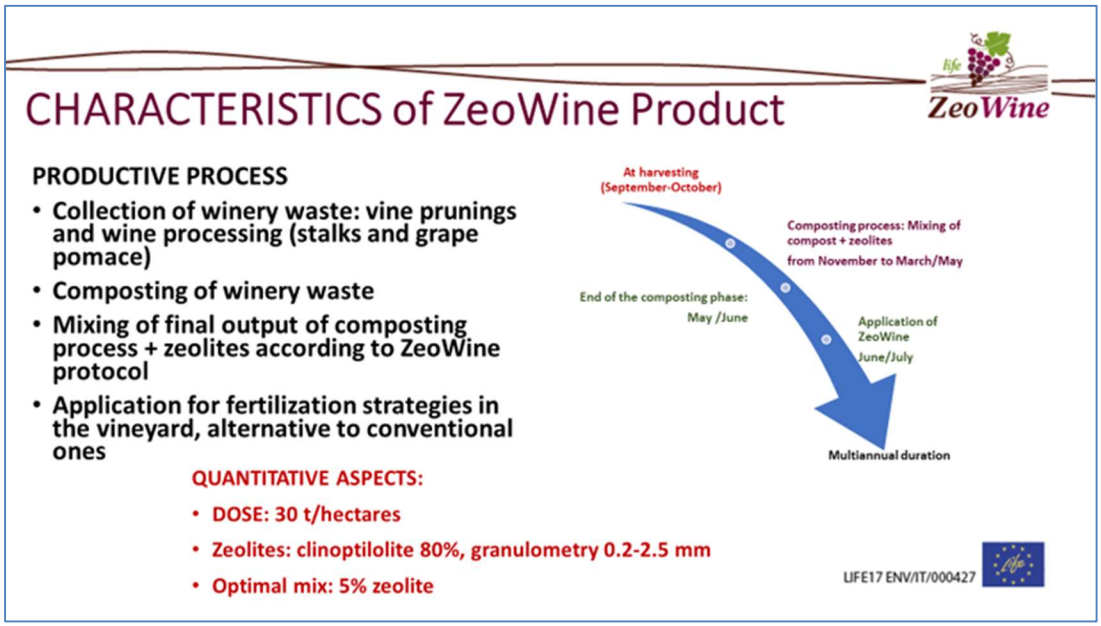
DN360 has carried out the registration of the Company in the Register of Fertilizer Producers (National Agricultural Information System (SIAN) 11 April 2022; Registration number: 03006/21) and is now registered in the list of Fertilizer Producers by the National Agricultural Information System (SIAN).

The ZEOWINE registration to the category of amendments in the Register of Fertilizers has been carried out the 12 May 2022 (Registration number: 0036556/22).

5. Strengths and opportunities of the solution proposed

In this section we present SWOT analysis of the ZEOWINE solutions proposed, in order to derive the feasibility of ZEOWINE application for potential end-users.

The ZEOWINE productive process is characterized by **a medium long term duration** either **in the preparation of the product itself** - linked to necessity to use winery waste for obtaining the by-waste compost to be mixed with zeolite – or **in its duration once applied to the vineyard soil** – linked to its properties to maintain the active features on a multiannual duration .



As reported in the figure above, the preparation process is developed along a period of 7-9 months, that span:

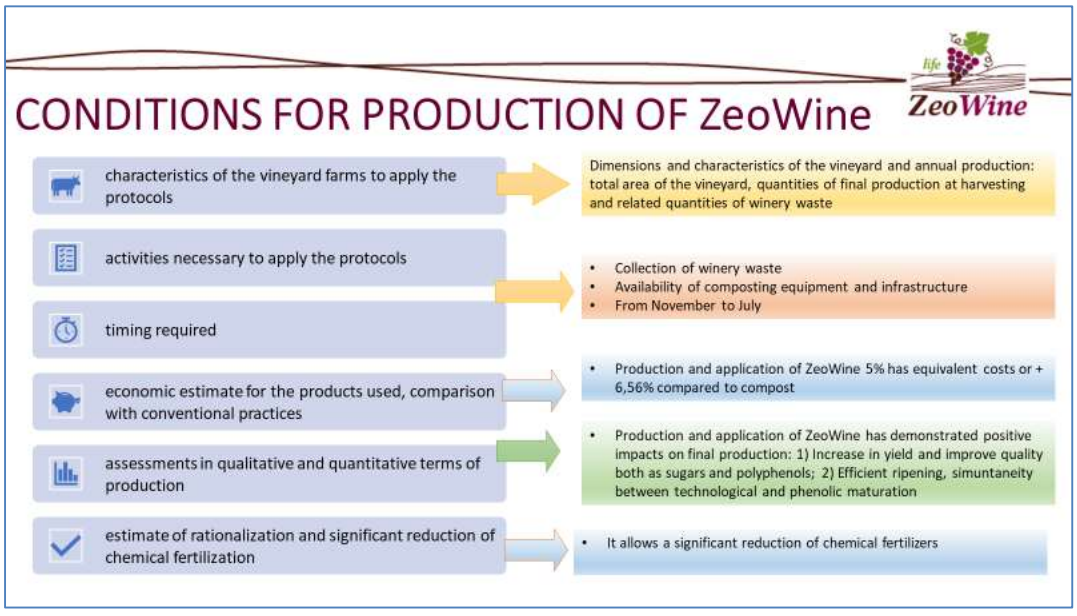
- from harvesting time-frame (usually **September-October**)
- waiting the necessary time to develop the composting process during which it will be possible the addition of zeolite (**March-May**), approximately 6-8 months;

- up to **June/July** of the successive year for its possible application.

Its production cycle, is therefore long, but once applied to vineyard soils, its efficacy has a long duration up to 8 years.

Moreover, **the area that can be covered with a single productive process strongly depends from the quantity of winery waste collected**, resulting in a certain quantity of final compost by-waste that, once mixed up with suggested typology of zeolite, can be applied at **a standard dose of 30 tons per hectare of final ZEOWINE product**.

In the light of these premises, specific conditions should be considered at single vineyard level, as assumptions to the feasibility of the ZEOWINE production and application.



The dimensions and characteristics of the vineyard and annual production will be crucial since depending from the total area of the vineyard, quantities of final production at harvesting and related quantities of winery waste, it will depend the levels of yearly production of ZEOWINE and the areas that each year could be covered with the application protocols.

The **availability of composting equipment and infrastructure** will be crucial to

determine the inclination of a vineyard farm to enter into the production and application protocol.

The **propensity of the vineyard farm to tolerate slightly higher, and potentially variable, costs for the implementation of the ZEOWINE production**, mainly link to the purchase of the required quantities of zeolites.

The **activities to be performed** are: collection of winery waste and delivery to composting dedicated sites; mixing with zeolite according to the suggested best option of a 5% concentration.

The timing for obtaining the best characterization of compost and, therefore, of the ZOWINE produced, should be respected spanning over a 8-9 months from November to June/July.

The propensity of the vineyard farm to choose environmentally sustainable options and strategies to manage vineyard soil, plants and final productions, is another crucial point to support and determine the level of implementation of the ZEOWINE system and practices

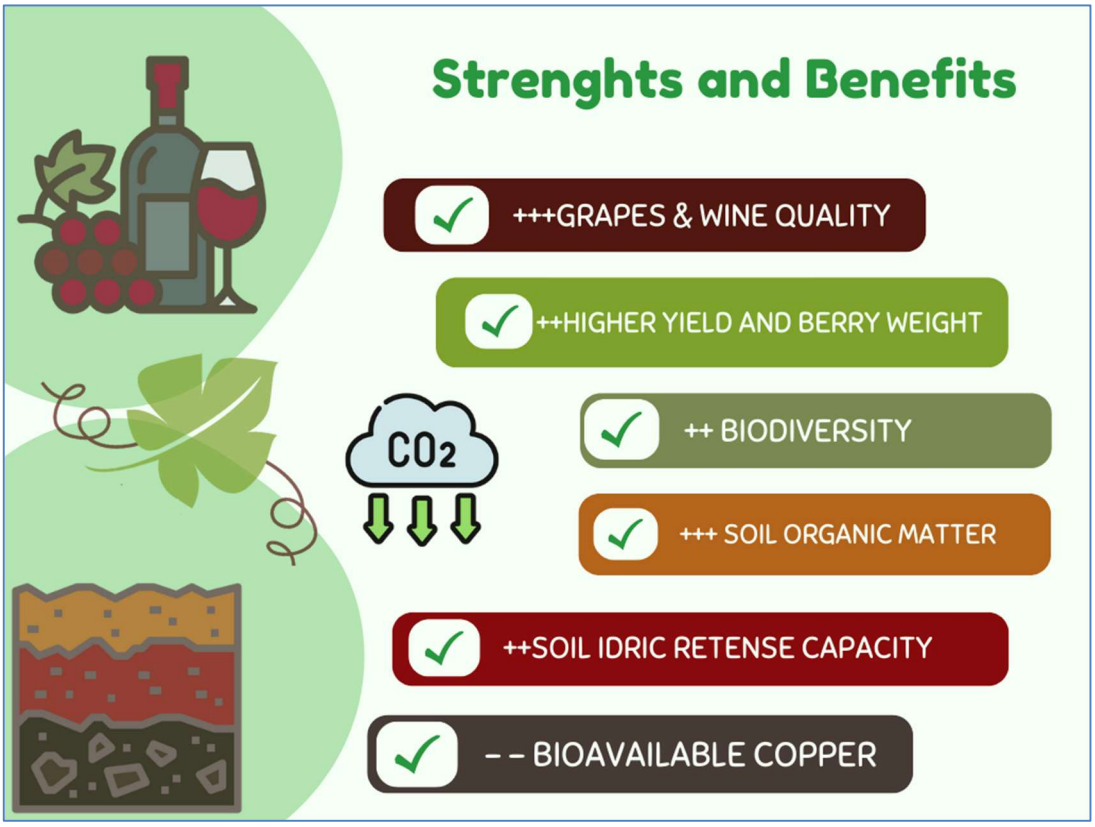
5.1 STRENGTHS

LIFE ZEOWINE vineyard soil management system in the pilot plots has shown that the use of compost derived from reuse of winery waste mixed with zeolite is possible, sustainable and capable to provide proven positive desired impacts on soil characteristics, biodiversity and structure and, what is most interesting for vineyard farms, equivalent or improved qualitative and quantitative results in the final production in comparison with the IPM or organic management.

The ZEOWINE solution proposed have made it possible to maintain high quality levels of final productions, without modifying their commercial value. Indeed, with regard to all the parameters analyzed (plant productivity, organoleptic characteristics, grapes and wine commercial features), there were no substantial differences between the

productions obtained with the procedure followed by the company and those achieved with the ZEOWINE soil treatment.

The proposed solutions prove to have a positive impact on other relevant environmental aspects, such as increasing biodiversity, reducing water consumption, reducing greenhouse gas (GHG) emissions.



The project offers interesting support to promote the sustainability and competitiveness of the wine sector in terms of:

- rationalization of the use of fertilizers
- reduction of energy consumption
- reuse of company waste materials
- increase in the quality of grapes and wine
- stability and / or increase in yields

Another important strength of the project was the **successful registration of ZEOWINE as «soil improver»**.

In fact, fertilizers placed on the market in Italy are subject to control to ascertain compliance with the provisions of Regulation (EC) No. 2003/2003 and Legislative Decree 75/2010.

ZEOWINE falls within the regulatory classification of "Green Composted Soil improver" as defined by Legislative Decree 75/2010 All 2.

DN360 has carried out the registration of the Company in the Register of Fertilizer Producers (National Agricultural Information System (SIAN) 11 April 2022; Registration number: 03006/21) and is now registered in the list of Fertilizer Producers by the National Agricultural Information System (SIAN).

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REGISTRO FERTILIZZANTI

SIAN

Menu Funzioni

REGISTRO DEI FERTILIZZANTI

Uso Convenzionale

Ricerca per Nome Commerciale

Ricerca | Guida

Elenco Fertilizzanti

Ricerca per: ZEOWINE
Totale Fertilizzanti: 1

Codice	Nome commerciale	Denominazione tipo	Sel.
0036556/22	ZEOWINE	All. 5.3.6 - Ammendante compostato verde	◉

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Dettaglio

For the placing on the EU market, the new Regulation 1009/2019, which will come into force from July 2022, ZEOWINE will be considered to belong to the Constituent Materials Category (CMC) 3.

For the first time, the EU legislation will allow the conformity and thus the free

marketability throughout the EU and the CE marking of organic recycled products. However, in order to be classified as compost in the CMC 3 category, the concentration of zeolite has to be reduced to 5% by weight.

In view of this, **an additional composting cycle using zeolite at 5% by weight and winery wastes derived from 2021 harvesting has been carried out, confirming equivalent results**.

5.2 OPPORTUNITIES

The LIFE ZEOWINE project has proved to be a **forward- looking project proposal in terms of adaptation to the specific vine sector, soil protection and the general environmental policies and regulations**, showing that it can effectively offer solutions in line with them.

The LIFE ZEOWINE project can provide support to EU farmers and land managers, to enable them to effectively **tackle waste management and land contamination and depletion; preventing further soil degradation and suggesting concrete alternatives to policy-makers and land managers to devise and implement new and effective wastes and agricultural soils management plans.**

Moreover, the project demonstrated high compatibility and alignment with several on going legislation and regulation.

With the adoption of the **Thematic Strategy for Soil Protection** the European Commission has encouraged the development of operational procedures and technologies for soil protection, restoration, and its sustainable use, and these are exactly the aims of the LIFE ZEOWINE project.

LIFE ZEOWINE project demonstrated to contribute to **European Environmental**

Objectives such as:

1. **Sustainable use and management of organic amendments**: A significant reduction in the volume of organic wastes which can end up in landfills is expected thanks to the alternative offered by recycling these organic wastes in vineyard soils with adequate management.

2. **Soil Protection**. LIFE ZEOWINE strategy allows the sustainable management of vineyard soils, and thus the protection of this important natural resource.

3. Nature and biodiversity: The promotion of sustainable soil use, with particular attention to prevent degradation and contamination, will be made when promoting a new soil status with high quality. It implies benefits to soil biodiversity and functionality.

4. **Climate change**: Although LIFE ZEOWINE is not directly related to climate change, it must be said that it takes into consideration the Kyoto Protocol, and emissions will be reduced as much as possible if the valorization of organic wastes as an organic amendment increases C and N fixation in soils, thereby avoiding the greenhouse effect. The ultimate effect of the LIFE ZEOWINE project is to contribute to the global conservation of the ecosystem services linked to soil (clean water, biodiversity, food security and so on) and mitigate the effect of global warming.

The information obtained by the LIFE ZEOWINE is strongly connected to European environmental policy and legislation, since the improvement of wastes and soils management and their consequences have both biophysical and socio-economic dimensions. Policy makers are expected to make extra efforts at the EU level to bring these two dimensions closer to each other. This is reflected, for instance, in the way that the **Common Agricultural Policy (CAP)** has progressively included more environmental requirements. CAP is one of the main EU legislations relating to Soil Protection, which aims to prevent and mitigate soil degradation processes in agricultural areas through a close monitoring to study soil conditions in the EU. CAP promoted Soil Protection particularly increasing or maintaining SOM and Soil Biodiversity in agricultural lands. Recently, CAP (**Post-2020 CAP, COM(2018)** introduced ***measures***

directly linked to Soil Protection, underlining the need of implementing sustainable soil management within the future agricultural policy in the EU.

EU Strategy for organic farming. Project results are consistent with the EU strategy on the use and reduction of copper, with a view to providing a practical tool that supports Organic farmers in implementing strategies that favour the use of eco-sustainable techniques for the management of crops.

The package of recent European regulatory strategies and guidelines represented by the Green Deal, the "Farm to Fork" Strategy focuses on issues widely addressed by the project such as these 2030 targets: environmental protection and biodiversity, human health protection and quality of food products, reduction in the use of chemical fertilizers, chemical and more hazardous pesticides by 50%; reduce nutrient losses by at least 50%, while ensuring no deterioration on soil fertility; reduce fertilizer use by at least 20%-25 % of total farmland being used for organic farming.

The project is also technically in line with **COM 2014 (398) final / 2 "Towards a circular economy: program for a zero waste Europe"**, in particular way in relation to the aim to "... encourage the adoption of ta cascade principle in the sustainable use of biomass, taking into account all sectors that use biomass, so that this resource can be used as efficiently as possible".

The use of residues from agricultural activities present in the area of vineyard farms for the production of compost, through the creation of on-site composting plants, has the double advantage of reducing the production of waste and its treatment as waste and, at the same time, providing them as materials for an economic and environmental enhancement to restore and improve the quantity and quality of organic matter in agricultural soils.

With a view to the concrete realization of what is called "CIRCULAR ECONOMY", the opportunity for agricultural companies, and in the specific sector, for vineyard farms, to have their own composting infrastructure/plant makes it possible to transform the

environmental-technical-economic "problem" of the management of processing waste into a resource to increase the sustainability and marketing of the farm production.

5.3 WEAKNESSES AND THREATS

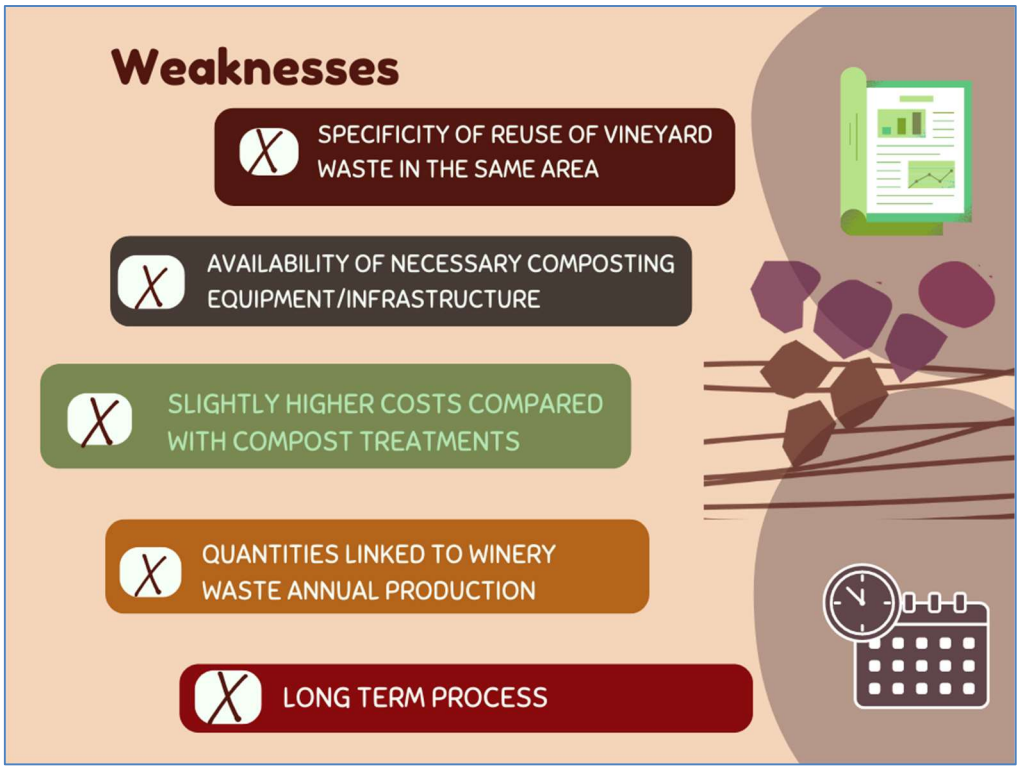
As highlighted in the introduction to this chapter, some limitations or structural weaknesses and threats can be highlighted in relation to the observed ZEOWINE productive process.

One is related to **timing and quantitative aspects** of the productive process:

- ZEOWINE production is characterized by a **medium long term duration** either in the preparation of the product itself, which is linked to necessity to use winery waste for obtaining the by-waste compost to be mixed with zeolite. The preparation process is developed along a period of 7-9 months, that span from harvesting (usually September-October) up to June/July of the successive year for its possible application, once the composting time is duly exploited.
- In terms of **quantities**, the area that can be covered with a single productive process strongly depends from the quantity of winery waste collected, resulting in a certain quantity of final compost by-waste that, once mixed up with suggested typology of zeolite, can be applied at a standard dose of 30 tons per hectare of final ZEOWINE product. This means that for wide vineyard estates, it usually takes more years to distribute ZEOWINE on the whole vineyard areas.

A further aspect is related to the **availability of the necessary composting equipment and infrastructure,** either at the level of single vineyard farm inclined to adopt the productive model for self production of ZEOWINE with their own by-waste compost, or at higher productive level, in the hypothesis of centralized production of ZEOWINE product to be sold to vineyard farms in general. Vineyard farms with already available infrastructure are more inclined to apply the specific productive process. Although

agricultural waste, according to the Italian legislation, fall within "Art. 185 Esclusioni dall'ambito di applicazione" comma 1, lett f) of the Dlgs 152/2006, and fall within biomass category, supported by COM 2014(398) final/2, the winery waste reused in the same vineyard farms still requires some long-term investments for creating and maintaining the infrastructure for their treatment, and initial authorization provided at regional level according to specific parameters.



Another important aspect, is related to **the territorial specificity of the reuse of the vineyard farm waste** in the same vineyard, which is a basic assumption to guarantee a certain level of saving for the vineyard farms (reduction of winery waste disposal costs) and the actual closing of the waste management cycle within the same organizational structure, activating virtuous circular economy models and strengthening low environmental approaches since the specificity of the reuse of the vineyard farm waste in the same vineyard would be maintained.

Rather than a weakness, this aspects represent a limitation on developing a marketing strategy based on ZEOWINE product, while it still represent an opportunity to be developed, when we refer to the dissemination of ZEOWINE productive model that can be autonomously adopted by vineyard farms.

Last but not least, during project implementation a survey on the **development of costs to evaluate the economic sustainability of the ZEOWINE protocols** has been carried out to compare the costs incurred for its production and application in comparison with other control strategies applied during the project.
In order to monitor the productivity costs of applying the protocols with respect to conventional practices, the CMM company, data and information relating to:
1. Direct costs of production of ZEOWINE and application of the protocols in comparison to the different strategies tested (average costs incurred during 3 vegetative cycles);
2. Indirect costs incurred.

The cost comparison was carried out on the specific strategies tested for:
- ZEOWINE 30%
- ZEOWINE 5%
- only ZEOLITE
- COMPOST only

taking into account the general budget costs per hectare related to the management of a vineyard in production, and comparing the costs of the 4 different trials.

	ZEOWINE 30%	ZEOWINE 5%	ZEOLITE	COMPOST
Annual cost in productive vineyard	€/ha	€/ha	€/ha	€/ha
Winter pruning	1000	1000	1000	1000
Head to fruit binding	400	400	400	400
Fertilization + distribution	3620	1520	2950	1100
Land management	1000	1000	1000	1000
Green pruning	400	400	400	400
Cluster thinning	0	0	0	0
Irrigation	0	0	0	0
Pest defense	1500	1500	1500	1500
Manual harvest + transport	1000	1000	1000	1000
Mechanical harvest + transport	0	0	0	0
Total	€ 8.920,00 / ha	€ 6.820,00 / ha	€ 8.250,00 /ha	€ 6.400,00 / ha

The comparison highlighted the following:

- the application protocols of the different field trials have **an impact mainly on the costs for goods and services for fertilization and related distribution processes**;
- there are **no economic impacts on the other areas of company costs** for other cultivation operations of land management, pruning, irrigation, defense and harvesting;
- in the projection should be also considered the depreciation costs for the provision and construction of eventual missing infrastructure for on-site composting, where missing;
- the most expensive thesis is that relating to the treatment with ZEOWINE with a concentration of ZEOLITE at 30%, followed by the trial with the treatment with only ZEOLITE;
- the **trial with the treatment of only COMPOST is comparable, in terms of costs, with the ZEOWINE trial with a concentration of ZEOLITE at 5%, highlighting a clear sustainability**.
- **Production and application of ZEOWINE 5% has equivalent costs or + 6,56% compared to COMPOST trial.**

6 Scenarios for economic feasibility

The project results have demonstrated that all the elements which had to be defined and officialized in relation to the potential use of the ZEOWINE product have been set and re-defined, specifically:

- ✓ ZEOWINE r**ecognition as soil improver and its insertion in the National Register of soil fertilizers**, thanks to the successful registration obtained on 13/05/2022 in the National Agricultural Information System (SIAN) Fertiliser Register puts the product in line with Regulation CE 2003/2003 and D. Lgs. 75/2010 (Beneficiary in charge: DN360);
- ✓ Moreover, the partnership has widen **the experimentation with the 5% concentration by weight** in order to demonstrate equivalent efficacy with the 10% concentration, thus gu**aranteeing furtherly the alignment with the recent set of regulations for natural fertilizer/soil improvers**, and also **positive effects on the final costs for the implementation of the practices proposed**.

Given this framework and the results of the SWOT analysis here represented, the project have highlighted 2 main scenarios in relation to ZEOWINE possible economic and marketing development.

A) **ZEOWINE as a PRODUCT**

In this scenario project partners have considered the potentiality for centralized production of ZEOWINE product and its distribution as a product in big bags.

The partnership in the project implementation phase have concretely faced the pre-conditions and limitations of this scenarios, linked to:

- Availability of winery waste in **sufficient quantities to satisfy the level of demand**;
- Availability of **wider equipment and infrastructures** for the composting phase based on large quantities;
- **Logistic aspects** to collect winery wastes from vineyard farms, which generates transport costs to collect the initial waste and deliver the produced ZEOWINE in return and negative environmental impacts for these transportation;
- **Loss of control on the quality of winery waste collected from different sources**, which can imply costs for further analysis before processing the centralized composting phase;
- **Loss of the specificity of reuse of winery waste in the same productive areas**;
- **Long-term productive process** (approximately 8-9 months for each composting cycles) although positively counterbalanced by the fact that then the application will have a long-term functionality per hectare treated (approximately 8 years);
- **Costs for alternative solution** (commercial compost for agricultural purposes) might represent a competitive obstacle.

B) **ZEOWINE as a PROCESS**

In this scenario, foreseen since proposal stage, project partners have considered the

production of ZEOWINE directly in the same vineyard farm that will then benefits from on site ZEOWINE application (B1).

During the implementation of the project, a further evolution of this scenario was considered as an up-scaling of solution B1, which is referred to similar zero-km solutions, involving wider consortia of wine produces, as represented below in B2.

(**B1**) The elements that characterize the option of **application of ZEOWINE process at single vineyard farm level**, have been considered, resulting to be the most easily practical and immediate way.

Most of the criticalities and limitations highlighted in the first option of the ZEOWINE as a product, appear to be overcome in this scenario, specifically:

- Although the issue of availability of winery waste in sufficient quantities to cover the entire vineyard farm still persists, this limitation can be overcome by a **multiannual plan in which the vineyard farm can quite easily plan the number of years necessary to cover the whole vineyard surface, in relation to the quantities of wastes yearly produced**. Moreover, in wide and extensive farms with differentiated cultivations and agricultural activities, the compost inputs can be improved with other natural waste collected by other productive chain covered by the company, increasing the quantity of waste strictly related to winery;
- In a medium - long-term planning of self production and application of ZEOWINE, the issue related to the 8-9 months length of **the productive process can be properly scheduled also considering the persistence of ZEOWINE positive effects with long-term functionality per hectare treated (approximately 8 years)**;
- **The availability of equipped dedicated areas and infrastructures for the composting phase in single vineyard farms is proportional to the farm dimensions**, and represents a pre-conditions for the ZEOWINE self production;
- The self-produced ZEOWINE will guarantee the **maintenance of the specificity**

of reuse of winery waste in the same productive areas as well as a certain degree of control on the quality of winery waste collected;

- **Costs for alternative solution** (commercial compost for agricultural purposes) will remain a potential obstacles for the company available choices.
- There are **no critical logistic aspects** to overcome, since the self production implies that the vineyard farm is autonomous to produce on-site the composting, mixing and application of ZEOWINE, with reduced costs and impact of transportation of both waste and produced ZEOWINE;
- In order to ensure the proper application of procedures and controls during the self-production process and application, vineyard managers can use project deliverables and require on line support or dedicate consultancy/coaching services from project team.

(**B2**) The elements that characterize the option of **application of ZEOWINE process at a wider level, promoting the creation of composting hubs with territorial wine consortia and association of wine producers**, have been considered, resulting to be a solution for up-scaling project feasibility and maintaining some scale economies which can locate this solution as intermediate between the ZEOWINE pure centralized commercialization of a product, and the single vineyard farm application.

The potential creation of composting hubs with territorial wine consortia and association of wine producers have the same features highlighted for B1 option, but with the advantage:

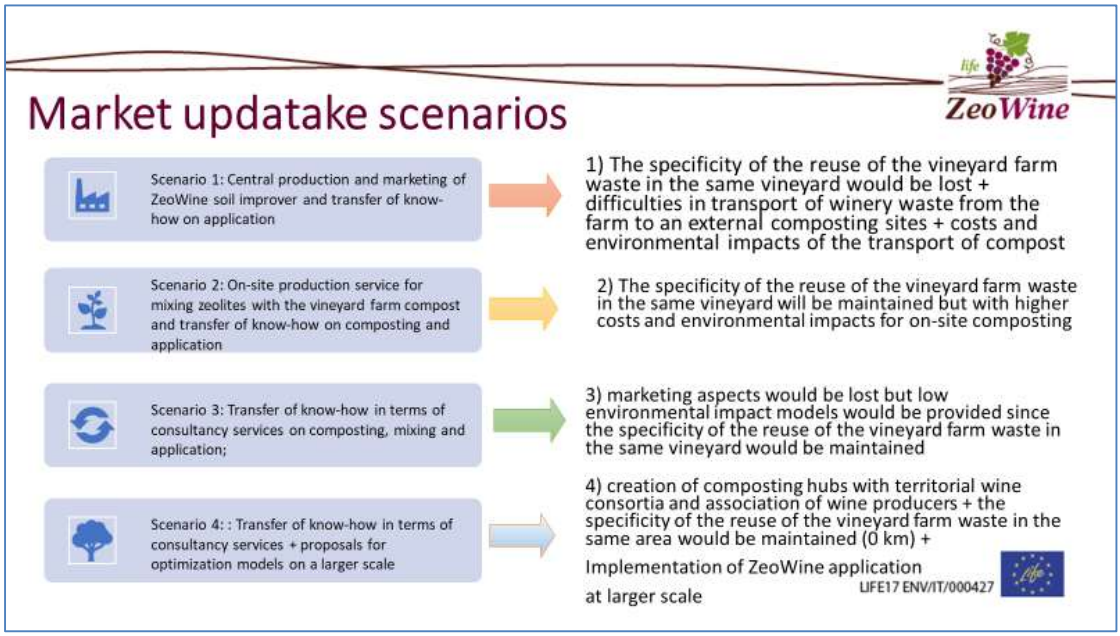
- to continue to guarantee the specificity of the reuse of the vineyard farms waste in the same area, at least within a 0 km approach,

- of reduced transportation costs, since the hubs should serve a limited boundary area where vineyard farms of the consortia are located,

- of possibility to share production costs, such as for composting equipment / infrastructures, for purchase of zeolite, for eventual specialized consultancy services and,

at the same time, the implementation of ZEOWINE application can be developed at a larger scale

The pros and cons of the different combined scenarios for ZEOWINE market up-take, can be represented as in the picture below.



Reassuming:

1) **Case-scenario of ZEOWINE product commercialization**: the specificity of the reuse of the vineyard farm waste in the same vineyard would be lost in case of production of ZEOWINE in other areas/with other compost for its commercialization as a product;
2) **Case-scenario of production and commercialization of ZEOWINE using specific farms composts delivered to a central productive plant**: the reuse of the vineyard farm waste in the same vineyard would be preserved but, difficulties in transport of winery waste from the farm to an external composting sites + costs

and environmental impacts of the transport of compost, generate negative environmental and economic impacts;

3) **Case-scenario of support to on-site process implementation**: the specificity of the reuse of the vineyard farm waste in the same vineyard will be maintained but with higher costs for the client farms for on-site composting; marketing aspects would be lost but low environmental impact models would be provided since the specificity of the reuse of the vineyard farm waste in the same vineyard would be maintained

4) **Case-scenario of creation of promoting composting hubs with territorial wine consortia and association of wine producers**: in this case the specificity of the reuse of the vineyard farm waste in the same area would be maintained (or at least tolerate within a 0 km approach) and the implementation of ZEOWINE application can be developed at a larger scale

7 Activities to support further project exploitation

The production and application / use of the ZEOWINE product developed with the project is technically feasible and socio-economically sustainable, in particular by increasing the awareness of end users and the acceptance of the benefits of protection of the soil, the environment and final productions.

Feedbacks from the involved stakeholders have been collected during the dissemination, training and networking activities planned under actions D.2 in particular in the workshops, training activities and webinars, Networking activities at national and EU level. Feedbacks were gathered to improve the development of supporting materials (ZEOWINE characterization, composting process, ZEOWINE application protocols, Guidelines) as well as to evaluate the potential willingness of potential end-users to use an apply LIFE ZEOWINE strategies, referred to composting, production and application of ZEOWINE product.

The potential for technical application have been supported by several information actions delivered under action D2 with the participations to events and fairs/exhibitions of the sectors involved which allowed to reach and create awareness in a consistent number (898) of specific target group of end-users and stakeholders with potentially high project visibility either at local (Tuscany) and national (Italy) and European levels.

At EU level the actions carried out were mostly focused on the scientific and technical aspects of the project, thanks to participation with scientific poster and presentation in international conferences and symposia on the aspects of soil management and protection, biodiversity and microbial activities, organic matter improvement of soil and overall environmental impact of the project.

During the project implementation, thanks to dissemination and training activities and events targeted either to potential beneficiaries (farmers, vine-growers and vine

nurserymen) as well as to key actors for potential future implementation of the strategies and techniques proposed - such as agricultural operators/consultants/agronomists enrolled in the national professional board of Agronomists -, it was possible to implement and widen the use alternative treatments in vineyards and vine nurseries to these extents:

- **in partner and support partner vineyard farms**: about 210 tonnes of ZEOWINE during the project were produced starting from

  CMM: 22,5 tons first cycle+22,5 tons second cycle+22,5 tons third cycle+**15 tons fourth added cycle** with consequent application on 0,35 ha of a new plant + 0,4 ha of vineyard in production linked to the first cycle and 0,5 ha linked to the fourth added cycle;

  Col D'Orcia: 64 tons first cycle + 64 tons second cycle; and its application on 2,4 ha linked to the first cycle and other 2,4 ha linked to the second cycle

  Tenuta delle Ripalte: application to 0,3 ha linked to the second cycle produced at CMM;

  Tenuta Santo Spirito: application to 0,4 ha linked to the third cycle produced at CMM;

All with a single application of ZEOWINE at a dose of 30 t / ha

- An important indirect action of **training for professional operators** aimed at the illustration of innovative recommended protocols, was performed as potential vehicle to further dissemination and to widespread the use of ZEOWINE protocols in viticulture. Although it is not possible to directly connect to this training activities the results reported in terms of further application in other vineyards of the ZEOWINE protocols, it is important to highlight the number of professional operators reached. Only considering the events which were recognized by the National/Regional/Local Board of Agronomists (ODAF) and allowed to agronomists accredited to the professional board to have their participation recognized as

training credits, we have reached:

- 12 Agronomists during the Life Zeowine workshop - Results of the first year, realized in San Miniato, Pisa, 28 January 2020;
- 63 Agronomists during the Webinar1 realized on the 18/03/2021;
- 47 Agronomists during the Webinar2 realized on the 08/04/2021;
- 14 Agronomists during the Webinar3 realized on the 03/06/2021;
- 15 Agronomists during the Final Conference in Florence on the 09/06/2022

for a **total of 151 Agronomists/professional operators trained**.

Agronomists, being professional consultants usually for more than one vineyard farm each, supporting decision to improve vineyard management and production, are susceptible to generate a cascade effect of the dissemination and use of the project product and protocols of application.

The project's likelihood of replication can be considered in the light of the all the vineyard farms directly involved in the ZEOWINE Project, with an estimated areas as reported in *Table 1a) "Companies applying the techniques developed in the Life ZEOWINE Project*"

Further projections of the project's likelihood of replication can be considered in the light of the all the vineyard farms that are potential end users of the ZEOWINE Protocols estimated as reported in *Table 1b) "Companies applying the techniques developed in the Life ZEOWINE Project*" which considers, as exemplificative projection, the involvement of other support partners which had expressed their interest in the project since the proposal stage.

Table 1a) Companies applying the techniques developed in the Life ZEOWINE Project 3 years beyond the end of the project

	NAME	Estimation of areas convertible to ZEOWINE	HA
	CMM	At CMM, considering the production of 55 tons / year of waste from stalks, skins and seeds and pruning residues, it will be possible to obtain approximately **42 tons of ZEOWINE per year** when fully operational. This means that it will be possible to treat every **1.4 hectare per year at a dose of 30 tons / hectare**. In three years from the end of the project it will be then possible to treat a maximum of **4,2 ha.**	**4,2**
	COL D'ORCIA S.r.l.	Considering the production of 95 tons / year of waste destined for the production of ZEOWINE, it will be possible to obtain **72 tons of ZEOWINE per year**. This means that it will be possible to treat **2.4 hectares per year** at a dose of 30 tons / hectare. In three years from the end of the project it would potentially be possible to treat **7.2 ha**. In the case of Col D'Orcia, the area is so large (540 ha) and its cultivation typologies are so diversified that the production of compost should not be a limiting factor and therefore this estimate could increase.	**7.2**
	Tenuta Santo Spirito	It is estimated to convert to ZEOWINE an overall minimum surface of **1ha.** **Considering the 0.4 hectares already treated during the project,** in three years from the end of the project it would potentially be possible to treat **0.6 ha**.	**0.6**
	Fattoria delle Ripalte	It is estimated to convert to ZEOWINE an overall minimum surface of **1ha.** **Considering the 0.3 hectares already treated during the project,** in three years from the end of the project it would potentially be possible to treat **0.7 ha**.	**0.7**
	Total convertible hectares after 3 years beyond project end		**12.7**

Table 1b) Companies potentially applying the techniques developed in the Life ZEOWINE Project –5 years beyond the end of the project

	NAME	Estimation of further potential areas convertible to ZEOWINE	HA
	ALSIA-Agenzia lucana di Sviluppo ed lnnovazione in Agricoltura	Wide company of about **45 ha** with a fruit-horticultural-cereal production orientation, it is estimated to convert **2 ha** to ZEOWINE	**2**
	Tenuta Fanti	Estate of **260 ha, 50 of which are vineyards**, it is estimated to convert 2 ha to ZEOWINE	**2**
	Fattoria di Montemaggio S.r.l.	Company farm of **80 ha of which 8ha of vines**, it is estimated to convert to ZEOWINE 1ha	**1**
	Azienda Poggiotondo S.r.l.	Company farm **of 40 ha of which 28 ha of vineyards**, it is estimated to convert 2 ha to	**2**
	Tenuta di Bibbiano Societa	Company farm **of 220 ha of which 27 ha of vines**, it is estimated to convert 2 ha to ZEOWINE	**2**
	Consorzio della denominazione San Gimignano	Consortium of **730 ha**, it is estimated to convert to ZEOWINE 5ha	**5**
	Antinori	Company farm of approx **750 ha distributed in different estates**, it is estimated to convert to ZEOWINE 5 ha	**5**
	+ other 1-9 vineyard farms	It is estimated that that a max. of 9 vineyard farm convert on average 0.5 ha to ZEOWINE, for a total of about 4.5 ha	**4.5**
	Total potential convertible hectares after 5 years beyond project end		**23.5**

Even though the name of the vineyard farms and consortia listed in Table 1b) might not be confirmed in the next 3-5 years, those vineyard farms and consortia are part of wider networks of end-users and stakeholders linked to some project partners (CNR, UNIFI, PRIMA FORMA) which have contacts for collaborations in several initiatives, researches, field trials and consultancy. Therefore the estimation can be considered applicable to an average number of 5-15 vineyard farms of medium-big dimensions and at least 2-3 consortia that project partners can involve in further application of ZEOWINE.

Other important tools for further implementation and use of the ZEOWINE protocols are represented by:

1) the **different deliverables produced during the project implementation**, specifically useful to support autonomous implementation of the production and application of ZEOWINE, such as:

DELIVERABLE NAME/TITLE	DESCRIPTION
B1 -Technical report on ZEOWINE composting process	Technical report related to characteristics of the composting process performed for the production of ZEOWINE, which can support potential end-users to implement the same process in interested vineyard farms
C1 – ZEOWINE characteristics	Characterization and analysis of ZEOWINE Product
B2 – ZEOWINE Application Protocol for new vineyard plant	Description and characteristic features of the ZEOWINE application protocol in the case of new/young vineyard plant
B2 - Guidelines for the application of ZEOWINE product and protocols in new/young vineyard plant	Guidelines for the correct application of ZEOWINE product and protocols in the case of new/young vineyard plant, which can support potential end-users to implement the correct application on newly planted vineyard soils
B2 - Technical report on application of ZEOWINE on new vineyard plant	Technical Report related to the application of ZEOWINE product and protocols in the case of new/young vineyard plant, which can support potential end-users to implement the correct monitoring of progresses in interested vineyard farms
B2 – ZEOWINE Application Protocol for productive vineyard	Description and characteristic features of the ZEOWINE application protocol in case of productive vineyard plant
B3 - Guidelines on application of ZEOWINE on productive vineyard plant	Guidelines for the application of ZEOWINE product and protocols in case of productive vineyard plant, which can support potential end-users to implement the correct application on vineyard soils
B3 - Technical report on application of ZEOWINE on productive vineyard plant	Technical Report for the application of ZEOWINE product and protocols in productive vineyard plant, which can

DELIVERABLE NAME/TITLE	DESCRIPTION
	support potential end-users to implement the correct monitoring of progresses in interested vineyard farms
D2 - POLICY RECOMMENDATION ON THE APPLICATION OF ZEOLITE IN COMPOSTING OF WINE WASTING	The document is a focused collection of legislative references that provide a solid ground for application and use of ZEOWINE as soil fertilizer/improver, demonstrating its legitimate insertion and classification as soil improver, and providing, therefore, the framework of Policy recommendations within which it can be used and applied. The document is useful for end-users and stakeholders/policy makers

This set of deliverables has been **made available and uploaded on 300 USB,** approx. 100 of these USB have been distributed during the last dissemination events realized (final conference) or participated bu project partners, the remaining quantities will be distributed in further events and occasions foreseen by the AFTER – LIFE Plan.

These documents are also uploaded and shared on the project website.

This set of deliverables, representing almost a "toolkit" for the production and application of ZEOWINE product, together with further dissemination and training activities, represents another important tool for further implementation and use of the ZEOWINE protocols since it can support not only professional operators/agronomists, but also vineyard managers, wine growers and vine nurserymen to almost autonomously implement the protocols in their private farms.

2) **LIFE ZEOWINE Layman's Report**: will be used together with the project brochures for dissemination to wider general public;
3) **Article, press and media releases and publications**: shared with participants to dissemination events and through the website;
4) **Project Website and the social media pages** will be maintained active for at least 5 years by P.Ri.Ma Forma and CNR. The website (www.lifezeowine.eu) has

a section with all deliverables produced during the project (protocols, technical reports, guidelines, report on environmental benefits and impacts, scientific articles, etc...) which can be furtherly consulted by potential users. Social media pages will be the main vehicle for project updates and participation to further technical and scientific events:

- https://twitter.com/zeowine;
- https://www.linkedin.com/showcase/life-zeowine;
- https://www.youtube.com/channel/UCQXDKO83TMFiyD8W8NK2MVw

Specifically the YouTube channel is the mean to continue the dissemination of videos realized by the project coordinator and partners. Specifically significant are the full registration of the webinars realized between March and July 2021, an oral presentation in English in occasion of the GSOS, and the registration of a FB live stream broadcasted on Wine TV channel:

- Life Zeowine Webinar Life Zeowine #1 (18/03/2021) - https://youtu.be/NMwwSFdaNr8
- Life Zeowine workshop - Results of the 2nd year, online webinar (08/04/2021) https://youtu.be/_LauWNY8D-s
- Life Zeowine workshop - Results of the 3rd year, online webinar(03/06/2021) https://youtu.be/QWCx3gfuSko
- An oral presentation of the project in English language, realized by the project coordinator Grazia Masciandaro in occasion of the "Global Symposium on Soil Biodiversity 2021" – FAO - has also been shared on the project YouTube channel https://youtu.be/A266vz05ecE
- a live streaming on Facebook launch of the Progetti in Vigna info pills tv series, https://www.facebook.com/winetvgroup/videos/progetti-in-vigna-life-green-grapes-e-zeo-wine-nel-programma-europeo-life/288809445521689/ which had over 2050 views, of which about 950 during the live broadcast;

Thanks to both the dissemination/training activities as well as the distribution of materials and deliverables:

- **it is expected that within at least 3 years from project end, project direct and support partners will implement the application of ZEOWINE to**

further 12,7 hectares

- **it is expected an increase in the use also in other existing productive vineyards by farm or vineyard managers, with a larger timeframe (5 years beyond project end, as estimated in table 1b) for approximately further 23.5 hectares**.

Specific monitoring actions to quantify the project diffusion and use as soil protection and improvement practice in viticulture beyond the project end will be carried out and a database of vineyard farms that will be implementing the project protocols, or continuing to implement the protocols after the end of the project will be yearly kept updated.

7.1 Continuation of training, communication and dissemination activities

Training, communication and dissemination activities demonstrated to have a transversal function and important role in enhancing the replicability and transferability strategy by enabling to reach a wider audience and by providing long-term dissemination and technical tools.

On the basis of the experience matured during the project, the activities identified by the partnership and that are intended to be carried out after the conclusion of the project in order to support the project replicability are:

a. **Participation in annual technical/scientific wider events, delivering information through presentations, submission of scientific posters and abstracts, info-desk; distribution of dissemination materials.** As demonstrated by project partners, both the scientific as well as the technical

areas are widely covered by annual participation of some partners to national, European and international events, such as: during its implementation such as:

1) BRIGHT
2) REMTECH
3) VINITALY
4) GLOBAL SYMPOSIUM ON SOIL PROTECTION AND BIODIVERSITY
5) ENOFORUM
6) ECOMONDO
7) General interdepartmental meetings at UNIFI and CNR

which have demonstrated to be relevant occasions to meet potential end users and furtherly disseminate the use of the project strategies.

b. **Delivery of further training for professional operators and agronomists** thanks to the fruitful collaboration with Ordine dei Dottori Agronomi e Dottori Forestali, which has expressed its interest in continuing the promotion of accredited training for its associated members;
c. **Dissemination of project results to vineyard farms and vine nurseries,** thanks to the ordinary activities carried out by project staff of CNR, UNIFI, P.Ri.Ma. Forma, DN360 with vineyard farms and vine nurseries that can be a powerful vehicle to continue the monitoring of extension of project protocols to other areas
d. **Project presentation and insertion into thematic platforms, such as, for example, the "Piattaforma delle Conoscenze" managed by the Italian MITE – Ministry of Ecological Transition-** https://www.mite.gov.it/pagina/lqs-piattaforma-delle-conoscenze-capitalizzazione-delle-esperienze-e-disseminazione-dei

The activities will be addressed to the following targets:

Potential end users: wine-growers, vineyard managers, vine nurserymen, table and wine grape farms managers

Professional operators: agronomists and experts of the wine and vine nursery sector

Scientific communities: researchers, students, scientific research groups and associations, academic institutions;

Technical communities: sector related technical groups and associations, environmental and agricultural associations, sector-related social parties such as associations of producers, trade unions, association representative of the viticultural sector;

Stakeholders: policy makers, local and regional authorities, National authorities in the wine and agricultural sector

General Public

INFORMATION AND REPLICABILITY

All the material produced within the project **LIFE ZEOWINE** useful to know and replicate protocols can be found in the website (*www.lifezeowine.eu*) and on social channels. In particular you can find:

GUIDELINES FOR THE APPLICATION OF ZEOWINE PROTOCOLS, practical consultation tool for vineyard managers and winegrowers who are ready to develop their vineyard soil management with a strong environmentally sustainable approach https://www.lifezeowine.eu/deliverables/

- **Articles and press releases** related to the project implementation and future activities https://www.lifezeowine.eu/pubblications/
- **Informative and training videos** https://www.youtube.com/channel/UCQXDKO83TMFiyD8W8NK2MVw
- **Contact email** lifezeowine@gmail.com

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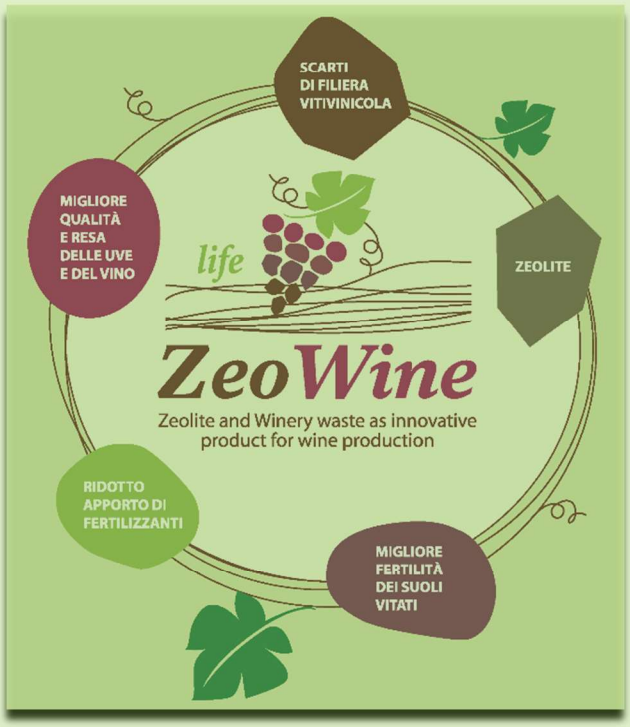

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