

# Glass bottles reuse in southern Europe wine sector

LAYMAN REPORT



The reWINE project (LIFE 15 ENV/ES/000437  
has the support of the EU through the  
LIFE program.

reWINE 





# Context

## Increased glass container waste

Waste management is nowadays one of the greatest environmental challenges we have to face. In Spain, container waste represents approximately 30% of the weight of all municipal solid waste and only 68% of this percentage is collected selectively (Eurostat, 2015). In Catalonia, glass containers represent 5% of the weight of all municipal solid waste (Catalan Waste Agency, 2019).

The growing generation of glass container waste is closely associated with the efficient use of natural resources and increased environmental impact. Glass containers consume large amounts of raw materials and cause emissions throughout their entire life cycle, from extraction of raw materials to production, transport and even waste management.

## Glass containers in the wine industry

In Catalonia more than 9 million bottled drinks are consumed every day and of these 6% are wine bottles. In the wine industry, these containers are one of the components that most contribute to the release of carbon dioxide into the atmosphere.

The wine industry is one of those most affected by climate change as the vines and the quality of the wine are largely dependent on atmospheric conditions. This is why new techniques and strategies must be implemented to reduce the carbon footprint.



**9 millions**

Daily consumption of bottled beverages in Catalonia



**6%**

Of the bottled beverages consumed in Catalonia are bottles of wine

## Bottle recycling in Catalonia

Recycling, in spite of being a priority in the European waste hierarchy is undergoing a downturn in Catalonia. According to data from ADISCAT (Association of Logistics and Beverage and Food Distribution Companies of Catalonia) returnable glass containers only represent 19% of the total amount of glass containers on the market and this is limited to the hospitality industry.

At present, wine bottles are not recycled by any of their distribution channels, not even in hotels, restaurants and catering companies, as occurs in other drink industries such as soft-drink or beer bottles.

# The reWINE project

The reWINE project has identified the opportunities and barriers for recycling glass bottles in the Catalan wine industry by studying experimental data that enable ensuring its technical, environmental, social and economic viability.

## Specific objectives

- Encourage the recycling of glass bottles in the Catalan wine industry.
- Contribute to creating awareness and achieve the qualitative and quantitative objectives for reduction of waste set out in Catalan and European legislation.
- Identify the barriers and opportunities for recycling glass bottles in the wine industry, as well as evaluate the environmental, economic and technical aspects involved.
- Encourage transfer of the experience into other geographic and economic contexts.
- Create a recycling network among different interest groups.

## Promoters

The reWINE project was conceived by the UAB Research Park, the Catalan Waste Agency, the Catalan Foundation for Waste Prevention and Responsible Consumption (Rezero), the Inèdit eco-innovation studio, the Falset Marçà Cooperative, Bodegues Torres and the Infinity bottle-washing facility.

- Reference: LIFE15 ENV/ES/ 000437
- Budget: 991,309 €
- Duration: From 01/09/2016 to 31/12/2020
- Location: Catalonia



The reWINE project (LIFE 15 ENV/ES/000437) has the support of the EU through the LIFE program.

# Phases of the project

## 1. Market study to identify the obstacles and possible solutions for recycling wine bottles

The first action of the project was to perform a market study of wineries, waste collection centres and distribution and catering companies to gain an understanding of the perception of different sectors regarding the advantages, inconveniences and opportunities for implementing the recycling of wine bottles in Catalonia.

# 1,100

contacts with wineries, PDO, waste collection centres, restaurant associations, merchant guilds and retailers

## Results

- More than **1,100 contacts** with wineries, PDO (protected designation of origin), waste collection centres, restaurant associations, merchant guilds and retailers.
- Identification of the barriers and opportunities through **324 surveys and personal interviews:**

### Advantages:

Sustainability, Corporate Social Responsibility, branding, customer loyalty.

### Inconveniences:

Variety of bottles, storage, return logistics, lack of awareness.

- Initial estimate of the recycling potential of the Catalan market: **18,842,432 bottles (8-13% of the total production).**



## 2. Design and functionality of wine bottle washing process tests

With the idea of performing a preliminary test of all the technical aspects, reWINE performed an analysis of the procedures for cleaning glass bottles. The two wineries participating in the project -the Falset Marçà Cooperative and Bodegues Torres- sent more than 5,000 empty bottles to the washing plant. These bottles were washed as many times as necessary until critical problems with the appearance was observed. The wineries then submitted the bottles to industrial testing to evaluate their microbiological quality and production controls as well as an assessment of the perception of end-users and sommeliers.

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*With the idea of performing a preliminary test of all the technical aspects, reWINE performed an analysis of the procedures for cleaning glass bottles*

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### Results

- **5,420 wine bottles washed and analysed** (3,200 for white wine and 1,500 + 720 for red wine from TORRES and AFALMA (Falset Marçà cooperative)).
- Determination of the ideal number of washing cycles: **7 cycles**.
- Validation of the recycling system in **2 winery models**: Large producer (TORRES) and small / medium producer (AFALMA) according to different health and quality criteria: microbiological, visual, structural criteria and consumer opinions.



### 3. Pilot test with wineries, waste treatment plants, restaurants and shops

Over a period of 20 months reWINE developed a pilot test to study the technical, environmental, social and economic viability of a sustainable system for the collection, cleaning and recycling of glass bottles in the Catalan wine industry.

The pilot test involved 7 Catalan wineries (Falset Marçà Cooperative, Bodegues Torres, Albet i Noya, Vinyeta, Talcomraja, Vins Pravi and Joan Ametller), 3 supermarket chains (Veritas, Ametller Origen and Caprabo), 32 shops, 54 restaurants, 2 logistics companies, 3 waste collection centres of the Vallès Oriental waste management Consortium and the Infinity and Vins Pravi bottle washing plants.

During the months when the pilot test was taking place 150,000 bottles were sold under the reWINE label. Recuperation of the bottles involved considering different collection procedures in 5 different scenarios. On the one

hand, collection of bottles through participating restaurants, and on the other, through commercial outlets with incentive systems, for example, various Veritas supermarkets and Ametller Origin outlets paid 10 cents to customers who returned a bottle with a reWINE label. The Vallès region also participated with four Caprabo establishments selling bottles of wines taking part in the project

and customers had to return them to waste collection centres to participate in a raffle for a wine-tasting experience. Some small establishments requested a deposit on the bottle (between 0.13 and 0.5 cents) that was refunded on recuperation of the bottle.

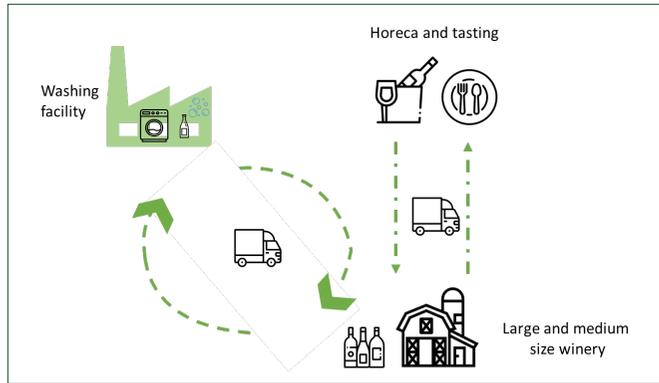
#### Results

- Inclusion of a total of **7 wineries, providing 31 different brands** in 12 different bottle types with different labels.
- Agreements with different participants: **7 wineries, 2 wholesale distributors, 54 restaurants, 32 shops, 3 supermarket chains, 3 waste collection centres.**
- **9 case studies** for 5 different scenarios.
- Implementation of **3 different types of incentive** (raffles, deposit-refund, bonus).
- A total of more of **150,000 bottles were sold under the reWINE label** and 82,239 were recovered.
- Recovery rate: **54%**
- High variability:
  - Between hotels restaurants and/or cafés (96%) and supermarkets (21%)
  - Influence of the location, logistics and incentives

# 82,239

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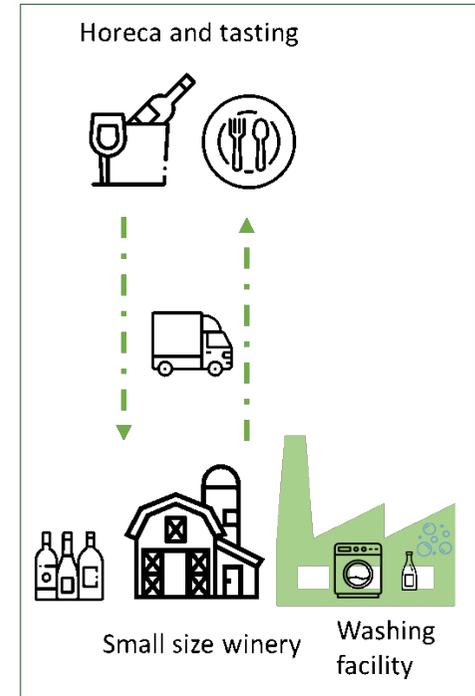
## Scenarios analyzed



Large and medium size case study



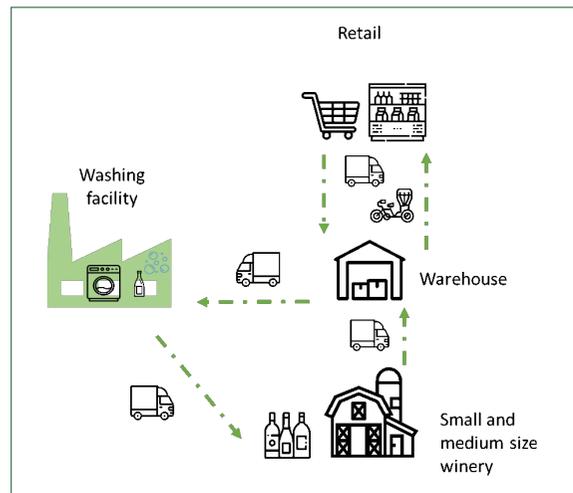
Large and medium size wineries for Retail and waste collection point case study



Small size winery and integrated washing case study



Small retail and small wineries case study



Large retail case study

#### 4. Validation of the viability of the project under environmental, economic and technical criteria

During the pilot test, reWiNE analysed the entire life cycle of the bottle, from manufacture, labelling in the winery and distribution on the market, to collection of empty bottles, washing and refilling. A life cycle analysis method was used to compare up to eight bottle recycling processes –the ideal number of stipulated reuses considering aesthetic and hygienic aspect- compared to the use of eight new bottles.

# 1.7 - 2.6

kg CO<sub>2</sub> savings per bottle after 8 reuses



### Results

- **Recycling of wine bottles is technically possible with logistics adapted to each situation** (wineries, distributors, hotels restaurants and/or cafés, shops, supermarket chains, waste collection centres, etc.).
- There are **6 factors determining the implementation of wine bottle recycling**: Characteristics of the bottle (model, label and capping system), bottle transport, distance to the washing facility, storage capacity, hygienic storage conditions and incentives for returning the empty bottle.
- **Reused bottles are, in general, more environment friendly** than single-use bottles in terms of their carbon footprint.
- The environmental benefits could be greater or lesser depending on the distance to the washing facility and the number of cleaning cycles.
- Recycling bottles could save between **1.7 and 2.6 kg of CO<sub>2</sub> eq/bottle** after of 8 reuses (7 washings).
- Nowadays, **the cost of a reused bottle is slightly higher** than that of a new bottle.
- The distance between the washing facility and the winery **is of prime importance in optimising the economic cost**.
- At present, the low cost of the green dot tax favours the employment of single-use bottles.

## 5. Awareness and divulgation of results

With the idea of spreading awareness of the importance and advantages of recycling to reduce the environmental impact as well as the main activities and results of the reWINE project, different communication activities were implemented in function of the target groups.

The main components for divulgation of the project were:

- Web page and social networks.
- Informative panels and leaflets.
- Videos explaining the project.
- Presence in the media.
- Organisation of seminars with actors in the wine industry.
- Participation in trade fairs and local events.
- Networking activities with other similar initiatives.

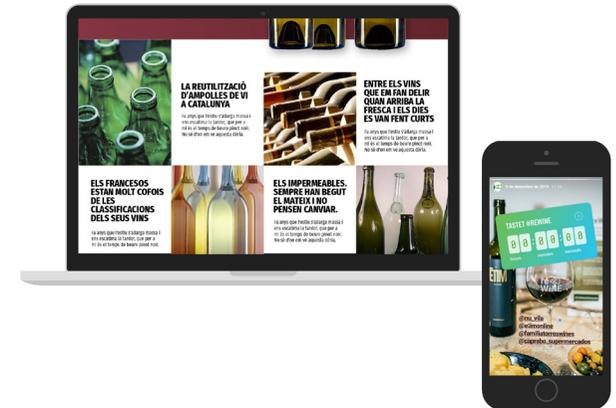
# 131

reports in the media



### Results

- **15,155 hits on the web page,** 10,608 users and 37,122 views.
- **131 reports** in the media.
- Organisation of **5 events**.
- **Participation in 24 regional and international events**.
- **8 contacts with other regions** to transfer the initiative.
- Contact with **6 European projects**.

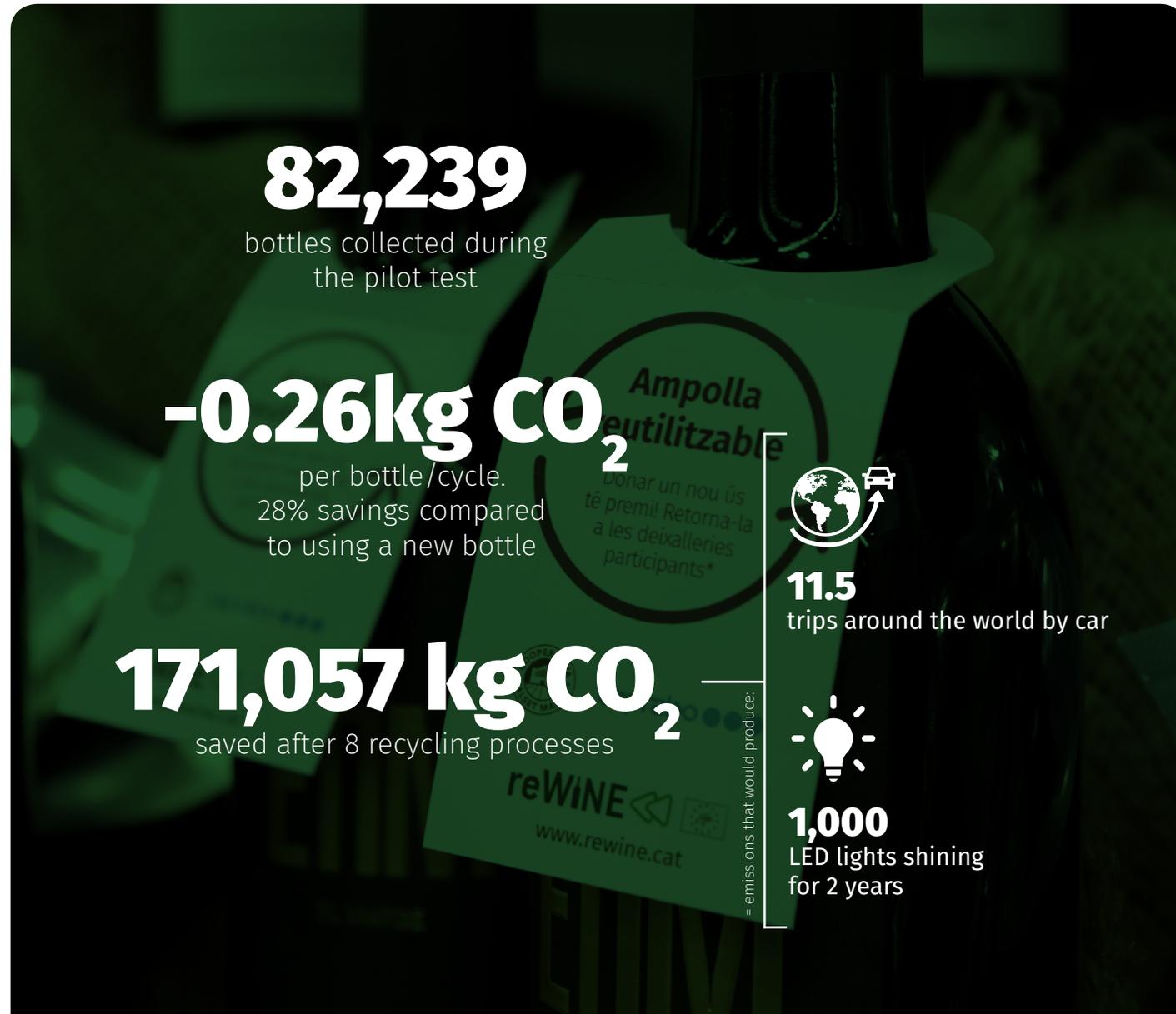


# Environmental feasibility

Environmental studies in the different scenarios analysed by reWINE indicate that reusable bottles are more environment friendly than disposable bottles as it has been demonstrated that recycling enables saving between 1.7 and 2.6 kg of CO<sub>2</sub> equivalent per bottle, accumulated after 8 cycles.

According to the studies, the environmental benefits could be increased even more by reducing the distance between wineries and washing facilities. In spite of the washing facility for the pilot test being located more than 400 km from the different wineries; there was a proven saving of the carbon footprint.

A distance of 60 km is sufficient to cover the areas of each PDO (protected designation of origin) in Catalonia. This means that the construction of a washing facility in each PDO (protected designation of origin), or shared between nearby PDO's, would enable covering distances during bottle transport of about 60 km and so increase the environmental benefits of the reuse system by between 40 and 50%.



## Summary of the GWP (Global Warming Potential) savings for 8 reuses

		Min CO <sub>2</sub> savings (kg CO <sub>2</sub> eq/ bottle)- real distance	Max CO <sub>2</sub> savings (kg CO <sub>2</sub> eq/ bottle)- optimal distance
A. HORECA	A1. MEDIUM SIZE WINERY	2.54	3.68
	A2. LARGE WINERY	2.09	3.31
B. LARGE RETAIL+ logistics	B1. MEDIUM SIZE WINERY AND RETAIL	2.02	2.37
	B2. SMALL SIZE WINERY AND RETAIL	2.20	3.50
C. Small retail + wine tasting	C1. SMALL WINERY AND TASTE	1.90	3.54
	C2. SMALL WINERY AND LOCAL STORES	1.66	3.63
D. Integrated washing	D1. SMALL WINERY AND INTEGRATED WASHING	2.32	2.32
E. Retail+ waste collection point	E1. MEDIUM SIZE WINERY+RETAIL	2.39	3.55
	E2. LARGE WINERY+RETAIL	1.91	3.19

# Technical and economic feasibility

One of the most important challenges to implementing recycling in this sector is resolving the bottle return system. The logistics of bottle collection must be easy and simple for both the points of sale as well as consumers. During the pilot test, the restaurant sector recovered 96% of the bottles, whereas sales in shops and supermarkets only had a return rate of 21%.

The reWINE project also enables verifying that the deposit and refund/return system -DRS- is the most effective way of guaranteeing return of empty bottles to establishments by consumers, far above other incentives.

On an economic level, the current cost of reusing a wine bottle is slightly higher than that of a new bottle. But in this case, one essential factor is the distance of the washing facility and the cost of cleaning the bottles. In this sense, the optimization of the distance to the washing plant makes the cost of the reusable bottle comparable to that of the new bottle.

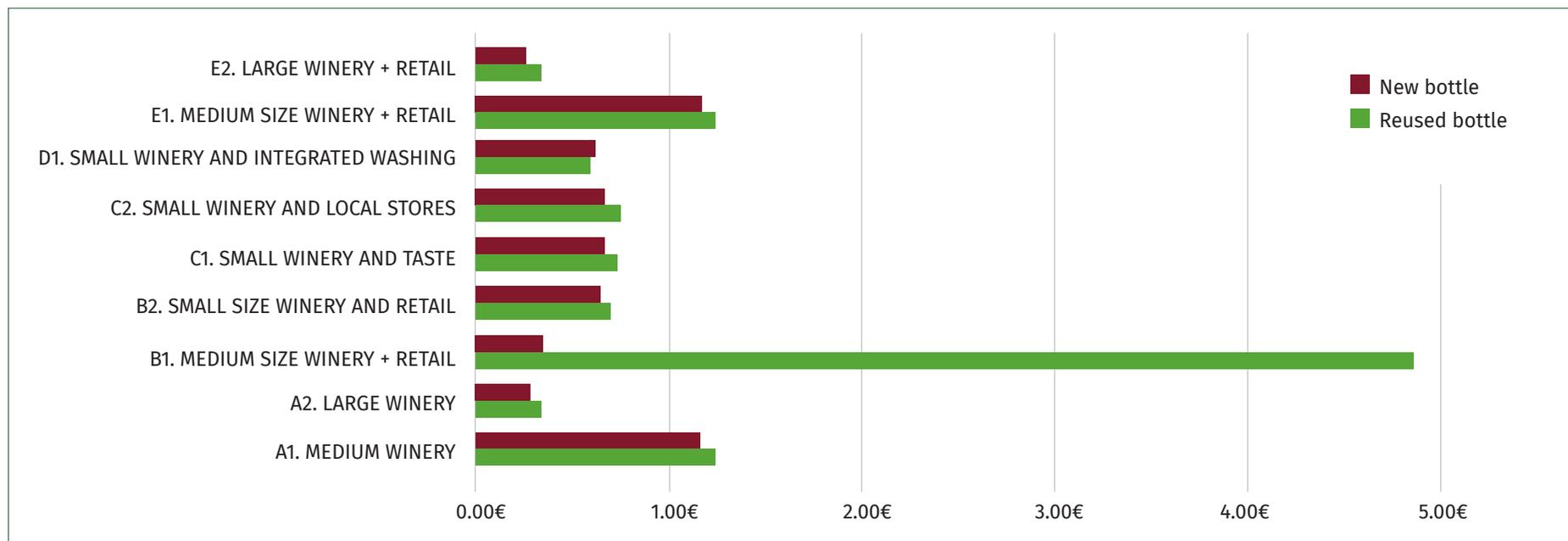
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*One of the most important challenges to implementing recycling is resolving the bottle return system: the logistics of bottle collection must be easy and simple*

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## Comparison of costs a reusable bottle and a new bottle for the different cases studied



		Cost of a reused bottle			Cost of a new bottle
		Average cost (€/bottle)	Min. cost (€/bottle)	Max. cost (€/bottle)	€/bottle
A. HORECA	A1. MEDIUM SIZE WINERY	1,23	1,17	1,31	1,17
	A2. LARGE WINERY	0,33	0,26	0,41	0,29
B. LARGE RETAIL+ logistics	B1. MEDIUM SIZE WINERY AND RETAIL	4,89	0,36	7,21	0,35
	B2. SMALL SIZE WINERY AND RETAIL	0,7	0,65	0,8	0,65
C. Small retail + wine tasting	C1. SMALL WINERY AND TASTE	0,73	0,67	0,84	0,67
	C2. SMALL WINERY AND LOCAL STORES	0,75	0,67	0,85	0,67
D. Integrated washing	D1. SMALL WINERY AND INTEGRATED WASHING	0,6	0,6	0	0,61
E. Retail+ waste collection point	E1. MEDIUM SIZE WINERY+RETAIL	1,23	1,17	1,33	1,17
	E2. LARGE WINERY+RETAIL	0,34	0,26	0,44	0,26

# Future scenarios

Recycling wine bottles in the Catalan wine industry could imply savings of more than 100 million kg of CO2 equivalent a year and 21,756 tons of residues and thus reduce their carbon footprint by 28%. This saving could be brought about by reusing 48,346,793 of the wine bottles produced in Catalonia and put on the Catalan market.

The reuse of wine bottles can offer potential economic savings for wineries (considering that in an economy of scale costs would be optimized and the cost of the green dot tax

follows a growing trend), for municipalities (derived from the savings in bottle collection and treatment costs that they would no longer manage) and job creation opportunities that foster a green, circular, local economy with the capacity to promote social reintegration (especially in employment linked to logistics and bottle washing)

**21,756** tons of residues that could be reduced per year in the sector

## WINERIES

- Install a washing facility shared by all the wineries of the denomination of origin.
- Install an in-house washing facility:
  1. High investment costs recoverable in the mid - long term.
  2. Collaboration agreements with hotels restaurants and/or cafés, distributors and other outlets.

## COMMERCIAL OUTLETS

- Consider recycling with the brand of wine with most rotation in the chain and reach an agreement with the winery for recycling the bottles:
  1. Study the viability of wine bottle storage
  2. Study which incentives to apply.

## ADMINISTRATION

- Promote the installation of washing facilities in strategic areas.
- Provide the sector with an easy-to-wash bottle and label design
- Promote wine bottle recycling with regulatory measures and instruments.





**reWINE**   
Reutilització d'ampolles de vidre al  
sector vitivinícola del sud d'Europa



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[www.rewine.cat](http://www.rewine.cat)