

reWINE

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

FINAL REPORT

15th MARCH 2021

LIFE 15 ENV/ES/000437

Final Report

Covering the project activities from 01/09/2016 to 31/12/2020

Reporting Date

15/03/2021

LIFE PROJECT NAME or Acronym

ReWINE

Data Project

Project location:	Spain
Project start date:	01/09/2016
Project end date:	31/12/2019 Extension date requested: 31/12/2020
Total budget:	995,309 €
EU contribution:	594,541 €
(%) of eligible costs:	59.98 %
Coordinator:	Fundació Parc de Recerca UAB (PRUAB)
Associated Beneficiaries:	Agrícola Falset Marçà I S.C (AFALMA) Agència de Residus de Catalunya (ARC) Fundació Privada Catalana de Prevenció de Residus i el Consum Responsable (REZERO) Inèdit Innovació SL (INEDIT) Infinity S.A. (INFINITY) Miguel Torres S.A. (TORRES)

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2. List of key-words and abbreviations

PRUAB	Fundació Parc de Recerca UAB
ARC	Agencia de Residus de Catalunya
FPRC (REZERO)	Fundació Privada Catalana de Prevenció de Residus i el Consum Responsable
INEDIT	Inèdit Innovació SL
INFINITY	Instalaciones de Gas del Mediterráneo, TODOGAS S.L.
AFALMA	Agrícola Falset Marçà i SC AFALMA SCCL
TORRES	Miguel Torres S.A.
MNUTO	Maria Nuto S.L.
EC	European Comission
EU	European Union
EASME	Executive Agency for Small and Medium-sized Enterprises
FR	Final Report
DO	Protected Designations of Origin
HWRC	Household waste recycling centers
HORECA	Hotel, Restaurant & Catering (Food service sector)
PA	Partnership Agreement
LCA	Life Cycle Assessment

3. Executive summary

The reWINE project aimed at demonstrating that the reuse of glass bottles can contribute to mitigate the greenhouse emissions and ensure a more sustainable use of resources in the wine sector. The main expected output was thus to test and validate a specific management system for the reuse of wine glass bottles in Catalonia and to disseminate it to other wine producing regions in Spain and Europe.

The demonstrative actions of the project have proved that reusable bottles are more environmentally friendly than disposable bottles. Even though, at this stage the cost of reusing wine bottles is higher than the use of new bottles, this is mainly due to the cost of transport of the empty bottles back and forth and the distance between the washing plant and the winery. Washing infrastructures near wineries and economies of scale would allow optimizing the washing and logistic costs, allowing reusable bottle achieving competitive costs.

The project was successful regarding the accomplishment of the specific objectives:

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

During the project period, the reWINE partnership has fully implemented all the planned actions. The main results obtained are the following:

A – Preliminary Actions

- Creation of a Stakeholders Database including more than 1100 contacts from 614 wineries, 12 wine Protected Designations of Origin, 473 municipal household waste recycling centres, 56 associations of restaurants, 91 food & wine retailers, and 165 retailer guilds.
- Gathering of the opinions about pros & cons of bottle reuse from 324 stakeholders (wineries, HWRC, retailers, HORECA) through specific polls and direct interviews.
- Estimation of the reuse potential in the Catalan market to 18.842.432 bottles (8-13% of total production).

B – Implementation Actions

- Test & optimization of 2 washing methods (chemical, mechanical) with different white wine and red wine bottles in preliminary tests.
- Validation of the reuse system in two different winery models (large/small producer) according to different microbiological, visual, structural and consumer-related criteria.
- Agreements with 101 different stakeholders to participate in the pilot, including: 7 wineries; 2 wholesalers; 54 restaurants; 32 stores; 3 supermarket chains; 3 HRWC.
- Inclusion of a total of 7 wineries in the pilot, providing 32 different brands in 12 different types of bottles with different labels (hydro soluble/non-hydro soluble).
- Design and implementation of 3 different types of incentives (raffles, deposit-refund, refund).
- Design and implementation of a campaign for consumers with specific communication materials, digital marketing and events.
- Completion of a large-scale pilot with a broad coverage of Catalonia.
 - Participation of around 100 points of sell and return during the pilot.

- Inclusion of 9 case studies representing 5 different scenarios: HORECA; small retailers; large retailers with internal collection point; large retailer with external waste collection point; integrated washing.
- Successful implementation of a reuse system in the different scenarios:
 - Average recovery rate: 54% (82.239 bottles collected /150.294 bottles sold)
 - High variability in recovery rates for HORECA (96%) and supermarkets (21%).
- Technical feasibility assessed.
 - Reliable monitoring system implemented.
 - Bottle reuse system assessed for different scenarios in terms of aesthetic, hygienic and logistics aspects.
 - Key factors for further reuse system implementation determined: Bottle characteristics (model, label); Storing capacity & conditions; Collection & transport system; Distance to washing plan; Incentives.

C – Monitoring Actions

- Environmental feasibility analysed
 - Reusable bottles are more environmentally friendly than single use bottles.
 - Benefits depend on the distance between the wineries and washing facilities and the number of washing per cycle.
- Economic feasibility analysed
 - Cost of reusing a bottle of wine slightly higher a new one in average.
 - Major improvements expected from reduced logistic distances: best scenario for distances below 60 km (e.g. distributed washing plants nearby each DO).
- Socioeconomic impacts of reuse assessed:
 - Organization of 2 focus groups with Consumer and civil society associations and Economic stakeholders.
 - Identification of economic impacts of the implementation of a reuse system for wine companies; municipality's waste management; grocery stores and job creation.
- Project performance assessed through KPI monitoring.

D – Dissemination and Networking Actions

- Creation and launching of communication materials: leaflets and posters.
- Creation and distribution of specific materials for restaurants, stores and supermarkets.
- Website updated with project results: final version adapted to after-life.
- Dissemination actions in social networks profiles: on Twitter via #reWINE and #Everybottlematters hashtags, on LinkedIn via reWINE page and on @reWINE_project Instagram.
- Strong impact in the media through 135 unique appearances (28 in newspapers, 88 in digital media, 10 in the radio and 9 in the TV).
- Organization of 3 large events: Public presentation of the project; 1st reWINE Workshop; Results presentation and 2nd reWINE Workshop (online: 589 viewers).
- Participation in 30 national/regional events.
- Exchange of experiences with other 8 related initiatives.
- Networking with other 7 LIFE/EU projects.
- Dissemination of the project through 4 international events.
- Design and submission of the Layman's Report and an email campaign for its distribution.

E – Project Management Actions

- Reporting: 25 deliverables prepared; 10 milestones completed; 1 Midterm report submitted; 2 Progress Report submitted; 1 Final Report submitted.

- Successful submission of an Amendment request (approved on 11/02/2019).
- After-life Plan submitted.

Deviations, problems and corrective actions met during implementation

The withdrawal of beneficiary MNUTO on 27/11/2017 and the incorporation of the new beneficiary INFINITY caused the extension of the project (until 31/12/2020) and the need for changes in the work plan, the reporting and the technical issues (washing method). The said extension of the project caused also an overspending situation.

The impacts of COVID-19 crisis caused delays in the bottle washing (B4), also delays and format changes on planned events related the focus groups (C2) and the workshop (D2). Fortunately, these issues could be solved and the events were held in virtual format.

4. Introduction

The environmental problem targeted by reWINE is waste prevention. The project contributes to the objective of reducing municipal solid waste generation in the EU, corresponding to about 10% of the total waste generated.

According to the data at the beginning of the project the five-step waste hierarchy (prevention, reuse, recycling and end treatment or disposal) in the Directive 2008/98/EC on Waste gives priority to prevention and reuse to reduce adverse impacts for the environment and human health. In this sense, the Catalan Waste Agency (ARC) published a waste management plan (PRECAT20) including the reuse of glass packaging in the wine sector as one of the key actions to be implemented in the next years in order to reduce packaging waste in Catalonia. Wine glass packaging is a household and commercial waste, and a reuse system is expected to provide more environmental and economic benefits than current waste management systems based in material recycling (Green Dot System). Moreover, only 57% of wine bottles consumed in Catalonia are recycled according to the project estimations, leaving 63,3 million of waste bottles and, thus, 28.500 Tn of glass waste.

In this context, the main goal of reWINE has been to design and implement a pilot showing the feasibility and desirability of glass bottle reuse system in the wine sector of Catalonia. In order to prove that reuse constitutes a more sustainable system, a comprehensive economic, environmental and social assessment has been performed and compared with the green dot alternative. The specific objectives of reWINE were to:

- Foster glass bottle reuse in wine sector of Catalonia.
- Contribute to raise awareness and achieve qualitative and quantitative waste prevention objectives in both Catalanian and European legislation. This will contribute to circular economy, efficient raw materials use, climate change mitigation, sustainable production and consumption and green economy.
- Identify the barriers and opportunities of glass bottle reuse as well as evaluate the environmental, economic and technical concerns involved.
- Foster the transferability of the experience to other geographic and economic contexts.
- Dissemination of the experience and capacity building a network of reuse between the different stakeholders.

In this context, the reWINE project demonstrative character lay in the development of a new process involving a well-known technology but implemented to a new product. Glass bottle cleaning technology would be applied to wine sector in Catalonia and a complete user-centric return system would be designed and implemented. Research insights and design strategies for overpassing cultural barriers and supporting a better return experience would constitute a valuable resource that would help other regions (especially in southern Europe) in envision the transferability of the project to other contexts.

To prove this demonstrative character several actions were planned and implemented: i) labelling reused bottles with hydrosoluble and non-hydrosoluble labels in different commercial wines, to be conducted mainly by TORRES and AFALMA and other wineries involved in the project, ii) definition of return points for bottles retake in wineries, HWRC, restaurants and grocery stores in their facilities, iii) washing process optimization and implementation, iv) filling reused bottles with wine (washed bottles reintroduced into the filling cycle).

Environmentally, the project aimed to serve as a local demonstrator of the transition towards circular economy.

The consortium used different dissemination actions to promote the project outputs, to create a platform for communication between the project and stakeholders and to have measurable impacts. Directing the project outputs and results towards the right channels was one of the key factors for the success of the project and essential to ensure a lasting impact on the reuse sector. These dissemination actions were directed toward a wide range of stakeholders, including consumers,

Catalan wineries, HORECA sector, retailers, local authorities and Catalan, Spanish and European Institutions and Associations.

The expected results and environmental benefits:

The expected result of the project was the development of a feasible and sustainable (economically, socially and environmentally) wine glass bottle return, washing and looping system. The designed test (actions B.1, B.2 and B.3) would unify stakeholder's interest and be focused in demonstrating the feasibility of the system at a local level with a view to the possible transferability to other geographic and economic contexts.

Specific results expected:

- Development of a glass packaging reuse system, making use of existing washing technology.
- Demonstration of the transferability and up-scale potential of the project.
- Generation of economic benefits to target stakeholders by reducing operative costs.
- Provision of detailed information on glass bottle reuse to Regional and National administrations to support decision/policy making.
- Involved stakeholders at regional and national level will have a profound understanding of glass bottle reuse and their role in this system.
- 500 civil society organizations in Catalonia, Spain and Europe will be informed.
- Stimulate local economy by creating new jobs.
- Approximately 1 million citizens of Catalonia will be informed and environmentally aware.
- Approximately 10% of the pilot wine glass bottles with hydrosoluble labels put on the Catalan market by partners wineries and other wineries will be reused (estimation of 100.000 bottles reused) and approx. 45 tons of glass packaging waste will be prevented.
- Contribute to decrease emissions of CO₂ eq.
- Dissemination of the project in media (newspapers, television, radio, websites and 2.0) (80 media impacts).
- At least 50 politicians, economics and media representatives will participate in the visits and specific workshops.
- Info Days with at least 80 attendees.
- Create a network of minimum 50 stakeholders interested in promoting glass bottle reuse at national and European level.
- Create an agreement between the different stakeholders for wine glass bottle return.

Expected longer term results (as anticipated at the start of the project)

Once the project was finished and its positive results were proven, it was expected to extend its territorial scope to other wine regions in Spain and Europe, ensuring the participation of other companies and administration. For this purpose, the action D.2 Networking activities with other R&D projects was proposed in order to extent the project to other stakeholders and assess measures to favour wine bottle reuse (Waste Agency of Catalonia (ARC) was the action leader).

During the final steps of the project, there were plans to begin studying the possible creation of a glass wine reuse system based on the agreement promoted in action D.2. It was necessary to contact the main wineries in Catalonia (information compiled in action A.1) and to explain to them the idea of the project and results achieved so as to get them involved in the proposal. In fact, they should become the main promoters of the reuse system. Action D.2 was an opportunity to starting to work in this reuse system involving the main actors. The partners participating in the LIFE-reWINE project would define a new project to promote the establishment of the reuse glass wine bottles in Catalonia. It is also worth to note that the Ministry of Territory and Sustainability of the Government of Catalonia has committed to promote the introduction of reused bottle criteria on the catering procurement and the organization of public administration events.

5. Administrative part

The coordinator and the management team have ensured the general coordination and management of the project, including the direction and monitoring of the beneficiaries' activities and also the communication and reporting to NEEMO's Monitoring team and EASME. In this sense, the project progress has been tracked in terms of expenditure, resource use, implementation of activities, delivery of results and management risks. The Partnership Agreement (PA) has been successfully created, accepted and signed by the whole consortium of the project in 2016. In the case of INFINITY, the PA was signed in 2019 after the approval of the Amendment request. Please, find attached the PA of INFINITY in Annex 1 Supporting documents. The PA of the rest of beneficiaries were already submitted with the Midterm report.

Firstly, it has been established the Project Management Handbook (PMH) which details the guidelines for the direction and coordination of the project, the management of the technical and financial issues and the reporting system. In the same document, it was defined the **management structure**, including the Steering Committee as well as the other boards and its members (figure 1).

In its role as coordinator, PRUAB was the intermediary between the Associated Beneficiaries and EASME and it is performing all tasks assigned to it. In particular, PRUAB is in charge of: (i) to coordinate technical, legal, financial and administrative issues according to the approved proposal in terms of results, schedule and budget, always taking into account the common provisions; (ii) to validate and control of the quality of partners' progress and deliverables, ensuring the implementation of the specific procedures of the project; (iii) to prepare, collect and compile technical and financial reports and to submit reports and communicate with EASME; (iv) to organize and lead the project meetings; (v) to manage knowledge and innovation and oversee the scientific and societal context potentially related to the project and to evaluate project results and transferability potential; (vi) to monitor and document personnel costs and project expenses and receive and distribute the EC contribution.

On the other hand, the responsibilities of the associated beneficiaries (ARC, INEDIT, INFINITY, TORRES, AFALMA and FPRC) were: (i) preparing and participating in the project meetings related to their contribution and giving feedback in the preparation of progress reports and (ii) performing satisfactory technical and financial operation and management of the actions in which each beneficiary is in charge of paying and filing invoices, etc.

The Project Management Handbook also set up the different tools and procedures used for a proper control and monitoring of the project's actions. In terms of tools, a common virtual workspace has been provided by PRUAB through its "NEBULA" platform. This platform allowed sharing and working collaboratively on documents. Moreover, specific mailing list have been also created to facilitate the communication among beneficiaries. In terms of procedures, a proper coordination and monitoring has been ensured through meetings (face-to-face and virtual) and reporting. Fifteen face-to-face meetings, including Kick-off and Project visits, have been performed during the current reporting period at different locations (table 1). 43 periodic and specific teleconferences have also been organized to monitor and coordinate the execution of the actions. These monthly meetings aim to evaluate the development and technical progress of the project. Due to COVID-19 crisis, all the meetings corresponding to the last year were held online.

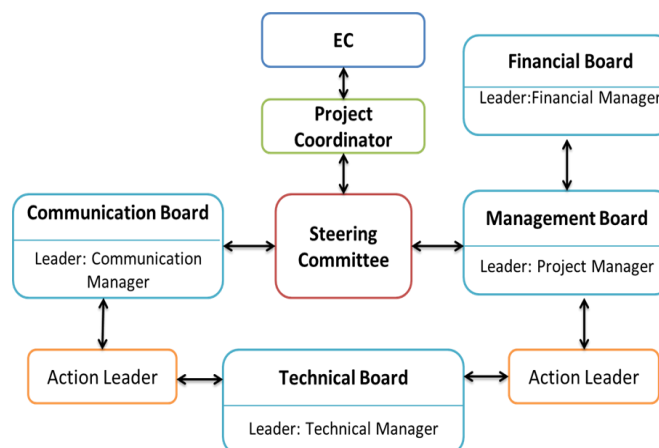


Figure 1. LIFE-reWINE Project Management structure

6. Technical part

6.1. Progress per action

The activities conducted and the resulting outputs are described below. The technical details are given in the corresponding deliverables of each action, in Annex 2.

Action A1: Preliminary evaluations: Market studies for wineries, HWRC, restaurants & food and wine			
Foreseen start date	September 2016	Actual start date	September 2016
Foreseen end date	December 2016	Actual (or anticipated) end date	December 2016
Responsible beneficiary: FPRC (REZERO)			
Other participants: ARC			

ACTIVITIES AND OUTPUTS

This activity consists in creating a database of wineries, municipal household waste recycling centers (HWRC), associations of restaurants, as well as food and wine retailers in Catalonia, as the main stakeholder involved in wine bottle production and consumption cycle.

The aim of listing all this contact data in Catalonia is sending them the poll for the preparatory action A2 Identification of barriers, desirability and potential solutions for wine bottle reuse, as well as for D dissemination actions and for D2 Networking activities. It will also be useful to contact other wineries potentially interested in participating in the implementation action B4 Pilot project and the previous subaction B3.1 Incorporation of other wineries.

The scope of the market study is Catalan wines, as the potential reuse of bottles is efficient (from different perspectives: logistics, economics and environment) at a local and regional level. This is especially relevant considering the reference washing plant in Catalonia (Maria Nutó, which is a partner of the project) is located in the center of that territory, a bit displaced to the coast (where there is more population and more consumption of wine). That is the reason why the geographic scope for the market study for wineries is defined in Catalonia.

4 databases have been created, of Catalan:

- wineries which produce some wine for the local and regional market (i.e. Consumed in Catalonia) and the regulatory councils of the DOs.
- municipal household waste recycling centers.
- associations of restaurants.
- food and wine retailers and related associations and institutions.

The databases have been collected in excel® format and accomplishing the Data protection law according to Agencia Española de Protección de Datos that belongs to the Spanish Ministry.

The data included in database is email address; telephone; postal address; contact person & website.

In the case of the municipal household waste recycling centers, the data included in database is: HWRC address, municipality, region, typology of HWRC, municipality population, website, telephone and opening hours, and also about the owner of the HWRC, address, telephone, contact person, email address and the operator.

This information has been collected mainly through:

1. the wineries and DOs websites and phone calls. Also, we contacted some wineries and DOs at “EcoSostenibleWine”, the 5th International Organic & Sustainable Viticulture and Climate Change Conference, held November 4th, 2016 in Vilafranca del Penedès. EcoSostenibleWine 2016 has been organized by VIMAC (Vineyard, Environment and Consumer Foundation) and the trade

associations Associació Vinícola Catalana (Catalan Wine Association) and the Institut del Cava (Cava Institute) in collaboration with the Department of Agriculture, Forestry, Fishing, Food and Environment of the Generalitat de Catalunya INCAVI (Catalan Institute of Vineyards and Wine). (<http://www.ecososteniblewine.com/en/>). In some cases, wineries have not facilitated the contact names of the departments of marketing or sales, for different reasons, such as for being a small company and do not having a specific department, or for privacy reasons.

2. the associations of restaurants, food and wine retailers' websites and phone calls. In some cases, they have not facilitated the contact names of the Marketing or Sustainability departments, for different reasons, such as for being a small company and do not having a specific department, or for privacy reasons.

This database (all property of FPRC, except from the municipal household waste recycling centers which is property of ARC, according to the Data protection law) is available in the internal part of website developed in action D1. The information compiled has been shared with all the partners involved in the project, and will be for internal use, exclusively for the reWINE project.

We have identified and collected the contact data of:

- 614 wineries in Catalonia and 12 Protected Designations of Origin for wine in Catalonia.
- 473 municipal household waste recycling centers in Catalonia.
- 56 associations of restaurants in Catalonia, accounting for more than 70 contacts. Also 91 food and wine retailer companies that sell wine in Catalonia, 165 retailer institutions, associations and guilds from all the Catalan territory, which sums up a total of around 270 different contacts.

As suggested by EASME's letter on 27th March 2018, the deliverables have been reviewed and the version 2.0 was elaborated by including the databases produced in order to complete the deliverables and the confidential information was blacked out:

- D.A1.1 Database of associations of restaurants and Food stores in Catalonia.
- D.A1.2 HWRC Database
- D.A1.3 Wineries Database

These deliverables were already submitted with the Midterm report.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

614 wineries have been identified in Catalonia, which is much more than the objective set previously (450). In fact, is even higher than the number of wineries identified by INCAVI (Institut Català de la Vinya i el Vi, the Catalan Institute of Vineyards and Wine that belongs to the Generalitat de Catalunya, the government of Catalonia) that was 609.

Progress indicators: N/A

DEVIATIONS:

There were no deviations.

Action A2: Preliminary evaluations: identification of barriers, desirability and potential solutions for wine reuse.			
Foreseen start date	September 2016	Actual start date	September 2016
Foreseen end date	March 2017	Actual (or anticipated) end date	March 2017
Responsible beneficiary: FPRC (REZERO)			

ACTIVITIES AND OUTPUTS

This activity allowed us to list barriers at all levels (washing plant, wineries, restaurants and bars, retailers, grocery stores, glass recovery plants) and also desirability at all levels as well as potential solutions for wine bottle reuse in order to implement them in the implementation actions B3 Preparation of the pilot project and B4 Pilot project.

The following methods have been applied:

- Designing an online poll addressed to each stakeholder: wineries, retailers, restaurant sector, local authorities responsible for household waste recycling centers (HWRC). The polls were adapted to the different sectors, and where structured in four big parts:
 - current relation with reusable bottles
 - advantages and disadvantages of reusable wine bottle
 - management and applicability of the reusable wine bottle
- Conducting polls to all stakeholders collected in the database developed in actions A1.1, A1.2 & A1.3 through e-mail, phone and, eventually, visits.

In order to collect the maximum amount of answers, several emails have been sent remembering to answer the poll, and also phone calls to promote the participation in the poll and facilitate the collection of data.

- Exploitation of results of the poll
- The polls include questions to know to what extent different stakeholders are a priori in favor or against wine bottle reuse, as well as their reasons.
- Designing an interview addressed to associations of consumers.
- A database of associations of consumers at regional (Catalonia) and national (Spain) level has been created.
- The organizations identified were contacted by phone and e-mail and invited to do the interview to provide their opinion on wine bottle reuse in Catalonia.
- Conducting interviews to associations of consumers, through visits and phone calls.
- Exploitation of results of the interviews.

The main results of the polls are:

- 1.106 contacts from different sectors (identified in actions A1.1, A1.2 & A1.3) where invited to respond the polls.
- At the end of the fieldwork term, 174 valid polls were collected, plus 150 polls with uncompleted answers that have not been used for this analysis.

The amount of contacts that responded to the poll from each sector out of all the contact persons identified in our database is:

- Wineries (78 out of 661)
- HWRC (55 out of 148)
- Food and wine retailers (19 out of 222)
- Restaurant sector (22 out of 75)

Based on these 174 polls completed, we have concluded the following issues:

- The advantages of the wine bottle reuse for all sectors are mainly related with environment. Also, for branding and marketing (CSR, more clients) and economic savings.
- The disadvantages for all sectors are related with logistics and space.
- There is a clear opinion of good will among clients or users towards wine bottle reuse: 63% in HWRC, 79% in retailers and restaurants.
- All sectors show high willingness to bottle, sell, serve or collect reusable wine bottles (at short, mid or long term)
- All sectors are in favour that Public Administrations promote wine bottle reuse.

Regarding the interviews to associations of consumers, 17 organizations of consumers were identified and targeted (9 in the Catalan scope and 8 in the Spanish scope), some of them are members of the Council of the Catalan Agency of Consumption. Some of these organizations work on general issues, others are specialised in food, household consumption, families and even conscious consumption. Some are organisations at first level (most of them associations), while others are organisations of second level (such as federations).

They were contacted, and 4 of them responded the interview: 2 work in the Catalan territory and are specialised in food or conscious consumption, while the other 2 work in the whole Spanish territory on general issues of consumption.

Based on these interviews, some of the main conclusions are:

- All the organisations agree that the main advantages of the reusable wine bottle for consumers are related to the environment, personal satisfaction and pride.
- The contacted consumers associations believe, in a generalized manner that the main disadvantages for consumers are related with logistics (inconvenience of storing and sorting bottles at home, return them for reuse), the low environmental consciousness among many consumers, as well as the misunderstanding on reuse (many people don't know the difference between reuse and recycling).

In order to succeed in promoting wine bottle reuse among consumers, the consumers organizations have pointed out some possible solutions to the disadvantages identified. The reuse of wine bottles proposed should:

- Be easy for consumers
- Include economic incentives for consumers
- Provide effective information and motivating communication campaign (convincing consumers that their effort returning bottles generates good results).
- Regarding the incentives for promoting the return of reusable wine bottles among consumers, several systems have been suggested:
 - Discount on purchase
 - Loyalty cards (consumer would get one wine bottle free when returning a certain amount of empty reusable wine bottles)
 - Economic deposit (in a deposit-refund system for the glass bottle, when returning the empty bottle, the consumer gets back the Euro cents left in the purchase)
 - Bonus on taxes (discount on some public tax such as the waste collection tax or the waste treatment tax)
 - Incentive linked to a social cause
 - Gamification
 - Raffles (such as enological sightseeing)

Discount on purchase and loyalty cards (limited to older than 18 aged) were considered for all organizations interviewed as the best incentives.

- Different points of consumption or return of reusable wine bottles have been assessed:

- Food and beverage retailers
- Restaurants
- Household waste recycling centers
- Directly to wineries

The organizations noted that food and beverage retailers would be the most successful for consumers.

- All organizations agree that most of the consumers are likely to be in favour of the promotion of reusable wine bottles by the Public Administrations.

As suggested by EASME's letter on 27th March 2018, the deliverables have been reviewed and the version 2.0 was elaborated by including the databases produced and detailed information:

- D.A2.1 Consumer insights report.
- D.A2.2 Updated report on barriers, desirability and potential solutions for wine bottle reuse.

These deliverables were already submitted with the Midterm report. However, an updated version of D.A2.1 Consumer insights report was generated later. Please, find the version 3 of the deliverable in Annex 2.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The conducting of the polls to the stakeholders collected in the database developed in actions A1.1, A1.2 & A1.3 through e-mail, phone and, eventually, visits took more time than what was estimated, as well as interviews to associations of consumers.

PROGRESS INDICATORS

324 surveys received. The indicators values are showed in the Updated Table of Specific Indicators in deliverable D.C3.2.

DEVIATIONS

The number of valid polls collected from stakeholders was lower than initially expected, but the data was enough to do an extrapolation to the entire Catalan market.

The expected number of responses were 375. In the execution of the project, a census of 1.106 contacts from different sectors was collected. To achieve a sampling error of 5%, 285 contacts should have been responded out of the total 1.106 contacts identified. If the sample is considered stratified by typology of stakeholder, then the number of responded polls needed to achieve a sampling error of 5% is much higher. To achieve it extra efforts were performed (such as phone calls) in order to get the maximum number of completed polls. At the end of the field work, 174 valid answers, which represent a sampling error of 7%, were reached. In addition, we get another 150 uncompleted polls, which have not been used for the study. So, a total of 324 polls have been received, of which only the 174 completed were used in order to prioritize the rigor of the analysis, as was agreed with EASME in the official visit last April 2017.

Action A3: Market study of the potential for wine bottle reuse in the Catalan market			
Foreseen start date	February 2017	Actual start date	February 2017
Foreseen end date	March 2017	Actual (or anticipated) end date	April 2017
Responsible beneficiary: FPRC (REZERO)			

ACTIVITIES AND OUTPUTS

This activity consists in identifying other wineries that also bottle in the same bordelaise and bourgogne bottles used for the pilot project in Catalonia (for Falset Negre and Viñasol wines), and also which ones already use hydrosoluble tag.

The aim is estimating the potential market share of wine bottle reuse in this first stage. In addition, identifying which wines are bottles in the same standard bottles and also with hydrosoluble label will allow to create a database of bottle that can be captures in action B4 Pilot project. So, this information can be useful for involving new wineries in the pilot project (action B3), as it identifies contacts potentially interested in participating in the implementation action B4 Pilot project or implementing wine bottle reuse in the future.

A database of wineries that use the same pilot bottles in Catalonia has been created. The database has been collected in excel® format and accomplishing the Data protection law according to the “Agencia Española de Protección de Datos” that belongs to the Spanish Ministry. The data included in this database is: email address, telephone, postal address, contact person & website.

An approach to fieldwork has been performed based on physical parameters such as color, volume, weight, height, inferior and superior diameter, shape and embouchure type. But experts from the wine sector and the regional public administration that deals with wine industry disapproved the method based on physical parameters as it is not appropriate to identify bottles. Instead they recommended a statistical approach. So, a concrete question on the use of the specific model of pilot bottles was included in the poll to wineries in action A2 Identification of barriers, desirability and potential solutions for wine bottle reuse.

Therefore, the database listing the wineries that use the same pilot bottles has been collected through polls. And also interviews to complete research and collect data on the number of bottles put annually on the Catalan market by those wineries.

Based on the polls, 10 wineries (including the two partners AFALMA and TORRES) that use the pilot bottles has been identified, 5 of them also use hydrosoluble tags.

Then extrapolation of data to the Catalan market based on statistics has been developed. Extrapolating this data to the Catalan market, the potential for wine bottle reuse in this first stage is 18.842.432 bottles, which is 10% of the Catalan bottle production (a range around 8 to 13%).

The deliverable of this action is D.A3.1 Database of wineries using standard bottles and bottles put on the market annually. As suggested by EASME’s letter on 27th March 2018, a reviewed version of the deliverable including detailed information was generated and submitted with the Midterm report. However, a new updated version (v3) was later generated and it is attached in Annex 2 of this report.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

Delay of the activity because of the adaptation of methodology.

DEVIATIONS

According to EASME’s suggestion during the official visit in April 2017, methodology was adapted to reality and the needs of the project, keeping the objectives of the action. So collection of data from wineries that use the same pilot bottles (through polls and interviews) and extrapolation of this data to the Catalan market based on statistics has been performed, as fieldwork based on physical parameters did not meet the requirements to detect differences between the huge amount of slightly different models put on the wine market.

Action B1: Design, test and validation of bottle washing process			
Foreseen start date	September 2016	Actual start date	September 2016
Foreseen end date	February 2019 (repetition test)	Actual (or anticipated) end date	November 2019 (repetition test)
Responsible beneficiary: MNUTO and INFINITY			
Other participants: INÈDIT, TORRES, AFALMA, ARC			

ACTIVITIES AND OUTPUTS

The action B.1: Design, test and validation of bottle washing process has several main purposes based on the assessment of an experimental washing test using wine bottles of AFALMA & MTSA wineries carried out firstly at MNUTO washing plant and secondly at INFINITY washing plant:

- Obtaining of reused bottles with wine to serve in restaurants and internal events in wineries obtained from the washing test.
- Increase the knowledge of the washing plants operation.
- Register of chemicals consumption during washing process test.
- Identification and selection of the hydrosoluble labels to be applied in demonstrative pilot.
- Register of water consumption and savings during washing process test.

During the period where MNUTO was partner in the project as provider of the washing facility plant, it was necessary to perform the following analysis to evaluate the consumptions of two alternative washing processes to quantify the chemicals applied in each one:

- **Alternative 1 (MNUTO) - Hydrosoluble label and innovative washing process:** Represents the current innovative process for MNUTO facilities and the label FASSON 'AB224', which was selected through several tests such as outdoor conditions or ice-bucket test (more detail in *D.B1.2* Technical design of the process line).
- **Alternative 2 - Hydrosoluble label and conventional washing process:** The same tag FASSON 'AB224' as in scenario 1 but with a conventional washing process.

After the introduction of INFINITY, the washing process proposed by this latest partner was evaluated. In this case, since INFINITY washing process consisted in a mechanical process and labels could be removed due to the friction action, the choice of the label was not a critical issue anymore.

During the B1 action, the washing process (MNUTO, Conventional and lately, INFINITY) was inventoried and data regarding all consumptions (water, energy, chemicals if necessary, detergent) was collected. In any case, once INFINIY joined the project in replacement of MNUTO, it was not necessary to monitor the consumption of chemicals during the washing, since a conventional detergent was the only washing agent used in the process.

Description of actions

Action B1.1 Hydrosoluble tag selection. A pre-test has been applied to be sure of the label selected for the test and demonstrative pilot stage (action B.4). Initially the pre-test was not considered in the proposal of project, but the consortium preferred to carry out an experimental and controlled pre-test before spending budget, time and resource in the pilot test (B1.2).

As a summary of the action (B1.1), the pre-test helped to understand the washing procedure and gathered plenty of data for more detailed context and analysis for the project. Also, the rest of the labels were discarded and the tag "FASSON AB 224" was chosen to be the one used for the pilot test (B1.2) and remaining stages of the reWINE project. This is the first important output (more information in deliverable *D.B1.2* Technical design of the process line, in Annex 2). After the introduction of INFINITY, pre-tests were performed again and due to the difference in the washing methodology

(INFINITY uses a mechanical washing process), the choice of the label has not been identified as critical.

Action B1.2 Washing test.

The washing system has been carried out firstly at MNUTO and secondly at INFINITY. The washing system proposed by MNUTO for the PILOT TEST is an innovative process with an extra stage that cleans up any kind of inorganic residue remaining inside the bottles. This extra step consists of introducing the bottles inside another external machine with similar design that carries out cleanse of the bottles by an immersion bath into an acidic solution, based on sulfuric acid, eliminating any kind of inorganic compound that could remain present. The Innovation in INFINITY washing process are based on a mechanical washing treatment applied by means of bottle washing machine with a) pre-wash, b) Internal and external washing per friction c) Rinsing with decalcified water from net. D) dry with filtered air.

This innovative system eliminates the organic waste, labels and other wasters from reused bottles. Furthermore, it presents a high advantage, the technical capacity of washing bottles with adhesive labels and hydrosolubles as well. The technology of INFINITY based on a mechanical washing generates more flexibility in the kinds of wines, bottles and labels could be considered in reWINE project, increasing the possibility of recovering and reuse more kinds of wines and bottles independently of the label used (more information in deliverable D.B1.3 Washing procedures report, in Annex 2). This washing test has been useful to register the consumption and savings of energy, chemicals and water in MNUTO and at INFINITY washing plant.

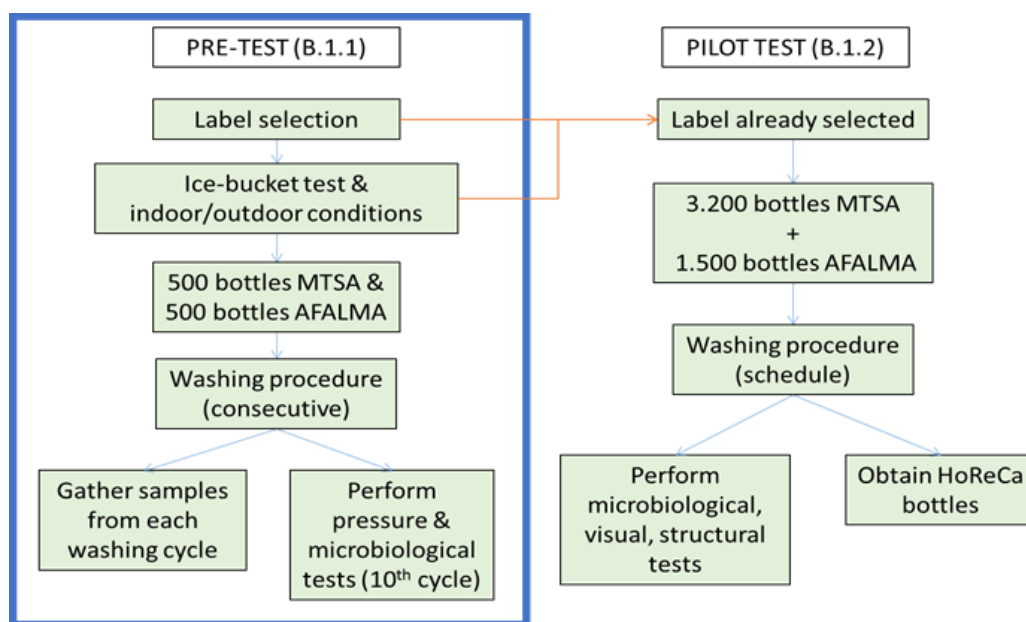


Figure 2. Steps in pre-test and test washing in reWINE project.

The INFINITY washing plant process scheme is presented in the next figure:

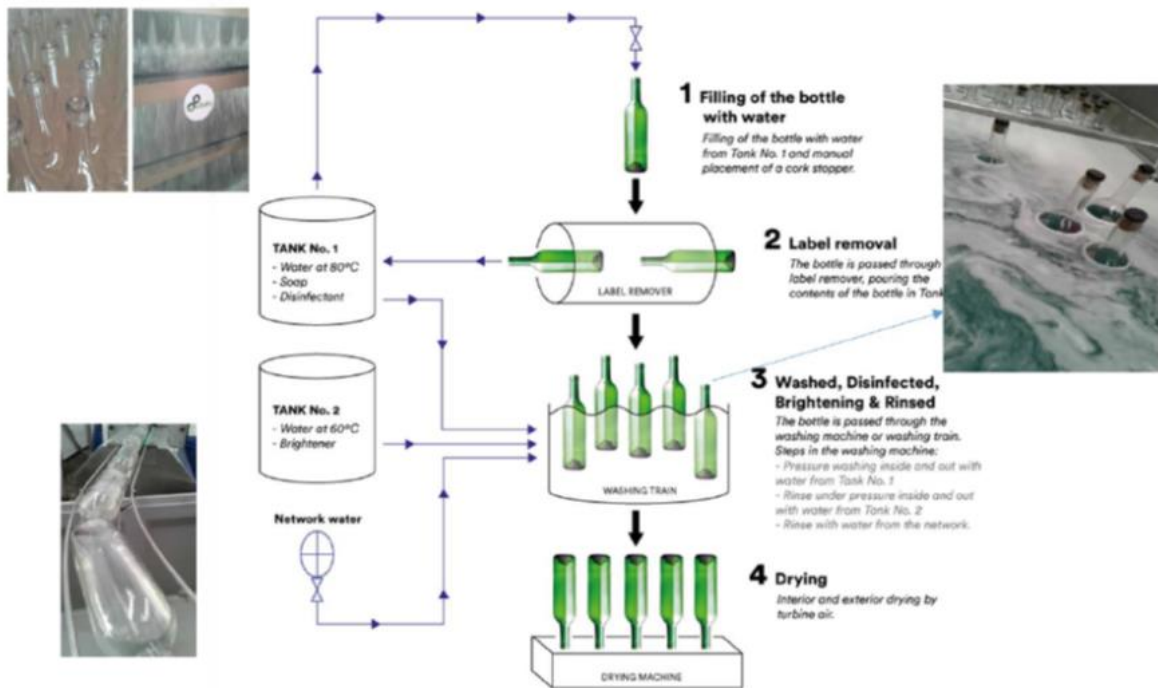


Figure 3. INFINITY washing process

The second output obtained from this action B1.2 is available reused bottles to be distributed in restaurants and internal winery events and used for control test. Some of these bottles have been used for the sanitary and quality controls and sommelier test as well. Bottles reused containing wine and available for quality and sanitary test or to be distributed in restaurants or internal events of wineries.

Action B1.3 Monitoring of washing process

The registration of inputs consumption as water and chemicals has been carried out in this action during the washing test and considering two scenarios conventional washing, MNUTO washing process and INFINITY washing process. The detailed information is shown in deliverables D.B1.1 Register of the use of chemicals during action B1, and deliverable D.B1.3 Washing procedures report, both documents attached in Annex 2.

Table 2. Water consumption per bottle of MTSA & AFALMA during washing test in INFINITY, MNUTO compared with conventional washing system.

Chemical Agent	Process Step	Unit	Alternative 1	Alternative 2	Current
			MNUTO	Conventional	INFINITY
NaOH	Basic immersive bath	kg	6,50E-03	8,13E-03	0,00E+00
H ₂ SO ₄	Acidic immersive bath	l	3,00E-02	0,00E+00	0,00E+00
Detergent	Detergent injection	l	1,10E-03	1,10E-03	1,00E+00 g
Polyethylene wax	Wax Treatment	kg	3,71E-04	3,71E-04	0,00E+00
NaCl	Decalcification process	kg	8,57E-03	1,36E-02	6,63E-05
Resin	Decalcification process	kg	4,04E-07	6,43E-07	3,82E-04
Active Carbon	Decalcification process	kg	4,71E-08	7,49E-08	0,00E+00
Cl ₂	Water Purification	kg	7,14E-05	1,13E-04	0,00E+00
H ₂ SO ₄	Wastewater Treatment	kg	1,86E-03	2,96E-03	0,00E+00
Amine Sulphate	Wastewater Treatment	kg	3,71E-03	5,90E-03	0,00E+00
Brightner	Drying treatment	ml	NA	NA	7,20E-02 ml
Anti-foam	Wastewater Treatment	kg	4,29E-04	6,81E-04	0,00E+00

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

Due to the withdraw of MNUTO and the introduction of INFINITY, the washing tests have been repeated for both AFALMA and MTSA bottles. The tests were carried out during the first semester of 2019. D.B1.1, D.B1.2 and D.B1.3 report the details concerning the washing procedures, labels selection and consumptions including both MNUTO and INFINITY data.

Progress indicators:

This action has been useful to validate the technical and logistical steps that must be carried out between wineries and MNUTO and INFINITY washing plants to manage reuse bottles. After action B.1 results, it has been demonstrated that reuse bottles with hydrosoluble and non hydrosoluble labels is feasible from a technical point of view while respecting the quality and sanitary requirements defined by wineries (and MNUTO's and INFINITY internal controls). B1 action has provided a positive experimental knowledge that increases the feasibility of pilot action (B4).

- Water savings comparing conventional process and INFINITY (mechanical) washing process: 66,5 m3.

Additional indicators are showed in the Updated Table of Specific Indicators in deliverable D.C3.2.

DEVIATIONS

The washing tests (B1) were done sequentially, first with TORRES and then with AFALMA bottles. AFALMA tests started later than initially planned, due to the acquisition of a new bottling machinery and unanticipated commercial compromises.

This delay had no impact on the next actions of the project since the wineries validation tests (B2) has been performed in parallel.

After MNUTO's substitution (amendment request), the new washing process provided by INFINITY has required the replication of the tests that have been performed during the first semester of 2019.

Action B2: Analysis of Wineries and Consumers perception			
Foreseen start date	May 2017	Actual start date	January 2017
Foreseen end date	March 2019	Actual (or anticipated) end date	December 2019
Responsible beneficiary: TORRES			
Other participants: AFALMA, FPRC			

ACTIVITIES AND OUTPUTS

Objective of the action

Identify the barriers and opportunities for reusing wine bottles, carrying out an industrial test with bottles reused in the bottling lines of Bodega Agrícola Falset Marçà SC (AFALMA) and Miguel Torres S.A. (TORRES), evaluating the results of the common quality, microbiological, and manufacturing controls in both wineries. Moreover, at the same time, assess the end consumers' and sommeliers' perceptions of these bottles.

The action B2 was carried out with the partner Maria Nutó at first stage of the project, evaluating the results of the washing of the bottles in 10 cycles. Subsequently, as a result of the change in the partner of the washing plant, the repetition of the 10 wash cycles with the AFALMA bottles and a small sample of TORRES bottles had to be carried out to validate the feasibility of the process with the new INFINITY washing plant.

Methodology

In each of the ten washing-cycles units were used for the various controls, analysis and tests as detailed below:

Materials monitoring

The technical specifications of the auxiliary materials were verified, from each cycle when the merchandise was received from MNUTO, the washing company, and the following checks were made:

- Bottle Inspection.
- Superficial Treatment to determine the surface tension by means of the "Sherman treaters" test.

In each of the 10 bottling cycles, labelled bottles were analysed:

- Visual inspection of the label.
- Ice-bucket inspection: determine the resistance of the labels to the water.
- Fridge inspection: assess the performance of the labels in hotel refrigerators.

The same winery validation tests (B2) have been carried out again with the washing company INFINITY, following the same methodology that was carried out with MNUTO.

Quality control and manufacturing in bottling lines

Quality and manufacturing controls were carried out in wine bottling-line, following the usual internal procedures. These take into account the various process phases.

Identification of incidents during the filling process

The identification of incidents during the filling process (sub-action B2.2) follows the usual internal procedures. These take into account the various process phases, from the depalletization phase to the palletization of the bottles.

Microbiological control

In accordance with internal protocols, microbiological inspections of empties bottles coming from the washing cycles and full bottles at the end of the bottling process were carried for each of the 10 washing cycles.

Laboratory analytics

Standard laboratory, metal and phytosanitary analytical tests were carried out during each of the washing cycles.

Bottled wine tasting by winemakers

Following internal protocols, in each bottling the winemakers tasted the wine, to validate the organoleptic quality of the final product.

Consumer test (TORRES only)

Out of each wash cycle, some bottles were consumed in restaurants associated with Torres, and each bottle was accompanied by an evaluation questionnaire of the bottles. At the same time, in washing cycles 5 and 10, an external test was carried out with a panel of consumers elaborated by the external company Peel Theonion, with the aim of learning how the final consumer perceives the reused bottles and whether they provide any differential value. The objectives and conclusions obtained in the consumer panel were summarized in a document also prepared by the external provider Peel Theonion.

Sensorial analysis of the different washing cycles. Tasting by sommeliers (AFALMA only)

The tasted bottled wine and the sommeliers tasting of red Falset wine conducted to analyses many different parameters such as color; aroma; descriptors in the mouth; persistence; quality and quantity of tannins; etc. All of them were evaluated with the maximum satisfaction from the sommeliers. Detailed information of these analysis is shown in deliverable D.B2.1 Report on the perception of the reuse of bottles by wineries, consumers and sommeliers (Annex 2 – Deliverables).

Results:

The results were evaluated as expected. No labelling anomalies were detected in any washing cycles of the wineries' bottles. The microbiological tests after the washing cycles were negative meaning that the wine is suitable for consumption. The standard analytical results and metals of the wash cycles were correct, meaning that they are suitable for consumption. The oenological tasting of the bottled wine did not detect any alteration and in the organoleptic quality of the washed and filled bottles is validated.

The results of the controls carried out during this activity in the case of the Maria Nutó partner are set out in version 1.0 of deliverable D.B2.1 Report on the perception of the reuse of bottles by wineries, consumers and sommeliers (version 1.0 was submitted with Midterm report).

The results obtained in the analysis carried out with the bottles washed at INFINITY are included in the version 2.0 of the deliverable D.B2.1 (please, find this updated version in Annex 2 – Deliverable)

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The action performed together with partner MNUTO has been fulfilled by the planned work plan, the industrial tests was realized initially in Bodegas Torres, from January to June 2017 and subsequently in AFALMA where the tests was performed from September to December 2017.

In both cases it has been fulfilled by the calendar foreseen of the phase B2 of the project. Please note that the start date for the first action was advanced so the B2 controls could be performed during the washing tests and not afterwards as it was described in the proposal.

The repetition of the analysis with the participation of INFINITY was implemented slightly later than the schedule approved in the Amendment request. The action should have ended in June 2019 instead of December 2019, but this did not have impact on the project implementation.

DEVIATIONS

The wineries validation tests (B2) have been advanced from May'17 to January'17, so they could be performed in parallel with the washing tests.

As mentioned before, the tests were repeated with INFINITY as proposed and approved in the Amendment request. The slight delay in the completion of the action have not affected the subsequent actions such as B3 and B4.

Action B3: Preparation of the Pilot operational phase.			
Foreseen start date	June 2017	Actual start date	June 2017
Foreseen end date	September 2018	Actual (or anticipated) end date	October 2018
Responsible beneficiary: FPRC (REZERO)			
Other participants: AFALMA, TORRES, INFINITY, ARC			

ACTIVITIES AND OUTPUTS

This action focuses on preparing the pilot operational test. In order to achieve the targets of the following sub actions for the preparation of the pilot operational phase, many meetings and contacts were performed by FPRC, with the wine sector, retail and restaurant sector, municipalities, logistics sector, partners involved in reWINE, etc.

B.3.1 Inclusion of other wineries

Wineries have been contacted to know their interest in joining the project and their profile (such as volume of consumption in the Catalan territory, use of hydrosoluble tag). Some of them were identified in actions A2 (Preliminary evaluations: identification of barriers, desirability and potential solutions for wine bottle reuse) and A3 (Market study of the potential for wine bottle reuse in the Catalan market). Several meetings have been realized with different wineries and sectorial associations (such as Federació de Cooperatives Agràries de Catalunya).

We found many wineries interested in joining the project. Find the list of the 27 wineries contacted for the pilot project in deliverable D.B3.3 List of other wineries included.

Finally, 5 new wineries joined the Pilot test phase: Vins Pravi, Celler Talcomraja (micro winery), La Vinyeta (small winery), Albet i Noya (medium winery) and Joan Ametller (small winery).

All the wineries fulfilled the technical conditions for participating in the pilot project (such as washable bottle and providing bottles to both restaurants and shops).

To prove the feasibility of the reuse for all types of wineries, a micro winery was included. As the washing plant (INFINITY) had no problem to receive pallets with different models of bottles, even with non-hydrosoluble tags, the inclusion of this winery was viable. The characteristics of the five new wineries can be consulted in deliverable D.B3.3. List of other wineries included.

B.3.2 Agreements with the participating grocery stores and restaurants

We performed several meetings with different supermarket chains and retailer sector (as Grup Bonpreu, Condis, Veritas and PIMEC Comerç), some of them were already selling the wine brands that were participating in the pilot. The first meetings were not successful, that is one of the reasons why the pilot test started without a supermarket chain.

The negotiation with supermarket chain took a lot of time as their decision making is a long process (see all the meeting on deliverable D.B3.5 Report on the grocery stores and restaurants visited). During 2019, three supermarket chain joined the pilot test with some shops: Caprabo (selling wines from AFALMA and Torres), Ametller Origen (selling wines from Joan Ametller) and Veritas (selling wines from Albet i Noya).

On the other hand, contacts have been done with several shops that sell wines of the new wineries incorporated.

Regarding the restaurant sector, good results were achieved. Several interviews have been done (federations and guilds, restaurant chains, wine distributors to restaurants, caterings, etc.). Please, see the summary of the meetings on deliverable D.B3.5.

As planned, there are two scenarios of bottle collection from restaurants: direct collection with reverse logistics by wineries from restaurants and shops (direct sales); and collection through a wine wholesaler distributor from restaurants in the area of Barcelona (selling wines from AFALMA). So

FPRC worked on one side with restaurants directly provided by wineries, and on the other side with a wholesaler (Vicalis) that sells AFALMA wines to restaurants in Barcelona area.

Wineries and the wholesaler (Vicalis) also contacted some of their clients (restaurants, shops, and supermarket) to present the pilot test. Several meetings were done with the help of FPRC (Rezero) to explain the functioning of the pilot test and encourage their participation. These meetings were done to ensure a higher number of restaurants and stores participating in the pilot test. At Barcelona city, other restaurants that were not costumers of Vicalis were contacted and visited in order to explain the pilot project and to ask them if they were interested in participating.

The 4 restaurants supplied directly by Bodegas Torres also participated in the pilot, collecting the Viñasol bottles.

Finally, Agreements have been signed with several shops, supermarket chains and restaurants that sell wines of the new wineries incorporated and AFALMA. More details in deliverable D.B3.5.

B.3.3 Design of the logistics

The logistic of the bottles was planned for empty pilot bottles to be collected from the different sources (grocery stores, restaurants, wineries and municipal waste collection centers), as well as for washed pilot bottles to be delivered and refilled in the wineries.

This logistic has been challenging, because depends on the technical and operational conditions of the washing plant, and the characteristics and agreements with the different sources from which bottles were collected (retailers, restaurants, wineries, municipal waste collection points). The change of the washing plant has been beneficial for the pilot project in the sense that Infinity has more flexibility related to logistic and the washing of bottles in comparison with Maria Nuto, but has required designing new logistics (organizational and technical aspects).

A protocol of the logistics for bottle collection, transport, washing and reuse in the pilot was defined before the start of the pilot operational phase. We studied several options of distribution for restaurants, shops, supermarkets and municipal waste collection centers. At the end the pilot test has had 5 different scenarios (and a total of 9 cases of study):

Case studies	Scenario
Medium size winery	HORECA: restaurants, hotel, small retail and wine tastings
Large Winery	
Medium Size winery and retail	Large retail
Small winery and retail	
Small winery and taste	Small retail + restaurants + wine tasting
Small winery and local stores	
Small winery and integrated washing	Integrated washing
Medium size winery and retail	Retail + waste collection point
Large winery and retail	

The 5 scenarios consist in:

- Medium and large wineries with HORECA channel (both direct distribution and indirect –through Vicalis) and complemented with some small retails.
- Medium and small wineries with large retail (supermarket chains).
- Small wineries delivering to small retails and restaurants.
- The winery with integrated washing plant.
- Wineries with supermarkets and return of bottles to municipal waste collection points.

Regarding the supermarket chains scenarios, different logistics were implemented: large retail with return of bottles to point of sale (Veritas and Ametller Origen) or to municipal waste collection points (Caprabo). While Ametller Origen collected reWINE empty bottles returned by consumers,

transported them to their logistical plant through reverse logistics and stored them, Veritas required an external logistic operator (Alencop) that collected the empty bottles from their grocery stores, and stored them. Finally, Caprabo participated in the pilot test in collaboration with municipal waste recycling centres, that acted as collection points of reWINE empty bottles.

The final design of the logistic for each winery is explained on the deliverable D.B3.4 Methodology design for pilot monitoring.

All wine bottles participating in the action B4 pilot test were identified with an additional label to facilitate the identification of the bottles as reusable (some photos are shown on Deliverable D.B3.2 Design of the campaign for consumers, and the design is shown on D.B3.3).

B.3.4 Design of the methodology to monitor the pilot project

Data collection was required for the action B4 and B5. The design of the methodology and the documentation needed from each stakeholder can be consulted on the deliverable D.B3.4. The parts involved in the pilot test (wineries, wholesaler and washing plant) were required to present data collection monthly to ensure a good monitoring of the pilot project. For better understanding of the pilot test, different handbooks with specific instructions were performed and delivered to each participant before the starting the action B4 Pilot test (wineries, wholesaler, washing plant, municipal waste collection points, restaurants and stores). This handbook contains the protocol of the pilot project with the requirements for storing, transporting, data registering (such as kilometres and number of bottles of each source). TORRES and INÈDIT have collaborated in the elaboration of the documents. The handbooks can be consulted on the deliverable D.B3.1.

B.3.5 Incentives to promote the return of pilot wine bottles

Incentives to promote the return of pilot wine bottles have been designed specifically with each winery, as well as the necessary communication tools. A total of 3 different incentives have been applied: Economic Rewards (ER), Deposit and Refund System (DRS), and Raffles (R). The final incentives proposed for each winery can be consulted on the deliverable D.B3.6.

B.3.6 Design of the campaign to consumers

This action takes into account the insights gained in action A2 in order to design a customer-centric system that fulfilled the needs and expectations of all the stakeholders.

A campaign for consumers has been designed to inform the population and promote their participation, with positive, modern and emotional claims, such as “every bottle matter” (Communication Plan). To ensure a good design of the campaign, the positioning, style and message need to be clear (described on the deliverable D.B3.2). The contents of several communication tools (door stickers a distinctive, poster, display, banners for social network, etc.) have been designed to disseminate the project in the participating wineries, shops and restaurants.

A video has also been designed and the recording took place in November 2018 and it has been disseminated on different media from December 2018.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The action B3 was extended due to the withdrawal of the partner that was meant to wash the bottles (MNUTO), which affected directly to the design of the pilot project and required to find another washing plant (INFINITY), increasing the hours and dedication. This change of partner required a new Grant Agreement, which approval process by EASME also took time. On the other side, the difficulty to involve supermarket chains in the pilot test also enlarged this action. The action B3 has finished in October of 2018.

DEVIATIONS

The withdrawal of MNUTO and the search of a new washing plant, as well as the substitution by INFINITY, has required the adjustment of the logistics previously defined.

Action B4: Pilot project with wineries, municipal household waste recycling centers, restaurants and grocery stores.			
Foreseen start date	June 2017	Actual start date	January 2017
Foreseen end date	June 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: FPRC (REZERO)			
Other participants: INFINITY, AFALMA, TORRES, INÈDIT, ARC			

ACTIVITIES AND OUTPUTS

The pilot study is one of the essential stages in the project reWINE. A total of 93 participants were involved in the pilot test phase. The next figure shows an overview of the main stakeholders involved in the pilot test phase:

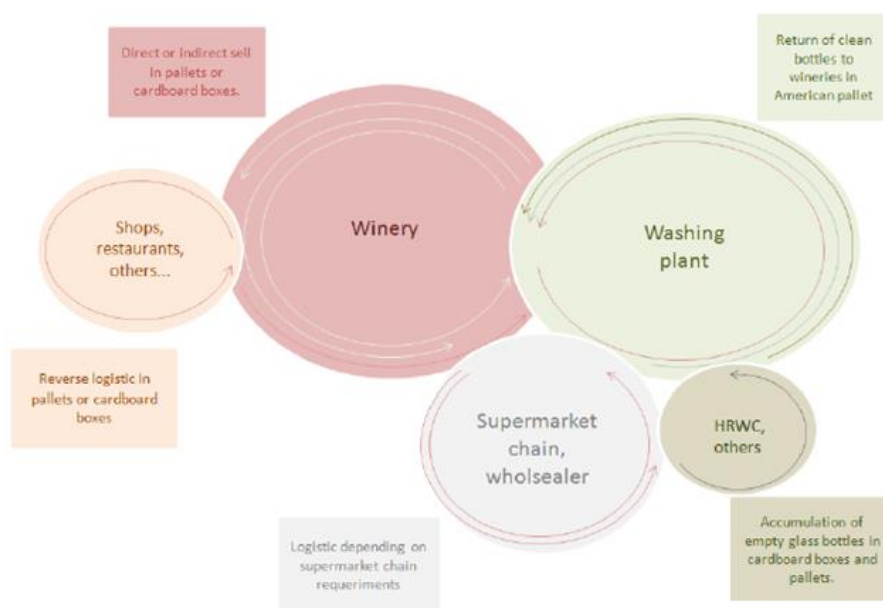


Figure 4. Stakeholders involved in pilot test phase.

The pilot test has been developed with 7 wineries, 51 restaurants, 2 wholesalers' logistic operators, 32 shops (including 3 supermarket chains) and 3 municipal waste collection points.

The pilot test has been also developed with 19 different models of bottles and 31 brands of wine (check deliverable D.B3.3).

B4.1 Labeling and put on the market

Before starting the collection of pilot bottles, all wineries identified reWINE bottles with hydrosoluble tags. This action started in February of 2017, but the process stopped as the washing plant Maria Nutó left the project. The labelling of bottles restarted in 2018, and the collection of bottles started in July 2018.

During the period from January to October of 2017, Torres and AFALMA wines (ViñaSol, IMUS, Falset Negre) were bottled with reWINE hydrosoluble tag.

Before starting the collection of reWINE bottles (July 2018), and external hydrosoluble tag was designed for the reWINE bottles from new wineries (La Vinyeta, Talcomraja, Vins Pravi, Joan Ametller and Albet I Noya).

In total, 276.314 labels were printed for the different wineries participating in the pilot test.



Figure 5. AFALMA's reWINE Bottles labeled and stored in the warehouse.

B4.2 Campaign for consumers

Different actions have carried out to increase the collection of empty bottles:

Material communication: Several materials were designed for the campaign for consumers, such as posters, door stickers for points of sell and return, leaflets, tag to identify Rewine bottles, etc. All material communication has been elaborated with the collaboration of each participant and some visits and interviews have been developed during the pilot test to ensure a proper functioning.

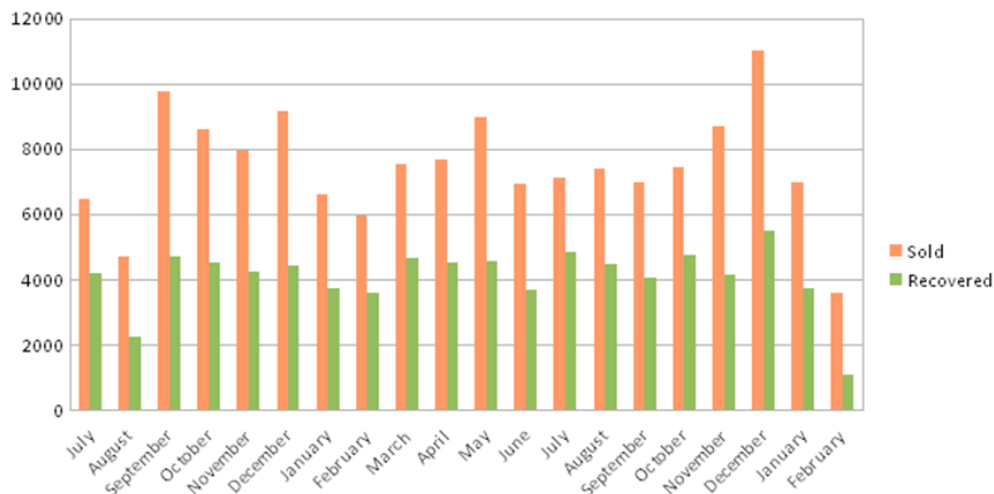
Public relation activities: Coordination of some press releases and 2 info days "Tastet reWINE" in order to connect the public with the project. The first Tastet reWINE was programed within the Responsible Consumption Week in Barcelona, and the second Tastet reWINE was promoted to encourage the consumption and return of reWINE bottles in a supermarket chain.

Digital marketing: Elaboration of a video and other materials as banners for social media. Dissemination of the results, raffles, videos and other actions during the pilot test.

More information about this action is detailed in deliverable D.B4.1.

B4.3 Collection, transport, washing and reuse

The collection of empty glass bottles started in July 2018 and finished in February 2020. At the end of the pilot test, a total of 150.294 reWINE bottles were sold, and 82.239 were recovered.



The % of all bottles recovered was 54,7%, but the results of the pilot reWINE shows differences depending on the channel, the type of logistic and the incentives applied (more information in deliverable D.B4.1):

- The average return rate in grocery store channel was 21%. In grocery stores, a total of 83.147 reWINE bottles were sold and 17.586 were recovered.

- The % of bottles recovered in HORECA channel was 96%. A total of 67.147 reWINE bottles were sold, and 64.653 were recovered.
- Economic rewards reached an average return rate between 2-22%, similar to the Raffles (12 – 18%), whereas Deposit Refund System achieved higher return rates (85-95%).
- Each scenario reached different average of bottles recovered: Scenario HORECA and small retail (between 12 and 80%), large retail (between 12 and 18%), small retail (22%), integrated washing (95%), retail + waste collection point (2%).

The collection of the bottles for the pilot test ended in spring 2020 and the washing of all the bottles has ended in September 2020. The following table shows the number of bottles that have been collected, washed and discarded during the entire pilot test.

Winery	Bottles sent to washing plant	Bottles washed	Bottles discarded during washing process
La Vinyeta	7500	7337	163
Talcomraja	3220	2015	1205
Joan Ametller	485	484	1
Albet I Noya	124	123	1
AFALMA	10539	10246	147
MTSA (TORRES)	234	233	1
Vins Pravi	58446	58446	70*
TOTAL	80548	78884	1588

* These 70 bottles were discarded prior to sending them to the washing plant.

A total of 81.399 bottles were sent to the washing plant. A loss of 840 bottles were calculated during all the period of the pilot test due to breakage of bottles or lose of some of them (especially in supermarket chain's warehouses, as during the month of March 2020 supermarket warehouses were submitted to changes and high pressure due to the pandemic alarm of COVID-19). Therefore, in total, during the process of collection and washing, a total of 1.588 bottles were discarded.

The consumptions for the INFINITY mechanical washing process are presented in the following table:

Consumption at each washing cycle	units	Quantity/bottle
Electricity	kWh	0,036
Diesel for warming up	l	0,00106
Diesel during the washing	l	0,0044
Water for washing and rinsing	l	0,058
Detergent	kg	0,00073
Brighter	l	0,000074

Full details of the washing process for each winery and the results of microbiological essays have been reported in D.B4.3.

B4.4 Monitoring of the pilot project

The logistic of the wineries participating in the pilot is shown in the next figure (5 scenarios):

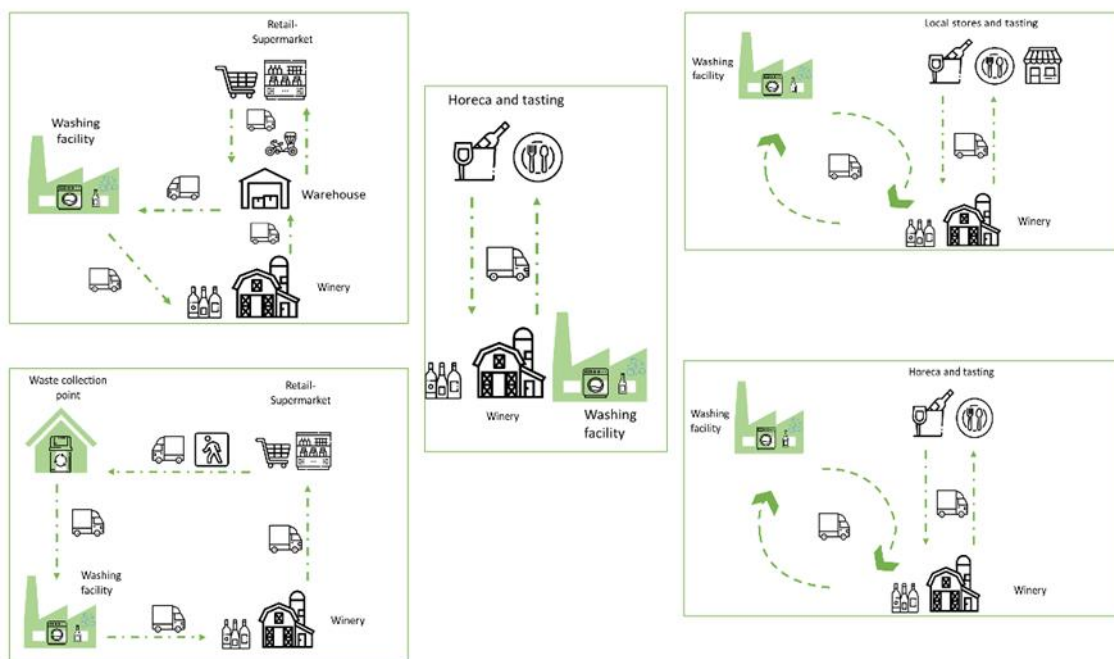


Figure 6. Scheme of the wineries' logistic in the pilot

The pilot test has considered the whole life of the bottle from washing, labeling, distribution on the market and collection of empty bottles by the wine producers, waste collection centers, restaurants and shops involved in order to study its viability and the environmental, social and economic performance.

In order to obtain all data collection necessary, all participants were asked to send all the information before starting the pilot test. As planned in action B3, every participant involved in the action B4 had a handbook available (deliverable D.B3.1) to ensure better understanding on the action B4.

After starting the pilot test, FPRC analyzed monthly the number of bottles sold and collected. The evaluation of bottles collected was necessary to evaluate the development of the pilot test and the perception of different participants. FPRC also developed other actions as surveys.

All pilot test monitoring (analysis of scenarios, interviews, data evaluation, etc) has been useful to identify the main considerations to take into account for the implementation of wine bottle reuse: Characteristic of glass bottles (so that it can be washed and reused), transport and collection of glass bottles (direct/indirect, reverse logistics), optimal distance between washing plant and collection point, storing capacity, storing conditions (indoor/outdoor) and percentage of bottles recovered (enhanced by incentives).

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

On one hand the starting date of the action was advanced to January'17 in order to match with TORRES and AFALMA bottling calendar.

On the other hand, this action has been extended due to the withdrawal of the MNUTO washing plant, which affected directly the design of the pilot project (B3) and delayed the initiation of the bottle collection.

The collection of bottles stage has been extended until the beginning of 2020 in order to collect a higher number of bottles. In addition, the last part of the pilot test was affected by the COVID-19 pandemic that delayed the final logistics (storage, transport and washing)

Progress indicators:

Number of bottles collected: 82.239

Number of bottles collected and sent to INFINITY washing plant: 80.548 (different values correspond to bottles discarded during the collection, 1.588 bottles).

Amount of glass packaging waste prevented: 33,2 tn

Consumers reached through sensibilization campaign: 1.540.898

Communications materials were shown in restaurants, supermarket chains, shops, municipal waste collection points and wineries participating in the pilot test.

DEVIATIONS

Regarding the schedule, the withdrawal of MNUTO and the search of a new washing plant caused a delay on the pilot's starting date.

Moreover, the withdrawal also had consequences from an organizational and technical point of view. The logistic of the pilot test changed due the location of INFINITY. New logistics have been designed to fulfil all requirements of washing plant and the other stakeholders (wineries, supermarket chains...). A total of 9 cases of study and 5 scenarios have been developed during the pilot test.

Action B5: Project Feasibility Evaluation			
Foreseen start date	June 2017	Actual start date	July 2018
Foreseen end date	December 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: INÈDIT			
Other participants: INFINITY, TORRES, AFALMA			

ACTIVITIES AND OUTPUTS

Action B5 has been structured in 2 main sub actions: B5.1 - 5.2 - 5.3 and B5.4. The main objective of sub action B5.1-5.2 and 5.3 is to evaluate the feasibility of wine glass packaging reuse in the region of Catalonia considering technical, environmental and economic assessments. The results are presented for all the cases studies that have been included in the pilot tests within the reWINE project, aggregated into 5 scenarios considering the logistics options.

SCENARIO	CASE STUDIES
A. HORECA	A1. MEDIUM SIZE WINERY A2. LARGE WINERY
B. Large retail+ logistics	B1. MEDIUM SIZE WINERY AND RETAIL B2. SMALL SIZE WINERY AND RETAIL
C. Small retail + wine tasting	C1. SMALL WINERY AND TASTE C2. SMALL WINERY AND LOCAL STORES
D. Integrated washing	D1. SMALL WINERY AND INTEGRATED WASHING
E. Retail+ waste collection point	E1. MEDIUM SIZE WINERY+RETAIL E2. LARGE WINERY+RETAIL

The results of sub actions B5.1, B5.2 and B5.3 are reported in deliverable D.B5.1 Project Feasibility Report (please, see Annex 2 – Deliverables). The review of deliverables focused in environmental, economic and technical feasibility of bottle reuse potential has been done by Dra. Julia Martínez Blanco from INÈDIT instead of an external researcher. She has a huge experience in LCA studies been and review of them. Just to mention some example she is co-author of Organizational Environmental Footprint Guide of UNESCO and author of several scientific published papers in prestigious research journals.

In parallel, the main objective of sub action B5.2 is to provide a methodological guide regarding the potential and future implementation of equivalent reWINE projects in other regions. The results of this sub action are reported in deliverable D.B5.2 Methodological Guide to implement the project reWINE in other regions (please, see Annex 2 – Deliverables).

B 5.1: Technical Assessment

The methodology applied to analyse the technical feasibility has pivoted in 3 main aspects that have revealed to be relevant to accept the reuse of wine bottles:

- 1- Visual inspection: indicate if the aesthetics of the bottle accomplishes with the wineries criteria.
- 2- Microbiological inspection: ensure the suitability of the washed bottle to contain wine for further consumers.
- 3- Other aspects related to logistics:

Other aspects that determine the feasibility of the reusability deal with the time of storage of the empty bottles. From the technical assessment, it can be stated that the return system is feasible since the quality of the re-used bottles after the washing is accepted by the wineries, considering aesthetical and hygienic aspects. Furthermore, the mechanic washing applied by INFINITY has resulted to be effective to remove both hydrosoluble and non-hydrosoluble labels.

B 5.2: Environmental Assessment

The environmental feasibility study has been carried out using the Life Cycle Assessment methodology. Life Cycle Assessment (LCA) is an analysis of the environmental impact of a product, process, or activity over the course of its lifetime by identifying and quantifying the energy and materials used and wastes released to the environment. There are two standards for LCA created by the International Organisation for Standardisation (ISO): ISO 14040 (Environmental management - Life cycle assessment - Principles and framework) and ISO 14044 (Environmental management - Life cycle assessment - Requirements and guidelines). The chosen functional unit is “500 wine bottles”. Therefore, data for the assessment and results will be given considering 500 wine bottles. In any case, results are further reported per wine bottle. The system boundaries of the assessment in the reWINE pilot tests are defined by the following figures, depending if the assessment is carried out for a single-use bottle or for the reusable bottle.

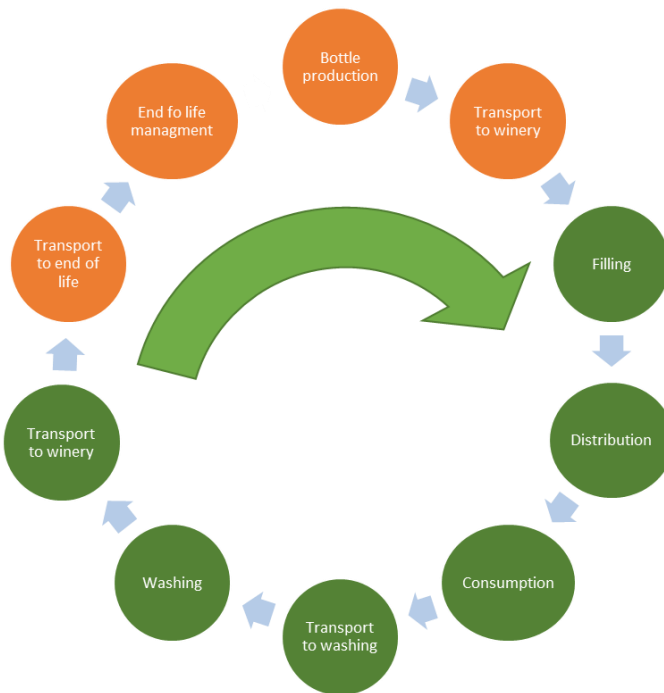


Figure 7. System boundaries for a reusable bottle

From the environmental perspective, it should be remarked that for all case studies included in the reWINE pilot tests, the return system provides environmental benefits: for instance, the carbon footprint of a reused bottle resulted, in average, 28% lower compared to the use of new bottles. The environmental benefits can be higher or lower, depending on the distance between the wineries and washing facilities and the number of washings required to ensure that the bottle is ready for a new use. For instance, regarding the specific impact concerning carbon footprint (Global Warming Potential, expressed in kg of CO₂ equivalent), accumulated savings after 8 reuses (7 washings) vary from 1,91 to 3,68 kg CO₂ eq /bottle, depending on the winery, the logistics or the distance from/to the washing facilities.

The reduction in the distance between the winery and the washing facility provides additional benefits to the remaining environmental impact categories. For the remaining impact categories, savings are also significant. A special analysis should be done for the Abiotic Depletion Potential (elements)

impact category, as this impact depends clearly on the fuel consumption in the transport. For this reason, savings on this impact category are found if distances are reduced. For this purpose, this study suggests that the creation of new washing facilities, spread along the territory and to have at least one in each Certification of Origin of wine, will enhance the obtaining of comprehensive environmental benefits.

More details of the results of the environmental assessment are reported in action C1.

B 5.3: Economic Assessment

The economic feasibility study has been developed using unitary cost per reuse bottle to compare to the cost of the acquisition of a new bottle. The economic study has been divided in several specific objectives:

- Determine the different scenarios related with the reuse system.
- Identify the unitary costs related to the information gathered.
- Identify the environmental impacts associated with the reuse system and compare them to a conventional scenario

In order to calculate the full costs of a new bottle. Equation 1 has been employed, while for the calculation of the costs of the reusable bottles, equation 2 has been applied. It should be stated that both formulae include all the costs associated to the use of a new bottle or to a reused bottle (glass, transport, label, green dot tax, etc.)

$$\text{Life Cycle Cost (New Bottle)} = C_{nb} + C_{tax} + C_{label} + C_{labelling} + C_{bottling} \quad (\text{Eq.1})$$

$$\text{Life Cycle Cost (Reuse Bottle)} = C_{wb} + C_{lsys} + C_{label} + C_{labelling} + C_{bottling} \quad (\text{Eq.2})$$

The results of the economic analysis are summarized in the following table. It should be noted that the Max cost refers to the cost of the reuse during the pilot test, while the Min cost has been calculated considering potential cost reduction scenarios. More details can be read in deliverable D.B5.1.

SCENARIO	CASE STUDIES	Cost of the reusable bottle considering the use of pallets (REUSABLE)			Cost of a single use bottle (NEW)
		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	0,70	0,65	0,80	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	0,60	0,60	0,00	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

Regarding the economic feasibility, from the analysis carried out, it can be concluded that the cost of reusing a bottle of wine is higher than buying a new bottle. The scenario that presents the best cost analysis is the third one; however, in this scenario it is assumed that the winery has its own washing plant. This scheme is valid in a local scale and a further analysis of the installation of the washing plant must be made to determine profitability.

However, when making some variations such as lowering the cost of washing bottle up to 0.13 (€) and reducing the distance from and to the washing facility, the total costs are the same for the acquisition of the new bottle and the reuse bottle. For this purpose, this study suggests that the

creation of new washing facilities, spread along the territory (for instance, a distance around 60 km between the washing plant and the winery) in order to have at least one in each Certification of Origin of wine, will enhance the obtaining of comprehensive environmental benefits.

B 5.4: Scalability and Replicability strategy

This sub action presented the replication strategy that has been adopted by the reWINE partners, based, mainly, in collecting all lessons learnt from the pilot phase during the project, and establish contact with potential implementers of future project.

The pilot phase in the reWINE has served to prove the technical, economic and environmental feasibility of the wine bottles return system in Catalunya. Though there are points that still need to be improved, it has been possible to identify them and provide potential solutions to solve them.

In parallel, worldwide regions have contacted the reWINE partners to find out more on the project as they will to replicate the project and want to learn from the reWINE experience. The same way, reWINE partners have carried out an extensive work to promote, disseminate and explain the project through workshops, congresses, wine taste and meetings.

All this activity has led to create a shortlist of potential regions that may host replication projects as they comply with most of the criteria that make a region eligible to implement similar initiatives.

It is also planned to continue making networking at the end of the project with other LIFE projects related to the theme of the reWINE project: waste prevention communication, environmental management of wine industry, etc. The international scale dissemination will continue with the European Week of Waste Reduction, and the Association of Cities and regions for Recycling and Sustainable Resource Management (ACR +).

The contacts done with agents from other countries in the previous phases of the project will continue in order to know their next steps and to find similarities among all of them to get inspired for further actions that aim at implementing a bottles return system.

This activity, that will continue beyond the end of reWINE, will aim to create a critical mass to implement the wine glass bottles return and make it real.

The replication strategy that has been presented in D.B5.2 Methodological Guide to implement the project reWINE in other regions is the following:

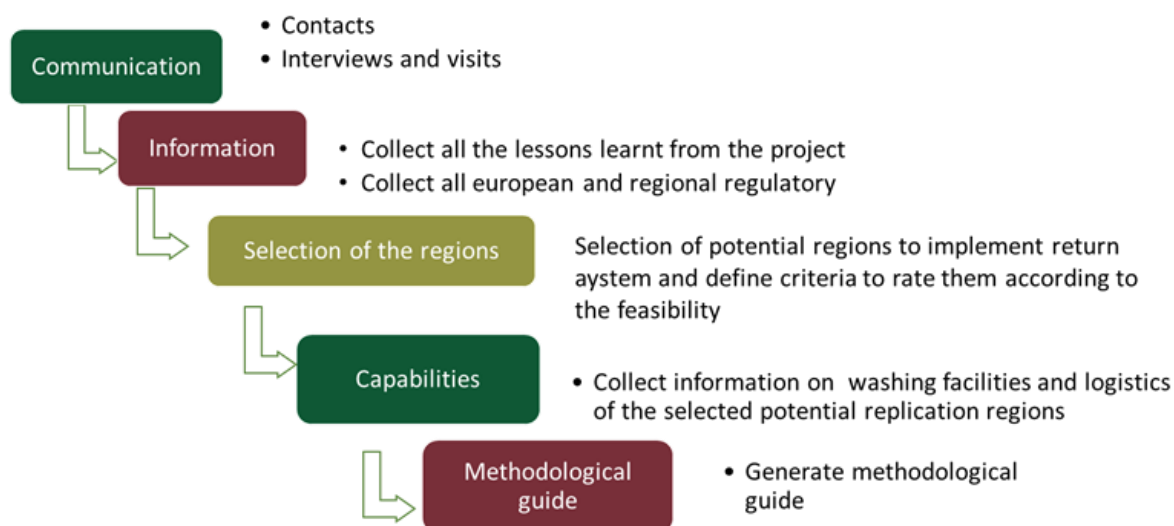


Figure 8. Replication strategy

Regarding the first point “Communication”, the more significant exchanges of experiences are showed below. The more relevant have been done with Spanish regions because of the territorial proximity or other exchanges due to the similar reuse objectives:

- Valencia government
- Navarra government
- Balearic Islands
- Basque Country government
- Styria government (Austria)

Apart from other exchange experiences not so relevant, there has been an exchange with European financed projects: the European Week for Waste Reduction, the CircE project (European regions toward Circular Economy), the LIFE+ Greece Cyclamen and the LIFE+Grack task Force, the LIFE Sarmiento, the LIFE Priorat + Montsant, the Interreg SUBTRACT and the Interreg Poctefa TRAILS project.

The following table shows a qualitative evaluation of the regions concerning a future development of similar projects:

	Glass bottles washing plants availability	Volume of consumption	Channels of distribution	Legislation	Consumers' sensitivity
La Rioja	●	●	●	●	●
Ribeira Duero	●	●	●	●	●
Valencia	●	●	●	●	●
Basque Country	●	●	●	●	●
Balearic Islands	● ●	●	●	●	●
Tuscany (Italy)	●	●	●	●	●
Piedmont (Italy)	●	●	●	●	●
Veneto (Italy)	●	●	●	●	●
Riestling (Germany)	●	●	●	●	●
Chile	●	●	●	●	●
Argentina		●		●	●

Deliverable D.B5.2 shows more details regarding the replicability strategy proposed to be followed after the reWINE project and includes a list of proposed actions to ensure a proper development of these replication projects. Moreover, in this deliverable an exhaustive **table with barriers and opportunities** that have been identified during the project has been included. Additionally, the After-LIFE Communication Plan presents details on the transfer strategy and a list of regions that have been contacted.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

Actions B 5.1, 5.2 and 5.3 have been extended in order to accommodate data regarding the pilot tests and the results of the washings performed. Action B 5.4 has not suffered any delay.

DEVIATIONS

No deviations have been reported apart from the delays due to the change in the washing facility provider partner and the delays due to the Covid19 pandemic.

Action C1: Monitoring of the environmental impact of the project			
Foreseen start date	August 2020	Actual start date	April 2020
Foreseen end date	December 2019	Actual (or anticipated) end date	December 2020
Responsible beneficiary: INÉDIT			
Other participants: TORRES, AFALMA, INFINITY			

ACTIVITIES AND OUTPUTS

This activity presents the environmental analysis performed during the project. This analysis has been carried out considering the scenarios described in action B5.

The methodology applied for the analysis is the LCA as described in sub action B5.2, comparing from an environmental perspective the use of new bottles and the use of reusable bottles 8 times (7 washings). All the case studies have been analysed considering the pilot test current situation. Moreover, it has been included the evaluation of cases studies where 2 or 3 washings per reuse cycles is required to ensure a proper bottle cleaning.

- Only 1 washing is required, thus 8 reuses of the wine bottle are possible
- 2 washings are required per cycle of reuse, thus 3 reuses of the wine bottle are possible
- 3 washings are required per cycle of reuse, thus 2 reuses of the wine bottle are possible

These alternatives respond to the fact that during the pilot test more than one washing was required since empty wine bottles were stored for a long time before being washed.

Additionally, the environmental assessment includes the evaluation in the current case, using the current distances between the wineries and the washing facilities, and an optimized scenario where the distances is reduced up to 60 km.

As it can be seen from the different scenarios there are variables that have an important role when calculating the economic sustainability in the reuse bottle process. The information gathered for this study is collaboration from the actors involved in the Life+ reWINE Project.

From the environmental perspective, it should be remarked that for all case studies included in the reWINE pilot tests, the return system provides environmental benefits. The distance between INFINITY and the wineries does not represent a limiting factor to obtain environmental benefits when reusing wine bottles.

The environmental benefits can be higher or lower, depending on the distance between the wineries and washing facilities and the number of washings required to ensure that the bottle is ready for a new use. For instance, regarding the specific impact concerning carbon footprint (Global Warming Potential, expressed in kg of CO₂ equivalent), accumulated savings after 8 reuses (7 washings) vary from 1,91 to 3,68 kg CO₂ eq /bottle, depending on the winery, the logistics or the distance from/to the washing facilities.

A summary of the results for the Global Warming Potential (kg CO₂ eq) indicator is provided in the following table:

SCENARIOS	CASE STUDIES	Min CO ₂ savings (kg CO ₂ eq/bottle) - real distance	Max CO ₂ savings (kg CO ₂ eq/bottle) - optimal distance	Average CO ₂ savings (kg CO ₂ eq/bottle)
A. HORECA	A1. MEDIUM SIZE WINERY	2,54	3,68	3,11
	A2. LARGE WINERY	2,09	3,31	2,70
B. LARGE RETAIL+ logistics	B1. MEDIUM SIZE WINERY AND RETAIL	2,02	2,37	2,20
	B2. SMALL SIZE WINERY AND RETAIL	2,20	3,50	2,85
C. Small retail + wine tasting	C1. SMALL WINERY AND TASTE	1,90	3,54	2,72
	C2. SMALL WINERY AND LOCAL STORES	1,66	3,63	2,65
D. Integrated washing	D1. SMALL WINERY AND INTEGRATED WASHING	2,32	2,32	2,32
E. Retail+ waste collection point	E1. MEDIUM SIZE WINERY+RETAIL	2,39	3,55	2,97
	E2. LARGE WINERY+RETAIL	1,91	3,19	2,55

The reduction in the distance between the winery and the washing facility provides additional benefits to the remaining environmental impact categories. For the remaining impact categories, savings are also significant. A special analysis should be done for the Abiotic Depletion Potential (elements) impact category, as this impact depends clearly on the fuel consumption in the transport. For this reason, savings on this impact category are found if distances are reduced. For this purpose, this study suggests that the creation of new washing facilities, spread along the territory and to have at least one in each Certification of Origin of wine, will enhance the obtaining of comprehensive environmental benefits.

More details on the environmental evaluation can be looked up in deliverable D.C.1 “Conclusions on the environmental assessment”.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The activity has been developed as planned.

DEVIATIONS

No deviation except for the delays due to the change in the washing facility provider partner and the Covid19 pandemic.

Action C2: Monitoring socioeconomic impacts of the project actions on the local economy and population.			
Foreseen start date	July 2020	Actual start date	July 2020
Foreseen end date	June 2019	Actual (or anticipated) end date	December 2020
Responsible beneficiary: FPRC (REZERO)			
Other participants: TORRES, AFALMA, INÈDIT, ARC			

ACTIVITIES AND OUTPUTS

The sub actions developed are:

C2.1. Discussion group with consumers and civil society associations

FPRC organized a discussion group with consumers and civil society associations. Due to the COVID-19 pandemic the discussion group were conducted with Zoom online platform. The objective of the discussion group was to evaluate the consumers environmental awareness about packaging reuse and the acceptance of wine bottles reused.

To summarize, the participants concluded that the health crisis appears as an opportunity as the consumer is more aware about local consumption, local production etc. Even though, there is a cultural barrier, as nowadays exists the habit of “use and throw away”. The public administration was identified as a key agent that can influence in different ways, from awareness campaigns to promote infrastructure investment for wine bottle reuse. The distributor sector is identified as one of the main challenges, and the participants claim that supermarkets chains must understand that the consumption of reusable products is a consumer’s right. It is needed to involve the large consumer to reach the general public. Last, reuse need to be explained in a simple way to the consumer, as the use of technical data is not understood by the consumer.

More information about the discussion group is available in deliverable D.C2.4.

C2.2. Discussion group with Catalan economic stakeholders

FPRC also organized a discussion group with Catalan economic stakeholders. The procedure of the session was the same as the other discussion group. The objective of the discussion group was to evaluate the economic opportunities of wine bottle for the different economic agents involved.

To summarize, the participants concluded that the project reWINE shows the environmental viability and the path for the economic viability. It is needed the construction of new washing facilities closer to the wineries. The reuse was abandoned for economic reasons, and now it is necessary to get a sustainable model. For that, it is necessary that the administration act in order to mitigate the economics disadvantages and promote the reuse. It is also necessary the collaboration of all sectors, as the new logistic may generate discomfort. There were discrepancies about the economic cost. Some sectors said that the reuse system could be a disadvantage for small companies and others consider that the price obtained in the pilot test reWINE were competitive with single use bottles. Last, the discussion group considered that it is necessary a social pressure in order to push the administration and the companies to the wine bottle reuse transition.

More information about the discussion group is available in deliverable D.C2.3.

C2.3. Projections about job creation

Different studies have demonstrated that reuse systems are an opportunity to create new jobs.

In this analysis the jobs created in the current system for single-use wine glass bottles have been compared to the ones estimated that would be created with a reusable system. According to the local authority Metropolitan Area of Barcelona, an average of 1,44 jobs is created for 1000 tons of glass waste collected and recycled. On the other side, according to a study performed by the European Environmental Bureau (Source: Reduce, Reuse, Refill! Institute for Local Self-Reliance, 2002), that

analyses the job creation in reuse of refilled glass bottles in several European countries, one job in the one-way sector replaces an average of nine jobs in the reuse sector. Considering the market of bottles produced and consumed in Catalonia (more than 48 million of wine bottles), the recycling system in the wine sector creates an estimation of 37 jobs, whereas the reuse system could create a total of 330 (9 times more jobs than the one-way bottle).

All calculation can be consulted in deliverable D.C2.6.

Wine bottle reuse offers opportunities of creating jobs that promote green, circular, local and with capacity to promote social reintegration (specially linked to logistics and washing). Jobs could be created in several sectors, such as:

- industry of washing plants
- logistics (collection, transport and storing of empty wine bottles collected from channels like restaurants and grocery stores)
- retailer sector (handling of bottles returned to point of sale, storing in warehouse)
- municipal waste collection centers (handling of bottles returned)

C2.4. Elaboration of a case studies report to assess the economic impacts of reuse in Catalan wineries using the results of the pilot project for the two wineries participating.

The deliverable D.C2.2 shows different scenarios of the economic impacts of reuse in Catalan wineries. In order to calculate these different scenarios, FPRC have considered the economic results of the pilot test. Even if the pilot test has shown that the cost of the new bottle and the reused bottle is similar, they involve different costs. While the cost of the single use bottle system is very much focused in the price of the new bottle (based in energy consumption and obtaining resources of the bottle production process with recycled glass), the reusable bottle system focusses the cost in the washing and logistics (transport and labor for the handling, storage and transport of empty bottles collected).

The annual production and consumption of glass wine bottles in Catalonia is 48.346.793 bottles and the pilot test has demonstrated that bottles can be used 8 times fulfilling the wineries requirements. The following assumptions have been considered: an average cost of new bottles of 0.20 euros/bottle (according to reWINE pilot test), the green dot tax of 0.017 euros/bottle (the fee of the Integrated Management System for 2021) and an average rate of reuse of 1 use of bottle per year. If we estimate the number of single use bottles used in 8 years and we compare with the number of bottles used in the reuse system during 8 years we can predict different costs of bottles and green dox tax depending on the recovery of glass bottle in the reuse system. If we compare single use system and reuse with a recovery rate of 100% (maximum scenario):

- After 8 years, the single use system generates 168.000 tons of glass waste and wineries spend a total of 83.930.033 euros in green dox tax and new bottles.
- After 8 years, the reuse system generates 24.654 tons of glass waste and wineries spend a total of 12.253.779,5 euros in green dox tax and new bottles. The starting point is considered with new bottles, so the first year all bottles would be new, and they would be used during a total of 8 years. Every year some bottles would be lost (breaks and for the periodic microbiologic analysis) and would need to be replaced (considered as new bottles). Green dot tax would be paid in the first time they are put in the market, so only for new bottles: the first year for all bottles, and annually for some bottles that need to be replaced for loses.

The reuse system could save a total of 71.676.253,5 euros after 8 years and a total of 143.346 tons of glass waste. This savings in green dot tax and new bottles would serve to cover the washing and logistics costs (handling, storage and transport) of reusable bottles. So, there is a transfer of costs from the single-use system (based in buying new bottles, whose production is CO2 intensive) to the reuse system (mainly based in washing and logistics, with an environmental impact much lower, as shown in action C1).

In a scenario of 50% returned bottles of the Catalan wine market of bottles produced and consumed in Catalonia compared with single-use system, the results would be:

- After 8 years, the single use system generates 168.000 tons of glass waste and wineries spend a total of 83.930.033 euros in green dox tax and new bottles.
- After 8 years, the reuse system generates 77.994 tons of glass waste and wineries spend a total of 48.091.907 euros in green dox tax and new bottles. In this scenario 50% of the Catalan wine market would not be reusable bottles, so they would be single use bottles contributing to the generation of glass waste.

The reuse system could save a total of 35.838.125 euros after 8 years and a total of 91.000 tons of glass waste.

C2.5. Elaboration of a case studies report to assess the economic impacts of reuse in Catalan grocery stores using the results of the pilot project of the stores participating.

The pilot has tested different logistics in the grocery stores and the economic impact may vary depending on the logistic applied. It is essential to plan a proper logistic in the large retail in order to make bottle reuse competitive.

For the small retail and retail + waste collection point has not presented many economic impacts as the collection of empty bottles were not a major problem for the retail.

For the large retail with return of bottles to the point of sale, the handling and logistics of the empty bottles represented an important change in the operational and organizational processes, so the adaptation and running of this supermarket chains had an economic impact (although they could not quantify for the pilot) test). Also, they assumed the economic reward of 0.10 euros/returned bottle.

However, as the reuse of wine glass bottle is not common in Catalonia for grocery stores the reuse bottle is a positive brand strategy that attracts responsible consumers to their stores. Reuse is an innovative opportunity to change our behavior that could bring significant benefits to users and businesses, some of these potential benefits are:

Cut cost: The pilot test reWINE has shown that the price of the reusable bottle is comparable with the price of the single use bottle when optimal logistic is applied. And considering the trend of increasing green dot tax in the future years, there is a potential for the reuse bottle to be even more competitive. This could represent a benefit for the grocery stores as they could purchase from wineries cheaper wine in reusable bottles and for instance offer to consumers cheaper wine products.

Build brand loyalty: Brand loyalty could be achieved when the consumer return empty bottles at the same point of sale. The return of empty bottles to point of sale means for the stores having more visits from clients, that normally take advantage of it to do new purchases (of wine or other products). Also, grocery stores could get new clients, that are attracted by products with environmental added values such as wine in reusable bottles, or consumers that bought reusable wine bottles in other stores and decide returning them in a closer store.

Optimize operations: Economies of scale for distribution and logistics can be achieved through sharing reusable packaging across the wine sector, that could have a positive economic impact for grocery stores.

For more details, please, check deliverable D.C2.1.

C2.6. Elaboration of a report about the impact of wine bottle reuse in the municipality's waste management as an opportunity to save costs based on the results of the pilot project and analysis of specific bibliography.

One of the scenarios tested in the pilot test was the collection of empty glass bottles in the municipality's waste collection centers. The introduction of the reuse system for wine bottles e have different impacts in the municipalities.

On one hand, the pilot test has demonstrated that municipal waste collection centers need to adapt their facilities to accept and collect empty glass bottles, to have proper storage condition in order bottles are save and can afterwards be cleaned efficiently in the washing plant. This adaptation may require some municipal investments

On the other hand, the reuse system has economic impact in the municipal waste management of the glass collected through the street containers waste collection. The adoption of bottle reuse in the Catalan wine market (where more than 48 million wine bottles are produced and consumed in the territory) would withdraw from street containers single-use wine bottles (estimated in around 21.000 tons of glass waste) that are currently managed by municipalities. The street containers wine bottles are mainly found in the selective glass container and the mixed waste container (residual waste). According to the official data of glass selective collection, 76,5% of the glass bottles are collected in the selective container. The rest (23,4%) is mainly collected in the residual waste container. In Catalonia this mixed waste is treated in landfills (23%, incineration (7%) and biological-mechanical treatment (70%). The cost of treating from mixed waste the wine glass bottles of the Catalan market represent an estimation of 550.000 euros, that results from applying the proportional cost of treatment for landfill (120 euros per ton), incineration (60 euros per ton) and biological mechanical treatment (110 euros per ton). This analysis has been calculated considering that the more than 48 million wine bottles that are currently produced and consumed in Catalonia represents around 21.000 tons of glass waste for the municipal collection system: 76,5% collected in the glass selective containers and 23,4% in the residual fraction.

With the reusable system, wine bottles would not be collected through street containers, so municipalities would not receive from the Integrated Management System the income corresponding to green dot tax, but on the other side municipalities would decrease public spending due to the reduction of the collection service as less tones of glass would be collected in the selective containers, and also in the residual containers. This savings would be direct in the municipalities that pay the collection service per weight. As the type and costs of the service paid by the municipalities are very diverse, a specific quantification could not be performed. With the implementation of wine bottle reuse, municipalities would also save the costs of treating the bottles that currently end in the residual waste (550.000 euros/year).

In conclusion, the adoption of reusable wine bottles in the Catalan market would represent a decrease in public spending as Catalan municipalities would save managing around 21.000 tons of glass waste, with the following economic implications:

- Decrease of income due to not receiving the part of the green dot tax corresponding to the wine bottles that would stop being collected through the selective containers.
- Decrease of expenses due to the decrease of the collection of wine bottles in the glass selective containers and residual waste (direct savings for municipalities that pay the service by weight).
- Savings induced by the treatment of the wine bottles in the residual waste that would be avoided (estimated in 550.500 euros).

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

On the other hand, the pandemic situation in 2020 have modified the discussion group. At first, FPRC designed a World Café Method (small groups discussion to create an environment of comfort). At the end, the discussion groups were conducted through a zoom session.

DEVIATIONS

The action has been modified due to the pandemic situation of 2020. The discussion groups have been made through zoom meeting (initially planned as a workshop applying the World-Café method).

Action C3: Monitoring of the impact of the project actions			
Foreseen start date	May 2017	Actual start date	May 2017
Foreseen end date	December 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: PRUAB			
Other participants: INÈDIT			

ACTIVITIES AND OUTPUTS

The monitoring protocol during the action implementation has consisted in an update and assessment of the project specific indicators established in the LIFE Project Specific Indicators Call 2017 table. These project indicators were reviewed and completed during the project execution and at the end of the project. Some of these specific indicators were already included in the description of actions B5, C1 and C2, D1 and D2.

During the implementation phase a data set regarding the relevant indicators and related descriptors has been collected in the Updated table of Specific Indicators. It reflects the project real data at different stages of the project implementation, and the estimates at project level regarding the situation at the outset of the project, at the end of the project and 5 years beyond the project's end.

The data collected during the project was included in the Updated Table of Specific Indicator. For the first stages of the project until Month 26, the data collected was presented in deliverable D.C3.1 Monitoring report on water, waste and chemicals indicators (I), already submitted with the Midterm report.

For the second half of the project onwards, the data collected in the Updated Table of Specific Indicator is presented in deliverable D.C3.2 Monitoring report on water, waste and chemicals indicators (II). Please, find the deliverable attached to this report in Annex 2 - Deliverables.

The data collected about KPI's during the project execution was entered in the online KPIs web tool of the LIFE program: (<https://webgate.ec.europa.eu/eproposalWeb/kpi>).

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The activities were implemented according to the Work plan approved with the Amendment request.

DEVIATIONS

The washing process proposed by INFINITY in substitution of MNUTO has different characteristics as it avoids the use of most of the chemicals employed by MNUTO. This change has led to review the monitoring of the indicators that quantify certain chemicals such as NaOH or H2SO4 that are not employed at INFINITY washing process. So, this made necessary the review of indicators corresponding to "Chemical releases" (sulfuric acid and sodium hydroxide descriptors) from the original proposal.

Action D1: Dissemination planning and execution			
Foreseen start date	September 2016	Actual start date	September 2016
Foreseen end date	December 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: Fundació Privada Parc de Recerca UAB (PRUAB)			
Other participants: ALL			

ACTIVITIES AND OUTPUTS

The first month of the project, PRUAB defined the Communication Strategy of the project, which included the communication activities ensuring that all possible channels and opportunities will be used for the project's outcomes to reach as many beneficiaries, target groups and potential final users as possible. The Communication Plan included communication messages, target groups, tools, time plan, activities to implement at support of the project activities and the related budget.

D1.1. Website, Notice Boards and Layman's report

First of all, we developed the visual identity of the project: a clear, modern and attractive logo and a basic communication kit ([poster](#), [leaflet](#), banners and an [overview presentation](#)) with general information about project objectives, approach, partners, and impact.

After, we focused on the creation of the [website](#). The design of the website was recruited to a company of interactive design & online marketing ([Digital Bakers](#)). The website was launched on 21st of December 2016 and it has been regularly updated during the lifetime of the project. It contains, among others, information about the objectives and activity of reWINE, partners involved, the pilot test, news, related events and results.

The website was published in three languages: Catalan, Spanish and English. As one of the main aspects of this project was the involvement of wineries, consumers and civil society, the project website had a very modern, friendly, attractive and responsive design to have more impact and engagement. Until 31st of December 2020, the website receives 15.749 sessions and 11.189 users.

Moreover, we have produced a [notice board](#) of the project, which included a description of reWINE and the main figures of reuse system of pilot wine glass bottles. It was displayed at strategic places accessible to the public of the partners building.

The corresponding deliverables of this action, D.D1.1 Notice Boards and D.D1.2 Project website, were submitted with the Progress Report.

At the end of the project, the [Layman's report](#) was produced and published on the website of the project. It was the main material to disseminate the results of reWINE to the general public. It was produced in Catalan, Spanish and English and it was written with a clear and direct language. It had a modern, friendly and attractive design to have more impact and engagement. In addition, an email campaign with the Layman's Report was to send to all the contacts of the project.

Deliverable D.D1.3 Layman's report is also included in Annex 2.

All the project communication materials include the LIFE logo and the following text: "reWINE project has received funding from the LIFE Programme of the European Union".



Figure 9. The reWINE website

D1.2. Info Days

Two “Tastets reWINE” were programmed during the development of the pilot test in order to connect with public sensitive with the project aims and keen on the wine world (the word “tastet” means tasting, so a wine tasting journey).

The [first event](#) was programmed on 13th of March of 2019, within the responsible consumption week in Barcelona, where more than 48 entities participated and a total of 73 activities were developed. The event was in the restaurant La Rubia (the first restaurant in Barcelona that participated in the pilot test). The agenda included the presentation of the pilot test by three partners of the project (Rezero, INÈDIT and the ARC), a wine tasting with a known writer and TV journalist sharing the experience with the public altogether, and then an appetizer and closure with the video of the campaign.

On 12th of December of 2019 it was organized the [second Info Day](#) to promote the consumption of reWINE bottles so it was programmed in Caprabo, one supermarket participating in the pilot test. The event included a presentation of the pilot test: the welcome was conducted by the councilor of the town Caldes de Montbui where the shop is located, Marta Beltran (from Rezero) presented the advantages reusing bottles and the aim of the reWINE project and Cristina Madrilley (from Caprabo) talked about their collaboration in the project. During the event an influencer in the region, Núria Vila (@nu_vila), prepared a workshop painting to explain specific logistics of the Caprabo and the Municipality waste management.

Moreover, we take advantage of the organization of external events of the wine sector to organize two other “Info Days”. On the 11th May 2019, reWINE organize a tasting with Albet i Noya reused bottles in the arrival at Barcelona of the Ultra Clean Marathon. It was a sports challenge that will travel 700 km in 7 days by bicycle, running and kayaking for the collection of waste and the cleaning of the natural environment. reWINE was there to bring reused of bottles to all participants.

On the 5th of February 2020, reWINE could not miss the Barcelona Wine Week (BWW) and Gabriela Benveniste, senior eco-innovation strategist at Inèdit, participated in the round table “The wine’s future is decided by present strategies”, held within the first Edition of the conference. She presented the reWINE and the preliminary results on CO2 savings achieved during the pilot test of reusing wine bottles.

Detailed information about these events are included in D.D2.2 Final Dissemination report.

D1.3. Newsletter and other information material

Although in the reWINE proposal it was considered the generation of a digital newsletter after each Info Day, during the project implementation we decided that focusing the dissemination efforts before each event would achieve better results. Therefore, we created emailing campaigns with information of the evolution and results of the project to encourage citizens, wineries and institutions to join the events. At the same time, we launched campaign through social networks with a great impact among the public target of the project.

Moreover, other communication material was designed to encourage wineries, shops, restaurants and consumers to participate to reWINE’s pilot test. For example, we printed leaflets, door stickers, posters, and displays to disseminate the project in the participating wineries, shops and restaurants.

At the end of the project, it was planned to print leaflets with the main results of reWINE to share during the final event. However, given the COVID19 circumstances, the event was held online and it was considered unfitting to print material.

D1.4. Videos

We produced a [video](#) to promote the project worldwide. It was an easy-to-understand video to present the project, its objectives and approach. There was a version in Catalan, in Spanish and in English. These versions were published on [reWINE’s YouTube channel](#) on April 2017 and they were distributed online via the website and social media. These videos received 2.126 views, so far.

Furthermore, on May 2017 we published four interviews with participants of the reWINE project, who explained the advantages of reusing bottles from different perspectives. On YouTube channel of the project, there are available the interviews with [Josep Maria Tost](#), director of the Catalan Waste Agency; [Rosa García](#), director of FPRC (Rezero); [Ricard Rull](#), president of the Cooperativa Falset Marçà, and [Carles M. Gasol](#), director of consultancy and training of INÈDIT. These videos receive 525, so far.

On December 2018, we also launched the [video](#) #EveryBottleMatters to encourage consumers to reuse wine bottles.

All the videos included the LIFE logo and written mention “reWINE has received funding from the LIFE Programme of the European Union” in the description of the video on YouTube. However, the audible mention to the LIFE financial support was erroneously not included in the edition of the videos. This situation was detected later and, considering the economic cost of repeating the voice-over and the loss of the many views that the videos already had, it was reckoned not to replace them.

D1.5. Social Networking and Networking

Social networks have become an indispensable channel to communicating with society. In this sense and in an effort to encourage an open dialogue with stakeholders and a broader audience, we created a reWINE profile on [Instagram](#) and [LinkedIn](#). We have 438 followers on Instagram and 51 followers on LinkedIn.

In addition, all the partners were informing about the development of the project and the reuse through their twitter accounts, using the hashtag [#reWINE](#). We published about 420 tweets and reached 521.543 accounts.

D1.6. Publications and Conferences.

The project had been presented in 30 workshops, seminars and conferences around Catalonia and in 4 International conferences. They are detailed below, in the description of Action D2, and in the Final Dissemination Report annexed in Annex 2.

D1.7. Workshop for journalists from mass media

We did not organize a specific workshop for journalist, but we invited Catalan and Spanish media to assist to all the events organized by reWINE. Nowadays journalist does not have time to assist to press conferences and they preferred to receive a press release with all the information.

During the lifetime of the project, we sent 8 press releases to journalists about the development and results of the project. reWINE had a strong impact in the media with 135 appearances in newspapers, digital media, radio and tv (28 in newspapers, 88 in digital newspapers, 10 in the radio and 9 in the TV).

All of them are linked on the website: <http://www.reWINE.cat/en/newsroom>

D1.8. Demonstration of the bottle washing process

Unfortunately, given the withdrawal of the partner MNUTO on November 2017, the organization of a demonstration activity of the bottle washing process was cancelled. The substitute of MNUTO tasks was INFINITY, a washing plant located in Villena (Alicante). Since the washing plant was located far from the wineries involved in the project, we decided that this activity would have no impact.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

Some activities planned on the proposal, such as the newsletters and the demonstration of the bottle washing process, were adapted or cancelled for communication impact reasons or due the location issue.

PROGRESS INDICATORS

- 15.749 visits on the web page, 10.985 unique users and 38.857 page views.

- 438 followers on Instagram
- 2.399.634 impressions on Twitter.
- 135 articles in the media.
- 3.443 views of reWINE videos.

The follow-up of the indicators is showed in the Updated Table of Specific Indicators in the deliverable D.C3.2.

Action D2: Networking activities			
Foreseen start date	January 2017	Actual start date	October 2016
Foreseen end date	December 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: Agència de Residus de Catalunya (ARC)			
Other participants: INÈDIT, FPRC (REZERO)			

ACTIVITIES AND OUTPUTS

D2.1. Dissemination of the project to various entities within the Catalan territory

During the project, there have been a total of **30 dissemination events**, meetings, workshops and seminars around the Catalan territory where the reWINE project has been presented. In all these events, the participation of different agents from the wine sector, different Catalan clusters (Efficient Energy of Catalonia (CEEC), Foodservice, Catalan wine sector INNOVI and the Packaging Cluster), Municipalities, environmental organisations, etc.

All this information is gathered in the deliverable D.D2.2 Final Dissemination Report, in Annex 2.

Outside the LIFE and after the project, in the Catalan Waste Agency we always promote the change towards a more sustainable waste treatment, so in every opportunity we have we explain the main projects achieved and the reWINE is one of them. Although it finishes on December 2020, we will continue communicating the results and spreading the knowledge achieved in order to promote the reuse system.

D2.2. Public presentation session of the project

In the public presentation of the reWINE there was an assistance of 50 people from wineries, restoration, retail, public authorities and entities related to the beverage sector. The previous mailing was sent to 2.500 contacts and the press note was released in order to be published in media. Please, find more information in document D.D2.2 Final Dissemination report, in Annex 2.

D2.3. Organisation of workshops

First workshop:

On May 29 2017, the first reWINE workshop was organised together with the European Week of Waste Reduction (EWWR) awards ceremony. The EWWR is a European project which the Catalan Waste Agency hold every year. The first workshop aimed to identify barriers and consider opportunities in reusing wine bottles. There were presented the reWINE objectives and three experts from three European countries were invited to explain their feasible experiences: Austria (Regional Government of Styria), France (Ecoscience Provence) and Finland (PALPA). From the 259 attendants of the two events, 129 attend the reWINE workshop.

After the event, there was the press note release and a mail sent to all the attendees to gather their impressions and improvements.

Second workshop:

Although it was planned to be celebrated on 2019, the workshop was held on 2020 after the pilot test was finished as we planned. It was celebrated together with the results presentation of the project due to the Covid19 pandemic, as it was no possible to hold face-to-face events and the decision of join the two events with online format had very positive results as people from different parts of the country could assist.

This workshop wanted to demonstrate the feasible different possibilities of implementation of glass reuse and there were invited 4 reuse initiatives to show different glass reuse feasible implementations with different products: Basque Country (cider bottle reuse, Usurbil municipality), Styria, Austria (wine bottle reuse, Styria Government), Barcelona (kombucha bottle reuse, Teresa Carles Healthy Foods company) and Barcelona (water bottle reuse, Aigua de Sant Aniol).

There were 128 people registered at the event and finally the assistance reached nearly 200 participants online during the event and nowadays the visualizations of the event are 559 views. Please, find more information in document D.D2.2 Final Dissemination report, in Annex 2.

D2.4. Exchange of experiences

The experiences exchange during the project was with other public administrations as the governments of **Navarra** (Spain), **Valencia** (Spain), **Styria** (Austria), the **Balearic Islands** (Spain) and the **Basque Country** or with some institutions interested in **Uruguay** and **Chile**.

The Styria contact and their presence in the first reWINE workshop, permitted the visit of the Catalan Waste Agency (ARC) to Austria and, moreover, we keep in contact and they explained their new advances in the second reWINE workshop. The contact will keep alive at least until 2023 with the Subtract Interreg project (ARC) about reuse centres.

The contact with Navarra and Valencia was related with the drafting of their new waste laws and they were very interested on exchanging the continuous advances as the Balearic Islands do. It is expected to continue the exchange of information.

Please, find detailed information in deliverable D.D2.2 Final dissemination Report, in Annex 2.

D2.5. Networking with other LIFE projects

There ARC have had several meetings with **8** LIFE and other European financed projects. The **European Week for Waste Reduction** which whom the first reWINE workshop took place on 2017, there were three meetings (2017 and 2020) with the **CircE Interreg project** (European regions toward Circular Economy) and in the last there was presented the guide of guide “Circular economy strategies and prevention of waste and food waste in the beverage sector” in which the reWINE is exposed as an exemplary model.

On 2018 the **LIFE+ Cyclamen** and the **LIFE+ Greek Task Force** contacted us and they come from Greece for a meeting. On 2020 there were meetings with the **LIFE Sarmiento** because of the territory proximity (they were in Murcia, Spain) and the same, topic, the wine. It happened the same with the **LIFE Priorat+Montsant** on 2020. Moreover, we had two meetings with Interreg projects, with the **SUBTRACT** project also carried out by the ARC and with the **TRAILS Poctefa** because of their interest of disseminate their initiative of exporting wine to European countries by a railway sustainable service. Please, see deliverable D.D2.2 Final dissemination Report, in Annex 2.

D2.6. Dissemination of the project internationally

The mentioned **European Week for Waste Reduction** disseminated the reWINE and also did the **ACR+** (Association of Cities and Regions for Recycling and Sustainable Resource Management) by its platform and the newsletter announced the reWINE workshop. The **SCP/RAC** (Regional Activity Centre for Sustainable Consumption and Production). reWINE Layman’s report will be sent to ACR+ and SCP/RAC in order to be disseminated internationally (see D.D2.2 Final dissemination Report).

D2.7. Promotion of agreements in the wine industry

Apart from the agreements with the **7 wineries** for the pilot test, with the project progress we realised that before of stablishing more agreements after the project, it was necessary to create a feasible framework that promotes the reuse in the waste treatment system and without which the future agreements could not be possible. That is why the reWINE participated in the roundtable meeting in the “**Waste Management at Empordà’s wineries conference**” on 2017, the “**Barcelona wine week**” and the “**Circular Economy Opportunities in the Catalan wine sector**”, both in 2020 (all of the events belonging in the D2.1 section and detailed in the Final Dissemination Report).

In order to boost the transition to a reuse system in Catalonia, from the Catalan government it was created a **Packaging Working Group on February 2020** with the aim of improving the management material flow and waste and its financing, in the circular economy framework. 31 representatives of the government, Municipality’s associations, business world and trade unions, integrated waste management systems and the associative and environmental world. So the wine agreements have been transformed and expanded into a compromise of all these different agents so as to change the actual waste system.

Moreover, there has been the drafting of a **new Catalan waste law** and also a **new Spanish waste law**. The Catalan law will be publicly drafted on the next 2021 first semester and then will take place the public consultation to make agreements with different sectors. Both are ambitious with the reuse and preparation for reuse waste prevention and the reWINE has helped the Catalan law to focus on the reuse field. The Catalan law which will transpose the last European Directives on waste, has a radical orientation towards resources. It is expected to transform everything related to waste and resources in Catalonia, and to be recognised as a reference for other regions. In this context, reuse is expected to be one of the main pillars concerning the policy development related to waste prevention, not just concerning wine bottles, but also reusable containers in general, reuse centres, etc. The final version will be the result of the initial draft and the need of establishing agreements, and therefore it is not possible, for the moment, to concretise the final instruments that will be put in place to assure reuse at its most, which can include obligations, promotion measures, voluntary agreements, etc.

D2.8. Public sessions presenting the results

The foreseen date for the results presentation in Barcelona was on the second half of 2019 but it was held on December 2020 after the pilot test was finished, as we planned. It was organized together with the second workshop of the project (EASME approved) due to the COVID-19 pandemic, as it was no possible to hold face-to-face events and the decision of join the two events with online format had very positive results as people from different parts of the country could assist.

An email invitation was sent to 5616 contacts, there were 128 people registered at the event and finally the assistance reached nearly 200 participants online during the event and nowadays the visualizations of the uploaded event are 559.

A technical company made the event live, the event was conducted by a known wine journalist and it had the musical interventions of a pianist and composer from inside the AFALMA winery. After the institutional welcome and a musical piece, the three partners PRUAB, FPRC and Inèdit presented the results achieved. Then the workshop explained in the D2.3. section took place and it led to a debate among the different agents who participated in the pilot test: Infinity (external washing plant), a washing plant integrated in the winery, two wineries (Torres and AFALMA), two retailers (Ametller Origen and Caprabo), and the reWINE partners Rezero, Inèdit and ARC. The journey ended with a final toast with another piece of music.

The media were very interested in the final public presentation and some wineries and particulars called after seeing the news or assisting in the journey in order to ask how they could reuse their wine bottles. All the emails were answered.

Please, find detailed information in deliverable D.D2.2 Final dissemination Report.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The action D2 was scheduled to begin in January 2017, but we started the dissemination of the project just after the Kick-off meeting, in October 2016.

PROGRESS INDICATORS

Winery professionals reached through LIFE-reWINE workshops and Infodays: 37 wineries and 26 entities related to beverage sector.

Other professionals from HORECA sector, retailers and public authorities: 6 HORECA, 4 Retailers y 172 Public authorities.

The indicators so far are showed in the Table of Indicators in deliverable D.C3.2.

DEVIATIONS

As explained above, due to Covid19 pandemic it was not possible to hold face to face events and the action D2.3 (second workshop) and D2.8 (public session presenting the results) were joined in one online journey of reWINE results presentation and workshop. The online format permitted the assistance of people around the country that could not have assisted in person.

Action E1: Project management			
Foreseen start date	September 2016	Actual start date	September 2016
Foreseen end date	December 2019	Actual (or anticipated) end date	December 2020
Responsible beneficiary: PRUAB			

ACTIVITIES AND OUTPUTS

During the first months of the project, the coordinator and project manager from PRUAB defined and implemented the required structures, procedures and tools to monitor the progress of the project and ensure a good communication among partners.

Project Management structures

A project organizational structure was designed to offer maximum flexibility and operational capability towards objective achievement. The roles and responsibilities of each partner within these structures were determined during the Kick-off meeting (Project Management Handbook).

Project Management procedures

- Reporting: Specific procedures for the preparation and quality assurance of project reports were established. In addition to contractual reports (deliverables, periodic reports) internal reports were established in order to facilitate the project monitoring and risk analysis derived from the activities and the related use of resources.
- Meetings: Fixed project “presential” and “virtual” (teleconferences) meetings were organized to guarantee a constant control, monitoring and coordination among the partners and towards the project governance body. Ten plenary meetings were organized during the project period. 43 monthly teleconferences have also been organized to ensure an efficient coordination and management of the project.

Project Monitoring and communication tools

Several tools were set up at the beginning of the project in order to address different project needs such as document storage, progress monitoring, collaborative work, communication, etc.

- Mailing lists. A general mailing list for all LIFE-reWINE participants were created by PRUAB to facilitate the intra and inter-Action communication.
- Document repository. A repository including key reference documents and with specific folders for each Action was created within PRUAB’s platform NEBULA. This platform has a proper content management system and allows collaborative work among partners.
- Online discussion supporting documents. During the first year of the project the regularization of the use of the online application TitanPad allowed LIFE-reWINE partners to have open living documents supporting meetings and to generate complete and reliable minutes. In 2018 the app was no longer available; since then the minutes were generated in a Word document and sent to the partners.
- Teleconferences platform. A specific room for the LIFE-reWINE project in the Skype service was created by PRUAB. Lately, the platform Microsoft Teams was used to hold the virtual meetings.

Significant results:

- Organization of nine plenary meetings; 43 monthly teleconferences; Kick-off and five Project visits.
- Set up of tools for project monitoring, collaborative work and internal communications.
- Submission of all due deliverables for the project.
- Accomplishment of the 10 programmed milestones for the project period.

Quality and risk management

During the project the Project Coordinator and his management team defined and implemented a general project management plan that establishes the basis for the project supporting and control processes.

Another important activity during the project period was Risk Management. Risks compromising a timely implementation of the project was analysed since the kick-off meeting and during all the presential and virtual meetings occurred throughout the project. It is important to note that major common risks, such as the impact of the delay in the washing test, have been analysed since the beginning of the project and that solutions and alternatives for every Action have been proposed in a coordinated way.

An internal Management Handbook (MH) was prepared by PRUAB and its first version was released in Month 4 of the project. The MH received updates until the approval of the Amendment request in Month 32 (updated Work plan), then a new version has been elaborated. It contains:

- Specific templates and guidelines for the preparation of the different categories of reports (deliverables, periodic reports, IAR) and presentations (consortium meetings, reviews).
- Procedures for Quality assurance of reports, including peer review of documents.
- Risk management procedures.
- Roles and responsibilities of the consortium members in each procedure.
- Updated project schedule with intermediary checkpoints and deadlines.

The MH corresponds to the deliverable D.E1.1 Project Management Handbook (see updated version submitted with this report).

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The project management was implemented according to the schedule updated by the Amendment request after the withdrawal of MNUTO.

Progress indicators

Preparation and delivery of the Project Management Handbook. Organization and holding of the Review meetings on May 2017, June 2018, May 2019, May 2020 and December 2020. Preparation and delivery of the Progress report n1 & n^o2, the Midterm report and the Final report.

DEVIATIONS

The main deviation of the action corresponded to the withdrawal of the partner MNUTO in the second year of the project. Later, an Amendment request was submitted to include the partner INFINITY and to extend the project one year. According to the changes due to the incorporation of the new beneficiary and the extension of the project, the deliverable D.E1.1 "Project Management Handbook" and its three annexes (Excel Consortium bodies, Work plan, Meeting schedule) were updated. Please, find the updated version in Annex 2 Deliverables).

Minor deviations: The project visits and the plenary meeting organized during 2020 could not be held in the partners' locations due to the Covid19 crisis and virtual meetings were arranged instead.

Action E2: After-LIFE Communication			
Foreseen start date	June 2020	Actual start date	August 2020
Foreseen end date	December 2020	Actual (or anticipated) end date	December 2020
Responsible beneficiary: PRUAB			

ACTIVITIES AND OUTPUTS

The tasks concerning the elaboration of the After-LIFE Communication Plan were carried out during the last phase of the project.

The general objective of the document generated is to define effectively, efficiently and cheaply communication tools in order to increase public and stakeholders' awareness, to stimulate acceptance and to foster replication of the reuse system throughout the European Union. Specifically, the plan aims to disseminate the main results of the reWINE project; to raise awareness of the importance and benefits of reusing glass bottles to reduce environmental impact and cost savings for wine producers; and to promote the implementation of the reuse of bottles in the Catalan and Spanish wine industry. Please, find the deliverable D.E2.1 After-LIFE Communication Plan enclosed to this report in Annex 2.

During the preparation of the plan, different **target audience** has been identified to achieve highest impact of the project results.

- **Wineries:** Wineries can obtain environmental, social and economic benefits using reusable bottles. Refillable be a great opportunity to reduce their carbon footprint and reduce the consumption of natural resources and greenhouse gas emissions.
- **HoReCa sector (bars, restaurants & wholesaler distributors):** It is an important point of distribution, consumption and recovery of reusable wine bottles.
- **Retailers:** Shops and supermarket chains are a key stakeholder in contributing to the environmental education of the consumers about reuse and waste prevention.
- **Consumers:** Consumers and the whole society are key players in waste prevention and reuse. They shop decisions might contribute to increase the distribution and demand of wine refillable bottles.
- **Policy makers and local authorities:** Policy makers have a huge responsibility to define a framework to support bottles reuse. Local authorities have a vested interested in reWINE for the ecological effect and the direct impact about municipalities saving waste to be managed and reduced waste management costs.
- **Media:** The media play an important role to inform citizens about reWINE results and the objectives of EUs waste policy and resource efficiency objectives.

The **key messages** for the target groups are:

- The reWINE pilot test shown that the reuse of bottles in the wine sector is technically feasible and more respectful of the environment.
- Reusable bottles are more environmentally friendly than single-use bottles.
- The implementation of a reuse system for wine bottles will reduce the generation of waste and greenhouse gases and will save costs in wineries and shops.
- Deposit, return and collection system is the most effective instrument to guarantee the return of empty bottles to the establishments by consumers, far above other incentives.

The After-LIFE proposes several **activities to continue communicating the benefits of reusing wine bottles** using different channels:

Dissemination of Layman's Report: This document will be the main material to disseminate the results of reWINE to the general public. The report is produced in Catalan, Spanish and English and it is

written with a clear and direct language. An email campaign with the Layman's Report will be designed and sent to all the contacts of the project.

Creation of After-Life Communication kit: A project communication kit will be designed and created according to the results obtained during the transfer, continuation and replication of the reWINE project. It will include a leaflet, poster, banners and an overview presentation with general information about progresses and new achievements.

Maintenance of the website: The structure of the project website will be updated to meet the needs of the After-LIFE Communication plan. Some sections will be changed to make it easier for stakeholders to obtain all the information on how to implement the reuse of wine bottles.

Dissemination via Instagram: The project's Instagram profile will be maintained with monthly posts about the benefits that the reuse of wine bottles would bring to wineries, consumers and environment.

Organisation of wineries visits: The wineries that have participated in reWINE will disseminate the results of the project in the visits and experiences they organize with consumers.

Participation in events and workshops: The results of the project will be disseminated in different events with the aim of spreading know-how and the results of the project throughout EU countries and to foster replication in other countries apart from those the members of the consortium belong to.

Exchange of experiences: Experiences will be exchanged with other European countries that have experimented with reusing wine bottles, taking in advantage the activities done by the Catalan Waste Agency and Rezero (the Layman's report will be sent to the International organizations ACR+ and the SCP/RAC so as to be disseminated by their international network).

Regarding the **transfer activities**, they can be done firstly using public channels, such as administrations, that use their public administration contact points. In parallel, international wineries association can be contacted in order to facilitate the promotion of the returning schemes in their territory. Several geographic areas have been selected based on their interest shown in developing similar projects: La Rioja (Spain); Basque Country (Spain); Balearic Islands (Spain); Galicia (Spain); Chile; Argentina and Uruguay.

The experience of reWINE with wine bottle reuse can be **transferred to other beverages sectors or food sectors**, such as beer, soft drinks, juices, water, dairy products, and not only products packed in bottles, but also in glass jars and containers of different sizes and shapes.

It is also recommended to disclose the results of the reWINE to wineries that could not participate in the pilot test during the project. An approach to contact these wineries is to involve the Designation of Origin (D.O) of the territory, that includes more than one winery. It is suggested to prepare a workshop with these wineries where reWINE results of economic, environmental and technical feasibility can be presented and the comments from the wineries can be collected.

This will enable to create **working groups of interest** that would lead the implementation of the return system in the territory.

COMPARISON WITH PLANNED OUTPUT AND TIME SCHEDULE

The action E2 was implemented according to the work plan updated in the Amendment request.

All the milestones scheduled for the period were accomplished:

- M1 Feedback from stakeholders
- M2 Bottles with chosen hydrosoluble labels
- M3 Labelled wine bottles on the market
- M4 Washing procedure validated.
- M5 Agreements with participating grocery stores and restaurants
- M6 Campaign for consumers launched participating stores, restaurants, HWRC and wineries.
- M7 Pilot Operational Plan ready
- M8 Wholesaler distributor contract.
- M9 Selection of the members of the discussion group: Catalan economic stakeholders.
- M10 Selection of the members of the discussion group: consumers and civil society associations.

The **replication efforts** done during this period led to conversations and meetings with the Navarra Government, the Balearic Islands Government, local authorities from Balearic councils (Mallorca, Ibiza, Formentera...), and Basque country Government, all interested in adopting the system in their territory and reviewing their legislation accordingly. As a result of FPRC's meetings and work with public administrations, economic and social sectors in Balearic Islands, the Balearic Islands Government approved the Waste Law in January 2019 that, among other measures, promotes reuse practices and targets for bottle reuse to be reached in 2030 in HORECA channel and food retailers for several beverages. Also FPRC has promoted the creation of the network "Reuse Pact" (that involves social organizations and economic stakeholders from the beverage sector, like HORECA, retailers, wineries and other fillers, including producers that sell drinks in reusable bottles and own a washing plant) that will continue working to enhance an effective implementation of the law, like developing resource-efficient actions such as wine bottle reuse initiatives. For that, many meetings have been done to present the project, search for institutional support, identify the key stakeholders, build confidence and involvement from the public, social and economic sectors, identify washing facilities, analyse and promote the potential replication of reWINE in Balearic Islands.

Conversations were also held with non-UE territories, such as Chile and Argentina.

Also, some conversations have taken place with INNOVI. INNOVI represents the Catalan wine cluster and its mission is to promote the competitiveness of companies of the Catalan wine sector and auxiliary sector, in order to face globalization through innovation and collaboration.

INNOVI's vision is the consolidation of the wine region of Catalonia as a global reference in innovation and quality. During these conversations, INNOVI has shown high interest in analysing, together with some of its partners, some of the identified barriers, and has already shown interest in the homogenisation of the wine bottles, in order to facilitate the operations related to the post-consumption storage and reverse logistics, to ease the management of the return of the bottles to the washing facilities. A pilot project proposal on this issue is expected to be presented to the grants that the ARC gives every year for projects promoting Circular Economy.

Regarding the **dissemination activities**, the effectiveness was high, since the subject of "reuse" attracted a great deal of public attention and a lot of wineries, shops and consumers contacted us throughout the project. In fact, at the end of the project there were many expectations regarding the continuity of a reuse system for wine bottles in Catalonia

Project achievements which supported legislation:

The Waste Catalan Agency (ARC) published the waste management plan called PRECAT20 in which one of the highlighted actions to be implemented in the next years in order to invert the tendency in packaging waste is the reusing of glass wine packaging in Catalonia. The reWINE has

helped the new Catalan waste law (Law on the prevention and management of waste and the efficient use of resources in Catalonia) to focus on the reuse field, this law is being drafted focused on reuse and preparation for reuse waste prevention and in the first semester of January 2021 it will take place the public consultation to make agreements with different sectors.

Main barriers identified during project implementation:

One of the main barriers identified during the project implementation was the difficulty to incorporate supermarket chains in the pilot test. The marketing plan designed helped in having a better understanding and reception from supermarket chains and opened the opportunity to have more conversations. But the politic situation in Catalonia in 2017 was influencing the availability and decision making of many sectors (such as supermarkets, restaurants and wineries). Despite many of them were interested in the project, it was not being a good moment for some Directive Boards to start new projects, so their engagement took more time and that affected the B3 and B4 implementation. The actions B3 and B4 were extended due to these situation and others as the withdrawal of the partner that was meant to wash the bottles (MNUTO), as the logistic needed to be modified with the introduction of the new washing plant (INFINITY). Also, the logistic for the collection and storage of empty glass bottle were the main discussion for the participation of supermarket chains in the pilot test. The collection of empty glass bottles in their shops and warehouses were discussed during a long period.

As result of the meetings and conversation established with the different agents participating in the pilot test several strengths and barriers were identified. The main barriers were logistical and organizational type and are caused by the lack of resources for the participation of the entities contacted in the pilot. Some of them stated that they could not afford the costs of the personnel dedicated and the space of storing the bottles used, among others. In fact, some directive boards stated that could not participate in the pilot test because of these barriers despite being interested in the project. Therefore, the main barriers are the transport costs, the storage space and the distance between the washing plant and the winery.

The more repeated question in every event exposing the reWINE results is the concern about whether the reuse system would affect the current “green dot” model managed by Ecovidrio. For a future implementation in a better reuse scenario provided by the new Catalan waste law, an agreement with Ecovidrio will be necessary to organize and coordinate both models. Ecovidrio assisted in the presentation results journey so is aware of the technical, economic and environmental results obtained.

Main opportunities identified

Despite the barriers described in the section before, a list of opportunities has been identified and show how the benefits of the reuse system can be exploited in further projects.

Most of them apply to the logistics that has been employed during the pilot phase. Reverse logistics, that is currently used in other sectors and even by some wineries, seems to be the option that leads to significant benefits both from environmental and economic side. Other opportunities are based on the identification of the bottles that can be returned as a way of differentiating the product from the benchmark and provide final users loyalty.

An exhaustive **table of all barriers and opportunities** identified is presented in deliverable D.B5.2 Methodological guide to implement LIFE reWINE in other regions.

6.2. Analysis of benefits

1. Environmental benefits

The environmental benefits can be classified into quantitative and qualitative indicators.

a. Direct / quantitative environmental benefits:

Regarding the quantitative environmental benefits, the analysis has shown that the reusability system provides significant benefits in terms of water savings, waste savings and emissions of carbon dioxide equivalent savings, among other indicators. Specifically:

- The LCA carried out in actions B5 and C1 has evaluated different logistic and collection scenarios and all have shown that reusable bottles are more environmentally friendly than disposable bottles.
 - o Regarding the carbon footprint indicator as it has been demonstrated that reuse enables saving between 1.7 and 2.6 kg of CO₂ equivalent per bottle, accumulated after 8 cycles. The environmental benefits could be greater or lesser depending on the distance to the washing facility and the number of cleaning cycles. These environmental benefits could be increased even more by reducing the distance between wineries and washing facilities and simplifying logistics. 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. CO₂ Emissions avoided for wineries reusing bottles 8 times: 167,23 Tons of CO₂ eq /year.
 - o Regarding water savings indicator, the action of reusing has led to save 42,4 m³ of water, when comparing the amount of water that is used to produce new bottles and the water employed for washing, for the total amount of bottles recovered at the end of the project.
 - o Regarding the amount of waste prevented, the action of reusing has led to save approximately 33tons of waste considering the total amount of bottles reused at the end of the project (78884 and average weight of 0.421 kg/bottle).
- Additionally, to the results obtained in the environmental evaluation carried out in action B5 and C1, the following quantitative benefits can be reported:
 - o 13 companies (including wineries, retailers, logistic operator) have been involved in the project and have been subjected to apply circular economy action such as sustainable mobility and logistics, reusability, ...
 - o Specifically, 114 circular economy practices have been implemented that include all the agents involved in the project. For instance: reuse of wine bottles, logistics optimization, sustainable logistics means of transport, incentives for consumers at return points, etc.

b. Qualitative environmental benefits

Besides the quantitative environmental benefits, that project has led to achieve qualitative benefits as follows:

- reWINE dissemination campaigns addressed to final consumers has supported the awareness of this collective towards the environmental benefits of the reuse of wine bottles. In fact, this may lead to a major consciousness of the environmental impacts associated to food packaging (in this specific case, glass bottles) and support the idea that reuse is the path to increase the environmental sustainability in this sector.
- Wineries that have participated to both the project as partners and to the pilot have obtained their specific results of the environmental analysis that has been performed. This information can be used to position the winery as an active actor to promote an environmentally sustainable consumption of wine and its packaging and demonstrate its commitment to the principles of the circular economy.

2. Economic benefits

The economic feasibility study has been developed using unitary cost per reuse bottle to compare to the cost of the acquisition of a new bottle. The most economical option to transport the bottles back and forth was the pallet (around 720 bottles/pallet) and the inverse logistics was the option with the lowest cost associated. At this stage, reWINE project has demonstrated the cost of reusing wine bottles is higher than the use of new bottles (12-18 cents per bottle higher). This is mainly due to the

cost of transport of the empty bottles back and forth and the distance between the washing plant and the winery.

The distance is therefore an aspect to be considered carefully when designing a wine bottle return system, as the benefits could be significantly larger.

For the Catalunya specific case, the distance of 60 km has revealed to be sufficient to cover the zones for each Certification of Origin (D.O) present in the territory. In Catalunya, nowadays there are 11 D.O. spread on all the territory. The area covered by each D.O is variable, but distances are lower than 60-100 km between extreme points in each D.O. For this reason, building a washing facility at each D.O will enable that distances to be covered during the bottles transport is around 60 km, maximizing the environmental benefits of the return system. Furthermore, this choice will provide very significant benefits from an economic perspective.

The evaluation of the socioeconomic impacts (action C2) also have demonstrated the economic benefits for different sectors as Catalan wineries (decrease in costs of new bottles and green dot tax), municipalities (decrease in the collection and treatment of glass bottle) and grocery store (increase of sales due to the loyalty of the consumer and new clients).

3. Social benefits

The implementation of wine bottle reuse can have a positive impact in job creation. This impact has the added value of green jobs (since bottle reuse economic activities protect and promote the environment) and social reintegration (because they can employ people at risk of social exclusion). So, wine bottle reuse offers opportunities of creating jobs that promote green, circular, local and with capacity to promote social reintegration (specially linked to logistics and washing). Jobs could be created in several sectors, such as industry of washing plants, logistics (collection, transport and storing of empty wine bottles collected from channels like restaurants and grocery stores), retailer sector (handling of bottles returned to point of sale, storing in warehouse), municipal waste collection centers (handling of bottles returned).

Regarding the potential of job creation of wine bottle reuse, considering the market of bottles produced and consumed in Catalonia (more than 48 million of wine bottles), the recycling system in the wine sector creates an estimation of 37 jobs, whereas the reuse system could create a total of 330 (9 times more jobs than the one-way bottle).

reWINE also has social benefits as it helps to raise awareness among different sectors (industry, distribution, consumers, municipalities), and at the same time offers the opportunity to consume responsibly without generating waste. Reuse is an increasing trend of consumption and in the next years is expected to grow also steering the production sector. This context can open opportunities for extending the reWINE experience in the following years.

4. Replicability, transferability, cooperation potential

The project has a huge potential of replication in the wine producing regions (in Spain and other European regions), especially in the territories that are legislating to promote or reinforce reuse as a priority in their waste policy.

Contacts are ongoing for its replication, such as Federación Española del Vino (TORRES would be part of the stakeholders), Balearic Islands government and economic and social stakeholders. As well as contacts with organizations from the Basque Country (like Ekologistas Martxan) that have interest in replicating reWINE for *txacolí* (a type of white wine produced in the north of Spain) and also transfer to cider, and contacts with a cooperative of cider producers in Navarra.

It has also potential for washing plants looking for develop their business.

The experience of reWINE with wine bottle reuse can be transferred to other beverages sectors, such as beer, soft drinks, juices, water and milk, which already exist under reusable schemes in HORECA channel in Catalonia and in all Spain, but do not run in grocery stores. Beer could probably be one of the sectors with more potential, as there is a high standardization of bottles, is the drink with highest reuse market share in HORECA channel and it is an important industry in Catalonia, Spain and other

countries, with many companies focused in local and regional markets and lots of them implement sustainable practices. Cider is also a sector with some small experiences in reusing bottles and standard bottles, and with local and regional distribution. In addition, bottles of cava were traditionally recovered and reused in Catalonia, but currently not working for post consumption bottles, and could benefit from reWINE results.

Moreover, the success of reWINE is already been taken as an example for other products, beyond wine bottles. For example, some contacts have been already done with the POTS initiative consisting in the reuse of glass packaging from other food products, which is expected to give additional value to the possibility of establishing washing facilities in Catalonia, not just for wine bottles but also for other glass containers. ARC will be watching on all these initiatives to assure their feasibility.

The contact with wineries of other regions has been explored, and still some cellars are asking for adhesion to the continuity of REWINE, what demonstrates the huge potential concerning cellars.

5. Best Practice lessons

During the evolution of the reWINE project, and especially during the development of the pilot phase, several issues have been met and that have been overcome. Therefore, a list of the main outputs (as lessons learnt) collected from the project activity is here provided:

- Lessons learned from the collection logistics:
 - It is preferable to simplify the collection logistics. For instance, it is recommended to use inverse logistics and to involve the minimum number of agents as possible in order to avoid unnecessary bottles trips that will affect the cost of the reused bottles
 - Concentrate efforts on the HORECA channel as the return ratio is higher and both consumers and restaurants managers feel comfortable to deal with reused bottles.
 - Refunding schemes on returned bottles are the preferred ones by the consumers.
 - Any logistics adaptation requires time, then more time is needed for the different stakeholders to fully adapt to bottle reuse (specially for big retail sector).
- Lessons learned from the washing procedure:
 - Reduce the storage time for the empty bottles as it may imply the necessity of washing more than 1 time the bottles and thus reduce the number of reuses. The more washing cycles a bottle requires, the shorter lifespan of the bottle and the economic and environmental feasibility of the reuse declines. Therefore, the environmental benefits comparing reused and new bottle would be less significant.
 - Though bottles can be reused more than 10 times, it is suggested to verify with the wine maker the maximum number of reuses of the bottles in order to maintain the optimal appearance of the bottle. In the reWINE project, reused has been limited up to 7 washes to avoid scratches in the glass to be visible.
 - The bottles washing is technically and economically feasible with different types of labels (both water-soluble and not), except PVC and vinyl labels, that are not washed well or in some cases the washing is only possible if they are withdrawn manually (economically unviable). However, for environmentally and economically optimized washing (less consumption of cleaning products, supplies - water and electricity - and associated environmental impacts), water-soluble glue paper labels are the most suitable.
- Lessons learned from the washing facility location:
 - In the reWINE pilot phase, environmental benefits are always found for the reused bottles if the distance between the wineries and the washing facility is below 1100 km. However, for economic reasons, it is preferable to place the washing plants in radius between 30-60 km from the winery to decrease the cost of the shipment of the bottles and thus, provide economic feasibility to the reusability.
- Lessons learned from the bottle:

- The diversity of models of wine bottles limits their reuse, focused in closed loops (mainly from winery and its distribution channels, washing and return to the same winery), for the difficulty to collect dirty bottles, classify and wash them, and return to the corresponding winery.

In the pilot test through each winery and its distribution channels its bottles were collected, classified, sent to the washing plant and returned to the same winery. In a normalized implementation this circuit is very feasible but would be convenient to complement it with open loops where pools of standardized bottles could be shared, which would favour reuse as logistics and costs could be optimized. Sharing a pool of bottles would enhance extending reuse to a bigger market and create scale economics. Then, although bottle diversity was not a barrier for the pilot test, using standardized model/s of wine bottle/s would facilitate logistics and competitiveness, and would be easier for consumers.

6. Demonstration value

The project has showed the reuse system and bottle collection from different sources (restaurants, food stores, wineries, municipal household waste collection centers), with the innovation of testing these different channels at the same time.

Also, it has studied different washing systems, demonstrating that some have the technical capacity of removing different types of labels, and demonstrating that bottle washing can be performed with simple technology.

On the other hand, the pilot project has developed many aspects that have demonstration value added. Like methods and protocols for stakeholder involvement and organization of their participation such as agreements with different stakeholders and handbooks adapted to each one, as well as several incentives for consumers that have been implemented and compared their performance. Also the different logistics designed and tested in the pilot project (direct, indirect, reverse...), and in particular the ones tested with wineries, supermarket chains, a wine wholesaler (Vicalis) and a logistic operator with the added value of social reinsertion (Alencop). All that experiences provide useful practical information for bottle reuse implementation in other territories.

7. Policy implications

At the beginning of the project, it was expected that the reuse of wine glass bottles will impact on:

- Directive 2008/98/CE and its transposed Spanish Law 22/2011 of waste and polluted soils through the proper management and the prevention of damage to the environment by promoting the change of the extend current practice (material recycling) to reuse.
- Directive 94/62/EC on Packaging and Packaging Waste
- EC commitments on Waste Prevention
- Decision No 1386/2013/EU on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet'
- Roadmap to a resource efficient Europe
- Catalonia's Waste Management Plan (PreCat 20)
- The implementation of waste legislation priorities of the LIFE Work Programme (Annex III, section A points (b)(i)-(ii)): actions primarily at the waste source for waste prevention, reuse, and separate collection of municipal waste.

And because of the potential barriers to the implementation due to regional/national legislation, it was foreseen that the reWINE could have a direct impact on the regulations applied by the recycling system entities (e.g. Ecovidrio) currently operating in the territory.

Moreover, apart from the policy implications expectations the **new Catalan waste law** is being drafted (law on prevention, waste management and efficient use of resources). It will substitute the Legislative Decree 1/2009 currently in force, but it is a restated text of the 15th July 6/1993 Law that regulate waste (more than 25 years ago) and a **new Spanish law** on waste and polluted soils is being drafted too. Therefore, the reWINE is expected to impact on the regional and country legislation on reuse. In

particular, in the Catalan case the ARC is already introducing some provisions in the first draft of the new Waste and Resources Law in order to ease the way to a new reuse scheme in Catalonia, either by introducing new obligations addressed to the main actors of the wine ecosystem (taking into consideration the limitations due to the Spanish legal framework), or by promoting the reuse of glass containers within the Catalan market in a voluntary basis, which could include a public based coordination.

7. Key Project-level Indicators

The comparison of targets that were set at the beginning of the process shows some deviations. It is important to mention that the new washing process proposed by INFINITY in substitution of MNUTO has different characteristics as it avoids the use of most of the chemicals employed by MNUTO. This change has led to review the monitoring of the indicators that quantify certain chemicals (such as NaOH or H₂SO₄, that are not employed at INFINITY washing plant, so this made it necessary to review a few indicators from the original proposal (i.e. the indicators corresponding to “Chemical releases”, the sulfuric acid and sodium hydroxide descriptors).

Another set of indicators show variations compared to the forecasted data:

- Bottles collection: the forecasted quantity at the beginning of the project was 100.000 bottles. At the end of the project, the number of collected bottles has been 82.239. This reduction has led to a proportional reduction in other indicators. As a consequence, the remaining indicators show reductions with respect to the forecasted values.
 - o Water savings: the water savings (42,4 m³/year instead of 53) is due to the proportional reduction of bottles collected.
 - o Amount of waste packaging prevented: this waste saving reduction (33,2 instead of 45 mT/years) is due to the proportional reduction of bottles collected.
 - o Tons of CO₂eq avoided for reusing wineries bottles 8 times: (167,23 instead of 212 mTons/year).

- Information and awareness:

- o The results obtained in the indicator “*Other tools for reaching/raising awareness of the general public*” (Twitter, Instagram, Brochures distributed, Articles, press releases, Videos, Consumers reached by sensitization campaign and press releases) have performed beyond the partners expectations.

In the case of “*Website visits*” indicator, the results have also been satisfactory (15.749 website visits), although maybe it was initially too ambitious considering 30.000 website visits at the State-of-play at the end of the project period at project level.

- o *Surveys carried out regarding awareness of the environmental/climate problem addressed*. During the action A2, FPRC worked in order to reach the number of key stakeholders expected. Finally, almost the 90% of key stakeholders estimated were reached (324 from 375). The large number of key stakeholders reached provided enough information to develop the action.

- Compliance/Enforcement:

- o *Involvement of industry associations, wineries, HORECA, HWRC, etc.*: 98 duty holders or “significant” involved instead of 20. The number of participants has increased due to the introduction of many participants in the pilot test, from different sectors: wineries, wholesalers or logistics operator (Vicalis, Alencop), municipal waste collection points (from Vallès Oriental), restaurants, shops and supermarket chains.
- o *Involvement of agencies from national/regional/departamental/municipal governments*: The target of 20 has been met. Different agencies have been involved in different phases of the project Rewine. Consorci per a la Gestió dels Residus del Vallès Oriental has participated in the pilot test, and other agencies as Metropolitan Area of Barcelona, INCAVI, Councils of Alella, Barcelona, Vilafranca, Caldes de Montbui, DO Penedes, Agència Catalana de Consum, Agència Catalana de Seguretat Alimentària and Departament d'Empreses i Coneixement de la Generalitat de Catalunya have participated in diferentes phases (as C2, D2 or B4). Governments of Navarra, Basque country, Valencia and Balearic Islands (Ministry of Enviroment, Agriculture and Fishing of, Island Council of Formentera, Island Council of Ibiza, Island Council of Mallorca), Federation of municipalities of the Balearic Islands-Sa Felib),

DARP (Department of Agriculture and Food of Catalonia) have been also interested in the project reWINE.

- Implication of NGO including interventions supporting EU environmental and/or climate change policies and of other stakeholders: 10 NGO instead of 8. Finally, more stakeholders were involved: working group for development of waste law in Balearic Islands, ARC and FPRC participating in the working group for the draft law. FPRC and other NGO (Fundació Deixalles, GOB, Amics de la Terra, Greenpeace, Retorna, Fundació Marilles, Cleanwave.org., among others) participated in the waste law in Balearic Islands. At Catalan level, participation of the entity Opcions.

- Jobs (full-time equivalents):

- *Direct and indirect jobs created by collection, washing and reuse of wine bottles:* 1,18 full-time equivalents (instead of 30), according to data available, which is a conservative approach and does not reflect all job created. Also, as Maria Nutó left the project reWine, all logistic were adapted with the new washing plant, and the number of jobs created varied:
 - Washing process = 1,09 FTE equivalent from the washing process of the pilot test with Infinity.
 - Vicalis (Wholesaler from AFALMA) = 0,0345 FTE equivalent 1 day work for 1 pallet recovered.
 - Alencop (Bottles recovered from Veritas) = 0,013 FTE equivalent for a total of 6 pickups and 4h each pickup.
 - Laboratory analysis = 0,009 FTE equivalent from bottle analysed during the pilot test.
 - Transport of empty bottles = 0,005 FTE equivalent for the transport from warehouse to Infinity and Infinity to warehouses from wineries during all the pilot test.

Other job created during the pilot test could not be quantified for a lack of data provided from several stakeholders (supermarket chains, small retail, wineries, restaurants, etc).

- Continuation/replication/transfer scope:

- *Entry into new entities/projects:* 1 instead of 10. In Balearic Island FPRC is working on the replicability of the project. Even the project has generated great interest among the sector in several territories, it is needed more time in order to entry into new entities and projects.
- *Entry into new sectors:* While in the beginning of the project there was not estimated value for this indicator. Then, the sector of cider manufacturing was identified as having interest in the reuse. This is the case of the Usurbil municipality from Basque Country (Spain) that created a public company promoting the social integration of disadvantaged groups, for the collection of abandoned cider bottles and they signed agreements with the cider house association and with the HWRC to collect and bring them to big shared washing plant among cider producers (Sagaberritu project).

All the data collected during the project is included in the Updated Table of Specific Indicators in deliverable D.C3.2 Monitoring report on water, waste and chemicals indicators (II) and in the EASME's online KPIs data base.

8. Summary of costs incurred

Cost category	Budgeted according to the grant agreement (in €)	Costs incurred from 01/09/16 to 31/12/20 (in €)	%
1. Personnel	689.164	876.662,13	127 %
2. Travel and subsistence	32.654	17.401,34	53 %
3. External assistance	117.060	43.475,56	37 %
4. Durable goods: total <u>non-depreciated</u> cost	0	0	0 %
<i>Infrastructure</i>	-	-	-
<i>Equipment</i>	6.000	0	0 %
<i>Prototype</i>	-	-	-
5. Consumables	40.509	36.982,77	91 %
6. Other Costs	45.076	37.141,41	82 %
7. Overheads	64.846	64.221	99 %
TOTAL	995.309	1.075.883,21	108 %

9. List of Annexes

Nº	Name	Description
D.A2.1	Consumer Insights Report	Results of the conducted interviews to associations of consumers. Identification of the barriers at the consumer level, desirability as well as potential solutions for wine bottle reuse in order to assess their implementation in actions B3 & B4.
D.A3.1	Database of wineries using standard bottles and bottles put on the market annually	Identification of other wineries that use Bordeaux and burgundy bottles and those that use hydrosoluble tags, for the estimation of the potential market share of wine bottle reuse in this first stage.
D.B1.1	Register of the use of chemicals during action B1	Record of all agents involved in each step of the washing process.
D.B1.2	Technical design of the process line	The process line report consisted on conducting a series of pre-tests (B.1.1) to locate in the market a suitable label while also testing out the whole system, including the transportation, storage, distribution and final consumption of the bottle of wine.
D.B1.3	Washing Procedures Report	It presents a description of the washing procedures employed in the reWINE project.
D.B2.1	Report on bottle reuse perception from wineries, consumers and sommeliers	Identification of the barriers and opportunities for reusing wine bottles carrying out an industrial test with bottles reused in the bottling lines of AFALMA and TORRES. Evaluation of results of

Nº	Name	Description
		the common quality, microbiological, and manufacturing controls in both wineries. Assessment of the end consumers' and sommeliers' perceptions of these bottles.
D.B3.1	Handbook for Pilot Participants	The Handbooks were designed to guarantee the understanding of the B4 Pilot project for each party involved and to ensure a better functioning on the implementation of the action B4 of the project.
D.B3.2	Design of the campaign for consumers	#Rewine contributed with a daily and specific experience through the reuse of wine bottles.
D.B3.3	List of other wineries included	Contact with strategic sectors as chain of commerce or green points to evaluate different logistics and to study the implementation of the pilot test.
D.B3.4	Methodology design for pilot monitoring	Presentation of the diversity of logistics practices in the pilot test reWINE and data collection.
D.B3.5	Report on the grocery stores and restaurants visited	Information about the logistic of the pilot test and the incorporation of new stakeholders required by the project.
D.B3.6	Report on the incentives to promote return of pilot wine bottles	The document shows all promotion proposed for different channels of the pilot test and all agreements reached.
D.B4.1	Pilot Report	Description of all steps involved in the execution of the pilot, organized into 3 different actions: Pilot test monitoring; Campaign for consumers; and Incentives for the return of pilot test bottles.
D.B4.2	Quantified record presenting the outcomes of the washed reused glass bottles after cleaning	Evaluation of the quality results of microbiological analysis, controls of manufacture and perception carried out by the sommeliers to the bottles reused. The advantages and disadvantages of reincorporating washed wine bottles in an industrial process.
D.B4.3	Record of input and output material during the bottle washing process	Presentation of the data collected after the washing tests of the bottles recovered during the pilot test (INFINITY and Vins Pravi's washing facilities).
D.B5.1	Project Feasibility Report	Evaluation of the feasibility of wine glass packaging reuse in the region of Catalonia considering technical, environmental and economic assessments. Results presented for all the cases studies included in the pilot test, aggregated into 5 scenarios considering the logistics options.
D.B5.2	Methodological guide to implement LIFE-reWINE in other regions	The results and the lessons learnt from reWINE were collected and used to create a methodological guide to be used by other regions beyond Catalunya, as it aims at developing a wine bottle return system.
D.C1.1	Conclusions from Environmental Impact Monitoring	Summary of the environmental analysis performed during the project.
D.C2.1	Case study report to assess the economic impacts of reuse in Catalan grocery	Conclusions on the economic impact of reuse in Catalan grocery thanks to the participation of different supermarket and shops in the pilot test.
D.C2.2	Case study report to assess the economic impacts of reuse in Catalan wineries	Conclusions on the economic impact of reuse in Catalan wineries.

Nº	Name	Description
D.C2.3	Conclusions of the discussion group with Catalan economic stakeholders	Evaluation of the economic opportunities of reuse wine glass for the different economic agents involved.
D.C2.4	Conclusions of the discussion group with consumers and civil society associations	Evaluation of the consumers environmental awareness about packaging reuse and acceptance of wine bottles reused; results of the discussion group of consumers and consumer associations.
D.C2.5	Impact analysis of wine bottle reuse in the municipality's waste management	Identification of the economic opportunities of wine bottle reuse for Catalan municipalities; study of the economic impact of wine bottle reuse in municipal household waste recycling centers and in the glass waste flow that municipalities collects from street containers.
D.C2.6	Report on job creation projections	Report on green job creation based on the results of the pilot project and the analysis of bibliography associated with the reuse systems.
D.C3.2	Monitoring Report on Water, Waste and Chemicals indicators (II)	Report of the outputs and impact of the project taking into account the LIFE project performance indicators. Updated table with the indicator values corresponding to the end of the project and the estimations beyond 5 years.
D.D1.3	Layman's report reWINE	Layman's report of reWINE project (English version).
D.D2.2	Final Dissemination Report	Description of dissemination and networking activities developed during the project implementation that aimed to present the project among the different target stakeholders, citizens and all type of agents related to the wine glass bottle reuse.
D.E1.1	Management Handbook	Description of the general project management plan, establishment of the basis for the project supporting and control processes, methodology to be followed and definition of roles and responsibilities of the beneficiaries involved in the deliverable production.
D.E2.1	After-LIFE Communication Plan reWINE	Description of how reWINE partners will communicate and transfer the knowledge and experience gained during the lifetime of the project.