



LIFE CIRC-ELV

LIFE17 ENV/ES/000438



## LIFE CIRC-ELV

BOOSTING CIRCULAR ECONOMY OF PLASTICS FROM END-OF-LIFE VEHICLES THROUGH RECYCLING INTO HIGH ADDED-VALUE APPLICATIONS

## Deliverable D\_E2.1.

**Deliverable Name:** After LIFE-Plan

Version Number: 1

Lead Beneficiary: AIMPLAS

Grant Agreement n°: **LIFE17 ENV/ES/000438**

Start Date/Duration: September 2018 / 44 Months

Due date: April 2022

Dissemination level		
PU	Public	✓
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



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## 1. Summary and Objectives

This deliverable establishes the basis for the afterlife project strategy. This activity objective is to ensure the project awareness after the end of the project. It will not allow to claim any costs as result of the project and will allow the proper dissemination and communication of the project results. All partners are involved.

## 2. Introduction

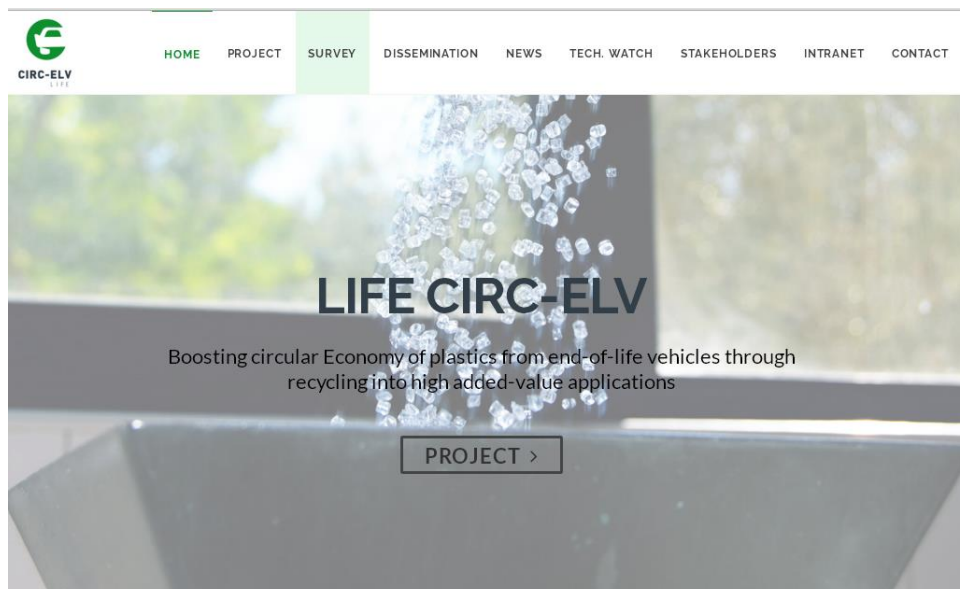
The commitment on the dissemination and communication of the project results as well as the public awareness and the end-of-life vehicles treatment sector has been implemented and has been carried out along the project duration. It is foreseen that INDRA y SIGRAUTO involve at 2 ATFs each year from the 3<sup>rd</sup> year up to the 5<sup>th</sup>. These ATFs will adopt the CIRC-ELV technology.

The afterlife plan will settle down the project activities planned already to continue with this activity mainly focus on using the promotion of the project solution.

The involvement of the industrial sector, regional governments, policy makers, regulatory bodies, plastic recycling sector and the society as a whole, will ensure the success of the afterlife plan.

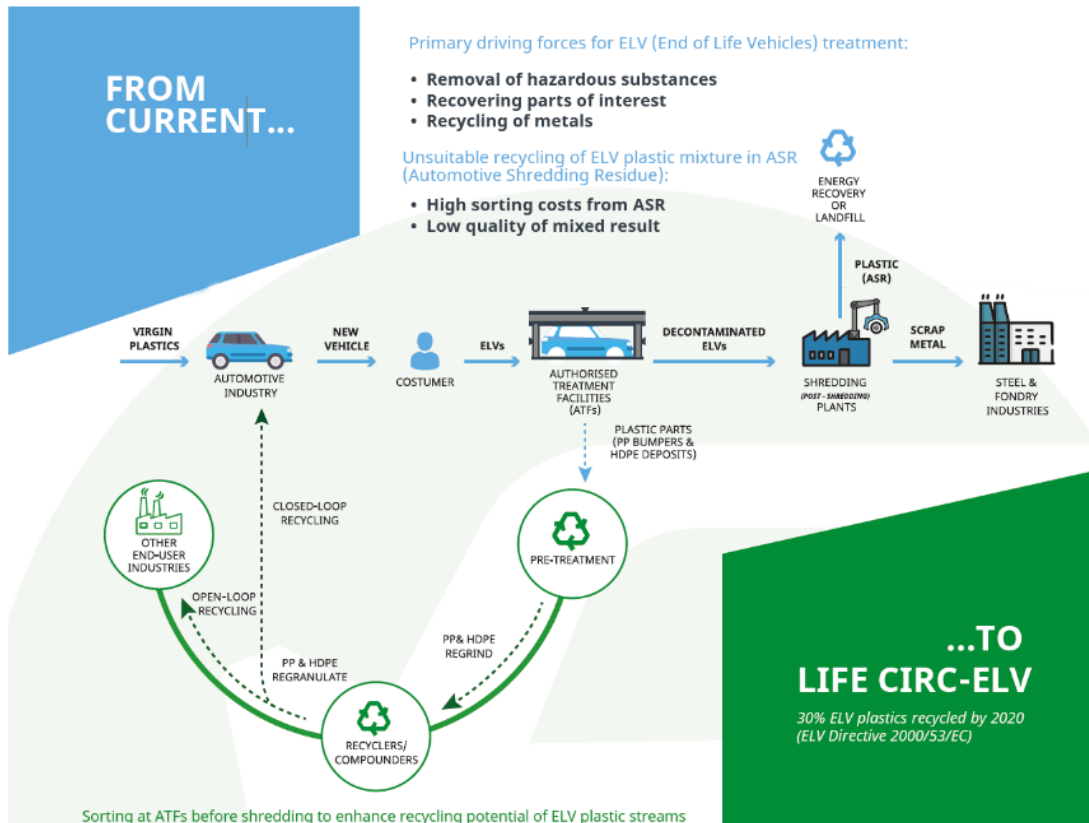
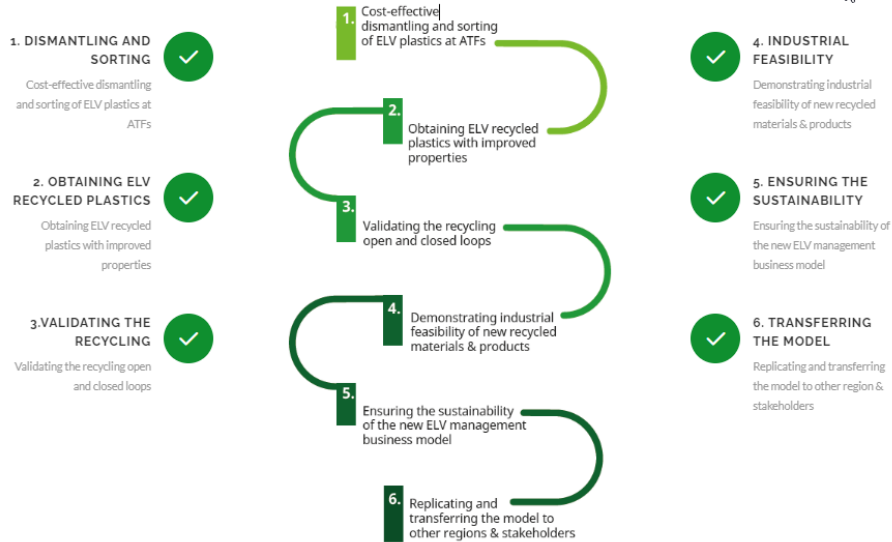
## 3. Foreseen activities

The project dissemination material available in the project website (<https://lifecircelv.eu>), leaflets, roll-up, notice boards, posters, layman and videos, which will be available to keep using it for any activity in different languages (Spanish, French, English and Portuguese) .





### OBJECTIVES





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Consortium












 <b>AIMPLAS</b> INSTITUTO TECNOLÓGICO DEL PLÁSTICO	<b>AIMPLAS</b> <i>Coordinating beneficiary</i> Paterna (Valencia), Spain <a href="https://www.aimplas.es">https://www.aimplas.es</a>	 <b>DESGUACE CORTES</b>	<b>DESGUACE CORTÉS</b> <i>Associated beneficiary</i> Benaguasil (Valencia), Spain <a href="https://www.desguacecortes.es">https://www.desguacecortes.es</a>
			
 <b>indra</b> AUTOMOBILE RECYCLING	<b>INDRA</b> <i>Associated beneficiary</i> Pruniers-en-Sologne, France <a href="https://www.indra.fr">https://www.indra.fr</a>	 <b>ISOLAGO</b>	<b>ISOLAGO</b> <i>Associated beneficiary</i> Aveiras de Baixo, Portugal <a href="http://www.isolago.com">http://www.isolago.com</a>
			
 <b>SIGIT</b>	<b>SIGIT</b> <i>Associated beneficiary</i> Calatayud (Zaragoza), Spain <a href="http://www.indeplas.es/">http://www.indeplas.es/</a>	 <b>SIGRAUTO</b>	<b>SIGRAUTO</b> <i>Associated beneficiary</i> Madrid, Spain <a href="http://www.sigrauto.com/">http://www.sigrauto.com/</a>
			

Figure 1: LIFE CIRC ELV website

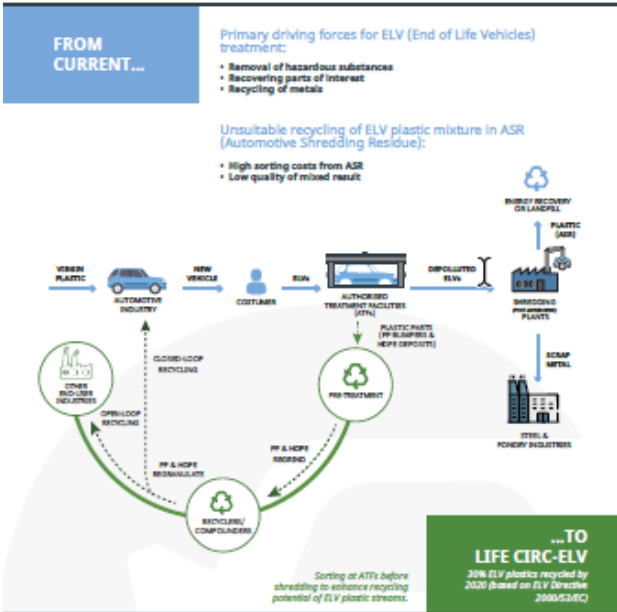


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### BOOSTING CIRCULAR ECONOMY OF PLASTICS FROM END-OF-LIFE VEHICLES THROUGH RECYCLING INTO HIGH ADDED-VALUE APPLICATIONS



### OBJECTIVES

1. Cost-effective dismantling and sorting of ELV plastics at ATFs
2. Obtaining ELV recycled plastics with improved properties
3. Validating the recycling open and closed loops
4. Demonstrating industrial feasibility of new recycled materials & products
5. Demonstrating industrial feasibility of new recycled materials & products
6. Replicating and transferring the model to other regions & stakeholders

### EXPECTED RESULTS

- New sustainable business value chain in the EU for ELV plastics recycling
- Tonnes of recycled plastics produced
- 1000 ELVs treated
- Carbon footprint reduction
- Non-renewable energy demand reduction
- New products made of recycled ELV plastics
- Cost reduction for new products
- 5 EU regions, 3 sectors and 12 customers
- Socio-economic benefits

**FUNDING**

This project has been co-financed by the European Union under the Horizon Europe programme of the European Union (H2020) (101015033)

**COORDINATING BENEFICIARY**

**ASSOCIATED BENEFICIARIES**

[www.lifecircelv.eu](http://www.lifecircelv.eu)

Figure 2. LIFE CIRC-ELV Poster



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CIRC-ELV LIFE

**FUNDING**

This project has been co-funded with the support of the LIFE financial instrument of the European Union [LIFE17 ENV/ES/000438]

**EXPECTED RESULTS**

- New sustainable business value chain in the EU for ELV plastics recycling
- 12 Tonnes of recycled plastics produced
- 1000 ELVs treated
- 75% Carbon footprint reduction
- 90% Non-renewable energy demand reduction
- New products made of recycled ELV plastics
- 15% Cost reduction for new products
- 5 EU regions, 3 sectors and 12 customers
- Socio-economic benefits

**COORDINATING BENEFICIARY**

**AIMPLAS**  
INSTITUTO TECNOLÓGICO DEL PLÁSTICO

**ASSOCIATED BENEFICIARIES**

- DESQUACE CORTES
- indra  
AUTOMOBILE RECYCLING
- ISOLAGO
- SIGIT  
INDUSTRIAL SYSTEMS SL
- SIGRAUTO

**CIRC-ELV LIFE**

**BOOSTING CIRCULAR ECONOMY OF PLASTICS FROM END-OF-LIFE VEHICLES THROUGH RECYCLING INTO HIGH ADDED-VALUE APPLICATIONS**

[www.lifecircelv.eu](http://www.lifecircelv.eu)

Figure 3. LIFE CIRC-ELV Leaflet Front page

**FROM CURRENT...**

Primary driving forces for ELV (End of Life Vehicles) treatment:

- Removal of hazardous substances
- Recovering parts of interest
- Recycling of metals

Unsuitable recycling of ELV plastic mixture in ASR (Automotive Shredding Residue):

- High sorting costs from ASR
- Low quality of mixed result

**...TO LIFE CIRC-ELV**  
30% ELV plastics recycled by 2020 (based on ELV Directive 2000/53/EC)

**OBJECTIVES**

1. Cost-effective dismantling and sorting of ELV plastics at ATFs
2. Obtaining ELV recycled plastics with improved properties
3. Validating the recycling open and closed loops
4. Demonstrating industrial feasibility of new recycled materials & products
5. Ensuring the sustainability of the new ELV management business model
6. Replicating and transferring the model to other regions & stakeholders

Sorting at ATFs before shredding to enhance recycling potential of ELV plastic streams

Figure 4. LIFE CIRC-ELV Leaflet back page



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CIRC-ELV  
LIFE

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Sorting at ATFs before shredding to enhance recycling potential of ELV plastic streams

OBJECTIVES	EXPECTED RESULTS
1. Cost-effective generating and sorting of ELV plastics at ATFs	New sustainable business value chain in the EU for ELV plastics recycling
2. Obtaining ELV recycled plastics with improved properties	12 Tonnes of recycled plastics produced
3. Validating the recycling open and closed loops	1000 ELVs treated
4. Demonstrating industrial feasibility of new recycled materials & products	75% Carbon footprint reduction
5. Ensuring the sustainability of the new ELV management business model	90% Non-renewable energy demand reduction
6. Replicating and transferring the model to other regions & stakeholders	New products made of recycled ELV plastics
	15% Cost reduction for new products
	5 EU regions, 3 sectors and 12 customers
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FUNDERS:

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www.life-circ-elv.eu

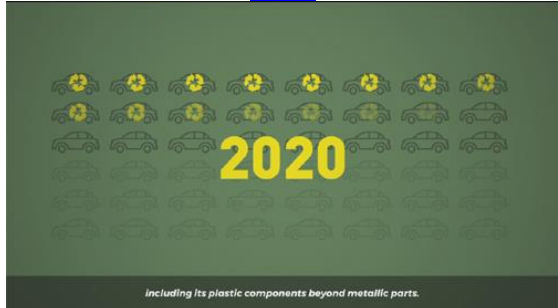




Figure 5. LIFE CIRC-ELV notice board





Videos

	Target audience	Duration	Content	Link
<b>Video 1</b>	Anyone	5 minutes	Explain the project to make people aware of the main objectives.	<a href="https://www.youtube.com/watch?v=MxtlAVVyk0Y">https://www.youtube.com/watch?v=MxtlAVVyk0Y</a> 
<b>Video 2</b>	Industry (affected sectors), authorities, scientific.	3 minutes	Show the development of the project, the technical issues, the processes followed, etc.	<a href="https://www.youtube.com/watch?v=OAsaWmpUCCI">https://www.youtube.com/watch?v=OAsaWmpUCCI</a> 
<b>Video 3</b>	Anyone but specially industry (affected sectors), authorities, scientific.	10 minutes	Show the results of the project to invite others to replicate.	<a href="https://youtu.be/luLjXOFIqUs">https://youtu.be/luLjXOFIqUs</a> 

The number of video visits have been increased since their publications and will continue increasing as the dissemination activities are increased.



# LIFE CIRC-ELV

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**BOOSTING CIRCULAR ECONOMY OF PLASTICS FROM END-OF-LIFE VEHICLES THROUGH RECYCLING INTO HIGH ADDED-VALUE APPLICATIONS**

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- 1 Description of the ELV treatment process and their plastics
- 2 The LIFE CIRC-ELV model
- 3 Partners and methodology followed
- 4 Results
- 5 Transferring and replicating the LIFE CIRC-ELV model
- 6 Conclusions

### 1 Description of the ELV treatment process and their plastics

Each year 10 million vehicles become end of life vehicles (ELVs) and are delivered to Authorized Treatment Facilities (ATFs) where they will be first dismantled, then some of their parts will be dismantled in order to prepare them for their reuse, and afterwards some other parts will be extracted from the ELVs in order to be sent to recycling processes. When the ATF has finished with its work, usually they will print the labels to improve the transport efficiency and deliver them to a shredding facility. At the shredder the ELVs are shredded into pieces of around 10 cm of maximum length and then a separation process starts producing at least three fractions:

- Metallic scrap (both ferrous and non-ferrous)
- Shoulder Light Fraction (SLF or A/F)
- Shoulder Heavy Fraction (SHF)

Shoulder plastics directly send the waste fraction to constructional molding industries and the remaining Automotive Shoulder Residue (ASR) is processed at post-shredding facilities. Post shredding facilities use all kind of separation and sorting techniques in order to obtain different materials that can either be recycled or energy recovered.

The 16 million ELVs contain around 1.5 million tons of plastics and as shown in the graph, around 50% are polyolefins (PE and PP).

### 2 The LIFE CIRC-ELV model

The LIFE CIRC-ELV model consists in dismantling and sorting plastics, bumpers and fuel tanks at the ATF, before delivering the ELVs to shredding plants. Pre-sorted plastics are then processed to obtain recycled plastics with suitable quality for their use in some market applications, either in automotive or other sectors (construction, electrical and electronic equipment, etc.).

### 3 Partners and methodology followed

Every partner of the consortium had a very specific role and a great coordination work was needed in order to be able to fulfil with all the objectives and expected results.

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### 3 Partners and methodology followed

Every partner of the consortium had a very specific role and a great coordination work was needed in order to be able to fulfil with all the objectives and expected results.

- AIMPLAS as one of the most advanced Plastics Technological Centers in Europe has had the project coordinating all activities but also has been involved in all the processes needed for preparing the plastics materials with their equipments and analyzing their properties with its laboratory capacities.
- Degraage Cortés as one of the most advanced ATFs in Spain and has been involved in all the actions aiming to find the best process for extracting and preparing the bumpers and fuel tanks from the ELVs.
- INDRA as one of the major players in the ELV recycling sector in France was crucial in providing and sharing all their expertise in order to find the best procedures to be applied for the extraction and preparation of the materials with Degraage Cortés.
- ISOLAGO is one of the most advanced plastic compounders in Portugal and their role in the project was mainly to find the best compounding solution for the materials coming from ATFs in order to obtain a plastic compound that would comply with the technical and quality requirements that the automotive sector of the piping sector need.
- SIGIT as an automotive plastic part manufacturer based in Spain but that is part of an international group with an Italian core and their role was to demonstrate the feasibility of using recycled plastics coming from ELVs at competitive level in the automotive sector.
- SIGARATO as an automotive screw manufacturers, ATF and shredding and postshredding facilities are together in order to coordinate their activities in the implementation of the ELV regulations in Spain and has a close relationship with other similar centres all around Europe and its role in the project has been mainly in the dissemination and the external relationship in the replicability and transferability of the project.

### 4 Results

More than 11 tons of recycled plastics were produced coming from 1,000 ELVs dismantled according to the new model. Degraage Cortés implemented the LIFE CIRC-ELV model in their process and will recover around 20,000 bumpers per year.

These recovered plastics were successfully recycled and used in fabricating new products. The properties of the recovered plastics were comparable as recycled, after they were sorted, shredded, cleaned and washed. However, to fulfil technical demand, of automotive and construction plastic products, virgin plastics should be used in the compounding step to have the final properties required by end users. The recycled plastics were used in the production of automotive parts and for pipes and fittings for the construction sector.

The automotive parts were validated by SIGIT and although the stability of the process has been demonstrated and 90% of the tests carried out comply with the requirements, material tests were found in the finished part that did not comply, as the next step would be to review these tests with the OEM to achieve a derogation. If possible, repeat these tests that do not comply, or substitute the material to change certain characteristics. More than 5,000 parts were produced with a 30% recycled plastic content.

### 4 Results

By implementing the new LIFE CIRC-ELV model at Degraage CORTELS, the carbon footprint for the new model is reduced by 60%.

The plastic recyclates obtained from this process, once they are pre-treated to be recycled, accounted for just 0.1 kg CO2/kg of plastic, compared to the value around 2 kg CO2/kg per kilogram of virgin plastics. However, since the new materials need to be fabricated with a mixture of recyclate and virgin plastic, the overall emissions for the new product made of recycled plastic is not as high (just 10%).

Nevertheless, increasing the rate of recycled in the final products, could lead to a reduction in both CO2 emissions and energy consumption higher than 90%.

### 3 Partners and methodology followed

The following scheme shows the methodology followed which was in most of the activities and iterative process where after finding a problem or some point, the information is provided in the previous processes in order to find a solution until the problem is solved.

### 4 Results

Regarding Pipes and fittings, there were many trials carried out and finally after validating that the best way to use 25% of recycled plastic, 200 kg pipes and 2072 kg fittings that met the same requirements than the ones produced only with virgin materials.

### 5 Transferring and replicating the LIFE CIRC-ELV model

One of the aims of the LIFE CIRC-ELV project is to be able to transfer the knowledge obtained during the project to other areas around Europe and also look for the possibilities to replicate the model to other sectors. During the project several ATFs from different European countries and also different organizations dealing with ELV management and recycling have shown their interest in the project with the aim to implement the model at their facilities/countries.

The consortium has also looked for other sectors that could be interested in using similar recycled plastics in their production processes and have already found that there are some other sectors that have produced using very similar plastics and they have even done some trials finding the recycled plastics very promising.

The LIFE CIRC-ELV partners at the different stages are in the disposition of offering consulting services to any ATF, compounder or part manufacturer in order to analyze which is the best way to implement the process at their facilities by looking at all the steps needed and providing not only technical guidelines for their process but also helping in finding the partners and providing them also with technical guidelines in order to fulfil all the process covered.

### 6 Conclusions

The LIFE CIRC-ELV consortium believes that all the objectives and the expected results when starting the project have been achieved. Recycled plastics coming from ELVs by extracting them before the ELVs are sent to the shredding and post-shredding processes is viable from a technical, economic and specially environmental point of view. The model is affected by many different parameters being probably the most relevant the specifications and requirements of the final application but there are many other like the volume needed, the plastic recycling and compensating infrastructure of the area, the labour and other related costs, the price of the recycled materials which is very much related to the virgin ones, etc.

During the project many lessons were learned that will help to boost circular economy of plastics from ELVs through recycling into high added-value applications.

If interested in knowing more about the project, we invite you to visit the project website and to see the videos that were produced during the project development: <https://www.lifecirc-elv.es>

Figure 8. LIFE CIRC ELV Layman's report in English



Social Networks from the different partners will continue to be used as done during the project implementation.

These activities will be performed in a framework time of minimum 2 years after the completion of the project (from September 2022 to August 2024).

All the evidence will be registered as done during the project duration and updated in the project website.

#### 4. Seminars, workshops, trade fairs and congresses

The details on the list of the potential future dissemination activities (both at national and international level), altogether the planned deadlines, resources to be involved and supporting documents to be prepared/showed is given below.

Event	Location	Expected dates
K-Plastics & Rubber Exhibition	Dusseldorf, Germany	October 2022
Plastics Recycling Show	Amsterdam, Netherland	November 2022
Circular economy & plastic forum	Valencia, Spain	November 2022
Compounding world conference	Messe Essen, Germany	June 2023
CONAMA congress	Madrid, Spain	June 2023
International Seminar on Plastics Recycling	Amsterdam, Netherland	August 2023
International automobile recycling congress	TBD	TBD
Equiplast fair	Barcelona, Spain	September 2023
Ecofira (fair)	Valencia, Spain	October 2023
Recuwaste		TBD
Barcelona international Motor show Automobile 2022	Barcelona, Spain	TBD

The consortium partners are committed with the afterlife project dissemination activities. Different dissemination material above mentioned will be used in the events collected in the table.



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## 5. Maintenance of the project website

The Project website <https://lifecircelv.eu/> will be kept by AIMPLAS during 5 years after the end of the project, this means 2022-2027, the dissemination material will be made available for downloading in the open area.

The project website will be also used to report the after-life plan activities.

## 6. Commercial visits

The Commercialization plan of the project in practice is based on the bumpers sales from CORTES partner, using the dismantling procedure and sorting validated in the project.