The **General Directorate of Roads of the Comunidad de Madrid Community**, is the regional public body dedicated to promote the development of road infrastructure in the region; we are committed to Research & Development by searching new ecological solutions for construction methods and cutting-edge materials in order to move towards a more sustainable roads in our region. This goal is performed through the participation in European projects aimed to reduce environmental impact.
We believe in innovation .......

Infravation
An Infrastructure Innovation Programme

Seventh Framework Programme

Life
As part of our commit with environmental new solutions to old problems, just now Comunidad de Madrid is arising a new Estrategy in our region, promoting the “Circular Economy”. This means we shall have no waste in the future in our region (that’s the goal, at least).
As you know, the circular economy defends that resources such as consumer products, materials, water and energy are kept on the market as long as possible, thus minimizing the generation of waste. It is circular because with it, the "cycle of life" is closed, thus eliminating the traditional forms of linear economy:
We call this strategy “The 7 - R strategy”, because it's based on:

1. Redesign objects to improve their lifespan
2. Reduce direct consumption
3. Reuse things to use them as long as possible
4. Renew the use of old objects so they can be used again
5. Repair objects instead of discarding them directly when they stop working
6. Recycle properly and
7. Recover, that is, collect used materials to be used again in the production of new products, and introduce them back into the consumption chain.

And of course, roads are an important piece in this strategy. Even more, we are called to be one of the leaders of this change.
The actions of 7-R strategy in this sense are framed in the Waste Strategy 2017-2024, which works on the recovery of materials once used to give them a second life, reintroducing them as new productive resources, minimizing dumping and, therefore, its impact on the environment.
In this way of thinking, we shall try to reach another goal:

In the future:

“The road should be (must be) the quarry of the road”: recycling, renewing…and so on.

That’s why we are participating in in the last 10 years in EU projects aiming to this goal.

No waste, even in the construction of the new infrastructures or the demolition of the old ones.

Today, we can proudly show you some of the projects we have taken part:

![Diagram of road layers with recycling and waste management](image)
NEW JERSEY  
(Via-M P.Coordinator)

New generation of New Jersey safety barriers using recycled materials and rubber from end-of-life tyres

Total Budget: 1,901 M€

POLYMIX

Demonstration of new environmental friendly asphalt mixes, using polymer waste to modify mixes.

Total Budget: 1,535 M€
Use of eco-friendly materials for a new concept of asphalt pavements for a sustainable environment.

Total Budget: 3,865 M€

Total Budget: 1,709 M€
Goal of the project

New concept of asphalt pavement structures with ecologically oriented attributes, reducing the asphalt pavement carbon footprint while achieving a level of long term performance comparable to that of conventional pavement structures.

...... Moving towards a circular economy model in roads
11 Partners
5 EU Countries
4 SMEs
4 Large Companies
2 RTD Performers
1 Public Body
Project Approach

Applied research

Analysis and selection of the green solutions
Integrated “eco-construction” design of asphalt pavements

Up-scaleing of the green asphalt pavements production
Accelerated testing of the APSE concept pavement
Implementation of the technology in full-scale trial roads

LCA/LCC
Training, dissemination and exploitation

Upscale, demo & validation

Future market uptake
Main achievements

1. **Use of recycled aggregates from C&DW into pavements**

   Construction and demolition waste is used in the sub base, utilising the residual pozzolanic properties to reduce overall resource use.

   A maximum of 15% C&D recycled aggregate can be added for asphalt mixtures applications; higher percentages of substitution may lead to pavement failures due to cohesion between binder and aggregates problem.

2. **Application of bio-fluxes to increase RAP content**

   To avoid the “super-heating” of the virgin aggregates when high rates of RAP are incorporated for the preparation of new asphalt mixtures, the addition of a plant-based bio-fluxing agent has been studied.

   The bio-fluxing agents partially behave as an asphalt rejuvenator, fluidizing the bitumen and recovering its original consistency.
3. Development of a green modified bitumen

Crude derived bitumen and polymers are partially replaced in the surface course with lignin, a by-product of the second generation ethanol production.

The main goal is to achieve a modified bitumen which fulfills the properties required by standards in EN14023:2010.

4. Up-scaling of the innovative for the components
Main achievements

5. Accelerated testing of the APSE concept pavement
   Summer 2016 in TRL’s pavement test facility (UK)

6. Validation of the technology in two test sections
   Summer 2017
Main achievements

7. Environmental and Economic benefits of the solution proposed.

LCA results:

APSE pavement concept is environmentally advantageous across all mid-point impact categories.

Economic performance:

The APSE pavement concept offers a substantial improvement compared to conventional pavement, mainly due to savings in bitumen and aggregates.
Our experiences: Main lessons to learn

To do.

Public bodies guarantees the strict adherence to laws

We have full access to our infrastructures

We have the force of an Administration, even to expropriate lands if necessary

We don´t have the encouragement of profit, only aimed to improve new techs

To learn.

Difficult to act as main partner: long and cumbersome procedures to dispose the money

Better to use an infrastructure under construction to test the investigated material than to introduce the European project into a government project.

Long procedures needs long term planification: we need to be realistic and take this fact into account to face it, specially not to exceed deadlines.
Thank you for your attention

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www.apseproject.eu