

Rationale

The SustainEuroRoad project aims to promote the construction and rehabilitation of more sustainable and environmentally friendly roads as part of the sector's commitment to achieving the climate change objectives set out in the Paris Agreement for COP21.

The new software will help European and national authorities to implement the future policy vision of the road infrastructure sector, by facilitating the reduction of CO2 emissions, energy consumption and the use of raw materials while improving the quality of the road network and optimising costs.

Background

One of the European Union's main objectives is to promote a more sustainable economy while fostering innovation. This includes the modernisation and adaptation of the sector to current challenges and thus the achievement of specific environmental objectives:

- 20% reduction in greenhouse gas emissions compared to 1990 levels
- 20% increase in energy efficiency
- 20% of energy from renewable energies.

Current figures need to be improved, particularly in the road sector, which alone is responsible for more than 5% of GHG emissions generated in Europe. In addition, reducing the consumption of energy and natural resources used for construction and maintenance has always been a major challenge for the sector, which has focused more on improving technical performance than on its impact on the environment.

At the same time, an important step to reverse this trend is the modernisation of public procurement processes for road goods and services. New European public procurement rules promote new technologies and greener solutions for public authorities, which are by far the main customer of road infrastructure companies.

The effective deployment of the new legal framework for public procurement supports the vision of the road construction sector. This sector is transforming itself by developing new technologies, products and processes capable of optimizing the technical and sustainable performance of its road projects.

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Partners



Duration: 2014-2017 - Budget: 1,311,980 Euro—Project website: <http://www.sustainableroads.eu>

Implementation in the following member states: France, Spain, Hungary, Germany, Belgium

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The problem

About 90% of road construction works are maintenance and network reconstruction works, while only 10% are new infrastructure construction works. Road operations currently take into account technical conditions and not environmental impact.

Limiting energy and natural resource consumption and greenhouse gas emissions has always been a challenge for the industry. SustainEuroRoad has developed innovative software to assess the environmental impact of road opera-

Objectives

The LIFE SustainEuroRoad project limits the impact of industrial activities on climate change by achieving 3 main objectives:

- Reduction of energy consumption, including fossil fuels and natural resources
- Reduction of GHG emissions from road construction and maintenance
- Preservation of natural resources used for road construction

The process

1 Data collection

First action was to create a list of parameters and then build the database of the software (characteristics of material sources and resources, characteristics of energy production, etc). Cooperation of technical associations and public bodies was requested to provide the necessary data. Contributions were included to cover all EU Member States. All the info was centralised to be used

2 Software implementation

SustainEuroRoad has been developed from a successful version zero called **SEVE**. This calculator broadly used by the road industry in France. The software has as main lack the no possibility to be extrapolated into another European country. SEVE allows the user to enter different parameters of each solution: nature of the layers, components, manufacturing condition of the pavement, composition of application groups, distances and transport.



LIFE SustainEuroRoad has taken a major step forward by adapting the software to the parameters of other countries. The data received from the first step have been included in the database, allowing for different countries and elements to be taken into account. Corrections and modifications have been made on the basis of the results of the tests carried out, on a series of theoretical cases for all countries.

3 Selection of demonstrators and Calculations for demonstrators

The selection of the 4 demonstrators was done through the possibilities linked to construction or maintaining of roads in specific regions or countries :

France: maintenance in urban area

Spain: road maintenance in non-urban area

Hungary: and **German** road construction

For each demonstrator per country, a list containing all the parameters needed for having the largest vision of the performances of the software was prepared. The selection was realised considering :

Complementary and exemplarity of the different demonstrators.



The final selection was made after an analysis of the calculations made for each demonstrator and its respective theoretical environmental impact.

Following the research activities that validated the proposed methodology for energy-efficient and environmentally friendly road works in France, the project partners validated the software with 3 full-scale demonstrators (road sections) in 3 EU Member States.

Based on the initial tests carried out in France, the project partners were able to better understand the software performance of all types of roads and road works. We also deepened our knowledge of different software possibilities: construction or maintenance, Western, Eastern and Southern European countries. The selection for validation also included a mountain route and a near-sea route to obtain data from different climatic zones.

4 Demonstrator on road maintenance in urban area

The department of Gironde (France) was the first where a specific road technique adapted to climate change was deployed within the SustainEuroRoad project.

The work site was concretely located in the departmental road 1089. Operations were completed by using cold in-place recycling with bitumen emulsion which means :

- Plane 8 to 10 cms of the road (bituminous materials)
- Mix the aggregates with some emulsion of asphalt, some water and a little cement
- Put back in place the new bituminous mix and roll it

Experts from SustainEuroRoad monitored materials, machine and asphalt plant consumptions during the works. The consortium also worked on an environmental comparison with the software French SEVE -TP between :

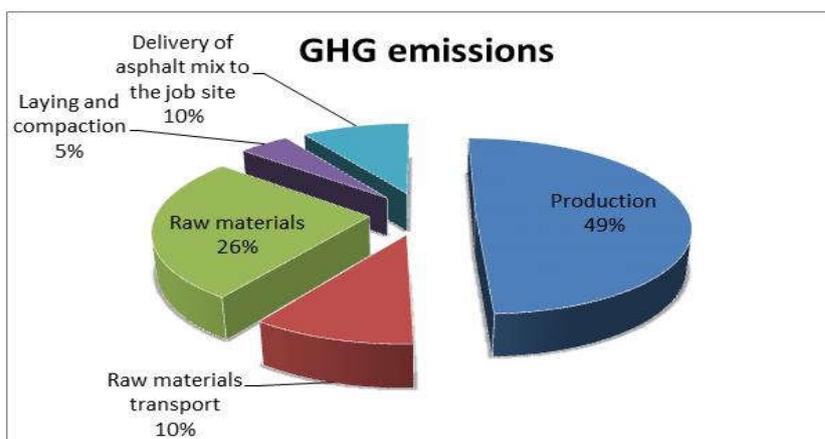
- The alternative technique (cold in-place recycling with bitumen emulsion), and,
- The basic technique: planning the road and applying a new hot mix asphalt (gravel bitumen)

While both techniques had the same technical performance, the comparison revealed a strong environmental gain in favor of the cold in-place recycling with bitumen emulsion reducing :

- 75 % of GHG emissions
- 73 % of energy consumption
- 90 % of natural aggregates

5 Demonstrator on road maintenance in non-urban area

The Life Cycle Analysis methodology lasts years. In this sense, the demonstration in Spain is still ongoing in an initial phase that verifies the real impacts of paving activities. Most of the data collection was focused on asphalt plants, since almost 90% of total emissions during construction the asphalt production and deployment are produced in these facilities. A very comprehensive set of plants was included in the study providing data that were compared to those coming from France. A typical set of data is shown in the beside figure.





Achievements

SustainEuroRoad has developed a comprehensive decision software package harmonised at European level, capable of calculating and then reducing the environmental impact of road infrastructure construction and maintenance.

The software has been validated for different types of road works and environments in France, Spain, Germany and Hungary. The experts have compiled all the technical specifications of each road site capable of reducing the impact on the environment, for different scenarios validating its good performance. The measurements also made it possible to document 75 health and safety projects and to validate the protocol of the global index with the health authorities.

The resulting software allows the user to calculate CO₂ emissions, energy consumption and the consumption of natural resources such as aggregates, from the design, construction and maintenance phase of road projects and their life cycle.

Compared to the current situation, SustainEuroRoad increases performance by reducing energy consumption by 37%, CO₂ emissions by 31% and natural resources by 70%. The software can be a unique tool for assessing environmental performance in future road public procurement.



GHG



Energy



Water



Aggregates



Transportation



Biodiversity

SustainEuroRoad software has specifically proved to achieve promising results during its demonstrations:

- Decrease in energy expenditure by **37%**
- Reduction in CO₂ emissions by **31%**
- Decrease in the consumption of natural resources (natural aggregates) of **70%**.

Outcomes

SustainEuroRoad main input will be to limit the impact of industrial activities from the road infrastructure sector on climate change.

The expansion and deployment of software throughout Europe will promote sustainable development and industry leadership by stimulating economic growth and the creation of skilled jobs. Future engineering work will include more environmentally friendly techniques and materials.

The new SustainEuroRoad software is a unique tool that allows stakeholders to carry out a real environmental assessment of road activities by optimising public funding. In particular in public procurement processes, the new tool will allow public authorities to move away from the "lowest price" model and choose economic solutions based not only on price, but also on the environmental performance of the tender.

In addition, it will encourage the road infrastructure sector to deploy new innovations in the market to make the construction and maintenance of road infrastructure more environmentally friendly.

Many benefits are also expected, such as the promotion of rehabilitation processes that will replace hot-mix asphalt with hot-mix asphalt, a true Made in Europe creation. In addition, road workers will benefit from positive and comfortable effects, as new tech-

