ORRAP

Optimal recycling of reclaimed asphalt pavement

2016-2019

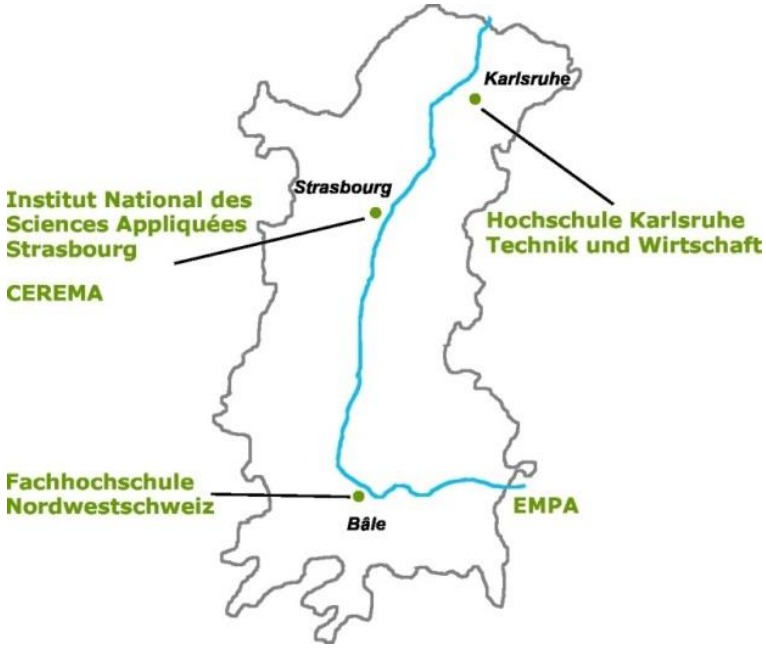
Executive Summary

Project outlines – reminder

The ORRAP Interreg project aims to develop a new strategy for asphalt recycling at ambient temperature without the addition of new bituminous binders or rejuvenators for low traffic pavements in the Upper Rhine region.

The project gathers several co-financing partners: INSA Strasbourg (leading partner), CEREMA, Hochschule Karlsruhe (HsKA), University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Swiss Federal Laboratories for Materials Science and Technology (EMPA) and Tiefbauamt – Canton Basel- Land. Twelve associate partners are also part of the consortium: Bundesanstalt für Straßenwesen (BASt), Deutsches Asphaltinstitut (DAI), Colas Est, LABINFRA (Groupe Hydro-géotechnique), Société Alsacienne de Recyclage des Matériaux, Südwest Asphalt GmbH & Co, Ziegler AG - Bauunternehmung, the Département du Haut-Rhin, Département du Bas-Rhin, Regionalverband Mittlerer Oberrhein, Stadt Karlsruhe and Landkreis Karlsruhe. The ORRAP project is supported by the Swiss Confederation, Canton Basel-Landschaft Canton Aargau and by the INTERREG Upper Rhine program from the ERDF (European Regional Development Fund) to the tune of 622 553€.

ORRAP started in November 2016 with a total budget of 1.48 M€. Due to ongoing experimental requirements, its duration has been extended until June 2020.



Project Progress

So far partners have conducted intensive investigations on practical, technological, environmental and economic aspects of the proposed recycling method. Firstly, the analysis of practices and techniques for the recycling of AA in the Upper Rhine region has allowed the identification of the current legal framework and optimization options for the recycling of AA. Secondly, the study of AA's self-binding properties has made it possible to characterize the mechanical performance of the material in order to optimize its design. Two test sections were built in France and Switzerland using the AA material. Finally, the preparation of a technical guide dedicated to road owners for the use of this recycled material started.

Construction of two test sections

Two test sections were built in Sermersheim (F) and in Wahlen (CH) of 200 m and 380 m respectively, using the AA material as base course material. The performance of the test sections will be monitored at least for one more year. The technical aspects of the construction and evaluation will be described and commented in the technical guide.

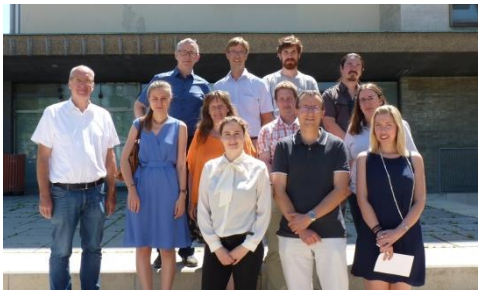
Study of mechanical performances

The required conditions for the reuse of AA in low-traffic roads is one of the main goals of this project, considering traffic loading and hydric-environmental solicitation. For the performance of the AA material the effects of temperature and water content on the thermo-hydro-mechanical behavior play a major role. In laboratory studies the AA material was therefore subjected to monotonic and repeated loadings using triaxial tests at different temperatures. Numerical simulations by discrete element approach were used to validate the experimental data and then to extrapolate to frequency and temperature values beyond the experimental data set employed in laboratory study. Furthermore, rutting tests were conducted on medium size laboratory specimens as to evaluate the resistance again permanent deformation.

Sustainable assessment

With the aim to compare conventional and the proposed ORRAP construction method, first relevant data concerning low traffic roads, location, number of asphalt plants, etc., was collected. On this basis, material and energy flows were created and first associated environmental advantages and disadvantages were evaluated. Based on this data, a techno-economic and environmental study of the proposed technique together with a risk analysis were performed. Furthermore, social aspects resulting from the construction activities were assessed. The results show that the ORRAP construction method can have both environmental and economic advantages compared to conventional hot mix asphalt construction methods. However, the expected lifetime of the construction methods has an enormous influence on these considerations.

Team Work



Beside exchanges on communication platforms, partners gathered for 9 general meetings in Strasbourg (F), Karlsruhe (D), Basel and Zurich (CH). These were opportunities to foster collaboration within the research consortium. Two annual meetings with associate partners have been organized so far, with the aim to create stronger cross-links between partners and associate partners. Those meetings also helped getting general feedback and practical insight into the strategy developed within the project.

Visibility & Dissemination

ORRAP is about environment and improvement of recycling techniques. Presenting the work to a wide audience is important for the partners. The main objectives and results of the project were presented at several scientific conferences such as the ICBBM EcoGRAFI - Clermont-Ferrand (F) 2017, RUGC - Saint-Etienne 2018 (F), JTR – Nantes (F) 2019, Kolloquium Straßenbau in der Praxis – Stuttgart (D) 2019, ISDCG - Glasgow (UK) 2019, ASCE T&D IAHPC – Chicago (USA) 2019, EATA - Granada (SP) 2019 and reported in international journals (Straße und Autobahn, RMPD). Over 1000 connections to the ORRAP website (www.orrap.org) were recorded so far. Ph.D student Laura Gaillard successfully defended her thesis about the ORRAP project in November 2019 and will keep working on ORRAP's experimental section.

The final steps

We are now entering the final phase, which consists in gathering data based on the ongoing experiments to produce ORRAP's final guide on this new strategy. Recommendations will be made for the contractors of the Upper Rhine Region. The guide will be made available online and sent to partners and interested companies. The final results and the guide will be presented during the last annual ORRAP meeting that will take place in Strasbourg in June 2020.

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