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Abstract

"Increasing the use of Reclaimed Asphalt in Italy towards a circular economy: A top-down approach" †

Iain Peter Dunn [1], Francesco Acuto[1], Oumaya Yazoghli Marzouk[2], Gaetano Di Mino[1], and Konstantinos Mantalovas[1]

[1] Department of Engineering (DIING), University of Palermo, Palermo, Italy: iainpeter.dunn@unipa.it, konstantinos.mantalovas@unipa.it, francesco.acuto@unipa.it, gaetano.dimino@unipa.it,
[2] Cerema, Direction Centre Est, Agence Autun, Boulevard Giberstein, BP 141, F-71405 Autun, France; oumaya.marzouk@cerema.fr oumaya.marzouk@cerema.fr
* Correspondence: Iain Peter Dunn iainpeter.dunn@unipa.it
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This contribution concerns recommendations which could be made to Italian regulatory bodies to improve their use of reclaimed asphalt (RA) in the road engineering sector. It is essential for the use of RA to be established as a standard practice since it has been proven that it can serve an end-of-waste product that complies with the principles of circular economy within both an open and closed loop approach [1], [2]. Several aspects will be covered, firstly an analysis of European nations whose economies can be classed as "more circular" compared to Italy's. This refers to nations which have a high usage of RA. Furthermore, nations which have clear regulatory guidelines on the use of RA in road construction or, alternatively, nations which have very lax statutory requirements on pavement design allowing best practice to reign, could be considered as more circular if these regulations or permissiveness results in a greater uptake in the use of RA in road construction.

The European average of RA reused in pavement construction currently lies at 60% [3] however, some nations greatly outperform this average. To give some examples of nations which have the highest usage of RA in pavements are Germany, France, and Spain which report to use 84%, 76% and 72.7% of all reclaimed asphalt in pavement activities respectively [4]. To understand why this is possible in these nations to greatly outperform Italy, which, according to the same source reuses only 25% of available RA [4], it is necessary to understand the regulatory framework in each nation, promoting the use of RAs in pavement design while limiting RA's use in Italy.

The most interesting example listed above, in the context of making recommendations to an Italian regulatory body, may be Spain; this is a nation with similar economic capacity and a similar climatic condition to Italy that would dictate to similar use of RA, prompting the question, why is there such a vast chasm between Spanish and Italian figures on the use of RA in road construction? The answer, in the authors' opinion, is that Spain sees the use of RA in pavement management not only as a sustainable solution but also one that is cost effective. Moreover, Spain appears to be an early adopter of hot and warm mix asphalt recycling, beginning in the 1980s [5]. These facts combined with a wealth of experience gained over the past three decades, seem to have changed the

perspective of Spanish lawmakers, who now understand that pavements containing a percentage of RA are not inferior to those containing only virgin materials [5]. Additionally, there is a dearth of research supporting the use of RA and advocating that a higher percentage of RA be used in pavement design. Combining the use of rejuvenators, asphalt mixtures with a RA content of 40% allows not only the amount of virgin aggregates to be reduced but also the quantity of virgin binder[6]. Assuming that Spain is as receptive to this new research as it has been in the past, it is likely that their rate of reuse of RA will continue to increase.

In Italy, however, there seems to be little push to increase the use of RA in road construction; the Italian association of pavement design and bitumen – SITEB, cites several obstacles. Firstly, complex bureaucracy and the slow rate of change to regulations, secondly, non-uniform regulations which vary not only from region to region but from municipality to municipality[7], and lastly a prejudice among not only engineers but also present in road authorities and governmental bodies, against the use of RA. Moreover, the Italian regulatory context allows for only 30%, 25%, and 20% of RA usage in base, binder, and surface courses. A fact that significantly limits and hinders the exploitation of RA as an End-of-Waste product. On the contrary, in Spain, although mixtures composed of 60-70% recycled materials can be produced, the most common practice is the production of asphalt mixtures with an RA content below 50%. Thus, it becomes evident that the increase of the allowed RA% in the recycling process of asphalt mixtures can significantly impact the recycling and sustainability implications of a country.

According to a report dating from 2011, Italy had the second highest quantity of available RA which could be used in new construction, and yet only 20% of that material was used [8]. At this point in time, Germany had the highest production and the highest recycling rate (82%) of any European nation. It is disheartening to see that the improvement in Italy's use of RA has been slow, and the authors would like to make recommendations to Italian regulatory bodies, in the hope that they could learn, not only from their most adept and advanced in terms of RA recycling European partners but also from those in a similar economic condition who understand that the use of RA is not only environmentally sustainable but also economically sustainable.

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