



Use of rejuvenators in asphalt mixtures

10-11 September 2019
Padova (Italy)



Recommendations for the use of rejuvenators in HMA and WMA

*European Asphalt Pavement Association
(EAPA)*

European vision

- Sustainability,
 - Reduction of Greenhouse gas emission, 80% by 2050 (1990 baseline)
- Circular economy*,
 - Dec 2015 action plan → March 2019 implementation
 - Avoid, Reduce, Reuse, Recycle, Treat, Dispose along the whole life cycle of products
- Green Product Procurement**,
 - Integrating circular economy requirements
 - 2016, criteria for road design, construction and maintenance

CIRCULAR ECONOMY



#104835927

* http://ec.europa.eu/environment/circular-economy/index_en.htm

** http://ec.europa.eu/environment/gpp/pdf/report_gpp_office_buildings.pdf

**Asphalt being 100% reusable is
a sustainable solution**

Asphalt recycling, the EAPA vision

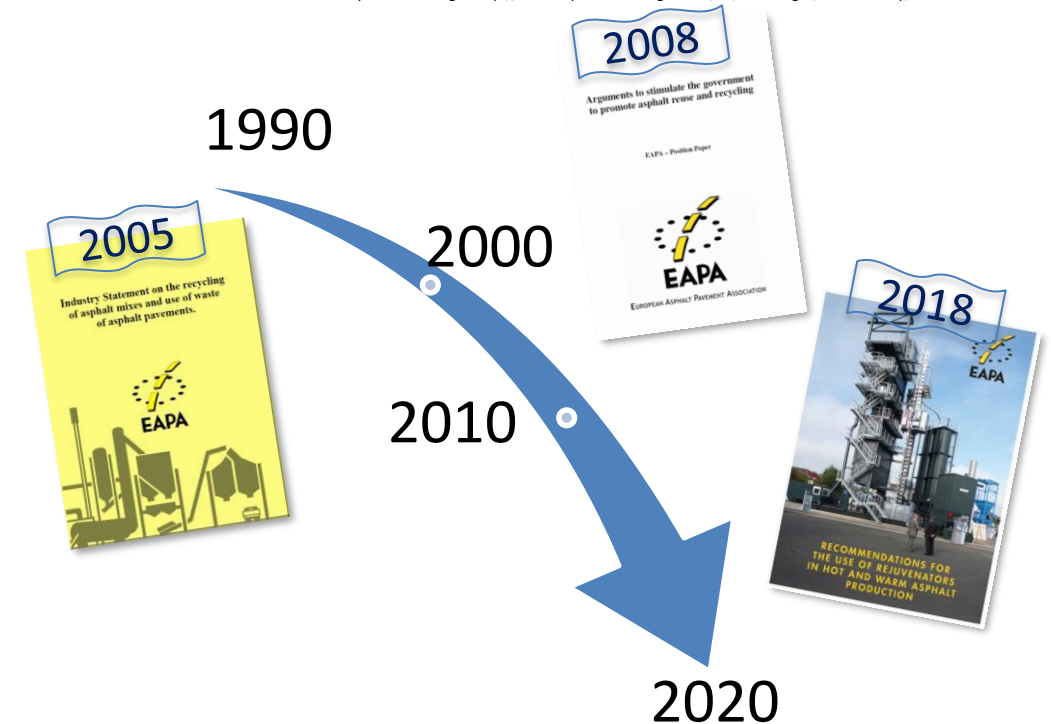
- Asphalt is one of the most reused materials
- From RAP recycling to reuse of RA
 - Since 2007 EN13108-8 standard for RA
- A continuously updated story
 - 2005, Statement on recycling
 - 2008, Arguments for recycling
 - 2017, Guidance for PCR, EPD
 - 2018, Recommendations for rejuvenators
 - And also national guides

**SUSTAINABILITY
ADVANTAGE 13**

ASPHALT IS 100% REUSABLE

Asphalt could be 100% used as aggregate for road construction and backfilling, but it is a precious construction material that can be better used for real recycling what means to re-use it in new asphalt mixes at the highest level. Currently in some European Union Member States the re-use rate for asphalt is up to 95%¹ with further potential compared to other construction materials like wood (31% re-use in timber products) or concrete (potential of recycling between 40-50%)².

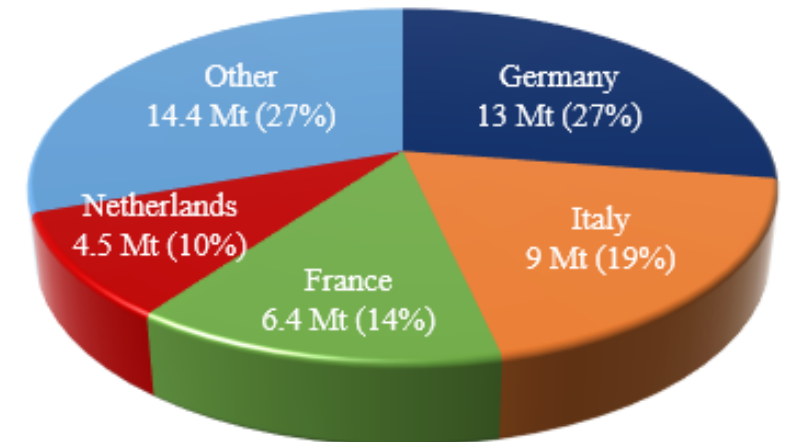
Asphalt Advantages <http://www.asphaltadvantages.com/en/advantages/sustainability/13>



Asphalt recycling in figures



- In Europe, 47mt RA available (figures 2017)
 - 68% reused into new Asphalt mixture,
 - 19% recycled as granular materials in unbound layers
- In the US, 72.5 mt RA available
- In Japan, 36 mt RA reused up to 80%



Recycling and rejuvenators

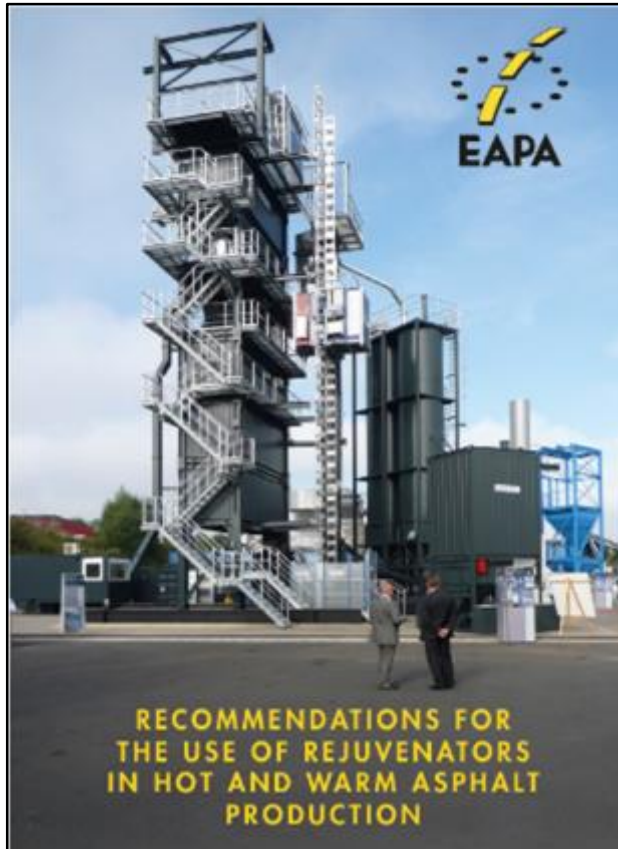
- Recycling of RA is established practice
 - In average 30%, mostly in base layer, still some country differences
- The roads from today are the RA of tomorrow
 - Use of harder bitumen, 2nd or 3rd recycling cycle, more surface maintenance
- Need some solutions
 - To increase RA content,
 - To reuse harder RA
 - To enable easy mix plant manufacturing
- New technologies / products developed over the last decade

EAPA technical review on rejuvenators

- A specific task group on rejuvenators
 - Review of academic researches on rejuvenators
 - Benchmark studies, binder and mix evaluations
 - Best practices shared from the industry
 - Mix evaluations, RA management and mix plant, field trials
- A rejuvenator has a minima, within the EN standards
 - To comply with HSE criteria
 - Restore the lost properties on flexibility and cracking resistance
 - Without negative impact on rutting resistance
 - Maintaining durability and recyclability over time



EAPA Technical guide



- Characterisation of rejuvenators
- Characterisation of RA binder
- Characterisation of RA binder + rejuvenator
 - Rejuvenator efficiency
 - Determination of dosage
 - Testing protocol
- Characterisation of asphalt mix with RA and rejuvenator
- Mix plant blending RA with rejuvenator

<https://eapa.org/wp-content/uploads/2018/08/Rejuvenators-Paper.pdf>

Before all!

- Rejuvenators should only be used if
 - There are **no negative environmental impacts** handling and using rejuvenators, now and in the future
 - There are no disadvantages with regards **to health and safety** for the workers or general public, now and in the future
 - The **future reuse or recyclability** of the asphalt mixes is not compromised
 - The **health and safety classification** of the asphalt is not affected with the use of rejuvenators
 - There is **no negative impact** on the technical product performance of asphalt, now and the future



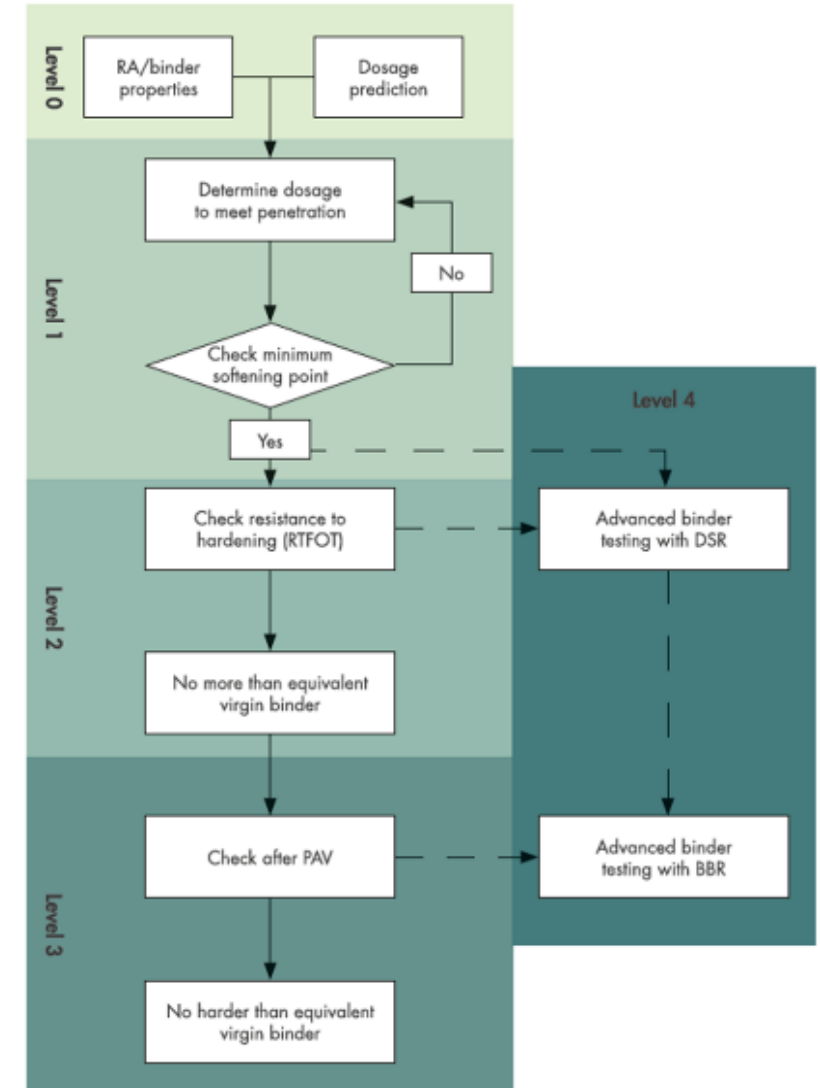
Rejuvenators – Why, When, What, How ?

- Why to use rejuvenators?
 - Maximise the long-term value of Reclaimed Asphalt and asphalt mixes made
- When to use rejuvenators? It depends on
 - Amount of RA in asphalt, type and characteristics of the asphalt mix to produce
 - Quality and stiffness of the RA binder
- What should do a rejuvenator?
 - Restore lost properties at low and intermediate temperature (flexibility)
 - Without harming the high temperature property (rutting)
 - And maintaining durability over time (aging)
- How to classify rejuvenators?
 - Numerous products on the market as “rejuvenators” but no harmonised method for characterisation



Rejuvenator evaluation on binder

- A pragmatic approach by steps
 - Depending on the degree of knowledge
- From plant to research centre
 - Level 0, prediction
 - Level 1, at mix plant
 - Level 2, in regional lab
 - Level 3 & 4, more advanced



Application at the mix plant

- Each asphalt mix plants are different*, the reuse of RA needs to consider the product and the process
 - Initial Risk Safety Assessment has to be conducted
- Different options to use rejuvenator at mix plant
 - Before to use at the mix plant
 - On the RA at the mix plant either before or after RA drying process
 - In the mixing unit
 - In the bitumen



*IDRRIM Note d'Information 26, Matériels pour le recyclage en installations de production d'enrobés, Juin 2013

Take away

- The future mobility goes through more sustainable road
- Moving from **Recycling** to **Reuse** of RA is possible with rejuvenators for more RA, hard RA
- Numerous technologies and products
- Need for harmonisation or methodologies
 - EAPA Recommendation as pragmatic approach
- Towards harmonised results across Europe

References

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