



1. INTRODUCTION

- ❑ Paris Agreement on Climate Change
 - ❑ Dutch National Road Authority Rijkswaterstaat: 50% circular and 100% climate neutral of asphalt industry in 2030
 - ❑ Limitations/challenges in high quality surface-to-surface recycling (limited to 30% RA for PA, 0% RA for SMA)
 - Challenge 1: Black Rock and partial blending
 - Challenge 2: Inhomogeneity and high variations
- Component level recycling, LE2AP 100% surface-to-surface recycling

(high quality warm recycling technology with reuse up to 95% and at a production temperature of 100-110°C)

2. LE2AP TECHNOLOGY

- ❑ European LIFE+ (2013-2016), LE2AP (Low Emission2 Asphalt Pavement), Component level recycling by decomposition
- Reclaimed stone: >2 mm, less than 1% bitumen, direct reuse as aggregate
- Reclaimed mortar sand: <2 mm, 10-12% bitumen, heating-rejuvenating-enriching-homogenizing-foaming
- Reclaimed stone + foamed LE2AP mortar to produce mixture with 95% reuse @100-110°C



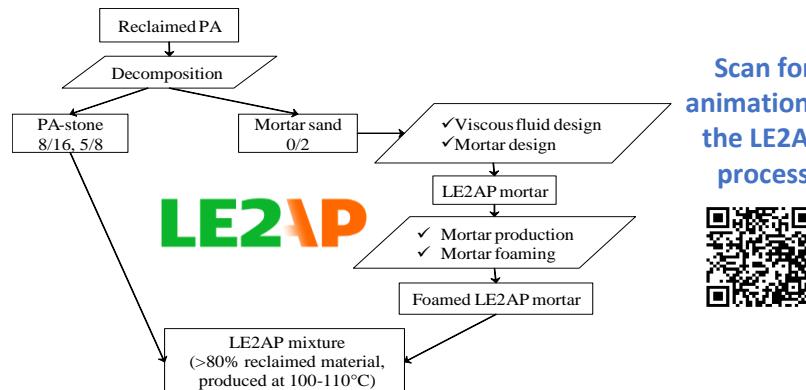
LE2AP, towards sustainable 100% surface-to-surface warm in-plant asphalt recycling

Poster ID: 60

Author names: Jian Qiu, Ernst Demmink, Marinus Huirman, Mark Frunt, Bastiaan de Bruin

Email contact: jian.qiu@asfaltnu.nl

Affiliation and address: AsfaltNu C.V., Culemborg, the Netherlands



3. DECOPOSITION PROCESS AND RECLAIMED STONE LINE

- ❑ Production speed of decomposition process 50-150 ton/hour



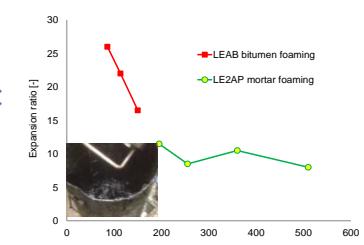
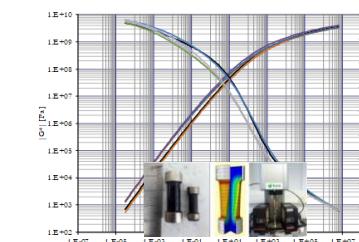
- ❑ Reclaimed stone has very limited variation, 200K ton have already been applied in different mixtures

Sieves passing	22.4 mm [%]	16 mm [%]	8 mm [%]	2 mm [%]	0.063 mm [%]	Bitumen Percentage [%]
Sieved Reclaimed PA 8/20	100	97.6	32.9	15.2	6.1	3.3
Bestone 11/16	100	88.5	3.5	1.1	0.4	0
Reclaimed stone 8/16	100	97.8	9.2	3.6	1.9	1.0
Standard deviation reclaimed stone production 2016 [%]	-	1.2	3.1	0.6	0.2	0.2



4. MORTAR LINE

- ❑ Heating-rejuvenating-enriching-homogenizing-foaming, performance of LE2AP mortar is identical to the virgin mortar



- ❑ Up to 75 ton/hour of mixture production with very limited temperature fluctuation



	Average production speed [ton/hour]	Average temperature mixture [°C]	Standard deviation of temperature [°C]
LE2AP SMA 8B N317 (2018)	74	118	2
STD SMA 8B N317 (2018)	136	163	7
LE2AP SMA 8B N625 (2018)	75	116	3
STD SMA 8B N625 (2018)	118	158	23

5. APPLICATIONS

- ❑ The LE2AP technology has been applied in various projects (PA, 2L PA and SMA) since 2016, with a recycling percentage up to 95% and a production temperature of 100-110°C. The LCA benefit (A1 to A3) and the CO₂ reduction are about 50%.
- ❑ The LE2AP technology will be surely contributing a sustainable, circular and climate neutral of asphalt industry.