MURE – Multirecycling and warm asphalt mix

11th EAPA Symposium

6 June 2019 Paris

PN MURE - ANR IMPROVMURE

MURE, a national project

PN MURE - ANR IMPROVMURE

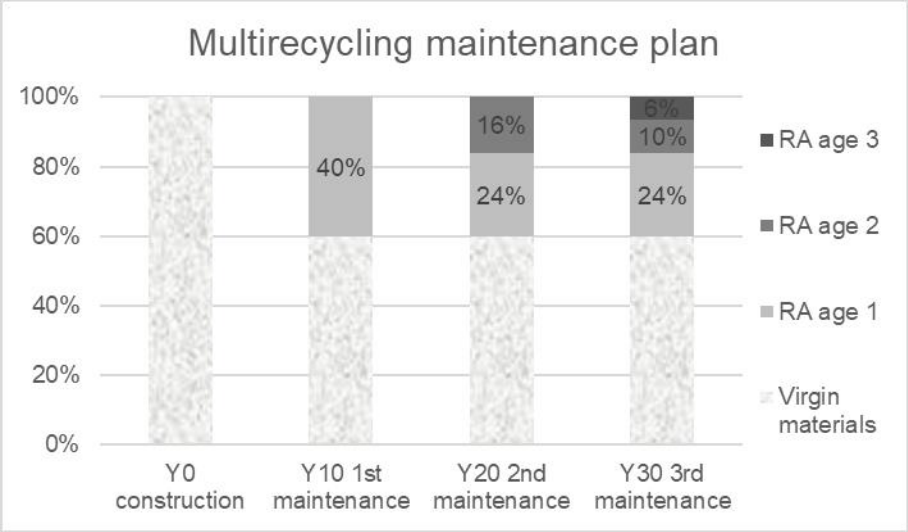
35 PARTENAIRES

- Partners
  - Road authorities, Industry, Research institutes
- Budget, 2.3 m€
- Duration, 5 years

MURE project

Objectives

- Answer to any questions about warm mix technologies and recycling
- Anticipate multi-recyclability of asphalt mix
  - Example, multi-recyclability every 10 years at 40 %



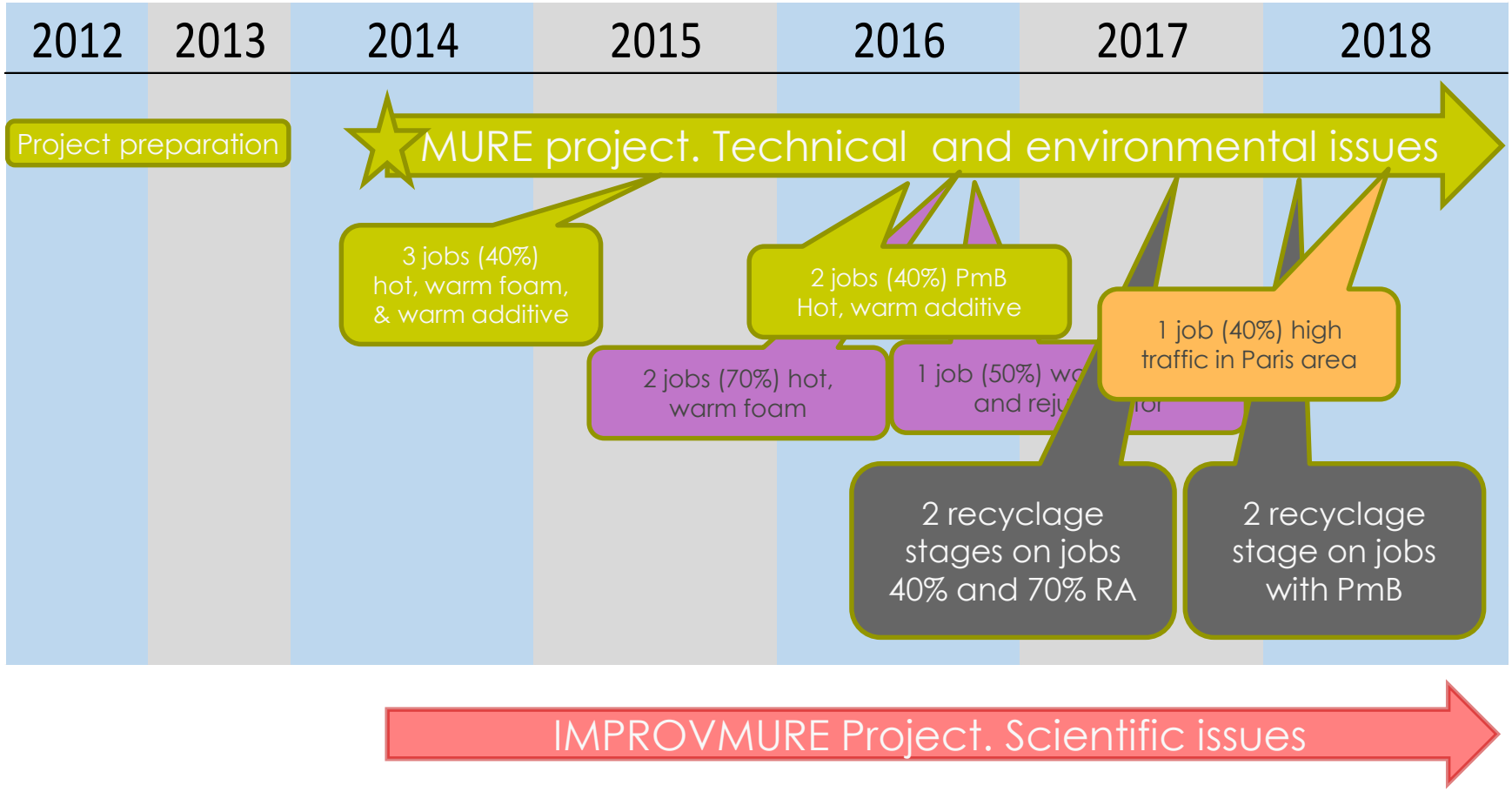
MURE project

Scope

- Go for full-scale trials
  - Two recycling contents 40% and 70%
  - Three asphalt mix productions
    - ✓ Hot process as reference
    - ✓ Warm (-30 °) mix with foam
    - ✓ Warm (-30 °) mix with additive
- Conduct laboratory surveys
  - Technical evaluation (within the MURE project)
  - Scientific evaluation (within the ANR IMPROMURE project)

MURE project

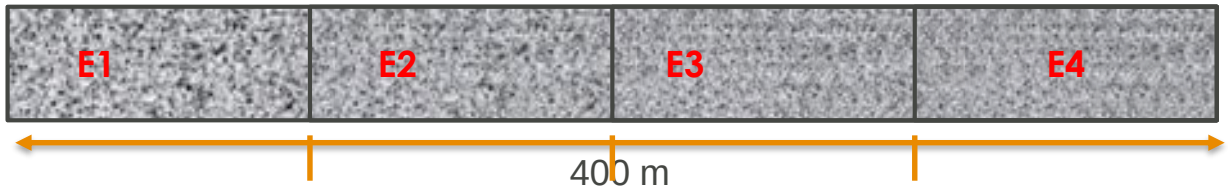
Timeline at a glance

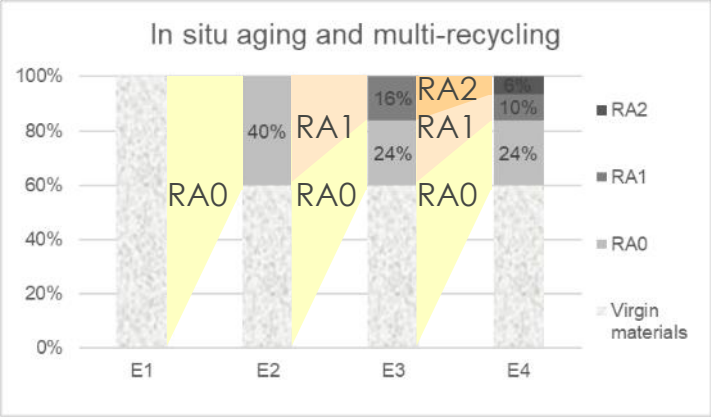


Multi-recycling

Principle

1. Fabrication mixes E1 (100m). No RAP
2. Mixes E1 (300m), Standard RAP → RA0 40% E2 mix
3. Milling E2 (200m), aging → RA1 40% E3 mix
4. Milling E3 (100m), aging → RA2 40% E4 mix





- VIDEO

Results

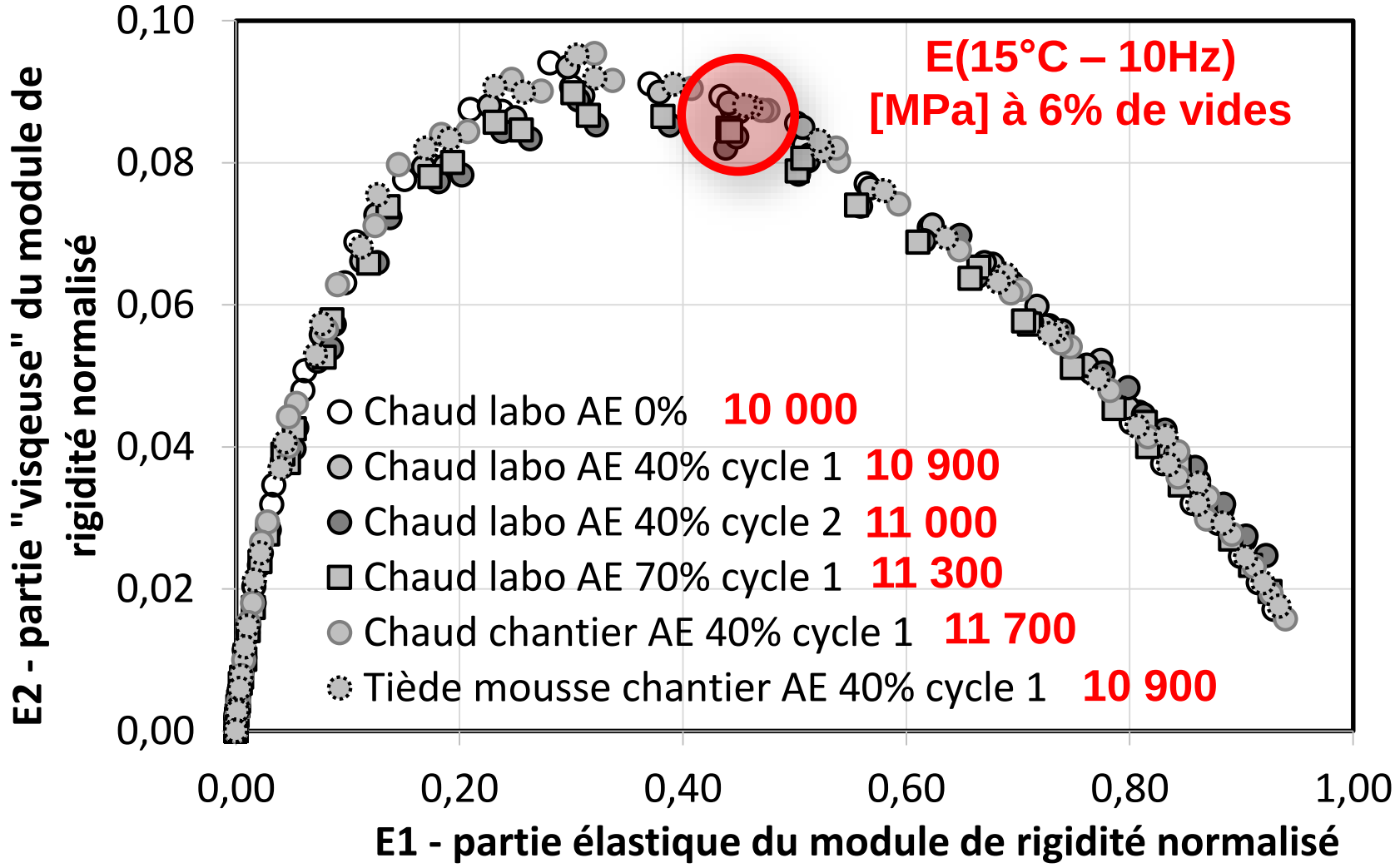
Multi-recycling

- Field sampling for binder evaluation
  - Binder properties penetration and softening point
  - Chemical evaluation through Infra-Red (Carbonyl)

	Age stage	FTIR, ICO	Penetration value, 0.1mm	Softening point temperature, °C
Pre-trial	1 Cycle	5.2	20	65.2
	2 Cycles	5.9	15	67.2
	3 Cycles	5.7	14	67.6
Field aging	1 Cycle	4.9	19	63.8
	1,5 Cycles	5.3	19	64.0
	2 Cycles	5.8	18	66.2
Standard RA, Fce			*10-15*	*65-75*

- Comparable to standard RA properties

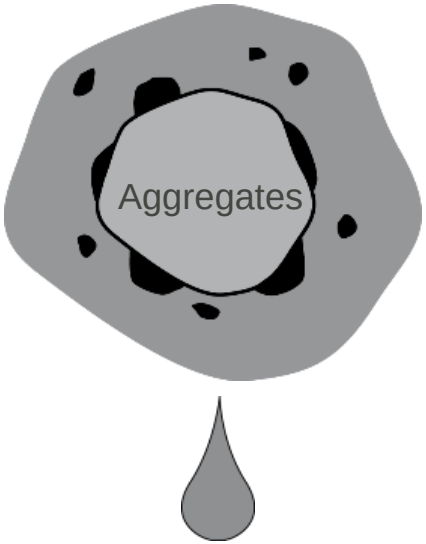
ViscoElastic Modulus

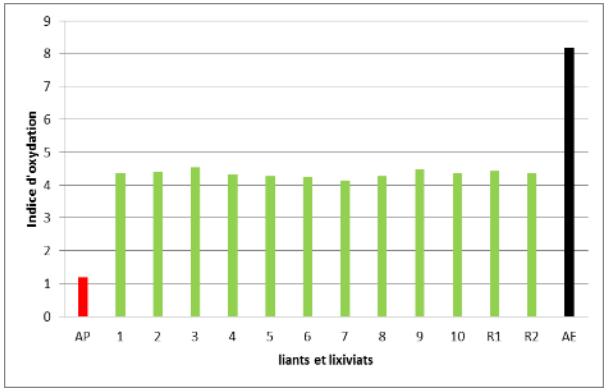


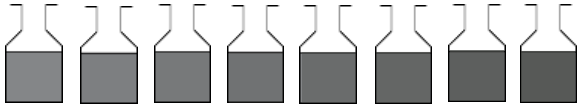
Results

Binder mobilisation

- Sequential extraction
  - Collect binder samples along extraction
  - Characterisation with Infra-red Carbonyl index
  - Measure of Binder mobilisation







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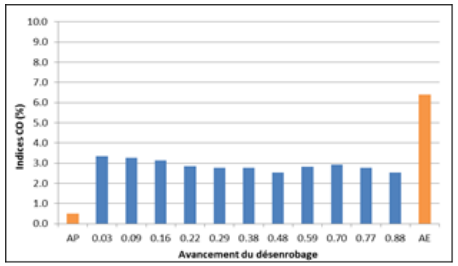
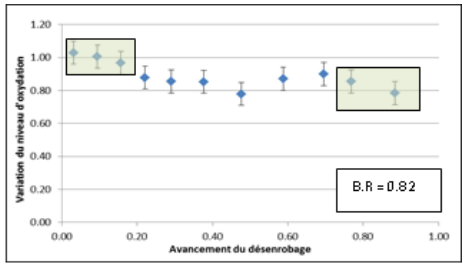
Results

Binder mobilisation

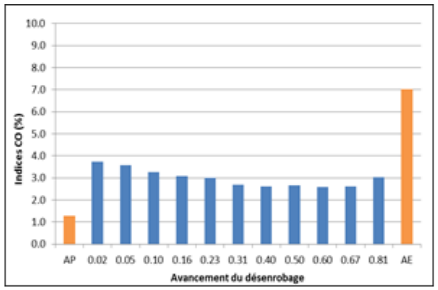
- Results on jobs with 40 % RA

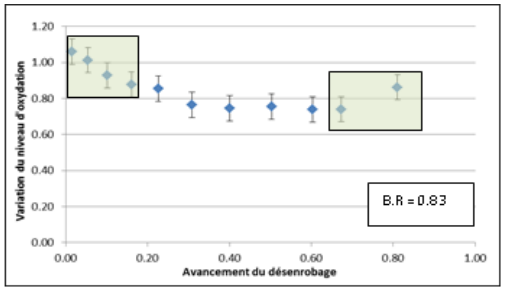
Hot



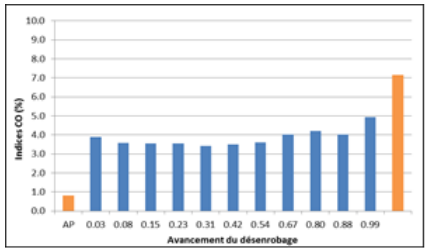


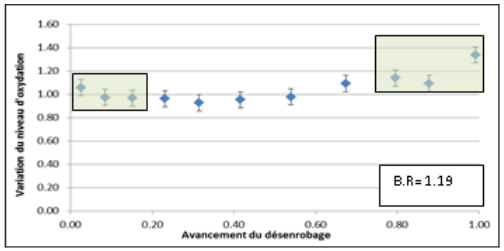
Warm foam





Warm additive





Conclusion

- Up to 40% RA
  - Asphalt mix production is possible hot or warm
- Technical learnings
  - Binder mobilisation can be evaluated
  - ViscoElastic Modulus: For 40% RA content, no differences according to the fabrication process.
  - Still need to monitor durability with water sensitivity, cracking, surface condition
- Next steps
  - Dissemination in France and abroad
  - Monitoring of the different field trials to continue
  - Conclusions for 70% RA and benefit of rejuvenators are to be validated

Thanks for your attention

For more

www.pnmure.fr

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